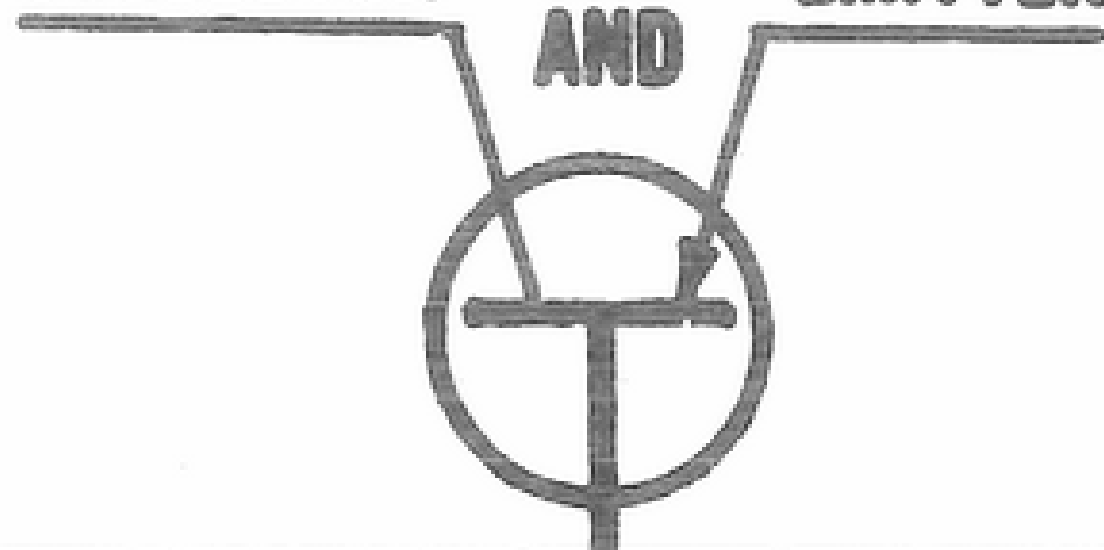


Central Oklahoma Radio Amateurs

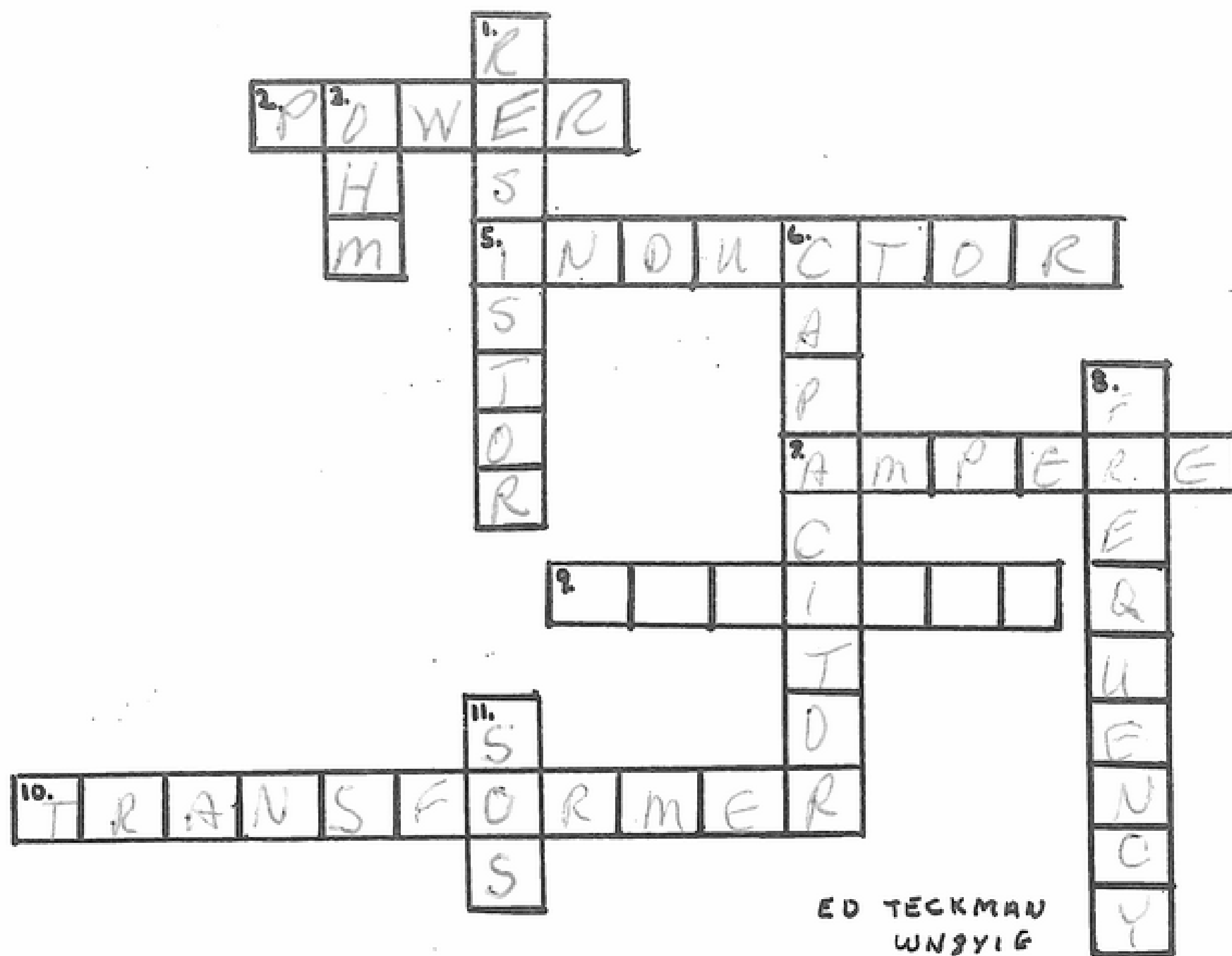
COLLECTOR AND EMITTER



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Vol. 2 No. 16

WE HAVE RECEIVED QUITE A FEW COMMENTS ABOUT THE USEFULNESS OF THE BACK PAGE, WHAT WITH THE MONTHLY ACTIVITIES THAT MIGHT CONCERN AMATEURS IN THE CENTRAL OKLAHOMA AREA. MANY SAY THAT THEY STICK IT UP IN THEIR SHA SHACK AND THERE HAVE BEEN STORIES THAT SOME CLUB OFFICERS MADE A MEETING THAT THEY WOULD HAVE MISSED WITHOUT THE CALENDAR, AND THEN THERE IS THE ONE ABOUT ANOTHER ONE WHO DIDN'T POST THE CURRENT ISSUE AND SHOWED UP FOR A MEETING A WEEK EARLY. NOW YOU CAN USE THE FRONT PAGE COURTESY OF THE LONGMONT ARC "SPLATTER".



ED TECKMAN
WNGYIG

DOWN

1. Name of \sim
3. Unit of measure for R
6. Name of \sim
8. Measurement for a radio signal.
11. A distress signal used in radio telegraphy.

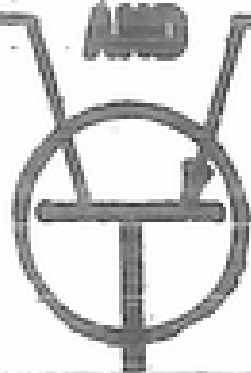
ACROSS

2. $P = EI$
5. Its unit of measure is a Henry.
7. Units of measure for I.
9. To listen to a communication service.
10. An inductor for increasing voltage.

THE PRESENT POPULATION OF AMATEURS IS EXPECTED TO INCREASE TO ONE MILLION BY 1982!

Central Oklahoma Radio Amateurs

COLLECTOR AND EMITTER



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AT OKLAHOMA CITY OK

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.

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Postal Station 18, Oklahoma City OK 73169

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Mail Dues to: Sid Gerber, 829 E Bouse, MWC 73110			737-1050

OKLAHOMA CITY AUTOPATCH ASSOCIATION, INC.

Meetings: 7:30 P.M. 3rd Tuesday, Bi-Monthly, Okla Military Academy 36th & Grand, WR5ACB 146 22/82, 147 81/21

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Vice President	Larry Dillard	WB5CWB	685-4065
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7705 S Charlotte Dr, Okla City OK 73159			

UNIVERSITY OF OKLAHOMA AMATEUR RADIO CLUB

Meetings: 7:30 P.M., alternate Tuesdays, Memorial Student Union, Room 161. Club Station W5TC. WR5AFW 146.28/88. Mail address: 202 W. Boyd, Room 219, Norman OK 73069.

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Vice President	Wayne Smith	WB5FEX	325-6391
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Treasurer	Mike Salem	WA5EPK	321-5453



Club
NEWS

V5107
The Elmer Gooder Memorial
Station

MINUTES OF APRIL MEETING

MEETING WAS CALLED TO ORDER 8:15 PM, APRIL 16 1976 BY PRESIDENT TOM, W50ZE, WITH 14 MEMBERS AND GUESTS PRESENT.

IT WAS MOVED AND PASSED THAT WE DISPENSE WITH, HENCEFORTH, READING OF MINUTES DURING MEETINGS SINCE THEY ARE PUBLISHED IN THE CORA C&E.

BOB, W5HXL, PRESENTED THE CLUB WITH A SELECTION OF HANDTOOLS GLEANED FROM THE GARAGE OF A FRIEND, WITH PERMISSION, OF COURSE. IT WAS MOVED AND PASSED THAT THE CLUB OFFER TO PURCHASE THE TOOLS. IT WAS FURTHER MOVED AND PASSED THAT \$15.00 BE OFFERED. OFFER WAS EXCEPTED. THE CLUB HAS A TOOLBOX BUT THERE IS ROOM IN IT FOR MORE TOOLS. PARTICULARLY NEEDED ARE ALLEN AND BRISTOL WRENCHES, SCREWDRIVERS, ETC.

THE CLUB HAS RESPONSIBILITY TO DEVELOP AN ENTERTAINING PROGRAM FOR THE LADY PARTICIPANTS IN HAM HOLIDAY. TOM, W50ZE, IS GOING TO CONFER WITH J.W., W5KFT, AND THEN LOOK FOR VOLUNTEERS TO DO THE JOB.

CARL, W5JJ, PRESENTED A VERY INTERESTING TALK ON LAMBDA DIODES AND THEIR APPLICATION IN OSCILLATORS. THEY ARE SIMILAR, IN FUNCTION, TO TUNNEL DIODES BUT CAN PRODUCE MORE POWER AND ARE EASIER TO TAME.

MEETING ADJOURNED AT 9:25 PM AND THE MEMBERS CONTINUED WITH COFFEE, DONUTS AND I.B. QSO'S WELL INTO THE NIGHT. JOE, W5TRS, SEC'Y

WR5AKP

IN SOUTHWEST OKLAHOMA CITY, THERE IS A SMALL, CHEAPLY BUILT REPEATER. ITS CALL IS WR5AKP AND IT IS OF 146.37/97. IT IS ONE OF TWO COMPLETELY OPEN REPEATERS IN TOWN EQUIPPED WITH AUTOPATCH.

THE REPEATER CONSISTS OF A VHF ENGINEERING TRANSMITTER AND RECEIVER AND USES A TWO TRANSISTOR CARRIER OPERATED RELAY, C.O.R. THESE ARE MOUNTED ON A STANDARD 19" RACK MOUNT PANEL. ON THE OTHER PANELS ARE POWER SUPPLY AND AUTOPATCH.

THE INTERNAL OPERATION OF A REPEATER ARE BASICALLY SIMPLE. WHEN THE RECEIVER HEARS A SIGNAL A TRANSISTOR OUTPUT VOLTAGE GOES HIGH AND CAUSES THE NPN TRANSISTORS IN THE C.O.R. TO CONDUCT THUS CAUSING A RELAY TO CLOSE. THIS RELAY KEYS THE TRANSMITTER AND ALSO SIGNALS THE C.O.R. INPUT ON THE IDENTIFICATION, I.D., BOARD. AUDIO FROM THE RECEIVER IS COUPLED, WITH A MATCHING TRANSFORMER, TO THE TRANSMITTER. WHEN THE RECEIVER LOSES THE SIGNAL, THE C.O.R. GOES HIGH AFTER A DELAY WHICH KEEPS THE TRANSMITTER ON FOR A SLIGHT PERIOD OF TIME.

