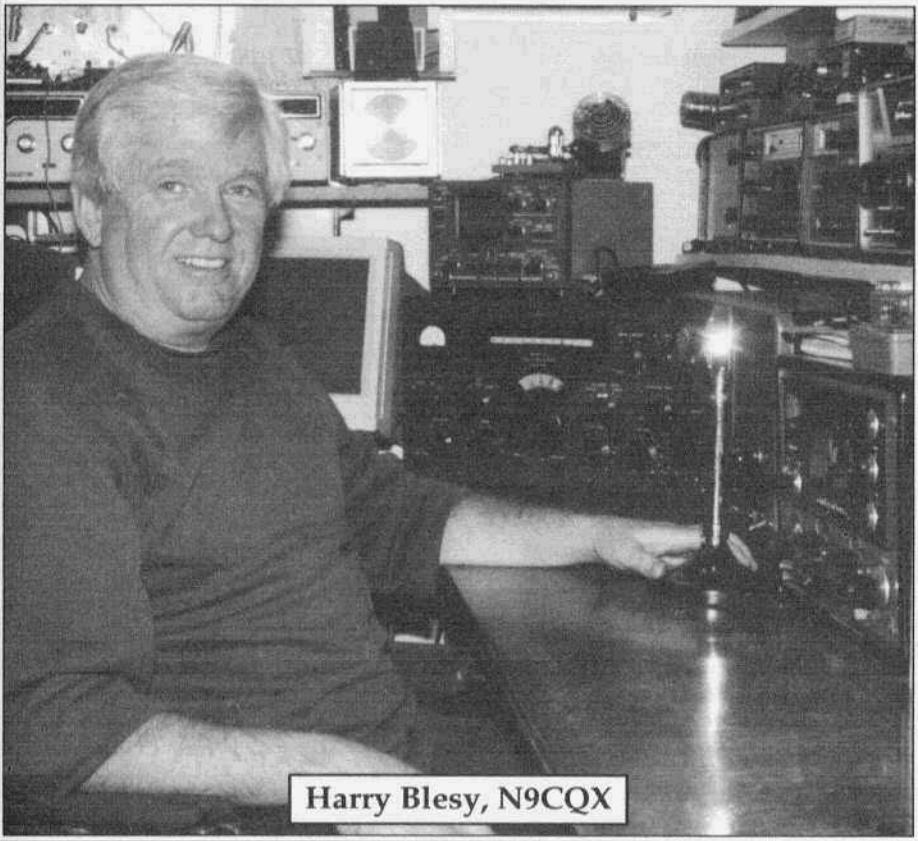
$2.50

ELECTRIC RADIO

celebrating a bygone era

Number 112 August 1998



Harry Blesy, N9CQX

ELECTRIC RADIO

published monthly by Electric Radio Press, Inc.
14643 County Road G, Cortez, CO 81321-9575
Second Class postage paid at Cortez, CO and additional offices

Authorization no. 004611
ISSN 1048-3020

Postmaster send address changes to: **Electric Radio**
14643 County Road G
Cortez, CO 81321-9575

Editor - Barry R. Wiseman, N6CSW
Office Manager - Shirley A. Wiseman

Electric Radio is published primarily for those who appreciate vintage gear and those who are interested in the history of radio. It is hoped that the magazine will provide inspiration and encouragement to collectors, restorers and builders.

We depend on our readers to supply material for ER. Our primary interest is in articles that pertain to vintage equipment/operating with an emphasis on AM, but articles on CW and SSB are also needed. Photos of hams in their hamshacks are always appreciated. We invite those interested in writing for ER to write or call.

Regular contributors include:

Walt Hutchens, KJ4KV; Bill Kleronomos, KDØHG; Ray Osterwald, NØDMS; Dave Ishmael, WA6VVL; Jim Hanlon, W8KGI; Chuck Penson, WA7ZZE; Dennis Petrich, KØEOO; Bob Dennison, W2HBE; Dale Gagnon, KW1I; Rob Brownstein, K6RB; Don Meadows, N6DM; Lew McCoy, W1ICP; Kurt Miska, N8WGW; Warren Bruene, W5OLY; Brian Harris, WA5UEK; Thomas Bonomo, K6AD and others.

Editor's Comments

Lloyd Hutterman, W6IOY, Silent Key

Last month at the age of 85, my good friend and Elmer W6IOY became a Silent Key. I met Lloyd shortly after Shirley and I moved from Canada to California in 1978. He encouraged and helped me get my ham license. I think that if I hadn't met Lloyd I might not have become a ham and there might not be an Electric Radio today. Although we left California in '82 or '83 we always kept in touch. I plan to write more about Lloyd at another time. He was truly a remarkable man and one of the nicest people I've ever met.

On page 3 in his issue, in his AMI Update column, Dale Gagnon, KW1I, talks about the latest proposal from the ARRL, this one to simplify the present license system. I hope everyone reads Dale's column and then goes on to find out more about what the ARRL is proposing either from QST or the ARRL webpage. In his column Dale asks the question, "Could this new proposal be the latest move by the League to reduce the license requirements in order to find new members?" I think the answer to that question is yes and I think we should all be in opposition to any change in licensing structure that reduces or "dumbs down" the licensing requirements. Dale will have more to say about this proposal next month.

Also in this issue, I've printed the VFD reports that we received. I wish there were more but I think what we have might encourage more participation next year. We're going to keep plugging VFD and modifying it and eventually we hope it will become a big annual event for vintage equipment operators. I think as propagation improves as we get into Cycle 23 we will get more and more participation.

The envelope option that we offered a couple of issues ago has worked out well but we have to remind everyone that the option is available only to 1st class mail subscribers. Because of postal regulations that we have to follow for 2nd class mailing, we cannot put just some of these magazines in envelopes. They all have to be mailed in the same way. At some time in the future we're hoping that we can put all the magazines in some sort of plastic wrapper. I hope that we can do that soon.
N6CSW

TABLE OF CONTENTS

Cover: Harry Blesy, N9CQX, in his vintage hamshack.

Looking Back

by Lew McCoy, W1ICP
1500 Idaho St.
Silver City, NM 88061
mccoy@zianet.com

I just had a heart breaking thing happen to me. I don't mean to inflict my grief on any of you but I know many of you would be concerned. My wife, Martha, to whom I have been married for 60 years, suddenly came down with cancer of the brain. Many of my friends in ham radio have met Martha at conventions when she helped me man either the ARRL booths when I worked at the League or the CQ booths as of as recent as last fall. Martha was also very active helping me while I was president of QCWA.

She started radiation treatments last week but evidently this isn't working so they are going to resort to surgery to remove the growth, however the prognosis is not very good. Believe me, I am not looking for sympathy—it is just that Martha has so many friends with the readers of ER that I felt I should pass the news on.

(Since I wrote the above she has gone through surgery but they could not do much. She is coming home this week.)

Barry has asked me to look back at some of the rigs I designed and built and there are a few interesting things that happened in those days. I always operated on the premise that if there was a cheaper way of doing something-that is the way I would go.

I suppose I should explain that statement. Like some of you, I grew up during the great depression that occurred after the stock market crash of 1929. My father was fortunate in that he had steady work during those bad years but spending money was an item that I just did not see. As I have mentioned previously, my father got interested in radio right at the end of World War One and had a spark transmitter but he never pursued ham radio simply because my mother raised so much hell with him. My mother thought that ham radio was a waste of time and money.

My first job was working at Marshall Field's Department Store in Chicago cleaning the air ducts and that was a really filthy job. Get this—my salary was one dollar a day, for a ten hour day or to break that down, a lousy dime an hour!

I am going go jump ahead here because it brings an interesting League story to mind. Dick Baldwin had become general manager of the League and he was looking at methods to improve QST. He hired a consulting firm to come in and critique the magazine-naturally, the firm was going to look at the technical writing. I had just written an article called "The Junk Box Power Supply." As usual with me, I had taken an old TV set and made a pretty good power supply at very minimal cost. I had/have a bad/good method of writing technical articles. In this junk box power supply article, I started off by stating, "Being a Notorious Cheapskate--" and I figured that would get the reader's attention. I don't know about the average reader but it certainly got the attention of the firm that was doing the overview of QST.

Baldwin told us one morning he wanted to see all the technical writers in the laboratory to discuss our writings with this firm. We all gathered in the lab. Doug DeMaw was the technical editor and the nominal head of the department. The guy from the assessment firm started off fairly smoothly but then got down to individual cases. I will have to admit he reminded me of a used car salesman in selling his pitch. He didn't spare De Maw or other writers in his criticism but I noted that he didn't mention any of my stuff. Not that I

continued on page 39

August AMI Update

Dale Gagnon, KW1I, President
dgagnon@concentric.net

AM International Discovery Weekend on September 11-13

This weekend operating event is one of the more popular events on the AM calendar. Remember the purpose of AMI Discovery Weekend is to get as many AM ops on the band on one weekend so that the rest of amateur radio can see how many of us there really are! It's also an opportunity for AMI members to discover other members. Here again are the rules. The operating event starts Friday evening Sept. 11 and continues through Sunday evening Sept. 13. The achievement level details are slightly different from last year. Level 1: Make 20 or more AM contacts total on the 160, 75 and 40 meter amateur bands. Level 2: In addition to Level 1 achievement, make an AM contact on 14.286 +/-. Look for AM activity starting at 1700 PDT (2000 EDT) each evening. Level 3: In addition to achieving Level 2, make an AM contact on 10 or 15 meters (or one of the VHF bands). Look for AM activity above 21.400 MHz and 29.000 MHz. Send a copy of your log to AMI Headquarters, Box 1500, Merrimack, NH 03054-1500.

"Participant" certificates will be awarded to Level 1 achievers.

"Participant Plus" certificates will be awarded to Level 2 achievers.

"Participant Primus" certificates will be awarded to Level 3 achievers.

You do not need to be a member of AMI to participate. It is customary to log equipment used and AMI numbers of stations you contact. If you have misplaced your AMI number you can write or e-mail me and I will look it up for you. If you would like to join AMI and have your certificate number in time for the event, please include your phone number or e-mail address in your letter and I'll see that you get your number.

ARRL Simplified License Structure

On July 24th the ARRL proposed a new system of four license classes to simplify the present license system. The League felt this was necessary because the FCC in a February list of 31 areas that it was focusing on, included the item, "Streamline Amateur Radio Service". In this item, "Simplify the licensing process" was specifically mentioned by the FCC along with "further privatizing the administration" of Amateur Radio.

The ARRL says it produced this document at this time in order to have a proposal on the table rather than respond later to an FCC initiative in this area. Briefly, a Class D license is proposed that would be equivalent to the Technicians license. A Class C license would take the place of the Novice, Technician Plus and General licenses. The Class B would replace the Advanced license and the Class A would replace the Extra. The Novice band segments would no longer be necessary. The existing CW frequency allocations would decrease slightly on 80, 40 and 15 in favor of a larger phone allocation. Code requirements would change. The Class C would require a test for 5 wpm and the Class B would require a 12 wpm test. No additional code test would be required for Class A. Complete information on this ARRL proposal, some questions and answers and the ARRL's letter to the FCC can be found on the ARRL web site: http://www.arrl.org

The proposal may be controversial because of the proposed loss of some CW spectrum in favor of more phone allocation. Even more controversial is the granting of today's General class privileges to Novice, and Technician Plus license holders and the lowering of CW requirements to 5 wpm for the

continued on page 38

Vintage Field Day Reports

I want to thank all of the VFD participants who sent in reports. I think that everyone will enjoy reading them. I hope it inspires more participation next year. Ed.

Mike Heltborg, WA7NPA

Vintage Field Day probably started about four months ago. I have been planning for this event for that long... Working on building a good 28VDC supply that would handle the starting surges of the dynamotors and still work on generator power, and what kind of antenna system that I was going to use that was frequency agile...

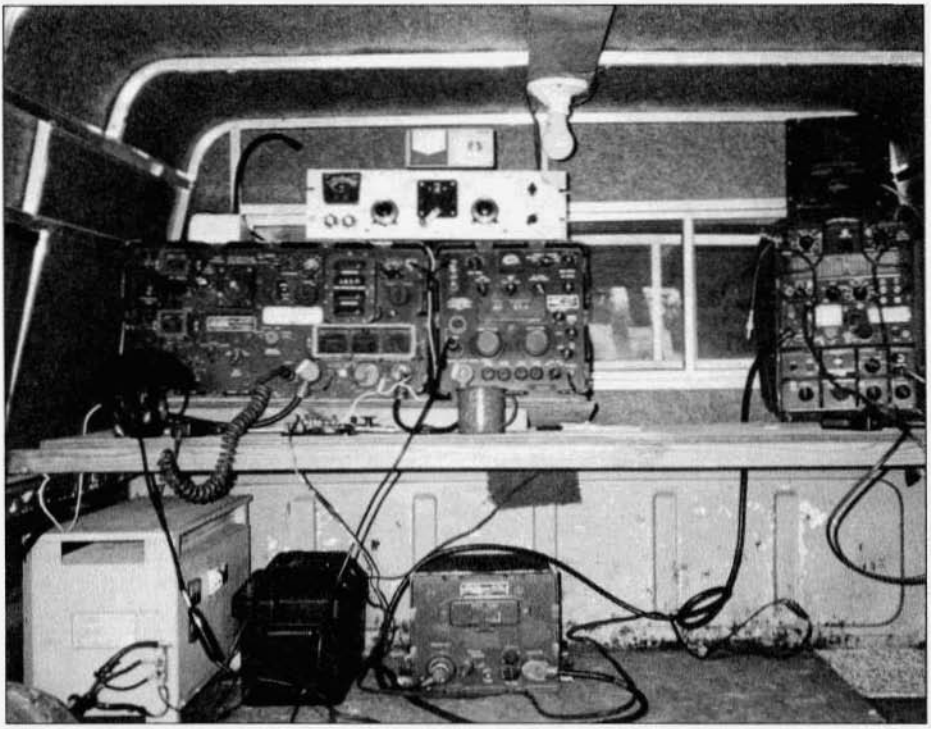
The supply was the first step. A friend gave me a telephone company supply that I rewired that would handle the 150+ amp starting surges of the T-195 transmitter and not go over 29VDC on a no load situation. Also I have since put two 12V batteries in series across the output of the supply, and they handle the surge fine. The other concern was, would the supply work off a generator and still maintain its voltage regulation. This it did with no difference between shore power or the generator. A plus to this setup is that the T-195, R-392 system (or GRC-19) will run on the batteries while you're checking the generator and having it shut down to gas it and so on. When you bring the generator back on line the supply charges up the batteries.

The antenna was the next thing that I dealt with. Where I was going to be operating from, there is a lot of brush and undergrowth. I wanted something that I could change bands without having to drop the antenna every time. I have always wanted to try a 160M dipole fed with open ladder line, so that is what we settled on, as I have a homebrew tuner that should match the antenna to the radio.

I used my 3/4 ton Ford truck as the rig to get all of this stuff out in the field and back again. It has a tall canopy which will make for a nice radio position after I build a table for it. (heavy table). This is kind of a rundown on the events leading to VFD.

Vintage Field Day 1998

I loaded the truck up with all the radio gear and support stuff that you just have to have, it looked like I was going for a week instead of just overnight. I didn't realize how long a 160M dipole is until I started putting up the critter. The bowl that I was in has a great shot to the east and south but a rock face that climbs about 500 feet up on the north side. The antenna was almost as long as the bowl was wide, so the antenna was about 75 feet high in the center. The south end was about 50 feet off the ground and the north end was about 1/3 the way up the north wall of this bowl. I finally got set up about 5 PM Saturday night and the local guys that I talk with all the time were looking for me. I had a lot of noise in the receiver until I remembered to ground the generator. I know that you are suppose to do this, but I haven't been on a field day in about 15 years! Had a lot of relearning to do. When things started at 7PM I worked a few guys that were around on 75M AM. I tried 20M and there were lots of signals both SSB and AM. The guys on AM, Barry, were wondering where you were! There was only a few that I could hear well enough to make out their callsigns. Seems like they were all in roundtables and not listening for weak field day stations! I never did work anyone on 20M AM. Also



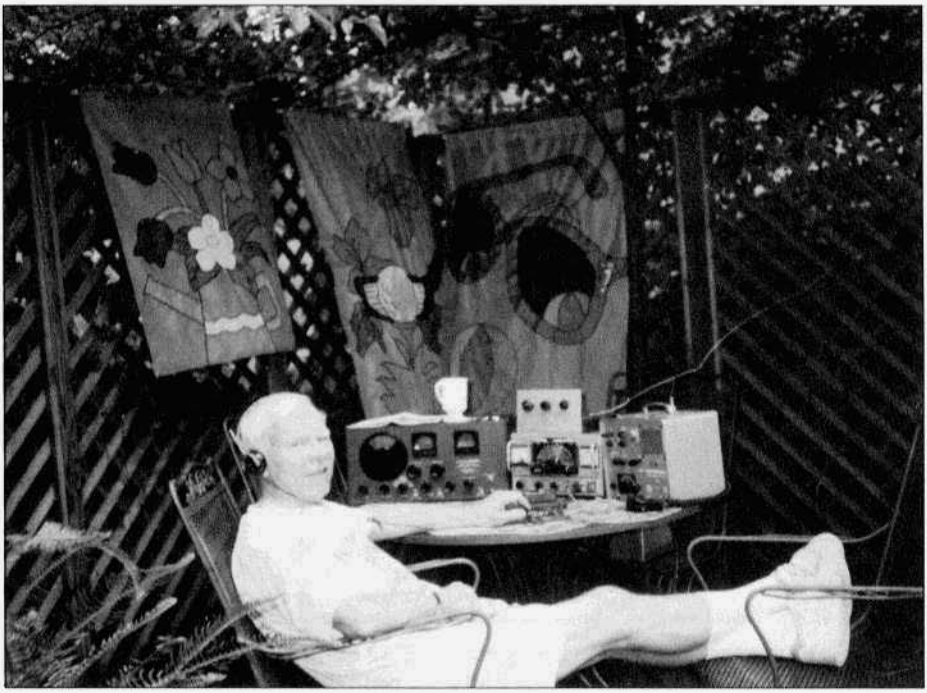
The main radio that I was using was the GRC-19 (T-195, R-392) It runs about 120 watts output on both CW and AM with the supply that I am using with it. Draws about 45 amps on transmitter with the receiver on standby and in the receive mode it draws about 13 amps. I also took along the GRC-9 radio but didn't use it at all. Lots of QRM so just ran the big rig. The antenna was a 160M dipole fed with 450 ohm ladder line though a homebrew tuner. The generator is a 3 KW Honda that used about 3 gallons of gas for 10 hours of running time. I had 3 CW contacts, one each on 80M, 40M, and 20M and 15 contacts on AM on 75M. I was kind of disappointed with the 160M dipole but I think that location had something to do with it. Also I am spoiled, as here at home I use a 75M loop that is in a vertical configuration! This antenna works very well for me.

I think that the 160M antenna was very directive on 20M as the next morning I worked a fellow in Southern California on CW with 599 signals both ways. I made about 15 to 17 contacts this year on both CW and AM in about 10 hours of generator running time. I used the GRC-19 the entire time without any trouble.

The only thing that you might want to change is the start and stop times. In my case I have to go to work on Monday so I shut down about noon on Sunday so I could get all of that stuff that I just had to take with me back into the radio room, and still be able to move on Monday (that's the big problem with military gear). Also I only worked and heard one other station that was operating portable. A lot of fun was had and we will do it again next year. ER

continued next page

VFD Reports Continued



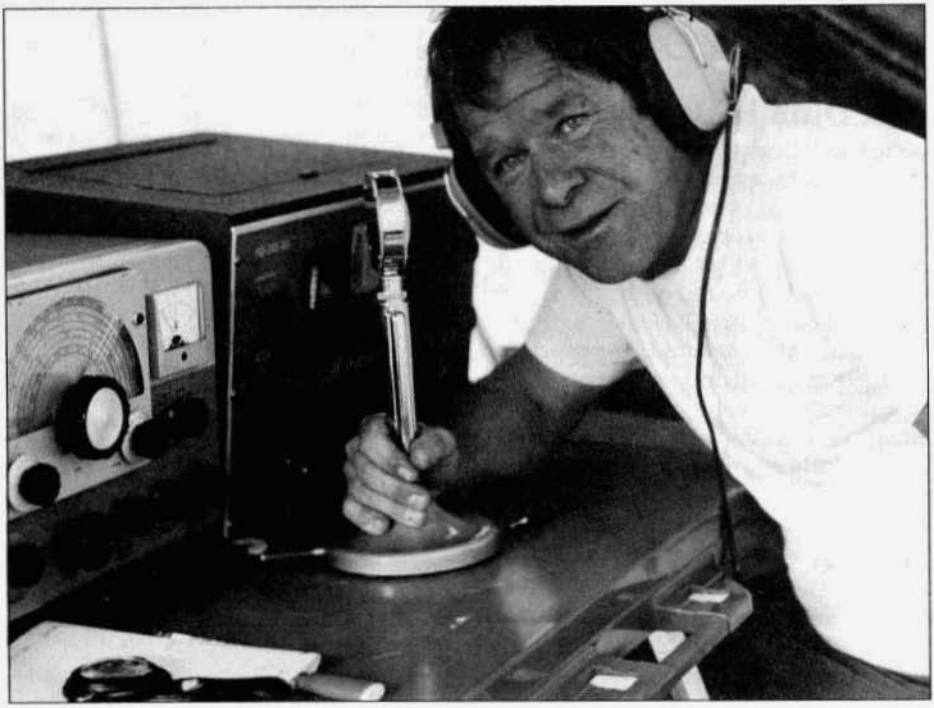
Chuck Teeters, W4MEW, with his VFD station that he located at the Forest Hills Racket Club outside Augusta, Georgia.

