CENTRAL OKLAHOMA RADIO AMATEURS
COLLECTOR AND EMITTER

50¢

VOLUME 10 AUGUST 1984 NUMBER 115

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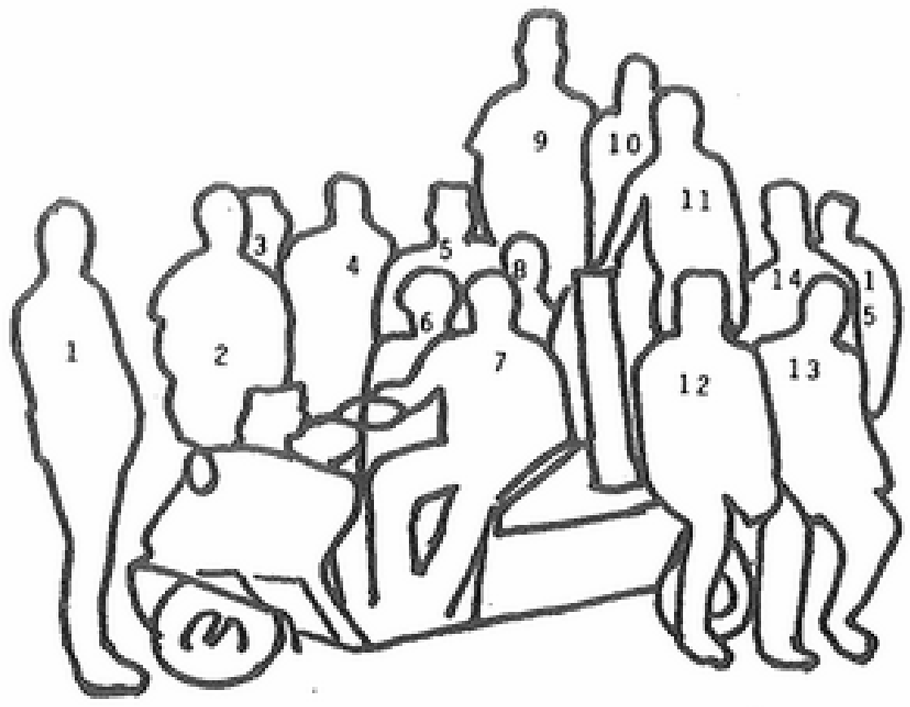
Parade Communications

HELPING COORDINATE STAGING AND CONTINUITY of the Oklahoma City Independence Day Parade were members and guests of the Edmond Amateur Radio Club. The sign added to the cart says, "Public Service Communication--Edmond Amateur Radio Club--VHF & UHF FM HAM RADIO".

--STORY AND MORE PHOTOS, PAGE 4



ON THE COVER: Here's a photo key to identify the operators:

(1) Mike Ketchersid, KA5JFT*
(2) Art Roberts, W1GOM
(3) Joe Garland, WA5FLT
(4) Joe Buswell, K5JB
(5) Stan Van Nort, WB5UIY
(6) Kay Northcutt, WD5DYJ
(7) Mark Northcutt, WD5DYI
(8) Aaron Van Nort, WB5UIY's Harmonic
(9) Wendell Cocheran, WB5ISO
(10) Jim Shideler, WB5YWO
(11) Bob Shaw, WA5BQX
(12) Bob Moore, KA5ETA*
(13) Larry Hazelwood, W5NZS
(14) Ray March, WD5BDW
(15) Mike Moore, N5DZW
Not Pictured: Leo Neyer, KØLOT
* Guest operators

WHEATSTRAW 01-61 ARC ®

As of now we are looking forward to the picnic at Canton Lake at the Canadian shelter the second Sunday of August at 1:30 (covered dish dinner). Everyone invited. Mooreland, Woodward etc. have promised to be there, so we're looking for a real good group.

The Wheatstraw Field Day was enjoyed by several and as the hamburgers etc were ready to eat it began to rain (cats & dogs) so about 15 tried to get into the CD bus to eat, had lots of fun doing that.

Our summer activities have been several outings but did have the July meeting in El Reno with 27 there.

As I'm writing this news, I'm at Ham Holiday at Okla City. There has been a real good group here, around 1000 and nice dealer displays and a large flea market.

See you next month at Canton.

Marvin, WA5JHB

WHEAT STRAW RADIO CLUB
CALUMET, OKLAHOMA

Mike Kramer KA5NUP

146.025 / 146.625 REPEATER

FEEL FREE TO USE IT

THESE CORA MEMBER CLUBS PROMOTE AMATEUR RADIO

1 AERONAUTICAL CENTER ARC
MEETS: 7:30pm First Thursday Flight Standards Bldg., FAA, S. Macarthur

PR	WB5SVN	Jack Iman	677-8537
VP	N5ABL	Holly Holcomb	799-2539
Sec	WD5JPW	Gloria Seignious	722-1740
Tr	WA5CJG	Bob Pace	376-3569
EDITOR: Gloria Seignious, WD5JPW			722-1740

2 OKLAHOMA CENTRAL VHF CLUB
MEETS: 10:00am Third Saturday. Red Cross. 10th & Hudson(Back door) Okla City.

PR	KD5IS	Jerry Wetmore	524-5080
VP	KA5MYY	Chris Sartorious	728-0058
SE	K5JB	Joe Buswell	732-0676
TR	W5KE	Ellard Foster	789-6702
EDITOR: Joe Buswell, K5JB			732-0676

3 MID-OKLAHOMA REPEATOR, Inc.
MEETS: 8:00pm First Tuesday. Okla City EOC. 4600 N Eastern

PR	N5EPV	Bob Allen	Unlisted
VP	WD5ISS	Don Saunders	751-0404
SE	N5BEQ	Jim Buswell	236-0368
TR	W5KOZ	Sid Gerber	737-1050
EDITOR: Susie Atkinson, KA5FED			842-8014

4 OKLAHOMA CITY AUTOPATCH ASSOCIATION
MEETS: 7:30pm Third Tuesday. Okla City Fire Training Center. 800 N Portland

PR	WB5NDO	Kathey Whited	799-1457
VP	WD5CSM	Dennis Patterson	495-0769
SE	N5DLM	Vicki Adkins	722-6195
TR	KE5M	Ron Recer	341-7030
EDITOR: Kathy Whited WB5NDO			799-1457

5 OKLAHOMA UNIVERSITY AMATEUR RADIO CLUB
MEETS: 7:30pm Second Tuesday (Sep-May) 119 Wilson Center. 1334 S Jenkins

PR	KA5BAY	Luke Noah	325-1775
VP	KE5N	John Wustenberg	325-2382
SE	KA5COI	Peter Richeson	329-3217
TR	KA5LZN	Greg Smith	366-1641
EDITOR: Greg Smith, KA5LZN			366-1641

6 ALTUS AREA AMATEUR RADIO ASSOCIATION
MEETS: 7:30pm Second Thursday
North Main Fire Station (CD) Altus

PR	W5CCV	Joe McDonald	782-3454
VP			
S/T	WA5CBF	Loren Simms	477-0921
EDITOR: Loren Simms, WA5CBF			477-0921

7 BICENTENNIAL (76ers) ARC
MEETS: 7:00pm Second Tuesday. OG&E Bldg. SE 3rd & E. K. Gaylord Blvd.

PR	AE5M	Donald Duck	691-4199
VP	WD5JNT	Ted Vanlaningham	262-1675
SE	N5AUH	Jerry Sproul	354-2061
TR	WA9AFM	Tom Webb	737-6716
EDITOR: Jim Seals, KB5XN			381-2005

9 WHEATSTRAW AMATEUR RADIO CLUB
MEETS: 2:30pm Second Sunday. Location varies. See club section.

PR	KA5DUO	Leo Peil	886-2998
VP	WA5FLT		
S/T	K5GGL	George Maschino	263-7614
EDITOR: Marvin Stokes, WA5JHB			893-2221

13 KAY COUNTY AMATEUR RADIO CLUB
MEETS: 7:00pm Third Thursday
Ponca City EOC

PR	KA5PYG	Paul Davis	765-2227
VP	WA5UBO	Marsh Pronneke	363-2526
S/T	WB0VHC	Harvin Cullison	762-3981
EDITOR: Dave Land, KD5FX			762-8616

14 CIMMARON AMATEUR RADIO ASSOCIATION
MEETS: 7:00pm Second and Fourth Mondays
Place varies. See club section.

PR	WB5ECM	Dennis Painton	764-3595
VP	N5FUP	Steve Schoonmaker	886-3274
SE	N5FMH	Nadine Painton	764-3599
TR	N5FUR	Ruth Simpson	227-2791
EDITOR: Major Bailey, KI5P			227-2061

15 SOUTH CANADIAN AMATEUR RADIO SOCIETY
MEETS: 9:30am Second Saturday. Red Cross Bldg., North OU Campus. Norman

PR	KA5MIZ	Bob Rabin	360-6996
VP	KA5EFJ	Ken Neptune	321-7789
SE	WD5GTC	Gene Johnson	321-6759
TR	N5BEW	Ken Esadoah	329-4667
EDITOR: Sam Barrett, WA5RPP			321-2601

16 EDMOND AMATEUR RADIO CLUB
MEETS: 7:00pm First Thursday. See club section for location and type.

PR	WB5UIY	Stan Van Nort	Unlisted
VP	WB5MLX	Glen Cochran	942-7[illegible]8
S/T	WD5DYJ	Kay Northcutt	755-4672
EDITOR: Mark Northcutt, WD5DYI			755-4672

18 GREAT PLAINS AMATEUR RADIO CLUB
MEETS: 7:30pm First Tuesday
Civil Defense room, Woodward courthouse.

PR	WA5PLW	Windle Hatchett	766-3561
VP	W5KEK	Lewis Patterson	
SE	K5YZK	Jim Phares	254-2319
TR	KA5SDE	James Rockhold	
EDITOR: Jim Phares, K5YZK			

10 EDMOND AMATEUR RADIO SOCIETY
MEETS: Varies. See club section

PR	KBØOU	Cal Callison	751-3620
VP	WA5ZGM	John Keeling	340-1253
S/T	KC5GN	Bill Wright	341-6076
EDITOR: John Keeling, WA5ZGM			340-1253

20 ARDMORE AMATEUR RADIO CLUB
MEETS: 8:00pm First Wed. Red Cross Bldg. Informal, 8:00pm other Weds. 221 9th NW

PR	WB5VBK	Fred Innis	223-1709
VP	WD5FZD	John W Merlyn	223-9543
SE	W5JCX	Jim Chilcoat	226-6816
TR	W5BLW	Charles Dibrell	226-0589
EDITOR: Glen Hamilton KE5ES			226-4379

CENTRAL OKLAHOMA RADIO AMATEURS, Inc.
MEETS: 7:30pm Fourth Tuesday. OKC Fire Training Center. 800 N Portland

PR	WN5NWX	Reggy Whited	799-1457
VP	K2GKK	D. C. Macdnald	672-4947
SE	N5BEQ	Jim Buswell	236-0368
TR	WD0FTM	Linda Callison	751-3620

CORA Collector & Emitter (USPS 116-150) is published momthly ny CORA Inc., 1020 Arthur Dr, Midwest City OK 73110. SECOND CLASS postage paid at Oklahoma City OK
SUBSCRIPTION: CORA members $3 others $6 yr.

POSTMASTER: Send Form 3579 to:
CORA C&E, P.O. Box 15013, Del City OK 73155

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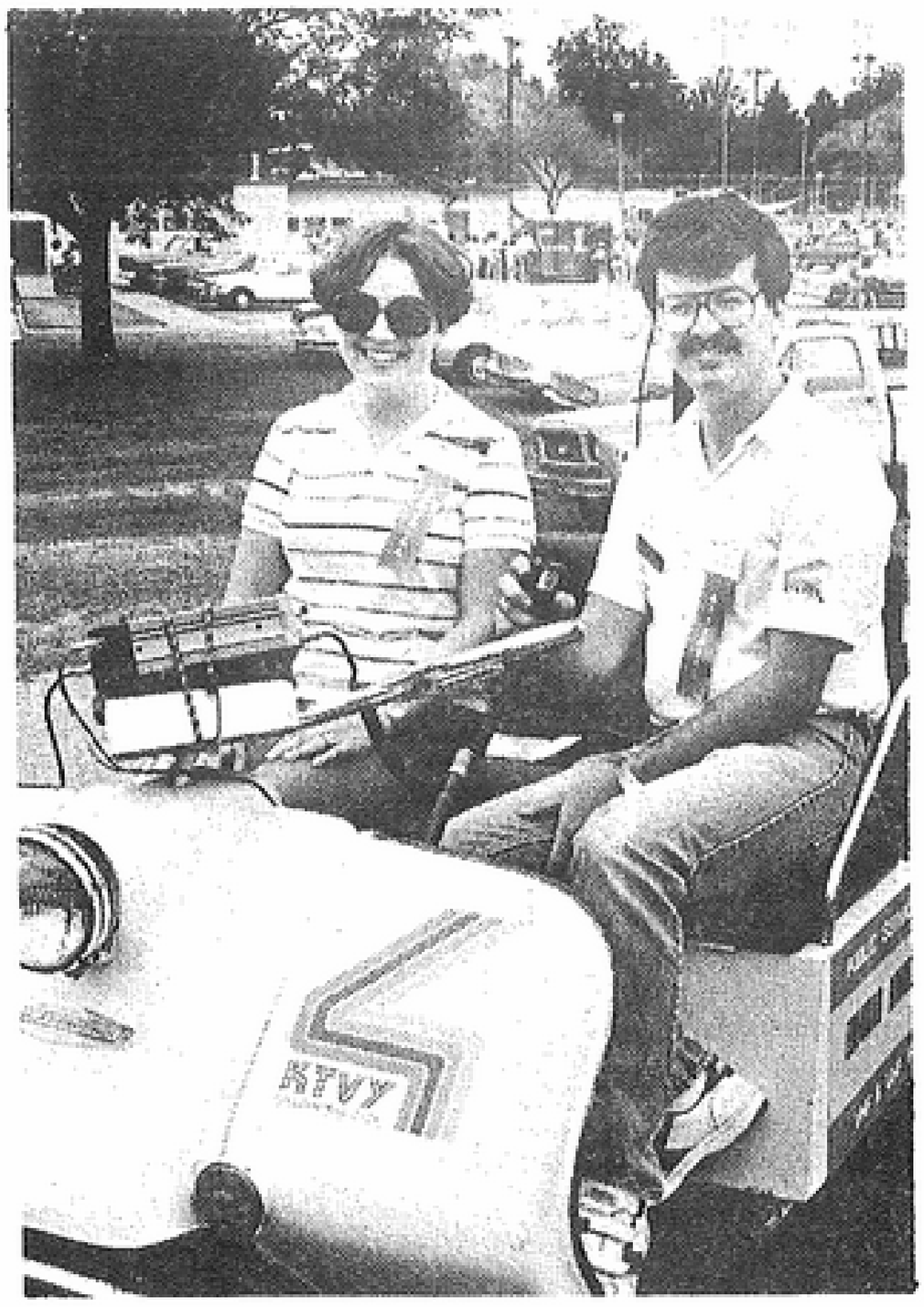
COVER STORY



45 WATTS ON TWO METERS was a feature of this electric cart, a handy addition to coordination of activities. Aboard are Kay Northcutt, WD5DYJ, and Mike Ketchersid, KA5JFT.

Edmond Amateur Radio Club members and guest operators participated in Oklahoma City's Independence Day Parade on July 4th.

The Club's primary objective was to assist in the staging of entries. This effort involved placing each entry in its assigned order before the parade began. One-hundred, sixty-one entries were logged for the march up Classen Boulevard.

The parade route was from N.W. 18th Street to N.W. 36th Street on Classen Boulevard, where the parade ended with a celebration in Memorial Park.

Staging all the entries involved two large parking lots and curbside space. Entries started arriving at around 8 a.m. for the 10 o'clock parade.

After all the entries were in proper order, the ham operator's attention shifted to the orderly progression of the parade itself. The hams placed themselves along the route to spot and solve problems along the way. Gaps between entries and crowding of entries were quickly spotted and relayed via two meters to nearby hams who corrected the problems.

Jim Shideler, WB5YWO, and Joe Garland, WA5FLT, were located at the point where the staged entries funneled-out onto the street. Any changes in order, dropped or added entries were then relayed by Shideler and Garland to Kay Northcutt, WD5DYJ, who was stationed at the official reviewing stand. Changes were then given to the public address announcer for an up-to-date commentary as the entries passed.

