



# HAM HUM

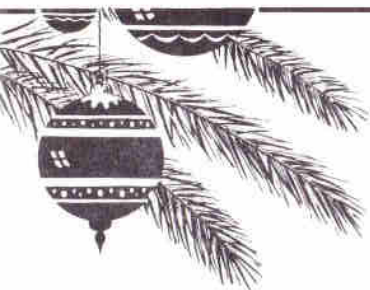
Published by

AK-SAR-BEN RADIO CLUB, INC. - Omaha, Nebr. 68101  
Post Office Box 291 - Downtown Station



Vol. XXII  
No. 12

December 1972



**DUES DUE  
BEFORE MEETING**

**1972 ANNUAL MEETING  
and  
CHRISTMAS PARTY  
of  
Ak-Sar-Ben Radio Club, Inc.**

**December 8, 1972 - 8:00 P.M.**

**World Insurance Company Cafeteria  
203 South 18th Street, Omaha**

**ELECTION** of officers. Paid Club members will vote on officers for 1973.

**GIFT EXCHANGE**-Club members and guests (adults) who wish to participate in the exchange of gifts must bring a gift - minimum value \$2.00. Only those who bring gifts will be eligible to participate in the exchange.

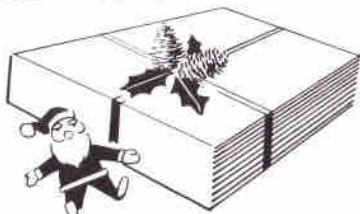
**DOOR PRIZES**-Drawing will be held for door prizes from list of paid members.

**MOVIES AND SPECIAL FAVORS FOR JUNIOR OPS**

**REFRESHMENTS**

**BRING YOUR FAMILY AND FRIENDS - GUESTS WELCOME**

**BEST WISHES TO YOU AND YOURS  
FOR A VERY MERRY CHRISTMAS  
AND A HAPPY NEW YEAR FROM  
THE BOARD OF TRUSTEES OF  
AK-SAR-BEN RADIO CLUB, INC.**



**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.



Next copy deadline: December 22nd

## PAST PRESIDENTS' NIGHT NOVEMBER MEETING

By—Bob Andrus, KØLUG

There is just something different about this one night of the year when everything else is forgotten and the "Ol' Timers" take over. At first reading, this may sound like we mean age. On the contrary, we are referring to the men who have given something of themselves in serving as President of the Ak-Sar-Ben Radio Club. It takes just a little more than the average to fill this office in our Club, and as we saw and heard at the November meeting, each person was there with some story of past endeavors.

Not being an old club member, I can't say first hand that all they said was true, but I can say that the stories about times past will give the new President a lot to try to beat. With projects like big feeds at some of the nicest eating places in town and the wives getting into the act, they must have had a bang-up time.

The comments after the regular session during coffee and donuts showed once again that everyone had a good time listening to the good ol' times!

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## SPECIAL NOTICE 1973 CODE AND THEORY CLASSES

Volunteer members of the Ak-Sar-Ben Radio Club, Inc. will again conduct code and theory classes in 1973. Purpose is to help you upgrade your license or to help others become amateurs.

Sessions will be held each Monday at 7:30 P.M. beginning January 8, 1973, at CREIGHTON PREP, 7400 Western Ave., Omaha. Sessions will undoubtedly continue for 14 weeks, ending April 9, 1973.

There will be 2 Code Classes and 2 Theory Classes conducted concurrently — slow code and theory for those going for novice; higher speed code and more advanced theory for those going for general and above privilege.

NO FEE — NO PRIOR REGISTRATION REQUIRED — CLUB MEMBERS AND NON-MEMBERS WELCOME TO ATTEND.

\*\*\*\*\*

## SILENT KEY

J. W. "Tony" Sikorski, WØRRN  
1900 South Menlo Avenue  
Sioux Falls, South Dakota 57105

\*\*\*\*\*

## THE ECONOMY

### NOT NATIONAL, NOT EVEN LOCAL, BUT OUR OWN.

The subject of finances in our Club has been a constant item on the agenda of all our Boards over the years.

In 1955 when our corporation began, the dues were 50¢ a month or \$5.00 if paid annually.

In 1963 dues were changed to 50¢ a month or \$6.00 annually. Because of accounting problems, manner of payment was changed to annual and to a calendar year only basis, all dues becoming due January 1st.

