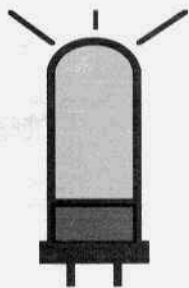


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ELECTRIC RADIO

celebrating a bygone era

Number 134

June 2000



AMI Festival Station at Dayton 2000

ELECTRIC RADIO

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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, KØEEO; 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

K8MLV/Ø Silent Key

Richard [aka Ricardo], Miczak, K8MLV/Ø, became a Silent Key on June 1 after a long illness. He was 57.

Rick will be remembered as one of the most devoted AM operators in the history of Amateur Radio. It was his whole life and his enthusiasm inspired others to get involved in the hobby.

I'll always remember Rick for the many late-night marathon QSOs we had and the great sound of his voice through his DX-100. I'm sure many others have fond recollections of him as well. I'm planning a remembrance of him for the August issue. I'm inviting everyone to contribute to it with their memories of Rick. And if anyone has photos of him I'd appreciate the use of them.

Vintage Field Day June 17/18

A last reminder to everyone regarding the 4th Annual ER Sponsored Vintage Field Day. This year we start early Saturday morning and end Sunday evening. Look for activity on all of the AM frequencies: 3880, 3885, 7290, 7260, 21.400-21.450, 14.286, 29.0-29.2. Shirley and I will be going back to Muley Point overlooking Monument Valley in Utah and we'll be looking forward to talking with everyone. We'll probably start out early Saturday morning on 75 with the Arizona and Colorado morning groups. When 75 goes out we'll move to 40 and then later on we'll go to 15 and 10. Around 6 PM local we'll be on 14.286. We'll probably stay there for a couple of hours before returning to 40 and then later we'll move back to 75. If conditions allow it we'll also try to get on 160. And as usual, I urge participants to send in reports and photos with their logs for the August issue. The rules are pretty simple: The only modes allowed are AM and CW. The gear must be vintage. You must be away from home and be operating on portable power.

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Cover: Bruce Howes, KG2IC, operating the AMI Festival station at this year's Dayton Hamvention. Photo by KW11.

Looking Back

by Lew McCoy, WIICP

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Thinking back I realized that I had never written about my first days at ARRL.

There was quite a controversy back in the late 40's about phone and CW. There was a problem in that the ARRL Headquarters just did not believe in phone and they were wanted to keep phone operation from being extended. These feelings were extremely strong throughout the League. However the ARRL Board felt differently and one of their actions was to institute an office at Headquarters that was devoted to phone operation. The office was to be in the Communications Department under the management of Ed Handy, W1BDI, the Communications Manager of ARRL.

I was living in Missouri in the Ozark Mountains then and having a rather hard time scratching out a living. I applied for the job at ARRL and Ed Handy made a trip around the country interviewing applicants and I got lucky and was hired. I have to admit I liked the back country of the Ozarks but I realized that raising two daughters down in that country was a damn fool thing to do.

I packed my clothes and my radio gear and made arrangements for my wife and two daughters to follow me up to Connecticut from Missouri. I arrived in West Hartford, Connecticut on a Sunday morning and drove by Ed Handy's who immediately took me over to Joe Moskey's house. Joe was his assistant and was to be my boss. Joe helped me find a room and my landlady actually permitted me to put together my rack and panel KW.

My first day was rather unusual. It was only half day's work as every one was getting ready for the annual League Headquarters picnic. We drove down to the ocean and had a cookout. Everyone was friendly but I noticed that most of the hams were a little distant. I just chalked that up to New Englandism but later came to realize that these hams were strictly CW men and I was alien.

As I worked at ARRL the distinction between CW and phone men became more clear. There were two radio clubs at Headquarters but both were strictly CW groups and I was not invited to join either. In fact, I got the message early on when one of my first jobs was to be in charge code practice from W1AW. What they never realized at ARRL was that I was also a CW operator and much of my DX was worked on CW.

I think I wrote two bulletins for phone guys in my one year in the Communications Department. Actually, I stayed in the department for a little more than a year but I found it was just not my cup of tea. I managed to rebuild some of the W1AW equipment. (The 20 meter phone rig was off the air for about two years before I put it back on.) I finally managed to get a job in the technical department. I really got along well with George Grammer whom I liked and respected very much. I think he was a technical genius.

I liked Ed Handy very much but I think he was one of the weirdest men I have ever met. He was a dedicated note keeper and he had literally thousands and thousands of notes. I don't think he ever worked phone although I am sure he a rig for phone. He was a technical engineer and really knew his radio. He was the author of the first ARRL Handbook and did a very good job with it. One thing that I have and treasure very much is a copy of that Handbook which was given to me by Ed.

Next month I'll have more on my beginnings at ARRL. WIICP

AMI Update - June

by Dale Gagnon, KW11, President

Dayton Hamvention 2000

This was a big year for AM at the Dayton Hamvention, May 19-21. The AM Festival Station over the three days of the Hamvention, the AM Forum on Friday and the AM pizza party on Saturday were all very well received. I went out early this year. Unfortunately, my brother KK1K was not able to go, so I had to spend a little more time on the trip. I had a mobile rig in the van and used AM exclusively on the trip. A number of AM stations were following the progress of my trip and talking with these stations was not only enjoyable, but the company helped pass the time and keep me alert.

I arrived at Fair Radio on Wednesday midday and spent five hours poking around. I bought bits and pieces with a special focus on mast materials, stakes, guys, etc. that might come in handy for antenna work for the AM Festival station on the following day. I did find a PE-73 dynamotor that will put N1JH's BC-375 on the air back in New Hampshire.

Late on Wednesday afternoon I got to Dayton, checked into my motel and went out to the Hamvention site to psych out the AM special event station location and the antenna possibilities. A report on the AM Festival station will be found elsewhere in this issue.

AM Forum

Friday afternoon the AM Forum commenced at 3:15 PM. We were in meeting room #3 which was the best accommodation we have had in several years. Years ago we had a midday Saturday forum which eventually drew over 100 people. Two years ago a new forum chairman offered us a late Saturday forum time slot and a location in a local high school! This was unacceptable to us because it would pull our AM audi-

ence away from the flea market on one of the busiest flea market days. We had our forum presentation off site that year as part of our pizza party on Saturday evening. Last year we were offered a Sunday forum slot at one of the Hamvention on-site meeting rooms. I took it, but the time slot was the last one on the Sunday schedule and attendance was down. I am happy to report that this year we drew 80-90. The forum committee was duly impressed. We should be set for next year!

The forum lasted just over an hour. There was a brief presentation of AM International status and AM issues in brief. Tim, WA1HLR briefed us on some tips to put stock AM rigs up on 18150 kHz. Then we heard from Andy, WA4KCY. Andy had not been at Dayton for several years and it was good to have him back in attendance. He had an interesting pictorial presentation of the AM'ers of the Southeast. Hank, W2IQ, participated in Andy's presentation.

After Andy's segment there were additional AM'er pictures and descriptions. Jack, W9GT had sent in a number of interesting images. Jack was in attendance and was able to take the podium and guide us through his shack. Jack had to leave the Hamvention early to be in attendance for the birth of a grandson on Saturday morning.

AM Pizza Party

About 30 of us gathered Saturday night at Marion's Pizza for several hours. This informal gathering is enjoyable because it allows those AM'ers attending with family members to bring them along and it is a good time to swap stories and pictures without being distracted by the flea market and all its temptations. We usually have five or six tables of discussions with people moving between tables as the night proceeds. There are also a number of AM'ers from the Collins Collector Association who participate every year.

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ELECTRIC RADIO IN UNIFORM



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Annual Military Group Meet

The Fifth Annual Military Radio Collectors Group meeting was held Friday and Saturday, May 5th and 6th at the NCO club, Camp San Luis Obispo, CA. The weather was great, enthusiasm was high and a new attendance record was set for the event.

The 2000 meeting was officially a two day affair again this year, with the first day set aside for setup and informal get togethers. Activities actually began the day before as early arrivals began setting up housekeeping and operating positions in the adjacent RV and camping areas, and by Thursday evening at least a half-dozen antenna installations were in place.

Friday

Friday morning saw display and operating equipment being set up in earnest. Working setups in the RV area included Dick Dillman (W6AWO)'s GRC-109, GRC-9, RT-68 and PRC-10 collection. Dick also had a very nice BD-71 WW II field-portable switchboard connected to a pair of EE-8s on display. Tom Horsfall (WA6OPE) shared Dick's picnic table with his SCR-628; Hank Brown (W6DJX) was back again this year with his GRC-9 and 1942 Ford (GPW) Jeep; and Jay Coward (KE6PPE) was listening in with an ARB/DU-2/ZBE setup. PRC-77 backpack, PR-6 and BC-611 handi-talkies were also seen in action, and I was operating down at the end of the RV park with my van

mounted T-368/R392 station and a 35-foot pneumatic antenna mast.

Of special note was Trish Gibbons' (WA6UBE)'s S144 shelter mounted on an M-37 truck. The shelter, which originally contained an AN/MLQ-24 countermeasures system, has been completely reconfigured and refurbished and now contains an impressive array of equipment including an RF Communications RF301A, Sunair GSB900DX, Motorola MICOM-2R, Tandy 1400LT Laptop (connected to the MICOM-2R), two Yaesu FT 4700RH transceivers and a Kenwood TM3530A. The setup also includes two attached crank up towers, an MEP 16 3KW generator mounted on an M101-A1 trailer, and dual AC and DC electrical systems. Operating equipment in the club display area included Hank Brown's TG-7 teletype, ARN-30 VOR receiver and BC-148 trench radio (see below). Ken Corwin (KF6IJR) was there running an ARC-12 on 2M AM. An AN/TIQ-2 PA system on loan from the Ft. MacArthur Military Museum (ER #123) also operated from this area throughout the meet providing a selection of musical favorites from the WW II era between official announcements.

Many other fine pieces of equipment were on static display in the club throughout the meet. Notable among these were Paul Thekan (N6FEG)'s RBM-4; Dan Arney (KN7DI)'s Rhode and Schwartz EK-07-D receiver; an RT-133/PRC-70 owned by Trish Gibbons;



Fleamarket Saturday morning. W6DJX photo

Andy Miller (KD6TKS)'s DAG-1 and TBX-8; and a German SEM-25 brought by Mark Blair (KE6MYK). Excellent examples of GRC-9, BC-611, PRC-25/77, SCR-288, SCR-511, BC-611, M209 and Wireless Set 19 hardware could also be seen along with Bjorn Forsberg (SM5UR/W6)'s RS-6 spy radio, Swedish RA-190 paratrooper radio set and a 1935 Royal Navy 1082 aircraft receiver. Ludwell Sibley (KB2EVN) had a 1943 Japanese morale/entertainment receiver on display.

A test and practice session was held at 1:00 PM Friday for three 6M fox hunts that followed throughout the afternoon. The last and most difficult of these was run at 4:00 with the target transmitter being concealed behind a commode in the Club men's room. Mark Blair (KE6MYK) and Cam Ogan (WA6VVC) came in first together with Tom Horsfall (WA6OPE) rounding out third place.

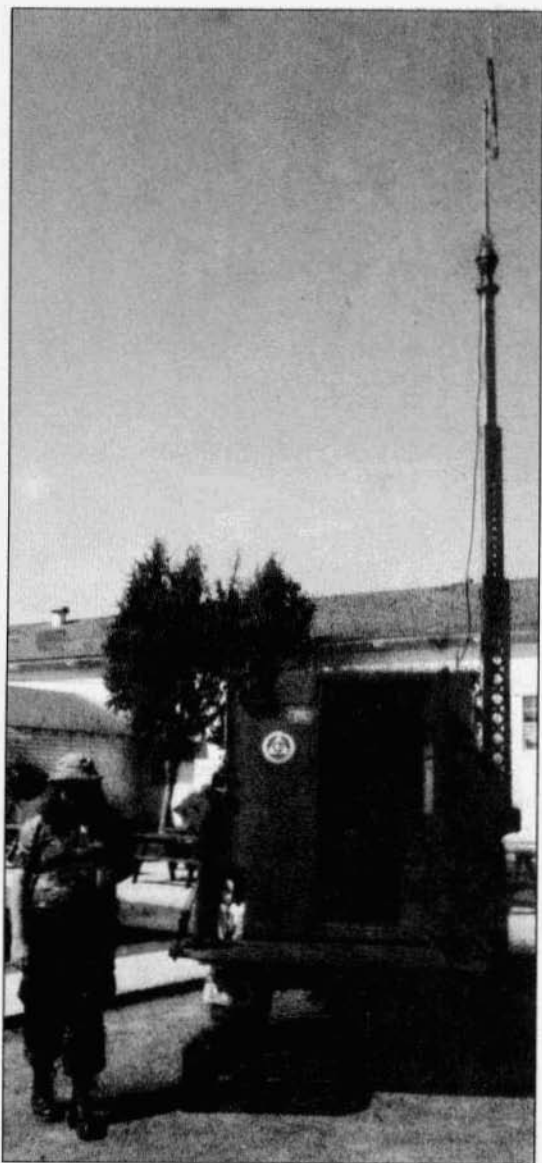
One particularly interesting Friday exercise was the activation of SM5UR and W6DJX's BC-148 trench radio sets in what has to be one of the few QSOs

between these fine antiques since the 1930s. These sets have been meticulously restored by their owners and several participants were enticed to try their hand at the keys of each throughout the day. Friday afternoon also saw the operation of MAB backpack radios restored by Andy Miller (WD6TKX) and Andy Becker (WØNVM) who achieved a "DX" of 3/4 mile on 3885 kc with these sets.

Friday's official activities ended in the late afternoon with pizza and salad in the club. Total attendance by the end of the day stood at 62 official check-ins, with 42 signing on for the evening feed.

Saturday

The Saturday program began with a swap meet that began officially at 4:57 A.M. Approximately 40 sellers and traders were counted. Notable offerings included a large pile of GRC-9 and GRC-106 radios and a pickup load of command set equipment and parts. A very nice BC-223 system was sighted (and quickly sold) along with a pair of R-390s and other receivers.



Trish Gibbons (WA6UBE) and her M-37/S-144. W7QHO photo.

The formal program got underway at 10:00 A.M. with a presentation by Ludwell Sibley on WW II Japanese and German equipment. The program began with a short discussion of the radio industrial capabilities of both countries at the start of the conflict. This was

followed by a presentation of equipment examples including the TORN EB, EU HEV-1 and K62 receivers on the German side, and the Japanese Mark 32 type F. A Chinese set from the 1950s was also covered. The talk concluded with a comparative analysis of Axis and Allied vacuum tube developments during the period.

We were fortunate to have Bart Lee back again this year as our second speaker with a presentation titled "Radio Intercept for Military and Intelligence Before WW II." Bart began with the light ship San Francisco's 1899 signal announcing the arrival of a Spanish and American War troop ship, an event that was arguably the first use of wireless by the military. This was followed by an extremely interesting discussion of the use—and from the very earliest days, interception (!)—of wireless up to the beginning of WW II.

Pre WW I highlights covered by Bart included the details of a 1912 scandal involving the Hearst newspapers, in which incriminating evidence was uncovered by a group of young radio experimenters listening in on commercial wireless traffic. Also, successful intercept efforts were mounted by both sides in the Russo-Japanese War and Gen. Pershing made use of this intelligence source while chasing Pancho Villa in 1915.

The beginning of WW I in Europe saw U.S. intercept efforts directed against German commercial wireless stations in North America, initially by amateur experimenters. Significant efforts by the military, both in Europe and in North America, came later as the war progressed and the U.S. was drawn



Bjorn Forsburg (SM5UR/W6) operating his BC-148. W7QHO photo.
into the conflict.

Intercept activities did not cease with the Armistice. Participants in the 1921 Peace Conference were targeted and our concern with Mexican communications apparently continued well into the 1920s. Prohibition saw significant targeting of rum runners by the Coast Guard and, in fact, these intercept and analysis efforts served as a valuable training ground for the next war. The 1920s and 30s also saw the initiation of serious efforts to exploit Japanese communications, beginning with the establishment of intercept sites in Shanghai (1928) and San Francisco (1931).

