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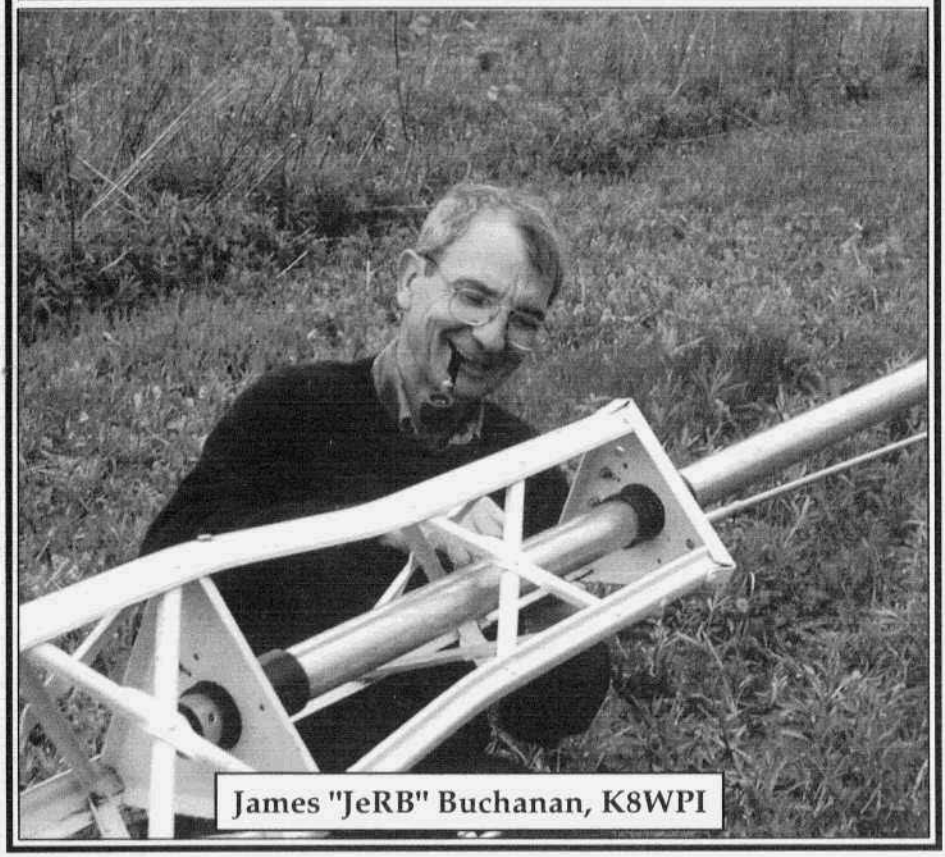
ELECTRIC RADIO

celebrating a bygone era

Number 136 September 2000



James "JeRB" Buchanan, K8WPI

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, KØEOO; Bob Dennison, W2HBE; Dale Gagnon, KW1I; Rob Brownstein, K6RB; Don Meadows, N6DM; Lew McCoy, W1ICP; Kurt Miska, N8WGW; Warren Bruene, W5OLY; Brian Harris, WA5UEK; Thomas Bonomo, K6AD and others.

Editor's Comments

Homer Hatch, WØAHO Silent Key

Just as we were going to the printer with this issue I received a letter from Dennis Hatch, WAØWAB.

"It is with much sadness that I inform you of the death of my father, Homer D. Hatch, WØAHO. He became a Silent Key on August 28.

"My Dad fought cancer for 12 years. I remember my late mother describing him as the kindest man she ever knew. He demonstrated that kindness in the way he raised his children."

I came to know Homer and his two sons Marvin, KØLZW and Dennis, WAØWAB in a kind of strange way. Back in October of 1990 I used a photo of Homer on the cover of ER #18. I found the picture of Homer in the archives of the late Lee Faber, W7EH. I was using the archives (several boxes of letters, photos, QSL cards, etc.) in the preparation of a series of articles on Lee. The caption on the photo read, "Homer Hatch, 9AHO, Gridley, Kansas, 1930." I called Lee and asked him about the photo and if he could tell me anything about Homer. He said that he remembered him as a "real fine man" and that he had had many, QSOs with him in the late '20's and early '30's. He didn't know if he was still alive or where he might be living if he was.

To make a long story short just after the issue went out I got a call from Wayne Steiner, NØTE. He told me that Homer was "alive and well" living on his farm in Burlington, Kansas. I called Homer and we had a great conversation. He was a very special individual. He was 79 then and had had a long illustrious run in amateur radio that I described in the following issue. Through him I came to know his sons and in issue #19 I had Marvin on the cover.

We've lost another great pioneer amateur radio operator. I'll have more to say about Homer in the next issue. N6CSW

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AMI Update - September 2000

by Dale Gagnon, KW1I, President

AM International Membership

Membership hits 1250 this month. The growth of our organization is slow, but steady. New members typically have heard about AMI on the air or in the pages of ER. Many still write a note that they have been meaning to join for years! Applications are picked up at the post office box every week or so. All applications received by Sept. 1 will have been processed when you receive this month's ER. Headquarters is making a special effort to process all newly arriving applications by the end of the month so that stations can have certificate numbers to swap in the this month's AMI Discovery Weekend activity. If you need a certificate number in a hurry, make sure to include your e-mail or phone number with your membership request. I will try to get your AMI number to you in time for Discovery Weekend. The special recognition and award certificate division of AMI has been dragging its feet, but renewed activity in September will insure that backlogged certificates are delivered to deserving amateur radio stations by the end of September. The Dayton Hamvention special event QSL is in production. Address labels are expected soon. QSLs should be mailed in early October.

ARRL New England Convention at Boxborough, MA, August 26- 27, 2000

The author missed this convention, but thanks to Mike Crestohl, W1RC, his report is located on the web at WB3HUZ's "AM Window" web site, (http://www.thebizlink.com/am/). Look in the recent "Bulletin Board" entries.

This is an edited for available space version of Mike's report. Check out the "AM Window" for the full text and digital images.

"Thinking about it, this is probably the BEST ham radio event I have ever attended in my 30 plus years in the hobby! I do not make this statement lightly as I have been to many wonderful events in the past including many Dayton Hamventions, Deerfields, Gaithersburgs, Boxboroughs, TRWs, Rochesters, et al. But this one was absolutely outstanding from all points of view. First of all, the WX! It was absolutely FB, OM!!!! Sunny, not too hot, not too humid, just perfect! The flea market was also extremely good—I spotted an RCA AR-88 for $75.00 (bought by my friend AE1P), several R-390As priced reasonably, some nice Collins, Drakes, Heathkits, keys, bugs, tubes, parts, etc. all available at decent prices. There was very little computer swill. Although not large in size this flea market reminded me of the times before eBay and rec.radio.swap had become part of the lingua franca. I bought several real neat items, real keepers—like a beautiful Tektronix miniature battery-operated scope ($80.00), a Collins DL-1 dummy load (obligatory Collins content), an R-390 chassis ($10.00) including a beautiful front panel and wiring harness which I need to restore the one I bought for $25.00 that had been stored in a barn and the mice had been sharpening their teeth on the wiring. There was also the un-built Heathkit digital clock, some books and another 1967 contract EAC "parts radio" I picked up for $50.00 after the fest on the way home. I am sure this will work after I provide the missing part —the 3TF7 regulator tube! Oh yes, I had to put the knobs back on. The best buy was made by a good friend of mine who shall remain nameless who snagged a Hallicrafters SX-88 along with

the matching transmitter, an NC-300 and the VHF converter for $400.00! It couldn't have happened to a nicer guy (other than me, of course!) and I am very happy for him.

But there's more to Boxborough than the flea market. There were several interesting forums, including the AM forum conducted by Timothy "Timtron" Smith, WA1HLR and Allan H. Weiner, owner of WBCQ (7415 kHz). It was packed to the doors as usual and a great time was had by all. The evening banquet special guest was Riley Hollingsworth, K4ZDH, who also conducted the FCC Forum with Vinny Kajunski, the FCC man in charge of the New England office in Boston earlier in the day.

I shared a room with Tim Smith and Al Weiner which was an experience in itself. Also we spent many enjoyable hours in the restaurant/bar with many of our fellow hams. Riley stopped in a few times to join our group! I even had a chat with the new ARRL President Jim Hainey whose Texas twang stood out among all the New England accents heard floating around the place. He seems to be firmly committed to helping us hang onto our spectrum as a first priority of his administration and I may even (finally) join the ARRL in support. We boatanchorites will have to help educate him about the pleasures of vintage equipment and AM, but it looks like Tim has gotten him started in the right direction. I was also happy to see a couple of my CCA friends like George Maier K1GXT and Denis Sharon at the fest. Also the Wouff Hong ceremonies were held at midnight and many were inducted into the ranks of this sacred radio society. I wonder how many hamfests conduct this traditional ritual, other than Dayton? Seems to me that nonsense of this sort is what makes this hobby so special.

Boxborough is just the perfect size event - you get to see everybody and there's enough time to visit and chat. Also you know just about everybody which makes for a very friendly atmosphere. There is a lot more to it than the flea market, new equipment displays, forums, special events station, meetings, good food, beer, and two days and one night to enjoy it all. I was particularly pleased to see so many of the new equipment manufacturers, radio dealers, publishers and other vendors in attendance.

This kind of wonderful event does not just happen. It's the result of many long hours or work by many volunteers. I'd particularly like to thank Mike Raisbeck, K1TWF (who is the new General Chairman), Dave Foner, W1TK; William, K1WD; Elliot, W1MJ; Ken, WO1N and a lot more. It's nice to see that these "younger" folks are now organizing and running the hamfest that we all attended as youngsters so many years ago. It also strikes me as very odd that years ago we came to attend the forums and listen to the wisdom of the elders. Today we are the elders (I don't know about the "wise" part) presenting the forums and people are coming to listen to us.

Yes indeed, Boxborough 2000 was a wonderful hamfest/convention/flea market and I'll remember it always. It shows me that hamfests are not dying off as so many would believe. Boxborough was alive and well, healthy and vibrant. There were even several teenagers seen sporting callsign name tags! If you were there you know exactly what I mean. If you weren't, you really missed something very special. However, you can visit it electronically at: www.boxboro.org."

AMI Discovery Weekend

This AM operating event has historically been the second weekend in September. A number of requests were received asking for the date to be set back a few weeks to hopefully take advantage of quieter 160/75 meter band

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The Wireless Set No. 38

by Sam Kelly, W6JTT
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The excellent historical military radio conference at Camp San Luis Obispo in May of 2000 resulted in my being the proud owner of a Wireless Set No. 38 Mk 2* courtesy of Trevor Sanderson, an avid historical radio buff. The No. 38 set is an early World War II vintage British lightweight manpack developed for combat infantry use. Its function was similar to the BC-511 handy-talkie, but the design is radically different. In addition to use as a manpack, it was also used for tank/infantry liaison and other applications. Louis Meulstee, in his excellent publication "Wireless for the Warrior" estimates that during the war, 187,000 sets were manufactured!

The set is tuneable over the range of 7.3 to 9 MHz. The receiver is a superhet with an IF of 285 kHz. Power output was 200 mW, and the operator could use either a 4 foot rod antenna that provided about 0.5 miles range, or a 12 foot rod that provided about a 2 mile range.

The set consists of an RF amplifier, mixer, IF amplifier and detector in the receive chain. The common oscillator is shifted by the 285 kHz IF frequency, driving a power amplifier with an AF amplifier/modulator in the transmit mode. The detector is an early semiconductor diode, a WX6 "Wesector device". Shifting from receive to transmit is by means of a manual

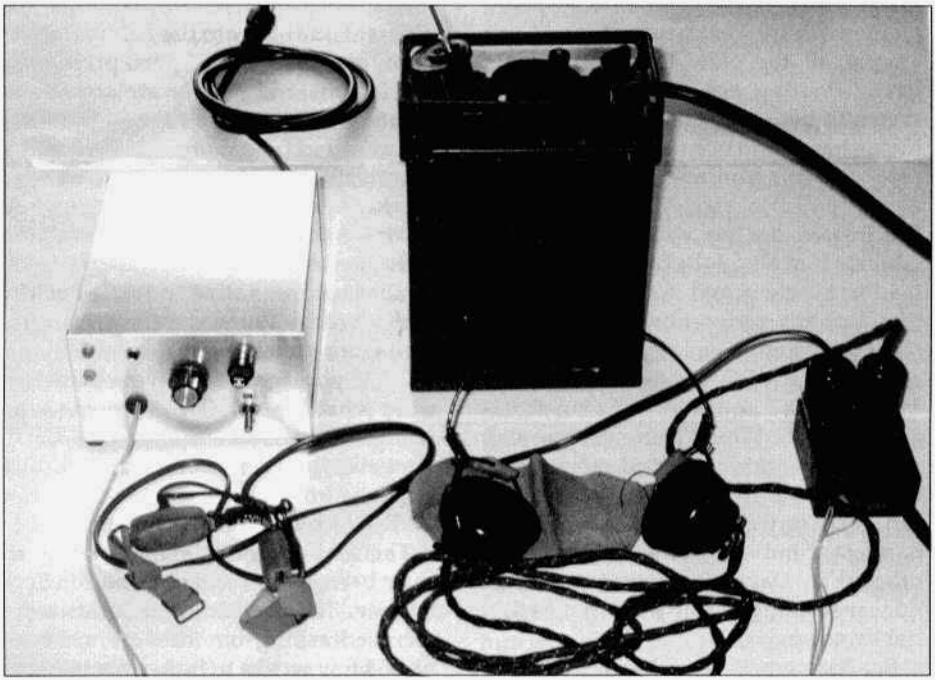
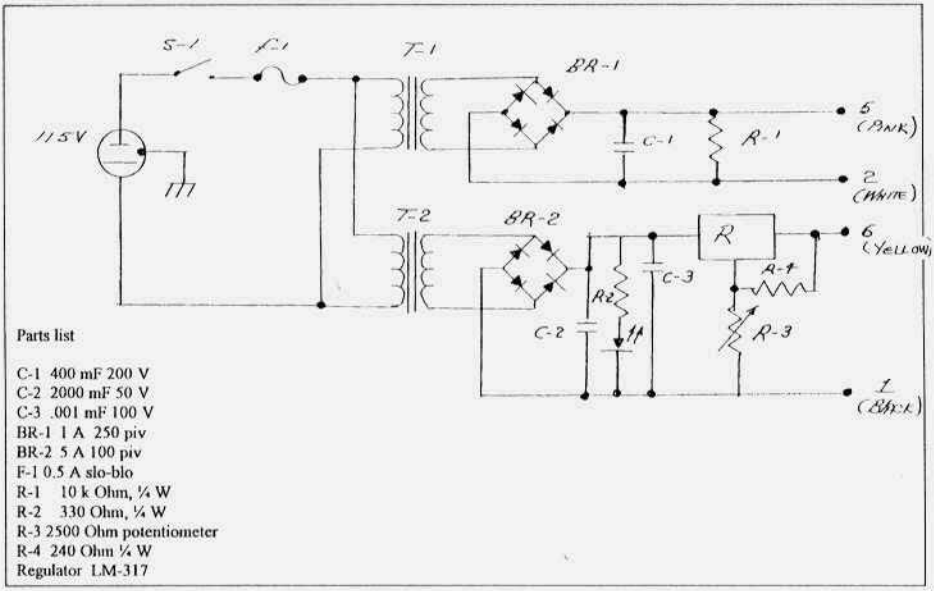


Figure 1. The No. 38 set with AC supply and accessories.



Parts list

C-1 400 mF 200 V
C-2 2000 mF 50 V
C-3 .001 mF 100 V
BR-1 1 A 250 piv
BR-2 5 A 100 piv
F-1 0.5 A slo-blo
R-1 10 k Ohm, ¼ W
R-2 330 Ohm, ¼ W
R-3 2500 Ohm potentiometer
R-4 240 Ohm ¼ W
Regulator LM-317

Figure 2. AC power supply for the No. 38 Set.

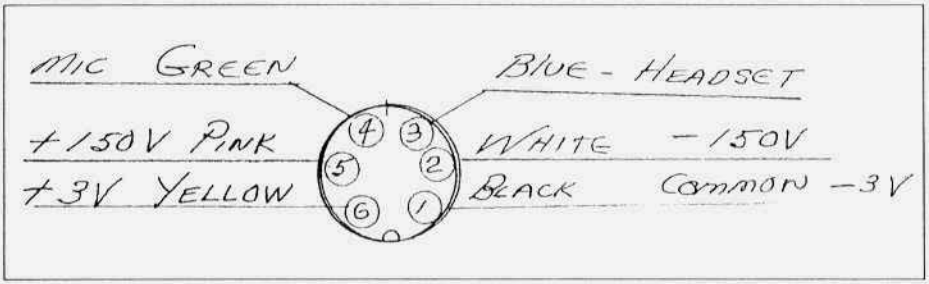


Figure 3. Junction box connections.

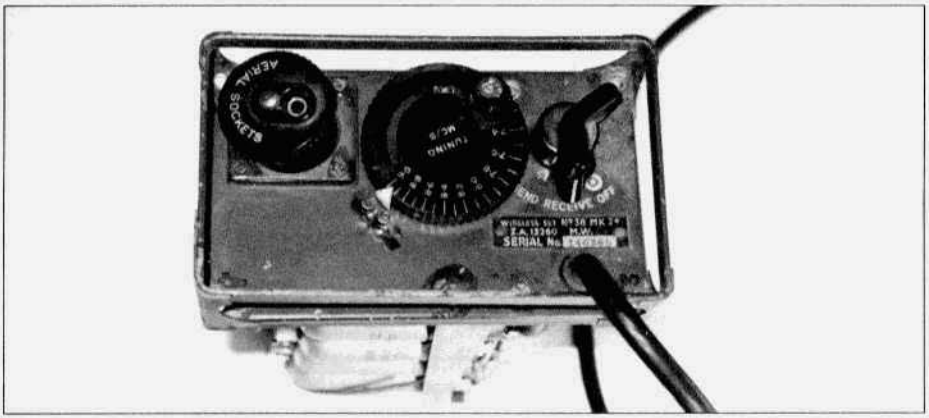


Figure 4. Front panel view. Note that the antenna connector rotates for the 4 or 12-foot antenna.

Figure 5. Interior view of the No. 38 set.

"off", "send", "receive" switch.