Chuck Teeters, W4MEW

As per your rules, enclosed is my log and photo entry in your Vintage Field Day Contest, June 13/14. What a weekend in Georgia, no rain, no thunderstorms, no equipment failures, and no propagation. Certainly Barry will go down in history as one of the best selectors of poor propagation conditions. What few signals that could be heard through the noise on 40 and 80 were long skip and not interested in contests. Sunday morning 40 was close to normal for a few hours but 80/75 never lost its craving for noise, and 10 and 20 never produced a hearable CW or AM phone signal.

Despite the conditions I did manage to cram 1 CW and 7 AM phone contacts into 5 hours of intensive operating. My greatest disappointment however was that I never heard the signal of our esteemed editor N6CSW. In fact I was so desperate that I would have worked W8KGI had his signal been heard. (I don't normally work W8s who desert Ohio while retaining their calls)

The only high point was the old Gonset Communicator, which heard FM just fine with slope detection, and apparently had enough incidental FM on the transmitted signal to produce local contacts (my prearranged local AM contact had equipment troubles). Since this was an AM/CW contest, if you were scoring contacts, how would an AM/FM exchange be scored? ER



Musser Moore, WØAS

Well, here's a photo of the setup for Vintage Field Day weekend. I was using a Ranger II (barefoot) an HQ-140XA, a Viking Matchbox and a Hygain tape doublet antenna up on a guyed pole about 40 feet in the air. I was located west of Fort Collins, Colo. in the foothills at about 6300 feet elevation.

Interesting weekend. This was also the weekend of the ARRL June VHF QSO Party, so I was working some 6 meters as well. 45 MPH winds provided an adequate challenge to getting any antenna up in the air, but pushing a 3 KW generator around the pasture was a good "warm-up" to bench-pressing the antenna support pole to an upright position! The lightning enhanced the thrill. In the end everything worked great, but I heard very few, if any, VFD stations on the air. Called CQ 'til the cows came home on Saturday evening, but it seems my 50 watts wasn't making much of an impression through the static.

Had a find conversation with the regular Colorado Morning Group on Sunday morning. The roundtable included WØZUS with his huge signal (100TH modulated by an 805 to an inverted V), KØCDJ in Detroit Lakes, MN with his Globe King 400B/SX-28 and others—NØTYL, KØOJ, KTØO, WØOD, KØKE.

I'd suggest for future VFDs that different categories of operation be established. I know several home-based AMers who would have enjoyed filling the ether with nice audio, but felt that only stations that were actually established in the boonies were encouraged to participate. I understand that the underlying idea of a field day is just that—setting up in the field, with all that entails. I think in order to encourage more vintage activity, especially considering the weight, fragility, and value of the some of the nice AM gear we should encourage home-based stations (emergency power and hooked to the grid) to join in the fray. ER

VFD Reports Continued

Dick Dillman, W6AWO

We tried. Really, we gave it our best. But our Vintage Field Day 1998 plans were frustrated at every turn.

A couple of weeks before the event Tom Horsfall, WA6OPE and I found what seemed to be the perfect location at a former Air Force base north of San Francisco. This seemed appropriate since we planned to use vintage military gear exclusively. We found a small hill in an unused portion of the base thoughtfully equipped with two abandoned utility poles just crying out to have antennas hung from them... excellent! We saw no reason to burden the authorities with a request for permission to use the site. It was abandoned and nobody seemed to notice us during our scouting trip.

So there we were at the site on Saturday afternoon happily stringing up all sorts of wires in all kinds of different directions. I had my AN/GRC-9 with DY-88 dynamotor power supply. Tom had his BC-1306 with a PE-162 generator. I even brought two EE-8 field phones (in leather cases of course!) to link our two locations.

Soon we were joined by former KPH engineer Tracy Reese, WB6TMY; fellow military radio collector Henry Engstrom, KD6KWH; and Adam McLaughlin, KD6POC, a great young kid with radio in his soul. Things were shaping up!

But then Navy security arrived in the form of two 21 year old kids with buzz cuts and 9mm pistols. Our bluff worked for a while but soon they were back to kick us and our wires outa there. Of course I know that the original operators of our radios would have defended their perimeter but we decided that discretion was called for in this case and gloomily coiled up our wires.

So the five of us gathered at a nearby park where we BS'd about radios, told tall radio tales and reviewed what we *shoulda* done to those security guards and how lucky they were to have escaped our wrath. That settled, we decided it was time to eat and adjourned to a local restaurant where we had a dinner that couldn't be beat.

My AN/GRC-9 setup on the tailgate of the Willys.

I had a great time socializing with my radio colleagues so in the end the day turned out well. But we were disappointed because we didn't get to play with our radios and because we had let down several people who were looking for us on the air, including Paul Thekan, N6FEG who had promised to have his TCS system warmed up and waiting.

Sunday morning dawned sunny and warm. Since the AN/GRC-9 was still loaded in my 1958 Willys wagon from the day before I took it to a park in San Francisco and set up. There was no room to hang an antenna so I was limited to the 15ft whip that is standard for the Angry Nine. I was set up in time for the military radio collectors net at 0930 with Tom as the NCS. But with only the whip I doubted anyone would hear me on 3975Kc. Nevertheless when there was a lull in the action I pressed the button on the T-17, the dynamotor grunted and I announced my presence. And they heard me! I was weak at some stations, reasonably strong at others, but good enough to participate in the net.

Next I was off to 40m where I tuned up on 7040Kc., the frequency we planned to use from the Air Force base. A lusty "CQ VFD" on CW brought an immediate reply from... N6FEG! Paul was right there, listening and waiting, and provided my first VFD contact. I went on to work several other stations, the best DX being Salt Lake City, but no other users of vintage equipment. There were a few comments on my note, however. One guy told me it sounded like I had dirty key contacts! Hrmph, the very idea! But Tom was listening from his home and advised that indeed the set would sound fine one minute, then start to wobble a bit. I figure after 50 years or so we're all entitled to a little wobbling.

So I managed to have some radio fun after all even in the face of adversity. And of course Tom and I have resolved that 'next' year we will find the perfect location. And maybe we'll even ask permission to use it. ER

Darryl Dippel, WA5AAO

I worked (1) one Field Day contact.

I swore last year that this year I would not be conflicted with. At the last minute every relative, as usual, needed my help. I'm the last young, (good looking and single) guy in the family. Everybody comes to me for help; I can't say no.

The one contact I made was with W7ISJ (Tucson) on 14.286 at 12.25 Sunday afternoon. My xmtr is a 32V-2 and the receiver is a 75S1. The antenna is an inverted V at about 20 ft. Off and on on Saturday nite I heard N6/Ø. That must have been you Barry! I had my hands full and couldn't get back to my operating position. TheN6 station commented on what a super view he had (you said in a previous magazine that you were headed to Utah).

Never heard any CQ VFD on 7290. But I did hear a couple of stations on ± 3880 on Saturday night but was not able to get back to them due to my committments.

I think VFD is a great idea; keep it up, maybe we can make it grow. ER

VFD Reports Continued

Barry Wiseman, N6CSW/Ø

At the suggestion of Fred, KFØOW, (who planned to participate with us but had to cancel out due to business obligations), we chose Muley Point, overlooking Monument Valley, Utah as our VFD site. We could have found a nice location that was closer (Muley Point is 110 miles from where we live) but nothing so truly grandiose and unique.

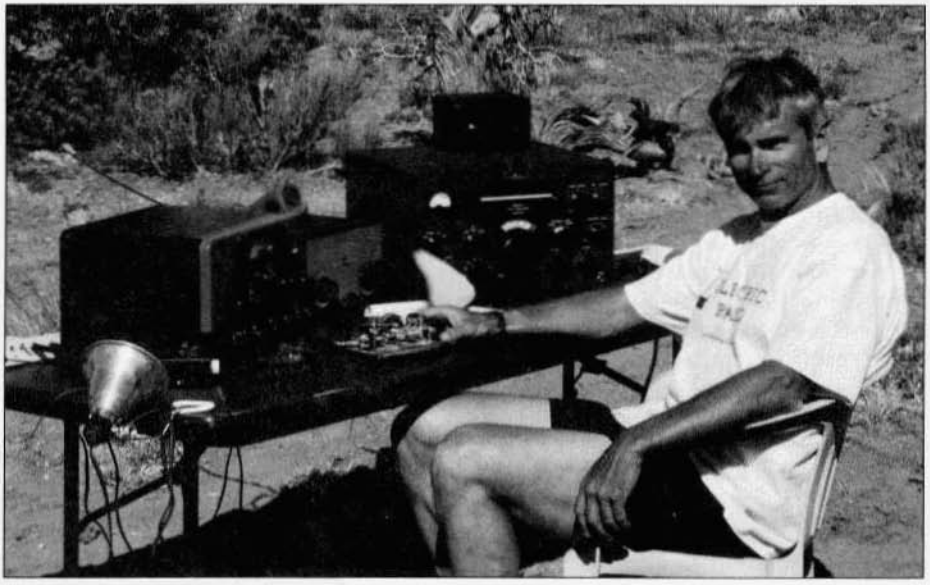
Shirley and I drove over to our site Saturday morning. When we arrived a veritable gale was blowing. I knew there was no way that just the two of us could get the antenna mast up and guyed (Cap, WØXC, who was our VFD CW op wasn't scheduled to arrive until later). Luckily just as we were getting the mast into position for hoisting, a German tourist, "Herbert" came wheeling by on his bicycle. He was actually very enthusiastic about helping us. The 30ft mast went up quickly in spite of the wind.

By the time that Cap arrived—a couple of hours prior to the start of VFD—I had my 75M dipole strung up (fed with 450 ohm open-wire feedline), all my gear set up and had already made a preliminary test QSO with Bill, W8VYZ on 14.286. My station consisted of a Viking II, and R-390 and a Dentron antenna tuner.

When Cap arrived we got his mast in the air and his gear set up just in time for the start of VFD. His station consisted of a G5RV antenna (on about a 20ft mast), a Ranger and 75A-4 with a Johnson Matchbox tuner.

We positioned our two stations 200 ft. apart with the generator (a rented Honda 6 KW unit) positioned halfway between us. This arrangement worked out very well and at no time did we interfere with one another.

While Cap started working CW sta-



Cap Allen, WØCX, worked about 25 stations on CW but none of them were partiipating in VFD from the field.

tions on 40, I concentrated on 20M AM. I worked several regulars on the W6HQI Memorial AM Net on 14.286 before I moved over to 75. I thought that conditions on 20 were very good evidenced by the fact that I was hearing low-power stations loud and clear. My best DX on 20 was Frank, VE5NT, up in Viscount, Saskatchewan.

75 meters was noisy right from early evening on but the band was very workable. I worked several low-power stations (Dennis, W7QHO, in Glendale, Calif., for example, who I had also worked on 20 meters earlier) but I felt that there was just not very much AM activity on the band.

I listened on 40 for AM activity but I did not hear any at all. I thought of Bob, W5PYT, while I was tuning around and thought that if he were still alive there would have been at least a couple of stations on 40 that I could have worked. We shut down about midnight.

The following morning I fired up the generator around 6 and made my first contact with Jim, K7JEB (located in Glendale, Ariz., about 300 to 400 miles away) at 6.20 Colo. time (it was 5.20 in Ariz.!) on 75 meters. He was about 30 over 9 and he gave me a 20 over 9 report. Then the whole Ariz. gang came on frequency. Propagation was great and it was absolutely wonderful talking with the group and watching the sun as it came up and slowly tracked across the valley floor from east to west.

I stayed on 75 until the band started to go out for us and then I went to 10 where I called and called and called. I thought there should be some activity in the AM window as I could hear plenty of sideband squawking on the low end of the band. Finally, finally I got a call from Stan, WA6SKD, in Oklahoma City. We had great propagation between us and we talked for about half an hour. He was running 10 watts to a vertical antenna!! That was my only contact on 10. Next year I expect that 10 will be wide open and that should be an encouragement for more people to participate in VFD.

continued on page 39

Shirley and our dog Samantha, on the rim of Monument Valley. We'll be back there next year for VFD; we'll try for some better photos.

A VT-4C Powered Hartley

state of the art for 1929

by Mike Maloney, AC5P
P.O. Box 33
Bartlesville, OK 74005
ac5p@ionet.net

This project came as a result of the failure of another. Many hours were spent constructing a 45 triode Hartley similar to the 1927 Hartley featured in ER for March '96. I could hear a rough signal in the receiver but the power out was not enough to get me out of my back yard. I determined my one and only 45 tube was a dud drawing about 3 times the plate current it should have been.

Howie, WB2AWQ had previously sent me a copy of the August 1928 QST article by Ross Hull on improving the Hartley for 1929 service. He had been successful using the article guidelines with a 211 triode, as had Gary, W7FG. Listening to them and the others in the 1929 AWA QSO party made me envious. When Gary offered a pre-tested VT-4C with socket, I got excited and busy on this project. After a few hours of fun, the circuit shown in figure 1 and the photo came to pass.

The circuit was built on a 10 by 16 inch board stained walnut. The filament transformer at left began as a 17 volt secondary. Turns were removed to reduce it to 10 volts. A 75 ohm 25W balance pot provides the cathode connection since the transformer has no center tap. The plate choke is 3-1/2 inches of #30 DCC close wound on a 3/4" dowel rod. Small holes were drilled near the ends for short terminal studs of #12 bare wire to wrap and solder the small wire. Credit goes to Sandy, W5TVW for this tip. The tube socket is raised above the base by short plastic spacers. This permits the twisted pair heater wires to route under the socket, keeping them the same length and out of the way of the rear plate and front grid terminals. The real secret of a successful power Hartley is in the Hi-C tank circuit. The coil is 12 turns of 1/4 inch soft copper tubing about 5 inches long. I used a spray paint can as a form to wrap the coil over. The ends were flattened in a vise with holes punched for #10-32 machine screws which go through the board. The coil mounts directly on the base for stability with the head of the screws on the bottom of the board. Short jumpers of #12 wire go to the ends of the 500pF variable. Flat and lock washers with nuts are tightened down to make a low resistance connection for the high value RF circulating current due to the low impedance Hi-C tank. A 25pF variable is piggyback on the main for fine tuning. It covers about 70 KHz on the low end of 80M and makes QSY'ing a few KC much easier.

Notice the main tuning cap is mounted on a piece of wood trim. A hole was drilled through parallel with the base allowing the cathode or B- ground tap connection to route under the capacitor frame. This worked out well, keeping this connection as short as possible by not having to route the long way around the plate or grid end to reach the coil. The B- tap is made with a 45C Mueller clip that will not jump off. The two-turn coupling link was made from #12 solid house wire. Holes drilled through the 1/2" dowel coupling rod hold the coil and the smaller stranded twisted pair going to the antenna terminals.

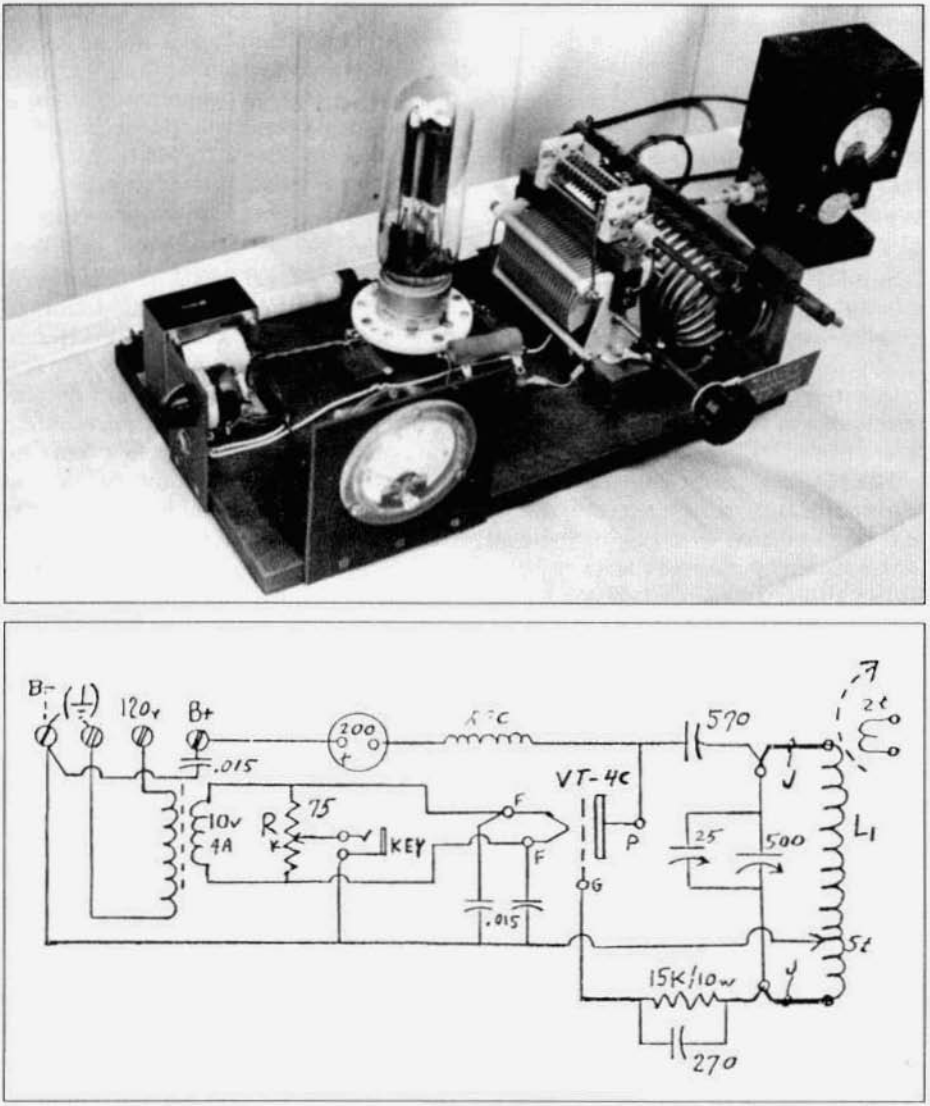


Figure 1. 1929 VT-4C Power Hartley. Tank coil "J" leads—as large as possible. Stationary (non-exposed) contact of key connects to cathode "RK" center tap. The VT-4C likes B+ of 600-1000 VDC—power out 15-30watts.

The coupling rod goes to the front through a stand off bushing of 1X2 trim.

The "T" handle control was Gary's idea and is nothing more than a short piece of 1/4 inch dowel. The link can be swung away from the main coil by twisting or moved further away by pushing the rod through the bushing. The coil is held in position beautifully and simply by common friction. Additional 1/4 inch dowel rod shaft extensions are used on the recessed variable capacitors to minimize the hand capacitance effect since the rotors are above ground. The exposed B+ connections are covered with electrical putty in case the cat gets a

continued on page 39

AM Special Event Station
at
Final Gaithersburg, Maryland Hamfest

by Paul Courson, WA3VJB
P.O. Box 73
West Friendship, MD 21794

Sunday, September 13th, 1998 is scheduled to be the final time the Montgomery County Fairgrounds in Maryland will be used for the annual hamfest sponsored by the Foundation for Amateur Radio, a coalition of about 100 clubs from around the Washington, D.C. area.

The "Gaithersburg Hamfest" as it is informally known, last year marked its 40th anniversary with one of the best AM special event stations ever held. This station has been established with vintage, vacuum-tube gear the past few years to help revive the notion of a working display that people would actually want to view and operate.

AM Special Event Stations at the Gaithersburg FARfest

1994: Viking II, Johnson 500 & R-390A
1995: DX-100, T-368 & R-390A
1996: homebrew pair of 4-500s & R-390A
1997: T-368 & R-390A
1998: TBA (potentially, a GPT-750 transmitter)

Each year we have strived to provide a high-fidelity "Classic" AM receiving and transmitting post for use on the shortwave ham bands, and have successfully entertained hundreds of spectators on-site and participants on-air. Gaithersburg is the nation's best-known and most well established regular AM Special Event Station at a hamfest.

History

The origin of the AM Special Event Station at Gaithersburg dates back to the "AM Corral" at the now defunct Deerfield, New Hampshire hamfests. For many years, Deerfield was an annual pilgrimage for prominent and rising members of the AM community in the northeast region of the U.S.

When Deerfield's organizers, Hosstraders, in 1992 decided to forego the site for one at Rochester, New Hampshire, the sense of community was lost at the subsequent hamfests. A mid-Atlantic bunch of AM-ers, representing a region from upstate New York to North Carolina, began to gather at Gaithersburg in much the same way as at the old Deerfield site.

These gatherings began to congeal in 1993, when the group who had just completed the Dobbins Island AM Expedition packed up the Friday/Saturday camp and moved their party to the Sunday hamfest at Gaithersburg. There was no station that year, but there was a strong turnout of AMers who had heard the Dobbins Island station.

By the next year, formal plans were afoot to establish an AM Special Event Station at the hamfest. The station opened on Saturday ahead of the one-day Sunday fleamarket, and provided a showcase to East Coast hams to encourage them to attend and meet other AMers with whom they'd been talking on the airwaves.

Red Carpet Treatment

The hamfest station would not have been possible without unprecedented official support from the Foundation for Amateur Radio. FAR executives, hoping to nurture the hobby's heritage,

decided to lend their event's prominence to the AM Community, in exchange for our giving back to the hobby a sense of experimentation, hands-on technical ability, and nostalgia which can seen firsthand by a generation of hams who may only know the pictures, stories and collector price lists of vintage gear. Alas, FAR has faced dramatic hikes in site fees for the use of the Montgomery County Fairgrounds in recent years, and no longer can justify the amount of overhead it takes to cover having the event at that location. Much of FAR's purpose is to generate revenue for scholarships, and obviously, the more spent elsewhere leaves less for its academic mission.

Consequently, in September 1999, the annual FARfest will move to the new Prince Georges County sports complex in Bowie, Maryland, about halfway between Washington and Annapolis. It is not yet clear whether that site will logistically support today's "AM Corral" and vintage special event station.

In the meantime, consider this posting an engraved invitation to make plans to visit the Final Gaithersburg event !

For the past two years, FAR has donated extra table space available immediately next to the AM Special Event Station, for use by individual (non-corporate) vendors of VINTAGE equipment.

