

# PACK RATS'



## PACK RATS

CLUB CALL: W3CCX

MT. AIRY VHF RADIO CLUB, INC.

# CHEESE BITS



MT. AIRY V.H.F. RADIO CLUB, INC., PHILADELPHIA, PENNSYLVANIA (ARNS)

(50.2, 145.2, 221.4, 432.03 & 1296.3 Mhz) Repeater 222.98/224.58

AFFILIATED CLUB: AMERICAN RADIO RELAY LEAGUE

MEETINGS: Third Thursday of Each Month 8:00 P.M.

Southampton Free Library, 947 E. Street Road  
Southampton, Pennsylvania

VOLUME XVIII

APRIL 1976

NUMBER 4

### THE PREZ SEZ

Last months meeting featured a very informative talk by our program chairman, K3BPP, on basic circuitry and components of a frequency counter. This month Walt will continue on the same topic with more detailed analysis of the basic counter circuitry. Much of the material will be taken from the recent series of articles appearing in QST. If you have some time read over the material in QST and you will really get more out of Walt's presentation. If you can understand how a frequency counter works, you are a long way towards having a working knowledge of many "integrated circuit" circuits.

The annual Pack Rat Banquet is coming up on May 1 this year at the Buck Hotel. The Banquet has been and will continue to be a traditional "ladies night". There will be doorprizes, gifts for the ladies, awards and music for dancing. You will soon be receiving a flyer and tickets for the affair. So mail your confirmation to our capable chairman, John Tate, K3KTY, as soon as possible. If you are not a club member and would like to attend please contact K3KTY or one of the Pack Rats for ticket information. This is the 20th Anniversary of the club, so the affair should be better than ever.

W3HQT, "Gunboat Olsen" will once again be the June QSO Party honcho. Bill solicits your support for this activity and requires much assistance from the membership to spread the work load. Many jobs are still open so please contact Bill and offer your help. The contest this year is on the weekend of June 12th and 13th at Hilltown, Pa. Hilltown this year will be the proving ground for the new array of 16x13 elem. moonbounce antennas being assembled by W3HMU and company.

73, Ron, WA3AXV

### KEEPING POSTED ON FUTURE EVENTS

June 12-13 June VHF QSO Party, Hilltown, Pa. Bill Olsen, W3HQT, Chairman, a few band capt. positions still open.

June 26-27 - ARRL Field Day

July 23,24,25 - ATLANTIC DIVISION CONVENTION - BENJAMIN FRANKLIN HOTEL, PHILA., PA.

October 3, 1976 - HAMARAMA 76

PACK RATS' CHEESE BITS IS A PUBLICATION OF THE MT. AIRY V.H.F. RADIO CLUB, INC. PHILADELPHIA, PA. AND IS PUBLISHED MONTHLY.

SUBSCRIPTION RATE \$1.50 PER YEAR

WE OPERATE ON AN EXCHANGE BASIS WITH OTHER PUBLICATIONS AND ANYTHING THAT IS PRINTED IN CHEESE BITS MAY BE REPRINTED, UNLESS SO STATED, AS LONG AS THE PROPER CREDIT IS GIVEN.

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SWAP SHOP ITEMS - NO CHARGE

DEADLINE FOR ARTICLES IS THE GENERAL MEMBERSHIP MEETING.

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7815 NEW SECOND STREET  
ELKINS PARK, PA. 19117  
215 ME 5-1078

PRINTER:

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PHILADELPHIA, PA. 19120  
215 RA 5-1928

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WA3TEM, MARSHA STEIN

MONDAY NIGHT NETS: NET CONTROL

145.2 - 7:30 P.M. W2EIF  
50.2 - 8:30 P.M. W3CL  
221.4/224.58 9:00 P.M. K3GAS  
432.03 - 9:30 P.M. K3IUV  
1296.3 - 10:00 P.M. W3HMU

FRIDAY NIGHT ATV NET: NET CONTROL

439.250 - 7:00 P.M. WA3AXV

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222.98/224.58

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K3ACR, RICH PATTISON  
W3HMU, TONY SOUSA  
W3HQT, BILL OLSON  
WA3JUF, DAVE MASCARO

DIRECTORS' MEETINGS ARE HELD ON THE SECOND WEDNESDAY OF EACH MONTH AT DESIGNATED LOCATIONS.