There are several "Marks" of the unit, all quite similar in circuit design. Five tubes are used, four of them being ARP.12's and the fifth an ATP.4

Design and chassis layout are quite well done for the period. The Mk III set incorporates a crystal calibrator.

Unpacking the box, I could appreciate that Trevor understood how to pack things! Inside was the No. 38 set, throat microphone, headset and the all-important junction box.

The first step was to build a power supply. The set requires +150V and + 3V as separate supplies. Current for the 150V ranges from 9 to 16 mA. and the 3 V from 240 mA to 480 mA.

The power supply, schematic in figure 2, was built in a 3 1/2 x 6 x 8 inch aluminum box. T-1 is a small 115V to 115V transformer and T-2 is a 5-V 1-A filament transformer.

The 2500 ohm potentiometer provides adjustment of the series filament voltage regulator. Test points for filament voltage adjustment are brought out to the front panel.

Before connecting the supply to the set, load tests were conducted, and the polarities and voltages checked several times! The "valves" are quite expensive! The filament voltage was adjusted to 2.5V and brought up to 3.0V under load. Note that the color code for the wires refers to the wire color used inside the set. If you are missing the little junction box, the connections are shown in figure 3.

I was quite impressed by the quality of the headset. The microphone was a dynamic throat mic. Connecting everything up and crossing my fingers, I applied power!

Amazingly the set came to life! Since it is strictly AM, I immediately tuned to the high power stations at the top of the 40 meter band. Reception was good, but there was overloading and distortion. Audio output was excellent, but the lack of a volume control was imme-

diately noted. It must have been interesting to the soldier with the headset held in-place by his helmet! My test antenna was a 20 foot piece of wire. I later fabricated a 4 foot antenna from 1/8 in. brass rod using a 1/4 in. diameter threaded bushing for the connector to the set. The bushing was turned down to 3/16 in. diameter to mate with the short antenna socket on the panel of the set. Receive performance was improved with less overloading. The cluster of international broadcast stations from 7.3 MHz to 7.6 MHz was easily tuned in. However, there wasn't much in the way of AM for the rest of the band.

Next, a transmitting test was conducted. The design approach accepted substantial drift between the transmitter and receiver frequencies. This was handled by having a broad receiver with at least 12 kHz IF bandwidth. Tracking for the Mk2* set is specified at no more than 2 kHz over the whole band test procedures and alignment test fixtures are described in Meulstee's Volume 2 of "Wireless for the Warrior." This is a British *Radio Bygones* publication.

Switching the "Off-Receive-Send" switch to the send position places the set in the transmit mode. However, this isn't instantaneous. Like the BC-474 and other early WW II sets, you must wait for the filaments to warm up. The transmitter came on, and was readable with very low audio.

Discussions with others working on British or Canadian World War II sets where dynamic microphones are used indicate that this is par for the course as the materials in the microphones deteriorate with time. I thought it amazing that a set over 50 years old would fire up at all.

The next step is a complete alignment and fabrication of a set of replacement antennas. The set has provided me an insight into the World War II British design philosophy for field communications which was radically different from that of the United States. ER

Park Cunningham, W8HSC Remembered

by Paul Courson, WA3VJB

It would have been ten years ago November that I first worked Park, W8HSC and his station at Romney, West Virginia. I haven't heard him on in a while, and I nodded grimly when I read about his passing in Electric Radio.

I've always had a soft spot for Park and others among the Elder Statesmen of ham radio who have chosen to ignore mainstream trends and stay with that which is familiar and pleasurable as they get on in years.

Park was usually somewhat melancholy, always polite and often reflective. His well-worn but comfortable personality matched well his old Apache transmitter and an even older Hallicrafters SX-96.

He was first licensed in 1932, he told me, was 83 years old when I first worked him, and said he usually did a lot more listening than transmitting. In fact, without my ever having worked him previously, he came on and introduced himself to me by comparing unfavorably the sound of a transmitter I had just put on the air and the rig I was usually on with.

Yet it was not a criticism as he encouraged me to look into why there was a pinched sort of audio quality to the latest rig. "You've got some work to do, hi!" he said, according to the quote I wrote for inspiration on the card I started on him for my log file.

Some years later, he was on the air sounding like he had a cold, voice raspy, speaking more slowly. Still, he was in good spirits, remembered me and earlier conversations we had, and commented that he could hear the geese heading north as another season passed.

He said he had migrated to 10 meters for the most part, and was fairly active with an Amelco R-390A and the old

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The Saga of the VT-127A, 304TL, 250TH Amplifier

Chuck Teeters, W4MEW
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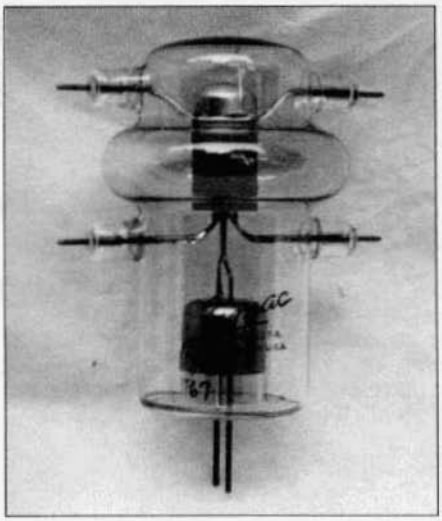
I guess we all get the urge to try to recreate our past sometime or another. My turn came a few months ago when I ran into a 304TL tube at a local estate sale. I had never used or even owned a 304TL before, but it reminded me of the VT-127A rig I built in 1947. The 304TL was a surplus VT-129, while the surplus VT-127A never had a civilian number. Both were cheap surplus transmitting triodes available after WW II. The cheaper of the two, the VT-127 was originally made by Eimac using a 250T filament and a 100T plate in a very strange envelope. Looked like a glass donut with a glass test tube stuck through the hole, two plate pins out the side at the top, two grid pins out the side just below the donut, and two filaments pins out the bottom. The odd configuration was because they were built to use in a VHF ring radar oscillator and referred to as the Zahl tube. Doctor Zahl was the engineer at Fort Monmouth, N. J. that designed prewar VHF radar. Original Eimac VT-127s were rare. Most of the surplus tubes were VT-127As made by Sylvania or Westinghouse. VT-127s transmitted the 205 MHz pulses that bounced off the Japanese planes about to attack Pearl Harbor on December 7th 1941. Sad to say the Signal Corps radar warnings were ignored by Army and Navy Headquarters.

A VT-127A cost $1.25 on the surplus market in 1947. They were written up in the November 1946 QST by W8AFW for the War Assets Administration to sell war surplus tubes and stuff. His article showed how to build up high powered finals with VT-127As. Add a BC-610 plate coil and tuning cap from Leeds for $2, an Amaratron plate transformer from Sun Radio for $6, and a rectifier-filter set from Terminal Radio, which consisted of 866s, filament transformer, filter choke and oil filter caps, for $5 and you had almost a complete rig. You had to improvise a tube socket, and scrounge up some other stuff but $25 was about the tops it would cost to put 500 watts of CW on the air. That was the route I followed in 1947. A piece of plywood and wooden frame held my amplifier. The power supply sat on the floor in a wooden box. I had a great time on 40 CW and managed not to electrocute myself or set the house on fire.

If you never got to "Radio Row" in New York City after the war you missed a great experience. Store after store full of military electronic surplus at dirt-cheap prices. I lived a day's train ride from New York so managed to get there every so often. The real problem was carrying the stuff home on the train. Purchases had to be planned not only in accordance with the finances but so you could get the prizes home. Sometimes I would take a friend along just to provide additional carrying capacity. Look through the back pages of QST or CQ from 1946, or '47 and you will have an idea of the magnitude of surplus radio stuff available.

When I bought the 304TL it started me looking for a VT-127A with the idea of duplicating the 1947 rig. VT-127As seem to have disappeared, at least around here. After several months looking I gave up and decided to build the amplifier around the 304TL using as



The VT-127A

much World War 2 surplus as I could find. Being a pack rat with radio stuff, I had a good start in my junk box. The 304 is made up of four 75Ts inside one envelope. The glass envelope looks like a 4-400 with a small base and a grid pin sticking out the side. The four-pin base is a one of a kind (except for the Eimac 152TL which is half of a 304TL) and requires a special socket. The sockets cost more than the tube back in '47. Like the VT-127A it was used in VHF radar but as a pulse modulator. The filament is split so you can light each half of the tube separately. It takes either 5 volts at 20 amps or 10 volts at 10 amps when you light up the whole tube.

As a concession to modern construction techniques and personal safety I found a metal chassis that was large enough and didn't have too many extra holes. A plate choke from an AN/ART-13 and a bunch of high voltage WW II micas let me use parallel feed. A command set tank coil with a variable coupling link took care of the grid. A tap let it tune both 75 and 40 meters, real deluxe. Series feed of the grid eliminated the need for a good grid choke. A jack bar and tank capacitor from a BC-447 took care of the plate tank. It was a single section cap but some ceramic insulators got it floating so I hoped the tank would be balanced. The spacing wasn't so great but the amplifier was for CW only so it should be good. If I could get the amp working on 80 then I would try moving it up to 40. A 10-volt filament transformer that was used for 813s in a WECo 33A took care of the filament supply. The rest of the stuff just fell into place.

The photo shows the completed but untested amplifier. Also in the photo you can see the smoke inside the 304TL. Don't trust a 60-year-old tube to hold its vacuum. When I first applied filament voltage, the 304 smoked like it was having a nicotine fit. There was enough air inside the envelope to put on a terrific display. So no VT-127A and now my 304TL substitute was just a smoky display tube. I never even got a chance to apply grid drive much less plate voltage.

While I was talking about my troubles at the local radio club, two members offered solutions. KN4AV had a new 833A and K4FKJ a new 250TH and both were reasonable. The 833A sounded interesting but was really too big to fit on the chassis and would be overkill for the rest of the parts I had in the amplifier. The 250 watt plate dissipation 250TH was between the 100 watt VT-127A and the 300 watt 304, so I bought it. All the work finding a socket for the 304 was down the drain, but I had a socket from a BC-375 that would fit the 250. The 250 has a 5-volt filament so the 10-volt transformer was a problem. The transformer had a center tap but it was brought out with very light wire. I cut it short and replaced it with #14. I got 5 volts under load, the transformer didn't run hot, and my 250TH was lit up with no smoke. The grid and plate pin heat radiating connectors that fit the 304 also fit the 250. I had to lengthen the plate lead, as the 250 is over 3 inches taller

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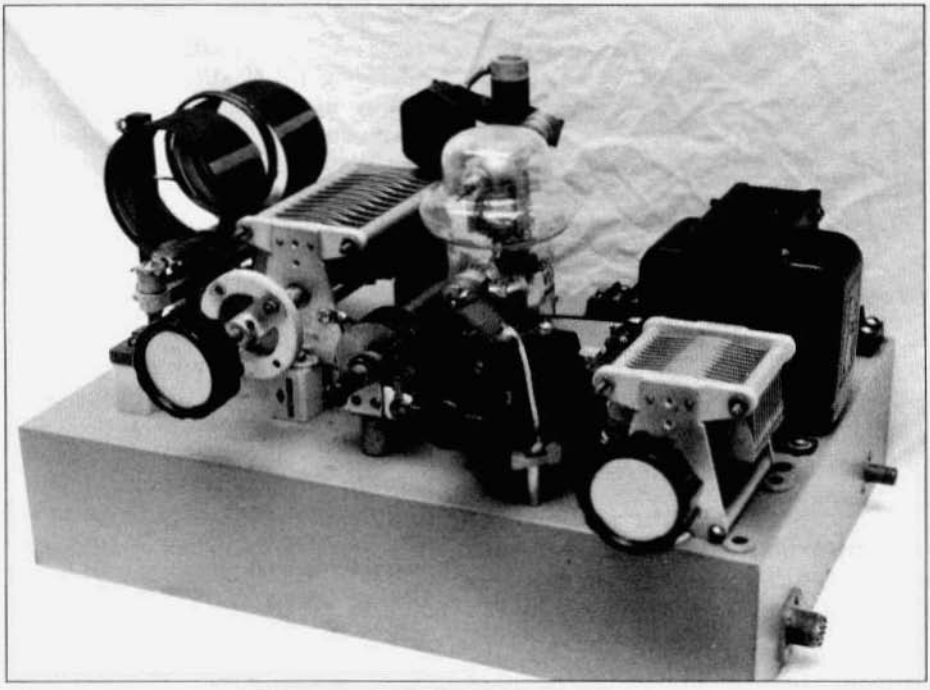

The 80 & 40 meter 400W amp using the VT-127A tube.

than the 304. I should have sub-mounted the 250 socket, but didn't. I never had a chance to see if my neutralizing capacitor was OK for the 304TL. It was the first thing I checked after I applied grid drive from my Ranger and checked that the grid and plate tanks would tune to 3500 kHz. The amp neutralized just fine.

I was not going to cut and drill a 19-inch rack panel yet. I wanted to see if this thing was going to work first. My AM rig has a 2000/2600 volt power supply so I set the taps for 2000 volts and connected it through a 500 mA meter. For fixed grid bias I used a 6-volt filament transformer backwards and got 90 volts DC. The 250TH calls for 140 volts bias on CW so a 1000-ohm resistor would provide the difference between the fixed and operating bias required. I connected a 100 mA meter to read grid current. A dummy load connected to the output link and I was ready to see what would happen.

The 250TH is a magnificent looking tube with its filament lit. I applied grid drive and hit the plate switch. The 250 looks even better with an orange red plate. I dipped the final without looking at the meter, the color of the plate told me when I hit resonance. The plate current was just under 250 mA. Almost 500 watts in. I shut down and connected the Bird in the coax to the dummy load. 340 watts out, not bad. I cut the drive off and the bias took the plate current down to 40 mA. The extra long lead to the 250 plate apparently was just right to eliminate any parasitic oscillations, as I couldn't find any. Even with the haywire connections all over the bench, I couldn't resist connecting the antenna and calling a CQ on the low end of eighty. A 579 from Charleston, not bad for a late summer afternoon. Happy with the contact I set the amplifier aside and announced the results of my CW amplifier project to the world, or at

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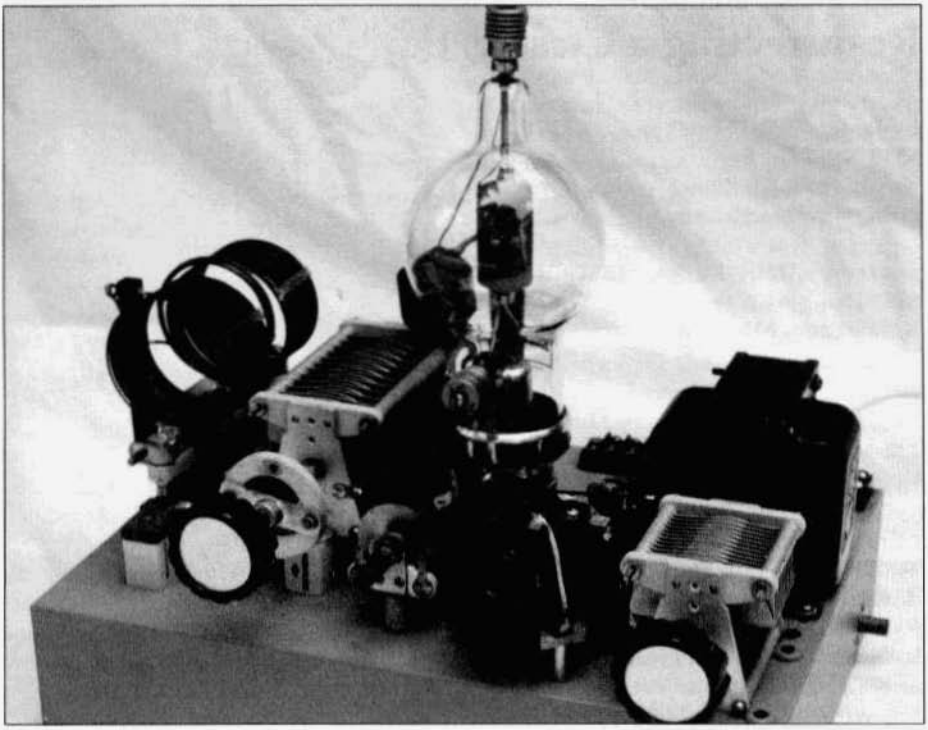

Amplifier with 250TH.

Amplifier with 304TL. Notice the smoke inside the tube.

Resurrecting a Classic, the Hy-Gain HT-18

by James "JeRB" Buchanan, K8WPI
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In a child's eye

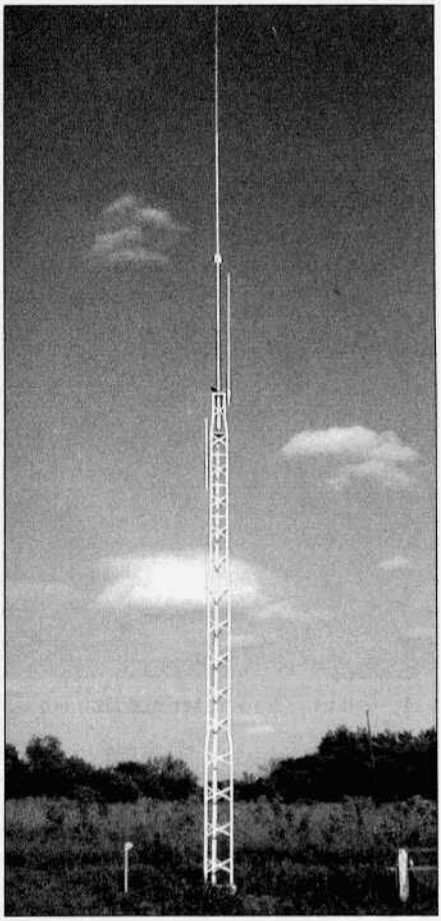
There was no attempt to conceal our exuberance or even keep our voices low as we trekked from Walker's house down the winding residential street to Joe Clapper's house. My elder sister took me to town and I was dropped off at Walk's house for an evening of playing with radios, as was typical for a Friday evening in 1961. Not being old enough to drive, I was stuck at the benevolence of my parents, and held hostage by the transportation whims of my sister. I attended a small school, where it had been nearly a decade since the last ham was around. I was almost giddy when Walker Sisson, WN8CZE, joined the school, as at last there would be someone to share my interests. Walker and I quickly became good friends and spent our high school, college, then another nearly twenty years together as a duo of radio junkies.