In qualifying for this space, there is a deliberate distinction made between individuals considering the sale of a privately-held piece, and those who have a *substantial* revenue-generating stake in the sales of such gear. This is to ensure fairness to all, and to respect our hosts, who have their own aforementioned revenue issue to deal with. With no firm definition, you can assume plenty of gray area, and decisions are case-by-case.

Commercial vendors of vintage gear are welcome to pay for and establish tailgate space adjacent to where the rest of us will be set up. This has proved to

continued on page 40

Special Display Planned for FARfest

A formal display of vintage radio equipment is planned as part of the Gaithersburg hamfest. Here are some of the details from John, K2TQN.

"My first theme is "Ham Radio before WW-II". It will contain spark, homebrew early tube equipment through early manufactured radios, microphones, keys, etc.

"I am taking it to the AWA meet in Rochester, NY, the week prior to Labor Day, then I am planning on arriving in Maryland early the day before the Gaithersburg Hamfest, to get a good spot near (but not too close to) the AM guys. I think my exhibit will go along nicely with the AM group. "

John will probably be set up at a spot in his vintage Dodge RV, sporting a 4-wire Hertz antenna in the trees above his parking spot near the AM Special Event Station.

"My plans are to open the evening before the hamfest (until it gets too rowdy at the AM Corral party) then on Sunday to open up about 9 or 10 a.m. for visitors to this free exhibit during the hamfest. And I might also have a table of for sale items (to help pay for gas, etc.)"

"This exhibit is privately owned by me. Hopefully, one day, it will become a non-profit foundation. "

"I'm a member and a Board Member of the Antique Wireless Association, a member of the New Jersey Antique Radio Club, the Delaware Valley Historical Radio Club and several NJ ham clubs."

Augusto Edgardo Castro Bruse, YS1ECB of San Salvador, EL Salvador, in his hamshack surrounded by vintage gear. Dennis, KØEOO, worked Augusto recently on 15 meters.

Pete Hamersma, WB2JWV, in his hamshack. *Photo by Dennis DuVall, W7QHO.*

Mike Oxenreider, WB3CTC, unloading a T-368 at Dennis DuVall's new residence in Glendale, Calif. *Photo by Dennis DuVall, W7QHO.*

The beginnings of a "1932" regen on Bob Dennison's, W2HBE, workbench. The receiver has a 57 det., 56 AF, 2A5 output and 80 rect. Bob plans to use it in the AWA's Old Time QSO party.

1998 Fall Classic (& Homebrew) Radio Exchange

The Classic Radio Exchange ("CX") is a contest celebrating the older commercial and homebrew equipment that was the pride of our ham shacks and our bands just a few short decades ago. Our object is to encourage restoration, operation and enjoyment of this older equipment. A "Classic" radio is at least ten years old (age figured from first year of manufacture), but NOT required to participate in the Classic Exchange. YOU MAY USE ANYTHING in the contest, although new gear is a distinct scoring liability. You can still work the "great ones" with your new equipment!

The Classic Exchange will run from 1900 UTC September 27, to 0400 UTC September 28, 1998. Exchange your name, RST, QTH (state/province for US/Canada; country for DX), receiver and transmitter type (homebrew send final amp tube or transistor), and other interesting conversation. The same station may be worked with different equipment combinations on each band and on each mode. CW call "CQ CX;" phone call "CQ Classic Exchange." Non-participants may be worked for credit.

Suggested frequencies:

CW: 3.545, 7.045, 14.045, 21.135, 28.180

Novice/Tech Plus: 3.695, 7.120, 21.135, 28.180

Phone: 3.880, 7.290, 14.280, 21.380, 28.320

7.045 and 3.545 will probably be the most popular CX frequencies.

Scoring: Multiply total QSO's (all bands) by total number of different receivers plus transmitters (transceivers count as both xmtr and rcvr) plus states/provinces/countries worked on each band and mode. Multiply that total by your CX Multiplier, the total years old of all receivers and transmitters used, three QSO's minimum per unit. For transceiver, multiply age by two. If equipment is homebrew, count it as a minimum of 25 years old unless actual construction date or date of its construction article (in the case of a "reproduction") is older:

Total QSO's all band times RCVRs + XMTRs + states/provinces/countries (total each band and mode separately; add totals together times CX Multiplier:

SCORE = QSO's x (Rx + Tx + QTH's) x CX Mult

Certificates and appropriate memorabilia are awarded every now and then for the highest score, the longest DX, exotic equipment, best excuses and other unusual achievements. Send logs, comments, anecdotes, pictures to Allan Stephens, 106 Bobolink Dr., Richmond, KY 40475. Include TWO-stamp SASE for next CX Newsletter and announcement of next CX. E-mail reports may be sent to modsteph@acs.eku.edu (Al, N5AIT).

6M Calling Frequency for VHF 'Green Radios'

A number of us - spearheaded by Dennis Starks on his Mil Collectors Mailing List - who collect and use mil tactical radios have gotten together and chosen a 6 meter FM calling frequency for VHF 'green' radios.

We have selected 51.60 Mc because it seems to fit appropriately in the ARRL band plan for 6 meters as well as within the range of the commonly available radios - PRC-6, PRC-10, CPRC-26, RT-68, RT-70, PRC-68, RT-524 etc.

Hopefully a calling frequency will encourage more people who collect, and are licensed, use their VHF mil radios on the air, and can bring a little more community to this widely scattered group of people.

Joseph Pinner, KC5IJD
kc5ijd@sprintmail.com

VINTAGE NETS

California Early Bird Net: Saturday mornings at 8 AM PST on 3870.
California Vintage SSB Net: Sunday mornings at 8 AM PST on 3835
Southeast Swap Net: Tuesday nights at 7:30 ET on 3885. Net control is Andy, WA4KCY. This same group also has a Sunday afternoon net on 3885 at 2 PM ET.
Eastern AM Swap Net: Thursday evenings on 3885 at 7:30 ET. This net is for the exchange of AM related equipment only.
Northwest AM Net: AM activity daily 3 PM - 5 PM on 3875. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT. The formal AM net and swap session is on 3875, Sundays at 3 PM.
K6HQI Memorial Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 3:00 PM PT, 7 days a week and usually goes for about 2 hours. Net control varies with propagation.
Arizona AM Net: Meets Sundays at 3 PM MT on 3855. On 6 meters (50.4) this group meets at 8 PM MT Saturdays.
Colorado Morning Net: An informal group of AM'ers get together on 3876 Monday, Wednesday Friday, Saturday and Sunday mornings at 7AM MT.
DX-60 Net: This net meets on 7290 at 2 PM ET, Sundays. Net control is Jim, N8LUV. This net is all about entry-level AM rigs like the Heath DX-60.
Eastcoast Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is Dennis, WA3YXN but sometimes it rotates to other ops. Saturday mornings on 1995 at 0500 ET. Will move to 3885 for summer.
Westcoast Military Radio Collectors Net: Meets Sunday mornings at 0930 local on 3975 + or - QRM, except the 1st Sunday of the month when the net meets at 2130 local. Net control is Tom, WA6OPE.
Gray Hair Net: The oldest (or one of the oldest - 44+ years) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8:00 PM EST & 8:30 EDT. URL: http://www.crompton.com/wa3dsp/grayhair.html
Vintage SSB Net: Net control is Andy, WB0SNF. The Net meets on 14.293 at 1900Z Sunday and is followed by the New Heathkit Net at about 2030Z on the same freq. Net control is Don, WB6LRG.
Collins Collectors Association Nets: Technical and swap session each Sunday, 14.263 MHz, 2000Z, is a long-established net run by call areas. Informal ragchew nets meet at 0100Z Tuesday nights on 3805 and on Thursday nights on 3875.
Collins Swap and Shop Net: Meets every Tuesday at 8PM EST on 3955. Net control is Ed, WA3AMJ.
Drake Users Net: Another relatively new net. This group gets together on 3865 Saturday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, WZ8O; Rob, KE3EE and Huey, KD3UI.
Swan Users Net: This group meets on 14.250 Sunday afternoons at 4 PM CT. The net control is usually Dean, WA9AZK.
Nostalgia/Hi-Fi Net: Meets on Fridays at 7 PM PT on 1930. This net was started in 1978.
K1JCL 6-Meter AM Repeater: Located in Connecticut it operates on 50.4 in and 50.5 out.
JA AM Net: 14.190 at 0100 UTC, Saturdays and Sundays. Stan Tajima, JA1DNQ is net control.
Fort Wayne Area 6-Meter AM Net: Meets nightly at 7 PM ET on 50.58 MHz. This net has been meeting since the late '50's. Most members are using vintage or homebrew gear.
Southern California Sunday Morning 6 Meter AM Net: 10 AM Sundays on 50.4. Net control is Will, AA6DD.
Old Buzzards Net: Meets daily at 10 AM Local time on 3945. This is an informal net in the New England area . Net hosts are George, W1GAC and Paul, W1ECO.
Canadian Boatanchor Net: Meets Saturday afternoons, 3:00 PM EST on 3745. For hams who enjoy using AM, restoring and operating.
Midwest Classic Radio Net: Saturday mornings on 3885 at 8AM Central time. Only AM checkins allowed. Swap/sale, hamfest info and technical help are frequent topics.
Boatanchors CW Group: Meets nightly at 0200Z on 3579.5 Mhz (7050 alternate). Listen for stations calling "CQ BA" or signing "BA" after their callsigns.
Wireless Set No. 19 Net: Meets the first Sunday of every month on 14.165 at 1900Z and 3760 at 2000Z. Net control is Dave, VA3ORP.
Beer Town Traders Net: On 3885, 5:30 Central Daylight Time on Saturdays.

Nets that are underlined are new or have changed times or frequency since the last issue.

The Beginnings of Amateur Single Sideband

Jim Hanlon, W8KGI
P.O. Box 581
Sandia Park, NM 87047

Though it may be a surprise to some readers, Arthur Collins did not invent Single Sideband or even introduce it to ham radio, nor did Wesley Schum and Joe Batchelor of Central Electronics. While these gentlemen did a lot to popularize SSB in amateur circles, there were pioneers who had gone before them as much as forty years earlier who were responsible for the invention of Single Sideband, for developing it and applying it to wired and wireless telephone circuits, and for making it practical for use on the ham bands. To get the full story of the development of SSB, we need to go back to around 1910 and to the Western Electric Engineering Department and the AT&T Company where developments in the radio and electronics field which would lead to SSB were all converging. [1]

The Beginnings of SSB

One of the first of these developments was G. A. Campbell's invention of filters. Campbell had been working at AT&T on extending the range of simple, audio band telephone transmission circuits. The telephone lines of the day attenuated the higher frequencies more than the lower ones due to their distributed capacitance. Campbell counteracted that effect by introducing lumped loading coils periodically into the lines, which balanced the effect of the shunt capacitance and flattened the line passband up to a certain frequency. Above that frequency, however, the passband sloped off into even greater attenuation than was there before. By building a ladder network of parallel capacitance and series inductance elements, Campbell had invented the low pass filter! When he realized what was happening, he devised other L/C circuits that passed frequencies above a given cutoff point and still others that passed only a particular range of frequencies. By 1910, Campbell's filters for the first generation of SSB "transmitters" were ready and waiting.

By about 1914, engineers had harnessed the new vacuum tube as a stable oscillator, amplifier, modulator and detector. Van der Bijl and Heising in the Western Electric Engineering Department showed how the nonlinear portion of a tube characteristic could be used to modulate and demodulate. A young Western Electric Engineer, G. R. Englund, first sketched the geometric relationship of carrier and sideband waves in his notebook in August, 1914; and in 1915 J. R. Carson published a mathematical analysis confirming the existence of "sidebands" on either side of the carrier. Carson further showed that it was not necessary to transmit the carrier and both sidebands; one sideband alone was enough to convey the full information. This "single sideband, suppressed carrier" transmission would be highly advantageous for telephone "carrier" circuits since only half the bandwidth of a double sideband signal was needed and suppression of the carrier greatly reduced the amount of power needed at repeater circuits. Carson filed for a patent on December first, 1915, "A Method and Means of Signaling with High Frequency Waves," which was granted in 1932. So if you're looking for a single "inventor" of single sideband as we know it, J. R. Carson is probably the person to get the laurels.

Telephone Carrier SSB

The development of working circuits was also being pursued. By 1914, simple "carrier circuits" consisting of multiple, spectrum-stacked SSB signals and using Campbell's band pass filters to get rid of the unwanted sidebands were demonstrated in the laboratory. In 1917, a three-channel SSB system was installed on an experimental basis at Maumee, Ohio. The equipment was used with highly successful results on a line which ran to South Bend, Indiana, and back. The first commercial SSB carrier system was known as the Type A and was installed between Baltimore and Pittsburgh in 1918. It provided four, two-way, lower sideband channels above the voice channel on open wire pairs in the frequency range between 5 and 25 kHz. Seven Type A systems were ultimately installed, the longest linking Chicago and Harrisburg. The last one remained in service until the 1940's. Bell Telephone Laboratories went on to develop several, more sophisticated, multi-channel SSB "carrier" systems which served as the backbone of the long distance and submarine cable networks until digital systems began to displace them in the 1960's.

SSB on the Air

In this same time frame, Bell engineers were working to establish transatlantic, low frequency radio telephone service. Their initial 1915 tests using conventional double sideband plus carrier AM were promising, but they needed something more efficient and powerful for commercial service. Single sideband offered double the number of channels, narrower receiver bandwidth with corresponding less noise pickup, and it didn't waste power in transmitting the carrier. Bell engineers also found that most of the noise sources on these low frequencies lie in a belt near the equator. So they located their transatlantic receiving stations as far north as possible and used Beverage Wave Antennas (beams) three miles long to improve the received signals and to reject the tropical noise. They also worked to develop the necessary high power vacuum tubes.

In 1922, the use of the large RCA antenna at Rocky Point, Long Island, was being investigated for telephone transmissions to England. This antenna was a large, multiple-tuned flat top, 400 feet high, consisting of 12 parallel wires each 1-1/2 miles long. It was supported on six steel towers at each of which leads were brought down through inductance coils to ground. All of this made it sharply tuned and highly efficient. RCA had built this antenna for transatlantic telegraphy, but its frequency passband was widened for telephony by appropriate tuning and by matching the input circuits. It was ultimately used for all commercial low frequency telephone service to Great Britain.

On January 14, 1923, Bell engineers combined the Rocky Point transmitting antenna, a 60 kHz LSB transmitter using their new high-power amplifier tubes, and a large loop antenna for receiving to demonstrate one-way transmission between New York and London. On January 7, 1927, they opened two way public telephone service between England and the United States with a charge of $75 for a three minute call. Their transmitting stations were located at Rocky Point, Long Island and Rugby, England, and their receiving stations, now using Beverage antennas, were at Houlton, Maine and Cupar, Scotland.

To put these radiotelephone SSB achievements into perspective, it's interesting to note that we Radio Amateurs of that time were conducting the battle between King Spark and CW and we were just beginning to find that the wavelengths around "200 Meters and Down" had some very interesting possibilities for one-way transoceanic transmissions.

continued next page

The Bell transmitters consisted of three main parts, a low-power "modulation-amplifier" system, a high-power, two-stage amplifier, and a three-phase rectifier and power supply. Two steps of modulation were employed, both at low-power levels, and both used dual triode balanced modulators to suppress the carrier in the output. The voice band (200 to 3000 Hz) first modulated a 33,200 Hertz carrier and the lower sideband of 33,000 to 30,200 Hertz was selected by a band-pass filter for modulating the second carrier of 91,700 Hertz. The resulting lower sideband gave the signal desired for transmission, 61,500 to 58,700 Hertz, the upper sideband and any residual carrier being easily filtered out since they were far displaced from the desired band. The 60 kilohertz LSB signal was then amplified to about a 750-watt level by three parallel, air-cooled, glass-envelope tubes.

The Power Amplifier involved two stages, each using water cooled tubes. The first stage used two tubes in parallel and developed 15 kilowatts output. The final stage used as many as 35 tubes and developed 200 kilowatts peak envelope power! In 1939, a second channel operating at 68 kHz was added to the Rocky Point system. A new low-power exciter was constructed and the two channels were multiplexed and used the same high-power amplifier in common, appropriate modifications in antenna tuning being made so the two channels could be handled. This system was continued in use or on standby until 1957 when it was dismantled.

By 1930, HF, shortwave circuits had also been established for overseas service. Initially they used conventional amplitude modulation. In 1933 experimental use of single sideband was begun and provided not only a roughly tenfold improvement in signal-to-noise ratio but also a reduction in distortion from selective fading. Commercial application of SSB began about two years later, and soon became universal.

The state of the art developed to the use of three sidebands channels multiplexed on a single transmitter in a 10 kHz bandwidth or four channels in a 12 kHz bandwidth with output powers as great as 80 kW PEP. By the early 60's when HF radiotelephone had achieved peak use, there were about 200 circuits linking 58 countries.

SSB in WW II

I had always thought that the US Military did not adopt SSB until Art Collins, "Butch" Griswold and Kurt LeMay promoted it to them in 1956, but not so. At the beginning of World War II, encrypted military traffic was handled via CW, either manually sent and received or automatically sent and recorded on tape for later transcription. There was an urgent need for a long-haul radio system that could handle several teletypewriter messages simultaneously. Bell Telephone Laboratories responded with a multichannel teletypewriter system that made use of the available, overseas service, single-sideband radiotelephone equipment. Two, three, four, and even six teletype messages were transmitted simultaneously in each direction at the rate of 60 words per minute. By 1943, General Eisenhower in Africa was in direct, secret communication with General MacArthur in Australia via the Algiers-Washington and San Francisco-Australia SSB radio teletype network connected from Washington to San Francisco by Bell System land lines.

SSB on the Ham Bands

In the 1930's time frame, Single Sideband was widely believed to be unsuitable for amateur use because our AM/CW receivers and transmitters were too drifty. It was thought that a frequency difference of 20 or 30 cycles would make signals unreadable, and besides the equipment was complicated, expensive, and hard to adjust compared to AM phone and not really necessary. Despite this general pessimism, Robert

Moore, W6DEI, one of the Editors and Engineers group in Santa Barbara responsible for the "Radio Handbook," built and operated a sideband transmitter back in 1933. It was similar to the telephone filter transmitters of the day, starting with a balanced modulator and filter at a 10 kHz carrier frequency, upconverting that with another balanced modulator at a 200 kHz carrier frequency, and upconverting again with a 4150 kHz carrier frequency balanced modulator to produce a lower sideband signal in 75 meters. He described it in R/9 Magazine[2] and there were perhaps half a dozen amateur sideband stations on the air by 1934. Curiously, my 1940, Seventh Edition of the Radio Handbook mentions nothing whatsoever about single sideband.

The singular event that kicked off the transformation of our HF phone bands to SSB occurred on September 21, 1947, at 9:30 P.M. PST when Oswald G. "Mike" Villard, Jr., W6QYT[3], an Assistant Professor of Electrical Engineering at Stanford University and trustee of the Stanford club station put that station, W6YX, on 3970 kc with an SSB signal and worked Winfield G. Wagener, W6VQD. "Win reported the signal Q5 S8 through heavy 75-meter QRM on his BC-348-Q receiver. He used the crystal filter and reported the quality good and the voice recognizable. The transmitter power was about 20 watts peak into a haywire antenna."[4]

Mike's transmitter was entirely different from all of the low frequency filter transmitters based on telephone technology that had preceded it. He had put together a "phasing" transmitter in which the signals from two balanced modulators with suppressed rf carriers 90 degrees apart and driven by audio signals also 90 degrees apart combined in such a way that the sidebands on one side of the carrier canceled each other out while those on the other side reinforced each other. The result was a single sideband, suppressed carrier signal generated at the operating frequency without the use of any of the complex filters or frequency translators needed in the telephone approach. This phasing idea had been around in theory for quite a while, but what allowed Mike to realize it on the air was the development ten months earlier by R. G. Dome[5] of a wide band, audio phase shift network that produced two audio signals with a phase difference of 90 degrees between them over a range as great as seven audio octaves. The on-frequency double balanced modulator in the first rig at W6YX probably consisted of two pairs of 6L6's (Mike can't remember for sure at this point), each pair with their grids driven in push-pull and from two coupled tuned circuits adjusted for the necessary 90 degree rf phase difference and with all four plates in parallel feeding a single tuned output circuit. The modulator screens were driven, also in push-pull, with 90 degree phase difference audio.

Mike also reports that he did not appreciate at the time how easy it would be to heterodyne an SSB signal generated on a fixed, out-of-band frequency like 5 or 9 mc into the ham bands with a mixer and a VFO. That's why he took the even simpler approach of generating the signal directly on the operating frequency where it would be used.

Mike reported on W6YX's early experiences with SSB in the January 1948 QST. The SSB transmitter and the W6YX kilowatt AM rig were driven from the same crystal controlled exciter, which allowed them to start a QSO on AM and then switch to SSB on the same frequency after coaching the AM operator on how to receive SSB (AVC off, Audio Gain full up, RF Gain down for volume control, and the BFO set a little off one side of center). Roughly one fourth of the operators reported themselves unable to receive the SSB signal clearly at all. Mike surmised that many of these

continued next page

had receivers with considerable FM and/or am hum in their local and bfo oscillators. Perhaps because of this and also to get around drifty receivers, Mike recommended that listeners use a separate, signal-frequency oscillator, for example a BC-221 Frequency Meter, to reinject the carrier on the receiving end. Mike noted that AR-88's and the new HRO's, equipped with voltage regulators, did not have drift problems when their line voltage changed and that the new Collins 75A seemed to avoid drift very nicely.