Boards have delayed any increase in dues hoping to solve the problem by way of such items as increased number of members. However, if it were not for the several "angels," we could never have continued. We do have a reserve fund which was established as the result of the three division conventions our Club has sponsored over the years. Twice we have had to tap into the reserve to the extent of drawing the interest thereon, once in 1966 and now again in 1972.

In order to attempt to balance our budget, the Board of Trustees of the Ak-Sar-Ben Radio Club, Inc. has concluded that membership dues shall be increased effective January 1, 1973; however, dues for 1973 which are paid prior to January 1, 1973 shall remain the old rate. Thus if you wish to avoid the dues increase until 1974, pay your 1973 dues before the year end at the annual rate of \$6.00 for regular member, \$1.50 for XYL, and \$3.00 for student.

Dues payable on and after January 1, 1973 will be as follows:

Initiation Fee	\$1.00
Regular Member	\$7.50
XYL	\$1.50
Student	\$3.50

It was also concluded that new members should come into the Club paying on the basis of quarters remaining rather than on a monthly basis. Thus the membership of a new applicant voted upon at the January or February meeting would take effect immediately for the balance of the year at the full annual rate plus the \$1.00 initiation fee.

March, April and May applicants would pay the \$1.00 initiation fee plus dues for three quarters at the rate of \$2.00 per quarter for a regular member; \$0.45 per quarter for XYL (optional); and \$1.00 per quarter for a student member. Membership on this basis would take effect at the beginning of the calendar quarter.

Following this same pattern, June, July and August applicants would pay the \$1.00 initiation fee plus dues for two quarters at the rate of \$2.00 per quarter; September, October and November applicants would pay the \$1.00 initiation fee plus dues for one quarter at the rate of \$2.00 per quarter. December applicants would pay the \$1.00 initiation fee plus the full annual rate and membership would become effective January 1st.

The Club Treasurer will be at the annual meeting ready to accept your 1973 dues at the old rate!

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## NOMINATIONS FOR 1973

The annual meeting of the Ak-Sar-Ben Radio Club, Inc. will be held on December 8, 1972 at which time officers will be elected for 1973.

The Articles of Incorporation and Bylaws of the Club provide for the election of a President, Vice President, and four members of the Executive Council each year. The President and Vice President are elected for a one-year term; the Executive Council members are elected for a two-year term. The outgoing President remains on the Board of Trustees as Immediate Past President for one additional year.

Remaining on the Board for 1973 are: Edward F. Askew, WAØRDZ; Alvin (Al) Comisar, WAØSTK; James E. Garr, WBØCLU; Dr. Edward A. Holyoke, WAØVSR; and Charles F. Kelly, WAØUZX.

These five together with the new officers and members of the Executive Council to be elected will comprise the Board of Trustees for 1973. The Board will then elect a Secretary and a Treasurer from the Executive Council.

At the annual meeting the Nominating Committee will place in nomination the following for the office indicated:

### For President

Russell A. Minks, WAØVEE  
Age: 48  
Address: 1010 Center Street  
Phone: 346-3629  
Wife: Phyllis  
Children: Jon and Kay  
Employment: American Distributors, Inc.  
License: 6/1968 (General)  
Hobbies: Ham radio, photography

### For Vice President

Leo F. Connolly, KØJIU  
Age: 42  
Address: 200 South 1st Street, Council Bluffs  
Phone: 323-3550  
Wife: Patricia  
Children: Patrick, Brigid, Frances, Joseph, Maureen,  
Stephen, Ann Marie, Edward, Robert  
Employment: Attorney  
License: 17 Years (General)  
Hobbies: Ham radio, family camping and traveling,  
electronics, civic affairs

**For Executive Council**

Delbert G. Gibson, KØUIV

Age: 25  
Address: 5426 South 19th Street  
Phone: 734-3034  
Wife: Mary Lou  
Employment: Wilson Certified Foods  
License: 9/1959  
Hobbies: Ham radio and General Electronics

M. J. (Jack) Prall, WØODL

Age: 67  
Address: 623 South 50th Avenue  
Phone: 558-9921  
Wife : Mildred  
Children: 1 Son, 2 Daughters (married)  
Employment: Alamito Dairy  
License: 9/15/1929  
Hobbies: Ham radio, travel and photography