That particular night, we were headed a few blocks away to take an unsolicited peek at Joe's (K8TPN) new antenna. As we walked in darkness, cutting across a few lawns to reduce travel time, we were the epitome of youth in our excitement and anticipation. Radio magazines had been showing ads for the revolutionary Hy-Gain HT-18 Hy-Tower for a few months. The ads and comments we heard on the air led us to believe without question that this was the only antenna to have for all-band operation. No doubt, in time it would be the end of evolution, and the only antenna any real ham would consider owning. At a price of $135 in 1961, it was also an antenna for the well heeled ham!

The advantages of vertical polarization for killer ground wave signals at modest distances were only surpassed by the edge-of-the-world DX which would just be waiting to hear from you, if only you had a Hy-Tower. The traditional problem with verticals is they were generally, at the time, a single band antenna and the requisite ground system made them either impractical or impossible for anyone other than a land baron. These two boys of 14 and 15 years old knew in their heart, the journey down the street would lead directly to Mecca. This was not a jaunt to see a Gotham, but a real Hy-Tower. We became quiet as we entered Joe's yard, looking through the dark windows we knew no one was home, perfect! We snuck around back and stood there, admiring this sleek three-section Spaulding tower adorned with various appendages which were quite graceful and obviously purposeful. The non-guyed tower would top out at 57 feet tall, and rest on three slender insulators perched upon stubs anchored in concrete. The simple ground system was six, eight foot ground rods bussed together forming a ground field less than three feet square. As today's youth would say, awesome, dude!

38 years later, an adult's dream

As the years crept by, the legend of the Hy-Tower remained as vivid as recollections of a Big Bertha or a Telrex



The finished installation, a 1976 Hy-tower installed new in 2000, after 24 years in the box.

Monarch Tri-Bander. There are some arrays you just don't forget. Eventually, verticals became more popular and ads for multiband, non-counterpoised verticals proliferated the magazines... and airways. Somehow, this newer generation of verticals never seemed to measure up to the old Hy-Tower. Perhaps it was only nostalgia, but the slim, sleek lines of the extremely sturdy Hy-Tower had been replaced with wimpy sticks of thin wall aluminum tubing with porcupine-ish appendages jutting out at various angles which do not instill confidence of engineering, theory or survivability. The new antennas lack any trace of elegance or grace. The last nearly forty years have brought many antennas into my life, all of which seem to have desirable traits and shortcomings, but in those forty years, I have learned such is the nature of life. Many hours have been spent fondly remembering the Hy-tower, and every now and then I would run into one on the air and quietly smile, profusely.

Stumbling over the Holy Grail

Last year I received a call from my old friend George Riley, W8JFU, advising me of the death of one of his friends, and wondering if I would be interested in looking at his estate of radio goodies. Even though I had been advised the "good stuff" had been willed to some of his lifelong friends, there was still about four acres of stuff available. The next week, George and I headed off to take a look. After hours of pouring through a lifetime collection of radio gear, I noticed the end of a box on pegs affixed to the studs of a wall of one of the buildings. The end of the box was covered with a label reading "Hy-Gain Hy-Tower Model 18 HT". Could it be, really? A quick scamper up the wall confirmed what I thought I saw, and within a few minutes the box was on the ground. We opened the box and found a sealed hardware bag, instructions, and what seemed like miles of aluminum tube. Although we didn't have the tower superstructure, that was (as I thought) standard Spaulding HBX sections 1,2 and 3, which we could (again, so I thought) easily acquire, it didn't make any difference, I had most of the components of an uninstalled Hy-Tower, which was loaded on the roof racks and carted home.

Earning our wings

I started taking inventory and found a couple pieces of telescoping tubing were missing, as well as the previously mentioned leg stub and base insulator.

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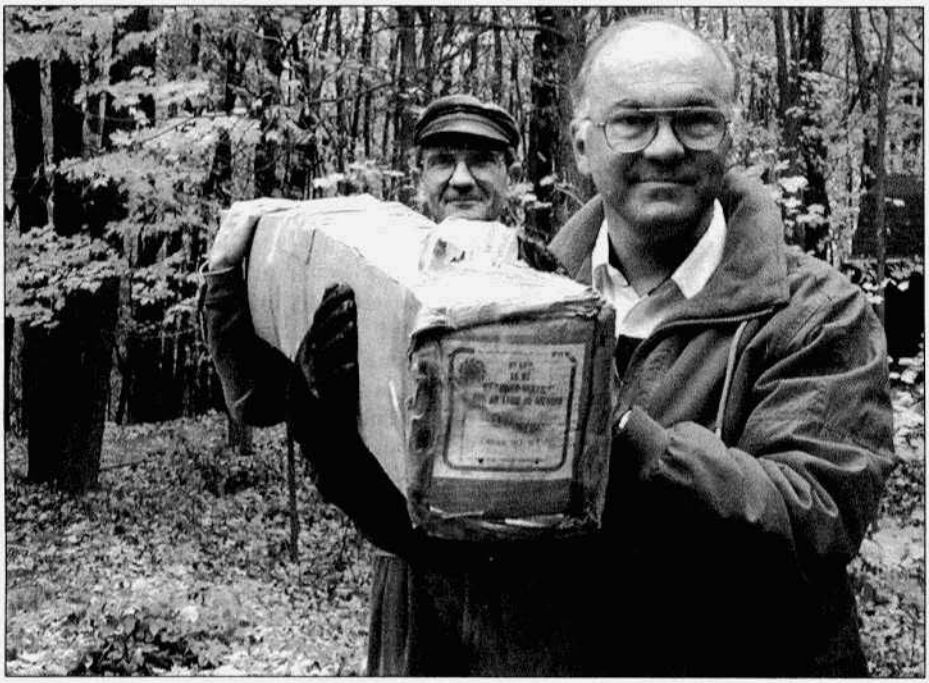

Doug (foreground) and JeRB with the NIB Hy-tower. The winter months would be spent readying the find.

There didn't seem to be much thought given to the matter, the antenna had to be rescued and put into service. The only problem was, I didn't have room for a Hy-Tower. I live in the center of a climax forest, and the tree canopy literally closes us in at the 40 through 70 foot range. Installation of such an antenna seemed like a tremendous waste of time, energy and money; I was doomed. A quick call to my neighbor, Doug Burke, WB8CFV confirmed my suspicions, he would love to have a Hy-Tower. Duh, who wouldn't? So, we started making a plan. We spotted a nice location for the Hy-Tower, nestled between the legs of Doug's rhombic. I would pursue getting three sections of Spaulding/Rohn HBX series tower, have new base insulators made and rebuild the 80 meter spike which was missing some sections, while Doug made arrangements for the base and feed line. It was late fall by the time we started in earnest. I contacted my favorite machinist who agreed to make three base insulators from HDPE. I thought we would be better off with three identical insulators. I knew I could sell the two originals, which would be mandatory to pay for the project. In 1999, base insulators cost more to make than the entire antenna cost when it left production in the late 1970s! Doug hired the base hole dug, and I schlepped the yard of concrete from the local ready-mix company to the site behind Mondo Mistu. The base was installed last fall, as was the conduit system. The Hy-Tower is nearly 200' from the house, so while we had the trencher we used the opportunity to lay conduits not only to the new HT-18 location, but also to the big tower, the barn, the end of the 160 meter inverted L, and any other location where a feed line could be useful. All conduits were filled with pull lines,

A trio works assembling the Hy-tower. The generator provides power for the soldering iron. Each aspect of assembly was delegated to one person for completion.

and vertical uprights with weather heads were added. The back yard (five acres) sort of looked like a drilling field, with little heads sticking up all over the place.

Over the winter months both Doug and I looked for 24' of tower. To our amazement, none was available, which struck us as ironic, as usually towers or sections are a dime a dozen. All we needed were sections 1,2 and 3 of a series of tower made for nearly 50 years, and we couldn't find anything. As springtime arrived, it was decided the only solution was for me to dismantle my 64' tower and donate the top 24 feet to the project. This tower was scheduled for removal anyway, as it just went into the tree canopy and was engulfed by the Sugar Maples and Beech trees. Any antennas were entwined with tree limbs and didn't radiate very well. It was decided I should get the tower down while I am still young and energetic. The top three sections of the tower were wire brushed clean and a coat of galvanized compatible paint was applied. Three full days were needed for cleaning and another three days for painting. This is tedious work when done correctly.

Replacement sections of tubing were acquired and cut to finish the missing parts. The entire antenna was assembled on the ground in front of my garage, to be sure we had all materials and to determine exactly where paint was to be removed from the tower to establish electrical contact between various band elements and the tower frame. It was during this time we noticed the deficiencies in the instructions provided with the antenna. It would have been nice to have done this 40 years ago, when we could call Hy-Gain and ask technical support for explanation of extending an element to 18.75", when the specified element is only 15.375

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Phil Sanders wires the ground field at the base of the Hy-tower. As a new ham first licensed in the spring of 1999 and upgrading to Extra by the end of the year, Phil found this experience is 'A real kick".

inches long. There were a number of such errors in the book, but common sense and patience eventually won out.

One of the worst aspects was learning that the standard tower top and rotor plate come with 2" diameter holes, and the HT-18 needs 21/2" holes to clear the 2" pipe and the insulators. Enlarging the holes to 2-1/2" was sort of a trick, especially on the rotor plate which was riveted into position, and there certainly isn't enough room inside the top section of the tower to use a saw! The manufacturer presumed the feed would be accomplished by splitting the coaxial cable and hard wiring it to the ground field and insulated tower base. This didn't seem appropriate to us, so an insulated SO-239 was fashioned to make easier connection to the antenna.

When we were well-convinced all was well with the world, the entire antenna was dismantled and transported over to Doug's and an erection party was planned. There was no lack of offered assistance to become part of such an event. I doubt the enthusiasm would have been as great for a lesser antenna. Besides Doug and me, Phil Sanders, AB8EO, Jesse Berns, KC8IYC, and Chuck Agosti, WD8AXA showed up for the ultimate erection. Everyone took on an aspect of final assembly depending on their skill/interest level. Jess installed the ground field while Phil provided wiring to the field. I completed initial assembly of the tower with Doug's assistance. When it was together and connected to the base ready to be raised, we all traded areas to double-check each other's work. Everything was re-measured and all hardware was double checked by "fresh eyes' to assure success on the first try.

The moment of truth

As Phil readied himself to drive the golden spike when we raised the antenna to vertical, the rest of us walked the tower up; it was a very uneventful

A closer view of the base assembly showing detail of the base insulators, ground field and the low end 80 and 160 meter loading coil. Old B&W coil stock was fitted with a Lexan strain relief and taps were provided for proper loading of the center 80 meter wire. Eventually, a phantom powered relay will be installed for remote 160 meter change-over. The tap normally stays on the 80 meter position for 80-10 meter operation. The coaxial connector insulating block can be seen below the base T section.

thirty seconds! With the tower secured to its base and final feed components attached, we connected an antenna analyzer to see what we had. As Doug is a CW operator, we selected the lower portion of the bands for initial settings, and began sweeping through the bands. There is no 80 meter setting, only 75 meters, and a brief note in the instructions indicated that 80/160 meter operation is possible by adding a loading coil in series with the tower. So for now, we were quite happy when the antenna dipped at precisely 3900 kHz as specified, all the way down to 1.1:1. Checking the other bands, we stood there in amazement at how each band dipped precisely on frequency, and that the dip was pronounced to a very low value. We sort of expected 1.7:1 as a satisfactory result, and were quite pleased to see the needle rest at 1.1:1 on all bands.

Our original intellectual plan was to use the antenna for a period of time to establish a baseline of performance and make a list of what needed to be done. Well, this was too easy, everything worked perfectly and within a week, I was back over there making measurements for the 80/160 loading coil. A simple fixture was made with tests using an antenna analyzer, and then the final loading coil was fashioned from old B&W stock. The day of the loading coil work was such a beautiful afternoon, I just couldn't resist... Doug was at work, and I ran a coaxial cable from the base of the tower to the FT-900 in my car. I cruised the bottom end of 40 which was dead, then went up to 20 to take a peek. I called CQ and received a response from AA5BU in Austin Texas, who offered me a 599, with peaks to 10/S9. Huck was running about 700 watts into an end fed wire, I gave him a 589, and commented perhaps it should be 599, as he was by far the strongest signal on the fairly quiet band. He was quite interested in what I was running, and when I responded 90W into a vertical, he immediately wanted to know more!

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A Thousand Marbles

Author unknown

Ed. This short article was sent to me via e-mail. The person who sent it to me said that he did not know who had written it. If anyone knows where this came from and/or who the author is, please let me know.

The older I get, the more I enjoy Saturday mornings. Perhaps it's the quiet solitude that comes with being the first to rise, or maybe it's the unbounded joy of not having to be at work. Either way, the first few hours of a Saturday morning are most enjoyable.

A few weeks ago, I was shuffling toward the basement shack with a steaming cup of coffee in one hand and the morning paper in the other. What began as a typical Saturday morning turned into one of those lessons that life seems to hand you from time to time. Let me tell you about it.

I turned the dial up into the phone portion of the band on my ham radio in order to listen to a Saturday morning swap net. Along the way, I came across an older sounding chap, with a tremendous signal and a golden voice. You know the kind; he sounded like he should be in the broadcasting business. He was telling whomever he was talking with something about "a thousand marbles". I was intrigued and stopped to listen to what he had to say.

"Well, Tom, it sure sounds like you're busy with your job. I'm sure they pay you well but it's a shame you have to be away from home and your family so much. Hard to believe a young fellow should have to work sixty or seventy hours a week to make ends meet. Too bad you missed your daughter's dance recital."

He continued, "Let me tell you something Tom, something that has helped me keep a good perspective on my own priorities." And that's when he began to explain his theory of a "thousand marbles."

"You see, I sat down one day and did a little arithmetic. The average person lives about seventy-five years. I know, some live more and some live less, but on average, folks live about seventy-five years." "Now then, I multiplied 75 times 52 and I came up with 3900, which is the number of Saturdays that the average person has in their entire lifetime. Now stick with me Tom, I'm getting to the important part." "It took me until I was fifty-five years old to think about all this in any detail," he went on, "and by that time I had lived through over twenty-eight hundred Saturdays. I got to thinking that if I lived to be seventy-five, I only had about a thousand of them left to enjoy." "So I went to a toy store and bought every single marble they had. I ended up having to visit three toy stores to round-up 1000 marbles. I took them home and put them inside of a large, clear plastic container right here in the shack next to my gear. Every Saturday since then, I have taken one marble out and thrown it away." "I found that by watching the marbles diminish, I focused more on the really important things in life. There is nothing like watching your time here on this earth run out to help get your priorities straight."

"Now let me tell you one last thing before I sign-off with you and take my lovely wife out for breakfast. This morning, I took the very last marble out of the container. I figure if I make it until next Saturday then I have been given a little extra time. And the one thing we can all use is a little more time."

"It was nice to meet you Tom, I hope you spend more time with your family,

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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. Net control alternates between John, W6MIT and Ken, K6CJA.
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, WB0SNF. The Net meets on 14.293 at 1900Z Sunday and is followed by the New Heathkit Net at about 2030Z on the same freq. Net control is Don, WB6LRG.
Collins Collectors Association Nets: Technical and swap session each Sunday, 14.263 MHz, 2000Z, is a long-established net run by call areas. Informal ragchew nets meet 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 Criss, KB8IZX; Don, W8NS; Rob, KE3EE and Huey, KD3UI.
Swan Users Net: This group meets on 14.250 Sunday afternoons at 4 PM CT. The net control is usually Dean, WA9AZK.
Nostalgia/Hi-Fi Net: Meets on Fridays at 7 PM PT on 1930. This net was started in 1978.
K1JCL 6-Meter AM Repeater: Located in Connecticut it operates on 50.4 in and 50.5 out.
JA AM Net: 14.190 at 0100 UTC, Saturdays and Sundays. Stan Tajima, JA1DNQ is net control.
Fort Wayne Area 6-Meter AM Net: Meets nightly at 7 PM ET on 50.58 MHz. This net has been meeting since the late '50's. Most members are using vintage or homebrew gear.
Southern 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, W1ECO.
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 callsigns.
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.
Hallicrafters 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.

Extending the Saga of the HT-4/BC-610

Bob Samuelson's careers at Collins Radio and Hallicrafters

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Robert (Bob) E. Samuelson is a protégé of both Arthur (Art) A. Collins and William (Bill) J. Halligan, two of the more illustrious entrepreneurial titans of radio manufacturing. Bob made pioneering contributions to transmitter technology, as an employee, respectively, of Collins Radio Company (1934-1938) and The Hallicrafters Company (1938-1946). His greatest sense of accomplishment derives from the HT-4, a prewar, medium-power transmitter that evolved into the BC-610, which military authorities declared to be analogous in importance to the Jeep and Garand rifle during WW II (Read, 1943). The BC-610 is arguably the most celebrated transmitter produced in the twentieth-century (See Grinder, 1999, ER #126, #127, and #128 for a comprehensive review of the BC-610).

Creativity is regarded as a complex human phenomenon; in any given individual, it depends on symbiosis among intrinsic and cultural attributes. Genes must be arrayed appropriately and must give rise, in turn, to an inquisitive, exploratory intelligence. These natural qualities are for naught unless a supportive work environment both nurtures and sustains expression. Finally, for a person to be judged truly creative rather than lucky, not one or two, but a series of novel, functionally desirable products have to be forthcoming. Bob Samuelson demonstrated brilliantly early in his professional career that he embodies these criteria.

Samuelson has published two insightful autobiographical papers that affirm my appraisal of his creative aptitude (Samuelson, 1989, ER #8; 1990, ER #11). My purpose here is (1), to highlight the experiences and accomplishments, first at Collins Radio, and subsequently, at Hallicrafters, that qualified him for designing the HT-4, and (2), to describe briefly how the Signal Corps and Hallicrafters cooperated in evolving the BC-610. My sources are primarily Bob's autobiographical materials, data from his personal files, and an informative, lengthy interview with him, Spring 2000.[1]

Bob Samuelson at Collins Radio

Radio broadcast stations proliferated during the early 1920s, and the gift of a crystal set initiated Bob into the vicissitudes of radio technology. Bob became an avid listener. A desire to improve his means of copying distant stations stimulated him to augment his meager store of knowledge by reading popular magazines, like **Radio Broadcast** and **Popular Radio**, which were beginning to mushroom like wildflowers. He studied carefully circuitry and construction articles, and he built successively complex crystal, regenerative, and superheterodyne receivers.

