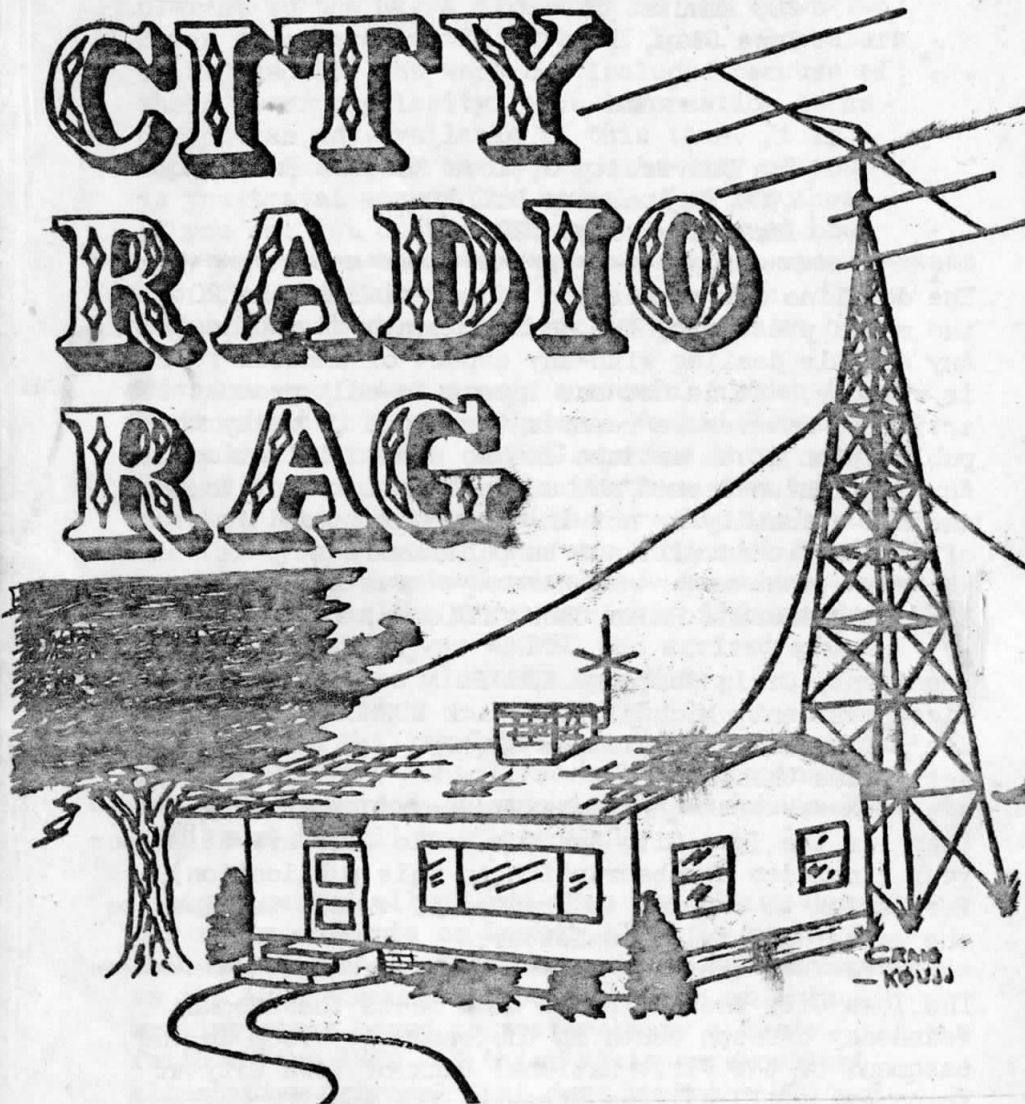


RIVER CITY RADIO RAG



CRAG
-KOUJ

July, 1975

Vol 2, No 7

PUBLISHED BY
THE IOWA CITY AMATEUR RADIO CLUB
AND
THE UNIVERSITY OF IOWA AMATEUR RADIO CLUB

The RIVER CITY RADIO RAG is published by;
The Iowa City Amateur Radio Club
403 Amhurst Street
Iowa City, Iowa 52240

and

The University of Iowa Amateur Radio Club
4900 Engineering Building
Iowa City, Iowa 52242

The 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 prospective articles, however we reserve the right to delay the publication of an article due to space limitations. Any submission deemed not of general interest to the amateur community or not in the general good interest of amateur radio will not be published.

Iowa City Amateur Radio Club Officers, 1975

President; Craig Fastenow KØUJJ
Vice-president; Michael L. Nowack WBØHOG
Sec'y-Treasurer; Ed Miltner WBØOUP
Activities Chairman;

Dues for the Iowa City Amateur Radio Club are \$6.00 per year (includes a subscription to this publication). Permission to reprint is granted if credit is given to the author and this newsletter.

The Iowa City Amateur Radio Club meets the second Wednesday of each month in the community room in the basement of the First National Bank of Iowa City at Towncrest, 1117 William Street. The meeting begins at 7:30 PM CDT.

Editor of the RAG: Michael L. Nowack WBØHOG
403 Amhurst Street
Iowa City, Iowa 52240

PREXY'S PAGE
de KØUJJ

We are publishing this month as a pull-out supplement to the Rag a directory of all known Two Meter repeaters in the state of Iowa. Repeater on 220 and 432 MHz were not included because of their lower popularity. The information is as current as any available at this time. It is hoped that it will be of value to many of you as you travel across the state. And for those of you not yet on two meters, seeing just how many repeaters there are in Iowa may provide a bit of an impetus to get a two meter box. It is a great asset when traveling as well as at home.

