

PACK RATS'



PACK RATS

CLUB CALL: W3CCX

MT. AIRY VHF RADIO CLUB, INC.

CHEESE BITS



MT. AIRY VHF RADIO CLUB, INC., PHILADELPHIA, PA
50.2, 145.2, 432.03, 1296.03, Repeater - WR3ACD - 222.98/224.58 Mhz.

ARNS

AFFILIATED CLUB: AMERICAN RADIO RELAY LEAGUE

MEETINGS: Third Thursday of each month at 8:00 P.M.
Southampton Free Library, 947 E. Street Rd.
Southampton, Pennsylvania, 18966

VOLUME XIX

MAY 1977

NUMBER 5

THE PRESIDENT'S PLATFORM

The month of May - a busy month of activities on the Pack-Rat calendar. By the time you read this, the Banquet and Ladies Nite at the Buck Hotel will be over. An enjoyable time for all thanks to the fine work of Chairman John Tate, K3KTY.

The meeting this month is ARRL NITE. We feel especially honored by the visit of our good friend Ed Tilton, W1HDQ who will be the featured speaker of the evening. Connie-Mac, W3SW, the Director of the Atlantic Division will be there to tell us about the latest league happenings.

There will be a renewal of another Pack-Rat event on the evening of May 26th - a Thursday - from 7 PM to 8:30 PM, a transmitter hunt on 220 Mhz. as suggested by Tony Souza, W3HMU - it will be called 'the Rats looking for the Cheese'. Better get to those handbooks and build up the 220 Mhz. beams for mobile operation.

The local hamfest season is off and running. The Warminster ARC will be having one May 15 almost in our back yard at the Wm. Tennant School grounds. Just go to W3ZD's QTH and look to the left across the field.

Those of you who have'tn been to our meetings lately are missing the whole parade. Come on out and join the fun of good technical programs, fine special guest speakers and always a few surprises that make the visit worth while.

A special thanks to Wayne Overbeck, K6YNB, Chairman of the ARRL CAC who stopped over for an evening for contest rules discussion with a representation of Pack-Rats. He took this time out of his busy schedule while traveling on the East Coast.

That's it for this month except you should be thinking about nomination of club officers coming up. Will look for you all on the repeater- 220 that is.

73, Lee K3MXM

VISITORS AT THE APRIL 21, 1977 MEETING

WA3IWT, Richard Prim, Feasterville. WB3DNH, Glen Weisman, Phila. W3RZU, Elio Colussi, Ambler. WB3DAD, Joe Colussi, Ambler. K3WKM, Steve Belcak, East Norriton. K3HIN son, Louis Albert, Phila. W3AJS, C.E. Keener, Oreland. WA3WAS, Steve Simons, Phila. K3EIF, Irv Cheskis, Phila. WA3QWO, Earl W. Downs, Jamison. exW1-, James Benjamin, Penna.

Pack Rats CHEESE BITS is a publication of THE MT. AIRY VHF RADIO CLUB, INC. Philadelphia, Pa. and is published monthly.

Subscription Rate - \$1.50 per year.

We operate on an exchange basis with other publications. Anything that is printed in CHEESE BITS may be reprinted, unless otherwise stated, provided that proper credit is given.

SWAP SHOP ITEMS - no charge.

DEADLINE FOR ARTICLES IS THE GENERAL MEMBERSHIP MEETING.

EDITOR:

W3CL, Harry B. Stein
2087 Parkdale Avenue
Glenside, Pa. 19038
215- TU7- 5052

PUBLISHER/SUBSCRIPTION MANAGER:

K3GAS, Doc Cutler
7815 New Second Street
Elkins Park, Pa. 19117
215- ME5- 1078

PRINTER:

K3IGX, Richard Boyle
7915 Bayard Street
Philadelphia, Pa. 19150
215- 927- 6471

TYPIST:

WA3TEM, Marsha Lissauer

TRUSTEE OF CLUB CALLS: W3CCX - WR3ACD

W3SAO, Francis Brick
821 W. Lindley Avenue
Philadelphia, Pa. 19141
215- DA4- 7524

AWARDS CHAIRMAN:

W2EIF, Joseph Kilgore
#5 Sunnybrook Court
Stratford, N.J. 08084
609- 783- 9478

CLUB HISTORIAN:

W3SAO, Francis Brick

OFFICERS: 1976 - 1977

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COR. SECY: WA3NGK, Harry Brown
REC. SECY: WA3NFV, Danny Mitten
TREASURER: K3GAS, Doc Cutler

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WA3AXV, Ron Whitsel (Ex-Officio)
K3IGX, Richard Boyle (2 years)
K3JJZ, Elliott Weisman (2 years)
W3HQT, William Olsen (1 year)
W3YXF, Joseph Rushton (1 year)

MONDAY NIGHT NETS:

145.2 MHZ 7:30 PM
50.2 MHZ 8:30 PM
221.4/224.58 MHZ 9:00 PM
432.03 MHZ 9:30 PM
1296.3 MHZ 10:00 PM

NET CONTROL

W2EIF
W3CL
K3GAS
K3IUV
W2EIF

FRIDAY NIGHT ATV NET:

439.25 MHZ 7:00 PM

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CALENDAR OF COMING EVENTS
Syllabus by Lee, K3MXM

- MAY
Fifth Month of the Year from Latin Maia - Goddess of Growth.
- 1 Sunday, Delaware Valley Radio Association Hamfest and Auction. Villa Victoria Academy, Rt. 29 (River Road) at I-95 West Trenton, N.J. 9:00 am to 4:00 pm. Talk in 146.07 - .67 and .52 simplex.
- 5 Ice Machine invented in 1851.
- 7 Potomac Area Hamfest - Frying Pan Park, Herndon Virginia.
- 7-9 Third Annual East Coast VHF/UHF Conference, University of New Hampshire, Durham, New Hampshire.
- 7 For our Western Pa. Readers - Meadville, Pa. Hamfest, Details, Cars. P.O. Box 653, Meadville, Pa.
- 7 Binghamton, N.Y. Hamfest, Details STARC, P.O. Box 11, Endicott, N.Y.
- 8 MOTHERS DAY
- 12 Board of Directors Meeting, QTH, W3HMU, Tony Souza, Ottsville, Pa. If lost, call 847-5017. Directors and interested parties invited.
- 15 Warminster Amateur Radio Club Hamfest, William Tennent High School, Warminster, Pa. 9:00 am to 4:00 pm. Talk-in 146.52 or .16 - .76
Flea Market, Auction, FM Clinic, Demonstrations. Info: K3ZAC, Horace Carter. Phone: 215-345-6816. Rain or Shine.
- 18-22 Hobby Electronic Fair, Phila., Pa.
- 19 Regular meeting - Southampton Free Library, 8:00 P.M. SHARP. ARRL NITE
All area clubs invited. Open meeting to all. Speaker Ed Tilton, WHDQ. Also, Mr. "Connie-Mac", W3SW, Director Atlantic Division to present awards. Mario's Raffle, Frankies Silent Auction, Refreshments. Meet the speaker Dinner at the Buck Hotel. 6:00 PM
- 20 Lindberg's Flight, 1927. Just try to grasp how far aviation has come and grown in these past 50 years!!
- 20-22 Rochester Hamfest, Details, P.O. Box 1388, Rochester, N.Y. 14603
- 23 Victoria Day, Canada
- 26 Hidden Transmitter Hunt on 220 MHz. 7:00 p.m. to 8:30 p.m. Details on nets.
- 30 MEMORIAL DAY
- 30 Giant CB Fair, Pocono International Raceway
- JUNE
3-5 "77 ARRL National Convention, Toronto, Canada. Info. Scarborough ARC, VE3WE, P.O. Box 1011, Station "C", Scarborough, Ontario M1H 2Z4
- 11-12 ARRL VHF QSO PARTY, Hilltown, Pa. Bill Olsen W3HQT, Chairman. Watch for an announcement of a Committee meeting!
- 25-26 ARRL - Field Day