Bob figured his best prospects for employment were in the field of mechanical engineering, so he chose it as his major at the University of Minnesota. After earning a B.S. degree in 1933, he entered the M.S. program in radio communications (Electrical Engineering). He never completed the program at Minnesota. One of Bob's classmates, Loren Toogood, had become a close friend, and he soon proved himself to be as helpful as any friend could be in

advancing Bob's professional career! While Bob pursued the M.S. degree, Toogood returned to his home in Cedar Rapids to work for his boyhood buddy, Art Collins. He had been in Cedar Rapids only a short while when he called to inform Bob that Art intended to hire a few engineers and to ask whether he would be interested in joining the company? Bob then met with Art in Cedar Rapids; Art was impressed, and he hired Bob as a radio engineer, to start, April 1, 1934.

Collins began manufacturing low-power transmitter kits in his basement (QST, 1932, p. 77), and by 1933, sales enabled him to acquire eight employees and to incorporate with $29,000 capitalization. Admiral Richard E. Byrd then selected Collins Radio to build the radio telephone transmitters, including a one-kilowatt unit, for his 1933 Antarctic expedition. Word of Byrd's high regard for the fledgling company spread, and orders accumulated swiftly, which necessitated rapid growth in research and production facilities. Indeed, total sales of $129,000 in 1934 doubled in 1935, and increased to $391,000 by 1936 (Braband, 1983).

Art Collins had first attracted Byrd's attention in 1925 during Commander Donald B. MacMillan's second Arctic expedition. The latter event was widely publicized as amateurs throughout the country struggled to contact expedition station, WNP, with John Reinartz, 1XAM, its radio operator (Forbes & Reinartz, 1925; Warner, 1925). Art Collins, 9CXX, at the time a 15-year-old who was operating an extraordinarily well-built 20 meter transmitter he had constructed, was consistently more successful than other amateurs in working WNP. [Reinartz had chosen 20 meters, then a mysterious, relatively high frequency, because he believed it would be the best available frequency for making contacts during continuous daylight hours.] Collins not only relayed messages from WNP to the Navy but also ran cooperative tests with Reinartz as they investigated 20 meters. Richard Byrd, a junior officer of the expedition, admired the lad's accomplished skills. Later, when he learned that Collins had commenced manufacturing transmitters, he turned to him.

Bob felt somewhat intimated during his first days on the job, especially since several new radio engineers were also joining the company. After all, he had been trained primarily as a mechanical engineer and had been hired as a radio engineer. But he found himself busier than at anytime in his life.

Bob's first major task was to improve the test facilities in Art's laboratory. Meanwhile, Collins Radio was beginning to obtain requests for special receivers as companion equipment for its praiseworthy line of commercial transmitters. Given Bob's broad knowledge of practical receiver technology, he soon found himself active in receiver development. His training in mechanical engineering proved invaluable for the tasks of designing cabinets and chassis with new aluminum alloys for three models of aircraft receiver. Bob's attention turned eventually to developing 100-watt aircraft transmitters. He and a colleague resolved the knotty technical problem of resonating an "'electrically short antenna"' for an aircraft transmitter, which operated from 300-600 kHz, by developing a series loading coil configuration tuned closely to antenna capacity. Six years later he adopted this approach in designing the BC-939 antenna tuner to match the output of the BC-610 to a sixteen foot whip.

A few months before he departed Minnesota, Bob acquired finally, in February 1934, an amateur license, W9RAD. As the years slipped by, Bob never put a station on the air, and his license expired eventually. He had invested considerable energy in attaining sufficient code speed to pass the test for

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a license, and given the appeal of communicating with faraway places, it appears today counter intuitive that he would forgo so readily his operating privileges.

Bob was too busy and too engaged in his work, however, to become a conventional amateur. Indeed, nearly all amateurs in the 1930s were, like him, inveterate experimenters, tinkerers, and constructors. For example, a fairly large survey of amateurs in 1938 revealed that 88% of the respondents preferred to *"build their own"* (italics in original) transmitters (Secor, 1938, p.374). The majority earned their livelihoods outside of radio as physicians, dentists, ministers, writers, lawyers, musicians, business executives, office workers, salesmen, merchants, college and high-school students, housewives, etc. These preoccupied amateurs squeezed in opportunities to build their radio projects during evenings, weekends, and other spare moments. Bob Samuelson, on the other hand, luxuriated in professional responsibilities where he was paid a salary explicitly to design, experiment, tinker, and build new radio equipment. His interest in operating an amateur station thus waned perilously as he invested his creative talents, first at Collins Radio and later at Hallicrafters.

Art Collins in 1936 conceived the idea of an "Autotune" system, whereby an operator could choose automatically ten frequencies with a press-to-talk microphone, which controlled a standard ten-digit telephone dial. Bob was asked to integrate telephone-type relays and switching mechanisms with a 100-watt aircraft transmitter that he was helping design. The transmitter incorporated Class-B, plate modulation. [Bob had become convinced that the method delivered a strong, undistorted signal. He stuck with his conviction when he designed two-years later the modulator for the HT-4/BC-610.] The Autotune mechanism and the voice-quality of a Class-B modulated transmitter proved to be enormously popular among pilots. To show their appreciation, Bob was invited to be a guest passenger on the inaugural flight of a Braniff Airlines DC-2 transport plane that had been outfitted with the new equipment. Shortly thereafter, Braniff became the first airline to supply its entire fleet with Collins apparatus (Braband, 1983).

Bob concentrated on refining ground transmitters with the Collins Autotune system during the latter half of 1937 and early months of 1938, until the course of his professional life again changed abruptly. Bill Halligan and his staff had determined that a propitious moment had arrived in the amateur radio market for manufacturing completely wired and tested transmitters (Grinder, 1999, ER #126; Samuelson, 1990, ER #11). They were confronted straightway with the fact that at Hallicrafters no one possessed sufficient expertise to design transmitters that would wean typical amateurs away from home-construction projects. Loren Toogood, Bob's enormously loyal friend, who had departed Collins Radio two years earlier to become Chief of Production at Hallicrafters, spoke up at a staff meeting to assert that Bob had the requisite transmitter experience and was the ideal man for the job.

Bob Samuelson at Hallicrafters

Bob drove to Chicago in March 1938, to meet with Bill Halligan. He encountered a man, "impressively friendly and gregarious" whose enthusiasm was "infectious." The real "Halligan phenomena", which he identified after he was on the job, revealed that while Bill projected an easy insouciance, he was dedicated uncompromisingly to achieving one enduring objective: to create a line of products advanced technologically, from which at least one item, manufactured to provide maximum quality for its price, would fit the budget of every amateur. Bob regarded Art Collins as

less concerned about breadth and more interested in manufacturing specific items at the highest possible quality, regardless of cost; he was a highly focused leader who might intrude deeply into design and construction issues. In contrast, Bob viewed Halligan as centering his restless energy on pruning ideas, which he solicited willingly and sociably from anyone who might facilitate attainment of his basic objective.

Bill Halligan had acquired a vast store of practical knowledge during his years as a radio operator aboard ships and his work in Boston as a radio reporter for the **Boston Telegram**, parts distributor, and merchandiser. He was more sensitive to the needs of amateurs relative to receivers than any of his employees. His experience enabled him to assimilate worthwhile ideas swiftly and to guide others to inferences that they might not have seen in advance. Once he arrived at a position that was practical technically and compatible with his aesthetic expectations and anticipated production costs, he turned to his design and production engineers to bring the prospective receiver to market. Circumstances were usually exacerbated because Bill sought to have every forthcoming receiver advertised and marketed to distributors as expeditiously as possible. To compress the time frame, new receivers were often advertised heavily during their transition from design/engineering to production phases. Consequently, employees at Hallicrafters worked frantically nearly all of the time.

Bob has stated, "Bill attracted good people. He knew everybody in the plant by name. He had a helluva sense of humor. He could be tough—he could chew us out one guy at a time, or as a group. But he was fair, and he created a great work atmosphere. We all felt tremendous loyalty toward him" (O'Brien, 1992, ER #38, p. 10). In contrast, Connelly (1944, p. 37) said that Halligan "brought terror to loafers and absentees, and generous rewards to workers and presentees". Samuelson maintains today, however, that the "terror" assessment is an exaggeration; he emphasizes that Halligan had a terrific sense of humor and was very sincere and gracious with employees.

Furthermore, Samuelson reflected a few years ago upon his eight years with Hallicrafters with these comments: "The best experience a young radio engineer could have had in that era. Bill Halligan let us feel the real joy of *creativity* [italics added]. It was an unorthodox place to work in a lot of ways. Nobody kept real track of our [senior staff] time; we came in the door early in the morning and went out at night when we felt we'd done what we could for that day. And every now and then we didn't accomplish too much because Bill liked to throw parties in the plant to keep up morale. We worked hard, but we had fun, too. I cherish the memories of those years." (O'Brien, 1992, ER #38, p. 36).

Bill Halligan insisted that every model in his line of communications receivers possess a "professional appearance". The features, in essence, were biased to exude a dignified, traditional impression. As the product line expanded, and as it gained favor and acceptance in the amateur community, Bill sought to enhance its marketability with touches of futuristic styling. Bill's desire intensified after he encountered, some time in 1936, James L. McLaughlin, a sophisticated radio technician and gifted artist who had returned recently to Chicago from a lengthy Tahitian sojourn. Bill liked his work and hired him as the "Industrial Designer" for products at Hallicrafters. As events at the company unfolded, McLaughlin's first creation influenced Bob immensely as he determined housings for his transmitters.

McLaughlin and Karl Miles, Chief Engineer, who was one Halligan's first employees, collaborated in developing

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the Skyrider dual-diversity (DD-1) receiver (McLaughlin & Miles, 1937; see Grinder, 1999, ER #126, p. 10 for a picture of the DD-1). The DD-1 was designated to become a super-eminent receiver in the product line. Karl Miles, with help from Ferd Schor, Receiver Engineer, worked out the theoretical and technical aspects of the receiver. The separate input circuits of the DD-1 diversified radio signal reception and minimized effects of fading on signal readability. It represented technical implementation of concepts in receiver theory heretofore unavailable commercially to amateurs.

McLaughlin's first major contribution at Hallicrafters was to design a stunning, "art deco" cabinet for the DD-1, which he contoured to sit conveniently atop a floor-mount Jensen bass-reflex cabinet. It is about 32" long, 15" high, and 19" deep. The verticality of the center portion of the brushed aluminum panel is accented by flanking it at each end with panels, 7" x 4", tilted backwards about 20 degrees. Decorative, horizontal chrome trim strips are placed above and below the panels to accent their tilt.

The DD-1 was to be marketed at about $500, which was nearly four times the price of any Hallicrafters receiver currently in production. It had been in development nearly two years, and it was ready to be introduced to distributors at the Chicago Radio Trade Show, June 1938.

Bob Samuelson was a relatively sophisticated, twenty-seven year-old Collins radio engineer when he arrived at Hallicrafters to design transmitters. His undergraduate training ensured that he was well grounded in the intricacies of mechanical design. His credentials in electronics had been established by a brief period of graduate work in radio communications augmented by fours years of persistent challenge to meet very high standards in creating aircraft receivers and transmitters. In the process, as part of his on-the-job training at Collins, Bob developed a personal planning notebook of "circuits I would like to build." The contents recounted his findings while trying out new tubes, components, and techniques.

The Hallicrafters factory in 1938 was located in downtown Chicago in an eight story building at the corner of 26th St. and Indiana Ave. Various unrelated tenants occupied floors 2-5. Offices of Bill Halligan and senior staff members, Engineering Laboratories, Model Shop, and Cafeteria were on the 6th floor. Manufacturing, Stockroom, and Final-Testing facilities were on the 7th floor. Shipping and Receiving activities were at ground level, where space was shared by tenants and a couple of taverns. When Bob stepped out of a rickety elevator at the 6th floor on April 4,1938, his first day on the job, he encountered Karl Miles and Ferd Schor. As often happens in a busy factory, a new employee's job description is mainly in the boss's head. Miles and Schor were thus perplexed; to be helpful, they showed Bob to the only space that seemed available for him—a 20-foot lab bench cluttered with abandoned chassis, parts, papers, wires, and scraps. Within a couple of days, Bob had cleaned and washed the bench and had located a desk for his papers and a table for doing layouts and drawings.

Bob's modus operandi was to set up "breadboard" test circuits to confirm specifications empirically. Consider, for example, the implementation of the HT-1: The transmitter was to have a 100-watt CW, 50-watt AM final, an exciter comprised of a crystal oscillator and doublers, with band-switching across any three bands from 160 to 10 meters, a speech amplifier driving an AB, modulator, and self-contained power supplies. Once the HT-1 specifications were met, Bob drew upon his mechanical

engineering background to address the issue of its housing. However, since Bill Halligan wanted the HT-1 and DD-1 in complementary cabinets, Bob merely commandeered a spare DD-1 cabinet for the HT-1. The foreshortened cabinet-selection process enabled Bob to have a model of the HT-1 ready for the June trade show—a few months before it would be in production. Moreover, everyone at Hallicrafters was so pleased with the choice of the DD-1 cabinet for the HT-1 that Bob adopted it subsequently for the HT-2 (CW only model of HT-1), HT-3 (marine receiver-transmitter), and HT-4 (exciter deck of the HT-4).

THE HT4/BC-610

The HT-4 is an instance of form preceding function; its cabinet style was determined before its circuitry. From Bob's earliest days on the job, Bill and he "kicked around ideas" about housing a medium-power transmitter. "How," they asked, "could we get a higher-powered xmtr into the living room—not in an ugly six-foot rack, but in some kind of a pleasing console" (Samuelson, 1990, ER #11, p. 27). Bill believed that wives of amateurs were appalled by exposed, dangling wires, protruding tubes, and components seemingly piled together in either breadboard layouts or towering metal racks. He observed that they, like most wives, were conscious of style and harmony in dealing with artifacts in their homes. The dilemma resolved itself one day when Bill proclaimed, "Look at that DD-1 receiver on that floor mount speaker cabinet! Doesn't that look great? ...Hey, let's set the HT-1 on the cabinet, and imagine it all in one piece!" And then, gently twisting Bob's arm, Bill said: "Hey, Bob, see what you could do with something this size" (Samuelson, 1990, ER #11, p.27).

The form of the HT-4 cabinet now a "given," Bob set forth enthusiastically to design a spectacular transmitter. He used the notebook of circuits he had conceptualized earlier at Collins to configure a transmitter with three decks: On the top deck, he placed the exciter and power amplifier; its outward appearance, including chrome strips, simulated the cabinet of a DD-1. The middle deck held the audio drivers and modulator. The heavy power supplies were located on the bottom deck. Bob also designed a "stressed skin/braced chassis structure" for the HT-4, which reduced its weight to about 400 pounds. Bill and Bob also sought to minimize the number of controls on the HT-4. "Make it easy for a new ham to get an old-timer's results out of it", Bill said (Connelly, 1944, p. 48).

The accompanying speech amplifier (HT-5) for the HT-4 was situated in a separate metal cabinet (see picture of HT-4 and HT-5 in Grinder, 1999, ER #126, p. 13). The schematic circuits of the HT-4 and HT-5 are shown on the following two pages. Each circuit is reprinted from its original manual.

The HT-4 produces power output of 450 watts CW and 325 watts phone. Bob employed an RK-63 in the final of the HT-4, driven by a pair of RK-39s. He used RK-38s in the Class-B modulator, driven by 2A3s in Class-A. Output tank coils are plugged in singly for particular bands and are tuned from the front panel. A bandswitch on the front panel selects the circuits associated with a "plug-in box", where the tuning elements for all the exciter stages are assembled. Given "boxes" operate differentially on amateur bands between 10 and 160 meters; any three at a time can be inserted inside the HT-4 on the RF deck.

Note that Bob elected to operate the plates of the 2A3 push-pull Class-A drivers below ground in order that one power supply could also provide negative bias voltages for the Class-B modulator tubes and the grid of the Class-C final (see Grinder, 1999, ER #127, pp. 7-8).

