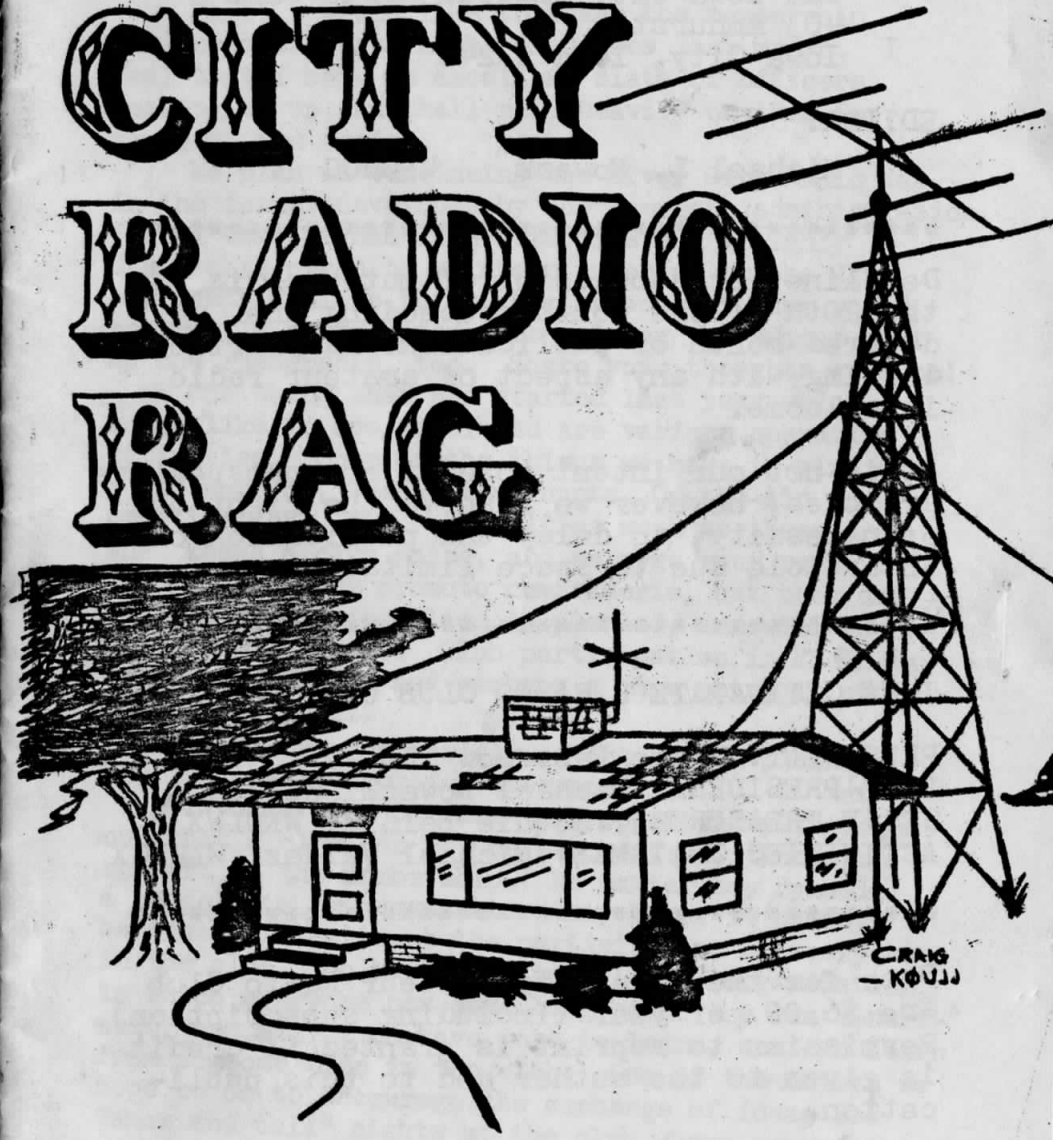
RIVER CITY RADIO RAG



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Michael L. Nowack WBØHOG

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Deadline for submission of material is the 20th of the month preceeding the desired month of publication. Any article dealing with any aspect of amateur radio is welcome.

