Mt. AIRY V.H.F. RADIO CLUB, INC.

CHEESE BITS

ARRL Affiliated Club

W3CCX
CLUB MEMORIAL CALL

Volume L **August 2009** **Number 8**

PREZ SEZ:

Well the DOG DAYS OF SUMMER have arrived and they are off to a fine start if you are a DOG FISH. We got over 4 inches of rain Sunday morning alone.

On Saturday the August UHF Contest enjoyed some nice enhancements on 432 and for the short time I was on the air I worked FN42 with better than S-9 signals in both directions , K1TEO up through 1296 with only 3 watts working and WZ1V through 1296. I heard WA3NUF and I heard K1PXE working WA3RLT but they both had moved on before I could work them. Most of Saturday was spent in the shop trying to get 222 working and setting up a test interface so I did not have to tear the station apart to do bench testing. So much for the August contest.

Next on the agenda will be the club's family picnic at the QTH of KB1JEY and I hope last minute commitments will be made so it can truly be a "Club Event". The picnic replaces the regular August meeting. The September meeting will be held at the Ben Wilson Senior Center in Warminster on September 17th where Bob McGuire, N4HY, will bring us an update on SDR. This will be a very interesting meeting.

The August Board of Directors Meeting will be the "peel & stick" party to launch the September Mid-Atlantic States VHF conference and HAMARAMA. If you have not made your commitments for these events please do so. Unfortunately I have a commitment in South Carolina for my son's wedding that will keep me away that weekend. There are an excellent menu of speakers and a well planned beginners' afternoon program. The beginners' program only is free.

Another September event is the 2009 September VHF QSO Party. This is a club scored event and it would be great if we had a large turn out of PACKRATS' logs. A good turn out of logs will reinforce the image that the PACKRATS are a lot more than a January/June Contest Club; we are active year 'round and serious about keeping the frequencies active.

Speaking of keeping active the MONDAY NIGHT NETS need more people to serve as NET CONTROL operators. WA3QPX has been stepping up to the mic to fill in for the missing net control operators. If we have regular net control operators and designated alternates we will again have a full schedule of nets every Monday evening. Since everyone should be trying to make at least one net weekly, and the nets are only 30 minutes long this should not be to daunting a task to ask of anyone. There are preamble scripts available or create your own to fit your style. The nets are one of the ways we distribute important club information. It should be every member's primary club information source rather than the internet. The net schedule is published in every issue of Cheese Bits. If you need it

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 (PL 131.8) Hatfield, PA

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PACKRAT BEACONS - W3CCX/B
FM29jw Philadelphia, PA
50.080 144.284 222.064 432.286 903.072 1296.245 MHz
2304.043 3456.207 5763.196 10,368.062 MHz (as of 1/08)

MONDAY NIGHT NETS

TIME	FREQUENCY	NET CONTROL
7:30 PM	50.145 MHz	K3EOD FM29ll
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 or www.w3ccx.com

...PRZ SEZ continued

bigger Lenny W2BVH can send you the schedule in large type to print out.

I did get on the air, earlier in the week before the UHF Contest, and worked an EN86 on 6 meter CW with good signals so I know the 6 meter transverter is finally working correctly.

I hope you all have a pleasant remainder of the summer and **Listen for the weak ones.**

73 de Doc W3GAD

Editors Column

Our next meeting will be the annual Packrat Picnic, starting 2pm on Saturday August 8. This year the picnic is hosted by Michael (KB1JEY) & Carol Davis at 533 Tennis Ave, Ambler (Lower Gwynned) PA 19002. Check the club email reflector for driving instructions or contact Michael directly at Michael@bassetconsulting.com. The picnic is open to Packrats and their friends and family . Please RSVP at the above email address. Rain date is August 9th. Our host will provide food & refreshments but you are more than welcome to bring dessert or additional liquid refreshment.

I'd like to pass on warm regards to all Packrats from our (currently) distant member Marc N2UO and from his wife Patty & son Eric. Marc was visiting our area a couple of weeks ago from his current QTH near Greensboro NC and he stopped by my QTH to visit. He comments that VHF+ operation is quite difficult from his current location due to low density of VHF+ ops in the area. An attempt at 10GHz operation last summer from the Outer Banks was a disaster due to 40+ mph winds (maybe that's why the Wright brothers chose that spot). Marc is re-assembling his 1296 EME setup, so look for him there.

73, Lenny W2BVH

This months technical article has an interesting history. Loren Moline WA7SKT asked a simple question as follows on the "Mw" Microwave reflector: "Would it be possible not to see LHCP signals with a RHCP patch but see them with LHCP? I know DTV and DISH use switched LHCP and RHCP to stack transponders close together without interference." In response, Dick K2RIW responded with a rather detailed explanation. Dick has revised and rewritten and expanded his explanation specially for Cheese Bits and that is what we present below. THANKS Dick !!! ---ed.

SOME CP ANTENNA POLARIZATION CHARACTERISTICS

by Dick, K2RIW

POLARIZATION ISOLATION -- In theory a Left Hand Circular Polarization (LHCP) wave, and a Right Hand Circular Polarization (RHCP) wave, are completely incompatible, and thoroughly isolated. In other words, you should NOT see a LHCP signal with a RHCP antenna.

ACCURACY? -- However, there is a catch -- how accurate are the CP antennas? Only with Perfect CP Accuracy (on Transmission and Reception), or with Perfect Polarization Orthogonality (explained below), are they perfectly isolated from each other. In the real world there usually is some measurable number of dBs of rejection of the opposite CP polarization with a particular antenna. Below are some polarization examples.

PURE POLARIZATION? -- Every Real Antenna is slightly Elliptical in its polarization characteristics. You may think your Horizontally Polarized Yagi is purely Horizontal. But if you do a careful measurement, you will probably find that it also has a slight Vertical component to its radiation that is suppressed by about 20 or 30 dB. Very few antennas are really pure in this manner. Correspondingly, almost every CP antenna radiates a signal that is slightly Elliptical. And, even if the transmitting antenna is purely linear, or purely circular, the emitted wave rarely retains that purity in a terrestrial communication situation because of the multipath characteristics of the environment -- the environment has chirality; which means it will alter the state of polarization. For instance, a linear polarized (LP) wave will become Elliptical, and a CP wave will undergo a change in its axial ratio (AR). See:<http://www.reference.com/browse/wiki/Polarimetry>.

COMMERCIAL SATELLITES -- Many commercial satellites (such as DirectTV) are using both RHCP and LHCP on the odd and even transponders as a method of achieving frequency re-use. They often use an opposite frequency plan on the adjacent satellites to increase the satellite to ground station isolation. Great care has to be used in both the transmitting antenna and

the receiving antenna so that the undesired polarization is suppressed by about 30 dB, otherwise the receiver demodulator will become confused.

THE SPACE ADVANTAGE & RAIN CHARACTERISTICS -- In an extraterrestrial communication link (like a satellite talking to a ground station) it is much easier to maintain the polarization purity, as long as the signal does not propagate through a tree branch, or a rain storm. You may have experienced a brief dropout of a DirectTV reception during a heavy rain storm. You probably thought the dropout was caused by signal attenuation; this usually is not the case. Actually, the larger rain drops are non-spherical in shape. This causes a coupling to take place between the RHCP wave (of an odd transponder) and the LHCP wave (of an the even transponder), for instance. The cross-coupling causes the demodulator to see both polarization signals with less than 30 dB of isolation, and it becomes confused even though the desired signal may be well above the threshold in signal strength.

COMBINING POLARIZATIONS -- An Elliptically Polarized antenna is merely one that is simultaneously radiating both RHCP and a small amount of LHCP (for instance). As a RHCP antenna becomes more accurate in its polarization alignment (such as properly setting the tuning screws in a **W2IMU** horn) the RHCP component becomes more dominant, and the LHCP component becomes more suppressed -- by 30 dB or more.

AXIAL RATIO -- The quality of a CP wave is measured by its Axial Ratio (AR). AR is measured by rotating a perfectly linear polarized receiving antenna in front of the Antenna Under test (AUT), and noting the peak-to-valley ratio (in dB). A perfect CP wave has an AR of 0.0 dB. A CP wave of "good quality" will have an AR of less than 1.5 dB. A pure Linear Polarized (LP) wave will have an AR of infinite dB.

COMBINING CP RADIATIONS -- If you take an Elliptical antenna (one that has both RHCP and LHCP emissions) and strengthen the weaker Circular Polarization until they become equal, you will have generated a purely linear polarized antenna!

COMBINING TWO CP ANTENNAS -- Or, if you take a RHCP transmitting antenna, and a LHCP transmitting antenna, and aim them both at the same receiver site, you will be generating a linear polarized wave. As you change the phase angle (or time delay) between the antennas, the resultant Linear Polarized wave at the receiver site will rotate from horizontal to vertical (for instance).

CP & GROUND BOUNCE -- A RHCP wave that bounces off the ground becomes primarily a LHCP wave. Therefore, in a multipath propagation the direct RHCP wave combines with ground-bounced LHCP wave, and becomes a primarily Linear Polarized (LP) wave at the receiver site. Depending on the different path lengths (the relative phase angles), the LP wave can end up Horizontal Vertical, or any slant angle in between. This partially explains why CP never became popular for the broadcasting of television signals.

POLARIZATION ORTHOGONALITY -- Polarization orthogonality is a measure of the degree of signal isolation that can be achieved between antenna pairs having particular polarization characteristics. Every antenna has a polarization state that can be represented as a particular address on a "Poincare Polarization Sphere" -- see <http://en.wikipedia.org/wiki/Polarization>.

POINCARE LOCATIONS -- On that sphere the North Pole Represents Perfect LHCP, the South Pole represents perfect RHCP. Latitude represents the ratio of LHCP to RHCP, and longitude represents the phase angle between them. Therefore, the Equator represents all possible slant angles of linear polarization, and all intermediate latitudes represent the various states of elliptical polarization -- the LH Ellipticals are in the northern hemisphere, and the RH Ellipticals are in the southern hemisphere. Any two antennas that are represented by points that are on opposite sides of the sphere will be orthogonal, and thus **decoupled from each other**. For instance, the north pole (LHCP) and the South Pole (RHCP) will be Orthogonal. An antenna Polarization state that is represented on the equator at the prime meridian (**Horizontal LP**) will be decoupled from an antenna on the Equator at the equivalent of the International Date Lne (**Vertical L**P).

THE DEGREE OF ORTHOGONALITY -- There are an infinite number of Elliptical antenna pairs that are also orthogonal. For instance, assume antenna #1 is CW (RHCP) Elliptical (from the southern hemisphere) with a an AR of 1.5 dB, and it has a major axis of polarization that is horizontal. Assume antenna #2 is CCW (LHCP) Elliptical (from the northern hemisphere) with an AR of 1.5 dB, and has a
major axis of polarization that is vertical. **These two antennas are orthogonal**. **If you change the AR**, **the polarization slant angle, or the Elliptical CW/CCW sense of either antenna, then they will begin to couple**, and they will not be completely orthogonal anymore.

A CP REFERENCE -- In the McGraw Hill "Antenna Engineering Handbook", chapter on circular polarization, which is chapters 17, 23, 23, and 26 respectively in editions 1, 2, 3, and 4, you will find charts and graphs, as well as a vector formula in the spherical coordinate system that will define the degree

of coupling between antenna pairs that have known polarimetry addresses on the Poincare Sphere. The Poincare Sphere is described in Chapter 1 of each edition.

A MATH PROCESS FOR DETERMINING THE ORTHOGONALITY -- The mathematically inclined amateur can do the following: **(1)** Represent the polarization state of each antenna as a vector from the center to the surface of the Poincare Sphere; **(2)** Use a normalized vector dot product procedure to find the angle (A) between the two vectors (it will be between 0 and 180 degrees) -- this must be a four quadrant angle-deriving procedure -- or use spherical trigonometry to find the great circle angular distance between the addresses; **(3)** Find the square of the cosine of half that angle (the cosine argument will be between 0 and 90 degrees); **(4)** Take 10 x the LOG of step (3). The complete coupling coefficient (C) in dB equals:

$C(dB) = 10 \times LOG\{[COS(A/2)]^2\}$

A = The 4 quadrant Angle between Vector 1 and Vector 2.

A = The GC Spherical Trig Angle between Location 1 and Location 2.

SOME FURTHER CP GROUND BOUNCE CHARACTERISTICS -- A RHCP signal that undergoes a ground bounce becomes primarily a LHCP signal, and it probably becomes elliptical. This is because the horizontally polarized portion experiences a nearly 180 degree phase reversal, and the vertically polarized portion experiences some amplitude decrease because of the brewster angle effect (see <http://en.wikipedia.org/wiki/Brewster%27s_angle>). This depends on the bounce angle, the dielectric constant, and loss tangent of that portion of the ground; and this changes with moisture content -- **it ain't simple**. **When you're doing CP antenna measurements on an outdoor antenna range, the number of possible errors increases considerably**.

10 GHz CP EME -- There is considerable empirical evidence that says that a CP EME signal on 10 GHz (and above) does not display the same amount of QSB advantage over an LP signal that is experienced on the lower bands. The Moon seems to de-polarize that 10 GHz (and above) CP signal.

CONCLUSION -- There is a lot more to the story of **RF and Optical Polarimetry**. For instance, a deep Parabolic Dish (such as an F/D of 0.25) will create some cross-polarization (it's called the diagonal de-polarization error), even if the feed horn is perfect. W2IMU published an IEEE Antennas and Propagation article on this subject in May, 1973. That partially explains why the 18" Direct-TV dish has an F/D that is greater than 0.6.

73 es Good Circular Polarization DX,
Dick, K2RIW

Packrat CQWW VHF Contest Results

Packrats provided the following reports and commentary on the CQ Worldwide VHF Contest (A 50 and 144 mhZ only contest).

From Rick, K1DS/R – Well, maybe about 8 hrs worth of operating as a rover. Beautiful weather, no traffic, no state police, no visitors, no enhancement, and no 2m preamp!! (Well, one 6m Es contact with EM80). Using 150 W on 6 with a Moxon at 18' and 350 W on 2 with a 10 el yagi at 12'. Nice to have some anchor stations on the air worked from all my stops on all bands, like WA2FGK, KA2LIM, K3TUF, K1WHS. Glad to work WB3IGR in FM18 several times also. Caught W2BVH on 6m. I'm sure the rest of you were enjoying some weather!
Results: 158 Q's and 85 Grids for a claimed 13, 430 on the old rover rules.

From George, WB3IGR - Not much soapbox, a pretty blah contest. 57 Qs; Claimed score 2430.

From Phil K3TUF - No comments. 137 Q's 46 Grids Claimed score 8004

From Lenny W2BVH - Some minor single hop Es on Sunday. 63 Q's; 38 Grids; in about 4 hours. Claimed score 2436.

From Mike KB3GJT - Just a comment: Due to other responsibilities, I wasn't able to put in a serious effort; but I did spend a number of half-hour periods listening while mobile. From Bensalem and the surrounding area, I really couldn't hear enough participation to make me wish I had. This seemed to be a contest that was best left to the towers and power, from my lowland location.

If you worked the CQWW VHF Contest a couple of weeks ago or the **ARRL UHF Contest** this past weekend, or you will be working the **10 GHz and Up Contest** later this month, please send Q's, Mults, Score, operating time and especially SOAPBOX to lennyw@comcast.net and I'll report the numbers in an upcoming issue of Cheese Bits. -- Lenny W2BVH

Thanks, K1PU

Mark Mokoski, K1PU of McKay Communications Inc in Rocky Hill, CT donated a headset and Kenwood adapter for Pack Rat contesting use. They were first used on the 432 MHz station at Camelback in June. With good results. Quality product, great (free!) price. Thanks Mark .

Reported by Michael KB1JEY

WA1ZMS Beacon Upgraded

by Brian, WA1ZMS

I made some equipment upgrades recently to the WA1ZMS 144.285MHz Trans-Atlantic Transmitter and would like to hear any signal reports and comments about signal quality i.e.: key-clicks, etc…

TX ERP is now 7kW! aimed at 60 degs towards Europe.

I want to be sure that all is working well. It sounds fine here at the home QTH, but it is loud and tends to work the AGC real hard. I'm about 20 miles from the mountain top location of the transmitter/beacon.

Of course, **DX reports** from "across the pond" are most welcome as well….

White Elelphant Sale 2009

Bruce & Dave set to go while El explains the auction rules

WA3GFZ wins White Elephant nr 2 -- Lots of brand new components

Very well attended - here is about 25% of the crowd

More of the crowd

Michael, Rick & Drex don't want to miss the next item

Al & Phil won't miss the refreshments or the next item!