By Lyn, W3NSI

1. KENWOOD TS 600: Kenwood Trio Co. will be selling a six meter version of the TS 700A 2 M unit that has been so popular. Like the 700, this unit covers the entire band and all modes. The front panel layout is the same, however the controls are different at some locations. Price, expected to sell for the same price as 700. \$599.00.
2. FM TRANS. REC. UNITS: Hamtronics of Rochester, N.Y. will start selling a new line of kits this May for use on 50-144 and 220 Mhz. These will be FM T/R VX-52/VX-144/VX220 value line kits featuring 6 channels, 2 watt transmitters, and receivers with 2 RF stages. Units are built on 7 1/4 x 5 1/4 inch PC boards and use standard crystals. Other standard features include, SS Switching, .2-.4 U/V receiver sens. and separate mic gain and dev. controls. Price \$99.95. 182 Belmont Road, Rochester, N.Y. 14612
3. MIDLAND 2M FM DIGITAL T/R: Midland International has a new model 13-510, 25 watt output FM rig which covers 144-148 Mhz. The digital readout (6 numbers) can be set to any of 400 frequencies in 10 Khz steps. There is also a push button to select frequencies 5 Khz up from these points, allowing split channel operation. Repeater offsets of 600 Khz plus and minus can be set with a front panel control. Price \$400. Box 1903, Kansas City, Mo. 64141

* * * *

VHF/UHF REPORT

By Jo, W2EIF

The six meter band continues to show low activity - everyone seems to be waiting for the E skip season, which should start about the 1st or 2nd week of May. The 600 point award by ARRL seems to have spurred some interest, but don't understand the requirement that ARRL members only are eligible. If the award was to spur 6 meter activity, one would think that it should be for anyone considering the apparently small numbers that are on six nowadays.

There was an aurora which affected 6 and 2 meters on the evening of April 6th. It was not very intense and apparently was noted only in the early evening hours. The highlight of this month's report concerns the evening of April 20th. All bands 50 thru 1296 were involved. It was a coastal opening extending from central N. Carolina to Maine. It did not extend too far inland.

2 meters was active with CW and SSB from 144.05 to about 144.15 and 145.0 to 145.15 Mhz. Stations in N.C. and New England stations near Boston were "pinning the needle" all night. The surprising activity was on 432 where the signals appeared to be even stronger and very numerous. It has gotten to the point that you had better be transceive or VFO control or the station won't come back to you. Outstanding signals were W1JR near Boston and WA4GPM in Norfolk, Va. K1FJM/4 in N.C. and K4PUV adequately represented that State. Most of these are high power stations but those running 10 watts were also strong.

The condition was also present on 1296 Mhz. W2EIF, WA3JUF, W3HMU and K1PXE all worked K1QIF in Norfolk, Va. with very strong signals both ways. Let us hope that this is only an indication of good things to come this summer.

* * * *

UPCOMING CLUB MEETING EVENTS:

June Election Nite - Contest Crying Towel Session, Old Fashioned Eyeball Rag Chew.

July Outdoor Meeting - QTH W3ZD, Zimmerman's Culch. White Elephant and Regular Auction
Start clearing the cellar now in preparation.

August Outdoor Meeting - Movie and Slide Nite, QTH K3GAS, Doc's Patio.

TID BIT: The club Picnic will be on August 14th at the Ft. Washington State Park; Mark the date on your calendars!!!

The Club will conduct its first Hidden Transmitter Hunt - In some five years - on Thursday Evening May 26th from 7 P.M. till 8:30 P.M. The frequency will be the output of the Club repeater 224.58 Mhz. It is being conducted by Tony, W3HMU and Dave, WA3JUF. Start getting your equipment and special sniffer antennas in shape!

Normally I am interested in writing technical articles and leave editorial comments to others but the Jack Anderson column in the Phila. Evening Bulletin of April 4, 1977 triggered me into making some observations.

He writes that the Amateur Radio Service has over 100 times more frequency spectrum than the CBers. Further, that the Amateurs have more total frequency spectrum than all the police, fire, all FM broadcasters (commercial and educational), and the TV stations on VHF in both New York and LA. That would be channels 2,4,5,7,9,11, and 13 in both cities. The total frequency spectrum allotted to the Amateur Radio Service on the so called regular bands from 1.8 Mhz to 450 Mhz is 46.5 Mhz. Starting from the same frequency point but including the 450-512 Mhz band the police, fire and FM broadcasting plus the TV channels mentioned in both cities has a total spectrum allotment of 212 Mhz. On our higher bands there is some activity on the 1296 and 2300 Mhz bands. Beyond these bands and presently including all frequencies above 10 Ghz the activity is practically nil. The lower part of this band has a wavelength of 3 cm. and there is no theoretical limit to this part of the spectrum so it is easy to say that the Hams are favored.

Mr. Anderson is further misinformed about the American Radio Relay League as a lobbying organization. This of course is not so since the ARRL constitution forbids such activity.

