Central Oklahoma Radio Amateurs

COLLECTOR AND EMITTER

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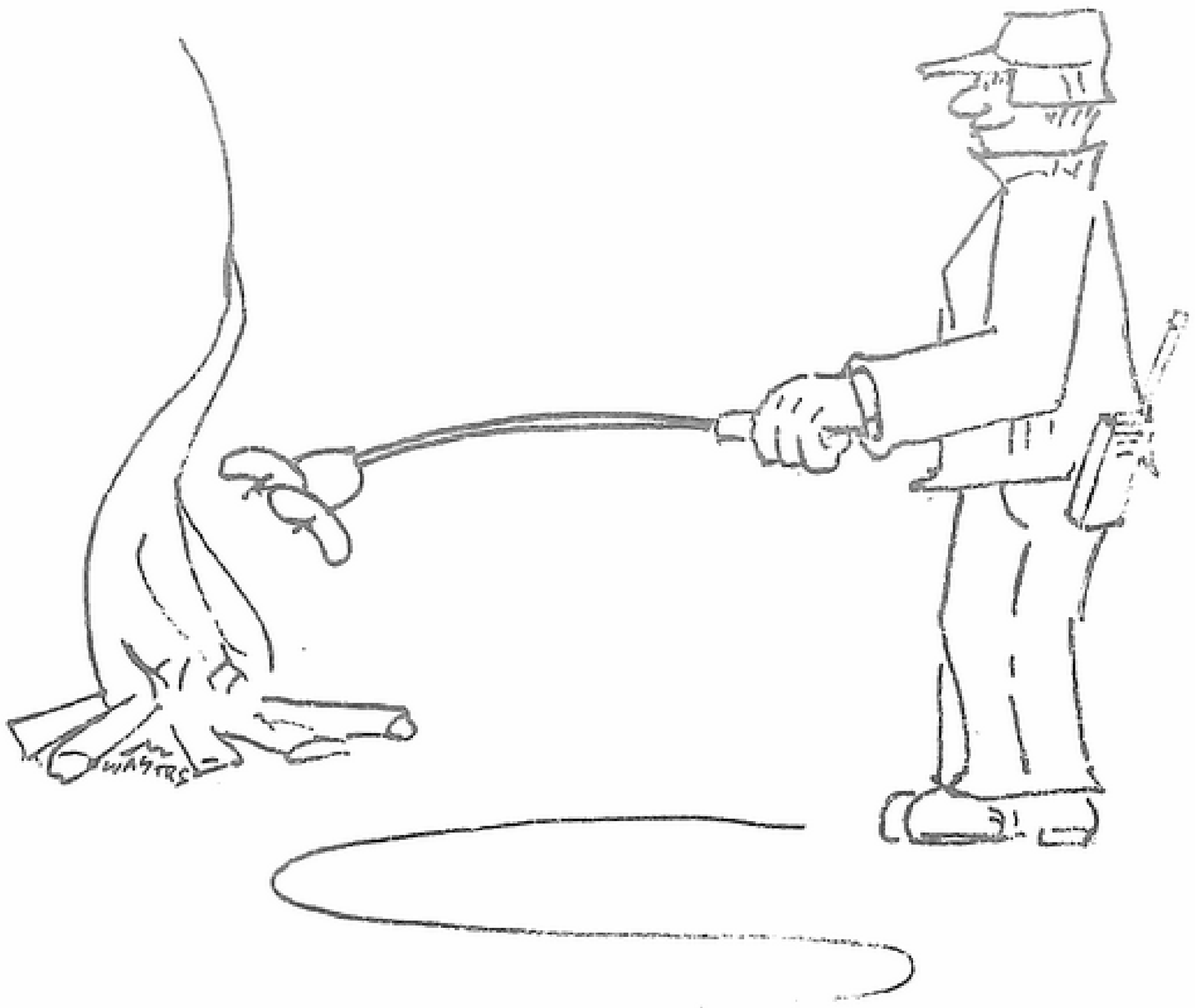
NOVEMBER 1976
VOL. 2 NO. 22

AN INFORMATIVE MAGAZINE PUBLISHED MONTHLY BY AND FOR OKLAHOMA RADIO AMATEURS AND ANYONE INTERESTED IN LEARNING ABOUT IT



CORA CAMPOUT AND WEINER ROAST

The annual "last fling before winter" campout and weiner roast will be at Little River State Park, Clear Bay Area (about 9 miles east of Norman on State Highway 9) Saturday and Sunday, November 20-21, 1976.

Plan now to join the fun. Bring your camper, trailer, pup tent, or whatever suits your fancy. Bring your own food, firewood, chairs, table, etc. for a weiner roast about dusk Saturday, and a covered dish dinner Sunday noon.

This is a completely disorganized affair. No-one is in charge - entirely pot luck - but we always have fun. If you can't make the full outing, come on out for the weiner roast or the covered dish dinner.

W5HXL

Central Oklahoma Radio Amateurs

COLLECTOR AND EMITTER

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Managing Editor Joe Harding, WA5ZNF 737-1044

Central Oklahoma Radio Amateurs, Inc. (CORA) is a not-for profit association of radio amateurs, founded for the promotion of interest in amateur radio communication and experimentation, for the advancement of the radio art and of the public welfare and operates to enhance the cooperation of member clubs in sponsoring activities of mutual interest to the clubs and all radio amateurs.

President	Gene Halley	WB5SQC	381-2228
Vice President	Bob Ashby	W5HXL	942-5375
Treasurer	Ken Burdick	WB5ORY	232-3416
Secretary	J. W. Word	WA5KFT	789-1865

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ACARC	DON TEMPLEMAN	WB5NIY 787-7174	OCVHF	JOE BUSWELL	WA5TRS 732-0676
MORI	BILL ROGERS	WA5RAQ 632-4375	OKCAP	DON MOORE	WA5FFK 787-5189
OUARC	MIKE SALEM	WA5EPK 321-5453	EARC	DENNIS ORCUT	WB5ISN 341-4200
BIARC	KEN BURDICK	WB5ORY 232-3416			

PARTICIPATING CLUBS FOR CORA COLLECTOR & EMITTER:

AERONAUTICAL CENTER AMATEUR RADIO CLUB
Postal Station 18, Okla City OK 73169
Meets: 8:00 PM First Friday each month
Flight Standards Bldg, FAA Aero Center
Club Station W5PAA

Pres	Al Prince	WB5KCU	789-1160
V-P	Bill Hulse	K5UGZ	376-2125
Sec/Tr	Bill Oliver	K5KDR	329-6333

MID-OKLAHOMA REPEATOR
Meets: 8:00 PM Tuesday of first full week in month. Okla City EOC, 4600 N Eastern
WR5AJP 34/94 WR5ADF 07/67

Pres	H. O. Townsend	WA5MLT	329-4426
V-P	Chet Hazelwood	W5GDL	427-1439
Sec/Tr	John Huckaby	K5QDR	672-4706

Dues: Sid Gerber, 829 E Bouse MWC 73110

OKLAHOMA UNIVERSITY AMATEUR RADIO CLUB
202 W Boyd, Room 219, Norman OK 73069
Meets: 7:30 PM Alternate Tuesday STUDENT UNION Rm 161. W5TC WR5AFW 146.28/88

Pres	Paul Thompson	WB5EEY	321-6265
V-P	Wayne Smith	WB5FEX	325-6391
Sec	James Koerner	WA5JTJ	634-3713
Treas	Mike Salem	WA5EPK	321-5453

BICENTENNIAL AMATEUR RADIO CLUB
Meets: 3rd Tuesday each month. Air National Guard, Will Rogers Airport

Pres	Coy Day	K5LMG	691-1194
V-P	Earnest Wolf	K5YDK	848-3425
Sec	Ken Newberry	WB5PYN	685-2717
Treas	John Oltmans	WB5PZG	525-6066

OKLAHOMA CENTRAL VHF AMATEUR RADIO CLUB
323 NW 10th, Okla City OK 73103
Meets: 8:00 PM third Friday each month
American Red Cross Bldg, 10th & Hudson
Club Station W5LOW

Pres	Tom Stinson	W5OZE	942-3714
V-P	Ken Ford	WB5KHU	528-8770
Sec	Joe Buswell	WA5TRS	732-0676
Treas	Ellard Foster	W5KE	789-6702

OKLAHOMA CITY AUTOPATCH ASSOCIATION
Meets: 7:30 PM 3rd Tuesday, Bi-Monthly
Oklahoma Military Academy 36th & Grand
WR5ACB 22/82 147.81/21

Pres	Gary McCormick	WA5ETV	946-2898
V-P	Guy Liebmann	WA5TKS	787-9547
Sec/Tr	Jim Denman	WB5EOL	681-6048

7705 S Charlotte Dr OKC 73159

EDMOND AMATEUR RADIO CLUB
WR5AHG 147.63/03
Meets: 10:00 AM first Saturday of odd numbered month, 3220 N Santa Fe (GE)

Pres	Larry Dillard	WB5CWB	685-4065
V-P	Bart Wortham	WA5JUU	751-9536
Sec/Tr	W. H. Thompson	W5UVI	348-1475

C O R A C O M M E N T S

Early in 1974 representatives from several of the Amateur Clubs in the Central Oklahoma area got together in an attempt to produce a Hamfest. As things progressed, the group incorporated into CORA.

The very successful Hamfest was produced and became part of the history of amateur radio in this area. CORA, however, did not pass into history. During the meetings to produce the Ham Holiday, as it became known, some ideas were presented.

One was to continue CORA for the purpose of coordinating the common interests of the various amateur clubs.

Another of the efforts of this group was to cause to be published, for all the area club members, the Collector and Emitter, originally the paper of one of the clubs. This provided not only a publication of interest to all, but also a substantial savings to the original club.

Subsequently, CORA directed two more successful Ham Holidays and I feel sure would be awarded some recognition of excellance for the Collector and Emitter.

CORA is alive today with plans being developed for Ham Holiday 1977 and continued superior publication of the Collector and Emitter.

With this in mind, I would like to ask each and every amateur who reads this to dedicate some part of his or her time in the future to support your individual club's activities and support CORA activities.

If you know an amateur who does not belong to any group, bring him or her to a meeting. Let us know about this person, so we can get a complimentary copy of the Collector and Emitter to him.

Incidentally, each and every one of you is a member of CORA. You are welcome to attend any of the meetings. Your ideas may be just what we are looking for!

73

Gene - WB5SQC

FOR SALE: 35mm camera, Yashica Electro, automatic exposure control, just focus aim and shoot. f:1.7 lens, wide angle lens, telephoto lens, tripod, attache carrying case, soft case, etc. Joe, WA5ZNF 737-1044.

MINUTES OF MEETING OF C-O-R-A Regular meeting on 24 Sep 76

Called to order at 7:50 pm by Pres. Ken, WB5ECJ at Red Cross Hdqtrs. Bldg 323 NW 10 OKC 11 members and 1 visitor present (list attached to these minutes)

The Nominating Committee presented nominations for officers for CORA

Pres.	Gene Halley	WB5SQC
V-P	Bob Ashby	W5HXL
Trea.	Ken Burdick	WB5ORY
Sec	JW Word	WA5KFT

There were no nominations from the floor. Those nominated by the committee were elected by acclaimation.

Retiring pres. Ken, WB5ECJ, expressed his appreciation for support given him by CORA members during his term in office. Also, stated he expected great work from new slate of officers.

Minutes of previous meeting were read and approved - with one correction to show license classes being held at AIR Nat'l Guard bldg. rather then Nat'l Guard.

Financial report was presented and reviewed by BOB, WB5LHR (copy attached to these minutes) He pointed out that $1.50 shown in CORA account should be in Newsletter account. It was agreed to "forget it". Bob, W5HXL, suggested changing financial report and bank account to read "Collector & Emitter" rather than "Newsletter". Bob, WB5LHR, stated we have on hand many blank checks printed with "Newsletter". It was agreed to continue use of title "Newsletter" until this supply of printed checks is exhausted.
Joe, WA5ZNF, feels that the Collector & Emitter publication requires enough time and effort of so many people, and is important enough in Central Okla Radio Amateur circles to be referred to in all correspondence, conversations, reports, etc, as "Collector & Emitter" rather than the less distinctive title of "Newsletter".