Thanks to the organizers, the staff and especially to our excellent and humorous auctioneer El K3JJZ and to our host Gary WA2OMY & family for a great event !!

Ham Radio URL of the Month

Presented this month by El Weisman

Did you know that a little while ago the webmaster for the Packrat web page Ron-W3RJW sent out an email saying that the Pack Rat moonbounce expedition to Colombia in 1976 was not well preserved. Ron requested from all of us who were there to give him what photos and info we had so we could have this for posterity.

My first reaction was you got to be kidding, that was more than 30 years ago. But when I thought about it I felt he was absolutely correct. We needed to preserve what we could remember about this adventure. And so reluctantly I started to pull together what I remembered, what I had squirreled away in secret hiding places etc. It was indeed a lot of work but the more I worked on it and watched the progress on our web site, the more excited I got. Even to the point where I crawled over all sorts of junk in my garage including my 1970 motorcycle to get to some stuff I knew I had saved.

Ron has done a superb job in putting it all together. I'm writing this for Cheese Bits since many who get it may not have been aware of the project.

Go to www.w3ccx.com and click on the HK1TL qsl card to see what was put together.

Ron thank you for helping me relive the excitement of this adventure.

Elliott K3JJZ

Thank you Ron for the Magnificent job putting the Colombia EME Expedition on the web site. Your dedication to the PACKRATS is greatly appreciated and we are looking forward to the Rodanthe Story.

Doc W3GAD

HAMARAMA !!

38TH ANNUAL PACKRAT FLEA MARKET

Sunday September 27th, 2009

MIDDLETOWN GRANGE FAIRGROUNDS
PENNS PARK ROAD, WRIGHTSTOWN PA

Rain or Shine

Gates Open:
Buyers 0700 Sellers 0600

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Huge Parking Area

BUYER ADMISSION ONLY $5.00
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Large open selling space available to accommodate everyone

OUTDOOR SELLERS ADD $10 PER SPACE

INDOOR SELLERS ADD $15 PER 10' TABLE

No overnight parking
No Advance Registration

Maps & directions at **http://packratvhf.com/VHF Conf/vhf conf.html**

EMAIL: **info@packratvhf.com**

Events

For inclusion, please direct event notices to the editor.

Reading Radio Club Hamfest August 8. See www.readingradioclub.org

ARRL UHF Contest - August 1-2. See www.arrl.org/contests/calendar.html for details.

ARRL 10GHz & up Contest - August 15-16. See www.arrl.org/contests/calendar.html for details.

JSARS Hamfest - Aug 16. See www.jsars.org

Pocono Area Hamfest - Sept 12 . See www.qsl.net/n3is/hamfest/index.html

ARRL Sept. VHF QSO Party - September 12-13. See www.arrl.org/contests/calendar.html for details

Gloucester County Amateur Radio Club Hamfest - September 20. See www.w2mmd.com

ARRL 10GHz & up Contest 2nd Weekend- September 19-20. See www.arrl.org/contests/calendar.html for details.

Mid-Atlantic VHF Conference - Sept 26 with Hamarama 9/27. Spr. Packrats. Mt Carmel Club /Mariott Hotel. Complete details at www. packratvhf.com/VHF%20Conf/vhf%20conf.html. Registration is now open.

Tailgate Fest Hamfest- Oct 3. Spr: Red Rose Repeater Assoc See w3rrr.org

… Events continued

OMARC Hamfest - Oct 4. See www.omarc.org

RF Hill ARC Hamfest - Oct 18. See www.rfhill.ampr.org

MUD - Oct 25 The Westin, Dallas Fort Worth Airport 545 West John Carpenter Freeway Irving, Tx 75063. See www.microwaveupdate.org

WANTED

By new Packrat Chris Patterson W3CMP (also 8R1DB) : Parts for a Cushcraft 617B 6M antenna, driven element and T-match, also elements, brackets and U-bolts for the Cushcraft A50-6 6el 6 Meter antenna.
These parts were “borrowed” from a station in HH and are very hard to replace down there.
Contact Chris directly: W3CMP@aol.com

Mid Atlantic States VHF Conference !

