



CHEESE BITS

W3CCX
CLUB MEMORIAL CALL

ARRL
Affiliated
Club



Volume XLVII

MAY 2005

Number 05

PREZ SEZ

I'm excited to say that we're back on track with another Mid-Atlantic States VHF Conference this coming September 24th, followed by HAMARAMA on September 25th. Due to the volunteerism and efforts of a dedicated group of Packrats, the VHF-UHF-microwave community will be able to enjoy eyeball QSOs with each other, hear some great talks, and share some nice meals together. Door prizes and auction items are already being assembled, several speakers have been lined up, and the announcements have been made on the reflectors. We have already received paid registrations. The actual Conference and HAMARAMA announcements, as well as a registration for the conference are available on our Packrat website. Please print several copies of the HAMARAMA flyer and distribute them to vendors if you go to any regional hamfests. You can also print the Conference flyer and registration forms and send them to hams that would have an interest in attending.

Our Packrat of the Year is Al Sheppard, N3ITT, and he was honored by the club as the recipient of this award at our April meeting. Al has been one of the supportive and giving hams in the club over the past several years, and for many of us relative newcomers, have come to know him as the chairperson for the June contest for at least 7 of the last 8 years. Not only has he chaired the event, but he has managed to do tower repairs with welding, fabricate new bases for the towers, assemble the trucks, supervise the loading and unloading, and serves on site as an operator, a cook, quartermaster and "general organizer." Al's most-often low-key manner allows the band captains and teams to maximize their efforts, and this year he is continuing to facilitate the logistical support, while transitioning the radio contesting and communications leadership to Steve, KF6AJ. Al and his wife Carol have also hosted the Packrat picnic at their home for several years, and despite some years of rainy weather, those have been counterbalanced by the great sunny and warm occasions when the pool was full of guests. Another duty that Al has managed is that of 2 meter net control on Monday nights. With a great location and powerful setup, he runs the busiest of the nets, and always attracts a wide participation. We all salute you Al, and appreciate all the things you have done and continue to do for the club and its members.

As always, the June contest effort needs as much help as possible, starting last year! We are well on our way, but efforts to add more clean power on 50 and 222 MHz needs additional technical support. Please contact Steve, KF6AJ directly to contribute your time and expertise. Loaders are needed on Friday AM June 10, and a crew to take down the gear Monday AM from the mountain and return it to W3GXB's storage facility. Please plan your schedules in advance so that we can make each of these a short and simple task with extra hands available. Thanks to all who made advanced contributions to the funding for our June contest needs.

Elections will be here in June and a slate is being assembled to fill our two director positions and the vice-presidency. Surprise us with a call (my home 610-270-8884) and ask to be nominated!

I spent a few hours with some of the Warminster club hams at the Hobby Show at the Ft. Washington Expo Center last month, talking up ham radio and making some 20m demonstration QSOs. The free admission for staff also allowed me to spend some time wandering through the most amazing model railroad exhibits, and vendors of kits and hobby tools. I was brought back to my early teens with the smell of the ozone from those small electrical motors from my own HO setup. Hey ma, what did you ever do with my trains?? Perhaps they'll show up one day when Bert, K3IUUV brings them in for a nostalgic look back to the 50's!!

73, Rick, K1DS

Pack Rats **CHEESE BITS** is a monthly publication of the
Mt. AIRY VHF RADIO CLUB, INC. -Southampton, PA.
 SUBSCRIPTION RATE: \$16.00 PER YEAR (USA)
 \$20.00 PER YEAR (CANADA)
 \$10 PDF only \$24.00 PER YEAR (ELSEWHERE)

We operate on a .PDF exchange basis with other non-commercial publications. Anything that is printed in CHEESE BITS may be reprinted in a not for profit publication, unless stated otherwise, provided proper credit is given. Deadline for articles and swap-shop is the monthly meeting date. Non-commercial swap-shop items free of charge.