Bob, W5HXL, reported Texoma Ham-Orama info. is in the mail. Lodge reservations will require 30 days in advance a deposit of at least one night's lodging rate. Only available remaining rooms are dormitory type in Bayview Lodge, $10.00 for two.

It was reported that Hobe, WB5MLN, is making progress in putting together a program for presentation to C-Ber groups who are interested in amateur radio. He is trying to get the new ARRL films.

Retiring pres. Ken, WB5ECJ, reminded the group of the campaign to elect as ARRL West Gulf Division director, Okla's own JACK GANT, W5GM, of Ardmore. A mailing list is to go out to all the 6423 ARRL members in the West-Gulf division, at an estimated expense of $800.00.
Bob, W5HXL, will accept any contributions and deposit them in a special campaign expense account now opened in an OKC bank.
A motion by Frank, W5PDH, seconded by Gene, WB5SQC, was passed that CORA contribute $100.00 to the Jack Gant campaign fund

Meeting adjourned at 8:50 for coffee, doughnuts, and general visiting and gossip

JW Word, WA5KFT
Sec

CENTRAL OKLAHOMA RADIO AMATEURS, INCORPORATED

AMENDED CONSTITUTION

ARTICLE 1 - NAME The name of this organization shall be the Central Oklahoma Radio Amateurs, Incorporated, a non-profit organization hereafter referred to as CORA.

ARTICLE 2 - PURPOSE The purpose of CORA is to coordinate group activities in the public interest between the amateur radio societies in central Oklahoma. These activities consist of a state-wide meeting of amateur radio operators; better use of communications skills in support of The American Red Cross, Civil Defense and the American Radio Relay League; and to seek solutions to problems facing amateur radio licensees throughout the state.

ARTICLE 3 - MEMBERSHIP Membership in CORA shall be as follows:

a. SUPPORTING - Each of the several constituted amateur radio societies in the central Oklahoma area, indorsing the purposes stated in Article 2 above, and providing financial or other support to this organization shall be a SUPPORTING member of CORA.

b. ASSOCIATE - By virtue of an individual's membership in a supporting member central Oklahoma amateur radio society, he shall be an ASSOCIATE member of CORA.

c. DIRECTORS OF CORA - A Board of Directors shall be established as follows:

1. Each SUPPORTING member of CORA shall duly appoint or elect three Directors to serve on the Board of Directors of CORA for a term of one year, beginning in September of each year. Each Director shall have one vote.

2. The immediate past President of CORA shall serve as an advisory member of the Board of Directors for a period of one year. He shall have a vote.

ARTICLE 4 - OFFICERS AND THEIR DUTIES The Officers of CORA shall be the President, Vice President, the Secretary, and the Treasurer. The Directors of CORA, at the annual September meeting, shall nominate and elect the above officers to serve for a term of one year. Nominees for the above offices are to be only from the members of the CORA Board of Directors. They shall be elected by a majority vote and shall hold office for a period of one year. There is no restriction on the re-election of any individual to an office he has held in the previous year, so long as he remains a Director of CORA.

a. The President shall call and preside at all meetings and represent the organization in all official matters. He shall appoint all committees that may be necessary in the administration of the organization's business.

b. The Vice President shall take over the duties of the President in the President's absence. He shall have all the authority of the President when acting in the presidential capacity. He shall assist the President in performing all activities of the organization.

c. The Secretary shall keep a written record of the minutes of each meeting of CORA and originate correspondence as directed by the President.

d. The Treasurer shall receive and disburse all funds intrusted to CORA and keep an accurate record of such, shall be personally responsible for all funds intrusted to him and shall give an accounting of the disposition of all funds at each meeting of the organization.

ARTICLE 5 - FINANCIAL MATTERS

a. CORA will receive financial support from each financial supporting amateur radio society as approved by each individual society. Funds for a specific activity shall be requested by the President from financial supporting societies upon approval of the Director Membership.

b. Upon final completion of a specific project or activity by CORA, the financial supporting societies will be repaid their financial support if possible. Any liability for loss shall not exceed the amount allocated for that activity.

c. A complete accounting of the financial matters of any CORA activity or project will be made available to the financial supporting societies when funds are returned.

ARTICLE 6 - EXPENDITURE OF FUNDS The President shall authorize any expenditure of funds up to an amount of $25.00. Expenditures of funds above $25.00 require the majority concurrence of CORA's Officers and Board of Directors in attendance.

ARTICLE 7 - VOTING All matters of CORA shall be decided by a majority of the Director Members present at any meeting.

ARTICLE 8 - MEETINGS Meetings of CORA shall be called by the President as may be necessary to conduct activities meeting the several objectives stated in Article 2 above. Advance notice of meetings, including time, date and location, shall be given all Director Members.

ARTICLE 9 - CHANGE OF CONSTITUTION This Constitution may be amended by a majority vote of the Director Members present at any regular meeting, provided Director Members have received thirty days advance notice of the proposed change.

Approved and adopted this 28th day of May, 1976.

AERONAUTICAL CENTER AMATEUR RADIO CLUB, INC.

W5PAA

MINUTES OF THE AERONAUTICAL CENTER AMATEUR RADIO CLUB MEETING OF 10/1/76

The meeting was called to order at 8:10p.m. by President Prince. There were 22 members and guests present. A round of self-introductions was asked for and comments heard were:

Joe, WA5TRS, enjoyed attending the Chicago Radio Exposition. Bob, WN5BBG, has a receiver and is looking for a transmitter. Fred, WB5PWO, has been wallpapering. Kenny, WB5RXZ, received his general license and has been working traffic. Dorothy, WB5ELG, recently returned from visits to Las Vegas and the west coast. Bob, W5HXL, has had some dental work done. He brought along for show and tell his portable 2 meter antenna. Charlie, WA5JGU, has been helping in the radio classes. He reported about 250 are attending classes in the Oklahoma City area. Ellard, W5KE, while returning from Omaha worked some skip on 2 meters. H. O., WA5MLT, has been working some DX on H.F. Carl, W5JJ, worked W4JJ in Norfolk. He also worked a maritime mobile on one of the tall ships. Todd,'WA5VAQ, while returning from the west coast, via commercial airliner, got the pilots permission to work 2 meters. He was able to get many repeaters needless to say. Gene, WB5SQC, received his Heathkit HW104 but got a mailgram not to open it and return it immediately. It seems Heath still has some problems with it. Dave, W4YDY, has his Swan 270B for sale. He has never unpacked it since moving here. It has been used very little. Lloyd, WB5HUP, is still going to college. His repeater is still performing OK. Susan, WN4AKB, has taken her test for technician. She was elected Vice-President of her school science club. Al, WB5KCU, has been spending some time relaxing at the lake.

The ACARC meeting will be December 3 at Dodson's Cafeteria at 59th and South Penn. Gene Halley, WB5SQC, is the new CORA President.

A motion was made and passed that the club advertise the Signal-One and DC-4 power supply in QST magazine and consider local bids until such time as the bids from QST come in.

The program consisted of an auction of several pieces of club obsolete and surplus equipment. Gene, WB5SQC, was the auctioneer. The club realized $84.25 and many members gained some good equipment at dirt cheap prices.

The meeting adjourned for refreshments at 10:20p.m.

Bill Oliver K5KDR
Secretary/Treasurer

THE PRESIDENT'S CORNER

It's that time again, time to vote! Have you watched the debates on TV? That's not what I had in mind, now is the time to select your Director and Vice Director for the West Gulf Division. You should have your ballot in hand by now. Make your selection and let's get them in the mail.

Note that the Aeronautical Center December meeting will be a dinner meeting at Dodson's Cafeteria, SW 59th and Penn at 6:30 p.m., December 3, 1976.

The Texoma Hamarama will be this month, October 29-30 and 31. It should be a good one, come on down and enjoy the programs they have put together for us.

The Aeronautical Center Club meeting for November will be at the regular time and place. Come out and join us for coffee and donuts.

73

Al WB5KCU

TECHNICAL REVIEWS

W5JJ

SPARK GAP TIMES, Jul-Aug, has a most fascinating account of the development of telegraphic codes. It gives examples on many, even including the complex and ingenious one for sending the 6000 characters of written Chinese!

ELECTRONIC PRODUCTS, Sep, gives the state-of-art picture of optocouplers, a field not fully explored by amateurs of radio.

QST, Oct, has plans for a 250-W RF amp and a low-cost touch-tone encoder.

73, Nov, also describes a touch-tone pad, "rediscovers" the inverted-L antenna with counterpoise, so commonly used 50 years ago, rehashes the charging of NiCad cells, and lauds the role of the sea-going radio operator.

POPULAR ELECTRONICS, Oct, shows an unusual capacitance meter and a converter to enable you to listen to the endless 10-4s of CB on an AM BC receiver.

RADIO COMMUNICATION, Aug, tells of means of combating the radiations from TV receivers, describes a semi-vertical trap antenna for 1.8, 3.5, and 7 MHz, and revives the idea of using semiconductors to replace tubes in frequency meters.

HAM RADIO, Oct, is devoted to receivers and converters, some simple, some very, very complex. Also, RC active filters. Tells where you can buy transmitter-type variable capacitors, a rare bird indeed.

WORLDRADIO NEWS, Oct, has the November schedule for OSCAR-7 passes.

ELECTRONIC COMPONENT NEWS, Sep, has excellent advice on selecting test equipment.

POPULAR ELECTRONICS, Nov, reveals the SW Broadcast mob will attempt to get the 3900-4000 kHz BC frequency assignment made world-wide. There goes a choice chunk of our most dependable band! Other articles concern a touch-tone accessary for FM transceivers and the use of diodes for protection of power supply components.

AMATEUR RADIO, Jul, tells about building a double delta beam for 14 or 21 MHz, reviews the Kyokuto FM144-10SXR 11 transceiver, and continues its hints for newcomers.

SHORT WAVE MAGAZINE, Sep, shows a converter for putting a 7 MHz SSB smtr on the 1.8 MHz band, an unusual quad for 21 MHz, and a pair of rather ordinary reduced space antennas for 14 MHz.

RADIO COMMUNICATION, Sep, has an unusual SSB exciter, one using the polyphase system of SSB generation; it can be built for less than a filter type. Also, there's a keyer using CMOS ICs, a quad antenna suited for VHF, a tunable Gunn oscillator for those who like UHF, more on logic circuits, and the excellent Technical Topics section.

NEW YAESU TRANSCEIVER

The Yaesu FT-301D sounds as though it's going to make quite a splash on the market. It's all solid-state, has a 6-digit readout, runs 200 watts PEP, and operates SSB/CW/AM/FSK on amateur bands 10-160 m. Of course, there's no word as to just when it will be on the market. You'll remember their FRG-7 has been advertised for many months, but no amateur has seen one at a dealer's showman!

W5JJ

Club
NEWS

WSLOT
The Elmer Cashiler Memorial Station

MINUTES OF OCTOBER MEETING

FOUL WEATHER, I PRESUME, CUT THE ATTENDANCE BELOW THE LEVEL REQUIRED TO CONSTITUTE A QUORUM. A VIGOROUS UNSTRUCTURED MEETING (BULL SESSION) THEREFORE REPLACED THE REGULAR CLUB MEETING.

IT IS IMPOSSIBLE FOR ME TO ADEQUATELY COVER THE VAST FLOW OF IDEAS THAT WERE DISCUSSED SO I SUGGEST THAT IF MEMBERS WANT TO FIND OUT WHAT'S GOING ON, THEY ATTEND CLUB MEETINGS.