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Ed Clark

CALENDAR OF COMING EVENTS  
Syllabus by Lee, K3MXM

APRIL

- 1 April Fools Day - beware of all phone calls from a Mr. Lyons at BA2-5300
- 3 Saturday - Tri-State Repeater Auction - garage of Bud, K3WAC, Phone 215-644-8171 for directions - in West Chester, Pa. area.
- 4 Calvert Hall Hamfest, Towson, Md. A very good one and only about three driving hours from Phila.
- 7 June VHF QSO Party Contest planning committee will meet at QTH of Danny, WA3NFV at 8:00 P.M.
- 10 Southern Tier Hamfest, Johnson City, N.Y.
- 14 Board of Directors Meeting - QTH, K3IGX, Dick Boyle, 7915 Bayard Street, Phila., Pa. Directors and interested parties invited. If lost call 927-6471.
- 15 General Club Meeting, Southampton Free Library, Street Rd., Southampton, Pa. Topic of the evening, Part II of IC Theory and usages in counters , by Walt, K3BPP. The Mario Raffle - Doc's Silent Auction, Refreshments. Open meeting to one and all.
- 15 The First Day of Passover
- 16 Good Friday
- 18 Easter Sunday
- 23-25 The Dayton Hamfest, The biggest and best along the whole East Coast.
- 24 Penn Jersey YL Flea Market, Mary Fisher's Antique Shopping Center and Flea Market, Route 202, Lahaska, Pa. (Across from Peddler's Village) Bert, W3TNP says she needs more items please.

MAY

- 1 Saturday Nite, The Pack Rat Banquet, Buck Hotel, Feasterville, Pa. John Tate, K3KTY, Chairman. A very good meal - dancing, music, prizes and surprises.
- 2 Delaware Valley Radio Association Flea Market and Auction. Pennington Rd. Fire Co. (Rte 31), Ewing Township, Trenton, N.J.
- 2 Westminster Maryland Flea Market.
- 2 First Trenton Computer Festival - Armstrong Hall, Trenton State College, Rte. 91, Ewing Township, N.J. Flea Market, tailgating \$2.00
- 16 Warminster Radio Club Hamfest - Wm. Tennent High School, off Street Road, Warminster, Pa. Support our neighbor radio club - a nice hamfest and right in the back yard, food, tables, prizes and all facilities.
- 20 General Club Meeting, ARRL NITE, special guest speaker from Headquarters. Ask your friends and radio buddies to come on over. Usually one of the better meetings of the year. Get the latest info.
- 21-22 Rochester, N.Y. Hamfest, A two day affair and one of the big ones.
- JULY 31/AUG. 1 Roanoke Div. Convention and Hamfest, Norfolk, Va. Details in May Cheese-Bits.

NEW PRODUCTS OF INTEREST TO HAMS

By Lynn, W3NSI

1. General Coverage Receiver: Kenwood is now importing a receiver that covers from 170 Khz to 30 Mhz in six bands. The QR 666 features a built in speaker, 'S' meter, power supply for AC operation, and a 500 Khz calibrator. A demonstrator receiver was borrowed from Press, at Trevoze Electronics in order to make a more complete evaluation. The unit has very good stability and SSB or CW signals were easily copied. The 500 Khz marker could be heard very well right up to 30 Mhz, and is much better choice for this purpose than a 100 Khz marker. The calibrator signal is also useful for peaking the antenna trimmer for that frequency range. A whip antenna is built in, however the usual outside antenna does a much better job. Cables for both AC and DC operation are packed with each receiver, as are two alignment tools and a complete instruction book, with service information. This is a two dial radio. The main dial is set to the indicator mark for ham bandspread, and then the amateur band tuning is spread over five separate scales, 100 Khz each. A well done unit, especially for the ham who likes to listen to his crystal osc. and check harmonics, etc. Well worth \$289.00 On display at Hamtronics, Trevoze, Pa.

2. Ham's Almanac: While checking out the QR 666 above, a pile of interesting books were noted on the counter at Trevoze Electronics. The 1976 Ham's Almanac contains information on contests, conventions, operating activities, propagation forecasts, and some monthly illustrations by Les, WA6HJL. An elaborate calendar for hams. Cost \$3.00.

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TID BITS

W3CJU back home after surgery. Look forward to seeing you at a meeting.

Sally & Jim Perkins had a siege with the Flu. A steady recovery folks --

Hy, WA3NDE underwent surgery at the Einstein Memorial Hospital. Wish you the best. Keep in touch.