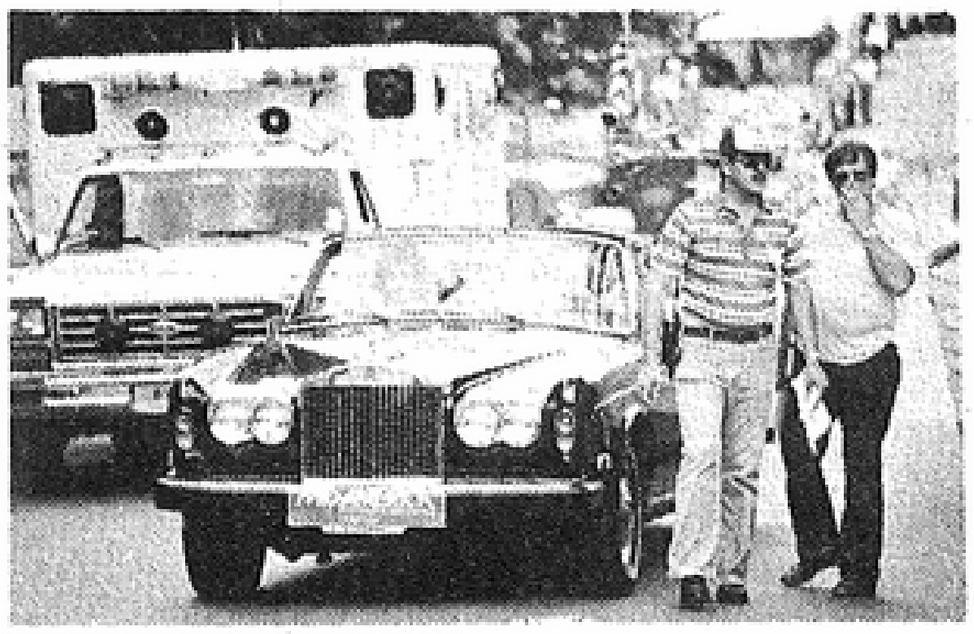
Edmond Amateur Radio Club
P.O. Box 70262 / Okla. City, Ok. 73147

Of great help this year was an electric utility cart, loaned by television station KTVY, Channel 4. The cart enabled EARC members to shuttle up and down the parade route to take care of any problems during the parade. Mark Northcutt, WD5DYI, and Mike Ketchersid, KA5JFT, employees of Channel 4, obtained the cart's loan. The cart included a Kenwood TR-7950 two meter transceiver and a Larsen 5/8 wave magnetic mount antenna, possibly making it the first ever 45 watt golf cart!

POINTING THE WAY to either his apartment or the staging area (we'll never know the truth) is Joe Garland, WA5FLT, and an unidentified Young Lovely.

This is the fifth year EARC has participated in the parade activities. Parade Marshall (the working title, not the honorary one) for the last five years has been Stan Van Nort, WB5UIY, President of EARC. Stan's involvement in the parade has spanned the last nineteen years, in which he has assisted his father, Turner Van Nort with Parade Marshall duties.

The club's 147.63/.03 two meter repeater was used extensively during the two hour staging and two hour parade. This was the first time the '03 machine had been used for the entire operation. Communications were also augmented on 2 Meter Simplex and on 70cm FM.



"DON'T CRY, ... you can drive the Club's car in next year's parade." Stan Van Nort, WB5UIY, and Leo Neyer, KØLOT, with an entry in the parade.

Official Sponsors of the parade were: Our American Heritage Committee, Classen Beautiful and Enterprise Square, U.S.A. The Edmond Amateur Radio Club was presented a plaque for its contribution to the parade by the sponsors.

The Independence Day Parade this year was the biggest in its 21-year history. Sponsors are already working on next year's parade, in which over 200 entries are expected. Among the "people in the background" next year will be members of the Edmond Amateur Radio Club!

Club
NEWS

WILOT

Minutes of July Meeting

There aren't any. We went to Ham Holiday instead. Hoo Boy!

August meeting will be a watermelon party with our brothers and sisters of the Aeronautical Center ARC. It will be Saturday, August 25, at 6:30 to 8:30 P.M. at the West shelter, Bethany (Lyon) Park. Lyon park is located North of the intersection of N.W. 36th and Glade, which is between Council and Rockwell.

Bring eating tools, newspapers and appetites. See ya there...Joe, K5JB, Sec'y

Ham Holiday 1984 - Thanks!

Ham Holiday 1984 is just over and I am just starting to get something together for the C&E. It was a really good Ham Holiday and applause is in order for those many people who put in long hours of hard work to make it a success. Some years ago I was program chairman and I have complete understanding of the sacrifice made to insure things run correctly. Those people who volunteer for the various committees miss the whole thing in order that we might enjoy ourselves. You aren't going to hear me complaining about anything (except the one-day flea market...you know how I am about fleas). Thanks everybody.

I know I am speaking for a lot of folks who might not have an opportunity to pat you on the back and shake your hands. We really do appreciate it!

The big issue of the year seemed to be the one of facility. I don't think there was any question about the superiority of the hotel as a convention site. As I recall, one of the compelling reasons for the switch to the Myriad was need for more room. I was unaware of any problems with insufficient room this year (except maybe in the one where the Packet Radio program was held, HI!). I think HH was about the right size. If it had been any bigger, there would only been more that I would have missed.

I particularlly liked the Hospitality room idea. The readily available coffee, pastries, conversation and seating were a winning combination. After all, one of the most attractive features of a Hamfest is the opportunity for meeting old and new friends of the far reaching airwaves. What can be nicer than such surroundings to enjoy those meetings? It certainly saves wear and tear on the feet!

During one of those meetings I was delighted to hear Dan, K5CAY, and Pete, K5OXE, relate the preparations and execution of the Owen Garriot, W5LFL, contacts from Enid. Both of those guys, you might recall, managed two way contact with Dr. Garriot. The stories included those of frustration experienced during the first scheduled contact when they just couldn't get the timing right. When things finally sorted out, the space craft slid out of range. Later tape listening confirmed that when they got their chance to transmit, signals were just fading off the edge of the earth. The media had been tipped off that there was a good chance for a contact and were there in force. I listened to Dan and Pete and compared their stories to the many hunting stories that turn out the same way...in that field, it is called "Buck Fever", and that is part of what makes it fun.

Pete got a long distance telephone call from a well known contestant and "big gun" who was looking for an inside track. Pete got the chance to give him the run-around. I heard Dan one morning on the Enid 94 repeater, just prior to his successful contact, comment to someone who was tring to pry some hints ... describing his elaborate tactics and unsuccessful attempts. "Golly Bum!" sez Dan, tongue in cheek. One couldn't have pried a hint out of him with a tire tool!

I went to Al Markwardt's (W5PXH) program, "Call 'em Line Flatteners" with a quiver full of slings and arrows because of the chosen name of the program. Radio frequency Impedance Transformers (What's wrong with the term "Match Box"?) don't flatten any line except the one between the RF generator and the device. On the air one hears so much misinformation from those, as Carl, W5JJ, would put it "Self proclamed experts reared back on their haunches braying ..." about the "truths" of antenna and transmission line theory. Well, Al redeemed himself when he described how everybody was doing fine before the SWR meter was invented! He put on a very good talk from a historical perspective and development of methods for coupling transmitters to antennas. He also made an extremely important point that there are so many variables that affect antenna performance it is nearly impossible to discover any absolute truths. He then went on to ignore his own advice and explain how he discovered a quad worked better than a certain Yagi by comparing results with his buddies three months later. Hell, in my experience, three minutes later is a whole new ball game on HF!

Anyway, I liked the program. One of these days, someone will have an antenna, or transmission line, program that will start out with "First question?" and go on from there. It might take Dr. John Krause, W8JK, or a panel, to come up with the answers but it is guaranteed to have some meaningful content (and a ration of irrelevant B.S. to boot).

As usual, I enjoyed seeing the 75 Meter Weather net regulars. These are a sterling bunch who faithfully meet every night, except Sunday, to forward weather reports to the U.S. Weather Service Office in Oklahoma City. As a weekly logger, I can testify that this is one service provided by amateur radio that is really appreciated by those served. I have had many compliments and comments regarding unusual conditions, or unusual numbers of reports, from the persons receiving the information. The staff seems to really appreciate the performance of the group. Perhaps the secret of longitivity is limited exposure to each other. We always see each other's good side. I can't think of anyone more dedicated to a cause than O.C., WA5OUV, the Net Manager, and the others who faithfully make the daily 5:45 P.M. schedule on 3900 kHz.

I might mention that there is always a need for loggers in the Oklahoma City local telephone calling area who will make a commitment to log one night a week and dilute the workload. Come up on frequency for details.

It will be hard to to top this year's version of Ham Holiday, but there's no need. I hope next year's is just like it. Joe, K5JB

Packet Progress

With the help of the others who are doing the packet radio thing, the Ham Holiday program turned out to be a lot of fun. Special thanks go to Joe, WA5FLT, who made a run back home to Calumet to pick up the IC-22S that was used with the TAPR TNC. Without that rig, we would have had to scramble to get another rig and hook it up for the demonstration. It would have been a real shame if the TAPR unit could not have been demonstrated.

The only other hitch was the schematic file. Its tail end got chopped off somehow and I had not noticed it. I had been using it to test a communication program on another computer

earlier in the week and did not notice that I had damaged it.

The room was crowded so I presume there was a lot of curiosity. There were more questions than I could have answered alone, and for this reason, I am grateful for the other packeteros who came. Currently, the Oklahoma City area packet experts (anybody who knows what "TNC" and "AX.25" means) are Jim, KB5XN; Mike, N5MS; Joe, WA5FLT; Leo, K0LOT; Bob, WA5BQX; and Jay, KB0QJ. At the meeting were the experts from Enid and Fort Gibson; Sandy, WB5RRR; and, Bob, WB5AOH. It was my first meeting with Jay, and Sandy. I met Bob at past meetings of the Oklahoma Repeater Society but somehow I didn't connect name and call until I saw him at the meeting. It was great to have all together at the same time. There was a Tulsa gentleman who owns a TAPR TNC but I don't remember his call. There is an amateur in Cleveland OK, Larry Papke, WB5MPV, who has a TAPR TNC but he was not at the meeting.

During the past month we have been experimenting with a GLB in the remote operating mode. It is only roughly packeged in it's rack configuration so we can see what space is left for power supply, watchdog timer and primary control receiver. After bench testing, it was carried around in my car a few days and tested for extreme temperature! It was always close enough to go out and reset if it went wild, but that hasn't been necessary yet. The only operating problem I have had is convincing Mike that it does no good to connect with it and try and leave messages. Nobody is there. Just like a real repeater, Mike.

For those who are interested in finding out what others are doing with packet radio and have capability of accessing Compuserve, Hamnet (Go HOM-11) has a real active bunch. The system operator, Scott, W3VS, is a packetero himself and has stirred up a lot of interest. Someone at ARRL (Ed and Jeff, Compuserve ID 75105,737) is checking in regularlly and passing on the things W1AW is doing on packet. Last time I checked, Jeff advised that ARRL was planning a packet radio newsletter. He was soliciting material via Hamnet. Also, after re-reading stuff I received last weekend, I noticed that there was some problem in converting the Digibit program (Jul 84 QST) from Apple to C-64. As of Jul 17, he said it was a few hours away from reality. That should answer why the program was published for such an obscure computer as an Apple and not an immensely popular machine like the C-64 (The article stated both versions were available but published the Apple version.)

If you haven't heard, the program is used to analyze a RTTY signal to identify type of code and speed.

To get at the packet, RTTY and AMTOR goodies and avoid all the propagation forecasts, contest resulte, etc., just use the command, "SS9;RN". This sets your interest section to 9, the Packet/RTTY/AMTOR section, and tells it to read new. After the first message is listed, type "NS" for no stop. This will eliminate all the menus until the whole message file is dumped. If your buffer gets too near full, use a Ctrl-A to stop at next line for a save. I check in every week or two and get about 20-30K of text.

Next month I am going to cool it while Mike builds the control circuit for the packet repeater. There are still some fatal commands and some problems with the GLB, under certain conditions, spewing out some garbage that locks up TAPR TNC's. I have been unable to duplicate this so I will be playing devil's advocate with the things to try and figure out what is happening.

I hope, as a result of the program, there will be some new packeteros in town (or out of town, for that matter). I am looking forward to helping them with their discoveries. It is just like Christmas morning when someone gets one of those things. Who wouldn't look forward to that? Joe, K5JB

Antenna Hints

A recent antenna party at Jerry, KD5IS's, prompted me to throw together some notes that may be useful to others planning erection af an HF beam.

The most significant thing about Jerry's antenna party that inspired me was his thorough preparations.

He installed a pair of sloping lines, attaching one end to an eight foot long 2x4 bolted to the tower top, and the other end to another 2x4 clamped to an outbuilding. These lines served as a sloping guideway for the Tri Band Beam. The only other time I was aware of this trick being pulled was by Ray Peters, WB5BTT. With the sloping lines, the antenna can be pulled up to the workers on the tower without having to weave it through the tower's guy wires.

In Jerry's case, not everything went perfectly. His antenna, a four element KLM has more things projecting out of it than a porcupine. As it neared the tower, we had to both work at the top of the tower to rotate the thing around the boom axis and untangle it from the guy wires. (I was at the top of the tower and had let the antenna get vertical, not noticing the guy wire problem.) The problem wasn't nearly as bad as it would have been without the lines. We pulled it up with the boom lying across the lines. We didn't lay the elements across the lines because the antenna was going to be attached to a long mast holding an existing antenna. We would not have been able to work the elements around or over the mast to its final position. If the mast had been a stub, and the antenna light enough, we could have presented the antenna to the tower with the elements crossways and lifted the elements over the mast. This would have prevented the rotation problem.

An eye-bolt and muffler clamp assembly was attached to the mast above the boom's attaching point. A line passed through this eye-bolt was used, with the assistance of the ground crew, to hoist the antenna. Also, he had provided slip lines on the element ends so the ground crew (his wife Pat and Son Mike) could control the attitude of the thing as it progressed. This was a good plan but I was the one who said "It won't hurt if the thing gets up here vertical!"

Jerry's KLM has a balun at the feedpoint and the old coax loop at the feedpoint is probably unnecessary. I put one in it anyway because it seemed like a good idea. Mosely antennas do not use the balun but that company recommends a 4 or 5 inch diameter loop of coax, consisting of about 4 turns, right near the feedpoint. Its purpose is to throw coax outer conductor currents, if any, out of phase with the antenna currents. The only time there should be significant currents on the outer conductor is when it's effective electrical length is odd multiples of quarter wavelength, creating a sufficiently low impedance for an appreciable current to flow. Even with the loop, there can be appreciable current flow but at least it will be out of phase with the antenna, for what ever that is worth.

Another trick I have used, though we didn't do it on Jerrys, is to lash the coax to the tower leg with fiberglass reinforced tape, which is stronger than heck, then covering it with aluminum foil tape which protects it from ultra violet radiation effects. This is an idea from DB Products, which brings you the DB-224, of repeater fame, and thus secures its matching harness. Joe, K5JB

INVENTORY OF HOUSEHOLD GOODS

INTRODUCTION. We have described in this article how we are attempting to keep track of our household goods. The inventory that we have recently completed represents our third method of keeping the records over a period of about 25 years. Our records have been either hand written or typed, but no computer inventories yet. (No Computer).

The thing that keeps a lot of inventories from being prepared is, no doubt, the large size of the job. Our system breaks the big job down into several smaller ones.

We show how to make changes to the record while the inventory is progressing. Also a system of record keeping that provides both safety from destruction of the records due to fire, etc., and accessibility so that the inventory can be kept current is described.

SOME USES FOR AN INVENTORY.

1. Warranty Facts. The date of purchase, model number and serial number are readily available at a glance.

2. Insurance Coverage needed on household goods may be determined.

3. Establish Ownership among the various family members.

4. Aid In Preparing A Will.

5. Provide Listing And Values when making insurance claims.

6. Facts For Police in case of theft or vandalism.

7. Settling An Estate can be facilitated.

NAMES OF INVENTORY PARTS. We must call the various parts of the inventory by specific names so we can talk about them. These names are shown in capital letters when necessary for emphasis.

SAFETY FOR THE INVENTORY RECORD. A glance at the "USES FOR AN INVENTORY" section will tell us that an inventory record must be kept in a place safe from the hazards that would destroy the listed goods. The best place is probably a safety deposit box at a bank. An alternative would be a friend's or relative's house separated from the listed goods by the width and path length of a fat tornado. Other safe stowage could be in a cellar, a basement or one of the small office safes. (Nail it down). We will refer to the BANK BOX as the safe place, although you might choose another safe place for your inventory.

ACCESSIBILITY. The inventory record must be within easy reach so that additions and deletions can be easily made. Other uses will be found if it is readily available. If one must drive to the bank, get access to the box and make the change entry, one is apt to neglect up-dating one's record. We do not consider the bank box accessible enough.

A SYSTEM PROVIDING BOTH ACCESSIBILITY AND SAFETY. We have two complete and separate inventory records. Our accessible inventory is a CARD FILE kept at home. There are presently about 1300 3 x 5 cards in the file. There is one card for each article of household goods in most cases. This sized card is adequate for handwritten facts.

The safe inventory is on TYPED PAGES, 8½ x 11 size and done in compact form using the facts on the CARDS which were prepared first. Put the TYPED PAGES in the safe place where they will lie and do nothing except be available in case of a claim, etc. Our present inventory has 36 typed pages. We typed, but the pages can surely be neatly written or hand printed.

RECORD FORMS. The CARD FILE has several advantages. It is an easy way to record the initial run. Cards can be juggled and grouped, stacked and shuffled. Additions and deletions can be easily done with the CARD FILE. It is a good source for preparing the TYPED PAGES. The TYPED PAGES take up little room in the bank box. They are readily prepared from the card facts. Copies may be run for the insurance company, police, lawyer, etc. They may be changed by adding a CHANGE PAGE. (See CHANGES). Deleted articles may be on the change page by reference to the INVENTORY NUMBERS.

PHOTO COPIES OF TYPED PAGES. We have found it convenient to have photo copies of these pages at home. And while we were in the copying mood we ran off a set for the insurance agent to keep.

PHOTOS. We have photos of most of our household goods. A whole bunch of stuff is piled up for each photo in most cases. Photos are numbered and noted on the cards.

CHOPPING UP THE JOB. Do this before you do anything else:

Decide on a classification grouping for all of your household goods according to use or common characteristics. Make a list of the GROUPS, arrange them in alphabetical order and assign a number to each GROUP. Describe each GROUP briefly, listing typical articles belonging to each. I would recommend not grouping by the rooms the stuff is in. We have 16 groups like: Bill's Clothes, Martha's Clothes, Amateur Radio Equipment, Furniture, Appliances, etc. A Miscellaneous group comes in handy. The kind of classification recommended helps find articles in the file and helps a lot as the inventory is prepared.