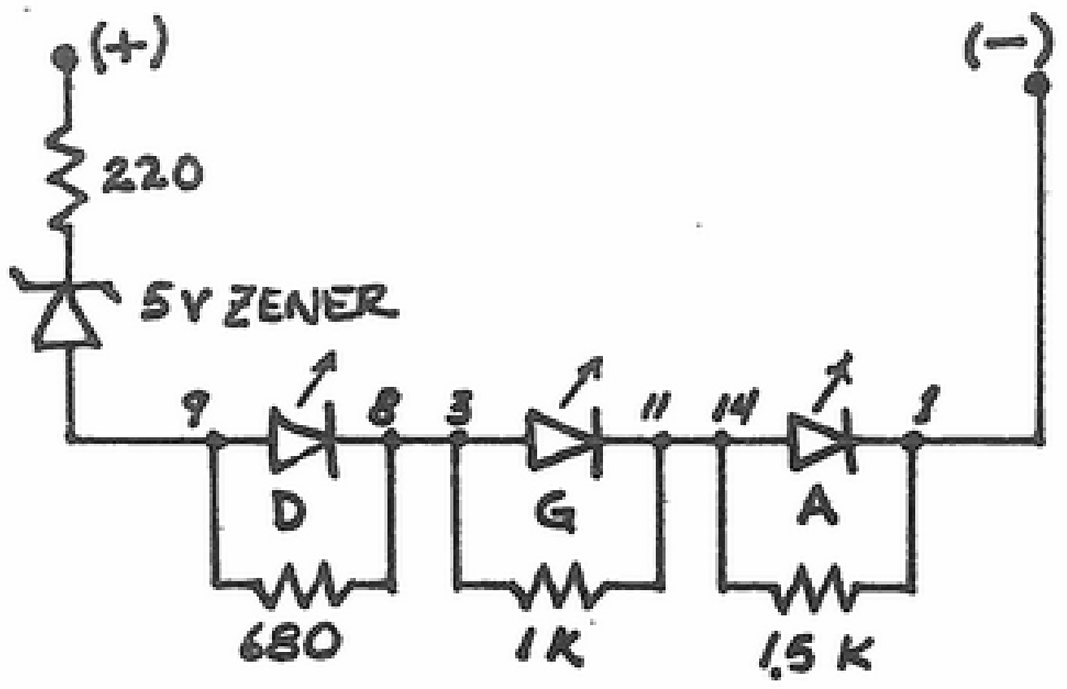
JOE, WA5TRS

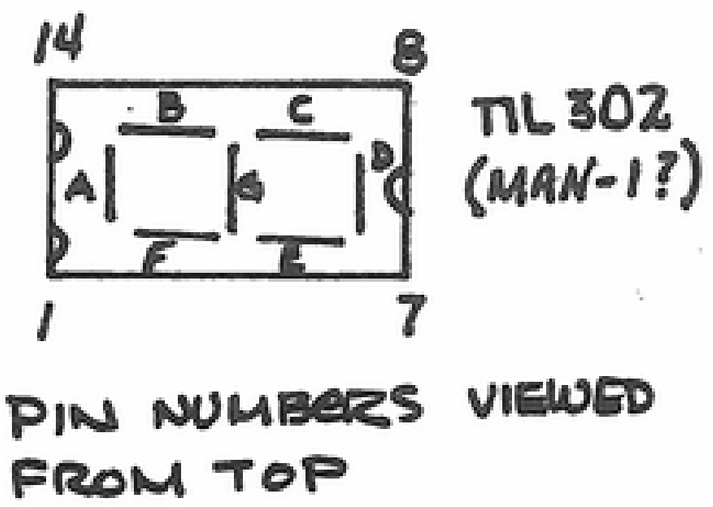
ANOTHER ZERO INERTIA BATTER CONDITION METER

IN TRUE AMATEUR RADIO TRADITION, A GOOD IDEA HAS BEEN MADE BETTER. WAYNE, WA5AOB, HAS WORKED OUT THE DESIGN AND DEVELOPMENT PROBLEMS TO COME UP WITH AN IMPROVED BATTERY CONDITION METER, OR TO PUT IT IN A MORE SOPHISITICATED WAY, A SOLID STATE DIGITAL VOLTMETER.

IN MAY 1976, COLLECTOR AND EMITTER, I DESCRIBED A VOLTMETER WHICH USED A COUPLE OF LIGHT EMITTING DIODES (LEDS). A ZENER DIODE WAS USED TO GET GRADUATED ILLUMINATION OF THE LEDS, ONE TURNING ON AT 12 VOLTS, THE SECOND TURNING ON AT 14.

WHEN WAYNE OBTAINED A HT-220, HE MENTIONED THAT HE NEEDED TO BUILD ONE OF THE GADGETS. I SUGGESTED THAT A SEVEN SEGMENT LED READOUT WOULD BE A POSSIBLE SOURCE OF DIODES IN A NEAT PACKAGE. THE IDEA IS ALL HE NEEDED. WITH "GREAT VIGAH" HE WENT TO WORK AND WHAT FOLLOWS IS THE RESULT.





SOLID STATE VOLTMETER

I AM NOT SURE OF THE PART NUMBER OF THE DEVICE WE USED BUT WAYNE THOUGHT IT WAS A MAN-1. I LOOKED THROUGH ALL MY LITERATURE AND WHATEVER IT WAS, IT WAS PIN FOR PIN THE SAME AS A TEXAS INSTRUMENTS TIL 302 SO I DREW THE PICTURE OF THE DEVICE JUST LIKE THE ONE IN MY BOOK. THE ANODES OF THE LEDS MAKING UP THE BARS E, F, & G ARE INTERNALLY TIED TOGETHER. LIKEWISE, THE ANODES OF A AND B ARE COMMON AND C AND D ARE COMMON.

THE DEVICE CAN THEREFORE BE WIRED WITH SOME OF THE DIODES IN SERIES AS SHOWN IN THE SCHEMATIC. THE RESISTORS BIAS THE VOLTAGES ACROSS THE DIODES SO THEY TURN ON SEQUENTIALLY. THE SEGMENT A, WHICH HAS THE HIGHEST VALUE RESISTOR ACROSS IT, TURNS ON AT THE LOWEST VOLTAGE.

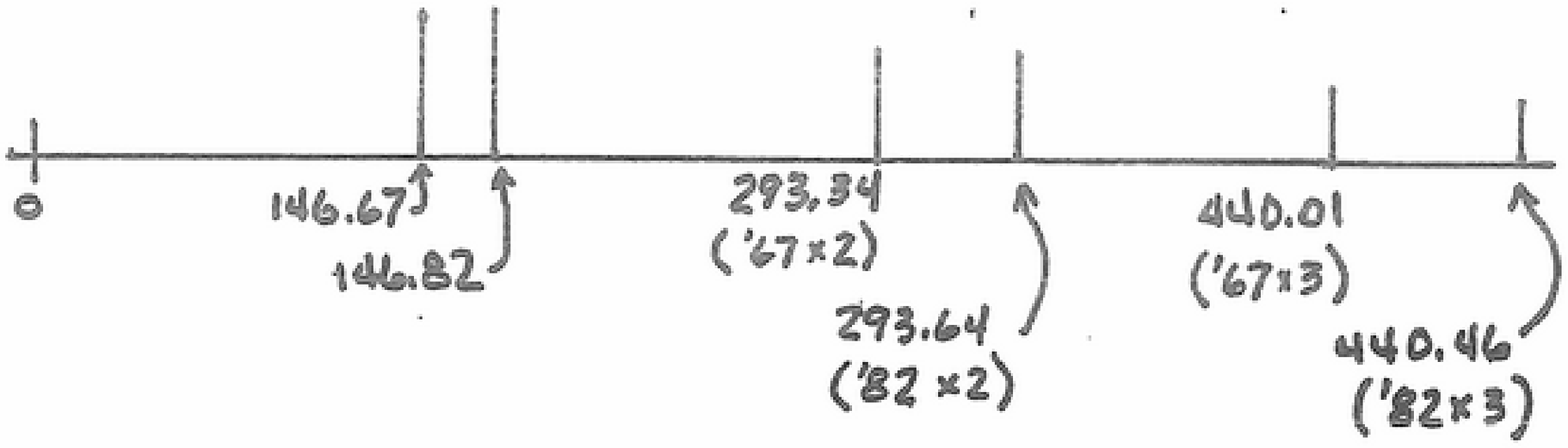
WITH THE VALUES SHOWN, SEGMENT A BEGINS TO ILLUMINATE AT 10.5 VOLTS, SEGMENT G AT 12.6 VOLTS AND SEGMENT D AT 14.2 VOLTS. THE DEVICE READS ROMAN NUMERALS 1, 2, AND 3, RESPECTIVELY AT THESE VOLTAGES. (OR ONE FINGER, TWO FINGERS, THREE FINGERS, ETC.)

THE ZENER AND RESISTORS ARE MOUNTED DIRECTLY TO THE PINS OF THE SEVEN SEGMENT READ-OUT, THE SURPLUS IS CUT OFF AND THE WHOLE THING IS POTTED IN POLYESTER RESIN. ANYBODY FOR A FOUR BIT BINARY VOLTMETER? JOE, WA5TRS

INTERMOD

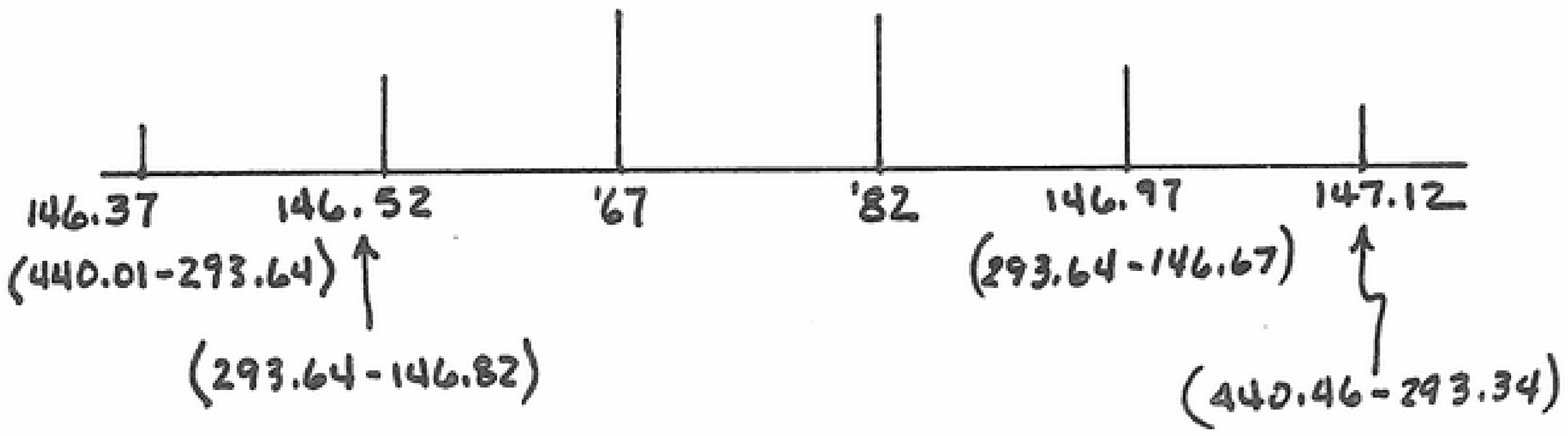
OR INTERMODULATION DISTORTION IS A TERM THAT IS PRETTY OFTEN HEARD ON 2M FM THESE DAYS. THIS IS NOT AN EXPLANATION OF IT OR ITS COUSIN CROSS MODULATION BUT A DISCUSSION OF ITS EFFECT AND A METHOD TO PREDICT IT.

IF RF ENERGY ON TWO FREQUENCIES ENTERS A NONLINEAR DEVICE (ALMOST ANYTHING EXCEPT A PURE RESISTANCE) HARMONICS OF BOTH FREQUENCIES ARE FORMED. THESE HARMONIES ARE THEN MIXED AND SUM AND DIFFERENCE FREQUENCIES ARE FORMED. THE BEST KNOWN EXAMPLE LOCALLY IS WHEN THE '67 AND '82 REPEATERS ARE TRANSMITTING SIMULTANEOUSLY AND BOTH ARE HEARD ON '52. LET'S EXAMINE WHAT HAPPENS.



THE GRAPH SHOWS FUNDAMENTALS, SECOND AND THIRD HARMONICS FOR 146.67 AND 146.82. THESE HARMONICS ARE NOT TOO TROUBLESOME BECAUSE THEY ARE EASILY FILTERED, BEING SO FAR APART. THE SECOND PHASE, HOWEVER, THE MIXING IS WHERE THE TROUBLE STARTS. THESE HARMONICS ARE CIRCULATING IN THE MIXING DEVICE. IF WE SUBTRACT 146.82 FROM 293.34 WE GET 146.52. THERE IS THAT BLAMED SIGNAL WE HEAR! LIKEWISE, IF WE SUBTRACT 146.67 FROM 293.64, WE GET 146.97. IF YOU HEAR THOSE TWO REPEATERS ON 146.52 YOU SHOULD ALSO HEAR THEM ON 97 (IF LLOYD ISN'T TALKING AT THE TIME, WHICH IS UNLIKELY).