The devastating wind storm on March 21st brought down some antennas. W3GEW say his are on the roof, WA3JUF is off the air, K3JJZ lost his 40 ft. pole with the 220 and 432 Mhz systems down.

VISITORS AT THE MARCH MEETING

WA3NUF, Phil Miguelez, Pendel, Pa.

WB3AOP, Bolmar Aquilar, Phila., Pa.

K3LXX, Jerry Farber, Phila., Pa.

WA3ZRE, Earl Garber, Phila., Pa.

WA3NHT, Mel Richman, Phila., Pa.

VOTED TO THE RETIRED LIST

WA3DJF, Carl Mattiace and WA3HVL, Don DeRosa.

APPLICATIONS FOR MEMBERSHIP

WA3NHT, Melvin Richman, 1132 Kent Lane, Phila., Pa. 19115 Phone: 215-OR 7-1760

WA3NUF, Phil Miguelez, 201 Durham Rd., Apt. J-6, Penndel, Pa. 19047 Phone: 215-757-0814

WA3ZRE, Earl Garber, 8956 Fairfield St., Phila., Pa. 19152 Phone: 215-677-1699

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There will be a meeting of the HAMARAMA 76 Committee soon. Those interested in helping, contact me, K3MXM. The HAMARAMA Fliers are now printed and those of you visiting other clubs or amateur affairs and want to help distribute them, call ME 5-4942 for a package.

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A very nice award is being offered by the S. Jersey Radio Assn. called the Bicentennial Operating Award. Contact and work the original 13 States on 50 Mhz or higher. Proof of QSO by QSL card. Send package of 13 cards to Awards Chairman Ed Poole, WN2ZDU, P.O. Box 293, Cherry Hill, N.J.

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After April 1, 1976 telephone users can legally add their own equipment to a phone system. A recent court ruling permits the addition of dialers, answering units, extra telephones and such equipment without having it installed by the telephone company.

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WANT YOU SEND YOUR LIST OF CRYSTALS TO BERT, K3IUU, FOR THE CRYSTAL BANK INFO.....

VHF/UHF REPORT

By Jo, W2EIF

The six meter band with the possible exception of the FM portion, shows little activity. The advent of the DX or E Skip season about the 2nd week of May will produce the usual Summertime contacts, centering on June 21. This type of activity is good but it is not enough to keep the band alive. It should be apparent by now that the majority of those on VHF are interested in the local type of contact which is more readily and cheaply accomplished by going to 2 meters or 220 FM.

The operator who likes weak signal work, whether it be by EME, tropo, aurora or other, is apparently a member of a minority group. It is a source of continual amazement to this operator, why anyone would enjoy the continual interruptions and "breaks" that seem so prevalent on the FM repeater type operations.

The 2 meter band continues to show some evening activity. Most of it is SSB below 145 and AM or FM above 145. Contrary to some sources, there is still AM activity from 145 to 145.5. Some is VFO controlled so that the operator has a wide choice of "private" frequencies at his command. It definitely limits the intruder or "breaker" to some extent.

The take over of the simplex frequencies of 2 meters by "repeaters" I hope will hasten the day when even FM operators will move down to 145-146, use VFO and rotatable beams and get out of the horrible congestion above 146 Mhz.

The bands above 2 meters show some activity but mostly on specific nites. Tuesday nites starting at 8:30 p.m. will find W4UCH, K1PXE, WA3JUF and W2EIF on the band. Thursday nites at 9, a North Jersey group gets on the low end of 220. Wednesday nite is supposed to be 432 nite but usually I hear only K1PXE. Thursday nite at 8:30, 1296 Mhz gets under way with K1PXE, W201A, W2OMS operating. There is a Pack-Rat Net at 1296 on Monday nites at 10 P.M. and the last one had 4 entries, namely W2OMS, K3GAS, WA3JUF and W2EIF. The Pack-Rats also sponsor an ATV net on 439.25 Mhz. This net convenes on Friday nites at 7 P.M. It is operated by Ron, WA3AXV.

Just remember if you want activity, start getting active on these frequencies. Nobody is going to do it for you. Also just listening is not being active.

PACK-RAT MOONBOUNCE IS BACK ON THE AIR

By Tony, W3HMU

A severe winter storm did in the W3CCX moonbounce antenna. Our antenna which is a "stressed-dish" parabola of twenty foot diameter was no match for the 80+ MPH winds of February 2, 1976. Those high winds put such a high force on the feed reflector and associated hardware that the feed support mast was broken off at the base and one-half of the dish surface was folded over on the other half. The final appearance resembled that of a folded pancake.