Following Bart's talk, we were treated to an excellent BBQ lunch put on by Dave Ragsdale (KF6BOM) and Art Plummer (W6LR) featuring chicken, beef and all the trimmings. Dave and

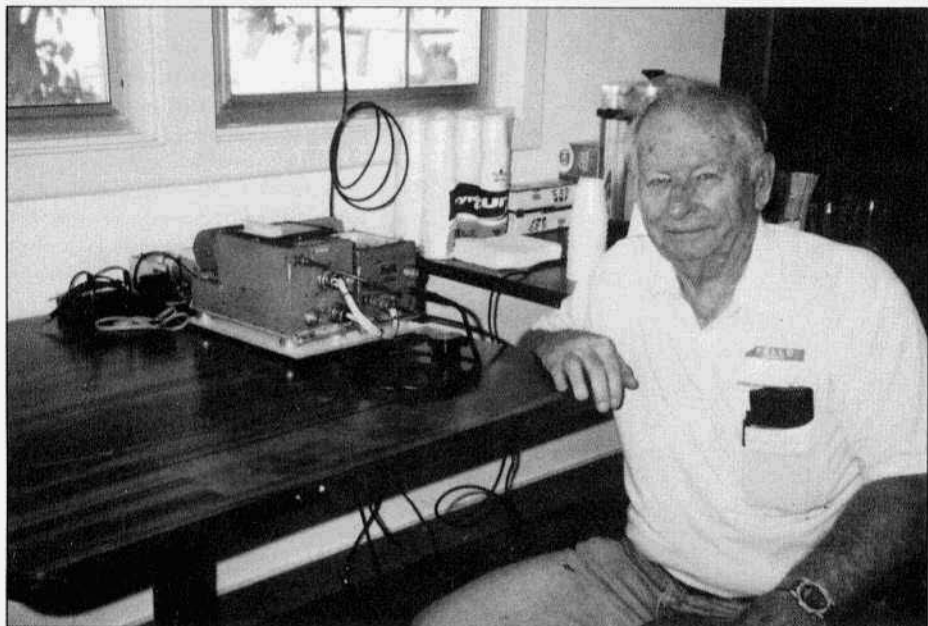
Art served 92, including several non-radio guests who joined us from the RV park.

The third presentation by Cam Ogan (WB6VVC) and Mike Frye (KM6AB) provided an overview and discussion of the newer crop of military radios now becoming available through surplus channels. Starting with the venerable PRC-47, Cam and Mike led the audience through a dizzying tour of the SC-20, MP-25, PRC-1099, PRC-70, PRC-77, PRC-68, PRC-68A, PRC-68B, PRC-126, PRC-127, PRC-128, URC-110, SOROC antenna kit, and an intriguing little satellite down-link antenna. Technical trends including satellite communications, ALE (Automatic Link Establishment), and NVIS (Near Vertical Incidence Sky Waves) were discussed along the way. Price and availability information was also addressed.

The final speaker was Bjorn Forsberg who has been a regular participant and speaker at previous meets. Bjorn anchored the afternoon's technical program with a talk covering the British 1082 aircraft receiver, the Cold War RS-9 bailout/spy set and the Swedish RA-190 paratrooper radio. Hardware examples from Bjorn's collection were included in the presentation.

The 1082 receiver was used on Royal Navy Swordfish torpedo bombers. These 1930s aircraft inflicted the initial damage on the German pocket battleship Bismarck which resulted in her final interception and sinking. The 1082 is a 4-tube 1935 regenerative design which includes a set of 32 different plug-in coils. (One wonders how the gunner/radio operator managed these in an open cockpit aircraft!)

The RS-9 was an early 1950s transmitter/receiver package covering 3-16 mc. The complete set included AC and DC



Ken Corwin, KF6IJR with ARC-12 running on 2 meters AM. W6DJX photo.

power supplies, antenna wire, and other accessories required to get on the air, all packaged for stowage under the ejection seats of B-47 and B-52 bombers. Bjorn's research indicates that approximately 20 thousand of these sets were produced. A lively debate ensued during this presentation concerning whether or not this set was actually a spy radio, given the number produced and the known existence of an accessory burst keyer module. The final consensus was for a possible dual role.

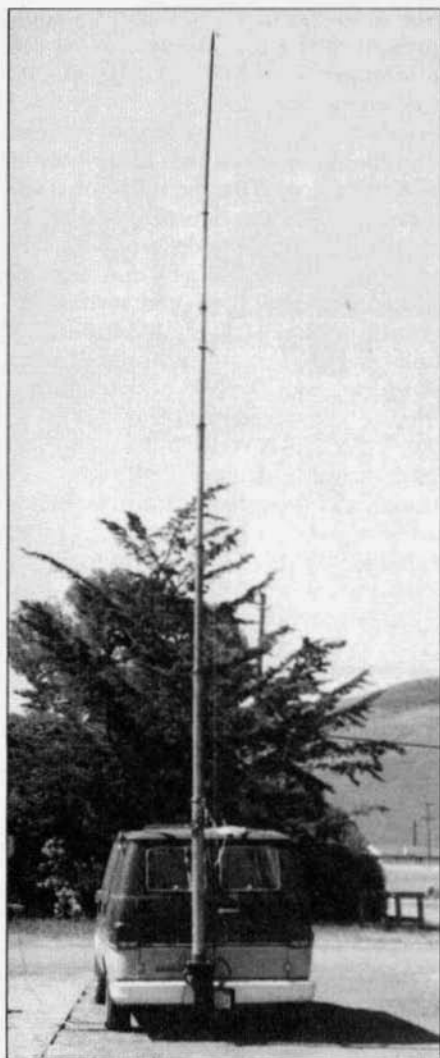
Bjorn's final presentation covered the RA-190 paratrooper radio, a 1950s-era packaged transmitter/receiver combination used by the Swedish armed services. This set was also on display in the club throughout the meet.

The formal program concluded with a short business meeting after which the floor was opened to general discussion and comments. On the business side, the current two-day format was reaffirmed by those present, and next year's meeting was set for the 4th and

5th of May, 2001. Continuance of the current informal, volunteer-oriented organization of the event was also reaffirmed, with myself and Trish Gibbons named as co-chairpersons for next year's meet.

All activities came to an end late Saturday afternoon, and the club was finally closed and secured at 6:01 p.m. A few participants remained overnight in the RV area, and at 9:00 p.m. I ran the West Coast Military Collectors Net from my van there (see above).

The meeting was taped by Bob Heusser, K6TUY, who has a new digital camera this year. Again, copies of a video covering the event will be on sale for \$10 and availability will be announced in a subsequent issue of ER. The 1996, 1997, 1998 and 1999 videos are also available at the same price from Hank Brown, and commemorative T-shirts are available from Ed Zeranski. [addresses at the end of the article]



W7QHO's van in the RV area. Thirty-five foot pneumatic mast, T368/R392 inside. W7QHO photo.

Doc Herald Award

The California Historical Radio Society's Doc Herald Award for 1999 has been won by Tom Horsfall and Dick Dillman for their work at the San Francisco Maritime Museum. The honor was announced by Bart Lee during the Saturday meeting. Congratulations Tom and Dick!

Alternate Program

The Saturday program for wives and girlfriends this year included a tour of the historic town of Salinas, CA, the birthplace and boyhood home of the Nobel Prize-winning author John Steinbeck. Following a gourmet luncheon in the beautifully restored Victorian home of the Steinbeck family, the group enjoyed a walk through the exhibits and art gallery of the National Steinbeck Center Museum. The remainder of the afternoon was then spent exploring Oldtown Salinas. Our sincere thanks to Jeanne Reed for organizing this event.

Finally

Attendance totaled approximately 100 with more than 60 on-site by Friday afternoon. This year saw participants from the Netherlands and the UK, as well as MO, NY, OR, SD, AZ, MA, NV, WA, VA and, of course, CA.

Plans are underway for a bigger and better meet next year. If you would like to help out, and/or have any questions or comments, please contact Dennis DuVall, W7QHO, or Trish Gibbons, WA6UBE. Also, please visit our Web page at <http://members.xoom.com/Milradio> (case sensitive). **ER**

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BC-611 Heaven

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The Dayton Hamvention is more than just another hamfest to my military surplus radio compatriots and me; it's become a tradition. One of my friends has made it 25 years in a row.

Asked what makes it so special, my answer is invariably that every year seems to have its own special memory. THAT was the year when everyone loaded up on GRC-106s, and THAT was the year when everyone in the group found their RA-6790, and so on.

Year 2000 at Dayton will be remembered by our group not so much for what goodies they hauled home (although that's important too!) but by an amazing event that developed and took

place so rapidly that most people present at the flea market almost certainly missed it: The Great BC-611 Confluence.

Joe, WA4VAG, found out several months in advance that there was an AM net planned on the traditional frequency of 3885 on Saturday at 1200 local time. Everyone in the group decided to get something going by that time. Joe pulled out, debugged, and verified operation of his complete GRC-9 radio set, and managed to get both his BC-611s working. John, K9WT, planned on using his GRC-106 on AM from his RATT van. Jim, KA8TUR, would have a PRC-70 on hand in AM mode. I had operational AM gear, but opted instead to serve as official photographer.

Joe set up the GRC-9 early Saturday morning for a test run, and drew quite a crowd during a successful QSO with the East Coast AM Net while wearing

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Joe, WA4VAG, gives directions to his space at the Dayton Hamfest flea market as Kim, WB4LZQ cranks away.



Dayton AM Net participants gather for a group picture.



Whip antennas EVERYWHERE. This group drew quite a crowd.

AM Festival Station at Dayton 2000

by Bruce Howes, KG2IC
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and Dale Gagnon, KW1I
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Amazing what \$250 will buy you nowadays! How about a Heathkit DX-100 transmitter, and a clean National NC-300 receiver? Yes, you can still find bargains out there; just don't look for them on Ebay. This pair was found sitting under a bench in a fellow amateur's shack. When I bought the pair in March I had no idea what they were destined for, I just wanted some fun gear to play around with. Little did I know that these two dusty boatanchors would somehow make their way to the Dayton Hamvention.

You may recall the 1st "AM Festival Station" at the 1999 Rochester, NY Hamfest. The station consisted of a "loaned" Collins KW-1 transmitter and an R-390A. At the end of the two-day event, our group had logged page after page of contacts. Perhaps almost important as on-air contacts was the positive effect that the station had on those off the air, those just walking by. Introducing many to a mode forgotten by some, undiscovered by others. You may wonder why we chose to use the moniker "AM Festival Station" rather than more traditional "Special Event". Tom W2KBW gets the credit for coining the phrase. It was our feeling that the term special event denoted more of a contest atmosphere, whereas the term "Festival" made one think of all that we enjoy about AM operation, the fun, good fellowship, and pleasant atmosphere.

Since the first "AM Festival Station" at the 1999 Rochester, NY hamfest, it had always been in the back of my mind to host such an event at that Mecca of all hams, the Dayton Hamvention. Drawing well over 30,000 amateurs from all

over the world, Dayton would be the supreme showcase for AM operation. To my knowledge AM had never been represented there, despite the event hosting special event stations each year. After a few tentative inquiries to the Hamvention folks the plan was hatched. We had hoped to use the Collins KW-1 transmitter that Tim WA1HLR had so graciously lent us for Rochester, but discovered that alas that had been recently returned to its rightful owner. I then considered dragging out one of my trusty T-368s, but for reasons that I will detail later that also became moot.

I shared my idea for a Dayton AM station with the AMI president Dale KW1I. Dale was enthusiastic about the project and went to work on his end to make contact with the Hamvention people. Using email, Dale and I worked to develop the concept of the station, how we wanted it to sound and look. In consideration of the distance we would be moving equipment, Dale from New Hampshire, and myself from Buffalo, we agreed to go with the "KISS" principle, and to model it after a very simple 1960s era station.

About 3 weeks before the event I received an ominous email from Jim Graves, the chairman of the Dayton Hamvention. It seems that our "contact" had not fully cleared the station with Jim. Jim was understandably concerned about our operation interfering to the other two special event stations, and to the public address system. Seeing our once in a lifetime opportunity slipping down the drain, I did my best to assure Jim that we intended to be "good citizens", and would not inter-



The AMI Festival station. The DX-100 and the NC-300 worked flawlessly throughout the event. *Photo by KW11*

fere with operations, and in the event we did, we would cease operations at once. Jim turned out to be a real gentleman, and not only approved the station, but became a supporter, sending over Hamvention media personal to cover the event. One condition that we did agree to was to limit our power to 100 watts, which meant good-bye T-368 and hello DX-100.

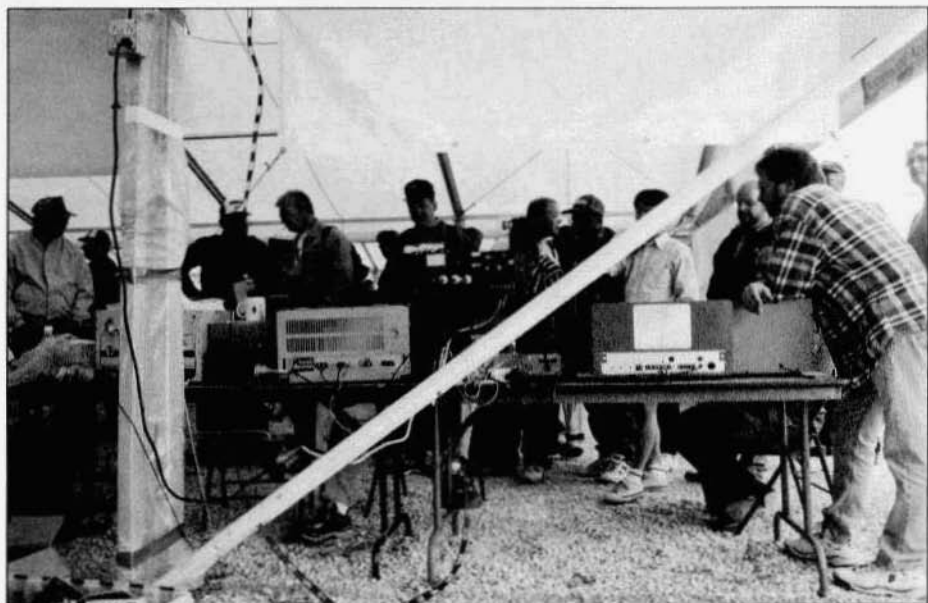
While awaiting a space assignment I had begun to work on the DX-100, replacing its heavily damaged cabinet with a nice Bud black crackle enclosure, carrying out WA1HLR's audio mods, and doing some serious on-air operational testing at all hours of the night. In the process I really began to respect the construction of the transmitter, and realized how often overlooked it is. With some simple audio mods, a few resistors and capacitors, the old DX-100 can sound very respectable.

Next on the list was my \$125 National NC-300. I see now why the previous owner had been so willing to part with

it. Despite its great cosmetic condition, it had horribly distorted audio. A quick check of the tubes showed that at some time during its life the previous owner had installed incorrect tube substitutions. A quick call to my friend Art KC2CAE turned up all the tubes that I needed, and a half hour of bench time and the old National was purring away cranking out audio into the matching National speaker.

Dale and I had hoped for a nice homebrew transmitter to show off for the event, but with no volunteers, the DX-100 and NC-300 were pressed into duty. A Heathkit antenna tuner, modified for built-in T/R switching by Jerry, N2QLS, rounded out the station. A D-104 microphone added the classic look and worked great with the DX-100.

Our last concern was the antenna. Without any foreknowledge of the terrain around our assigned space, Dale and I prepared for the worse. I wrote to Barker and Williamson requesting a donation of their wonderful folded di-



The festival station attracted a considerable number of onlookers. Photo by KW11.

pole that had been developed for military use some 20 years ago. Jeff Engel was kind enough to donate the antenna to the cause, and share with me the recent history of B&W. (Yes they still make coil forms)

The days slowly clicked by and finally the date was at hand. The AM Festival Station was loaded into the minivan for the trip out to Dayton. When we arrived at the Hamvention late Thursday evening, I was greatly surprised to see that Dale KW11 had the antenna already in place. A fabulous antenna it was! A 130-foot inverted "V" at 30 feet, fed with 250 feet of balanced line. Dale had somehow managed to install and erect the antenna supports, feedline and ropes by himself prior to our arrival!