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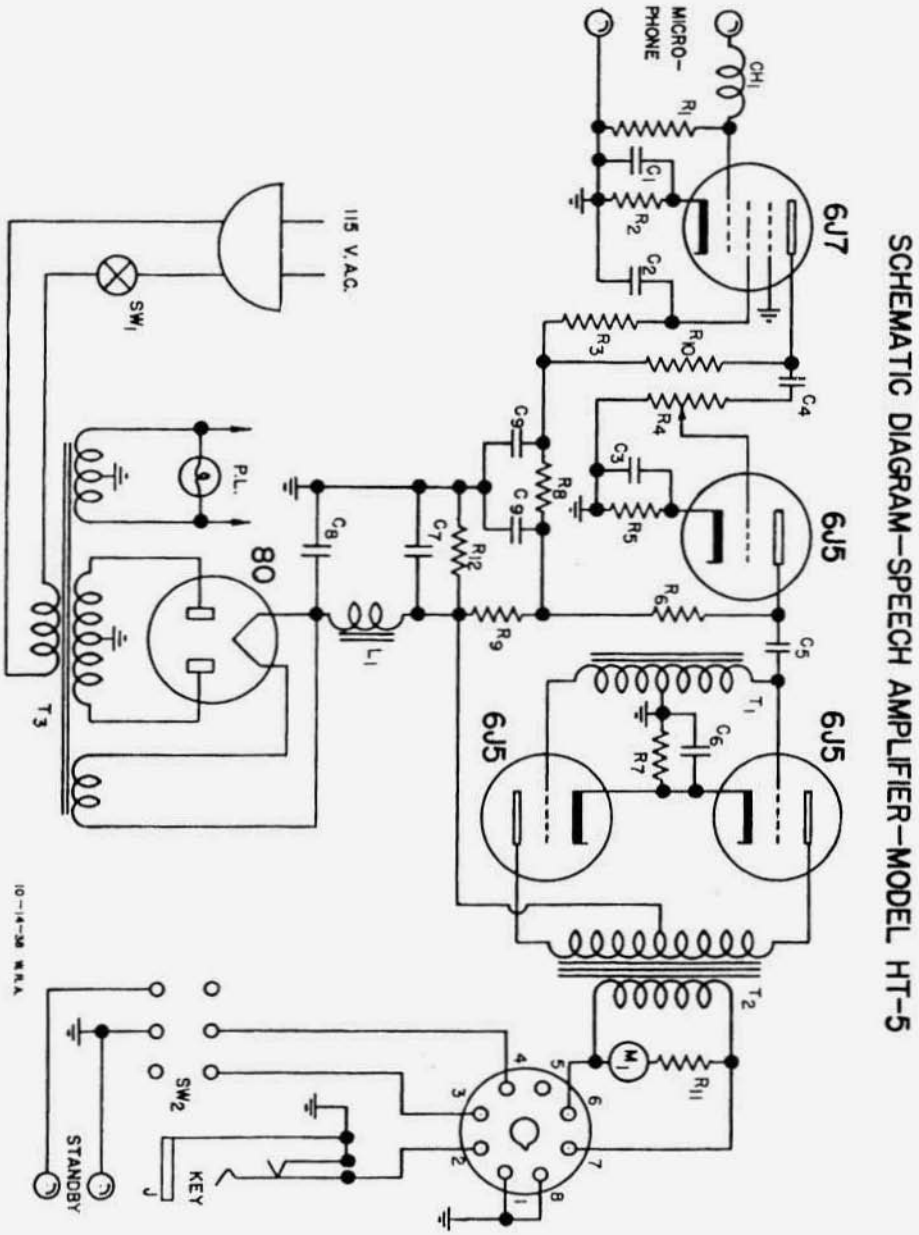
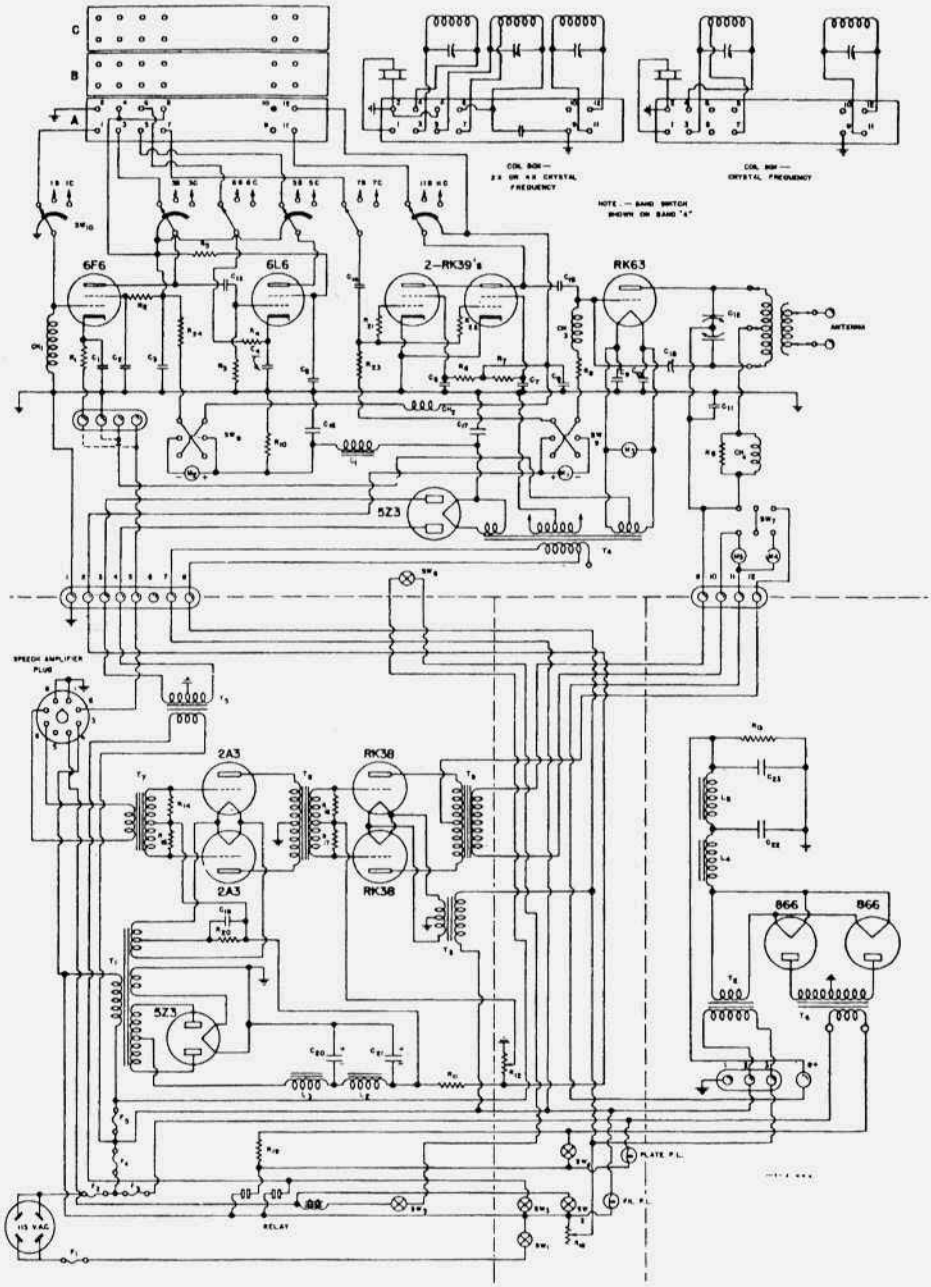


A draftsman and a few technicians, along with helpful counsel from colleagues, assisted Bob in creating the first HT-4. Remarkably, a scant few months after he began the project, Bob enabled Hallicrafters (a) to have advertising copy ready in September for the November issue of **QST** ("Advertisement", 1938); (b) to present a prototype of the HT-4 at the September 1938 convention of the American Radio Relay League (ARRL) in Chicago; and (c) to



Schematic diagram of the Model HT-4 transmitter

have an operational unit for Bill to experiment with from his home station, W9WZE.

The late-1930s amateur community responded tepidly to the HT-4 (Grinder, 1999, ER #126, p. 13). Production was labor-intensive, and since only about 20 had been produced in 1939; pros-

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pects for recovering production costs were fairly dim. Bill Halligan thus was preoccupied selling amateurs and distributors on the advantages of the HT-4 when, unexpectedly, a delegation of British and French commissioners and engineers knocked on the door of his office. They placed an order for every HT-4 and SX-28 that the Company could produce! Their arrival, stemming from a raging war in Europe, marks the moment when perspectives at Hallicrafters changed radically. Selling activities subsided; production urgencies became paramount. More space in the building was rented; jobbers and suppliers were cajoled into accelerating material and component deliveries; assembly lines were made more efficient, and more technicians were hired to craft items on the lines. Calls for immediate action punctuated the atmosphere, and consequently, production of HT-4s was hastened to more than 20 a month.

Simultaneously, the U.S. Army Signal Corps saw a major war on the horizon and was searching frantically for a transmitter that would facilitate communications among fast-moving armored forces. Heightened expediency yielded only one option: locate a mass-produced transmitter that met the following criteria: carry voice communications over a wide range of frequencies (effectiveness); operate reliably whatever the terrain (durability); possess relatively few parts, assemblies, and power sources (avoid breakdowns); be relatively light weight (maneuverability); be constructed of readily available parts and materials (prompt serviceability); be designed for rapid mass production (availability); and importantly, be easy to operate (facilitate personnel training).

Four men at the Signal Corps general development laboratories at Ft. Monmouth, New Jersey, were responsible primarily for finding a transmitter that would satisfy the criteria: Colonel Roger B. Colton (in charge), Major William S. Marks, Captain W. F. Soules, and John Jipp, a civilian engineer. The team evaluated via grueling tests at least twenty transmitters before they settled on the HT-4. During informal discussions with Hallicrafters' personnel, durability arose as an utmost concern. On one occasion, Bob overheard a member of the Signal Corps team suggest that "maybe they should drive the HT-4 in a hearse over the winding roads of New England to see whether they would end up with a box of parts."

Fortunately, the Signal Corps elected instead to evolve the BC-610 by altering the HT-4 systematically. Tests were conducted at Ft. Monmouth; implementation was carried out at the Hallicrafters factory. Specifically, John Jipp was the conduit who usually conveyed recommended modifications to engineers in the Hallicrafters production department. The mechanical and electronic modifications to the HT-4 that led to the BC-610 are detailed in Grinder (1999, ER #127). None altered significantly the operating characteristics of the HT-4; hence, Bob was customarily on the sideline during these deliberations. He had moved on to develop the HT-6 (May, 1939) and the HT-9 (early 1940) (O'Brien, 1992, ER #38).

However, as the Signal Corps moved to establish the BC-610 as the centerpiece of army mobile communications, Bob stepped up to solve the vexing problem of matching the various output frequencies of the BC-610 to a 16 foot whip antenna. The Signal Corps aimed to house a BC-610, receivers, control units, spare parts, antenna tuner, etc. in the rear of a one-and-one-half-ton panel delivery truck. A gasoline generator towed by the truck supplied power to the equipment. The Signal Corps designated the mobile system as the SCR-299, and it emerged eventually as one of the more prominent communications installations of WW II. Bob ensured its

operational feasibility by dipping into his earlier experience at Collins with aircraft transmitters and electrically short antennas to develop the incomparable BC-939 antenna tuner, which can be used across a wide range of frequencies with either a whip or long wire antenna.

The final assembly of SCR-299s constituted a major logistic challenge. The panel trucks, generators, and trailers were shipped to Chicago from Michigan and stored by the hundreds in the enormous Chicago international amphitheater. The BC-610s were assembled at the Hallicrafters factory, although some chassis and, perhaps, a few complete units were assembled at companies like Barker & Williamson when demand exceeded local capabilities. Finished BC-610s were then warehoused in a huge, barn-like building, located near the Chicago airport. Here, technicians from Hallicrafters installed the BC-610s and auxiliary equipment in the panel trucks. The SCR-299s were then tested and certified ready for shipment to battlefronts all over the world. **ER**

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Footnote

[1]Bob Samuelson was born in 1911 and grew up in St. Paul, Minnesota. He left Hallicrafters in 1946. He then earned a Ph.D. at Northwestern, and, in 1950, joined the Government Electronics Division of Motorola, Phoenix. He retired from Motorola in 1976 and lives currently in Scottsdale, AZ. I am very grateful to him for providing a large proportion of the data that has made it possible for me to prepare this article. The interpretations and judgments that I have advanced herein, however, are solely my own.

The JRC NRD-1EL

A Japanese LF/HF Receiver

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Recently, I had the good fortune to acquire one of these rigs from a gentleman in New Zealand. It is a marine receiver and was salvaged off the Kobayashi Maru 21, an ocean-going vessel which had been mothballed in Nelson Harbor. The Japan Radio Company has a long history of providing high quality HF rigs for deep-water vessels and remains in that business today. I had found some info on the rig and the company's history in Fred Osterman's omnibus collection of shortwave receivers. The NRD-1 was produced in the late sixties and appears to have been the last of JRC's hollow-state rigs. Within two years, they were offering a receiver with similar specs and appearance that was completely solid-state.

Functions and Controls

The receiver covers 90khz to 30 MHz. The large knob on the left of the faceplate is a detented switch that selects from 0 to 29 one MHz band segments. Tuning within a band segment is achieved by turning the large central knob. It runs smoothly, but without "flywheel effect." The frequency indicators are a digital sliderule at top with numerals for each MHz segment, and under that, an analog sliderule which reads position within the band segment labeled 0-10 x100 kHz, augmented by a circular readout above the tuning knob with numbered marks every 5 kHz and hash marks at each individual kHz. There is some room for interpolating to about 200-300 Hz. A "zero set" knob controls the position of a fiducial overlay on the kHz readout.

It seems every manufacturer has to add their own wrinkle to frequency display, and JRC is no exception. In addition to being able to see the two linear cursors through clear sections of the dial glass, each clear segment is mated with a frosted segment, the MHz segment being labeled with number [0...29]. Once the rig is powered on, the purpose of these becomes obvious. The appropriate MHz number is silhouetted by a sharp backlit square of light surrounding it, and a similar arrow shaped projection appears in the lower frosted portion to give an indication of where the rx is tuned within each labeled 100 kHz region. I believe this is done by having two bulbs at the extreme right-hand edge project a focussed beam of light onto two mirrors aimed 45 degrees, so that the light is reflected from the side frontward onto the back side of the ground glass. It's really quite effective!

One of this receiver's more unusual features is the motor-assisted tuning. The "Auto" switch on the front is a two position momentary switch that engages a friction clutch on a disc attached to the main tuning knob. While pressing this, the knob spins quickly to the left or right as desired, covering an entire MHz segment in about five seconds. Overrun is prevented by microswitches at either end. No "R-390 wrist" here!

Toggle switches activate the BFO and 100 kHz calibrator. Separate knobs are provided for RF and AF gain. There is also a variable BFO pitch knob with a labeled mark for the "SSB" position.

Front panel view.

Bandwidth is selectable via a knob with options for 6 kHz, 3 kHz, and 1 kHz. The 6 kHz position is implemented using tuned circuits, but the other two positions select Kokusai mechanical filters. The "EH" variant of this rig had one more mechanical filter bandwidth, a tight 0.5 kHz for CW. As far as I can tell, this was the only difference between the two models.

Two more toggle switches are labeled "A" and "B". These turn the unit on. The manual instructs the user to flip the "A" toggle, wait a bit, and then flip the "B" toggle. I can't tell if this is some relic from the distant past, or a odd way to avoid applying HV too quickly through the silicon rectifiers, but it certainly isn't ergonomic. BTW, the five toggle switches on the front are not plated. I suppose any serious piece of marine gear should have some brass to polish.

The "S" meter has two switch selectable scales one of which is used in conjunction with an inside cabinet knob to adjust the AC inlet power (via taps on the transformer) to the 100V Japanese standard. The other scale provides for a dB readout of the signal strength taken from the AGC line.

The function of the "Attenuator" knob/switch varies depending on the band in use. The attenuator is only active in the first two 1 MHz bands where it is used to suppress cross-modulation from strong signals. When turned fully CCW, it switches in a 535 kHz LPF to allow for better LF reception in the presence of BCB interference. This works out to be pretty useful at my QTH.

There are four AGC switch positions, "off", "T", "S", and "I".
"T": exclusively for A1 (CW)
"S": used for CW and AM
"I": specifically designed for SSB

The "T" position is kind of strange. In addition to providing an appropriate AGC constant for CW, it adds a circuit that rectifies the CW audio and adds harmonics. It sounds just awful. According to the manual, however, that's what it's supposed to do! They added this feature so that in a room full of receivers, the output of one specific rx would be immediately distinguishable. I can only assume this was meant to be tuned to an emergency frequency.

Two jacks for phones and 600 ohm speaker connection round out the front panel, while rear connections provide for antenna input, grounding lug, LF pre-selector in/out, FS converter out-

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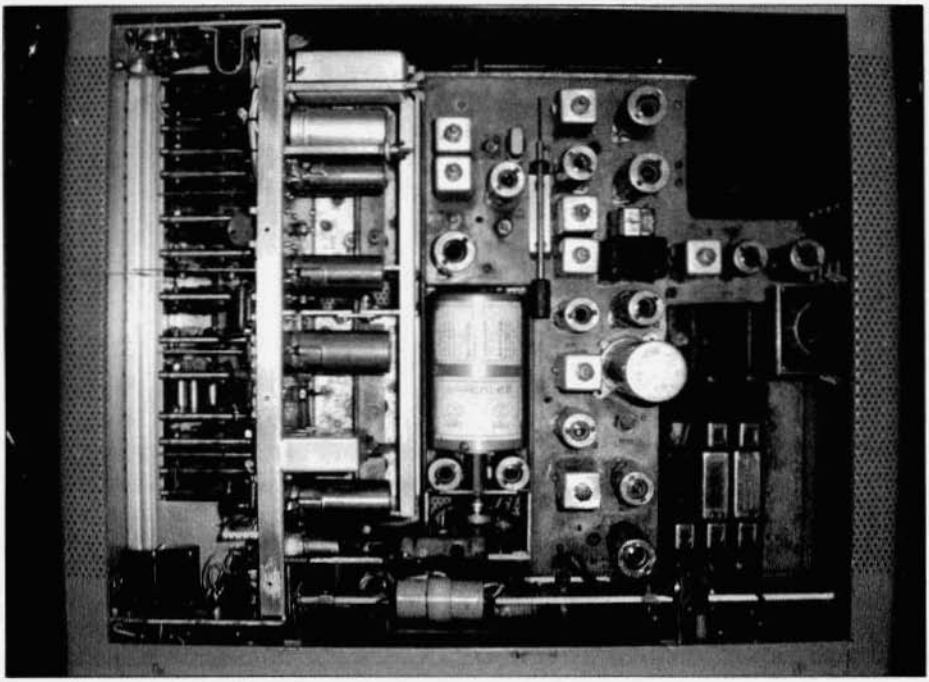

Topside of the chassis.

put, 455 kHz IF out, and a Jones connector which has both line out audio and a BK line (for use with some unknown TX). Of course, there's also power inlet for a detachable AC cable. It's an odd standard, and on my rig has been changed from a two-pin to a three-pin grounding type.

Design and Implementation

Although not visually like much American gear I've seen, the design is very closely patterned after the Collins 51S-1. There are: inductively tuned VFO (PTO), mechanical filters, and a set of ganged slug racks whose position is controlled by complex cams. Yet this rig has many striking similarities, and some unusual differences. Coming, as it did, at the end of the vacuum tube era, the designers clearly took advantage of the best technology available at the time, adding their own ideas as needed. I'll try to present the design as best as I can, pointing out the highlights.

The NRD has three basic signal paths: 90 kHz - 2 MHz is a triple conversion which upconverts the input signals by 8 MHz forming two 1 MHz bands {8-9 MHz and 9-10 MHz}. RF amplification follows, and then another conversion to the 3-2 MHz variable IF. Final mixing with the permeability tuned VFO brings the signal down to the 455 kHz fixed final IF. 2-6 MHz signals are fist upconverted to 14.5 -15.5 MHz and bandpass filtered. Then, as above, downconversion to 3-2 MHz VIF and final conversion to 455 kHz. The 7-30 MHz band segments only double conversion first to the 3-2 MHz VIF, and then to 455 kHz

To eliminate the need for an antenna trimmer, a double tuned circuit precedes the RF amplifier. Although the exact details of this circuit aren't covered in the manual, the effect is to present a better match to the anticipated variations in antenna input im-

pedance. The double tuned circuits aren't used in the lower two bands. Perhaps that partially accounts for the availability of a LF pre-selector?

Only one gang of coils is required for the RF stage, and one for the Variable IF stage. In order to achieve this simplification, it was necessary to implement a 30-position switch turret controlled by the MHz selector knob. To accomplish this, the designers created a stack of 14 circular printed circuit boards with the appropriate crystals, trimmers, and other passive parts. These pcbs rotate and contact is made via solder pads on their circumference. Contacts are held over these solder pads by stainless contact arms which extend over the edge of the circular wafers. Each arm contains a small sponge of foam that is supposed to be moistened with contact cleaner, creating a self-lubricating system. Regular maintenance involves reloading the sponge with fresh cleaner. The entire turret is enclosed to prevent contamination from brine and grit. There's considerable evidence that this old sailor has seen plenty of both. The marine environment is one of the harshest, yet everything still moves with silky ease.

The tube complement seems fairly conventional for the late 60's. There is one stage of RF amplification (6BZ6) followed by (6U8A) tubes used partially as mixers and oscillators. IF amplification uses the common 6BA6. The final detector is a 12AX7A using plate detection for AM, and mixing with the BFO for CW/SSB. Semiconductor diodes form a balanced limiter (non-adjustable). This is used in conjunction with the AGC system which uses a separate AGC amplifier whose input is taken from the limiter and applied directly to the IF tubes. A threshold is used to "delay" AGC action to the RF amplifier.

Connections to the BK line and a microswitch in the turret are used in conjunction with a transistor (hush!) to bias the limiter circuit in order to eliminate key clicks and noisy transients while bandswitching. Nice touches, clearly meant for TX/RX operation.

The audio stage is 1/2 (12AX7A) into a 6AQ5A to produce the claimed 1 watt into 600 ohms, while a cathode follower 1/2 (12AT7) provides IF output at 75 ohm impedance to the rear panel connector.

The power supply provides for switch selectable input ranging from 90-120V. All rectification is done with silicon diodes, providing DC voltages of +200, -100, and +150 (regulated). All filaments are 6.3V.

The physical construction of the unit is very, very rugged. Base materials are thick aluminum in most cases, coupled with some steel structural elements. Anything likely to pop out has some appropriate gizmo to restrain it. The rig weighs in at 20 kg (rackmount), 30 with the case. All controls have a serious feel to them, and the internal cams and gears seem to move about with no trace of slop or backlash. There is a lot of point-point wiring, but in some instances, the Tek style ceramic terminal strips have been used. The case lid made of steel seems to be the only part that succumbed to the elements, and as I received the rig, it had been done over in a "Bondo" style restoration comparable only to some of my early teenage attempts at fixing old cars. The paint, however, was beautifully matched. The rig is blue, and the matching speaker (SP-101), which I found separately, is light green. My JA source tells me the light green-blue is a standard for such equipment. On the inside, the only trace of repair I could see, was the changing out of the main electrolytic power caps.

Specifications, Performance, and Impressions:

Range: 90 kHz -30 MHz continuous

Modes: A1, A2, A3, A3J, and A3H, (F1 & F4 with adapter)

Sensitivity: 2-30 MHz: A1: <2uv A3: <6uv

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The Heathkit VX-1 Electronic Voice Control

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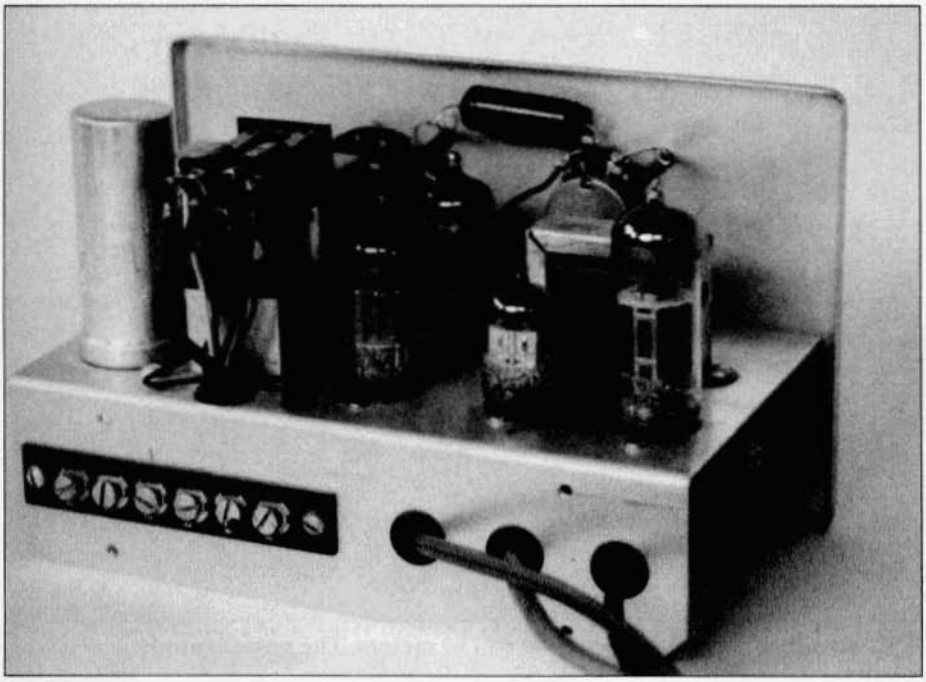
It is dangerous to read Chuck Pension's book, "Heathkit, A Guide to the Amateur Radio Products," the night before a swap meet, but that's what I was doing a couple of springs ago. I checked out my Heath collection, DX-20, DX-40, DX-60, DX-100, QF-1, and I found that they were all good gear in their day - and all are pretty common today except for the DX-40 which is "clean" and Chuck rates as "rare." Then I browsed a bit, hitting among others the very last item in the book, the VX-1 Electronic Voice Control. Describing it, Chuck says, "The VX-1 is one of the rarest Heath products ever made and finding one will require a special effort." "No chance of ever finding one of those in Albuquerque," I mused...

The next morning found me at the spring swap meet in a high school parking lot, when what to my wondering eyes should appear but a little gray box about the size of a QF-1 but with knobs in different places. Could it possibly be? Yes, it was a genuine Heathkit VX-1, the rarest of the rare, the pearl of great price! The owner wanted only ten bucks for it, must not have been reading Chuck's book recently. So I quickly concluded the deal and escaped with my prize.

Now it is fun to look at that VX-1 sitting on top of the BC-348 out in my summer shack in the garage and to realize what a great rarity it is, especially since it has the original microphone connector on it and the one pictured in

The Heathkit VX-1 Electronic Voice Control, "one of the rarest Heath products ever made." The "MIC INPUT" connector is original.

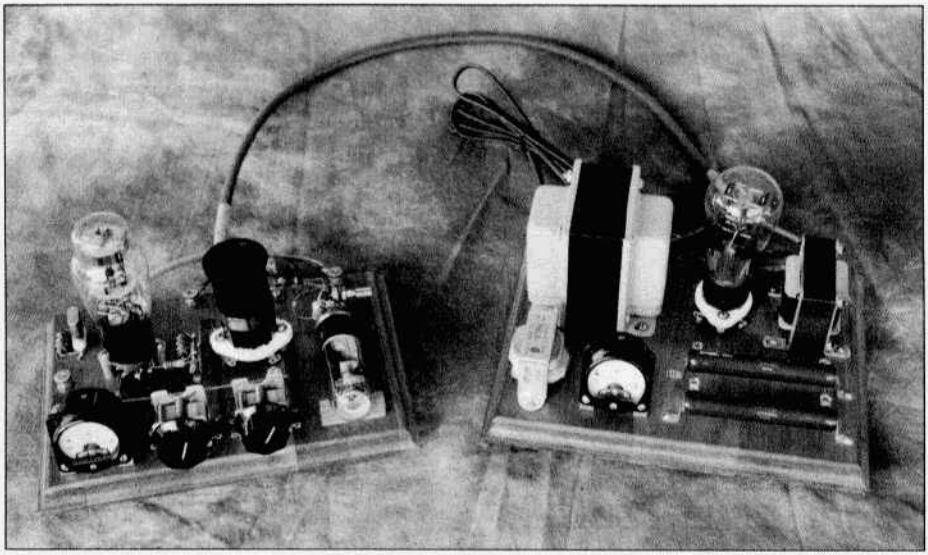


Behind the panel of the VX-1 you will find a lot of hollow state electronics.

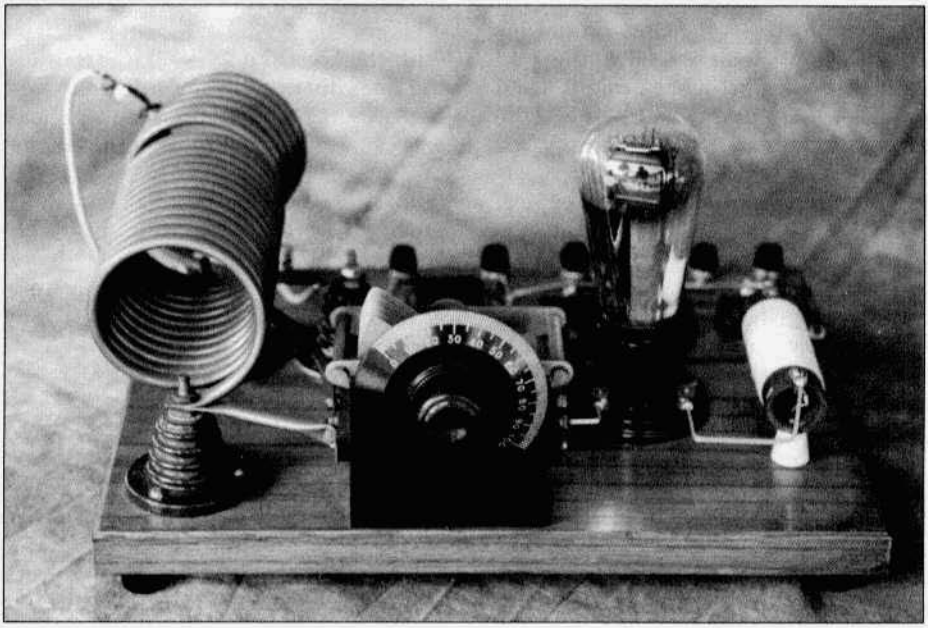
Chuck's book does not. But now and then I wonder just what I might use it for, or what the original owner who built it back in 1960 might have used it for; and then I begin to realize why it is so scarce. Obviously it's a voice control (VOX) unit. You attach your microphone to it, run leads to the transmitter mike input, receiver input, and station control system (antenna relay, TR switch and what not), plug it in, and turn it on. Then as soon as you talk into the mike it does its thing, the receiver turns off and the transmitter turns on and you are on the air with phone break-in. A moment after you quit talking it switches back and you are listening on frequency again. That's great, and just about every manufactured SSB transmitter since the Central Electronics 10A in 1953 has had voice control built-in. So who is going to buy a VOX unit in 1960? The manual says, "The VX-1 was designed primarily for operation in conjunction with the Heathkit DX-100 transmitter, but does not need to be confined to this use only. ... Imagination and application will find varied uses for the unit..." But unfortunately, the AM ops in 1960 who were holding forth on 75 with their DX-100's were the kind who talked at least ten minutes straight and never took a breath, at least not one long enough to drop out the VOX unit. So, that may well be why the VX-1 was offered for only a year and why it was so rare then and now.

That being said, the VX-1 is a rather respectable little box. It has its own transformer/rectifier/two section filter capacitor power supply. It has two stages of 12AX7, RC coupled speech amplifier which drive the later stages and which can be used as a microphone preamp if your transmitter needs one. It has a 12AT7 which further amplifies the microphone audio and also the audio coming in from your receiver's

continued on page 40



6L6G breadboard transmitter for 40 and 80 meters. The power supply uses a type 80 tube.



210 TNT transmitter for 80 meters built in 1994 from an article in CQ, January 1973. The xmtr uses an RCA 210; 500 volts/60ma. The base is oak with golden stain and varnish. It has a Cardwell variable with homemade grid coil and beehive insulators. It puts out 50 watts.

The front view of a 2-tube receiver. It covers from the broadcast band to 30 meters using plug-in coils. The vernier dial is a National from the 20's.

This receiver uses a 224 detector and a 227 amplifier.

Jeff Covelli, WA8SAJ, celebrating a birthday with a "Collins" cake.

A summer eyeball QSO in Edgemont, SD. From left to right: Arne Sjomeling, KØAS; Dewey Angerhofer, WØZUS and Bob Tapper, KØYJ.

least to the local AM gang on 3885 kHz.

That was the best thing I could have done on AM, although I didn't know it until a few days later when the mailman delivered a package. It was a VT-127A from a South Carolina SWL. The attached note said he liked to listen to AM and tuned 75 meters often. He heard me talking about my tube troubles and had an extra VT-127A in his collection so he sent it along. I guess there are still lots of very nice listeners out there these days. Makes me glad I always sent a QSL when I got a card from a SWL. Also makes me wonder if any SWLs listen to SSB. I've never gotten an SWL card while operating SSB. I'll bet the AMers have the big following. Also I now have a new friend and maybe we will have a new AMer shortly.

I pulled the 127A out of its Kleenex shipping box, and put 5 volts on the filament. Lit up just fine. I put three jumpers between the 127A and my Supreme tube tester and it said I had a good 2A3. My tester doesn't have a VT-127A listed so the 2A3 is a good substitute. The 127 doesn't look like much after the 250TH but it sure was 1947 all over again. I mounted two pin jacks on the chassis where I had removed the 250TH tube socket. They accept the filament connections from the 127. It was a good thing I didn't sub-mount the 250TH, as I would have had a big hole to fill in. The VT-127 filament leads are not very strong and you have to be careful with them. They were designed to sit on the top of a rigid twinax quarter wave stub, which was the way the filament voltage was fed to the tube in the radar ring oscillator. I used the same heat radiating connectors as before for the grid and plate but I changed the leads from wire to sheet copper so they could help hold the VT-127A upright. The 127 calls for 300 volts bias with 70 mA grid current so I changed the grid bias resistor to 3K. I applied grid drive, checked the bias, and neutralized the amplifier.

The moment of truth arrived as I applied plate voltage. 210 mA plate current at resonance and just under 300 watts out. The 90 volts fixed bias dropped the plate current to 45 mA with the drive removed which left the tube running hot but within safe limits with the key up. Moving the grid and plate tuning around without drive resulted in pegging the plate current meter. There was a severe oscillation around 100 MHz. I put a parasitic suppressor in the grid lead and it cured the problem. On the air the amplifier behaves itself on both 80 and 40. It is a pleasure to use, and the VT-127A, while not what you would expect a big triode to look like, is still fun to watch. The plate runs red/orange loaded to 400 watts in and a cherry red at 300 watts input. Since the plate shows a deep red key up I don't need a HV pilot lamp, and with the glow from the 50 watt filament I sure don't need a filament pilot light.

At the start of this amplifier project I had the idea of using a rack panel on the amplifier to mount the grid and plate meters, but by the third time around I had gotten to like the looks of the amplifier, so I decided no panel. I mounted the grid and plate meters on a small panel beside the amplifier. The amplifier looks good sitting on the top shelf in my shack without a panel. Even if it is on a metal chassis, it is haywire enough to be a clone of my 1947 amplifier, so when visitors ask about it, I tell them about the VT-127A, the Pearl Harbor radar, and my troubles duplicating the 1947 amplifier in 2000. Then I fire it up and let them see the colors in the VT-127A plate. Gets lots of ohs and ahs from the solid state hams hereabouts and gives me the satisfaction that I made it back to 1947. ER

Hy-Gain HT-18 from page 17

Doug and I are enjoying the HT-18, and have confirmed that when low angle vertical radiation is the proper approach, this antenna offers great performance. In my recent travels, our nightly sked on the bottom end of 40 has revealed some near evident truths. At distances over 300 miles, the vertical can offer absolutely killer signals.

Occasionally in the 600 mile range, Doug's double zepp has been unusable, with signals down in the mud on both ends. Switching to the tower has yielded comfortable 569 signal reports. Sometimes, however, his rhombic will knock it's socks off! There is no single antenna to meet all needs; I have secretly known this for years but still, the anticipation of the HT-18 kept me going for nearly 40 years, and the smooth performance and multiband coverage offer a convenience of merit. If nothing else, we have enjoyed a tremendous experience in resurrecting this legendary antique from obscurity, and have had the unique experience of installing a new Hy-Tower. Another check mark on our life-list.

Both Doug and I have encountered a few Hy-Towers on the air, and I saw one sitting in the back yard of a ham in rural Ontario this past summer. From response gained from my posting the extra base insulators on the internet, there is a large following of this antenna, which is treated with cult status. This self supporting vertical seems to enjoy tremendous respect on 75 meters, and there have been numerous articles over the years describing "improvements" which can be made to their 160 meter operation. 40 and 20 meters seem to be other favorite locations for the Hy-Tower, and phased arrays are not uncommon. As this article goes to press, Doug is negotiating for another unit, he mentioned something about a phased array. Go get 'em, Doug! ER

The Heathkit VX-1 from page 35

speaker which will be used in an Anti-Trip circuit. It has a 6AL5 dual diode which performs Anti-Trip logic on the mike and receiver audio, turning on a 12BY7 relay control tube when audio from the mike includes something that is not also coming out of the speaker, namely your voice or the dogs barking. The 12BY7 switches a four pole, double throw relay with contacts that can switch as much as 13 amps and that will deliver as much as 5 amps at 117 volts to an external load such as an antenna relay.

And it does work. I haven't gotten the nerve yet to use it with my DX-100 on the 75-meter net. The guys think I'm a little crazy already, so why help their opinion of me along?

So, does anyone want "one of the rarest of the Heath products ever made," a VX-1, for their collection? I almost feel selfish hoarding it all to myself. ER

A Thousand Marbles from page 18

and I hope to meet you again here on the band. 75 year Old Man, this is K9NZQ, clear and going QRT, good morning!"

You could have heard a pin drop on the band when this fellow signed off. I guess he gave us all a lot to think about.