The moonbounce crew responded to this disaster with typical aplomb. "It's got to be fixed, so let's have it," said Bill, W3HQT. The dish was removed from its mounting tower and laid down at ground level for closer inspection. Nine out of 18 radial arms were bent or broken; the pipe flange which bolted the feed support mast to the center of the dish was broken but the mast was still straight and intact. The chicken-wire covering was folded up like a dirty dish rag but still intact and it looked like it could be pulled back into shape. The broken radials were removed and straightened and plans were made for their repair.

Taking advantage of a warm February weekend, the radials were spliced back together and the center mast refastened. The stress lines were reconnected and the covering pulled back into approximate position. A check with the parabolic template showed that the shape of the dish could be brought into agreement with the template. The tedious process of adjusting the shape of each radial arm and then refastening the dish covering was completed in short order proving once again that "many hands make light work."

The following weekend the dish was remounted on its tower by the now standard grunt and groan technique of manually sliding it up a ramp to the top of the tower. A strong southwesterly breeze helped by pushing in the right direction but hindered by making the delicate balancing of the dish on the ramp very difficult. After completing the dish installation, the whole antenna was tied down very carefully to protect it from the strong March winds.

The entire moonbounce system was reactivated on Friday evening, March 12. It was a scheduled moonbounce weekend; however, W3CCX had no schedule since it was not expected that we would be back in operation so soon. The weather was typical for March;

PACK-RAT MOONBOUNCE IS BACK ON THE AIR  
CONTINUED

snow, sleet and freezing rain. Needless to say we could not see the moon but had to aim the antenna on instruments. Good echoes were obtained with almost no effort. Some stations were heard operating random contacts on 432.010 Mhz. We answered a CQ from F9FT and had a good solid contact. During this contact, I5MSH broke in! We went on to work the Italian station with very good signals both ways (539). Later LX1DB (Luxemburg) was heard with a good signal but we just couldn't get his attention. Too bad, we could use Luxemburg for a new country to add to our totals.

It looks like the W3CCX moonbounce operation is back in full strength.

Many thanks to WA3AXV, WA3YZC, WA3NGK, WA3JUF, K3JJZ and HK1AMW for their terrific assistance.

The Pack Rat Moonbounce Committee

Note: HK1AMW, Bolmar, is stateside WB3AOP. W3HMU, W3HQT, K3BPP

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OFFICIAL BULLETIN NR 578 FROM ARRL HEADQUARTERS NEWINGTON CT FEBRUARY 26 1976 TO ALL RADIO AMATEURS BT: The comment deadline in Docket 20686, the FCC proposal to delete both the requirement for advance notice of portable operation and for portable/mobile identification, has been extended from February 27 to April 30. The reply comment date has been moved from March 8 to May 7. Please continue to spread the word on the docket and let ARRL Headquarters and your ARRL director know your views as soon as possible, whether you are in favor of or opposed to the concept. Further information on Docket 20686 will appear in the April issue of QST. AR

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OFFICIAL BULLETIN NR 579 FROM ARRL HEADQUARTERS NEWINGTON CT MARCH 4, 1976 TO ALL RADIO AMATEURS BT: Senator Barry Goldwater, K7UGA, on February 25 introduced a bill, S-3033, requiring that measures to prevent radio frequency interference be incorporated in the manufacture of consumer electronics products. The new bill, similar to the Vanik Bill, HR-7052, page 76, September 1975 QST, has been assigned to the Senate Committee on Commerce, Subcommittee on Communications, which is headed by Senator John O. Pastore of Rhode Island, AR

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OFFICIAL BULLETIN NR 580 FROM ARRL HEADQUARTERS NEWINGTON CT MARCH 11 1976 TO ALL RADIO AMATEURS BT: The Federal Communications Commission is amending its rules so as to make possible telegraph exams which will test understanding of the messages over a five minute period rather than letter by letter copy for a single minute. To prepare the way, the words, "Free from omission or other error for at least one minute," have been deleted from section 97.29C. Initially, only a few FCC offices will be testing the new procedure; the rest will continue with the traditional style code exam. Headquarters will soon have sample tests for volunteer examiners. Other minor regulation changes have been to delete references to the drawing of diagrams in section 97.29D and to delete reference to intracommunity coverage, in the definition of repeaters at 97.3 I, reflecting earlier changes which permitted linking of repeaters. AR


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VHF SPACE NET CONTEST SALUTING USA...APOLLO II...APOLLO/SOYUS JULY 3/4, 10/11, 12/18, 24/25, 1976-OPERATING TIME...6 P.M. SATURDAY TO 9 P.M. SUNDAY, EACH WEEKEND.  
DETAILS IN MAY CHEESE-BITS!!