I will let Dale relate in his own words the story of this "strapping" antenna. "The Hamvention authorities had given us guidelines covering the installation of our AM station. We had to limit our transmitter to 100 watts, the antenna could not be attached in any way to the

vendor tent structure and we would have to shut down if we caused interference with the public address system. When I surveyed the site late on Wednesday afternoon several possible antenna scenarios were possible. I had enough equipment to put up a dipole or a center loaded vertical with ground system. I decided to set up a 130 ft doublet on a grassy strip next to the flea market vehicle exit. This site was far removed from the public address speaker wiring and it was fenced off which would keep away vehicle or pedestrian traffic. The major drawback was the 200+ feet wide parking lot that separated the antenna from the station. I used a three-mast support arrangement so that I would have an inverted "V" configuration. I needed a strong center support to take up the strain of one end of the 230-foot run of ladder line over the parking lot to a light pole near the vendor tent. I lashed a fourth mast with a pulley on top to the light pole near the tent. For the antenna center support I used a large diameter



Foreground, left to right: Tim, WA1HLR; Joe, WA2VYZ; Mike, W1RC and Bill, K2LNU. Background: unknown at left; Bill, K1KV at right. *Photo by KW11.*

mast with two guy points. I wanted the center mast to be up 35 ft. but the wind was bad and I was single handing the antenna installation. I battled with the wind and had the tower go over too many times to count. When the wind took it away, I had it close enough to a tree so the masting always had a soft landing. After it went over it took 5-10 minutes to set up for the next attempt because all the guys and uphauled had to be sorted out. Finally I went with only 30 ft. and got it up during a lull in the wind. The heavy duty stakes I bought the day before at Fair Radio came in handy because it was necessary to have quite a bit of tension on the guys to keep the feedline from sagging over the parking lot. Late afternoon Thursday I checked out the system with my Elmac AF-68 and PMR-8. The New England and Western New York AMers with the rest of the equipment arrived within minutes of each other shortly after the antenna checkout was complete. It was almost like we planned it! The antenna

came down a lot easier than it went up, but it still took a couple of hours to pack it all in the van. Next year I hope to apply a little engineering to the mast erection so that I can use a small mast to pull up the larger mast. The extra height will not change the signal much, but it will make the antenna installation visible from almost everywhere in the flea market!"

With the antenna already in place, we hurriedly unloaded the van, and set about getting the station on the air. The NC-300 was soon filling the tent with rich AM audio, and a small crowd had gathered around. The DX-100 was then fired up to test our new antenna; it loaded up on 75 and 40 meters like a charm. If anyone ever needed convincing of the practicality of balanced wire feed, this was the place for demonstration. We could never have enjoyed such a wonderful antenna had we used coax in place of the balanced feedline.

With the hour getting late, we covered the station with tarps and called it



Organizers of the festival station at Dayton 2000. Left to right: Jerry, N2QLS; Bruce Howes, KG2IC and Dale Gagnon, KW1I. Photo by KG2IC.

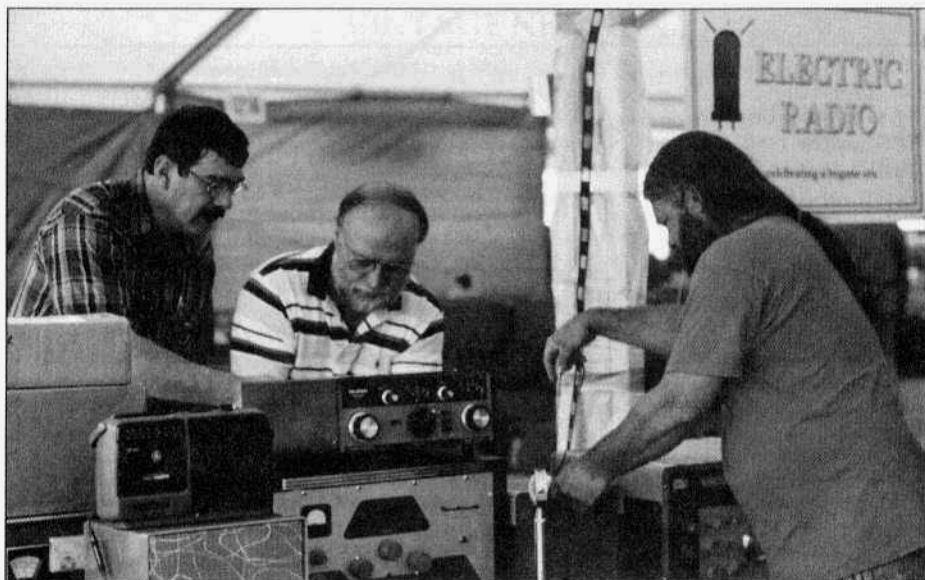
a night. The next morning Jerry, N2QLS and I arrived on site at 6:00 AM to commence operations. Dale, KW1I was already in place working the Military Radio Net, and in a few moments the Dayton Hamvention AM Festival Station commenced formal operation.

Operation started out slow, but soon a mini pileup ensued, and we all worked diligently to log all the stations that wished to contact us. We even managed to somehow copy a SSB station that called us on 20 meters. Every now and then a fellow AMer would stop by, offer moral support, or be pressed into service as the operator while we took a break.

I could tell you about the many and varied on-air QSOs I enjoyed, but I became fascinated by another facet of the operation that was occurring off air. I received special satisfaction when an old timer sat down next to me and mentioned that he had the same lineup, DX-100 and NC-300 at home, but had not had them on the air in years. He con-

fessed that he did not realize that anyone "still operated AM". I assured him that not only is AM alive and well, we would welcome him back on the air. Before he left, he put his hand and my shoulder and assured me that he would be "dusting off the gear tonight". There were many stories like that from both young and older hams. Something about the fine sounding audio seemed to draw them in. A warm atmosphere permeated about the station during our two days of operation, compliments with a great deal of handshaking, introductions, reminiscing, and promises to be back on the air.

I am delighted to report that despite some initial concerns, not one instance of interference was encountered, nor was a harsh word spoke during the entire event. The AM community was at its best, both on and off the air. I even had an operator from the WIAW special event station compliment our group on the operation.



Setting up the station, left to right: Jerry, N2QLS; Tom, W2KBW and Tim, WA1HLR. Photo by KW11.

One of the highlights of the operation was a visit by Riley Hollingsworth; otherwise known as the "Special Council for Amateur Radio Enforcement". Present at the station during Riley's visit was Tim WA1HLR. I introduced Tim to Riley, and lively conversation soon ensued. I was surprised to hear Riley mention that he not only was a fan of vintage gear, but also in fact owned several Hallicrafters units. It was Tim, along with several others who questioned Riley on his feelings about AM operation. Surprise again, he liked it, and felt it was important that others, especially those who maliciously QRM AM operations, understand and know this. He spoke about the need to better inform the amateur community of the need for tolerance, and to not make the amateur spectrum a "wasteland" of foul language and behavior.

As the cliché goes, all good things must come to an end, and the end for the first AM Festival station came about 6 PM Saturday evening. With several pages of log filled with AM contacts, the thought of many enjoyable QSOs, both

on and off the air, were still ringing in my ears: Dale KW11 was on the air Sunday morning with his Elmac, and managed to add even more contacts to our logbook. The total count was seven pages of the log filled; nearly 175 stations worked from throughout the eastern US.

There are so many people who make this effort a success: Barry and Electric Radio for their promotion and sponsorship. Dale KW11 for his unwavering support, and devotion to the cause. Jerry N2QLS for his help with the DX-100 and support gear. Bill, K2LNU and Tom, W2KBW for their help during many late nights of on-air testing sessions. Mike WN3B for being the "channel master" and keeping our frequency clear of QRM. Bill, WC3K for keeping up the QSO when pileup began to lag. Jeff Engel from B&W for his antenna donation. And finally thanks to the Dayton Hamvention staff and especially to Jim Graves for believing in us, and allowing our efforts to go forward.

Just wait until you see the lineup we

Guess Who's a Fan of Vintage AM ?

by George Maier, K1GXT
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The AMI Festival station, sponsored by AMI members and Electric Radio, was located in one of the outside tents, and proved to be a busy attraction. One particular visitor to the station that attracted a little attention on his own was K4ZDH, Riley Hollingsworth, the FCC's Special Counsel for the Amateur Radio Enforcement Bureau. What was Riley doing there? Well it turns out that Mr. Hollingsworth is a really boat-anchor fan, and simply wanted to see the AM station. Riley has been a ham since July 1960, and has more than a passing interest in vintage gear. In his shack, he has a Johnson Viking Valiant, two Challengers, and a Ranger; a Hallicrafters HT 32B, and two SX-101's; a Heathkit Mohawk; and several Drake line ups.

So why the interest in vintage gear ? Well, Hollingsworth answered it this way, "I also have a couple of solid state rigs, but they don't show me anything. If it doesn't light up, get hot, and occasionally smoke, what good is it??" Yup, that's the sign of a confirmed boat-anchor fan.

As a testament to the support for the enforcement work that Riley and his folks at the FCC are doing, he received very enthusiastic rounds of applause at both the ARRL and Collins Collectors Association banquets after giving an accounting of some recent amateur enforcement activities in his keynote speeches. After meeting Riley, and exchanging some e-mails with him, it is clear to see that the commission has the right kind of person in the enforcement bureau. Riley Hollingsworth is a tough enforcer, a gentleman, and a long time ham, and most importantly, a guy that can readily identify with those of that believe that "real radios glow in the dark". ER



Shown left to right, Joe Vendetti, K2VXV; Bruce Howes, KG2IC; Riley Hollingsworth, K4ZDH; Tim Smith, WA1HLR and Michael Cresthol, WIRC.
Photo by K1GXT.

VINTAGE NETS

- Arizona 40M AM Group:** Meets on 7293 kHz at 10:00 AM MST (1700 UTC) on Sat. and Sun.
- West Coast AM Net meets Wednesdays 9PM Pacific on or about 3870kc.** Summer conditions have moved the net control to California with **John, W6MIT** and **Tom, K6AD** as net controls. In the winter months **Randy, KK7TV** usually runs the net.
- 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 controls are **Andy, WA4KCY** and **Sam, KF4TXQ**. 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 5:00 PM PT, 7 days a week and usually goes for about 2 hours.
- Arizona AM Net:** Sundays at 3 PM MT on 3855. On 6 meters (50.4) 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 3880 at 0800 AM, ET, Sundays. Net control is **Jim, N8LUV**, with alternates. 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 **Ted, W3PWW**. Saturday mornings at 0500 ET on 3885 + or - QRM.
- Westcoast Military Radio Collectors Net:** Meets Saturday evenings at 2130 (PT) on 3980 + or - QRM. Net control is **Dennis, W7QHO**.
- 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. <http://www.crompton.com/grayhair>
- Vintage SSB Net:** Net control is **Andy, WBOSNE**. 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, WB6LRC**.
- 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 on Tuesday nights on 3805 at 2100 Eastern and on Thursday nights on 3875. West Coast 75M net that takes place on 3895 at 2000 Pacific Time.
- Collins Swap and Shop Net:** Meets every Tuesday at 8PM EST on 3955. Net control is **Ed, WA3AMJ**.
- Drake Users Net:** This group gets together on 3865 Tuesday nights at 8 PM ET. Net controls are **Chris, KB8IZX**; **Don, W8NS**; **Rob, KE3EF** 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 Calif. Sunday Morning 6 Meter AM Net:** 10 AM Sundays on 50.4. NC 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, W1ECC**.
- Canadian Boatanchor Net:** Meets Saturday afternoons, 3:00 PM EST on 3745.
- Midwest Classic Radio Net:** Sat. mornings on 3885 at 8AM Central time. Only AM checkins allowed. Swap/sale, hamfest info and technical help are frequent topics. NC is **Rob, WA9ZTY**.
- Boatanchors CW Group:** Meets nightly at 0200Z on 3579.5 MHz (7050 alternate). Listen for stations calling "CQ BA" or signing "BA" after their call signs.
- Wireless Set No. 19 Net:** Meets the first Sunday of every month on 7.175 +/- 5 kHz at 2000Z (3760 +/- 5 kHz alternate). Net control is **Dave, VA3ORP**.
- Halicrafters Collectors Assoc. Net:** Sundays, 1730-1845 UTC on 14.293. Net control varies. Midwest net on Sat. on 7280 at 1700 UTC. Net control **Jim, WB8DML**. Pacific Northwest net on Sundays at 22:00 UTC on 7220. Net control is **Dennis, VE7DH**.

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

De-bugging Homebrew Rigs

by Bruce Vaughan, NR5Q
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Part One

Here is a point I've often pondered. Why, when you build electronic gear do those items that seem to have the most bugs when power is first applied, often turn out to be examples of your better efforts. If a receiver, for example, works moderately well when first powered up, it will probably remain only average in performance. But if said receiver greets you with squawks, screeches, distorted sound and a wisp of smoke—plus a bug or two that refuses to be identified, you may very well be on your way to creating an outstanding performer. Been there? I'll bet you have. If not, consider yourself lucky and move on to another article.

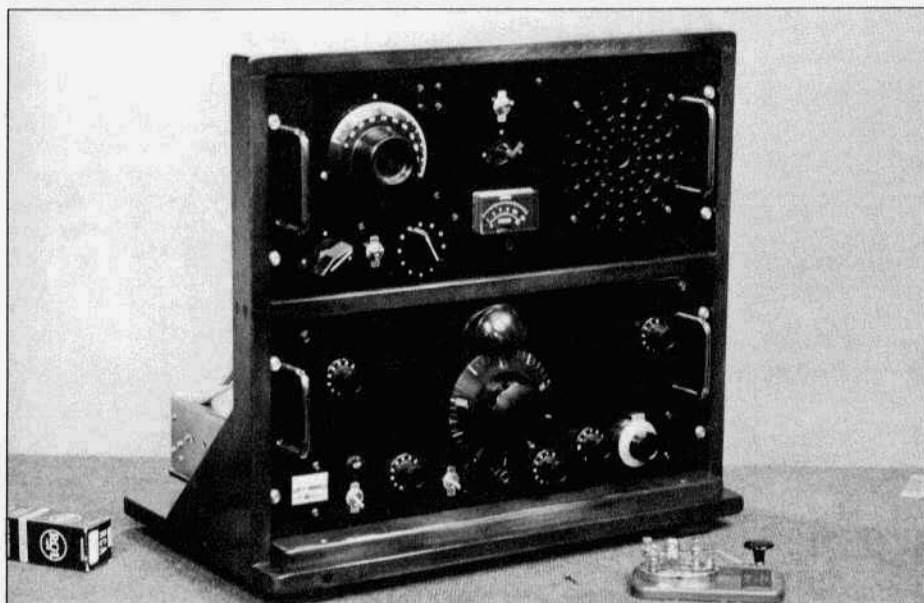
After 68 years of building I believe I have finally found an answer to this paradox. As with any solution to a technical problem, it is necessary that certain parameters are first known, or assumed, before a conclusion may be drawn. For example: How long will it take a ball to roll down an inclined plane? Obviously we need more information to even attempt an educated guess. You would have to know the length of the plane, and angle of inclination, the smoothness of the surface, details of the ball, etc. Let us look then at my assumptions about a piece of radio gear. I used my personal experience and building habits as a norm. I doubt my shop is better equipped than shops of most readers of this magazine, and believe my level of expertise as a builder is close to the norm.

I built my first receiver some 68 years ago, and for the past ten years have concentrated on building regenerative

receivers from the 1930's. Perhaps it is an attempt to re-live the good ol' days of radio. Occasionally my efforts lead to the construction of a QRP or medium power classic transmitter, but regenerative receivers occupy about 90% of my building time. As some of my friends say, "Bruce is down there in his shop tryin' to re-invent radio." Therefore, I will confine the balance of this article to problems encountered with my regenerative receivers.

What assumptions about my homebuilt projects can one draw from the information presented thus far? I can think of several. (1) Most of the parts used in my projects will be used, surplus, or in rare cases NOS. (2) I will be building from designs that are old and have been tested time and again. (3) I know how to solder. (4) I know enough to realize the importance of mechanical construction. (5) I own some test equipment. That equipment includes items from local Hamfests, a VOM, tube tester, and capacitance analyzer. (6) I learned long ago to apply the master carpenter's rule of thumb; "measure twice, saw once." (7) All old, used, new, and surplus parts are tested before being installed. (8) When a component is installed it is checked again. Is the component good? Is it wired in the circuit properly? Did I leave any small pieces of wire or solder around to cause problems later? (9) Resistance, and when possible, voltage measurements are made and compared to what should be expected.

OK, you get the general idea. Now, applying such careful and well-planned construction practices, when your receiver is powered up for the first time



All finished, debugged and ready for years of service. This set using technology that goes back well over half a century is a real getter. The top panel was added to contain the speaker, antenna matching network and S-meter.

you should be greeted with pleasant musical-like sounds of rare DX pounding in with ear shattering volume. Oh, if such were only true!

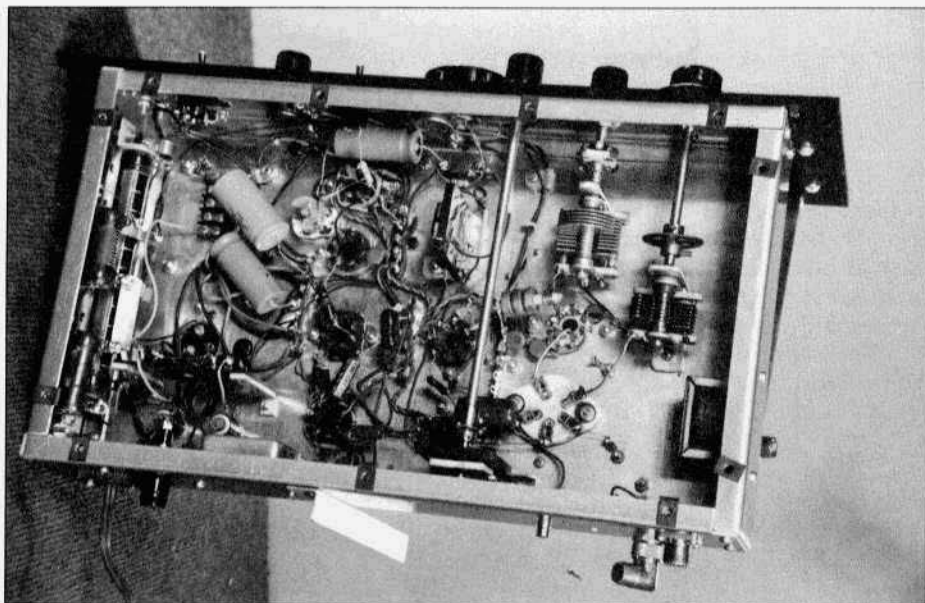
I have yet to build a receiver that worked perfectly the first time I turned it on. Some come very close and only require minor adjustments. However receivers requiring more effort and thought—receivers that refuse to respond to common trouble shooting tactics, are far more interesting and usually turn out surprisingly well.

And what are my normal trouble shooting procedures? I break regenerative receivers down into three basic circuits—power supply, audio, and RF. It seems that in receivers I build, over 50% of the bugs relate to the detector stage. Knowing this, I still proceed to de-bug more or less systematically, checking the power supply first, then the audio. Everything from the antenna to the first audio is saved until the very last.

Let's walk through the de-bugging

process of one of my latest receivers. I started construction of this receiver in November 1999, and first applied power to it four weeks later. The last soldered connection was made just two minutes before the 20th Century came to a close. I had pre-tuned the receiver to WWV, and heard the clock tick off the last two seconds of the year. Though the set was completed in 1999, I have continued with my de-bugging and improving process. I'm sure you are beginning to understand why troubles in the beginning are in reality a blessing.

The nucleus of this building effort is a National PW dial, and 90 gearbox. The National assembly was purchased from a seller on e-bay. The usual HRO variable capacitors were included. Both tuning capacitors were disassembled and removed. One shaft was left 'naked'. The capacitor on the right hand shaft was reinstalled as a three-plate capacitor—an error I would later correct. I found that with three plates the tuning



Underside of receiver. Note that a recent lucky find at a hamfest has enabled me to replace the bleeder with a 50K, 30W adjustable resistor. Also note that an antenna trimming capacitor and SO-239 has been added. Now the set can be used with the adjustable antenna winding or with conventional coils.

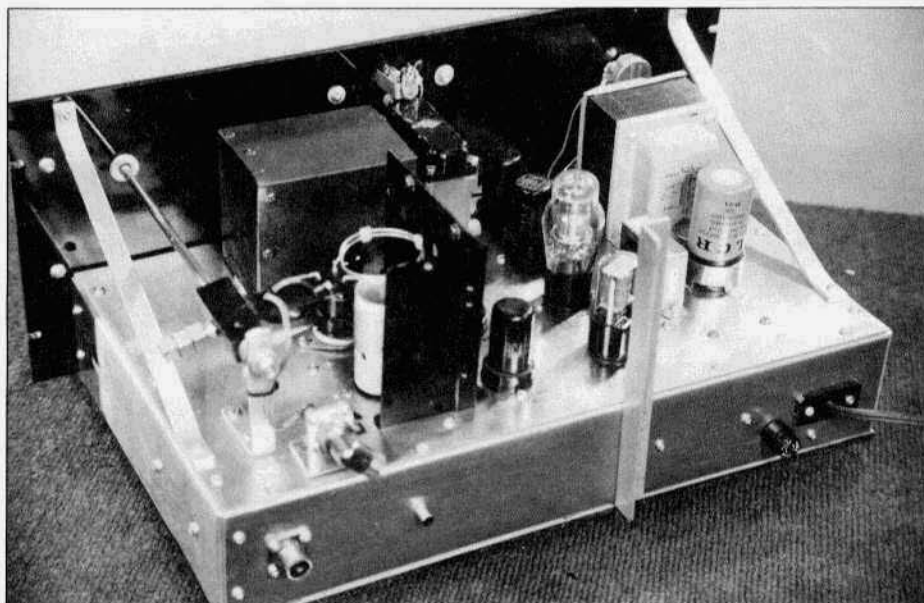
was much too 'fast' and critical. I removed another plate, and separated the two remaining plates as much as possible. Now, the receiver tuned better—almost perfect, and band coverage is much improved.

Because regenerative detectors have about all the gain you can use I chose a common triode for my detector, a 6J5. Why a 6J5 instead of a SG tube? If, as promised, the SG tube delivered more gain I am not sure what I would do with it. I've found 6J5's work great, are capable of exceptionally smooth regeneration, require no extra shield, work well with very low voltage on the plate, are easy to obtain, and relatively inexpensive. What more can one ask of a detector tube?

The tube lineup is a 6J5 regenerative detector, followed by a 6SQ7 first audio, 6SQ7 second audio, 6V6 audio output, 0D3 voltage regulator, and a 6SK7 marker oscillator.

When first powered up the receiver exhibited a number of problems, the strangest being my inability to accurately tune in a station. Stations were heard with ample volume, but when I removed my hand from the tuning dial the station would often disappear. Ah Ha, you say, a classic case of hand capacity. I did not think so—because I whipped that little bug about fifty years ago. As I was reaching for my trusty Simpson VOM, the set went completely dead.

A power supply problem was indicated. What troubles can one expect from a receiver power supply? No voltage, low voltage, high voltage, hum, overheating, poor regulation, arcing, and by far the most common, blown fuses. There are others I'm sure but these are the ones I encounter most of the time. As I expected, the 1 amp fuse in the 120-volt AC supply line is blown. Though I know better, I try another



Topside of the receiver. Note piece of aluminum angle stock attached to back. I install a support on every set I build. I find them very useful when troubleshooting by protecting parts above the chassis and making those below readily available for service.

fuse. It blows immediately.

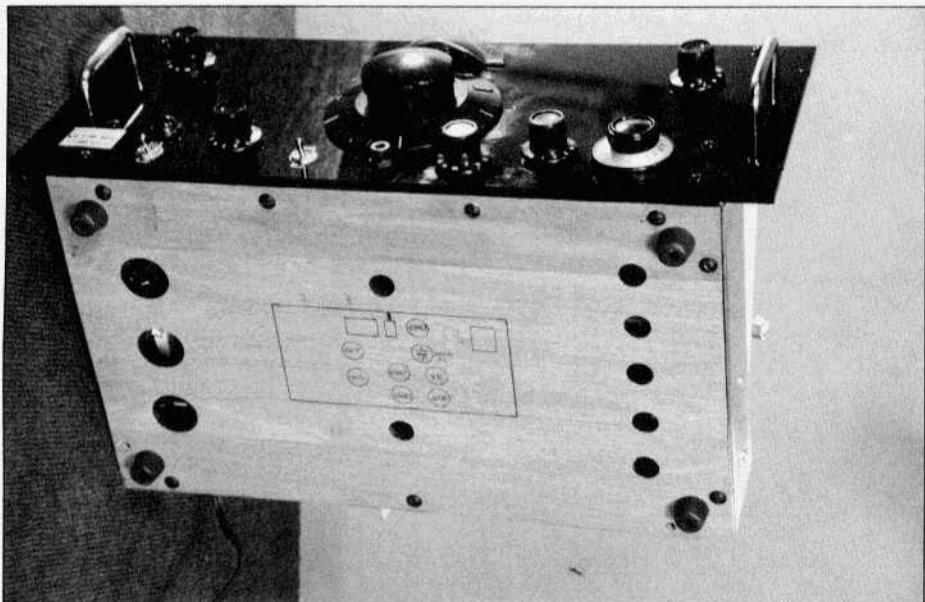
What do I know about the power supply? I know the transformer HV output is a trifle more than I need—a bit over 500 volts each side of CT. I would much prefer a center tapped 700 volt secondary. I know the diodes used in my full wave rectifier were purchased at a hamfest for 10 cents each, and that I cannot determine operating parameters by the markings. They looked like good husky diodes so I put them in the circuit and hoped for a miracle. Like most miracles, it did not come to pass. A resistance check showed one had broken down. Obviously I needed to buy diodes large enough for the supply.

I made a decision many readers will think stupid. I bypassed my local parts vendor—Radio Shack—because their parts, aimed at the present day market, are on the anemic side when used in 'hollow state' gear. Instead, I place an order to K2AW's Silicone Alley. For

only \$5.00 each, I buy a pair of diodes that can handle a 1/2 KW transmitter. Is this overkill? Of course it is. Is it a bit extravagant? I think not. I now have peace of mind, and diodes that will outlast me by years. Some builders don't mind living on the ragged edge. I prefer a good comfortable cushion.

Make sure you have plenty of filtration—surplus capacitors are inexpensive. When I first started working as a radio repairman back in 1937, the 8 MFd., 450-volt capacitor was a standard power supply replacement. Today, I seldom use less than 80 MFd in my power supplies. A generous use of filter capacitors in regenerative receivers should be given careful consideration. The rewards of a well filtered 'regen' far outweigh the small cost involved.

It is easy enough to purchase a pair of heavy diodes, but high secondary voltage is more difficult. I switch to choke



Once de-bugging seemed successful a plywood bottom was added to the receiver. Note tube base diagram on bottom. If the set survives after my cycle, the next owner will find it convenient.

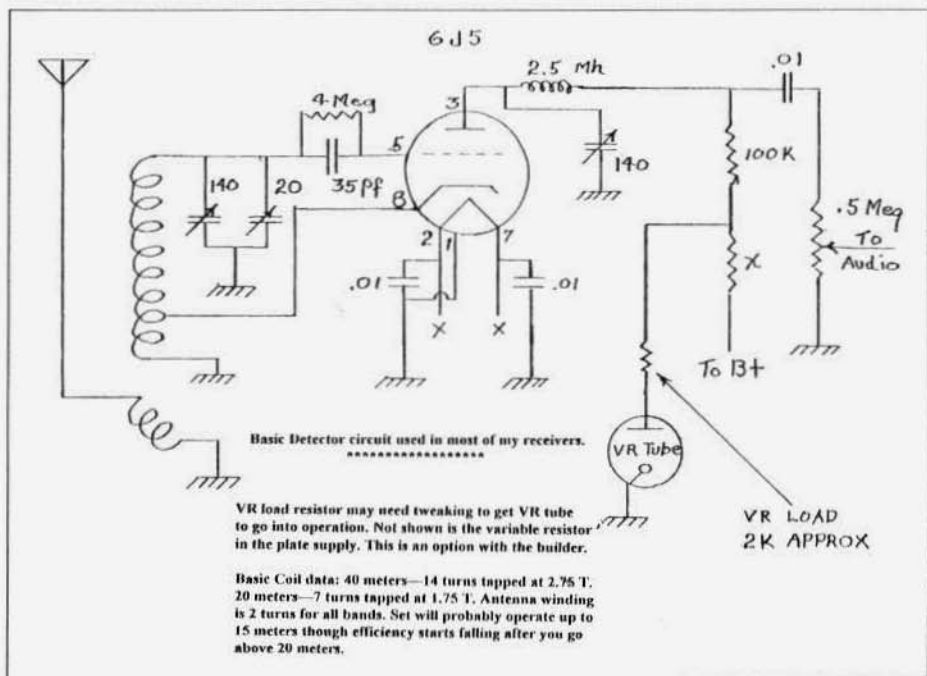
input-this drops the voltage to my filter capacitor, but only by a few volts. I am still applying about 475 volts to a 450-volt filter capacitor-an invitation to disaster.

How about resistors in the HV leads going to the diodes. Uh, well, that may be the solution. Voltage regulation will be somewhat less wherever we put them. When the set draws more current the resistors will dissipate some energy as heat and as a result the voltage drops. In reality, for our circuit this is not a big problem. A few volts, up or down, will have little noticeable effect on audio circuits. I am pulling my detector plate voltage off of a VR-105. So, even with some voltage fluctuation my detector voltage should be quite stable.

In this case I drop a resistor between the diodes and the choke. Some of our readers will cringe at this, but I have been doing it for years with no problems. I try a number of different resistor values in the circuit to get the voltage

down to an acceptable level. The value I finally used is unimportant, but I believe it was around 3K. I remove the B plus load and turn the supply on. If everything is OK, it should operate for hours with no excessive heating.

Everything looks good; now for the cook-in. I like to run my power supplies several hours without load to see if anything overheats. It is better to melt down now than later. I leave a voltmeter connected to the HV supply and leave the shop. When I return one hour later I notice the bleeder is running warmer than I like. I intend to pull the 6V6 plate voltage off of the divider at the 300-volt lever, the first audio at about 250 volts and the detector at 130 volts. I realize that with the set drawing current, the bleeder/divider will heat up even more. I connect the B connections and give it a smoke test. No smoke, and plenty of voltage. I decide to let it cook for another hour and see how hot the thing gets. I am not pleased with the results.



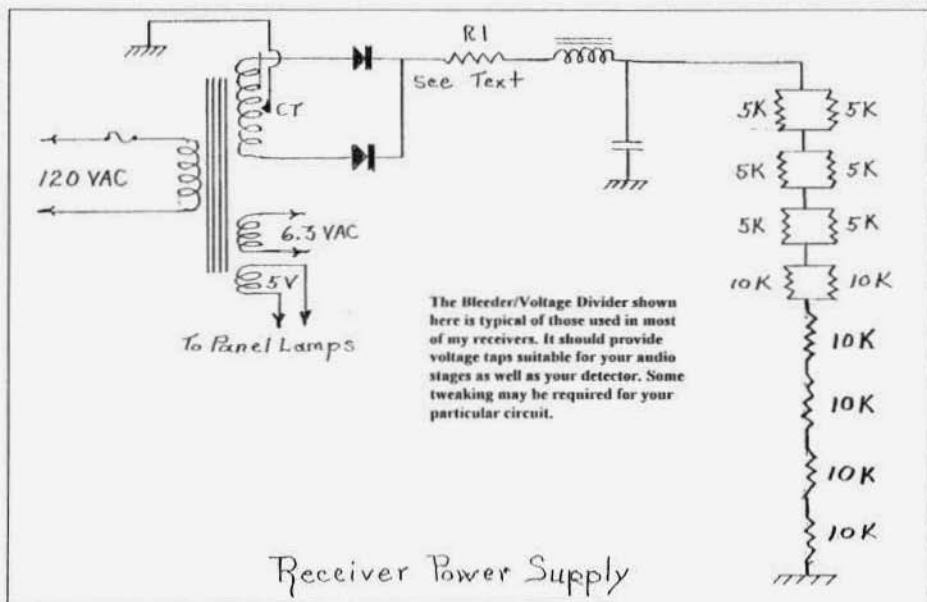
A word about bleeders/voltage dividers—I've not forgotten my old 'Elmer's' rule of thumb. His method of calculating bleeder resistance was simple—100 ohms per volt of supply voltage is a close approximation of the lowest resistance you should use. This would mean a bleeder of from 25K to 35K for most receivers. I normally use a resistance about 20% to 40% higher than this figure. The difference in voltage stability is, for my purpose, undetectable and the capacitors still discharge within seconds.

Remember the good ol' days when we could sit down and order everything we needed to build a radio from one of a dozen big supply houses? Well, those days are long gone. Today some parts are difficult to find, while others are almost impossible. Sadly, 30 to 50 watt voltage dividers are among the rarest of the rare in my part of the country.

Here is how I solve the problem. I buy

ten, 5K Ohm and ten 10K Ohm-10 watt resistors. We don't need all of them on this project but they are cheaper when you buy in lots of ten, and it is far better to have 'em and not need 'em, than to need 'em and not have 'em. One typical arrangement is shown in the power supply diagram. Every set is different—this is only a starting place. Some 'tweaking' of resistances may be necessary to get the exact voltage you need for a circuit. That is why it is good to have the extra resistors. You need a method of mounting several of the 10-watt resistors. Find an old mounting strip or make a new one from perf board and aluminum bar stock purchased from your local Home supply store. Home Depot, and Lowe's, are good sources in my area.

Let's review the basics. What is the purpose of a bleeder? The primary, and most important use is to discharge the capacitors thus keeping the builder alive to build another day. A secondary use



The Bleeder/Voltage Divider shown here is typical of those used in most of my receivers. It should provide voltage taps suitable for your audio stages as well as your detector. Some tweaking may be required for your particular circuit.

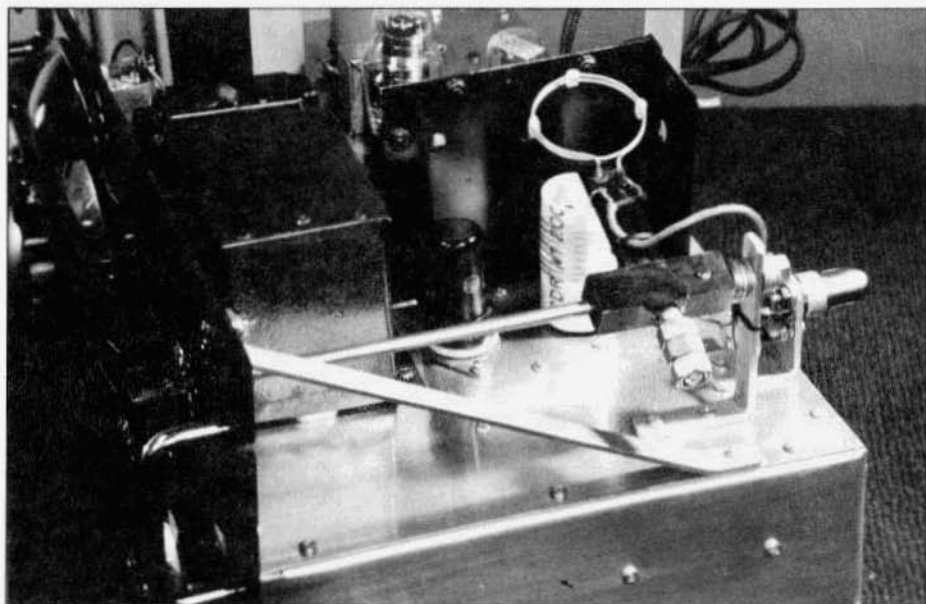
or benefit is to 'stiffen' up the power supply. By providing a constant load on the power supply we achieve a certain degree of voltage stabilization. As I mentioned previously, when using a VR tube in critical circuits such as regenerative detectors, the stability of the primary supply voltage is not a big problem. I increase my bleeder resistance by 20K, and now the entire voltage divider assembly runs nice and warm-not hot. I let the receiver 'cook in' for three hours before proceeding with the debugging.

Now that we have a voltage source that is close to ideal, I proceed to the audio stages. Using a scientific test learned many, many, years ago I wet my finger on my tongue and place it on the volume control CT. A good healthy buzz or burp greets my ears. It seems OK but I feed a signal into the grid of my first audio and check the fidelity. I like what I hear with one exception-the tone control has little effect on the sound. I was skeptical of my choice of a .047 capacitor when I installed it. I also had a feeling I should be using a pot

nearer 250K instead of the 1 meg I installed because it was on hand. After a 15-minute search I come up with a 150K pot and a nice looking .1 capacitor. The tone control now has the desired effect.

At last it is time to see why this receiver is working so weird. I tune in a 20-meter CW signal, take my hand off the PW dial, and the signal disappears. Carefully I tune across the band trying to fine the same signal. There he is-up about 3 Kc. Once I take my hand off the dial, the signal disappears. Even by holding the dial with a firm grip signals are very unstable.

Bingo! I may have the answer. I had an old NC-101X that had a lot of backlash. I remember that the worm drive inside the gearbox was worn beyond all hope. That may be my problem. I remove the PW dial, and the gearbox and disassemble both. Caution-If you are not familiar with the PW dial I would advise you proceed with caution. The instructions for disassembly and reassembly of the National PW dial can be found several places on the web. See end of this article...



Closeup of the variable antenna winding. Note the assembly is counterbalanced with heavy 3/8 inch nuts.

I found the gearbox lubricant was dried and hardened—very little lubrication qualities remained. The dried-out old grease was difficult to remove. I tried automobile degreaser, (Gunk), several household cleaners, WD-40, and mineral spirits. All worked poorly. I finally resorted to wood skewers, cotton swabs, and a small stiff brush. After an hour of cleaning I had the last bit of old grease removed. I applied light machine oil to the bearings, and a silicone based gear lubricant to the gear and worm.

After reassembly the knob turned much better—it was silky smooth. I could give the dial a spin now and there was even a slight 'flywheel' action. Did my set work any better? Unfortunately it did not!

By now I was sure that something in the capacitor drive train had some backlash. The movements involved are so slight that it is difficult to detect any slack or play in the drive. I attached two 12-inch pieces of number 14 wire to two

large alligator clips. One was attached to the dial shaft immediately behind the panel. The other wire was clamped over the capacitor shaft. Both were clamped with the wires in a vertical position. Now, by observing the tops of the wires I could see even the slightest variation in movement. I slowly turned the PW dial and watched the top ends of the wires move. It was plain to see that there was a very minute bit of play somewhere in the shaft. I was positive it was not in the gearbox. That left the insulated flexible coupling between the dial and the gearbox. It looked great, but I replaced it anyway. My tuning problems disappeared. It seems that any idiot should have found this early on. However, the problem was not visible until I added the long wires to the drive.

I was getting close to completing my de-bugging. Regeneration was smooth but I felt there was room for some improvement. Plate voltage on the 6J5 measured about 27 volts. I've found that the ideal plate voltage varies

Bug Stories

by John Bipes, KØYQX
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When we'd tuck our youngest daughter, Christy, into bed she'd always say, "Tell me a bug story." Now she's a H.S. Senior, her bug stories are pleasant memories, but here are a pair of 'bug stories' you may yet enjoy!

Like many of ER's readers, an obscure item of the past can become inexplicably alluring - usually with inverse proportionality to its scarcity. So it was for me with a pair of Vibroplex 'bugs,' the scarcest of all - the 'Midget' - and the nearly as scarce and perhaps more greatly treasured 'Vertical.' Both were creations of Vibroplex's founder, Horace Martin. Both bugs lived their ever-so-short commercial lives circa President Woodrow Wilson, the 1st World War and spark gaps and early am transmissions on the presidential vessel to the Treaty of Versailles.¹

Knowing I'd never ever get to touch or probably even see one of the few of these keys yet in existence, we did what we could. Reading their written descriptions^{2/3}, studying patent drawings⁴ and published photos⁴ and doing our best trigonometric (from perspective oriented photos) extrapolation and averaging of sizes, dimensions and approximations of shapes, we had enough info to do the replications.

The 'Midget' was completed during my week of Christmas vacation, '97. As it's really a miniature vest-pocket version of the ever so popular (horizontal) bug, with a familiar horizontal vibrator, at least envisioning its action was comparatively easy. But not so with its standing-on-end brother!

The action of the 'Martin Upright' or 'Vertical' bug required figuring out.

Here's how it happened. No great fan of Jack Nicolson, at the movie with my XYL and friends, my attention took leave of what was happening in "As Good As It Gets." Propping my knees against the seat back ahead of me and closing my eyes, I called up for mental review the patent drawings and photos I'd been studying. And it dawned on me... so that's how the thing works!

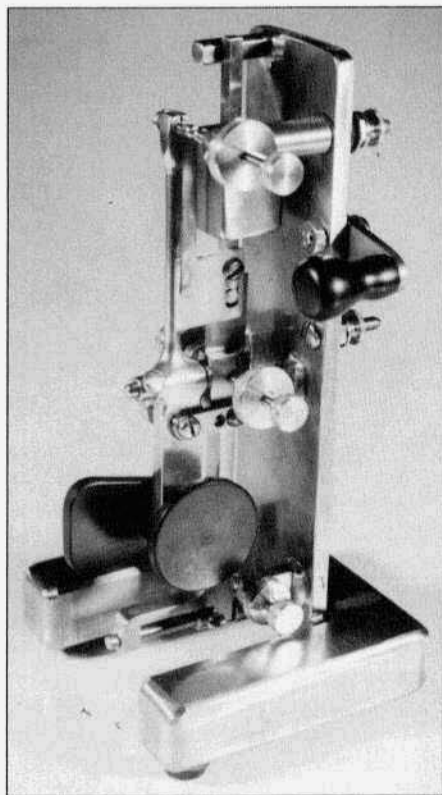
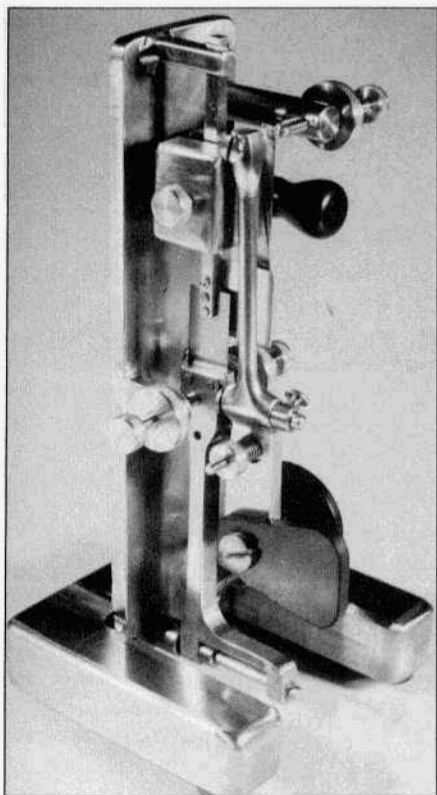
Until that moment, I couldn't envision how on earth the bloody complexity and seeming incongruity of levers and pivots functioned. And, of course, once mind's eye "saw it" it all levers, pivots, and even the myriad of adjustments - and their locations - became intuitively evident. Evident to the point of replicating it also, and these days the key I more regularly use in the shack.

So, Christmas and then the early weeks of 1998 found me at either the mill-drill or small machinist's lathe - each spaced diametrically opposite the garage's wood stove - machining component pieces of the 'Midget' and then the 'Vertical.'

In an age when the religion of the land, the economy, commodifies even the heart of a precious hobby like amateur radio, one can take a sharp stick and poke that economy in the eye, especially on a project where the delimiters we were stuck with - or which we set for ourselves - were:

* We'd never seen nor touched these two keys and didn't know anyone who had - and it was unlikely we'd ever have chance to do so;

* Until we solved the 'Vertical's' mystery of operation we didn't know how it worked nor what either one's "feel"



Left and right views of the 'Vertical'.

should be;

* Our one replication of each key would have to incorporate the differences between the ('Vertical's') patent drawings and actual keys known to exist while keeping the familial curves and swaggers common to all to make our replications 'genuine';

* Our replication of the 'Vertical' would stop short of pouring a cast iron base and back;

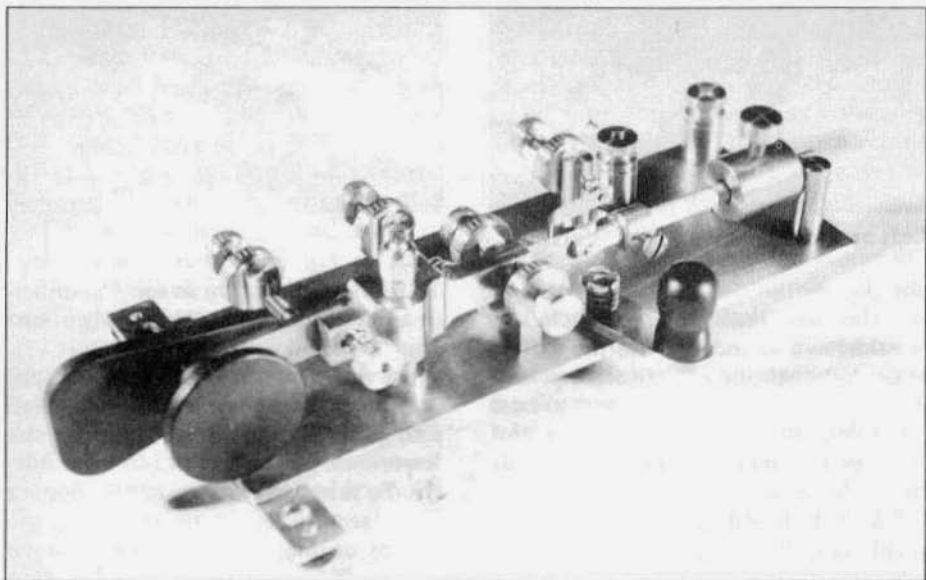
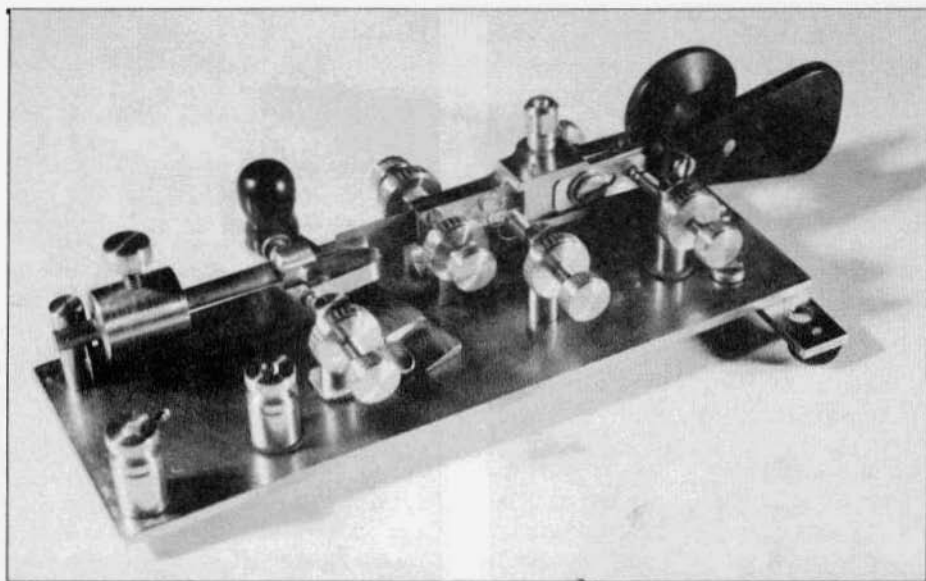
* Everything had to be made from scratch.

But having escaped the economy of it all, what a joy remained once we could forget about \$ and hours and everything having to have some damned utilitarian purpose—like a faster bit-rate!

The 1st, 3rd and 4th bulleted items conspired to haunt us in a small ways.

The 2nd and 5th gave us some unanticipated delight when the replications were finished.

Friend Owen, WBØSCN, has taught me one of life's basic lessons - no small part of a task well done is getting the 'ewwwww' and 'ahhhhs' from admirers. To that end (but we're also hoping for more virtuous reasons) we sent some photos of our replicated keys to Dave Ingram, K4TWJ, which he published in CQ Magazine, May, '98. Little did we know that Dave and his wife Sandy, WB4OEE, would become so enthused with the 'Vertical' that the coming weeks would see us making a 2nd one especially for them - in trade for more than a fair amount of pretty nice gear from their shack. ("No in advance, readers; that was a one-time deal we cannot



Left (top) and right (bottom) views of the 'Midget'.

imagine we'd do again - as mutually rewarding as it was.")

