HAM HUM

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Vol. XXIV
No. 9

YOU ALL COME
TO
28TH ANNUAL HAMFEST
OF
AK-SAR-BEN RADIO CLUB, INC.
SUNDAY – SEPTEMBER 15, 1974
MISSOURI VALLEY CITY PARK
MISSOURI VALLEY, IOWA
(One-half mile east of I-29 on US Hwy 30, west edge of town)

AUCTION – PICNIC – EYEBALL QSOs
REGISTRATION OPENS AT 10:00 A.M.
AUCTION BEGINS AT 1:00 P.M.

NO REGULAR MEETING IN SEPTEMBER

* * * * *

NEXT REGULAR MEETING OCTOBER 11

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

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Regular member	$7.50
Regular member and XYL	9.00
Student member	3.50

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New member initiation fee	$1.00

Quarterly for balance of year:

Regular member	$2.00
Regular member and XYL	2.45
Student member	1.00

REPEATER SCORE

With 20 to 30 watts, and a good antenna, the typical Omaha FMer can expect to work the following repeaters:

Omaha	34-94	P
	22-82	P
Bellevue	146.04-147.30	P
Lincoln	16-76	P – A
	25-85	A
Clarkson	28-88	A – G
Fremont	07-67	? (Pending)
Clarinda	37-97	A – G
Savannah	25-85	G – E
	10-85	G – E
Des Moines	34-94	E
Sioux City	34-94	E

Minimum Band Conditions:

P = Poor
A = Average
G = Good
E = Excellent

That's a dozen (count 'em) repeaters! Things are poppin' here 'bouts!

Rip, WBØGAJ

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AUGUST MEETING

The regular August meeting was held at our usual quarters at Commercial Federal Savings and Loan 24th and L Streets.

In the opening portion of the meeting, President Rip, WBØGAJ, made several announcements and introduced the Committee Chairmen for the Hamfest. They are:

Program	Russ, WAØVEE
Facilities	Mike, WBØBMV
Fiscal	Kelly, WAØUZX
Advertising	Ed, WBØBCB
Support	Marty, WAØGEH

Help from all members was solicited and encouraged.

Consummation of the mutual aid agreement between AREC and Offutt Base weather was announced. This represents fulfillment of a project spearheaded and guided by Project Officer Claude, W5GAQ/Ø with the support of Bob, WAØDHU, AREC Chairman; Lowell, WAØHKT, Douglas County EC; and Dave, K5QJG/Ø, Assistant Project Officer, with Rip, WBØGAJ, as liaison. (The letters of agreement are published elsewhere in this issue of Ham Hum.)

The program was introduced and the featured speaker, Dick Cunningham, KØHHP, gave most of us our first close-up, in-depth look at the fabulous Signal One transceiver. Dick's presentation included a glimpse of the history of the development of the ıper Rig, a review of the specifications, and some of the operating characteristics of the Signal One. Fielding questions superbly, I believe that Dick had many persons dazzled by his breadth and depth of knowledge about the rig which he repairs as a sideline. Typical of his modesty, Dick did not mention until prodded the several circuit improvements he has made to the transceiver. A most impressive program, and our congratulations and thanks to Dick for the enticing look at the Signal One.

Incidentally, Roy, WØQH, was there for the meeting. Roy has a special interest (and apparent propensity) for the Signal One as he has seven of the machines in his "shack." Let's see . . . that figures out to one rig per band, 160 through 10 with a spare to boot! Really, Roy . . . seven????

Rip, WBØGAJ

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ANNOUNCING MULTIMEDIA COURSE IN FIRST AID

In connection with the A.R.E.C. Net, arrangements have been made for a first aid course. This will be a three-week course on Mondays, beginning October 7th, at the Red Cross Chapter House, 39th and Dewey Avenue, main floor. Five booklets will be used in the course at a cost of $5.18, including tax.

If enough persons are interested, there will be a second course following the first one. Notify Bob Lockwood, WAØDHU, 451-7233, if you wish to take advantage of this course. Check into the net Tuesday evening 34/94 at 8 P.M. for details.

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MEMBER NEWS

Mike, WBØDXA, will soon join the ranks of Omaha area hams on RTTY. Any other takers?