# MT. AIRY V.H.F. RADIO CLUB, INC.



AD  
MANAGER  
K3MXX

## ADS

<p>NE 7-6329</p> <p><b>GEORGE S. VAN DYKE, JR., P.E.</b> CONSULTING ENGINEER</p> <p>W3HK</p> <p>4507 CONVENT LANE PHILA., PA. 19114</p>	 <p><b>AMERICAN RADIO RELAY LEAGUE</b> HARRY A. McCONAGHY, W3SW/W3EPC DIRECTOR, ATLANTIC DIVISION</p> <p>8708 FENWAY DRIVE - POTOMAC BETHESDA, MARYLAND, 20034</p>
<p>609-429-0087</p> <p><b>BRADDOCK ASSOCIATES</b> MANUFACTURERS' REPRESENTATIVE</p> <p>EDWARD BRADDOCK MEMBER, I.E.E.E. W2BAY</p> <p>POST OFFICE BOX 305 HADDONFIELD, N. J. 08033</p>	<p>215-117-8052</p> <p>W3CL</p> <p><b>HARRY B. STEIN ASSOCIATES</b> COMMUNICATIONS CONSULTANTS</p> <p>HARRY B. STEIN</p> <p>2087 PARKDALE AVE GLENVIEW, PA. 19038</p>
<p>(609) 424-4258</p> <p><b>GREENTREE PRESS</b> Business cards - Envelopes QSL cards - Tickets - etc -</p> <p>1980 GREENTREE ROAD CHERRY HILL, N. J. 08003</p>	<p><u>A request from your AD Manager</u></p> <p><u>PATRONIZE OUR ADVERTISERS</u> Tell them you saw their ad in <b>CHEESEBITS</b>. Leave your QSL card with them. <b>CHEESEBITS</b> is one of the best read local radio club papers. Circulation - 300</p>
<p><b>73</b> <b>magazine</b> for radio amateurs</p> <p>1 year - \$10 2 years - \$17 3 years - \$20</p> <p>PETERBOROUGH, NEW HAMPSHIRE 03458</p>	

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Tektronix 514D scope-works-manual \$20.  
R-48A Receiver, works o.k. \$15.  
RCA Xmitter, 432 Mhz, 5894, works \$10.  
Heath Q Mult. QF-1 \$3.  
Jackson Model 642 VOM \$5.00  
Pair 4--400B-new-both for \$30.00  
Pair SK-410 Sockets for 4-400-both for \$10.  
B&W 1KW lowpass filter-50Mhz \$4.00  
Heath IB-102 Prescaler \$25.  
Eico 753 Xcvr, modified for better stability \$60.  
Heath HW-32A, new finals, 20 mtrs. \$75.  
Briggs & Stratton 2 HP side-shaft motor \$10.  
CONTACT: WB2SZK, Randy Bynum  
127 Arbor Meadow Drive  
Sicklerville, N.J. 08081  
609-728-2690

FOR SALE: ICOM 22A-2 mtr Xcvr, 15 channels and  
tpl 1202, 2 mtr. amplifier-10W-120W.  
Both like new (6 months old) Bargain at \$400.00  
CONTACT: K3LXX, Jerry Farber  
9137 Revere Street  
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215-698-1985

FOR SALE: Drake TR22-C, 16 xtals, Rubber  
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owner \$200.00  
CONTACT: K3UKW, Tony Musero  
1609 S. Iseminger Street  
Phila., Pa. 19148  
215-271-8898

FOR SALE: Rohn PT6 Telescoping tower,  
50 ft. hinged base. firm price \$80.00  
CONTACT: K3ESL, Ben Gindin  
6504 Roosevelt Boulevard  
Phila., Pa. 19149

FOR SALE: Cushcraft 40 element 432 Mhz collinear  
Antenna, \$20.00. Gonset IV 220 Mhz Communicator  
setup for 221.4 and Pack-Rat FM Repeater. Works  
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CONTACT: K3IPM, Stan Smith, 133 Hogeland Rd.  
Southampton, Pa. 18966. 215-355-2867



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## RTTY ANTHOLOGY (PART 1)

By Ralph Alexander, WA3FOF

Since the time that man first started to live in communities that were based on agriculture, he has found that communication with his neighbors to be desirable and in some cases very necessary. This communication has taken many forms - the first being the runner who would go from village to village with messages. But this was a very dangerous job and was also very time consuming. So this was only done with very important messages. For the less important messages another method was used, the peddler, who had been around before the agricultural communities were formed. These peddlers would go from place to place; and as they would sell their wares, they would tell their stories and the news.

