

"Does this Ohm's law that everybody's citing mean more government regulation?"

# KRYDER ELECTRONICS

**YOUR COMPLETE AMATEUR RADIO STORE**

OWNER/MGR. IN OKLAHOMA CITY: CHUCK GUSCHKE N5SW



YAESU



*Dentron*



Larsen

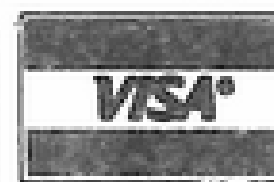


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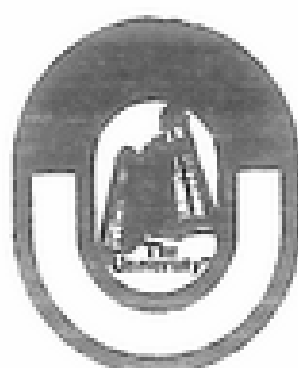


HOURS:

**TUESDAY & FRIDAY 10-9  
WEDNESDAY, THURSDAY & SATURDAY 10-5  
CLOSED SUNDAY & MONDAY**

ALSO LOCATED IN

**FT. WAYNE, INDIANA & PHOENIX, ARIZONA**



OU started its new semester and after an extended holiday the OU Amateur Radio Club began its new year with its first meeting the 18th of January. Some changes had taken place since our last get-together. For starters our revered president, James Gardner is now a full-fledged novice. He has assured his fellow adherents that he will devote himself and upgrade to at least a general class licensee as soon as possible. Another major change is in the trusteeship of the club license W5TC. John, N5ABC willingly took over that honor and has begun renovation work on several pieces of equipment owned by the club. The equipment John now has in the shop, combined with what is already in use and planned for in the near future will give W5TC an impressive, if not new, array or rigs.

With the business out of the way Daryle, WB6WZC, our magnanimous activities chairperson gave the membership present a highly informative demonstration of a T.D.R. Of course almost everyone is familiar with the virtues of a time domain reflectometer but relatively few of us have a chance to see one in action. These are truly great little devices. All you have to do is hook-up your coax to the front panel and before your eyes your entire antenna system appears as an oscilloscope trace. The impedance of the entire system from the connector to the insulator at the far end of your long wire can be seen. Any impedance bumps will be shown and by reading one dial you can tell how far away the mismatch lies. This device can save a great many trips up and down the tower or the dissection of good connectors.

After this revealing demonstration the door prize was awarded to Nathan, NB5BF. I would like to mention here that the door prizes given away at each meeting, for free, are donated by local, Norman and Moore, electronic entrepreneurs. Almost ever business contacted has been quite willing to donate something. This is especially true of Radio Shack located in the City of Moore Shopping Center and managed by Jess Martin. Jess has generously provided several prizes given away at the meetings and the Norman first annual ham get-together back in December.

With the awarding of the door prize the meeting was closed. So far this year turn-out for the club must be considered light. However, the potential for a really vivacious club exists. Our equipment inventory is increasing, we are trying to get a new location for the station to expand our antenna system and another, improved 2 meter repeater is now being acquired. So I would like to remind all area amateurs or prospective amateurs the OU Amateur Radio Club is open to all, not just OU students.

WA6TLK

#### WANTA TALK THROUGH YOUR EAR?

No, that's not a feeble joke! Really, there is a device on the market that acts simultaneously as an earphone and a microphone. It plugs into ones ear much as a conventional "cheapie" earphone. A lead goes out to a box. What lies in that box is not described but probably it is a type of VOX, one that normals the earpiece to the output of the audio portion of a transceiver and makes the transfer to the microphone input portion when it detects the individual's voice. That voice probably reaches the earpiece by bone conduction or by air conduction through the eustachian tube.

The device is marketed by the Electronic Instrumentation Division of Lear Siegler, Inc. It's operated off of a nine-volt battery and measures 4 1/2" X 2 7/8" X 1 1/3" and weighs seven ounces. The price is not given in its initial announcement.

W5JJ

# Central Oklahoma Radio Amateurs

## COLLECTOR AND EMITTER



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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	Mark Northcutt	WD5DYI	842-1086
Vice President	Chuck Wilhite	K5NK	721-4926
Secretary	Nathan Kirby	KB5BF	364-7979
Treasurer	Ron Recer	WD5FRQ	751-5378

### CLUB EDITORS

ACARC	Bob Graham	WB5NSV	677-8685	OCARC	Joe Buswell	K5JB	732-0676
BIARC	Bill Riddles	N5MM	691-1194	OKCAP	Henry Israel	N5IH	722-3848
ALTUS	Janice Simms	WB5MMN	477-0921	MORI	George Lee	WB5NMK	946-2754
OUARC	Nathan Kirby	KB5BF	364-7979	Contributing Editor, Mike Salem, N5MS			

### PARTICIPATING CLUBS FOR CORA COLLECTOR & EMITTER:

#### AERONAUTICAL CENTER AMATEUR RADIO CLUB

Postal station 18, Okla City OK 73169

MEETS: 8:00PM First Friday each month

Flight Standards Bldg, FAA Aero Center

Pres	Bob Pace	WA5CJG	376-3569
V-P	Bill Oliver	K5KDR	329-6333
Sec	Bob Graham	WB5NSV	677-8685
Trea	Sam Gover	WA5WHO	

#### MID-OKLAHOMA REPEATOR

MEETS: 8:00 PM First Tuesday of month. Okla City EOC, 4600 N Eastern

Pres	Chuck Wilhite	K5NK	721-4926
V-P	Bill Atkins	N5AH	737-6984
Sec/Tr	Jim Jones	K5PR	634-5235
Dues: Sid Gerber, 829 Bouse, MWC 73110			

#### OKLAHOMA UNIVERSITY AMATEUR RADIO CLUB

MEETS: 8:00 PM, 1st & 3rd Thursday Rm 449, Carson Engineering Center.

Pres	James Gardner		321-8779
V-P	Dan Orr	WD5GKZ	325-6951
Sec	Mark Proting		329-1452
Treas	Nathan Kirby	KB5BF	364-7979

#### BICENTENNIAL AMATEUR RADIO CLUB [76'ers]

MEETS: 2nd Tuesday each month, 7:00 PM

Air National Guard, Will Rogers Airport

Pres	Mark Northcutt	WD5DYI	842-1086
V-P	Joe Ramage	WB5TDW	685-4814
Sec	Joe Couch	WD5BMP	282-4353
Treas	Don Duck	AE5N	

#### OKLAHOMA CENTRAL AMATEUR RADIO CLUB

323 NW 10th, Okla City OK 73103

MEETS: 8:00 PM third Friday each month.

American Red Cross Bldg, 10th & Hudson

Pres	Ken Ford	WB5KHU	528-8770
V-P	Al Prince	WB5KCU	
Sec	Joe Buswell	K5JB	732-0676
Treas	Ellard Foster	W5KE	789-6702

#### OKLAHOMA CITY AUTOPATCH ASSOCIATION

MEETS: 7:30 PM 3rd Tuesday, Monthly Oklahoma Military Academy 36yh & Grand

Pres	Frank McCollom	N5FM	751-3577
V-P	Henry Israel	N5IH	722-3848
Sec/Tr	Hobe Burgan	WB5MLN	751-1646

#### CENTRAL OKLAHOMA RADIO AMATEURS

MEETS: 7:30 PM. Normally on last Tuesday, but see calendar. Red Cross Building, 10th & Hudson. (Alley)

#### ALTUS AREA AMATEUR RADIO ASSOCIATION

MEETS: 2nd Thursday, 7:30 PM

North Main Fire Station [CD]

Pres	Steve Norris	W5KI	
V-P			
Sec/Tr	Mike Schenkel	K5VXU	







### MEETING HIGHLIGHTS

There are two meetings to report this month due to paste up dates. First the December meeting. Chuck (WB5YL2) was able to arrange for a very FB subject. The speaker was from Bell Telephone and spoke on a topic we are all interested in, PROPAGATION. Along with the talk every one enjoyed the slide (overhead projection) presentation. Those who missed the meeting, I am sure are sorry they did, since the subject was one which is important to all of us.

The January meeting was a swap meet. There was a pretty good turn out, and all there got a chance to add to there collection of amateure equipment. Anything from a coax connector to a brand new transceiver. In addition Hobe (WB5MLN) held another one of his famous "CASH" drawings, and the giant jackpot was won by N5IH, and it is reported that he is only \$1348 short of having a new IC701.

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### INPORTANT

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THE FEBRUARY MEETING WILL BE THE WX MEETING AT CHANNEL STUDIO. THERE WILL BE WX MAPS AVAILABLE, ALONG WITH THE OTHER MATERIAL. GARY HAS ALSO PROMISED US A NEW SPEAKER FOR THE MEETING. SO BE THERE.

The time for the wx meeting will be 7:30pm local, but the doors will open at 6:45 As most know it is important to be there early to make sure of a good seat, but at the same time please do not arrive befor 6:45pm. Channel 9's address is 7401 N. KELLEY, Oklahoma City.

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We are very pleased to welcome the following people into OCAPA:

KA5DAO	MARY LESTER	3001 Quail Creek Road	OKLA CITY 73120		1/80
KA5DBY	BETTY BRADLEY	12401 Blue Sage Road	Okla City 73120	7550872	1/80
KA5CAY	RON McCALIP	Rt 6 Box 474	Shawnee 74801	2735974	1/80
WD5JFJ	BILL McKELVIE	5908 N. Sterling Dr.	Okla City 73122	7215705	1/80
WD5HPR	DON McDOWN	305 W. Pratt DR.	MWC 73110	7326749	7/79
WA4PLG	CHARLES KENAMER	600 S.W. 52nd St.	Okla City 73109	6324653	1/80

### ASSOC MEMBERS

KA5DDE	MIKE CREWS	5709 N.W. 115 <sup>th</sup> St.	Okla City 73132	7221376	1/80
KA5DBZ	MARY LOU MANKIN	3004 Thornridge	Okla City 73120	7552121	1/80

XXXXXX

### FROM HRH

AMATEUR RADIO FARED QUITE WELL in the FCC's WARC 79 proposal, as further details were made available in mid-Dec. The biggest gain was the addition of three new HF Amateur bands-10.1-10.2, 18.068-18.168, & 25.11-25.21MHz-as exclusively Amateur bands worldwide. A 50khz addition to 15 meters, and a 50khz downward shift for 40 meters making it exclusively amateur is also proposed.

XXXXXX

### DON'T FORGET THE WEATHER MEETING

FOR SALE: Kenwood TS900 with outboard VFO, and all cables, call N5IH at 722-3848

FOR SALE Complete YAESU Station--FR 101S 10-160 Rcvr, CW and AM filter 7 SWL Bands---FL 101 10-160 Xmtr 240 watts PEP---YO 100 Monitor Scope--Landliner Spkr/Patch---Ham Key and Keyer---CEC Active Audio Filter---al boxes, cables, manuals-----\$1200.00. All eqpt LIKE NEW, now in operat as N5ALG, Bob, Norman OK, 3602042 329-7391

NEW TOWER FOR SALE - 40' Rohn #25G tower, with 3' base section and rotor plate. Brand new. \$185, tax included. Hurry, only two left.

Bill, N5WM, 842-0092



Club  
NEWS

WSLOV  
The Elmer Goodwin Memorial  
Station

MINUTES OF MEETING

MEETING WAS CALLED TO ORDER AT 8 PM BY PRESIDENT KEN, WB5KHU, WITH SIXTEEN MEMBERS AND GUESTS PRESENT.

THE QUESTION OF HAM HOLIDAY PUBLICITY COMMITTEE CHAIRMAN WAS RAISED. CARL, W5JJ, VOLUNTEERED TO ASSUME THE POSITION. BOB, W5HXL, AND JOE, K5JB, WILL HELP.

C.Y., WB5TKG, ASKED THAT THE CORA REPRESENTATIVE HAVE MATERIAL PUBLISHED BY THE PERSONAL RADIO FOUNDATION MADE AVAILABLE TO EDITOR, C&E FOR PUBLICATION.

76ERS RADIO CLASSES ARE BEING HELD AT AIR NATIONAL GUARD ON THURSDAY NIGHTS, 7 PM. CLASS AT RED CROSS IS MEETING ON WEDNESDAY NIGHT AT 7 PM.