http://packratvhf.com/VHF%20Conf/vhf%20conf.html

SATURDAY SEPTEMBER 26, 2009

MT CARMEL CLUB

1210 E. Ridge Pike
Plymouth Meeting PA 19462
610-277-5320
Conference and Dinner now at the same location !!

Preliminary Program--more to follow/subject to modification

Al, K2UYH - "Small Station EME for 432 and Up"
Steve, W1SMS - "Tower Construction and Safety"
Phil K3TUF & Len N3NGE - "Building a VHF Multi-Op Station"
Paul, W2PED - "A Compact 'Starter Rig' for 24 GHz"
Rich, KB3NRL - "A Low Cost, Digitally Modulated Optical Transceiver"
Dale, AF1T - "Antenna Basics"

Beginners Program: 1-4 PM (free of charge, please register in advance)

Register Early
for
Best Deal !!

Until 8/28/09 - $50.00
8/29/09 to 9/18/09 - $60.00
9/19/09 to 9/26/09 - $70.00

Additional Buffet Tickets $20.00
Additional Proceedings CD $5.00
Hamarama Ticket $5.00

Registration Includes:

Special Hotel Room Rate
Friday Night Hospitality 7PM at Courtyard Hotel
Continental Breakfast 8AM at Mt. Carmel Club
Conference 8:30 AM at Mt. Carmel Club
Saturday Lunch at Mt. Carmel Club
Afternoon Snack
Buffet Saturday Evening at Mt. Carmel Club
Copy of Proceedings on CD
Door Prize

Papers and presentations still being solicited through 8/15/2009
MS Word Format Preferred
Send yours to program chair Paul Drexler, W2PED
-- pdrexler@hotmail.com

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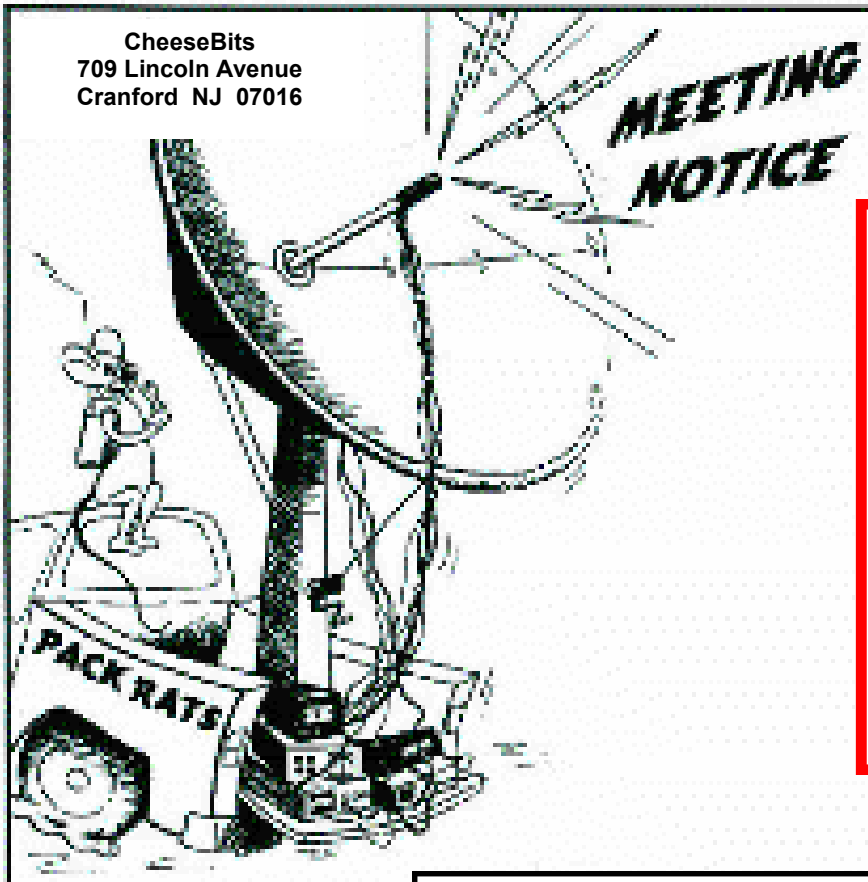

FIRST CLASS

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