ARTICLES IN THE "WRONG" GROUP. If the article is obviously in the wrong group, change in accordance with the CHANGE procedure described below. An article that has been typed into page form and is ambiguous and seems to be in the wrong group could simply be left where it is. When looking in the record for an article search a little farther than the obvious group.

PERFORMING THE INVENTORY. Select any GROUP. Call this the WORKING GROUP. Prepare all the cards for this group only. When you have all the articles recorded on cards for the working group, arrange the cards in alphabetical order and number them in sequence. These are the ITEM NUMBERS. The group number is also on each card. The combination of ITEM number and GROUP number is the INVENTORY NUMBER which is discussed further elsewhere.

Type the card inventory facts on the TYPED PAGES. Stow these PAGES in the selected safe place. This much of the inventory is finished and this much is also safe. Before you relax too much, select another GROUP and complete the inventory for it, etc., until you are done. Easy!

INVENTORY NUMBER. Each article has its own exclusive INVENTORY number, and consists of the GROUP number, a dash, then the ITEM number. There will be duplications of ITEM numbers among the various groups, but GROUP numbers will make them exclusive.

The INVENTORY numbers tie the articles as listed on the CARDS and TYPED PAGES together. Estate settlement or insurance claims should make use of the INVENTORY numbers. The INVENTORY number is the main identification of articles removed from the inventory as explained in the CHANGES section below. It would be neat if every article could be labeled with its inventory number, but we haven't accomplished this yet.

ITEM NUMBER CONTROL CARD. When making the initial assignment of item numbers for a group, write "ITEM NUMBERS" at the top of a blank card. Also note the number of the WORKING GROUP at the top of this card. When all of the item numbers have been noted on the cards for the working group, write these item numbers on this control card. File the card in front of the stack of cards for the working group to guide you when assigning item numbers in the future, so that no two articles in a group get the same item number and all possible item numbers are used as they come up. CONTINUED NEXT PAGE

CHANGES. Recording the addition and removal of articles.

Now we have four inventory records in three different places, so how do we change 'em all? We add or remove cards, we add pages, but no scribbling in or scratching out.

Each time an article is acquired, fill in a card with the inventory facts. Each time an article is disposed of write across its card: (in red ink), "REMOVED" and the date. Stow these cards as described in "CHANGES RECORD CARDS STOWAGE" below.

When the add & removed stack grows big enough to fill a typed page, prepare the TYPED CHANGES PAGE with an additions section and a deletions section. Type the inventory facts under the additions heading for each article that is added just as it was done during the initial run. List in the deletions section the INVENTORY number, date removed, and value for each article removed. Make photo copies if you wish and distribute them if any and stow the original CHANGE page with the existing inventory TYPED PAGES. File the new add cards in the CARD FILE and dispose of the cards for the removed articles. This brings our CHANGES stack to zero. Start another CHANGES record when you buy or discard articles in the future.

Make additions or deletions directly to the inventory cards being prepared for the card file for the working group if the page preparation has not started. Use the CHANGES procedure after the PAGES typing has begun.

CHANGES RECORD CARD STOWAGE. This will be the only inventory record of the changes until the CHANGE PAGE is typed. If the change card stack is kept in the CARD FILE it will be exposed to the same hazards as are the household goods. If the stack is kept in the bank box, the bank trips are added to the process, so a secure yet accessible stowage was chosen for our CHANGE CARDS - the cellar. Here they will accumulate until the next CHANGE PAGE is typed.

ITEM NUMBERS FOR CHANGES. When an article is added to a group, find its ITEM NUMBER CONTROL CARD and assign the next number in sequence and note it on the control card. When an article is removed draw a ring around its item number on the control card. This is a dead number and will not be used again.

The cards in the CARD FILE are kept in alphabetical order. Additions are inserted in alphabetical order. Changes will disturb the numerical sequence that was established for a particular group as soon as it starts getting additions or deletions. The sequence of item numbers in relation to alphabetical sequence is not important, it was just an easy way to assign numbers during the initial run.

A FINAL ACCOUNTING SOME DAY. A final accounting of the inventory in the case of destruction of the property or in the settlement of the estate will require a blending of the initial inventory TYPED PAGES with all the CHANGE PAGES that have accumulated, guided by the inventory numbers. After several years these pages might require re-typing. The card file doesn't have this problem because cards are added directly in place or removed, so it should serve for a re-typing at any time that it is brought up to date.

INVENTORY FACTS. Record some or all of the following:

1. Key noun or article's name
2. Manufacturer
3. Model or Type
4. Serial number
5. Brief description
6. Group number
7. Item number
8. Date purchased or acquired
9. Cost, estimate or value
10. Photo reference
11. Date the pages are typed
12. Article's size
13. Value of home made articles
14. Who made the article

In some cases, we have listed several small similar articles on one card with one item number assigned. The total cost is shown, also the quantity. The card can be updated with a new item number, cost and count occasionally.

Inventory the articles that will last a while. Supplies like food would be tedious to keep track of. Anyway a guess of the amount and value in case of a loss should be easily agreed upon.

CARDS FORMAT. Arrange the facts on each card in standard positions so that little or no identification will have to be included. As an example, assign the upper left corner to the "key noun or name", etc. Make a card that identifies each position. All groups can be alike. Also letters and symbols may be used with some of the facts. For instance, (B) can be used with the brand name, (M) can mean model or type number and (#) can be used with the serial number.

TYPED PAGES FORMAT. Make each set of pages for a group compact, close spaced and without columns. Arrange lines on the page in alphabetical order. The heading has your name, the group name and number and date typed. Each line starts with the item number except where more than one line is needed for an article. Next is the key noun. Place the inventory facts in standard positions, separating by some symbol like the comma or dash, rather than in columns. This saves space, time and permits some variations for a lengthy set of facts.

LETTER OF TRANSMITTAL. A letter is addressed to the insurance agent to accompany each submission. Explain the situation briefly, give your policy number and show the cost or value for each group and a total for all the groups. In this case, the agent gets the original, and a copy is kept in the bank box.

START YOUR INVENTORY TODAY! Although this system seems complicated, it was devised to take care of a multitude of problems. It may be comforting to know that once the initial run is completed, the changes are easily handled. You might do a TYPED CHANGES PAGE once a year or so.

Since this is a complex procedure and my struggle with this writing has had me wondering if I would ever get it in good shape, I want to offer you an opportunity to call me or grab me at a meeting in case I have left anything unclear. Any comments will be welcome.

Try to consider all the possible factors when planning your inventory. If there are changes from this procedure, draw up your plan before beginning. The information here should aid in computerizing an inventory record.

Bill, WA5RAQ

Keep Me At It

God, Give me due respect for the abilities you have given me.

Don't let me sell them short. Don't let me bury my talents through indecision, cowardice, or laziness.

Plant in me the necessary determination. Keep me at it.

Rouse in me the fires of dedication. Keep me at it.

Give me the energy, strength, and the will power to bring your gifts to their proper fruition. Keep me at it.

When I falter or fall lift me up and set me back on my destined path. Keep me at it.

From:
I've Got To Talk To Somebody, God

TRS 80C Central Oklahoma Computer Organization

CLUB OFFICERS

Chairman	= Tom Stott	324-5086
Vice Chairman	= Hollis Holcomb	387-9267
Secry/Treas	= Miles Langmacher	352-4059

Meeting held at Red Cross Building
10 & Hudson
Second Sat. of the month: 9:00 a.m.
Club Dues: $5.00 per year

Meeting called to order by Hollis Holcomb, Tom Stott not being present, promptly at 9:00 a.m. 37 attended.

Holly announced a personal move. So, for the books, here is his new address and phone number:

HOLLIS HOLCOMB
RT. 5 BOX 24
BLANCHARD, OK. 73010
1-(405)-387-9267

Some disgressions about the Disk Distribution Program (again) were voiced. A motion was proposed to put your name on the disk that you trade. The motion was carried, all for, none opposing.

Some one dared to ask when and where the Commadore 64 is being held. Two stores that will give you information on such meetings are:

Merit Micro, 50th and Portland
Second Hand Software, 23rd and MacArthur
Computer Software Center, 7832 S. Western

A problem with the Color Con/E program was solved. It appeared that the Down Loaded programs would not load. A "?DS ERROR" was all the reply CoCo would give. The solution is to load the program into Telewriter 64 using the ASCII Disk Input/Output function. Go into the editor, look for garbage, and take it out.

How do you get the Program Pak onto disk? Put a piece of tape over one of the pins (I'm not sure which one) on the cartridge, and stick in the port. Then load and run the program "ROMCRACK".

The RED CROSS, having recently refurnished the building, has been quite busy. A motion was proposed to donate $100 to the RED CROSS. Motion carried, all for, none against.

Now in the mood to spend money, the club proposed giving $200 to Flexnet. The motion, however, was withdrawn.

Someone suggested buying Rainbow on Tape & Instant CoCo (Hot CoCo) so we could distribute it. Motion carried, all for, none against.

For the last part of the meeting, Bob Pace gave a talk about the J&M Systens Disk Controller. AU REVOIR!

Secry/Treas
Miles Langnacher

****
** TREASURER'S REPORT **
==========
** 7/18/84 **
==========
** BEFORE: $793.17 **
** AND AFTER THE MONEY IS SPENT: $514.15 **
****

PROGRAM: TELEWRITER-64

USE: ADVANCED WORD PROCESSOR

COMMANDS: TAPE VERSION HAS THREE MODES; MAIN MENU, FORMAT MENU AND EDITOR.

MAIN MENU COMMANDS:(ONE KEY)

N New text file created (destroys old)
E Jump back to Editor (non-destructive)
S Save all text in buffer to tape
% Save marked block of text to tape
R Read in text file from tape
A Append text file from tape to end of buffer
V Verify (SKIPF) Skip to end of file on tape
C Characters/Line - Sets linewidth
F Jump to Print/Format menu

FORMAT MENU COMMANDS:(ONE KEY AND ANSWER CURSOR)

S Line spacing
L Left margin
C Chars per line
U Upper (top of page) margin
L Lines per page (usually 66)
B Bottom margin
F Font (MX-80 printer only)-(see Epson Font Table)
X Baud (Xmit) rate (see table)
P Print entire text buffer
% Print marked block of text buffer
R Return to Main Menu
D Direct (ascii/control code) output to printer
T Typewriter (keyboard chars direct to printer)
N Number pages (0=No; Val=start page number)
W Where to position page number (along botton line)
Q Queue (chain print) files (Val= number of files)
E Epson=1/2; Oki/Centronics=4; LF=5
J Justify (0= No; 1= Yes)
O One page - pause at bottom (1= wait; 0= don't wait)

RAY MILLER, W5REC

SECTION MANAGER

Thanks to the Whited's and the fine crew that made Ham Holiday a fine State Convention. I really appreciated it!

The Volunteer Examiner and Accreditation Manual is coming out. Whew!! There is a lot to digest. If anyone, who thinks they should have gotten one, does not get it--let me know. Sure hope some of you get it all together for Texoma.

The OK Section new organization is really taking shape. The State Government Liason, Larry Hazelwood, W5NZS, has gotten the Governor to proclaim July 23-29 as AMATEUR RADIO APPRECIATION WEEK for the State. Our Section Emergency Communication (SEC) and his District Emergency Communication (DEC) people have now surpassed 50% of the Counties that are covered. The Section Traffic Manager (STM) has merged the old Oklahoma Traffic Net with the Oklahoma Traffic and Weather Net(OTWN), Sooner Traffic Net is "rockin" along in fine shape and Oklahoma Liason Net(OLZ) is growing with more and more liasons to the National Traffic System (NTS). The Bulletin Manager is doing a great job--he's getting an Offical Bulletin Station (OBS) on EVERY high frequency net and soon ALL the areas of the Section will be covered with an OBS on the selected VHF Repeaters! The Public Information Officer (PIO) now has a Public Information (PIA) appointed in the five areas of the Section and will begin recommending others to be appointed for adequate news coverage. Our AFFiliated Club Coordinator (ACC) is K5CAY. He has traveled to several clubs to inform them of all the aids stat the ARRL Club and Training Dept. offers. We have twenty affiliated clubs in the Section -- if your club is not one, call K5CAY. Our Technical Coordinator (TC) will get the repeaters sectionalized for the upcoming new Repeater Directory--Anyone interested in an Amateur Radio Technical Society in the Section? Our OO/RFI Coordinator is not yet appointed. It is one "whale-of-a-job"!! All the RFI problems in the Section can get tedious--EVERY Club is going to have to have an RFI Chairman that will help in this program. If that is not enough, I believe the Volunteer Monitoring Program will also operate under his coordination!

We are 2000 STRONG AND GROWING--if you want to be a part of this great "bunch", now is the time to join ARRL!!!

HOME-BASED REPEATER OPERATION

The home-based repeater operators can improve their image while at the same time provide valuable service to the mobile/handheld repeater system. Think of ways this system can be served. The home-based operator has some advantages over the mobile operator in making phone calls, obtaining information and more continuous monitoring. A link with HF is readily achieved. Correct the ills that home-based repeater operators are accused of committing by cutting radiation to just that needed and by reducing transmission time during commuting periods.

The station construction can enhance home operation by conveniences such as those described in the article CONSOLIZING THE KENWOOD TR-7930 found elsewhere in this issue.

Bill, WA5RAQ

EDITOR COMMANDS:(ONE KEY)

ENTER	Terminate line (Carriage return)
BREAK	Delete character at cursor
UP ARROW	Cursor up 1 line at left margin
DOWN ARROW	Cursor down 1 line at left margin
RIGHTARROW	Cursor right one character
LEFT ARROW	Cursor left one character

(SHIFT/ARROWS for auto-repeat)

EDITOR COMMANDS:(Preceded by CLEAR ("control") key)

A	Align text lines to fit line width
B	Begin Text Block Marker
C	Copy block
D	Disable Wordwrap feature
E	End Text Block Marker
F	Find a search pattern (answer cursor)
G	Global (Selective) Search and Replace (answer 2 cursors)
K	Kill line
N	Go to next instance of search pattern
P	Page forward through text
Q	Search for special characters (codes, markers etc.)
R	Replace search pattern with replace pattern (from Global)
S	Speed mode (when action slows on very long buffers)
U	Normal mode (exit speed mode)
V	Vertical Tab (page finder)
W	Wordwrap mode enable (defaults on)
X	Block delete
Z	Delete all block markers (begin and end)
-	Page backward through text
0	51 column display mode
:	64 column display mode
@	85 column display mode
;	Toggle character set
ENTER	Tab
BREAK	delete character before cursor
UP ARROW	Cursor to top of text (must be used after read-in)
DOWN ARROW	Cursor to botton of text
RIGHT ARROW	Cursor to end of line
LEFT ARROW	Cursor to beginning of line
.	Embedded format code
/	Underline delimiter for NX-80 only
,	Backslash
1-9	User defineable control codes

EMBEDDED COMMANDS:(Marked with flag (CLEAR/PERIOD) char)

S	Line spacing
M	Left margin
C	Chars per line
U	Upper margin
B	Bottom margin
L	Lines per page
N	New page (optional val=start pg#)
D	Define direct code output
DP	Define printing diredt code
H	Define header
H+	Immediate header
*	Center line
=	Center line of different size font
;	Don't justify or align block
T	Tab stops if 1st line
T	Non-printing comment if not 1st line
Ttext	Print flush left, don't align (no space after T)
Q	Load and print disk file (chain print)

EPSON FONT TABLE

0=clear special fonts (normal font)
1=emphasized (ESC E)
2=double (ESC G)
3=condensed (SI)
4=enlarged (SO)

BAUD RATE TABLE

110	498
120	458
300	180
600	87
1200	41
2400	18
4800	7
9600	1

Q. R. Zedd

ZEDD DOES FIELD DAY IN HIS USUAL STYLE

As everyone knows, the ARRL awarded 1,000 bonus points to every operator who worked Oklahoma's own Q. R. Zedd, A5A, during the recent Field Day event.

A lot of us thought it was weird for a couple of reasons. For one thing, working the holder of the country's only 1x1 callsign is high enough honor in itself. For another, as is well known, when Zedd enters a contest he works all stations, so the bonus points for 1984 went to everybody with a working rig in operation that day.

Zedd, the world's greatest DXer, set up shop with his momma, Constance Wilhemina Zedd, and his nubile, blond, 20-year-old QSL secretary, Tondelayo Schwartz, in a gully on Honor Roll Ranch, just a hoot and a holler south of Norman. The great man decided to rough it this year and operate QRP.

What a sight it was! There in the gully, in the shade of a cottonwood once held sacred by local indians and now sure to be a permanent shrine revered by the DXers of the world, was Zedd himself, seated in a folding metal chair at a simple card table purchased especially for the occasion at the local Target store. On the table were an FT-7 borrowed from the author; a small power supply from the same source; a mike, a keyer, battery-operated clock, logbooks and pencils, and generous can of bug spray. Straps led to a grounding rod, and coax was strung out to the modest antenna set up by Tondelayo for the operation, a TH7DXX on a portable tower at 100 feet.

The generator purred along in the deeper section of the gully about fifty yards away.

Nearby was a brightly colored pop-up tent containing a few amenities, including cots, sleeping bags, a portable refrigerator, two or three kegs of Strohs, a color TV, and a case of Jack Daniels. A glance into the frig revealed sliced ham, bread, potato salad and baked beans, pheasant under glass, a nice supply of caviar and chili, some mixers for the bourbon, Twinkies, honey buns, frozen pizzas, Hostess cupcakes and 10 or 12 pecan pies.

For cooking, Momma Zedd had the microwave humming in Zedd's 66-foot mobile home, parked downstream under some scrub oak.