KEN FORD, WB5KHU, WAS REELECTED PRESIDENT  
JIM WILLIAMS, K5VRL, WAS ELECTED VICE PRESIDENT AND APPOINTED PROGRAM CHAIRMAN.

JOE BUSWELL, K5JB, WAS REELECTED SECRETARY.  
ELLARD FOSTER, W5KE, WAS REELECTED TREASURER.  
BILL NOWLAND, W5FWD, C.Y. CHANDLER, WB5TKG, AND CHARLIE GREENE, W5JGU, WERE REELECTED FOR ANOTHER TERM ON THE BOARD OF DIRECTORS. THE CARRY OVER BOARD MEMBERS ARE RANDY WILLIAMS, WB5CNM, AND JACK MUSE, WB5ZKZ.

THE FOLLOWING TOPICS WERE SUGGESTED AS POSSIBLE PROGRAMS FOR THE YEAR.

- TRANSMISSION LINES
- LEGAL ASPECTS OF AMATEUR RADIO
- SATELLITE RECEPTION-TV
- ANTENNA ROTORS-PANEL DISCUSSION
- TELETYPE
- TOWERS
- HOW CW IS LEARNED
- CONVERSION OF CB SETS TO TEN METERS
- SWAP MEET

C.Y., WB5TKG, WILL ORGANIZE A GROUP OF KNOWLEGABLE PERSONS TO SERVICE ALL ITEMS IN THE CLUB STATION THAT ARE IN NEED OF ATTENTION.

IF RED CROSS HAS NO OBJECTION, THE CLUB WILL HOLD A SWAP MEET ON THE EVENING OF THE FEBRUARY MEETING. IT WAS MOVED AND PASSED THAT THIS BE A BI-MONTHLY FUNCTION.

IT WAS SUGGESTED THAT THE CLUB'S TRAILER BE EITHER CLEANED UP OR DISPOSED OF. THE BOARD OF DIRECTORS WILL LOOK INTO THE PROBLEM.

MEETING WAS AJOURNED AT 9:20 AND THE GROUP MOVED TO THE CLUB STATION FOR COFFEE.

JOE, K5JB, SECRETARY

PUBLIC APOLOGY

REGRETFULLY I HAVE TO ADMIT THAT I DROPPED THE BALL AFTER CARL, W5JJ PASSED IT TO ME. HE SENT ME SOME GOOD MATERIAL FOR THE COLLECTOR AND EMITTER AND I AM NOT ABLE TO GET IT INCLUDED IN THIS ISSUE. LAST FRIDAY WHEN I WENT TO THE OFFICE IT FELT MORE LIKE MONDAY THAN FRIDAY. BY TEN O'CLOCK, I WAS FEELING ROTTEN SO I WENT HOME. AS I LATER DISCOVERED I HAD BECOME INFECTED WITH THE FLU AND AN ABCESSSED TOOTH SIMULTANEOUSLY. MY TEMPERATURE WENT UP TO 103 AND I SPENT MOST OF THE WEEKEND IN BED. IT IS USUALLY MY HABIT TO SNEAK DOWN TO THE OFFICE TO TYPE MY COPY ON THE SELF CORRECTING TYPEWRITER...FOR OBVIOUS REASONS. WELL, THIS WEEKEND I JUST DIDN'T

MAKE IT. CARL'S MATERIAL IS IN NORMAN AND I AM HERE AND I DISCOVERED IT TOO LATE TO DO ANYTHING ABOUT IT. CARL HAS HAD MANY THINGS PUBLISHED BY THE BIG BOYS AND I AM SURE HE HAS HAD MANY MONTHS PASS SOMETIMES BEFORE HE FOUND HIS MATERIAL IN PRINT. WITH C&E, HOWEVER, WE SHOULD BE ABLE TO OUTPERFORM THE BIG BOYS IN THIS RESPECT. THERE SHOULD BE NO EXCUSE FOR SOMETHING SUBMITTED TO ME NOT TO APPEAR IN THE NEXT ISSUE. I JUST MADE SUCH AN EXCUSE THOUGH. CARL, IF YOU WILL ACCEPT THE APOLOGY, I PROMISE I WILL RUN THE ARTICLES NEXT MONTH. FOR YOU WHO WONDER WHY I AM MAKING SUCH A BIG DEAL ABOUT THIS, IT IS SO SELDOM THAT ANYONE MAKES A CONTRIBUTION THAT WHEN I GET ONE AND MUFF IT, IT IS A TRAUMATIC EXPERIENCE. JOE, K5JB.

#### WHAT THE H--- IS MAKING ALL THAT NOISE?

CARL'S ARTICLE REFERRED TO ABOVE CONTAINED COMMENTS ON AN ARTICLE IN MOBILE TIMES. I WILL RUN THAT ARTICLE NEXT MONTH. WHAT FOLLOWS IS SOMETHING I PREPARED AS A COMPANION TO HIS ARTICLE.

MOBILE TIMES IS NOT AN EVENING NEWSPAPER IN ALABAMA. IT IS A RELATIVELY NEW MAGAZINE FOR LAND MOBILE RADIO USERS. IT ONLY HAS A SMATTERING OF TECHNICAL CONTENT, CONCERNING ITSELF MOSTLY WITH RADIO BUSINESS AND REGULATORY MATTERS.

THE DECEMBER 1978 ISSUE CONTAINED AN ARTICLE BY CHARLES M. WHITE, GENERAL ELECTRIC COMPANY, WHICH RELATED TO TRACKING DOWN SOURCES OF RF INTERFERENCE. THE TECHNICAL PORTION WAS A BIT WEAK AND THE METHOD WAS NOT TOO SPECIFIC BUT THERE WERE INTERESTING STATISTICS WORTHY OF MENTION.

IN A YEAR'S RECORDS OF A UTILITY COMPANY IN TEXAS, THE FOLLOWING RESULTS WERE ACCUMULATED FROM CUSTOMER COMPLAINTS OF RFI.

- 23% DEVICES IN RESIDENCE OR BUSINESS
- 21% POWER COMPANY DISTRIBUTION LINES
- 11% FAULT IN CUSTOMER'S RECEIVING EQUIPMENT
- 42% DRY RUNS-NO INTERFERENCE PRESENT DURING VISIT
- 3% HIGH VOLTAGE TRANSMISSION LINES-69 TO 345 KV

BROKEN DOWN BY TYPE OF EQUIPMENT EXPERIENCING INTERFERENCE THERE WERE:

- 70% TV RECEIVERS
- 20% BROADCAST AM/FM RECEIVERS
- 9% AMATEUR AND CB EQUIPMENT
- 1% OTHER

A CLOSE LOOK AT THE FIGURES PROVIDES US WITH SOME CLUES FOR OUR OWN "HUNTS". SINCE THE DRY RUNS AND RECEIVER FAULTS CAN BE REMOVED FROM THE DATA, 49% OF THE RFI COMPLAINTS CAN BE ATTRIBUTED TO DEVICES IN THE RESIDENCE OR BUSINESS AND 51% CAUSED BY POWER DISTRIBUTION EQUIPMENT. IN THE HUNTING FOR SOURCES OF NOISE, HIGH VOLTAGE EQUIPMENT CAN BE GIVEN LESS ATTENTION BECAUSE IT ONLY ACCOUNTS FOR 6% OF THE PROBLEMS.

DEVICES IN THE RESIDENCE INCLUDED THERMOSTATS IN ELECTRIC BLANKETS, FREEZERS, AQUARIUM HEATERS, BRUSH TYPE MOTORS AND DOOR BELL TRANSFORMERS. THE LATTER WERE THE MOST COMMON OFFENDER. THE ARTICLE RELATES THAT IN SOME NEW APARTMENT COMPLEXES, AS MANY AS 50 BAD DOORBELL TRANSFORMERS HAD BEEN FOUND. THE NOISE COMES FROM SPARKING OF THE THERMAL CUTOUT. GREAT! THERE IS A NEW APARTMENT COMPLEX RIGHT BEHIND MY HOUSE! JOE, K5JB

#### TIDBITS FROM W5TJL

AL, W5TJL, GAVE ME SOME DIDJAKNOWS...HERE IS WHERE SOME OF THOSE OLD SAYINGS COME FROM.

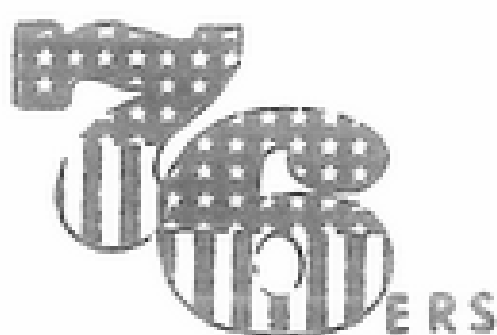
THE RESULT JUSTIFIES THE DEED - OVID, 34 BC

IT IS HARD TO TEACH AN OLD DOG NEW TRICKS - WM. CAMDEN, 1605

HONESTY'S THE BEST POLICY - CERVANTES, 1615

IT SERVES YOU RIGHT! - SOCRATES, 470 BC

MORE NEXT MO.



## THE BICENTENNIAL AMATEUR RADIO CLUB



### FROM THE PRESIDENT...

By the time this edition of Collector and Emitter reaches you, our amateur training classes should be in full swing. The FCC will be making another appearance April 10<sup>th</sup> here in Oklahoma City and hopefully our classes will have a group prepared for the exams.

The FCC examiner did comment on the fact that the advanced and extra class written exams were a "new batch" and there seems to be some controversy over which license manual to study. Among our members at the last meeting, one thought the advanced test was straight out of the old manual, and quite a few others, including me, thought the new manual should have been studied. In any case, a straw poll at the January meeting (the same day as the tests) indicated a problem with the advanced class test: none of us who took it passed it!

Of course, I had a great excuse--getting past the 13 wpm code first! About 3 days before the exam I found my speed wasn't what I thought it was. At that point, cramming in time to look at the license manual (new edition) went right out the window and as a result, I had only skimmed the manual about 3 weeks before.

The code test was about what I thought it would be. Still, I never knew my wrist and elbow, along with my ear-brain connection, could lock up so tight! Reasoning through what I had scribbled is what passed the code test for me. After that big relief, all I did was look at the advanced test with a 60% score.

The majority of our members seem to think studying the new manual is the thing to do for the advanced and extra. We will be putting this info to the test next time.

Be sure to attend our February meeting to see how our club is staying active. We'll hear some proposals on the future of our repeater and have a good time socializing. Bring your spouse--we're seeing more and more of them at our meetings and it is a great feeling.

#### FCC AMATEUR EXAMINATIONS IN OKLAHOMA CITY

April 10      July 10      October 16

#### FCC AMATEUR EXAMINATIONS IN TULSA, OKLAHOMA

May 8      August 7      November 6

Mark Northcutt, WD5DYI

### FOR AT-200 OWNERS--A MINI-MOD

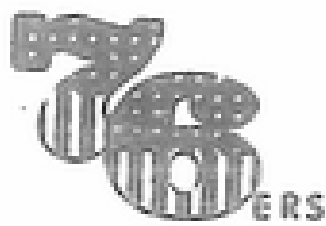
One of the recent additions to my station is the Kenwood AT-200 Antenna Tuner. It is working great. This unit contains a matching network, SWR bridge, wattmeter, and antenna switch in one matching case. The meter in the unit is easy to read but doesn't have a light, which seemed a bit of an inconvenience.

Upon looking inside the box I found the meter assembly had two semi-circular notches in the same manner as the TS 520, 520S and 820S has to hold two small light bulbs. I thought about ordering exact part numbers from Kenwood, but found something that works well in its place:

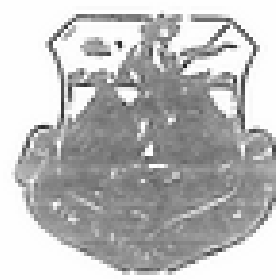
Kenwood uses two bulbs with wire leads mounted inside grommets which slide into the notches on the top-backside of the meter assembly. I used two grommets that fit 5/16" holes and Radio Shack's #272-1141, 12v, 25ma bulbs. The hot leads run through a .75A fuse in a fuse block mounted to the inside panel with double-stick foam tape. From there the power lead becomes a shielded cable (Belden 8451) and goes to the rig's external VFO connector where 12.6 volts can be found on Pin 4 and ground on Pin 3 on both the 520 and 820. The Belden runs out the bottom corner of the tuner without drilling a hole, and the tuner's meter light comes on when the 820's main power is switched on.