For quite a bit of man's recent history, this is the way news and messages were transmitted. After the dark ages in Europe, a method of semaphore was developed using towers placed at a distance to the horizon from each other. This is how some of the important messages would be transmitted. In Africa, because of the dense jungle and the relative closeness of the villages, drums were the standard means of communication. While in America, the Native Americans used smoke signals. This along with the mail system, was how news and information was transmitted from the middle ages up until 1835, when an American, Samuel F.B. Morse, invented the telegraph. Morse was fascinated with Michael Faraday's work on Magnetism and this "fluid" called electricity (maybe that is why it is still called "juice").

Faraday discovered that a compass needle moved, when he placed a wire carrying an electric current near a compass. This was an amazing discovery; because up until this time, there were only two things known to affect a compass which were another magnet or the Earth's own magnetic field. While doing more experimentation, he found that he caused a stronger deflection by using a piece of iron with current carrying wire wrapped around it, making the first electromagnet. As I said Morse was interested in the work, and he knew that there was some way of making this phenomenon work for him to send signals.

Morse's early work was fraught with failure. He would wrap piano wire around a piece of iron and pass an electric current thru it but nothing would happen, until an associate pointed out to him that maybe the wire should be insulated. He quickly wound a coil using insulated wire and it worked.

Morse now knew that he had it, and all that was left to do was to devise a way to make this work for him! His first telegraph receiver was a very crude device, as most inventions are somewhat more complicated than they have to be in order to really work. It was a strip of paper and a spring motor to pull the paper past the solenoid onto which an inking device had been attached. The first telegraph line was strung from Baltimore, Md. to Washington, D.C. The first message ever sent by electrical methods was "WHAT HATH GOD WROUGHT?" The system was a total success; and by the time of the Civil War, the total amount of telegraph lines strung in the U.S. was over 20,000 miles. Most of this was in the North.

Both the North and the South made extensive use of the telegraph during the War, mostly for troop movements and the like. Another use was in barrage balloons where men would go aloft to about 300 feet in these hydrogen filled balloons. From this height they could see the enemy movements and they would use the telegraph to tell the ground what was going on. It was better to use the telegraph because it was either that or yelling to the ground that "they're coming over the ridge." This would only serve to aggravate the enemy on the ground who would not really be watching for the balloons at all. After all, a balloon filled with hydrogen was very flammable and something large enough to lift two people and the cable to hold it in place was a very easy target.

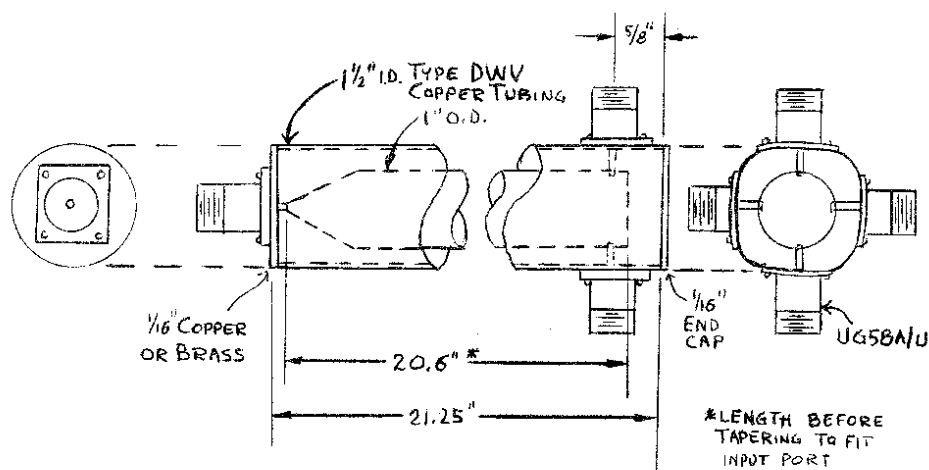
It was not long after the invention of the telegraph that the operators discovered that they could "read" the clicking sounds directly and that they did not need the paper strip with the dots and dashes. So the spring motor and the paper roll were discarded for an empty wooden box to make a loud sounder.

