HAM HUM

Published by
AK-SAR-BEN AMATEUR RADIO CLUB, INC.
Post Office Box 291 — Downtown Station
Omaha, Nebraska 68101

September 1978

Vol. XXVIII
No. 9

HAM HUM is the official organ of the Ak-Sar-Ben Amateur Radio Club, Inc., of Omaha, Nebraska, mailed monthly to all members and to others upon request.

Published by:
AK-SAR-BEN AMATEUR RADIO CLUB, INC.
Post Office Box 291
Omaha, Nebraska 68101

President ..... James R. Peterson, WBØQGV
Phone: 558-0643
Editor ..... Dick Eilers, WØYZV
Phones: Res.: 397-3999
Bus.: 342-1402, X-20
Assistant Editor . . . John Snyder, WØWRT
Phones: Res.: 556-1538
Bus.: 397-3000, X-3542

Copy deadline for Oct. issue is Sept. 19th.

Dues-Annual Basis
(Due and Payable each January 1.)

New member initiation fee	$ 1.00
Regular member	$10.00
Regular member and spouse	$12.00
Student member	$ 4.00

Dues-Quarterly Basis (For each quarter or part thereof for balance of calendar year.)

New member initiation fee	$1.00
Regular member	$3.00
Regular member and spouse	$3.60
Student member	$1.05

NEXT MEETING

WHEN: TUESDAY, SEPTEMBER 12, 1978

TIME: 7:30 P.M.

PLACE: JEWISH COMMUNITY CENTER
333 South 132nd Street
Omaha, Nebraska 68154

PROGRAM: MARS. We hear so much about MARS, but what is it? Who are the members? What is its purpose? How can you get involved?

Many of our members have questions about MARS. Bob Neben, K9BL, will attempt to explain all of these questions and more! CU there.

73s WBØPHP

* * *

VISITORS WELCOME – REFRESHMENTS – EYEBALL QSOs

****

THE PREZ SEZ

Well fellow (and lady) members, spring has sprung – summer has almost ended – and fall is around the corner. Time to check out those :ennas and pick up the shack and put things in order.

Be sure to bring the extras from your shack to our annual picnic for the car trunk flea market. On Sunday, September 24th, we will gather our families, pot luck side dishes, hot dogs and drinks furnished by the Club, for fun and eyeball QSOs in the Missouri Valley, Iowa City Park.

Activity is still heavy amateur-wise as we enter the fall season. Our fall classes will begin in October as WAØDHU, Bob explains in this issue. Also, WAØIWF, Frank has volunteered to teach a class in "how to" electronics, to further your knowledge after you have the license. A site for this class is still being sought. Frank says it's like–all you ever wanted to know about electronics, but were afraid to ask. Still going to stay at home in the evenings this fall?

With so much going on I have given up on the Nebraska QSO Party, at least through early October. It deserves more than a hurried attempt as we need statewide help. KØGND, Reynolds Davis, president of the Lincoln Club, has pledged cooperation. With help from outstate amateurs, we could put our trailer midway between Omaha and Lincoln, n it from both clubs, and talk to state people for public relations weather reports on HF and VHF for the I-80 travelers. Meanwhile the national and international QSOs could be taking place. The big job would come in answering the SASE requests of confirmation. Do I have a volunteer to run this? Or, if you want, pick a co-conspirator and split the job up.

The City/County Building E.O.C. installation is now well underway, thanks to WAØGEH, Marty and crew. He has received funding and donations of equipment for the initial phase. Also, he is recommending action on a Master Plan for Emergency Network Communications for amateur radio. A meeting of those concerned is scheduled for late August, and more will be scheduled if necessary until the details are laid out and responsibilities assigned.

Permanent marking and cataloging of Club equipment should now be underway by the Equipment Committee. All equipment will have an identifying number on it. Type, location and value have already been recorded as we reassessed for our insurance renewal.

Thanks go to John and Tim of the Byte Shop for their program on microprocessors last month. If they got in deep on the technical side, it was because of the penetrating questions from the floor. Still confused? Consider joining Frank's classes for the explanation of solid state devices.

Everybody must have sat down quickly after the Pledge of Allegiance last meeting as WAØVEE was left standing. He stood as a volunteer to repair the Club rotors and controls. Many thanks, Russ. I know we will all appreciate your work, especially next year at Field Day.

Who's the new voice on the repeater? That's right WBØWHO, John is now a general class licensee. And

speaking of the repeater, I see that contributions for maintenance have not kept pace with previous years. Might I suggest that if you expect to have it available for yourself or any itinerate amateur that you support it now. Please!

Contrary to published reports, our towers work fine as permanent installations. If you didn't mail a bid in, you can hand the bid to me at the September Club meeting. I expect to act on the bids now in hand and those received before the next Board meeting.

Plan if you can to attend the Midwest ARRL Convention in Kansas City during October. They are enjoyable and you can upgrade while you are there. If not, the FCC will be here a little later in that month.

A member for each degree in a complete circle. That's right, 360 members strong as of our July meeting. If you haven't received your roster, you soon will. We're still growing.

Are you a worker? Do you know a worker? I know who is doing the work now. Maybe you are a worker but too shy to jump in. I am looking for a few good men (or women) to recommend for nomination to the Board. Your suggestion will be considered as we move toward 1979.

Come and enjoy both Club activities this month – the meeting and bring your family to the picnic.

Jim, WBØQGV

****

LADIES ONLY

What in the world is YLISSBCS??? ...Since there have been inquiries and suggestions that we learn more, our own Irene, WBØMPC, (one of the net controls) has written the following informative explanation:

The YL International Single Sideband Communication System meets on 20 meters, 14.333 seven days a week for the primary purpose of handling emergency traffic. When there are no emergencies for the system, members make contact with each other for a very beautiful awards program. It is not a routine traffic system as they do not handle stateside traffic. There are over 11,000 members at this time, worldwide. To become a member of this wonderful system, a person may send a #10 SASE to WØUUE, Dr. Fred Holzapfel, 422 Clover Leaf Drive, Golden Valley, Minnesota, 55422, requesting information on the system. By return mail he will send you a brochure on the YL System. The dues are $4.00 a year, and after you join you will be given a Single Sideband Number. Everyone is welcome to participate whether a member or not, but to be eligible for the awards, you must be a member and have a number.

The 40 meter system opens each Monday, Tuesday, Thursday, Friday and Saturday nights at 0030Z on 7.280. The 75 meter system opens at 0100Z every Wednesday evening on 3.926. The 15 meter system opens band permitting, daily at 1600 on 21.373. The Moonbeam System follows the daily 20 meter system. Each Friday night the Moonbeamers merge beautifully with the ZL/ZK

System at 0300Z when the SCs change from stateside to ZL/VK.

...Ed. Note, Irene is Third Period Control of the YL Single Sideband Communication System every Monday beginning at 2100Z. OMs and YLs alike may be interested in following Irene's leads for membership application.

33s, Jill, WBØNYH

****

VHF COLUMN
September, 1978

The ARRL September VHF QSO Party will start at 1900 hours UTC Saturday, September 9th, and ends 0600 hours UTC Monday, September 11th. Contest length, use of simplex frequencies and other rules can be found on page 65 of August QST.

Compared with last summer, this year is down in total E_S days on six meters. As expected with high sunspot years, sporadic E activity has been poor. Hopefully this fall will be better.

The Perseids meteor shower August 12th gave several VHFers new states on 2, including KØPAY who worked GA, SC, and NC among others.

Some very good tropo on 2 noted early August 13th to ND, SD, MN; signals at times were 40 over at my QTH.

That's all for now, see you at the meetings.

John E. Bruckner, WAØMRH

****

NO MORE FCC?
By Joe Niemann, WBØFWB

Perhaps you've already read or heard about it. But for those who haven't, a bill (H. R. 10315) has been introduced in the U. S. House of Representatives, entitled, "Communications Act of 1978."

Among other things, the proposed legislation would abolish the Federal Communications Commission (FCC), by repealing the Communications Act of 1934. "Hurray," you say. Well, don't cheer too quickly. In the FCC's place would be a new agency called the Communications Regulatory Commission.

A perusal of the 217 page document would indicate it has very little to do with amateur radio, on the surface at least. It deals mainly with commercial radio and television, public (educational, state, etc.) broadcasting, common carriers and communication satellites.

However, a closer study of the proposal shows that it also orders the creation of a National Telecommunications Agency, an independent agency reporting to the executive branch of the Federal Government. As currently written, the proposed legislation would give the director of this new agency the principal responsibility of studying existing frequency allocation to provide a more efficient use of the spectrum. Specifically, it would order the director to "establish criteria for determining the portions of the (frequency) spectrum which should be made available for various specific uses."

That's where the measure could have a major impact on amateur radio. It's not likely we would gain frequencies under a new "study," but we certainly could lose some.

The bill has been assigned to the Committee on Interstate and Foreign Commerce. Because of the approaching adjournment of Congress, it could be laid over until the next session, but not necessarily.

Such an important measure as this is likely to be the target of many amendments. There's also the chance, of course, that it will not make it out of committee.

This proposed bill should be of major concern to all of us, who, as hams, have a fairly substantial amount of money invested in our hobby. Perhaps this would be a good time to advise your congressman of your interest in this legislation, and urge him or her to oppose any amendment which could prove detrimental to amateur radio.

(For those interested, a copy of the bill may be obtained by calling the local office of your Representative, or by writing his Washington office, requesting H. R. 13015. It should arrive in less than one week.)

****

TEN METER PROJECTS

At the time of this writing, a ten meter repeater is in the near operational stage for the Omaha-Council Bluffs area. The repeater will have an input frequency of 29.52 MHz and an output frequency of 29.[illegible] MHz. The machine will be open to all amateurs equipped to operate it. Repeater call is WBØQPP/RPT.

Time schedule of operation will be limited for the first year. Planned time

of operation will be Monday through Friday from 6:00 p.m. to 12:00 midnight and from 9 a.m. to 12:00 midnight on Saturday and Sunday.

There are many ten meter repeaters in operation across the country. With the crowding of the two meter spectrum and the high cost of equipment in the UHF region, ten meters offers an affordable outlet for the ham who wants a nice local rag chew – mobile or base.

There are several advantages to using ten meters. First, three or six channel CB units are easily converted to use on the ten meter band. Secondly, with a repeater up, it will be possible to work the country with a solid S-9 receive signal. Thirdly, the cost of "limited channel" CB rigs is still in the budget of the ham who just bought an umpteen million foot tower and a Telrex beam.

The receiver site is to be located at Cathedral High School at 3915 Burt. The antenna is approximately 120 feet above surrounding terrain. The receive antenna is a converted CB ground plane. A Realistic TRC-9A three channel unit is used for the receiver. Sensitivity is rated at 0.7uv for 10dB S/N. Selectivity is 6 Kc @ -6 dB – not the best, but adequate.

The COR is a homebrew type that uses the squelch transistor output from the TRC-9A to key a relay. CWID function is provided by a board built by John, WBØCMC. It is a truly find board, John. Provisions for manually keying the system and IDing are accomplished by front panel pushbutton switches. A VHF Engineering transmitter board is used for the link. Output is one watt.

A VHF Engineering receiver board is used at the transmitter site at 4719 Valley. The COR is a duplicate of the one at the receiver site. There are provisions here for local mic, manual test, etc. The ten meter transmitter is another converted CB rig with 5 watts output. Transmitting antenna is another CB ground plane.

For information on how to convert a CB rig to ten, please put the following in writing and send to WBØQPP, 4719 Valley, Omaha, NE 68106:

a. Type of rig (name and manufacturer)
b. Number of channels
c. The frequencies of ALL crystals in the rig (not including i.f. or SSB filters)

Information on how to do it will be sent as soon as possible. If the repeater is not used, it will not remain in operation. Comments, questions, criticism? Call me, WBØQPP...

73,
Scott, WBØQPP
****

RECENT CONTRIBUTORS

Ham Hum Postage

Donald L. Spray WB7ABG

Repeater 34/94

Larry T. Bock, WDØBVG
Ralph C. Fontaine, Jr., WB4BWG

Repeater 22/82

Larry T. Bock, WDØBVG
Ralph C. Fontaine, Jr., WB4BWG

Repeater 40/00

Larry T. Bock, WDØBVG
Loren F. Chase, WBØQYK
Ralph C. Fontaine, Jr., WB4BWG

Thanks to you all and to John Bruckner, WAØMRH, for his donation to the Club of a 6 meter beam.

****

PLAN TO ATTEND THE
FAMILY PICNIC AND
CAR TRUNK FLEA MARKET
OF
AK-SAR-BEN RADIO CLUB, INC.

WHERE: MISSOURI VALLEY CITY PARK – MISSOURI VALLEY, IOWA
(One-half mile east of I-29 on U. S. Hwy 30,
southwest edge of city.)

WHEN: SUNDAY, SEPTEMBER 24, 1978

TIME: STARTS at 2:00 P.M. EAT at 4:30 P.M.

CLUB WILL FURNISH FREE..HOT DOGS..BUNS..COFFEE..COLD DRINK
YOU BRING DISH OF..BAKED BEANS..SALAD..COLESLAW..POTATO CHIPS
OR WHATEVER YOU WOULD LIKE TO BRING

CAR TRUNK FLEA MARKET – In view of interest evidenced by some Club members, you are welcome to hold a flea market from the back end of your car, or bring a table to display your wares beside your car. All money transactions will be handled by individual. No charge by the Club for any sales made. Come early for a preferred parking place.

FUN . . . . . GAMES . . . . . PRIZES – SILVER DOLLARS

EVENTS FOR CHILDREN
* * *

NO RESERVATIONS NECESSARY

ALL AMATEURS, FAMILIES AND FRIENDS ARE INVITED TO ATTEND
****

NOTES FROM AUGUST 15TH BOARD OF TRUSTEES MEETING

Present were: Jim, QGV; Tom, PQR; Jim, JPN; Bob, TVP; Butch, NGD; Jon, GQT; Ken, TXV; Bob, UQJ.

Treasurer's report was read by Jim, JPN. Motion made to accept by Butch, NGD, seconded by Jon, GQT, and approved by the Board.

A motion was made by Ken, TXV, to allocate $250.00 maximum funds for equipment at EOC. This motion seconded by JPN and approved by the Board. More funds may have to be spent on the project at EOC at a later date for a Motorola console and other items.

Tom, PQR, made a motion to allocate up to $160.00 for the Club's Annual Picnic at Missouri Valley, Ia. Motion was approved by the Board.

President Peterson appointed Jim, JPN; Tom, PQR and Marty, GEH as Club Budget Committee Members. Their first budget report will be given at the October Board Meeting. This Committee will enable the Board Members to keep control while spending funds.

Marty, GEH and Tom, PQR brought up an important subject for the Board to consider – what will be the "HUB" of our five Emergency Centers? It appears the Red Cross Center will be the Hub, but this is not definite.

The Board will hold a special meeting with ARES on the 24 of August. We hope to get everyone involved with the Centers and get their input to help us make the network one we will be proud of.

Club Secretary
Robert R. Chereck, Sr., WBØTVP

****

CODE AND THEORY CLASSES

Code and Theory Classes for novice and general privileges will be held at the Jewish Community Center, 333 South 132nd Street, Omaha, at 7:30 P.M. beginning Thursday, October 5, 1978, and will continue each Thursday evening during the month of October. After November 1st, classes will be held at 7:30 P.M. each Monday and Thursday evenings. A $5.00 registration fee will be charged, payable to the Jewish Community Center.

Material to be used for the novice class will be "TUNE IN THE WORLD WITH HAM RADIO" and the ARRL License Manual.

Material to be used for the general class will be the ARRL License Manual and the General Class Tab Book (73 publication).

Anyone welcome to attend. No prior registration required.

Bob Lockwood, WAØDHU
Chairman, Education Committee

****

UPPER BERTH: A place where you rise to retire and get down to get up. –*Service*

****

ADDITIONS TO ROSTER

Larry T. Bock, WDØBVG
1002 North 18th Avenue
Blair, Nebraska 68008
Phone: (402) 426-9549

Donald I. Honke, KAØBJW
6309 North 63rd Street
Omaha, Nebraska 68104
Phone: 571-7656

Verla Kay Larwick, KAØBDM
800 North 34th Street
Council Bluffs, Iowa 51501
Phone: 328-1379

Gaylord M. O'Hara, WAØRWW
4968 South 142nd Street
Omaha, Nebraska 68137
Phone: 895-4559

****

THE FOLLOWING BIT ON NICADS IS FROM GENERAL ELECTRIC'S SERVICE NEWSLETTER. My copy courtesy Willis Wilson, W5FTS.

THE CARE & FEEDING OF NiCd BATTERIES

(NL/76.04/akg)

The public "knows" a lot of things which just ain't so! The public is convinced, for example, that semi-conductors (transistors, diodes) last forever. One needs only to observe the flow of these devices through the replacement parts warehouses to know that the public image isn't fully earned by the actual performance. Ditto for nickel-cadmium (NiCd) batteries. Although the makers don't really claim immortality for their products, a lot of people have that impression. He who naively budgets zero for NiCd battery replacement is due for a shock!

NiCd batteries can and do fail completely, and fail to deliver any power at all. Usually the cells, themselves, are "simon pure" when this happens. The problem is likely to be the interconnections between cells inside the multi-cell assembly. When it happens though, the entire battery goes into the scrap box, unless the pack is one which can be opened up and fixed.

The more insidious fault is "failure to deliver rated capacity." It's difficult to confirm by measurement, and the failure can pass by undetected. "Failed" batteries can and do remain in service and perform their day-by-day mission without fault, only to fall flat when an unusual circumstance demands them to do what they're supposedly able to do. When the chips are down, they "poop out."

Battery capacity is rated in ampere-hours (AH). In the two-way radio field, NiCd battery capacity is usually specified at the "one hour" rate, to an end point of one-volt-per-cell. To test: a fully charged battery is discharged into a load which will dump the rated capacity in one hour. A 4 AH battery is discharged at 4 amps. A 500 MAH battery is drained at 500 mils. The discharge is for one hour in all cases. If, after an hour, output voltage is above one-volt-per-cell, the unit unquestionably meets its capacity rating. If voltage reaches one-volt-per-cell in *less* than one hour, it's unquestionably below its rated capacity. 80 percent of rated capacity is a common maintenance "throwaway" point. If the voltage stays above one-volt-per-cell for 48 minutes or more, you keep it; if for less than 48 minutes, out it goes.

The one-volt-per-cell end point makes good sense to the battery manufacturers, and it's realistic in the two-way radio business. Most of our battery powered gear is designed for this voltage as the lowest to be input and equipment performance usually falls completely apart at lower battery voltages.

Battery capacity can be lost through heat-related deterioration of the cells, induced by *sustained overcharging*. That's the disease. The antidote: Don't overcharge as your usual practice. Heat-related damage

can also result from very heavy discharge currents, as into an accidental short circuit. Of course, we don't plan on this one.

Capacity can be lost when one of the cells in a series string is subjected to *reverse charging.* This happens when a battery is discharged well below one-volt-per-cell. In this "out of spec" condition, one cell is depleted first. The remaining "healthy" cells force current through the "weak sister," and charge in the reverse direction to its chemical detriment. There's another disease. The antidote: Don't do it!

Then, capacity is also lost due to *memory* effects. Long recognized, most of us "understand less than we know" about it! Messrs. Rensabene and Gould shed a lot of light on the subject in their article, "Unwanted Memory spooks nickel-cadmium cells," in *IEEE Spectrum* for September, 1976. Switching from their chemistry talk to layman's terms, NiCd cells are a lot like humans. If you don't require them to perform to the limits of their capacity they lose the ability to do so. A NiCd cell which is consistently exercised to only ten percent of its capacity will fall to one-volt-per-cell in fewer minutes than a battery which is exercised over a much higher portion of its designed-in capability. And, also like people, capacity so lost can often be restored, at least in part, by stress. When dealing with "memorized" batteries, a series of charge/discharge cycles will yield improved capacity for each cycle. That's the third disease. The antidote: Let the period of use between charges use up *most* of the capacity of the battery.

Summing up:

- Avoid sustained overcharge (heat)
- Avoid frequent complete discharge (cell reversal)
- Avoid working off the top of the battery's capacity (memory)

In practice, this requires *management* of charge interval and/or charge rate, and/or charge duration, all in context with the actual conditions of use.

Assume you have conventional chargers, which deliver charging current at the ten-hour rate. Charge current, in amperes, is one-tenth the battery's ampere-hour rating. For a 4 AH battery, charge current is 400 milliamps. For a 500 MAH battery, charge current is 50 ma. Charging efficiency for NiCd batteries is about 0.66. A fully depleted battery is completely charged, not in 10 hours as suggested by theory, but in the 14-16 hours experienced in practice. Battery-powered equipment is usually deployed for eight-hour shifts. This makes eight hours and sixteen hours look good, administratively, as charging intervals. Eight hours isn't long enough to charge a dead battery; sixteen hours is about right. Sixteen hours charge for eight hours use is a good schedule, *if* the batteries are near depletion at the end of the use period. If not fully depleted, or nearly so, this schedule asks for two kinds of trouble: heat-related (from habitual overcharging) and memory. Management of charging practices requires you to know the drains of the equipment under transmit, receive and standby conditions, and that you know the battery capacity. You must also make some *realistic* estimates of duty cycle.

(Turn to page 14)

The new Heathkit Catalog is now out and for those of you who have not received your copy, please stop by, or give us a call and we'll send it out!

Heath Co. has extensively redesigned the 2 meter hand-held radio and will offer it for sale around mid-October. The price will be near $200.00, which should represent an excellent value to the consumer.

Redesigned linear amplifiers will be appearing shortly for both 2 meter mobile (40 watts) and 2 meter hand-helds (10 watts). Base station linears 1 KW and 2 KW will be offered early winter for about the same price as the previous models.

The response has been so good for our garage door opener special that we have decided to continue the sale for another month. Even though the economy chain drive model is no longer available from Heath Co., I bought a dozen because I believe they offer excellent performance and cost savings over competitive models. The chain drive model starts at $140.90 with one transmitter.

Heathkit's deluxe screw drive garage door opener also offers excellent cost savings over Sears' or Ward's models costing $50.00 more. And here we are still offering them at $10.00 below the Heathkit retail store catalog. Prices start at $189.95 with one transmitter.

(Continued from page 12)

The power requirements of a battery-run two-way radio unit, averaged over the operating period, P_T, is:

(1) $P_T = TD_T + RD_R + S\,1 - (D_T + D_R)$

where

P_T = power requirements per hour's operation, in AH
T = transmit drain, in amperes
R = receive drain, in amperes
S = standby drain, in amperes
D_T = transmit duty cycle
D_R = receive duty cycle

Don't get carried away with duty cycles. We usually estimate too high—way too high! If you have 100 transmitters in a system, the average transmit duty cycle can't exceed 1% (.01). Otherwise, you'd have two units talking at the same time! And, the receive duty can't exceed the sum of all transmit duty cycles in the system. In a system with a repeater, the receive duty cycles for the mobile equipments are the same as the duty cycle for the repeater transmitter.

To determine *charge ratio* (charge time) per hour of operation:

(2) $\dfrac{\text{Charge hours}}{\text{Operate hours}} = \dfrac{P_T}{\text{Charge Rate (amps)} \times .66}$

.66 is the typical "charging efficiency" of the kind of NiCd batteries used in two-way radio.

To determine the *maximum interval* between charging periods, in hours:

(3) Max Interval $= \dfrac{C}{P_T}$, where:

C and P_T are in ampere-hours

Take, for example, a hand-carried two-way radio with transmit drain, T, of .680 amps; receive drain, R, of .14 amps; and standby drain, S, of .015 amps. Battery capacity is 700 MAH.

Assume 5 of these units in a system; with transmit duty cycle of .01, which puts receive duty cycle at .05.

By plugging these values into Equation (1), we find P_T = 0.0279 AH per hour's operation. For charging current of 0.07 amperes (one-tenth of the .7 AH battery capacity), Equation (2) gives us a "charge ratio" of 0.6. These batteries require 0.6 hour or 36 minutes) for each hour of use. An eight-hour use period (one shift) demands five hours of charge.

If you follow a use eight hours (one shift) and charge sixteen hours (two shifts) schedule, you put way too much charge into the NiCds, even though this is a very natural arrangement.

Equation (3) reveals that it is possible to run 25 hours (three shifts) between 16-hour charging periods. This doesn't look too good! Besides needing a covey of shiny-seated bookkeepers to keep track of a use three shifts/charge two shifts arrangement, you'd start two shifts with partially discharged batteries and zero reserve for emergencies. A closer match between desire and practicality is a use one shift/charge one shift schedule. You run some risk of memorization, but you can't have everything! If a use one shift/charge two shifts arrangement is all that will work administratively, it then makes sense to *reduce* the charging current to something more realistic. We can go back to Equation (2) with a charge/use cycle and obtain the optimum charge rate: (Continued on Page 15)

HAM HUM SWAP

NO CHARGE FOR SWAP ADS (NON-COMMERCIAL) SUBJECT TO SPACE LIMITATION. MUST BE SUBMITTED IN WRITING TO P.O. BOX 291. SEE COPY DEADLINE PAGE 2.

OR SALE: Several 2M, one channel transceiver chassis–$50.00 each or 2 for $90.00.
VHF Xistor finals, 15W–$6, 25W–$10, 25W UHF–$20.
Rich Swig, WAØZQG; phone 322-7775

FOR GIVEAWAY: I have a number of older Sams photofact manuals for Radio and TV, mostly pre-1970.
Would anyone in the Club or the Club itself be interested in acquiring these?
John D. Snyder, WØWRT, C.E.T.
Phone: 397-3000, Ex. 3542

FOR SALE: Drake Model 1-A Receiver 1959;
Heathkit Apache Transmitter Model TX1;
Heathkit SSB Adaptor Model SB10; all three with manuals – $300.00.
John M. Duffy, 12507 William St.,
Omaha, NE 68144; phone 333-9209

FOR SALE: Galaxy V transceiver (300W SSB/CW on 80-10 meters), AC power supply, remote VFO, crystal calibrator, VOX, deluxe accessory console with speaker, 24-hour clock, SWR bridge, phone patch, and VU meter. Complete with operating manuals and schematics. Everything in mint condition – $490.00.
Call Steve Matthews, WBØBVS, phone 334-7258

****

(Continued from Page 14)

(4) $\frac{\text{Operate hours} \times P_T}{\text{Charge hours} \times .66} = \frac{8 \times .0279}{16 \times .66} = .021A$ over-discharge, and memorization at less than rated battery capacity.

Although less than ideal, NiCd is the best system currently available for battery-powered communication equipment. They can and will take a lot of abuse. You can help finance your next pay raise by working out a charging schedule which is in reasonable context with the way the batteries are used, taking pains to avoid substained overcharge, frequent

A few of those who read about the NiCads will be already well informed on the subject. Such fortunates may pass the unnecessary copy to some less fortunate user of NiCads. Thanks and thassall, chillun

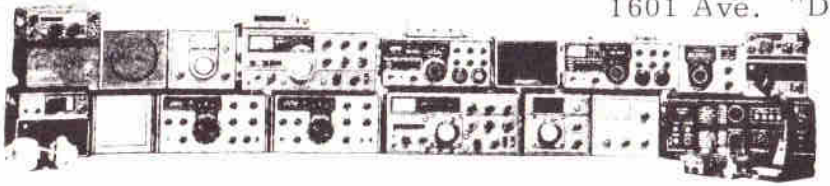
Art Ross, W5KR
Editor, OFF RESONANCE
P. O. Box 3561
Brownsville, TX 78521

****

KENWOOD

Hi Inc

AMATEUR RADIO EQUIPMENT
BOX 864 COUNCIL BLUFFS, IOWA 51501
TELEPHONE 323-0142 (AREA CODE 712)
1601 Ave. "D"



DISCOUNTS

HI SAVINGS PLAN

HUSTLER

RUGGED 4BTV

SELF-SUPPORTING VERTICAL 40-10 METERS (Add-75M)

Ground mount with or without radials, or roof mount with radials

Superb 40-10 meter operation with precisely tuned traps (add 75 meters by connecting RM75 on top). Fully adjustable and handles max. legal power. No guys needed and sturdy-construction resists all weather. Feed with 52 ohm coax SWR 1.5:1 or better at resonance. Wt. 15 lbs.

4BTV AND RM75 REG. $115.45

BOTH FOR $99.95

GOOD UNTIL 10-15-78

SALE

CD-44 ROTOR $79.00

WITH ANY TRI-BAND BEAM ORDER UNTIL 9-30-78

SALE!

ORDER YOURS NOW!

Buy the 1978 Radio Amateur's Handbook for the regular $8.50 price and for just 1¢ you'll get the ARRL's popular book "Learning to Work With Integrated Circuits" (regularly $2.00).

Handbook $8.50
Integrated Circuits + .01
ONLY postpaid $8.51