The club completed a very succesful hidden transmitter hunt this past Sunday. We had 5 teams start and 7 finish! WBØHOG won the thing with a record time of about 4 minutes from when he started! A good time was had by all, including the fox (yours truly), who was hidden at Shimek school on the city's North side. Must have been a good place as the first arrival of those who started at K-Mart was WBØMED who arrived after 62 minutes, three minutes after Mike.

Computerized Mailing Labels are now in use for mailing the Rag. Check yours for correctness, and if not correct, please notify me (phone 351-8258) and it will be corrected.

I might remind all of you that the filing deadline for reply comments on Docket 20282 is August 18. This means you can file comments on such things as the ARRL's counterproposal, which at this writing seems bound to restore many a ham's faith in the ARRL. I think it is an excellent alternative proposal that does what the FCC had in mind without completely tearing up the service as we now know it, and I intend to tell the FCC about it. Why don't you?

See you all at the August meeting, the 13th.

73, de KØUJJ

IN CASE YOU MISSED IT.....

The meeting on July 9th was brought to order by craig, K0UJJ. As per the usual ritual of everybody introduced themselves and their calls. Dan, WB0MED, gave some of the details of the upcoming club picnic to be held at Kent Park along Highway 6. It was also suggested that a transmitter hunt precede the picnic, so it wouldn't be a bad idea to dust off the loops and put new batteries in those attenuators. I myself would like to see a lot of participation in this event as I think it's a lot of fun. Even non-hams can participate as this is one event that doesn't require a license. Just a radio, antenna, desire and determination. Anyway, one other item was brought up and that was about the RAG. As you may have noticed, there was no RAG this month. I myself think that the big reason for this is practically no input from club members, myself included. If you have an interesting item of news or a circuit that proves of interest to anyone who reads it, write it down. If one person reads it, the effort was not wasted.

Enough of my rantings and ravings. The next meeting would be on August 13th. I would like to see as many there as we possibly can. Also at the transmitter hunt and picnic that follows. Lets really get things moving!

73's and 88's add CUL.....

De ED WB0OUP

* * * * *

The next meeting of the Iowa City Amateur Radio Club will be held at 7:30 PM, Wednesday, August 13, 1975 in the community room in the basement of the First National Bank Of Iowa City, Towncrest Branch. The address is 1117 William. A short business meeting will be followed by refreshments and a program on the principles of Radioteletype (RTTY) to be presented by Dave Christ, K0LUM. All members, their friends and any interested parties are invited and encouraged to attend.

TRANSISTOR OPERATION

de Dan, WB0MED

Because a transistor is essentially two or more P-N junctions, it is recommended that SEMICONDUCTOR DIODE OPERATION be read in the April '75 Rag.

Transistors, being semiconductor devices, operate in a similar manner to the diode. With the addition of a third terminal we will see how a small current flow can effectively control a much larger one.

Figure 1 illustrates a working model and schematic representation of a NPN transistor, named as such due to the physical order of impurities. Take note that the base material is at least several orders of magnitude thinner than either the collector or emitter. The reason for this geometric consideration will become transparent as we proceed. To start, let's separate the collector from the base and emitter, and connect a voltage source across them as shown in Figure 2. (V_{be} - voltage across the base and emitter) We see that we have a forward biased diode with a current flowing. (I_b - base current) Note that the base material is very thin and when in the conductive state becomes saturated with electrons. The input resistance of this device is therefore very low. Let's now remove B-1, reconnect our collector, and connect a larger voltage source, B-2, as shown in Figure 3. (V_{ce} - voltage across the collector and emitter) At first glance we see two diodes hooked back to back. This means that regardless of B-2's polarity, one of the junctions will always be reverse biased, and no collector current (I_c) will flow. Taking a more intimate look at the forces in the device, we see that the positive terminal of B-2 causes the collector electrons to migrate away from the collector-base junction. The area of N material directly above the base region will become highly resistive unless more valence electron carriers can be supplied to its crystal structure. Likewise the base's holes have a tendency to be repelled downward by the positive source. This reverse bias region now prevents current flow in the circuit. The collector's electrons can flow no further till the circuit becomes a closed one. The emitter electrons, due to the negative terminal of B-2, migrate toward

the base region, and likewise the base's holes tend to migrate down into the emitter. The emitter-base junction resembles the forward bias condition. However, because the collector-base junction is essentially open, it blocks B-2's positive terminal. Because of this the electrons in the emitter do not have sufficient energy to flow into the base in large numbers. Reference to Figure 4 shows the reconnection of B-1 (V_{be}). The base-emitter junction is fully forward biased. The emitter's electrons can fully saturate the base. B-2 (V_{ce}) is very large, and the base is very thin. Electrons saturating the base, a majority of which come from the negative terminal of