(PART 2 IN NEXT ISSUE)

# POWER DIVIDERS FOR 2 METERS

By Harry Brown, WA3NGK

When an array of antennas is used, one of the many problems encountered is the feeding of power to several 50 ohm antennas from a single 50 ohm transmission line. The Packrat Antenna-Bits manual shows many ways of accomplishing this but they all had the drawback (to me) of requiring several lengths of transmission line to be cut to multiples of a quarter wavelength in order to give the correct impedance transformations. This requires a knowledge of the velocity factor of the cable being used and is not all that involved once you've done it but I would rather do things simpler and not fool around with a lot of grid dipping. I looked up the note in the VHF column of QST for October 1973 and reviewed the power divider designs of WQEYE. In case you're not familiar with these power dividers, the 4 way model consists of two quarter wave lines connected together (in parallel) in the center to a common 50 ohm port. The ends of each quarter wave line have two 50 ohm ports connected in parallel. The two 50 ohm ports in parallel represent 25 ohms which is transformed to 100 ohms by the quarter wave line that has an impedance of 50 ohms. The two 100 ohm ends in parallel at the center of the power divider give a 50 ohm common port. I decided to use this approach but instead of using two quarter wave lines all 4 output ports were placed in parallel at one end of the line and their parallel load of 12.5 ohms was transformed to 50 ohms in a single quarter wave line. This required a transmission line of 25 ohms. Calculations were made to see if standard round copper plumbing tubing could be used since I couldn't locate square aluminum tubing. It was found that if 1.5 inch i.d. tubing was used for the outer conductor and 1" o.d. tubing is used for the inner conductor, a 24.3 ohm line would result. The drawing of the power divider shows the final results. The center conductor is tapered to a cone shape at the single port end starting at .75 inches from the end. V shaped sections are cut out with a hack saw and the sides are bent and soldered to the connector center pin. At the 4 port end, notches are cut into the center conductor at 90 degree intervals for soldering to the center pins of the output connectors. When the plate supporting the input connector is soldered to the outer conductor be very careful that excessive solder does not enter into the line to cause a short. The 4 port end of the outer conductor is squared a little by squeezing it in a vice to make it easier to mount the four UG58A/U connectors. They can be mounted with four screws each or can be soldered in. A cap should be soldered on the four port end to prevent moisture from getting inside.



2 METER 4 WAY POWER DIVIDER

If only a 2 port model is required, the line should be 35.35 ohms. Type M copper tubing with an i.d. of .75 inches can then be used for the center conductor since it's o.d. is approximately .843 inches. This gives a line having 34.5 ohms. Although they haven't been built, this same approach can be used at 50, 220, and 432 MHz by scaling the lengths to give the proper quarter wave lines.

SWAP SHOP CONTINUED

FOR SALE: Vanguard mosfet 45 Mhz RF preamp. \$5. RCA 5 in. scope-WO-79, rack mnt. \$75.  
DeMornay Barardi H-460 MicroWv load \$10. Heath VTVM-V7A, NEW \$35.  
PS-HB, Rack Mnt. 150V., 200 ma. \$15. Heath Grid Dip Meter GD 1B \$15.  
220 Mhz, Barry rig w/ PS-rack mnt. \$20. Scott Comm. Rcvr-90Khz to 23 Mhz-rack  
20 mtr. novice type xmtr. \$10. mnt. \$40.  
Waters 50-52 Mhz. 100 Watt LP filter Johnson 6 N 2 Xmtr, with VFO-rack mnt. \$25.  
model 373-6 \$10.00 AM Modulation 3 in. Scope with PS,HB \$10.  
Panoramic analyzer military 110V. AC-30 ARC-5 VFO, 7-9.1 Mhz, with PS & NFM  
Mhz input .5 inch \$20.00 Mod. Rack mnt. \$15.  
Heath Transistor checker IT-10 \$10. Heath Mobile PS GP-11, 12 volts \$10.  
Heath Battery Eleminator BE4, 12V, 7.5A \$20. INQUIRE ABOUT OTHER TEST EQUIPMENT ITEMS  
Knight #P2 SWR Power Meter \$10. CONTACT: Ed Kushner, W3HKZ  
Phone: 215-825-0775

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FROM FOUNDATION FOR AMATEUR RADIO, INC.