A REPEATER WITH AUTOPATCH IS SLIGHTLY MORE COMPLICATED. IT MUST HAVE SOME PROVISION FOR ACTIVATION OF THE PATCH AND TURNING IT OFF. SOME SPECIAL WAY IS INCORPORATED IN THE SWITCHING CIRCUITS TO KEEP CONTROL TONES FROM THE RECEIVER AUDIO FROM GETTING INTO THE PHONE LINES VIA THE PATCH. THIS IS EASILY ACCOMPLISHED BY TURNING ON THE PATCH WITH A TONE BUT NOT LETTING THE TELEPHONE CONNECT UNTIL THE CARRIER IN THE RECEIVER DROPS OUT.

THE PAIR OF TONES USED TO ACTIVATE THE 37/97 AUTOPATCH ARE GENERATED BY THE STAR, *, BUTTON OF AN A TOUCH TONE KEYBOARD. THE TOUCH TONE DECODERS ARE PHASE LOCKED LOOP I.C.'S COMMONLY CALLED 567'S. THEY DECODE THE SIMULTANEOUS DUAL TONES AND CLOSE A RELAY WHICH THEN LATCHES EVERY OTHER RELAY SHUT EXCEPT THE ONE THAT SWITCHES THE PHONE LINE ON. THIS LAST RELAY CLOSING AND LATCHES WHEN THE CARRIER IS DROPPED AS EXPLAINED BEFORE. UNDER NO CIRCUMSTANCES SHOULD THE * TONES BE ALLOWED INTO THE PHONE LINES BEFORE REGULAR DIALING BECAUSE



Club NEWS

WSLOW
The Elmer Gooder Memorial
Station

THE PHONE COMPANY WILL GENERATE A FAST BUSY SIGNAL INDICATING A MIS-DIAL, LIKE THE SIGNAL WHEN ITS EQUIPMENT IS BUSY. AFTER THE CALL IS COMPLETED, ANOTHER STAR IS SENT TO DISCONNECT THE PATCH.

THE REPEATER NOW HAS AN AUTOMATIC MORSE CODE I.D., THANKS TO SEVERAL AMATEURS IN TOWN THAT RECOGNIZED THE NEED AND DONATED FIVE DOLLARS OR SO, EACH, TO BUY IT. THE I.D.'ER IS ALSO MANUFACTURED BY VHF ENGINEERING. IT IS REALLY NICE, AND IN MY OPINION, IT CAN'T BE BEAT FOR THE PRICE. IT WILL AUTOMATICALLY I.D. EVERY 3 MINUTES WHEN THE REPEATER IS IN USE AND AFTER A PERIOD OF NON-USE, IT WILL I.D. WHEN SOMEONE KERCHUNKS. SINCE ARDMORE AND PONCA CITY WILL BE, OR ALREADY ARE ON 97 ALSO, THE I.D. SENDS "DE WR5AKP OKC" IN PERFECT MORSE CODE.

THE I.D. BOARD IS ABOUT 9X3, OR SO, AND HAS NINE I.C.S, SEVERAL RESISTORS AND CAPICATORS, AND COMES WITH ABOUT 70 DIODES FOR THE DIODE MATRIX. THE BOARD WILL HOLD UP TO 160 BITS, OR 80 DOTS. THIS IS PLENTY FOR MOST USES. IT HAS VARIABLE TONE, SPEED, VOLUME AND I.D. INTERVAL CONTROLS.

THE REPEATER RUNS 25 WATTS FROM AN EXTERNAL AMPLIFIER DRIVEN BY 1.6 WATTS FROM THE TRANSMITTER. THE TRANSMITTING ANTENNA IS USUALLY A DB 224, WHICH IS A TWENTY FT. LONG, VERTICALLY STACKED ARRAY OF FOUR DIPOLES, AND HAS A GAIN, WHEN IT'S ADJUSTED FOR OMNIDIRECTIONAL COVERAGE, OF LITTLE OVER 6 DB. IT IS MOUNTED ON A TWENTY FOOT SECTION OF TOWER WITH THE MIDPOINT ABOUT 29 FEET HIGH. THE RECEIVING ANTENNA IS A RINGO RANGER AT ABOUT 55 FT.

ALSO ON THE REPEATER IS A FIVE PORT FILTER, LOANED TO ME BY DENNIS ORCUTT, WB5ISN. THE WHOLE REPEATER IS MOUNTED IN A 28X19 INCH RACK MOUNT.

OVERALL IT DOESN'T WORK BADLY AT ALL EXCEPT ITS COVERAGE ISN'T GREAT; BUT, BASE STATIONS CAN GET INTO IT ALL OVER TOWN AND MOBLES CAN GET INTO IT FROM ABOUT S.W. 89TH TO N.W. 40TH. MOBILES HAVE NO TROUBLE AT ALL WHEN THEY ARE PASSING DOWNTOWN ON INTERSTATE 40, EXCEPT WHEN THE 34/94 REPEATER OVERLOADS THEM.

TO IMPROVE THE SYSTEM MORE PEOPLE ARE NEEDED TO USE IT SO I CAN SEE WHAT COVERAGE IT HAS AND OBSERVE IF THE AUTOPATCH WORKS CORRECTLY. ANYONE WHO HAS 37/97 AND CAN HEAR IT SHOULD PUT OUT A CALL FOR ME OR JUST ANNOUNCE HIS PRESENCE. MAYBE SOMEONE WOULD COME BACK TO HIM. IT IS ON 24 HOURS A DAY. IF YOU HAVE A TOUCHTONE PAD, TRY IT OUT ON THE PATCH. IF IT DOESN'T WORK, GIVE ME A LANDLINE AND I'LL SEE WHAT CAN BE DONE. ONCE AGAIN, THE AUTOPATCH IS OPEN TO ALL, STAR ON, STAR OFF. 73, LLOYD KIRK, WB5HUP, TRUSTEE WR5AKP

EDITOR'S NOTE: SINCE THIS ARTICLE WAS RECEIVED, MANY THINGS HAVE BEEN GOING ON WITH 37/97. A TEMPORARY SITE, ACROSS TOWN, WAS TRIED, DURING WHICH TIME A PHONE LINE WAS UNAVAILABLE FOR THE AUTOPATCH. THIS REPEATER IS A DYNAMIC THING, LIKE THE YOUNG FELLOWS WHO ARE WORKING ON IT. SO, FOR LATEST NEWS ON WHAT'S GOING ON, CALL LLOYD, WB5HUP, ON 37/97. JOE, WA5TRS

ERRATA

CLIFF APPEL, WB6AWM/KH6, SENT A NOTE THAT HE HAD MADE A MISTAKE ON THE NUMBER OF LICENSED AMATEURS IN HAWAII. HE REPORTS THAT THE FIGURE SHOULD BE 12000 RATHER THAN THE 20000 HE REPORTED IN HIS ARTICLE PUBLISHED IN THE MARCH ISSUE OF C.O.R.A C&E. SINCE CLIFF POINTS OUT HIS MISTAKE, I MUST POINT OUT OURS. SOMEHOW WE GOT PAGES TEN AND ELEVEN CONTAINING HIS ARTICLE, REVERSED. I DONT KNOW HOW THAT HAPPENED. SORRY ABOUT THAT CLIFF.



Club
NEWS

WSLOW
The Elmer Goshier Memorial
Station

ZERO INERTIA BATTERY CONDITION METER

USERS OF HAND HELD PORTABLES ARE GENERALLY FAST MOVING PEOPLE. UNHAMPERED BY ELECTRICAL POWER LEADS AND ANTENNA TRANSMISSION LINES, THEY ARE ABLE TO FLIT AROUND WITH MUCH ABANDON. SINCE THEY USUALLY HAVE THE RADIO EQUIPPED WITH A RUBBER DUMMY, WHICH IS A DUMMY LOAD WITH INCIDENTAL RADIATION, THEY DON'T HAVE MUCH RADIATION SO THEY OFTEN HAVE TO STRIKE A GYMNASTIC POSE TO HOLD A REPEATER (NO VIRGINIA, THAT IS NOT THE GOD, MERCURY; THAT'S A 2M FM'ER.) THESE AWKWARD POSITIONS ARE TIRING AND DON'T ENCOURAGE LONG WINDED TRANSMISSIONS. ANOTHER CAUSE OF FLEET OPERATING PROCEDURE IS THE SHORT KEY-DOWN TIME ALLOWED BY THE UNDERSIZED NI-CAD BATTERY POWER CONTAINED IN THE TYPICAL TALKIE.

THUS, WE GET TO THE POINT OF THIS ARTICLE. BEING A RATHER FAST OPERATOR MYSELF, I FELT I NEEDED A FAST WAY TO CHECK BATTERY CONDITION. MY RADIO DOESN'T HAVE A BATTERY CONDITION INDICATOR BUILT-IN SO I ALWAYS HAD TO RUMMAGE AROUND IN THE TOOL BOX, OR UNDER THE CLUTTER OF MY BENCH, TO GET TO A VOLTMETER. WHAT I NEEDED WAS A SPECIAL PURPOSE TEST INSTRUMENT I COULD CARRY IN MY POCKET. IT NEEDED TO BE RUGGED, ACCURATE AND SMALL. FIGURE 1 SHOWS WHAT I BUILT.

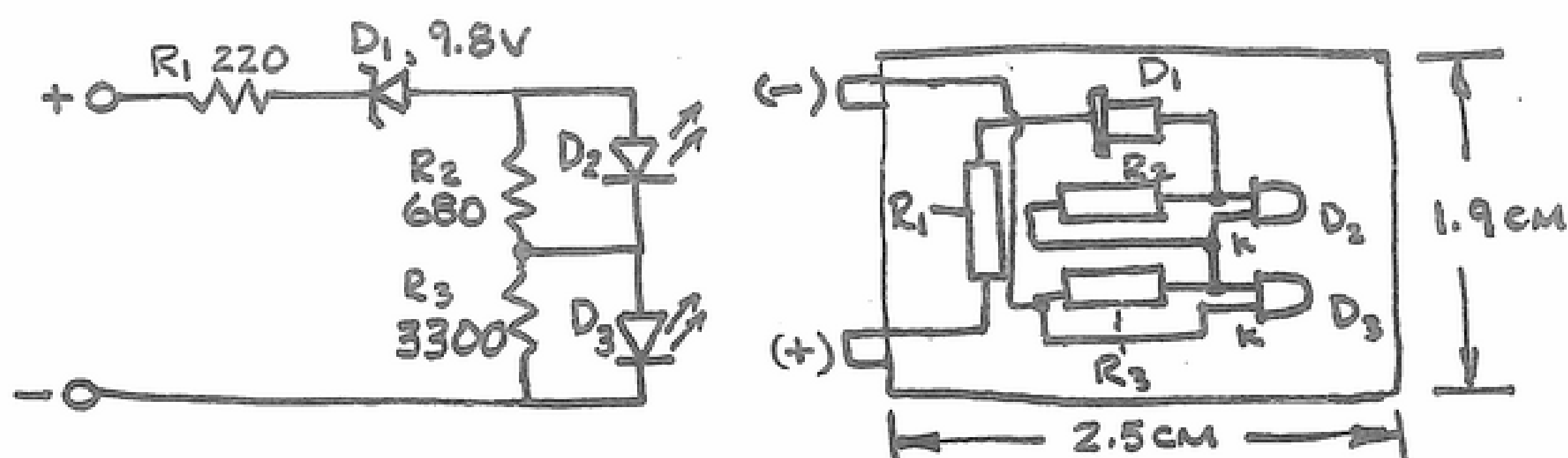


FIGURE 1. SCHEMATIC AND PARTS PLACEMENT

THE CIRCUIT IS LIKE ONE OF AN EXPANDED SCALE VOLTMETER. THE ZENER DIODE, IN THIS CASE, PREVENTS ANYTHING FROM HAPPENING UNTIL THE MEASURED VOLTAGE RISES ABOVE 9.8V. WHEN IT DOES, CURRENT BEGINS TO FLOW THROUGH R_2 AND R_3 BUT NEITHER LIGHT EMITTING DIODE TURNS ON UNTIL THE VOLTAGE GETS TO ABOUT $1\frac{1}{2}$ VOLTS ACROSS IT.