On October 9, 1947, 20 meters was opened to SSB with a QSO between W6YX and WØNWF. By that time, a higher powered W6YX phasing rig had been built using four 813's in the balanced modulators. Peak envelope power in that rig was gradually raised over a period of time to the 400 watt level. Shortly after that first QSO, Art Nichols, WØTQK, literally threw together a 20 meter sideband rig from scratch in less than a week and was working W6YX, while scores of other amateurs across the country listened and found out they could copy SSB on their existing superhets as easily as they could pick up CW. In contrast to the W6YX phasing transmitter, Art Nichols' rig used low frequency telephone filter technology. It started off with a carrier at 9 kc, a balanced modulator to produce a pair of sidebands with no carrier, and a 9 to 11.6 kc filter that passed the upper sideband. A second balanced modulator took the sideband to 540 kc, and a third to 20 meters. Not counting the power supply, Art used eleven tubes including two dual triode 6SN7's and two dual triode 6SL7's to accomplish all this, winding up with about 10 watts output from a Class A 807.*

Early SSB operation was so unusual that QST periodically ran a special column, On the Air with Single Sideband, with news of who was on the air, what kind of gear they were using, and info on when and where AM operators could find them to listen to this new phone mode. In March '48, QST pictured a "small," 10 to 13 kc. SSB filter, the National Company's F-22, just 4 1/2" long, 3" wide, and 4 1/2" tall. By July of '48, seven stations were reported on 75, 20 and 10, most with filter rigs, but phasing rigs were starting to show up. The July QST ran a detailed article by Ray L. Dawley, W6DHG, Editor of the California "Radio Handbook," on a 20 meter, on-frequency, double balanced modulator phasing "adapter" that used four 6L6's as the RF modulators driven by push-pull 6K6's for audio and that was driven by the VFO and low level multiplier stages from your old AM rig. Ray also used the Dome audio phase shift network as Mike Villard had done before him at W6YX.

Ray had several, in retrospect amusing, comments in his article. In enumerating the expected benefits of SSB, he mentioned " that the bedlam of heterodynes between carriers on the amateur phone bands can be eliminated." But then he contributed an interesting thought, "the carrier heterodynes would be replaced on a band loaded with S.S.S.C.' signals by heterodynes between sidebands. It is difficult to visualize how such a band might sound." Ray also offered the opinion that, "Since the power output of an S.S.S.C. transmitter is proportional to the signal level, it is only necessary to cut the peak power output down to perhaps 20 to 50 watts, if this amount is all that is required to sustain good communication. There would be neither need nor justification for an 'S-9-plus-40-dB' signal when the level of interference was far below this value." Sure, Ray, dream on!

Other technical developments that we now recognize as basic to the SSB art came fast in 1948. In the April QST, Mike Villard published on "Selectivity in SSSC Reception, A Balanced Frequency Converter Circuit for Commu-

The face may not be familiar, but the name and call will ring a bell. This is Don Norgaard, W2KUJ, of Scotia, N. Y., whose signal and many excellent articles on s.s.b. techniques are known throughout the world. The temperature-controlled VFO tuned circuit and a Panadapter are sitting on top of the receiver — Don's strong microphone arm is hiding his selectable-sideband receiving adapter. Another view of the shack would show the rack housing power supply, *two* s.s.b. generators, and the "lazy linear" final (push-pull 811-As). (*Photo by W2NJR*)

Don Norgaard, W2KUJ, designer of the SSB, Jr. - from QST, October 1951.

nications Receivers," using a pair of 6L7 pentagrid converters in what today we would call a product detector. In June, Donald E. Norgaard, W2KUJ, (who will show up several times later in this tale) published on "A New Approach to Single Sideband, Generating SSSC by the 'Phasing Method,'" a good block-diagram level article which included generating the SSB signal at 5 mc and heterodyning it to 75 and 20 meters with a 9 mc VFO. Don was back the next month with "Practical Single-Sideband Reception, A Phasing Method for Selectable-Sideband Reception." This contribution was commercialized a few years later by Central Electronics and sold as their SSB "Signal Slicer" receiving adapter. In November '48 QST, On the Air with Single Sideband reported that W2KUJ (Don Norgaard again) demonstrated his phasing rig at the ARRL National Convention, and that Captain Hoffman, W5RNP in Albuquerque had a phasing rig on 20 that wound up in a pair of 813's. W6UUB in North Hollywood was on 20 with a kilowatt phasing rig and had worked JA, VK3, and several ZL's. Most interesting to me was the report that someone had broken into the W6YX shack at Stanford and stolen their entire SSB rig, $800 worth of gear! (Mike says that they also took a lot of tools and other stuff.) I wonder if it was one of our early AM ancestors trying to hold off the tide.

In January, 1949, QST ran a portent of the multi-mode rigs to come in the 50's as "The Basic Phone Exciter, Single or Double Sideband or PM from One Transmitter," by Byron Goodman, W1DX. It was a 14 tube, 5.2 mc phasing generator using Don Norgaard's circuit with four 6SA7's in a double balanced modulator combined with a 9 mc. VFO to get to either 75 or 20 meters. In March, W3MBY built "An Inexpensive Sideband Filter" at 10 kc. using RCA TV horizontal linearity coils. In August, William M. Rust, W2UNJ, showed "Single Sideband for the Average Ham, A Straightforward One-Band Exciter" with four 6V6's in a phasing double balanced modulator a la Mike Villard and Ray Dawley. In November, By Goodman, the editor of On the Air with Single Sideband, came back with "A 75 and 20 Meter Single Sideband Exciter" using a new, prepackaged Millen 75011 audio phase shift network along with an on-frequency double balanced modulator made from two 6SN7's. You supplied the on-frequency signal using the vfo from your old AM/CW rig.

1950 brought more developments. In January, George H. Nibbs, W6BES, of the Canoga Corporation in Van Nuys, California, detailed an "Audio Phase Shift Network." This circuit, also of-

continued next page

fered as the 75011 by Millen, came prebuilt and adjusted, and it made the alignment job a whole lot easier for the average ham who usually didn't have a well calibrated audio frequency oscillator. In the September QST, J. L. Flanagan, W1SJT, described "A Simple Voice Operated Keyer for Automatic Break-In Operation." Today we know this as Voice Control or simply as VOX. In November 1950, F. E. Edmunds plowed new ground with "A Crystal-Filter SSB Exciter, Simplified Design with I. F. Quartz Crystals," in which he moved filter rigs up to the 450 kc. range by building a lattice filter out of surplus FT-241 crystals. His was an under-dash, 75 meter mobile rig running 5 watts out of a 6AG7. His effort had been preceded by "Crystal Lattice Filters for Transmitting and Receiving" in the June and August QST's by Weaver and Brown.

Up to that point, SSB rigs had been multi-tube, cumbersome affairs that often required a lot of savvy and some lab equipment to line up and get on the air. There was a growing handful of SSB pioneers on the air, but the vast majority of hams were doing nothing but listening to the new "Donald Ducks" on the rare occasion when they could find them. And then, as often happens in rapidly emerging technologies, an elegantly simple breakthrough occurred.

In the November/December 1950 issue of General Electric Ham News, Don Norgaard, W2KUJ, (remember him?) now identified as being from the General Electric Research Laboratory, Schenectady, N.Y., unveiled a three tube, 75 meter SSB transmitter called the SSB, Jr. which revolutionized amateur use of SSB. It used nothing more complicated than simple coils, condensers, resistors, one carrier frequency oscillator crystal, four germanium diodes and three tubes in the classic Phasing Circuit to put out 5 watts pep. A 12AU7 served as speech amp and crystal oscillator or VFO buffer. A 12AT7 acted as a twin channel audio amplifier following the audio phase shift network. Four 1N52's made up the dual balanced modulators. And a 6AG7 served as the linear amplifier output stage. Optimized for one spot frequency in 75, its output frequency could be varied up to 50 kc either side of center with adequate carrier and unwanted sideband suppression. Either upper or lower sideband could be selected by reversal of the audio polarity to one of the balanced modulators. There were no special parts. The trickiest job was adjusting the audio phase shift network. Don said that following the instructions in his article he had tuned up the RF circuits and adjusted the audio phase shift network and balanced modulator for the #2 unit pictured in Ham News in only 10 minutes - but then he wrote the instructions. Also a builder could use one of the Millen or Canoga units if he didn't want to roll his own. Any reader of ER who knows which end of the soldering iron to hold onto could duplicate the SSB, Jr., even today.*

Byron Goodman of the QST staff recognized immediately what a gem the SSB, Jr. was. In On the Air with Single Sideband, QST December 1950, By said " Right on the heels of the W1JEO/9 crystal-filter job in last month's QST came the "SSB, Jr." of Don Norgaard, W2KUJ, described in the November/December GE Ham News. If you haven't seen this new design, we suggest you do so at once. Don has incorporated many clever angles in the construction of this 3-tube phase-shift exciter. Even if you already have an s.s.b. rig, the new phase-shift network circuit is worth your while."

Bill Orr, W6SAI, in the Fifteenth (1959) edition of the Radio Handbook said of it, "Some of the most popular sideband exciters in use today are variations of the simple phasing circuit introduced

Simple · Complete · Amazingly Effective!

The first advertisement for the Eldico SSB, Jr. in QST, February 1951.

in the November, 1950 issue of General Electric Ham News. Called the SSB, Jr., this simple exciter is the basis for many of the phasing transmitters now in use. Employing only three tubes, the SSB, Jr. is a classic example of sideband generation reduced to its simplest form... The Central Electronics 10A is an advanced version of the SSB, Jr. incorporating extra features such as VFO control, voice operation, and multiband operation." Indeed, all of the Central Electronics transmitters, 10A, 10B, 20A, 100V and 200V, had an SSB, Jr. buried deep inside.

The Eldico Company was the first to hit the market with a commercial SSB rig for amateurs, what else but an SSB, Jr. with a built in power supply advertised in the February, 1951 QST for all of $69.95 as a kit or $99.95 wired and tested. You would think that Eldico would have capitalized on their being the first to market a transmitter in this new technology, but strangely they didn't mention the SSB, Jr. again - even though they took two-page ads in most issues of QST - until their ad of September 1952! In that ad, they were asking $79.95 for the kit and $129.95 for the wired and tested version.

In that same September 1952 QST, an ad from another, brand new company was seen for the very first time. Central Electronics had embedded the SSB, Jr., now designed to work on 9 mc, in their ground-breaking 10A, and they had added extra features such as VFO control, VOX, and 160 to 10 meter operation. You could buy a 10A for $99.50 as a kit or $139.50 wired and tested, and coils were extra at $3.95 per band. Cen-

continued next page

The Central Electronics ad from QST, January 1953, featured the Multiphase Exciter Model 10A, the Sideband Slicer Model A, and the PS-1 prealigned audio phase shift network, all based on Don Norgaard's designs.

tral Electronics added their model A Slicer (a phasing receiving adapter/product detector taken from Norgaard's 1948 article) and their PS-1 pre-adjusted phasing network in January of 1953, and they came out with the bandswitching, higher-power 20A kit in December 1953 for $199.95. At last, someone had brought to market multiband, feature-filled Sideband/AM/PM/CW rigs at an affordable cost. It's my recollection that these rigs sold like hotcakes and that a lot of Central Electronic SSB signals started showing up on the bands in '53 and '54. The avalanche had started, and the days of AM phone were numbered.

The SSB, Jr.'s simplified Phasing Circuit dominated ham SSB practice in the early 50's, implemented by several companies including Eldico in its SSB-50 and SSB-100 series transmitters, by Central Electronics in their famous 10A, 10B, 20A, 100V and 200V line, by Lakeshore in its Phasemaster rigs, and by Johnson in its 1956 Pacemaker. As late as 1959, the new Hallicrafters HT-37 was a phasing rig. The 1954 B&W 51SB, 1959 Heath SB-10, and 1962 Johnson Viking SSB Adapter were all on-frequency phasing generators that were designed to adapt AM/CW rigs like the B&W 5100, Johnson Viking and Valiant and Heath DX-100 and Apache to sideband. Early-on, Edmunds, Weaver and Brown had shown ham builders how to make 455 kc sideband filters out of surplus FT-171 crystals. But in 1955 when Art Collins brought out the KWS-1 with his new mechanical filter at the heart of its sideband generator, the end of commercial Phasing SSB was in sight. Sideband generators based on the Collins filter, and later on high frequency monolithic crystal filters, had better carrier and unwanted sideband suppression and required a lot less adjustment to keep in trim. But the Phasing Method of SSB generation, first made practical by Mike Villard and then reduced to elegant simplicity by Don Norgaard in the SSB, Jr., had made ham sideband cheap and practical and it had virtually wiped out AM phone on the HF bands. **ER**

Editor's Note: For a lot more good info on the early development of SSB and its coming to the ham bands, reread Jim Muscgrove's series, "The First Fifty Years of Sideband" in ER, Number 31, 32, and 33, November 1991 through January 1992.

The Central Electronics ad from QST, December 1953, announcing the New Model 20A Exciter.

Sic transit gloria mundi [9]

1 - The following information comes from "A History of Engineering and Science in the Bell System, National Service in War and Peace (1925 - 1975), edited by M. D. Fagen and published by Bell Telephone Laboratories, 1978. Alas, the Bell System is no more, and Bell Laboratories, now minus its Telephone middle name, is a faint shadow of its former self.

2 - Robert Moore, W6DEI, published a three part series describing his SSB transmitter starting in the September/October, 1933 issue of R/9. Does anyone have access to these articles? I'd sure like to know more about what these early rigs were like.

3 - The same Villard who analyzed Taylor Supermodulation for QST in December 1950 as reported in ER, January 1998.

4 - "Single-Sideband Operating Tests," O. G. Villard, Jr, W6QYT, Trustee W6YX, Department of Electrical Engineering, Stanford University, California, QST, Jan. 1948, pp. 13 & ff.

5 - R. B. Dome, "Wideband Phase-Shift Networks," Electronics, December, 1946.

6 - "A Single Sideband Transmitter for Amateur Operation," Arthur H. Nichols, WØTQK, QST, Jan. 1948, pp. 17 & ff.

7 - Before we called it "SSB," single sideband was often called "SSSC," after J. R. Carson's 1915 term, Single Sideband Suppressed Carrier.

8 - For an SASE, a green stamp and a little pleading, you could probably get our esteemed ER Editor to send you a good copy of the December 1950 GE Ham News.

9 - Shakespeare's Julius Caesar ("So passes the glory of the world.")

Viking II Modifications—Revisiting a Legend
Part 3

by Thomas Bonomo, K6AD
81 Lakewood Circle
San Mateo, CA 94402
bonomo@cpici.com

Parts 1 and 2 of this article covered audio modifications for the Viking II that will give you near broadcast quality audio. The last part of this article series on the Viking II will offer something for CW operators.

It is unfortunate that a stock Viking II has such crummy sounding audio, and such a dirty, clicky CW signal. I think for these reasons, it never quite earned the respect that it could have. Back in 1951 when this rig was designed, Johnson clearly didn't feel that it was necessary to pay attention to some of the details that we today consider important. Instead, TVI suppression was the problem of the day.

But, as you saw in Parts 1 and 2 of this article, the good news is that the Viking II's few audio shortcomings are easily remedied without tearing apart the entire rig. Its straightforward, basic design and heavy-duty components just make it an outstanding candidate for restoration and modification. Viking IIs have even been used in radio stations as either their main or backup broadcast transmitter. Radio station HRXK in Honduras used a Viking II as its primary transmitter, which was purchased for this purpose from ER's Barry Wiseman, N6CSW [ER #61, 5/94, "Viking II Broadcast Transmitter"]. Few amateur transmitters were heavy-duty enough to survive the rigors of daily CCS service for very long. The Viking II is probably one of a very few.

If you've ever copied someone who was sending CW using a stock Viking II, you probably know that it did not have a reputation for good sounding CW. Take a look at the "before" photograph in Figure 6, which shows the waveform of a single CW 'dit,' and you will immediately understand why. There are a number of problems with this waveform:

1. Sharp rise and fall times, which result in key clicks.
2. Contact bounce which results in dirty keying (notice the gap near the beginning).
3. 60 cycle hum superimposed on waveform.
4. Waveform ringing (notice the overshoot time-constant near the beginning).

Diverting for just a moment, this part of the project would have been very difficult if I had not recently obtained a Tektronix 468 Digital Storage Oscilloscope at one of the Livermore, CA swapmeets. It sure made the job of seeing single-shot waveforms much easier, not to mention that it would have been nearly impossible to get good pictures without digital storage. If you plan to do this type of work, I highly recommend obtaining a storage scope. This waveform was obtained using a sampling port attached to a Bird wattmeter and the pictures were taken with a standard 35 mm camera in a semi-darkened room.

As you can see from the circuit in Figure 7, the Viking II uses cathode keying, with virtually no time constants to shape the waveform or eliminate contact bounce. Various modifications have been proposed over the years, which usually employ grid-block keying to help alleviate

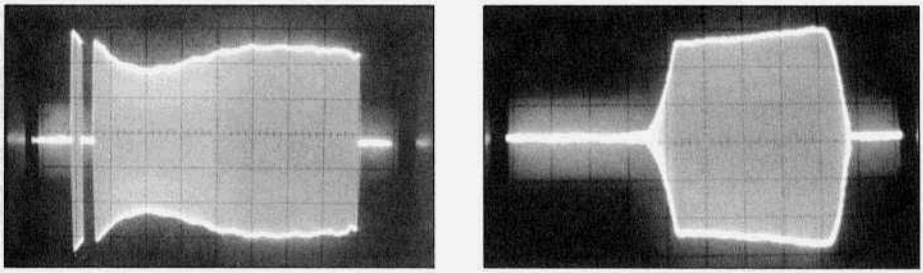


Figure 6. "Before" and "after" waveforms for a single CW dit. "Before photo taken at 5ms/div. to clearly show contact bounce and sharp rise and fall times. "After" photo taken at 10ms/div.

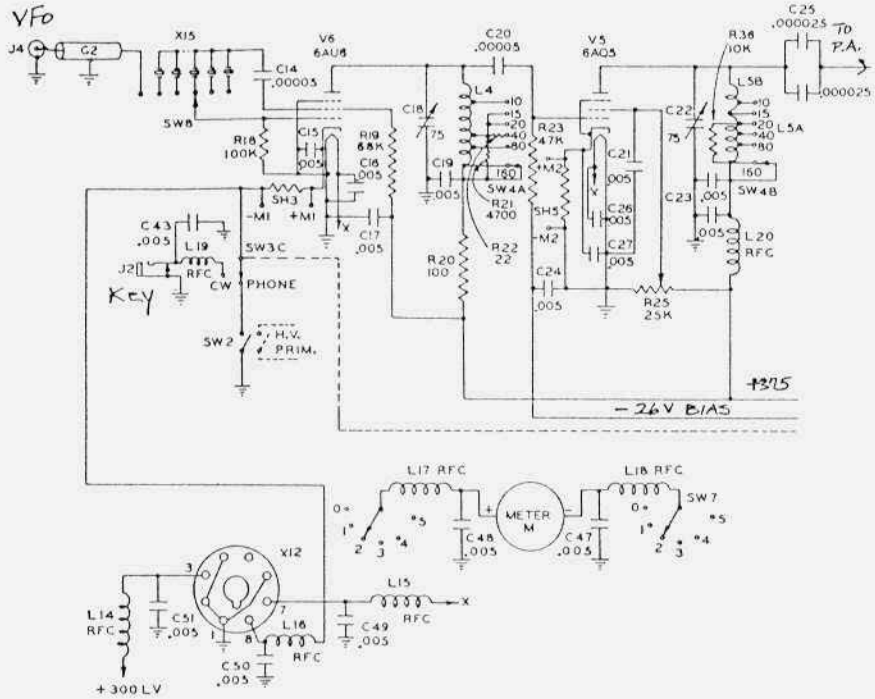


Figure 7. Schematic of the stock oscillator and buffer sections.

ate these problems. While they may help clean up some of the contact bounce, none of them provide the slow rise and fall times necessary to produce soft keying without key clicks. Freedom from key clicks requires rise and fall times of about 4 - 5 milliseconds.

Another difficulty with most grid-block keying schemes is that they require modification of the external VFO as well. I really don't like these kinds of mods because someday, someone will plug in an unmodified 122 VFO, it won't work right, and then they'll proceed to make it work by removing all the mods you just added! Right back to square one. So, one design objective was to keep all mods "internal" to the Viking II itself. The modified Viking II must work with any stock 122 VFO.

continued next page

In order to provide adequate waveshaping, it is necessary to develop some form of differential keying circuit. Differential keying, sometimes called "time sequence keying," requires that the oscillator continue to run for a period of time after the key opens, so that the keying waveform has time to do its job shaping the trailing edge of the waveform before the oscillator finally shuts down. The differential keying principle is shown in Figure 8.

Before jumping to the final circuit, though, I thought some readers might find it instructive to first hear about what did not work and the arduous path it took to get there. Now a better engineer than me would certainly have been able to design these circuits in much less time that I did. In fact, I would be embarrassed to reveal the large pile of failed circuit sketches that I tried. Finding a good solution to this problem that was free of serious drawbacks was just a real bear.

My first attempt at implementing the differential keying principle was by converting the oscillator to grid-block keying, and applying a shaped keying signal to the grid of the following buffer stage. However, as I quickly learned, this was easier said than done. Although it took much more time than I had expected, persistence finally produced an absolutely beautiful keying waveform . . . . until I changed bands from 80 to 40 meters. On 40, the shaped waveform had sharp rise and fall times again. Worse yet, when I switched back to 80, I couldn't even reliably repeat my earlier results without changing some of the circuit's values. I quickly discovered that getting a good waveform was dependent not only on the band, but on the specific crystal chosen, the setting of each of the oscillator and buffer controls, the phase of the moon, the time of day, and how much I ate for dinner. My circuits behaved as if under the influence of some alien species out of The X-Files. Only the challenge kept me going.