I had planned to work on the antenna that morning, and then I was going to meet up with a few hams to work on the next club newsletter. Instead, I went upstairs and woke my wife up with a kiss. "C'mon honey, I'm taking you and the kids to breakfast." "What brought this on?" she asked with a smile. "Oh, nothing special, it's just been a long time since we spent a Saturday together with the kids. Hey, can we stop at a toy store while we're out? I need to buy some marbles." ER

The JRC NRD-1EL from page 33

.09-2 MHz: A1: <30uv, A3<100uv
Note: all measurements at 20 dB S/N and 100 mw output, mod. percent not stated
Selectivity: 1 kHz. (1-1.5 kHz, <4 kHz) 6/60
3 kHz (3-4kHz, <11 kHz) 6/60
6 kHz(6-7 kHz, <42 kHz) 6/60
Image ratio: 2-14 MHz >70 dB, 14-30 MHz > 50 dB

Since I currently have only the operators manual, and not the separate maintenance manual, I haven't tried to verify these. Since I'm intrigued by the similarities to the 51S1, when I have two rigs fully up to spec, I'll do some detailed measurements, and either put them in ER, or on the web.

In casual use everything seems to function well, the rig is very nice sounding, stable, quiet in the background, and everything a top-notch rig of its time should be. I particularly appreciate the motor-tuning which allows me to whip from one band-edge to the other.

Although, like most people, I love to find mint condition rigs, the obvious history and use of this receiver adds more to it's appeal to me than any wear detracts. I would like to know more about it, and the history of the JRC tube-based rigs. Perhaps one of the readers would have some interesting insights? ER

Special thanks to Fred, N8EKU and Junichiro, JA5CNT.

Park Cunningham, W8HSC from page 7

reliable Apache.

I'll miss working him on the air every so often, and I will miss thumbing past his card in my file, pausing for a moment to wonder how he's been. Park would have been 92 on August 5th. 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

AMI Update from page 3

conditions. So, Friday evening, September 29 through Sunday evening October 1 is the AM operating event time period this year. Remember the purpose of this gettogether is to demonstrate to the rest of the amateur radio community that AM is alive and well on the amateur bands. To make it interesting, certificates are awarded for three levels of participation. Level 1 requires 20 or more AM contacts on 160, 75 or 40 meters. To qualify for Level 2, Level 1 must be earned and an AM contact must be made on 20 meters, e.g. 14.286 kHz. In addition to Level 1 and Level 2, Level 3 requires one AM contact on a higher band, e.g.15m, 10m, 6m or 2m. "Participant" certificates are awarded to Level 1 achievers. "Participant Plus" certificates are awarded to stations attaining Level 1 and Level 2. The coveted "Participant Primus" is awarded to stations attaining all levels. You do not need to be a member of AMI to participate. Logs should be sent to AMI, Box 1500, Merrimack, NH 03054. Please log AMI certificate numbers if available, as well as transmitter used and transmitters worked. If you have lost your certificate number contact AMI headquarters and include an e-mail address for quick response. ER

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.

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Deadline for the October Issue: October 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: 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) xfmrs (2 W) - $13 ppd/dom/USA. ABEN, POB 4118, Jersey City, NJ 07304-0118,Avidov@aol.com

FOR SALE: HRO60 with 8 coils (A,B,C,D,E, F, AC and AD). Rack mount with rack cabinet included. Recently alligned by a pro. A few paint scrapes on panel touched up but match not perfect. Panel otherwise very good with orig knobs in exc. shape. Matching spkr included - $675. Rich Dixon W7QZO, 16032 Lost Coyote Ln., Mitchell, OR 97750. (541) 462-3078 richdix@bendnet.com

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

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

FOR SALE: Meters for WW II military radios, have some connectors. Henry Engstrom, KD6KWH, CA, (707) 544-5179. pacifica@sonic.net

FOR SALE: Johnson Tie Bolt Sets: Ranger, set of 3 - $10.50; Valiant, set of 4 - $15.50. (Note that one of my sets sold as much as $25 on ebay!) PTT relay - $6; 9-pin plug - $7; powdercoated black cabinet for Viking 1, unused - $65; restored, silkscreened and painted Viking 1 front panel - $55. I pay shipping on all parts CONUS. Cal Eustaquio, N6KYR, 1964 11th St., Los Osos, CA 93402. catman351@digitalputty.com

FOR SALE: NOS TCS baseplates - 2/$15. A very limited supply of good used TCS shockmounts - 8/$20. Plus shg. Carl, KN6AL, POB 3531, Laramie, WY 82071. (307) 742-0711, knbal@uwyo.edu

FOR SALE: S-38C, fair - $30; HW-16, good - $50; S40A, vgood - $80; SX-25, good - $50. Chuck, NZ5M, (806) 698-8767

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: Naval rcvrs, RAK, RAL, RAO, RBA, RBB, RBC, RBL, pwr splys available, prices from $75 to $350 depending on type, condx. Carl Bloom, (714) 639-1679, 3778111@MCIMAIL.COM

FOR SALE: Radio, TV tubes NOS, send want list & SASE. Dan Hill, POB 49, Divmont, 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: Vintage Germanium transistors CK722, 2N107, 2N35, CK760; many others including point contact transistors & other vintage radio parts. Visit site at: www.electronic-projects.com or send $1 for catalog. Helio Sakaya, 10726 Wiles Rd, Coral Springs, FL 33076

FOR SALE: Hallicrafters SX-25 rcvr, fair to good condx, works. Fred Clinger, OH, (419) 468-6117 after 6 pm EST.

FOR SALE: HQ-129X Hammarlund rcvr, works great, nice - $175; Drake R-4B, mint condx, realigned to orig factory specifications - $250; Gonset Communicator II, 2 meters, mint realigned to facotry specifications - $150. All + shpg. Steve Gross, N4PZ/W9OJL IL, (815) 734-4255.

NOTICE: York, PA Hamfest. Sept. 17th 8am to 4pm. Interstate 83 exit 6E. For info http://www.yorkhamfest.org

FOR SALE/TRADE: Antique tubes, SASE. **WANTED:** Index to Surplus, published by 73 Magazine. Louis D'Antuono, 8802 Ridge Blvd., Brooklyn, NY 11209. (718) 748-9612 after 6pm

FOR SALE: T-Shirts 4 Color 807 Tube - $18.07ppd Priorty Mail (CA-$19.43). S, M, L, XL (XXL-+$3) See ER#128 pg 52. http://members.aol.com/tcsopr/ mouspads, buttons, hats, etc. Greg Greenwood, WB6FZH, POB 1325, Weaverville, CA 96093. msg# (707) 523-9122. wb6fzh@arrl.net

FOR SALE: Collins KWM-380 exc condx according to CCA grading scale - $2475. Joel, W4SLH, 337 Compass Point Dr., Oriental, NC 28571. (252) 249-2344

FOR SALE: Heath HW-100 w/ SP-650 & pwr sply - $200; Swan 350 xcvr, pwr sply needs work - $100. Robert Braza, W1RMB, MA, (508) 222-5553.

FOR SALE: Hallicrafters SX 110 rcvr not working not checked - $60 as is. Hoover, SC, (843) 726-5762 any time.

FOR SALE: Allied SX-190 shortwave rcvr, exc - $130; matching spkr SP-190, exc - $35; Drake 2-AC calibrator - $30. John B. Keil, 4618 Norwalk St., Union City, CA 94587. (510) 471-4838

FOR SALE: Transformers for Collins 32V3, Hallicrafters HT9, 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 order since 1954. Bigelow Electronics, POB 125, Bluffton, OH 45817

FOR SALE: Meters, mostly new, all sizes & shapes. SASE for list. Bill Riley, 863 W 38th Ave., Eugene, OR 97405. (541) 345-2169

FOR SALE: VM parts, new boxed electron tubes, new Heathkit parts, new panel meters. Norm, 1440 Milton St., Benton Harbor, MI 49022

FOR SALE: Two S20Rs, both - $140+shpg. Call for details. Mike, W1JZ, MA, (508) 529-4427

FOR SALE: ARC5 T18 xmtr, very good condx - $25 + UPS. R.J. Eastwick, W2RJE, 400 N. Haddon Ave., Unit 109, Haddonfield, NJ 08033. (856) 429-2477

FOR SALE: Military units: Motorola, lge unit xmtr T278/U - $300/BO; half size control radio set C-845/U - $200; amplifier pwr sply AM-598/U (RCA) - $175; signal rcvr - $125. Dial to right set #1, set 2; dial to right rcvr 1 & 2 meter in center. Small set 8"W x 4"H x 10" deep. All units clean. Bernie Samek, 113 Old Palmer Rd., Brimfield, MA 01010. (413) 245-7174, Fx -0441

FOR SALE: GPR-90 w/orig cabinet & spkr - BO. **WANTED:** AN/BRR-3 VLF rcvr. Tom Brent, POB 1552, Sumas, WA 98295. (604) 826-4051

FOR SALE: Hallicrafters HT32, SX101A & manuals, orig owner, clean units - $575. Joe, W6CAS, CA, (916) 731-8261.

FOR SALE: Drake R4C, T4XB, Wilson TRI bander, 6 element beam mod 65(?); Viking II Johnson xmtr, PU only. Gene, KB4YST, KY, (502) 895-1705.

FOR SALE: Drake TR4 w/MS-4 sply - $250; Galaxy 2000 amp - $100; Heath HW-12 - $75; HP-10, HP-13 - $50 ea; HX-10 xmtr - $165; Hallicrafters: S-19R - $170; S-20R - $160; SX-24 - $200; S-38, C - $80 ea; S-82 - $50; S-85 - $125; SX-99 - $170; SX-101A & HT32A - $525, HA-1 keyer - $80; Hammarlund: HQ129-X - $160; HXL - One amp - $375; National: NC-200 spkr - $100; Instructograph w/paper tapes; 1000's of tubes. Tom Stiefel, AB0ER, 611 2nd St., Yutan, NE 68073. (402) 625-2013

FOR SALE: Gonset Communicator 4 2-meter xcvr, restored - $45. Robert Martin, 111 Bancroft, Rochester, NY 14616. (716) 663-4182

TRADE/SWAP: TV-2B/U military tube tester, exc working condx w/manual & 32 pages test data for Hickok 539C in exc shape & working condx. John, TX, (956) 584-7840.

FOR SALE: Amateur Radio Handbook 1934 thru '80s. Most in fine quality - $25 to $5. Write for list, + shpg. WA7LUY, 644 Pineview Pl., Casper, WY 82609.

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: 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: 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 xmtr. I need the AM modulator deck and other parts to restore this unit. John, KF2JQ (716) 873-0524 jpusso@acsu.buffalo.edu

WANTED: Long wire ants AT101, AT102, GRC-9; DY88/105; PP327/GRC9; 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, frankdellechaie@sprintmail.com

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 leroysparks@earthlink.net

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: Chrome (aluminum?) trim strips for a Hallicrafters S-20R rcvr. Skinner, 3 Meadowfield Ct., Ormond Beach, FL 32174. (904) 673-0197, K4LVZ-W4TQE @ msn.com

WANTED: WW-2 Japanese military radio of any kind. Yokohama Radio Communication Museum, Takashi Doi, 1-21-4, Minamidai, Seyaku, Yokohama 246 Japan. Fax 011-8145-301-8069, takadoi@carrot.ocn.ne.jp

WANTED: Tuning and bandswitch knobs for a Hallicrafters SX-62A. Doug Owen, KC8JT, 1539 North Rd., Troy, OH 45373. (937) 335-1300 dowen36@erinet.co

WANTED: Manual (s) for R390A, early version. Have R390 manual. Dennis Olmstead, WB9EMD, 431 Ridgewood, Glen Ellyn, IL 60137. (630) 469-0531, wb9emd@aol.com

WANTED: Military rcvr, 225-400 mHZ AM. Must be clean, wkg and in good condx. Don Barsema, 1458 Byron SE, Grand Rapids, MI 49506. (616) 451-9874, DBARSEMA@prodigy.net

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ron@kk4pk.com
www.kk4pk.com

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

WANTED: HeathGear, unassembled kits, catalogs and manuals. Bill Robbins, 5339 Chickadee Dr., Kalamazoo, MI 49009. (616) 375-7978, billrobbs@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.cliffords@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 xmtr & 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, k4kyv@hotmail.com

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

WANTED: Oddball old 1930s military radio control and junction boxes. BC-177, BC-214, BC-235, etc. William Donzelli, 15 Gen MacArthur Dr., Carmel, NY 10512. (914) 225-2547, aw2886@osfn.org

WANTED: Original or copy of Sam's photo facts CB-1 George, W2AMR, (856) 848-6699 rock301@snip.net

WANTED: A spkr for National NC-101X rcvr. WA2UMP, 32 Garretson Rd., White Plains, NY 10604. (914) 644-2603

WANTED: National NC-240D, NC-183D, NC-400, Multi-Elmac PMR 8 and AF 68. Frank, KB6W, (916) 635-4994, frankdellechaie@sprintmail.com

WANTED: SX111 40M ant coil; GPR90 and SX-140 cabinets; National cosmic blue spkrs. Bill, (701) 772-6531, ke7kk@gfherald.infi.net

WANTED: Set of Kenwood twins CR-599 & T-599
FOR SALE: Knight R-100A & T-150. Cliff, WA9SUE, WI, (608) 625-4527 after 6 pm

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, origs & reprints. New list. Send $1 & address label to Robert Downs, WA5CAB, 2027 Mapleton Dr., Houston, TX 77043-2410. (713) 467-5614

FOR SALE: I repair all tube type amplifiers. Licensed in 1955. Steve Gross, N4PZ-W9OJI, IL, (815) 734-4255.

FOR SALE: 51J-4 filter replacements, direct plugin—6.0 kc Collins mech. filter, 500 cycle xtal latice - $215 each. Chuck Felton, KDØZS, 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: Homemade galena xtal radios, SW or BC. Pix available, also parts. Len Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150.

FOR SALE/TRADE: Transmitting/rcvr'g tubes, new & used - 55¢. LSASE for list. I collect old & unique tubes of any type. **WANTED:** Taylor & Heintz-Kaufman types & large tubes from the old Eimac line; 152T thru 2000T for display. John H. Walker Jr., 13406 W. 128th Terr., Overland Park, KS 66213. (913) 782-6455, johnh.walker@honeywell.com

FOR SALE: New Release. For details send 2-stamp LSASE to: Olde Tyme Radio Co, 2445 Lyttonsville Rd. Ste 317, Silver Spring, MD 20910

FOR SALE: New WD-11 replacement tubes - $15 ea + $3.20 priority shpg for 2 or more. James Fred, 5355 S 275 W, Cutler, IN 46920.

FOR SALE: BC-348-R, orig & unmodified w/24 volt dynamotor ps, clean - $85 + shpg. Ken, TX, (254) 772-7307

FOR SALE: KW Matchbox - $300; Gonset 201 - $400; Gonset VFO - $75; Hallicrafters CRX-103 - $30; S-38A - $35; S-108 - $135; National 1-10A - $175; NC-46 - $175; Clegg Thor 6 - $245; coax relays - $35. Much more. Free list. Richard Prester, 131 Ridge Rd., W Milford, NJ 07480. (973) 728-2454, rprester@warwick.net

FOR SALE: WWII Merchant Marine rcvrs, Mackay 128AY, Radiomarine/RCA AR8506B, AR8510, EH Scot SLRH, SLRM, any rcvr - $250. Carl Bloom, (714) 639-1679, 3778114@MCIMAIL.COM

FOR SALE: SB200 w/Harbach soft key, exc - $375 firm + shpg. Richard Cohen, 11802 Willow Pt. Way, Tampa, FL 33624. (813) 962-2460

FOR SALE: HH Scott 357 tuner amplifier AM/FM stereo - $75; Stromberg Carlson mono amplifier SAV 33, 6L6s - $50. All + UPS. Onerio Sabetto, 1717 Burgess Rd., Cleveland, OH 44112. (216) 481-1036

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-RES, 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, KØZQD, POB 282, Ash Grove, MO 65604.

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, KDØZS, Felton Electronic Design, Box 187, Wheatland, WY 82201. (307) 322-5858, feltoned@coffey.com

FOR SALE: Collins 32RS 100 watt commercial xcvr pwr sply GC - $145; rare National SRR regen set, some mods - $95; NC-44, looks & works nice - $195; interstage xfmr replacement for SW-3, 5, etc - $28; NC-101XA, beautiful restoration - $345; NC-120 (shielded 1st RF WW II Model) rare - $295; FBX w/boxed coils & FB-7 pwr sply, unusual complete - $495; Meissner Traffic Master VGC - $295; Hallicrafters S-15 factory S-meter special, GC - $275; 13 tube 5X-17 super set - $350; orig Sky Buddy 5T, nice restoration - $325; beautiful Skyrider SX-23 w/spkr (see CQ Calender for 2/2000) - $495; Comet Pro old, neat, restored - $350; RME-69 w/DB-20 GC - $395; Echophone EC-1A - $65; Heath HD-1410 keyer - $38; Sargent 10 band Model 11-UA, award winning set - $395; Coast Guard WW II DAE-1 Direction Finder w/loop, gimbal, compass dial, & turning wheel w/orig inst. book -can be mounted on a boat - $495; rare Electro-physics Autronic key - $135; Radio Shack Model II Impact Printer for multiple forms-cost $2000, hardly used w/cables, instructions, & spare wheel - $150, PU only; above or BO + UPS, most include manuals. Robert Enemark, W1EC, POB 1607, Duxbury, MA 02331. (781) 934-5043

FOR TRADE: Two good RCA 833A's for one Taylor 833A; also looking for Taylor 204A, 813, 866B. John H. Walker Jr., 13406 W. 128th Terr., Overland Park, KS 66213. (913) 782-6455, johnh.walker@honeywell.com

WANTED: Bug with a 3 inch wide black or grey base. MacElroy bug. Brian Roberts, K9VKY, 130 Tara Dr., Fombell,PA 16123, (724)758-2688 K9vky@stargate.net

WANTED: Zenith 121-872 or 121-00950 transistors. No longer available. (no sub please) Jack, AZ, (520) 634-2028

WANTED: BC-375/BC-191 xmtr; BC-611. Pete Hamersma, WB2JWU, POB 467, Holderness, NH 03245.

WANTED: Tubes wanted: 6U5, 3CX800A7, quantities. **FOR SALE:** Tubes, send SASE for new list AD; also sockets; extenders; savers; time-delay relays; ballest tubes; Collins plugs, (PL-68). Fred Schmidt, N4TT, Typetronics, POB 8873, Ft. Lauderdale, FL 33310.

WANTED: Copy of schematic/manual Racal RA137B VLF convertor. Harry Weber, 4845 W 107th St., Oak Lawn, IL 60453.