Mark, WD5DYI

FOR SALE: DeForest Digital Multimeter, mint cond. Cost \$105.00.  
Will take \$55.00. Want to buy 3 inch 15 Amp. AC meter movement.  
Call Jess Speer (W5SQJ) 321-7302, Norman.



THE BICENTENNIAL AMATEUR RADIO CLUB



### FROM YOUR CLUB EDITOR

On Thursday, January 18th, the '76ers had their first class meeting for the new semester of amateur radio classes. We are conducting novice, general, and advanced/extra theory classes -- the novice section also includes an introduction to Morse code and code practice, as well. These classes are free and will be held every Thursday at 7pm at our regular meeting place, Will Rogers ANG Base (next to the airport). Come check us out and prepare for upgrading. The novice section is very comprehensive and the general and advanced/extra sections are run with much class participation. Late starters are always welcome so, for information, call Coy, N5OK at 691-1194 or me, N5WM, at 842-0092.

I received some very positive feedback from my proposed BOOTLEGGER OF THE MONTH column last month. If anyone has any new nominees, we would appreciate having their names and self-assigned call signs ---- however ---- no one has yet told me why bootleggers are seldom heard operating cw -- hmmmm -- I just know there must be a reason!!!

Three of our local amateurs are to be congratulated for their part in a new communications medium which they were investigating recently on the six meter band. Paul, WB5EVO; Doc, WA5CZN; and Steve, WB5CTS informed me that they felt moonbounce (pompously referred to by some as 'MB') is really just small potatoes compared with their development. Paul said their group had contemplated Mars and Saturn bounce, but decided for a real challenge: URANUS BOUNCE!!! Paul's final comment to me in reference to the matter was, "You may not believe this, Riddles, but I'm bouncing signals off Uranus right at this very moment."

---- And congratulations to the ATV'ers. Larry, WB5NYX, recently told me that the Amateur Television Repeater is now completed and two site locations have been offered. The '76ers wish you guys all the very best of success. Marvin, K5HQP, said he is constructing a tuned cavity for the system. Keep up the good work, fellows.

The recent invitation to all amateurs from the '76ers to use our 16/76 autopatch repeater seems to have substantially increased the traffic there. (And, at the same time, lightened the load on MORI's 07/67 system). Your C&E editor, Joe, WA5ZNF, was the first to fire up and thank us for the hospitality! Welcome aboard, Joe!

The '76ers meet on the second Tuesday of every month, 7pm, at the Will Rogers ANG Base (next to the airport) off S. Meridian Ave. Our annual dues are \$2, which includes a subscription to the C&E. We welcome everyone to our meetings and free amateur radio classes. For all who wish to use our 16/76 autopatch repeater on a regular basis, we do ask for a \$10 annual repeater support fee donation. For more information about our organization, call Mark, our club president, WD5DYI, at 842-1086 or me, the club editor, at 842-0092.

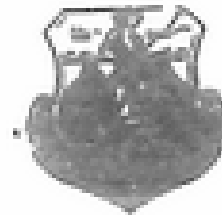
Bill Riddles, N5WM

FOR SALE: Argonaut 509 w/ model 251 power supply, model 405 linear, CW filter. Bill, KA5AFD, 534-8857.

FOR SALE: NOVICE RIG, Globe Chief 90 transmitter, some 40 & 80 meter crystals. BC3-48 Signal Corps all band receiver. Reasonable. Contact Al, WB50HK, 390-2983.



THE BICENTENNIAL  
AMATEUR RADIO CLUB



Minutes Bicentennial Radio Club

Meeting was called to order at 7:00 p.m. by Mark Nothcutt, WD5DYI. 42 members and guests were present. The recent FCC test resulted in upgrades from our school, Novices-2, Technicians-2, General-2, Advance-6, Extra-1; ???

Charles, WAAPLC, reported on 16/76 repeater. Working okay, needs more activity. Coy reported a gift from one of his novice students, Mr. Gene Warr, of \$200. Motion made by Coy to earmark that money for a duplexer for the repeater, second by Orville, WA5KCI. Motion carried. Bill, W7TM made a motion to charge \$2.00 for the school, seconded by Bob, WD5EVP. Discussion followed. Motion was withdrawn.

Paul, WA5HTL, needs your input for the lady's committee. Ken, K5UAB, reminds us to renew our ARRL membership through the club.

Our program were movies of air shows brought to us by Abe, W7LLP. Late news from FCC: Bettie Couch received a novice ticket, KA5DRX, CP will never be the same again!  
Joe Couch, WD5BMP

NORTHEAST OKLAHOMA RADIO AMATEURS HAMFEST, Apr 28-29 in Vinita OK at the fairgrounds exhibit building. An exhibit area is available, along with flea market space, and programs of interest to all. More details later, or contact Randall Langley, WD5IND at 789-4586.

CHOCTAW AMATEUR RADIO CLUB

Well, we had our 1st Annual Feast at Adairs Uptown, Thursday evening, 21 Dec. 1978. Someone said "All you can eat, so much per head". As you can probably guess by now, we didn't put Adairs out of business but it was sure fun trying.

We had 6 members, 4YF's, 5 Harmonics, in various stages of hunger and 1 visitor that arrived just in time to miss all the food. Sorry George.

Well anyway, we all had a good time getting to know one another and discussing amateur radio.

Speaking of amateur radio, it was just discovered that Tony(WB5PNH) made his first JK contact Dec. 17. Congratulations Tony.

That brings us up to date, well, almost! Our latest meeting(18 Jan.) brought about some sweeping changes(Tri-County A.R.C. will no longer exist). We will be known as Choctaw A.R.C. This, because of the existence of another A.R.C.--within 40 miles of us--with a very similar name.

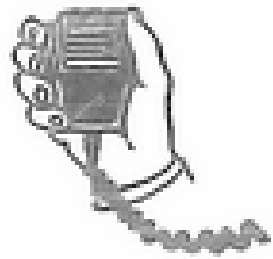
We are also starting Novice to General classes Monday evening 22 Jan. President Frank(AB5H) will be instructor in the General class and Vice-Pres. Gary(WB5WHF) will be instructor of the Novice. They will have several other helpers at their call.

After all business was completed, the meeting was turned over to Mike(K5UV) for an very informative demonstration of the workings of a repeater--in this case, 147.69/.09.

Now for a little about ourselves. We are a group of amateurs from the Eastern Okla. County area. We would like to extend an invitation to anyone interested in amateur radio to attend our meetings. We meet the 2nd Thursday of each month at 7:00 p.m. The place is the Indian Meridian School(cafateria). Directions are--1 mile east of Choctaw Rd. and 1/2 mile north of S.E. 29th street.

Last but far from least, goes a very special thanks to Mr. Harding for allowing us to enter these articles in C&E. We are applying for CORA membership, and look forward to many years of a fruitful relationship with all CORA members.

Richard Edwards, KA5ALO



## THE ZANY NEWS FREQUENCY

By JOE, WA5ZNF

As I write this there is no telling how many pages this issue of CORA Collector & Emitter will have. This awful (to me) weather has messed up a lot of plans. I had a nice cover and story planned but the ice and snow kept these old bones inside most of the time and the pix and the story didn't materialize but maybe next month.

I wanted it for this month to celebrate what very few people are aware of -- CORA C & E's start on the fifth year of publication. It has been a rewarding four years for me and a bunch of others who have labored to make it what it is. These old bones will hopefully hold out for a dozen or so years more to allow us to reach even greater levels of accomplishment.

ALWAYS A BRIDESMAID - NEVER A BRIDE - - I have just received the results of the Amateur Radio News Service publications contest for last year and our standing was still the same, second place like last year, but we were in a new category, Multi-Club publications with less than 1000 copies published. Avis doesn't seem to mind being second but with all of the people we have here we should be No. 1. You can help by insisting that your club support your club editors and that you do the same. Call him up, write him a letter, hand it to him at club meetings - what is IT? Technical items, mods you have made to equipment, experiences in the shack, on the tower, newsy tidbits about fellow amateurs, in fact anything you would like to see yourself.

Right after typing the above paragraph I received the Cora Comment from Mark, WD5DYI and it should be referred to for some good ideas.

Bill Rogers, WA5RAQ, makes his annual index of articles appearing in CORA Collector & Emitter available to you. It is really appreciated.

In a mailing from ARRL I noted that our own H.O. Townsend, WA5MLT, has been appointed to the league Emergency Coordination Committee. He is doing a good job as state coordinator and is to be congratulated. Also he is reminded that these columns are open to league activities.

Cecil E. Pegors, Manager 787-0560

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## RALEIGH ARS NEWS

IF YOU HAVE LISTENED to 10, 15, or 20 meters in the last several weeks, it is probably obvious that the gud days of DX'ing are back. 20 meters is open 24 hours a day, 15 is open well into the hours of darkness, and 10 is open most days to nearly all parts of the world. The best thing about these great conditions is that the sunspot peak is still more than a year away and appears to be heading for one of the highest peaks in history. If this doesn't satisfy your DX hunger, watch for the upcoming DXpeditions.

Can you believe all the stuff being worked by RARA DX'ers? Listen to this - WB4WXA and WA4QIW during a Sunday afternoon drive operated 10 meter mobile and logged the following countries: I, G, DK, SM, F, 4Z4, LU, ZF, HC, VE, and KL7.

### QSL'ing

When QSL'ing via a manager, there are several good things to remember whic will make the job a little easier for the QSL manager. The following is a list of requests from Joe Arcure, W3HNK.

1. Be sure to enclose a self-addressed envelope (SASE) with your QSL Card.
2. Put your call sign on the same side of the QSL as the report form )this saves the manager from having to to turn it over to find your call letters.)
3. Use Day-Month-Year for the date since most DX countries express the date in this format; ie. 28-10-78. If you can't get used to this, another popular way is using Roman numerals for the month. ie. 28-X-78.
4. Use GMT time. Remember standard time & daylight saving time.
5. Enclose your SASE with the folded side down (seems as though Joe has ripped a few SASE's when opening the mail with a letter opener.

A must for any serious DX'er is a directory of QSL managers. One of the most complete listings is published by Gary Yarus, WBØMSZ. This is a listing of QSL managers for over 5000 DX stations and is updated each week. Such a list can save a DX'er time and money and will easily pay for itself. It is \$100. Address, 4466 W Pine-#13-D, St Louis MO 63108.

### WHEN AND WHERE TO LISTEN

Half of DX'ing is knowing *WHEN* and *WHERE* to listen. One of the best ways to work "rare" DX, without having to fight a pile-up, is to check into a DX NET. Generally, one or two stateside stations act as net control and begin by taking check-ins from each call area. Usually the check-in "list" is limited to not more than 5 stations from each call district. Net control then takes check-ins from DX stations. To get things off-and-rolling, each statesise station, in turn, calls the DX station of his choice. The secret here obviously is to get on the list. The following is some of the active DX nets and a sample of the DX which checks in:

- |  |   |
|--|---|
| 1. Africana Net<br>21.355 MHz at 1700Z daily<br>(ZS,9GI, 9J2, 5Z4, 5T5, etc.)      | 4. W2HCW 3.803 at 2200Z daily<br>(Europeans - This is not a net but Arnold puts US stations through.) |
| 2. P29JS (14.225 MHz, 0700Z daily)<br>(VR3, VR4, H44, VR8, ZKI, VK, FM8, YJ, etc.) | 5. CE9AT (21.333 at 1600Z daily)<br>(List by WA2NHE)  |
| 3. Pacific(14.285 MHz, 0500Z weekdays<br>(Pacific Islands)                         | 6. OY5J (14.240 at 2300Z Monday<br>(list by AA4VK - it never hurts to know the "list-taker"           |

Now that we are all believers that the gud days are back, lets get back on 10 meters (its a good place to work DX and also bump into the locals for a ragchew).