Pack Rat Web Site: <http://www.ij.net/packrats>

SUBSCRIPTION/ADVERTISING MANAGER:

Bob Fischer, W2SJ 7258 Walnut Avenue, Pennsauken, NJ 08110

(856) 665-8488 bobw2sj@prodigy.net

EDITOR:

Doc Whitticar W3GAD 28 Twining Bridge Rd, Newtown, PA 18940
 215-968-6397 doc@docstech.com

CLUB TREASURER:

Dave Mascaro, W3KM 1603 Mink Road Ottsville, PA 18942
 (215)-795-2648 dmascaro@motorola.com

TRUSTEE OF CLUB CALL - W3CCX

Ron Whitsel, W3RJW
 (215) 355-5730 W3RJW@aol.com

PACKRAT 222 MHz REPEATER - W3CCX/R

222.98/224.58 MHz, Churchville, PA

OFFICERS 2004-05

PRESIDENT K1DS, Rick Rosen rick1ds@hotmail.com

VICE PRES: N4HY, Bob McGwier rwmcgwier@comcast.net

CORR. SEC: WA3EHD Jim Antonacci
 Antonacci@worldnet.att.net

REC. SEC: K3EGE Bill Shaw K3EGE@aol.com

TREAS: W3KM Dave Mascaro dmas-
 caro@motorola.com

DIRECTORS:

(2005) W3KJ Joe Keer w3kj@comcast.net

(2005) K1JT Joe Taylor

(2006) KB3HCL Dave Fleming KB3HCL@arrl.net

(2006) AA3GN Joe Landis joe.landis@draegermed.com

COMMITTEE CHAIRMEN

January Contest AA2UK

June Contest: N3ITT & KF6AJ

HAMARAMA: WA3DRC

VHF Conference: KB3XG 610-584-2489

Awards Chairman WA3GFZ 215-884-3116

QUARTERMASTER: K3IUUV, Bert Soltoff, soltoff@uscom.com

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

<u>TIME</u>	<u>FREQUENCY</u>	<u>NET CONTROL</u>
7:30 PM	50.150 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	WA3GFZ FN20kc
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

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

Editor's Column

Well here it is Mothers Day 2005 and I am finally getting your May issue ready for distribution. I must apologize for the delay but I have spent a lot of time traveling in the last month including a marathon group of out of town service calls all over the southeast. I love the travel and the work but it does, at times, cut into my free time to get things like CHEESEBITS completed on a tight schedule.

As you can see we are a little light on content this month—I just received a 20 page issue of the SCATTER-POINT from England and have not had a chance to sort through all the interesting information to share with the group. If the folks across the big pond can get together 20 pages maybe some more of you can share ideas and projects here on the pages of CHEESEBITS. Thanks to Dave KB3HCL for his information on AM6154/6155 modifications

Like many of you I am working on my part of the planned trip to Camel Back in June and have some more interesting plans to keep you all well fed at the control for the entire contest period.

The next major event in my life will be my first ever visit to the DAYTON HAMVENTION and, as luck would have it, this year it is also the ARRL NATIONAL CONVENTION. In 1957 the 14th ARRL convention was held in Chicago. The FCC was giving exams at the convention and I passed my Novice test to start my adventures in amateur radio. My how time does fly when your having fun.

Instead of flying on the airwaves for the spring sprints I was on the run with work and it looks like I will have to be in New York City moving my mother-in-law's house on the 15 during the 6 meter test. I am very happy to see Our friend and SUPER ROVER Bill Seabreeze W3IY active again on the shorter wave lengths and I hope Bill will fill us all in on his progress.

We have more projects planned but most will have to wait until after Dayton.

In this day of computers and the internet it is gratifying to see folks pushing radio communications to new heights and even greater distances. In case you missed the meeting and don't get the reflectors there is some information about the first 47GHz EME contact using real CW.

Amongst the junk mail I receive daily, I received a bit called "I OWN MY MOTHER". I have shared a smattering of those bits her and there along with another "NEW WORD" or two to fill in a few short columns.

Time to get this issue finished up.

Listen for the WEAK ONES

73

W3GAD Doc



I have for sale a working 10 watt TWT for 10 GHz complete with power supply.

It is a Siemans RW1125D. I bought it a while ago but have decided not to use it.

Price is \$250.00 plus freight.

I look forward to seeing many of you in June.