When CQ readers followed up by requests for (then-nonexistent) prints and (then-nonexistent) how-to's on the pair of projects, another friend, Arley, a former aircraft draftsman, volunteered to take my replications - a vernier cali-

per - and my manila folder of innumerable and barely decipherable scribbings and create a detailed set of real blueprints. First completed were the 'Vertical' drawings. Now, a year later, he's completed the 'Midget' prints. During one of the iterations of 'Vertical' print reviews we did over lunch together, I'd

Repairing Racal RA17 Receivers

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After servicing my last Racal RA17, I thought I would share my experiences with your readers. I have been involved with Racal equipment in an amateur and professional capacity for the last 16 years and in the last 4 years have repaired and serviced quite a lot of RA17/117 Rxs and associated adapters including Transmitters, SSB units, LF units and panadaptors etc. So when a friend at Racal mentioned that he had an RA17 which needed "looking at", I offered my services. After finally picking up the kit it turned out to be a MK1, manufactured in 1957 and last refurbished in 1977.

On taking the covers off the units a lot of caps had begun to leak and resistors looked burnt and brittle. At this stage I took off all 3 major modules and worked on them separately. On the LF strip I replaced all the paper caps, anode, screen and HT dropping resistors. Then I dismantled the LC and xtal filters, cleaned up the wafer switches and resoldered the connections. The BFO was dismantled, I replaced the anode and screen resistors and checked the paper caps. They seemed quite modern, so I left them in place. But as it turned out later on that was a mistake.

I have a set of factory Test Jigs so I can test the modules outside of the set and this is what I did to test they were up to spec. The LF strip seemed to work intermittently, but then died. Eventually I traced the fault down to a bad earth connection in the LC filter. Next came the first V.F.O, that was totally dead as

one of the vanes of the variable capacitor had been broken. It was easier to replace the whole unit with a known working one.

The last module was the second V.F.O and that turned out to be a late version one, not the original Mark 1. Once again I replaced all the screen, anode and HT dropper resistors and paper caps, put it in to the test jig and it seemed to work up to 550Kc/s on the film scale, but above that it died. After some head scratching I remembered something an RAF technician had told me. I checked the earthing clip on the oscillator section of the variable capacitor and found that when the V.F.O was tried above 550 Kc/s there was a bad connection. I cleaned that up and it seemed to work for a while. It was turned off and then on again and then this time the V.F.O only worked up to 400 Kc/s!. The fault this time was an O/C choke in the anode feed of one of the valves, this was replaced and the V.F.O was okay. I then retracked it and knifed the capacitor vanes for equal calib. pips every 100 Kc/s.

After completing all 3 modules, I turned my attention to the main chassis. I replaced all the electrolytics in the power supply stage and changed the wire wound resistors to metal clad ones. Most of the H.T dropper, screen and anode resistors were replaced, in fact two of the resistors fell to bits when they were unsoldered. I replaced brittle wire, i.e no insulation was left on it due to the heat generated from nearby com-

ponents. Then I generally resoldered dry joints as there were quite a few. Finally I got to the stage where I could reassemble all the modules together. After connecting them together and powering up there was a smell of a burning resistor from the 2nd mixer compartment, i.e. V9 and V10. On closer examination it was discovered that the main H.T dropper had burnt out. I know this happens when the vanes of C108 are shorted out, i.e. touching. On closer examination, the vanes were touching, so I carefully knifed them apart. This usually happens when people try to adjust C108 with the cover on and miss the slot on top of the cap and hit the vanes instead, with the result the vanes are shorted out. So I replaced the resistor and opened up the vanes of the cap. Switched on again and the same thing happened, i.e. R66 burnt out. Lovely, one of those faults!

So out came the board and replaced it with another one. Yes the same thing happened

Again. After a mug of tea and some head scratching I changed the last section of the 40Mc/s B.P.F as that looked a bit burnt and only connected one of the wires back up to it. This time the resistor survived, so I connected up the other wire and straight away there was the sound of frying bacon! I switched off and looked at the valves as that was the only thing I had not checked. V9 was okay, but V10 had a horrible burn mark between pin 7 and earth, i.e. screen and earth. On checking the valve base of V10 sure enough the insulation had broken down between pin 7 and earth resulting in a hair line fracture.

So this was the elusive H.T fault, you can gather the rest, I changed the valve base. And the valve, this time the resistor survived. But according to Murphy's law as soon as one fault is fixed another one shows its head. This time there was no gain on the 37.5Mc/s B.P.F according to the wobulator. This fault was

due to a duff silver mica capacitor in L28. So I then also decided to check out the 40Mc/s B.P.F and found that one of the coils was not soldered! I switched the set on for an hour, switched it off and then switched it back on an hour later and once again the set failed.

After 20 minutes of signal injection and tracing I arrived at V9. I measured the screen and anode voltages and found they were about 70V too high, also there was no Cathode voltage. After V9 was swapped the set appeared to work.

I still had a bit of fine tuning to do, so I decided to leave the set on soak test for a while to see if any other faults occurred. After 3 days the H.T fuse blew, I went to investigate and was greeted by the smell of a burning resistor. Yet another valve had developed an internal short and as a result the resistor burnt up. I replaced the valve and fuse and switched on and was greeted by silence!. This time the L.T side had developed an O/C, i.e. a dry joint, so as a result only half the set's valves were glowing. I resoldered it and got some noise out, but no signals. So it was finally tracked down to the diode detector valve which apparently was not working, replaced it and the set sprung into life. The set lasted for a couple more days until the sensitivity died. It turned out that 3 of the 33pF silver micas in the 37.5Mc/s B.P.F had gone u/s, so I changed them and peaked up the filter on the wobulator. After several hours the amplitude had remained constant as displayed on the C.R.T.

After all these faults I didn't think anything else could go wrong, but I was to be proved wrong. After listening to 20M USB one night, I decided to have a listen on 40M LSB, but I was unable to resolve any LSB. Yet on 20M I could resolve USB on +/- 1.5Kc/s on the BFO. So I took the unit out of the RX and changed the two .05 uF caps which I had originally left in place. Afterwards I was able to resolve both USB and LSB.

One other fault occurred after the set was moved from its rack to a bench. This fault was caused by a dodgy pin connection on valve base one. I took the offending pin out of the valve base and cleaned it up. After resoldering all the other connections the set was okay. After a bit of fine tuning the set's sensitivity was measured as 1uV for 100ua meter movement, which is not bad for a set that's 42 years old.

Besides coming across the common receivers, one also finds numerous adapters. There are 3 types of LF adapters, these all cover 10 - 980 Kc/s. The RA37 was the first one, then that got superseded by RA137, this was similar to the 37, but it had a tuning scale included on it. Finally there was the RA237 which was designed for the RA117 RX. These adapters all took their HT from the associated RX. The 37 and 137 had the same style plugs as used on the 17, whereas the 237 had BNCs.

Then there are 4 types of SSB units, RA63, 98, 121 and 218. The two most useful units are the 63 and 218, these were used for SSB whilst the 98 and 121 were designed for ISB use. The 63 can be used with either the 17 or 117 RX. The 218 was designed to be used with 117 RX, and it had a fine tuning unit which varied the 1.7Mc/s o/p. The 1.7Mc/s is one of the IFs used on the 117 RX. The 218 can be used with the 17, but the fine tune unit is inoperative as the 17 does not use 1.7Mc/s as one of its IFs. The 121 had a CRT and the 98 had a motor driven AFC. All these units operated from the 100Kc/s IF o/p of the associated RX.

Another useful unit is the MA197 pre-selector unit. This covers the freq range of 1 - 30 Mc/s and was used when the RX was operated at the same site as the TX and the unit prevented overloading of the RX's front end. Although overloading of the front end is unlikely on the average Ham shack, this unit still finds its place, particularly when used

on 40M at night time, as it cleans up the signal due to the close proximity of powerful BCST stations.

The RA66 is the panoramic adapter and was used to display 1Mc/s spectrum on a built in CRT. When used with the RA17 a buffer amp stage MA251 was used. When used with the RA117 an MA282 buffer amp stage was used.

The MA79 is the universal driver unit, this covered the freq range 1.5 - 30 Mc/s and had an o/p of 100MW. Its modes of operation were CW, DSB, SSB, FSK and ISB. There are two commonly available models, these are the 79G and 79H. The difference between these two models is that the H model can be used with a synthesizer, although an MA284 needs to be plugged into the 1Mc/s octal base socket in the txr. The G version is basically the same, except a 1Mc/s crystal is used in place of the MA284. There were various linear amps available for this kit, ranging in power o/p from 100 W upto 10KW!

There are 4 types of synthesizer available: MA150, MA250, MA350 and MA1350.

The MA150 has outputs of 1Mc/s and 3.6 - 4.6 Mc/s, and this unit was used with the RA117 Rx and the MA79 Tx. This unit was all valved and had a separate psu and freq standard unit.

The MA250, 350 and 1350 all have one thing in common and that is that they are all transistorized!

The MA350 had outputs of 100Kc/s, 200Kc/s, 1, 1.7 and 3.6 - 4.6 Mc/s and this unit was used in conjunction with the RA117 Rx and the MA79 Tx. For extra freq stability the internal freq standard could be isolated and an external high stability unit, such as the MA259 could be used instead.

The MA1350 has outputs of 100Kc/s, 1Mc/s, 118Kc/s and 2.1 - 3.1 Mc/s. This unit was used with the RA17 Rx and the RA98 SSB unit.

Finally the MA250 was designed for the Speedrace equipment, this was a



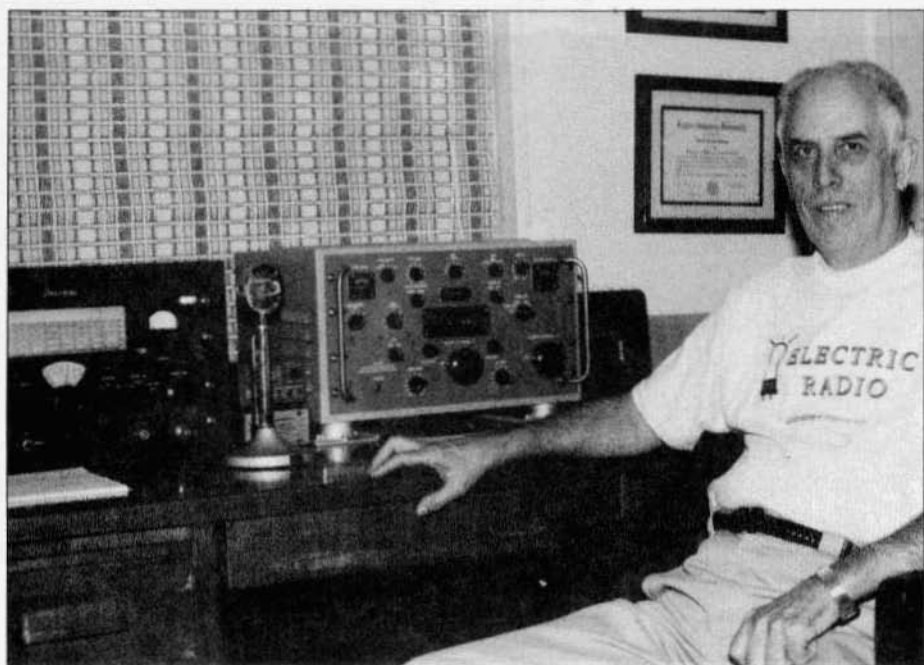
'The Transmitter Hunters' at the recent MRCG meet in Calif. Left to right: Cam Ogan, WA6VVC; Mike Brown, N6WIG; Dick Dillman, W6AWO and Mark Blair, KE6MYK. Photo by W6AWO.



Tom Horsefall, WA6OPE, at the MRCG meet operating his nicely restored SCR-628. In spite of his expression he was actually having a good time. Photo by WA6WHO.



Frank Fisher, WA6RBQ, at his AM operating position.



Travis Bailey, K5AVH, in his vintage hamshack. The gear shown is a Collins 32V-2 and an EAC R-390A.

Collins Collectors Association Annual Dayton Banquet

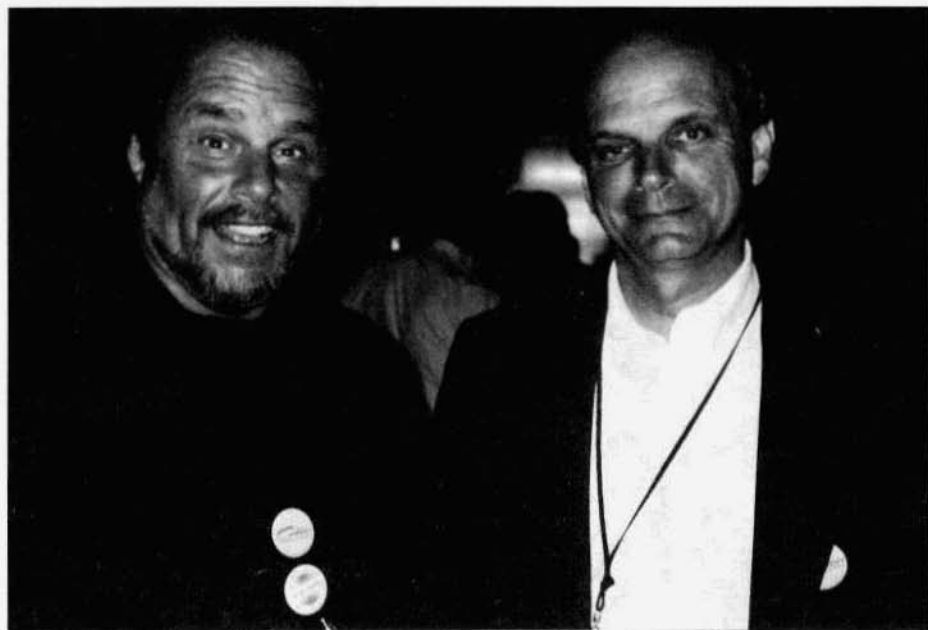
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The Collins Collectors Association banquet at the Dayton Hamvention has over the years become one of the most popular "unofficial" annual functions. With this year's attendance at a record-setting high, the banquet sold out at least a month in advance. The popularity of this event is a testament to Arthur Collins legacy, the radios that his company built, and the good fellowship that the CCA membership enjoys.

This year's attendees were treated to a riveting keynote speech by Riley Hollingsworth, K4ZDH, the FCC's special counsel for the amateur radio enforcement bureau, and the story behind the writing of "A Pictorial History of Collins Amateur Radio Equipment",

by the author himself, Jay Miller, KK5IM. In addition, there were some wonderful raffle prizes, including a fully restored 75A-4 donated by Joe Walsh, WA6ACU, and a one of the best roasts I've ever witnessed; more on that later. During the social hour preceding the banquet, folks were serenaded by Bob Heil, K9EID, of Heil Sound, who cranked out some soothing music, and also donated a Gold Line microphone to the raffle.

It came as a surprise to many of us, that Riley Hollingsworth K4ZDH, is not just a fan of tube type radios, he is a paid member of CCA with a true interest in Collins radios. It is probably his interest in these radios, compounded



Sandy Meltzer, KW6KW, CCA President, thanks Riley Hollingsworth, K4ZDH for his speech at the CCA Banquet.



Winner of the 75A-4 raffle, Wayne Spring, W6IRD (left), is congratulated by Joe Walsh, WA6ACU, who donated the prize, while Butch Schartua, KØBS, who restored the radio, looks on.

by his sense of duty, and his sense of the amateur community that prompted Riley to accept the CCA's invitation to speak. As it turned out, he has a terrific sense of humor as well.

During his address, Hollingsworth credited the ARRL for having sent a letter to FCC Commissioner William Kennard describing the blatant disregard for rules that some amateurs had shown in operating on the ham bands. "The amateur service cannot survive if it isolates itself," said Hollingsworth. "We will be the ones that get the messages through in emergency situations" he later added, and went on to describe new initiatives for preventing 10 meter encroachment, and another initiative for better ways to approach the 10 meter linear amplifier situation. Riley received a thunderous applause when he announced that the new enforcement ap-

proach was working, and that the number of complaints in the amateur service has been dropping. He promised "to work with us to make this the best amateur service in the world." I, for one believe him.