ALTUS AREA  
AMATEUR RADIO  
ASSOCIATION

President - Steve Norris, W5KI  
Sec/Tres. - Mike Schenkel, K5VXU

The Altus meeting was opened by newly elected President, Steve Norris, W5KI, just after 7.30 PM. With some 13 members present, there was a general discussion about the upcoming weather season. Dwight, WB5KRH, advised everyone that there are now two general weather information stations broadcasting in our area, Clinton on 162.475 and Lawton on 162.55. He emphasized that with the bad weather season just around the corner, professional operating methods and attitudes become extremely important especially when considering the many hundreds of scanners now in use around our area.

In preparation for this year's weather season, an appropriate film is on the schedule for the February meeting and there are plans to hold the annual weather watch organizational meeting the first or second week of March.

With the formal part of the meeting out of the way, Steve introduced Mr. Marvin Moss, W4UXJ of Atlanta, Georgia. Mr. Moss presented a program on the basics of various frequency counters, their internal stages, basic operation and theory. He brought several examples, all available on the general market for under \$100.00, which were displayed and examined in detail by the membership. Upon the conclusion of this excellent presentation, most of the members adjourned to the nearby coffeeshop for the unofficial portion of the evenings entertainment, coffee and shop talk.

To show you the efficiency of our local Post Office, a QSL card came in the other day addressed to Major Bailey, KA5CES, but not showing any street or other address. It took some doing, but they found the man who was to receive the card. Maj, as he is known by his friends, is completely captivated by his new hobby, he is one of our new novices.

Steve Defibaugh, KA5CRC is now getting some hands-on practice. He borrowed a general coverage receiver and seems to be spending a good deal of time listening around the HF bands.

D.L. received his new call, AJ5Q; Mike, W5VXU, completed his 80Meter WAS and is awaiting his ARRL certificate and Dwight, WB5KRH is getting ready for this year's storm season.

Members, especially our new novices are invited to let the Secretary know about their activities, favorite band, certificates being sought or already earned, projects being pursued, information being sought, etc. Keep me posted and I'll tell the world about you and Ham Radio.

Mike Schenkel, W5VXU

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## C O R A   S P E A K S

### FROM THE PRESIDENT...

One of the greatest advantages of the Collector and Emitter is its input from our readers. I've been talking to a few amateurs around the area, and they along with me seem to think we could use articles, questions and comments from even more of you. Club presidents and club editors ask for input, and often get it; but there are some possibilities for Collector and Emitter we may be overlooking that are of a general nature:

"Letters to the Editor" pretty much speaks for itself--comments, pro or con, on local, national or world-wide subjects relating to amateur radio. Once this column got a good start with some differing views and a touch of good-natured controversy, it would be something else to look forward to every month.

"Questions and Answers" needs to be handled by someone who knows where to get the answers, not knowing it all himself. This would be a matter of coordination among several "specialists" of our hobby. Anything from amp to zepp, legal, technical, emergency preparedness, etc. could be covered.

In addition to these ideas, we could develop our own local versions of Hints and Kinks, a public service calendar, net activity, an ATV column, occasional articles from our SCM, SEC, Division Director, MARS Directors and the like. It all doesn't have to be serious, either. We need humor, too.

Now all this sounds rosy, right? The catch is our reserve of amateurs willing to put their thoughts on paper. Amateurs have long been known to expound among themselves for minutes and sometimes hours upon end about their particular gripes or interests on the air. Let's put a little of that energy between the brain and fingers and see how it looks in print. Don't worry about not having a degree in journalism--that doesn't matter. What does matter is that we get off our good intentions and get more interaction among our readers.

Think about it seriously. Volunteer to help, send in a question, send in a gripe, applaud another amateur's actions, tell your favorite amateur radio story or make one up. Don't let just a few writers determine what you read. After all you are the reason C & E exists, so why shouldn't you be responsible for it? Send your input to the C & E mailing address. Contact Joe Harding, our editor, about format and other details. Let's see what you think as soon as possible, so we all can enjoy it that much sooner!

Mark Northcutt, WD5DYI

### STATEWIDE MEETING OF OKLAHOMA REPEATER SOCIETY

The Society will meet at the Holiday Inn in Enid, Saturday, Feb. 3 at 10:00 am. If you are interested in repeaters make the meeting and help the small core of dedicated amateurs who made/make them possible.



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+ + + Bill, WA5RAQ - - -

= =

## SEVERE WEATHER REPORTING CODE CHART

OKLAHOMA CITY AUTOPATCH ASSN. REPEATER 146.22/82

# CORA COLLECTOR AND EMITTER

+ + + Bill, WA5RAQ - - -

# Mid-Oklahoma Repeater Inc.

A NON-PROFIT ORGANIZATION  
OF RADIO AMATEURS DEDICATED TO PUBLIC SERVICE

Well, here it is, another month slipped away, and time to type up another article - another month & another article, maybe someone will read it if the managing editor lets it slip through.

I'm supposed to write - what? Last meeting was called because of the weather. I reckon the younger members, as well as this old man, were afraid to try driving their cars that turned into sleds on that ice! Too bad that one of the worst sins, as well as the most common and easiest to commit, is to emit four letter words that melt the ice a guy slipped on! so far, i've been lucky & fortunate, some one upstairs must have held my hand when disaster threatened, the hospitals are full of those, especially the elderly - that have broken hips and tail bones, etc. Jack Gant, W5GM, was one of the unfortunate ones and ended up in an OKC hospital with a suspected concussion. Our heart and prayers go out to him and the others.

I understand that Chuck, K5NK, MORI president, will have an article dealing with certain items of interest to the ham fraternity - I will omit any discussion of them. His knowledge is more authoritative, anyway. I understand that these are pretty important.

I was agreesbly surprised to receive some mail from Carl Drumeller W5JJ for publication in the CORA C&E. He states that, although he is a long-time member of MORI, it is the first time he has submited an item through the MORI editor. It is flattering to me to receive the article and considering his status as a technical writer with a number of ~~Ham~~ amateur magazines, I am very glad to submit his article with my mediocre contribution.

P.S.: Larry Griffin, WB5NYT, requested the following announcement be made:- There will be a meeting of the ATV (Amateur Television) Club on February 8 at the Del State Bank, SE 29th & Vickie, Del City.

George, WB5NMK

\* \* \* \* \*

KENWOOD TS120V TRANSCEIVER ANNOUNCED. - Although not yet advertised in this country, Kenwood has marketed a new and lower powered HF transceiver. The TS-120-V is small, only 9 1/2 by 3 3/4 by 9 1/4 inches, but covers amateur bands from 3.5 to 30 MHz. The full two MHz on 10 meters suits it well for use with VHF transverters.

Another feature making it useful for transverter use is its low output power, only ten watts.

But don't get the idea it's a stripped job. How do these features sound? Digital readout, VOX, break-in CW, receiver RIT, noise blanker, and the same passband tuning system used in the TS-820. And, like many other solid-state transceivers, it requires only VFO tuning. That, of course, may be a disadvantage unless your antenna system boasts a rhombic or a log-periodic! Otherwise you'd have to use an antenna tuner or accept a loss in output power if you were to deviate more than a few kilohertz from the resonant frequency of your antenna. The cost in dollars is not known, but in Great Britain it sells for 425 pounds. For comparison, the TS-820-s sells for 789 pounds.

COLLINS IS ALSO INTO SOLID-STATE HF TRANSCEIVERS - Although Collins continues to offer only their vacuum tube line of transmitters, receivers and transceivers on the Amateur Radio market, they have introduced a solid-state line for commercial use. Two of the new transceivers, the HF-281 and the HF-282, have an output of 125 watts. For

commercial use, they are channelized but can be adjusted to any frequency between 1.6MHz and 30.0 MHz in 100-Hz increments. A "clarifier" control permits excursions 150 Hz above or below the established freq.

With the HF-281, the user may select among six pre-set channels. The HF-282 offers 20 channels as well as a plug-in PROM IC to permit additional 20-channel ranges to be readily available. Each of the two new models includes a built-in ac power supply for 50 or 60 Hz 115 or 230-v operation. In addition, either may be operated from a 12-V dc power source. Optional features include VOX, squelch & noise blanker.

For operation with a variety of antennas, a companion antenna coupler, the HF-280, enables use of antennas ranging from a short whip to random-length "ling wires". It is not stated whether this matching device tunes automatically or must be manually retuned for major frequency changes.

It is not known whether Collins has any plans for putting similar equipment in the Amateur Radio market.

Carl, W5JJ

\* \* \* \* \*

USING A COUNTER TO ADJUST TUNED CIRCUITS - By using a counter and a one turn coupling loop to your GDO you can forget about the sloppy dial calibration of the beast and turn it into a precision frequency generator. Provided the coupling is kept loose its very easy to precision adjust tuned circuits and the basic idea is of course to sweep the frequency by adjustment of the GDO until a dip on the meter is indicated. Note that the coupling to the counter is very loose and is actually only the test leads of the counter clipped together over the far end of the GDO coil, as shown in fig. 1.

Perhaps a neater way of adjusting many tuned circuits, and also with a counter, relays on keeping the frequency constant and just adjusting the tuned circuit as shown in fig. 2. In this setup the counter performs a dual function. First, it indicates the exact frequency, secondly, it will indicate a definite dip, just as the meter on the GDO (with a small amount of trickery). Somewhat heavier coupling to the circuit is required, however excessive coupling isn't needed.

How can the counter indicate a dip? Well, perhaps you have noticed before that when the input signal to the counter is less than required the number of digets displayed will drop and the flicker will increase. When we rely on this principle and monitor the voltage across the coupling loop its possible to tune a tuned circuit, and we do this by tuning for maximum flicker. It's all very easy and the only precaution needed is to be sure to set the counter and signal generator level initially so that its just adequate to indicate the frequency reliably.

Bill Huffman, N5CC

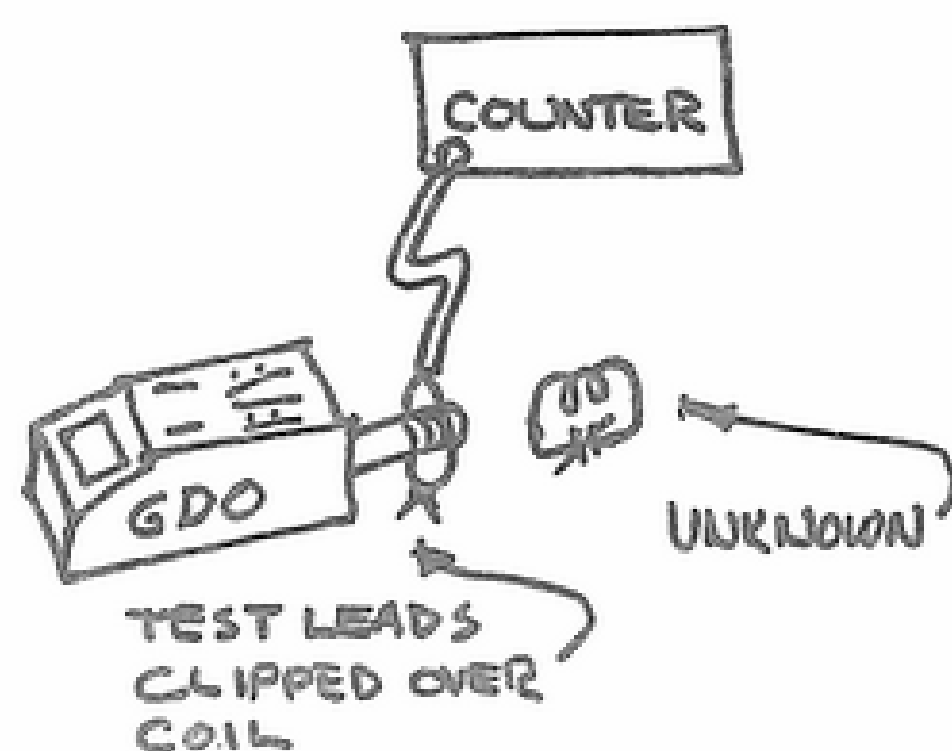


Fig 1.

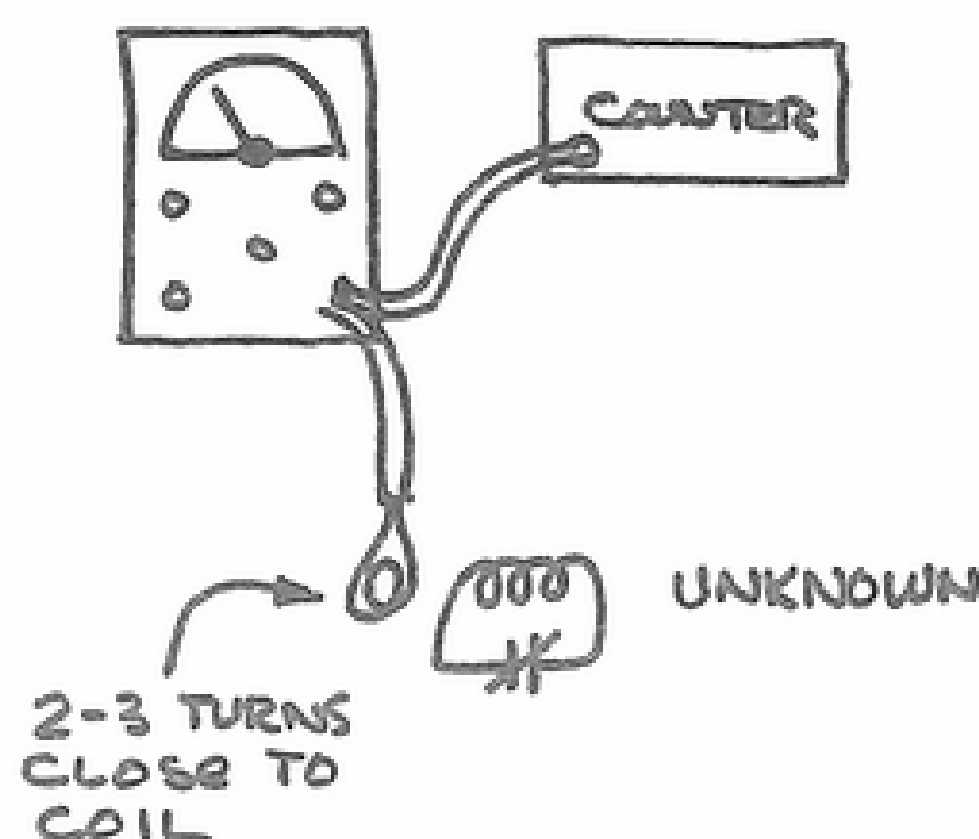


Fig 2.



I HEARD: CZN playing with his new Touch Tone.....ETB pounding brass but looking for a river to throw his key in.....ZKY telling WM he knew what he was talking about.....AZO bragging.....WD5???, WD5???, N5??? and a few others saying THREES to someone.....Come on fellows, this is not 11 meters, you are an AMATEUR RADIO OPERATOR now and it's 73, not even 73,s and sure not SEVENTY THIRDS.....UKP company overtime is driving him mad.....OZE working all those distant repeaters on two meters.....DYJ looking for DYI.....SJX talking about all of his new projects.....SVN and his daredevil exploits with his camera on the tower.....MCJ's sounder.....JJ is taking Spanish lessons and practicing at Around the Corner.....JGU and HXL talking about their eating places.....SRX and his new ATV equipment.....NYX talking about a coming blessed event.....OLO hilltopping.....ZKY was on at 4:00 in the morning looking for someone to talk to.....5Z is building a new house.....FRQ talking about HBX's new TR-7.....a fat little Okie talking to a hot water heater.....OZE and all that.....NXO going.....TY has a new rig.....Jim now has 6 letters down and working on the 7th.....MCJ has a bunch of new brothers.....DYI out looking for a job as a mechanic.....PS looking for any kind of job.....SLA was in love.....ETB actually liked cw.....OHK didn't like the dentist.....CZN talking to an XE on 2.....LLP's ignition noise.....SXJ there.....ABF, DYI, NYX playing with new TS-820s.....SRX was shot out of the saddle.....ABM was really a giant in disguise.....CNM was a beard disguised as a man.....FXP by golly.....EVO was a daddy rabbit.....VVZ working on some new phonetics.....and a whole bunch of other good stuff.

FEBRUARY MEETING: As most of you know, we have experienced all kinds of bad weather since the first of the year. As a result, we called the January meeting off. However, we plan to have the same program this next month. Bill Demand, K5SKA has a very interesting film to show about tower construction. Let's all turn out to see this film. We also are in need of a good program chairman. Keep this in mind and some of you guys railroad, excuse me, I mean let's put someone in to help come up with some good programs for our meetings.

NIGHT-OWL NET: The Night Owl Net has survived a rather disastrous period and appears to be back in full swing. The net meets each night beginning at 10:30 on 146.67. They have been averaging around 20 or more check-ins every night. If you are a night person, why not join this group. They assist motorists out and about, pass some traffic and have some good conversations. You never know what you will hear. Recently a truck driver and his wife were trying to get some sleep at a local rest area and were being bothered by the girls of the night. With the assistance of the group, the highway patrol was notified and appeared on the scene. Why not listen in and join the group.

K5NK

"Sometimes the biggest reason we never really listen to the other half of our QSO's is a shorted capacitor between the ears." -- WD5DYI

FOR SALE: Icom 22S synthesized 2 meter FM rig with manual & magnetic mount 5/8 wave mobile antenna. \$195. 11 element 147-11 Cushcraft two meter beam, \$25 Tri-bander 20-15-10 Mosley TA-33 beam. New, still in box, \$185. Larry, W5ZCG, 946-7941, OKC.

STOLEN: ICOM IC-21A, Serial No. 2570. Secret mark identification. Thief broke into house and took only this rig on 4 January. If you come across it or suspect someone call Horace Marinar, W5AY0, 842-8959

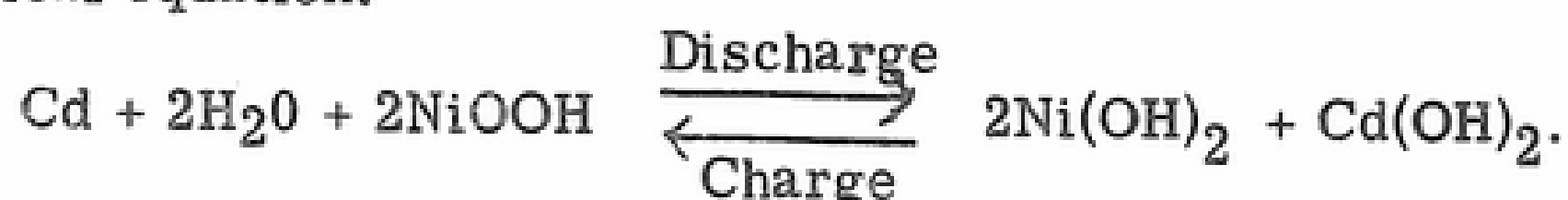
## NI-CAD BATTERIES--A POTENTIALLY ELECTRIFYING SUBJECT

One of the most common questions I am asked has to do with the care and feeding of ni-cad batteries. Without a doubt, these cells and batteries are the most common source of electrical energy in the consumer and amateur marketplace. The last article I can remember writing about Nicads appeared in the November 1976 issue of C & E at page 12. That article covered discussions concerning a few nicad myths, including "memory", cell reversal, overcharging, and a method of extending the life of Motorola HT-220 batteries by the use of a little surgery.

I own enough walkie talkies and the necessary batteries to justify a reasonable expenditure of time to research a few of the characteristics and foibles of this potentially (pun intended) interesting power source. In this article, I will briefly discuss a few of matters mentioned in the 1976 article and review some circuits and procedures for charging nicads and provide a few rules for using the batteries as energy sources. Most of my experience is with the 15 volt HT-220 batteries used in Motorola portable radios. However, it shouldn't be difficult to extrapolate to the basic 12 volt cell present in most radios.

In 1976, I cited a couple of sources for information about nicads. These are still valid in 1979. Check out 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, but I am sure that that cost has gone up.

Batteries are classified as either primary or secondary. Primary cells may be only used once. This operation generally involves a non reversible chemical reaction for the production of electricity. Perhaps the most common primary cell is the simple carbon zinc dry cell. I have seen various schemes for recharging these types of cell. For the most part, none of these methods ever return the full capacity of the primary cell. Secondary cells are made with a reversible process that allows them to be recharged over and over. The two most popular rechargeable or secondary batteries are the common lead-acid battery and the nicad battery. Nicad batteries may be either sealed or vented cells and the charge and discharge cycle may be described by the following chemical equation:



This equation describes the equation for a sealed cell. The electrodes in a nicad undergo changes in oxidation state without any change in physical condition. An important cell characteristic which results from this physical and other properties is the cell potential which remains essentially constant throughout nearly all of the discharge. In the nicad, nickel hydroxide is the active ingredient in the positive plate. During discharge, the charged nickel hydroxide, NiOOH, goes to a lower valence state (for those who remember their high school chemistry), Ni(OH)<sub>2</sub>, accepting electrons from the external circuit. Cadmium metal is the active material in the negative plate. During discharge, it is oxidized to cadmium hydroxide and releases electrons to the external circuit. During charging, these reactions are reversed. This reaction occurs in a Potassium Hydroxide electrolyte. By construction and design (making the negative plate larger than the positive plate to equalize the charging and constructing the cell so that excessive oxygen produced at the positive plate can migrate to the not fully charged negative plate and be recombined to prevent gas buildup internally), it is possible to continuously overcharge sealed cells for relatively long periods of time without noticeable loss of performance.

## DISCHARGE CHARACTERISTICS

Nicad batteries possess several remarkable and useful characteristics that make them very good power sources. The nicad's voltage remains relatively constant until very near all its capacity is discharged, at which point the voltage drops off sharply. Voltage ratings of nicad batteries are easily calculated, being multiples of the individual cell nominal voltage of 1.2 volts. Although most cells are rated at 1.2 volts nominally, it should be recognized that the discharge voltage will probably exceed 1.2 volts for the majority of the discharge period, depending upon the discharge rate. For example, a fully charged HT-220 battery is nominally rated at 15 volts typical discharge voltage, but is generally 17.0 volts upon completion of a charge cycle. Generally, I have found that the battery will hold this voltage for only a little while in normal handie talkie service and then it drops to 14.5 to 15.0 volts.

Discharge voltage is not the only characteristic that is dependent upon the rate of discharge. Cell capacity also varies with the rate of discharge. It is fairly standard to state discharge is reached at a point where an individual cell has reached 1.0 volts. Capacity is defined as the amount of energy that can be removed from a cell to reach a point of 1.0 volt in one hour. In general, at low drain rates, the available capacity of a cell is greater than at high drain rates. This means that if you do nothing but listen to your talkie and don't draw heavy current from it, the receiver will last much longer than the one hour capacity rate would indicate.

The term "C" is used to indicate a discharge rate which is numerically equal to the rated ampere-hour capacity of the cell. If something less than the one hour capacity is drawn from the cell, then it is generally spoken as a numerical fraction of the "C" rating. For example, a discharge rate of one-tenth C rate is expressed as .1C; similarly, a discharge rate equal to twice the C rate is expressed as 2C. Similar terminology is used for charging characteristics.

The equivalent circuit for a nicad battery is shown below where  $E_0$  is the equivalent cell no-load voltage;  $R_e$  is the total effective resistance or ( $R_h + R_p$ );  $R_h$  is the effective instantaneous resistance;  $R_p$  is the effective delayed resistance; and  $C_p$  is the effective parallel capacitance.

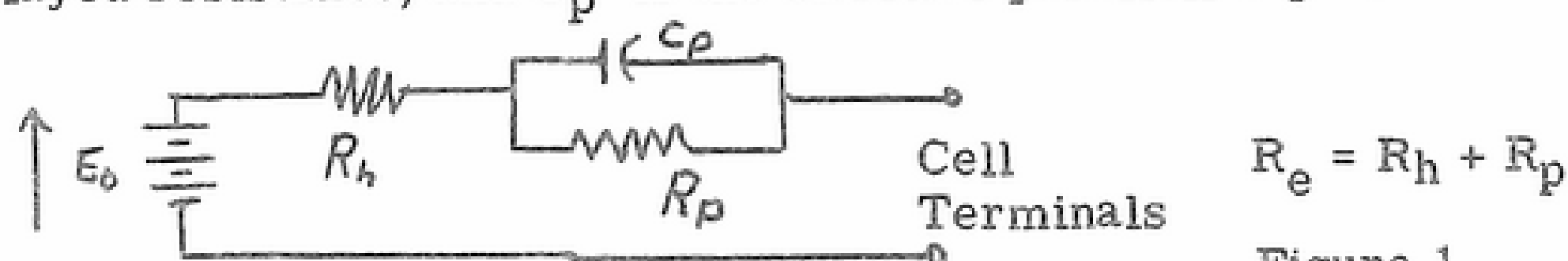


Figure 1.

Internal cell resistance  $R_e$  is composed of two resistive components in series,  $R_h$  and the parallel combination of  $R_p$  and  $C_p$ .  $R_p$  has a time constant of approximately one to three seconds.  $R_h$  is the resistive component which causes an instantaneous drop in discharge voltage when the load switch is closed and an instantaneous rise in voltage when the load switch is opened. For very short discharge periods,  $R_p$  can be ignored and the internal cell resistance is only  $R_h$ . The internal resistance ( $R_e$ ) is relatively small for a nicad battery which means that high discharge levels of 2C, 3C, or higher is possible without a substantial drop in the voltage present at the terminal. Care must also be taken to avoid external short circuiting of the battery since sustained high discharge rates will damage the battery and may create a burn or fire hazard. I will not mention the name of a hapless Dayton conventioneer who dropped an extra HT battery in his pocket upon leaving the hotel and did a quick tattoo around the lobby, dancing around until he could get the battery and the key chain it almost melted across the contacts of the battery out of his pocket. But I digress.

There are a few things to keep in mind when discharging a nicad battery. The first problem is cell reversal. There is no difficulty in discharging a single cell completely to zero. Nicads can get along quite well. However when you have a series of cells in a discharge cycle, because of the individual characteristics of each cell is different, individual cells may reach zero volts at different times which means that those cells that do reach zero first will be charged in reverse by the remaining cells. This reverse charging of the lowest capacity cells can lead to a build up of gas pressure in the cell that is reversed. Sealed cells are equipped with a safety vent to prevent explosion during gas buildup in either charge or discharge conditions. This is normally a one way vent that if required to frequently operate could adversely affect the battery's performance. For this reason, it is recommended that the discharge be terminated when the battery voltage reaches a value determined by the application voltage per cell multiplied by (N-1) minus 0.2, where N is the number of cells in the battery.

Multi-cell batteries should not be tapped to give two or more voltage levels. Again, the cells that provide energy to both voltage levels will be drained at a faster rate than the other cells which could lead to cell reversal.

The Memory Effect is another problem encountered with NiCad batteries, but not as frequently as claimed. A nicad battery is said to be exhibiting memory effect when its apparent capacity has been reduced by continuous overcharge or repetitive shallow cycling. Continuous overcharge occurs if the battery is lightly or infrequently used, and is allowed to charge over a long period of time (30 to 60 days). This shows up as an apparent drop in voltage and inability of the battery to deliver its rated capacity before the terminal voltage drops off. Repetitive shallow charging occurs if you call upon the battery to deliver less than full capacity (for example 30 or 50%) during a series of similar charge-discharge cycles. If you have called upon the cell to deliver only 50% of its capacity in frequent cycles, should you attempt to utilize the remaining 50% capacity, you may experience a drop in terminal voltage. It has been my experience that memory rarely occurs as often as suspected. There are several reasons. First, the memory effect was first discovered in the space program during the testing of batteries under constant conditions of temperature and pressure and repetitive cycling. The average amateur use of batteries just doesn't duplicate those conditions. Second, most so-called memory that I have seen is really decreased cell capacity from shorted cells and batteries nearing the end of their charge retention ability. Third, whatever memory that may accumulate can be easily eliminated by a couple of deep discharge cycles. For an HT-220 battery, you should let the battery run down using an unquenched radio until the voltage falls from the nominal 15 volts to 3 volts. (You may also use a 30 ohm, 10 watt resistor) One or two deep discharge cycles broken up by a normal charge cycle should be sufficient.

Any nicad which shows signs of repetitive apparent loss of capacity should be checked for memorization and shorted cells before being discarded. Shorted cells may be eliminated by putting a "blast" of current through the cell for just a second or so. Anything above 20-30 amps should be sufficient. When I attempt to rejuvenate shorted HT-220 batteries, I usually use a car battery and another 12 volt ni-cad that I have. I stack the two batteries in series and then make the connection to the offending cell. Sometimes it takes a couple of shots to clear the shorts. But exercise extreme caution. Too much current through the cell could cause an explosion if left too long. Rejuvenating cells by the use of high current "shots" is useful, but can be dangerous.

There are a few other matters that should be considered when working with nicads. When selecting a battery for a particular application, try to obtain the largest capacity battery without having to parallel batteries or cells. The reason is that the low internal resistance of the batteries coupled with the

variations in construction that produce uneven capacities and terminal voltages produce circumstances in which it is possible for a battery with a higher capacity or terminal voltage to "charge" other cells or batteries in parallel with it. It is practical to discharge batteries in parallel if you use a diode in each parallel cell as shown below.

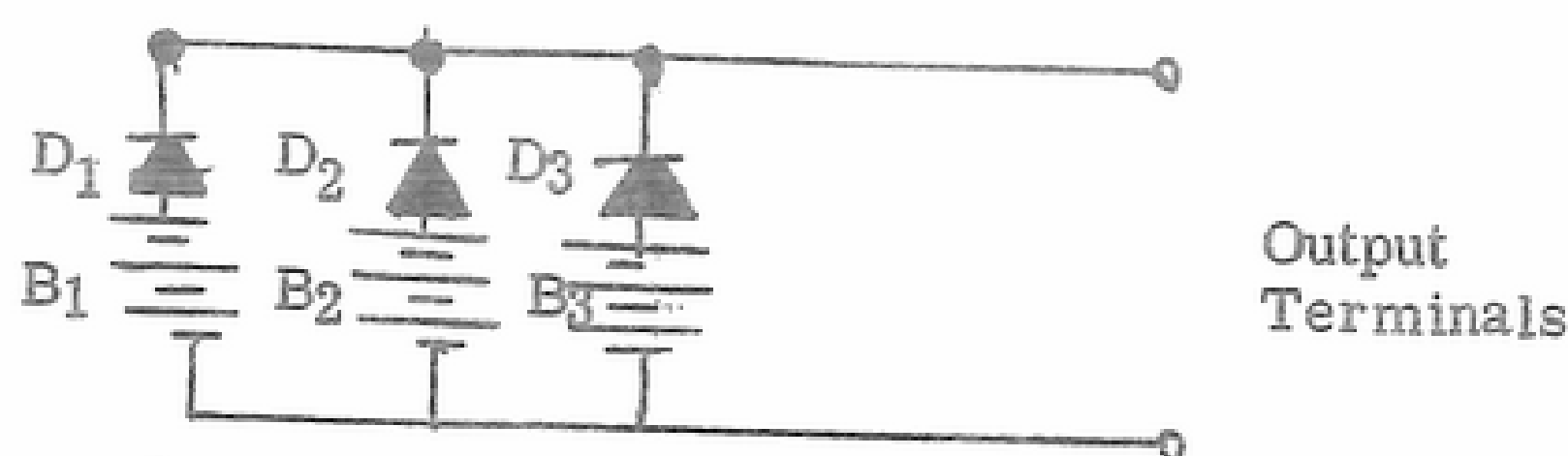


Figure 2. Discharging batteries in parallel by the use of diodes.

It can be seen that the cells will now discharge in the order of their respective capacities and terminal voltages. Current is prevented from flowing from one battery to another. Of course, it will be necessary to rearrange the diodes when charging the batteries. It may also now be necessary to place equalizing resistors in place of the diodes to equalize the charging current. Depending upon the charge rate, these resistors may be paralleled across the diodes. If you are using high charge rates and have corresponding low resistors, then the resistors should be substituted for the diodes. The best method may be to provide another separate path for charging using diodes and resistors as follows:

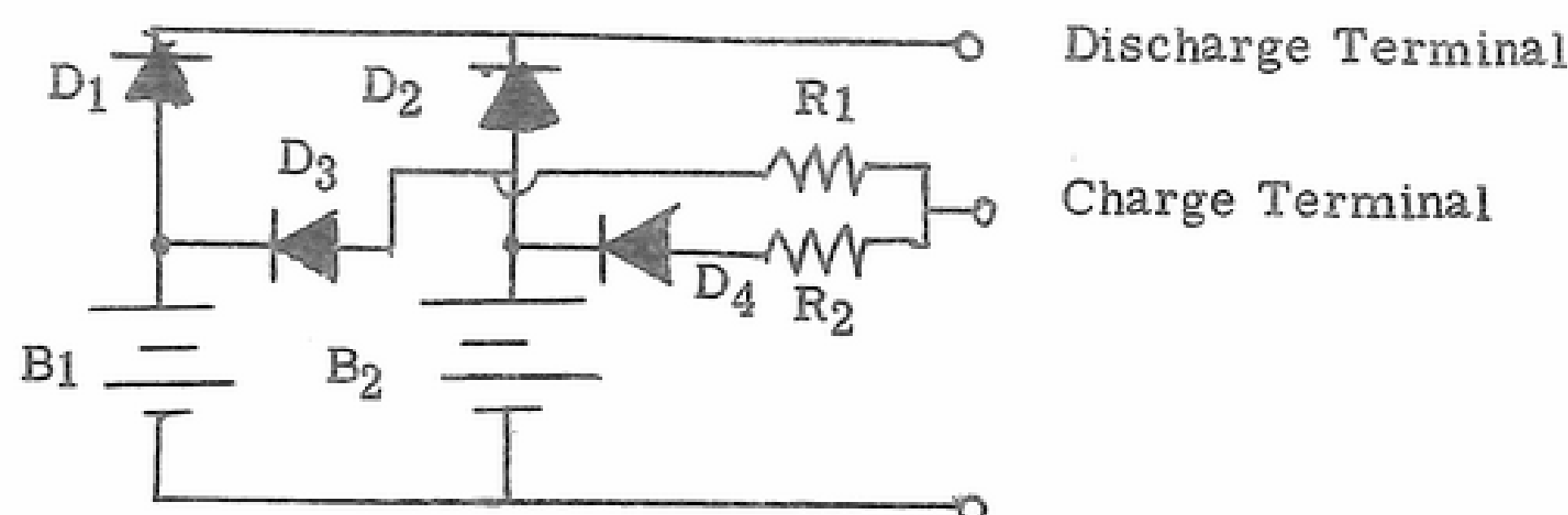


Figure 3. Charging and Discharging Circuitry for parallel nicads.

Next is a simple circuit which allows you to charge a nicad battery set in series, yet, discharge them in parallel. I can't think of an application offhand, but I think that this is a darn cute circuit:

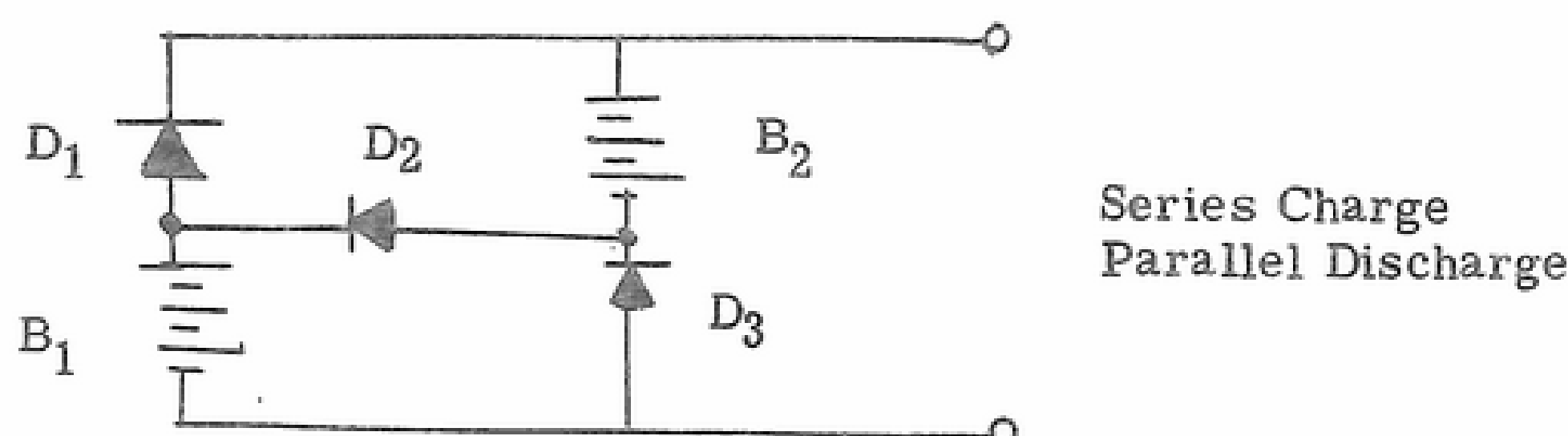


Figure 4. Series Charge, Parallel Discharge Circuit.

This circuit can be expanded to as many cells as you like. One application that just occurred to me is to use the 110 V line to charge, but obtain only 12 volts. The expansion to two or more cells is left as an exercise for our gentle readers. If there is enough interest, I will diagram the answer next month. A small hint is in order. Make sure each battery discharge path has the same number of diodes so as to equalize the voltage from each cell. The voltage of the parallel discharge path will be equal to the terminal battery voltage minus any voltage drops across the diodes.

If you must parallel nicads, then it is best to attempt to equalize the terminal voltages and capacities of each parallel cell or battery before attempting the suggestions in the previous paragraph. In some instances, you might be interested in just determining what the capacity of your battery is and whether or not it has been reduced since you got it new. Or perhaps you just bought a load of batteries in the flea market at Dayton and you want to know if you got stung. I will first describe the Motorola test procedure for HT-220 batteries and then extrapolate a procedure for any battery that can approximate the results of the Motorola test.

HT-220 Omni batteries have a capacity of 450 mils. The slimline HT-220 batteries check in at exactly half that value or 225 mils. The battery should then be discharged through a 215 ohm resistor until its load voltage is between 9.0 and 12.0 volts. The battery is then fully charged using a standard charge constant current rate of .1C for a period of 16 hours (more on charging next month). The battery is then discharged at 68° F through a 32.5 ohm resistor (65 ohms for slimline batteries) until it reaches a 12 volt discharge state (remember Motorola batteries have 12 cells in them and have a nominal charged voltage of 15 volts). The time required to reach 12 volts must exceed 60 minutes for 100% capacity. Incidentally, Motorola requires their batteries to work for at least 80% (48 minutes) before replacement.

By extrapolating the data and using some quick calculations from Ohm's law, you can see that Motorola has selected a nominal individual cell voltage of 1.22 volts per cell. I am sure that this value may have been selected empirically or after some rather heavy calculations. In any case, if you know the rated capacity of your battery and the number of cells in it, then you should select the appropriate discharge resistor as follows: Divide the rated current of the battery into 1.22 volts. This gives the resistance per cell needed to check the one hour discharge rate. Multiple this number by the number of cells in the battery and obtain the total resistance for a one hour test. For example, an Omni battery has a capacity of 450 mils. Divide this into 1.22 volts and obtain 2.71 ohms/cell. An omni battery has 12 such cells, so when you multiply 2.71 times 12, you get 32.53 ohms which is the value previously specified by Motorola. You may get several different values if you repeat the test. In this instance, you might look at the charging procedure to make sure that it is a simple 16 hour charge. You could be seeing the vestiges of a memory that you might be sending on its way. Keep trying until you get a consistent value as an indication that the memory effect is gone. This will give you an indication of the condition of the battery. If you noted that the terminal voltage is less than what should be, contemplate the old shock treatment of jolting the battery with a power line ( a multi-amp charge) surge to burn out any metallic "whiskers," that might form between the sintered plates of the battery.

Next month, I will present some simple charging techniques and schematics for some constant current chargers. As space permits, I may describe a rapid charger. In the meantime, don't forget the homework assignment on the previous page.

Micheal Salem N5MS

## WB5POW SERIOUSLY INJURED IN PLANE CRASH

Many of you may already know that Larry Stewart was very seriously injured in a plane crash on January 18, 1979. Larry is presently in serious condition in the Intensive Care Unit at the University Hospital in Oklahoma City. At press time, he has shown only slight improvement and has not regained consciousness since the accident. I can not state in any small way how this has affected me and his many friends. Larry is a good friend and generous donator of his time to many friends and causes. I can only hope that he will improve and overcome this terrible incident. I believe that he has the courage and strength to do it.

Micheal Salem N5MS

## CB RAIDS REVEALED--FCC STRIKES BACK

A recent story in a large local newspaper revealed that the FCC seized about \$200,000 worth of CB linears at Porter from Brewer Laboratories. An FCC spokesman said that more than 440 of the amplifiers were seized by U.S. marshalls acting under the direction of the United States Attorney in Muskogee. Assistant United States Attorney John Osgood said that the raid was part of a nationwide enforcement effort aimed at ensuring that the manufacturing and selling ban enacted April 28 by the Commission is enforced. The maximum penalty for violating the linear amplifier is a \$10,000 fine and one year in prison.

It also appears that the Commission is examining the misuse of the Citizen's Band in the light that it constitutes a crime involving radio to the extent that it might bar any chance the CBer might ever have of holding an amateur license. A recent newspaper article detailed the story of a Baltimore CBer who recently pled guilty to operating with excessive power in Federal Court. He was fined \$100 and was banned from ever holding any type of amateur license. In addition, the government agreed not to charge him with 30 other violations and he was to forfeit \$900.00 in radio equipment. This is one bad dude who will, thankfully, never have an opportunity to appear on the amateur bands.

Actually, this is nothing new. Question No. 20 on the Form 610 has always required a statement regarding criminal convictions involving the use of radio. The instructions for answering the question are quite comprehensive in requiring a complete explanation of the crime charged, sentence imposed, probation, present occupation and employment, and whether or not the crime committed involved the use of any radio facilities. Of course, I would like to see many more CBers who operate illegally caught and banned from the ham bands for 10 years or more, but I don't expect a big net to drop, yet.

Micheal Salem N5MS

## TECHNICIANS TO GET OPERATING PRIVILEGES IN OKLA!?

My OU English Department correspondent, Vince Liesenfeld KØDKR, called the other day to report that a bill was introduced into the Senate of the Oklahoma Legislature which might affect amateur interests. The Short title as quoted in the paper was as follows:

SB169 --Wolfe, Allowing persons with technician class rather than general class of the Federal Communications Commission License to operate an amateur radio station and to receive special vehicle license plates.

Foolish I thought that Technicians could already operate amateur radio stations



in Oklahoma, but if they haven't been able to, then I am glad that they are going to get to. I am sure that there may be a few problems with the attempt by the State to preempt the Federal Communications Commissions decisions in this area, but I can't see any problems if the State of Oklahoma also wants to grant permission to Technicians to operate amateur radio stations. There's just one thing that bothers me and that is I wish they would also include Amateur Extra Class licensees in the bill so I can stay on the air. I have a small fortune in radio equipment I would like to continue to use.

Actually, I think that one of the newspaper reporters might have garbled the wording of the Bill just a little bit. But this is a welcome piece of clarification in the law. There has been some question in my mind whether or not Technicians could get call letter plates. I know several who have, so apparently the Oklahoma Tax Commission doesn't think that it is any problem. My only great fear is that if the Legislature pays any attention to this area of the law affecting amateur radio, they might screw it up somehow. Sometimes it is best to let them pass a law and then keep it out of their sight for as long as possible. We should be vigilant to make sure nothing goes wrong.

Micheal Salem N5MS

#### A CLEAN BREAK DEPARTMENT

Elsewhere in this issue of C & E appears the first part of an article about nicad batteries. I decided that it was time to expound upon this most useful source of potential energy. Ordinarily, the diagrams and drawings that I usually include in my articles are very professionally done by an extremely talented draftsman (ahem), me. In this issue, I farmed the work out to an incompetent dolt with a broken arm (ahem), me. For those who would prefer full size (poster size) drawings of the diagrams used in the article, send 25¢ in coin to Merkle Press, Washington, D. C.

It is true, however. I did break my arm this past week and it has slowed down the preparation of this month's material. I do not intend to say where I broke my arm (except to say above the wrist), but it will suffice to say that I was not (a) Drunk, (b) Fighting, (c) Chasing wild women, I merely (d) Fell down. I must now cope with going to bed plastered every night for the next six weeks, getting dressed with one hand tied in front of my back and typing a C & E article at a mere snail's pace. Needless to say, my already poor draftsmanship suffers immeasurably when the right arm is immobile from the middle of the palm to above the elbow. That's correct, I am righthanded.

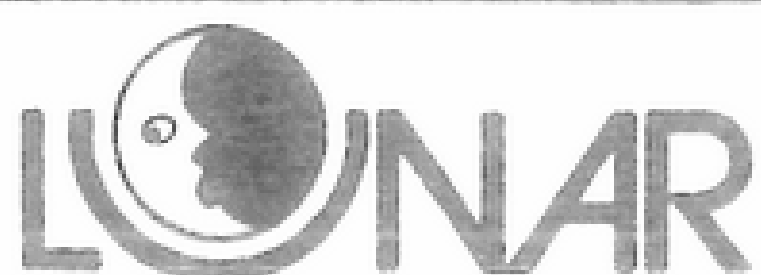
Please bear with me. C & E stuff may not be quite the same for the next couple of months. However, I expect things to return to normal in a few months. I asked the doctor if I would be able to play the piano when the arm healed. He said sure. I said, "That's funny, I never could before." He didn't laugh.

I don't disparage the medical care I got, but it was quite expensive. A few X-Rays in the Emergency Room and an examination came to over a \$100. Well, as they say, "That's the breaks."

Micheal Salem N5MS

FOR SALE: Be the first on your block to own a VHF Motorola HT-220, D Series Board. The price is negotiable, and options may be added to suit you. The radio is presently a single frequency omni with a lot of class. Also for sale, a mint late Model Swan 350 transceiver with 117XC Console Power Supply and VX-1 Plug-in Vox. Very Clean, all for just \$400. Call Micheal Salem N5MS at 321-5453 or 360-1302 for more details.