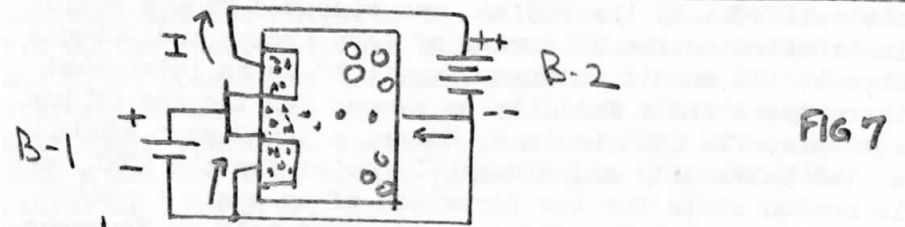
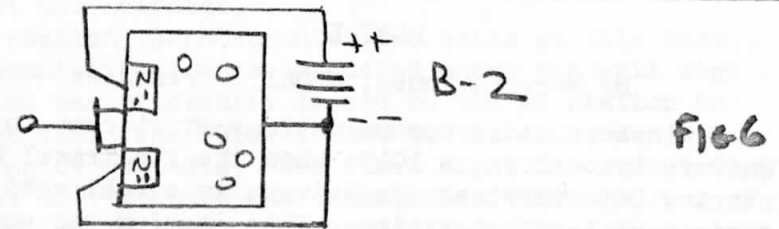
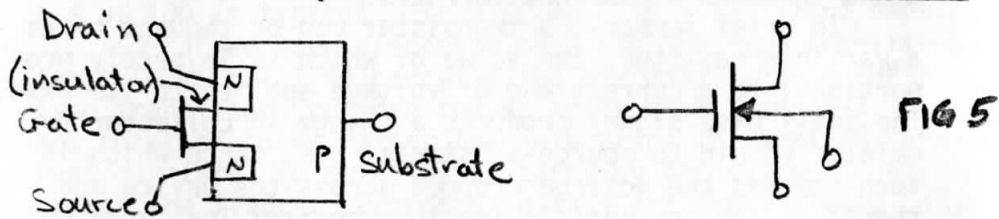
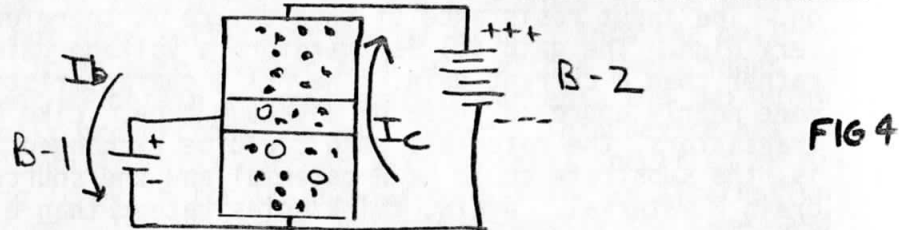
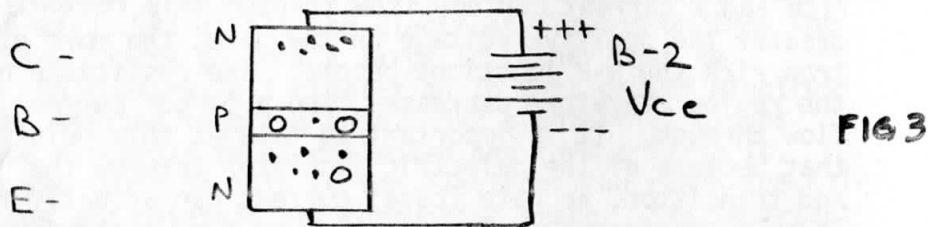
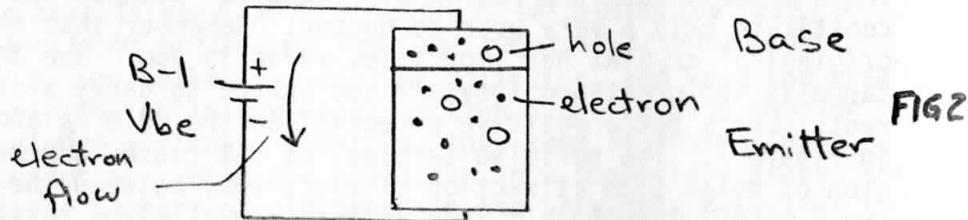
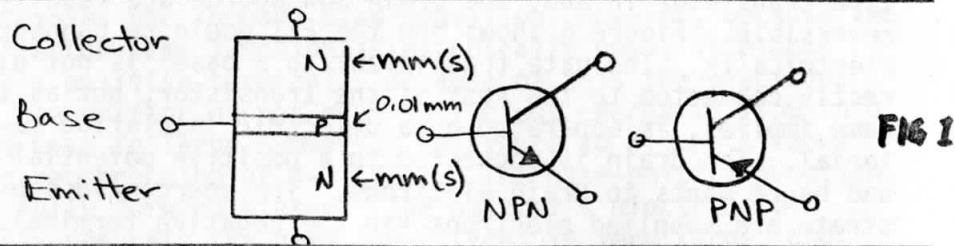
B-2, are pulled up into the collector, and keep the area near the collector-base junction supplied with carrier valence electrons. That is, they keep it resembling a conductor. With the collector in a conductive state, the large numbers of electrons in the very thin base feel the strong pull of B-2's positive terminal and therefore flow that way. 99% of all the electrons flowing up from the emitter choose to form a large I_c rather than I_b .

In summary, B-1 creates an I_b that causes electrons to be emitted into the base. B-2's potential causes these electrons to be collected and form a large I_c . The base must be thin so the electrons can reach the collector and maintain its conductive state. The important concept is that without I_b , the electrons in the emitter will not have sufficient energy to pass into the collector. I_c is much greater than I_b . With a small input current we obtain a larger output current, the two being directly proportional to each other. This device has DC (h_{FE}) and AV (h_{fe}) current gain (β beta) specified by dividing I_c by I_b for DC and ΔI_c by ΔI_b for an alternation waveform. The DC and AC gains are usually the same, and a β of 100 is typical. $I_c = 10$ ma. $I_b = 100$ micro amps.