Right from the start it was a fun contest. At the appointed hour, Zedd keyed his mike and announced his name, pouring the FT-7's bodacious 20-watt DC input into the fray. Of course several thousand stations came back instantly, and Zedd began bashing them off as Tondelayo, in a pink bikini with gold strap sandals, worked diligently beside him on the logging. Momma Zedd, knowing her turn at CW would come soon, took the opportunity to unfold a deck chair beside the portable 10,000-gallon above-ground pool she had brought in for the occasion, and was soon engrossed in back issues of Collector & Emitter while sunning herself in a black strapless that once got her arrested on the beach at St. Tropez.

Right away there was a nice DX opening on 15 meters, and Zedd got interested in that.

"I hate to leave that pileup calling me on twenty," he said, switching the rig over and starting to rotate the beam, "but I figure I can work this band ten, fifteen minutes and then get back to the bunch calling me on twenty, and they'll have been so busy yelling, and the frequency cops cussing and all, they won't realize I was ever gone from there."

He keyed the mike again. "Here I am, boys, come and get me. QRZ?"

It was a lot of fun. In the first bunch came most of Europe, with some Asia stations coming in longpath. After five or six minutes we sneaked a look over the great one's shoulder and made some notes of the stations he had worked. The top of the page went like this:

1901	OH3DBI	5-9	5-9
1901	3V8MN	5-9	5-9
1901	LZ6PDX	5-9	5-9
1901	J31SKL	5-9	5-9
1901	SM2AAC	5-9	5-9
1902	YA1OPP	5-9	5-9
1902	JT1NNB	5-9	5-9
1902	A51PN	5-9	5-9
1902	VP8SQQ	5-9	5-9
1902	ZA2MMM	5-9	5-9
1902	9U5RR	5-9	5-9
1902	W5NUT	3-3	5-9
1902	HV1HWS	5-9	5-9

"Obviously nothing much on," Zedd muttered, switching back to 20. "But you might as well give everybody a break in a contest."

On 20 meters, he worked mainly what he called "locals," those within 3,500 miles. About 4:30 local time in the afternoon, he turned it over to Momma, who went to work with the key.

"It's really hard," she murmured after a few hundred contacts, "holding it down to thirty words so these folks can work me." But she stayed right in there.

There is no final tabulation of how many stations Zedd and his momma worked. Zedd sent his logs to the ARRL as check logs only. He said, "There's no sense spoiling the competitive fun for the younger boys, you know what I mean, son?"

We did. In the proper spirit of reverence, we returned home the next day with the FT-7, which we are having bronzed.

-- KU5B

EARS — EDMOND AMATEUR RADIO SOCIETY

Well here I am and I guess you will just have to tolerate the pain. Received a call from Cal and the club needed a person to fill in the time left by John WA5ZGM who is leaving town for a new job.

So at the last minute I'm goining to try to keep this column going.

The latest we have is of course on Ham Holiday. And according to what I could judge from the applause at the convention it was a success and everyone there the Lincoln Plaza over the Myriad.

I believe the prizes were very very good although none of our group won anything this year.

I did pick up a IC02AT for myself but, that of course came out of my pocket. KC5GN Bill sold all his honey (by the way that's the kind you eat N5DBM)and received $5.00 for an audio amplifier.

Channel 5 showed up at the convention and shot some tape for the 5P.M. news.

Next month we will meet at Pepe's Restaurant at 6 P.M. on tha third Friday August 17.

BE THERE!

de K5SKA Bill

NO CON FUSE ION ABOUT FUSES

I don't like fires. Especially when they start in that expensive radio equipment that I just bought or built. No sireee. Just not about ready to homebrew up a power supply and not fuse it or equipment. Now, there are several ways of protection for electrical shorts. Circuit breakers, etc, might even use a crowbar circuit (still needs a fuse) just all add to the confusion... Power supplies are becoming more sophisticated what with current limiting, foldback current limiting, and other type of fault detections, but anybody who uses something fancy like that and still doesn't fuse it somehow is just asking for trouble. After all, all that electrical short circuit protection stuff is electrical and anything that is electrical can still fail. Not that I am simple simon, just old fashioned.

Many years ago, I got one of the managers at a local radio shack to sell me all the broken stuff that came in. I got to pick and paw and wheel and deal. That doesn't happen any more for some reason. (Ah, yesteryear. . .) One item that Radio Shack used to get returns on a regular basis was a little unregulated power supply. Seems like Uncle Ed or Aunt Martha would be hooking up the tape deck or CB and accidentally short the output leads of the power supply. When it went dead, they would replace the fuse. Still, no dice and it was generally time to take the power supply back to the local radio shack. I bought em for generally about $5.00 apiece. The problem every time was a fusible link in the transformer that would go in a minute. The solution was very easy. There was very little that would go wrong with a power supply that consisted of nothing more than a capacitor, diode, transformer and a bridge. The first one that I got just had nothing wrong with it except that there was no voltage. I had talked to the manager who indicated that he had heard that there was a fusible link in the transformer, but never really found out since he was suppose to ship them back. He sold them to me for whatever he would charge off against his inventory on the return. I drilled into the tabs that held the cabinet together, started to carefully cut the insulation around the transformer and found the link fairly quickly. I jumpered across it with a fuse and the power supply came back to life. I then went back to the Store and bought another `11 power supplies. We had them running out our ears for days. They were easy to fix.

When deciding upon the replacement for the fusible link in the power supply, I spent some time looking up some quick data on selection of fuses. I found that you don't just stick a fuse back in the radio and go. Fuses help with protection in many different categories. From power surge to temperature to lighting, the fuse selection can be mighty important. I especially contemplated this when trying to settle on a power supply for the ACC RC-850 controller installed on the 88 repeater. This piece of equipment cost quite a bit and I wasn't going to leave it at the mercy of a $25.00 power supply. I tried several including a fairly nice pass regulator type Lambda. But when I had modified that power supply (to change the voltage output) I measured the voltage before the regulator. Yow! It was over 20 volts. That does a couple of things. First, it generated a lot of heat because there was 8 volts at whatever current that would be dropped across the pass regulator. Second, a lot of pass transistor type regulators have a tendency to fail shorted and put the full unregulated voltage across the equipment. I had obtained a crowbar type circuit from Lambda (flea market stuff that would throw a dead short across the power supply output if something like that happened. This would cause the local fuse to pop. I still wasn't interested in letting anything like that next to my Controller. I finally settled on a simple pass regulator made by (yep) Radio Shack. But I drilled it open and modified it to a lower voltage as well as installed a 15 volt zener (50 watts) across the output to clamp anything over 15. I then ran a fuse (there was also a circuit breaker) to the controller. I selected a regular fuse (no slow-blow) and picked a value just over the minimum that I could. I think that it helped the day I was out of town and lightning took out the power on the top of the building. The fuse blew, there was some damage to the controller, but it was, or at least, appeared to be fairly minimal. Thus fuse selection is very important. The wrong fuse may not be positive protection. You really don't have much opportunity to guess wrong and get away with it in situations like this.

What is Fuse Protection?

Simply put, the function of a fuse is to provide circuit protection--specifically electrical fault--against fire or further damage to circuit components. Fuses, in one form or the other, have been around since the early 1900's or late 1800's. I am not going to talk about branch circuitry type fuses, but will limit this discussion to the consumer type fuses commonly used in the amateur service. Much of this information can be found in an Industry Standard promulgated by Underwriters Laboratories (No. 198.6) entitled "Fuses for Supplementary Overcurrent Protection." There are basically three types of fuses covered in Standard:

Subminiature - the smallest fuses available, starting with a pigtail fuse having body dimensions of 0.093 in. in diameter and 9/32 of an inch in length. Voltage rating is typically 125 volts and current ratings are up to 10 Amps. The interrupting capacity is up to 50 amps AC.

Miniature- These include somewhat larger fuses with diameters ranging from 0.197 in to 9/32 in and length from 0.787 to 1 7/16 inch. Voltage rating is for 125 to 250 volts. Current rating is up to 30 amps. The interrupting capacity is about 10,000 Amps AC at 125 volts. In addition, fuses rated at 150 volts must have a minimum interrupting capacity of 35 Amps to 1500 Amps AC, depending upon the actual current rating of the fuse.

Miscellaneous - These are the largest of the three types, with diameters of 13/32 in. or larger and length of 1 1/2 in or greater. Voltage ratings are 125, 250 or 600 volts. Current capacity is up to 30 amps and the interrupting capacity is about 10,000 Amps AC at 125 volts for all fuses, with optional interrupting capacity of 50,000 or 100,000 Amps AC.

A fuse is considered to pass the operational requirement if it can meet certain time/current conditions and can safely open a circuit carrying a current equal to the stated interrupting capacity or higher. Besides meeting these requirements for short-circuit protection, the fuse must also open within specified times at current overloads shown on the next page in Table 1. Fuses just don't blow when you put the rated current through them. They can actually pass the rated current indefinitely (this is not strictly true in practice, I have had fuses blow with less than the rated current because the fuse contacts were not making good connection and the heating that resulted from the IR Losses (resistive heating) across the fuse heated it up and helped the fuse to blow)

Fuses not only have resistance, they also have inductance and capacitance. As such they have a "time response" before they blow. Fast acting fuses (such as used in signal generators to protect them from being transmitted into) are generally expensive. The UL Standard does allow for fuses to be classified as "time delay" if they have a minimum delay at 200% of their rating of 5 seconds for fuses rated up to 3 Amps and 12 seconds for fuses rated over 3 amps. To make sure that the fuse dogs not overheat, a temperature rise of up to 70 C is allowed when subminiature fuses are operated at 100% of current rating and when miniature fuses or miscellaneous fuses are operated at 110% of current rating. The industry standard has been standardized on requiring a minimum of 4 hours of operation under these conditions based on a correlation to the temperature-rise requirement. Anybody who thinks that a fuse does not get warm at rated current need only feel it to become a believer. They can get to be fairly hot.

Something else to consider is that fuses, to some extent, can introduce resistance, inductance and capacitance into a circuit. There can be a voltage drop across a fuse of significant size in some instances. For special circumstances requiring fast acting fuses, you might have to pay a premium.

Fuses that meet all the detail requirements of the specifications can be UL listed. Fuses that only meet certain requirements can be submitted for Recognition under the component program that recognizes the use of the fuse for certain specific applications.

Military Specifications

There have been many military specifications for the Armed Services and they are similiar for fuses to the UL Standard. There are certain military requirements that are additional, including environmental requirements such as mechanical shock, vibration, themal cycling and so on. There are several MilSpec requirements, but two of the most common are Mil-F-15160 and Mil-F 23419. There is an additional newer Mil-F-23419 version that provides for two levels of subminiature fuses (standard and "high performance")

Performance Improvements

You can teach an old dog new tricks and fuses are an example of that. There have been many changes and improvements in fuses in the last several years that show a change for the better in the industry. The new plug in fuses found in automobiles are expected to replace the traditional glass cylindrical fuses. First used by General Motors in 1977, they are being installed in all new domestic automobiles. The plastic encased fuse offers longer life at rated current, faster blowing at overloads , smaller size, greater reliability and simplified manufacture.

Slow blow fuses (designed to delay before blowing so that they will not blow under high current start up conditions such as motors, capacitor of large values that must charge up) have been improved with a new spiral-wound fuse that is a glass-bodied fuse with a filament wire that is spirally wound on a relatively small cylindrical substrate. This replaces the previous technique of slow blow construction of using a spring under tension. Slow blow should not be used in certain types of electronic equipment because of the chance for delay before blowing during which a power surge might just zap that transistor or chip. Slow blow might find their way into your amplifier power supply where those big filter capacitors might take awhile to charge up before the plate goes on.

Table 1. Maximum Opening Times For Standard Fuses

	135% of rating	150% of rating	200% of rating
Subminiature	—	10 minutes	1 minute
Miniature and Miscellaneous	60 minutes	—	2 minutes

Table 1. Maximum opening times for Standard Fuse

If you are looking for a fuse in certain new equipment, and can't seem to find it, look carefully for a new subminiature fuse with an epoxy coating and IEC color coding. This fuse installs on the PC card and comes in a tape for use on automatic insertion machines. The fuse is similiar in appearance to a 1/8 watt resistor or small capacitor found on PC boards. The color coding, of course, denotes current ratings and time/current characteristics. It can withstand normal small-component wave-soldering time/temperature processes without damages. Its epoxy coating results in higher axial-pull strength and makes the fuse and fuse markings impervious to damage from board washing solutions and processes.

Fuse Selection

Selection of a fuse type and speed is not as simple as just pulling one off the shelf, plugging it in and going. The fuse is called upon to meet certain performance requirements under what are adverse conditions. You normally select a component for your circuit to function under worse case situations. Fuses are particularly critical in this regard. Perhaps the most difficult job in fuse selection is defining the fault condition for which circuit protection is required. The mere fact that a circuit functions with a fuse or the converse, a blown fuse, are neither confirmation of proper fuse selection.

Successfully selecting a fuse involves satisfying two sets of conditions. The first set defines the fault condition the fuse must protect against. The second set of conditions represents the "normal" conditions the fuse is expected to endure. It odviously does no good to select a fuse that blows all the time (if too small) even during normal conditions, or one that doesn't blow during a fault (if too large or poor time/current characteristics).

Determining the "normal" operation conditions are usually easy. Fuse selection must be such that normal current flow under typical conditions of operation do not exceed the fuse ratings. Particular selection should take into account current changes and current peak durations as well as average current flow. Normal operation current should not exceed 75 to 80 % of the fuse current rating. (See Table 2 on next page).

The fault description must include current flow under fault conditions. For this, you must analyze the circuit to determine what fault current will result from what component failures. Normally you should select fuse current to be 50% or less of the fault current to provide proper protection. Fault description normally includes the voltage and the time by which the fuse must open when subjected to particular fault current. Voltage rating of the fuse is also important although since they are current sensitive devices, they can be used in circuits with any voltage equal to or less than the rated voltage.

Compliance of a fuse with the fault condition blowing requirement can be determined by examining its time-current curve, which provides the fuse opening times at various current overloads. These curves are usually based on average values, so some safety factor should be used in its application. Safe

operation of the fuse odviously demands that the interrupting capability of the fuse as stated by the manufacture must equal or exceed the worst short-circuit currents available in the circuit.

Normal condition current analysis include normal operating current and the ambient temperature. If you can, select the operating current at the 75 to 80% of the fuses rated current, which is established at 25° C. The value must be derated for temperature since current carrying capability of the fuse is derated for temperature.

Table 2.
Fuse Checklist

Fuse Parameter	Requirement
Voltage Rating	Must equal or exceed application voltage.
Interrupting capacity	Must equal or exceed maximum short circuit possible in application.
Current rating	Normally 50% or less of fault current to provide protection. Normal operating current at 25°C should not exceed 75 to 80% of fuse current rating.
Time current characteristic	Time/current curve should be reviewed when the fuse must open within a defined time.
Temperature derating	Fuses carry less current at higher ambient temperatures. Derating information, available from the manufacturer, should be applied.
Other factors	Electrical pulses, environmental conditions, type of mounting, size, etc.

Fuse Speeds

Proper protection and elimination of nuisance blowing for a given application requires selecting the proper speed blowing characteristic of a fuse. Most manufacturers will specify the blowing characteristic of the fuse by means of a time-current graph, which is simply a graph of the time it takes the fuse to open at various specific current overloads. Fuse speeds are generally categorized into three basic characteristics--fast acting, medium-acting and time-delay or slo-blo.

Medium-acting fuses are intended to be used in general applications and is perhaps the most widely used. Fast acting fuses are used for delicate instruments, certain semiconductors or other sensitive equipment. RF signal generators frequently are fused in their output with fast acting fuses to protect the output circuit. Time-delay or slo-blo fuses are used where a built-in time lag is desirable. Motor-starting, capacitor charging or highly inductive circuits are examples of normal operation that might include peak current capability. Time delay fuses should be selected to have sufficient delay to avoid trips to the site for replacement for fuses resulting from nuisance blowing.

Cost

Cost is a frequent and important characteristic to a manufacturer. For the one time project, it may not be important (although I have blown a bunch of expensive fuses while trouble shooting , even "cheap" fuses can get expensive that way). The 3AG fuse is perhaps the most popular and inexpensive fuse and has medium acting characteristics. I am always prowling the surplus stores for in-line fuse holders for 3AG. I cabbaged onto a bunch of 8 amp fuses and a variety of other values a long time ago. I used those for a long time with my old Swan 350 which required a 10 amp fuse. Nuisance blowing was not a problem since I had plenty of them and rarely operated.

Intentionally Induced faults

For certain conditions, you simply want the fuse to blow and blow quickly. This would be instances where the radio or equipment is accidentally connected up to the power source backwards. Protection can be inducted into the circuit by using a diode to protect the circuit in two different ways. In figure 1, the diode is in series with the circuit and prevents current flow when connected in reverse. In Figure 2, the diode is placed across the power source in a reverse biased condition. Connect the equipment or device up backward, and the fuse blows when the diode is forward biased.

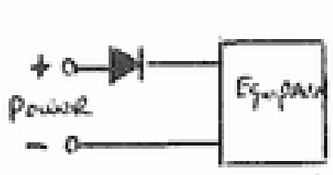
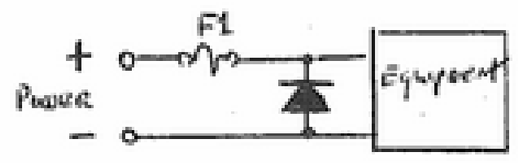


Figure 1.



/Figure 2

I also avoid the problem by standardizing on a particular power connector and wire it and my equipment in a particular. Right now I am using a 4 conductor Molex and have replaced a lot of my equipment power connections to conform. This way, I can power all 12 volt equipment from all 12 volt sources. For other voltages, I standardize a particular connector for each voltage. That prevents accidental destruction for equipment of differnt voltages.