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DEPARTMENT OF THE AIR FORCE
[illegible] (MAC)
OFFUTT AIR FORCE BASE, NEBRASKA 68113

2 August 1974

Reply to: WX (Lt Col Von, 2073)

Subject: Letter of Agreement between the AK-SAR-BEN Amateur Radio Club and the Offutt Base Weather Division

To: AK-SAR-BEN Amateur Radio Club
ATTN: Mr. Riportella (President)

1. I am certainly encouraged by the enthusiasm and willingness shown by members of your club to help us improve our detection and warning capability for severe weather. The concept of a cooperative network of radio equipped observers presents a great potential for the timely and accurate reporting of weather phenomena as they occur. The usefulness of weather reporting decreases rapidly with time and hence a viable and mobile team of observers who have the capability and motivation to report events as they happen is invaluable.

2. I propose that the following procedures be agreed upon in order to establish a workable plan:

a. Upon the recommendation of the duty forecaster, Chief Forecaster or Weather Station Commander, position radio-equipped observers anywhere within about a twenty mile radius of Omaha-Offutt AFB complex.

b. Position a director or controller in the weather station to act as a liaison between radio-equipped observers and forecasters.

c. Instruct radio-equipped observers to report in detail exactly what they see. The attached set of guidelines should be used in making observations.

VERNON M. H. VON, Lt Col, USAF
Chief, Base Weather Division

1 Atch
Set of Guidelines

GUIDELINES FOR OBSERVING SEVERE WEATHER

1. When reporting sky conditions, indicate in tenths how much of the sky is covered by clouds, what the clouds look like, and give some estimate of how high they appear to be and what form or shape the lower clouds have.

2. When reporting precipitation, indicate whether the precipitation is liquid, or frozen, give some indication of the intensity and drop size of rain, give some estimate of size of and intensity of hail, give some estimate of the condition of the hail and if possible note the beginning and ending of any form of precipitation.

3. When reporting winds, give some estimate of direction and speed, describe effect on trees, shrubs, litter, etc; indicate whether wind is steady or gusty; if gusty, how much.

4. When reporting visibility, give some estimate of how far you can see and in what direction. Estimate how far you can see through precipitation if it is raining or hailing. Estimate relative darkness or light or changes thereof.

5. When reporting lightning and/or thunder, indicate whether lightning is from cloud to ground or cloud to cloud. Estimate frequency of occurrence and indicate whether or not thunder is heard and frequency of occurrence.

6. When reporting tornadoes, estimate direction and speed of movement (from - to). Describe destruction.

Report any phenomena which may be approaching the observer and from what direction. If possible give times of start as well as duration of occurrence. Be as descriptive as possible in reporting events.

ATCH 1

MEMO OF UNDERSTANDING

between

Base Weather Division, 3 Weather Wing, Offutt AFB

and

AkSarBen Amateur Radio Club

A.R.E.C.

regarding

SEVERE WEATHER WARNING/WATCH OBSERVATION & REPORTING

1. During periods of anticipated or actual severe weather, at the determination of the base weather personnel that a storm system is approaching and may affect the Offutt AFB and vicinity for which visual observation would be of assistance for analysis, the chief forecaster on duty will notify members of the Amateur Radio Emergency Corps through the use of a notification list which will be provided.

2. Upon notification, a member will proceed to the weather station and, if necessary, call up the spotter net and prepare the station to take direction from weather personnel as to desired positioning of spotters and relay information from spotters to the forecasters as required.

3. The net may initially be directed by the station located at base weather. However, at the first opportunity, control should be assumed by a separate base station. This will be a directed net with the net and net control being responsive to the weather station requests. Exception to normal directed net procedures will be direct contact from weather station to spotters for specific information at any time. All general reporting will be accomplished from spotters to net control.

4. The operator at the base weather station should take care to avoid unnecessary noise in and around weather personnel. The use of headsets is recommended unless forecasters wish to hear the reports directly.

5. It is further recognized that the Amateur Radio Emergency Corps is a voluntary organization and therefore there may be times when (during duty hours for example) participation may be light but will always respond to the greatest extent possible.