It is not our intent to edit any prospective articles, however we reserve the right out of necessity, to delay the publication of an article due to space limitations.

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IOWA CITY AMATEUR RADIO CLUB OFFICERS 1975

PRESIDENT: Craig Fastenow KØUJJ
VICE-PRESIDENT: Michael Nowack WBØHOG
SEC'Y-TREASURER: Jacquie Belding WNØLWX
ACTIVITIES CHAIRMAN: Michael Valdez WNØNCX

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PREXY'S PAGE

de KØUJJ

First I would like to thank the membership for their support in the elections last month. I feel that I have an excellent slate of officers backing me up and shall rely heavily on them for support, and advice.

We plan on continuing the River City Radio Rag in the format developed by the previous administration. I feel that it has been effective and a highly desireable organ to maintain interest in the Club. Any contributions to the Rag anyone may have would be greatly appreciated, not only by the Editor, but by the readership, too. Share your thoughts with us!

One thing that was started last year which I would like to see continued are various operating activities. Some of the things we have in mind are a WAS contest, Transmitter hunts, On-the-Air code practice, etc, etc. Activities such as these are what keeps a club going, and we urge your support. Not only do they promote comaraderie, but they are FUN. A new Novice Class is planned, and will be publicized shortly. Club participation in Field Day is being planned, and perhaps a club entry in other contests as well.

So, we have a variety of activities planned, hopefully something for everyone.

I would like to take this opportunity to point out that a club can not be successful without the support of the membership. No matter how dynamic a leadership an organization may have, it cannot be successful without the participation of everyone in the club. We have a multi-talented organization, in which everyone has something he or she can contribute, and all of us have more to learn, and can learn from someone else in the club. One of the things we hope to do to encourage the exchange of ideas are "show and tell" nights at the club where anyone who would like to can show and tell others what they have been up to.

See you next meeting, January 8th!

73, de KØUJJ

IN CASE YOU MISSED IT

The regular December meeting was called to order by Mike, WBØHOG in the absence of Steve, KØSVW, with the guests and members introducing themselves. The minutes and treasurer's report were accepted as read. Mike, WNØNCX said general license classes were finished with the theory but still needed a lot of practice with the code, and asked for contributions of tapes, records, etc. to help the class' practice. It was announced that we are losing a member of the group - Lloyd, KØDDA is moving to Des Moines in January to run the cafeteria at the Commission for the Blind. Mike, WBØHOG announced a 10-meter contest coming up. There was no old business. Jack, WØMIE noted that there were people present who were interested in getting their Novice Licenses, and the possibility of a Novice class was brought up - Mike, WNØNCX volunteered to look into setting up such a class. Some old magazines were brought in to be recycled. The business of election of officers was brought up - Jack, WØMIE, chairman of the nominating committee, presented the slate: President - Craig KØUJJ; Vice-President - Mike WBØHOG; Secretary-Treasurer - Jacquie WNØLWX; and Activities Chairman - Mike WNØNCX. Nominations were called for from the floor, but none were forthcoming. A secret ballot was then taken, and the results were 21 in favor of and 0 opposed to the proposed slate. There was a discussion of the new logging rules, and a difference of opinion noted on "portable" and "mobile" operation. This will be investigated further, in an attempt to clarify the ARRL definitions. There being no further business or discussion, the meeting was adjourned, until January 8th at 7:30 pm.

de Jacquie WNØLWX

BITS AND BAUDS

by David E. Christ KØLUM

Amateurs over the years have been known for the varied nature of their interests. Some of these have been on the forefront of progress, while others have been spin offs of the activities and developments of commercial and military activities. Amateurs have been among the first to make regular use of short wavelengths. In the case of SSB the amateur was a relative latecomer. The Bell System had begun to use SSB on its long distance circuits as early as 1917. My topic for what I hope will be a continuing series, is one of those areas where the amateur was not first. Teletype (which is registered trademark of Teletype Corporation) had its start in practice, if not in name, way back in 1849 with the stringing of a line between Philadelphia and New York. The early Morse circuits were not read by ear but from a marked strip. The use of an inked strip is still present in both the military and on commercial circuits for high speed operation.

The "modern era" began in 1906. It was then that Charles L. Krum and Jay Morton developed a practical printing telegraph. Their firm, the Morkrum Company, was not a great success until 1915 when the Associated Press decided to try using the Morkrum machine. Even more important was the simultaneous development of a machine by the German immigrant Edward Klienschmidt. In 1925 Kleinschmidt merged his company with Morkrum and 5 years later this firm became the Teletype division of AT&T. Mr. Klienschmidt did sign a non-competition agreement, but with the passage of time the agreement ran out and Klienschmidt had to try again. He

formed the Keinschmidt Company and as the original design was well protected by patents, he invented a machine using a completely new principles. In effect he invented the page printer twice. Thus by the beginning of WWII, the machines used by the majority of amateurs had been invented, designed and to some extent manufactured by him.

What really sets Teletype apart from other amateur endeavors? The FCC itself gives an insight into this by their views on the relationship between AT&T and Western Union. The basis of their decision was to give WU the Record Communications and AT&T the rest. The only commonly used amateur mode resulting in a permanent record of the exchange is RTTY (RATT to you military types). Indeed faximilie is a form of record communications but it is little used. Many of you probably have seen some of the RTTY on TV screen display units that are advertised nowadays, but I must express my opinion (or bias if you wish) that although they are cute and quiet, they defeat the whole purpose of RATT and record communications as it was conceived. One is at that point indulging in gagetry and why not just pick up a mike?

RTTY and SSTV had some of the same problems in becoming widely used communication modes. Both modes had to get FCC to make modifications in the regulations to allow the use of the mode in a useful manner. Both had to convince other amateurs that the introduction of a new mode would not wreak havock on the bands. The CW men of the late fourties were scared of RTTY as the phone men were of SSTV. Fortunately reason prevailed and both have been accepted.

In later articles I hope I can give further information on the theory of RATT, notes on the technical aspects of equipment currently available, how to get started, and other similar topics.

Information Sources on RTTY

Kretzman, Byron H. The New RTTY Handbook. New York, Cowan, 1962, $ 3.95 from CQ. This is one of the better books on the machines commonly available to amateurs. Much of the material comes from Kretzman column in CQ during the 50's. The wiring diagrams are given. The information on converters is severely dated.

Tucker, Durward J. RTTY from A to Z. New York, Cowan, 1970, $5.oo from CQ. This is a compilation of articles that appeared in CQ during the sixties. It is weighted heavily toward the servicing of the Teletype model 15 (the most common machine) but has some descriptive material on newer and more exotic devices.

RTTY Journal. Box 837, Royal Oak, Mich 48068 $ 3.oo/yr. For those really interested this is the latest. About 16 pages per month. Due to their short lead time this is where newest circuits etc appear first. Interestingly this is not copywrighted and many articles are published later in other amateur magazines.

Hoff, Irvin M. January QST and later issues. This series, although 10 years old, constitutes the best introduction to amateur teletype. The series is suitable for the complte beginner. The concepts and circuits mentioned therein are still current and among the best

available. Some newer converters have been designed, but it is still a matter of debate if they are better than those in this series. Much of my material is ultimately based on Hoff's.

Other manuals and texts have been published by RSGB, 73, and others. I am not familiar with them so can give no guidance as to their worth.

* * * STRAY * * *

A serious shock hazard exists in the operation of Henry 2K-4 linear amplifiers supplied by Henry Electronics Inc., 11230 West Olympic Blvd., Los Angeles, Cal. Hazard exists due to the close proximity between transformer T201 and the metallic intake filter screen. There is less than one-half inch clearance between terminals one thru six of T201 and the filter screen. Shorting of 3000 volt B+ to the cabinet can occur due to greater than half-inch play in the filter screen. To cut this hazard down, Henry recommends installation of insulated caps on terminals one thru six and the use of non-conductive screening material. (This info from SPARKS, the Navy MARS publication via KØLUM)

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Mike, WNØNCX, tells of a Christmas present: a contact with WN8TPP from Hubbard, Ohio. Ron, WN8TPP, told him that was his first contact and that he was using a Zenith short wave receiver with a signal generator as BFO. It is refreshing to see that the ham spirit has not died and that a ham can start without a factory built kilowatt and five element beam.

BRAIN TEASER OF THE MONTH

de WBØHOG

A stonemason was engaged the other day in cutting out a round ball for the decoration of a new building when his son came upon the scene. "Look here" said the mason, "you seem to be a sharp boy, can you tell me this? If I placed this ball on the ground, how many other balls of the same size could I lay around it (also on the ground) so that each should touch this one?"

The son gave the correct answer and then put this question to his father: "If the surface of that ball contained just as many square feet as its volume contained cubic feet , what would be the length of its diameter?"

The mason could not give the answer. Could you have replied correctly to both the father's and the son's questions?

Answer in next months Rag.....

Answer to last months puzzle....
A total of 1226 balls each 2 inches in diameter can be packed in the box of dimension $24\ ^{9}/_{10} \times 22\ ^{4}/_{5} \times 14$ inches. -30-

* * * STRAY * * *

John KØHLB has been reported on 75 M recently by Gene KØCKX. Gene had a QSO with him on 12-31 around 3970 KHz and John reports that he is using a mobile antenna in his attic with a small ground plane under it. He hopes to improve it so he can put a good signal into River City. John also has an attic dipole on 20 and has worked many countries with it. So keep an eye out for the Blue Hat on 75.

WHO IS WHOM de WØMIE

Tom Vorwald KØGBG entered into Amateur Radio as a Novice in 1955 with the aid of WØCYY. Tom didn't "fool around" long as he received his General ticket a year later in 1956.

Tom was graduated from Cresco High in Cresco, Iowa and the moved on to the Navy for three years where he was an electronics technician. Upon saying fairwell to the Navyy our friend went to work for Collins Radio as a test tech, but being wise he decided to enter The University of Iowa where he obtained a degree in Business Administration. For the past three years Tom has been with the VA Hospital on the engineering staff.

Tom's wife is named Carrol, to whom he has been married for the past twelve years. They share the household with two daughters Kacey and Missyy

Tom is now using an Eico 753 into a Tri-bander beam and states he is now studying for the Advanced test.

* * * STRAY * * *

The local Post Office reports that the recent French Post Office strike is now over and that the embargo on mail to France has been lifted. Your QSL cards to F-land can now go through.

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Lloyd KØDDA has left the Iowa City area to take on new duties at the cafeteria in the Institute For The Blind in Des Moines. We wish him much good luck and regret to see him leave. Who will put Iowa City on the air via the OSCARs now?

* * * STRAY * * *

Steve KØSVW, Craig KØUJJ, and Mike WNØNCX attended the 19 December meeting of the Cedar Valley ARC. Steve spoke and showed slides of his overseas operations. Mike spoke of his DX notification program and Craig showed off his home designed keyer. Some 40 members showed up and afterwards a dozen adjourned to a local pub for some brew ---- not a bad tradition to incororate here?

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The Iowa repeater council is now publishing a newsletter and anyone wishing to subscribe can send $1.00 for one year to the editor D. Dennis Crabb WBØGGI, 705 Clegg Road, West Des Moines, Iowa 50265.
Further the council reports that all the available repeater pairs in 146-147 MHz have now been used in Iowa. (The last was 146.13-146.73 at Knoxville.) Any new machines can expect assignment in the 147-148 segment. The next meeting of the council will be 1 February 1975 at 1300 local in the community center, Marshalltown.

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Thanks to the suggestion of Mike Valdez WNØNCX, about a dozen local amateurs met at Joe's Place to say fairwell to Lloyd KØDDA who is moving to Des Moines. A lot of fun was had by all and even a few of us made it to work the next day. // 73s and good luck to Lloyd.

DOCKET 20282--RESTRUCTURING

de KØUJJ

The bombshell that has everyone talking right now is the so-called restructuring Docket recently released by the FCC. In the interests of informing those who have not yet seen the actual proposal I am writing this short article summarizing this docket and giving some of the background of why this came about.

First, the why. The FCC, and in particular Prose Walker, W4BW, Chief of FCC's Amateur Division, is concerned with the current state of amateur radio. We currently have about 250,000 licensed amateurs, but it is estimated that less than 180,000 of these are currently active. In addition, Amateur ranks are showing a net loss of about 350 per month. This diminishing number of amateurs puts us in a very poor position at the upcoming ITU conference in 1979 at which the frequency allocation charts will be reviewed and possibly revised. If we had a dynamic and growing amateur population it is felt that we would be in a very good position to gain more frequencies in the HF spectrum. As it is, the FCC fears for the existence of the Amateur Service. In comparison to the situation here in the US, in Japan the amateur population is growing at about 25% per year with almost 400,000 now licensed. It is interesting to note that Japan has a Code Free license similar to the proposed Communicator Class, and nearly 80 per cent of Japan's amateurs hold this class. The FCC hopes that by 1980 there will be about 1 million licensed amateurs in the US, which they feel would put us in a good position at the bargaining table.

So, with that background info, let's take a look at just what is contained in this proposal. The thing that is causing the most controversy is the code free Communicator class license. The test would be a Novice level written test given by mail, with material aimed at VHF-FM operation. Privileges would include F3 (FM) only, 250 watts input, above 144 Mhz. The license term for this and all licenses in the amateur service would be 5 years, with the exception of the Extra Class which would be issued for life. (Station licenses would still

have to be renewed every 5 years) All licenses would be renewable, with the exception of conditionally issued General, Advanced, Technician, or Experimenter's (those taken by mail because you live more than 175 miles from the nearest examining point). Although Novice and Communicator are given by mail, they would be renewable.

The spectrum would be divided at 29 Mhz, that portion below 29 Mhz would be called Part A, above, Part B. Separate licenses would be required for each part. This means one could hold Novice and Communicator concurrently. The Extra Class phone segments would be eliminated, but the CW segments--25 Khz at the low end of 80 through 15 --would be retained. The 20 WPM CW requirement would stand, but the Extra Class written test would be eliminated, with that test along with new material incorporated into the Advanced and Experimenter's tests, making them more difficult than the current Advanced test. One would have to pass both the Advanced and Experimenter's tests plus the 20 WPM Code to get Extra Class. Power levels for Advanced, Experimenter and Extra would be 2000 W PEP OUTPUT!!! For General and Technician 500 W PEP output and for Novice and Communicator 250 Watts input. The FCC's logic is 6 db or one "S" unit difference in power between classes. Note that 2000 W output is about 3000 W input.

As President of the ICARC I will appoint a committee to evaluate these proposals and formulate a reply to the FCC on behalf of the entire club. Before this reply is submitted it will be discussed and voted on by the membership. We have until June 16, 1975 for a reply, so there is plenty of time for careful evaluation. I urge everyone to get ahold of a complete copy of this proposal and study it thoroughly before forming opinions. It is my understanding that the complete text will appear in February QST. The things we must evaluate are what the effects would be on amateur radio as it now stands. In particular, what will become of 2M FM with a huge influx of new operators on this band? What effects will a 50% in-

DOCKET 20282, Continued

crease in power do to the HF spectrum? We hope to announce the membership of this Committee at the upcoming January 8 meeting, and urge each of you to communicate with the committee and inform them of your ideas and opinions.

de KØUJJ

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PART 97 HILITES

de KØUJJ

This new feature will appear from time to time and will spotlight small items from the FCC Amateur Regulations. Because of considerable discussion on the subject, this month we will look at definitions of portable and mobile operation. Everyone will have to form his own interpretation of the regulations as they are not extremely specific.

97.3(m) Amateur radio operation. Amateur radio-communication conducted by an amateur radio operator from an amateur radio station. May include one or more of the following:

Fixed operation. Radiocommunication conducted from the specific geographical land location shown on the station license.

Portable operation. Radiocommunication conducted from a specific geographical location other than that shown on the station license.

Mobile operation. Radiocommunication conducted while in motion or during halts at unspecified locations.

* * * STRAY * * *

Gene KØCKX has received and built his new Heathkit SB-230 linear. He states that it really looks and works well and adds that the construction techniques coming out of Benton Harbor are much improved.

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Effective 1 January 1975, all WØ, KØ, WAØ, WBØ, and WNØ's can use the same ARRL incoming bureau for DX QSL cards. WØOYP, Reggie has resigned as WØ manager and all "zeroes" can now send thier envelopes to KØZFL, Dr. Phillip Rowley, 5209 Loma Linda Road, Alamosa, Colorado 81101.

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FCC Docket of Proposed Rulemaking #20118 is designed to eliminate the use of power amplifiers on the CB band. It would make it prima facia evidence of violation to even have an amplifier at the station.

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Dave, KØLUM has a new Wilson handie-talkie for 144MHz. Maybe he will demonstrate it at the next club meeting.

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Thanks to Max, WØLFF for mentioning our club in his January, 1975 Station Activities Report in QST. Don't forget to let Max our Iowa SCM of your activities such as net actions etc so that he can report it.

WEBSTER VS FCC, NOT QUITE

Did you ever hear one of the following expressions? You might even be in the habit of using them. Check

-This is KØXYZ, mobile Ø; well, I am no longer mobile because I am already home.

-This is WBØXYZ, portable Ø. I am using my handy talky in the porch of my house.

-This is WØXYZ. No, I am not portable, I am using my handy talky in my basement.

-This is WAØXYZ, portable Ø. I am now walking from the Post Office to the Court House.

If you use these expressions, do not get mad at me for what I am going to say. It will be worst to get a pink ticket.

Common use here, defines mobile operation when you are in your car away from home and portable when you are using your handy talky. There is currently a very large freedom in using the language with the corresponding corruption. Anybody uses words the way he wants without any regard to the meaning given by the ethimology and use. Even the distionaries are changing to adapt to the new fashion (and to sell). In technical matters things are simpler. A paper is white regardless of the common fashion and terms have precise meanings. In our particular case, we have FCC regulations to follow, regardless of what long hair professors at the University might say.

FCC defines as portable a station that is installed away from the specified location indicated on the license, and in a perfectly defined location which should be entered on the log (incidentaly). Thus, a handy talky cannot be portable, unless it is connected to an antenna or power supply, but not at home. A mobile station, on the other hand, is one that is transmitting while in motion or from unspecified locations while stoped. The idea of portable is then clear: it is a fixed station away from home; the idea of mobile is also clear: a station that moves, or can move, and that do not have any connection to a fixed point.

When you are in your car you are mobile; when you park at the supermarket, you are mobile; when you get home, you are still mobile; when you are parked in front of your home, you are still mobile; if you extend a wire and connect your rig to an antenna, you are no longer mobile. You are fixed if you are at home, portable elsewhere.

When you are using your handy talky in the porch of your house, or in the basement, you are mobile and both, Webster and FCC will tell you so. Do not wait until FCC tells you that. Webster and FCC will also agree that when you walk from the Post Office to the Court House, or any other place for that matter, you are mobile, not portable. A portable station is like the one we had during the Field Day.

de WNØNCX, mobile Ø,
I am running as fast as I can so you don't get me!

* * * STRAY * * *

Davenport announces their fourth annual hamfest on Sunday Feb 23, 1975 at the Mount Joy Airport, north of I-80 on Brady Street (Highway 61). Advance tickets from KØHSC, 1711 W 15th Street, Davenport are $1.50. At the door, $2.00.

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FOR SALE: Heath SB-630 station console, perfect condition, $45. See Dan WBØMED at 656-3292 (Kalona).

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The next meeting of the Iowa City Amateur Radio Club will be held at 7:30 PM, January 8, 1975 in the Community room of The First National Bank at Towncrest. The program will be a discussion of antennas and transmission lines by Paul, KØRLT. Refreshments will follow and the public is invited to attend. Come on out and enjoy the fun.

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Dues for most members of the ICARC will come due this month. The club secretary will be at the meeting and will be glad to accept your renewal. Your dues help to support the activities of the club and publish this newsletter. 1975 dues are $6.00. Members whose dues expire this month will not receive further issues of the Rag unless they renew on time as the costs of publication and mailing are high. If you cannot be at the meeting, dues may be sent to the ICARC at the address shown on the inside cover.

CONTEST CORNER de KØSVW

A few days ago I was contacted by the powers of the ICARC and asked to be "Contest Chairman" . I accepted and in this regard I will try and put together a monthly article for "The Rag" and make pertinant announcements at the meetings.

Fred WAØHFW has been named ICARC FIELD DAY CHAIRMAN; Field Day this year is on June 27 and 28.

The ARRL Novice Roundup runs Feb 1 thru 9, 1975. Ops pick a total of 30 Hours during the above period and the exchange is RST plus Your section (ie 599 Ia). Remember to use coordinated universal time. To score count each QSO as one point, add to it your ARRL Code Proficiency Credit and multiply this by the number of diferent sections and DXCC countries worked.

Also watch for the ARRL DX Competition. Phone weekends are 1-2 February and 1-2 March while cw weekends are 15-16 February and 15-16 March. I will operate the cw weekends as KØSVW and am looking forward ops. Anyone interested?

Watch for details for an upcoming ICARC worked all states contest.... KØSVW

* * * STRAY * * *

FOR SALE: HR2A 2M FM Xcvr with preamp and crystals for 34/94, 28/88, 52, 46, 76, 16/76 and others. With extra crystal deck the price is $100. Hallicrafters HT-40 novice transmitter 80-6M AM/CW price $40. HG-10 VFO price $25. Drake 2B rcvr with shortwave crystals price $160. See Bob WAØDXZ.

THE BASIC NATURE OF ALKALINE BATTERIES

Alkaline batteries, sometimes called alkaline-manganese cells, use a potassium hydroxide electrolyte in an alkaline-manganese dioxide-zinc system. They are available as either primary (non-rechargable) or secondary (rechargable) batteries. Each cell has a nominal output voltage of 1.5 volts that decreases as the cell is discharged to a cutoff voltage (generally chosen to be between .8 and 1.1 volts) at which point the cell is considered to be "dead". The primary cell shall be dealt with first.

Alkaline primary cells are generally packaged in a hermetically sealed steel can that can be made to explode if an attempt is made to charge the cell with a reasonably high current. They are characterized by a high ampere-hour capacity that is almost independent of duty cycle and level of discharge, and are capable of providing high output current, long shelf life, and excellent performance at hot and cold temperatures. They will out perform conventional Leclanche cells (carbon-zinc) in all applications and will show an economic advantage in all medium or high current applications.

Now for some details and explanation. The highly alkaline electrolyte is very active and electrically conductive. This, coupled with a good mechanical design, accounts for the cell's high output current capability and the ability to function well at low temperatures. The alkaline cell is usable at temperatures as low as -40 °F and can withstand repeated cycling from -20° to +140° without serious degradation. The maximum recommended current rating for an alkaline cell is normally about 6 times the current rating for a carbon-zinc cell of similar size. The table below lists this current rating for some of the popular sizes of cells.

Eveready Number	Size	Voltage	Max. Recommended Discharge Current
E95	D	1.5	650 ma
E93	C	1.5	480 ma
E91	AA	1.5	150 ma
E92	AAA	1.5	100 ma

At discharge currents below the recommended maximum, the total energy available from the cell before it reaches the cutoff voltage is almost independent of the discharge current and the discharge schedule. Currents as high as 12 times the recommended maximum are practical, particularly for low duty cycle applications such as electronic flash circuits where the high current demand exists only for a few seconds during which a relatively low cell voltage can be tolerated.

With regard to shelf life, an alkaline battery can be expected to supply more than 90% of its original capacity following storage at 70° for a period of one year. In other words, the shelf life is greater than one year. As with carbon-zinc cells, the shelf life is extended by storage at lower temperatures and is shortened by storage at higher temperatures.

The alkaline primary battery stores more energy per unit volume than any other generally available type of battery except the mercuric oxide, or mercury battery. The table below gives approximate ampere-hour capacities for several types of high quality D size cells.

Type of Cell	AH Capacity
Carbon Zinc	6 (Under ideal conditions)
Alkaline Primary	9
Alkaline Secondary	2-4
Nickel Cadmium	4
Mercuric Oxide	14

Unlike carbon-zinc cells, alkaline cells are not prone to leaking as they discharge or as the result of high temperature storage. This, along with all the other characteristics of alkaline cells, make them ideally suited for use in that "emergency" flashlight that is stored for years in the glove compartment of a car and still expected to perform when needed in midwinter cold, an application for which carbon-zinc cells are particularly poorly suited.

In the following paragraphs some comparisons will be made between carbon-zinc and alkaline batteries. Keep in mind that the carbon-zinc cells being compared are the "top of the line" types, usually sold as

"super" flashlight batteries or "transistor radio" batteries. These types might provide up to 2.5 times the service of a conventional, "low class" flashlight battery (depending, of course upon the application).

The alkaline primary cell generally contains 1.5 to 2 times the energy capability of a high quality carbon zinc cell that has the same case size. This sets a lower bound on on what one might expect from an alkaline cell; it should give at least 1.5 times the service of a carbon-zinc, regardless of the application. In continuous discharge at currents near the recommended maximum for carbon-zinc cells, a alkaline cell of similar size should give about twice the service (assuming room temperature operation and a cutoff voltage of .8 volts). Maximum recommended discharge currents for several carbon-zinc cells are listed below. In continuous discharge at currents

Eveready Number	Size	Voltage	Max. Recommended Discharge Current
1015	AA	1.5	25 ma
1035	C	1.5	80 ma
1050	D	1.5	150 ma

that approach the recommended maximum for alkaline cells, the alkaline cell should give 4-5 times the service of a similar size carbon-zinc cell. The only applications in which carbon-zinc cells might be more economical than alkaline are those that are ideally suited to carbon-zinc: room temp operation under very light continuous load, or under light intermittent load conditions in which the cell is discharged over a period that does not exceed about 6 months.

Alkaline secondary batteries will be dealt with at another time. The table below indicates the approximate ampere-hour capacities of several alkaline primary cells.

Eveready Number	Size	Approx. Ampere Hour Capacity
E95	D	9
E93	C	4
E91	AA	1.3
E92	AAA	.7

de KØRLT