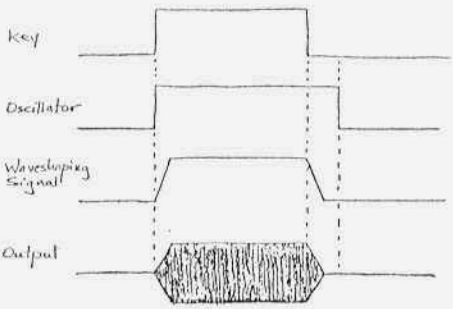
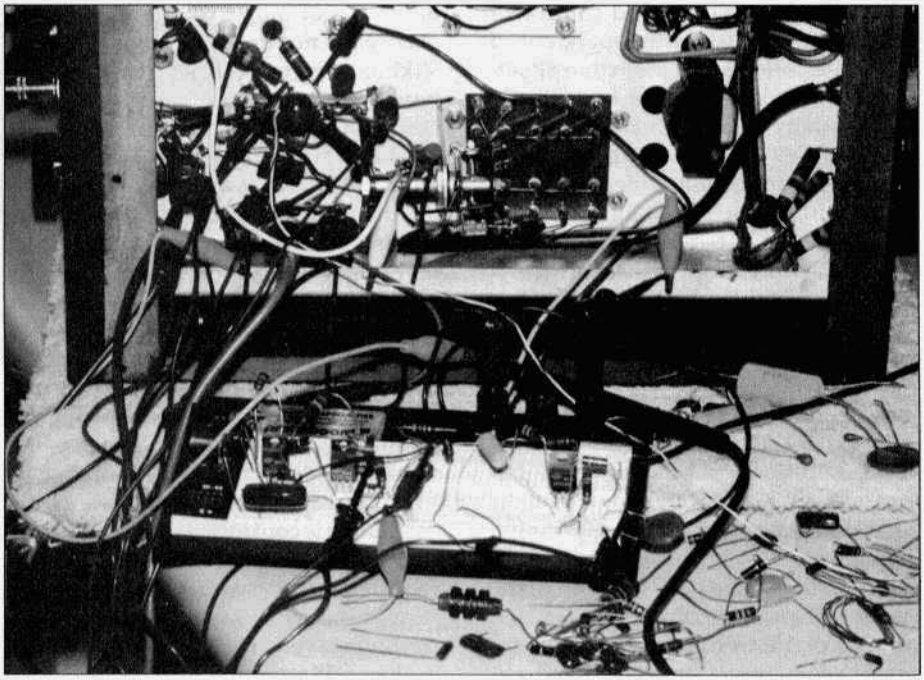


Figure 8. Differential keying principle.

After countless hours of tinkering, I finally recognized one reason I was having so many problems: grid block keying was failing because it takes a variable amount of time for the oscillator to start. Lazy crystals can take as long as 25 ms to get going, in which case the keying waveform -which lasts only about 5 ms - is long gone. The result is those sharp rise times again. In addition, the amount of time each crystal takes to start oscillating is also dependent on the setting of the oscillator tank control and the band harmonic to which the oscillator is tuned.

Regardless of how the keying waveform was to be applied, it was essential to find a way to get the oscillator going quickly, independent of crystal and band settings. After many, many failed experiments, I finally abandoned grid-block keying and began experimenting with cathode keying. Late one evening, a stroke of pure luck led to a startling discovery. The oscillator could be run continuously at extremely low levels, if a small amount of leakage current was allowed to flow in the cathode circuit while the grid leak was returned to the cathode instead of to ground. Resistances as high as several megohms in the cathode circuit provided just enough crystal activity to provide reliable "instant on" operation when fully keyed, without radiating enough signal to be picked up in a nearby receiver dur-



With all these alligator leads, it's amazing it worked at all. At low frequencies, this is the way I usually prototype new circuits.

ing key-up conditions. This was the breakthrough I desperately needed to get this frustrating project back on track - an "instant on oscillator." This little revelation might have even had some useful applications had I discovered it about 40 years earlier.

I then developed a cathode keying circuit using a MOSFET to control the resistance between the cathode and ground. This made it easy to control the amount of time the oscillator was stretched. Since the new stretched oscillator always started up reliably in about 2 ms, regardless of band and front panel control settings, I thought this project was nearing completion. I thought all I needed to do was apply a shaped keying waveform "somewhere" in order to finish the project. Well, that "somewhere" turned out to be quite elusive. Keep in mind that everything - keying, oscillation, frequency multiplication, waveshaping and buffering - is all taking place within only two tubes: the oscillator and buffer. And worse yet, everything interacts with everything else. A modern rig uses lots of additional stages so that each of these functions can be isolated and thus performed separately.

Well, I explored applying shaped keying waveforms to the screen of the buffer stage, but just couldn't get good rise and fall times. I explored applying a waveform to the grid of the buffer stage, but this only worked for a limited range of front panel settings because of the tremendous variation in output produced by the oscillator. I explored shaping in the screen of the oscillator stage, the grid of the oscillator stage, the screen of the PA stage, the grid of the clamp tube, etc. etc. etc. etc. I tried single point control and I tried mixed approaches. All failed in one respect or another.

continued next page

I just couldn't get a good consistent waveform, which was independent of the crystal selected, panel control settings, the band, and one that would work equally well with both crystals and the 122 VFO. Every approach presented an unsolvable engineering problem without resorting to lots of circuit complexity. In the interest of simplicity, I resisted the urge to throw in a few op-amps to get the required result, because I figured that much complexity would scare off most owners from making the mods. Despite my lack of success, I continued to forge ahead in the belief that there just must be an elegantly simple solution just waiting to be discovered.

Finally, I decided to try applying a shaped +380 volt pulse (during key down) to the entire buffer stage - plate, screen and all. After blowing up quite a number of MOSFETs in the process, I finally had a circuit that yielded a beautiful leading edge, but still stubbornly refused to yield an acceptable trailing edge. I was nearly at the point of just bagging the project when I remembered an earlier circuit which, when applied to the oscillator, produced a great trailing waveform but not a good leading waveform. Hmmmm . . . . . this is exactly the reverse of the present situation. That finally lead to the solution: produce the leading edge separately from the trailing edge. Shaping the leading edge in the buffer stage and the trailing edge in the oscillator stage produced a great looking CW waveform - one that was completely independent of the crystal selected, the band, and the settings of the front panel controls. It also worked well with the unmodified 122 VFO. How could it have taken me so long to figure this out?

The circuit presented in Figure 9 represents the final circuit. Somehow, I wish it didn't look so deceptively simple (after all, a circuit with just gobs of stuff in it would look so much more brilliant). But of course this gives you little excuse for not implementing it in your Viking II! Here's a brief description of how it works: the oscillator keying circuit is responsible for stretching the oscillator time and shaping the trailing edge of the CW waveform. The buffer circuit is responsible for shaping the leading edge of the waveform. Q1 is an inverter stage, which inverts the +7.5 volt signal at the key to a +380 volt signal on the collector of Q1. At key down, diode D1 becomes forward biased, quickly turning on Q2 - Q3 (wired as a Darlington pair), thus starting the oscillator. At key up, D1 becomes reverse biased and the turn-off time of Q2 - Q3 (and hence the decay rate of the oscillator) is controlled primarily by the time constant of C1 and the current required by the base of Q2. C1 therefore provides control over the slope of the trailing waveform. The leakage current in the oscillator which provides the required minimum crystal activity for "instant on" operation is provided by R3 in the cathode of V6.

During key down, the +330 volt positive-going signal at the collector of Q1 is applied to the gate of Q4 through the waveshaping network composed of R2 and C2. Q3 is configured as a source follower, so the voltage at the source of Q4 will follow the shaped waveform produced by R2 and C2. During key up, the plate and screen of the buffer stage are therefore held at 0 volts, while during keydown the source of Q4 rises to +320 volts, allowing the buffer stage to do its normal job. C2 therefore provides control over the slope of the leading edge of the voltage being fed to the buffer stage. Cathode keying of the VFO is provided via D2 and it receives the same "stretched" waveform seen by the cathode of the oscillator. The VFO, however requires additional stretching which is provided by D2 and C3. During key down, D2 conducts turning on the VFO quickly. When the key is

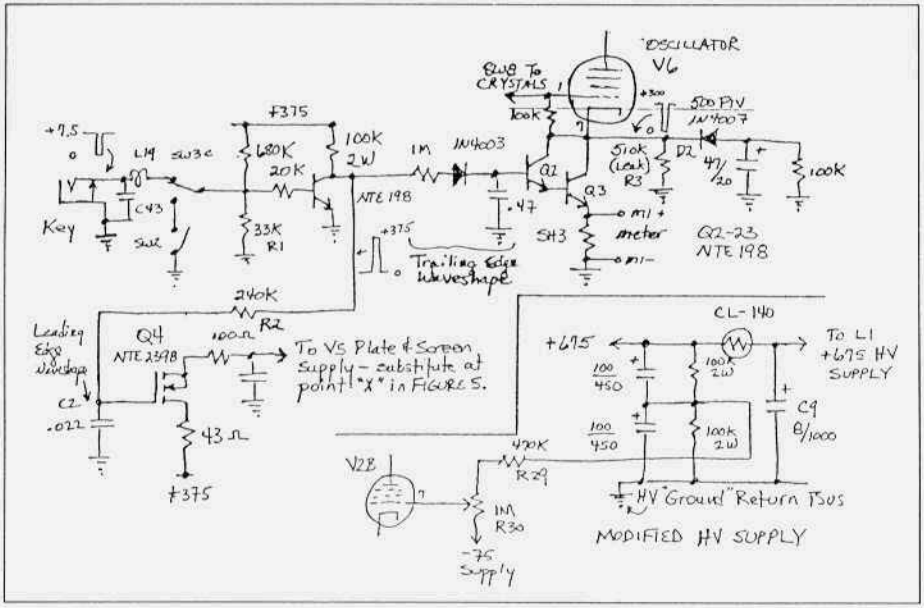


Figure 9. Waveform keyshaping schematic.

opened, D2 becomes reverse biased and the additional time constant is provided by C3. The benefit of this approach is that the VFO itself requires no modification. Any vintage VFO with cathode keying may be used, although you may need to change the value of C3. Whew, aren't you glad this saga is nearly finished!

There are a few other minor changes that should be made for peak performance. The problem with the 60-cycle hum and the large single-cycle ring at the beginning of the waveform can be traced to the time constant of the high voltage power supply and inadequate HV regulation. The high voltage supply is a single stage choke-input filter, which allows reasonably high currents to be drawn without exceeding the peak current rating of the rectifier tubes. It employs a 10 H choke and an 8 uf capacitor, which results in about 1.3% ripple. Short-term regulation is indeed very poor.

Significant additional capacitance is required to improve short-term regulation (for time constants of less than 50 ms or so at approx. 450 ma peak final plate current). I experimentally determined that an additional 50 uf is adequate to improve short-term regulation to the point that the output waveform will be smooth, with little noticeable overshoot. There will still, however, be some slope to the waveform as the power supply slowly drops to its steady-state value under load. Regulation of the HV supply would solve the long-term problem, but since there would be no audible benefit, I opted for the simpler solution. I used two readily available 100 uf @450V capacitors in series (for an effective 50 uf) with 100K ohm 2 W resistors in parallel across each of them as bleeders and to equalize the voltage drop. With the additional capacitors in place, power supply ripple falls to less than 0.17%.

When adding this much additional capacitance to the power supply, it is quite important to add a current inrush limiter (CL) as shown in Figure 9. This will limit the very large inrush currents

continued next page

that would occur were a limiter not present. Use Keystone Thermometrics CL-140, available from Digi-Key at 800-344-4539 (Digi-Key part # KC014L-ND). The resistance of the inrush limiter drops from 50 ohms when cold to 2.17 ohms at 500 ma, for a loss of only about 1 volt. This extremely small degradation in regulation is well worth the protection it will provide to the input choke and regulator tubes. Don't even think about not using one with capacitors of this size. The small on resistance will also help increase the operating current angle of the rectifier tubes, reducing peak rectifier current.

There are a few important implementation details: 1) Don't forget to return the grid leak resistor from the oscillator grid (pin 1, V6) to the cathode, instead of to ground. 2) Don't overlook the fact that the grid bias supply was re-configured in Part 1 of this article, and that the grid bias for the buffer stage, V5, is now derived directly. 3) Carefully follow the wiring from the negative side of the oscillator meter shunt, SH3 - the physical wiring scheme for the negative side of this shunt isn't readily obvious and it must be returned to ground, not to the switch as shown on the schematic. I found this wire located on the Phone/CW switch in my unit. 4) Don't overlook the fact that V2B's grid bias resistor R29 is no longer connected to the divider tap on R13. Instead it is returned to the +340 volt junction of the 100K bleeder resistors. 5) Don't substitute transistors. I have specified heavy-duty NTE devices which are nearly bulletproof and which are widely available (Allied - 800-433-5700). Substituting devices will likely lead to poor results (I couldn't even get a monolithic Darlington transistor to work properly in this circuit). D2 is not critical as long as it has the necessary peak reverse voltage (PIV) rating of at least 450 volts.

CW Mod Results

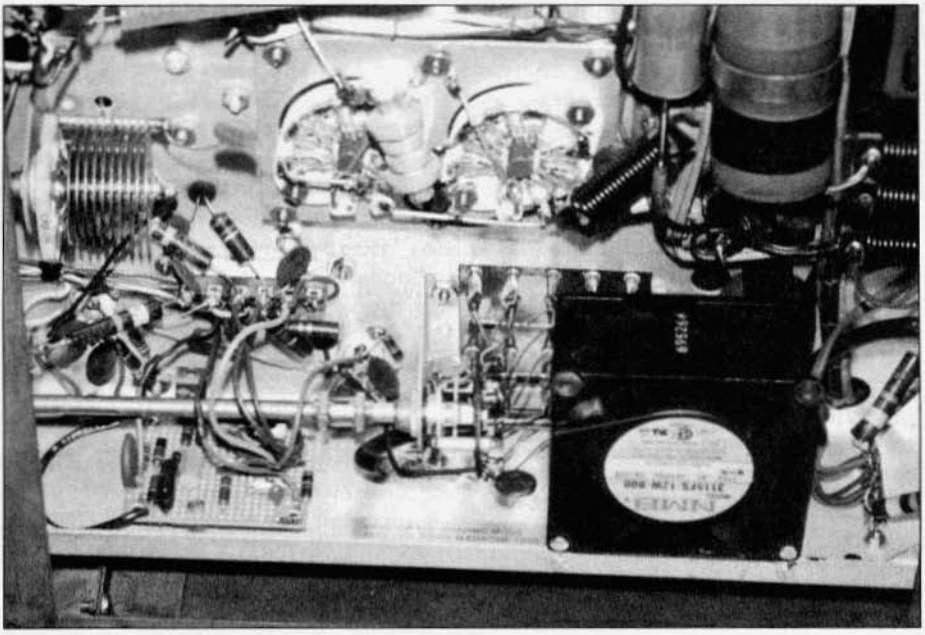
So, how do the changes look? The "after" photograph in Figure 6 which again shows a single 'dit', but this time with all the modifications in place. You'll notice that the top of the waveform has some slope, which reflects the fact that the unregulated HV power supply slowly drops to its steady state value under load, but again, this has no audible effect.

How does it sound? Before and after listening tests reveal that the modified Viking II sounds fabulous. It keys cleanly and is free of the annoying clicks that were prevalent before. When you are operating right next to someone on the band, they will appreciate the fact that you aren't creating key clicks up and down the band a significant distance from your operating frequency. Your CW will be easier to copy, too. As before, the Viking II remains chirp-free. Here is what we've accomplished:

1. The CW waveform rise and fall times are approximately 5 ms, for click-free operation.
2. Contact bounce has been eliminated.
3. 60-cycle hum has been eliminated.
4. Overshoot ringing has been eliminated.
5. There is no "backwave" associated with vintage keyed systems.
6. Use any Johnson 122 VFO without the need to modify it.
7. There is no change in tune-up procedure.
8. The circuit's operation is completely transparent to the user: all front panel controls behave exactly the same.
9. Use a standard key OR any modern electronic keyer, configured for positive input keying.
10. Safe voltage of only 7.5 volts appears at key.
11. Cheap, "no holes" mod that is easy to install.

Inadequate PA Grid Drive

If your Viking II doesn't have adequate PA grid drive on some of the



The finished CW key shaping board and cooling fan is shown installed in the author's Viking II.

high bands, especially on 15 meters, then replace the two parallel capacitors which together comprise C25 (50 pf total) with a single 36 pf NPO (temperature stable) 1000 V ceramic or dipped mica capacitor. The slightly smaller capacitance will really help increase drive on 15 meters. Without this mod, I couldn't get enough grid drive to reach full output on 15 m.

122 VFO Mods

There is an undersized resistor in the 122 VFO, which should be replaced with a higher wattage unit. R51 dissipates nearly 3 watts, and yet only a 3-watt resistor was specified (the Valiant and Viking 500 exhibit this problem as well). If your VFO has been used much, this resistor will probably show some heat damage and will have drifted considerably from its original design value. Replace R51 with a 5 or 7 watt unit.

If you want to generate less heat in your VFO to reduce its drift, the OA2 shunt regulator could be replaced with a series pass regulator similar in configuration to that shown in Figure 4 (Part 2 of this article) for the modulator tube screens. Merely using a zener diode in place of the OA2 will not reduce generation of heat or improve regulation. You'll need to use a series pass regulator to reduce heat generation. Since I usually operate AM, I wasn't that concerned about VFO drift and chose to forgo replacing the OA2 regulator.

Incidentally, the schematic for the 122 VFO does not show the correct connections for R51 - it shows one end tied to L51 and R52 (wouldn't that have been an interesting regulator configuration!). Instead, this end should be shown tied to B+ (the other end is connected to the anode of the OA2 regulator).

Cooling

Cooling isn't absolutely necessary, but it will really help prolong the life of the equipment and reduce downtime. I'm surprised that it isn't more widely

continued next page

known that tube life is directly dependent on bulb temperature and just a few degrees can significantly prolong tube life [ER # 66, 10/94 "Electron Tube Survival Primer"]. Fortunately, there is a very easy place to add a small, quiet cooling fan on the bottom-side of the chassis without doing much work. As you can see from the photograph, a small AC fan is mounted just under the crystal deck, and it is exactly the right size so that one end rests on L3, while the other is attached with small straps to the bottom of the chassis. There are plenty of openings for the air to flow from the bottom to the top side of the chassis, and Johnson recessed the PA tubes, so cooling air will flow around them as well. I covered the inside of the bottom plate with a thin layer of stiff pressboard, except around the fan, to help force air from the bottom to the top side of the chassis. For easy mounting, the fan should measure 3.25" X 3.25" X 1.5". I used NMB model 3115PS-12T-B10, available from Newark Electronics (no 800 number, but local branches in most major cities). Any 120 VAC fan with these dimensions should work fine. The fan can be wired to the adjacent terminal strip, which feeds switched AC to the transformers.

That's All Folks

When you are finished making these mods, I'd encourage you to affix a small label to the chassis indicating what mods you've made, perhaps simply referencing this ER article. This way, some future user will know what's going on when they open it up and see that modifications have been made. If they are troubleshooting and don't understand what the mods are for, they might restore it back to its original poorly performing condition! Undocumented mods are a real pain in the rear to deal with.

Your modified Viking II should give you a near broadcast quality phone signal and a very clean CW signal as well. A restored and modified Viking II is a lot of fun to operate, and should give you years and years of reliable, stable performance. Well, that's all for now. I hope you've found a Viking II and begun restoration and modification. I hope the next really outstanding signal I hear on the band will be yours! ER

August AMI Update from page 3

Class C license which is basically the same as today's General class license.

Some questions to consider are: What does the FCC mean when it says it wants to simplify the amateur licensing process? (Last month my daughter took two license elements from an efficient VE organization. She passed and received her license from the FCC in less than a week). Why has the ARRL interpreted this in terms of license system "structure" rather than "process"? ARRL efforts in recent years to reduce or eliminate the CW testing requirement has been rejected by the membership. Could this new proposal be the latest move by the League to reduce the license requirements in order to find new members?

The ARRL is looking for comments on this proposal. They would like you to write your local ARRL Division Director. There is little likelihood of this exact proposal being accepted as written, but the FCC will be very interested in the response of the amateur population to it. Indications are that the League directors have various levels of support for this proposal. Your ARRL Director needs to know where you stand.

Please send a copy of your comments to this proposal to the FCC and to your Regional AMI Director. If you don't have your AMI Regional Director's address, mail your comment copy to AMI Headquarters and I'll forward it. ER

To Join AMI send $2 to:
AMI
Box 1500
Merrimack, NH 03054

Looking Back from page 2

really gave a hoot in hell what these guys thought but they finally got around to me. He asked, "Who here is Lew McCoy?" I indicated that I was and I expected the worse—but this character went on great lengths about my writing and stated that QST needed more of that. The example he used was the article on the junk box power supply! To put this in the correct light, I should add that it took me about one hour of writing to knock out that article. Maybe he thought it was deathless prose but I sure in hell did not! Whatever you readers do—don't get me wrong—those were his opinions. I considered De Maw a very, very fine writer. I will admit we had differences but at the end, we were what I consider very good friends.

By the way, several of you have sent me information on Ross Hull—detailed information. I am staying here in Phoenix and all my material on Ross is back in Silver City. I promise I will do a follow up article on Ross—he was really an outstanding scientist and I am sure our readers will be interested. Also, I plan to describe some of the more popular rigs I built so please stand by. W1ICP

VT-4C Powered Hartley from page 13

wild idea to step on it when hot. The plate current meter began as a 0-1 mA and was shunted with a length of #26 wire wound on a wood dowel sufficient to obtain X200 multiplier or 200mA full scale. With 750VDC B+ and the coupling adjusted for 100 mils, it was possible to obtain about 30 watts into 50 ohms according to my custom walnut case Bird Thruline with the tap set 5 turns from the grid end. Best keying tone and stability seems to be with coupling reduced to 15-20 watts out and 80 mils DC of plate current.