Crow-Bar Circuit

Another intentionally induced fault is the crowbar circuit which earns its name from the fact that its effect is the same as dropping a crowbar across the power circuit, and the fuse is blown. Most of these detect overvoltage (such as the failure of a pass regulator, etc) and there have been many circuits for these. I reproduce a simple circuit below. Odviously don't use a crowbar circuit with no fuse or a grossly overrated fuse.

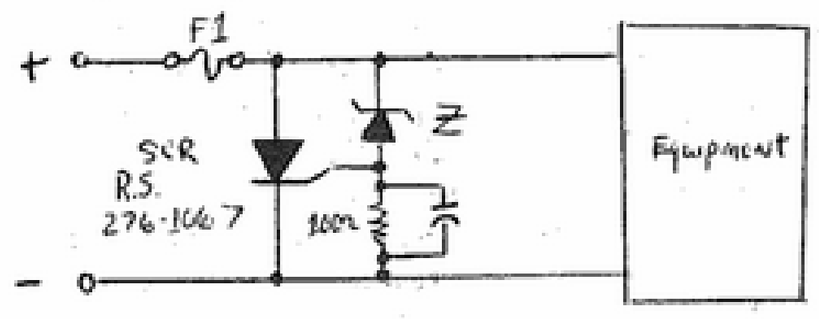
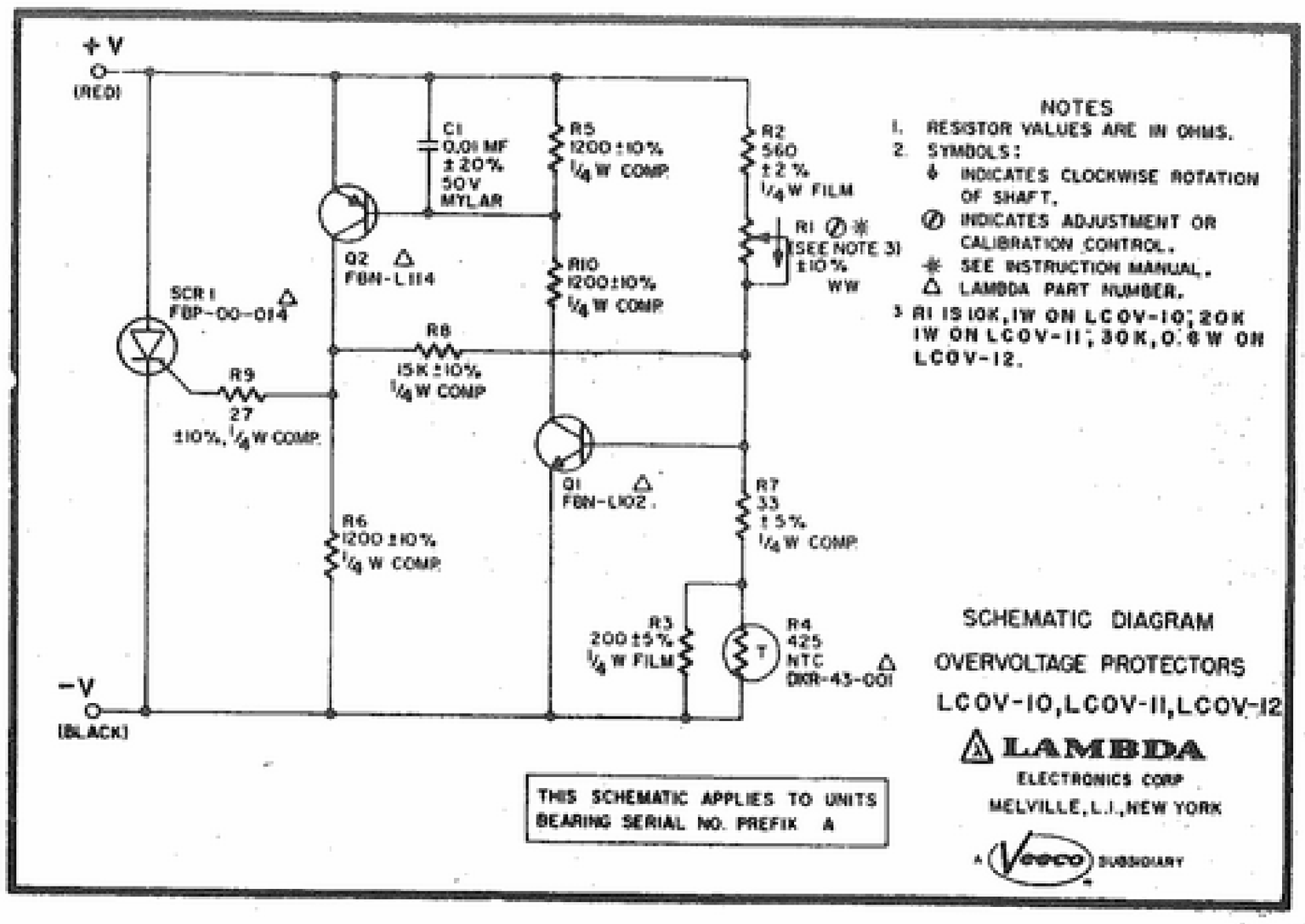


Figure 3. Simple crowbar circuit. Use only with a suitable fuse and make sure that SCR can handle fault current.

Occasionally in the flea market, I find a small OVP (Overvoltage protection) devices made by Lambda. These are simple to use and usually can be picked up for a buck or so. Of course, they might be bad or something, but if you can get inside, you ought to be able to get them to work. The circuit is a little more complicated that the previous circuit, but they are built with a little more precision. Since they are designed to be used with precision regulated power supplies, Lambda recommends that they be set with precision. This means that the recommended voltage-protection point should be about 115% of the normal power supply operating voltage plus one volt. The OVP circuits are offered in 3 different values but basically run from 1.8 volts up. The

1. 8 volt to 24 volt model is probably the one with the most utility and is Model LC-0v-10. The voltage adjustment pot is a 10 turn or so and can be set with some precision (2.3 volts per turn).



The Lambda circuit works because R1, R2, R3, R4 and R7 attenuate the power supply output voltage and act as a divider. The power supply increases in voltage and the voltage of the divider also increases and biases on Q1. Q1 in turn biases on Q2 through R10. Q2 then supplies gate current to SCR-1, turning it on and causes an effective short circuit. This causes the power supply voltage to drop and puts the fuse out of commission.

The circuit described earlier works about the same. When the voltage across the zener diode exceeds the reversed biased voltage of the diode, current is then conducted to the gate of the SCR and turns on the SCR which throws a short circuit across the line. The RC combo at the bottom of the circuit is used to pull down the gate and the capacitor acts to prevent transients from triggering on the circuit. Depending upon the zener values shown, the SCR can be set to trigger at just about any voltage. The circuit can even be made adjustable with a little work.

IC Voltage Fault Warning Chip

Well, integrated circuits also are sneaking into the overvoltage protection circuit business. I haven't taken the time to dig out all the alternatives, but Intersil has come out with a chip, the ICL 7665. The circuit is CMOS and the circuit draw is generally less than 3 uA (15 uA maximum).

The chip is intended for primary use in battery powered instruments, memories, and radios. It features independently programmable upper and lower trip voltage levels as well as hysteresis. The chip has two comparators which compare input voltages to a shared internal 1.3 volt bandgap reference. Outputs are open drain N-Channel FET stages, and hysteresis outputs feature open drain P-Channel devices. Each selection of under and over-voltage protection detectors is independent of the other. When turned on (by a fault condition), the outputs behave as a low resistance switch (for each output) that goes to the appropriate rail. They can sink up to 25 ma on each of the outputs, plenty enough to perform logic turning the circuit off or bump an SCR.

The Intersil chip features operation from 1.5 to 15 volts, 10 nA maximum voltage setpin input leakage current, and is available in an 8-pin minidip or TO-99. The costsis about $2.50 apiece in 100 quantities.

Summary

Fuse protection, foldback current limiting, etc. are all about the same. The intention is to protect equipment under fault conditions. I have designed many circuits and always consider the use of a fuse somewhere basically because they are so cheap and simple to use (although selection of a fuse is not alway the easiest thing to do). I also have a fascination for battery operated devices (including my HF transceiver) and batteries should alway be fused. I wired up a battery for WA5LTM the other day for use with a portable television to take to the Democratic convention and I fixed it with two fuses since he would never forgive me if something started smoking inside his brand new television.

Fuse selection can be an imprecise science at times. I have had unexplained failures in fuses where there was no indication of a fault condition. The fuse just fatigued. And of course, everybody has designed a circuit with a fast acting fuse that is suppose to protect a high dollar transistor and have the transistor blow up just in time to protect the fuse from going. Well, I have.

Micheal Salem N5MS

DALLAS HAMCOM, HAM HOLIDAY, ETC

Time constraints in the last couple of months have made it difficult to sit down and write about the shank of the hamfest season. In general, it has gone pretty well. Dallas is always a good trip for HamCom and the first weekend in June offered a bigger flea market than usual. WA5JXX now confines himself to just about 1 (better make that 2 with Ham Holiday) hamfest a year. Dallas is the only time that I can get him to go out of town. Daytnn is a definite no for him. Oh, he made noises like he wanted to know, but he got the Jim Shideler Hospitality Award for wanting to stay at home during Dayton. Someday, both of those guys will go back to Dayton, but I will be old and gray. Come to think of it, I am already old and gray. It's time.

Well, Roger was interested in going to Dallas and WA5LTM missed Dayton also this year, so both decided to dash down to Big D the first weekend in June. Since it looked like the weather would be good (a slight chance for some scattered storms) I had planned on taking the plane. We planned a customary doughnut stop at a much earlier hour (and somehow a hot doughnut or cinamon roll seems worth it) and planned on being off the ground about 7:00 a.m. or so on Saturday morning. The flight was smooth as glass and Roger managed to locate WB5YWO just as we were coming in to land at Love. After unloading the plane, we hotfooted it out to the site. Hot, I tell you Dallas is hot always this time of year. I retreated to the inside flea market after a quick run through the outside area. I didn't find anything of any special interest, so I wandered inside and for the first time ever in many years, went to a program. WB5UIY and I picked up on the Packet Program and it, for the most part, was pretty good. The room was absolutely packed. And the TAPR group was there selling TNC's by the handful. I think that the packet crowd will increase slowly. Talk about a democratic mode, the nice thing about packet is that everybody sounds the same over the air. Just a BRRRRRRRRup. Not a lot of personality, but anybody with a talent for composition can make an interesting packet QSO. The nice thing about it is that the people who don't have anything to say will not go to the trouble to say it. Fone operation is different, people will say anything since it is easy to do, especially if they have nothing to say. People who communicate using their fingers (even me, to some extent) will use some economy of conversation.

The discussion regarding the PACSAT was the most interesting and up to date. They are planning on this time for about 2 -4 Megabytes in the satellite with a store and forward capability and realtime operation. This means that an amateur will be passed over twice a day (in the planned low earth orbit (LEO)) and will have the capability of uplinking up to the satellite with a message which he can leave for somebody else in the world. The orbit will cover just about every spot in the world twice a day minimum. The low orbit means that it will be accessible with just simple antennas and modest power requirements. I have to think that this will be one of the most useful amateur tools around. Of course, the real test will be the development of plans for an amateur satellite in a geostationary orbit. 24 hour a day use will be helpful. The present configuration of PACSAT will not find much use in emergencies it would seem, but will probably be limited to routine traffic and message exchanges (including computer programs).

We had planned on staying in Dallas for dinner and the weather was going to permit it. All the bad thunderstorms they kept talking about in west Texas just never materialized. In fact, they passed well north of us and clobbered Oklahoma. WB5YWO and his family, Stan WB5UIY and Annette Roger, Tim and I finally found the Trail Dust Steak house on the west loop of I-35. Don't know if Stan got any of the pictures in, but we had a whopping good time. It was getting late and time to dash back to Oklahoma, so we went back out to the plane and loaded up and got home by about 10:30 p.m. or so. No major purchases were made. In fact, went to Dayton this year and didn't spend hardly anything.

Dallas seems to be growing. The flea market is still a slightly overgrown version of the sidewalk sale and that is still pretty good. it is also augmented by people from out of town who come down and bring their goodies. We found a couple of real deals, but unfortunately, they had already been purchased. John Graham bought two Motorola receivers in shielded cabinets which could be good for repeater receivers. These eventually got traded around until I got ahold of one of them. Might try to turn it into a spare for Kahuna. (Don't have to refer to the Kahuna by its first name The. There is only one). Dinner is alway fun in Dallas. There are so many places to go. The only problem is finding one. A friend of mine who works for a major credit card company in customer relations has given me a long list of "topnotch places" to try. Misplaced it, but it might be a good idea to try to eat my way through the list. The only problem then will be the weight on the way back.

One month later, John Graham and Dean N5AMV and myself decided to take the plane down for the July sidewalk sale. Three people make the break in price about right. John needed to be back as soon as possible anyway. The weather was fine, just very hot. The flight started about 6:45 a.m. and we were in Dallas by about 8:30 a.m. and looking for a rent car. The problem here is that the usual place to rent was closed and there were no extra cars available. This chewed up the lead that we had in getting up early. Had to go over to the main terminal to find a car. I had tried to reserve a car when I knew that we would be definitely be going, but it was getting late on Friday. Next time, I will line the car up early.

This is the first time that I have Dean in the plane with me. Don't know if he trusts it or not, but I led him around on the walkaround. An old mechanic like him should know a good bird when he sees it. Nice thing about it is that the plane is just about paid for. I didn't buy very much again. Buying in the flea market just has to be a state of mind. I have so many projects, there isn't time to start any more until the equipment in the house that is broken gets fixed. Ought to be able to buy more stuff in the flea market in about another 2 years. . . .

Micheal Salem N5MS

HAM HOLIDAY HIGHLIGHTS

Well, there are probably going to be another 10 articles in this issue of C & E about Ham Holiday. Therefore, I will be brief. I enjoyed it. I am so glad that there are a group of people in Oklahoma City who are willing and yes, perhaps even, eager to do the work that it takes to put on Ham Holiday that I just have to say that I really appreciate. I make this clear. It is not Dayton. But neither is Dallas. And I have to say that I have sold more stuff at Ham Holiday than I ever sold at Dayton. Some items just don't move very well when there are a thousand other persons selling the same thing. People can easily spend all their time looking. The selection is not as big as Dallas or Dayton, but I spent a little money and bought some things that

I was looking for and some other things that I was not looking for. The commercial exhibitors were not really plentiful, but they pretty much covered the gamut of equipment.

Roger WA5JXX always enjoys HH. He likes to take his van to haul the stuff I want to take to sell. The flea market was going to open at 8 in the morning for the flea marketeers. I didn't see any reason to get to OKC before 8:30 a. m. Besides Jim Shideler was going to hustle up and get a table or two. I always like to work with an advance man. He got my preregistration and was holding it for me so that I didn't have to stand in line at the desk. Darrell WA5TOO wanted to put a couple of things on my table and I said fine. Hoo boy. He sold a couple of hundred dollars worth of stuff before I got there. The flea market is an underground economy all to itself. And the fleamarketeers buy and sell among themselves just as much as the walkers buy. I guess that a flea market is just a device designed to convert cash to equipment to cash to equipment etc., etc. I went home with a slight expenditure, but the stuff that I sold paid for a couple of other trinkets that I bought. Buying in the flea market is always a guess. I am not relunctant to buy something if the price is right. Unless there is no information or data available, it usually can alway be fixed. I bought an amplifier in the flea market at .Dayton that was cheap. I could see why when I got back home and hooked it up. I found that it was drawing about 3 amps all the time. Well, I might have gotten burned on that one because I thought that I was going to have to buy some finals. But it was putting out power and I had never seen that particular failure mode before. After nosing around in the circuit, I saw that somebody had put about a 12 ohm resistor in the power cord. This did something . I pulled it out and it worked fine. Never really understood that modification. Now, 8 watts in gets out about 50 watts. 10 watts does about 55 watts.

Programs at HH varied. JB went to a lot of trouble getting three packet stations in the room and the place was packed. Packets were dashing around with great abandon in and out of the room and outside to a digipeater in the car over to two stations in Edmond, then back to the Lincoln Plaza to another packet station right in the same room. The ability of the packet systems to link, store and forward and repeat is the real fascination. The error free transmission is also a gas. The machine keeps trying until it gets it right. I got in on the Oklahoma Repeater Society. It is nice that there is a single organization that does have some interest in maintaining the frequency coordinator and helping with problems. I think that there are several groups that were able to exchange information through the ORS. It appears that linking, at long last, is slowly becoming a reality. Dwight Dennis and those guys down at Ada are certainly ahead of whoever is in second place in that department.

On Saturday after locking up, everybody was ready to go to eat. Couldn't get the entire group together, but we wound up at Sleep Hollow with Tom Clark and his wife from Tulsa, WB5YWO, K5GIU, K5FVL K5JB and WA5JXX. Don't know if it was the food or the group, but had a really good time before heading back to Norman. The group did get a little rowdy. I tried to convince Shideler that we got our check so quickly because they needed the money, not because they were in a hurry to see us go.