73, Randy Bynam NR6CA

THE PACKRATS HONOR THEIR OWN AT ANNUAL AWARDS NIGHT

Paul WA3GFZ happily opens AWARDS NIGHT with a review of the accomplishments of the membership over the past year. From a record setting performance in the June Contest and the difficult, snow storm hampered, January contest to Home Brew night and, this year, a PACKRAT of the YEAR honoree.



Paul, WA3GFZ earned the first

place award for low power single-op with W3KJ in 2nd place and AA3GN in 3rd place.

Phil, WA3NUF accepts a plaque for HIGH SCORE Single Op high power category in the January Contest...

and you wondered why we're called "HAMS"



Phil, K3TUF received the 2nd Place High Power category award. W3SZ won the 3rd place high power award.



Bruce Crawford, WA3WUL accepts the Third Place Multi-op award for AI K3EOD.

Phil, WA3NUF is also awarded a Certificate for having worked the most PACKRATS during the January Contest.



Absent for HOME BREW NIGHT—Bert, K3IUU, accepts the plaque for the Most Antiquated Project for his 6 Meter "Worked all Neighbors" Amplifier.

N3ITT is honored as PACKRAT OF THE YEAR



Al is honored for his tireless efforts as June Contest Chairman over the past several years, Family Picnic Chairman as well as and Host for the picnics and his overall contributions to the membership exemplifying the PACKRAT SPIRIT.



Paul, W2PED accepts the 1st Place Multi-op award for N3NGE

Joe, K1JT is awarded the 2nd Place Multi-op plaque.



My mother taught me about HYPOCRISY.
*"If I told you once, I've told you a million times.
Don't exaggerate!"*

Using the 4CX400 Tube As A Substitute for the EIMAC 8930 In the AM 615x Amplifier

Rick K1DS suggested that others might benefit from my experience in substituting the 4CX400A for the EIMAC 8930 in the AM 615X amplifier.

I had converted two AM 615x's, one for 144 and one for 222 (Brian EXA did most of this one) applications and was trying to get a third one operating on 432. Problems developed and to make a long story short I borrowed the tube from my operating 144 unit to try in the 432 amp only to damage the tube. Checking around it seemed that the 4CX400A was a drop in substitute for the 8930, so I purchased one. (A note, I got it from tomstubes.com for \$102 and had been quoted prices elsewhere as high as \$155).

My experience with the 4CX400A and getting the AM6155 on 144 operating again was:

Mechanically - it was a drop in replacement for the 8930 except for the minor adjustment needed to bend the spring connectors that make contact with the anode of the tube. The 4CX400A anode is a few thousandths of an inch smaller than the 8930. No problem here and only minor bending was required.

Electrically - It became bit more of a challenge in determining what was needed. Just dropping the 8930 tube in resulted in an inability to produce any plate current. With the much-appreciated help of Ed Finn WA3DRC and Tom Fredericksen KA3FQS I was able to get it going. Ed discovered that the bias range had to be adjusted for the 4CX400A tube.

In the standard configuration the AM615X has a control grid divider voltage of -100V and this needs to be changed to allow for a range of -50V to -30V for the 4CX400A. It required some experimentation with the resistor values of R16 and R12 so that the variable pot R15 could adjust the idle current to its suggested 100mA. I ended up with:

In the A3, Control Grid, PS control module:
Substituted for:

R14 = 10K resistor, ½ watt
R16 = 10K resistor, ½ watt – connected with
VR1 for the keying circuit
R12 – 10 K resistor, ½ watt

The change of the few resistors mentioned above was all that was required to bring the 4CX400A to life. It is now transmitting at a comfortable 400 watts. I believe that it could probably do a bit more, but choose not to tempt it.

I really have to give the credit to Ed WA3DRC and Tom KA3FQS without whose electronic knowledge I would have never known which resistors needed to be changed and to what value.

I hope to bring some tubes back from Dayton, so I can use my trial, smoke and explosion approach to get the 432 unit going.

Happily, I am back on the air with a few extra watts on 144.
Dave KB3HCL

70CM Net back on the Air

Net control for the East Coast 70 CM Net has moved back to North Carolina. We have gained momentum over the past few weeks with about a dozen stations checking in. Sure would be nice to hear from someone to our North East. Years ago the majority of the net activity was from that direction.