Operation of the Hartley has been much fun when the band is quiet with good T-8,9 reports from all over. Several DX contacts were made into Europe on the low end of 80 on the incredible night of Dec. 28, 1997. More than one operator (those being around long enough to know what a Hartley is) have asked if I am really using such a transmitter. I only have to wave my hand over the top of the set to demonstrate hand capacitance modulation. One local old timer I showed it to asked me how I modulated it. I would have to say now, "only manually". Also I have noticed that the older the key (bug), the better it plays!

I hope this will inspire others to join in the fun with the rest of the self-excited oscillator gang. I look forward to meeting more of you on-the-air. ER

VFD Reports from page 11

In the afternoon I worked a couple more stations on 20. About 5 O'clock we started packing up. VFD #2 was over.

Shirley and Cap and I had a great time. Between us Cap and I worked about 50 stations. The disappointing thing was that none of them were VFD stations.

Part of the enjoyment of any outdoor activity is good food and Shirley certainly provided us with that. Saturday night for dinner we had the following on the menu: barbecued steaks, boiled red potatoes, wild asparagus (picked from along our irrigation ditch in the spring and frozen), a bottle of good red wine and for desert a pecan pie. The next day for brunch we had pancakes, eggs, bacon and fresh strawberries. How about that!!

I think that we will continue to promote VFD with the hope that it will grow in popularity. It may take a few more years before we get the level of participation that we would like to see.

We've received a lot of input regarding how we might change the rules to make VFD better and more interesting and we'll be making some changes for next year. N6CSW

Product Review:

HAManuals Series 1 - DRAKE

by Thomas J. Bonomo, K6AD

HAManuals, the brainchild of Bill Turini, KA4GAV, is an exciting new product for owners of R.L. Drake Company equipment. Bill has compiled a nearly complete set of operator and service manuals and related information about Drake amateur equipment from the 1-A to the R8, which is available on a two CD set. HAManuals is compatible with any computer using Adobe Acrobat Reader (available for free off the Internet). Tube-type gear is conveniently grouped together on one CD, while solid state equipment is grouped together on the other.

The schematics have been scanned at high resolution, so you'll be able to print very high quality manuals. I printed out several and had them "tape bound" at my local copy shop and they look much better than any photocopy manual I've ordered. Many covers can be printed in color. Acrobat allows you to zoom in to read the fine print or look closely to see where a wire goes in one of the figures. The detail you can see when zooming in is just incredible. The indexes of the "main piece" manuals are hyper-linked so you can jump directly to the section of the manual or the figure you want to see.

The CDs contain information about the most popular mods that were offered by DX Engineering, Sartori, Sherwood, and Fox Tango. Drakemod Version 6 and 6A is included, as is a master list of equipment and a comprehensive bibliography of articles. The CDs contain very few article reprints, so most must be ordered from ER, QST, CQ, etc. Reprint ordering information is included.

Future releases will include some of Drake's marketing materials and promotional pieces, and some of the more obscure manuals that are missing from the first release. If you order now Bill promises you will be able to receive future updates at near his cost. When you consider that you'll spend at least $20-$25 to get a decent copy of just one manual, the price of the 2 CD set at $79.95 (plus $4 shipping) seems like a real bargain. I counted 104 manuals on the two CD set, which is only about 80¢ per manual. Now that's a real bargain! The Drake series can be ordered from HAManuals at 29926 SE 408th St., Enumclaw, WA 99022-7761. (360) 825-1167.

OK, Bill, now you need to get busy producing a set of HAManuals for E.F. Johnson, Collins, National, Heathkit, Swan, and let's see, even WRL, EICO, Hallicrafters, ...

AM Special Event Station from page 15

be an excellent way to "group" our specialized kind of equipment, and to foster a nice sense of involvement which otherwise might be difficult when sites are scattered in such a large venue.

Operating Event

As it stands, organizational details anticipate setting up on Saturday, Sept. 12th, with the station to be on the air by afternoon. Saturday evening, expect an on-air QSO party with those gathered at the scene. There is camping under the trees a few dozen yards from the station (this is the AM Corral !!). The station will remain on the air through Sunday, with final QSOs some time around 1-2pm depending on condx.

There is some interest in applying for a special call sign associated with this event. Most recently, we've been using the Foundation's club call, W3PRL. ER

A complete index of the entire 9+ years of ER is available for viewing or downloading at the following website:
http://www.qsl.net/n9oo

CLASSIFIEDS

Advertising Information

Subscribers receive 1 free - 20 word- ad per month. **Extra words are .20.** Here's how to count the words in your ad: the heading - For Sale, Wanted, etc count as **1 word**. Your name, call, address and telephone number count as **6 words**. Hyphenated words count as **2 words**. **Please count the words in your ad and if you're over 20 words send payment for the extra words.**

Non-subscribers: $3 minimum for each ad (up to 20 words). Each additional word is .25. **Please call or write for display rates.**

VINTAGE EQUIPMENT ONLY

ER
14643 Road G
Cortez, CO 81321-9575

Phone/FAX (970) 564-9185
e-mail: er@frontier.net

DEADLINE for the SEPTEMBER Issue: SEPTEMBER 1

FOR SALE: Repair and restoration on all vintage equipment; 45 years experience. Barney Wooters,W5KSO, 8303 E. Mansfield Ave., Denver, CO 80237. (303) 770-5314

FOR SALE: "AM FOREVER" quality Haynes T-shirts, grey, blue, green & red. Sizes M, L, XL - $15 shpd. Rick, K8MLV/Ø, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

FOR SALE: R-390A Orig. Maint. Manual,TM11-5820-358-35,189 pgs - $28 incl. Dom Priority Mail. Aben, POB 4118, Jersey City, NJ 07304. avidov@aol.com

FOR SALE: Radio books, magazines, catalogs, manuals (copies), radios, hifi, parts. Send 2 stamp LSASE. David Crowell, KA1EDP, 40 Briarwood Rd., North Scituate, RI 02857-2805. aq253@osfn.org

FOR SALE: Nice Military TS-323 UHF frequency meter, w/AC sply; S-94 Civic Patrol rcvr. Fred Clinger, OH, (419) 468-6117, after 6 PM EST

FOR SALE/TRADE: Numerous manuals for Ameco, Lafayette, Allied/Knight, National, EICO, Hallicrafters, WRL, Hammarlund. NI4Q, POB 690098, Orlando, FL 32869-0098. (407) 351-5536, ni4q@juno.com

FOR SALE: Capacitor, 4uf at 10KV - $20; Heath DC pwr sply, HP-13B - $45. Frank S. Law, W8SET, 1 Wildacre Rd, Charleston, WV 25314. (304) 343-0415

FOR SALE: Collins S-Line aluminum knob inlays: small (exciter/PA tuning) - $1; 30L-1 - $2; spinner/plain (main tuning) - $3. Charlie, K3ICH, 13192 Pinnacle Lane, Leesburg, VA 20176. (540) 822-5643

FOR SALE: Hallicrafters, RME, Gonset, others. Also some military, test equipment, VHF/RF amps, more. LASE, Don Jeffrey, POB 1164, Monrovia, CA 91017.

FOR SALE: Tubes, Penta Labs, 811A- $20.; 572B- $55.; 3-500Z- $170.; ZG also avail.(these are Amer. made); NOS 811A- $35.. Many other US NOS. VISA/MC. Dee, W4PNT, VA (540) 249-3161, soundnmind@rica.net

FOR SALE: Heath Q-mult - $35; Heath Patch-HD-15 - $35; B&W T/R switch - $50; Clegg 22er, mint - $90; Viking 6&2 - 50; W.E. Stepping Selector Switch #60AP - $50; W.E.7A amplifier - BO; next four PU only: ART-13 - $100; Hallicrafters HT-37 - $150; Hallicrafters SR-150 - $150; Johnson Viking Two - $150; for more info, Bob, K2LGO, NY, (516) 722-5737, 5-8PM only, napoli6@2000.com

FOR SALE: I quit building. All kinds of parts wholesale. I ge lot! Bring truck or van. KBØBY, 852 Sunrise Dr., Salina, KS 67401. (785) 823-8455

FOR SALE: Heath TX-1 Apache xmtr, very good condx - $250. Robert Braza, N1PRS, 23 Harvard St., Pawtucket, RI 02860. (401 723-1603

Vintage Manuals Available
Step way up to the finest replicated and original vintage manuals available. Get new Catalog 7, three $.32 stamps. Pete Markavage, **The Manual Man**, 27 Walling St., Sayreville, NJ 08872. (732) 238-8964, manualman@juno.com

WANTED: QST, CQ, Radio Craft & Radio News magazines, 30s, 40s, 50s. Advise price + shpg. Beni Fernandez, KP4DN, 1674 Atlas St., Summit Hills, PR 00920.

WANTED: Collins - Amateur catalogs, sales literature, manuals, promotional items & Signals. Richard Coyne, POB 2000-200, Mission Viejo, CA 92690.

WANTED: Howard radios of any type. Andy Howard, WA4KCY, 105 Sweet Bay Ln, Carrollton, GA 30116. wa4kcy@usa.net

WANTED: E. F. Johnson Co. HAMALOGs, unusual photos and information 1923-70. Bruce Hering, 41120 State Highway 13, Waseca, MN 56093. (507) 835-5619. bhering@efjohnson.com

WANTED: Homebrew xmtrs and rcvrs or parts, working or not. George, N1TNQ, (401) 724-5516.

WANTED: Top dollar paid for Winchester Radios and Winchester related items. Donald Daggett, 122 Hall Rd., Grahamsville, NY 12740. (914) 985-7249, wc2e@webtv.com

WANTED: German W.W.2. military radio/avionics gear. Clandestine sets all periods. Cash or swap. Rag Otterstad OZ8RO. Hosterkobvej 10. DK 3460 Birkerod, Denmark, otterstad@inet.uni2.dk

WANTED: Specs, circuits, or other info on 6BN6 gated beam tube. David Ringo, WD6AF, 199 Brookside Dr., Portola Valley, CA 94028. maggihouse@aol.com

WANTED: Owners of the John Leary, W9WHM, re-engineered Hammarlund SP-600 rcvr, seeking info and serial number of rcvr. Bill Mills, KC4AA, (912) 452-2957, wmills@gmc.cc.ga.us.

WANTED: Galaxy V accessories (F-3, DAC-35, SC-1, RV-1, etc); cabinet for 600L. Tom Hoitenga, K8NGV, GA, (770) 426-8682, hoitenga@bellsouth.net

WANTED: Manual with schematic (copy ok) for B&W Model 381 automatic antenna switch. Also, info on the ferrite wound coil inside. Tom Mackie W2ILA, 14 Washington St., Jamestown, RI 02835. (401)423-2474, w1lax@aol.com

WANTED: Heath HW32 manual. **FOR SALE:** Heath MM1 multimeter - $15; E.F. Johnson AntennaMate - $15. Dave Roscoe, W1DWZ, 49 Cedar St., East Bridgewater MA 02333. (508) 378-3619, w1dwz@juno.com

WANTED: WW II German, Japanese, Italian, French equipment, tubes, manuals and parts. Bob Graham, 2105 NW 30th, Oklahoma City, OK 73112. (405) 525-3376.

WANTED: Vintage AM equipment for personal use, must be collector quality or mint. Prefer Collins, will consider others. Bob Tapper, K1YJK, 5 Polo Club Dr., Denver, CO 80209-3309. (303) 740-2272, FAX 777-6491.

WANTED: Collins 310A-1 &/or 310A-3, any condx; 30J, 30K-(any); 302C-1, 312A-1. **FOR SALE:** SC-101 lamp hoods & grills. Butch, KØBS, MN, (507) 282-2141.

WANTED: HeathGear, unassembled kits, catalogs and manuals. Bill Robbins, 5339 Chickadee Dr., Kalamazoo, MI 49009. (616) 375-7978, billrobb@net-link.net

WANTED: TMC GPT-750 xmtr. Top dollar price paid for unit in first class condx. Alan Gray, W3BV, 1361 Sylvan Rd., Perkasie, PA 18944. (215) 705-0943, agray@voicenet.com

WANTED: Books by Thomas Adams published by Howard W. Sams in the Basic Electronic Series, circa 1961. Dan Langston, KO4RA, (912) 453-9066, danman@accucomm.net

WANTED: Historical info on development of 12AT7, 12AU7 and 12AX7. Which of these was first, when, production info, etc. Tech info not needed. Kurt Miska, 3488 Wagner Woods Ct., Ann Arbor, MI 48103. (248) 641-0044 (w), Fax 641-1718, khm@tir.com

WANTED: Variometers. Steve Gross, W9OJI, 602 W. First St., Mt. Morris, IL 61054. (815) 734-4255.

WANTED: Navships 94200.1 "Directory of Communication Equipment". Joseph W. Pinner KC5IJD, 201 Ruthwood Dr., Lafayette, LA 70503. kc5ijd@sprintmail.com

WANTED: Hammarlund: SPC-10 and Noise Immunizer (for HQ180A). Ed, N5BFW, (817) 222-5355 days or (817) 788-5256 evs, Fort Worth, TX.

WANTED: KWS-1 large knobs (2) and Clegg Interceptor spkr. Dick Bean, K1HC, MA, (781) 461-0101, K1HC@AOL.COM

WANTED: National Velvet Vernier dial and wirewound 20 ohm pot, circa 1934. Bob, AZ, (602) 816-0660, CTXP98a@Prodigy.com

WANTED: R390 in good to good fixable condx, (please state which). Email info to Russ at lencom@wcworld.com

WANTED: RADIO Handbook, First Edition; Drake 2-AC calibrator. Lynn Stolz, N8AJ 428 Hopewell Dr., Powell, OH 43065. (614) 885-5428.

WANTED: Manuals or copies for Heath Solidstate Oscilliscope and Simpson 260 VOM with white reset button. Pete, WØEWQ, MN, (612) 362-4794.

FOR SALE: Genuine new surplus. Unused R-390A cabinets #CY-979A/URR w/shock supports and misc hardware package - $305; top and bottom cover sets - $75. Mac McCullough, TX, (214) 324-4849, Fax - 324-4844

FOR SALE: Hallicrafter's manuals, copies starting at $5, some Johnson, WRL, others. SASE for list. DSM Diversified, 909 Walnut St., Erie, PA 16502.

FOR SALE: Vintage radio owners, retire the variac, new solid state SofStart available SASE. Rick Paradise, KE4OCO, 515 Wood Forest Ct. NE, Marietta, GA 30066-3519.

FOR SALE: Racal TA99 1KW linear amp (requires pwr unit) 1.5 to 25 MHz - $600; Racal 1KW H.F. Servo tuned linear amp type TA349C - $1600; Racal H.F. xmtrs; TA127 - $5000; TA83 - $3000; TTA371C - $5000; all in orig 19 inch cabinets, lge & heavy but very well made; military H.F. automatic antenna tuner CU2351, roller inductor & vacuum capacitor operation, tunes 1.5 to 30 MHz for use w/whip or long wire antenna, unused condx - $500; collection of U.S. & U.K. radio magazines - $100. Nigel Boyd, K4UGD, 4280 Day Rd, Conyers, GA 30012. (770) 414-0550 (w), 922-8546 res.

FOR SALE: B&W6100, KWM-1; SP-600 VLF; case for SP-600; other stuff, SASE for list. Tim Walker, W1GIG, 19 Woodside Ave, Westport, CT 06880. (203) 454-4376.

FOR SALE: ARRL Handbooks: 1935, 1936 - $15; 1972, 1973, $10; 1977 - $8; 1981, 1983 - $6; 1992 US Ham callbk - $7; HP8616B siggen as is - $50; Measurement 800A siggen - $100; Heath IM-2400 500 MHz counter - $75; HP5245L counter - $88; HP3468A DVM - $285; Boonton 91H RFVM - $69; much more, list-SASE. KK4YP, 203 Edgebrook Dr., Pikeville, NC 27863. (919) 242-6000 or kirkellis@juno.com

FOR SALE: 4CX1500B new boxed - $450; Viking I, good condx - $175; all + shpg. Walter Treftz, N4GL, 3840 Laguna Loop, Hernando, FL 34442. (352) 637-1755

FOR SALE: Collins 136B2 noise blanker - $175; RE 302C3 meter & coupler - $300; KWM-1 & 516F1 & manual - call. W2AO, NY, (914) 691-7957.

FOR SALE: Naval rcvrs RAL, RBA, RBB, RBC, RBL, RBM, some checked, pwr splys available. Price varies w/tube type & condx - $75, $350. Carl Bloom, CA, (714) 639-1679, cbloom@mcimail.com

FOR SALE: Drake R4A, exc, 30M - $150; Gonset GSB100, exc - $200; Hallicrafters HT40, near mint - $100; orig manual for all; Gellman variable ps 0-500v/o-150mA - $60; USM-207 500MHz frequency counter - $80. David Bertman, AB7B, 13145W Hall #E, Portland, OR 97201. (503) 223-5295.

FOR SALE: Hallicrafters HT37, looks nice, works very well - $250 + shpg. Jim Rupe, W7DDF, WA, (360) 267-4011.

FOR SALE: WACO-5NWX telephone filters. Just plug in. 1/$13.95, 2/$25, 3/$34. Money back. Cecil Palmer, 4500 Timbercrest Ln., Waco, TX 76705. (817) 799-5931, w5nwx@juno.com

FOR TRADE: Two good RCA 833As for one Taylor 833A; also looking for Taylor 803, 813, 875A. John H. Walker, Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455, jh.walker@alliedsignal.com

FOR SALE: Join SPAM, the society for the promotion of AM. Lifetime certificate $1, SASE. W4CJL, 202 Baker Dr., Florence, AL 35630.

ANNOUNCEMENT: Sept 23-27 - Hope, AR, "Sentimental Journey to Southwestern Proving Ground" includes a Warbird Airshow and a get-together show-&-tell for military radio collectors. Info: Jim Haynes, 1535 W. Cleveland, Fayetteville, AR 72701. (501) 443-9339, jhaynes@alumni.uark.edu

FOR SALE: British WW2 Telegraph key, No.2 MKIII - $25 + shpg. George Rancourt, K1ANX, MA, (413) 527-4304.

FOR SALE: Dow Key T/R switch 115 volts AC or 18 volts DC, very good condx - $10; Hallicrafters Skyrider Panoramic SP-44 working, missing rubber gasket - $72. Mervyn Ellsworth, 2309 N 25th St., Boise, ID 83702. (208) 345-6878.

FOR SALE: 75A4 w/spkr + 3 filters exc condx - $1500. Paul, DC, (202) 226-1128 work, 363-8593 (h).

FOR SALE: Gonset AM 2 mtr communicator - $100; 4k-2 Henry 4kw linear w/spare 5CX1550 - $1500; Drake L4B 2 kw linear little use on both linears - $650. W6ATC, CA, fax (310) 273-1995 or w6atc@aol.com

FOR SALE: Collins 30L1 owners new Cetron 811A's - $19; 32V owners Raytheon 4D32 - $19; all major credit cards accepted. Don, W4GIT, FL, (352) 475-3306.

FOR SALE: Yaseu FT-102 & FV-102DM remote control, both exc - $550 U shp. Dave, KB4AI, VA, (540) 752-0760.

FOR SALE: Viking Challanger, manual - $75 shpd; D104 - $40 shpd. Doug, KG8JT, OH, (937) 335-1300.

FOR SALE: Galena stal radios parts & free info on how to make your own. L. Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150. (716) 873-0447.

FOR SALE: Hammarlund HQ110 rcvr, manual, clock - $110. Jim, W8HPL, OH, (740) 927-2592.

FOR SALE: TCS rcvr - $125; broadcast band Command rcvr - $100; Radio Handbook 10, 15th edition - $25 ea. Gary, MN, (612) 496-3794.

FOR SALE: Globe King 500, not 500A, complete, almost mint, PU only - $1200. Sam Hevener, W8KBF, 3583 Everett Rd., Richfield, OH 44286-9723. (330) 659-3244.

ELECTRON TUBES FREE Catalog, over 2,000 types in stock. **Electron Tube Enterprises,** Box 8311, Essex, VT 05451. (802) 879-1844, FAX (802) 879-7764

FOR SALE: T-Shirts w/Johnson Viking logo - $15, state size. Viking Radio Amateur Radio Society, POB 3, Waseca, MN 56093.

FOR SALE: Used technical books - radio, electronics, math, military, magazines, etc. List: $1 (stamps OK). Softwave, 2 Dept. ER, 1515 Sashabaw, Ortonville, MI 48462

FOR SALE: Strong steatite antenna insulators. Lengths from two to fifteen inches. SASE for list. John Etter, W2ER, 16 Fairline Dr., East Quogue, NY 11942. (516) 653-5350

FOR SALE: Dial/clock covers. Send bezel, old or drawing, make/model, guaranteed satisfaction - $10 ppd. William P. Turner, WA0ABI, 1117 Pike St., St. Charles, MO 63301. (314) 949-2210

FOR SALE: Free info on many topics related to vintage amateur radio equipment & operations at http://www.mnsinc.com/bry/hamlynx.htm Everyone welcome. Brian Carling, G3XLQ/AF4K

FOR SALE: New Ranger I, Valiant I & Navigator plaster dials, 160-10 freq no's in green, w/all holes like orig - $17.50 ppd. Bruce Kryder, 4003 Laurawood Ln., Franklin, TN 37067. (615) 794-9692

FOR SALE: Collins meatball lapel pin - $5.95 + $.75 S&H. George Pugsley, W6ZZ, 1362 Via Rancho Prky, Escondido, CA 92029

FOR SALE: Cleaning up shack, lge SASE for list. You make offers for individual items. WH6CZD, 80 Lehua St., Kahului, HI 96732.