Mr. Anderson completely overlooked the reason for the overcrowded conditions on the CB bands. Just listen to CB for a little while and discount the small children with their new toys. You will find that a lot of activity on CB is just about the same that one hears on the Ham frequencies. Many of these people have lengthy discussions on topical matters and question each other on technical subjects. The FCC established CB to provide a cheap means for personal or business communications. Those that use CB for other purposes such as so called hamming are really violating the essence of the law. All they need to do is to learn 5 wpm code and some simple electronic theory and obtain an Amateur license so they can then do all the "hamming" on the Amateur bands. It is indeed unfortunate that many folks are frightened or too lazy to study a bit and obtain an Amateur license. Our country is filled with people wanting instant everything. When will they learn again that the things that are truly worthwhile still take some time and effort.

* * * *

April 4, 1977

BARCC FINAL REPORT

by Dave Zimmerman, Chairman

To those of you who may not remember, the Atlantic Division ARRL convention was held in Philadelphia last July 23,24,25. Those who worked on the effort were the Bicentennial Amateur Radio Convention Committee, from whence came BARCC. Financially, the convention was not an outstanding success, and a bit of negotiating was needed with the hotel to avoid a first class disaster. The latter is the reason for the long delay in issuing the final statement.

It now can be reported that the committee is about to close the books on BARCC. An appeal was sent out to the twenty odd clubs who supported the affair, and some of them together with some individuals including some committee members came through.

I would like to thank the following for their contributions and to say that the committee appreciates the effort:

Dick Loveland, WA3LAK
Jesse Bieberman, W3KT
Horace Carter, K3ZAC
Ed Braddock, W2BAY
Pete Shavney, WA3OVH
Paul Mercado, W3FBF

Joe Frezza, WA3VGT
PJYL Radio Club
Penn Wireless Association
Frankford Radio Club
South Jersey Radio Association
Mt. Airy VHF Radio Club

Also, there was a raffle held 1st Summer, and the prizes awarded at the Pack-Rat Hamarama. Many helped out with the ticket sales and almost \$500.00 was picked up that way and I would like to thank those that supported that effort.

* * * *

The Foundation for Amateur Radio, Inc. a non-profit organization with its headquarters in Washington, D.C., announces its intent to award four scholarships for the academic year 1977-78. 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.

The Radio Club of America Scholarship also pays \$250. There is no restriction on the course of study, but applicants must be enrolled in or have been accepted by an accredited university, college or technical school and intend to seek at least an Associate degree. There is no area of preference.

Application forms can be requested from FAR Scholarships, 8101 Hampden Lane, Bethesda, Maryland 20014. Requests must be postmarked prior to June 1, 1977.

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.

* * * *

OFFICIAL BULLETIN NR 641 FROM ARRL HEADQUARTERS
NEWINGTON CT APRIL 14 1977 TO ALL RADIO AMATEURS BT

New amateur rules for purity of emissions have been adopted by FCC and go into effect on April 15. As of that date, harmonics and other spurious signals must be reduced 40 db below the mean power of the fundamental for transmissions on frequencies less than 30 Mhz, and must not exceed 50 milliwatts. Above 30 Mhz, the spurious radiations must be reduced 60 decibels, and must not exceed 25 microwatts. The action is contained in a First report and order, docket 20777. No action has yet been taken by FCC with respect to modes and bandwidths which were also discussed in that docket. ARRL has filed two Petitions with FCC concerning this first report and order, one requesting a nine month stay of the effective date of the new rules, and one requesting reconsideration of the whole matter. Needless to say, the rules will be in effect until action is taken on one or both requests, but the commission stated its belief that the majority of bona fide amateur equipment readily meets the standards and should not require extensive modification.