On Sunday, I didn't get back up to the City until about 10:45 a. m. and went to hear a technical advisor from the League talk about antenna tuners (err, make that line flatteners, uhh, I think that should be transmitter tuners, well, can't really be sure what they call them. I know that they do work). Now, I have to say that it takes guts to do that with K5JB and W5JJ in the audience. I wouln't do it. I guess that is why they hired somebody from out of town. It is tough enough to talk about radio or the news without dotting every i and crossing every t much less talk about a voodoo subject like SWR with any precision in front of those guys. I general ly confine myself to the role of "humming." This means that when Joe or Carl are talking, I just sort of stand there and go "hummm" after each point. It is also a good idea to throw in an occasional, "You may be right." or "That sounds OK." The only question that I would dare ask is "Are you sure ?" The answer is generally yes. Carl made the essential point that you can't really call it a line flattener if it follows the transmitter. The SWR is still the same between the tuner and the antenna. JB counterpointed that perhaps it might be a good idea to call it a transmitter tuner (how about transmitter flattener ? That sounds bad, though) I am not really sure what the confusion is. The essential point is that power is transferred to the antenna when the output impedance of the transmitter is matched to the input impedence of the antenna. Match em and the transmitter power transfer is maximum. Reflected power along the line is really a mathematical construct, useful for characterizing the transmission line. Mismatch on the line is important, however, because power loss in the transmission line is related to the voltage across the dielectric and higher SWR means higher voltages and consequently greater loss in the line. But this power lost is not equivalent to the reflected power and that's that.

Hey, wasn't bad and I really enjoyed it. Might make another sidewalk sale before football season starts but I guess that will have to hold me until Dayton rolls around next April.

Micheal Salem N5MS

BEARCAT SCANNERS DEPARTMENT

I bought a Bearcat 250 several years ago. What a great radio and a nifty piece of test equipment. I generally left it on just about all the time. Eventually, this took its toll and the display blanked about a year ago. I went inside the radio and nosed around for awhile to see what I could see. It began to work again and I boxed it up. It then failed again a day later. I gave up and expected that I would have to return it to Bearcat for repairs and it would cost about $50.00 or so taking into account the repair fee and shipping both ways. I finally got around to taking it to the office to pack up and compose a letter to go with it with a description of all the symptoms. Well, something made me wait until after HH and I am glad I did. I ran into Dennis Werblo who suggested that I check a pass power transistor on the processor board. Sounded like a good idea so I went home and unboxed the radio for one last look. Well, the voltages didn't look right, so I replaced it and the radio came back to life. Thanks Dennis! That's one I owe you. The transistor is Q204 and it is a pass darlington TIP 29 located on the processor board over close to the speaker. I pulled it out and replaced it with TIP 31 (same type in this application) and checked it. It ran fairly hot (as did the TIP 29) so I decided to flatten out a circular heat sink and bolted it to the transistor with some heat sink compound. That made a lot of difference in the ambient temperature. For the purpose of preventive maintenance, you might want put a small piece of metal with some heat sink compound and be sure that it doesn't touch the speaker or other grounded piece of metal. I put some scotch tape below the heat sink to make sure that there were no accidents. Now got to dig into that Bearcat 20-20. Display went dead on it yesterday . . . .

Micheal Salem N5MS

THE CANTON SYNDROME

Five Amateurs and six civilians gathered on the windy shores of Lake Canton on the early afternoon of June 23. The first two vehicles arrived with chicken in hand. Food was first... Then rigs went onto the tables... Large size batteries were put in place and then... Antennas went up...

It was decided early on that KD5WA would be the station's call, since Lewis had his QSL card printed on page 8 of July issue of 73 Magazine. We thought some others might have seen the QSL of the month and we needed all the fame we could find. Tim, KA5LTM, didn't mind as his solar panels would give extra multipliers to the group. Jim, WD5HPU, furnished the Yaesu FT-7 with digital readout and that is enough glory alone. The other rig, with a heavy 3 watts out, was Tim's Ten-Tec 509.

My learning experience began when Lewis started stringing antennas. A piece of nylon string and some 5 oz. lead sinkers, a handy swing and voila... The center of an inverted 'V' was some 40 feet up. The two ends of the 5/8 (on 80 meters) were nearly as high as the center. Then the twin lead open ladder line was attached to a large 'matcher'.

After the stations were set up... Then KA5KWM, Hershell, arrived with his wife, Jackie. I think for Hershell, it was a learning experience also. Who would have thought Lewis could have done so well with a lead sinker. Lewis could not go fishing. (He couldn't pass the test for that license.) But great things can be done with those sinkers.

It was not all fun and games. There were some CW contacts. One that I started to make wiped me out in a speed test. I turned to Lewis and said, "go ahead, that one is yours." Lewis failed that test too.

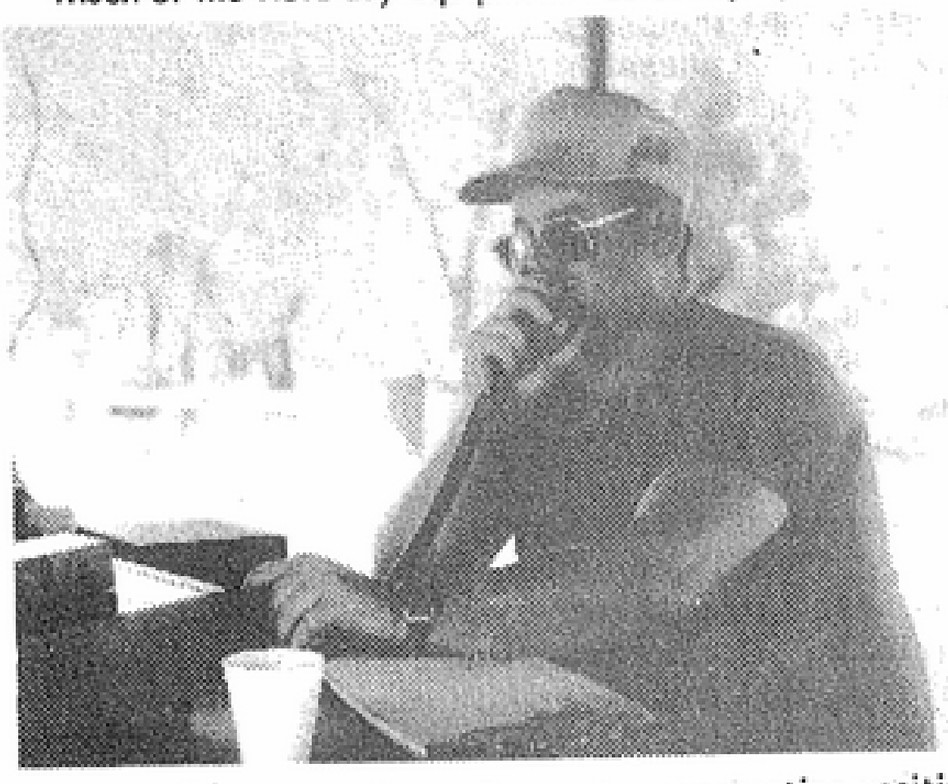
Late that evening, a cousin of Tim's arrived. KC5CR, Bruce Goff, pounded the key into the table like killing snakes. Apparently, he could copy just as fast. Later on in the evening I heard Bruce say, "I keep going back to those Japanese stations but they won't answer me." Tim retorted, "You've only got 5 watts." Well, we all expected a lot out of this field day.

We expected a lot and we received a lot. We received some things learned, ... some friends enjoyed, ... about 3 pages of contacts, ... a lot of memories AND an expectation to do it again next year, only better.

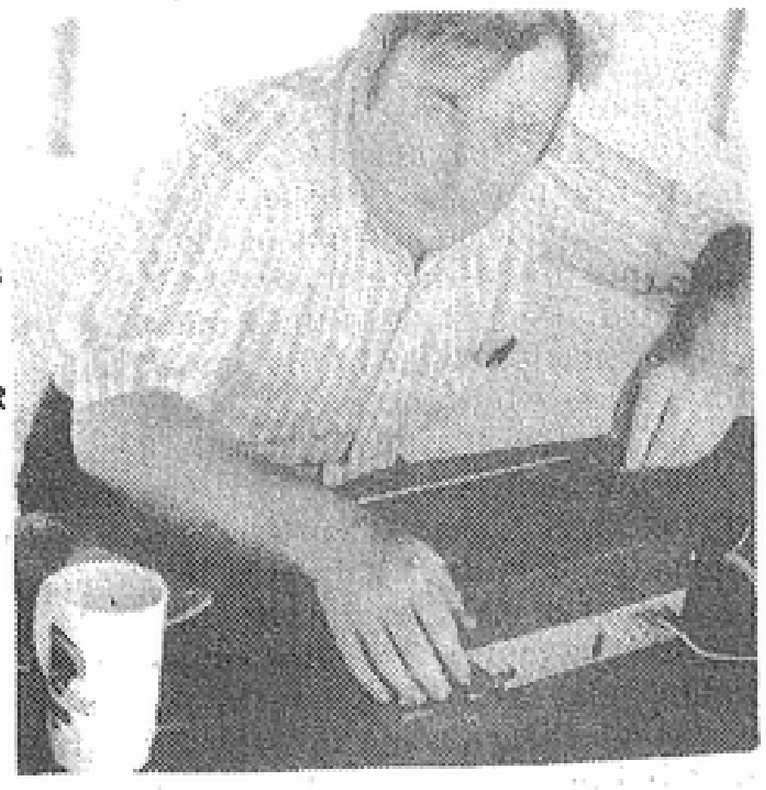
What about 'syndrome'? ... A collection of symptoms characteristic of a certain illness ... Ham Radio and NATIONAL FIELD DAY. (1984)

WD5HPU, Jim

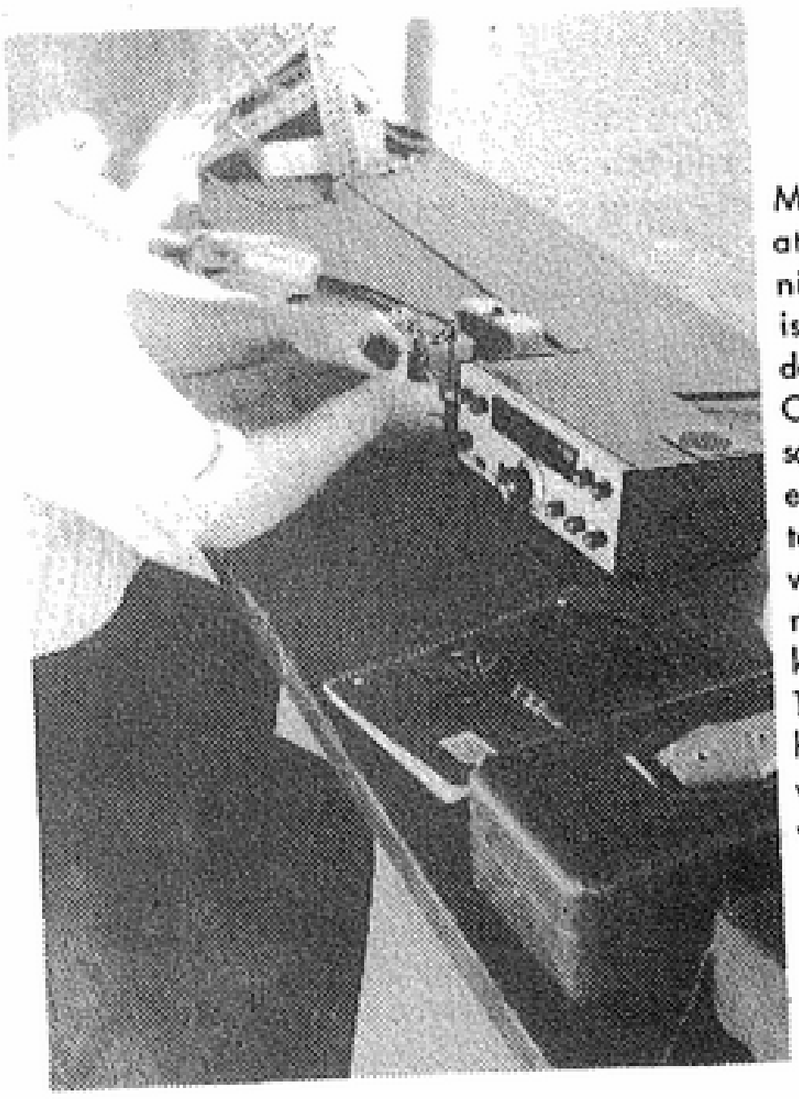
On the left is Jeff putting bait on the modified antenna. Much of the field day equipment was dual purpose.



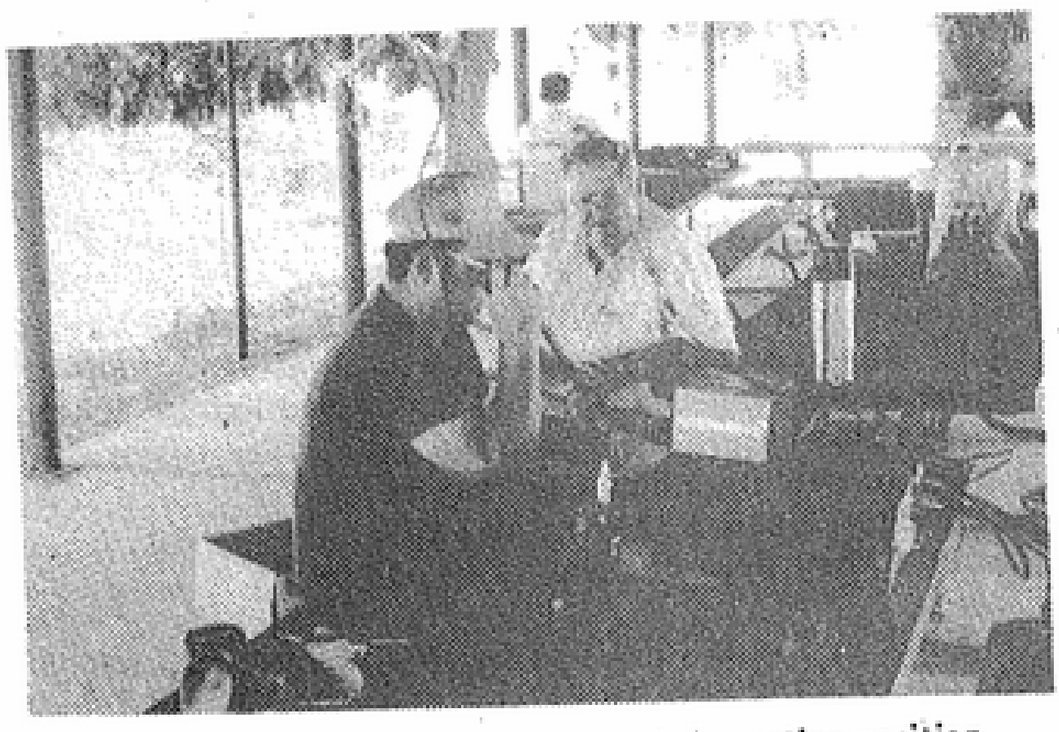
And here we have the station master at operating position with the mike in his face. Lewis was a very serious operator, taking out time for food only. (and sleep)



WA5LTM, adjusts his 509 for the maximum 3 watts out so that KC5CR can make that JA contact.



Making the 'charger' attachments to the nicad battery pack is the famous delegate from Oklahoma. His solar charger gave extra multiplier to the strong 3 watts. To the right is his repair kit, just in case. Tim, WA5LTM, had more that 3 watts when he went to CA.



This picture shows 3 of the 5 operators in operating position. All pictures were by WD5HPU and that's why you don't see him in any of them.

THE RING IN THE NIGHT...

Generally the phone in the late night can be an upsetting event. When I first met Steve 'officially' it was about 5 months ago. He was just good-old-single Steve back then. Linda changed that. Linda couldn't change everything tho. Steve was already studying for his license. The honeymoon took two class meetings away from Steve, but not his enthuasism for Amateur Radio. The new system is a little different and the 610 form is going to be revised again. Meanwhile, the form is modified to conform to the new procedures.

Steve was not up on the ongoing changes in FCC. He just wanted to become a ham. You have to meet this young Irishman to appreciate him. He is already a Ham in many ways. Steve is a natural born actor, piano player, teller of tales. Does he sound like some other Ham that you already know. Believe me, he will fit right in.

In the shortest time one could imagine, the FCC sent back Steve's call, KA5UFN. It was only 2 weeks and six days from the drop in the postal slot. Steve swears that he tried to call me on that hot and dusty Saturday, but Linda was the first to learn. (You can't blame Steve. Linda is really very charming.)

Sunday's study session included a lot of questions about 'getting on the air'. Steve was a little unsteady when he keyed down to Gene, WD5GTC. Gene has been a great help throughout all of the study sessions. After all, a live, extemporanious code practice is so much better than all the tapes you could invent. That first event with Steve was not on his own rig, not at his house, not his antenna, etc. The following Sunday, I could sense that it was about to happen. A few more questions about 'what if' and 'was such-and-such correct?". Steve was very close. SWR of 1.3 to 1. Sloper over the house for 40 meters. Would I listen for him? Certainly, after supper and a visit to my dad.

My old verticle was all I had for 40 meters. Full of water from the hail storm ... etc. Couldn't hear him for hell... We quit trying about 8:30 or so that Sunday nite. Steve planned to try some other stations... But you know what the 40 meter band is like on a Sunday evening. Not just the 40 meter band BUT the 40 meter NOVICE Band...

Tough as it was. It was only a small challenge for the recently converted. I had gone to bed early...about 9:45. Sometime around 11:00, my sleep had been going on for about 30 minutes.

KA5TZY in N. Dakota. On a frequency of 7.103. Would I look up his address in my book. Steve, I loaned my book to a friend. I would call him tomorrow nite. The following day when I looked at the call 'TZY' I figured it was issued only a little before 'UFN'... so it would not be in any book. I checked with my friend anyway, just to be sure.

And now, the world. Congratulations, Steve. From all of us. Almost every ham will remember that first contact. It is well worthy of 'that ring in the night.'

WD5HPU, Jim

Checking out the dual purpose antenna is Bonnie, youngest of the famous KD5WA, Lewis.

CIMARRON A.R.A.