Join us tonight and each Wednesday night on 432.090 MHz. The net starts at 9 p.m. Eastern with net control looking to the NE around 9:30 p.m.

More details available at:
http://www.w4dex.com/east_coast_70cm_net.htm
Tnx es 73, W4DEX

SPRING SPRINT NEWS and COMMENTS

Yo,

As expected, the activity on 222 was less than that on 2m, but still pretty decent. We had a blast working 56 QSOs in 28 grids from W4RX last nite. We found guys in the following grids, (many of which we missed on 2m last week):

EM77	EN90	FM18	FN12
EM86	EN91	FM19	FN20
EM89	EN92	FM29	FN21
EM95	FM06	FN00	FN30
EN73	FM07	FN02	FN31
EN81	FM08	FN03	FN32
EN82	FM17	FN10	FN41

Best DX was K8EB in EN73. Many tnx for all the QSOs. It's great to hear so many good operators hanging in there and breaking thru the noise...

73, Bill W3IY (at W4RX)

p.s. Many tnx to Jim, W4RX, for letting me use his great station.

* * * * *

Got a late start as the connectors to the balun of the KLM yagi needed re-soldering. Operated from FN20 and FM29. Had one visit from the Township Inspector (who was passing by and was fascinated by the rover as he was an old CB'er--a nice contact to have made!)

Total of 47 QSOs and total 23 grids. Not bad for 100W and 14 elements.

North to FN43, South to FM06, West to FN00....tnx es 73, Rick

It looks as if there is very little interest in the SMBS 2.3 and up contest on April 30th.

I likely will operate the Microwave sprint on May 7th, and try to start at Almunchy in FN20 in North Jersey at 7:30 or 8 AM for an hour, then head to Camelback FN21hb for the balance.

de Rick, K1DS/R

* * * * *

Had a good time on a quiet band last night. seemed here like as much activity as last week on 144. although I missed Dave in FN43, there were some new englanders on: FN41 and FN32 plus the usual FN31's. But did manage to wake up some EN's in 81 and 91 as well as DEX down in EM95. Bill sure did good in getting a bunch of EM and EN's

See you all on 432 next week.

Forgot to mention my score, had 40 q's in 21 grids.
Phil K3TUF

PERCUSSIVE MAINTENANCE: The fine art of whacking the electronic device to get it to work again.

JUNE 2005 Contest

Preparations are in process for the June 2005 June VHF/UHF QSO PARTY and Club Competition.

KF6AJ presented a report on progress to date and some of the crew spent a work day at W3GXB's working on the new tower bases, removing the ROHN hinge bases from the heavy wooden base plates and getting them ready to be welded to the new design by N3ITT. Thanks to Paul WA3GFX, K1DS, N3ITT and W3GXB for the fine effort in helping move the project forward



W3GXB and WA3GFX with Bob's 1939 tractor check out the old bases and figure out how to move them to the work site

The ROHN hinge bases have been removed from the old drive on bases and are ready for the new style steel base designed by N3ITT with its' bright orange finish



My mother taught me WISDOM.

"When you get to be my age, you'll understand."

Joel Knoblock W3RFC

www.therfc.com

The R.F.Connection

213 N. Frederick Ave. #11WWW

Gaithersburg, MD 20877 USA

World wide shipping via FED-EX or US Post OFFICE

Tech Line 301/840-5477

Order Line 800/783-2666 All major credit cards taken

Fax Line 301/869-3680

Hours: Monday-Friday 9:30am-5:30pm Eastern

ANOTHER FIRST for AMATEUR RADIO

FIRST EME 47 GHz QSO Confirmed

The team of RW3BP, AD6FP, W5LUA, and VE4MA would like to announce that the first 47 GHz contacts via the moon have been completed. As you may recall, RW3BP heard the first lunar echoes on 47 GHz back in August of 2004. At that time he was heard by AD6FP, W5LUA, VE4MA and VE7CLD. Since the receipt of the first 47 GHz echoes via the moon, numerous tests between RW3BP and

AD6FP led to improvements by RW3BP allowing him to copy calls from the lower power signal of AD6FP in January of 2005.

As of April 16, 2005 the team of AD6FP, W5LUA and VE4MA have each completed a CW QSO via the moon with RW3BP.

The station at RW3BP consists of a 2.4M offset fed dish and 100 plus watts while the station at AD6FP consists of a 1.8M offset fed dish and 30 watts. At W5LUA and VE4MA 2.4M offset fed dishes and 30 watt TWTs were used. Noise figures of all stations are in the 3.5 to 4.7 dB range.

Since the doppler shift can be as much as 100 + kHz at 47 GHz, one must continuously adjust the receive frequency to keep the station centered in the passband. Precision frequency control was obtained by using GPS controlled, Rubidium locked, or TV sync controlled phase locked local oscillators. Various techniques were in use to keep the Doppler shifted frequency in the passband of the receivers.

Here are some sound recordings from the 47 GHz EME Group

http://www.nitehawk.com/rasmit/ve4ma_47GHz.html

Enjoy es 73 Rein W6/PA0ZN

NE3I

Robert A. Griffiths

Attorney at Law

KLETT ROONEY LIEBER & SCHORLING

A PROFESSIONAL CORPORATION

12th Floor, Two Logan Square

Philadelphia, Pennsylvania 19103-2736

(215) 567-7857

FAX: (215) 567-2737

e-mail: rgriffiths@klettrooney.com

WHATS HAPPENING

A LISTING OF INTERESTING EVENTS

12 MAY 2005—PACKRATS BOARD of DIRECTORS Meeting at the home of Dave Fleming KB3HCL, 794 Hallowell Drive, Huntington Valley, PA

14 TO 15 MAY 2005—50MHz Sprint 2300z 14 May to 0300z on 15 May

14 TO 15 MAY 2005 —Mid-Atlantic QSO Party

19 MAY 2005—Regular meeting of the Mount Airy VHF Radio Club (PACKRATS) at the Southampton Public Library at 8 PM.

20 TO 22 MAY 2005—DAYTON HAMFEST and ARRL CONVENTION—Dayton, Ohio

11 TO 13 JUNE 2005—ARRL June VHF QSO Party and PACKRATS BOD Meeting on the mountain.

16 JUNE 2005—Regular meeting of the Mount Airy VHF Radio Club (PACKRATS) at the Southampton Public Library at 8 PM.

25 TO 26 JUNE 2005—ARRL Field Day

14 JULY 2005—PACKRATS BOARD of DIRECTORS Meeting

16 TO 17 JULY 2005—CQ VHF CONTEST 50 and 244 MHz only—*Rules next month*

21 JULY 2005—Annual PACKRATS WHITE ELEPHANT AUCTION at the Home of Gary Hitchner WA2OMY, 39 West Mount Kirk Avenue, Norristown, PA

30 JULY 2005—*RAIN DATE 31 JULY*—ANNUAL PACKRATS FAMILY PICNIC at the QTH of Al and Carol Shepard N3IIT, 77 Foellner Lane, Ottsville, PA

11 AUGUST 2005—PACKRATS BOARD of DIRECTORS Meeting

5 SEPTEMBER 2005—Final call for papers for MICROWAVE UPDATE 2005

15 SEPTEMBER 2005—PACKRATS BOARD of DIRECTORS Meeting

22 SEPTEMBER 2005—Regular meeting of the Mount Airy VHF Radio Club (PACKRATS) at the Southampton Public Library at 8 PM.

24 SEPTEMBER 2005—MID ATLANTIC VHF/UHF/MICROWAVE CONFERENCE Sponsored by the Mount Airy VHF Radio Club (The PACKRATS) at the Marriott Courtyard, Street Road, Bensalem, PA

25 SEPTEMBER 2005—PACKRATS HAMFEST—Middletown Grange Fair Grounds, Wrightstown, PA

13 OCTOBER 2005—PACKRATS BOARD of DIRECTORS Meeting

20 OCTOBER 2005—Regular meeting of the Mount Airy VHF Radio Club (PACKRATS) at the Southampton Public Library at 8 PM. Special guests Dave and Linda Sumner K1ZZ and Lind KA1ZD will their experiences on 10 GHz. Dave is Chief Executive Officer of the ARRL.

27 TO 30 OCTOBER 2005—MICROWAVE UP DATE 2005 sponsored by San Bernardino Microwave Society and Western States Weak Signal Society—Cerritos California (Near Los Angeles)

10 NOVEMBER 2005—PACKRATS BOARD of DIRECTORS Meeting

17 NOVEMBER 2005—Regular meeting of the Mount Airy VHF Radio Club (PACKRATS) at the Southampton Public Library at 8 PM. Special guest Joel Harrison W5ZN Executive VP ARRL. Joel is a VHF, EME, HS Meteor Scatter enthusiast.

ANNOUNCING THE 2005 CQ WORLD-WIDE VHF CONTEST

FROM GENE ZIMMERMAN W3ZZ

Below is a summary of the rules for the 2005 CQ VHF Contest

Starts: 1800 UTC Saturday, July 16, 2005

Ends: 2100 UTC Sunday, July 17, 2005

Rules Summary

Bands: 50 MHz [6 meters]; 144 MHz [2 meters]

Categories:

- Single-Op All Band
- Single-Op Single Band 6 meters
- Single-Op Single Band 2 meters
- Single-Op QRP All Band [<10 watts]
- Hilltopper [SOAB QRP Portable limited to 6 continuous hours operating]
- Rover [1 or 2 ops mobile/portable operating from 2 or more Grid Locators]
- Multi-Op

QSO Exchange: Maidenhead Grid Locator to 4 digits [e.g. FN41]

Multipliers: Total number of different Grid Locators worked per band.

Scoring: Work stations once per band regardless of mode. Count 1 point per QSO on 50 MHz and 2 points per QSO on 144 MHz. Total QSO points X Multiplier = Final Score. Rovers only: Final Score = Sum of QSO points from each Grid Locator visited X sum of different Grid Locators worked from each GL visited.

Awards: Certificates are awarded to high scoring stations in each USA state, Canadian province, and DX country in categories with outstanding effort. Sponsored plaques are awarded to the highest scoring stations. See <http://www.cq-amateur-radio.com> for more information on plaques.

Log Submissions: Cabrillo formatted logs via e-mail attachment to: cqvhf@cqww.com with subject line: Callsign [used in the contest] only. It is strongly recommended that paper logs be entered on-line via: http://www.b4h.net/cabforms/cqwwvhf_cab.php or postmarked by September 1, 2005 to: CQ VHF Contest, 25 Newbridge Rd., Hicksville, NY 11801 USA. Electronic logs received are posted hourly on: <http://www.cqww.com/2005vhflogs.htm>.

Complete Rules: Complete rules can be found at: <http://www.cq-amateur-radio.com>.

C3i[®]

**Top Quality, Performance, Durability, Cost
Others make claims, C3i[®] Delivers**

Call, FAX, or E-mail or Order from our Web Site

**Our K1FO and K1JX VHF and UHF Antennas are proven
Performers in Contest after Contest @ K8GP / FM08fq**

GO WITH THE WINNERS

VISIT OUR HOME PAGE TODAY FOR MORE DETAILED INFORMATION
<http://www.c3iusa.com>

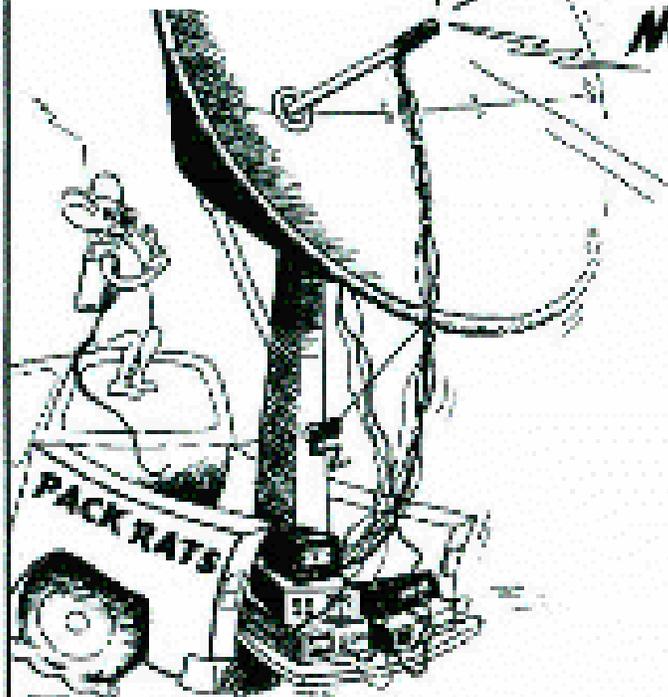
1-866-207-7126 + pin # 6408

Owormser@c3iusa.com sruffin@c3iusa.com



CheeseBits
c/o Doc Whitticar W3GAD
28 Twining Bridge Rd
Newtown, PA 18940-9704

MEETING NOTICE



LOOKING AHEAD:

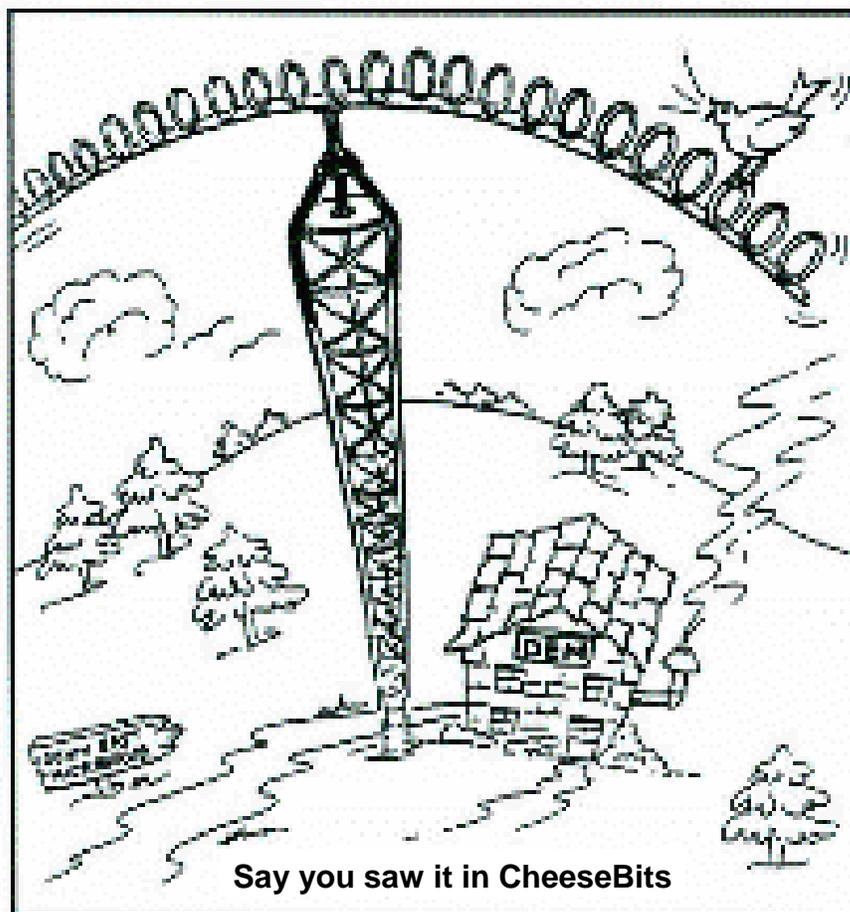
VHF Contest 11-12 June
White Elephant Sale 21 July
Family Picnic 30 July

INSIDE:

Awards Night
AM6154/55 Modification
CQ Vhf Contest rules

FIRST CLASS

MT. AIRY VHF RADIO CLUB, INC.



Say you saw it in CheeseBits

DOWN EAST MICROWAVE

Manufacturers and Distributors
Of VHF/UHF/SHF Equipment and Parts
50 to 10,368 MHz

- Microwave Loop Yagis
- No-Tune Linear Transverters
- Linear Power Amplifiers
- Low Noise Preamps
- Coax Relays, Coax Cable, Connectors
- Crystals, Chip Capacitors, MMICs, Transistors, RF Modules

For All Equipment and Antennas:

Steve Kostro, N2CEI

954 Rt. 519

Frenchtown, NJ 08825

Tel. 908-996-3584

Fax. 908-996-3702

<http://www.downeastmicrowave.com>