* * * *

OFFICIAL BULLETIN NR 640 FROM ARRL HEADQUARTERS NEWINGTON CT APRIL 7 1977 TO ALL RADIO AMATEURS BT: The completely new WIAW spring-summer schedule is ready for distribution. Designed for ease of use, the new schedule details code practice as well as various call signs. The tabulation indicates PDST, CDST, EDST as well as UTC. In addition, information is included on the ARRL Qualifying Run Program. Please send an addressed stamped envelope to ARRL, 225 Main Street, Newington, Ct. 06111 and ask for your copy of the new WIAW schedule. AR

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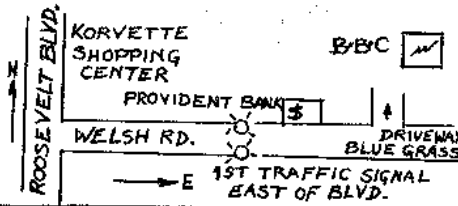
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CONTACT: Bob Welsh, W3CZM

2632 Brownsville Rd.
Langhorne, Pa. 19047
Phone: 215-757-7764

FOR SALE: Tempo MR-2 VHF HiBand Monitor, 140 to 170 Mhz (can be converted to 220 Mhz) 12 channels receive with recharger and rubber ducky - \$85.

CONTACT: Don DeRosa, WA3HVL
205 W. Champlost Ave.
Phila., Pa. 19120
Phone: 215-WA4- 8101

WANTED: 7 or 11 element 2 Mtr. beam. Will buy or trade Telrex 6 el. 6 Mtr. widespaced.

CONTACT: Henry Slapkowski, Box 908-A
Sicklerville, N.J. 08081
Phone: 609-227-6149

FOR SALE: RME VHF 126 tuneable Converter, for 6,2, and 220 - \$75. 6M-450Mhz. IF - \$5. Gonset 6M tuneable Conv. - \$10. Morrow 5 band Auto Conv. - \$10. 6M FM monitor radio, xtal for rpt. and simplex - \$20. 2M FM monitor radio - \$15. RCA Carfone HiBand - \$30. 2M 417A Conv. - \$10. 2000 VDC, 500 Ma Pwr Sply w/Variac Con. - \$50. 30 Watt Modulator - \$25. 2M HB RF deck, 2E26 out - \$7.50.. 2M HB Xmtr. 6146 - \$15.

CONTACT: Elliott Weisman, K3JJZ
8533 Algon Ave., Phila., Pa. 19152
Phone: 215-742-3525

FOR SALE: HW202 2FM slightly modified with Pwr Sply - \$200 or trade for HT. HW-7 low band QRP- \$75.

CONTACT: Earl Garber, WA3ZRE
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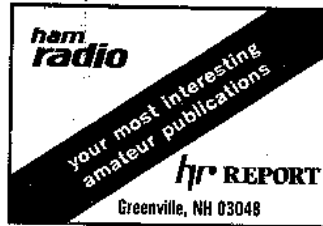
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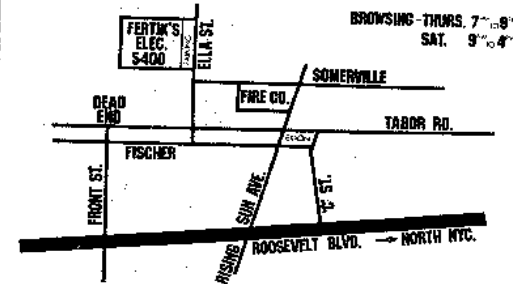


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W2HX

When Mercer County Civil Defense wanted to buy portable radios that can direct dial any telephone within 50 miles and cost more than \$1,500 each, B.B. Wentzel was called to test the equipment.

Wentzel has been pioneering radio in Trenton since he built the first commercial station here in 1920.

That station was at the F.S. Fatzenbaugh hardware store at 38 W. State Street, which sold crystal receivers made by Wentzel.

Involved in amateur radio since he was 19, Wentzel took "B.B." as his radio name when amateur radio was mostly Morse code. He still uses it.

Not all of the 73-year old Wentzel's ideas were so well received. In 1921 he designed and installed a two-way radio system for the Trenton Fire Department.

"This was the first two way radio set-up in the country for fire and police and it cost \$6,000." Wentzel recalled. "That was a lot of money at that time. People started hollering about the cost. It became too heated even for the fire department to handle and the system was pulled out," only to be replaced at greater cost in 1940.

White haired, blue eyed and looking like somebody's favorite uncle, Wentzel has used his hobby turned profession to improve the design and application of electronic equipment.

"Developing the impossible is the nature of amateur radio." Wentzel said.

"It's also the nature of Wentzel, 1941 found him working at the Palmer physics laboratory at Princeton University, building the components for early experiments in rocketry and telemetry.

"It was all top secret then," he says. "We used to go out to the football field at 5 a.m. and fire a rocket tied to a pole for guidance experiments while it flew around in circles."

That work was the basis for the telemetry used between ambulances and hospitals today Wentzel says.

Before the Second World War ended Wentzel would construct parts for experimental models of the atomic bomb and anti-aircraft proximity fuses.

In 1952 he was working in a small room of the Palmer labs with parts bought from local electronics stores. The project was top secret. He was one of a few starting the search for a Hydrogen Fusion Reactor.

Today that project involves 800 people and nations all over the world.

Wentzel represented Princeton at the "Atoms for Peace conference" in Geneva in 1958, where he met an old friend for the first time.

Since the early days of radio he has communicated regularly, first by code then by voice with Christian Nauf of Gent Belgium. He still speaks to him every Monday morning at 9 a.m. on the radio.

Wentzel retired from the Palmer lab in 1969. He has since been volunteering most of his time to the Civil Defense which he joined in the 1950s.

Mercer County has gained one of the finest CD communications operations in the nation since Wentzel began installing and maintaining it in 1955.

"He is one of the most knowledgable men in a highly technical field in the country," says William H. Falcey coordinator of Mercer County Civil Defense.

The equipment in CD Headquarters in Ewing links the sheriff, state police, Mercer Metro Bus Company, highway department, hospitals and Red Cross.

The network Wentzel set up as Communications Coordinator includes amateur radio check point on each of the major roads into Trenton. No one was complaining about the cost when these check points were guiding 112 emergency fire engine pumpers to the hardest hit parts of a waterless Trenton during the summer of 1975.

Note: BB is a senior Pack-Rat and has been the secretary of the Delaware Valley Chapter, QCWA for many years.

OID BITS

Congratulations to Greg Adams, WA3UXM who made Private 1st class in the Marine Corps. Greg has been attending school in Palms, California.

Had an Fb telephone conversation with Carl Barish, WA2MWB. He reports that his company, Melco Labs, is transferring him to their home office in Seattle, Washington. Company phone: 206-641-7200. His new home QTH as follows:

Carl Barish, WA2MWB/7
737 Kirkland Way
Kirkland, Washington 98033.

Best wishes to you and Jane, keep in touch!!

A speedy recovery to Edna, XYL K3EPB, Howard Fratz who underwent surgery recently.

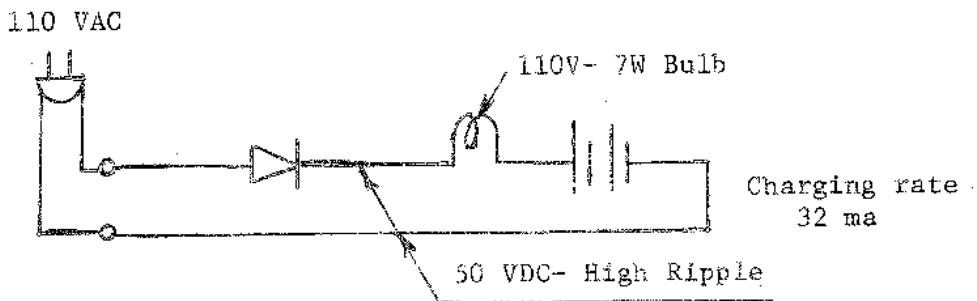
A very fine illustrated lecture on the design and manufacture of transistors was presented at the April meeting by James Benjamin of Solid State Scientific Co., Montgomeryville, Pa. He was ably assisted by Steve Belcak, K3WKM and our own Pack-Rat, Elio Colussi, W3RZU who was accompanied by son Joe, WB2DAD. We also appreciate the gift transistors which were placed in the Mario Raffle. Come again real soon.

JACK ANDERSON'S "ANTI-AMATEUR RADIO" column (HRR 143) turns out to have provided one of the best PR opportunities Amateur Radio has had in recent years. Copies of many letters to the editor, a good number of them already published, have been received by HR Report and Pete O'Dell, ARRL's Public Information Officer, says the League has a pile of pro-Amateur Radio clippings about four inches high with more coming in every day. In Michigan WB8VBP even managed to turn Anderson's blast into invitations to two radio talk shows, where she was able to push the positive side of the Amateur Service very strongly.

Welcome home to Muriel (Xyl K3IGX) after a short hospital stay. Keep well.