CIMARRON ARA

Another Field Day has come and gone and most of us are none the worse for wear. To completely recap the event would be impossible to do in so few lines, so here are the highlights of the event. Friday evening; better check the generator just to be sure everything is in order. Gosh! 150 volts seems like a lot. OK Denny, let me take a look at it. Hey, how does this regulator work? It's starting to get dark out here, tell you what, I'll hold the flashlight and you can adjust that little spring down there. Well I don't know if 50 volts is enough or not. Tell you what, it's already nearly midnight, lets try it again in the morning. Saturday morning; where's the coffee? Gosh I never realized that my eyes wont focus this early in the morning. We're gonna have to fake it on the generator. Just put a stick in the regulator and hope for the best. But I thought you were bringing the coax!? What do you mean that keyer won't work? By gosh it doesn't does it. Hey! This rig supposed to pull 50 amps? What's that funny smell?

Needless to say, everybody had a great time but there were a few minor difficulties along the way. Oh well there's always next year.

Those participating in Field Day were; Fred, Ruth, Reeta, Larry, Vickie, Denny, Nadine, Jack, Betty, Ed, Terry, Steve, Brian, Brad, Billy, DeDe, Bill, Helen, and Major.

What ever happened to: Tex, WA5OUB and Leo, KA5DUO? If anyone has any information as to their whereabouts, please contact us on the Thursday nite net on 145.45 at 9:00 local time.

Just a reminder. Our monthly meetings are now on the first Monday of the month at 8:00. If you don't show up, you'll probably end up volunteering for something by proxy. 73 till next month.

Major

WORKSHOP T I P

If you do much metalworking around your shop, it's not a bad idea to clean up metal filings and chips after each session. There are practical advantages to this, in addition to marking you as a good housekeeper. Metal filings can be murder on tile floors and on your feet too, if you go around the house barefoofed very much. Neither have I known many YFs who enjoy finding steel or aluminum chips in their carpeting. And, finally metal filings can raise havoc with electronic components, especially those with permanent magnets.

Lumber Jacks are always stumped.

A librarian knows volumes.

Undercover Agent: Snooperman.

The person wearing a smile is always well dressed.

Today we grabbed our microphone,
To talk into a foreign zone,
We've worked no DX this month,
The heck! Nothing rhymes with "month."

The easiest way to stay awake during a QSO is to keep transmitting.

In ham radio we realize that friendship is like wine - it gets better with age.

How To Get The Most From A Nicad Battery

By Harry J. Ekelund, P.E.
Product Manager
Multiplier Industries Corp.

High energy density and tolerance for abuse have made nickel cadmium batteries first choice for powering hand-held portable transceivers. The nicad is perhaps the most economical portable power supply.

While the nicad battery pack has the ability to stand up to the worst of what a hard-working police officer or fireman can offer—bone-chilling cold or withering heat, there are limits to the level of performance that a nicad can sustain. With some knowledge of these limitations, and knowing how to deal with some everyday battery difficulties, the service center can provide the user with a reservoir of information to keep his battery-operated equipment operating at peak performance levels.

First, a review of some of the specifications of a nicad battery: Printed on the label of most high-quality batteries is most of the information needed for proper battery maintenance. Clearly stated should be the batteries nominal voltage rating, capacity and recommended charge rate. For many of today's communications batteries, two charge rates should be indicated; a standard or slow rate, and a fast rate.

Load voltage of a fully charged battery will float between 1.20 and 1.30 volts per cell depending on the cell design. A fully charged nicad battery will provide 1.2 volts per cell under load. (See Fig. 1). As a battery's state of charge changes from fully charged to fully discharged, its terminal voltage will be fairly constant until the battery is nearly depleted. A voltage of 1.00 volt or less per cell while under load indicates a fully discharged battery.

Capacity (C) is the measure of the energy a cell or battery can provide and is the product of the time to discharge a cell to 1.00 volt and the current at which the discharge takes place. Nicad batteries are rated for capacity based on a one-hour discharge rate at a temperature of 70°F. The unit of measure is the milliampere-hour (mAh) or Ampere-hour (Ah) for larger cells. For example, a cell that can provide a current of 450 milliamperes for one hour is rated at 450 mAh or 0.45 Ah. Capacity ratings at other than the one-hour rate are not uncommon, but the one-hour rate is the most frequent reference. Some slight increase in capacity will be evident at the 10-hour rate, but the improvement is usually not much greater than 8%.

Nickel cadmium cells will operate over a wide range of temperatures, although their characteristics will vary significantly when the operating temperature is far removed from room temperature (70°F). As temperature increases, usable capacity increases. This increase in capacity is due to higher chemical activity at elevated temperatures and is not considered when cells are rated for capacity. Nicads will lose capacity as temperature is decreased. This "loss" is a result of decreased chemical system activity and will be "restored" as cells warm. At 115°F, a cell will have approximately 106% of its room temperature capacity. At 20°F, capacity will be about 80% of room temperature capacity (see Fig. 2).

The standard charge rate for nicad batteries is the 10-hour rate or C/10. Higher charging rates are possible and practical for many modern cell designs. Five-, three- and one-hour chargers are common in communications equipment, and cells that can be fully recharged in 15 minutes are available.

Common Nicad Problems

The most frequent complaint associated with nickel cadmium batteries is about capacity loss, resulting in operating time that is less than expected. Reduced capacity or operating time can result from any of a number of common causes, including: (1) selection of an incorrect battery for a given duty cycle; (2) effects of long-term storage; (3) effects of long-term overcharge; (4) effects of shallow discharge/full charge; (5) cell depletion as a result of normal usage; (6) insufficient time in the charger; and (7) charging at high temperature.

Duty Cycle

Customers who complain about less-than-adequate service life from their portable equipment may have underestimated the energy needed to sustain operation through a duty shift. To estimate the energy required for a radio to operate over a given time period, it is necessary to know the currents drawn from the battery under receive, transmit, and standby conditions for specific equipment. Then, using a standard duty cycle (typically 5-5-90%, receive, transmit, standby), the service time available for a battery under this duty cycle, can be predicted. For example, battery capacity required by a radio having the following current drains: receive, 45 mA; transmit, 245 mA; standby, 12 mA; can be calculated as shown in Fig. 3.

This represents the minimum capacity required for an 8-hour duty shift. More active services may need to utilize a 10-10-80% duty cycle or higher. A calculation of required capacity under more demanding service is shown in Fig. 4.

A 450 mAh battery, typical for many radios, will provide more than adequate service in these cases, and still provide reserve capacity for extended duty tours, or even worse-case duty cycles.

Long Term Storage

Batteries that have been stored for long periods of time will not demonstrate full capacity when first placed into service. This reduced capacity results from two different effects. The first effect is called *passivation*. During storage, a crystal-like film grows on the positive plates (the anode) of nicad batteries. The passivation layer acts as an insulator to the anode and must be removed before the cells will provide full service. The passivation layer acts to some degree as a "preservative" for the positive plates, preventing deterioration of the anode, and in that sense, is beneficial to the shelf life of the battery.

The second effect of long term storage is *pooling* of electrolyte. Electrolyte, as a result of gravity, is no longer evenly distributed within a cell, leaving some portions of the cell starving for electrolyte, while other areas are saturated.

Both storage problems can be corrected with ease. After batteries are removed from storage, it will be necessary to "wake up" the cells with two or three charge/discharge cycles. This maintenance will "burn off" the passivation layer, and redistribute electrolyte evenly throughout the cells. After the first cycle, perhaps 40% of capacity will be exhibited. After two cycles, 70 to 80% will be available. Following the third cycle, more than 95% of the battery's original capacity will be available and the battery may be placed into service with confidence.

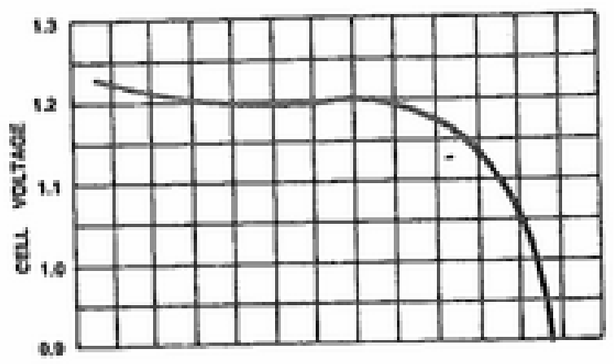


Fig. 1—Nicad cell voltage vs. discharge time curve shows relatively constant cell voltage over discharge life, rapid voltage drop as cell charge is depleted.

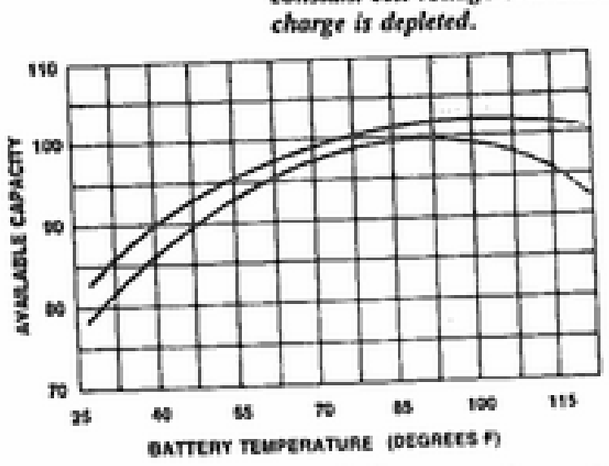


Fig. 2—Nicad battery capacity increases as temperature rises above room temperature. Conversely, capacity at 20°F is about 80% of that exhibited at room temperature.

STATUS	CURRENT	×	%	=	CAPACITY CONSUMED IN 1 HOUR
STANDBY	15	×	.90	=	13.5
RECEIVE	45	×	.05	=	2.25
TRANSMIT	245	×	.05	=	12.75
					28.5 mAh per hour
					× 8
					228.0 mAh per 8 hr shift

Fig. 3—Portable transceiver energy requirement calculation for 5-5-90% duty cycle. Typical 450 mAh battery provides capacity to spare when used in such light-duty service.

STATUS	CURRENT	×	%	=	CAPACITY CONSUMED IN 1 HOUR
STANDBY	15	×	.80	=	12.00
RECEIVE	45	×	.10	=	4.50
TRANSMIT	245	×	.10	=	24.50
					41.0 mAh per hour
					× 8
					328.0 mAh per 8 hr shift

Fig. 4—Energy requirement calculation for more demanding 10-10-80% duty cycle representative of active radio services shows demand still within capacity of 450 mAh battery.

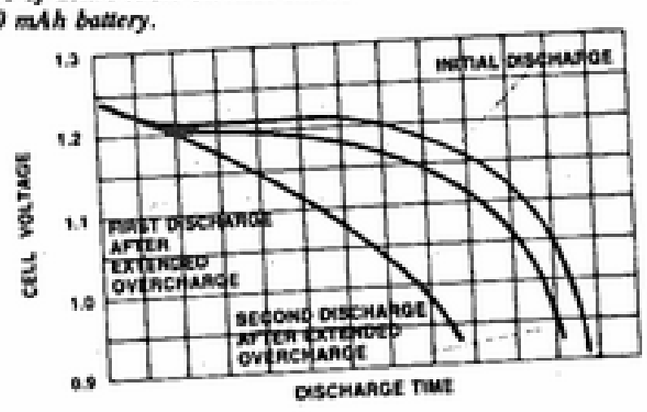


Fig. 5—Extended overcharge does not render nicad batteries unusable. Recycling battery charge restores capacity to 85 to 90% or more of new battery specifications.

Charged or discharged cells may be stored for indefinite periods of time with no significant degradation in performance after maintenance cycling. If possible, it is recommended that batteries be charged before storage. Cells and batteries which are stored in the charged condition will lose about 1% of capacity per day due to self discharge. This is a normal condition. No maintenance should be required during storage unless there is a requirement for immediate use upon retrieval from storage. In such cases, periodic charge/discharge cycles are recommended to maintain full charge capability.

Long-Term Overcharge

Modern nickel cadmium cells have been designed to withstand the deteriorating effects of long-term overcharge at the 10-hour rate. Gassing, venting and leakage are rare, even when a cell has been left on charge for days or weeks at a time. Capacity of such a cell or battery, however, will often appear to diminish after extended overcharge. This is not a permanent fault. Even batteries that appear to have lost as much as 35% of total capacity can be restored to service by a single charge/discharge cycle. Such batteries will typically exhibit capacities of 85 to 90% or more (see Fig. 5).

Shallow discharge/full recharge of nickel cadmium cells receives perhaps the most publicity, yet is probably the least frequent of nicad problems. Often called *memory effect*, it is the most misidentified problem associated with nicads. Early nickel cadmium cells, when discharged to only a small portion of the total available capacity, would "memorize" that level of discharge. Such cells in that condition would be able to provide only the "memorized" capacity level and no more. Pagers and other devices which spent much of a 24-hour day in a charger often exhibited such an effect. When called upon to provide more capacity than "normal," the "memory" would prevent further discharge.

Today's modern cell design has all but eliminated the memory effect. Special plate processing techniques have reduced the problem to the point where only *repeated* and *identical* discharges will cause a battery to exhibit "memory." Even in cases where identical shallow

discharge/full recharge cycles do produce a real memory effect, the condition may be corrected by several charge/discharge cycles. Full usable capacity then becomes available (see Fig. 6).

Cell Depletion

As nickel cadmium batteries are cycled, there is a progressive loss of capacity available for use. This is a result of mechanical changes within the cell that occur as the battery is subjected to an ever-increasing number of charge/discharge cycles. The electro-chemical process that occurs when cells are charged and discharged is, in theory, fully reversible. In practice, the reformation of the chemical agents within the cell limits the cell's life to a discrete number of cycles.

As time passes, less and less capacity is available and, at some point, when available capacity is less than necessary for a given duty cycle, the battery should be replaced. Public safety agencies often replace batteries when available capacity falls to 80% of rated capacity. Other users of portable equipment, whose duty cycle requirements may be lower, can perhaps afford to use batteries having reduced capacities. Even when capacity falls to 50% of rated, some useful life remains. Some users retain such batteries to use as spares.

Standard charge batteries will provide as many as 1,000 full charge/discharge cycles before their capacity falls below 80%. Fast charge batteries should provide 600 to 700 cycles. These figures are valid only if proper care and maintenance are applied.

Insufficient Charger Time

Nickel cadmium batteries and cells are normally charged from a constant current source at some convenient rate. This rate is frequently chosen to provide fully charged batteries within a given time period. The "standard" rate is the 10-hour rate or C/10. If charge/discharge efficiencies were 100% perfect, then a cell charged at the 10-hour standard rate would be recharged in 10 hours. Unfortunately, this is not the case because charge efficiency is less than perfect. To recharge a fully depleted battery, it is necessary to provide 140% of the energy that the charged battery can deliver. This means that, when charging at a 10-hour rate, charge time must be increased by 40%, for a total of 14 hours for full recovery. Excess charge is dissipated as heat in the charging battery.

This energy requirement also applies to "fast" chargers. Rapid battery chargers frequently use the internal temperature of a battery to "trip" a charge indication lamp. This usually means that the charge rate has been changed from a rapid rate to a standard rate. The switch is often set to trip when internal temperature reaches 113°F. It does *not* indicate end of charge.

At this point, the battery may be charged only to about 75 to 85% of full charge, so additional time should be spent in the charger to "top off" the charge. When a customer complains about short service between charges, it is important to verify that he is charging his batteries correctly, and not removing his batteries from the charger when he sees a green light.

Charging At High Temperatures

Charging a battery when ambient temperature is greater than normal room temperature may reduce full charge capacity. When a battery or its environment is warmer than 70°F, full recharging will not occur and batteries will appear to have lost capacity. (See Fig. 7.) Warm batteries will not accept a charge in the same way as batteries at room temperature. Further, the higher temperature may cause premature "tripping" of fast chargers controlled by thermal sensors. Thus, the battery would require more time than anticipated in the charge rack.

Testing Batteries

Before batteries are replaced, it is prudent to verify that there has been a true loss of capacity. Simple methods may be used to measure available capacity. Using any method, several charge/discharge cycles can be performed on a battery and the measured capacity compared with records or specifications. If any common nicad problems appear to be present, successive charge/discharge cycles will restore performance. Depleted batteries will not recover and should be replaced if they exhibit less than a required capacity level.

Verifying nicad battery performance can be an easy task. The most inexpensive battery tester is a load resistor and a voltmeter. A fully charged battery should be discharged at its "C" rate to one volt per cell, while time required to reduce voltage to one volt per cell is measured.

For example, a 15.0-volt, 450-mAh Omni battery, which contains 12 cells, would be verified using a load resistance of 32 ohms. At a discharge rate of 450 mA, the battery should discharge for 60 minutes or more before the voltage under load falls to 12 volts (one volt per cell) in order to meet published specifications for a new Omni battery. A discharge time of 48 minutes corresponds to 80% of capacity. Thirty-six minutes equates to 60% of capacity, a level at which many (non-public safety) users would replace a battery.

To determine test conditions for any battery, the battery's terminal voltage is divided by cell voltage (1.2, 1.25 or 1.3 volts—the correct value depends on the battery manufacturer). The quotient is the number of cells. Terminal voltage is divided by the battery's rated capacity to find the test load resistance. To summarize:

Load resistance = (Number Of Cells × 1.2 Volts) ÷ Capacity

Other Common Problems

When a battery is left to discharge to less than 1.00 volt per cell under load, cell reversal may result. As the weakest cell in a series string reaches terminal voltage, remaining cells still have enough capacity to drive current through the weak cell, in effect charging it in reverse. If this occurs, cell voltage actually reverses; the positive terminal becomes negative, and the negative terminal becomes positive. If the battery has not been badly reversed, it may be possible to correct this situation by subjecting the battery to a full charge cycle. In the long term, the effect can lead to excessive gassing within the cell and possible venting, resulting in electrolyte loss and premature failure.