R_2 AND R_3 WERE EXPERIMENTALLY SELECTED TO GIVE THE LED'S THE REQUIRED TURN-ON VOLTAGE CORRESPONDING TO DESIRED TERMINAL VOLTAGE ON THE TESTER. D_3 TURNS ON AT ABOUT 12 VOLTS, D_2 TURNS ON AT ABOUT 14 VOLTS. THESE VALUES ARE APPROPRIATE FOR MY MOTOROLA WHICH USES TWELVE NI-CAD CELLS. TO TEST, THE DEVICE IS PLACED ON THE CHARGING CONTACTS OF THE RADIO. THE ZENER AND RESISTORS COULD BE JUGGLED TO FIT ANY SIMILAR APPLICATION. IN FACT, THE VALUES OF R_2 AND R_3 WILL PROBABLY HAVE TO BE EXPERIMENTALLY SELECTED BECAUSE LIGHT EMITTING DIODES OF VARIOUS TYPES HAVE DIFFERING TURN-ON VOLTAGES. SEE FIGURE 2 FOR VOLTAGES MEASURED ON THE DIODES. THE ZENER COULD BE LEFT OUT AND THE DIODES TURNED ON BY A SIMPLE VOLTAGE DIVIDER BUT THE TURN-ON WOULDN'T BE AS SHARP. R_1 LIMITS THE CURRENT THROUGH THE DIODES ONCE THEY TURN ON.

IF THE CIRCUIT WAS TO BE USED OUTDOORS IN A CAR OR BOAT TO INDICATE BATTERY CHARGE CONDITION, I WOULD WANT THE LED'S TO TURN ON EVEN MORE SHARPLY SO THEY COULD BE SEEN IN THE SUNLIGHT. I WOULD PROBABLY ADD TRANSISTOR DRIVERS SO THEY WOULD TURN ON TO FULL BRILLIANCE WHEN PROPER THRESHOLD VOLTAGES ARE REACHED

BATTERY VOLTAGE	D ₂ BRIGHTNESS	D ₂ VOLTAGE	D ₃ BRIGHTNESS	D ₃ VOLTAGE
12V	OUT	0.6V	DIM	1.7V
14V	DIM	1.7V	BRIGHT	2.1V
16V	BRIGHT	2.0V	BRIGHT	2.75V

FIGURE 2. MEASURED DIODE VOLTAGES AND RESPONSE

IN A RADIO WITH EXTERNAL CHARGING CONTACTS, THERE IS USUALLY A BLOCKING DIODE INCORPORATED TO PREVENT DISCHARGE OF THE BATTERY THROUGH THE CHARGING CONTACTS. IF THIS IS THE CASE, RATHER THAN REMOVE THE DIODE, I WOULD SHUNT IT WITH A RESISTOR OF A COUPLE OF HUNDRES OHMS TO LIMIT ACCIDENTAL SHORT CIRCUIT CURRENT TO A SAFE VALUE AND THEN CALIBRATE THE TESTER WITH THE MODIFIED RADIO, MEASURING VOLTAGE AT THE BATTERY TERMINALS RATHER THAN THE TESTER TERMINALS.

NO ATTEMPT WAS MADE TO MINIATURIZE THE TESTER; I MAINLY WANTED TO SEE IF IT WOULD WORK. IF I BUILD ANOTHER ONE, I WILL PROBABLY ADD A COUPLE MORE DIODES AS ADDITIONAL VOLTAGE INDICATORS TO MAKE THE DEVICE MORE UNIVERSAL. JOE, WA5TRS

ARRL MOBILE COMMUNICATIONS TECHNICAL SYMPOSIUM

ON MARCH 24, I WAS FORTUNATE ENOUGH TO DISCOVER AN ARRL FUNCTION SCHEDULED IN WASHINGTON, DC DURING THE IEEE VEHICULAR CONFERENCE. I WAS IN WASHINGTON ON OTHER MATTERS AND WAS KEEPING AN EYE OUT FOR SOMETHING TO MAKE THE TRIP WORTHWHILE. I FOUND OUT ABOUT IT ON A 28/88 REPEATER IN MARYLAND, WR3APB, MAINTAINED BY THE GREEN MOUNTAIN REPEATER ASSOCIATION.

INCIDENTALLY, COMMON PRACTICE IN THE AREA, WHEN CALLING CQ ON 2M FM, IS TO STATE "CQ, THIS IS W3XXX," RATHER THAN, " LISTENING ON 88," ETC.

AFTER SOME WORDS FROM PRESIDENT HARRY DANNALS, W2TUK, FROM LEAGUE HEADQUARTERS, THE PROGRAM, WITH THE THEME, "SELF TRAINING, INTERCOMMUNICATION AND TECHNICAL INVESTIGATION," BEGAN. COORDINATOR WAS PAUL RINALDO, K4YKB, PRESIDENT, AMATEUR RADIO RESEARCH AND DEVELOPMENT CORPORATION, AND MODERATOR WAS JERRY FREEMAN, W4CEM, ENGINEER IN CHARGE, NORFOLK, VIRGINIA FIELD OFFICE, FCC. PAPERS WERE PRESENTED BY FIVE INDIVIDUALS.

JOHN G. OEHLenschLAGER, WA4EMO/KØMOC, WOODBRIDGE WIRELESS, INC., "1250 MHZ BAND PLAN AND STANDARDS."

FRED MERRY, W2GN, RADIO AMATEUR SATELLITE CORPORATION (AMSAT), "VEHICULAR COMMUNICATIONS VIA ORBITING SATELLITES CARRYING AMATEUR RADIO (OSCAR)."

THOMAS F. MCMULLEN, JR., W1SL, ASSISTANT TECHNICAL EDITOR, AMERICAN RADIO RELAY LEAGUE (ARRL), "A SHOPPING LIST FOR REPEATER OPERATORS."

STUART G. MITCHELL, WAØDYJ, WOODBRIDGE WIRELESS, INC., "DIGITAL REPEATER CONTROL."

PAUL DUNCAN, WB4KRL/W9OFI, PRESIDENT, NORTHERN VIRGINIA FM ASSOCIATION, "RF ENVIRONMENTAL CONSIDERATIONS OF VHF/UHF REPEATER OPERATION."

THE MOST INTERESTING TO ME WAS THE ONE PRESENTED BY STU, WAØDYJ, "DIGITAL REPEATER CONTROL." THE SYSTEM HE DESCRIBED WAS SO SOPHISTICATED, HIS GROUP IS CONSIDERING REPLACING ALL THE LOGIC FUNCTIONS WITH A MINI COMPUTER AND CONTROLLING TWO REPEATERS WITH IT. PARTICIPANTS IN THE CONFERENCE ARE SUPPOSED TO RECEIVE COPIES OF THE PAPERS PRESENTED SO IF ANYONE IS INTERESTED, HE CAN CONTACT ME FOR A COPY WHEN I RECEIVE THEM.

JOHN WA4EMO, WHO WAS KIND ENOUGH TO GIVE ME A LIFT BACK TO MY MOTEL IN VIRGINIA, IMMEDIATELY GOT SOME HOLES PUNCHED IN HIS 1250 BAND PLAN BY USERS WHO HAD SPECIAL PREFERENCES. HE EXPLAINED THAT HE WANTED TO GET THE DIALOG UNDERWAY, AND EXPECTED SOME PROBLEMS GETTING AGREEMENT ON THE FIRST DRAFT.

FRED, W2GN, IS THE GUY OFTEN SEEN PICTURED WITH AN FT-101 MOUNTED ON A SHELF OVER THE TRANSMISSION OF HIS CAR, WORKING OSCAR SATELLITES. HE SHOWED PICTURES AND PLAYED TAPE RECORDINGS, MADE ON BOTH ENDS, OF SOME CONTACTS. MOST INTRIGUING WAS A RECORDING MADE ON THE WEST COAST WHILE HE WAS ZIPPING DOWN THE HIGHWAY IN NEW JERSEY.

TOM, W1SL, SHOWED SOME OF THE TESTS RUN ON EQUIPMENT AT LEAGUE HEADQUARTERS. HE RAN THROUGH QUITE A WISH LIST OF EQUIPMENT ITEMS AND DESIGN FEATURES HE WOULD LIKE TO SEE BECOME AVAILABLE.

PAUL, WB4KRL, RAN THROUGH A LIST OF PROBLEMS CAUSED BY CLOSE PROXIMITY TO SOURCES OF RADIATION, IN AND OUT OF BAND, AT REPEATER SITES.

A PANEL DISCUSSION ON INTRUDERS FOLLOWED WITH CONSIDERABLE COMMENT FROM THE FLOOR. KEN BASS, K4EVH, AN ATTORNEY; JERRY FREEMAN, W4CEM, FCC; JAMES GREENLEAF, K4ENY, FBI; TOM MCMULLEN, W1SL, ARRL HQ'S AND LUTHER SMAFFORD, WA3JSZ, GREEN MOUNTAIN REPEATER ASSOCIATION, WERE THE PANEL. MOST OF THE CONCERN WAS ABOUT INTRUDERS ON THE 2M FM SYSTEMS. MOST INTRUSION IS APPARENTLY NON-MALICIOUS, CAUSED EITHER BY DEFECTIVE, OR IMPROPERLY USED RECEIVING AND TRANSMITTING DEVICES, OR BY UNLICENSED OPERATORS WHO HAVE NO KNOWLEDGE THAT EQUIPMENT THEY ACQUIRED IS FOR 2M FM AND NEEDS LICENSE FOR OPERATION. IN THE LATTER CASE, SWIFT TRACKING BY PRACTICED TEAM OF TRANSMITTER HUNTERS, COORDINATING BY TELEPHONE, CATCHES THE INTRUDER BY SUCH SURPRISE THAT HE WANTS NO PART OF SUCH A GUARDED ENVIRONMENT. IN SOME CASES, THE INTRUDER HAS BEEN CONTACTED WITHIN TWENTY MINUTES OF GOING ON THE AIR.

ONE PROBLEM AIRED BY THE GROUP WAS A CONTROL OPERATOR SHUTTING OFF THE REPEATER BECAUSE OF, IN HIS OPINION, ILLEGAL OPERATION WHICH HE COULD NOT ALLOW TO CONTINUE. CONSENSUS WAS TO WORK THE PROBLEMS OF CONSCIENCE OUT WITH TRUSTEES AND CONTROL OPERATORS. ONE TONGUE-IN-CHEEK REMARK WAS THAT THE FCC WOULD HAVE TO FIND THE ILLEGAL OPERATOR AND PROVE HE WAS UNLICENSED, BEFORE IT WOULD ACCUSE OTHER OPERATORS OF COMMUNICATING WITH AN UNLICENSED STATION. ANOTHER OPINION EXPRESSED WAS THAT THE END JUSTIFIES THE MEANS SINCE THE AMATEUR OPERATORS ARE PERFORMING A FUNCTION WHICH IN THE OTHER SERVICES, IS LEFT TO THE FCC. IF, IN THE UNLIKELY CASE, THE FCC SHOULD CITE TRUSTEE, CONTROL OPERATOR AND ALL OTHERS FOR ILLEGAL OPERATION, IT ... WOULD BE NECESSARY TO EXPLAIN CIRCUMSTANCES. AND THAT'S ALL, UNLESS, OF COURSE, UNNECESSARY ROUGHNESS IS CALLED! JOE, WA5TRS

EDITOR'S NOTE: THE FOLLOWING IS PRINTED AS IT WAS RECEIVED. IT REALLY TICKLES ME WHEN SOMEONE MAKES MY JOB SO EASY. THANK YOU VERY MUCH STEVE!

SIX METERS...AND THAT'S THE WAY IT WAS

Since I was chosen "at random" by the VHF Club Editor to contribute an article to C&E, it seems appropriate (especially for me) to write the same way.

It has been a long time since I have prepared some copy for the paper and I seem to have lost the art of rambling along to fill up space. But, before I finish there will be those who will argue that point.

First, I want to express my appreciation to Joe, WA5TRS, for his untiring effort each month to have something for the rest of us to read. Having been a former editor and publisher of the VHF Club paper for about a year and a half, I know just how he feels except he has more originality and perserverance than I had. I just might nominate him for "Ham of The Year" if somebody would get the appropriate award, etc.

Now, for the old-timers---a bit of nostalgia. For the newcomers---I hope you will be interested in some past history of amateur radio and the challenges that keep amateurs interested.