So far we have discussed only the NPN type transistor. (N material is carrying the current) For a PNP type transistor, reverse the polarity of B-1 and B-2. Now think of holes rather than electrons in terms of current carriers. (P material is carrying the current) Although the figures presented in this article indicate that the emitter and collector, both being made of the same material, are interchangeable, in reality they are not. For this reason these types of devices are called bipolar transistors. We speak of these as current ampli-

fiers with current gain because their operation depends directly on the flow of current. Other types of transistors exist. One of them is shown diagrammatically and schematically in Figure 5. It is called an Insulated Gate Field Effect Transistor (FET). It is not a bipolar type transistor in that the drain and source are readily reversible. Figure 6 shows how the FET would be connected electrically. The gate (equivalent to a base) is not directly connected to the rest of the transistor, but as the name implies, is separated by a dielectric insulating material. The drain is connected to a positive potential and hence wants to drain electrons. The source and substrate are supplied electrons via the negative terminal. The N material and the region of P material between them constitute only a very poor conductor. Remember that the original Si crystal had impurities added in ppm. The distance is too great and they are too sparse to carry a current. Let's put a positive potential on the gate as shown in Figure 7. The positive terminal of B-1 causes a repulsion of holes (an attraction of electrons) between the two N material regions. This area is now electron carrier rich and a current can now flow through this region. The greater the positive voltage on the gate, the more electron rich the N-P junctions become. The resistance of the region therefore decreases, and a larger current can flow through. It is important to note at this point that because of the dielectric insulator between the gate and transistor, no gate (base) current can actually flow! It only requires a small potential to turn these devices on. The input resistance of this device is therefore very high. The gain (β) is therefore a voltage gain rather than a current gain. The FET's characteristics more nearly approach those of a vacuum tube. Like bipolar transistors, the materials used could be exchanged. That is, the substrate could be N material and the source and drain P material. Again, think holes rather than electrons in terms of current carriers.

In brief summary, a transistor can be thought of as a variable resistor, the value of which is inversely proportional to a current and or voltage applied to its base. The small base signal produces a change in collector to emitter (drain to source-substrate) resistance which in turn changes the voltage dropped across the device and therefore the current flowing through it. The large output change being exactly proportionate to the small input change.



Key concepts to remember:

1. NPN, PNP type transistors (bipolar)
2. Collector, Base, Emitter
3. I_b , I_c , V_{be} , V_{ce} , β
4. FET (insulated gate type)
5. Drain, Gate, Source, Substrate

5/18/75
WBΦMED

*** STRAYS ***

In the OUCH department; the recent Mount Athos DX-pedition was delayed due to equipment problems. Seems they forgot to disconnect the TS-520 they were going to use when running tests on the portable generator. During a high speed test they put 300VAC on the TS-520 and creamed it. To get back on the air, one of the members had to make a 2 day round trip back to Athens for new equipment.

A HISTORY OF THE UNIVERSITY OF IOWA AMATEUR

RADIO CLUB

PART I

By Merritt Jones, WBOAJT, President

Wireless radio communications first came to the University of Iowa in 1919, when the Electrical Engineering Department at the University established an experimental radio station. This station was assigned the call W9YA by the FCC and was operated from a building located on the NE corner of Iowa Avenue and Dubuque Street. It wasn't, however, until 10 years later that there was a radio facility on campus for the use of the students. In 1929 Louis R. Huber, a third year student at the University and Midwest Director for the ARRL, set in motion steps for the formation of an amateur radio club on campus. The first meeting was held in November, 1929 and was attended by seventeen students and interested amateurs. At this meeting it was decided to attempt to get a short wave station on the air by spring.

Several members donated parts and equipment which was used to construct a transmitter and receiver for the proposed station. The station was ready for operation in time for the MECCA Week activities in the Engineering Department and it was put on display. The station was located in the basement of the Engineering Building and the 42 meter half-wave doublet was strung between the Engineering Building and the stone chimney of the old heating plant. The 75 watt transmitter performed admirably and two way communications were established with several ships at sea and the signals were heard as far away as New Zealand.

The parts to the transmitter and receiver were donated by the members and as they began to graduate, they reclaimed their parts, so the operational status of the station was constantly changing. It was evident that in order to establish any kind of permanance, the equipment would have to be owned by the University.

When school resumed in the fall of 1930, a plea for assistance was made to the members of the Electrical Engineering staff. They responded very favorably and through the efforts of John Ebert, the club was

allowed to take over the communications lab in the EE building. The equipment included with the new location included a 250 watt transmitter and two 75 foot towers to support the antennas.

The station operated under two calls at this time. Voice communications were conducted under the call sign W9YA, which was originally issued to the EE station in 1919. The call sign W9IO, issued to the club, was used during CW contacts. The first night the new station was on the air, contact was established with all four of the inspection districts in New Zealand, three Australian amateurs and two ships in the Atlantic. During the next two months, contacts were made in 12 foreign countries and U. S. possessions and many amateurs in the United States. At one time the club conducted a little gee-whiz radio operation setting up a booth and offering to send a message free to any place within a 10,000 mile radius of Iowa City.

The University club operated from that station from 1930 until the outbreak of World War II when the U. S. government suspended all amateur activities. When amateur activities resumed in 1945, Iowa was transferred from the '9' district to the new '0' district, and the station became W0IO. Shortly after its operations resumed, a linear amplifier was donated to the club enabling it to run a full kilowatt. Also after the war came television to Iowa City, a factor which was to cause continual woe to the club. The club's new kilowatt proved to be a serious source of TVI. Many attempts were made to eliminate this problem, but all ended in frustration. So, in 1946 it was decided to disband the club and turn in the license!

CONTINUED NEXT MONTH
IN THE RAG.

* * S T R A Y S * *

Two meter SSB and CW should get a shot in the arm with a new ham active here in IC on those modes. Bob WA0DXZ has a new SSB-CW KLM box and beam and will be putting IC on the low end of 2.

Well the FCC has come around and now allows for the automatic repeater control, making 24 hour operation possible without the need for a control operator to be monitoring at all times. The new rules provide for the automatic taping of the repeater when a control operator is not monitoring, with the tapes to be kept for possible review later. Also approved was the linking docket which allows repeaters to be linked or cascaded, i.e. linking a machine in Los Angeles to a machine in Las Vegas. This could be very useful in areas of low population density or in cases of emergency traffic.

Denny Crabb, WBØGGI from Des Moines has been elected to the office of President of the Iowa Repeater Council. The council needs more information on the following machines, such as sponsors, frequencies, etc. If you have any help for them, please pass it on to a member of the council;

Clarinda	WRØABY	
Davenport	ex-WRØAES	04-64
Davenport	WRØ?	01-61
Sioux City	WRØ?	22-82

The Spencer Amateur Radio Club, Repeater Branch, with the 22-82 machine in Ayrshire, have plans under way to convert their system to solid state with emergency battery powered capabilities using a VHF Engineering transmitter strip and 25 watt PA built by WØMDM. Construction is progressing on the VHF Engineering receiver by WØKSS and WØQUS. The new solid state control logic system has been completed by WAØYGJ.

The back-up power will come from a bank of 24 surplus telephone type batteries.

The machine (WRØACF) has been off the air since the April ice storm which lowered their receiving antenna by several feet. It will be back on the air as soon as it is replaced at 160 feet, with 25 watts of solid state power.

73 Chuck, KØØBU

IOWA

2 METER
REPEATER DIRECTORY

supplement to
the
RIVER CITY RADIO RAG
August 1975

information supplied by
the
IOWA REPEATER COUNCIL

How To Use This Directory

There are two sections to this directory, one a listing by frequency, second a listing by city. Frequencies are interpreted as follows: The first number is the repeater input frequency, the second is the output. Where the first number is smaller than the second 146 MHz is indicated, except the special case of 40-00 which is 146.40 in and 147.00 out. As an example, 34-94 means 146.34 in, 146.94 out. Where the first number is larger than the second, 147 MHz is indicated, e.g. 87-27 means 147.87 in, 147.27 out.

The fourth column indicates special capabilities, as follows: Autopatch (AP), Private Line (PL), Voice access (VOX), Tone Burst Access (TB), Radio Teletype (RTTY). A date indicates when operation is planned to begin.

The other columns should be self-explanatory.

IOWA TWO METER REPEATER DIRECTORY

By Frequency

01-61	WRØ?	Davenport	
	WRØ?	Spirit Lake	08-75
04-64	WRØACO	Ames	
	WRØABA	Omaha, Nebr.	
	WRØ?	Knoxville	
	WRØ?	Sioux City	
07-67	WRØ?	Clinton	
10-70	WRØAGJ	Cedar Rapids	RTTY
	WRØACE	Council Bluffs	RTTY
13-73	WRØAEO	Lamoni	
16-76	WRØACO	Ames	
	WRØAEH	Cedar Rapids	VOX, TB2K
	WRØADE	Clinton	
	WRØAHO	Mason City	
	WRØACY	Moline, Ill.	
19-79	WRØAFJ	Burlington	
	WRØAGK	Creston	
22-82	WRØACF	Ayrshire	
	WRØACE	Council Bluffs	AP
	WRØABS	Davenport	AP
	WRØAFN	Des Moines	AP
	WRØAHH	Waterloo	AP
	WRØ?	Sioux City	
25-85	WRØ?	Ossian	
28-88	WRØADF	Omaha, Nebr.	
	WRØAIF	Davenport	
	WRØAGC	Denison	
	WRØACU	Iowa City	
	WRØAHQ	Marshalltown	
31-91	WRØAJF	Fort Dodge	
34-94	WRØABQ	Omaha, Nebr.	
	WRØAEZ	Des Moines	
	WRØABD	Dubuque	
	WRØAFA	Waterloo	
	WRØABX	Moline, Ill.	
37-97	WRØABY	Clarinda	
	WRØADC	Ottumwa	
	WRØAGZ	Sioux City	
40-00	WRØAID	Cedar Rapids	
63-03	WRØ?	Muscatine	10-75
69-09	WRØAGM	Cedar Rapids	PL, AP
75-15	WRØ?	North Liberty	9-75, PL, AP
81-21	WRØ?	Sioux City	PL, AP
87-27	WRØAIW	Cedar Rapids	

IOWA TWO METER REPEATER DIRECTORY

By City

Ayrshire	WRØACF	22-82	
Ames	WRØACO	16-76	
	WRØACO	04-64	
Burlington	WRØAFJ	19-79	
Cedar Rapids	WRØAEH	16-76	VOX, TB2K
	WRØAGJ	10-70	RTTY
	WRØAGM	69-09	PL, AP
	WRØAID	40-00	
	WRØAIW	87-27	
Clarinda	WRØABY	37-97	
Clinton	WRØADE	16-76	
	WRØ?	07-67	
Council Bluffs (Omaha, Nebr.)	WRØACE	10-70	RTTY
	WRØACE	22-82	AP
	WRØABA	04-64	
	WRØADF	28-88	
	WRØABQ	34-94	
Creston	WRØAGK	19-79	
Davenport (Quad Cities)	WRØABS	22-82	AP
	WRØAIF	28-88	
	WRØ?	01-61	
	WRØACY	16-76	
	WRØABX	34-94	
Denison	WRØAGC	28-88	
Des Moines	WRØAEZ	34-94	
	WRØAFN	22-82	AP
Dubuque	WRØABD	34-94	
Fort Dodge	WRØAJF	31-91	
Iowa City	WRØACU	28-88	
Knoxville	WRØ?	04-64	
Lamoni	WRØAEO	13-73	
Marshalltown	WRØAHQ	28-88	
Mason City	WRØAHO	16-76	
Muscatine	WRØ?	63-03	10-75
North Liberty	WRØ?	75-15	9-75, PL, AP
Ossian	WRØ?	25-85	Planned
Ottumwa	WRØADC	37-97	
Sioux City	WRØAGZ	37-97	
	WRØ?	04-64	
	WRØ?	22-82	
	WRØ?	81-21	PL, AP
Spirit Lake	WRØ?	01-61	08-75
Waterloo	WRØAFA	34-94	
	WRØAHH	22-82	AP

