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MT. AIRY VHF RADIO CLUB, INC.

CHEESE BITS



SCANNED TO PDF BY BERT

MT. AIRY VHF RADIO CLUB., "THE PACK RATS", PHILADELPHIA, PENNSYLVANIA W3CCX
NET FREQUENCIES: 50.125, 144.150, 220.125, 224.58/222.98, 432.110, 903.100, 1296.100 MHz
AFFILIATED CLUB: AMERICAN RADIO RELAY LEAGUE ARNS

Meetings: Third Thursday of each month at 8:00 PM
Southampton Free Library, 947 E. Street Road
Southampton, Pennsylvania 19866

VOLUME XXXII

OCTOBER 1990

NUMBER 10

THE PREZ SEZ

First off, let me get into something that has had me bugged for awhile. It seems that there are people trying to change VHF contest agenda by mail through polling by the ARRL publication "National Contest Journal". I don't subscribe to the magazine and I'll bet many other VHF/UHF/Microwavers don't either. I guess I thought "QST" was supposed to publish issues about changes in the interests and attitudes of the VHF and above contesters as well as all other important matters that pertain to ham radio. It does not make sense to penalize clubs or individuals that build their equipment and put in concentrated efforts, by limiting their number of bands operated. And, at one time, all of the contest scores were in QST! They want us to participate but we have to buy another publication to see the scores and keep up with the opinions and changes. Oh, well, I've said my piece, Hi!!

I hope to meet a lot of you at our annual VHF Conference and Hamarama. By the list of speakers it looks like another great conference, thanks to our faithful chairman John, KB3XG. If you get into town Friday, I'll see you at the hospitality suite that evening for some lively eyeballs/highballs.

Thanks again to Stan Hojnacki, WA2NPL, for his interesting talk on restoring old radios at the September meeting.

Enclosed in this issue is a 3.4 GHz form. Please fill it out or pass it along and have it returned to me. I'm making an activity directory and hope to have it complete after the first of the year. Thanks for your response.

Listen for the weak ones,
Dave Hackford, N3CX

THERE WILL BE A PACK RAT HOMEBREW DISPLAY TABLE SET UP AT THE VHF CONFERENCE. PLEASE PARTICIPATE BY BRINGING ALONG YOUR VHF/UHF/MICROWAVE CONSTRUCTION PROJECTS. EVEN SHOW YOUR PROGRESS ON ANY PROJECTS WHICH ARE NOT YET COMPLETED. TNX de John, KB3XG, Chairman.

Pack Rats CHEESE BITS is a publication of the Mt. AIRY VHF RADIO CLUB, INC. Philadelphia, Pa. and is published monthly. SUBSCRIPTION RATE - \$7.00 PER YEAR

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SUBSCRIPTION/ADVERTISING MANAGER:

WB2YEH, BOB FISCHER
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(609) 665-8488

EDITOR:

WC2K, RICK CONNOR
412 CARRANZA ROAD
TABERNACLE, NJ 08088
(609) 268-0736

CONTRIBUTING EDITORS:

W3IIT, HARRY BROWN WB3JYO, PAUL DREXLER
3012 POTSHOP ROAD 73 CHERRY LANE
NORRISTOWN, PA 19403 WYCOMBE, PA 18980
(215) 584-4846 (215) 598-3934

TYPIST/PRODUCTION ASSISTANT:

JANICE CONNOR

AWARDS CHAIRMAN:

W2EIF, JOE KILGORE
(609) 783-9478

CLUB HISTORIAN:

W3CL, HARRY B. STEIN
(215) 887-5052

TRUSTEE OF CLUB CALLSIGN - W3CCX

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<u>MONDAY NIGHT NETS</u>	<u>NET CONTROL</u>
7:30 PM - 50.125	W3CL
8:00 PM - 144.150	W2EIF
8:30 PM - 220.125	WC2K
8:30 PM - 224.58/R	K3ACR
9:00 PM - 432.110	WA3AXV
9:30 PM - 1296.100	WA3NUF
10:00 PM - 903.100	N3CX