Calling List

Name	Home Phone	Duty Phone
1. Capt Claude Sauvain	291-6283	294-4955/4643
2. Cmdr Dave Wells	291-5346	4526
3. Maj Jim Howard	339-5318	5381
4. Mr. Vern Riportella	339-2162	422-0400
5. MSgt Nel Amick	331-9577	2 AACS
6. Mr. Lowell Jackson	571-8325	343-2012 (can be contacted)

Net Controls

1. Bill Leatherwood	292-0970	221-3040
2. John Gebuhr	553-6414	341-7973
3. Bob Lockwood	451-7233	558-1000

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WORTH YOUR LOOKING AT

We highly recommend that our readers look into the following articles to increase their FM savvy: *Definition of Terms*, page 48, June 1974, *QST* under FM Repeater News. And, REPEATERS ARE PUBLIC SERVICE MACHINES, page 49, June 1974, *QST*, by A. Stewart Johnson, W1UVE. Both of these pieces are *excellent* and should be carefully studied by all.

DESPITE CONSTANT WARNINGS STILL.....many stations operating mobile or portable are identifying improperly. It is interesting to note that these serious violations are by well established FM repeater operators – not just the new operators. Part 97 Amateur Radio Service, Subpart D Operating Requirements and Procedures, paragraph 97.87 Station identification states: (b) "When an amateur station is operated as portable or mobile station, the operator shall give the following additional identification at the end of each single transmission or exchange of transmissions: (2) When identifying by telephony immediately after the call sign, transmit the word 'portable' or 'mobile' as appropriate, followed by the number of the call sign area in which the station is being operated."

Improper identification:
W9XXX mobile
Proper identification:
W9XXX mobile nine

Failure on your part to do it right is a verbal request to the FCC for a citation to you and your station!!!

de Indiana Repeater Council

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PRESIDENT'S COLUMN

In regard to our last meeting on August 9th, as Club President I extend my sincere apologies to the membership for having to shoo everyone out at 2120 hours. One of the provisos of our arrangement with Commercial Federal people is that we be *out* by 2130 hours, period. (Another is that we leave the premises in a semblance of order.) So if the program runs inordinately long, as it did this last time, it does cut into our "eyeball QSO" time. We are looking into possible alternative meeting places.

It has been pointed out to me, and I have noted myself on occasion, that some of our repeater users may be falling into patterns of operation which more than superficially resemble that "other" service (?!?) and in particular participate in discussions which are, if not illegal prima facie, lie in an area of questionable legality. I refer here to the discussion and revelation of police operations, e.g., radar traps, checkpoints, roadblocks, etc. on the air. The recent crackdown by authorities in Iowa on such revelations by CBers should be an index to the climate in official channels regarding these types of communications. Please, for the good of the amateur fraternity, if not your own reputation, avoid any discussions of police operations on the air.

If at times it seems that the Ak-Sar-Ben Radio Club is totally devoted to, or at least "overoriented" towards VHF (2 M repeater) operation, the results of a straw poll I recently conducted may be of interest. At least half our membership is equipped for and active on one or more of the HF bands. What is true obviously is that when we chat with other Omaha Hams on the air, it usually transpires on the 2 M band which is the best means available. In other words, it would not make sense to yak cross-town on 20 M while your signal is propagating to both coasts and beyond. This is clearly not the best means available as it is a grossly inefficient use of bandspace. So 2 M is the best means available for local QSOs and since many of us, perhaps 75% are on 2 M, it would seem that since we talk to each other on 2 M, we assume that the Club is 2 M "overoriented." Since we don't talk to each other on HF, it would seem that the Club is "underoriented" towards HF. I believe, as stated above, that this is an illusion caused by the circumstances of our local mode of communications. And further, if voice mode, as opposed to CW, SSTV, RTTY, et al, seems predominant, I believe an analogous statement can be made here.

Past President Russ Minks, WAØVEE, had a lightning hit at his QTH Friday morning, 16 August. He thus has a tale of woe to relate. He was quickly, if not permanently, put off the air. Seems the bolt hit the power lines in the immediate vicinity of his QTH and, although all antennas were disconnected and the equipment was grounded, the power line surge wiped out the power supply on his TR-3, and his 2 M rig was pretty well zapped. The bout with Thor also knocked out the TV and provided a rather rude awakening at 0500 hours. The moral is, perhaps, though nothing practical can be done to afford total protection from damage, unplugging all rigs can't

hurt a bit if there are storms in the area. On the other hand, it might prevent a very "Thor" rig. By the way, Russ remarks that he strongly believes that the installation of a Zenner protection circuit (see July '74 Ham Hum) in the 2 M rig's power supply saved that equipment from relegation to the scrap heap. Thanks to Cecil, WØRMB, for that circuit!