During his presentation, author Jay Miller, KK5IM, described some of the difficulties he encountered in gathering material for his new book, *A Pictorial History of Collins Amateur Radio Equipment*. Miller's slide show gave an appreciative audience a look at some historical photos, never shown before, as well as some from his book; all dealing with Arthur Collins and the business he built from the ground up. Much to the pleasure of the audience, Jay announced that a calendar, based on the work done for the book, would soon be available.

Certainly, the humorous highlight of



John Bess, WA5VVT, holding the award he received after roast in his honor by Joe Walsh, WA6ACU.

the evening came when Riley Hollingsworth read a letter to the audience that was allegedly prepared as a warning to CCA board member John Bess, WA5VVT, that he was due to be re-tested for amateur service. This was followed by a multimedia roast, given by Joe Walsh, WA6ACU. Joe showed a series of slides that had been altered to provide a comedy backdrop while he did his own rendition of "This is your life John Bess." Later Joe played a highly edited audiotape made from some of John's transmissions on the 20-M Collins net. At the end of it all, John received a trophy for his good sportsmanship, but said to me later, "Just wait 'till next year." Seriously, WA5VVT is one the most consistent contributors to the Collins nets, and well liked by all that know him.

As mentioned earlier, Joe Walsh do-

nated a KØBS restored 75A-4 to the long list of raffle prizes that were given away that night. The radio was won by Wayne Spring, W6IRD, who was most pleased by his good fortune.

All in all the CCA banquet was a roaring success. When I asked CCA president Sandy Meltzer, KW6KW what he attributed this success to he said, "This is a great group of people that have a lot of fun, and fun is contagious." "It's also the only hobby group to be officially recognized and licensed by Rockwell-Collins for the use of the name, and the rights to reproduce certain documents, all of which add significant value to our members" Said Meltzer. More complete information on the group, and its association with Rockwell-Collins can be found at <http://www.collinsradio.org>. ER

Bug Stories from page 30

noted that he'd put "Vibroplex" in the title blocks. Before erasing the name, which you all know is quite alive and well, we contacted Mitch, W4OA, Vibroplex's new owner. Mitch wound up purchasing the 'Vertical' prints from Arley. We also gave Mitch the list of CQ requests for Vibroplex to now contact. In short, we were delighted to see how these 80 years later we'd become part of resurrecting such wonderfully sought-after keys - that are so much fun to use!

At this writing, we're unsure what Vibroplex has done or plans to do with the 'Vertical' prints. None-the-less, it's all been great fun and we have great satisfaction in closing the historic loop, so to speak, on this bit of telegraphic history - and for such a historic name in amateur radio! ER

- 1) Perkins, Jan David; Don C. Wallace: W6AM, Amateur Radio's Pioneer.
- 2) French, Tom, W1IMQ; VIBROPLEX COLLECTOR'S GUIDE, Artifax Books, Maynard, MA, 1996.
- 3) Holly, Bill, K1BH; THE VIBROPLEX CO., INC., 1st Ed., Portland, ME, 1990.
- 4) Ingram, Dave, K4TWJ, KEYS, KEYS, KEYS, "A Visual Celebration of Amateur Radio's Favorite Accessory", CQ Communications, Inc., Hicksville, NY, 1991.
- 5) Ingram, Dave, K4TWJ, KEYS II: THE EMPORIUM, "The World's Most Admired Keys - New and Old", 1995.

TUBE COLLECTORS GROUP FORMED:

The new tube collectors association is now in operation. This is a non-profit, non-commercial organization of collectors & history enthusiasts focusing on all phases & vintages of tube design. The founding president of the group is Al Jones, W1ITX, who is known for his award winning tube collection. For more details & complimentary copy of the association's bulletin contact Al Jones, CA, (707) 464-6470, Ludwell Sibley, OR, (541) 855-5207, or mail request to POB 1181, Medford, OR 97501.

Racal RA17 Receivers from page 33
remotely tuned RX and TX terminals.

These three units are compact and quite difficult to repair as extender leads and boards are needed to extend the modules outside the set to repair them.

Finally if anybody need any advice or info on Racal gear, feel free to drop me a line. ER

Corrections to last month's review of the Longwave 75A-4 Filters

On top of page 26, first column, the first complete sentence is ... "Figures 4 and 5 were taken at 2 dB per vertical division..." This should read Figures 3 and 4.

At the bottom of this same paragraph it says....."and Figure 5 is the A-4 filter." This should read Figure 3.

In figure 9, the number comparison, the 75A-4 column should have 4300 cps under -60 dB BW and 2.15 under shape factor. The LW column should have 4600 under the -60 dB BW column and 1.77 under shape factor.

Editor's Comments from page 1

NO JULY ISSUE

As I announced last issue, there will not be a July issue due to my desperate need for a holiday. Shirley and I will be in the Bahamas from June 22 until July 7. Our intentions were to have someone man our phones and send out orders but because we have not been able to find anyone for this job, we're now just shutting everything down for the 2 weeks plus that we will be gone. We appreciate everyone's understanding and regret any inconvenience. N6CSW

**Electric Radio
now takes credit card payment
Visa, Mastercard &
American Express**

De-bugging Homebrew Rigs from page 27 slightly from set to set. I started lowering the voltage. At 16 volts the regeneration of this receiver was velvet smooth. At 15 volts the detector quit operating. Voltages from 16 volts up to 35 volts were acceptable but the lower voltages provided smoother regeneration. Unfortunately, when 16 volts was applied, the detector would not operate at frequencies above 15 MHz. Normally, my 20-meter coils cover approximately 10 to 17 meg.

What to do? Sacrifice operation on the 20-meter band by increasing my plate voltage, or running 16 volts on the plate and put up with loss of 17 meters. I solved the problem by adding a variable resistance in the plate circuit that is adjustable from the front panel.

Now, the set was working very well, but at night when the bands become crowded with megawatt religious stations bombarding the world they play havoc with less selective receivers. Detector-amplifier type regenerative receivers are notorious for their poor selectivity. Thinking of how much better my sets operate with adjustable coupling of the antenna winding, an antenna-matching network, I reasoned, should be a big help when pulling in weak DX, as well as improving selectivity when listening near the frequency of QRO BC stations. I tested the feasibility of building in a tuner by coupling several different antennas to the receiver through a 100-watt class MFJ transmatch. The improvement was remarkable.

Remembering the old HRO rack mount receiver, speaker, coil combination, I decided to add another panel above the receiver that would hold a speaker, antenna matching network, and a 'poor man's' 'S' meter.

The S-meter is nothing more than an output meter fashioned from a meter parted out of a Heathkit KW amplifier. A new scale was made for the meter using rub on lettering. To use, set vol-

ume control to a predetermined number and read signal strength. I calibrated the meter by comparing it to a Kenwood 930 tuned to the same station. In this particular case by setting my volume control to number six on its scale, my 'S' meter reads about the same as my Kenwood. At best this is a good guess as to signal strength, but it look pretty and is probably as accurate as 90% of the meters in use today.

The rack was constructed of soft pine. After completion it was sanded smooth, stained, and given three coats of satin varnish. After a final rubbing down with 0000 steel wool, the rack was waxed with Kiwi neutral color shoe wax.

Yes, I'm proud of the way my set looks, and proud of the way it works. I also know that if it had worked moderately well in the beginning, I would have called it good and ended up with a receiver relegated to a shelf in my shack—a set seldom operated, and never improved. It is the mean ones that get all the attention.

Most experienced builders build from memory—from circuits long ago etched in their mind. For those who are not all that sure of their built-in memory chips, I have sketched out diagrams of my favorite power supply and detector circuits.

Even though I build without using diagrams—very often starting a receiver without really knowing what the final configuration will be, I often refer to one of my well worn ARRL Handbooks, and RCA tube manuals, when the need arises. I start construction with a blank piece of cardboard taped to the wall over my workbench. As each part is soldered in the circuit I draw it into a circuit on the board. When the set is finished the circuit, messy though it is, is also complete. This serves as a double check and is a great aid in locating wiring errors in a hurry.

With the permission of you, the reader, and our ER Editor, I will pursue more debugging stories in the near future.

AMI Update from page 3

General Hamvention Observations

The weather for the Hamvention was very good. Overall attendance did not seem to be much different than last year, even though this year's Hamvention was the site of the ARRL National Convention. In the flea market there were a lot of vintage receivers, but not as many transmitters. Prices were on the high side. There were still great deals on components. It is still worthwhile to rummage through those cardboard boxes underneath those tables! A lot of AM'ers were in attendance and interest in AM among the general ham population appears to be growing.

I believe that the AM community had a very successful Hamvention. It was helpful to have a number of related AM activities going on. Multiple activities appear to mutually promote one another. I encourage AM groups in other parts of the country to take part in their regional hamfests with demonstration stations, presentations and social get-togethers.

Museum Ships Special Event

This year this event is scheduled for July 15 1330Z through July 16 1900Z. Though not specifically an AM event it is has a strong attraction for vintage and military enthusiasts. There are 25 ships involved so far. Though no recommended frequencies have been published, the presence of these ships on the air is usually not hard to spot. Four battleships, two cruisers, five destroyers and six submarines are among the participating ships. Some will be using vintage equipment. I think the operators of these special event stations will be very pleased to work those of us who can put vintage military gear on the air. There is a certificate award for contacting five ships. Award requests should be sent to WIQWT. More info is available at <http://www.ziplink.net/~rcal/salem/ops.html>. ER

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

Should any set appearing in my articles be found of sufficient interest let the Editor know and perhaps we can come up with a complete 'How-to-do-it' article on that particular radio. ER

Bug-Something not obvious at the moment that keeps a radio from working the way the builder intended.

QRP transmitter—any rig running less than 100 watts.

HRO dial removal and adjustment...<http://www.io.com/~neilw/index.htm>

BC-611 Heaven from page 10

out one hand-crank generator volunteer (victim?) after another.

At 1200 straight up, with Kim, WB4LZQ cranking away, Joe called into the First (?) Annual Dayton Hamfest AM net. The growing crowd listened as one station after another signed in. Amazingly, many of them were BC-611s, the 40s-vintage HF walkie-talkie of D-Day fame.

Net Control thought that everyone should meet somewhere and John, K9WT, immediately suggested to Joe that the meeting place be here, at the GRC-9. Joe relayed the suggestion with his space number and an immediate consensus came crackling back through the speaker perched atop the radio.

There was a definite feeling something important was about to happen.

Suddenly, we were surrounded by a forest of whip antennas. There were BC-611s everywhere! OPERATIONAL BC-611s! I don't know what the record is for working 611s gathered in one place, but I'll bet we pushed it hard.

It was an amazing moment, and I tried to capture it quickly because like all moments, it was fleeting. ER

A complete index of the entire 11 years of ER is available for viewing or downloading at the following website:
<http://www.qsl.net/n9oo>

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Deadline for the August Issue: August 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: McMurdo Silver model 802 super regen rcvr, 2 meter coils, exc - \$100 + shpg. Bob Rolfiness, W7AVK, 2327 Malaga Rd NE, Moses Lake, WA 98837. (509) 765-4721

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: KWM-2 fan bracket - \$12 ppd. Dave Ishmael, WA6VVL, 2222 Sycamore Ave., Tustin CA 92780. (714) 573-0901.

FOR SALE: Small parts, transformers for projects and repairs of tube gear. Let me know your needs. Van Field, W2OQL, 17 Inwood Rd. Center, Moriches, NY 11934. (516) 878-1591 or wreck_and_rescue@juno.com

FOR SALE: NOS, UTC # F-7101 matching (600-8 ohms) xfms (2 W) - \$13 ppd/dom/USA. ABEN, POB 4118, Jersey City, NJ 07304-0118. Avidov@aol.com

FOR SALE: Book, TM11-353, Installation and Maintenance of Telegraph Printer Equipment, \$19 ppd. R.J. Eastwick, W2RJE, 400 N. Haddon Ave., Unit 109, Haddonfield, N.J. 08033. (856) 429-2477.

FOR SALE: Collins S-Line aluminum knob inlays: small (exciter/PA tuning) - \$1; 30L-1 - \$2; spinner/plain (main tuning) - \$3. Charlie, K3RCH, 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: Meters for WW II military radios, have some connectors. Henry Engstrom, KD6KWH, CA, (707) 544-5179. pacifica@sonic.net

FOR SALE: NOS TCS baseplates, still in orig. factory shpg wrap - 2/\$15.00 plus shpg. Carl, KN6AL, POB 3531 Laramie, WY 82071. (307) 742-0711. kn6al@uwyo.edu

FOR SALE: Hammarlund Super Pro Receivers (3) with rack mount power supplies - one Rx dismantled. KR6BS, CA, (805) 482-4028

FOR SALE: Homebrew amp from January 1960 QST, two 811A's. Dick Bean, K1HC, 422 Everett St., Westwood, MA 02090-2218, (781) 461-0101. K1HC@AOL.COM

TRADE: Collins 70E-8 PTO (PN 503-5049-003) new and unused for a 4:1 gear assembly and knob for my 75A-4. 70E-8 dial assembly is available at addl. cost. Dietrich, 49 - 6182 - 27785 or dietrichdall@netscape.net

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NOTICE: At long last Chuck Dachis has opened his web site. Come visit him at <http://www.halfcraftercollector.com>

FOR SALE: Military and commercial communications items: www.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: Over 600 electronics magazines, mostly 1960's & '90's - 99¢ ea + ship; also available: electronics books, parts, etc. List for stamp. Bob Eckert, 133 E. 7th St., Clifton, NJ 07011.

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: E. F. Johnson SWR meter, 250-38, used in KW Matchbox, NO6 - \$25 + S&H. Bruce Hering, 41120 State Highway 13, Waseca, MN 56093. (507) 835-5619. bhering@efjohnson.com

FOR SALE: Nice Meissner Model EX Signal Shifter - \$75. Charlie, WB5LHV, 1409 Jeanie Ct., Las Cruces, NM 88005. (505) 526-5778, WB5LHV@zianet.com

NOTICE: T-368 Registry. For info w2zr@aol.com or W2ZR callbook address. Subscribe to T-368 reflector: www.onelists.com/t-368_bc-610

WANTED: Drake L-4B linear amplifier. David, W3HYM, (301) 934-6100, W3HYM@ARRL.NET or DAVID@DELMARLAW.com

FOR SALE: Books, all electronics related; 300 titles. SASE Paul Washa, 4916 Three Points Blvd, Mound, MN 55364. wotok@email.msn.com

FOR SALE: Build your own "Midget" bug replication by K0YQX, ca 1918, featured by K4TWJ in CQ Magazine, May, '98, 10 detailed blueprints. FAX (507) 345-8626 or e-mail: bug@mnnc.net

FOR SALE: parts, tubes, books. SASE or email for list. Wayne LeTourneau, POB 62, Wannaska, MN 56761. wb0cte@arrl.net

FOR SALE: Heath VHF watt and swr meter, HM-2102, clean and works - \$45 plus shipg. Marty, NJ. (609) 466-4519

FOR SALE: T-17D mike NIB - \$ 25; manuals, equipment, parts, crystals, etc. list - \$1. Joe Orgerio VE7LBI, 1349 Leask Rd., Nanaimo BC V9X 1P8 Canada. joseph@pacificcoast.net

FOR SALE: Two Hammerlund SP-400 rcvrs, one exc, one for parts - \$175 takes both. Carleton Rand, W1PZL, 85 Black Hall Rd., Epsom, N.H. 03234. (603) 736-9695.

FOR SALE: National NTE exciter cosmetically clean and complete - \$300. Earl Russell, WR1Y, 98 Skyfields Dr., Groton, MA 01450. (978) 448-5822 pegruss@fultranet.com

FOR SALE: CK722, 2N107, 2N35, many vintage transistors and tubes at www.electronic-projects.com. SASE for flyer: 10726 Wiles Rd Coral Springs, FL 33076

FOR SALE: OEM Heath belts - \$2.50 each shpd; or 10+ for \$2 each shpd. Send check or money order. Roberta Hummel, 202 Midvale Dr., Marshall, WI 53559.

FOR SALE: 30 yr collection, moving to a no basement house, send LSASE for list. Gregory S. Pace, WA4SQR, 5636 Mountainbrooke Ct., Stone Mountain, GA 30087.