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CALENDAR OF COMING EVENTS

By Harry Brown, W3IIT

OCTOBER

- 4-5 CRRL Fall VHF/UHF Sprint contest, 432 MHz. See September QST, page 78.
- 6 14th Annual Mid-Atlantic VHF Conference, presented by the Mt. Airy VHF Radio Club. Technical symposium 0900 - 1630 with mid-day break for lunch. Cocktail party and buffet dinner conclude the day. All activities will take place at the Warrington Motor Lodge, Warrington, Pa. Call Chairman John, KB3XG, for last minute info: 215-766-2643.
- 7 Mt Airy VHF Radio Club HAMARAMA hamfest, presented by the Pack Rats, will be held at the Bucks County Drive-in theater, Route 611 and Street Road, Warrington, Pa. Admission is \$5/person or \$8/carload. Please ride with a buddy. Talk-in: 224.58/222.98 repeater + 146.52.
- 8 Columbus Day (observed)
- 9-10 CRRL Fall VHF/UHF Sprint contest, 220 MHz. See September QST, page 78.
- 11 Pack Rat Board Of Directors Meeting at location to be announced. All interested club members invited. Meetings start promptly at 8:00 PM.
- 12 Columbus Day
- 13-14 ARRL International EME Competition, first of two weekends, see September QST page 78 for rules.
- 13-14 ARRL New England Division Convention will be held at the Sheraton Boxboro Hotel, Route 495 at Route 111. Featured speakers include ARRL President Larry Price, W4RA and AMSAT President Doug Loughmiller, K05I.
- 13-14 Pennsylvania QSO Party, see September QST page 80 for rules.
- 15-16 CRRL Fall VHF/UHF Sprint contest, 144 MHz. See September QST, page 78.
- 18 General Membership meeting of the Mt Airy VHF Radio Club. Steve White, WA3IAO, will present a talk on antenna tower restrictions and PRB-1. Meetings begin at 8:00 PM at the Southampton Free Library. Refreshments will be served. Bring a friend.
- 27-28 CRRL Fall VHF/UHF Sprint contest, 50 MHz. See September QST, page 78.
- 27-28 CQWW DX Contest, phone weekend. See September QST page 81 for rules.
- 28 RF Hill ARC Hamfest at the Pennsylvania National Guard Armory, Route 152, Sellersville, Pa. Talk-in: 145.31/144.71, 146.88/.28, 146.52.
- 31 Halloween

ALL MEMBERS & SUBSCRIBERS, PLEASE NOTE:

If your mailing label is in red print, your subscription to Cheese Bits has or will soon expire. See page 2 for renewal information. Thank you.

PROPAGATION REPORT

By Paul Drexler, WB3JYO

The solar flux has started to creep its way up again as indicated by frequent openings on 10 meters. Six meter F2 propagation is showing signs of life again with European stations working into Africa and the West Coast boys working into the Pacific. If the 1990/91 6 meter DX season is starting to warm up as it did last year at this time, we'll be seeing some openings to Europe and South America in the near future. Watch for a SFI above 180 and a K index of less than 3; remember too that intense 10 meter short skip often precedes 6-meter propagation.

On the evening of September 1, East Coast VHFers were treated to a good tropo opening extending from Nova Scotia to North Carolina. N3CX reports working K4QKR, FM06 on 903 with good signals. WC2K worked VE1UT and W4FSO on 432 also with good signals. On the 5th, starting around 0130z, enhancement was observed on 144 to the EN90 and FN02 areas but little more developed during the evening. On the evening of the 7th, I copied VE3BQN, FN04 with an S6 signal on 432 for several minutes while 144 had enhancement to the NW as well. Conditions were at times above average during the September VHF QSO Party, weekend of 9th and 10th. Although no 50 MHz DX was observed or reported, the higher frequency bands showed tropo enhancement throughout much of the weekend, giving a much needed boost to the lonely September contester. Many of the "usual" grids such as FN25 and FN00 were nowhere to be found. A few highlights however include working W1XX/FN44 on 903 and 1296, WA3EQ/FM09 on 1296, VE1VL (FN95) and K1GVM/FN85 on 432, and several stations on 3456 including W2SZ/1, K3YTL, N2CEI.

Two final notes on beacon news. The K3IVO beacons (from FM19, Maryland) are temporarily off the air - the tower they were using is no longer available - but they will be back on the air soon, including a new 2304 beacon (TNX W3IP). Also, N3CX has discovered that the WB2IEY 220 beacon has apparently been improved. The beacon still runs 3W but is consistently readable in our area. It signs CT for a QTH, so it may have been moved from its previous NYC location. Listen for this beacon on 220.058 MHz to check-out 220 band conditions.

73, and CU on the bands!

1990 MID-ATLANTIC STATES VHF CONFERENCE

0900 - 0955	TOWER INSTALLATION and SAFETY CONSIDERATIONS	Norm Jeweler
1000 - 1055	SECRETS OF THE KGB - 10GHZ	Ed O'Connor
1100 - 1155	ANTENNA MODELING PROGRAMS	Jim Breakall
1215 - 1315	LUNCHEON	
1330 - 1425	JUNE VHF QSO PARTY, 1990	Dick Frey
1430 - 1525	MICROWAVE LIGHTNING PROTECTION	Ron Block
1530 - 1630	5.7 GHz NO-TUNE TRANSVERTER	Rick Campbell
1830 - 1930	COCKTAIL PARTY AT THE PACK RAT HOSPITALITY SUITE	
1930 - 2200	BUFFET STYLE DINNER	

Conference prices: Advanced registration - \$8. Registration at the door - \$10.
Conference registration includes Hamarama ticket. Lunch - \$8.50. Dinner - \$16.

SWAP SHOP

FOR SALE: UHF TV antenna, 6 foot boom, \$5. 2-meter amp w/ps \$200. Hasselblad 500 cm with 80mm and 120mm lens, 3 12A backs and more, \$1500. 19 inch highly polished aluminum dish with 0.25 f/d, good for 10 GHz or laser work \$5. 8122 tube, never used, \$5

CONTACT: Chuck Steer, WA3IAC
215-335-0637, after 6 PM

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HELP WANTED: Engineers, Technicians, and Technical Support. Several openings in the following areas: UHF Circuit Design, Digital Signal Processing, Datacommunications Systems (like packet), and change control. If you would like to put your Ham skills to work for you full time, in a professional atmosphere, then call Woody Peitzer, AK2F, at HEPCO Inc. (201)-992-8660 between 7:30 to 5:30 PM.

3.4 GHz ACTIVITY FORM

NAME _____ CALLSIGN _____
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CITY _____ STATE _____ ZIP _____
TELEPHONE _____ (H) _____ (W) _____
3.4 GHz EQUIPMENT _____

Please complete and mail to: Dave, N3CX, Box 138 RD#2, Pennsburg, Pa., 18073

Directory correction: The new callsign for N2ASC is WY2X not WX2Y as was reported in the September issue of Cheese Bits.

ARRL, FCC PREPARE FOR FINAL 220 BATTLE

Having exhausted its lobbying, filing, commenting and reconsideration efforts for the most part, the ARRL now looks to the U.S. Court of Appeals to roll back the reallocation of 220-222 MHz to private land mobile radio services for "narrowband" (5 KHz) usage. The FCC gave Amateur Radio exclusive use of 222-225 MHz, but the ham community generally reviled the reallocation of the lower part of the band because other spectrum is available for land mobile; because the benefits of narrowband technology may have been overblown; and because of troubling questions in the FCC's analysis, among other issues. Oral arguments before the court are scheduled for November 16 in Washington, DC.

FCC decisions are often appealed to the court by parties who believe the FCC to have acted irrationally or beyond its jurisdiction. The FCC usually wins appeals of spectrum allocations, however. The court tends to defer to the agency's broad authority to decide where in the spectrum its licensees must operate. We think it's doubtful that the court could find enough errors in the FCC's decision to reverse it outright. Even if the court were to 'remand' the case to the FCC -- that is, return it to the FCC for modification or better explanation -- we think the FCC would reaffirm the spectrum takeaway but would just come out with additional papers to justify it. But, maybe we'll get lucky.

In any case, both sides are giving this final appeal their best shot. Especially for this effort, the ARRL retained Caldwell, Wickersham, and Taft, a law firm experienced in appeal matters, in addition to its long-time counsel Chris Inlay, N3AKD, of Booth, Freret, and Inlay. Interestingly, the FCC can't use one of its employees who is highly experienced in the 220 case. That individual is Robert Pettit, who is the Commission's General Counsel (chief attorney). Pettit was involved in the 220 reallocation as a member of the law firm retained by United Parcel Service. UPS was the main proponent of the reallocation. The company is an intervenor in the appeal, as are the major land mobile radio associations and manufacturers. Pettit has 'recused' (excused) himself from this 220 appeal, as conflict-of-interest regulations require. Instead, the FCC is being represented by Associate General Counsel Daniel Armstrong and by counsel Sue Ann Preskill.

Much of the dispute between the FCC and ARRL pertains to the FCC's belief that usage of 220-222 MHz is light. Taking the ARRL Repeater Directory as its guide, the Commission apparently assumed that the main use of 220-222 MHz was for repeaters, and finding few in that band, decided that the band was little-used. "After examining the record, the Commission rejected ARRL's contention that this band was heavily used by amateurs," the FCC said. "While amateurs alleged intensive use of the band... there was nothing to support that contention. The review of all the available data, including the material submitted by the ARRL and individual amateurs, confirmed the findings in the NPRM that the use of the 220-222 MHz band by amateurs was relatively light.

ARRL told the court that "Rather than accept ARRL's survey as a sample of overlooked use, FCC misused that data to support its assumption of light use. FCC simply combined the obviously incomplete ARRL survey with the necessarily incomplete Repeater Directory. To make matters worse, FCC averaged the Directory listings and the ARRL sampling data over the entire nation. This masked the intensive loading around urban areas, the very areas where emergency communications links are most vitally needed, and where other bands are too crowded to accommodate any displaced services. The FCC said, "ARRL's complaints about the deficiency of the record cannot overcome its own failure to provide the FCC with sufficient evidence to support its position that the Commission was obliged to give the amateurs all of the 5 MHz of spectrum at issue here.

The decision of the appeals court is likely to impact not only the 220 MHz case but future cases as the supply of available spectrum appears to dry up and more conflicts erupt over allocations. TNX W5YI Report.

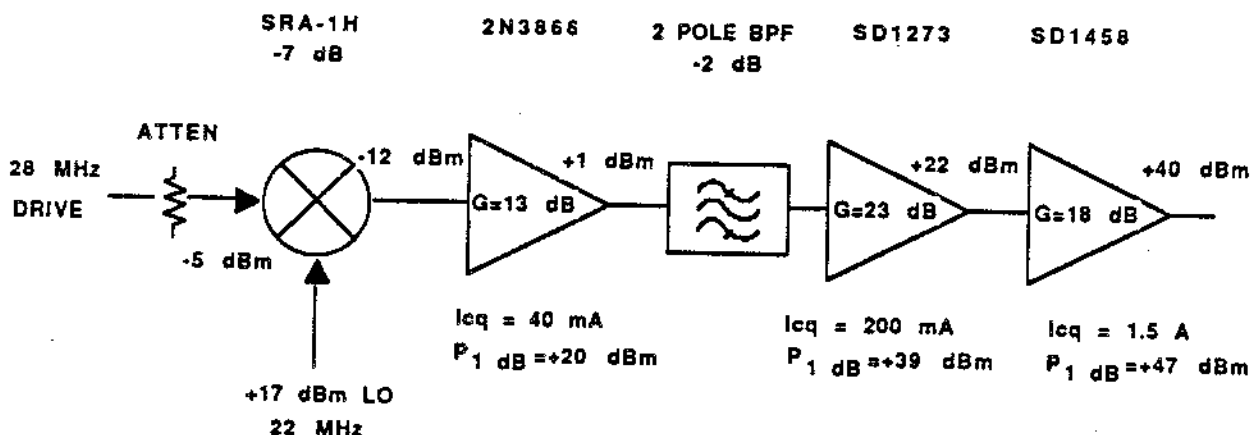
A LINEAR 50 MHz TRANSMIT CONVERTER

Circuits for a complete 50 MHz transverter will be presented in Cheesebits over the next several issues. A block diagram for the transmit portion is shown below. At 50 MHz the exceptional gain of the transistors results in a 10 W transverter with just 3 stages of amplification! All stages are stable into a 10:1 VSWR, and considerable effort went into making this design as linear as possible for good sounding SSB quality. Since construction practices at 50 MHz are not as critical as at higher frequencies, the transverter should make a good "first time" project.

Each amplifier is operated at better than 6 dB below it's 1 dB compression point in order to maintain excellent SSB linearity. Additionally, biasing was chosen for optimum linearity using a two-tone intermodulation distortion (IMD) test. Feedback is used in each stage for good stability and input match.

Looking at the block diagram you'll note that a Mini-Circuits SRA-1H mixer is used. This is a high level double balanced mixer requiring a 50mW (+17 dBm) LO power for extremely good linearity. The higher LO power of the SRA-1H allows a greater input drive level to be used while maintaining low distortion. Consequently, only 3 gain stages are needed following the mixer. A 2N3866 stage biased class A presents a broadband 50 ohm match to the mixer IF port. LO and image frequencies are rejected using a 2 pole bandpass filter. The second gain stage uses an SD1273 device biased for class A operating at +22 dBm output. An SD1458 TV linear device is utilized for the final stage and operates class AB for 10 watts power output. A lowpass filter (not shown) may be used following the final stage to further suppress harmonics.