WANTED: Spkr for RAS/HRO, table top or rack type (RAS/HRO thru #5) ARC-5 controls-C-26, C-29, C-24; tubes- new/used: 7360, 807, 2E22, 12BZ6, coils: GF-11, B&W turret output; CRC-9- all (radio & acc.). Greg, Greenwood, WB6FZH, POB 1325, Weaverville, CA 96093. msg # (707) 523-9122

WANTED: Hickok 539C, must be in exc working condx & appearance w/all manuals. John, TX, (956) 584-7840.

WANTED: QSTs before 1936 and various years ARRL Handbook for personal collection. Gary Yantis, WG7M, 800-844-9860, gary@wd7m.com

WANTED: Drake 1A rcvr; 399C1 Collins VFO; JRC 505 twins. K5YY, AR, (501) 756-5010. k5yy@arrl.net

WANTED: GF-11 & GF-12 aircraft xmtr equip. Mike, WØBVA, 305 N. Keith St., Scammon, KS 66773. (316) 479-2756

WANTED: Top $ for Philmore CR5A RX, international xtal 80/40 xmtr, WRL, CW7, xmtr. Gary Wagner, K3OMI, TN, work # (865) 690-4217

WANTED: Complete clean R-390/URR w/all technical manuals. C6ANI, POB N4106, Nassau NP, Bahamas

WANTED: RBB/RBC rcvrs, pwr splys, cables & RAK/RAL equip. Andy Miller, KD6TKX, CA, (831) 484-2389, amillertkx@aol.com

WANTED: Heath manuals (orig): DX-60, DX-60B, TX-1, HW-10, HW-99. Bernard, POB 690098, Orlando, FL 32869. (407) 351-5536

WANTED: Coil winding machine such as Morris or equivalent. Al Kaiser, W3LEQ, 713 Marlowe Rd., Cherry Hill, NJ 08003. (856) 424-5387

WANTED: Hallicrafters S-20-R rcvr (my first commercial rcvr), CBA OK. Hiltz, W5AQ, 1833 Elaine St., Jackson, MS 39204.

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

WANTED: Cash for Collins: SM-1, 2, 3; 312A-1, 2; 55G-1; 399C-1; 62S-1; KWM-1; 302C-3; 51S-1; 75S-3C; 32S-3A. I buy any Collins equip. Leo, KJ6HI, CA, Ph/Fx (310) 670-6969. radioleo@earthlink.net

WANTED: QSL cards from old/pre WW II Ham DX countries; old regen kits. Hajime Suzuki, Nishikuniyoshi 1644-24, Ichihara-Shi, Chiba-Ken, 290-0231 Japan

WANTED: Western Electric horns, spkrs, amps, mics, theater equipment. Barry Nadel, POB 29303, San Francisco, CA 94129. bnadel@ccnet.com

WANTED: Mics: Astatic JT 30/40; UT-48; Shure CR80/81/41; 707A; Turner VT-73; CD/BD; parts for same. Tom Ellis, Box 140093, Dallas, TX 75214. (214) 328-3225. tomsmics@flexcomp.com

WANTED: Stancor/Chicago PCC200, PCO/PS0150, RC8150; Triad A-9-J, A-10-J, A-11-J, A-12-J. **FOR SALE:** Books, send SASE. Richard Robinson, POB 1425, Wallingford, CT 06492. (203) 949-0871, richmix@erols.com

WANTED: National FRR-59; Hallicrafters SX73, Scott Special Communications rcvr. EA4JL, please call, Kurt Keller, CT, (203) 431-6850

WANTED: Restoring Motorola R390 (not 390A). I'd kill (well, not quite) for xfmrs T602 & T603 from audio unit; sheild covers for T505 & Z503 on IF sub-chassis, & a bandswitch knob. Thank you, thank you!!! Dick Dixon, W7QZO, 16032 Lost Coyote Ln., Mitchell, OR 97750. (541) 462-3078 richdix@bendnet.com

WANTED: Small 1" panel meters, especially DC ammeters. Send price info. Chris Cross, POB 94, McConnell, IL 61050

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

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

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

WANTED: RCA 140, 141, AVR5A. GE K80, K80X, K85. Any condx. James Treherne, 11909 Chapel Rd., Clifton, VA 20124. treherne@erols.com

WANTED: Tube-type Hi-Fi & guitar amplifiers by ACRO, EICO, Fender, Marantz, McIntosh, Pilot, Triad, UTC. Rob, CA, (510) 845-2625.

WANTED: Seeking unbuilt Heathkits, Knightkits. Gene Peroni, POB 7164, St. Davids, PA 19087. (610) 293-2421

WANTED: Ampex tube type decks, mixers, amps. George, OH, (216) 486-6489, blksub4808@yahoo.com

WANTED: Watkins-Johnson or Communications Electronics Inc. info, catalogs, manuals or equipment. Terry O'Laughlin, WB9GVB, P.O. Box 3461, Madison, WI, 53704-0461, 608-244-3135

WANTED: Will pay big bucks for Pop Electronics issue or photo copy of article that featured a one-tube "6U8 Regenerative Shortwave rcvr." The project appeared sometime between Jan '60 & Dec '62 in the summer or fall issue, I think. Ed, CA, (530) 529-4875.

WANTED: AC pwr sply for Stancor ST-203A; old AM 10 meter xmtr using a 2E26 & 4-6V6s. Joe, W5JDY, 317 White St., Norman, OK 73069. (405) 321-4717

WANTED: AM1088 VHF Amp; P/O MT1088; Ant. AS-2887/UR; Pack CW-1005/UR; MK-1517/UR for R1518/URR-71. Steve, milspec22@aol.com or (480) 962-0220

WANTED: Westinghouse MW-2 pwr sply; BC-603; BC-221; DX-100; DX-60; Teletypes Models 14, 15 and 28. Gary, WA4ODY, POB 58506, Houston, TX 77258. (281)-291-7701, pycckuu@gateway.net

WANTED: Hallicrafters: SX100 response knob; R48A spkr; & a PS 150-120. H.I. Stark, K9UBL, 3215 S. Meridian St., Indianapolis, IN 46217. (317) 788-1210

WANTED: Transmitters: GO-9; TBW; GF11; BC-AR-430; rcvrs: R-1004 part of GRC-109; RR-2B, goes w/xmtr RT-3. Bob Lackey, W4QBE, 1252 Worley Creek Rd., Lakemont, GA 30552

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

FOR SALE: Various parts for homebrewing. List at: http://home.earthlink.net/~af4k/trade.htm FREE: Buy/Sell crystals at: http://pluto.beseen.com/boardroom/b/21532/ Brian Carling, AF4K, af4k@earthlink.net

FOR SALE: Send SASE for large list of excess parts, publications, ham & test gear. K4AFW, 104 Glenwood Dr., Williamsburg, VA 23185

FOR SALE: Johnson 124-215 sockets for 204-A, 849 tubes. See ER 121; Collins replica xmtr, new - $30; Heath 1661 spkr, exc condx - $75; assortment of elect capacitors, 1 to 100 mfd, 10 to 50 volt; approx 50 quant + 5 fuse holders, all new stock - $12. Boyd, KØLGG, NE, (402) 551-3085.

FOR SALE: BC-348Q w/FT-154AC mount & pwr connector - $90; National HRO-7 w/4 coils, neatly recapped, w/o ps & spkr - $130; RCA AVT-112A aircraft xmtr - $75; Kenwood R-599 w/2 & 6-meter converters - $150. William Ernst, 16300 Campbell Rd., Comins, MI 48619. (517) 848-5002

FOR SALE: Repro Nameplates, R-390A generic - $9; 51J-3 and 51J-4 exact replicas - $12. Tom Marcotte, N5OFF, 242 Chestnut Oak Dr., Mandeville, LA 70448. marcotte@i4america.net

FOR SALE: Repair! Radio repair, tube or solid state. Reasonable charges. J. Dan Rupe, W7DDF, 998 Whipple, POB 697, Grayland, WA 98547. (360) 267-4011, w7ddf@yahoo.com

FOR SALE: RCA tube manuals, RC-15, RC-20, RC-25; ARRL Handbooks, 1965, 1968, 1972 & 1978. LSASE for list. Charles Brett, 5980 Old Ranch Rd., Colorado Springs, CO 80908. (719) 495-8660, brett3729@aol.com

FOR SALE: Collins drum overlays. 75A-2, 3, 51J#. For 75A-4 & KWS-1, specify new/old - $8.50 ea. 2/$15 ppd. Correct colors. Charlie Talbott, K3ICH, 13192 Pinnacle Ln., Leesburg, VA 20176-6146. (540) 822-5643.

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

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

FOR SALE: Dial/clock covers. Send bezel, old or drawing, make/model, guaranteed satisfaction - $10 ppd. William P. Turner, WA9ABI, 1117 Pike St., St. Charles, MO 63301. (314) 949-2210

FOR SALE: Mackay rcvr, type 3010B, mint condx, spare tubes, orig manual - $650, includes shpg. John Walsh, W3GCE, PA, (610) 264-4645.

WANTED: National HRO black wrinkle spkrs, oak coil boxes, coils; Western Electric horns, spkrs, amps, mics. Barry Nadel, POB 29303, San Francisco, CA 94129. bnadel@ccnet.com

WANTED: Searching for RME CT-100 or 389 xmtrs and info about them. David Edsall, W1TDD, 156 Sunset Ave., Amherst, MA 01002. (413) 549-0349, dedsall@crocker.com

WANTED: Mohican, SB-200; SB-220; SB-100; SB-101; SB-102; Knightkit Band Spanner II; Heath GW-12A; GW22A; GW42. Debbie, AR, (870) 857-3366.

WANTED: New or used unmodified BC459A, BC696, T18/ARC/5, T19/ARC/5, CBY52232. Louis Lytch, K2DET, 117-33 230th St., Cambria Heights, Jamaica, NY 11411-1806. (718) 528-5065

WANTED: Manuals, manuals, manuals for radio-related equipment to buy or swap. Catalog available. Pete Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872. (732) 238-8964

WANTED: Collecting military electronics including radio, radar, RDF and test, manuals & literature. William Van Lennep, POB 211, Pepperell, MA 01463. (978) 433-6031

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

WANTED: WW II Japanese xmtrs & rcvrs (parts, plug-in coils) for restoration & ER articles. Ken Lakin, KD6II, 63140 Britta St., Ste. C106, Bend, OR 97701. (541) 923-1013. klakin@aol.com

WANTED: Postcards of old wireless stations; QSL cards showing pre-WWII ham shacks/equip. George, W2KRM, NY, (631) 360-9011, george2k@aol.com

WANTED: Collins 310B, basket case OK - welcomed; Chicago 500W CMS-2 high-level modulation xfmr; Taylor T21. Jerry, W8EGD, CO, (303) 979-2323

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

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

WANTED: Cash for Collins: SM-1, 2, 3; 55G-1; 62S-1; 399C-1, 515-1; 75S-3A, C 32S-3A; any Collins equip. Leo, KJ6HI, CA, ph/fx (310) 670-6969, radioleo@earthlink.net

WANTED: TMC GPT-750, TAC Tuner, GPR-90/92 & GSB-1. Alan Gray, W3BV, PA, (215) 795-0943.

WANTED: Hallicrafters S-39 rcvr Skyranger. Bob, K1YJK, CO, (303) 768-9200, k1yjk@arrl.net

WANTED: Hallicrafters HT-1, HT-9, HT-31, 5-T, SX-11, SX-17, SX-25; Howard rcvrs; Harvey xmtrs. Ken Seymour, KA7OSM, 9115 SW 176th Ave., Beaverton, OR 97007. (503) 306-7439 24 hrs. ken.seymour@attws.com

WANTED: 80 & 40 meter stals in FT243 holders. Howard Weinstein, K3HW, 4041 Ridge Ave. Apt 4-405, Philadelphia, PA 19129. (215) 843-1180. k3hw@arrl.net

WANTED: Merchant ship radio memorabilia, radios, keys, parts, clocks, documentation. Tom Mackie, W2ILA, 14 Washington St., Jamestown, RI 02835. (401) 846-1200

WANTED: Collins promotional literature, catalogs and manuals for the period 1933-1993. Jim Stitzinger, WA3CEX, 23800 Via Irana, Valencia, CA 91355. (661) 259-2011. FAX (661) 259-3830

WANTED: National SW-3, model I version 3 (uses 32-32-30 tubes). Dean Showalter, W5PJR, 72 Buckboard Rd., Tijeras, NM 87059. (505) 286-1370

WANTED: Electric Radio, Antique Radio Classifieds; Old Timers Bulletin. Alan Mark, POB 372, Pembroke, MA 02359.

The Collins Video Library

The Collins KWM-2 Video 4 hours - $89.95. Highly detailed video on operation, rebuilding, alignment, troubleshooting and neutralizing of this classic! A must for anyone who owns and operates a KWM-2/2A. Printed documentation included.

The Collins 75S-3/32S-3 Video 3.5 hours - $74.95. An in depth examination of the most popular version of the S-Line. Operation, modification, alignment, neutralizing and more! Much of this information applies to all versions of the S-Line!

The Collins 30L-1 Video 1 hour - $39.95. A complete guide to the 30L-1 amplifier. Operation and safety, updates and a discussin of the 811A triode. Learn the secrets to greater performance.

The Collins 30S-1 Video 1 hour - $39.95. Finally, the one everybody has wanted! This extraordinary video describes operation and user safety, maintenance and modifications of this classic Collins amplifier. Very informative—truly a must for all 30S-1 owners. Printed documentation included.

The Collins Amateur Radio Equipment Video Spotter's Guide 1 hour, 40 minutes - $24.95. Close to 90 individual pieces of Collins Radio equipment are shown in the video. Examples of some of the gear covered are: KW-1, KWS-1, 30K-1, 20V-3, 75A-4, KWM-2, S-Line, KWM-1, 30S-1, 30L-1, KWM-380 and much more!

The Collins KWS-1 Video 2 hours - $39.95. This video is the perfect companion to the 75A-4 video for owners of the "Gold Dust Twins"! Butch Schartau, KØBS, shows you how to operate, maintain and repair your KWS-1. Watch as Butch goes through the entire alignment and neutralization process, as well as showing you how to properly operate this famous transmitter.

The Collins 75A-4 Video 4 hours - $89.95. This video is four hours of information on how to repair, maintain and restore this classic receiver. Butch Schartau, KØBS, guides you through all aspects of keeping your own 75A-4 running like a top.

R-390A Video 7 hours - $109.95. Here it is! Long awaited by serious "boatanchor" enthusiasts! The ultimate receiver now has the ultimate video to go along with it. R-390A expert Chuck Rippel, WA4HHG, covers an absolutely incredible array of information in this "heavy duty" video. This video looks at operation, its modules, circuit description, front and rear panel details, complete mechanical and electrical alignment, PTOs, performance evaluation, modifications, troubleshooting and restoration. There is nothing like this video available today, at any price!

R-390A Addendum Video - $49.95. Another 3 hours and 40 minutes of R-390A information from Chuck Rippel, WA4HHG.

SP-600-JX Video 4 hours - $89.95. Chuck Rippel, WA4HHG, takes us through all aspects of the SP-600-JX—repairs, restoration and modifications. This video is a must for any newcomer attempting to work on the SP-600.

All videos are now available in PAL version!

Purchase three or more videos and get 10% off the retail price!

Add $4.50 each for the first two videos for shipping & handling within the U.S.A., additional videos are shipped free.

Produced by Floyd Soo, W8RO (ex-KF8AT)

ER Bookstore, 14643 County Road G, Cortez, CO 81321

FOR SALE: Patterson PR16 radio - $450, PU or professional shpg & pkg only extra. L. Schimmel, POB 1234, Spanaway, WA 98387

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

FOR SALE: Short-wave rcvr in good condx, Icom R-70 - $300; preselector MFJ1046, mint - $50. Alex Tsirelman, 3111 Brighton 7 St., Apt. 4-G, Brooklyn, NY 11235. (718) 648-7370

FOR SALE: Tube types 803, 809, 826, 829B, 836 - $10 ea; 813 - $15; 828, 872A - $20 ea; 815, 832A - $5 ea. Add $4 for S&H on 1 or 2 tubes. More depends upon weight. All tubes are tested & guaranteed. Contact us for list of other xmtg tube types. George H. Fathauer & Assoc., 688 W. First St. Ste 4, Tempe, AZ 85281. (480) 968-7686, tubes@uswest.net

FOR SALE: ARRL Handbook 1930 7th Ed, good condx, covers intact - $27 shpd in 48 US. Tom Berry, 1617 W. Highland, Chicago, IL 60660. (773) 262-5360, 262-0016

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

WANTED: Collins 70K-2 PTOs working or not; IN82A diodes; Bretting 14/14AX manual. Clark, WØBT, KS, (785) 286-2132

WANTED: RF amplifier module 2A2A4 for T827F/URT; AM3007 amplifier. Don Brooke, WA2ELD, 1653 Wyatt Pkwy, Lexington, KY 40505. (859) 254-1886

WANTED: Hallicrafters FPM-300 Mark II in very nice conditon. Frank Scutch, W4FMS, (954) 472-9474, w4fms@aol.com

WANTED: One of those spline wrench whatchies for R390. Takes off knobs etc. Dennis Olmstead, wb9emd, 431 Ridgewood, Glen Ellyn, IL 60137. (630) 460-0531, wb9emd@aol.com

WANTED: Paying $30 ea for good used type 201 tubes (not A). NOTICE: Buy list & new 2000-2001 catalog of collector tubes available. See fathauer@home.com George H. Fathauer & Assoc., 688 W. First St. Ste 4, Tempe, AZ 85281. (480) 968-7686, tubes@uswest.net

ELECTRIC RADIO STORE

BACK ISSUES

All back issues are available at $34 per year or $3.25 for individual copies. Buy the entire first 11 years (#1-#132) for $290. This price includes delivery in the U.S. Foreign orders please inquire.

COMPENDIUMS

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

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

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

T-SHIRTS

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

BOOKS

Vintage Anthology - Book 1 by Dave Ishmael, WA6VVI.....$14.95

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

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

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

Oscilloscopes, Selecting and Restoring a Classic by Stan Griffiths.....$24.95

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

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

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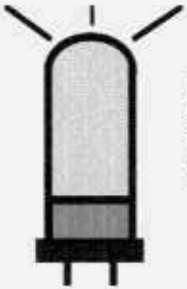

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