REPEATER OPERATING PROCEDURES

Keep all transmissions short. Monologues do not belong on the repeater. (Most repeaters have timers that will cut you off after three minutes or less.)

Pause a couple of seconds between exchanges to allow someone with high priority need of the repeater to break in (and to reset the three minute timer).

Identify properly: You must give your call at the beginning of a contact, every ten minutes during, and give the call of the station you are in contact with followed by your call at the end. Don't identify excessively; only your call once in ten minutes is enough.

Be courteous. Cooperation is essential to good repeater operation.

State your intentions when first accessing the repeater, e.g., monitoring, directional assistance, emergency, requesting autopatch, etc. If you are testing, say so, but keep tests short.

Do not call CQ. Simply say "monitoring." One does not "tune across the band" looking for CQ's as on HF, rather, everyone monitors one channel, the repeater frequency. After contact is established on the repeater frequency you can then move to a simplex channel if desired.

Don't key up the repeater just to see if it is working without identifying. This is both illegal and very annoying to those monitoring the repeater.

Don't abuse autopatch privileges. Use it only when necessary. Business calls are illegal. Do not call information or operators--carry a directory or ask a fixed station to look up the number for you. Inform the party you are calling that he is on the radio as soon as he answers to avoid embarrassing comments.

SUPPORT YOUR LOCAL REPEATER GROUP. A good repeater can be expensive. Do your share.

CONTEST CORNER de KØSVW

Well Field Day is over and the contesters are gearing their sites on Sweepstakes (November) and the World Wide CQ Contest (October). My thanks are extended to Fred, WAØHFW who chaired this years Field Day, to Mike, WBØHOG and Craig, KØUJJ both of whom acted as our local entry captains.

WØJV/Ø and KØSVW/Ø were the two Iowa City Amateur Radio Club Field Day entries this year. Both experienced some late operator 'drop-outs' but both managed reasonable efforts.

WØJV/Ø was set up at Scott's Church Corner, about 5 miles east of Iowa City and participants included Fred, WAØHFW; Mike, WBØHOG; Gordon, WØAYH; Dennis, WBØMCX; Mike, WNØNCX; Rick, WAØUVG; Max, WØLFF; George, WØPPF; Lou, WAØQDB; Jerry, WNØPLZ; and others including several of the XYL's. They used a Tempo One and a Kenwood TS-520 into a TH-3 at 30 feet, a ZL beam on 40M and a dipole on 75M. They accumulated some 824 QSO's, of which only a few were on CW, working all but 6 of the ARRL sections. They achieved all of the possible bonus points except those for a QSO via OSCAR 6 or 7. They utilized a solar panel to power a 2 meter rig for the 'natural power' bonus points. They estimate their final score at 1979 points in class 1A.

KØSVW/Ø operated 18 miles west of Iowa City just past Oxford. With similar antennas and using an SB-102 and a TS-520, Steve, KØSVW; Craig, KØUJJ; Steve, WBØFSQ; Ed, WBØOUP; Dan, WBØMED; and Lucas Van Orden pounded out some 635 QSO's with about 25% being on CW and good for those extra points. Our group made a clean sweep of all bonus points including working via the amateur radio satellite, OSCAR 6. Using a hand key and 25 watts output, Craig called CQ FD while Ed pointed a 13 element beam towards Denver and elevated 20 to 30°. We were all excited to hear W6DL in Los Angeles come back and give us a 599 from space! The official results will be in QST in the fall, but KØSVW is claiming 1910 points.

I will be in Washington DC for the period 16 July to 20 September so this is 73 for a while. I plan to attend a meeting of the Frankfurt ARC and attend the ARRL National Convention in Reston, VA in September

so I will try to jot down a note of two on our travels.
See you in the fall and thanks again for the support.

CUL, Steve K0SVW

Congratulations are in order for some new Novices in the Iowa City area. Recently receiving their licenses in the mail are Dr. Jan Smith, WN0PXH; Kim Smallwood, WN0PXI; and Bill Bonney, WN0PYI. There are still several other graduates of the ICARC novice classes awaiting word from the FCC. Again, congratulations for a job well done.

A small change has been made to the Iowa City repeater to make it more pleasant to listen to. The annoying 'noise crash' that accompanies the squelch tail has been removed and the tail is now 'quieted'. If you haven't noticed this, have a listen and enjoy the quiet.

A sad note must be added to some of the news coming back from Steve, K0SVW in Washington. His Icom IC-230 2 meter transceiver was stolen from his van. A new one is on its way to Steve from Ottumwa courtesy of his insurance company. It makes you think a bit about our relatively save conditions here in the midwest.

A new voice has been heard on the Iowa City repeater, Dave W0FBI is now on two meters with a TR-22. Dave and his family will be moving to Dayton, Ohio, so he is not long for 2 here in Iowa City. Too bad you didn't get active sooner, Dave!