10 W 50 MHz TRANSMIT LINE-UP



NOTE

Use these equations to convert from mW or dBm

$$\text{dBm} = 10 \log \text{mW}$$

$$\text{mW} = 10^{\frac{\text{dBm}/10}{}}$$

TRANSISTOR SELECTION FOR LINEAR SSB TRANSVERTERS

Many homebrew and commercial VHF transverters make use of transistors designed for class c operation. While some transistors may be biased for acceptable linear operation, others are very difficult to make linear. Transistors operating in a nonlinear fashion not only sound "grundgy" but often produce "splatter" over large portions of the band, sometimes 100KHz or more.

Each stage in a transverter line-up contributes to the overall linearity of the transverter. From the mixer to the final amplifier care must be exercised to keep each stage operating below its compression point, or in the linear range. It is possible to design a clean sounding SSB transverter by selecting the proper transistors, biasing them appropriately, and avoiding overdriving.

A variety of devices that operate linearly at VHF are available for power levels of about 500 mW or less. Many of these are designed for true class A linear operation - the 2N5179, 2N5109, BFR96, and SD1006 are but a few examples. MMICs are also very linear if they're operated below their compression point - for example, the MAR03 has a P_{1dB} of about 20 mW and is very linear when operated at 10 mW. Another easy way to get linear power is to use the linear modules designed for CATV service. These amplifiers will have a VSWR of 1.5:1 since they're made for 75 ohms but they make extremely linear amplifiers for amateur service.

Above 1 W or so it gets increasingly difficult to find devices designed for linear service. Most of the commercially available parts at VHF are designed for class C service for FM radio. Class C transistors don't frequently make good class AB amplifiers - often no matter how much biasing current is used! Some transistors may be found as the exception of course, but trial and error seems to be the only real way to tell. There are some options to using class C transistors, however. At 50 MHz many of the devices designed for 30 MHz SSB service may operate well with reduced gain. Above 50 MHz devices designed for linear TV applications make excellent linear SSB amplifiers. Since they are frequently operated under class A conditions their rated power output is much lower than if they were to be biased for class AB. Operating class AB, devices like the Thompson SD1458 make excellent linear amplifiers at VHF to power levels of over 50 W!¹

Whatever transistor you decide to use you'll want to make some basic linearity tests. Make a plot of P_{out} vs. P_{in} and stay 3 dB or so below the 1 dB compression point. Then, give it a try on the air, you'll be pleased with the signal reports!

REFERENCES

1. "Amplifiers for 144, 220, and 432 MHz using the SD1458," WA3AXV/WA3JUF, circa 1987.

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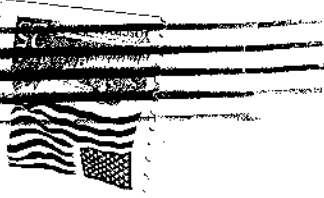
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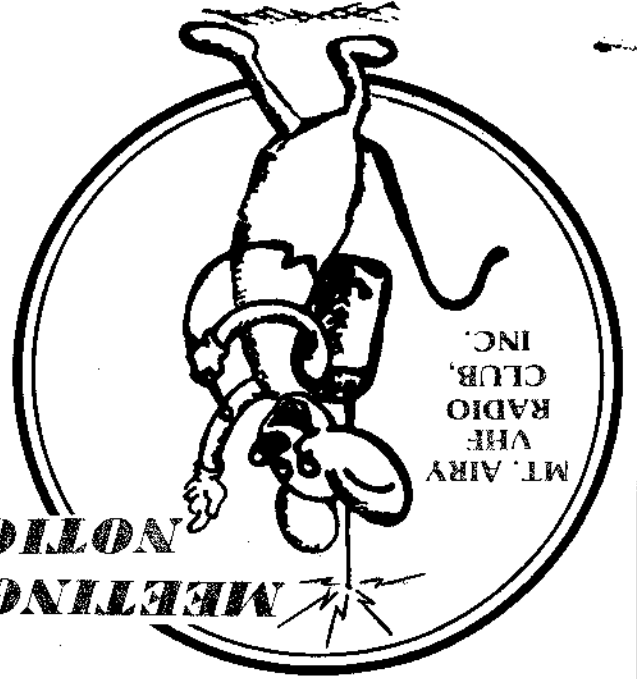
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