PRESS RELEASE:

The Foundation for Amateur Radio, Inc., a non-profit organization with its headquarters in Washington, D.C., announces its intent to award three scholarships for the academic year 1976-77. All amateurs, wherever resident in the U.S. and holding an FCC license of at least General class, can compete for one or more of the awards if they plan a full-time course of studies beyond high school.

The John W. Gore Scholarship pays \$750. Applicants must intend to pursue a career in electronics or a related science and have completed at least one year in an accredited college or university toward a baccalaureate or higher degree. Preference will be given to residents of the District of Columbia, Maryland, and Northern Virginia.

The Richard G. Chichester Scholarship also pays \$750. Applicants must be members of the ARRL and be sponsored by an ARRL-affiliated club. There is no restriction on the course of study, but applicants must be enrolled in or have been accepted by an accredited university or college and intend to seek a baccalaureate degree. Preference will be given to residents of Ohio, Kentucky, Indiana, Illinois, the District of Columbia, Maryland, and Northern Virginia.

The Edwin S. Van Deusen Scholarship pays \$250. Applicants must have been accepted or enrolled in an accredited 2-year technical school and intend to seek an Associate degree in a science-related area. Area preference is the same as the Gore Scholarship.

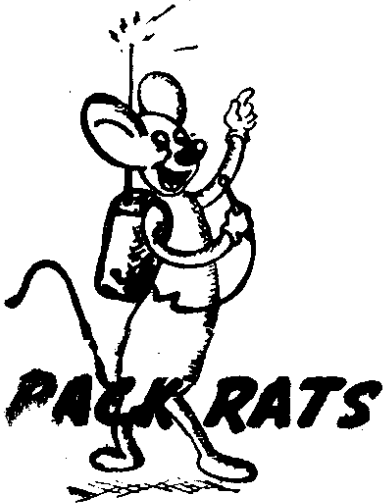
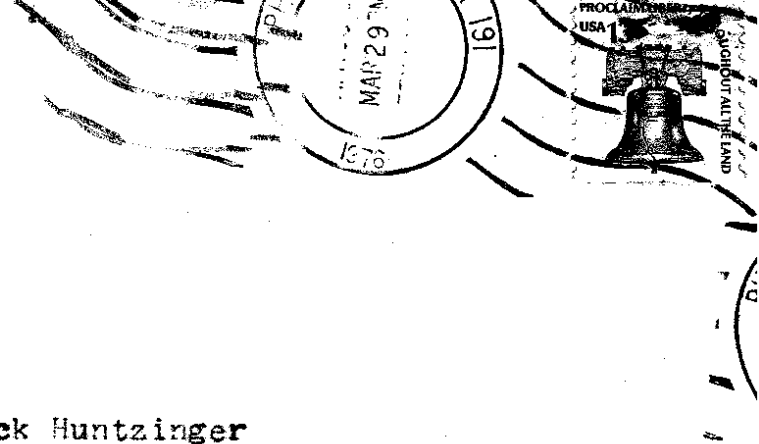
Application forms can be requested from the Chairman, Scholarship Committee, 8101 Hampden Lane, Bethesda, Maryland 20014. Requests must be post-marked prior to June 1, 1976.

The Foundation is devoted exclusively to promoting the interest of amateur radio and to scientific, literary and educational pursuits that advance the purposes of amateur radio.

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NOTE: Anyone having a 220 MHz Ringo Ranger ARX-220 with a black plastic insulator in the base section should remove the ring and tuning rod and return the base section to Cushcraft in Manchester, N.H. for insulator replacement. Gain with the black insulator is only 3db. Cushcraft will replace it free of charge.

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OFFICIAL BULLETIN NR 581 FROM ARRL HEADQUARTERS NEWINGTON CT MARCH 18 1976 TO ALL RADIO AMATEURS BT: A new Emergency Reference Information operating aid is now available from ARRL. This form, of particular use to mobile repeater users, fits the sun visors of most automobiles. The card provides a convenient place to record the information necessary to accurately and efficiently report emergencies. To receive your copy unfolded, send an addressed six by nine inch envelope, with 13 cents United States postage, to ARRL, 225 Main Street, Newington, Connecticut 06111. Ask for CD-209, the Emergency Reference Information card. AR

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