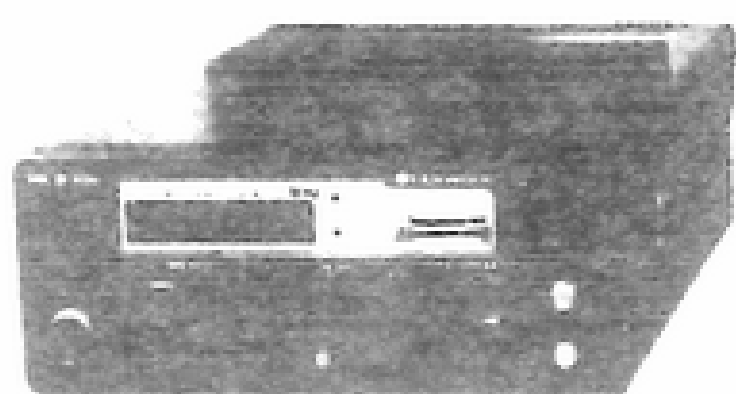




28-432 LOW NOISE FIGURE  
RECEIVING PREAMPLIFIERS

AMATEUR RADIO  
LINEARIZED AMPLIFIERS

Kenwood TR-7400  
Transceiver PLUS

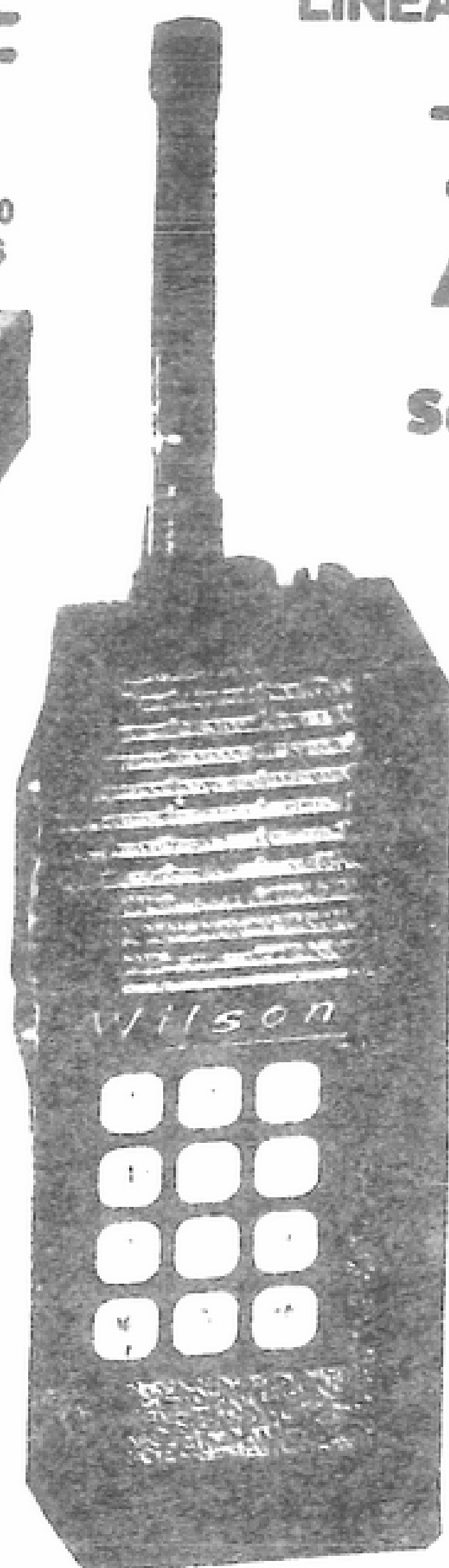


TET  
ANTENNA

Super DX Series



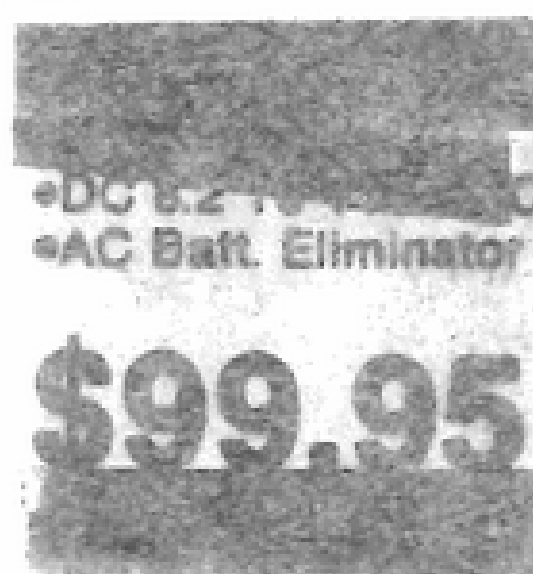
The AUTO DIALER



*Illustrated with  
optional Chomaries  
or Digitran Touch Pad.*

DSI

FREQUENCY COUNTER



•DC 8.2-10-100-1000 C  
•AC Batt. Eliminator

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Wilson

2.5 watt MARK II and 4.0 watt MARK IV  
amateur hand-helds

BRODIE ELECTRONICS COMPANY

2537 Edgewood Drive  
Moore, Oklahoma 73160  
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## RANDOM WORDS FROM THE PRESIDENT

The regular meeting of the Aeronautical Center Amateur Radio Club was held Jan. 12. This was a week later than normal because of bad weather. We held our annual election of officers, when the final vote was counted the results were for President was BOB PACE WA5CJG, Vice-President BILL OLIVER K5KDR, Secretary BOB GRAHAM WB5NSV, and the Treasurer is SAM GOVER WA5WHO. Also elected to represent the associate membership was JIM BUSWELL.

I would like to take this opportunity to thank the 1978 officers, and the Board of Directors for the fine job they have done in conducting the business of our club. I would also like for each club member to shake the hand of another club member and say thanks for coming to the club meetings and thanks for making our club one of the best in Oklahoma.

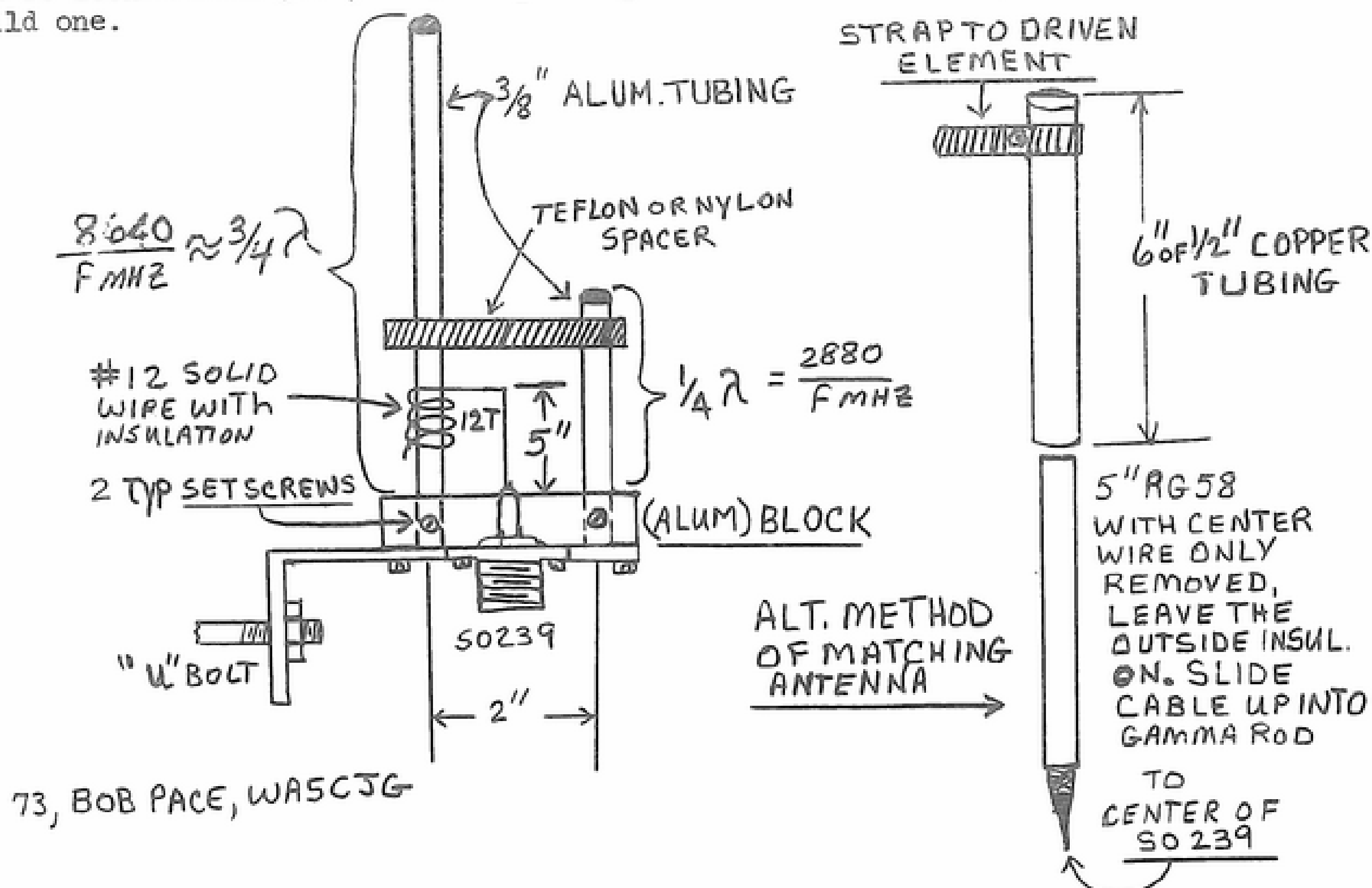
During 1978 "ACARC" took two big steps, one into the world of micro computers, and one into the repeater world. The computer is now having the names of all member clubs of "CORA" loaded, so the address labels for the Collector and Emitter can be addressed by the computer.

The 25/85 repeater now has a one minute no signal timer on the auto patch, what this means is if you make a call through the auto patch and you do not talk at least once each minute your call will be disconnected and the repeater returned to normal operation. Remember our repeater is an open machine and we invite everyone to use it, the only thing we ask is that you obey the rules of the F.C.C., and no business calls on the auto patch please.

73, BOB PACE, WA5CJG.

## QUICKIE VHF/UHF ANTENNA.

A month or so ago Don WD5GWH was over visiting, and was telling me about the antenna he is using on his 2 meter mobile rig, so we went out side and took a look at it and it looked real good, so I am putting it in the C&E for anyone who would like to build one.





W5PAA

# Minutes of the Aeronautical Center Amateur Radio Club - Jan. 1979

The meeting was called to order at 8:04 P.M. by President Graham. There were 23 members and guests present. A round of self introductions was held. Bob reported that the Amateur Radio class at the Red Cross is off to a good start. He also reported that we still are very much in need of some help to sit at the computer console and enter names for the C&E labels. Bob Pace reported that the repeater is in good shape, and working well. A discussion followed on repeater autopatch regulations and irregularities. A special Thank You to John Ivers, WA5IFR, is due for his help in maintaining our repeater.

A motion was made and vote passed to allow Associate members to vote in the officer election at this meeting. A motion was also made and vote passed to change our constitution to make the job of Secretary, and Treasurer into two jobs for two men. Election results follow:

President	Bob Pace, WA5CJG (by acclamation)
Vice-President	Bill Oliver, K5KDR
Secretary	Bob Graham, WB5NSV
Treasurer	Sam Gover, WA5WHC

The associate members present elected Jim Buswell as their Associate Assistant to the President.

Bob Pace assumed his new position as president and presided over the remainder of the meeting. He asked that all members be advised by way of the C&E that the constitution is being changed to separate the Secretary and Treasurer positions. Bob also asked that those interested in helping in the upcoming S.E.T. exercise, contact Charlie Greene, WA5JGU, (Red Cross Communications Officer).

Paul Asplin, WA5HTL, reported on Ham Holiday progress, and expressed that much help is needed in our efforts concerning the Lady's program. The meeting was adjourned at 8:55 P.M. for coffee and doughnuts.

Bob Graham, WB5NSV, Secretary

EXCITING NEW DEVICES THAT REDUCE RADIO FREQUENCY INTERFERENCE are described in the February issue of QST. INCONs are inexpensive wire-wound coils that effectively reduce the complexity and cost of radio frequency interference filters.

Inventors A. C. Doty, Jr., K8CFU, along with Michael Scherga, Professor of Electronics at Wayne State University, have coined the name INCONs for their electronic components that are both INductor and CONDenser (capacitor) in one. Dr. Alan Macnee, himself a former Ham Radio licensee, now in the Department of Electrical Engineering at the University of Michigan, has undertaken the initial design studies of the devices.

The use of INCONs in RF filters can mean up to 50% reduction in the number of parts required to eliminate RFI in various electronic circuitry such as TV, radios and other home entertainment devices.

Heretofore, the cost of electronic parts for a receiver to reject unwanted signals from nearby two-way radio transmitters has been a few dollars. Assumant that most of their receivers will not be placed in such an environment, manufacturers have hesitated to include such such parts, feeling that many consumers would be forced to pay for extra circuitry. The subject has been a matter of much debate in Congress, the U.S. Senate and the Federal Communications Commission. INCONs, a technological breakthrough, make it possible to include the necessary rejection circuits for a fraction of a dollar, thus proving that through scientific experimentation the Radio Amateur has once again succeeded in improving the art of communication.

\* \* \* \* \*

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FEBRUARY HAM HAPPENINGS						
SUN	MON	TUE	WED	THU	FRI	SAT
				① MEETS 1	ACARC MEETS 2	OKLAHOMA REPEATER SOCIETY 3 ENID
4	46 YEARS AGO TODAY, JOE & FRANCES WERE 5 MARRIED	MORI MEETS 6	7	ALTUS, ATV & CHOCTAW 8 CLUBS MEET	9	10
11	12	76 ETS MEET 13	14	① MEETS 15	VHF CLUB MEETS (SWAP MEET) 16	17
18	EDIT C/E 19	AUTOPATCH MEETS 20	21	22	23	24
25	AUTOPATCH MAILS C/E 26	CORA MEETS 27	28			

See page 2 and/or individual club sections for details

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