* * * *

QUICKIE BATTERY CHARGER



This charger will work somewhat on 9V transistor batteries, but does a good job on Ni-Cads. I have charged one 1.2V Ni-Cad and I have charged eight 5V Ni-Cads in SERIES. It works as is.

This is the same charger circuit sold for about \$9.00 in the various electronics stores and catalogues.

Al Jorrett, W30WK/K2LK

(From the Philmont "BLURB")

RTTY ANTHOLOGY (Part 11)
by Ralph Alexander, WA3FOF
THE MODEL 19 KEYBOARD

The Model 19 keyboard and the Model 15 keyboard employ the same method for the generation of Baudot Code. These keyboards share the polar neutral switch that connects the machine magnets directly into the main loop circuit; or places the operating winding of the polar relay into the main loop and connects the polar relay contacts and the machine magnets into the local loop.

In addition, the Model 19 keyboard can produce a chad tape. A chad is a small round piece of paper that is punched from the tape in making a hole in the tape. A chad tape is one that has holes in it for each MARK and it produced chads when it was made. For a chadless tape the hole is punched thru the tape three quarters of the way around the chad and the unpunched one quarter acts like a hinge for the chad so that the front part of the chad is held to the tape. The chadless tape does not produce chads, and since it has no holes it can be printed upon. Tape is a very important item in any good Amateur RTTY station.

Most Hams say the same thing with each new contact such as name, QTH, equipment run down, etc. To type all this information every time it is sent is repetitious - why not put it on tape. Most people cannot type as fast as the machine speed of 60 WPM so tape transmission is useful to speed up the QSO. Using the Model 19 keyboard it is possible to tape a message or a reply at your leisure. When the time comes during a contact to transmit the required information, you do so at the system speed with a transmitter/distributor. Another useful tape is one with several lines of test combined with a CQ. While the tape is running both the sender and the receiver can adjust their equipment for proper operation.

Another name for the Model 19 keyboard is a 'punch' or perforator 'punch'. These names are not to be confused with the re-perforator or with the typing re-perforator which will be discussed in a later article. When a key lever is depressed on the Model 19 in the tape mode, it will cause that character to be punched in parallel Baudot Code on the tape and may or may not print the character on the page. For each character including the blank character there will be a feed hole close to the center of the tape. This hole is smaller than any of the information holes. The remaining positions (two above and three below the feed hole) will have a hole whether there or not there. If a hole is present, it indicates that the segment is a MARK; if the hole is absent, it indicates that the segment is a SPACE. Because of the manner of construction, it is not possible to punch on tape any messages from off the loop; but it is possible to print messages on the page from off the loop. However, while the page is printing from the loop, the keyboard can punch a reply on the tape since the keyboard is mechanically connected to the punch.

The Model 19 perforator punch operates as follows:- The code bar as well as the universal bar have additional extensions to the left of the machine. The code bar extensions will move to the left for a MARK and to the right for a SPACE. There is a sixth arm on the punch system that is in a fixed position midway between MARK and SPACE and it punches the feed hole. The universal bar, which moves any time an operation is selected, has one pair of contacts connected to it. When this set of contacts closes, it completes the connection for the punch magnet. When the contacts on the universal bar open, the punch magnet resets, and the advance system moves the tape ahead one position.

The power for the punch is obtained from a large loop supply at 1 A., 110 VDC. It also supplies normal 60 ma. loop current as well as bias voltage. The resistance of the punch magnet is 19 ohms. The additional magnet circuit resistance is made up of series resistors that are located under the bottom of the keyboard assembly. A large capacitor is also located here which is used to suppress the arc at the contacts that feed the punch magnet.

One of the unique features of the Model 19 is that it may be operated in the loop mode, in the punch tape mode or in both loop and punch tape modes together. The switch for this selection is on the right hand side of the machine. In the tape only position the universal bar linkage is mechanically disconnected from the transmitting contacts for the loop, and the tape is punched with no printing on the page by operation of the keyboard. The keyboard position is the same as the Model 15 operation. In the keyboard tape position the tape is punched and the page is printed by the operation of the keyboard.

Most Model 19 keyboards have a counter which is usually mounted on the front of the punch system. A normal line has 72 characters but the counter usually has 80 positions. There is an indicator light that may be set to warn the end of any length of a line or to tell the operator when to use the carriage return while punching a tape. The counter will reset to zero with the carriage return.

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