FOR SALE: Radio, TV tubes NOS, send want list & SASE. Dan Hill, POB 49, Dixmont, ME 04932. (207) 234-2315

FOR SALE: Manuals for old ham gear of the '30s to the '70s. Check WEB Catalog www.hi-manuals.com

FOR SALE/TRADE: NC-2-40D, R-483/FRR/SP-600, R-392, RBL-3, MD-7 w/dyn. Wanted: RCA/Radiomarine T-408/URT-12 manual. Sam Timberlake KF4TXQ, POB 161, Dadeville, AL 36853. (256) 825-7305, sttimber@lakemartin.net

FOR SALE: Presto portable suitcase recording lathe, nice conds w/two heads, spare cutters. Fred Clinger, WA8KJL, OH, (419) 468-6117 after 6 PM EST.

FOR SALE: Power xfmtr & filter chokes, heavy & light duty from salvaged Wurlitzer, Seeburg jukeboxes of the '40s. Great for pwr splys. Free list & prices. Onorio Sabetto, W8PTU, 1717 Burgess Rd., Cleveland, OH 44112. (216) 481-1036

FOR SALE: National NC-125, working - \$125. Hoover Noonan, SC, (843) 726-5762.

FOR SALE: (2) Webster pwr amps. Rated 90W ea, Push-Pull 650/61.6 driven by pair of 6SN7s - \$40 ea. PU only. Gus, WA, (360) 699-0038 or gus@wanet.com

FOR SALE: RCA BTA-1M AM broadcast xmt, tuned to 1380 kHz, plug & play conds - \$1500. John P. Tiedeck, WA2SDE, 212 Grandview Rd., Media, PA 19063. (610) 566-8049

FOR SALE: Western Electric 443A-1 1000 watt AM broadcast xmt, complete & in exc conds but hasn't been turned on in years - \$1000. John P. Tiedeck, WA2SDE, 212 Grandview Rd., Media, PA 19063. (610) 566-8049

FOR SALE: 3" sq 50 & 500 micro amp mtrs, coax ant relay 24 & 140 VIX. Dave, W0BEB, (800) 580-8055, dschmid@lakes.com, <http://villa.lakes.com/home>

FOR SALE: BC-645A IFF rec/trans, new in box - \$90; AN-74 & AN-73 1/4 wave antenna for SCR-522 - \$80 ea; antenna AS-114-APT, 1/4 wave, aircraft - \$65. Ron Germain, 717 Waterloo St. Clair, MI 48079. (810) 329-4954

FOR SALE: Swan Astro-102BX, mint - \$495; Swan Astro-150, mint - \$395; Swan 700 CX, exc - \$350. **WANTED:** ICOM-761, mint. Sidney, CA, (949) 498-4988.

FOR SALE: Transformers for Collins 32V3, Hallicrafters 11T9, BC610 & RF xfmrs for Hammarlund SP600. Roland V. Matson, POB 956, Lake Panasoffkee, FL 33538

FOR SALE: Older type electronic parts & hardware; free vintage flyer. Mail orders since 1954. Bigelow Electronics, POB 125, Bluffton, OH 45817

FOR SALE: Heath HW-100 w/5B-600 spkr & pwr sply - \$225; 5B-301 rcvr - \$100, both in good conds. Robert Braza, WI RMB, M.A. (508) 222-5553.

FOR SALE: Motorola FM-Broadcast Monitor rcvr model T-1100A, checks line levels, frequency & deviation, has stals for several FM frequencies, includes WWV rcvr on 5 & 10 MHz for time ticks. Good operating conds - \$70 + shpg. Bob Simpson, N0NTC, 9570 Haney Dr., Houston, MO 65483. (417) 967-3535, n0ntc@train.missouri.org

FOR SALE: (2) S20Rs, both for - \$150 + shpg. Call for details. Mike, W1JZ, MA, (508) 529-4427.

FOR SALE: SX-25 - \$250; S-20, as new - \$225. Ron, 546 Avon St., Lansing, MI 48910. (517) 374-1107

FOR SALE: 24V dynamotor w/base DM-36-D, military vehicle whip antenna w/ceramic base, all NOS, unused - \$50 ea ppd. Bruce Beckeny, 5472 Timberway Dr., Presque Isle, MI 49777. (517) 595-6483

FOR SALE: Heath Mohawk RX-1, Marauder HX-10, Warrior HA-10 in good to exc conds, one extra HX-10 in fair working conds - \$1750 w/manuals; w/Apacha TX-1 in exc conds - \$1995. PU only. Cliff, WA9SUE, WI, (608) 625-4527 after 6 PM.

FOR SALE: ARRL Radio Handbooks, 1972, exc - \$10; 1967, mint - \$12; 1959, good - \$8; W6SAI Publications Cubical Quad Antennas 1959 - \$5; VHF Handbook 1956 - \$6; RCA RC19 Tube Manual - \$7. All + UPS. Onorio Sabetto, 1717 Burgess Rd., Cleveland, OH 44112. (216) 481-1036

FOR SALE: Phenolic coil forms for the MM-1 regen rcvr in May ER - \$6 ea + shpg. James Fred, 5355 S 275 W, Cutler, IN 46920.

FOR SALE: TMC GPR-90 cabinet w/feet, VG +- \$100 shpd; Globe Chief Deluxe, w/manual copy, exc - \$145 shpd; Globe Scout Deluxe w/manual copy, exc - \$175 shpd; Globe Scout Deluxe parts set, no PA tank, wrong knobs, VG +- \$60 shpd; as always, trades considered **WANTED:** Hammarlund SP600 JX-21A, working or not, complete, but w/o cabinet or spkr. Abe, W3DA, DE, (302) 349-5389 between 6 & 10 pm EST PLEASE.

FOR SALE: Collins collectors rare ECM R390A; Drake collectors R4C, TX4C, TR4CW; prefer trades, no shpg will meet half way. Darryl, WA5AAO, TX (979) 968-3384.

FOR SALE: FT-727-R, 2M/70CM, scvr, all access, manuals - \$135. Len Gardner, 458 Two Mile Creek Rd., Tanawanda, NY 14150. (716) 873-0447

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: Globe King 500B/C; Johnson Ranger; Heathkit; Mohawk; National 183D; Hallcrafters SX100. KB0W, CA, (916) 635-4994. frankdellechiaie@sprintmail.com

WANTED: For purchase. Equipment & technical information related to AN/ARN-6 Radio Compass. Jim Cavan, 6 Timberline, Norfolk, MA 02056. (508) 528-0908. jcavan56@aol.com

WANTED: Gearshift for Teletype Model 28, or complete machine with one. Ivan, WA6SWA, POB 248, Reno, NV 89504. (775) 329-7738. idh@cs.unr.edu

WANTED: SW3 #33A and #35 coils. I will trade my extra coils SW3 coils. Hank Bredehorst, 2440 Adrian St., Newbury Park, CA 91320. (805) 498-8907

WANTED: Parts for a TMC GPT-750 xmt. I need the AM modulator deck and other parts to restore this unit. John, KF2JQ (716) 873-0524. jprusso@acsu.buffalo.edu

WANTED: Long wire ants AT101, AT102, GRC-9; DY88/105, PP327GRC9; counterpoise CP12 & 13 GRC9; BC348 pwr conn PLQ102/103. KA1ZQR, 348 N. Main St., Stonington, CT 06378.

WANTED: Globe King 500 B/C; Viking Valiant I/II; Viking 500; Heathkit Mohawk. Frank, (916) 635-4994. frankdellechiaie@sprintmail.com

WANTED: Globe King 500 B or C for California PU. Bob, CA, (562) 928-8820. rjljlie@earthlink.net

WANTED: Military radios: British A-13, A-14, & Soviet R(P)-129, Leroy Sparks, W6SYC, 924 W. Mc Fadden Ave., Santa Ana, CA 92707. (714) 540-8123. leroyspark@earthlink.net

WANTED: BC610 80&40 mtr coils and xtals. Gary Willey, W4ZXS, 8125 Lunenburg Rd., Keysville, VA 23948. (804) 736-9029

WANTED: National Company emblems, escutcheons, WW II era equipment. Will trade HRO coils or purchase. Don Barsema, 1458 Byron SE, Grand Rapids, MI 49506. DBARSEMA@prodigy.net

WANTED: FT 243 etc Xtals: 3836.0, 3836.5, 3837.0, 3837.5, 3872.5, 3877.5, 3882.5, Thanks. W2JBL (732) 842 6606, s.krevsky@ieee.org

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

WANTED: I wish to correspond with owners of National FB7/FBXA/AGS coil sets. Jim, KE4DSP, 108 Bayfield Dr., Brandon, FL 33511. j.c.clifford@juno.com

WANTED: British, Commonwealth W.S. 62, W.S. 22, W.S. 18, W.S. 48, W.S. 46. George Rancourt, K1ANX, MA, (413) 527-4304

WANTED: Contact w/Bendix fans, especially those working on the TA-12 xmt & the RA-10 or similar rcvrs. Sam Kelly, W6JTT, CA, (714) 893-2092 or skellycp@aol.com

WANTED: PreWW-II Iowa QSL cards; materials of 1920s Iowa Radio Relay League. Will trade or purchase. Bill Smith, W5USM, w5usm@aol.com

WANTED: HF-300 tubes. Don Chester, K4KYV, 2116 Oldover Rd., Woodlawn, TN 37191. (931) 647-2179. k4kysv@hotmail.com

WANTED: Hallicrafters SX88 or SX115. Larry Redmond, 413 Belfort Dr., Duluth, GA 30096. (770) 495-7196

WANTED: Signal Corps BC-307 xmt, circa 1937 General Electric. Any out there? William Donzelli, 15 General MacArthur Dr., Carmel, NY 10512. (914) 225-257, aw288@csfn.org

WANTED: HT-32 (A,B) bezel for homebrew project. Conds not critical. Tom Hoienga, K8NGV, 3170 Kennesaw Pk, Marietta, GA 30064-2444 (770) 426-8682. hoienga@atl.bellsouth.net

WANTED: Walter Ashe: WAR-25, WAP-25, WAT-25. Bob Mattson, W2AMI, 16 Carly Dr., Highland NY 12528. (914) 691-6247. bobmattson@juno.com

WANTED: Pwr sply for Westinghouse MW-2 xmt (will pick up); Also BC-348 & Heath DX-60. Gary, WA4ODY, Houston, TX, (281) 291-7701, pyccu@gateway.net

WANTED: WW-2 German HF transmitters like 5WS, 30WS, 100WS etc for my museum display. Takashi Doi 1-21-4, Minamidai, Seyaku, Yokohama 246 Japan. Fax 011-8145-301-8069, takadoi@carrot.ocn.ne.jp

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: Military radio TM's, orig's & reprints. New list. Send \$1 & address label to Robert Downs, WASCAB, 2027 Mapleton Dr., Houston, TX 77043-2410. (713) 467-5614

FOR SALE: I repair all tube type amplifiers. Licensed in 1955. Steve Gross, N4PZ-W9OJL, IL, (815) 734-4255.

FOR SALE: 51J-4 filter replacements, direct plugin—6.0 kc Collins mech. filter, 500 cycle stal lattice - \$215 each. Chuck Felton, KDOZS, WY, (307) 322-5858, feltoned@coffey.com

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 Signal Magazine, Jan 1934, describes Byrd Anarctia Expedition, Collins equip & announces the 4A xmtr; Collins Signal Magazine, Dec 1935, announces multiband antenna products, 600A xmtr, others. Bill Coolahan, 1450 Miami Dr. NE, Cedar Rapids, IA 52402. (319) 393-8075

FOR SALE: Hallicrafters HT32, Hallicrafters SX101A - \$575. California PU. Joe, W6CAS, CA, (916) 731-8261.

ESTATESALE: Complete Johnson station: Invader 2000, KW matchbox, TR switch; also NC-303, SX-25, B&W 6100; Morrow MB6 rcvr/MB 565 xmtr w/120V & 12V pwr sply, much more. Call or write. Tim Walker, W1GIG, 19 Woodside Ave., Westport, CT 06880. (203) 454-4376

FOR SALE: Clegg Zeus xmtr & Interceptor rcvr, all bander converter, manuals, Dow-Key relay - \$500; NC173 & spkr - \$200. Virgil, W4OLJ, TN, (423) 337-6484.

FOR SALE: Hewlett Packard 200 AB audio sig gen - \$50; Heath HD-15 phone patch - \$25; Swan 350 + 117XC, needs repair - \$75. Al Jenkins, W1RWB, MA, (508) 325-7122.

FOR TRADE: My professionally copied Viking II manual for equal quality Valiant I manual. Louis L. D'Antonio, 8802 Ridge Blvd, Brooklyn, NY 11209. (718) 748-9612 after 6 PM

FOR SALE: Hallicrafters S-118 rcvr, nice shape, no book - \$59 plus ship. **WANTED:** WRL 755 VFO. H. Mohr, W3NCX, 1005 Wyoming, Allentown, PA 18103.

FOR SALE: Swan 410 VFO - \$75; Heath HP-23B sply - \$55; Johnson LoPass - \$25; pair of NIB 8072 - \$75. U-ship. WA7HDL, ID, (208) 756-4147.

FOR SALE: Eldico Twins, 1RX, 1TX, no pwr sply, manual - \$350 U ship. Tom Berry, K9ZVE, 1617 W. Highland, Chicago, IL 60660. (773) 262-5360

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. (254) 799-5931, w5nwx@juno.com

FOR SALE: Heath Nostalgia, 124 pg book contains history, pictures, many stories by longtime Heath employees. (See BOOKS inside back cover.) Terry Perdue, 18617 65th Ct., NE, Kenmore, WA 98028

FOR SALE: "Complete Guide To WWII Military Communications Equipment", 117 pg info on almost all WWII equip. - \$15 + \$2 domestic mail. Sam Hevener, W8KBF, 3583 Everett Rd., Richfield, OH 44286-9723. (330) 659-3244

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

FOR SALE: Complete hardware set to connect Collins PM2 to KWM2 - \$19.95 ppd. Warren Hall, K0ZQD, POB 282, Ash Grove, MO 65604.

FOR SALE: Tube type kits for CW/AM. Vintage Radio Kit Co, 427 North Main St., Sharon, MA 02067. email us at CPCW-5@aol.com or visit our web site at: <http://www.mmsinc.com/bry/vintage.htm>

FOR SALE: Repair, upgrade, performance modification of tube communications & test equip. Accepting most military, all Collins & Drake designs, & the better efforts from others. Laboratory performance documentation on request. Work guaranteed. Chuck Felton, KDOZS, Felton Electronic Design, Box 187, Wheatland, WY 82201. (307) 322-5858, feltoned@coffey.com

FOR SALE: SASE for list of reconditioned gear. Ed Clink, WA9PFB, 1285 New Salem Church Rd., New Berlin, IL 62670

FOR SALE: S-40B - \$50; SR160 w/sply - \$150; HA-350 rcvr - \$70; Cib-Fone tube CB - \$50. Ken Sands, K8TFD, 15614 Edgewood Circle, Plymouth, MI 48170. (734) 420-3448

FOR SALE/TRADE: Manuals: Knight R100, T50; Multi-Elmac AF54, AF-67, AF-68; Drake 1A; Regency ATCI, NHQ. POB 690098, Orlando, FL 32869-0098. (407) 351-5536, n4kpt@juno.com

FOR SALE: Ampex recorders 351, 601 AG-440 & 960 stereo; ART-13 w/all plugs, dynamotor, mounting base, remote box, key box. Rudy, WZ2IA, NY, (716) 937-9279.

FOR SALE: Three foot by five foot reprint of factory schematic for Collins KW-1 - \$28 ppd. Tom Berry, K9ZVE, 1617 W. Highland, Chicago, IL 60660. (773) 262-5360

FOR SALE: IC3220H, as new dualband - \$45; Clegg 22er - \$90; Realistic Pro35 scanner - \$75; Matt, K2MAC, 174 Lincoln Blvd, Kenmore, NY 14217. (716) 876-3259

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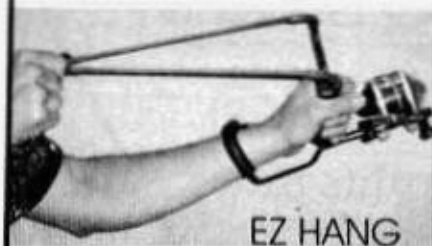
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