FOR SALE: SX-100, QC - first $160 + shpg. Paul, WB2ZEW, 40 W Sail Dr., Lehi, NJ 08087. (609) 296-1099

FOR SALE: Acrosound RS-310 ultra-linear output xfmr, 8k P-P (6V6, 6BQ5) to 4, 8, 16 ohm VC - asking $75 USA ppd. Joel Ekstrom, W1UGX, POB 391, Cabin John, MD 20818. (301) 469-6562

FOR SALE: Johnson Viking II, 122 VFO - $200; Heath HW-101, ps - $100; HQ-110 - $80; Harris RF-403 VHF FM mobile xcvr - offer. Al Jenkins, WA1RWB, 5 Daley Ct. Box 1162, Nantucket, MA 02554. (508) 325-7122

FOR SALE: Hallicrafters S76 good short wave rcvr, double conversion - $150; National NC300, working, looks nice - $200. John Strachan, NE6G, 7495 Gunter Rd., Pensacola, FL 32526. (850) 944-6563

FOR SALE: Magazines, manuals, surplus books, some surplus xfmrs, & other parts. Call your needs. Vic Edmondson, W4MYF, RT 1 Box 2599, Lee, FL, 32059. (904) 971-5580

FOR SALE: Collins 516F-2 bias mod, parts/instr - $12, ppd/US. Cory, N2AQS, 1000 E 14th/178, Plano, TX 75074-6249. hinec@cggate.dl.nec.com

NEW RELEASE: Flyer 198. For details send 2-stamp LSASE to: Olde Tyme Radio Company, 2445 Lyttonsville Rd. Suite 317, Silver Spring, MD 20910.

FOR SALE: Sell/Buy/Wanted/Trade: Vintage equip at the "K8CX Ham Gallary." http://paradox2010.com/ham/ a free service.

FOR SALE: Drake Twins; MN-4 tuner; TenTech; Century 21; Heath keyer; other items, tubes state your needs. SASE. Don Dillard, 5106 Red Oak Dr., Amarillo, TX 79110. (806) 352-4776

FOR SALE: ANC-5 & BC274N xmtr's. Ken Kolthoff, 8967 Scott DR., DeSoto, KS 66018. (913) 585-1196 or kolthoff@gvi.net

FOR SALE/TRADE: Transmitting/rcv'g tubes, new & used - 55¢ LSASE for list. I collect old & unique tubes of any type. **WANTED:** Taylor & Heintz-Kaufman types & large tubes from the old Eimac line; 152T thru 2000T for display. John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455 or johnh.walker@alliedsignal.com

FOR SALE: At auction, no reserve, Sept.12th Lexington, NE: (2) BC610E, one in crate, (2 ea) ART-13; Navy CG-52206 xmtr; command sets; AN/SRT-4A T397/SRT 4A xmtr; (11) Heinz-Kaufman type 54, NIB; hundreds of tubes, AF68, DX40, DX20; Heath Twoer; Sixer; much old military equipment; parts; hand keys; 1930 Handbook; more. WA0JRM, Rt 1 Box 141, Wilcox, NE 68982. http://hara.simplenet.com/ for weekly update.

FOR SALE: Swan 500C, new finals, PS/SP, SWR meter, mic, all band vertical - $400; Swan 500C AC ps - $300; Harvey Wells Bandmaster Deluxe, HB/PS - $100; Yaesu FT101EE like new - $375; Heath SB 220, (2) spare mod tubes - $550, pair - $900; Swan 700CX new finals + 2 new finals - $475; Drake 2C - $225; all above exc; Morrow MBR5, MB560A mic, RTS600S AC/PS - $350; Morrow MB560A - $75; MB565 - $75, both $125; Heath TX1 - $125; National NC183, 12" SP, no manual - $150; Globe Champion 350 - $350. All have manuals. Eugene, ID. (208) 522 5854.

FOR SALE: HT32A, HT33A, SX-101, sold together only - $1050. PU only. K0GPX, ND. (701) 347-5018 after 5 PM

FOR SALE/TRADE: Swan 350, no pwr sply/spkr - $155, trade for AN/SSR11, AN/SSR13A, AN/FFR-21, R-1401, etc. Ronnie, N2UDI, CT. (203) 371-6691.

FOR SALE: Repair! Radio repair, tube or solid state, reasonable rates. Jim Rupe, AB7DR, Western Amateur Radio Repair Co., (WARRC), 998 Whipple, Grayland, WA 98547-0697. (360) 267-4011

FOR SALE: No room in shack to work. Must sell 50 cubic feet of collectors ham gear, military & ancient broadcast radios. Send SASE. Fenton Wood, W5AIR, 109 Shoreline Dr, Star Harbor, Malakoff, TX 75148. (903) 489-0204 or fenton@tvec.net

FREE SAMPLE: Transistor Network Magazine for collectors of regular & novelty transistor radios, & related items. Articles & ads. Subscribers get a free 50-word ad monthly. Subscription: $17 (US); $28 (Canadian); $36 (Foreign). POB 43, Live Oak, FL 32064-0043. Visit our Web Site at: http:www.suwanneevalley.net/~rmorison/

FOR SALE: Look in the K7FF Super List for vintage radio parts (very old coil forms, 4-250/4-400 tubes/chimneys/sockets, meters, including RF ampmeters, porcelain spreaders, porcelain knife switches, etc.), list has doubled! Huge list of amateur parts (some equipment), e-mail for the K7FF Super List, <k7ff@inreach.com>, now easier to open. Derek, K7FF.

FOR SALE: Military and commercial communications items: maxpages.com/murphyjunk. For up-to-date lists: murphy@cts.com. Mike Murphy's Surplus, 401 N. Johnson Ave., El Cajon, CA 92020. (619) 444-7717

FOR SALE: Collins 51J series drum overlay - $10 ea, specify which. Ron Hankins, KK4PK, 555 Seminole Woods Blvd., Geneva, FL 32732. (407) 349-9150

FOR SALE: Collins repair: FCC Licensed Technician, we repair the Collins Gray Line i.e. S-Line, KWM-2/2A etc. & other select models. Merle, W1GZS, FL, (352) 568-1676

FOR SALE: R-390A Repro nameplates - $9 shpd. N5OFF, 111 Destiny, Lafayette, LA 70506. trinit698@idt.net, (318) 989-3430

FOR SALE: Knight TR-108 2-meter AM xcvr w/orig mic, VGC - $75 plus shpg from Chicago. John, WB9OVV, (708) 431-2693, jvercellino@sprynet.com

FOR SALE: Collins KWS-1 the AM King - $1000; Higain beam TH7DX triband - $300; T2X rotor, 20 sqft - $300; QST 1934 to 1988 some to 29 - $400. All is in great shape. Dave, TN, (615) 782-7842 (d) dmeitzen@pow.com

FOR SALE: Nat'l HRO-60R w/4 coils - $275; Heath SB600 spkr - $55 shpd in conUS. Doug, OR, (541) 367-6486

FOR SALE: Collins KW-1 S/N 129, exc condx - $20,000. George Flanagan, W2KRM, NY, (516) 360-9011, 7 to 9 PM EDST. george2bl@aol.com

FOR SALE: R-648/ARR-41; Clegg 22'er; BC-348-L; CU-351/M. SASE for list to Marvin, 2957 Gaffney Rd., Richmond, VA 23237. (804) 275-1252, wa4bpi@juno.com

TONY'S LIST AT LAST!!

Tony Snider has finally compiled his complete list of vintage/military gear.

The list can be accessed at the webpage below. Just click on the button that says "online classified". It has "Marine", "Communications" and "Test Equipment" sections. It will be updated every 2 weeks with new items and people can sign up for a e-mail update right on the page.

http://www.meob.com

WANTED: Hallicrafters Village/Hamlet radios TR-5/TR-20 & Gonset Civil Defense 6m radios/ accessories, manuals also. Daniel Cahn, 3444 Greenwood Ave., Los Angeles, CA 90066. Fx/msg (310) 398-7159 or danielc411@aol.com

WANTED: Japanese WW2 Chi 4 radio plugin coils. Yes, Chi 4 not Chi Ichi. Stan, JA1DNQ fwgf8431@mb.infoweb.or.jp

WANTED: Instruction manual for DX Engineering LC-2-T4X speech processor for Drake T-4X. Makoto Takazawa, JA1XS, m-takaza@ja2.so-net.or.jp

WANTED: CE-100V or CE-200V. Have NC-183D with matching spkr toward trade. Please state condx and price. Keith, KK5FE, 31 Claudia Dr., Covington, LA 70435-9513. (504)-892-4538. kk5fe@communique.net

WANTED: Gonset Communicator III, linear w/ 826's, manuals and product literature. Fred, KC9WW, 1325 S 103 St., West Alls, WI 53214. (414) 257-0189, fredmik@execpc.com

FOR SALE: Xfmrs, UTC-541 power - $40, Triad modulation, M-7AL - $40, Triad Power, R-51 - $25. Carleton T. Rand, W1PZL 85 Black Hall Rd., Epsom, NH 03234. (603) 736-9695

WANTED: Command sets ART-13's; Collins radios & all accessories top $ paid; most radios repaired reasonable. FCC licensed. W1DEJ, MA, (781) 485-1414 eves, hobfact@tiac.net

WANTED: Kleinschmidt teleprinter models: 311, 321, (AN/FGC-40, AN/GGC-16, AN/UGC-39...) Tom Kleinschmidt, 506 N. Maple St., Prospect Hts., IL 60070-1321. (847) 255-8128

WANTED: Old tube amps & xfmr's by Western Electric, UTC, Acro, Peerless, Thordarson; Jensen, JBL, EV, Altec, WE spkr's. Mike Somers, 2432 W. Frago, Chicago, IL 60645. (312) 338-0153

WANTED: Military survival communications equip: radios, beacons, manuals, books, historical info/photos. Daniel Cahn, 3444 Greenwood Ave., Los Angeles, CA 90066. (310) 398-7159. danielc411@aol.com

WANTED: Any military entertainment radio (Morale rcvr), manuals, accessories, or data plates. Henry Engstrom, KD6KWH, POB 5846, Santa Rosa, CA 95402. ph/fx (707) 544-5179

WANTED: Visitors and tubes by museum. Old and odd amateur or commercial tubes, foreign and domestic purchased, traded or donations welcome. All correspondence answered. K6DIA, Ye Olde Transmitting Tube Museum, POB 97, Crescent City, CA 95531. (707) 464-6470

WANTED: WW II Japanese, German, Italian radios & communication equip for display in intelligence museum. LTC William L. Howard, 2191 Harborview Ln., Largo, FL 33770. (813) 585-7756, wlhoward@gte.net

WANTED: Copy of MIL-T-27A spec, RCA, Gates, Langevin B'cast gear. R. Robinson, 868 S. Main St., Plantsville, CT 06479. (860) 276-8763, richmix@erols.com

WANTED: RCA 140, 141, AVRSA. GE K80, K80X, K85. Any condx. James Treherne, 11909 Chapel Rd., Clifton, VA 20124. treherne@erols.com

WANTED: Johnson Viking Model 122 VFO for Viking II. Jay Lyter 455 Melrie Dr., York, PA 17403. (717) 741-4270, wa3ong@juno.com

WANTED: Schematic/manual for Harris RF-281A antenna coupler. W6MIT, (530) 672-0903, svoboda@directcon.net

WANTED: Broadcast gear, tube or solid-state, compressors, limiters, equalizers, microphones, consoles, mic preamps, recorders. Mike States, Box 81485, Fairbanks, AK 99708. (907) 456-3419 ph/fax or mstates@polarnet.com

WANTED: Collins 310B3, spare 70E8A linear glass scale, Bud JEL coils any band, & Chicago 500W CMS-3. Jerry, W8EGD, CO, (303) 979-2323.

WANTED: Perforated cabinet for a Gonset G66/ 77. HE Spaulding, 1567 Lilac Way, Upland, CA 91786-2217

WANTED: S-meter, cabinet & manual for RCA CR-88. Robert Harding, KC5LHR, 1321 Monte Largo Dr NE, Albuquerque, NM 87112. (505) 291-0950 or robert.harding@abq.com

WANTED: Anything related to Tecraft & Ameco, cheap stuff only; Tecraft pwr sply & manuals. Bud Fritz, N3SFE, 104 2nd St., Montgomery, PA 17752.

WANTED: Collins R389, 30K-, 310-, 399C-1, KW-1, HF80 i.e. HF8014, 8515-1, Hallicrafters SX-115. Richard, WA0AKG, NE, (402) 464-8682.

WANTED: Test equipment & tube audio amplifiers. Mike Nowlen, WB4UKB, 2212 Burgee Ct., Reston, VA 20191. mike@3dnet.com

WANTED: McKay Dymek radio literature & info. Gene Peroni, KA6NNR, POB 58003, Philadelphia, PA 19102. (215) 665-6182

WANTED: Collector/builder seeks lge & small vacuum tubes & vacuum tube collections, sockets, etc. Will pay good prices. Please call Marc, OR, (800) 330-2004.

WANTED: Keys - keys - keys - keys - keys - keys - keys - keys - keys - Jim, KØYLW, KS, (785) 364-3989

WANTED: E.H. Scott Radios only in very good condition. EA4JL, contact in the States, Kurt Keller, CT, (203) 431-6850.

WANTED: WWV rcvr. **FOR SALE:** Collins & miscelaneous parts, xtals, manuals, books magazines, list - $1. Joe Orgnero, VE6RST, Box 32 Site 7 SS 1, Calgary, AB T2M 4N3, Canada. (403) 239-0489

WANTED: WW-2 Japanese military radio of any kind. Takashi Doi, 1-21-4, Minamidai, Seyaku, Yokohama, 246 Japan. Fax 011-8145-301-8069 or taka-doi@kk.iij4u.or.jp

WANTED: Technical manual for Lampkin Labs model 105-8 frequency meter. Al Kaiser, W3LEQ, 713 Marlowe Rd, Cherry Hill, NJ 08003-1551. (609) 424-5387

WANTED: Cash for Collins: SM-1, 2, 3; 55G-1; 62S-1; 399C-1, 51S-1; 75S-3A, C 32S-3A; any Collins equip. Leo, KJ6HI, CA, ph/fx (310) 670-6969, radioleo@earthlink.net

WANTED: Military electronics, RDF, radar, communications, test, manuals, literature, etc. What have you got? William Van Lennep, POB 211, Pepperell, MA 01463. (508) 433-6031

WANTED: Watkins-Johnson or Communications Electronics Inc. info, catalogs, manuals or equipment. Terry O'Laughlin, WB9CVB, P.O. Box 3461, Madison, WI, 53704-0461, 608-244-3135

WANTED: Hallicrafters HT-1, HT-9, HT-31, S-T, SX-11, SX-17, SX-25; Howard rcvrs; Harvey xmtrs. Ken Seymour, KA7OSM, 9115 SW 176th Ave., Beaverton, OR 97007. (503) 306-7439 24 hrs. ken.seymour@attws.com

WANTED: Manuals, manuals, manuals for radio-related equipment to buy or swap. Catalog available. Pete Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964

WANTED: Navy xmtrs: MQ, TCA, TCE, TCN, TCX, TDE; rcvrs: RAW, RAX, RBD, RBJ. Steve Finelli, 37 Stonecroft Dr., Easton, PA 18045. (610) 252-8211. navrad@enter.net

WANTED: Squires-Sanders SS-1R, SS-1T, SS-1V, SS-1S, see my web page tulsa.oklahoma.net/~wd5jfr. Hank, WD5JFR, OK, (800) 364-4265

WANTED: Hallicrafters HT-9 parts - side fins, osc/plate coils, serial plate, ant. post. Carl H. Nord, WA1KPD, 16 Saddlebrook Dr., Killingworth, CT 06419. (860) 663-3676, cnord@snet.net

WANTED: Information-WW2 TCS Radio System: Design, Manufacturing & Operation for article. Any help appreciated. Thanks. Greg Greenwood, WB6FZH, POB 1325, Weaverville, CA 96093. (707) 523-9122 (message) gregg6fzh@aol.com

WANTED: Door knob caps; Sprague "Black Beauty" caps; buy-sell unused tubes. Send SASE for list W+. Typetronics, POB 8873, Ft. Lauderdale, FL 33310-8873. (954) 583-1340, fx 583-0777

WANTED: Tektronix memorabilia & promotional literature or catalogs from 1946-1980. James True, N5ARW, POB 820, Hot Springs, AR 71902. (501) 318-1844, Fx 623-8783, james.true@ibm.net

WANTED: R-392 rcvr in good shape w/meter intact. Bruce Beckeney, 5472 Timber Way Dr, Presqueisle, MI 49777.

WANTED: National NCX-5 VFO, calibrator, & 10 mtr xtals; Heath MR-1 Comanche rcvr. James Shank, W3CNS, 21 Terrace Ln., Elizabethtown, PA 17022. (717) 367-3149

WANTED: GPR90 cabinet & spkr; NCX5 options & parts; SX-146 AM filter & calibrator. Bill, KE7KK, 6712 Lake Dr., Grand Forks, ND 58201. (701) 772-6531

WANTED: For rare Boulevard Electronics rcvr. instruction book, schematic, etc. Can you help? Jim, K7BTB, Box 50355, Parks, AZ 86018. (520) 635-2117

NOTICE: Watch Radio Finder web site http://www.radiofinder.com for new listings of old keys and bugs, including a 1920 Vibroplex, an old McElroy and plenty more. Old QSTs, CQs, and Radio magazines now are part of the web catalog plus many old Handbooks and other radio publications.

FOR SALE: Copies: Hard to find schematics for radios, also kit radios 1922-1950; manuals: test equip. ham gear. Contact me for prices, availability. Duane Ballew, KB7QZK, 6813 152nd St. Ct., NW, Gig Harbor, WA 98332. (206) 851-4505

FOR SALE: Signal one CX-7 w/CW filter, manual, service records - $1000, shpg neg. Mike Keller, WA2RRY, NY, (914) 423-5196 after 6 pm EST.

FOR SALE: First issue Ham Radio + 11 other early ones - $20 + $2.50 shpg. RJ Eastwick, N2AWC, 224 Chestnut St., Haddonfield, NJ 08033. (609) 429-2477

FOR SALE: Meters: Weston, Simpson, Triplet, RCA, others, exc condx. SASE for list. Bill Riley, W7EXB, 863 W. 38th Ave., Eugene, OR 97405-2375.

FOR SALE: EICO 720 - $125; EICO 730 - $125; Johnson mobile xmtr - $125. **WANTED:** PE-73 dynamotor. Greg Richardson, WA8JPC, POB 405, Gallipolis Ferry, WV 25515.

FOR SALE: Collins Repair. I specialize in S-line equipment. Reasonable, & work guaranteed. Steve, N6HK, Box 1136, Goleta, CA 93116. (805) 967-7466

FREE: Encyclopedia of Amateur Radio Equipment. Hundreds of photos & descriptions spanning over 80 yrs. http://www.aade.com/hampedia/hampedia.htm

FOR SALE: Ceramic socket 2 API-11 w/xfmr 6V-2.5V 4300V - $30; vib sply 12V 275V - $20. Joe, W6CAS, CA, (916) 731-8261.

FOR SALE: National RCK rcvr, no ident plate, works w/ manual and other information - $100 plus shpg. Dennis, KE0QM, KS, (913) 782-9092, wbfim@sound.net

FOR SALE: Zenith 6G601 AM portable - $ 30, AK-42 - $ 40. Carter, VA, CElliott14@aol.com

FOR SALE: Harvey-Wells TBS-50D - $95; Collins PM-2 - $95; Heath: 1972 catalogs (2), manuals, AM-2, BC-1 - $5ea. George, W4BDG, 2910 Virginia St., NE, Albuquerque, NM 87110. (505)298-7347

FOR SALE: My collection of transmitting tubes, large Eimacs, RCA 800 series, etc. SASE brings complete list. AA2CB, rosariok@juno.com

HAMFEST: 42nd Annual York Hamfest - Oldest Continuously Held Hamfest in Penna., September 20, 1998, Exit 6E off I-83, York, PA. TI 146.97, (717) 764-8193 http://www.yorkhamfest.org

FOR SALE: SSB adapter for B&W 5100B - $100 + shpg; **WANTED:** Drake 2A or 2B. Bill Smitherman, 9401 Hwy 67, East Bend, NC 27018. (336) 699-8699

FOR SALE: Hallicrafters HT-40 & SX-140 - $100; Globe VFO - $50; RT-70 6M FM military xcvr w/AM-65 pwr sply, spkr, mic & hook-up cords, equip all clean, complete w/manuals. Dirk, W8IQX, IA, (515) 232-9487 or doctordirk@aol.com

FOR SALE: RME 4350A - $195; Knight T-150A, exc - $145; Allied A-2516, like new - $195; Hallicrafters HT-40, exc - $125; Heath HA-14 KW Kompact & ps, collector grade - $375. Free list. Richard Prester, 131 Ridge Rd., W Milford, NJ 07480. (973) 728-2454

FOR SALE: Galaxy parts III, V, 84, manuals rare VOX board. **WANTED:** ART-13 sply. Darryl, WA5AAO, Box 335, LaGrange, TX 78945. (409) 968-3384

FOR SALE: Classic gear - SASE for list. **WANTED:** Vintage rigs. The Radio Finder, Joel Thurtell, 11803 Priscilla, Plymouth, MI 48170. Tel/Fax (313) 454-1890

FOR SALE: Hundreds of books: ARRL; Rad; Lab; RCA, Receiver Design, 2-stamp SASE for list. Charles Brett, 5980 Old Ranch Rd., Colorado Springs, CO 80908. (719) 495-8660

FOR SALE: Japanese Radio Communication Equip - Technical Manual (Enemy) TM E 11-227A, 12/1944. Cover-to-cover reprint, professionally done, great graphics, profusely illustrated - $24, ppd USPS, insured UPS $5 additional. Military Marketing, Inc., Box 741, Norcross, GA 30091-0741. (770) 729-9315

FOR SALE: Clegg 62T10, 160W AM 10,6,2 meter xmtr - $550. JeRB, MI, (616) 382-5401, jerb@iserv.net

WANTED: Triplett Modulation Monitor 1696A; Chicago splatter choke SR-500; Chicago modulation transformer CMS-3; UTC bias transformer S-51; Triad splatter chokes C-26X. Mike Ruggiero, W2NVR, Rd 3, Box 3358, Saylorsburg, PA 18353. (610) 381-3211, w2nvr@ptd.net

FOR SALE: New orig. PJ-068 mic plugs for Collins S-line/KWM-2A/HF-380 shp'd in USA - $8 ea. Clint Hancock, KD6H, 6567 Ashfield Ct., San Jose, CA 95120-4502.