I joined the local 6-meter gang in early 1957 simply because that was the only equipment I had to get on the air for license renewal requirements. There were quite a few on and most had surplus or home brew gear. The old SCR-522 was a popular rig since AM was the prevalent mode. A few months later the skip

began on 6 meters and this was the beginning of an endless challenge. Everybody wanted QSL cards and certificates were in demand. The Oklahoma Central Six Meter Net was formed in July, 1957 and a certificate was originated to give to any amateur working 6 of the members. These went out to hundreds all over the country and several foreign countries.

1957 and 1958 were known as International Geophysical Years and the F2 layer produced many long-haul contacts. As an example, I worked EI2W in Ireland on 6 meters both years. He was President of the Great Britain Radio Society and had a special IGY permit to operate on 6 meters, since they have a television channel 1 over there which takes in the 6 meter band. Others in this area also worked him too. We used to listen around 48 Mc for the TV station in London and when it reached 20 over 9 the band was open to Europe. I even worked a G3 in London. He couldn't transmit on 6 but I heard him calling "CQ 6 meters" on 10 meters. I answered on 6 meters and had a QSO, got a card too. Ed Tilton of QST thought this might be a record distance for 10/6 contact.

Hey Joe! If this is too long, wanta make it the First Installment?

The IGY period also provided a means to achieve WAS on 6 M. for many. I didn't make it, lacking Maine and Vermont. I did get WAC-6M after a friendly DX'er pointed out that Hawaii counted as Oceania. It is difficult to believe that you could work all continents on 6M, but some did and will never forget it. Some of the locals worked Germany, Spain and Italy during the time. Many worked ZS3G in Southwest Africa. One opening was outstanding when the Japs came in one night for an hour and a half. Sounded like 75M on a Saturday night. I worked four and got one QSL.

The 6 Meter Club went all out on an outstanding DX award. Instead of the piece of paper, a gold velvet banner with fringes was made and went out all over the world. We used to have a list of recipients circulated to all who earned it. We were well known for this award and it provided a conversation point.

One challenge to the 6M operator is attempting to predict when and where the band will open during skip conditions. The propagation reports from WWV do not provide adequate information, however the weather maps contribute data for short-term predictions of E-layer activity. Aurora and Meteor showers can provide marginal openings and the beams are usually pointed North for aurora.

Oh yes, the 6M Nite Owl Net used to be on every night at 10:30 with alternating NCS. New Years Eve was a big event for this net with 25 to 30 checking in, a breakfast followed. Then there was the 6M "SMYLE" Net that the YL's got going, with their own certificate for awards.

Yes, the 6M band has offered the most challenges and has been the most interesting, at least to me and I have worked all bands 80 thru 2, including 11M before CB got it. Someday I hope to confirm Maine and Vermont for WAS-6M, except I'll have to work Alaska and Hawaii all over again since they have become States.

Incidentally, the 6M Net still meets on 50.25 every Monday nite at 2030 local time with yours truly as NCS. AM only please.

W5VCJ

FOR SALE: HEATHKIT WARRIOR AMPLIFIER. CONTAINS FOUR 572B'S. WORMY AS THE DICKENS. TAKE IT AWAY FOR \$40.00. RAY, WB5BTT, 732-6498

FOR SALE: TWO KLM 12 ELEMENT BEAMS, POWER DIVIDERS, BALUNS AND HARNESSSES, \$130.00. TWO METER CLASS C AMPLIFIER CAPABLE OF ONE KW INPUT. TWO WATTS WILL DRIVE. CALL FOR PRICE. DENNIS, WB5ISN, 341-4200

CORA MEETING HIGHLIGHTS*

23 April 1976 Meeting

1. Introductions included WN5RWW, her spouse, and son.
2. Joe Harding WA5ZNF announced receipt of 2nd Class Mailing approval. This not only reduces mailing cost to about 15% of previous payments; but it was retroactive, resulting in a nice refund to the Collector & Emitter account.
3. Jim Williams, K5VRL reported successful operation of 5 mobile crews who picked up collections for the Oklahoma Cancer Drive 8 April.
4. A new all-CORA-clubs roster is planned. Attempt will be made to send it out with the June Collector & Emitter.
5. The Edmond Amateur Radio Club will join CORA - making us a 6-club association.
6. Ed Dulos, W5OEC has been selected by MORI to be the new Prize Committee chairman.
7. New Ham Holiday letterhead and hamfest pre-registration blanks have been prepared.
8. A by-laws committee recommendation to increase official delegates to three per club received approval. It is expected the additional delegates will be seated at the 28 May meeting.

* These are not official minutes. Regular minutes will be read and amended as necessary at the next CORA meeting. If you want to know what goes on at a CORA meeting, attend for first hand information. All CORA club members are invited.

W5KE, CORA Secretary

EXTRACT OF BY-LAWS APPROVED AT LAST MEETING

- A. Two types of membership in CORA.
 1. Each club to be a SUPPORTING member.
 2. Every member of each club shall be an ASSOCIATE member of CORA by virtue of his membership in that club.
- B. A Board of Directors is established, composed of:
 1. Three appointed or elected, director representatives from each club.
(At present - $6 \times 3 = 18$)
 2. The immediate past president of CORA shall serve as an ex officio member of the board.
 3. The term of each director shall be one year.
- C. At the September CORA meeting, the newly elected director members shall meet and elect a President, Vice President, Secretary and Treasurer from within their numbers Only.
(i.e. There will be 4 officers and 8 Directors.)
- D. All financial matters of CORA to be resolved by 2/3 of Directors and Officers present. All other matters could be resolved by a simple majority of those present.

ALL SIX CLUBS NEED TO HAVE THEIR REPRESENTATIVES APPOINTED OR ELECTED AND BRIEFED ON THE CLUBS DESIRES IN TIME FOR THE NEXT CORE MEETING ON 28 MAY AT THE RED CROSS BUILDING, 10th & Hudson, 7:30 SHARP!



THE PRESIDENT'S CORNER

This has turned out to be a busy month with many activities. First, we enjoyed a good attendance at the Aeronautical Center Club meeting, and we wish to express our appreciation to Gil, W5RB for the fine program presented concerning the operation of CW nets. It certainly sounds like fun if you know what you are doing and an excellent way to move traffic.

There was also a look at the Wheatstraw VHF trophy which is being passed among the local clubs. I was informed that Wheatstraw was not located in Enid (sorry about that, Charlie.) I always thought that anything to do with wheat came from Enid. We will be looking forward to competing to keep the trophy again this year. Then there was the (weak) coffee and donuts. It must have been the pot, because I always make good coffee! Will have to see that the pump is well seated on the pot next time.

The weather was good Saturday evening for the weiner roast at Lake Thunderbird. So many weiners were roasted to go with the chili, potato salad and other goodies, that some of us left Saturday night with full stomachs to return to our homes. Others with travel trailers remained at the Lake, however, Sunday turned out rather damp and cold. Certainly a good time was enjoyed by all.

Sunday afternoon was a good time to stay inside. I completed the 2-meter 5/8 wave vertical antenna in the March issue of the Ham Radio magazine. Installed it the first of the week at a height of about 20 feet, and it seems to perform very well. So, if time permits, we will be able to use the 2-meter rig again.

Then there was the Lawton Hamfest. Mel, K5VWQ, lost his original passenger, so he drove by Saturday morning and offered Daisy and me a ride. We enjoyed being sight-seers on the way to Lawton, rather than having to drive as well as a stop on the way for breakfast. Then on to the Hamfest for registration and programs, and an opportunity to visit the dealers and deals offered. Many deals were made, some good and some not so good - such as 75-meter resonator which I came home with and installed on the pick-up. On a trip to Lake Eugaula this past weekend, I found the SWR was the same in reverse as in the forward position. So I went back to the 40-meter, mobile operation. I will put the grid dipper on the 75 resonator and see what it looks like. Perhaps someone can tell me what to look for in a bad resonator.

We enjoyed several good meals at Lawton - having a free quarter-pounder for lunch and barbecue for dinner. At the Sunday Buffet, many prizes were given away. Nearly everyone received a prize except me, but Daisy gave two of hers. One, an engraved desk plate and a set of clip leads.

Again, anyone interested in amateur radio is welcome to the Club meetings. So, come out and bring a friend. We will have a program and better coffee and donuts. We will be looking forward to seeing you at the next meeting.

73
Al WB5KCU

NATIONAL ARRL CONVENTION

Denver must be caught tight in the woes of inflation....or its amateurs are devoted to the Get Rich Quick way of life! Get these prices quoted in addition to the \$4.00 registration fee: QCWA breakfast \$7.00, Saturday Evening Banquet \$18.00 (served off gold plates, no doubt!), Sunday breakfast \$7.00, Sunday luncheon \$9.00.

This writer quickly decided he'd miss the National Convention! \$34.00 for food a diabetic can't eat is just a wee bit too much!

W5JJ



Minutes of the ACARC Meeting of April 2, 1976

The meeting was called to order at 2007 by President Prince. There were 34 members and guests present. Self introductions were asked for and these comments were made:

Ivan, W5HFU, is starting to build a new receiver antenna. Lloyd, WB5HUP, had his electronic watch stolen, and the repeater is still working. Joe, WA5TRS, lost his "show and tell" miniature voltmeter. Gene, W5GC, is back in amateur radio on 2M after a long absence.

Dix, W7FRO, was a visitor from Oregon. He is attending a course at the Postal Institute.

Lee, W5MCN, just returned from South Texas. He said the skip on 2M from Florida to the Corpus Christi repeater was almost too good. Bob, WB6NOZ, is taking a course at the Academy. He was surprised at the range of some of the repeaters along the way from California.

Father John, K5HMI, needs to fix his tri-band beam. It spins on the mast. Ellard, W5KE, just returned from California. He worked Bob, WB6NOZ, while there on 2M. Bill, W5UGZ, has one college degree, but is going again to get another.

Darrel, WN5RUN, has his Novice ticket and is continuing in the class taught by Don, WB5NIY. Don, WB5NIY, has a camper now.

Bob, W5HXL, reported 16 were at the weiner roast at Lake Thunderbird. Joe, WA5ZNF, is getting use to his new store teeth. Al, WB5KCU, is back on swing shift now.

A motion was made and passed, that the club explore the possibility of acquiring a frequency counter for member use.

The program was given by Gil, W5RB. Gil did a good job of explaining the CW operation of the National Traffic Net.

The meeting was adjourned for refreshments at 2150.

Bill Oliver K5KDR
Secretary/Treasurer

The following is a list of people who have completed their code for either Novice or Technician. Some have their tickets and others are still waiting for the mailman:

Ron W. Bailey, Jim Kerr, Darryl Welch (WN5RUN), Roger Lower, Larry Lower, Joel Meyers, Monte Bateman (WN5RZX), Ton Larason, and Kenneth Store.

This course was taught by Jim Russell, K5HXX, George Lower, W5TOQ, and Don Templeman, WB5NIY.

Don WB5NIY

FOR SALE

Galaxy 300 SSB HF transceiver, 20, 40 and 80 meters. Also AC power supply with 24-hour clock. Belongs to W5TKC and has been in storage for five years. See at (and buy from) W5JJ, 5824 N. W. 58 St., Warr Acres, OK 73122. Phone (405) 789-3788.

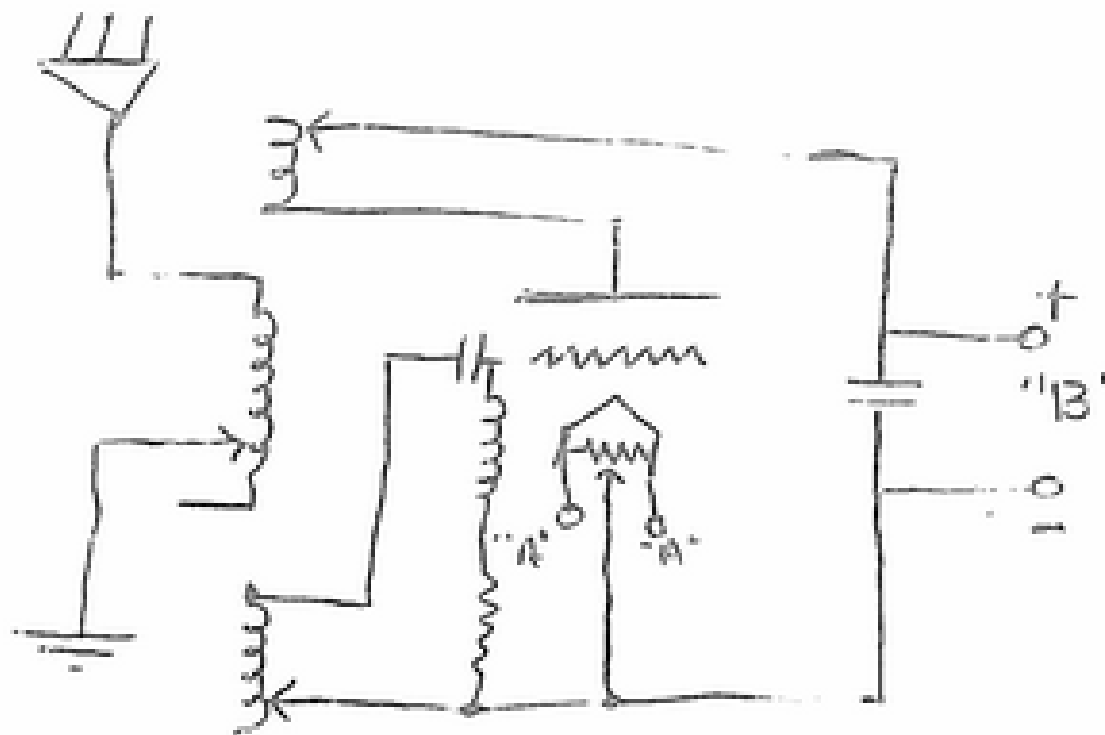
DEATH OF A PIONEER

Meissner is dead. There was just a brief notice of his passing, at the age of 85, in the local newspaper. I let the paper get tossed out without salvaging a clipping, and now I don't recall his given name. I do recall, though, the part he played in amateur radio, although he also was famed for his contributions to commercial radio and to music.

Those of us who were active in the 1930s will remember the famous Signal Shifter and the kit-form all-wave receiver he marketed. If your memory encompasses the 1920s, you may recall also the Three-Coil Meissner and the Four-Coil Meissner circuits.

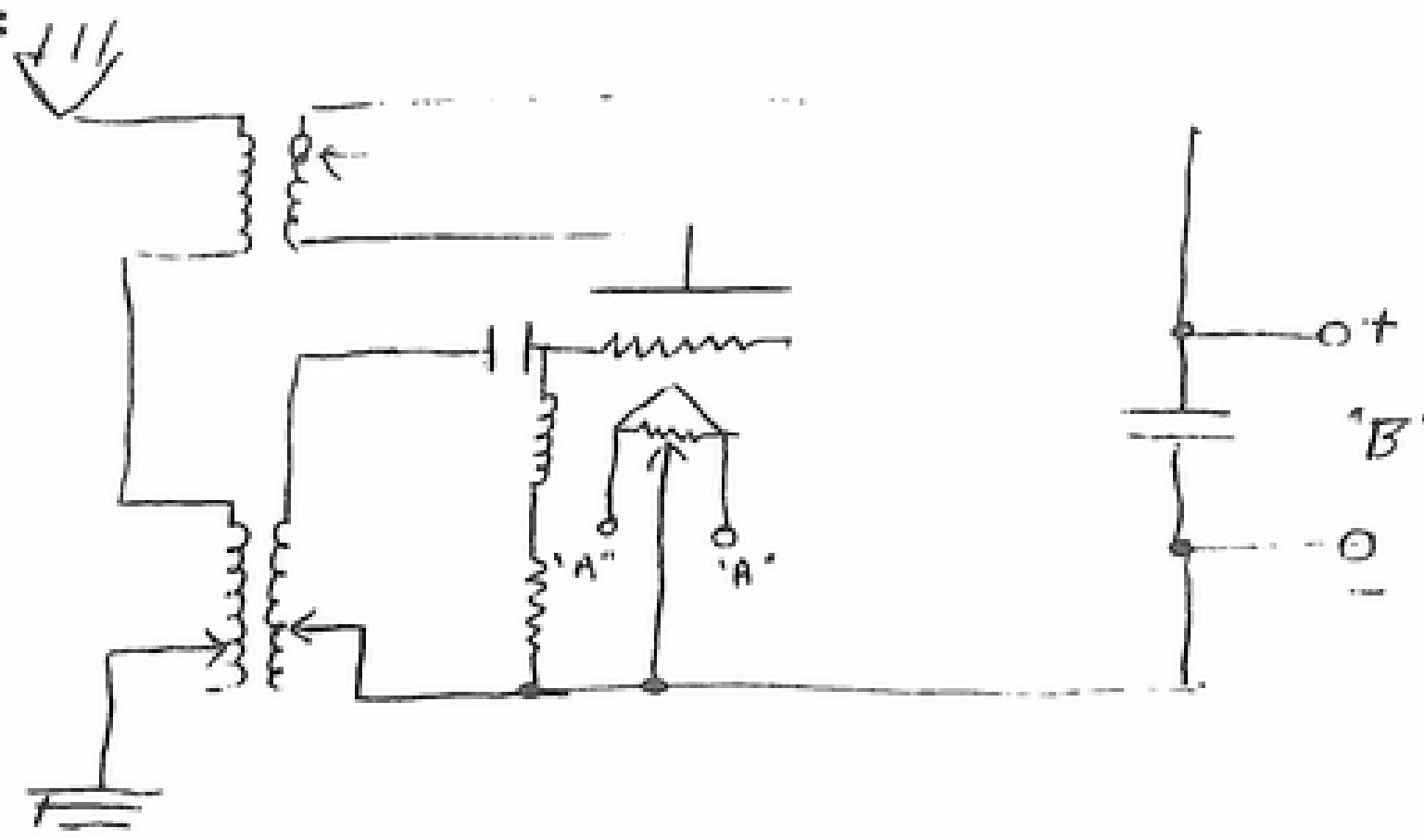
In those days, much faith was put in circuits. It was only until years later that we awoke to the fact there was little to choose among Hartley, Colpitts, Armstrong, "LDH Reversed Feedback", or any of the other touted and famed circuits. Given equal components assembled with equal care and tuned properly, all produced just about the same results.

But it was not ever thus! Along about 1921 or 1922 the Three-Coil Meissner really made a splash. It looked like this:



Note that the only capacitance in the tuning circuit was that of the antenna (to ground) across the antenna coil. As you might suspect, the frequency stability was nil when the antenna swung in the wind! You tuned it up by guess and by gosh....mostly by increasing the coupling from plate to antenna until the tube got dangerously red and by messing with the coupling between the grid and antenna coils so that the note didn't sound too gosh-awful.

Things never stay static, though. The next step was the Four-Coil Meissner, considered just about the bee's knees (in the language of the day!). It looked like this:



It was suppose to isolate all coupling between grid and plate except through the antenna circuit. Just why this had some particular merit, I never discovered, yet it was the circuit that the "experts", those superior beings who possessed "Z" calls, favored.

Just as an aside, those who think "Incentive Licensing" is something new are callow youngsters who have not done their history homework. From the very first years of licensing, a few well qualified individuals were issued special calls, ones with a Z behind the numeral, calls that allowed operating on preferred frequencies, usually on 220 meters (or higher) instead of the common 200 meters, Universities and other institutions of learning also had special calls; these had a Y behind the numeral. And, of course, the Experimental stations had X calls; these were not too hard to come by and many amateurs qualified for an X call.

W5JJ



TECHNICAL REVIEWS

W 5 J J



73, May, has an excellent section on antennas, factual as well as a bit off the beaten track. Then read about extraterrestrial communication possibilities. And don't miss Wayne's father's account of early flying!

AMATEUR RADIO, Jan, describes several modifications to the FT-101B. It shows also a multi-band L-match network for use with an end-fed wire 20 meters long.

CQ, Mar, has a satire about the language "hams" (a lower class of radio amateurs) use. W2GQK describes an outboard rcvr preamp for Heath HF xcvrs. ON4UN tells how to improve the Drake Twins, V01KE has a simple converter for receiving LF and MF on HF rcvrs. WB5LAO shows modifications for the HW-101.

HAM RADIO, Apr, is just about solid with good articles! Outstanding are Corner-Fed Loop Antennas; Amateur Radio's Golden Years; and Universal L, C, R Bridge. Devoted homebuilders will find Solid-State Communications Receivers and 80-Meter SSB Transceivers challenging.

IEEE VEHICULAR TECHNOLOGY, Feb, courtesy of W5KE, has the word on suppression of ignition noise.

IEEE SPECTRUM, Mar, has excellent information on voltaic cells, both primary and secondary, both old and new, both inexpensive and dear.

QST, Apr, has another in its good editorial series, notable for its avoidance of the use of the denigrating term "ham" for amateur radio. Technical articles of note are on a superior 80-m steerable antenna and on applications for Zener diodes. The April Fool article looks almost plausible!

ELEMENTARY ELECTRONICS, May-Jun, is rather sad. Other than its section on antique radio and its Basic Electronics course, there's little worth reading!

RADIO COMMUNICATION, Mar, in addition to the famous Technical Topics, has articles on a frequency counter and a 1.8 MHz direction finder. Also, ads on two HF transceivers that should be on the American market! One is the NEC CQ-110, the other the Uniden 2020. Either appears to be far ahead of anything offered here. Why? Is the British marketing a "trial run"? Maybe we'll be permitted to buy them in 1980.

POPULAR ELECTRONICS, May, describes a logic probe and a simple 5-V power supply. The Amateur Section is devoted to emergency communication.

RADIO-ELECTRONICS, May, has some useful info on graphs. Read it before you shrug it off as old stuff!

OKLAHOMA

HAM HOLIDAY

and

STATE ARRL CONVENTION

AUGUST 7 & 8, 1976

IN THE "TROPICAL MALL" AT THE
BEAUTIFUL SOUTHGATE INN -
I-35 SOUTH IN OKLAHOMA CITY

FUN FOR EVERYONE

BRING THE ENTIRE FAMILY FOR
A MINI VACATION

REGISTRATION FEE:

\$3.00 IN ADVANCE

\$4.00 AT THE DOOR

LOTS OF GOODIES

MEN'S GRAND PRIZE

LADIES' GRAND PRIZE

ADVANCE REGISTRATION PRIZE

(You need not be present to win,
but your ticket must be.)

Following each program, atten-
dance prizes will be awarded.
YOU MUST BE PRESENT TO WIN.

The MAJOR PRIZE AWARDS will
be SUNDAY at 1:00 p.m.

Supplement to CORA Collector & Emitter
May 1976

1011 4th Avenue North

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The CORA Collector & Emitter can not REALLY succeed unless ALL MEMBERS contribute news. If you wish to continue receiving a meaningful publication, then please help by taking a few minutes to send some "NEWS" and/or items of interest.

Do you have a new rig? Tell us all about your experience with it!
New antenna, wife, dog, etc.
List some "JUNQUE" which you would like to swap or sell:

fold

List some items you would like to obtain:

Announcements, meetings, nets, novice classes, articles you have run across and any item you think might interest other members.

What projects are you building?

Fill the reverse side also!

fold

Name _____ Call _____

Street _____

City _____ ZIP _____

Place
Stamp
Here

TO: CORA Collector & Emitter
P O Box 15013
Okla City OK 73115

staple or tape

REMOVE - Complete & Mail



TEAR ON THE DOTTED LINE, OR SEND THE WHOLE PAGE, TODAY

PRE-REGISTRATION FOR OKLAHOMA HAM HOLIDAY & STATE ARRL CONVENTION
SOUTHGATE INN - OKLAHOMA CITY - 7 & 8 AUGUST 1976

NAME _____ Call _____ Lady _____

Street _____ City _____ State _____ Zip _____

Mail check (\$3.00 per person registered) to HAM HOLIDAY, Box 20567, Oklahoma City OK 73120.
Letter must be postmarked NO LATER THAN 2 August to be eligible for the pre-registration award for which you are eligible whether you are in attendance or not. Register as many people as you wish. Just list and enclose \$3 for each.