Frank D. Taylor, WØGOJ

Age: 33  
Address: 4604 Hascall Street  
Phone: 558-4227  
Wife: Sandra  
Children: Frank, Debera, Patricia, Theresa  
Employment: Precision Measurement Lab  
License: 1958 (Advanced)  
Hobbies: Ham radio, hunting and fishing

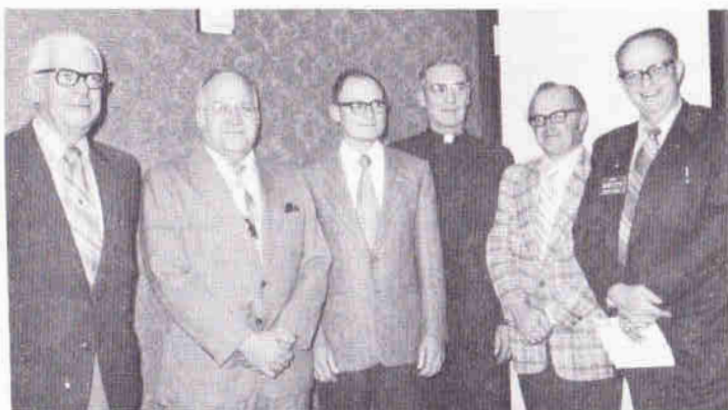
Marion (Mike) Wilczynski, WBØBMV

Age: 42  
Address: 6212 Kansas Avenue  
Phone: 571-7932  
Wife: LeAnne  
Children: Terri (14), Sally (10), Kristy (8)  
Employment: Hawkins Construction Co.  
License: 7/18/1969  
Hobbies: Ham radio, fishing.

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## PAST PRESIDENTS' NIGHT

It was a real pleasure to have a good number of Past Presidents attend our meeting in November as shown in the photos below:



Left to right

Arthur R. Gaeth, WØFQB (1947)

Earle E. Olson, WØJKE (1951)

John W. Orr, WØPHW (1952)

Rev. R. J. Strange, WØQHG (1953)

Frank W. Cooper, W3NV (1954)

Dick L. Eilers, WØYZV (1956)



Max N. McKinney, WØYVV (1960)

John A. Droescher, KØKWB (1961)

Royal M. Enders, KØLYO (1962)

Robert C. Lockwood, WAØDHU (1968)

Harold E. McClenahan, Jr., WAØDGA (1970)

James C. Droege, WØYCP (1971)

Dick Eilers, WØYZV, acted as master of ceremonies. Art Gaeth who was president the longest time ago is also a charter member of the Club. Before presenting him in the lineup of past presidents, recognition was given to Art for his Certificate as a 50-year Ham in behalf of the Quarter Century Wireless Association. Originally the Certificate was to have been presented to him by Bob Rudd, WØMW, who unfortunately moved from our area to the western part of the state before presentation could be made.



Herb Curry, WØQXR, who was president in 1948, planned to attend the meeting but could not do so because of illness.

It was a pleasure to hear from Elmer Stein (Ex-WØAVM) via a phone call (1949 President). He too planned to attend but his work prevented him from doing so.

Next in order of year as president are Earle Olson, John Orr and Rev. Ray Strange. We expected a letter from Frank Cooper, W3NV, but the letter did not arrive prior to the meeting. Instead, it seems Frank wanted to save the stamp so came in person from Pittsburgh, Pennsylvania, and was the only out of town Past President attending. As this was the first time Frank has been at our Club meeting for a considerable time, it was good to see him and to be reminded of some of the things in the past he could think of, including his early efforts at editing Ham Hum. Frank was the original editor and originator of the magazine in 1951.

Next in order of year of presidency are Dick Eilers, WØYZV, Max McKinney, WØYVV, John Droescher, KØKWB and Royal Enders, KØLYO. Then in what can be termed "the newest club past presidents" are Bob Lockwood, WAØDHU, Harold McClenahan, WAØDGA, and Jim Droege, WØYCP.

We were pleased to receive letters from two past presidents - Dr. Leon M. Becker, W6AID (President in 1950) and David A. Hollander, W6COJ (President in 1959) which we quote for your interest.

Dear Dick:

Many thanks for the invitation to attend the last meeting of the AK-SAR-BEN Radio Club honoring the past presidents. I had planned to attend this meeting barring no unforeseen difficulties, but as luck would have it a help problem arose and I could not leave the area. I did however place a long distance call to the meeting place at 2100 hours your time but I must have reached the switchboard and received no response. This letter is a bit late as I understand you read out of town correspondence at this meeting.

Needless to say both Pearl and I have been kept pretty busy lately with the three fish and chip shoppes we are running and with the possible acquisition of a fourth shoppe we will be kept busier. In addition to the above I divested myself of the printing establishment I had and bought a Cessna 172 Skymaster airplane and to make a long story short, "When I am not frying, I am flying" in addition to attending school a couple of nites a week. I decided to go back to school to find out how stupid I have become in my older years.

I have not been too active on the air lately due to being plagued with noise problems, finally the Southern California Edison people worked it out for me with a new transformer and new hardware in the poles in my area. I usually QSO Charlie, WØKH during the week on 20 meters and Ferris Kramer, WØYZK, Charlie, WØKH and Frank Cooper, W3NV on Sundays at noon Omaha time on 14270. By the way, Frank Cooper is in the local area and I am supposed to meet with him later tonite. Of my other old Omaha friends I never hear on the air these days.

I understand from Frank and Ferris that you had a mighty nice turnout at this meeting and that the club membership is now up. I certainly enjoy reading the HAM-HUM every month to keep up with the latest happenings of the club.

I hope I can make it to Omaha on a meeting nite in the near future, all the best and 73s.

David A. Hollander  
Major, USAF (Ret.)  
W6COJ

\* \* \*

Dear Dick:

I was very happy to receive your letter informing me of the Past Presidents' Night of the Radio Club to be held on November 10, 1972.

Unfortunately time and distance do not allow me to be present in person but you can be assured that I will be there in spirit.

My radio activities have been severely limited the last two or three years for various reasons but in any event my interest gravitated to VHF and specifically repeater operation. For the past three or four years my hobby has been that flying and I have my own little plane and although it is sort of an antique nevertheless I enjoy it very much.

Hopefully I will be able to drop in to Omaha one of these bright days and visit some of my friends, but do not hold your breath because I do not know just when it will be possible. I am so busy here in Merced, California in my new practice that I do not actually have much time for either hobby and I have not even had the



opportunity to set up my radio gear to see whether or not I can receive the Grizzly Peak Radio club's repeater at this distance or not.

Please give my very best to all of the boys and again I assure you that I will be there in spirit.

Sincerely,  
"Doc" Becker, W6AID  
\* \* \*

A special message to the past presidents who did not attend the meeting or send a note - we're still interested in you. It is still not too late to send a short letter telling what you are doing and your current interest or lack of interest in ham radio. We will reserve space in next month's Ham Hum for your letters. Your names were all brought up at the meeting and we heard about a number of you from members who had contacted you either on the air or in person.

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### NEWS NOTES

Appreciate the news in Ham Hum about my friends in Omaha...was startled to see my article reprinted! Hope the facts were correct; the opinions expressed are all my own responsibility! We are working on a few projects: building up the TR22 into a 'portable' 10 watt unit for AC/DC use with built-in whine filter; want to trade the ML-2 for the complete Standard SRC146A HT package for more versatility...we work from 1600-2400+ to earn money for our Master's Degree; monitor 76 and 88 in Fort Wayne most of the time not working. Hope to see some of you this summer as you pass through on vacation. New QTH is: 1410 Spy Run Avenue, Ft. Wayne IN 46805. A bit hard to get to, but worth the trip! Keep up the excellent work in the new net on 2 meters...and best of 73's to all..... (Rev) G. Wayne Heck, WB9HJM

\* \* \*

At 12:50 P.M. on November 8th a mobile station, WA8WDZ, John reported on the Omaha repeater of a car weaving all over Interstate 80 West, east of Council Bluffs.

WØYDV, John replied and called the information to the Council Bluffs Police Department. WA8WDZ gave description of the car including the license number. He then followed the car. Later he reported the police pulled the guy over.

Nice job fellas!

WAØDHU  
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### MEMBER NEWS

Dear Sirs: I received my advanced class license on November 10th so my call is now WBØIAH.

Sincerely,  
Craig D. Hinton, WBØIAH  
(Ex-WNØIAH)  
5004 Amy Circle  
Omaha, Nebraska 68137

(Ed. Note: Congratulations, Craig!)  
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### FOR SALE

YAESU FRDX 400 Receiver. Like new. Will sacrifice for quick sale.

Philip R. Brown  
1305 Wilshire Drive  
Bellevue, Ne. 68005  
Phone: 291-9677  
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## DIESEL MOBILE HAMMING

As most of you already know, I do most of my hamming as diesel mobile from Omaha to the west coast on 2 meters. Since I have a few minutes free, I'll give a short resume of my findings.

First I hit the Lincoln repeater on 16-76 which I find I can work from Omaha to the first exit for Grand Island.

Next 2 meter activity is North Platte where at the present time there is only 94 simplex in use. They have a club repeater ready to go, but are waiting for a license. The FCC sent their application back due to the new rules and needs ERP data. Their old repeater on 34-94 was privately owned, and was sold by its owner due to no contributions for original outlay or maintenance. As I hear it, there may be some other repeaters in the same boat.

The Cheyenne-Laramie Repeater Association has a 16-76 repeater on Sherman Hill above Laramie that has a range of about 90 miles east and west on I-80. WA7EGK who maintains it also has a 34-94 repeater on QRP at Laramie on the campus of the University of Wyoming. This repeater will have open auto patch in the near future.

Of course everyone has heard of the big voice of Denver on 34-94. I can work it from I-80 in Wyoming near Cheyenne. Denver also has a 10-70 for RTTY. Boulder has a whistle on and whistle off repeater on 16-76.

Salt Lake City has a nice 34-94 that has a range of about 40 miles west and 80 miles north but hardly any range east due to the mountains.

Ogden, Utah has a 22-82 being tested and will be on the air shortly. There will also be a 10-70 RTTY repeater in the Salt Lake area in the near future again. They had one up before, but I don't know how long ago.

There is simplex 94 activity around Twin Falls and Jerome, Idaho. Mountain Home, Idaho has a remote base on 94 simplex with about 5 fellows with 450 access. They have a range of about 50 to 75 miles.

Boise has a nice 34-94 with a range of about 75 miles east and west on I-80N. This covers into Eastern Oregon.

Portland, Oregon has a 34-94 open repeater and a 07-67. Also a 10-70 voice that is privately owned and outsiders are not welcome to use it, as I hear it. There is another 34-94 1950 HZ tone access about 70 miles north of Portland in Washington that can be opened from Portland. You can talk to Seattle, Washington on it.

Seattle has a 88-58 (that's right - 88 in and 58 out) that is open only to members.

Yakima, Washington has a 34-94 with range of about 50 miles. There is also a remote base on 76 in Sunnyside, Washington with 100 mile range.

There is a 34-94 repeater in the center of the state on I-90 but I haven't found anyone on it, so don't know its location.

Spokane, Washington has two 34-94 repeaters; one can be shut off and the other on for DX.

Great Falls, Montana has a 34-94 on the Canadian border with over 100 mile range.

I've found no activity across Nevada on I-80S except Reno. They have a 34-94 and a 94 remote base. Their 34-94 is linked to San Francisco and Los Angeles by 6 meters. This can be controlled by remote switching. Its purpose is civil defense.

There is some 94 simplex around Sacramento and also a remote base on 94 near there.

Berkley, California 22-82 has a range of about 150 miles to the east so easily covers Sacramento and most of the west slope of Donner Pass. This repeater was on 20-80 but they tell me all 20-80 in California will now be 22-82. The FCC watches them very closely out there. Also, there must be a station identified every ten minutes as a monitor. They have five master control stations with 450 controls. Also about 20 with 2 meter controls. A 450 station must turn it on first, then it takes a control on 146.22 to code it open. This station identifies himself as control monitor and is responsible for the goings on. When he has to leave his shack he must ask for a volunteer who has 2 meter control or 450 control to take over as monitor. If there is no station around to take it, he then turns the repeater off. If another station with control capability happens into his shack and doesn't hear anyone on the repeater for a while, hits his button 22 and no squelch tail, he then dials up the code to open the repeater and announces he is the control monitor. They say it has recently cleaned up their repeater. They also claim that if a station identifies as mobile without adding the six, he may get some unwanted mail. Many have!

There is also a 34-94 tone access in San Francisco. It takes about 2400 HZ

to open it. There is a 16-76 in San Jose also. I've heard these two repeaters, but haven't worked them yet.

SK

Ray Kydney, WAØWOT

P.S. If anyone doesn't know what a remote base is — it amounts to a private repeater, receiving and transmitting on the same frequency on 2 meters. The received signal is retransmitted from the remote location, usually on 450, to the base. The base then transmits back on 450 to the remote site (usually a mountain top) where it is rebroadcast on 2 meters.

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Mother of a small boy to child psychiatrist; "Well, I can't say whether or not he feels insecure, but everybody else in the neighborhood certainly does." — de Midwest C-B 9er's paper

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## RECENT CONTRIBUTORS REPEATER FUND

Charles W. (Bill) Armstrong, KØEFR

Leo F. Connolly, KØJIU

William C. Terwilliger, WAØFPB

Our sincere thanks also to Harry Snyder for sending in contributions for the repeater fund from the following:

WAØTTW	—	Pat
WBØIBV	—	Roy
WØUVU	—	Roy
WØNVE	—	Harry
WØWR	—	Doug
WØQOU	—	Tony
WØTYG	—	Jake
KØKQE	—	Sherm
WAØCWD	—	Doc
WBØILK	—	Judy
WBØIEN	—	Lyman

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## A simple-to-make VOLTMETER

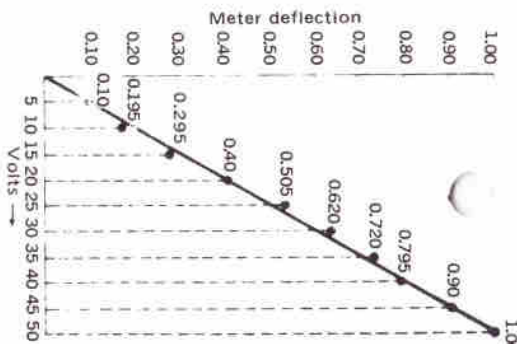
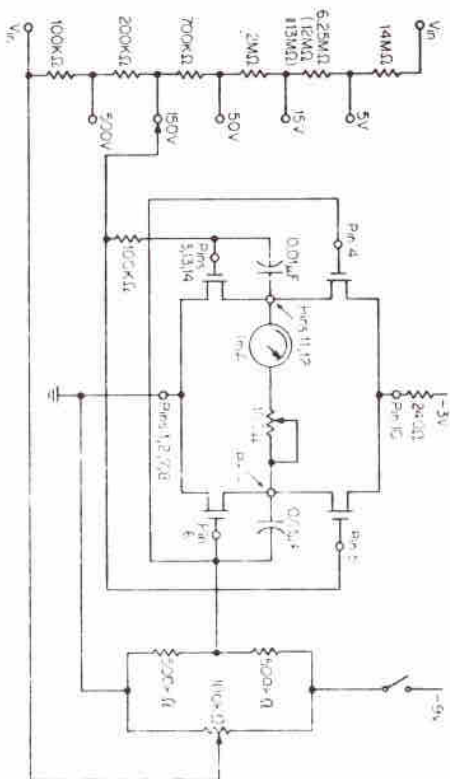
Lanny Parker  
Motorola Semiconductor, Phoenix, Ariz.

Using MOS integrated circuit transistors as resistive elements is a common technique in present-day logic circuits. The resistive quality of the MOS devices used in this circuit provide the excellent linearity of the voltmeter.

The MOS elements are used in a meter bridge configuration. Because of their high input resistance, they impose minimum loading on the input voltage divider. Therefore, as you select different voltage ranges, the input resistance of the voltmeter remains essentially constant.

This particular circuit uses either an MC1155 or an MC2255 IC, both of which are general purpose logic elements. In this application, the MOS transistors act as voltage controlled resistors. The input network consists of a resistive divider giving you an input resistance of about 20 M $\Omega$ . With no input voltage applied, the bridge is balanced and the meter is zeroed by adjusting the 100 k $\Omega$  pot. When a voltage is applied to the circuit, one branch of the bridge changes in resistance, and current then flows through the meter.

The resistive ladder at the input permits full scale deflections of the 1-mA meter at input voltages of 15, 50, 150, and 500 V. For greater full scale accuracy, you can use 1% resistors rather than the 10% resistors used here. The 0.01  $\mu$ F capacitors provide meter needle damping, and the 100  $\Omega$  pot adjusts the meter for full-scale deflection. For operation,



the circuit requires two supplies — 9 V and 3 V. The graph gives you an idea of the linearity you may expect, illustrating meter deflection versus applied voltage for the 50-V FS range.

de THE ELECTRONIC ENGINEER  
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## NEW MEMBERS ADDITIONS TO ROSTER

Dareld Ahrens  
R.F.D. 2  
Blair, Nebraska 68008  
Phone: 426-6673

Keith Ahrens, WNØIRP  
R.F.D. 2  
Blair, Nebraska 68008  
Phone: 426-6673

C. W. (Bill) Armstrong, KØEFR  
1519 Valley Street  
Plattsmouth, Nebraska 68048  
Phone: 296-2532

H. W. "Bill" Boltinghouse, Jr., WAØQVZ  
34 Sunset Blvd. Trailer City  
Council Bluffs, Iowa 51501  
Phone: 366-0698

Fred G. Groce, WBØBLR  
2449 — 4th Avenue  
Council Bluffs, Iowa 51501  
Phone: 322-0788

Craig D. Hinton, WNØIAH  
5004 Amy Circle  
Omaha, Nebraska 68137  
Phone: 333-9521

Lowell W. Jackson, WAØHKT  
4206 Castelar  
Omaha, Nebraska 68105  
Phone: 551-9854

Jack L. Kinn, W3YYC/Ø  
10612 Charles Street  
Omaha, Nebraska 68114  
Phone: 397-3821

Mrs. Ellen Morrissey, WNØHWF  
Palms Apt. #154  
320 North 20th Street  
Omaha, Nebraska 68102  
Phone: 344-4140

Neil Wesley Plouff, WA8CBN  
PSC 2, Box 6841  
Offutt AFB, Nebraska 68113  
Phone: 294-5120

William D. Rambo, WBØDFJ  
4 Beverly Hills Drive, R. R. #1  
Council Bluffs, Iowa 51501  
Phone: 366-0720  
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## FOR SALE

DX100 by Heathkit. Used it in 1966 when first licensed as novice; hasn't been used since. Will take best offer.

HT200 Motorola Handie-Talkie, battery charger, 34-94 and 94-94 Xtals, carrying case with belt. Asking \$270.00.

Trio 9R-59DS General Coverage RX, 2 yrs. old, .550-30 MHz, AM/SSB, 5 bandspread 80-10 m tuning. Asking \$80.00.

Homebrew phone patch. Best offer.  
Heathkit Q-Multiplier QF-1. Best offer.

Harold W. Boltinghouse, Jr.,  
WAØQVZ  
34 Sunset Blvd. Trailer City  
Council Bluffs, Iowa 51501  
Phone: 366-0698  
\*\*\*\*\*

## THYRISTORS

The term comes from the word Thyatron and Transistor. All of these devices are solid state and have characteristics similar to those of the Thyatron tube... and they are as follows:

1. Conduction is gate controlled.
2. Gate control is lost during conduction.
3. Gate control is restored when conduction stops.

The best known thyristor is the SCR (Silicon Controlled Rectifier). The SCR has been in use for a number of years now and has all but replaced the Thyatron tube. The SCR is a four layer p-n-p-n device that has three electrodes - cathode, anode, and gate. It is a very practical device used to control the current through a load. When used with AC it conducts on one half cycle. Lighting and motor speed control are but two applications.

Within the last few years, two new thyristors have been marketed - the Triac and the PUT.

The Triac (AC triode) is a bi-directional thyristor and is not unlike two SCRs, connected in inverse parallel. Since it can conduct on both half cycles of AC it can deliver up to twice as much current. The start of conduction is controlled by the gate voltage. Beside the gate there are two other anode electrodes. The triac is rapidly displacing the SCR for motor speed.

The PUT (Programmable Unijunction Transistor) is a combination of a unijunction transistor and a SCR. Many circuits were designed with a unijunction relaxation oscillator used to trigger an SCR. The unijunction was

not capable of handling large currents. The PUT has gate, cathode, and anode electrodes. In the usual circuit the gate voltage is set and conduction is anode controlled. Much use is being made of the PUT in staircase generators (( transistor curve tracer base drive). Two PUT relaxation oscillators are used to charge a capacitor. You have heard of the push pull and push, push circuits. Do you suppose we should call this circuit a PUT PUT????

de Pueblo, Colo. Ham Club  
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## FOR SALE

Galaxy V Mk3 xceiver with A/C supply . . . . .	\$200
Heath SB 300 & SB 400 . . . . .	200
Heath SB 610 monitor scope . . . . .	50
Heath SB 620 scanalyzer . . . . .	75
Drake ML2, 20W 2mtr, w/xtls . . . . .	225
Heath 2 & 6 mtr converters (ea) . . . . .	15
Motorola H33 1W HT (DC supply) . . . . .	65
Motorola H33 (A/C supply) . . . . .	50
Motorola P33 5W (A/C supply) . . . . .	80
Heath IO-21 3" scope . . . . .	15
Heath IG-72 audio gen. . . . .	25
Heath IG-42 signal gen. . . . .	30
BC 221 freq. meter (A/C sup.) . . . . .	50
Boehme 5C F.S.K. converter . . . . .	25
TT-76 TTY machine . . . . .	30
C808 TTY control group . . . . .	10
VRC-19's(3), 2mtr FM, 30W (ea) . . . . .	25
Marine R.T. (Ray Jefferson) w/12v. supply . . . . .	15
Misc. parts, tubes, etc.	

Jack Kinn, W3YYC/Ø  
10612 Charles St.  
Omaha, Ne. 68114  
Phone: 397-3821  
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## WHAT CRYSTALS?

By Jim Crossman — WA4SUF

What crystals to buy? This is the perennial question of the 2 meter hams. The real question, of course, is what repeaters are in use in the area where I will be?

If you are relatively fixed in your location, this isn't too much of a problem, as you can find out by listening on the band and talking to other hams in the area. But when you hit the road, this is a different matter and it becomes a matter of getting the most use out of the fewest number of crystals.

I travel a great deal, and I never can tell where I'm going next. Picking the right ones becomes of more than academic interest. So I did a little study to find the most popular combinations. I tried to pick out the combinations which were used by at least 2 repeaters. Table A shows the "Top Ten." If you were going to start from scratch and crystal for country-wide use, you would pick these crystals.

But this is not the whole answer, as it pays to have a detailed look at the area where you are going. In the Southern California area listing, for example, out of some 66 frequency combinations, I find only one each of the "usual" pairs: 13-73, 28-88, 34-94, 37-97. And two of those are tone-burst input. In certain areas, frequencies tend to run in bunches,

like bananas. For example, there are 6 listed at 34-76 in Florida, out of a total of 21 country-wide.

Before you take off on a trip, it pays to have a look at the frequencies in use in the area where you are going and in the areas along the way. The

"73" Magazine and ARRL Directories supplement each other to some extent and will help you pick the right crystals. "73" has published a "Repeater Update" section every month which shows the changes since the original directory. But with the way things are changing in the 2 meter field, you may find that real life is different than as published!

### TABLE A

THE TEN MOST POPULAR COMBINATIONS IN ORDER OF POPULARITY

1.	34/94	6.	37/97
2.	16/76	7.	25/85
3.	28/88	8.	13/73
4.	22/82	9.	19/79
5.	34/76	10.	31/91

de Auto-Call

(Ed. Note: Locally 34/94 and 22/82 are repeater frequencies. 16/76 is Lincoln. 52/52 is the simplex frequency locally and from what I read is being used elsewhere about the country for simplex.)

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Viking Invader 200 Xmtr . . .	\$185.00
National NC303 Receiver . . .	\$175.00
Heath Two'er . . . . .	\$ 35.00
Heath GP-11 mobile power supply for Two'er . . .	\$ 5.00
Heath HM-15 SWR meter . . .	\$ 7.50
Heath IT-17 Tube-Checker . .	\$ 35.00
Heath Xtal Calibrator . . . .	\$ 5.00
RF Field Str. Meter . . . . .	\$ 5.00
Calrad TK-301 Multitester . .	\$ 5.00

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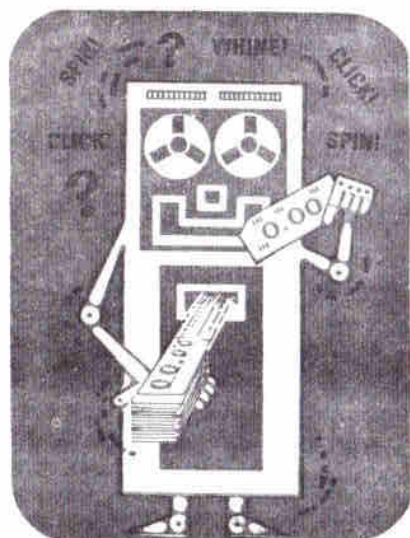
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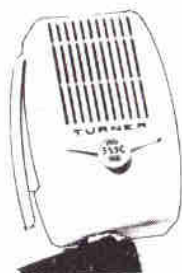
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