Jan, WN0PXH, is reportedly negotiating for the purchase of a new TS-520 transceiver so that he can take advantage of his newly won novice priveledges. It should make quite a nice station for a novice. Good luck, Jan and we'll be listening for you on the HF bands.

The Second Annual Iowa City Amateur Radio Club Picnic was held at Kent Park Sunday, July 27, with an excellent turnout. Special Thanks to Dennis Kahler, WB0MCX and his wife for the use of the Ice Cream maker and for rounding up all the materials to make the ice cream. It was delicious!!!

K0UJJ now (finally!) has an outside antenna up for two meters and can now put a signal into the repeater that is somewhat readable. The antenna is a 69¢ special--5 pieces of #12 wire and an SO-239 connector.

Rumor has it that WB0HOG's XYL has a Novice written test on the way.....now wouldn't it be something if she got the call WN0SOW.....

The new ARRL Repeater Directories are now available from ARRL Headquarters, 225 Main St., Newington, CT 06111, for 50¢ to members, \$1 to others.

In a surprise move, Prose Walker resigned from the FCC effective on July 31. Who will take his place and the resignations effect on restructuring are anyones guess. In any case, it would seem likely that the Amateur Service will suffer for his loss. It is reported that he will still have his fingers in the pot, especially in regard to the 1979 ITU conference. (HR Report)

WNØNCX

The operating manuals for amateur equipment indicate that the ground terminal of the transmitter must be connected to a good ground. The statement is simple but the reasons behind it are not generally well understood. To complicate the problem, the term "good ground" does not have a simple definition and the physical implementation of a good ground will depend on what we are talking about. A connection to a good ground is required to protect the operator and the equipment from discharges of static electricity, from the effect of short circuits inside and outside the equipment, from discharges of atmospheric electricity and from high radio frequency voltages. The main reason for a good ground connection is the protection of the operator and the equipment from undesired or uncontrollable discharges of electricity.

To understand the operation of the ground, we should talk a little about capacity. When a body acquires electrical charge, its absolute potential changes. Capacity is the relation between the charge that is applied and the change in the potential that results. A body with small capacity will have a large change in potential for a given charge, while a body with a large capacity will have a small change in potential for the same charge. The earth is a body with such a large capacity that the addition of very large charges produces only an insignificant change in potential. For all practical purpose, the potential of the earth remains unchanged and any conductor connected to the earth will have that same potential.

If a body is isolated from the earth, it can acquire and electrical charge, static charge, that will elevate its potential with respect to the earth. If that potential is large enough, it can discharge through the air or through the operator. In this last case the operator is subject to an electrical shock that can

produce secondary damage from the muscular contraction that is always present. The discharge of static electricity is, in general, a transient phenomena, instantaneous.

A person can also accumulate static electricity that discharges to ground or to other objects with the same discomfort and danger from secondary effects. Very minute discharges of this type, that do not produce any sensation, are damaging for solid state devices, specially those with FET or MOS transistors.

There is another type of static electricity, that although is the same thing we are going to differentiate because it has different effects for us. This is the static electricity that is generated in the atmosphere, specially during the storms. A storm 30 to 50 miles away can induce in an antenna a very high voltage that will discharge through the operator, the equipment or sparks that can be one inch long. Such discharges can be very dangerous for the operator and the equipment.

Another effect to consider is an electrical fault inside the equipment that puts the chassis in connection with the high voltage or the line. Such a fault can be very dangerous even when it takes only a fraction of a second to trip a breaker or blow a fuse. A fault outside the equipment can also elevate the chassis at a high voltage because of the large currents that circulate through the lines.

The protection for all these cases can be obtained by connecting a heavy wire, # 10 or larger, insulated, preferable stranded, to a good ground, which is a water pipe or a heavy rod driven at least 10 feet vertically into the earth. The length of this wire is not important but if it is longer than 100 feet, it is good to make it # 8. The important consideration is to have as little resistance as possible between

the chassis of the equipment and ground. An antenna can be grounded for these cases, DC ground is called, by connecting a coil made of heavy wire, from the antenna to ground, and tuning the coil to the frequency of operation. Another possibility is to have a switch that connects the antenna to ground when not in use. The usual lightning arrester is not efficient in this case.

The problem of radio frequency is completely different. Imagine an equipment working on 20 meters with a wire, 17 feet long, from the chassis to ground. If radio frequency circulates through this wire, high radio frequency potentials might be present in the chassis. Note the wire is quarter wave long. Radiofrequency is present in the chassis wherever the antenna does not match exactly the transmission line; that is when the impedance of the antenna is not exactly the conjugate of the impedance of the line. Remember that matching exists only at one frequency if it exists at all. In most cases, r.f. energy is reflected back from the antenna and creates the standing waves. Depending on the length of the line and the ground wire, almost any voltage can be present at the chassis. The experience of touching with the nose, of the lips a "hot" microphone is not pleasant. It is to be noted that a 50 watt transmitter can produce very dangerous and unpleasant discharges. No, you do not have to have a kilowatt to worry about ground!

The problem of r.f. ground becomes important with some types of antennas that work against ground. A vertical antenna works against its reflection on ground to form a vertical dipole. When a vertical is mounted on top of a pole or a house, the only way out is to provide an artificial ground or ground plane. This is normally

a grid of wires, connected to earth ground, that act as a reference plane for the vertical antenna.

The same solution can be used to provide a radio frequency ground for the protection of the operator in a shack that is more than a few feet from earth ground. A grid of wires connected to earth ground for DC purpose, is installed at or directly under the floor. This grid provides a reference ground plane that although it is not at earth potential for radio frequency provides around the operator an environment that is all at the same potential. All equipment, metallic furniture, shelves, etc are connected to this grid or reference plane. This is what is called an equipotential ground.