LET'S LOOK AT THE TWO METER SPECTRUM A LITTLE MORE CLOSELY.



IF WE TAKE THIRD HARMONIC OF 146.82 AND SUBTRACT SECOND HARMONIC OF 146.67, WE GET 147.12. LIKEWISE, WE CAN GET 146.37. THAT IS BAD NEWS IF 37 HAPPENS TO BE ON THE INPUT TO A REPEATER BUT FORTUNATELY ONE WOULD HAVE TO WORK AT A RECEIVER DESIGN OR HAVE A NONLINEAP DEVICE IN THE NEAR FIELD OF THE ANTENNA DOING AN EFFECTIVE MIXING JOB TO DEVELOP A SUFFICIENTLY STRONG DISTORTION PRODUCT OF THIS HIGH AN ORDER.

NOW TO THE POINT OF THE ARTICLE, HOW TO PREDICT THESE FREQUENCIES EASILY. NOTICE THAT THE DISTORTION PRODUCTS IN THIS EXAMPLE ARE SEPARATED BY 150 KHZ. THIS IS ALSO THE SPACING BETWEEN THE TWO FUNDAMENTAL FREQUENCIES. WE CAN TAKE ANY TWO FREQUENCIES, FIND THE DIFFERENCE BETWEEN THEM AND CALCULATE THE ODD ORDER DISTORTION PRODUCTS BY ADDING MULTIPLES OF THIS DIFFERENCE TO THE HIGHER OF THE TWO FREQUENCIES AND SUBTRACTING FROM THE LOWER OF THE TWO.

ANOTHER EXAMPLE WOULD BE 146.82 AND 146.94. THE DIFFERENCE IS 120 KHZ. THERE MIGHT BE DISTORTION PRODUCTS AT 146.60 AND 147.06 UNDER THE RIGHT CONDITIONS. ALSO THERE WOULD BE PRODUCTS AT 146.48 AND 147.18. ANOTHER EXAMPLE IS 146.67 AND 147.97. DISTORTION PRODUCTS ARE SPACED 300 KHZ APART, OR 146.07, .37, 147.27, .57, ETC.

THE 146.37 IS A PARTICULARLY BAD ONE AS WB5HUP WILL TESTIFY.

THERE ARE SOME EXOTIC DISTORTION PRODUCTS NOT COVERED HERE. BACK TO THE FIRST EXAMPLE; 146.67 AND 82. 146.52 IS ONE OF THE DISTORTION PRODUCTS. SUBTRACTING 146.52 FROM SECOND HARMONIC OF 67 GIVES 146.82! SO WHAT, YOU SAY? YOU WANT THAT ONE? NOT ON YOUR LIFE. EACH ONE OF THESE FREQUENCIES IS A BAND OF FREQUENCIES WHICH ARE MULTIPLIED, SUBTRACTED AND SO FORTH ALL TOGETHER. WHAT RESULTS IS 67 IN-FORMATION ON THE 82 SIGNAL. THAT'S NOT SO GOOD.

NOW THAT YOU KNOW HOW TO PREDICT WHAT FREQUENCIES MIGHT BE TROUBLESOME YOU CAN FIND THE SOURCE OF SOME OF YOUR GRIEF AND/OR MAKE WISE SELECTION OF REPEATER FREQUEN-CIES. I'LL LEAVE IT TO SOMEONE ELSE TO EXPAND ON HOW TO ELIMINATE THE PROBLEMS OF THE NONLINEAR DEVICES RESPONSIBLE FOR ALL THIS! JOE, WA5TRS

CARE AND FEEDING OF NI-CADS REVISITED
or
"I Remember Your Name, But Can't Place Your Cell Capacity"

How many articles have you read recently that discussed the proper care and use of Ni-Cad batteries? Well, the answer to that question might require the use of more than one handfull of fingers for counting. Ni-Cads, being the useful sources of potential energy that they are have also been the subject of much misinformation by users and designers alike until a recent outburst of information in the ham journals. However, two bits of information concerning "memory" and "cell reversal" don't alwayssurface in these discussions and the proper method of counteracting these problems isn't always crystal clear. A recent article in the September 1976 issue of the IEEE Spectrum by two engineers who work for the General Electric Battery Business Department explain the problem of cell reversal and explodes the myth of "memory."

The Ni-Cad is almost 80 years old and has become the workhorse of potential energy in many consumer products. However, the Ni-Cad also exhibits a phenomenon discovered during the early 1960's which still cripples complete understanding of this very useful battery. Talk arose of "memory" which re-duced capacity and lowered the terminal voltage. After that, every time the voltage of a ni-cad dropped, it was always the victim of this "memory" and efforts to retrieve the battery were to naught. The fact is that memory is a rare occurrence except under carefully controlled circumstances such as en-countered in the space program tests where cells received a carefully controlled charge/discharge regime at constant temperature, over and over again. Such Ni-Cads, put through their paces begin to exhibit a "apparent reduction in capacity to a predetermined discharge voltage cut-off point (usually one volt) resulting from repetitive use patterns."

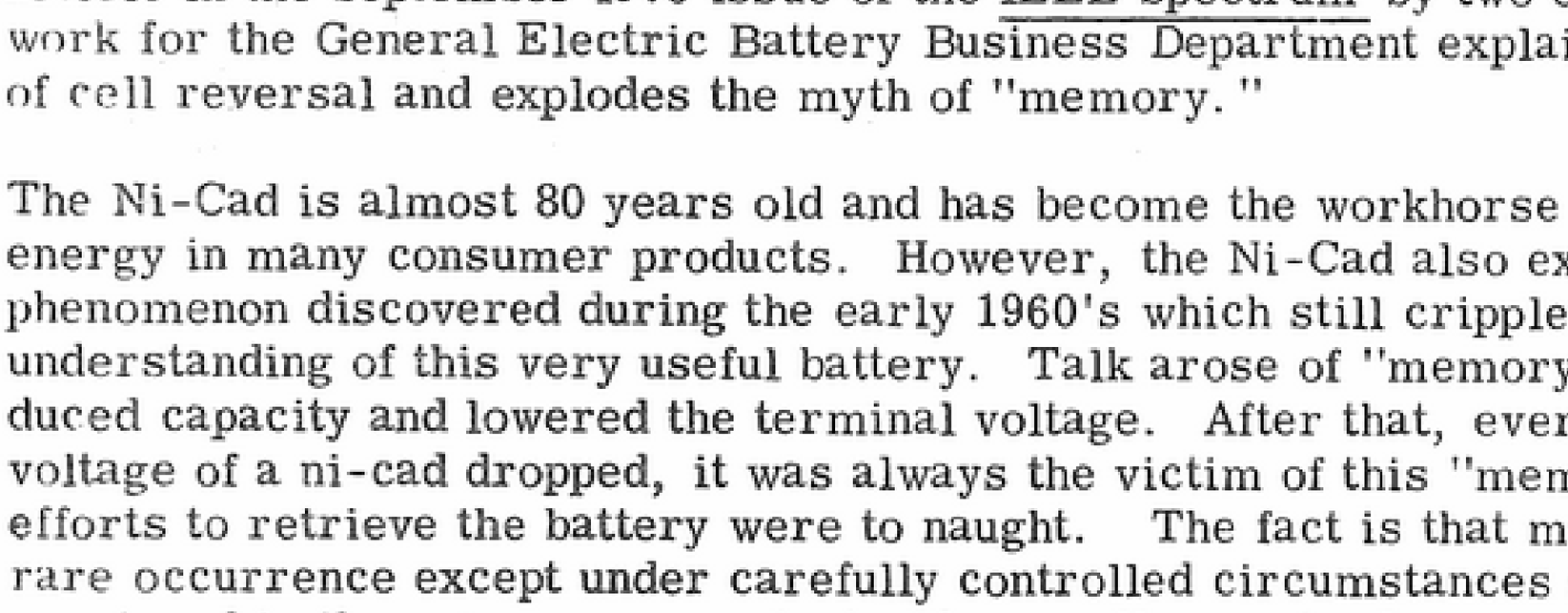


Figure 1.

Figure 1 shows two typical discharge curves for a Ni-Cad battery. Curve A displays the usual characteristic of a Ni-Cad that makes it desirable and that is the relatively constant output voltage under load during discharge. Curve B shows the same battery that has been subject to a high number of repetitive identical charge/discharge cycles. The net effect is that the Ni-Cad will hold the voltage relatively constant until it reaches a predetermined point (usually the endpoint of the repetive cycles) and then the voltage exhibits a sudden dropoff to about 1 volt where the battery stays for the duration of the discharge cycle. Since battery capacity is determined by integral of curve (or the area under the curve from 0 to 100% discharge), the lower voltage exhibits less area and a consequent lowering of the battery capacity.

So it can be seen that memory can and is a problem. But, is it a problem for the amateur in everyday use? The answer to that question has to be a qualified No. Everyday amateur and consumer use does not run in the constant temperature highly repetitive use exhibited by the tests run for the space program. The normal random pattern of partial and complete charge/discharge cycles virtually insures that memory will not be encountered. Moreover, it has been found that

Ni-Cads can be made to "forget" that they have a memory by cycling them once between a full discharge and full charge. So, actually Ni-Cads are hard to remember and easy to forget. Memory will go away after one complete charge and discharge. If the amateur should encounter a situation where strictly repetitive cycles or long-term overcharge (greater than four months) are the de rigeur, allowances should be made for the memory effect. When the load is sensitive to low voltage, extra cells should be added to the battery to assure the retention of a higher voltage profile. This should be a rare occurrence in normal amateur and consumer use.

Another important subject that often arises when Ni-Cad memory is under discussion is cell reversal. Cell reversal occurrs when cells of different capacity or capability are connected in series for use. If one cell arrives as discharge before the others, current is then forced through that cell in a reverse direction. In effect, it looks like the cell is connected in backwards and it might be even be said that the cell looks like it is being charged by the other batteries in the reverse direction. Actually cell reversal is a dangerous condition not only for the battery, but also for the user. Reversed cells have the potential (no pun intended) for damaging or actually bursting the affected cell. The solution to eliminate cell reversal is to carefully pick each cell for about the same capacity. Additional changes in manufacture to eliminate the possibility of gas formation during reverse charging is important in minimizing the problem.

An additional problem encountered in Ni-Cad use is overcharging. All batteries have some internal impedence. During charging, part of the energy used in charging is disipated in the internal resistance of the battery as heat. The internal resistance of the battery is determined by the contact made between the components of the battery such as the nickel hydroxide, the potassium hydroxide, and the metal support/substrate plates. The higher the temperature generated, the faster the breakdown of materials used in cell construction, particularly in the thin electrode separators used in sealed cell design. The ability of the separators to withstand high temperatures during charging and discharging determines cell life. Thus, some care should be paid to charging and discharging if you want to preserve cell longevity. GE has had some cells that are still in excellent condition after 14 years of use in a "one cycle per day" environment. This represents some 5000 charge/discharge cycles. This means that the lower the overcharge and discharge rates, the longer the cell life. Most manufacturers conservatively rate battery life at about 1000 charge/discharge cycles.

What does this mean as a practical matter? Take care of your Ni-Cads and they will take care of you. For those of you who favor HT-220 portables and other hand held radios where batteries can (and considering the price must) be pur-

chased surplus, there is no inherent danger in this if your observe a few caveats. Most of these batteries (such as those purchased from Spectronics) have been through a few mills (or is that mils ?) but can be resurrected with a little experimentation. Handling such problems as shorted cells have been discussed previously by K2OAW and WA5TRS. My experiments with removing shorts has shown that a battery can be made to work if you use it daily once the short is removed. Failure to use means that the terminal voltage drops and must be returned by a high amperage "goose." The conclusion must be that apparently the battery has reformed the internal short. Another symptom that I have seen has been where a battery has leaked and formed a high resistance path between various cells. This high resistance path allows the individual cell to discharge but does not affect the other cells. In this instance, there is a great chance for cell reversal because one cells capacity is crippled by the leakage. Thus the battery goes bad. One method of detecting this is to fully charge a voltage until the terminal voltage goes above 16 volts (assuming all cells are good), then monitor the voltage over a period of days. If one individual cell is discharging through a resistance path, the voltage will drop slowly as that one cell is emptied. Such a cell can still be used if short periods of usuage are followed by partial charges, but you run the risk of overcharging the other cells.