A battery with a weak cell in a series string of cells will exhibit a lower-than-normal terminal voltage under load after the battery has been discharged for a short time (see Fig. 8). The weak cell will likely go into reversal and vent. Batteries with this difficulty should be replaced if cycling does not restore the weak cell.

Batteries with shorted cells will exhibit lower-than-normal voltages under load, usually by multiples of 1.2 volts. For example, a freshly charged Omni battery (normal voltage under load: 14.4V) that has a terminal voltage of 12 volts under load can be suspected of having two shorted cells. Batteries that have shorted cells should be replaced.

Vented Or Leaking Batteries

Due to modern nickel cadmium cell construction, it is most unusual to see a battery leaking electrolyte as a result of can or seal failure. The steel can construction and crimp seals used have virtually eliminated leakage as a source of concern.

Cells which have vented are another matter. Cell venting, with consequential spillage of electrolyte, is always the result of some other problem: long-term overcharge, forced discharge, runaway charging systems, cell reversal and cold battery charging may contribute to electrolyte spillage.

Spillage leads to a loss of capacity and to cell failure. If it is suspected that venting has caused a battery to lose electrolyte, the loss may be verified by measuring the battery's voltage while in the charger after charging is completed.

Batteries suffering from vented cells typically have abnormally high terminal voltage near the completion of the charge cycle. A battery having a rated voltage of 15 volts will normally show a terminal voltage of 17 to 18 volts at the end of its charge cycle. A battery which has continuously vented cells in charging may measure as high as 20 volts or more. Such batteries should be replaced if they fail to provide adequate service capacity. Cycling these batteries will not improve their condition. It is also prudent in such cases to try to find what caused the battery to vent. The charger and its environment should be checked.

Cracked Or Broken Cases

Plastic battery case design takes into consideration the effects of rough treatment, accidental mishandling and just plain abuse. ABS, Lexan and other polycarbonate materials are used to reduce the probability of case breakage. However, cases do break. Batteries with cracks and splits can be used, but with discretion. Any battery with pieces missing, or with internal parts showing, should be replaced, because cells may accidentally short-circuit.

Melted Or Swollen Cases

A melted or swollen case is frequently associated with fast charge batteries in circumstances where the fast charge cycle has failed to terminate properly. Under such circumstances, the battery should be removed from service (distortion of the case will likely prevent it from fitting into a radio), and the charger should be checked thoroughly to confirm its failure. Dirty contacts on the charger or battery can cause a runaway charger. So can AC line voltage or current transients, surges and dips. Aged components in older battery chargers have also been found responsible for runaway conditions.

Many batteries utilize fuses or thermal cutouts to protect the battery from damage due to high currents or temperatures. However, open fuses will result in a dead battery that must be replaced. Thermal cutouts or thermostats will reset themselves after cooling and will give best battery performance in everyday, practical use.

Nicad Dos And Don'ts

Nicad cells should not be discharged continuously at rates greater than 2C. Doing so can overheat internal cell components causing premature failure. Short-term high discharge rates are permissable, but caution should be observed whenever discharge rates exceed the 2C rate.

Short-circuiting nickel cadmium cells and batteries should be avoided. Because nicad cells have extremely low internal impedance, very high currents can flow in a dead short, causing very rapid heating. Tools, jumpers, wires and other shorting devices will get hot, leading to the possibility of burns or even fire, should a source of fuel be at hand. Many of today's communication batteries include a diode in series with exposed charger contacts to prevent inadvertent shorts when a radio is put in a pants pocket along with keys, coins or other metallic objects.

Cold batteries can rupture if charging is initiated before allowing them to achieve moderate temperature. Batteries should be warmed before placing them in a charger. Fast charge batteries should reach 60°F before starting the charge cycle. Standard charge batteries should be 40°F or warmer. Such temperatures can be achieved by allowing cold batteries to stand at room temperature for a

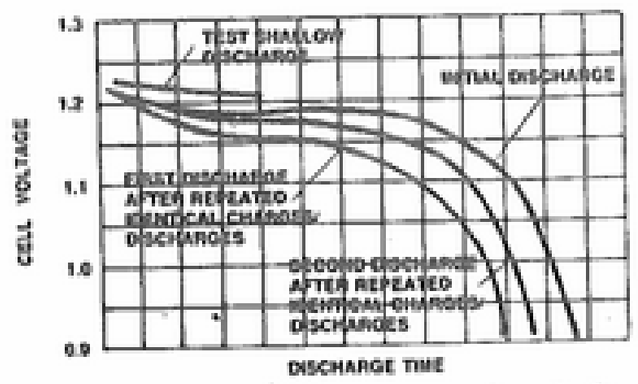


Fig. 6—'Memory effect' is rarely a problem with modern nicads. Even after repeated, identical charge/discharge cycles produce some memory effect, recycling restores full capacity.

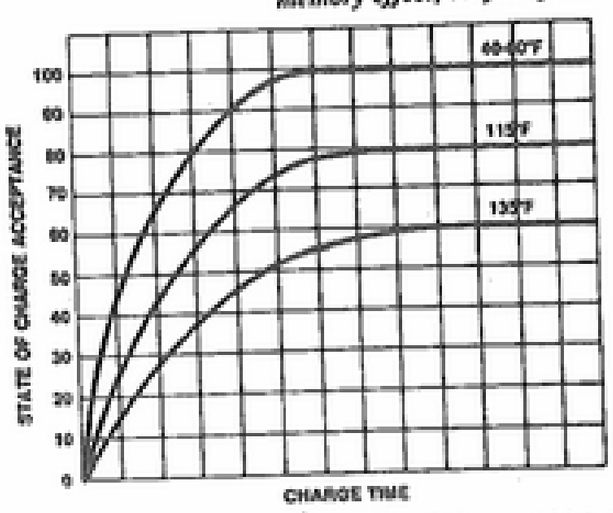


Fig. 7—Nicad battery accepts reduced charge at high temperatures, lowering apparent capacity. Thermal sensors may switch charging rate to 'trickle' prematurely.

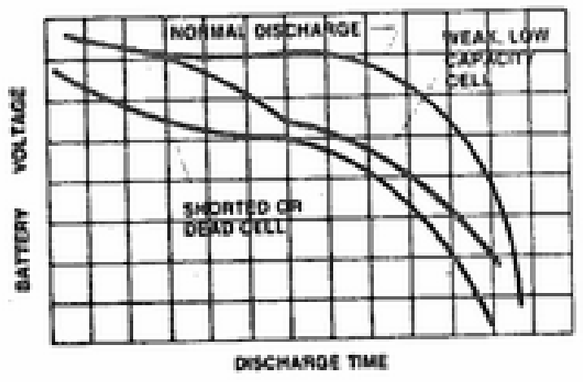


Fig. 8—Weak or shorted cells result in abnormal discharge voltag curves exhibited during battery discharge cycle. Cycling may restore weak cells. Shorted-cell batteries should be replaced.

BICENTENNIAL AMATEUR RADIO CLUB

"To Promote Radio Communications"

July Minutes for 76ers Amateur Radio Club
The meeting was called to order by The President Don Duck at 7:30. The meeting for this month was held at Dons house as it was a meeting to finalize computer input for HH84 preregistrations.
Treasurer Report. Treas Tom Webb read the financial Report. The account is now in the Tinker Credit Union where it will draw interest. The totals are $117.79 in club account and $188.78 in the Repeater account for a total of $328.51 with $45.68 cash on hand.
CORA Report. Jim Buswell passed out the copy of the minutes of the last meeting,most of which pertained to Ham Holiday 1984. Also noted that we had been volunteered to head up the flea market tables this year.
Repeater Report. Repeater is now back up on top of the Hospital building on a tower at about 250 ft.
Field Day Report. Field Day this year was helc at Roman Nose Park in Watonga..altho we didnt make as many contacts this year as in previous years We had more of a family outing this year.
New Business. A motion was made to hold the August meeting at Granada Village Activity bldg and have an icecream supper and swimming party... this received a majority approval. so come to out summer picnic this August 14th at the Granada Village club house at 2400 S.McArthur.
At 8:00 the meeting was adjourned for the main business of the night of finishing up the input for Ham Holiday preregistrations. The input was finished and sorted by Don's computer and the result transmitted tc George's computer so tickets could be printed.

See you at the Ice cream social next month.

Jerry N5AUH
Sec.

For Sale: Radio Shack Cat acoustical modem will work on any computer that has RS232 N5AUH 354-2061 OR 354-0017.

LATE NEWS FROM AUTOPATCH - The following were reconended by the nominating committee:

President	Cathy Whited	WB5NDO
VicePresident	Bob Northern	N5GWZ
	Joe Hustak	WA5ZNQ
Secretary	Vicki Adkins	N5DLM
Treasurer	Ron Recer	KE5M

few hours.

Wet batteries should be allowed to dry thoroughly before being placed into a charger. Moisture can act as a conduction path that can lead to permanent charger or battery malfunction.

Nicads should not be discharged to less than 1.00 volt per cell.

A battery's condition may be verified by cycling it before returning it to a manufacturer—which is exactly what the manufacturer will do in verifying a difficulty. Cycling will very often cure the most common nicad problems at little expense.

Minimizing abuse, and operating batteries and chargers within their design parameters, increases nicad battery reliability. Care in the maintenance and use of nicad batteries will go a long way in reducing portable equipment operating cost and increasing customer satisfaction.

The South Canadian Amateur Radio Society

-wa5rpp-

SCARS TO ASSIST AT BALLOON RACE.....

The South Canadian Amateur Radio Society will, again this year, provide communication assistance to the Great Oklahoma Balloon Race. This year's race will be held on August 18th at Max Westheimer Field in Norman.

An organizational meeting for all volunteers will be held on August 13th (a Monday nite) at the Red Cross building in Norman. The meeting will start at 7:30 p.m., and all of those interested in assisting in this project are asked to attend. If you are interested but cannot be at the meetinng, please contact Ken, KA5EFJ as soon as possible.

There is also a need for volunteers who are not members of SCARS. The manpower requirements for this event are so great that additional help is needed. If you know someone who is interested in this activity even though not a club member, please encourage them to contact Ken.

SCARS HOLDS JULY MEETING.....

On July 14th, SCARS held its regular monthly meeting at the Red Cross building in Norman. Several items of club business were discussed.
--The repeater is back up and on the air. The machine is in good working order and the range is greatly improved. The only difficulty in the operation of W5OU/R is with the autopatch. The patch is working as well as it can, however due to design it will not allow use by some tone pads. The autopatch circuits were state of the art about ten years ago, but better results are available with the current day technoligy. The club will decide on obtaining a new autopatch controler.
--David, K5PL, will investigate the possibility of putting 10 meter capabilities on the repeater.
--KD5IT, Dave, sent off the Field Day results so that they can be registered for participation in the event. The club operation logged over 500 contacts by operating for 4 hours with four transmitters.
--The club is grateful to David, K5PL, and others who gave assistance in replacing the beam antenna at the top of the Red Cross tower. The club station is now reported to be fully operational again thanks to their good efforts.
--Howard Hagglund, KA5UGN, is SCARS' newest addition. Howard recently received his call, and some of the club members pitched in a little labor to erect an antenna for him.
--SCARS also welcomed a not so new ham to the last meeting. W5PNO, Joe, was present at the last meeting. Although Joe has not been active for several years, he has recently become interested in getting back on the air. He is certainly another welcome addition to the club.

HAM HOLIDAY PRIZEWINNER.....

The members of SCARS were pretty well shut out at the prize drawing at the Ham Holiday. One bright spot occurred however, when Linda, N5DWN, was awarded a T-shirt with a computer generated picture of herself on the front. The prize was given by one of the commercial exhibiters at the hamfest. Congratulations Linda.

kay COUNTY AMATEUR RADIO CLUB

BY KD5FX

Greetings once again, and I hope you had a good month. July was busy here in Kay County. We helped the Jacees with communications during their annual raft race down the Arkansas river. The race proceeded with only minor problems, two inflatable rafts had leaks which were patched by our roving helper, KA5OUH (who, by the way, is currently the world leader in the ARRL auto-patch contest for the leading amount of patches made during 1984). A four car pile-up occurred on I-35 during the raft race and a ham called into the repeater for help. The information was quickly forwarded to the fire department via the W5HZZ auto-patch and help was on the way.

**** JULY MEETING NOTES ****

Next months meeting will be held on the FOUTH Thursday, because WB0VHC who lets us in to the Parks Dept. building will be out of town on the third Thursday. WB5YRN read the proclamation from Gov. Nigh stating that July 23-29 was Amateur Radio Week in Okla. and Delbert also reported on the KCARC participation in the raft race. The minutes were read and approved and the financial business was taken care of. WN5LUI gave a report on his test of the W5HZZ repeater and improvements were made due to a squelch readjustment. For the August meeting, everyone is to bring their mobile rig and it will be checked out. After this is done we will schedule a time for the repeater coverage test to be done. Meeting adjurned early.

ICOM 2AT RAMBLINGS OR MODS FOR THE MODERN.
BY KD5FX

Well, I didn't get the mod done that I wanted to do this last month, but I will tell you about it anyway. To make the 2AT tune from 150.00 to 160.00 MHZ. First you must make the mod that opens up the tuner so that it will tune from 140.00 to 150.00. There was an article in the Feb. issue of 73 that told how to do this. Breifly here is what to do-

1-De-solder the brown jumper wire from the MHZ BCD thumbwheel switch to allow the MHZ switch to run through its whole range.
2-Solder a small piece of wire or form a solder bridge at the position where the cellophane PC harness terminates at the programmable divider IC. If you look at your 2AT circuit board layout diagram, (you did find it didn't you?) there is a picture of the FLEXIBLE BOARD, at the bottom of the picture there is a C4 Pin shown with a gap that goes to the PC tracing, just bridge that gap.
To make the 2AT jump up 10 MHZ you must put a jumper from Pin 1 on IC1 (the programmable divider) to Pin 15 on IC1. Pin 1 is Vdd i.e. 5 vdc and Pin 15 is the next address line of the divider. I haven't been able to do this yet, but there are several of them working in the Vinita area. Of course if you want to transmit up there (with the proper license) you will have to retune several circuits. Next month-A mod for your drop in charger that will allow you to fast charge ni-cads in your BP-4.

FER SAIL
KENWOOD TS-130S w/PS-30 pwr supply, 500 hz CW filter, mic, narrow SSB filter (not installed). Low hours. Used by a VHFer, like new condition. contact-N5DUB Doug Everitt, 1706 E. Okla., Enid, OK 73701 or call him on the 444.85 OKC repeater or 145.29 in Enid.

AERONAUTICAL CENTER AMATEUR RADIO CLUB, Inc. W5PAA

ACARC . . . . FIELD DAY '84

The weekend of June 23thd & 24th was the setting for a fun and exciting time for members of the Aeronautical Center Amateur Radio Club. It just happened to also be the weekend for ARRL's annual Field Day competition. We can't really say we started with a bang, but on the other hand we did not end with a whimper. There were already reporters from Channel 5 News waiting for us to set up before the official start time. We only wished the weather would have been more cooperative.

Those present for the setup/teardown were: Ted Anderson, KA5OQQ and Steve Bense, WA4OLE (co-leaders); Jack Iman, WB5SVN (ACARC President); Bob Pace, WA5CJG (club treasurer); Buddy Sohl, KC4WQ; and Tim Knechtly, WB8TEV. We all managed to get some operating in, some more than others. Unfortunately, Mother Nature stepped in and curtailed our operations Saturday night. Thank goodness we disconnected everything. While we were sitting in the camper waiting for the storm to clear, lightning struck the ground 300 feet DOWNHILL from us. You definitely stand up and take notice when that happens. Still can't figure, though, with all those metal masts standing atop the hill why the lightning struck a spot at least 50 feet lower!

One special note to those planning such a venture again: Don't try to remember everything! So what if the gang has to eat hamburgers for breakfast because you forgot pancake batter! And don't use a checklist; if you're like me you'll forget to take it along.

After the dust had settled, it was generally agreed that we accomplished what we set out to do.....have fun! Many thanks to all who helped in one way or another, whether by physical help or giving us a contact. This includes the merry trio of midnight visitors we received bearing news of other exciting adventures (you know who you are). Now, who do we nominate for the job next year.....!

Ted/KA5OQQ &
Steve/WA4OLE

AUGUST REMINDER

Our Club will be joining the VHF Club for some cold sliced watermelon...

Date: August 25th

Place: Bethany Lion's Park.

Time: 6:30-8:30 p.m.

Bring your own utensils... BE THERE!!!!

This event will take the place of the August ACARC club meeting at the Aeronautical Center. Our next regular club meeting will be Thursday, September 6th at 7:30 p.m. in the Flight Standards Building at the Aeronautical Center.

Gloria Seignious
Secretary ACARC

NOTICE TO ALL C64 USERS IN OKLAHOMA
Would you like to start a C64 net? Lets discuss! Call KD5FX evenings (i.e. after 9 PM) on the Enid 145.29 repeater or call me on 3.815 MHZ during the same time.

HAM HAPPENINGS REFER TO CLUB SECTION FOR SPECIFICS

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			ARDMORE 1	EDMOND Club 2	3	4
5	Great Plains CIMARRON 6	M O R I 7	8	ALTUS AREA 9	10	C O C O SCARS 11
Wheatstraw AT CANTON 12	13	76'ers 14	15	16	EARS DINNER 17	18
19	20	AUTOPATCH 21	22	KAY County 23	24	Aeronautical Center ARC VHF Club 25
26	EDIT COLLECTOR - EMITTER 27	CORA AT RED CROSS 28	29	30	August 84 31	