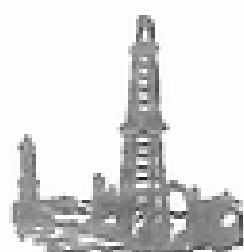
FREE Fleamarket tables will be reserved by number. Non-Commercial only. RESERVE ME A FLEAMARKET TABLE. ☐

We will stay at Southgate Inn. Reserve (Single) (Double) for me. Dates _____ ☐

We expect to utilize the BUFFET Saturday evening. _____ ☐

We WILL make the BUFFET Sunday before the awards. _____ ☐

YOUR TICKETS WILL BE HELD AT THE RESERVATION DESK UNLESS YOU SEND s.a.s.e.!



MID-OKLAHOMA REPEATER INC.

MORI BUSINESS AND ANNOUNCEMENTS

TOUR TINKER 3D COMBAT COMMUNICATIONS GROUP (3rd MOB).
SCHEDULED May 6, 1976.

Armed Forces Communications Electronics Association (AFCEA) Tinker Oklahoma City chapter has invited the MORI & Autopatch members to join in the May meeting. Start at Tinker Officers Club with 6:30 P.M. Social Hour - 7:30 dinner and 8:30 program. Cost of the buffet style dinner is \$4.25 each. Those desiring to make only the program may meet at the officers club parking lot prior to 8:30 or may go to "3D MOB" parking lot. Enter Tinker by Gate 1 (Airdepot) if you have Tinker sticker or go to Gate 2 (Industrial Gate) for entrance pass. Pre-registration is necessary to arrange meal and for gate pass. ARRANGEMENTS MUST BE MADE BY 12:00 NOON WEDNESDAY, MAY 5th by calling Leona Chicoraske, 781-3606; Barbara House, 737-1481 x 262; Chuck Collins, 781-4280; or Chet Hazelwood, 732-7321 x 3211.

This should be a very interesting visit of one of the Air Forces largest and most versatile mobile communications organizations. See the latest in military communications and navigational aids.

EMERGENCY PUBLIC SERVICE PHONE PATCH is now available on 07/67 which is WR5ADF. With this facility, you will be able to call the Oklahoma City Police, the Oklahoma City Fire Department and the Emergency Operating Center (EOC) 24 hours a day. The traffic signal repair may be called between 8 AM and 4:30 PM Monday through Friday. For traffic signal problems at other times, call the EOC.

The numbers are:

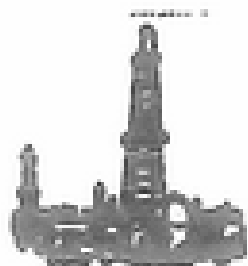
Oklahoma City Police	- - - -	231-2121
Oklahoma City Fire	- - - -	235-1313
EOC	- - - -	231-2255
Traffic signal repair	- - -	231-2649

This is not intended to be an open autopatch. Because of this, you will be restricted to the "231" and "235" exchanges. Also you are responsible for logging a public service call that you make since it is third-party traffic. We urge you also to report such calls to the editor of C&E or the MORI editor for possible publication and use in public service records.

PROCEDURE.

1. Get the exact location of the trouble and nearest intersect street.
2. Give your call and push the # and the 6. Listen for the dial tone.
3. Dial 2 and listen. If you hear the dial tone, try the 2 again. The first number the system will accept is the 2. If the dial tone stops, dial the remainder of the number.
4. Deliver message. Time is 30 seconds which is reset each time you key the repeater. If party talks longer than 30 seconds, just key it up again.
5. After your message is delivered and before you disconnect, give the date and approximate time. Give your call and say "clear of WR5ADF".
6. Then disconnect by pushing #.

-- -- Ken, K5VVZ



MID-OKLAHOMA REPEATER INC.

MORI BUSINESS AND ANNOUNCEMENTS (cont.)

EVENTS coming up for which MORI shares some responsibility:

FIELD DAY June 26 & 27

HAM HOLIDAY August 7 & 8

Get in on the fun and satisfaction of participating. Call an officer and say you will help.

=====

The very special program for April was a slide presentation of solid state VFO's by Doug DeMaw, W1CER. He is the technical editor of QST. The turn-out was good, but I believe it could have been larger for such a program.

The presentation was a practical one. Most or all of it will be in QST soon. Mr. DeMaw mentioned two new books that ARRL will publish soon. One is a data book. The other is a comprehensive book on solid state. Incidentally, while you are building shelves for the new-sized QST, make some room for ARRL books. Mr. DeMaw said all their books will eventually be printed in the new large size also.

Testing of commercial gear in the ARRL laboratory is contributing greatly toward assuring a high level of quality, he indicated.

ARRL has set up an entirely new department to handle the project of increasing the amateur population. Included in the training portion are some training aids for instructors.

And a final note - because of the CB onslaught, restructuring is 2 or 3 years away.

INTERESTING CATALOGS

Sometimes, in the piles of junk mail, I find an item that is worthwhile. Catalogs from the following companies contain things that are reportedly of high quality or are not readily available. These and other attributes might interest you also:

ELECTRONIC COMPONENTS & EQUIPMENT

Circuit Specialists Co. P. O. Box 3047 Scottsdale, Az. 85257	- Leading brands, no junk baggies, no minimum order, 40¢ minimum handling.
--	--

SECURITY ALARMS

Mountain West Alarm Supply Co.
4215 North 16th Street
Phoenix, Az. 85016

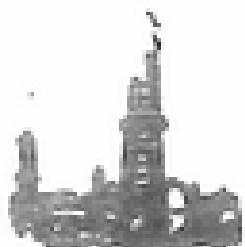
TOOLS

Jensen Tools and Alloys 4117 North 44th Street Phoenix, Az. 85018	- Hand tools, precision tools, tool kits for field technicians, small; power tools
---	--

Brookstone Company 122 Vose Farm Road Peterborough, NH 03458	- "Hard-to-find tools and other fine things"
--	---

Other suppliers of unusual interest to radio amateurs will be listed as I find out about them. = = = WA5RAQ.

When we were young, we resolved not to get married until we met the ideal woman. Years later, we met her, but she was looking for the ideal man. . . . Cheer, April 1976.



MID-OKLAHOMA REPEATOR INC.
MINUTES FOR THE APRIL 1976 MEETING

We did not have a regular type of meeting for the month of April. We had Doug DeMaw, W1CER as our guest speaker. He is from ARRL headquarters. His talk was on solid state VFO's and associated type of circuits. I think everyone that was at the meeting enjoyed his talk immensely.

We had 40 members and guests at this time. This included the SEC and West Gulf Div. Area rep.

The meeting next month will be the tour through the West Comm Center out at Tinker Field on the 6th of May.

Other announcements for upcoming dates: The 7th and 8th of August will be HAM HOLIDAY down at Southgate Inn again this year, so spread the word on all bands.

Storm season is also coming up so get your gear ready.

Word is that our new Rcvr will be shipped early in May so be looking for our new rcvr to be on the air we hope by late May or early June.

Only other news for new is that when we can get people and the weather together they can get the .07 antennas moved up so for now, 73's. - - - John W. Huckaby, Sec.....

HOME SECURITY, though perhaps not as dramatic a subject for A amateurs as mobile rig ripoffs, is none-the-less a major problem area. Home burglaries, like other crimes, are increasing at a rapid rate so a tip-filled pamphlet -- "Home Security Starts at Your Door" -- should be of interest to Amateurs as well as others. It's free from Consumer Information Center, Boulder, CO 81000. - hr REPORT.



APRIL CLUB MEETING NEWS: .

FRANK, WB5JBL REPORTED ON THE PROGRESS OF THE NEW EQUIPMENT THAT HAS BEEN PURCHASED FOR THE REPEATERS. A NEW WEATHER PROOF CABINET HAS BEEN ORDERED TO HOUSE THE EQUIPMENT ON THE CHANNEL NINE TOWER. A NEW GENERAL ELECTRIC TRANSMITTER IS ON THE WAY TO REPLACE THE CURRENT MOTOROLA EQUIPMENT. TWO GENERAL ELECTRIC RECEIVERS HAVE ALSO BEEN PURCHASED FOR USE ON BOTH THE 22-82 AND THE 81-21 MACHINES.

THE CLUB IS PURCHASING INSURANCE FOR THE REPEATER EQUIPMENT AND WILL GO IN WITH THE EDMOND REPEATER GROUP AND COMBINE THE COVERAGE FOR BOTH GROUPS. THIS WILL GIVE BOTH CLUBS A BREAK ON THE COST.

ON MAY 6 AT 6:30 A GET TOGETHER OF ALL CORA MEMBERS WILL BE GOING ON AT TINKER FIELD. FIRST WILL BE A BULL SESSION AND THEN A TOUR OF THE 3RD MOB WILL BE GIVEN.

REPORT ON CORA WAS GIVEN BY GARY WA5ETV, AND A NEEDED CRY FOR HELPERS WAS GIVEN. IF ANY ONE CAN GIVE GARY A HAND PLEASE GIVE HIM A CALL.

THE CLUB HAD 155 PAID UP MEMBERS AS OF CLUB MEETING NIGHT. THIS LEAVES ONE OPEN SLOT. WITH 155 MEMBERS ONLY 28 SHOWED UP FOR CLUB MEETING, WHERE WERE YOU?

BOB, K5PJU HAS ASKED FOR INTERESTED PERSONS TO HELP WITH THE REPAIR OF THE REPEATER EQUIPMENT. BOB WILL BE STEPPING DOWN AS TECH DIRECTOR AND THE CLUB WILL NEED SOMEONE THAT IS WILLING AND QUALIFIED TO FILL THIS POSITION. ANY ONE INTERESTED CONTACT BOB.

K5CE, THE CLUB TRUSTEE BROUGHT OUT A COMMON ERROR THAT HAS BEEN GOING ON THE REPEATER. WHEN SIGNING OFF FROM THE AUTO PATCH A NUMBER OF STATIONS HAVE BEEN SAYING "W5XYZ CLEAR WR5ACB REPEATER" SINCE THE R IN WR5 STANDS FOR REPEATER ONLY CLEAR OF WR5ACB IS NEEDED.

FOR SALE

COLLINS KWS-1, COLLINS 75-S2, ROBOT SSTV
GUY LIEBMANN W4TKS 787-9547

MIDLAND 13-500, 1-15 WATT TWO METER RIG, 22/82, 16/76
34/94.94/94.52/52.28/88, 07/67 CRYSTALS WITH IT.
HENRY BALL WB5NHZ 321-5852 OR 521-2547

HELP WANTED

NEED SOME HELP WITH REPAIR OF TEXTRONIX 532 SCOPE, NEED TO USE MANUAL, LOST HIGH VOLTAGE TO CRT.
DON MOORE WA5FFK 787-5189



AUDIO RECTIFICATION

AUDIO RECTIFICATION INTERFERENCE IS SUCH A SERIOUS MATTER THAT IT IS BEING LOOKED INTO BY CONGRESS. SENATOR BARRY GOLDWATER INTRODUCED RFI LEGISLATION INTO THE U.S. SENATE LATE IN FEBRUARY. THE BILL, THE BILL IS VIRTUALLY IDENTICAL TO THE "RFI BILL" INTRODUCED INTO THE HOUSE OF REPRESENTATIVES LAST MAY BY CONGRESSMAN CHARLES A. VANIK. BUT WHAT IS ARI?

HAMS ALL OVER THE COUNTRY ARE GETTING COMPLAINTS FROM IRATE NEIGHBORS THAT THEIR VOICES WHEN TRANSMITTING, CAN BE HEARD THROUGH HI-FI SYSTEMS, TV SETS AND RADIOS. THE FCC HAS RECEIVED THOUSANDS OF COMPLAINTS ABOUT THIS KIND OF INTERFERENCE.

WHEN YOUR HAM SIGNAL INTERFERES ONLY WITH THE PICTURE ON A TV SET TVI, BUT IF IT COMES THROUGH THE AUDIO IT IS ARI. WHEN YOUR VOICE IS HEARD THROUGH A TV SET IT IS AN ENTIRELY DIFFERENT PROBLEM THAN TVI. THE SOUND CHANNEL OF A TV SET IS DESIGNED TO REPRODUCE FM SIGNALS AND SHOULD NOT BE ABLE TO REPRODUCE AN AMOR SSB SIGNAL. NOR SHOULD AN FM BROADCAST BAND RECEIVER WHICH IS NOT RESPONSIVE TO AM OR SSB.