Consequently, after the resistance path increases to the point that the cell discharges even in this type of light service, Surgery is indicated. K5HMD has attempted this several times with some success. The Motorola sealed batteries are cut open as shown and the two posts which held support the battery mechanically are carefully drilled out. The offending cell is located and carefully snipped out and removed. Another cell from another battery is then taken and carefully soldered into the bad battery. Surgery is then completed by resealing the first battery and saving the second battery for future procedures. Joe has one such battery in use for quite some time and anytime a failure should occur, he removes the teflon tape that holds the battery together and replaces the cell. The battery is initially taken apart with a tiny Dremel saw. Considering the costs new of these batteries, this is an excellent was to obtain good results with just a little effort. In addition, it pays to keep on the lookout for bad batteries since they can provide transplant parts for weak cells.

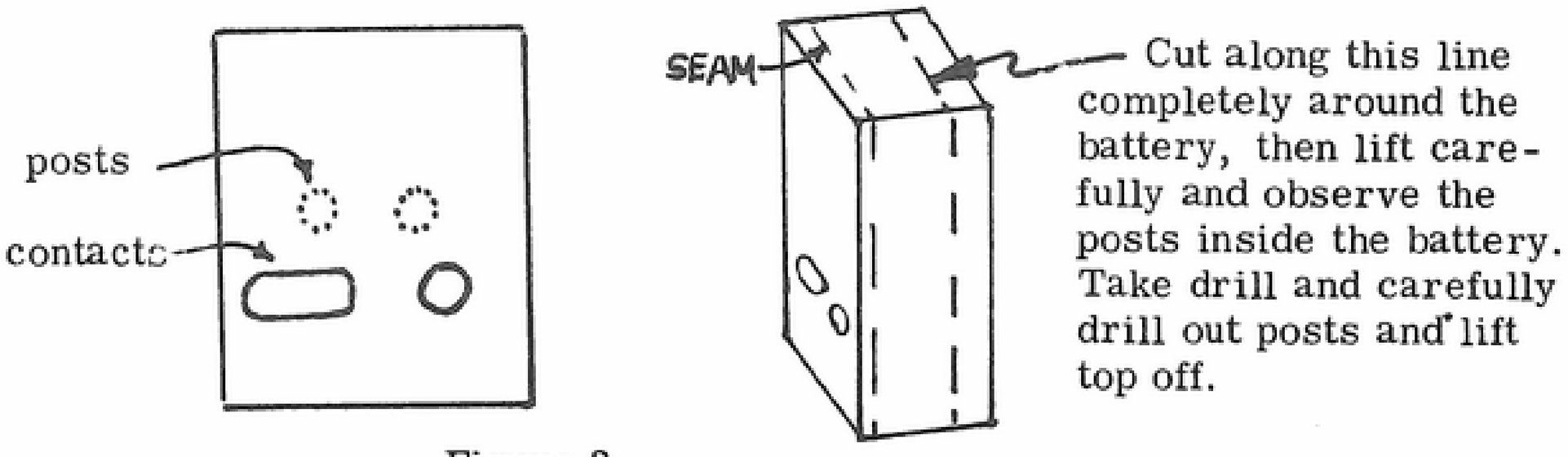


Figure 2
Motorola HT-220 Omni or Slimline Battery Surgery Procedure

By using this surgical procedure, you can get extended life from your Ni-Cads. If you have the time to check out the article in the Spectrum, it starts on page 32. I didn't have time to talk about all the idiocycracies of batteries that I have ran into during the last few year, but there will be other C & E's. In the meantime, should you have any other questions, I suggest that you take up the invitation made by the authors in the Spectrum article and write for the General Electric Nickel Cadmium Battery Application Engineering Handbook from GE at P. O. Box 861, Gainesville, Florida 32602. Mine has a price tag of $2.50 on it, but it is about 5 years old and I am sure that the price might have gone up in the time since I got it.

Mike, AA5EPK

SAM, W5HAZ

ED SANDERS

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THE NEAT HAM SHACK

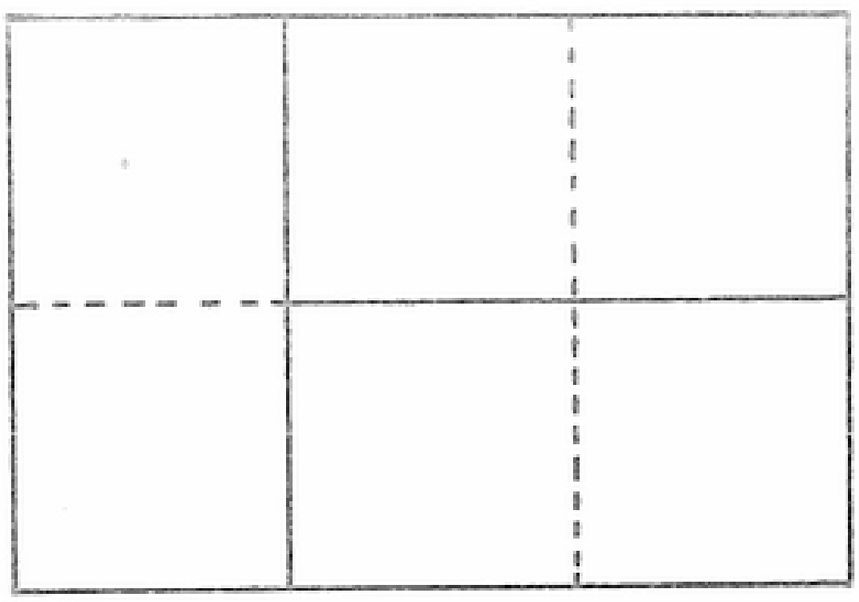
Contributions to this department are solicited.

THE BATTERY HOUSE, Part I. The rare instances that my power from the electric company is off are usually times when I want my 2 meter rig and possibly other equipment operating, so I decided to use an auto battery to operate various 12-volt equipments in the shack.

The problem was - where to put the battery so it would not release its hydrogen inside the shack or mess things up nearby. The answer in my case was to build its own house just outside the shack. The battery wires feed through the window with the antenna cables.

This installment of THE BATTERY HOUSE describes the foundation and lower part using cement blocks that measure approximately 15½ x 7 5/8 x 1 5/8 inches. A roof and cover unit will be described in a later issue of C & E.

Fig. 1



Bird's eye view of the 6 foundation blocks

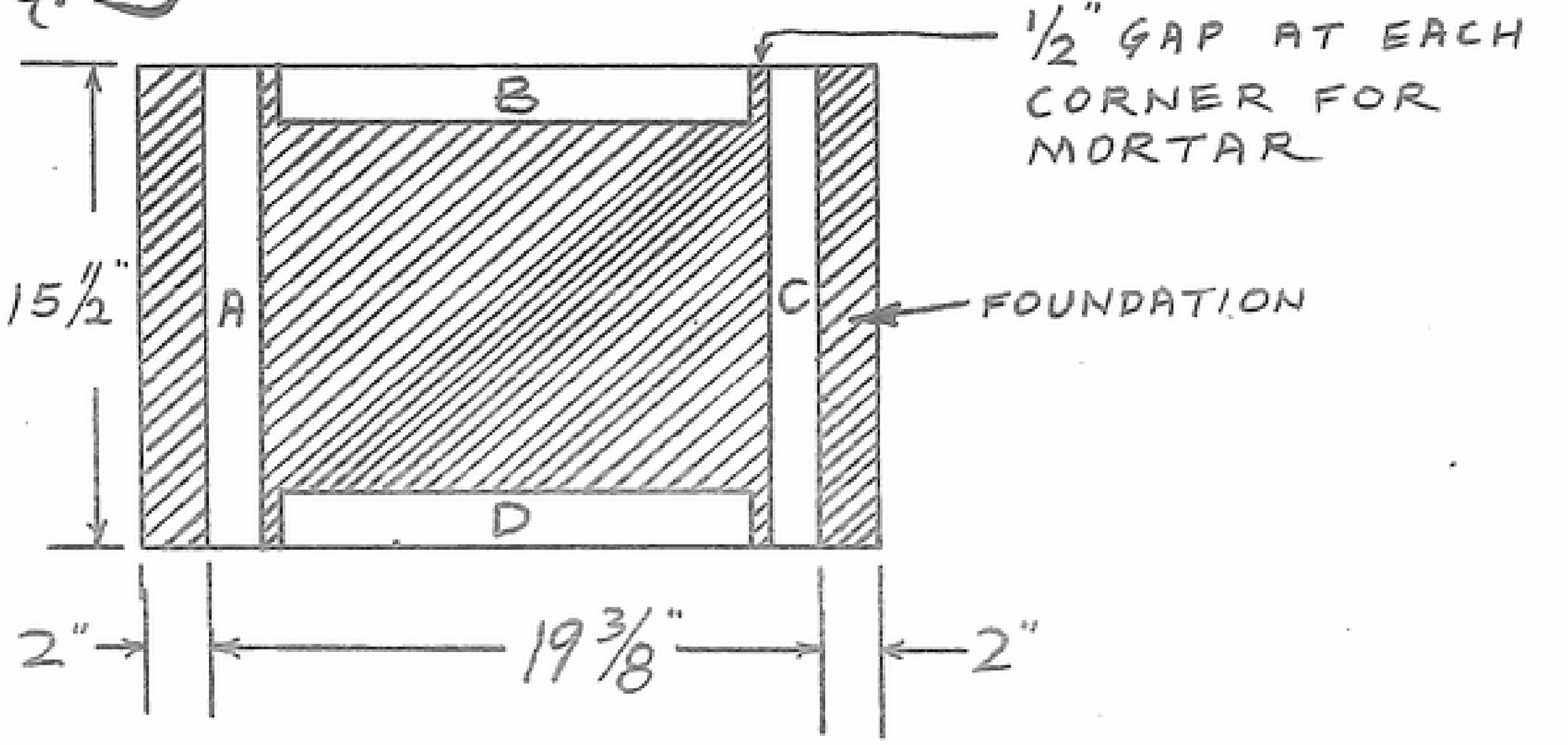
Fig 2

Foundation. Lay three blocks on level ground in the desired position as shown in Fig. 1. Place three more blocks in a reverse pattern on top of the first three. I prepared a good bed by scraping the dirt down about an inch. See Fig. 2. This made use of the firm weathered ground without filling or tamping. A thin layer of sand may also be used to set the blocks on. I have good drainage, but you might need more height for protection against heavy rains. If so, stack on another layer of blocks. Do not fill back with the loose dirt yet. A layer of mortar and some asphalt will be applied later.

Base of Battery House. Four blocks are used for the lower portion of the battery house. Drill a hole in one of these blocks for the two connecting wires. Slope it down toward the outside, and place it as high as possible. Study the entire structure before drilling. My hole is 4½" from the lower edge of the block that is next to the ham shack and is centered laterally. I used a ½" carbide-tipped masonery drill already on hand. Set the four blocks on edge on the foundation as shown in Fig. 3.

The Battery House, Part I (continued)

FIG. 3 BIRD'S EYE VIEW OF BASE ON FOUNDATION



Align blocks B & D with the edges of the foundation with approximately equal spacing between each block end and foundation end. Place blocks A & C near the ends of blocks B & D as shown. The four gaps will be filled with mortar. Instead of drilling a hole for the wires, you might imbed a length of tubing within one of the corner joints to serve as a conduit for the battery wires.

Mortar the Base. A premixed mortar, like SAKRETE is put in the gaps at the four corners of the base and is plastered along the joints between the base and foundation, inside and outside. Wet all surfaces to be mortared. Mix the mortar with water in a suitable container, I used a plastic dishpan of some sort. I believe I used about three cups of the mix. Stir mix thoroughly to get it all wet. Not too loose & watery, not too dry & crumbly. Wet the blocks again as you apply mortar, but avoid getting extra water on the mortar. Work fast. Don't knock the base blocks out of line. This part of the construction is not easy. I had had some mortaring experience prior to the project that helped. After a few days, apply asphalt roof coating (asphalt that has the consistancy of thick paint) to the entire outside of the base and foundation, but not to the top edges of the four base blocks. Paint it on generously with an old brush that you can discard. After the asphalt has dried, level the dirt around the outside of the foundation.