Don't forget the Hamfest/Picnic/ Auction September 15. See you all there. I'll be there, of course. Remember my phonetics, "Gathers All Junk"!

73,
Rip, WBØGAJ
President, A.R.C.
****

ARRL 492

FCC has proposed three more rules changes affecting the Amateur service. Automatically controlled repeaters would be permitted under certain conditions to operate without a control operator present at a control point. The prohibition on cross-band operation of repeaters would be deleted, as requested by ARRL in a petition filed in March. Provisions for the issuance of special short-term licenses to commemorative stations would be added to the rules. The usual fee schedule would apply for such special stations, and licenses would be issued only to Advanced and Extra Class licenses. Comment deadline of late October in each case provide time for study of the proposals. The complete texts will appear in an early issue of QST.

de PHD News, North Missouri
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SPECIAL ANNOUNCEMENT

Ak-Sar-Ben Radio Club President Rip, WBØGAJ, announces the second appointment to the President's Special Advisory Group (SAG) as J. Howard, K5TNP. Jim thus becomes the second SAGee joining Marty, WAØGEH, in a similar capacity. (See July 1974 Ham Hum.)
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RECENT CONTRIBUTOR

Repeater Fund

Damon B. Nuckols, WØUIO
****

NEW MEMBERS ADDITIONS TO ROSTER

Floyd H. Schadendorf, WNØLXP
5625 Burdette Street
Omaha, Nebraska 68104
Phone: 558-4629

Betty Schadendorf (XYL of WNØLXP)
5625 Burdette Street
Omaha, Nebraska 68104
Phone: 558-4629

Paul S. Sherrerd, WBØBKZ
3008 Mason Street
Omaha, Nebraska 68105
Phone: 341-3262

Jon K. Taute, WNØMNK
2314 South 40th Street
Omaha, Nebraska 68105
Phone: 556-6695

Richard Tennant, WNØMRT
2584 Titus Avenue
Omaha, Nebraska 68112
Phone: 455-3083
****

JUDGMENT: INSTINCT, EXPERIENCE, OR COMMON SENSE?

This column is not a treatise in philosophy. It is an open question for our members to ponder. It offers few, any, answers but perhaps will illuminate one facet of a particular aspect of A.R.E.C.

The question now occurs as to whether the "Weather Watch" activities of 2M A.R.E.C. in Omaha have gone overboard. That is, are we becoming alarmists or reactionaries? Does absence of a clear sky, or conversely a few dark clouds, warrant activation of the A.R.E.C. net on 2M to the exclusion (and discontent) of those not interested in, nor participants in, the A.R.E.C.?

There are so many auxiliary questions that can be built around the preceding question that it boggles the mind. For example, when does the WX situation warrant an upgrade of communications? Isn't it *every* ham's responsibility to be interested in A.R.E.C even if the emergency (real or potential) does not affect him directly? Who shall determine what comprises real or potential hazard and on what basis? What is the impact of alarmist or zealous callup of the net on A.R.E.C. credibility, etc., etc.?

Clearly, answers to these questions will vary with the respondent. Enter the topic, Judgment. More questions arise. Is judgment a product of experience? If so, then perhaps an increase in discretion will be apparent in future operations. Will, then, an increase in discretion (implying wisdom) reduce the number of net callups? Is judgment a function of instinct or common sense? For that matter, is common sense not a function of experience? And so the questions propagate as the Heads of Hydra; sever one and two develop from its root.

The point appears to lie herein. The exercise of judgment, whether rooted in experience, common sense, or intuition is critical to the maintenance of A.R.E.C. credibility and integrity. While it is easy to sit on the sidelines and take potshots at those who are "doers," to act as "Monday morning quarterbacks," to criticize with only one-half of the requisites of critique, i.e., to cite fault without recommending corrective action, is irresponsible, cantankerous, and counterproductive. Is it not better to be cautious, not alarmist, and if the balance is biased in either direction (complacent vs. reactionary), is not the safer position to be biased towards precaution? So if a judgment is, in the clear light of retrospective, found to be unduly cautious, isn't that what experience can be expected to remedy?