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Fred, WAØHFW and XYL Judy, WNØPMA are now operating portable from 4 land as they have settled into their new home in North Carolina near Fort Bragg. Several skeds with Iowa Citizens have taken place and more are in the offing. If you are interested in the times and frequencies see Mike WBØHOG as Fred is anxious to keep up on all the activities back here in River City. Fred has a dipole up at 60 feet for 40M and a 14AVQ for the higher bands.

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Sporting a new Multi 2000 2 meter FM/CW/SSB transceiver, Steve KØSVW plans to become active thru the OSCARS on the 2 to 10 meter translator. This will take place upon his return from DC land. For the present the 2000 is in the safe keeping of Mike, WBØHOG who is enjoying the ability to channel hop at will.

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Remember the up coming Cedar Valley Hamfest on October 5th, to be held at Hawkeye Downs. Should be a good one with lots of booths and a large flea market. More words on this and the prizes as they are received.

The answer to last month's puzzle was 28.5 feet above ground. You didn't even need to know trig for that one as it was solvable using proportions and similar triangles..

This month's puzzle is a number game. The nine digits (excluding 0) are arranged to form square numbers: 9, 81, 324, 576. Now can you use the same nine digits to form one square number? The largest? The smallest? The answers will be in next month's RAG.

* * * S T R A Y S * * *

An add in a recent Interstate Shopper offered to pay a general class or higher ham to administer the Novice exam. This is another example of the need to promote the ICARC. I am sure that any one of our members would be more than glad to help anyone in such a need. It would appear that the problem lies in letting people know that we are here and willing to help! Beside that point, it may be just more than slightly illegal to take the guys money.

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Interesting reading from the newsletter from WØFZO our Vice-director. "The verified circulation figures of the 4 major ham magazines makes on wonder about some of the circulation figures recently released. 73 claimed a circulation of about 92,000, actual mailing was about 38,000. CQ claimed 55,782, actual mailing was about 28,000. Ham radio's claimed and actual figures were about the same, at about 43,000. QST claimed and actual was over 115,000."

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From the "Watch the blinking lights department"..... Max, WØLFF has a new toy, a TS-900. With all those lights and knobs, Max, how are you ever going to figure it all out?

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The traffic on the repeater would indicate people are expecting the autopatch to be operational soon..... how about it Paul?

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* * * S T R A Y * * *

In an effort to clean up the 160 trays of back-logged mail, the processing of all applications was halted for two weeks at the FCC's Gettysburg office and all staff members opened and sorted the huge stacks of mail. The results were that during the first week after the shut-down, over 90,000 CB licenses were granted. Let us hope that the amateur service is getting 'equal time'. Related to this, the Gettysburg office has established seperate box numbers for the different services. All amateur applications now go to the FCC, Box 1020, Gettysburg, PA. 17325. This is for all routine mail.

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Great news! Mike W1NØNCX has passed his Advanced class test and is waiting for the paper mill to grind out his new ticket. Rumor has it that he is dusting off his microphone for that HW-202 that has been stuck in the receive position for over a year. Wonder if that push to talk relay really works?

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Look for special Canadian prefixes to be in use from now until July 31, 1976 in honor of the '76 Olympics. VE stations will be using XJ and VO stations XN. This will be very confusing with the XE of Mexico and the XP prefix in use by Extra Classes in Chile. But we will get back at them with our special Bi-centennial calls.

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Australian Novices are a new inovation. Like US Novices, they have a 5 wpm code test and simple technical exam. Privileges include 30 W SSB, 50 KHz slices of 80 and 15 plus 11 meters. Should be lots of skip from state-side on that latter band. (HR Report)

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Repeater DX-ing can be hazardous to your license. The Greater Cleaveland Repeater Newsletter reports FCC in Norfolk, VA. area issued citations to amateurs who were DX-ing via repeaters on the grounds that they were interfering with communications in progress on some of the systems they were bringing up. Point to remember is that repeaters are licensed for intra-community communications, not DX-ing. (HR Report)

I have a little to say about a lot this month, but first I would like to extend a hearty 'Well done' to Dan WBØMED, who organized the recent picnic. All there agreed that this was the best one yet. There was plenty of fun, food and brew for all. A special thanks goes to Dennis WBØMCX and XYL for the delicious home-made ice cream. And that freezer! Those of you who were not there missed one of the high points of the year for the ICARC.

I would like to thank all who helped to put this month's RAG into print. You cannot imagine how much easier it is for me when material is received on time and there is help to call upon for the other chores such as typing. When I know that others care enough to help, then I know that the RAG serves a useful purpose. A special thanks goes to Bill WNØPYI and his father for their assistance.

The fall season is fast approaching and I would like to revive the idea of having a ham radio display at the Mall this fall. The idea was tabled this spring because of the many summer activities. Now is the time to start thinking about this. It is our opportunity to show the public what amateur radio is all about and to do some recruiting. In conjunction with this, a novice class would seem to be in order, reflecting on the recent success of Mike's (WNØNCX) novice classes of this spring. However, a few people cannot do all the work. Each of us must get involved, no matter the amount of time you have to donate or your talents or resources there is a place for you to do your thing. This is the only way any activity can succeed, or for that matter it is the only way the club can succeed. More about this at the next meeting.

Speaking of a place to help, the office of Activities Chairman is now vacant due to the resignation of Mike, WNØNCX. It is a job that does not take much time, but is essential to the club. If you or someone you know is interested in filling this position until the end of the year, please let one of the officers know. Here is your chance to help make the ICARC one of the best, so come on, get involved!