You may have noticed that some of the dimensions are a little off. The whole may not equal the sum of its parts, but the blocks were rough. The dimensions given are close enough to guide you to build one about like it, or make changes to suit your situation. The battery will be set down in this box that appears to not be high enough to cover the battery. Waterproofing should be good up to the wire hole. I have yet to experience a very heavy rain, but have had no seepage in moderate rains. The cover for the battery house, to be described in the next installment, will allow room for the top of the battery, keep out the weather, and permit venting. To be continued.

========== Bill, WA5RAQ ==========

QUESTION & ANSWER DEPARTMENT Bill, WA5RAQ would like to know if the summertime temperatures found in a closed vehicle will damage nicad batteries.

MID-OKLAHOMA REPEATOR INC.

ELECTION OF 1977 MORI OFFICERS

Election will be at the November meeting, which is the usual time and place. A nominating committee has been appointed and several names were suggested by members. Nominations may be made from the floor.

CHRISTMAS PARTY

The annual Christmas party is being planned for December.

JACK GANT, W5GM spoke at the October meeting. He is a candidate for director of the West Gulf Division. Jack briefed us on several of the happenings, both nationally and internationally, that are of concern to Radio Amateurs. Jack's discussion with us will not be reviewed here, but a few comments he made should be of interest to you:

> The word "interference" in R. F. I. is being changed to "interception" because the latter word does not place the blame on the sender. He urged we all try to use the word "interception" rather than "interference".
>
> El Paso amateurs are building a solar powered repeater and putting it on North Mount Franklin. They are making a special effort to achieve a very high degree of reliability due to the site's inaccessability.
>
> Jack had praises and plaudits for the Central Oklahoma Radio Amateurs organization and Collector and Emitter magazine. He said CORA was a "model of cooperation," and the C &E magazine was the "most beautiful example of cooperation" he had seen, that it was "unique." He said we need this cooperation, especially right now, to compete effectively for the frequencies we have and the spectrum expansion we hope to get in the 1979 World Administrative Radio Conference.
>
> ...Bill, WA5RAQ

++

FLASH! The new RCA receiver is installed and tuned up on 34/94. ...hotter than a pistol! reports Ron, WA5EAI.

From W5PDH's CHEER for September:

LEADERS

"Here are the three qualities that Floyd Hall, of Eastern Air Lines, believes make up that most rare bird of all, the natural business leader: 'The kind of guy who commands leadership is first of all the fellow who knows his business, and knows it so well that he exudes confidence. Second, he has to be a thoroughly honest person, with himself and everyone else - not because some outside influence tells him, but because of an inner ethical sense that tells him right from wrong. Finally, the natural leader must have a real appetite for accomplishment. He must have the ability to work hard for long periods of time, without breaking down mentally or physically, under stress. ' - Dun's Review"

REMINDER Come to the MORI November meeting and vote for your 1977 leaders.

==========

FOR SALE Gonset GSB-100 transmitter. 80 thru 10 meters, CW, PM, AM, Upper or Lower SSB, VOX, Antenna relay. Modified to 135 watts. Good condition. Rig is hooked up for demonstration. $150.00. Sue Kinney, WB5MWO, 329-7572.

THE BIG SIGNAL NEWS
OKLAHOMA CITY AUTOPATCH ASSOCIATION, INC.

TIPS ON USING FET'S

MANY CONSTRUCTION AND PROJECT ARTICLES HAVE APPEARED INVARIOUS BOOKS AND MAGAZINES USING FET'S. THE INVENTION OF THE TRANSISTOR HAS HAD A PROFOUND AFFECT UPON OUR WORLD OF ELECTRONIC TECHNOLOGY AS WELL AS OUR DAILY LIVES. IF THE FET HAD BEEN DISCOVERED BEFORE THE TRANSISTOR, RATHER THAN VICE VERSA, THESE AFFECTS AND CHANGES WOULD HAVE COME ABOUT EVEN FASTER. THIS STATEMENT IS BASED ON THE SIMILARITY OF THE FET AND THE VACUUM TUBE.

FET STANDS FOR FIELD EFFECT TRANSISTOR. AS THE NAME IMPLIES, THE TRANSISTOR CONTROL IS EFFECTED BY AN ELECTRIC FIELD.

UNTIL THE ADVENT OF THE FET THERE WAS NO NEED FOR DIFFERENTIATION BETWEEN TRANSISTORS, HOWEVER, THE FET MADE IT NECESSARY TO ADD SOME DISTINGUISHING NOMENCLATURE. THUS, BIPOLAR REFERS TO THE FAMILIAR TYPE TRANSITOR AND UNIPOLAR REFERS TO FET'S . THE TERM BIPOLAR IS USED FOR TRANSISTORS BECAUSE THEY OPERATE ON THE PRINCIPLE OF TWO CARRIERS, MAJORITY AND MINORITY(HOLES AND ELECTRONS). THE TERM UNIPOLAR IS USED FOR FET'S BECAUSE THEY OPERATE ON THE PRINCIPLE OF ONE CARRIER, WHICH IS A MAJORITY CARRIER.

THE "FIELD" IS THE DE-LETION REGION FORMED BY THE REVERSE BIASED PN JUNCTION. (THE FET EXHIBITS A HIGH INPUT IMPEDANCE BECAUSE OF THIS REVERSE BIAS.) THE DEPLPETION PRINCIPLE IS ILLUSTRATED IN FIGUR 3(A) A SMALL NEGATIVE POTENTIAL APPLIED BETWEEN THE GATE AND SOURCE RESULTS IN A LARGE ELECTRON FLOW, DUE TO THE SMALL DEPLETIONAREA AND RESULANT WIDE CHANNEL. AN INCREASE IN GATE-TO-SOURCE REVERSE BIAS ENLARGES THE DEPLETION AREA AND NARROWS THE CHANNEL, AS SHOWN IN FIG 3B. THE ELECTRONS WILL BE ATTRACTED TO A POINT WITH NO CURRENT FLOW AT THE CHANNEL. THIS POINT IS CALLED THE PINCH-OFF(SATURATION) VOLTAGE NO CURRENT FLOW IN THE SOURCE-TO-GATE DIRECTION, THUS RESULTING IN A VERY HIGH INPUT IMPEDANCE.

MOS IS THE ACRONYM FOR METAL OXIDE SEMICONDUCTOR AND IG FOR INSULATED GATE. MOS AND IF ARE SYNONYMOUS. A J IS USED TO REFER TO A JUNCTION DEVICE. IT SHOULD BE NOTED THAT THE TERM J FET IS RARELY USED ANYMORE, JUST FET BEING ACCEPTED FOR THIS TYPE O F DEVICE. HOWEVER, THE MOS OR IG FET WILL ALWAYS BE IDENTIFIED BY ONE OF THE OTHER ACRONYMS.

UNTIL RECENT MANUFACTURING BREAK-THROUGHS, MOS FET'S SUFFERED FROM SHORT-LIFE PROBLEMS AND WERE INHERENTLY UNSTABLE. HOWEVER, THESE DRAWBACKS HAVE BEEN OVERCOME AND THE DEVICES BEING PRODUCED TODAY REFLECT THE QUALITY AND LONG LIFE THAT IS EXPECTED FROM SEMICONDUCTORS IN GENERAL.

AN IMPORTANT CHARACTERISTIC NOT SPECIFIED AS A PARAMETER IS FREQUENCY. THE APPROXIMATE OPERATING FRFQUENCY RANGE, STATED AS AUDIO, VIDEO, VHF, OR UFH IS USUALLY STATED ON THE MANUFACTURER'S DATA SHEET. FOR EXAMPLE THE MOTOROLA HEP 801 IS CLASSIFIED AS AN AUDIO THROUGH VHF DEVICE.

MOST FET'S ARE SYMETRICAL IN CONSTRUCTION. IN OTHER WORDS THE GATE IS LOCATED HALFWAY BETWEFN THE DRAIN AND SOURCE AND SINCE THE MATERIAL THAT MAKES UP THE CHANNEL IS EVENLY DOPED, IT IS POSSIBLE TO INTERCHANGE THE DRAIN AND SOURCE LEADS WITH NO NOTICEABLE CHANGE IN OPERATING BEHAVIOR. THE MOTOROLA 801 AND 802 ARE EXAMPLES OF SYMMETRICAL FET'S.

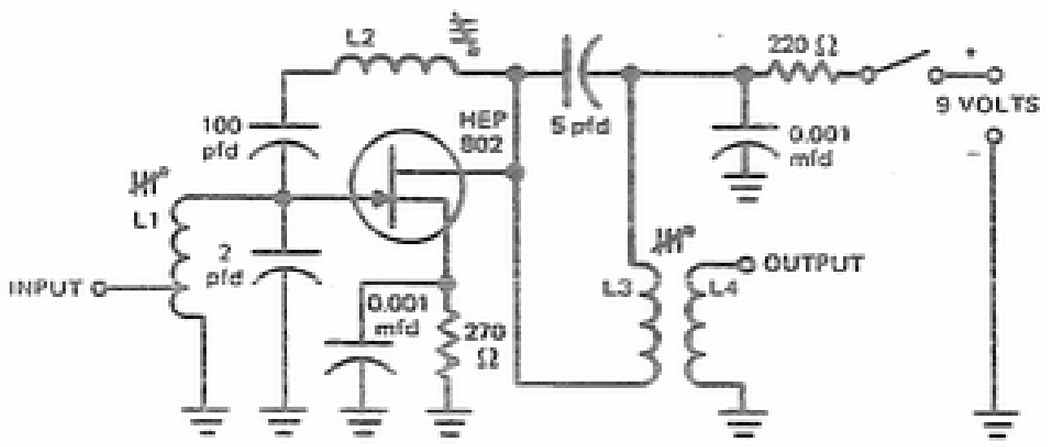
J FET'S CAN BE HANDLED THE SAME AS TRANSISTORS ARE HANDLED, SOLDERED, AND TESTED MOS FET'S CANNOT. DUE TO THE UNIQUE CONSTRUCTION, MOS FET'S ARE VERY SENSITIVE TO STATIC ELECTRICITY AND MERELY TOUCHING A FLOATING GATE LEAD WITH A STATICALLY CHARGED FINGER CAN RUIN THE DEVICE. THE INSULATING LAYER SEPERATING THE GATE AND CHANNEL IS IN THE ORDER OF MICRONS IN THICKNESS AND STATIC ELECTRICITY CAN EASILYPUNCTURE THIS LAYER AND RUIN THE DEVICE. FOR THIS REASON THE LEADS OF A MOS FET SHOULD ALWAYS BE SHORTED TOGETHER WHEN THE DEVICE IS NOT CONNECTED INTO A CIRCUIT.

THE BIG SIGNAL
OKLAHOMA CITY AUTOPATCH ASSOCIATION, INC.
NEWS

2-METER (150 MHz) PREAMPLIFIER

USES:
Provides Low-Noise Amplification Ahead of Receiver

FEATURES:
14dB Gain at Low Noise



PARTS LIST:
1 HEP 802
1 Ceramic Capacitor, 0.001 mfd, 10V
1 Mica Capacitor, 2 pfd, 10V
1 Mica Capacitor, 5 pfd, 10V
1 Mica Capacitor, 100 pfd, 10V
1 Resistor, 220 Ω, 1/2 Watt, ± 10%
1 Resistor, 270 Ω, 1/2 Watt, ± 10%
1 SPST Switch
1 9 Volt Battery

(All coils wound on brass-slug ceramic form)
L1 5 1/4 turns, tapped at 1 1/4 turn, #26
L2 9 1/2 turns, #34
L3 5 turns, #26
L4 1 1/4 turn, #26, at low end of L3

NOTE: All leads should be kept as short as possible (pc board is recommended)

Just as bipolar transistors are available in NPN and PNP versions, FET's also come in different configurations as shown in Table I and illustrated in Figure 1.

Figure 2 and Table II present a basic comparison of a FET, bipolar transistor, and vacuum tube. (Remember that the transistor is a current amplifier and the FET and vacuum tube are voltage amplifiers.)