REPRODUCTION OF YOUR VOICE BY OTHER RADIOS IS CAUSED BY RECTIFICATION OF THE RADIO SIGNAL. THE RECOVERED AUDIO SIGNAL IS THEN AMPLIFIED BY THE AUDIO AMPLIFIER OF THE RADIO, TV SET OR HI FI SYSTEM AND FED TO THE LOUDSPEAKERS.

YOUR HAM SIGNAL CAN CAUSE SUCH INTERFERENCE WHEN IT IS PICKED UP DIRECTLY BY THE AMPLIFIER WIRING, OR BY THE RECORD PLAYER, TAPE DECK OR THE SPEAKER CABLES WHICH FEED THE LOUDSPEAKERS.

YOUR HAM SIGNAL CAN CAUSE SUCH INTERFERENCE WHEN IT IS PICKED UP DIRECTLY BY THE POWER LINE SERVICING THE PIECE OF EQUIPMENT. THIS KIND OF RADIO FREQUENCY INTERFERENCE IS CLEARLY NOT THE FAULT OF A HAMS RIG OR HIS EQUIPMENT.

OLDER RADIOS, TV SETS AND HI FI SYSTEMS USING TUBES SELDOM SUFFER FROM THIS KIND OF INTERFERENCE. BUT, THOSE IN WHICH TRANSISTORS ARE USED ARE MORE SUSCEPTIBLE TO RFI. IMMUNITY TO THIS INTERFERENCE CAN USUALLY BE ACCOMPLISHED BY ADDING FILTERS TO EXISTING EQUIPMENT. BECAUSE THERE ARE SO MANY MILLIONS OF THEM, IT WOULD BE QUITE A TASK TO MAKE THEM ALL IMMUNE TO OUR RADIO SIGNALS.

TO PREVENT THIS PROBLEM FROM GROWING WORSE AS MORE INTERFERENCE PRONE EQUIPMENT IS MANUFACTURED AND SOLD, THE EIA AND ARRL HAVE TAKEN ACTION. THE FCC WOULD ALSO LIKE TO TAKE ACTION, BUT THE FCC IS POWERLESS TO ACT UNTIL IT GETS AUTHORITY TO REGULATE RECEIVERS AND AMPLIFIERS. ALTHOUGH THE FCC ALREADY HAS AUTHORITY TO REGULATE TV AND RADIO RECEIVERS IN REGARD TO THEIR INTERFERENCE CAUSING CAPABILITIES (UNWANTED RADIATION OF SIGNALS THAT CAN INTERFERE WITH COMMUNICATIONS AND NAVIGATION SYSTEMS) AND ALSO TO PRESCRIBE MINIMUM STANDARDS FOR MARINE RADIO RECEIVERS, IT NEEDS ADDITIONAL ENABLING LEGISLATION.

"RFI BILLS" WOULD ENABLE THE FCC TO ACT. THE HOUSE BILL CALLS FOR AMENDING SECTION 302 OF THE COMMUNICATIONS ACT OF 1934 TO AUTHORIZE THE FCC TO PRESCRIBE REGULATIONS WITH RESPECT TO CERTAIN ELECTRONIC EQUIPMENT THAT IS SUSCEPTIBLE TO RADIO FREQUENCY ENERGY INTERFERENCE. (CONT. NEXT PAGE)

ARC NEWS

CLUB STATION W5TC

THE ANSWER IS:

So the Engineers will have plenty of places to park their bicycles!

TIDBITS FROM THE APRIL 13th MEETING...

Microcomputers were the topic of the first scheduled meeting of the month with approximately 23 in attendance. Mr. Pittipaldi of the OU Engineering Dept. gave a slide presentation and explained how a typical microcomputer might be set up and used, including some of the applications one might have. The gang was then shown Mr. Pittipaldi's personal microcomputer which uses a Motorola MC6800 chip (the microprocessor). He had it programmed to make four different tests on each of the NAND gates in the 7400 IC to determine which of the gates were OK.

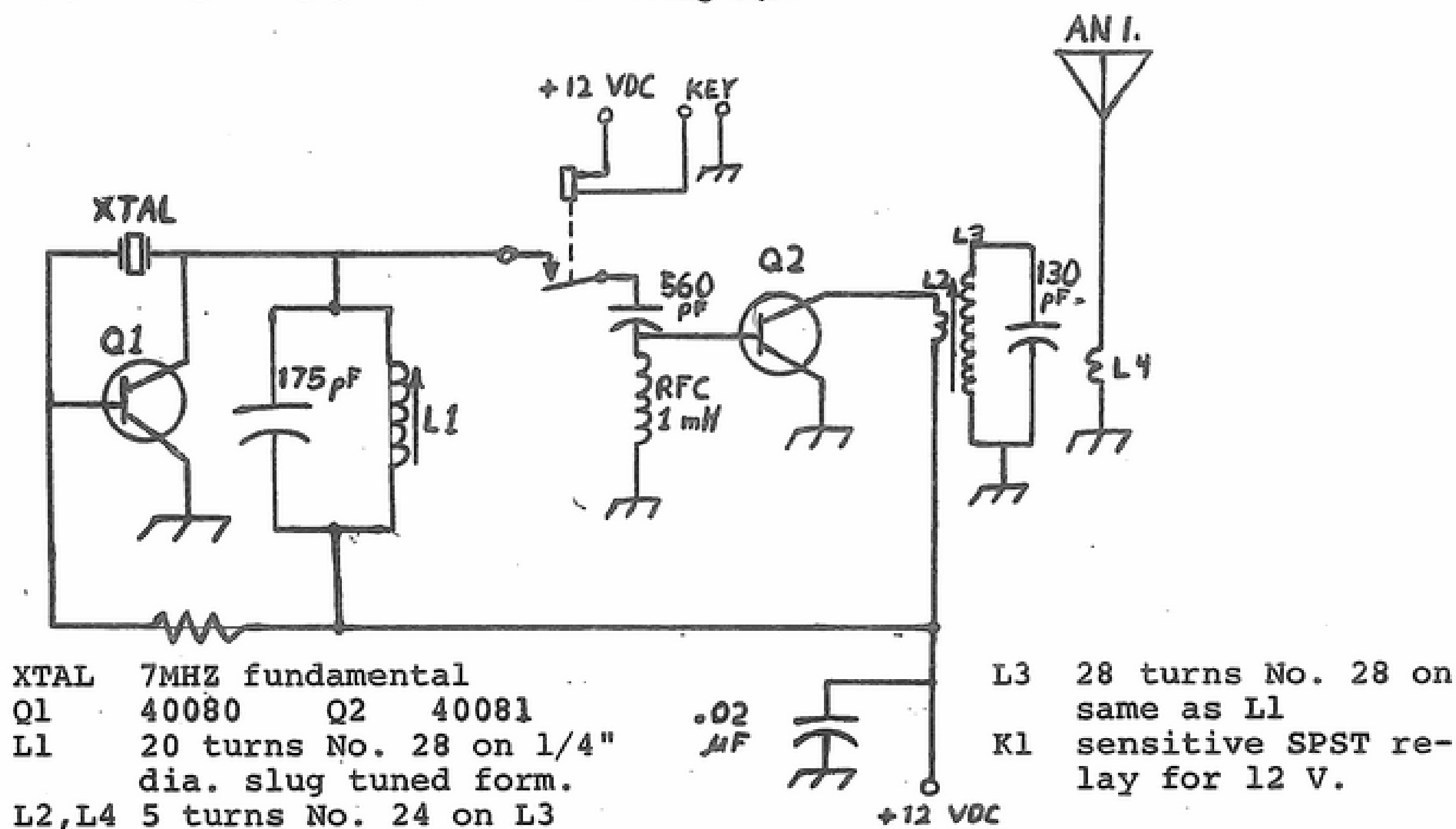
OU ARC will not meet during the summer months (May, June, July, and most of August) so there will be no scheduled activities as a club. However, individual club members are very much urged to attend the Field Day activities and the Ham Holiday both sponsored by CORA. Field Day is the last weekend in June and Ham Holiday is slated for the first weekend in August. Further information on these two activities will be included in next months Collector & Emitter.

QRP?

Below is a schematic for a low power transmitter (CW of course). When you find that you have a few spare moments (literally!), why don't you try building this "patience builder" yourself and try your hand at QRP operation???

TIPS FOR QRP OPERATION.

- 1) Get up the best antenna system you possibly can! Try a good high dipole with a low-loss transmission line (RG-8U, open-wire line) first and try experimenting with different antennas... beams, long wire, phased verticals?, etc.
- 2) Call the other guy! Zero beat his frequency and call him when he finishes his QSO or CQ call. Don't call very weak stations. Generally, when the other station's signal is weak you're not gonna have a chance! Don't call CQ unless you're getting good results answering CQs!



OKLA CITY REPEATER LOG

This column continues the listing of repeaters in the Okla. City and surrounding area that was initiated last month. As stated previously, no claim is made as to the accuracy of the material in this column and corrections from those "In-the-know" will be appreciated!

NATIONAL SIMPLEX FREQUENCIES

SIX METERS
52.525

TWO METERS
146.52

Other two-meter (146 MHZ) simplex frequencies in common usage include:

146.43 146.46 146.49 146.55 146.58

Simplex frequencies should be used whenever possible to help alleviate congestion on the repeaters and to keep them free for emergency and other important calls.
.....

Frequency	Call	Location	Special*	Trustee	Group in Charge
<u>Six Meters</u>					
52.680 IN .525 OUT		EDMOND			OCAPA
<u>Two Meters</u>					
146.07 IN .67 OUT	WR5ADF	NE OKC	LIM.AP	K5VVZ	MORI
.16 IN .76 OUT	WR5ADZ	WEST OKC			Western Electric ARC
.22 IN .82 OUT	WR5ACB	NE OKC	CAP	K5CE	OCAPA
.28 IN .88 OUT	WR5AFW	NORMAN	SAP	WA5EPK	OU ARC
.34 IN .94 OUT	WR5AJP	MID OKC		W5KOZ	MORI
.37 IN .97 OUT	WR5AKP	NW OKC	OPEN AP	WB5HUP	WB5HUP
147.63 IN .03 OUT	WR5AHG/5	NW OKC	CAP	WB5ISN	Edmond Amateur Radio Club, Inc.
147.96 IN .06 OUT	PENDING	NW OKC	OPEN AP	WB5GWB	WB5GWB

3/4 Meters (440 MHZ)

449.10 IN
444.10 OUT WR5AJP MID OKC W5KOZ MORI

449.80 IN
447.80 OUT WR5ADK NW OKC OCAPA

- * LIM.AP... Autopatch limited access to OKC Police, Fire, and Emer. Op. Center
- CAP..... Autopatch closed to members only.
- SAP..... Autopatch open although support of autopatch is encouraged.
- OPEN AP.. Autopatch open to all.

INC.
PENN WIRELESS ASSOCIATION
BOX 311 BRIDGETOWN, PENNSYLVANIA 19005

8 April 1976

Collector and Emitter
Oklahoma City

Dear OM:

An original article in Penn Wireless' X-MITTER that originated in Ok City has made its way home by a lengthy and devious route. I'm referring to the article on the need for a balun with a coax-fed dipole so both legs radiate.

I picked up the original from one of our swap papers; since the piece wasn't too accurate (or let's say it was fully erroneous) I deliberately omitted a credit, but ran it with an article I solicited from Carl, W5JJ as one of the most respected and knowledgeable amateur radio writers.

The entire X-MITTER article - the anonymous original and Carl's reply, was widely copied - until it got back to Carl's own C&E!

Seems that the X-MITTER credits got dropped somewhere along the line!

It's now as good a time as any to publicise how I first met W5JJ. A few years ago, while Andy KØNL was doing such a fine job with AUTOCALL, I made a few contributions. In one of these one of our Penn Wireless members filled in for me, and in the process he made some comments on a W5JJ quote that someone else had taken out of context so as to make Carl seem "less than sophisticated." Carl saw this reflection on him and fired a request for retraction to me - - when I saw the full text that Carl supplied it was obvious that he had truly been maligned.

This started not only a regular swap between C&E and X-MITTER, but also a visit to Carl's home and much enjoyable correspondence.

Incidentally, our member who started it all has since left our area -- John Johnston, K3BNS. If you don't now recognize his call, you should!

Commercial: When, oh, when, can some of the OK City gang fill me in with some of the recent years' call letter license plates for the collection? Any and all very much desired -- please ship parcel post or UPS and I will reimburse. But please get me some recent Okla ham plates.