It would be tragic if the schism between the advocator of various philosophies regarding callup of the 2M A.R.E.C. net was allowed to detract from its effectiveness and mission. I am reminded of a series of anecdotes from the military which all endeavor to make the same point. That is, don't try to second-guess the battlefield commander; he's the one out there getting shot at, and he alone knows the circumstances and factors leading to a particular decision. We all have an understanding of when and why the A.R.E.C. net should be called to order. If these understandings

differ, then we must rely on the judgment of the guy who's calling the shots, be he E.C., A.R.E.C. member, or whatever. The question is then, if you don't participate, is it fair to take issue with the activity in the first place? Do you have the necessary perspective? In the second place, isn't shooting from behind a tree distinctly less risky than being in the middle of the battle line, and thus aren't unkind words from the forest justly ignored, or taken for what they are: potshots? On the other hand, shouldn't criticism, when coupled with logical, rational recommendations, be considered irregardless from whence it originates, and if sound, incorporated?

Finally, if we err, is it not better to err in a direction that will have the least damaging results? If an error in judgment causes inconvenience for those who would see the repeater used for purposes other than an unscheduled A.R.E.C. net callup, shall we regret the inconvenience and sincerely apologize? If, on the otherhand we are alert to potential, probable, or eminent danger in WX conditions, is it we who will be surprised by a sudden and perhaps fatal turn of events. All A.R.E.C. members should be aware of the conditions which fall into the "spectrum" of potential or probable hazard to life and property. These are:

Damaging winds (approximately 40 MPH and above)

Large hail (greater than 3/8")

Severe and frequent lightning (many cloud-ground strokes)

Funnel clouds

Cumulus mammatus clouds

If we recognize that the interval between a funnel cloud formation and its first ground contact may be very short, doesn't it pay to be cautious?

If a tornado touched down in a field in Plattsmouth, it could be in Bellevue in 3-5 minutes, in Omaha 7-10 minutes. In that time, how many, if any, sirens would sound? How many, if any, broadcast stations would alert the public? Seconds *do* count. If the alert actions of an A.R.E.C. member adds 30 seconds to the warning time of the general populace, hasn't he more than fulfilled his mission? There are those who say, "que sera, sera, whatever will be, will be." Bah Humbug, I say! While we don't yet have the tools of knowledge to allow us to dissipate or divert a tornado or severe thunderstorm, we sure can detect 'em. And the specific characteristics of any given storm are often ascertained best by visual reconnaissance, especially local disturbances where radar, blanked by ground clutter, is absolutely useless! Thus, if we can't dissipate or divert the storm, we can certainly get a few more heads down a bit earlier in the drama.

We began by asking several questions. None of these has been completely answered. A panel discussion is perhaps the answer to getting out into the open the various factors which form the individual's judgment. I hope I have not dissuaded any individual from his or her convictions (yet). I do hope I've given you some questions to mull over at your leisure and which might, when resolved, form the basis of an enlightened attitude toward "judgment calls."

Rip, WBØGAJ

(Comments are solicited.)

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LIKE FISHING, MINNESOTA TWO-METER HAMMING IS "CATCH-AS-CATCH-CAN"!

By Don Filbert, KØAJO

Having recently returned from a ee-week vacation in Minnesota, we thought our two-meter activities during this trip might be of interest to other hams who may someday journey to this "Land Of The Sky Blue Waters."

Leaving Council Bluffs at 4:00 a.m. on July 20th, en route to our rented cabin on the shores of Lake Ida near Alexandria, we found the Omaha repeater completely inactive at that early hour. Even Cecil (WØRMB) had apparently pulled the big switch!

Traveling northward on Interstate 29, we also failed to provoke any response as we passed first through Sioux City, then by Sioux Falls. And the 34-94 repeater at Brookings – requiring a tone-burst to bring it up – evaded our attempts to supply the proper signal.

Angling northeastward into Minnesota, however, we had better luck---making a few contacts through the Marshall 16-76 repeater and, by some strange skip, even enjoying a QSO with a Detroit Lakes amateur located more than 100 miles away.

We continued in business upon arriving at Alexandria, picking up an aeronautical mobile and chatting with a W5 who passed us on the highway as we entered the outskirts of the city.

Upon reaching Lake Ida, we ıpacked our gear, took a swim, went out to eat, then put in a good night's sleep with no further attempts to work the rig.

Early the next morning, however, we promptly set up our portable station---connecting the Clegg to its power supply . . . placing our Regency scanner alongside it . . . feeding both units into the Ringo antenna we had mounted on the cabin roof.

Shortly thereafter we made contact with "Rube" (WAØMGF) who was camping with his family on a nearby lake about six miles from our site. This was the first of many "rag-chews" we enjoyed with him during the remaining week of his vacation. We were also privileged to host him and his XYL for an eye-ball QSO before they returned to their home QST at Austin, Minnesota.

Later that same day – anticipating the arrival of Lynn (WAØODH) and Randy (WBØDDZ), who had planned to join us for a two-day outing – we made contact with these two Omaha-area hams and talked them into camp. Having left at a later hour than we, and on a Sunday, they were rarely without a contact with someone during their entire 405-mile trip, they reported.

On Monday, July 22nd, the band was really jumping! We were able to bring up two repeaters in the Twin Cities (about 130 miles distant!) and enjoyed numerous rocking-chair-copy QSO's with these St. Paul and Minneapolis hams. From the north, the Detroit Lakes repeater also came up at our command. But this was the only day during our entire three-week vacation that we were able to communicate with these remote regions.

Later that week, after Randy and

Lynn had left, we had the pleasant experience of first contacting, then meeting personally, an old two-meter friend from the Omaha area---Bob (WØPOL) of Ashland, who was vacationing with his family at a nearby lake. Until he returned home, we kept daily schedules with him both morning and night.

With our scanner running almost constantly, we were able to pick up any mobile who was looking for a contact as he passed through the Alexandria area. Most of these random QSO's were made on 94-94, although we also had crystals for simplex channels 52, 76, 82, 88 and 97.

If any local hams were operating on two-meters, we failed to hear or raise them. Sometimes so much time went by between contacts as to make us wonder if our rig was on the fritz. Then, to our immense relief, a "QRZed the frequency" would break the silence of our receiver and we would soon be talking to a new-found friend.

During our three-week stay we talked with perhaps a total of 12 two-meter hams from our fixed-portable location. Driving home on August 10th, we first chatted with four Marshall amateurs over their repeater; then, about 20 miles north of Sioux City, we picked up the 34-94 repeater that this Iowa community is using temporarily until its 37-97 permanent installation is readied for use in mid-October. For the next 50 miles, we were in constant contact with one or more two-meter hams in that area---several of whom we had talked to previously via our own 34-94 repeater.

Continuing south on I-29, we left the city limits of Missouri Valley while beginning to copy the familiar voices from the Omaha-Council Bluffs area. A few more miles and we were in QSO with them--happy to have logged new contacts during the vacation but glad to be back at the home QTH again, chatting with old friends.

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SOLID STATUS

By Dick Blasco, WA4DHU-2

The Rock That Amplifies.

In the late 1940's engineers put two of these junctions "back-to-back" as in figure 1. They found that if the "base region were made very thin, the device would amplify. Amplification is the ability to control a large voltage or current with a smaller voltage or current. Just what goes on in this device to make it able to amplify gets you into modern physics and fancy mathematics, but we can assume that it does work. The device is, of course, the transistor.

The two types of transistors are shown with their symbols in figure 1. Each type has its advantage and disadvantage. It turns out that PNP transistors were easier to make from Germanium, and early transistors were Germanium PNP. Silicon has become popular for modern transistors primarily because it isn't quite as sensitive to temperature as Germanium. So you will find that most transistors now on the market are Silicon, and also NPN, since this type is easier to make. Germanium is still used in low-voltage applications where its 0.3 volt forward barrier potential as compared to 0.6 volts for Silicon becomes very important.

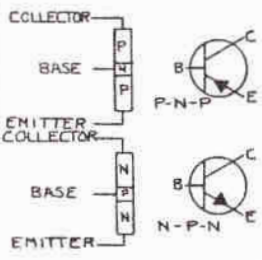

FIGURE 1 - TRANSISTOR TYPES

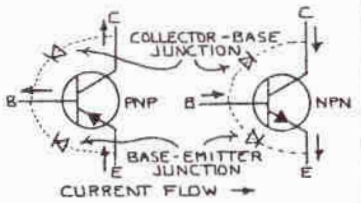

FIGURE 2 - JUNCTION DEFINITIONS

TABLE 1 - OPERATING REGIONS

	BASE-EMITTER REVERSE	BASE-EMITTER FORWARD
COLLECTOR-BASE REVERSE	CUTOFF	ACTIVE
COLLECTOR-BASE FORWARD	IMPROPER BIASING	SATURATION

Figure 2 shows the junction definitions and imaginary back-to-back diodes are sketched to represent them. Normal direction of current flow is also given. NOTICE THAT THE ARROW IN THE TRANSISTOR SYMBOL POINTS IN THE DIRECTION OF NORMAL EMITTER CURRENT FLOW (assuming current from positive to negative).

You might wonder at this point why a transistor can't be "turned around," connecting the emitter where the collector should be and vice-versa. This is undesirable, since the base-emitter junction is specially designed for high gain and the collector-base junction is designed to conduct heat, since NEARLY ALL OF THE POWER DISSIPATED IN A TRANSISTOR IS DISSIPATED AT THE COLLECTOR-BASE JUNCTION.

Transistors have three regions of operation as summarized in Tables 1 and 2. At cutoff, the transistor looks like an open circuit, and there is NO GAIN and very little power dissipated, since current is essentially zero. As the base-emitter junction becomes forward-biased and passes the barrier potential, the transistor enters the active region. Here amplification and power dissipation take place, since current is flowing and there is a voltage drop across the reverse-biased collector-base junction (Power equals Voltage times Current).

Since the base-emitter junction is forward-biased, its voltage drop is characteristic of a P-N junction and is relatively constant (between 0.4 and 0.7 volts for Silicon). The low voltage drop means lower power dissipation than at the collector-base junction. The relatively narrow voltage range means that collector CURRENT is being controlled primarily by base CURRENT, and you may have heard that the transistor is a current-operated device for this reason (as opposed to FETs and vacuum tubes, where a voltage swing on their control elements causes output current variation and gives them the properties of being voltage-controlled devices). Strictly speaking, it is really the

base-emitter voltage (even though the variation is small) which is controlling current, but that is a fine point for engineers to worry about.

In the active region the transistor has gain, and this gain is expressed by two parameters: beta and transconductance gm. DC beta is the ratio of a steady collector current to steady base current. AC beta is the ratio of the change in collector current due to a change in base current, and depends on biasing and frequency. AC beta is generally lower than DC beta, but is usually close enough that one number is given for both. You should be aware of the difference, because it might get you into trouble if you try to use the DC beta for an audio transistor at 2 meters! Typical betas run from 50 to 200 for modern transistors.

Gm is the same thing as the vacuum tube equivalent. It is an AC parameter that measures the ratio of collector current change to base-emitter voltage change. It can be shown by fancy mathematics that gm depends almost entirely on collector current, and is roughly 40 times collector current, regardless of the transistor type! Unfortunately, it is far less useful for current-operated devices and normally

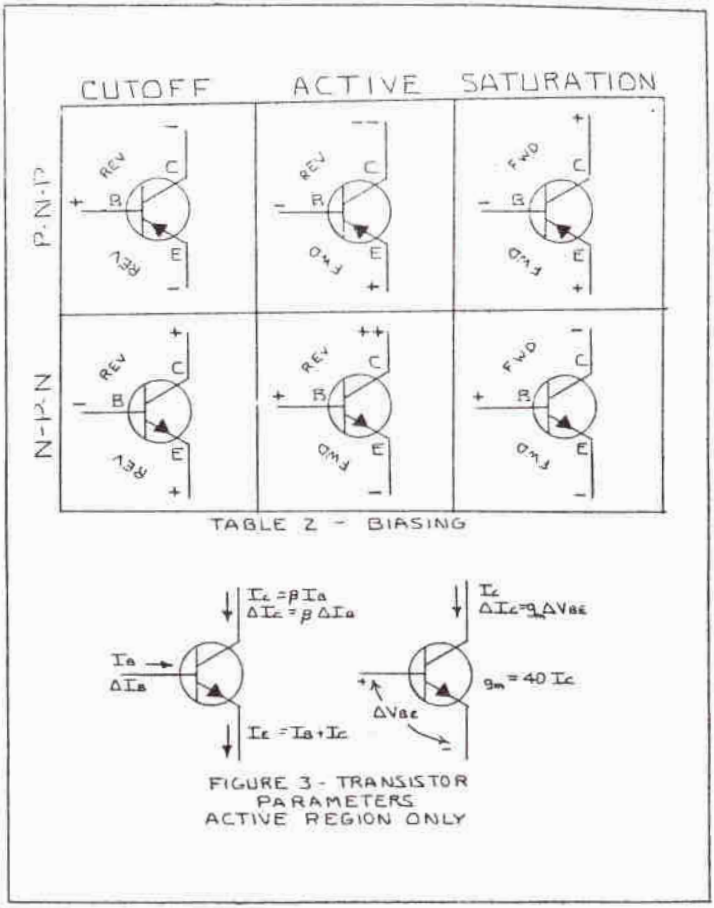

FIGURE 3 - TRANSISTOR PARAMETERS ACTIVE REGION ONLY

HAM HUM SWAP

FOR SALE: From the estate of Floyd Himmel, WAØRKU:
Robot Slow Scan Monitor Model 70 – $230.00
Robot Model 80 Camera, Slow Scan – $240.00
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FOR SALE: Heathkit DX-60B Xmtr, HG-10B Rcvr, and Xtal Calibrator, along with HG-10B VFO. Also, will sell Knight 50 W. Xmtr cheap. Best offer. John Bergmann, WNØMFL, 424 N. 5th Street, Plattsmouth, Ne 68048

FOR SALE: Eico 753 SSB-AM-CW 80-40-20 meters Transceiver
Knight T-150 Transmitter. Built-in VFO. Good novice rig.
Phone Jon Penner, 571-5076

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(Cont'd from preceding page)

everything is described in terms of beta.

As base voltage reaches the point where the collector-base junction becomes forward-biased as well as the base-emitter junction, the transistor enters the saturation region. At saturation, the device is basically a short circuit. Very little power is dissipated, since even though current is flowing, the voltage drops are all very low. NOTICE THAT AT CUTOFF AND SATURATION THERE IS NO AC GAIN, AND gm AND AC BETA ARE BOTH ZERO IN THESE REGIONS. There may be some DC gain at saturation, but this depends on the degree of saturation and is relatively unimportant. You might note that vacuum tubes and FETs have the same three states: cutoff, active, and saturation.

That basically covers the important properties of transistors. The next step is learning how to bias the transistor to put it into the region you want.

de Florida Skip

****

Mrs. Gordon was sending her husband to the store to get a head of cabbage.

"What size head?" Mr. Gordon asked.

"Oh, about the size of your head," he was told.

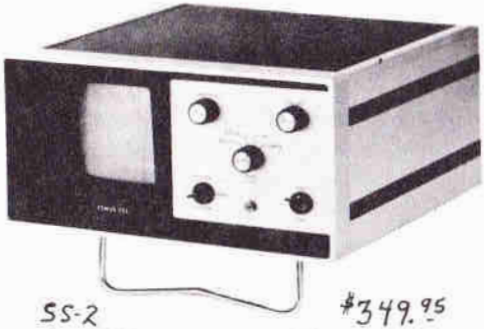
Later, a friend reported, "I think you should know, Mrs. Gordon, that your husband is acting strangely. I saw him at the store today trying his hat on one head of cabbage after another!"

Sunshine Magazine

****

"Of course I was good—how much trouble can I get into standing in the corner all day?"

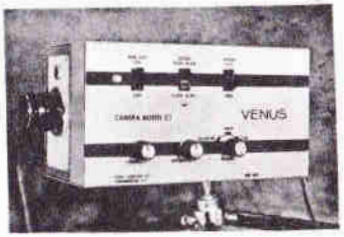
Venus **Slo-Scan** SEE IT AT **Hi Hobby Industry**



SS-2 $349.95

TV monitor

Provides an optimum SSTV picture on a 3¼ x 3¼" screen with high brightness, from most any audio source. "Accu-Sync" also gives video presentation (see below) -- a tuning and diagnostic aid. Simplified function controls, screen burn protection, accessory jacks for receiver - transmitter - patch - recorder, etc. An outstanding unit to give great results.



$469.95 C-1

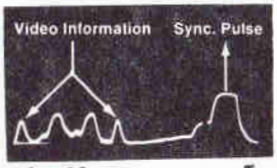
TV camera

Compact (7x6"x10" HWD) and the most outstanding - versatile "ham" camera around. Fast scan for "real time" pictures (video and RF (ch. 3/6) for any TV) to monitor & adjust pictures and SLO-SCAN with automatic light control. Focus sharp down to postage-stamp size --- to infinity. Variable frame size, black-white reversal, bar generator, 25 mm - f/1.8 lens. The pair, SS2-C1 make a great combination.

JOIN THE FUN WITH THE SSTV GANG

Hi AL - WØJJK

SSTV is a great way to "eyeball" a QSO!



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