Table I. FET Configurations

FET (junction type)
N-Channel depletion mode
P-Channel depletion mode
MOS FET or IG FET
N-Channel depletion mode
P-Channel depletion mode
N-Channel enhancement mode
P-Channel enhancement mode

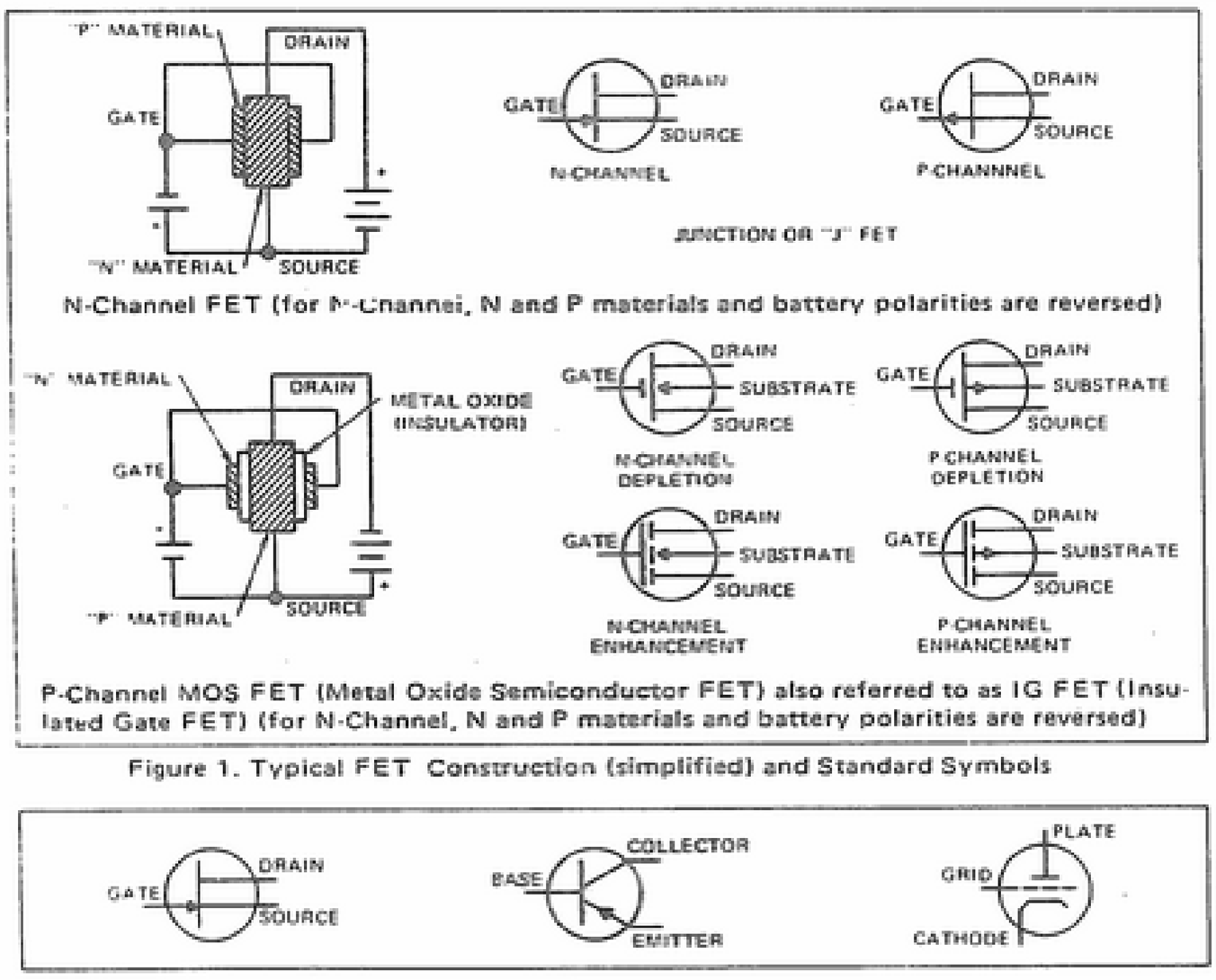


Figure 1. Typical FET Construction (simplified) and Standard Symbols

Table II. Characteristics Comparison of FET's, Transistor, and Vacuum Tube

Characteristic	J FET	MOS FET	Transistor	Tube
Impedance (input) (typical in ohms)	High (10 meg)	Very high (100 meg)	Medium to low (1000Ω)	Very high (100 meg)
Average Life	Long	(Long, see text)	Long	Short
Gate/Base/Grid Current (typical; in amperes)	1×10^{-9}	1×10^{-12}	1×10^{-6}	1×10^{-9}
Noise (internal)	Low	Low (variable)	Medium to low	Low
Amplification Factor	Low	Low	Low to high	Low to high

THE BIG SIGNAL NEWS
OKLAHOMA CITY AUTOPATCH ASSOCIATION, INC.

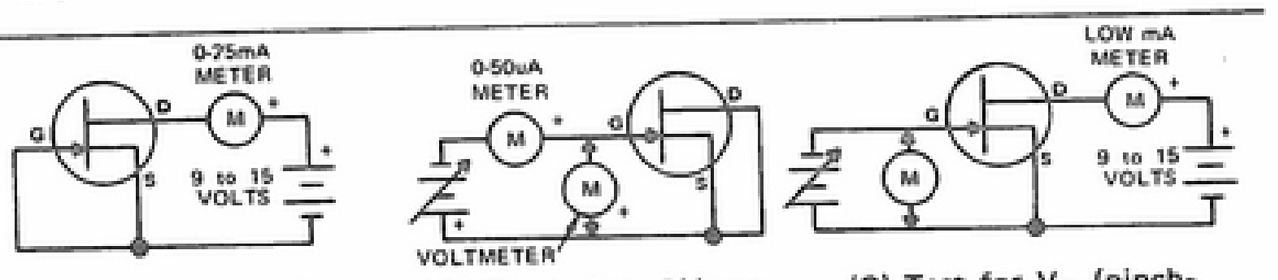
TIPS ON FET'S CONT.

IN THE DDSIGN AND CONSTRUCTION FO FET CIRCUITS THE IDSS IS PROBABLE THE MOST IMPORTANT PARAMETER. A SPECIFIC DEVICE TYPE MIGHT HAVE A BROAD IDSS CURRENT RANGE, FOR EXAMPLE, 1MA TO 10 MA AND ANY SINGLE DEVICE WILL FALL WITHIN THIS RANGE A WELL DESIGNED CIRCUIT MUST OPERATE AT BOTH OF THESE EXTEAMES. SHOULD A CIRCUIT BE ENCOUNTERED WHERE A DEVICE FAILS TO FUNCTION IT COULD BE DUE TO THIS IDSS FACTOR. AND A RESISTOR VALUES SHOULD BE VARIED IN AN ATTEMPT TO OPTIMIZE THE CIRCUIT OPERATION.

TESTING FET'S

FIGURE 4 ILLUSTRATES SOME OF THE TYPICAL FET ELECTRICAL CHARACTERISTICS THAT CAN BE MEASURED WITH SIMPLE TEST EQUIPMENT:

ANOTHER SIMPLE TEST FOR THE CONDITION OF A FET OR MOS FET CAN BE CONDUCTED AS SHOWN IN FIGURE 5, USING ONLY AN OHMETER. DISCONNECT THE FET FROM THE CIRCUIT AND MEASURE THE RESISTANCE BETWEEN THE TERMINALS AS SHOWN. POLIARITY OF THE METER MUST BE KNOWN.



(A) Test for I_{DSS} (current, drain to source with gate shorted to source). Typical 0.5 to 15 mA.

(B) Test for BV_{GSS} (breakdown voltage, gate to source with drain shorted to source). Typical 25 to 100 V. Increase voltage until Ammeter starts to deflect. Read voltmeter directly.

(C) Test for V_P (pinch-off voltage). Increase gate to source voltage until drain current is zero. Read voltage directly.

Figure 4. Simple FET Tests

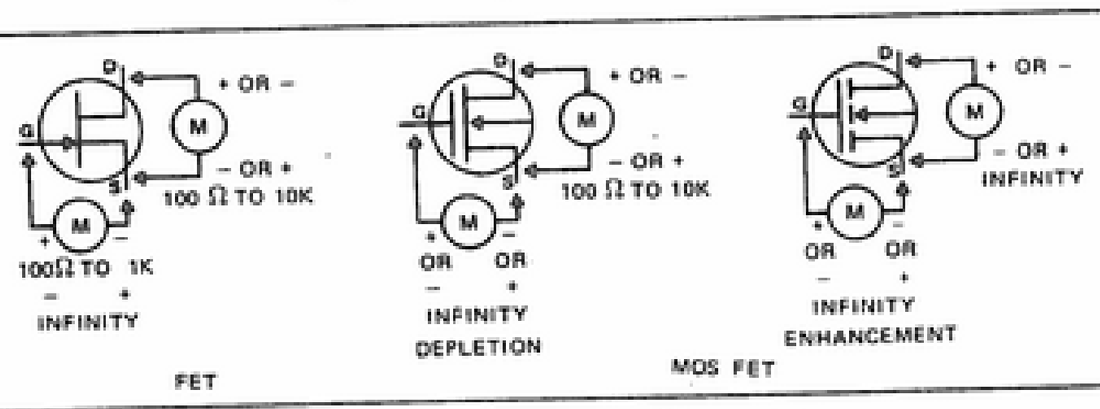


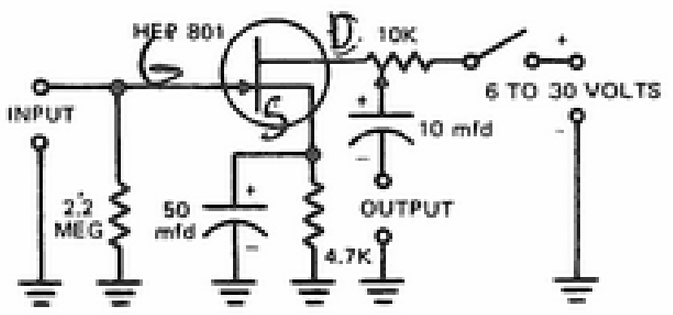
Figure 5. FET Tests Using an Ohmmeter

MICROPHONE or PHONO PREAMPLIFIER

USES:
Preamplifier for ceramic or crystal microphone or phone cartridge

FEATURES:
Excellent Frequency Response
Operates on Wide Range of Supply Voltages

PARTS LIST:
1 HEP 801
1 Resistor, 2.2 meg, 1/2 Watt, ± 10%
1 Resistor, 4.7K, 1/2 Watt, ± 10%
1 Potentiometer, 10K, Audio Taper
1 Electrolytic Capacitor, 10 mfd, 25V
1 Electrolytic Capacitor, 50 mfd, 25V
2 SPST Switch
Battery as Desired



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☐ HAVE NOT CHANGED DURING PRECEDING 12 MONTHS ☐ HAVE CHANGED DURING PRECEDING 12 MONTHS *(If changed, publisher must submit explanation of change with this statement.)*

10. EXTENT AND NATURE OF CIRCULATION	AVERAGE NO. COPIES EACH ISSUE DURING PRECEDING 12 MONTHS	ACTUAL NO. COPIES OF SINGLE ISSUE PUBLISHED NEAREST TO FILING DATE
A. TOTAL NO. COPIES PRINTED *(Net Press Run)*	554	600
B. PAID CIRCULATION 1. SALES THROUGH DEALERS AND CARRIERS, STREET VENDORS AND COUNTER SALES	6	20
2. MAIL SUBSCRIPTIONS	437	484
C. TOTAL PAID CIRCULATION *(Sum of 10B1 and 10B2)*	443	504
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F. COPIES NOT DISTRIBUTED 1. OFFICE USE, LEFT OVER, UNACCOUNTED, SPOILED AFTER PRINTING	41	55
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G. TOTAL *(Sum of E, F1 and 2—should equal net press run shown in A)*	554	600

11. I certify that the statements made by me above are correct and complete.

SIGNATURE AND TITLE OF EDITOR, PUBLISHER, BUSINESS MANAGER, OR OWNER

Joe K Harding

12. FOR COMPLETION BY PUBLISHERS MAILING AT THE REGULAR RATES *(Section 132.121, Postal Service Manual)*

39 U. S. C. 3626 provides in pertinent part: "No person who would have been entitled to mail matter under former section 4359 of this title shall mail such matter at the rates provided under this subsection unless he files annually with the Postal Service a written request for permission to mail matter at such rates."

In accordance with the provisions of this statute, I hereby request permission to mail the publication named in Item 1 at the phased postage rates presently authorized by 39 U. S. C. 3626.

SIGNATURE AND TITLE OF EDITOR, PUBLISHER, BUSINESS MANAGER, OR OWNER

Joe K Harding

PS Form 3526 Apr. 1976 *(Page 1)*

THE BICENTENNIAL
AMATEUR RADIO CLUB

Minutes of meeting September 21, 1976. Meeting was opened at 7:00 pm by President Coy Day K5LMG.

Plans for the upcoming school were discussed and instructors were appointed. Instructors are: Ernie Wolf K5YKD, John Oltmans WB5PZG, Coy Day K5LMG, Ken Burdick WB5ORY, and Richard Barber WB8AQZ.

Club Patch Designs were submitted by Jim Townsend and Greg Peck. Jims wife had spent much time drawing patches and it was very difficult to decide which one to use. Many thanks to Jims wife for her hard work.

Discussion was opened about the rising of stolen equipment. Bob W5VZU lost his equipment one Saturday evening while he was standing on his front lawn, visiting with C.Y. WB5TKG and Joe WN5TDW. Lost was a Collins Rcvr 75A3 S.N. 910 and a Heath Apache Xmtr.

A list of volunteers was taken to fold the October issue of the Collector and Emitter.

A Nominating Committee was appointed to nominate officers for the coming year.

Guest were Gene WB5SQC, the newly elected CORA President and Gene Taylor W5GC. After coffee and doughnuts Gene Taylor gave a very informative and understandable talk on transmisson lines. Many thanks to Gene for his efforts.

The meeting adjourned at 9:30 pm.

Ken, WB5PYN

<u>THE PREZ SEZ</u>:

Survey of those in our current novice class which is in the fourth week. I ask them the following questions:

1. What is your occupation?
2. How did you find out about the school?
3. Do you plan to operate as a novice?
4. Why do you want to become a ham?
5. Do you have a background in radio?

Eighteen of my twenty-five students answered the survey.
It was interesting to note that none of them were employed in communications and I could find no real relationship to their occupation and amateur radio. Of the group, three of them were managers, two in sales and service and two were retired. Some were civil servants and the rest was a pot pori of what you would find in the yellow pages.
Well, how did all these people from various occupations find out about our school? Most of them found out about it from a friend, whom in most cases was a ham. Others found out from our flyers, relatives, Radio Store, ANG members, previous students and the newspaper. It appears that word of mouth is still the best method. The next one surprised me. The clasical way of getting into amateur radio has been thru the novice program, spending long hours pecking away with CW on 80, 40 or 15 until one day the novice graduated into a full fledged ham. In recent years, I've noticed a trend to want to skip this very important step and jump right into voice operation (2 m fm or SSB). Fourteen of the eighteen surveyed plan to operate as novices and only four were going on to technician or general before they planned to operate. Very interesting.
As to why they wanted to become hams, most of them replied "because it's interesting" or they were intrigued by it or just curious. Several wanted to become hams to increase their knowledge in radio fundamentals or learn to build equipment. Others were interested in it as a hobby or because the spouse was interested or just to

talk to relatives. Some wanted to be hams because of their apparent professionalism, because they are an elite group or because it offers more capability and flexability than the citizens radio service. On the first of these last three, I wonder if they've been listening to the same hams that I have.
For background, most listed CB and military or both. Three said "none whatsoever" and another "air traffic control".
So what does all this prove? I'm not quite sure. I do know two things though. They are sure eager to learn and we're glad to have them.

Coy K5LMG

GREATER OKLAHOMA CITY REPEATER DIRECTORY

FREQ.		CALL	LOCATION	A-P	CLUB	TRUSTEE	A-P Access (On-Off)
146.01	IN						
.61	OUT	WR5ADL	EDMOND	-	EARC	WB5ISN	-
.07	IN						
.67	OUT	WR5ADF	OKC	OPEN#	MORI	K5VVZ	
.16	IN						
.76	OUT	WR5ADZ*	W OKC	-	WEARC		-
.22	IN						
.82	OUT	WR5ACB	NE OKC	-	OCAPA	K5CE	-
.28	IN						
.88	OUT	WR5AFW	NORMAN	CLOSED	OUARC	WA5EPK	-
.34	IN						
.94	OUT	WR5AJP	OKC	-	MORI	W5KOZ	-
.37	IN						
.97	OUT	WR5AKP	S. OKC	OPEN	OCRCI	WB5HUP	*,*
147.63	IN						
.03	OUT	WR5AHG	NE OKC	CLOSED	EARC	WB5ISN	-
.69	IN						
.09	OUT	WR5ANG*	NW OKC	-	OCRCI	WB5GWB	-
.81	IN						
.21	OUT	WR5ACB	NE OKC	CLOSED	OCAPA	K5CE	-
52.680	IN						
.525	OUT	WR5ADL	EDMOND	-	EARC	WB5ISN	-
449.1	IN						
444.1	OUT	WR5AJP	OKC	-	MORI	W5KOZ	-
442.8	IN						
447.8	OUT	WR5ADK	NW OKC	-	OCAPA	K5CE	-

* To be in operation soon
\# Autopatch open to all amateurs for emergency use.

EARC- Edmond Amateur Radio Club, Inc.
MORI- Mid-Oklahoma Repeator, Inc.
WEARC-Western Electric Amateur RC
OCAPA- Oklahoma City Autopatch Assoc., Inc.
OU ARC- Oklahoma Univ. Amateur RC
OCRCI- Oklahoma City Repeater Club , Inc.

This information is not guaranteed to be totally correct- if you see any errors please phone 325-1955 or 364-8993 for corrections.

OU ARC NEWS

WHAT HAPPENED AT THE MEETING?

Several important items came up atthe Sept. 22 meeting of the OÜ Amateur Radio Club which should be of interest to members:

One) A motion was made to hold club meetings on Wednesday evenings at 7:30 PM .

Two) Only one business meeting per month (including a program) would be held,with the other monthly meeting being on an informal basis; a get-together for the amateurs in the area.

Three) Election of officers would be postponed a short period of time until the membership had a chance to grow and form some knowledge of those capable of holding office in the club.

These three proposals were voted on and carried.

The election of officers was scheduled to be held at the first meeting of the school semester: however those present at the meeting felt they hadn't had sufficient time to learn of the newer members' capabilities.

Also a large number of last semesters' active members were not present. Therefore it was decided that last years officers will continue in their previous club roles until the election is held.

NEW BEEZNUSS

Several of our club members have seen a need for improvement in the club station, especially in the area of antennas! One member in particular suggested that the club look into the possibility of buying a vertical antenna (5-band) to put on the Engr. Center roof (which gives good ground-plane effect). The antenna would be one of the well-known commercial-brands: Hy-Gain, Mosley, Newtronics,?.

We will be able to obtain some kind of a discount for the OU Club.

NEW BEEZNUSS II

OPEN HOUSE appears to be drawing nigh: That annual OU Engineering department event which shows high school and college students what some Engr. students and various clubs associated with Engr. are doing. Last year OU ARC had a very fine exhibit which consisted of auto-patch demonstration, RTTY setup, and OSCAR satellite station (complete with slides). We didn't win any prizes but had a good time and showed off amateur radio to a lot of people! We even appeared on the six PM news of a local TV station!

Open house is November 19th and 20th and we will need help from each of you to be ready with a fantastic set-up this year! Try to help sometime during this weekend if you can! Don't underestimate the importance of displays such as these to increase public awareness of and confidence in amateur radio!

License classes are still going smoothly with 24 enrolled and about 16 average enrollment!

NORMAN EMERGENCY PREP. DRILL

Quite a few Norman and Oklahoma City area hams participated in the emergency drill which was held during the afternoon of October 11. The drill was conducted to test the abilities of the local hospitals (Norman Municipal, Goddard Health Center, and Central State Hospital) to handle an emergency situation with many patients arriving simultaneously. A simulated train, school bus, truck wreck occurred on Acres at the railroad tracks with a number of junior high and high school students acting out the parts of injured persons (very realistically, we might add!) The injured were then transported to the various hospitals via ambulance, rescue squad, etc. Amateurs coordinated communications between the Emergency Operating Center at the police station Red Cross, and the hospitals. Afterwards they were commended by Geo. Martin, Cleveland Co. Red Cross Director, for their readiness and communicating skill. Local amateurs participating included W5AVK, Norman Municipal; W5EOD, Net Control; W5MCJ, coordinator; WB5EEY, Red Cross; K5KDR, Central State; WB5GWB, Goddard Health Center; W5MCN and WB5HUP, HF freqs.; WB5KRD, EOC; WB5MWO, EOC.

TRAFFIC HANDLING

Here is a listing of some of the finest CW traffic nets for Novices and higher classes. Below also is a check-in procedure for these nets.

OKLA AREA NET (OAN)	3705 KHZ	6:30 PM
OKLA LIASON NET (OLZ)	3682.5 KHZ	7:00 PM
MO. SLOW NET (MSN)	3715 KHZ	4:00 PM
TEX. SLOW SPEED (TSS)	3748 KHZ	8:00 PM
KANS. SLOW NET (QKS-SS)	3735 KHZ	8:00 PM
LA. SLOW NET (LSN)	3703 KHZ	8:30 PM

To check into a CW net you should listen for the net control station,NCS, who will be sending the net designator; OLZ, for example. When you hear the NCS call for check-ins (QNI), give some signal such as didit or dah, just something to get NCS' attention. He will in turn send the same signal back to you, which is your cue to give your call , location, and traffic list (or QRU). If you do have traffic, send QTC "city or state for which traffic is destined" and number of pieces of traffic going to that city or state.

EX: WB5NCS DE WB5RXZ NORMAN QTC ARDMORE 2 $\overline{AA}$ TEXAS 3 $\overline{AR}$

Here are some commonly used signals of CW Traffic nets:

QRU- No Traffic

QTC- I have traffic for_____

QNI- I am checking into net

QNU- I have traffic for you

QNV- Go to ____KHZ and send traffic for _____

to_____

QNX- You are excused from net.

Kenny WB5RXZ

To be continued soon.

THE ZANY NEWS FREQUENCY

Joe, WA5ZNF

SOME QUALITY CITIZEN - -About the first time I turned my new receiver on, even before my novice license came, notice I said receiver and not transmitter, I received my first lesson in phoenetics. I knew the old WW II ones but many or most of those I was hearing were new to me and then I began to hear all those foreign locations such as Zanzibar, Germany, Russia, Holland and Japan. They were all speaking pretty good English for foreigners and then I realized that if they would use the official phoenetics they would be saying Zulu, Golf, Romeo, Hotel and Juliet.

Noteing strange and unusual phoenetics became sort of a second hobby and there have been some strange ones. Then there are those who make up cute ones so others can remember their call (such as Zany News Frequency, Old Party Pooper or Kind Old Zombie to name a few) and I have noticed that many if not most are self-depreciatory.

Now to get to the 'head' at the start of this column. I have talked to Gene Halley, WB5SQC, on two meters and he had some combination that didn't seem to fit him so when he agreed to take over the demanding and important post of president of CORA I decided that, to me at least, SQC would mean SOME QUALITY CITIZEN, for it takes one of those to take the helm of an important organization and give unselfishly of his time and talent to make it work. From what I have observed he will do just that and live up to my new phoenetics. He will need the help of the club representatives and every amateur in the metro area.

Take this copy with yo- and reach or walk over to the phone and dial 381-2228 and offer your time and talents to Gene.

While I am at it I want to thank the outgoing officers, Ken, WB5ECJ and Bob, WB5LHR for their work over the past two years. Each in his own way has contributed more than his share to all of CORAs projects and particularly I want to thank them personnaly for their assistance in getting the CORA Collector & Emitter out.

* * * * *

This month's contribution is pretty short and I am doing it at the last minute. I could have filled several pages with all of the things that have happened to me since the last issue but they wouldn't be interesting to anyone else so a little white space will have to do.

* * * * *

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NOVEMBER HAM HAPPENINGS

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3 QJ	4	5 ACARC	6 EARC
7	8	9 MORI	10	11	12	13
14	15	16 76ers	17 QJ	18	19 VHF (AND) EDIT C&E	20 "T" BIRD CAMPOUT
21 'T BIRD CAMPOUT	22	23 MAIL C&E (MORI)	24	25 THANKS-GIVING	26	27
28	29	30				

See page 2 and/or individual club sections for details