73 to all ---



Dave Heller, K3HNP / W5NFJ - Editor, X-MITTER

SUNSTROKE FROM SUNSPOTS?

If you're really interested in keeping up with propagation conditions, you might add the daily obituary column to your regular information sources. At least that's what some Russian scientists seem to be saying. They claim there is a direct causal relationship between solar activity and deaths from stroke and heart attack. A recent report from the U.S. (Nature magazine, Jan. 29, 1976, p. 392) says that no correlation exists. But check figure 3 in that article. Is that a nonlinear correlation? You can find the journal Nature in the FAA's CAMI library and in the OU library. The question remains "up-in-the-air"(sorry), but maybe these guys just need more data to get positive results... especially data from hams who are in the middle of an essential DX contact when the band goes out!

Jess McKinzie

Ed Note: Jess is attending licensing classes of OU ARC and plans to go for his Novice license soon... THANX, JESS!

1976 Bicentennial Calls

BICENTENNIAL CALL SIGN PREFIX EXCHANGE

In celebration of the U.S. Bicentennial, the Federal Communications Commission is permitting the use of special prefixes on a voluntary basis by its amateur licensees from 0500 UTC January 1, 1976, to 0500 UTC January 1, 1977. No special approval is required. The following tables are designed to make it easy to determine what prefix you should use (left columns) and what prefix a Bicentennial station you hear usually uses (right columns). Those "K" prefixes not listed, such as KG4 and KZ5, are not under FCC jurisdiction. Plans for special prefixes for those locations were unknown at press time.

Call Sign Prefixes Within Contiguous U.S.			
Existing	Bicentennial	Bicentennial	Existing
W	AC	AA	WA
K	AD	AB	WB
WA	AA	AC	W
WB	AB	AD	K
WD	AE	AE	WO
WN	AK	AF	WR
WR	AF	AK	WN

Call Sign Prefixes Outside Contiguous U.S.			
Existing	Bicentennial	Bicentennial	Existing
KB6	AG2	AG1	WW6
KC4	AL4	AG2	KB6
KG6	AG6	AG3	WB6
KH6	AH6	AG5	WG6
KJ6	AJ7	AG6	KG6
KL7	AL7	AG7	KW6
KM6	AH7	AH1	WH6
KP4	AJ4	AH2	WM6
KP6	AJ9	AH3	KS6

KS4	AH4	AH4	KS4
KS6	AH3	AH5	WS6
KV4	AJ3	AH6	KH6
KW6	AG7	AH7	KM6
WB6	AG3	AJ9	KP6
WG6	AG5	AJ1	WJ6
WH6	AH1	AJ2	WV4
WJ6	AJ1	AJ3	KV4
WL7	AL1	AJ4	KP4
WM6	AH2	AJ7	KJ6
WP4	AJ8	AJ8	WP4
WS6	AH5	AL1	WL7
WV4	AJ2	AL4	KC4
WW6	AG1	AL7	KL7

1 Navassa Is., NOT Antarctica.
2 Guam only, NOT the other Mariana Is.
3 Novices on Baker, Canton, Enderbury, Howland Is., NOT California (other "W" prefixes in this table are also Novice stations.)

U.S. Amateur Frequency and Mode Allocations (Revised as of Nov. 14, 1975)

BANDWIDTH LIMITATIONS

FREQUENCY (OR PHASE) MODULATION: On frequencies below 29.0 MHz and between 50.1 and 52.5 MHz the bandwidth of F3 emission shall not exceed that of an A3 emission having the same audio characteristics.

TELEVISION: On frequencies below 50 MHz, the bandwidth of A5 and F5 emissions shall not exceed that of an A3 single sideband emission. Between 50 and 225 MHz single sideband or double sideband A5 may be used and the bandwidth shall not exceed that of an A3 single sideband or double sideband signal respectively. The bandwidth of F5 emission shall not exceed that of an A3 single sideband emission. Below 225 MHz, A3 and A5 emissions may be used simultaneously on the same carrier frequency provided the total bandwidth does not exceed that of an A3 double sideband emission.

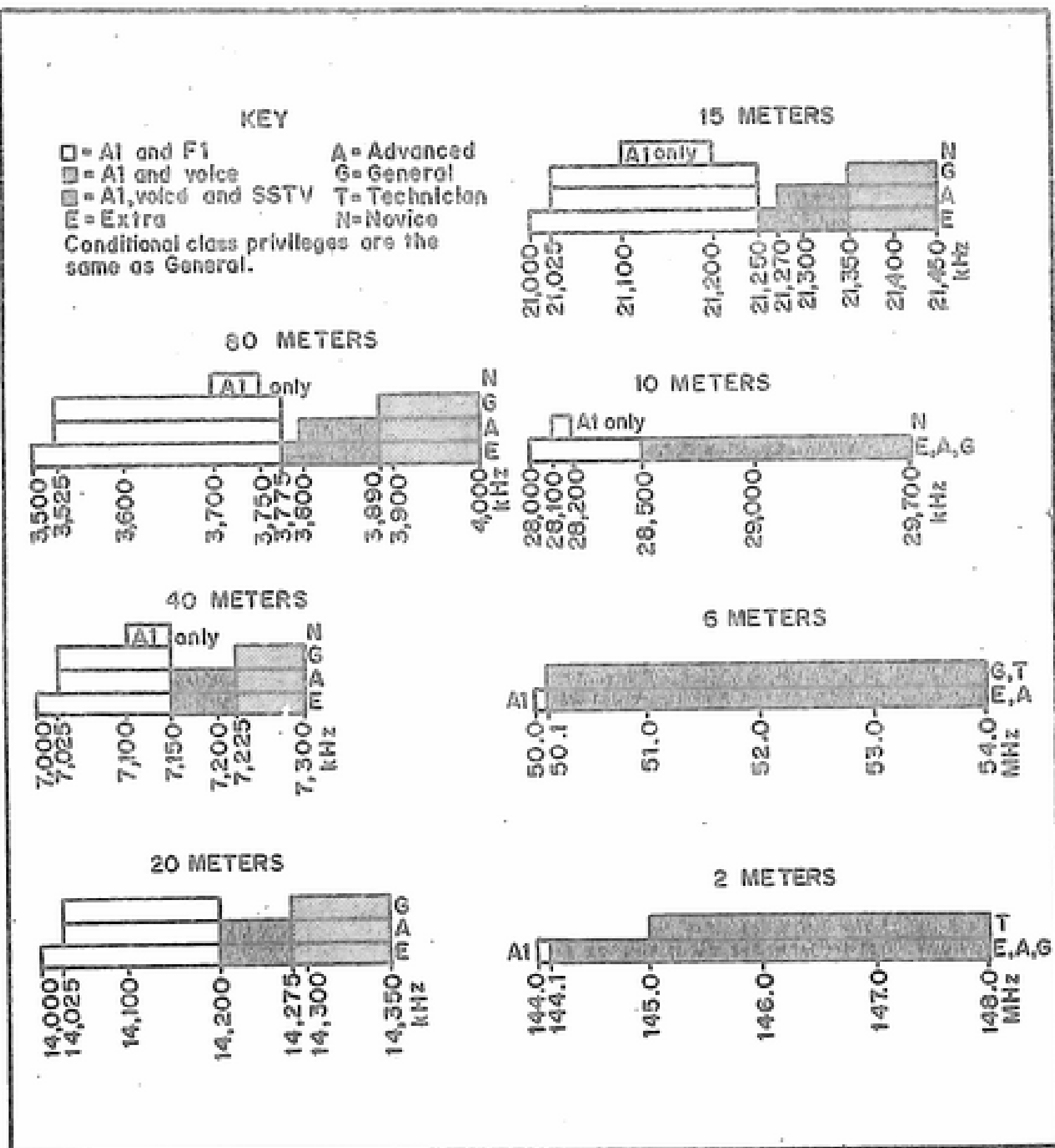
RTTY: When using frequency-shift keying, the shift shall be less than 900 Hz. With audio frequency-shift keying, the highest fundamental modulating frequency shall not exceed 3000 Hz and the audio frequency shift shall be less than 900 Hz.

ALL MODES: The carrier frequency plus modulating frequencies must be contained within amateur allocations and within appropriate sub-bands.

NOTE: Some amateur bands are shared with other services. Some geographical limitations exist for the 220 and 420 MHz bands. For details, and for information on specialized modes, see ARRL License Manual. For information on repeaters, see License Manual and Repeater Directory.

160 METERS: Extra, Advanced and General may use some segments at 1.8-2.0 MHz. Limitations are on a geographical basis; see License Manual or request form S15A from ARRL Hq.

Other — All modes except as noted
Extra, Advanced, General, Technician.
MHz GHz (1GHz=1000MHz)
220 — 225* 10.0 — 10.5*
420 — 450* 24.0 — 24.25
1215 — 1300* 48.0 — 50.0
2300 — 2450 71.0 — 76.0
3300 — 3500 165.0 — 170.0
5650 — 5925 240.0 — 250.0
* Pulse not permitted All above 300



TWO FIRSTS

On April 10, 1976 Monte, WB5RZX, contacted WN8WVI at Youngstown, Ohio. This was the first Novice contact for each person.

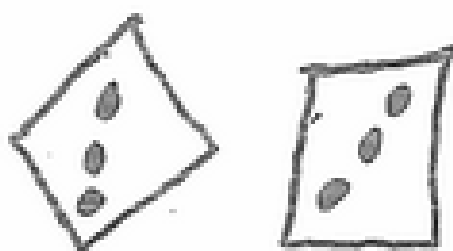
Don WB5NTY

THE ZANY NEWS FREQUENCY

Joe, WA5ZNF

I DID IT - - - In the VHF Club section there is a comment about the mixup in pages last month which made a real fine article a little hard to follow and I will have to admit it was my fault. Maybe I should read the last line of one page and the first line of the next.

* * * * *



SIX IS A GOOD NUMBER - - Now I wonder who will make it a lucky seven. The Edmond Amateur Radio Club president made the CORA meeting Friday night and applied for membership and of course they were accepted as would any of the clubs in the Central Oklahoma area, such as Wheatstraw, Shawnee, Enid, Lawton and all the others.

CORA has worked wonders for the clubs that started it and those that have come on board and there is always room for more for in union there is strength and amateur radio needs cooperative strength to protect what we have and improve on it.

* * * * *

JUNE IS BUSTING OUT ALL OVER - - So goes an old song. It could also apply to amateur radio activities since there are several happenings in June. Just to mention a couple there is the Annual Picnic, Campout, Eyballing, Swapping and just plain eating and visiting on 19 & 20 June at Lake Overholser in Oklahoma City. Everybody is invited. More details will be carried next month.

Then of course there is FIELD DAY on the next weekend. CORA will take charge of it the same as last year. Plans are already in a final stage and it looks like a good one. Don't quote me but I believe it will be held at the same Lake Overholser location as last year. See next issue.

* * * * *

TURN THE PAGE SIDEWAYS -- It will be worth your time to read the letter below, reproduced just the way I received it. I predict that he will make it up the ladder. And it's good to see workers praised.

15 APR. 76

OPEN. Letter to CORA,

3 Months AGO GAD

Boy, I took the General Exam. on 15 JAN. 76 = BUT only got 5 wpm on Code, so wound up with Tech. License. OK, 9 weeks later I received my License. Now I PASSED the 13 wpm Code test today, what a BIRTHDAY PRESENT. Who knows, Later maybe I will make it farther up the bands. Thanks Fellas for the help and drive from other hams, the school session from 4 Sept. 75 to 18 Dec. 75 - JOE WASTERS, for ramroding it, and to our Lord God, he helped the most!

DE WB5RAG
JOE

127-

MAY HAM HAPPENINGS						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
RESERVE 7 & 8 AUGUST FOR HAM HOLIDAY						10 AM EDMOND ARC
2	3	4	5	6 SPECIAL MORI MEETING	7 ACARC MEETS	8
9	10	11 Q CLUB	12	13	14	15
16	17	18	19	20	21 VHF CLUB MEETS	22
23 30	24 EDIT C + E 31	25	26	27	28 CORA MEETS	29

SEE PAGE 2 & CLUB SECTIONS FOR DETAILS. EDMOND MEETS 3220 N SantaFe

amateur radio

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