FOR SALE: Boatanchor paints; Heathkit Tech Journal Subscriptions; phone filters - call or write for free catalog. R&R Designs, 202 Midvale, Marshall, WI 53559. (800) 372-4287

FOR SALE: Convert any wattmeter to read PEP! Perfect for AM/SSB - $19.99 ppd for complete kit! HI-RES, 8232 Woodview, Clarkston, MI 48348. (248) 391-6660, hires@frust.net

FOR SALE: RIT for KWM-2 and S-Line. No modifications for KWM-2. $59.95 tested/42.95 for kit. SASE for details and order info. John Webb, W1ETC, Box 747, Amherst, NH 03031.

FOR SALE: Tube list, new & used, wide variety audio, ham. Recently expanded. SASE 52¢. Bill McCombs, WB0WNQ, 10532 Bartlett Ct., Wichita, KS 67212-1212.

FOR SALE: QST's: Any issue 1930 to date - $6, ppd; Bakelite panels & straightened lengths of #10,#12,#14 tinned wire - SASE for info. Parker, W1YG, 87 Cove Rd, Lyme, CT 06371.

FOR SALE: Knight Star Roamer & Hallicrafters S38C - $35 ea + shpg. Henry Mohr, W3NCX, 1005 W. Wyoming, Allentown, PA 18103.

FOR SALE: TMC PMO-5 - $150; HQ-180A - $350; Drake FS4 - $275; 2B and 2BQX - $125; R4B - $150; HQ-110 - $100; SX-110 - $75; SX-99 - $75; BC-221 w/ PS - $25; BC-221 OD green cabinet (wood) - $25; B&W 370 SSB adapter - $100; Lafayette HE89 6&2 VFO - $20; HE73 - $20; SB-310 - $150. Manuals and spkrs available for all. All equipment in exc condx. Bill, KB8IJC, WV, (304) 842-4635.

FOR SALE/TRADE: BC-348Q (AC) - $200. Drake R-4B - $225; Heath SB-301 - $300; HRO-50T w/ SP - $425. Sam Timberlake, KF4TXQ, POB 161, Dadeville, AL 36853. (256) 825-7305 stimber@lakemartin.net

FOR SALE: TenTec RX-10 rcvr - $130; March 1939 Japanese 0-200 milliampmeter, EC - $200. Gary, WA9IYF, 3429 Gaddy Ct., Falls Church, VA 22042.

FOR SALE: SB1400 rcvr; SB1402 mic; SB1404 pwr sply; Collins 180SI antenna tuner; KWM-380 paper work; ART-13 DP-DT knife switch ; keys, keyers, code reader; Ellenco Electronic radio kits. Bill Coolahan, 1450 Miami Dr. NE, Cedar Rapids, IA 52402-2933. (319) 393-8075

FOR SALE: Hallicrafters HT-37, very good, works well, mic jack not orig - $150. David L. Muse, 510 Minturn Ave., Hamlet, NC 28345. (910) 582-8446

FOR SALE: Books, all electronics related, 200 titles; SASE. Paul Washa, 4916 Three Points Blvd, Mound, MN 55364. wetok@email.msn.com

FOR SALE/TRADE: BC-704 set in rack, heavy. **WANTED:** Tube audio amps, output trannies, UTC CG-16, 6BQ5 & 6942 tubes. Robert, (815) 226-6123, RBTR@SNDS.COM

MERCEDES UNIMOG RADIO TRUCKS
THE ULTIMATE MOBILE

The UNIMOG "Radio Truck" was manufactured by Mercedes Benz for the NATO Armies between 1958 and 1970. Incredible off-road performance! Better than a Humvee at a fraction of the price! Approximately 7x12' rear cab, 3-seat operating positions, 24VDC, auxillary generator and several antenna mounts will accomodate multiple stations for field day, VHF contests, emergency services, hamfests, military radios, etc. Camper versions also available. **Shep, AA7MH, Prescott, AZ, (520) 717-2877, www.umog.com**

WANTED: WW-2 Japanese military radio of any kind. Takashi Doi, 1-21-4, Minamidai, Seyaku, Yokohama, 246 Japan. Fax 011-8145-301-8069 or taka-doi@kk.iijlu.or.jp

WANTED: Keyer paddles of all kinds. Cap, WØXC, CO, (970) 247-0088. capallen@frontier.net

WANTED: National HRO-500 & LF10; Hammarlund SP600-JX21A; Johnson AN/FRT-505. Ric, C6ANI, POB N4106, Nassau NP, Bahamas.

WANTED: Millen 90711 VFO schematic & instructions. Don, W7KCK, 7117 N. Seward, Portland, OR 97217. (503) 289-2326

WANTED: Mod xfmrs 60-120W audio, CVM or other; mod xfmr 5W-1KW RCA 5500/5900 1:1 perfect, mod xfmr 2.5-5 KW; audio driver xfmrs; xfmrs for LV/screen PS 350-1kv; sockets 4CX5000; lge multi sections BC variable caps for Pi net output; 2 meter tube type KW amp. John Freeman, YN4SFA, POB 1773, Pinehurst, NC 28370.

WANTED: Socket for 955 Acorn tube & Heath RCL bridge. Walt Tukkanen, POB 254, Koza, Okinawa, Japan 904-0021.

WANTED: Hallicrafters SX130 junker or working unit, I need the glass dial; SX88 & SX115. John Suker, W1TX, VT, (802) 775-6732.

WANTED: SM-57 ext S meter for NC-57 rcvr. Bill Bowes, N7MOB, WA, (253) 839-8591.

WANTED: Orig manual for RS-6. Chuck Milton, KF4LYF, 505 Sampson Dr., Frankfort, KY 40601. cemilton@aol.com

WANTED: CQ Magazine June 1945. Please respond by mail, state price & condx. Tom Berry, K9ZVE, 1617 W. Highland, Chicago, IL 60660.

WANTED: Hallicrafters SX-28, PU only within four hrs drive of Ann Arbor, MI. Dan Gutowski, 9753 Easton Rd., Dexter, MI 48130. (734) 433-1354

WANTED: HQ100A or HQ110, HQ145, HQ160; dead HF tube rcvrs, xmtrs. Prefer complete. John KF7OM, NV, (702) 727-8171.

WANTED: Drake 1A spkr (1AS) & Kenwood RS99 spkr (S599). Pay reasonable price. San, K5YY, AR, (501) 756-5010.

WANTED: Dynaco amps, preamps, tuners & Heath HO1424A active antenna. Bill, KB8IJC, WV, (304) 842-4635.

WANTED: Temco 75GA or Supreme AF-100 post WWII desktop xmitters. Robert Perlstein, W1IV POB 642, Old Orchard Beach, ME 04064. (207) 934-9206, perls@compuserve.com

WANTED: CR-1/AR xtals in the 6400 to 6600 kilocycle range for ARC1 radio. Robert Martin, 111 Bancroft Dr., Rochester, NY 14616. (716) 663-4182

Please remember to count the words in your ad and if you're over 20 words send 20 cents for each extra word.

CONVERT YOUR WATTMETER TO READ TRUE PEP FOR LESS THAN $20! The PDC-1 will convert your Average Reading wattmeter to Peak Power! Even works on the Bird 43!

$19.99 postpaid in the USA and Canada

HI-RES COMMUNICATIONS, INC.
8232 Woodview, Clarkston, MI 48348
(248) 391-6660 or hires@msn.net

WANTED

Collins promotional literature, catalogs and manuals for the period 1933-1993. Jim Stitzinger, WA3CEX, 23800 Via Irana, Valencia, CA 91355. (805) 259-2011. FAX (805) 259-3830

Radio Repair & Restoration
Hollow State/Solid State (R³)
Specializing in the SBE 33, 34
Chuck Banta, N6FX 909/593/1861

DR. RADIO
***Repair & Restoration of Vintage Equipment**
*** Reasonable Rates & All Work Guaranteed**
Steve Trimble, K5DJH
Box 73, Weston, TX 75097-0073
Call Toll Free: 1-888-73-K5DJH

WANTED: Hallicrafters S-2, S-33, S-35; HT-2, -3, -8, -12 (old series); AC p/s for HT-45; BC-669 or parts; complete BC-729. **Chuck Dachis, WD5EOG, "The Hallicrafters Collector"**, 4500 Russell Dr., Austin, TX 78745. (512) 443-5027

WANTED: Condenser, carbon and other early broadcast microphones; cash or trade. James Steele, Box 620, Kingsland, GA 31548. (912) 729-2242

WANTED: Compressor amplifiers & other pro-audio gear: mics, preamps etc-tube or solidstate. Mark Linett, CA, (818) 244-1909.

WANTED: Tube type shortwave converters, preferably pre-war. David L. Muse, 510 Minturn Ave., Hamlet, NC 28345.

WANTED: Western Electric sound reenforcement equipments - mics, amps, tubes, spkrs, horns. Barry Nadel, POB 29303, S.F., CA 94129. (415) 346-3825

WANTED: To buy or trade military surveillance & countermeasures rcvrs & jammer or related gear 1960 - present. Tony Snider, VA, (757) 721-7129.

Mil-Spec Communications
R-390, R-390A, R-388 & other military receivers
Sales - Service - Manuals - Parts
Box 633, Englewood, FL 34295-0633
941-474-6818, Fax - 941-474-7874
"Since 1985"

ELECTRON TUBES: All types - transmitting, receiving, obsolete, military-- Large inventory. **Daily Electronics Corp.**, 10914 NE 39th St., B-6, Vancouver, WA 98682. (800) 346-6667, (360) 896-8856, FAX (360) 896-5476

FOR SALE

SRT-16 Transmitter

HUGE SHIP ANCHOR!! TOO BIG to be called a boat anchor! The SRT-14 version of this was written up in the April, 97 issue of ELECTRIC RADIO. UNIT in good condition and with original Tech Manual. With antenna tuner also. $1200 or will trade for Collins equipment. Local pick up only!! Very heavy and large!! 2 large racks total weight over 1800 lbs. 3 phase AC required for part of system. Will fax picture if someone is very interested.

Howard Rock
4711 Croatan Hwy, Suite 6B
Nags Head, NC 27959
800-654-9251
Fax - 252-441-7322
hrock@interpath.com
www.meob.com

WANTED: WW II Japanese xmtrs & rcvrs (parts, plug-in coils) for restoration & ER articles. Ken Lakin, KD6B, 63140 Britta St., Ste. C106, Bend, OR 97701. (541) 923-1013. klakin@aol.com

WANTED: Collins S-line, KWM2A, 30L-1, etc. Mark pays the most for clean gear. WD4AAS, FL, (954) 776-5996 (d), 566-0014 (n).

WANTED: National coils, dog house pwr splys & NIB parts. I love National. Sylvia K. Thompson, N1WVJ, 33 Lawton-Foster Rd., Hopkinton, RI 02833. (401) 377-4912

ORIGINAL MANUALS FOR SALE

Ameco Amateur Radio Theory; Catalog #102-01; TX-62; TX-62 flier

B&K 1466A Scope Instr Manual

B+W Catalog

Caywood 90881

Collins 32S3 Manual; 310B1 Exciter; 310B3 Exciter; 651S1 Data Sheets; 70E Oscillator page; 75A3 Data Sheets; 75A4 Knob Instr Book; 75A4/KWS-1 Equipment Catalog; 75S3 Manual; 75S3B Manual; 75S3C Manual; Amateur Equipment 1970; Amateur Radio Flier 1961; Amateur Radio Flier 1963-64; CP1 Instr Sheet Catalog; Equipment Catalog #33; KWM2 Catalog; KWM2 Manual; KWS-1 Instr Manual; Logbook showing "S" Lines; Logbook showing "S" Lines,thick; Pricing Schedule May 1969; Collins Amateur Handbook 1954; "S" Line Equipment Catalog; SC101; SM-2 Spec Sheet; St James SC101 etc ad

Comcraft CTR-144

Drake 1-A; 2-A; 2-B; 2-C; MN-4; R-4; W-4; Communications Catalog

Dentron MT3000A Operating

EICO 710 Assembly Manual; 717 Assembly Manual

Fada TV S-1055X Instr

Gonset 11-A Instr Book; 11-B Instr Book; Com IIA flier; Com IIB flier; GR-212; GR212 flier

Hallicrafters Sky 23 Instr

Ham Buyers Guides Vol.1 & 2

Hammarlund HX-50; 110; HQ-145; HQ-180

Heathkit AM-2 Power Meter; Apache TX-1; AR-3 Receiver; DX100B Transmitter; GD1B Grid Dipper; GW-11D CB XCVR; HD1984 My Coder; HD1982 My Coder; HM2141 VHF Dual Wattmeter; HR1680 Receiver; HW12 80 Meter XCVR; HW12A 75 Meter XCVR; HW2036 2 Meter XCVR; HW202 2 Meter FM XCVR; HWA202-1 Power Supply; HWA2036-3 Power Supply; HM10A Tunnel Dipper; HX10 Marauder; IB1103 Frequency Counter; IM5218 Voltmeter; IP2718 Power Supply; RX-1 Mohawk Receiver; SBA300-4 2 Meter Converter; VF-1 VFO; VHF-1 Seneca Transmitter; VP-1-12 Power Supply

HP 606A Instr Manual; 608A Instr Manual

Icom IC-21 Instr Manual; IC-255A Instr Manual; IC-706 Instr Manual

Johnson 6N2 Instr Manual; 978 Catalog; 979 Catalog

KnightKit 83YU726 (R100) Ass'y; R100 Assembly; T-60 Assembly; T-150 Assembly; Signal Tracer; X-10 Assembly

Lafayette HA-350 Oper.; HA-800B Oper.

Lysco 600S

Mackay 138-B Instr Book

Millen Sales Catalog; General Catalog 136

Military: I-176; A+M 5192; AN/USM-44; BC339; BC348 J-N-Q; BC348-Q; CV157/URR; ME 71A/FCC; OS-8C/U; PE 162-B; R392; R96A/SR; RBV-1; SG376A/U; TCM-2; TG-5-A; TM 11-5820 554-12

National HRO-500 Instr; NCX-1000; NCL-2000; Radio 1947 Catalog; Station Log Book

Nye Viking MB-II

Packet Companion Book

Sonar "E" Manual

Swan Astro 150 Instr Book; Watt Meter WM-3000 Book

Tempo One

Vectronics VC300D

VoCom 2C025 Amp flier

Waters 374 D.L. Instr. Book; 384 D.L. Instr. Book; Manufacturing Catalog

Wawasee JB1000SM Instr Book; JB4001S Instr Book

Yaesu FT101E

Rick, W1DEJ, 1111 North Shore Rd., Revere, MA 02151

781-485-1414, hobfact@tiac.net

http://www.tiac.net/users/hobfact

CHEAP RADIOS & MISC BLOWOUT $25 to $99

Ameco PT-2 Pre Amp; TX-62 2+6 Trans w/VFO

Astatic D104 Microphone

Baltimore Labs Decade Amp 220C

B+W 51SB Sideband Generator; Video Monitors

Collins Dir Wattmeter (panel mount); MM-1 Mics (no decal); PTO's, assorted

Dayrad 54A Radio Set Tester

Delta Products 3000 VOM

Drake 584-A Phone Patch; FA7 Fan

Eldico Grid Dipper, 110v

EICO 324 Signal Generator; 717 Electronic Keyer; 950A Tester

Gonset 2 Meter VFO; 6+2 VFO; Communicator III 2M; Communicator IV 2M XCVR; G-76 10-80 Meter XCVR; GC105 2 Meter XCVR

Hallicrafters SX-130 Receiver

Hammarlund HQ110 Receiver; HQ110A Receiver

Heathkit AM-2 SWR Bridge; IM5218 VTVM; ID4101 Elect Switch; Q Multiplier QF-1; HS1661 Speaker; IT-12 Signal Trace; IM1202 Dig Multimtr; IT-22 Cap Tester; IT-1 Iso Transformer; IG5282 Audio Gen; IB1103 Freq Counter; HG10B VFO; HW-17 2 Meter XCVR; VF-1 VFO; GD-1 Grid Dip Meter; HW202 2 Meter XCVR; HW-12A 75M XCVR w/PS; HR-1680 Receiver; SB-630 Console; EUW-27 Freq Multiplier; IM28 VTVM

HP 412A VTVM; 415B SWR Meter; 606A RF Generator; 606B RF Generator; 608C RF Generator

Icom Lighted Sign; IC21 2 Meter + VFO

Jetronics AN1839D Preamp

Johnson 250-46 Phone Patch

Knightkit KG-670 R/C Tester; R100A Receiver; R100A Rcvr (no cab); SWR Bridge

Lafayette TE-46A CR Analyzer; HA-90 10-80 Converter; HA410 10M XCVR; HA800 Receiver; HA800B Receiver; 99-26411 SWR+Watt; HE-73 Pre Con 80M-10M; HE-48C Speaker

Military: ARC-3 Shock Mount; Signal Generator SG-376 A/V; AN/URM-7 Wattmeter (new, 400W); TS174/U Frequency Meter; BC221AH Frequency Meter; BC221AA Frequency Meter

10 Mc Scope (new); Standard Electric TS2162/VHF Wattmtr; PE162 Power Unit; Audio Level Meter ME71C; Walkie Talkie BC611; Triplett 177B Mil Tube Tester

McGraw Edison Xtal Calib 111

Meissner 150B Converter

MFJ 1701 6 Position Ant Switch

Millen Wavemeter Sets; Antenna Match 92101

Monitor Radio M-40 Converter 30-50

Murch VT2000A Tuner

National HRO Main Knob (N.I.B); HRO500 Main Knob; HRO500 Meters (N.I.B); NCL2000 partial Chassis; NC-88 Receiver

Pyramid CRA-1 Cap/Res Analyzer

Robot 400 SSTV

Star SRZ00 Receiver 160-10

Swan WM3000 Wattmeter/SWR

Tektronics 545A Scope w/cart; 5354E Scope Module; 53A Scope Module; CA Scope Module; K Scope Module; 53/54D Scope Module; 3A6 Module; 3B4 Module; RM 564 Scope

Waters 373-6 Co-Ax Filter; 3001 Hybrid Coupler

Yaesu Microphone MD-1; Land Line Phone Patch; YC355D Freq Counter; FV101B VFO; SP101PB Landline Patch + Spkr

Rick, W1DEJ, 1111 North Shore Rd., Revere, MA 02151

781-485-1414, hobfact@tiac.net

http://www.tiac.net/users/hobfact

ELECTRIC RADIO STORE

BACK ISSUES

All back issues are available at $34 per year or $3.25 for individual copies. Buy the entire first 9 years (#1-#108) for $240. This price includes delivery in the U.S. Foreign orders please inquire.

COMPENDIUMS

Collins 75A-4 Modification Compendium- all the factory modification bulletins from Collins Radio Co., all the articles printed in CQ, Ham Radio, QST and ER, 85 pages- $20 plus $3 S&H

Service Modification Compendium for the S-Line, KWM-1/2/2A series - 260 pages - $45 plus $4 S&H

Service Modification Compendium for the KWS-1, 32V and 75A series - 42 pages - $15 plus $3 S&H

T-SHIRTS

The front displays the logo from the cover of ER (the tube outline, Electric Radio, and 'celebrating a bygone era'). The back has "Real Radios Glow in the Dark" (used with the permission of Classic Radio).The T-shirts are U.S. made by Hanes and come in S-M-L-XL-XXL. The color is just a little lighter than the cover of ER - $15 del. ($16 for XXL)

BOOKS

Vintage Anthology - Book 1 by Dave Ishmael, WA6VVL.....$14.95

The First Fifty Years: A History of the Collins Radio Company and the Collins Divisions of Rockwell International $49.95

Fixing Up Nice Old Radios by Ed Romney.....$24.95

Communications Receivers, The Vacuum Tube Era: 1932-1981 by Raymond S. Moore.....4th Edition $19.95

Oscilloscopes, Selecting and Restoring a Classic by Stan Griffiths.....$19.95

McElroy, world's champion radio telegrapher by Tom French $19.95

The Pocket Guide to Collins Amateur Radio Equipment 1946 to 1980 by Jay H. Miller, KK5IM.....$19.95

Heathkit A Guide to the Amateur Radio Products by Chuck Penson, WA7ZZE.....$24.95

Heath Nostalgia by Terry Perdue, K8TP.....$14.95

Radios By Hallicrafters by Chuck Dachis.....$29.95

Transmitters, Exciters & Power Amplifiers by Raymond S. Moore.....$21.95

The Cathode-Ray Tube, Technology, History and Applications by Peter Keller $29.95

Receivers Past and Present, Communications Receivers, 1942-1997, 3rd Edition, by Fred Osterman, ...$24.95

Please add $3 S&H for one book and $1 for each additional book.

Three or more books shipped free!

ER Parts Unit Directory

If you need a part for a vintage restoration send $2 and an LSASE (.32 postage) for a list of parts units. If you have a parts unit, consider putting it on the list.

ER, 14643 County Road G, Cortez, CO 81321-9575

Subscription Information

Rates Within the U.S.

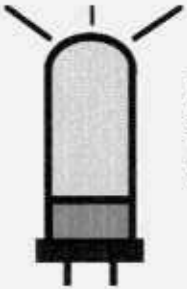
$28 per year 2nd class
$38 per year 1st class, with envelope $42

Canada (by airmail only) - U.S. $42

Other Foreign Countries (by airmail only) - U.S. $54

Electric Radio
14643 County Road G
Cortez, CO 81321-9575

Phone/FAX (970) 564-9185
e-mail: er@frontier.net



ELECTRIC RADIO
14643 County Road G
Cortez, CO 81321-9575

FIRST-CLASS MAIL
U.S. POSTAGE
PAID
MAILED FROM ZIP CODE 81321
PERMIT NO. 23

FIRST CLASS

TO: