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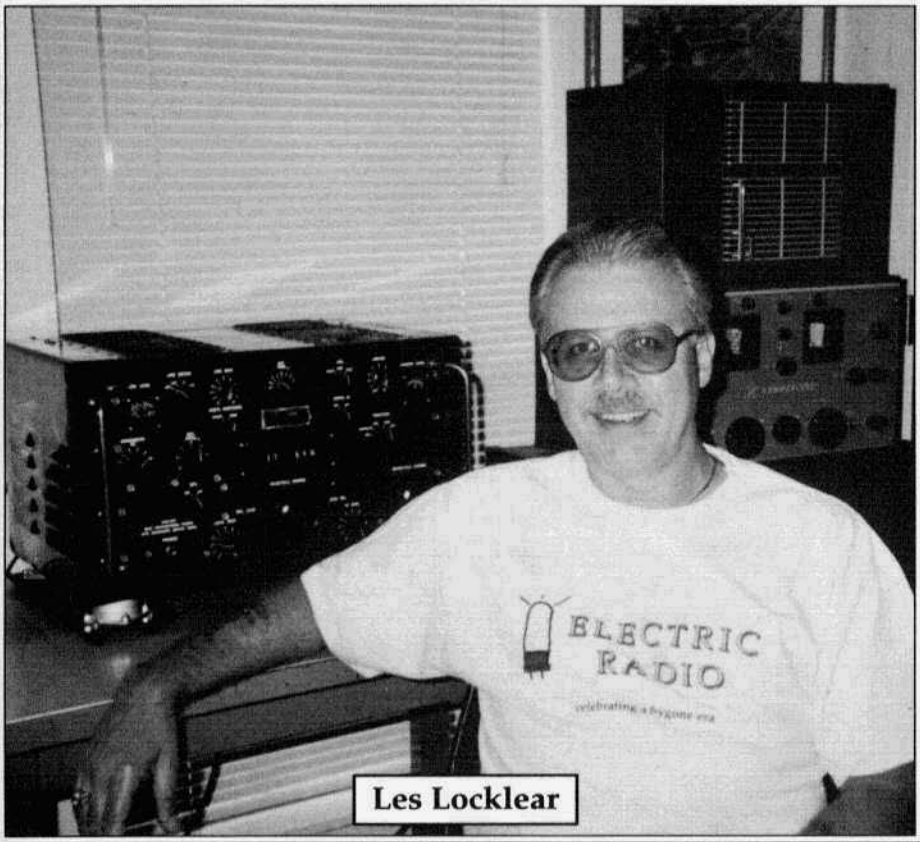
ELECTRIC RADIO

celebrating a bygone era

Number 111 July 1998



Les Locklear

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.

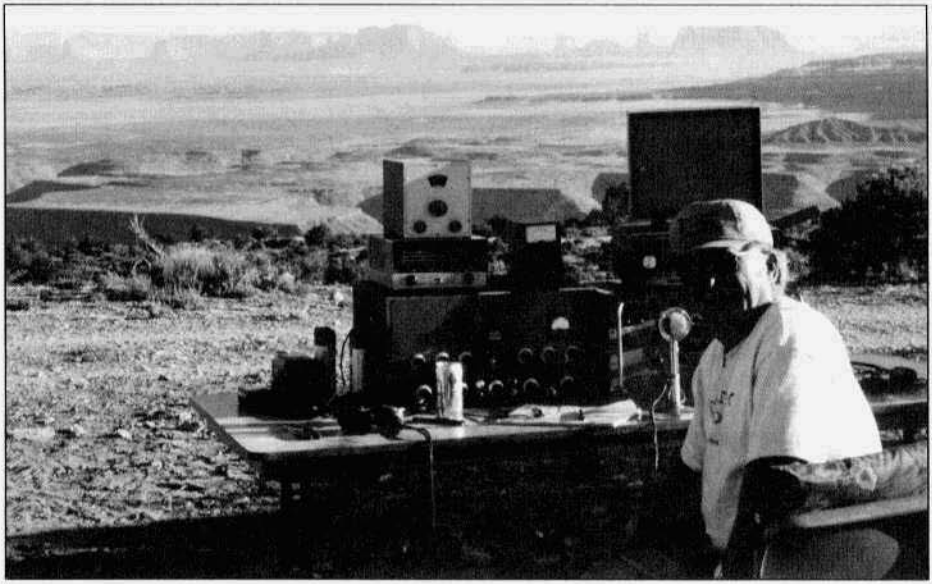
Regular contributors include:

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

Preliminary VFD Report

From our location overlooking Monument Valley in Utah, about 110 miles west of here, Cap Allen, WØXC and I made about 50 contacts. Cap operated CW, mostly on 40M and I operated AM on 20, 75 and 10 (only made one contact on 10). We had a great time—I'll write all about it next issue. The photo below of me at my operating position (taken by WØXC) shows just how beautiful our VFD location was. N6CSW



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Cover: Les Locklear with two of his favorite receivers; an R-390A and a Hammarlund HQ-150. The R-390A is a very rare (one of 50 or so) black faced units manufactured by Motorola. Les will be doing articles on both of these receivers for future issues of ER.

Dick Haungs, W2UJR, Silent Key

by Bruce Howes, KG2IC
6040 Whitegate Xing
E. Amherst, NY 14051

Throughout our life we meet only one or two people that have profound effect upon our lives. For me, one of those people was Richard H. Haungs. Known through the northeast amateur radio community as W2UJR, or just "UJR", Dick was one of those rare people who was truly everyone's friend.

Born September 18, 1921, Dick had an interest in radio from an early age. He was first licensed in 1940, at the age of 19.

One of Dick's early elmers was Harvey Wannemacher, W2MZ. Harvey, who was employed with the local electric company as an auto mechanic, was also a talented musician with the organ. Like Dick, Harvey lived in Lancaster, NY.

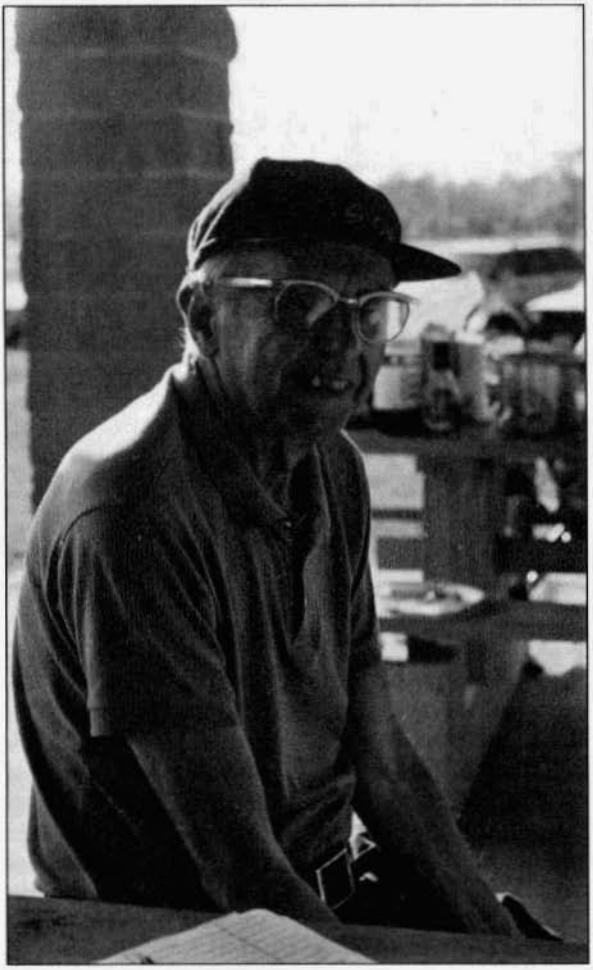
Another mentor and friend was the legendary Mike Premus, W2OY who was licensed 1919 to 1967. After WW II, Mike didn't want to bother getting back on the air, but Dick talked him into it.

In the fifties and sixties Dick was THE BIGGEST AM signal in the northeast on 75 meters. In those days he ran his push-pull 250THs modulated by push-pull 810s. The RF section (and its power supply) was in one seven-foot rack cabinet, and the AF section (and its power supply) was in another. What a rig that was, and when he ran it into his two-element collinear array at 60 feet it was the biggest signal in the northeast. It was so big that in the mid 1960s, the sideband stations put on 4-KW rigs with 75 meter beams just to QRM him. He finally got disgusted with it all, and left 75 AM forever.

Most recently, Dick could be found on 1.888AM early mornings like clockwork. He was an early riser, often awake and on the air at 5:00AM. Dick became the backbone of the early morning 160-M group, which often had a 10-15 member roundtable from throughout the northeast, with check-ins as far away as the midwest. Dick was also a member of the Gray Hair Net holding number 116, in addition to keeping other skeds with friends outside the local area via CW and AM.

Dick's ham shack was something that had to be seen to be appreciated. I can still vividly recall the first time that I visited. Dick's transmitters, except for the Collins 32V-2, were all homebrew. They were mounted in large seven-foot racks with crinkle black panels. Dick patiently showed me about the place, proudly explaining each of his creations. The glowing tubes, the whirl of blowers and the hum of high voltage transformers were something that needed to be seen and felt to be understood. For high voltage supplies on some of the transmitters, Dick was using what he termed "pole pigs", old power pole transformers. He was a firm believer in open-wire feedlines, and used homemade acrylic insulators between the wires. I noticed little neon bulbs carefully secured to each feedline in the shack; Dick would later explain that the RF would cause the neon gas in the bulb to glow, and he could tell which antenna was active.

With a chuckle and a beaming smile Dick then showed me his binary transmitter and receiver control system. Using a series of Schmidt triggers and other chips Dick had constructed a digital logic control for his transmitters and receivers that allowed fingertip access from his operating position. Cleverly designed, it allowed only one transmitter and receiver to be active at a time! Eighties Digital Logic circuits interfaced



W2UJR at Field Day, 1995.

with 1950s vintage gear, only W2UJR could do that! Photos of Dick's station can be found on the W2UJR Web Site at the Buffalo AM page, URL http://hamgate1.sunyerie.edu/~larc/ujram.html.

Dick certainly became a fixture on 160 AM, but his first love was always CW. After becoming disgusted with 75 meters, he dismantled the 75-meter rig with its 810 modulators, and built up a 40-meter CW rig with PP 810s in that rack cabinet instead.

W2UJR was well known and respected throughout the northeast for his professional operating manner, and extensive technical knowledge. When I was first given my HF privileges I was a bit nervous and shy on the air, until I discovered a magic key. I only had to mention that W2UJR was my elmer and I would be warmly welcomed into the fold.

As a founding member of the Lancaster Amateur Radio Club, Dick served faithfully as club Secretary for over 10 years. He was the backbone of the club, instrumental in both its growth and outreach. A fixture at club events, you could always count upon Dick to run the weekly Net, help with the hamfest, show up at Field Day, or coordinate the July 4th Parade. He always had time for people. And when something had to be done, and no one else would do it, Dick would take up the challenge without a complaint.

Dick was also an ARRL VE, and ran the monthly exam sessions in the Lancaster area for over 10 years. He looked forward to every VE session; he had tested over 2500 candidates. "You passed"; he would say and shake another outstretched hand. If the candidate needed to try again, he encouraged each one to do so. Dick did not confine himself to exams, he taught a course in the spring and fall for new amateurs and upgrades. Even after I was licensed, I used to go and sit in on his Saturday license classes just to hear him speak.

One thing that I remember best about Dick was his patience. He would listen as you presented some rambling, disjointed explanation of a technical prob-

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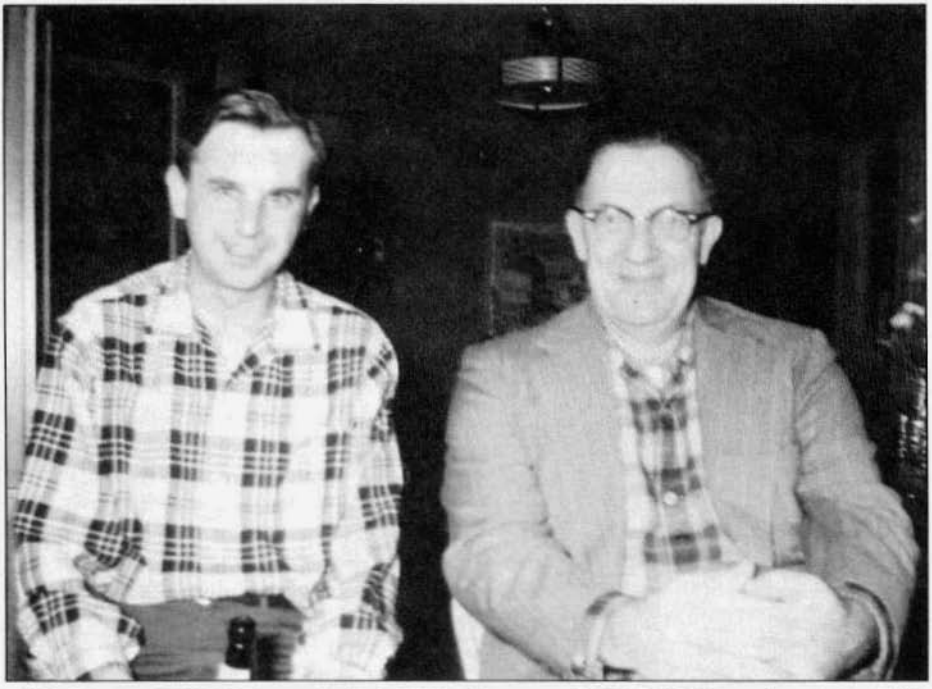


Dick Haungs, W2UJR on the left; Mike Premus, W2OY (SK) on the right. This photo was take at Christmas, 1957 by Herb Ulrich, K2JVM.

lem that you were having, then, when you were done, he would think for a moment and come up some clear simple solution. He would say, "try this" and hand you a part, or "do this" and draw a quick schematic, and it would usually work. I must have spoken with him 100 times about the problem I was having with my newly acquired KWS-1. He always had time to listen, do an air check, or offer a replacement part. That is what I remember most about Dick, he was patient, and kind to everyone.

Dick became ill in December of 1997. Although I did not know it then, Dick had developed terminal cancer. In the last 6 months of life, fighting cancer, Dick remained the same caring, dedicated person as always. Unable to sleep comfortably due to the pain, Dick would often be awake and in the ham shack at 4:00 AM. Sometimes he would call his usual CQ "Anyone around this morning?" if he felt good, or just stand by listening. I was fortunate to have had several early morning QSOs with him during this time. Even though it was often a struggle for him to speak, Dick would always want to know how things were with the club, how the VE sessions were going, and how my 20-wpm CW was coming along. It really struck me that though he was often weak and in pain from his illness; Dick was still focused on helping others.

Despite the pain of his illness, Dick remained active on the air until just a few weeks before his death, continuing his many friendships and dispensing advice to his radio friends.

Richard H. Haungs, W2UJR, passed away May 15, 1998. At the age of 77, after 58 years of hamming, Dick became a Silent Key. I found it strangely fitting that the number of the last hymn at W2UJR's memorial service was 599.

599 W2UJR my friend and my teacher de KG2IC SK. ER

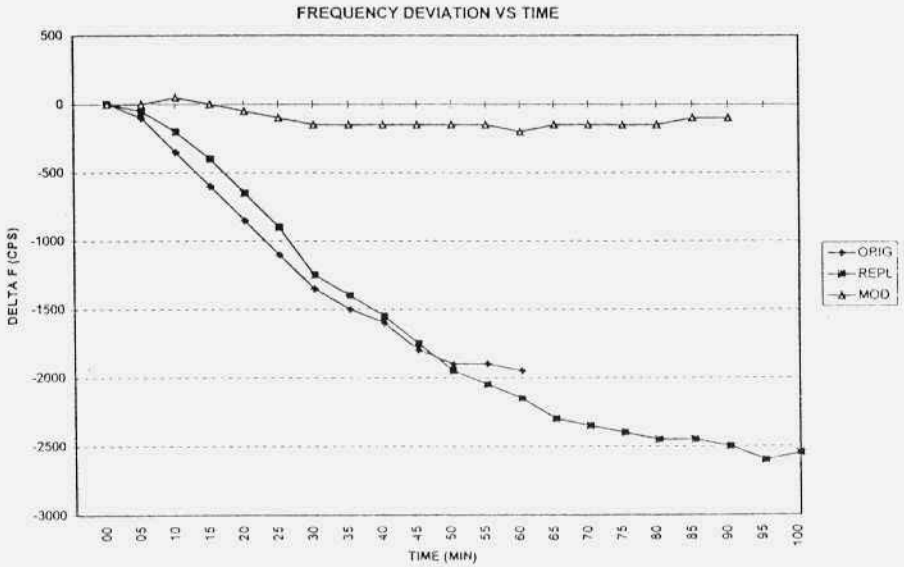
Curing B&W 5100B Drift

by Tom Clinton, W4ULL
3600 Ashley Estates
Marietta, GA 30067

The Barker and Williamson 5100B is to me one of the neatest, most businesslike looking of the classic table top rigs. It's amazing to me what moving the meter up a bit on the front panel did for its looks compared to the basic 5100, which (I know I'll get mail on this) looks tacky. At any rate, my B worked like a charm except for the fact that the VFO drifted like an untethered dinghy in a hurricane. I occasionally used the rig but made only short contacts for obvious reasons.

Having seen an article in ER on the subject (different VFO), I finally got up the courage to tinker around with trying to stabilize the VFO. Fortunately, I have a parts rig with a spare VFO and was able to experiment with impunity. One of the nicest features of the B&W's is the modular construction which allows easy removal of the VFO. There are two plugs, four mounting screws, and two set screws for the shaft. The crystal oscillator/buffer has to be moved slightly to get the VFO out, but it only requires removing four screws and a slight movement, with no need to unplug it.

My first effort was just to replace the original (ORIG) VFO with the replacement (REPL) one from the parts unit. As can be seen from the plot, both of these VFO's drifted badly but with surprising consistency. I first thought that some component had probably failed but having two VFO's exhibit almost identical characteristics leads me to believe that the drift is caused by an inherent design flaw. The data was only taken for a one hour period on the original VFO, but I collected data for 100 minutes when the replacement was installed and similar drift was noted.



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To help operate on the patient, I threw together a regulated power supply to use on the bench. The VFO needs only 6.3 VAC for the heater and a regulated 150 VDC for the B+. Current demands are minimal and any small power transformer from the junk box will do. A VR150/OD3 regulator tube assures stable B+. Alternatively, power may be taken from the accessory socket of a receiver.

After checking the various condensers and resistors in the original unit that are not primarily associated with the frequency determining network, I decided to experiment with temperature coefficient condensers across the tuning circuit. There are three types of condensers in parallel across the tank coil: 1). The main variable condenser (turned by the frequency select knob). 2). A screwdriver adjustable trimmer (for tracking adjustment). 3). A set of three ceramic condensers connected in parallel by twisting their leads together. The manual says that 3) is for temperature compensation.

The screwdriver adjustable trimmer is one of the typical ones which I believe is variable from about 3 - 30 micromicrofarads. Since it was set at approximately 3/4 mesh, I wanted to use a temperature coefficient condenser across it that was below the value set (3/4 of 30 mmfd) so that I could back off the trimmer and maintain tracking of the VFO. I'd like to have you believe that I used my engineering background to apply higher mathematics in determining the right value and temperature coefficient. In fact, what I did was look in my supply of ceramic condensers (read junk box), and came up with only two that were not NPO. As I'm sure all of the readers know by now, NPO means they're not supposed to change value with temperature. What I needed was some that WOULD change value with temperature, and further, that would decrease capacitance with a temp rise since the subject drift was downward in frequency. To make a long story short, I could only find two - one 22 mmfd, and the other 33 mmfd, both with a temp rating of minus 750 parts per million per degree centigrade (N750). I first tried the 22, but found that it had too much capacitance to allow proper tracking of the VFO. Having only the two ceramics, the only way to get a lower value was to put them in series, giving a net value of about 13 mmfd, and that was done. It's very easy to bridge components across the tuning circuit once the U-shaped cover is removed from the VFO.

When I first tested the VFO using the makeshift power supply, I thought something must have gone wrong with the hand-held frequency counter (my only concession to modern test equipment). The frequency appeared to be rock steady at the fundamental frequency of the VFO (160 meters), even though I was blasting the heck out of it with the XYL's hair dryer. Of course the proof of the pudding would be when the VFO was reinstalled in the chassis and the signal monitored after quadrupling to 40 meters, where I normally operate. Also, it would be subjected to the considerable heat of the B's cabinet. What I observed from a cold start is what you see on the plot labeled MOD (modified unit). After a 30 minute warm-up, drift was negligible. Even starting from a cold start would not be objectionable except for those who use a 100 cps filter for CW (remember, we're talking boatanchors here folks). Things like this don't usually happen to me. My junk box is littered with projects that did not quite meet specification (read abject failures), and this was like hitting a home run the first time you ever approached the plate. In one fell swoop my B&W 5100B has gone from the laughingstock of 40 meter CW to the point where the folks at WWV call me three times a day for a frequency check. It is such a pleasure to use the unit (now that I no longer get comments on my drift) that I kick myself for waiting so

The author in his hamshack.

long to tackle the problem. Now the B ranks right there with my 32V-3 for stability.

Pictured is the author's B which now sports a new dial face. I carefully peeled the old yellowed dial face off the parts unit, blew it up on a copy machine and corrected small imperfections with a black pen and white-out. I then had it reduced and printed on card stock. Beware that although I was able to peel the dial card off the parts unit using some contact cleaner as a sort of solvent, I was NOT able to do the same with the original unit and had to scrape it off in small pieces with a jack knife. This was OK since I had already made the replacement card. Apparently the glue had aged differently on the two units. The new dial face was reattached to the mounting surface with some thin contact cement. As with all contact cement, you put some on both surfaces and allow them to dry the specified time before joining. You must have the card in perfect alignment because after joining there is no tomorrow. When ready, the mating surfaces are practically dry to the touch, so you can use a piece of paper between the surfaces. The paper is gradually slipped out after a small corner is joined and alignment is verified. A good time to remove the dial assembly is when the VFO is out and requires the RF module to be moved aft a bit (three screws into the chassis plus removal of pertinent knobs). The dial assembly is held to the panel by five screws, one of which is accessed by removing the FREQUENCY knob.

Incidentally, the knobs on the B&W's are solid aluminum and can be polished to look like new as follows: Chuck a piece of 1/4 inch rod (from a worn out volume control or such) in an electric hand drill. The knobs may then be mounted on the rod in the normal manner. When turned against 0000 steel wool, the corrosion disappears like magic. Be careful though, the knobs are fluted and tend to catch the wool if not done properly. A finger could get sprained, or worse. The front part of the knob can be shined by just laying the wool down on the bench and bearing down on it with the spinning knob. Don't use anything too abrasive or you'll wear away the knob. **ER**

LETTERS

Dear ER

Maybe a little story from yesteryear about home brewing would be found entertaining. It happened in 1946 after returning from 8th Air Force WWII activity in England. I transfered to the Air National Guard in Virginia and was attending U of VA at Charlottesville, trying my hand at the Amateur Station W4UVA. I had an older Mentor in Richmond (where my Guard Fighter Squadron was based), and he had produced a W8JK open wire beam. We put it up between a tree and his chimney, after connecting to the home brew transmitter running about 150 watts to an 813 on 10m. We tried to tune into the 8JK. It looked like an open circuit, so I took a lite bulb up to the feed line, unhooked it from the antenna, and then attached the bulb. When he transmitted it lit up just fine. He called "Test 123" and a voice replied your signal is S-8 here in Houston, Texas, can I help!!!!! We had several QSO's that way until deciding to re-attach the feed line to the 8JK and try it again, this time it loaded well and we proceded to enjoy some more 10m contacts.

I realize when ten is open not much antenna is required to "Get Out" but could hardly believe that we did so well on about 35 ft of open-wire transmission line and a light bulb. Never was able to repeat that at my own QTH.
Pete Hardiman, N7DUC

Dear ER

Attached is my check for subscription renewal for the excellant ER magazine.

I read most issues cover to cover. I especially enjoy the "in-depth" coverage of glow-in-the-dark receivers, transmitters and transceivers.

Also enjoyable are the "personality" articles: both persons who were instrumental in the radio industry, and enjoyable ham AM'ers.

Such as the article on Ozona Bob, W5PYT, in this April '98 issue. I, too, had the pleasure of listening to Bob expound on ham radio gear at length in his QSOs with others. I found it fascinating that Bob could recall all that radio data from memory and relate it in a really enjoyable manner. His transmissions were long (at times he seemed like a broadcast station); yet the hands on the clock seemed to fly by.

Please put a thank you in your letters column to ER's regular and special contributers (writers) as they are the people who are helping make ER a 'must have' magazine. Thank you.
Ralph Bond, KBØWJM

Dear ER

I have just ordered a subscription to ELECTRIC RADIO and all back issues. I want to thank ELECTRIC RADIO for renewing my interest in ham radio and taking me back over 30 years. I have been a ham since 1964 but started to lose interest because of band conditions, CB type operators, fighting on the bands and becoming completely lost in the electronics of today. I was an electronics tech in the US Coast Guard from 1963 to 1967. I cut my teeth on radios that glowed in the dark, radios that I could repair and circuits and components that I understood. I didn't stay in electronics once I got out of the Coast Guard, in fact I retired from the Seattle Police Department so electronics passed me by. I always wanted to get back to the good old days of ham radio and electronics but never really thought there was much interest by anyone else. Was I ever wrong.

I just returned from a local fleamarket where I helped our club raise money by selling donated equipment. Two items donated for sale were a mint Johnson Viking Challenger and a mint WRL

Globe Chief 90 still in the original box. Both had been donated by the wife of a friend who had recently become a silent key. I bought both of them and started to get excited about ham radio again. I left the flea market with not only those two transmitters, but a mint Hammarlund HQ-180. This fleamarket is one of the biggest in the Northwest so there were lots of vintage radios and people who wanted to talk about them. I had more fun at the flea market than I have had in years. I got more information and names then I ever thought existed, but the best was yet to come. I ran into a friend, W7UQJ, who has a vintage station. He told me about ELECTRIC RADIO and the next day brought me a box of back issues to look at. When I got home I picked up one of the copies and the first thing I saw was an article on the Drake 2-B. At that moment I realized that I had one of those in my attic along with a Hammarlumd HQ-110, a National receiver, Drake TR4C and boxes of tubes and test equipment. I also found articles on my new Viking Challenger and Globe Chief 90. That did it. I was hooked on ham radio again. I am selling some of my newer gear and putting together a vintage station.

There is one big problem with my rebirth into ham radio. How to get all my new old radios past my wife. They are much bigger then ones of today and not as easy to hide or blend into your station. Just kidding. Although not interested in ham radio my great wife of almost 30 years totally supports my hobby.

Many thanks for your excellent magazine and to everyone who works so hard to get it out. I especially want to thank everyone who writes articles. Life is great again.

Jerry Sampont, WA7BUY

To Join AMI send $2 to:
AMI
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Operating Vintage Tube Radio Broadcast Station

The Antique Radio Club of Illinois (ARCI) will, for the first time, have a vintage amateur station ***transmitting*** on August 5th through 8th, 1998 at **Radiofest XVII** from the Holiday Inn, Elgin, Illinois. **RADIOFEST XVII** is one of the nations largest gatherings of antique radio collectors held each year. **N9CQX** will be our host and will be assisting individuals, who bring a current copy of their license, to broadcast over a variety of vintage tube radio equipment. The station will operate AM Phone and SSB on 80, 40, 20, 15 and 10 meters. Contact (or receive) station N9CQX on either of these days and send a reception report along with a LSASE to ARCI for a QSL certificate. For more information about this rare opportunity or for more information about **RADIOFEST XVII**, visit our website at arci312806@aol.com or write to us at ARCI, P.O. Box 1139, LaGrange, IL 60526 or call Art Bilski at (630) 739-1060.

The 1998 ARRL Colorado State Convention & The Denver Radio Club's Annual Hamfest

Our 51st Year with ARRL. Sunday, August 16th, 1998. 8:30 AM to 2:00 PM, Jefferson County Fairgrounds, 15200 W. 6th Ave. (Indiana Exit), Golden, CO

Talk in on 145.49- 100 Hz PL,
Tables $10 ea;
Admission $4 ea,
Vendor set-up at 7:30 am

For Reservations &/or Info Contact:
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A Fifty Watter From the 1950s

by Harry Hyder, W7IV
1638 W. Inverness Dr.
Tempe, AZ 85282

Before I left the east coast in 1957 I sold my transmitter and receiver, planning to start over again when I was settled in Arizona.

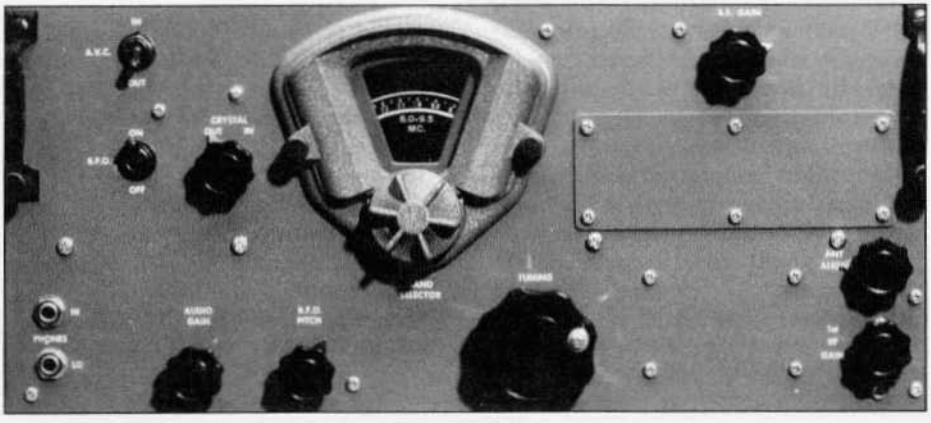
My first acquisition when I arrived in my new location was a BC-348 receiver, which I got for $25 at a flea market. It worked fine, but it looked a little shop-worn. I like to have good-looking equipment, so I decided to refinish the front panel and cabinet. I removed them, washed them thoroughly and then sprayed them with gray lacquer. I re-lettered the controls and also added an RF gain control.

The chief fault of the BC-348 was a small amount of backlash in the tuning mechanism. There were several "Hints and Kinks" in QST telling how to cure this. I tried them all, but never found a permanent solution, so I learned to live with it. The refurbished BC-348 is shown below.

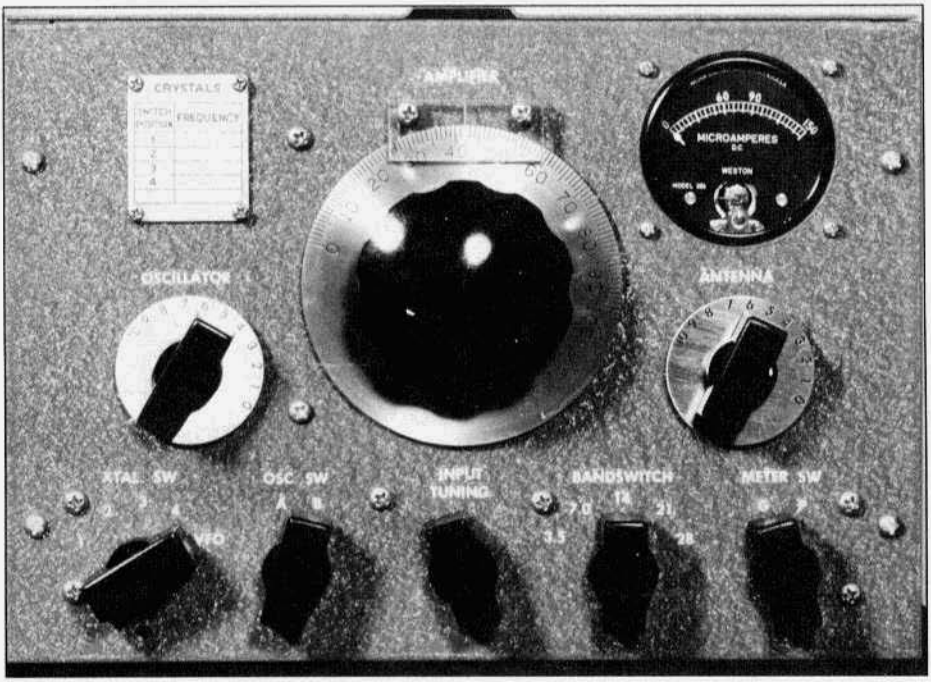
For my new transmitter I decided to use an 807, as I had in my previous pre-and-post WW II rigs. Both of the old rigs had used plug-in coils but this time I decided to go modern and have band switching. I used a 12BY7 oscillator, which could double or triple and a 6AQ5 for a clamp tube on the 807 screen. There is a switch for four crystals and a position for feeding in an external VFO. The crystals are mounted in two octal sockets on the back drop of the chassis. The oscillator plate circuit is tuned by a 150 pF variable. The inductance can be switched. One switch position covers the 80 and 40 meter bands and the other covers 10, 15 and 20. The external VFO input also has a tuned circuit; it covers 40 and 80 meters.

The 807 tank coil is made from 2" dia. B&W coil stock. The 10 meter tank is a small air-wound coil, not visible in the photograph. The tank tuning capacitor is a 100 pF per section National. One section is used for 10 through 20 and the second section is switched in for 40 and 80. The antenna capacitor is a dual 400 pF per section BCL type. On 80 meters a 500 pF mica is switched in parallel. All of this switching is handled by the amplifier band switch.

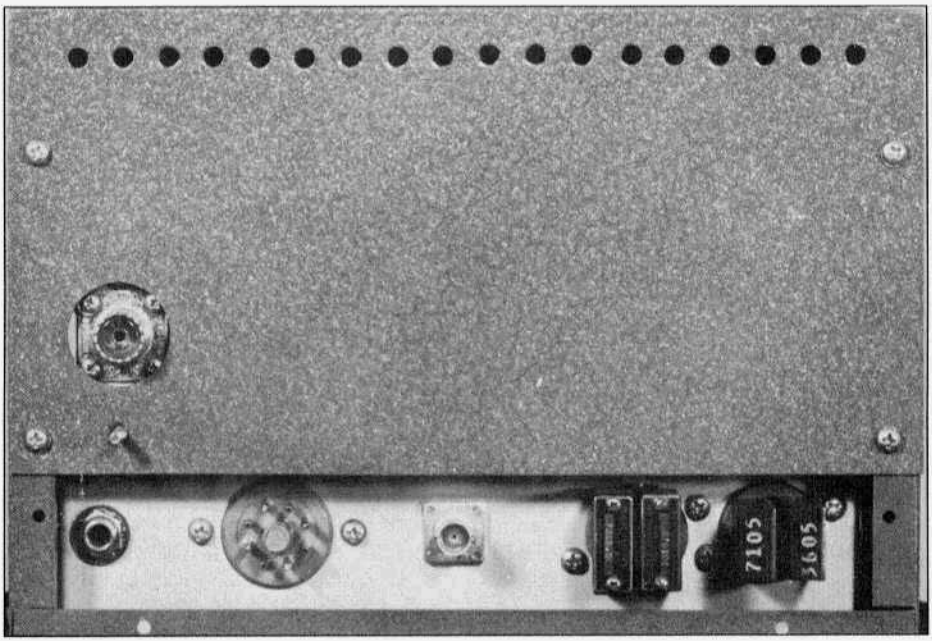
The 807 screen dropping resistor is four two-watt resistors in parallel, mounted on the oscillator side of the partition.



Front panel of the author's refurbished BC-348.



Front panel of the 'Fifty Watter'.



Rear view.

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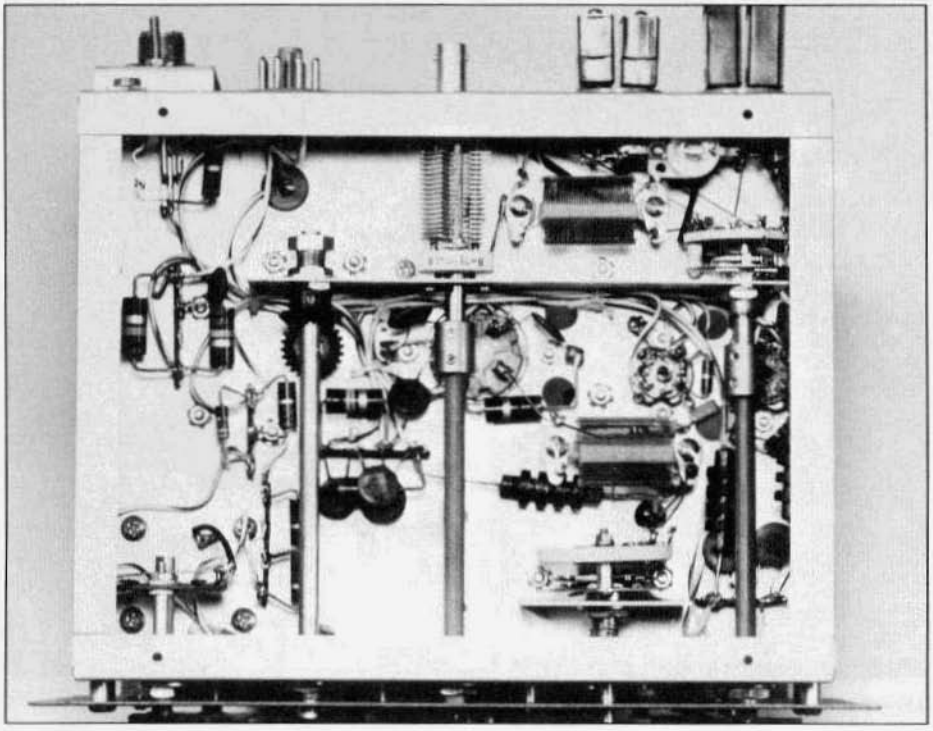
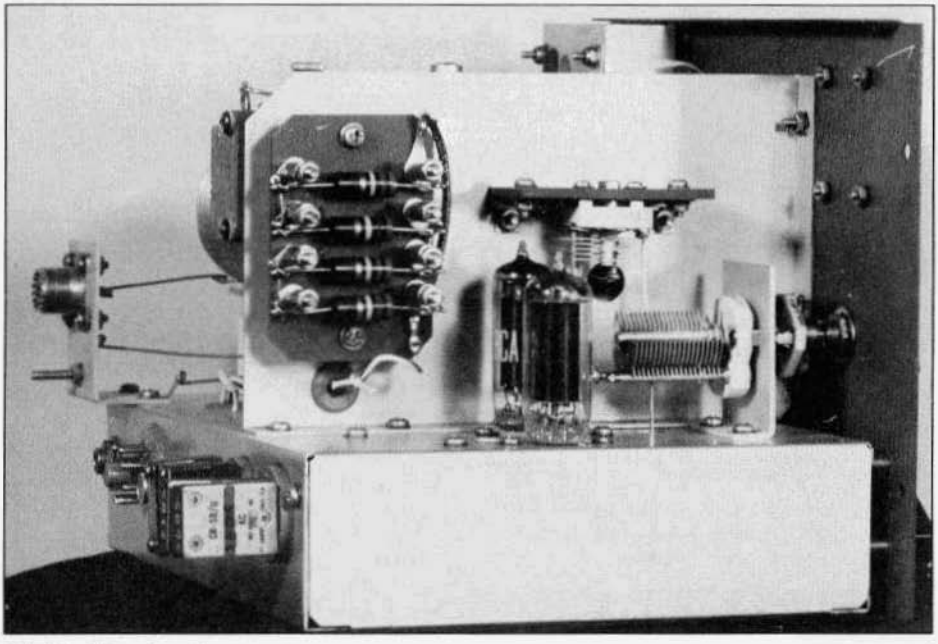
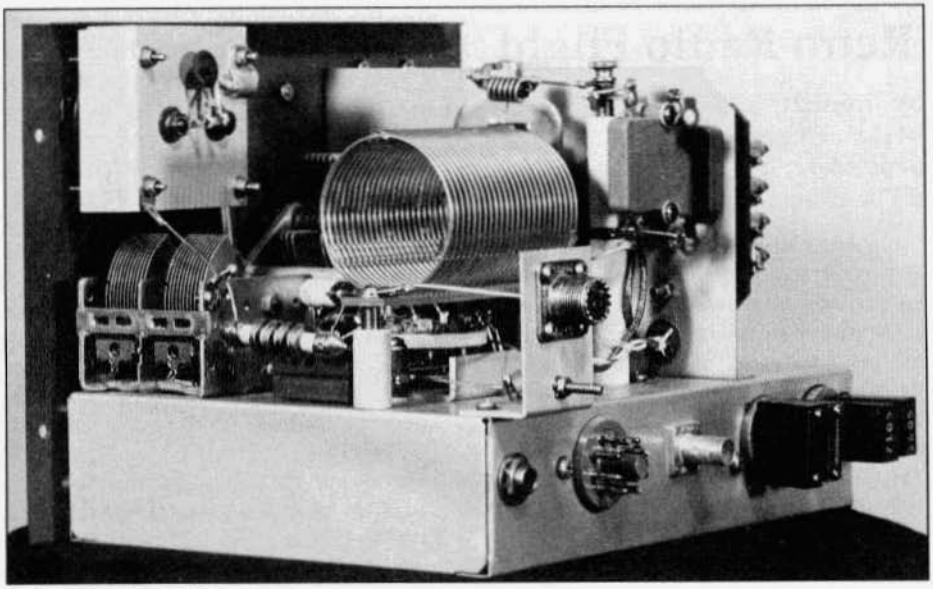


Under-chassis view



Right-side view from rear.



Left-side view from rear.

The amplifier band switch is mounted above the chassis under the tank coil. It is operated by a pair of miter gears I had on hand, as the photograph shows.

I had previously operated 807s successfully without neutralization, but this time I decided to put in a neutralizing capacitor. It is always easier to add this function when building a rig than to find out later that you need it and wonder where to put it.

The neutralizing capacitor is mounted on the oscillator side of the partition.

The meter reads 15 mA on switch position "G" (grid current) and 150 mA on "P" (plate current).

The tube shown is actually an 807W (5933) which has a shorter bottle than the standard 807.

The set is built in a standard 7"x8"x10" hingled-lid cabinet. The rear surface had the bottom two inches removed to give access to the connectors and crystal sockets. Holes for ventilation were drilled along the top. The cabinet was originally black wrinkle, but after all of the holes were drilled it was sprayed with gray lacquer.

Most of the parts for this rig I had brought with me from my previous QTH. Some of them, such as the dials and knobs, are actually pre-WW II.

I used the rig for a short time crystal controlled, but then at a flea market acquired a Heathkit VFO. This VFO had a problem I never solved. It was given to sudden frequency jumps of a few hundred hertz. When I received an ARRL Official Observer Notice (the first one in my life) I got rid of the Heathkit and at a flea market bought a Hallicrafters VFO, which worked fine.

Later, in the 1960s, I was bitten by the DX bug and decided to raise power. I built a power amplifier using a pair of 811s, running about 400 watts, driven by this rig. This amplifier was described in the March 1970 issue of *Ham Radio magazine*.

I used this transmitter until 1969 when, at the ARRL Southwest Division convention in San Diego, I won the grand prize: a SIGNAL/ONE CX-7 transceiver. Since then this little rig has sat on a shelf in my shack where I look at it fondly almost every day. Over the years I have received a number of offers for it, but I would not sell it. **ER**

Retro Radio Flight

by Jim Riff, K7SC
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On April 30th, 1998 our company's PR office contacted me and asked if I would be available to participate in a project to highlight Motorola's 60 year history in military airborne electronics. The program was to be to the radio operator on a B-17 WW II bomber on a flight out of an old Army Air Corp. training base in Arizona. I was thrilled and excited to accept this once in a lifetime challenge, as it meant vintage radios and aircraft; two of my passions.

I reported to Falcon Field in Mesa, Arizona at 0630 hours (fig.1) for the pre-flight checkout and instruction. A crew of 10 were present, and each was given their assignment for the flight. The props were pushed through two full revolutions to clear the oil from the bottom cylinders of each of the 4 Wright Cyclone radial engines. 700 gallons of 100LL aviation gasoline were pumped into the wing tanks, and oil was added to the engine oil tanks.

As we boarded the aircraft with a gymnastic hand overhead motion the pilot fired each engine, one at a time. As the engines fired the inside of the plane momentarily filled with oil smoke as the cylinders cleared and smoothed out. The noise and vibration were extreme, and we were not even at a power setting yet. From my seat at the radio desk (fig.2) on the port side of the aircraft, behind the bomb bay, I could see the two engines turning through a small window on my side of the plane. All was ready, and at 0700 hours we began to taxi. Although the pilot and copilot used a modern (King) VHF radio, my HF station was period Army Air Corps.

As we approached the takeoff runway the pilot advised me that the generators were all at indicated output and it was OK to turn on the HF equipment. There is another plexi hatch above the radio room, that allows the radio operator to operate a 50 cal. machine gun when in combat, this was not necessary on this flight so I only had radio duties this day. Through this upper hatch I could see the horizontal Vee antenna connecting from the upper part of the rudder down to each side of the radio room where two ceramic feed through insulators feed into the antenna tuner boxes at the rear of the compartment. The receiver is a BC-348Q, and the transmitters are ARC-5 units, one for each band segment. I would be operating 80 and 40 CW and 75 AM phone on this trip. All of the equipment operates on 24 volt dynamoters, and their whirr mixes with all of the other hydraulic motors to play a unique tune. We were now ready to take off, and the big Wrights were brought up to 2200 rpm and the brakes released; we were rolling! The noise from the 4000 hp being produced was deafening, then add the wind blasting through the bomb bay and gun windows and the earphones were barely adequate to hear any signals.

As we reached our cruise altitude of 4500 feet, note the B-17 is not pressurized nor was there oxygen available, the air temp was cooler, but the noise was increasing with the increase in speed to 220 knots. The first CQ on 7047Kc was sort of answered, as the ambient noise level was greater than the max volume of the BC-348. The electrical and ignition noise made 75M AM operation impossible. A few additional CW contacts completed my mission, a tough operation this aeronautical mobile stuff.

My stint in a WW II bomber was great fun, but it made me think of the 17 year old who sat in this seat 55 years ago and had to accurately copy CW as if his life depended on it; and it did. **ER**

Figure 1. The author with the B-17 WW II bomber at pre-flight checkout.

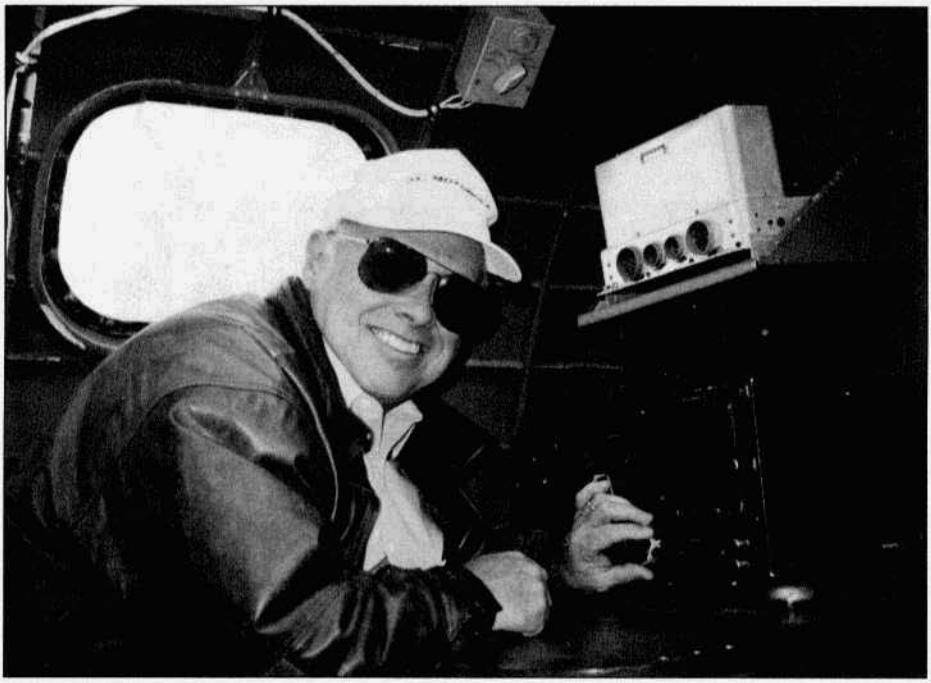

Figure 2. The author connecting up BC-348 prior to takeoff.

James Harvey Knauss, K5OZO, in his hamshack back in 1960. He had this station in San Antonio, Texas from 1959 to 1964.

Mike Dormann, W7DRA, at his operating position. This photo was taken while he was working the 1997 CQWPX 80-meter QRP contest.

Frank Fisher, WA6RBQ, in his AM station. Some of the equipment shown includes a DX-100, NC-183, RME-70, SX-42 and 2-M Gonset Communicator III.

A group picture of the New England HF and VHF AM contingent. This photo was taken at this year's Hosstraders hamfest in Rochester, N.H. *Photo by Ken, KA7OXQ.*

A Tribute to Barry Goldwater, K7UGA, SK

by Barry Wiseman, N6CSW

To my knowledge no other ham was more well-known or universally appreciated than Barry Goldwater. No one else ever brought the kind of recognition to amateur radio that he did. (Remember the photos of him in Life magazine during his 1964 presidential campaign, setting up antennas on hotel roofs and operating is KWM-2 and remember all the magazine articles about him over the years that always mentioned his involvement in amateur radio.)

Politics aside, it's really hard to find anyone who has anything bad to say about Barry Goldwater. He was truly a unique individual, a great American patriot and most important to us—a ham. In Arizona he had a great many ham friends. Some of them that I know include Harry Snider, W7HC; Gerry Higgins,W7ES and Bill Braden, W7XK. and of course the late Lee Faber, W7EH. From them I've gained some information and insight that makes me appreciate K7UGA even more.

Gerry Higgins, W7ES, wrote the following recently:

"In 1990 Harry Snyder, W7HC, and myself went to Barry's house to attend the presentation of his 60-year ARRL award. We arrived quite early and had a chance to visit with Barry in his den. After a while it became obvious that Barry had forgotten that the group was coming and mentioned that he had an appointment with his doctor in an hour. Some time later I looked at my watch and mentioned that it was getting close to his appointment time. Barry said, 'Oh to hell with the doctor, this is more fun!'

"In 1991 we decided to name our QCWA chapter after Barry. I wrote a letter asking his permission to do so and got the following reply--

'Dear Gerry: You flatter the hell out of me by suggesting you change the name of our Chapter to the Barry Goldwater Chapter. Honors like that just don't come around that often, and it would make my life complete to know that I left my name on such a good cause. Sincerely, Barry.'

"Barry offered his help with the upcoming National QCWA Convention and spoke at the opening breakfast. Early in 1992 by a vote of the membership, Chapter #16 became The Barry M. Goldwater, Arizona Chapter #16, QCWA."

Bill Braden, W7XK, sent the following:

"When I first knew him, I do not recall that I thought he was a bigshot. He was quiet and very dedicated to trying to learn how to take good photos of this land and the original people. I did not know that he had a pilot's certificate or had ever had a ham license.

"Don't remember what organization had voted K7CRO the Amateur of the Year but he was invited to the award banquet in Phoenix to accept the honor and declined as none of us here [in Tucson] ever want to get into the craziness of Phoenix traffic. I think Barry knew that John lived on a cul de sac so he could practically give him a direct order to step out his front door to board the chopper for the run to PHX. (The late John Buchanan, AKA 'The Old Crow' which was also the name of Barry's beverage of choice.) Do not know whose logo was on the chopper."

When I was writing the series of articles on Lee Faber, W7EH, back in '92-'93, he provided me with all his archives. Amongst all the stuff that Lee had kept over the years, were several letters from his friend Barry Goldwater.

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VINTAGE NETS

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

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

The CW Special

Bruce Vaughan, NR5Q
504 Maple Dr.
Springdale, AR 72764

A cold north wind tugs at the empty robin's nest outside my 'shack' window. The bird's temporary home is well built; it withstands the gusty winds with ease. I glance at the outside thermometer—28 degrees. Small snowflakes are falling—more accurately blowing horizontally; some sticking to the north side of trees and shrubs in the garden. Inside our old two story house, my radio shack is nice and cozy—a perfect day for ham radio.

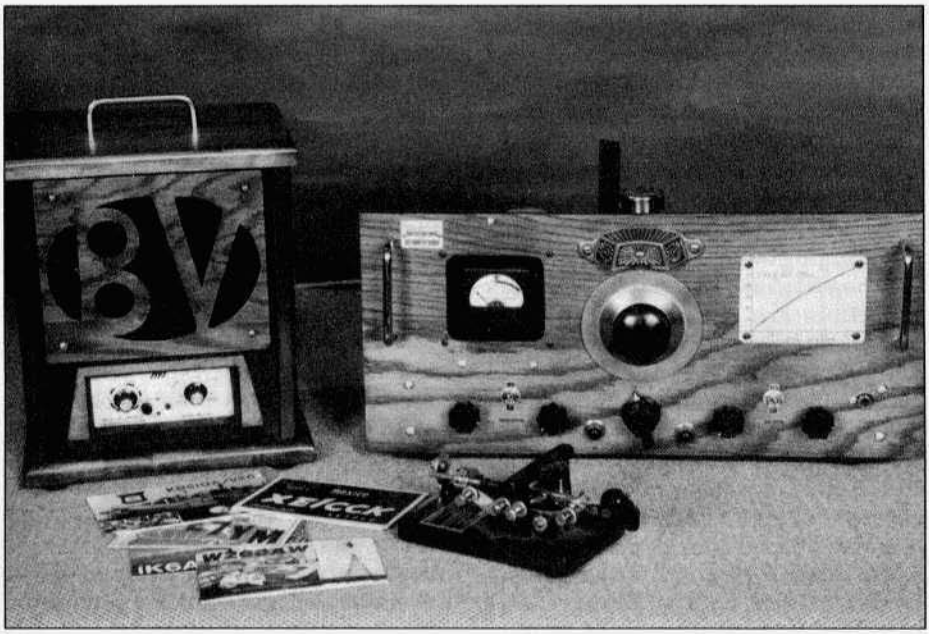
I pull my chair closer to the operating desk and turn on my latest receiver. I feel confident DX will be good on the beam; the bands have really been jumping these last few days. It looks like our current cycle is taking off like an Atlas rocket. Today however, I am curious to see how the receiver works on a wire antenna. I move the classic 'velvet vernier' tuning dial across the band. (1)[see notes at end of article] European stations are booming in loud and clear. East coast stations are so strong I am forced to back off on the audio gain control. I tune more slowly -- there is a ZS6, an EA8, and a KL7. I adjust the antenna trimmer, ever so slightly, to loosen the coupling. Signals are so strong the radio is 'pulling,' a term you will become familiar with if you build and operate regenerative radios. Older handbooks go into this phenomena in detail. No rare DX, yet I am thrilled at the sound of each signal. After sixty years of ham radio it still amazes me when I take a small box of used parts, a few hours spare time, some old handbooks and tube manuals, and build a set that works so well. Yes, the magic of radio is as strong as ever, it just takes a little time and effort to find it. There is no doubt in my mind, CW sounds better on a regenerative receiver; especially if you build your receiver from scratch.

The CW Special is very similar to many other receivers sitting around the shack--with one big difference; this one is band-switching. True it only covers the lower portion of 40 and 20—the CW portion of those bands—without adjusting and re-calibrating. Hey, that's what home building is all about! Build equipment for your own needs.

'Way back in February of 1947, I came across a QST article *"The Old Stand-By,"* written by George D. Knipe, W7IGE. The article described a four tube regenerative receiver, and according to the author it was quite a receiver. Prior to reading the article I had built perhaps ten or twelve "regens"—none of which measured up to my expectations. I still had a receiver on the shelf built from an old pre-war, Frank C. Jones, handbook that was very similar in design. It worked rather poorly--which I assumed was normal for that type of receiver. I decided to give the regenerative circuit one more chance and build "The Old Stand-By."

In 1947 parts were plentiful and cheap. If your junk box was short a few parts, Allied Radio could fill in the gaps. I wanted my set to work well so I ordered the complete parts list, including new tubes. Well, the set worked but it certainly was nothing to brag about. This was when I decided that regenerative radios were totally impractical. The set went on the shelf where it gathered dust with other less successful projects.

It took a lot of years, and many build-



The CW Special. Both the front panel of the receiver and the speaker grill are made from oak plywood. The front panel of the receiver is backed with lightweight aluminum for shielding. The audio filter in the speaker is a help when the bands get crowded.

ing projects before I finally changed my mind--but that's another story--and one much too long for one article. Suffice to say, my "regens" improved tremendously over the years. The set described here is what might be called a "variation."

I began construction of this receiver with the following goals in mind: I wanted to cover the CW portion of my two favorite bands, 20 and 40 meters. I did not want to bother with plug-in coils or band set dials. I've long admired the business-like appearance of the National AGS, so I wanted a set that would bear some resemblance to that landmark receiver. I not only wanted a set to work like a good 1930's radio, I wanted a 1930's appearance. I prefer a built in power supply—though this sometimes introduces the problem of induced hum. I wanted a "fine tuning" control for regeneration—a variable resistance, screwdriver adjusted, so that the detector voltage could be adjusted to match different tubes and conditions. The featured receiver met all of those requirements--and more. The set is good enough to use for ham communications on today's crowded bands. Is it as selective as a modern transceiver? (2) Of course not. Neither is it as accurately calibrated. However it has something the new transceivers do not. It stirs up a lot of memories and brings a smile to the face of all old timers who operate it. Ham radio is supposed to be fun--and this receiver is fun to build and use.

There is little reason to offer a step by step, "paint by numbers" description of how to build this receiver. Your ideas, your parts, your ability, and your shop facilities will be different from mine. For example, my only power tool is a small drill press--and my radio test equipment is ancient. Your shop may

continued next page

be equipped with a frequency counter, digital VOM, and a sheet metal brake. I should be so fortunate. I approach radio building as most hams have from the beginning—cut and try.

Construction Details

A decision was made to use a simple three pole, three section wafer switch for changing bands. The 80 meter band may be added at a later date. The tuning capacitors are screwdriver adjusted midget variables (Hammarlund APC midget or micro) that are available in abundance. Coils were wound on 1 1/2 in PVC, 2 1/2 inches long. A round piece of plywood, center drilled with a 1/8 in. hole, (for mounting to the chassis) was cut to fit tightly inside the tubing, and glued inside one end. The coils were wound from experience—and when checked with a 'dipper' were found 'on frequency.'

I expected some problems with unshielded coils and tuning capacitors mounted under the chassis amid all the other components. Much to my surprise, such problems did not surface. I chose to place the twenty meter coil on the side of the bandswitch farthest from the power supply. I thought this might keep down some hum. The set has no hum on 20 meters—placement of the coil may, or may not, have been a factor. In sets that exhibit a mild hum on twenty meters, I have found that adding more filtering to the power supply often cures the problem. I'm certainly not disputing the handbook—I'm just telling you what works for me. (3)

I believe that some hum protection is offered by using a separate, center tapped, filament transformer for the detector tube only. In some receivers this amounts to overkill.

In referring to the schematic—the tone control is optional. You may wish to use a capacitor somewhat larger than the .05 I used. A larger capacitor will attenuate more of the high frequency response.

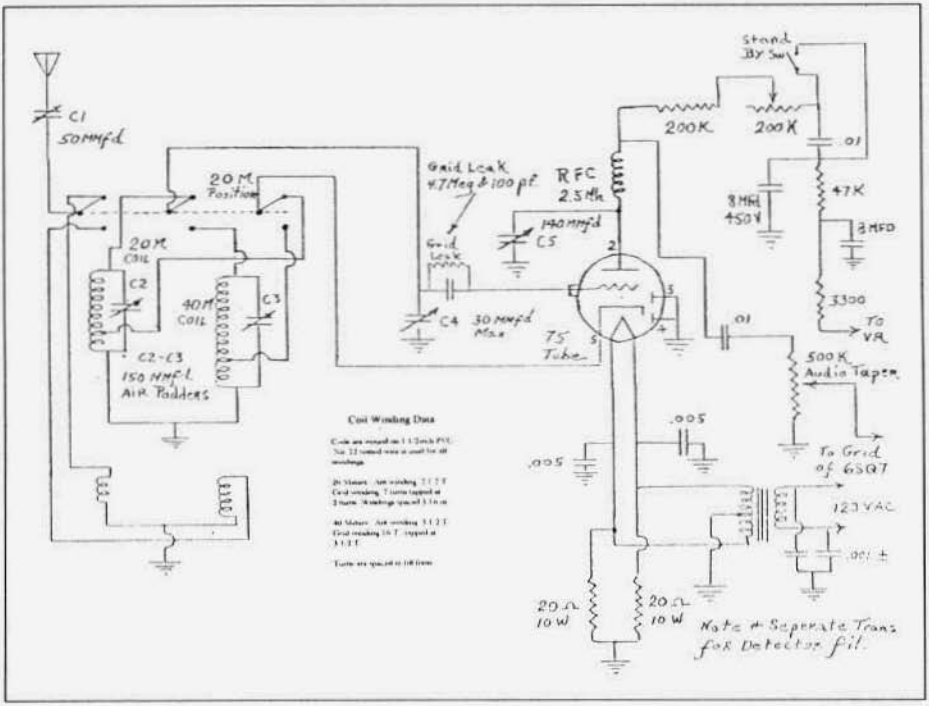
Note the output transformer. I was lucky enough to find a nice new transformer with a tapped secondary. I made use of the taps. This is of little use and any 6V6 output transformer can be used...something with a 5000/7000 ohm primary and a 4 to 8 ohm secondary.

About the tuning capacitor--the diagram shows a 30 mmfd. This value will probably cover the entire band and more. I prefer a value closer to 15 mmfd. I am only interested in the lower part of the CW band. The band-set (chassis mounted midget variables) should be at least 100 mmfd. capacity—140 mmfd. is preferred.

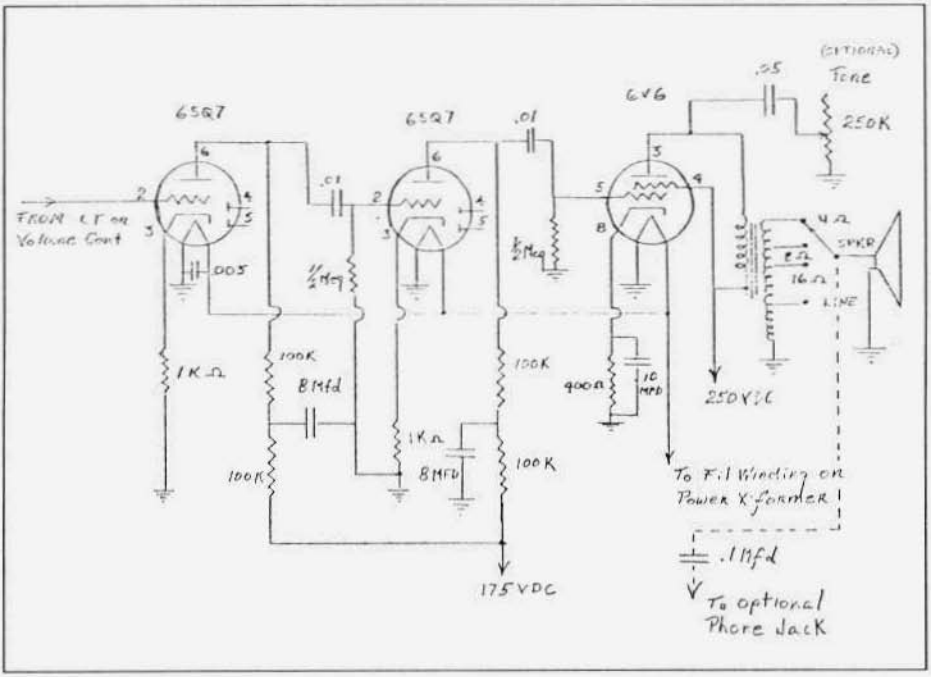
I recommend you use a medium to large chassis. There is a place for small radios and crowded components--but a regenerative such as this is much easier to build and get working properly if you have plenty of room. I used a 17 X 10 X 3 chassis. I purchased my chassis from Antique Electronic Supply, in Tempe, Arizona.

About the power supply. I show 8mfd. filters because this is a rather common size. If available, use larger caps. It is hard to get too much filtering in a regenerative receiver power supply. However, you must remember that large capacitors present a 'dead short' condition when first energized. This is the reason for "in-rush" circuits in large linear amplifiers. For a millisecond or so your rectifiers are looking at a very low resistance load. Most rectifiers can take the initial shock--but then others do not. I like to use very heavy rectifiers from K2AW's, "Silicon Alley." They have 6KV, 1A, HV modules for five bucks each. Overkill? Sure. Peace of mind? You bet. I think it's worth an extra ten bucks. If you are comfortable with 10 cent hamfest specials, use 'em. I'm using a few right now and getting away with it, but I have a few horror stories I can tell about hamfest diodes.

I am including a schematic which contains no innovations and no sur-



Detector Circuit



Audio Amplifier

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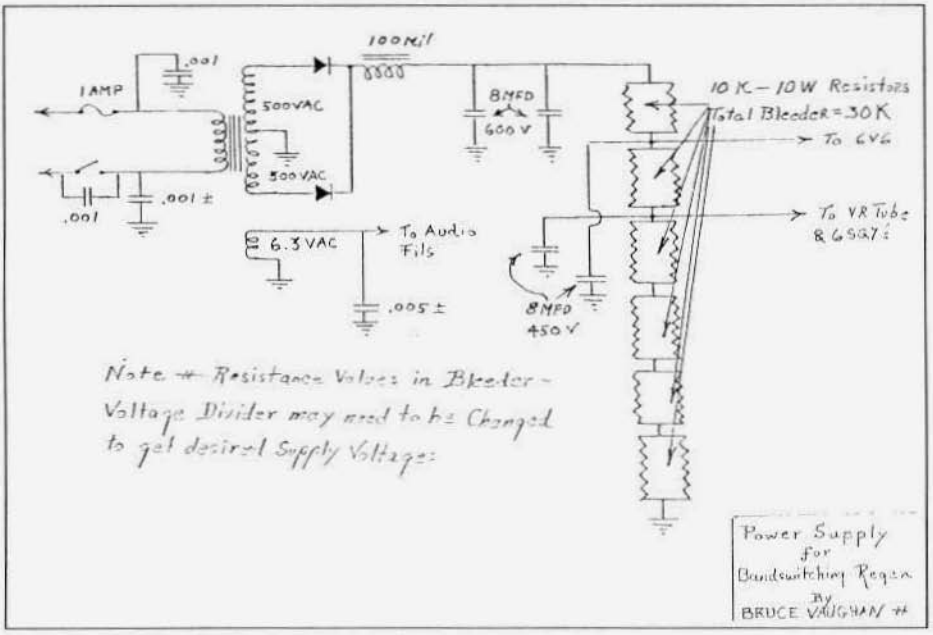


Power Supply Circuit

prises--values for most parts are not critical. I do recommend that you adjust your voltages fairly close to those listed in the chart. Some tubes' voltage requirements may be slightly different. Example: the voltage shown in my chart for the 75 may be low by about 10 volts. The particular tube I'm using in this receiver operates with 79 volts on the plate. Most tubes will require about ten volts more. There is not much tolerance here if you want really smooth regeneration. If you have a problem finding a 75 tube and tube shield, I have had very good luck by substituting a 6J5 triode for the detector. I do believe the 75 is a better choice.

Calibration of the receiver is easy to accomplish by tuning in the signal of the regenerative detector on a modern transceiver. (3)

About voltage regulation. I believe it is worthwhile to use a VR tube in the detector circuit. Refer to the ARRL handbook for specs on VR tubes and circuits.

If you follow the diagram faithfully, if you adjust your voltages correctly, and if you do a perfect wiring and soldering job, the results will not duplicate my receiver. Your receiver could very well work better, and it may not work as well. I've built over two dozen receivers using this basic circuit and no two sets work the same. Sometimes one will fail to satisfy me even after hours of de-bugging. Other sets amaze me at how well they work.

Think about this: Shipboard stations used regenerative receivers for many years. I understand some were in use well into the 1950's—perhaps even later. I'm sure some of our readers can enlighten us about this. There are legends about how good those receivers were. When you get a chance, take a look at the schematic of one of those old seagoing receivers. It's amazing! There are practically no parts in them. I'm sure that was one reason they were kept on board--they were almost indestructible, and if they did break down, they could be repaired quickly.

Voltage Measurements

Readings made using a Simpson Model 260
vol. and tone cont. normal listening settings

Pin #	1	2	3	4	5	6	7	8
75	3.2AC	79	Gnd	Gnd	—	3.2AC		
6SQ7	Gnd	—	.8	NC	NC	165	6.3AC	Gnd
6SQ7	Gnd	—	.75	NC	NC	165	6.3AC	Gnd
6V6	Gnd	6.3AC	260	260	1.5	NC	Gnd	15

As the circuits are extremely simple, and the parts are few, it should follow that an inexperienced builder can duplicate a good shipboard regenerative in a weekend and have time left over. Not so! Rugged construction, physical layout of parts, shielding, lead dress, and quality components were, and are, of prime importance. Companies that built good regenerative receivers developed them over a period of time. They were not built down to a price, but up to a standard.

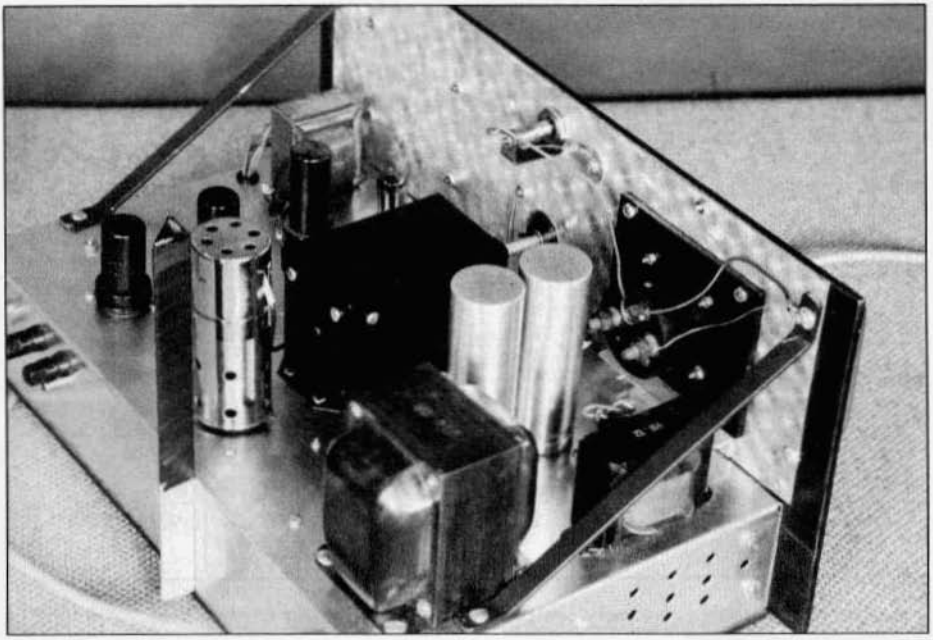
Let's discuss the grid leak. In the very early years of radio, a certain mystique surrounded the grid-leak. Some radios even went so far as to make grid-leaks that could be changed without soldering--they employed various plug-in, snap-in devices. It has been my experience that the grid-leak is one of the least critical items in a detector. Use a resistor somewhere between 3 and 5 meg ohms, and a 50 to 100 pf capacitor and forget it. My choice is a 4.7 meg resistor and a 50 pf capacitor.

How well does this receiver operate? I can switch bands and do not have to make major changes in the regeneration control or tuning dial. 7000 Khz is adjusted for 20 on the vernier dial. 14,000 Khz is also 20 on the dial. Calibration charts were drawn up for both bands. Readout is possible to within 3 or 4 Khz. During recent contests I have been able to tune in, and copy solid, over forty stations between 14,000 and 14,060 without using the external audio filter. I do admit that I was doing considerable filtering between my ears. It is relatively stable—not my best—but certainly not bad. SA, and EU, often come in with ear shattering loudness. The set literally runs circles around such sets as the old Sky Buddy, and S-38.

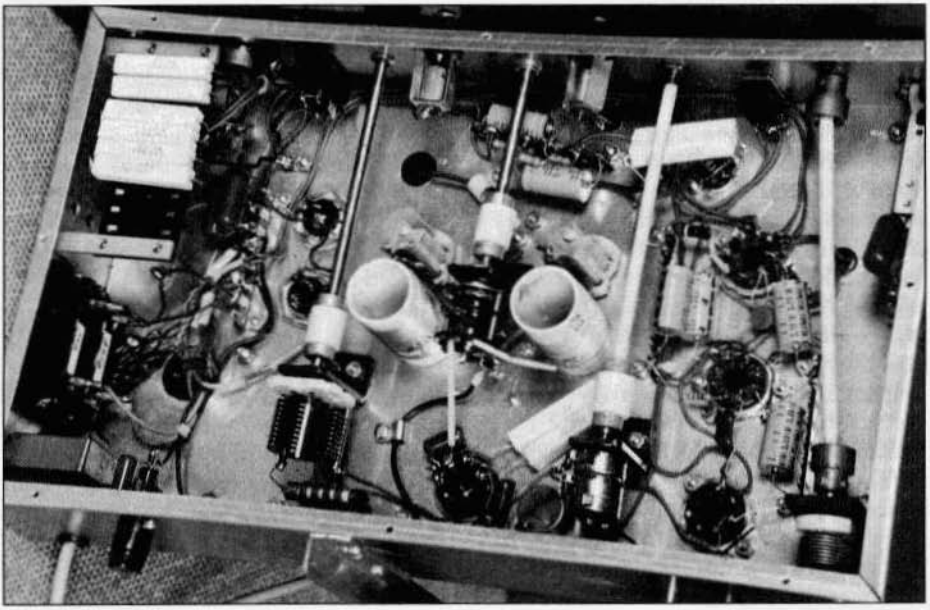
General Construction Rules

To save you some disappointment and headaches I have drawn up the following list of rules. These are rules that work for me. If you can do things differently, and get good results, you have my blessing—and admiration.

1. Build your receiver "Hell for Stout." Remember that the mechanical construction of a regenerative receiver is of prime importance. Microphonics are a problem you must live with, but the more solid the receiver, the less they



Note braces from panel to chassis. Rigid construction is a must in regenerative radios. Aluminum angle mounted on rear of chassis is a support to protect parts and keep chassis positioned conveniently when constructing and trouble shooting. Black tape on support was placed there to make it less noticeable in photo.



Bandswitch is located in center of chassis. The 20M coil and capacitor are on the left—40M coil and capacitor to the right.

Closeup of speaker.

bother. Solidity is also a factor in the stability of the receiver.

2. Do not even think of using a direct drive on the tuning capacitor.

3. Shield the front panel. The only time you can get away with not doing this is when you shield detector parts well. Use of both shields is strongly recommended.

4. Use insulated shafts and couplings between knobs, and the antenna trimmer, and both tuning capacitors. This is an absolute necessity with the antenna capacitor, and good insurance against hand capacity on the other two.

5. Brace the front panel to the chassis with heavy aluminum strap stock.

6. Keep leads short, but do not crowd parts to do so. Spend as much time on the layout as you do the wiring.

7. If working with old parts--and who isn't these days—check as many components as possible before installing. Double check your wiring as you go along. Remember the carpenter's rule—measure twice, saw once.

8. Use a good "stiff" power supply. I like to use transformers that are large enough to run cool. Use choke input if possible. I know chokes are getting hard to find, but put out the effort. I like to use at least 100 mfd of filter in the supply. Use a voltage divider heavy enough to handle the job. Add a filter at every point on the divider where you tap off voltage. Build the power supply first and 'run it in.' If it will not stay on all day, without load, and show no sign of over-heating, you better find the problem.

9. Be aware that you are working with POTENTIALLY LETHAL VOLTAGES. You can get across as much as 1000 volts in one of these little receivers—and under the proper conditions that can ruin your entire day. ER

Notes

(1) Light for the National dial is supplied by a #47 pilot bulb. An ornate drawer pull purchased from a building supply store directs the light downward, while lending a nice 'old-time' look to the receiver. A pointer, fashioned from a plexiglas, and mounted with brass screws and spacers 3/16 inch in front of the pilot bulb, makes a nice 'edge-lighted' pointer.

(2) A look at the picture of the speaker used with this radio shows a little MFJ audio filter built right into the speaker cabinet. While I love to build, I'm no "purist." The filter was on hand—it really sharpens the selectivity of a 'regen' so why not use it.

(3) Here is what the 1948 ARRL Handbook has to say about hum. Hum at the power supply frequency may be present in a regenerative detector, especially when it is used in an oscillating condition for C.W. reception, even though the plate supply itself is free from ripple... Connecting one side of the heater supply to ground, or grounding the center tap of the heater-transformer winding, is good practice to reduce hum. The handbook further states that such problems exist in this type of circuit, and especially at frequencies above 14 Mhz.

Viking II Modifications—Revisiting a Legend Part 2

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After reading Part 1, a ham in Calif. sent me an e-mail to report a "serious typo" on page 35. The phrase in question was "...Thévenin equivalent resistance ..." Nope, this wasn't a typo, but his comment pointed out the need for a short explanation. Thévenin was one of the great contributors to the early science of electrical engineering. His theorem makes circuit analysis much simpler by allowing nearly any complicated circuit to be reduced to an equivalent circuit of an emf in series with a resistor. The Thévenin equivalent voltage is the open circuit voltage measured across two terminals in a circuit without current flowing and the Thévenin equivalent resistance is the impedance measured between terminals with all energy sources within the network reduced to zero output (the short circuit impedance). It is quite a handy theorem and is frequently used to reduce the work of analyzing circuits. You can find out more about how to use Thévenin's theorem by using any search engine on the Internet to conduct a search using the key word "Thévenin." Application of this theorem will be on your final exam at the end of Part 3.

The Viking II was introduced in 1952 by the E. F. Johnson Company as an upgraded and repackaged version of the Viking I. It initially sold for $279.50 in kit form, but was also available wired and tested by "factory-authorized wiremen" for a nominal additional cost. The tube lineup was similar, except that the Viking II featured two 6146 tubes in the PA, while the Viking I used a single 4D32. This allowed Johnson to advertise the Viking II as having an output of 130 watts CW and 100 watts AM, a modest increase over the Viking I's output of 115 watts CW and 100 watts AM. The remaining tube lineup remained the same, and even the panel controls are identical.

In addition to the standard Viking II, there was a CD (Civil Defense) and a CC (Continuous Coverage) version as well. The CD version was modified to provide continuous coverage from 1.75 to 4.0 MHz. The 160 "Band" position provided oscillator and buffer coverage from 1.75 to 2.625 MHz, and the 80 "Band" position provided coverage from 2.625 to 4.0 MHz. The two position "160" switch (OUT/IN) was changed on the CD version to have three positions: "OUT," "INT," and "IN." The "IN" position provided coverage from 1.75 to 2.625 MHz, "INT" from 2.625 to 3.5 MHz, and "OUT" from 3.5 to 30 MHz. The CD version also included an automatic modulation limiter using a type 6J6 tube.

The CC version is a curious and rare beast, offering full continuous coverage from 1.7 to 30 MHz! VY2DA provided some interesting information on the CC version. Evidently, it was used by the Royal Canadian Air Force in the 1950s and carried the military designation **AN/FRT-505!** The part numbering scheme is completely different: V103=V7, C119=C28, etc., etc., so if you have one of these, watch out and make sure you have the right schematic! There

are two differences in the layout of the front panel. First, the two position "160" switch on the standard Viking II was replaced with a three-position switch marked 1.7-2.3, 2.3-3.5, 3.5-30. Second, the 6-position bandswitch, which had the band numbers silk-screened on the knob, was replaced with a 9-position switch, which had only a hairline marker on the knob. The frequency markings were screened on the main panel as follows: 1.7-2.3, 2.3-3.3, 3.3-4.5, 4.5-5.8, 5.8-8.4, 8.4-11.7, 11.7-16.6, 16.6-23, and 23-30. There was also an extra coil in the output of the PA.

It was interesting to discover that the Viking II - *an amateur rig* - was considered solid enough to satisfy the military requirements of the Canadian Air Force. I've never seen one of the CC versions, but it sure would be fun to find one. Imagine, full ham band coverage including the WARC bands from a rig made back in the 50s!

The 122 VFO

The companion 122 VFO kit was offered separately for $42.75. The 122 VFO is essentially the same circuit used later in the Valiant and the Viking 500 and has a 6AU6 oscillator and OA2 regulator. It offers a number of heavy-duty features including a ceramic tuning capacitor, ceramic insulated air dielectric trimmers, temperature compensated ceramic padders, and ceramic coil forms. Two separate oscillator tanks are used, one delivering 5.5 to 7.5 volts on the 1.75 to 2.0 MHz range, and the other delivering 8 to 10 volts on the 7.0 to 7.425 MHz range. Frequency multiplication within the transmitter is used to cover the higher bands.

The Viking II's oscillator stage is utilized as an isolating amplifier or frequency doubler when driven by the 122 VFO. The VFO has a keying line and utilizes cathode keying. When used with the Viking II, both the VFO and transmitter are keyed simultaneously, allowing break-in operation on all bands. There is an interesting article about the 122 VFO by Bob Thomas, W3QZO [ER #77, 9/95, *"The Johnson Viking VFO Model 122 ... and its little secret"*]. This article explains in more detail how the 122 VFO and the Viking II were designed to work together as a system, using frequency multiplication to obtain output on all bands.

TVI Suppression

One real driving force at the time the Viking II was designed was TVI suppression. The Viking II is just loaded with TVI suppression features not found in the Viking I. The Viking II's TVI suppression features included a copper plated steel cabinet, a copper plated meter shield with silver plated, phosphor bronze bonding fingers, and a copper plated dial window shield. Even the removable lid is bonded with silver plated, phosphor bronze contact fingers.

Suppression filters, which consist of low inductance chokes and ceramic disc capacitors, are located on each lead of the AC line, keying jack, microphone connector, antenna relay connector, and VFO power socket. Johnson didn't skimp on TVI suppression features in this transmitter, and I have never had any TVI complaints while operating my Viking II. The Viking II's TVI suppression features were prominently featured in all of Johnson's advertising at the time.

Johnson Sales Figures

It is interesting to see the sales figures for the number of Viking IIs manufactured by Johnson, which was first brought to my attention by Dave Harmon, K6XYZ [ER #27, 7/91, *"E. F. Johnson Transmitter Sales Figures"*]. Despite the rather small number of units sold in its later years, Johnson continued to offer the Viking II until 1961 - a period of 10 years. Imagine a major piece of ham gear being sold for that many years today! My ICOM 706 mobile rig was on the market for less than 2 years before they introduced the Mark II version.

continued next page

Viking II Sales Figures

1952	1,900
1953	4,156
1954	2,100
1955	997
1956	500
1957	218
1958	72
1959	71
1960	56
1961	48
	10,118

The Last Heavy Duty Johnson

It is interesting to note that the Valiant was announced in 1955 and introduced in 1956, and as you can see from the above sales figures, it had a considerable impact on sales of the Viking II. A quick look at the Valiant's schematic reveals that Johnson recognized some of the problems inherent to the Viking II and attempted to solve them. With TVI problems no longer a major engineering focus, Johnson's engineers turned their attention to improving the Valiant's audio chain, and also improved its performance on CW. The slightly improved sound and CW performance of the Valiant in addition to its built-in VFO and higher power rating made it a big success in the ham market at the time, and that success continues to keep it in demand with vintage collectors to this day. Fortunately, the mods contained in this article will allow your Viking II to substantially outperform a stock Valiant in all but RF power output.

Another interesting comparison of these rigs is that the Valiant doesn't feature all the heavy-duty components and quality construction features that were offered in the Viking II. Gone were most of the heavy-duty ceramic switches and ceramic tube sockets. They were replaced with cheaper phenolic components. Gone were the phosphor bronze contact fingers around the cabinet and meter shields. Gone was the heavy-duty copper-plated cabinet. Gone was the oil-filled HV capacitor. Gone were the coil forms on all of the TVI chokes. Gone were may other quality construction features. They even cheapened the meter shield housing. Sure looks like Johnson decided to cut costs without sacrificing the Valiant's published performance specs.

I've heard speculation that the Viking I and II benefited from the huge quantity of military-grade surplus components available on the market at the time, but that dwindling stocks of these components forced Johnson to use cheaper grades of newly manufactured parts by the time the Valiant was introduced. Now please don't misunderstand me - I like the Valiant. I have one and I really enjoy using it. It's just that it doesn't come close to offering the rugged quality that is built into the Viking II. The Viking I and Viking II are really in a class all to themselves.

Review of *Level I* Mods

Before moving forward with the *Level II* audio mods, let's review what we accomplished with the *Level I* mods in Part 1 of this article: 1) we replaced the driver transformer, which is wired in a step down configuration, to increase frequency response and reduce distortion; 2) changed numerous values associated with V1 and V2 to reduce distortion and improve frequency response; 3) added voltage regulation to the screens and grids of the modulator tubes to increase output and reduce distortion; and 4) revised the tune-up procedure to keep the modulator operating within class AB_1 parameters.

A *Level I* modified Viking II will supply about 80 watts of carrier with peaks of about 290 watts, relatively distortion free (at 115 VAC). Why not 80 X 4 = 320 watts peak? The difference is primarily due to carrier shifting because the supply voltage drops on voice peaks. When you operate, don't be tempted to drive the Viking II beyond these power lev-

els, which is possible, because the increased power will only come at the expense of severely increased distortion on voice peaks.

The frequency response of the audio chain from input to modulator output is 75 Hz - 12 KC, while the frequency response of the entire transmitter is 105 Hz - 5.8 KC (±3 dB). The modulation transformer establishes the low frequency rolloff point, while the high frequency rolloff point was chosen according to personal preference. Not too bad an improvement considering we stuck with the stock tube lineup, including the much maligned 6AU6 audio stages.

Level II - Stepping Up To Class AB_2

The *Level II* mods will bring up the performance of your Viking II to near broadcast quality. The key to the performance improvements offered by the *Level II* mods are: 1) the addition of a push-pull driver that is capable of handling the variable load which is presented by the grids of the 807 modulator tubes as they are driven positive - without creating excessive distortion, and 2) the addition of negative feedback. Driving the modulator into class AB_2 operation will increase modulator power by about 15%, allowing 100% modulation at the 230 ma loading point recommended by Johnson. The RF carrier power will increase to about 95 watts (at 115 VAC) and undistorted RF peaks will approach 360 watts (again, carrier shifting prevents undistorted peaks from reaching the full 4 X 95 =380 watts). It will also reduce distortion and give you the option of adding feedback to the audio chain.

The modulator circuit presented in Figure 4 is similar to the circuit published by Bill Mottes, W1CKI [ER #79, 11/95, *"A Speech Amplifier For Everyone"*]. I prototyped Bill's circuit and confirm that it works quite well. It offers flat response with low distortion. The primary difference is that Bill's circuit uses all vacuum tubes, but requires changing V1 from a 7 to a 9-pin socket to accommodate a 12AX7 front-end. The circuit presented in Figure 4 achieves the same result, but preserves the original tube lineup and most of the work you did in the *Level I* mods. I just didn't want to tear up the chassis to accommodate a 9-pin tube, especially since the performance of the modified 6AU6 frontend is more than adequate to the task of producing high quality audio. As you may remember from Part 1 of this article, my design philosophy is to keep the original tube lineup in place whenever possible. When making these *Level II* mods, take note that V1 remains the same as in *Level I*, but that there are a few changes surrounding V2 (since it will no longer act as the driver for T3).

One of the choices that needed to be made was how to implement the phase splitter to drive the push-pull driver. I ultimately chose to implement this function using a Darlington transistor rather than a tube simply for ease of installation and space considerations. The alternative would have been to implement the phase splitter using a 6C4 as Bill did. For the same reasons, I would also have preferred to use a solid state push-pull driver, but my prototypes convinced me that it just wasn't practical considering the peak-to-peak voltages involved. This is one place where it is definitely easier to use a tube and so I ended up using a 12AU7 to implement the push-pull driver. There is more than adequate room to add the 12AU7 under the chassis using standoffs as shown in the adjacent picture. There are several unused holes in the original chassis, so no drilling is required.

To Add Feedback or Not, That Is The Question

One nice feature of the *Level II* audio chain is that it is feedback-ready. You have the option of adding negative feedback to further reduce distortion. The choice is yours. The audio chain has more than enough gain, so no other

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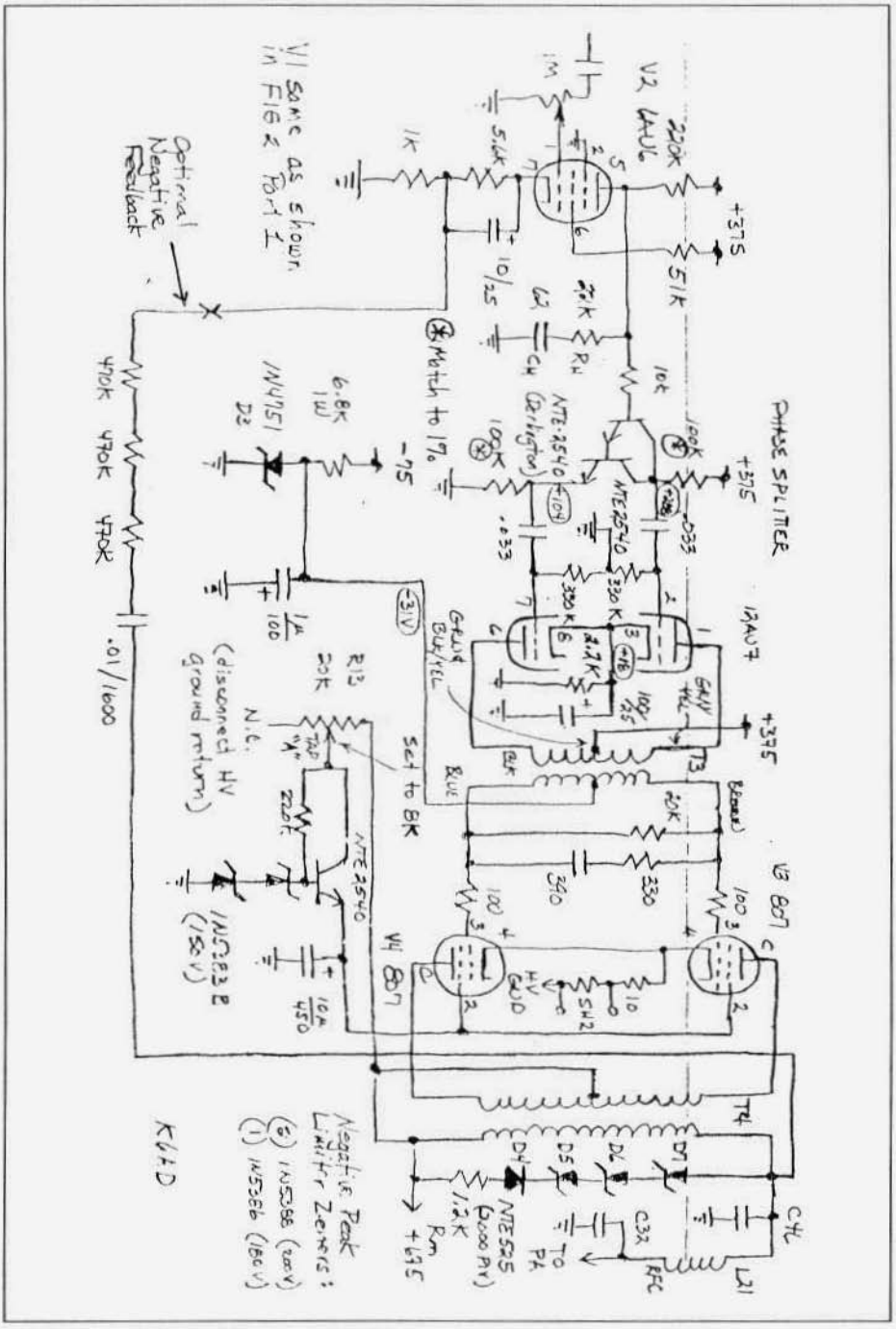
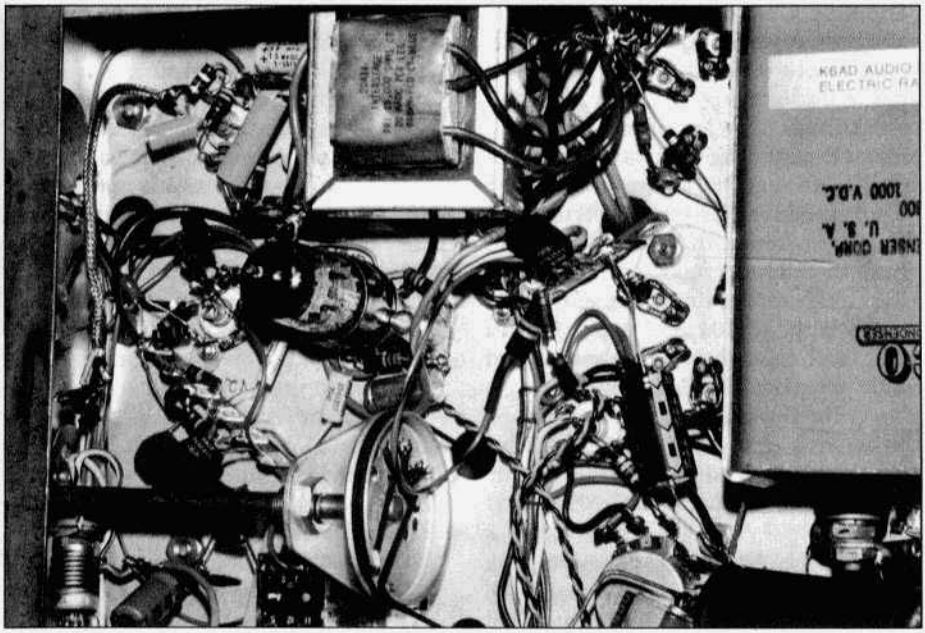


Figure 4. Level II audio chain with negative feedback and negative peak limiter.



There is plenty of room to add the 12AU7 driver as shown here. Look carefully and you'll find the solid-state phase splitter and modulator screen regulation.

values need be changed when adding feedback. This makes it very easy for you to do your own on-air tests to decide if feedback is something you want to implement.

The disadvantage of adding feedback, however, is that you lose the flexibility of conveniently reversing audio phase, and there are many times when this flexibility can come in very handy. The reason for this is that many microphones do not put out a symmetrical signal. Depending on which way your microphone is phased, this means that either the positive or negative modulation peaks will reach 100% while the other may only reach, say 75%. A significant improvement in peak power can often be realized by switching the phase of the microphone to produce the best positive modulation peaks.

In a transmitter without feedback, the easiest way to reverse the phase of the audio signal is to simply reverse the plate caps on the modulator tubes. If you add feedback, however, you'll need to change phase by reversing the leads on the microphone cartridge, because switching the plate leads will change negative feedback to positive feedback, and then you'll just have a big high power oscillator on your hands. So, with feedback in place, you will no longer be able to simply pop the top cover of the transmitter and switch plate caps.

Since feedback is being injected in the cathode circuit of V2, it is important to make sure that the audio at the cathode of V2 is in phase with the output of T4, or the modulator will oscillate and produce ultrasonics (and might even destroy your modulator section). Exercise caution when measuring the signal at the high side of T4. To see the phase of the audio signal at T4 on my scope, I used a 10 M ohm resistive divider, because +1200 volts on my Tek scope would have cooked it. If you don't have a scope, you can just try the experimental approach by simply reversing the

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plate caps. Negative feedback will produce the desired drop in audio output, while positive feedback will produce a gain in audio output or possibly even oscillations.

On-air listening tests confirmed a small, but noticeable improvement with negative feedback, so I decided to forgo the convenience of changing audio phase and added feedback to my Viking II. Of course, the phase of the signal with the D-104 that I use wasn't ideal, so I took the microphone apart and switched the leads on the cartridge. Changing the microphone's phase in this manner yielded a significant increase in perceived loudness.

Negative Modulation Limiter

If you operate the modulator class AB_2, you should add the negative peak limiter circuit shown in Figure 4, which is composed of R_m and D_4 through D_7. This inexpensive circuit could save your modulation transformer, which is becoming increasingly expensive and difficult to replace. The transformer-destroying event occurs on 100% negative modulation peaks. As the plate voltage approaches 0 volts, the PA tubes cut off, presenting an infinite impedance to the modulation transformer. The infinite impedance on the secondary of the modulation transformer allows the voltage across it to soar when the magnetic field collapses, which can then arc through the insulation on the windings, causing shorted turns. Partially shorted modulation transformers can present all sorts of weird effects, which can make troubleshooting just a boatload of fun, so the few dollars it costs to install this circuit is well worth the effort.

This is how it works. Under normal modulation conditions (< 100% modulation) the voltage generated across T4 never exceeds ± B+ (about ± 675 volts). When the top of the transformer swings positive (positive modulation peaks), diode D_4 remains reverse biased and the diode string does not conduct. In fact, regardless of how far positive the transformer swings, no current will flow in the diodes. During negative modulation peaks of less than 100%, the voltage across the transformer is negative and D_4 is forward biased, but no current will flow because the zener diodes have not yet reached their reverse breakdown voltage. But when the negative voltage across T4 exceeds the zener breakdown voltage, they begin to conduct, and R_m is placed across the transformer. Since the circuit prevents the modulation transformer from operating without a load, it will do an excellent job of protecting it. D_4 should have a peak inverse voltage rating of at least 2000V (NTE 525 or equivalent).

Because this is not a "hard" limiter, it is best to choose a zener string voltage which will allow an overlap so that during the last 5% percent or so of negative modulation, T4 will be loaded by both the tube and R_m. The more the overlap, the "softer" the limit. Since B+ in the Viking II normally runs about +675 volts (under load at 115 VAC input) and since the tube begins to cut off somewhere near 50 volts, I used a total zener breakdown voltage of +580 volts. Values between 525 and 600 volts should be acceptable. With a breakdown voltage of 580 volts, negative modulation peaks between 95 and 100% will not be linear because T4 is working into two loads - the modulating impedance of the PA and R_m. As the voltage continues to fall below cutoff of the PA, the transformer will only be loaded into R_m. For peaks which do not exceed 100% by much, this overlap region helps produce a "soft" type of negative peak limiting and will produce fewer harmonics, and thus less splatter, than "hard" limiting. Of course, if the peaks are well overmodulated, you will see little difference between hard and soft limiting.

While this negative peak limiter will protect your modulation transformer

and also provide a modest amount of negative peak limiting, I have seen a number of claims regarding peak limiters, which are rather dubious. It has been claimed that the limiter will allow you to can crank up the modulator (if it has enough power) to achieve higher positive modulation peaks, without producing splatter because the negative peaks are "limited." Their argument is based on the fact that at the moment the negative peak occurs, the power being transmitted is nearly 0. So, they claim that the distortion products created by the limiter will be unnoticeable because there are very few RF watts associated with them.

This is complete hogwash. A clipped waveform contains the same harmonics, regardless of whether the positive or negative peaks are clipped. However you look at it, increasing the positive modulation peaks above 100% while clipping the negative peaks produces distortion. It may sound louder, but you still create splatter and distortion in the process. Only to the extent that the negative peak limiter produces "softer" clipping of the negative modulation peaks will splatter be reduced. While the 807 modulator in the Viking II doesn't have enough extra power to drive the positive peaks much beyond 100%, the negative peak limiter *is* still quite useful in protecting the modulation transformer and should be installed for this reason alone.

And that, gentlemen, (and hopefully a few ladies as well) is the last of the audio mods.

Push-to-talk

The last mod I did was to add a push-to-talk relay, which Johnson had curiously left out. It just wasn't very convenient having to turn the HV switch on and off during each transmission. There was already a 1/4" phone jack on the front panel, so it was an easy matter to rectify and filter the filament voltage to drive a relay which was wired across SW2. Figure 5 shows the simple PTT circuit I used using a small 6V relay from my junk box. Nearly any small relay will do, as long as the contacts are rated for at least 4A AC. Radio Shack has a number of different relays that will work fine. The peak voltage available to drive the relay is ((6.3 X 1.41) - 0.7) = 8.2 volts. Of course, this is the unloaded value and loading will reduce this voltage considerably. You should experiment with R_1 to determine what value just fails to latch the relay and then use a value that is about 20-25% smaller to ensure the relay is reliably activated. D_4 serves to short-circuit the reverse emf generated by the relay coil when it is de-energized.

If you want to use a relay with a 12V coil, you will need to build the simple voltage multiplier circuit shown in Figure 5. It is really a half-wave series multiplier. During one half of the AC cycle, C_2 is charged to nearly the peak voltage through rectifier D_2. During the opposite half of the AC cycle, D_3 conducts and C_1 is charged to nearly twice the peak voltage (about +16 volts, unloaded). This should provide more than enough drive for most 12V relays. Again, you will need to experiment with R_1 to ensure reliable relay activation.

Pass on these mods

I have read suggestions that the PA screen resistor should be reduced from 20K to around 13.3K ohms. This isn't a good idea. The RF final stage is pretty well designed and reducing the screen resistor to this low value will increase the screen voltage to about 177 volts. The screen current will increase to I_s = (675-177)/13.3K = 37 ma. Screen dissipation will increase to P_s = 177 X 37 ma = 6.55 watts (for two tubes). This is 3.275 watts per tube which exceeds the manufacturer's maximum rating of 3 watts per tube. In addition to exceeding the tubes' maximum dissipation ratings, I noticed no improvement in linearity with this modification.

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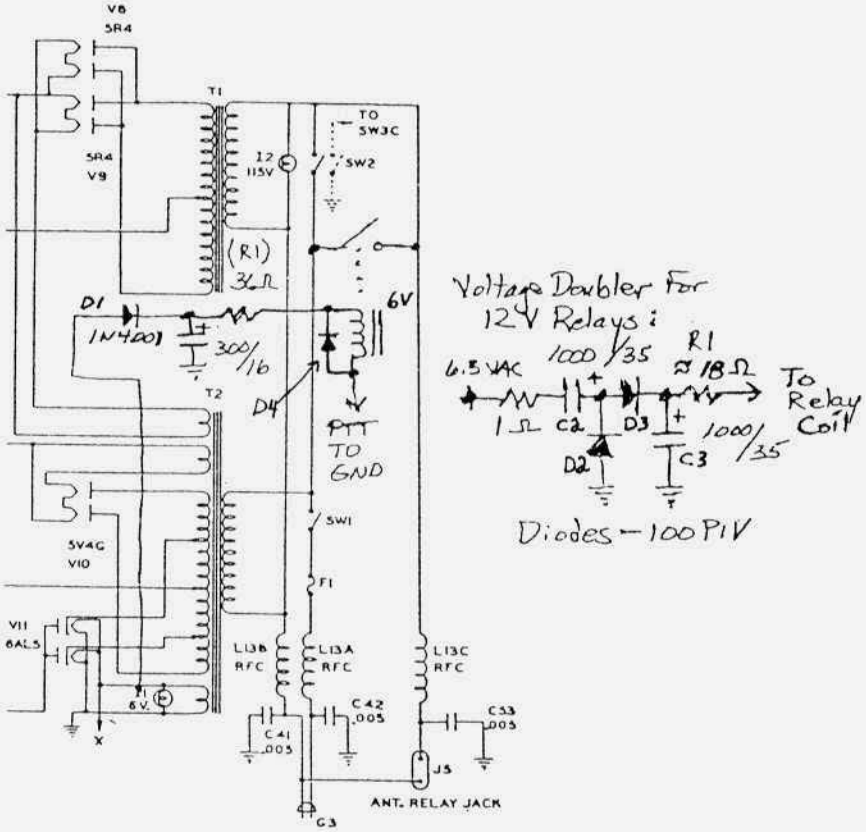


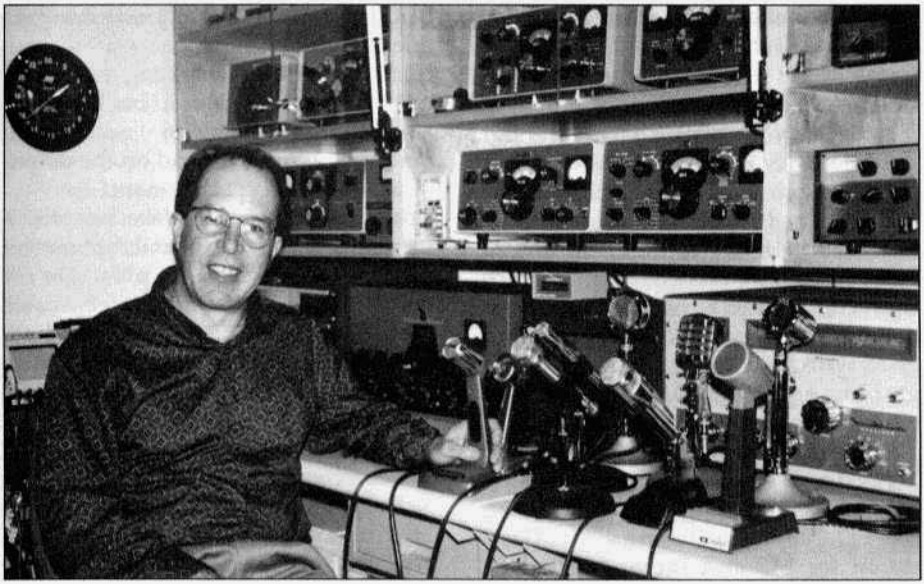
Figure 5. Push-to-talk circuit.

How Does It Sound?

Well, now that you are finished making the *Level II* audio mods, you should get excellent audio reports. If you should get poor audio reports, it is because you are putting poor audio into it! This modified transmitter has very low distortion and extremely flat frequency response and will therefore reproduce *exactly* what you put into it. You should notice a bigger difference between microphones now than you would have before making the mods, because the transmitter no longer masks many of the microphone's characteristics with poor fidelity and distortion. The transmitter's nice flat response also makes outboard processing an effective option allowing you to optimize a given microphone to your voice characteristics.

I conducted a series of on-air tests with Joe, N6OIP, to determine which microphone sounded best with this transmitter. He'd be the first to say that this is pretty subjective, but he has a pretty critical ear, so I trust his conclusions. Your results may vary, of course, depending on your voice characteristics (my voice isn't exactly "broadcast announcer quality" and I haven't yet discovered any voice mods to correct this problem). This was the order of microphones Joe preferred using my *Level-II* modified Viking II:

Astatic D-104 (crystal)
Astatic 10-DA
Shure 444



The Astatic D-104 and 10-DA mics gave the best sound with my recently modified Viking II. I tried many different types.

Heil HM-10 (5-ragchew cartridge)
Electro-Voice 676
Ampex H-1390
Electro-Voice Mercury 611
Electro-Voice 664
Electro-Voice 627C

The D-104 frequently seems to come out on top with most transmitters. As you can see, it did with my modified Viking II as well. If you aren't using outboard processing equipment, this is certainly one of the best microphones to choose. Its peaked response gives it a lot of presence that many operators prefer. By contrast, the relatively flat 664 sounds a bit muffled, especially now that the transmitter no longer offers a peaked response above 1KHz.

I have two amplified D-104 microphones and found that both of them were unacceptable. They produced audio in which the voice peaks were severely clipped. In fact, the amplified D-104 exhibits the same problem that V1 did before it was modified (see Part 1 of this article): if you talk too close to the microphone, the high output level of the crystal cartridge causes the transistorized amplifier to clip voice peaks. If you get closer than about 5 or 6 inches to the microphone, the transistor amplifier will begin clipping, regardless of the setting of the gain control. Unfortunately, the gain control only determines the output level of the transistor amp, not its input level; the clipping level is therefore determined exclusively by how loud you speak into it, not the position of the gain control on the bottom of the microphone. So unless you plan on talking several feet from the microphone, an amplified D-104 just makes no sense. Heck, a plain old D-104 is about the highest output microphone out there, so it is hard to understand the marketing rationale behind adding an amplifier which only degrades performance. Must have been the marketing guys that thought this one up.

If you use a D-104, don't overlook the fact that the crystal element degrades over time, especially when stored in hot conditions. New elements are widely available from most amateur equipment

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suppliers and can be one of the cheapest and easiest ways to improve your sound.

Outboard Processing

Now that your Viking II has excellent flat frequency response, consider adding the few components needed to build a simple audio chain. Outboard processing will give you the flexibility to compensate for your particular voice characteristics and the opportunity to make nearly any microphone sound good with your transmitter. Outboard graphic equalizers are usually very cheap at swapmeets (even an outboard processor as simple as the vintage Heil EQ-300 microphone equalizer will help).

I picked up a TEAC two-channel, 10-band graphic equalizer in excellent condition for $45 at a recent Livermore, Calif. swapmeet. I also found a PEAVEY dual channel variable compressor for another $50. Together, these make a great audio chain, offering tremendous flexibility. The only fault I found with this equipment, which was designed primarily for sound system use, was its sensitivity to picking up RF. It was necessary to experiment with different ground configurations and install RF chokes on the inputs of each unit to prevent RF from getting into the chain.

You may or may not need a microphone preamp to feed the processing equipment. Many graphic equalizers have sufficient gain, so I'd suggest trying it before investing in a microphone preamp. Since the output level from most processing equipment is line level (high output), you'll need to add a resistive divider before feeding audio into the microphone input of your Viking II. Inserting line level audio directly into a transmitter will usually result in severe distortion in the first audio stage, regardless of the setting of the microphone gain control because gain control usually occurs in a later audio stage (just like it does in the Viking II). I used a 5K ohm potentiometer in the interface box to pad the audio back down to microphone level. Since we aren't concerned about maintaining calibrated levels of audio, as would be the case in a recording studio, it is not necessary to maintain a 600 ohm load on the output of the processing equipment.

I built a simple interface box with a standard 1/4" jack for microphone input, an output cable to plug into the transmitter, and an interface cable which carries the input to and output from the processing equipment which is located on the other side of my shack. This makes plugging the audio chain into any transmitter as easy as plugging in a microphone.

The interface box contains a +15 dB Hi-Z microphone preamp and the resistive divider needed to reduce the processed line level audio back down to microphone level. A switch on the front of the box selects direct microphone operation, or padded audio from the audio chain. The microphone preamp I built wasn't really necessary since the TEAC graphic equalizer has +20 dB of adjustable gain built in, but I did it as insurance that low output microphones could still be used. On-air reports with this simple audio chain have been excellent. I use it on vintage SSB transceivers as well.

Part 3 Next Month

Well, that's all for you AM folks. Next month offers something for CW operators. The Viking II did not have a reputation for good sounding CW and one look at an oscilloscope picture of a single CW 'dit' will tell you why. We'll explore some mods which will make your Viking II sound as good on CW as it does on AM.

Until then, find yourself a Viking II, warm up your soldering irons, and dig in. I'll be expecting to hear great broadcast quality audio coming from your modified Viking IIs on the Westcoast AMI Net soon. ER

Tribute to Barry Goldwater from page 18
They were very nice letters written in a very casual way from one friend to another. The letters really revealed the 'niceness' of Barry Goldwater and the caring attitude he had towards his friends.

When I started writing the series on W7EH, he asked me to send copies to Barry which I did. Barry responded with the following short letter.

"September 10, 1991

Dear Barry:

It's darn seldom that I get to use my first name in writing to someone, but this time, it's a real joy.

The material you sent me from "Electric Radio" is far and away the finest thing I have ever seen done in our name. We should all be grateful to you for having done this. Let me be right there with a thank you, thank you from the bottom of my heart.

73,

Barry" [Barry Goldwater]

A few months later I received another letter.

"March 19, 1992

Dear Barry:

Your publication "Electric Radio", comes to me, and I want to continue to get it. If I owe you any money for a subscription, be sure and let me know. This is possibly the best publication that has come to my desk in a long time.

73,

Barry" [Barry Goldwater]

The first letter was really encouraging to me at a time when keeping ER going was a tremendous struggle. To my mind if Barry Goldwater liked ER I just had to be doing something right. The second letter revealed to me a character of his that I had heard from others—he didn't expect or want to get anything without paying for it.

Although few of us got to meet Barry or even to talk to him we all appreciated him. He will be missed. N6CSW

Corrections:

In the June issue we got Bill Leahy's callsign wrong—we had "WØMP" and it should have been "KØMP". He was the author of *"Danger Island, 1958, KH6MG/ZKI"*. Sorry Bill.

On page 39 of the June issue the e-mail address for Don Jeffrey is wrong. The correct address is boallan@aol.com

Fleamarket/Special Events Station in Waseca, Aug. 15/16

The Viking Amateur Radio Society is planning a combination tailgate fleamarket and Special Events Station for the weekend of August 15 & 16. The fleamarket will be on Saturday the 15th from 8 am until 2 pm at the Waseca County Fairgrounds in Waseca, Minnesota. Talk in will be on the 146.940 MHz WAØCJU repeater.

The special events station will be held on both Saturday and Sunday of that weekend using vintage E.F. Johnson transmitters on both SSB and AM and possibly CW. HF operation will be between 0800 and 2100 CDT. Frequencies that we are planning to use on AM are 3885, 7290, 14286, 21400 and 29000 kHz. SSB operation will be on 3900, 7260, 14250, 21350, 28400 kHz. CW operation will be on 3700, 7125, 14050, 21150, 28050 kHz. The callsign that we are currently planning to use is WAØCJU/9ALD. 9ALD was Edgar Johnson's call before Minnesota became part of the 0 call district.

Jon Wynnemer, WBØZFH
V.A.R.S. Fundraising Chairman

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

NOTICE

Listen for the Antique Radio Club of Illinois vintage operating ham station on 80-10 meter AM fone in August (5th -8th). Certificate QSL for 2 or 1-way report. N9CQX/9

CLASSIFIEDS

Advertising Information

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

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

VINTAGE EQUIPMENT ONLY

ER
14643 Road G
Cortez, CO 81321-9575

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

DEADLINE for the AUGUST Issue: AUGUST 1

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

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

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

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

FOR SALE: RME 4350 rcvr w/manual and factory installed 100KC calibrator, Very good condx - $75 plus shpg. George, OK, (405) 341-6419

FOR SALE/TRADE: HRO-50T/w spkr - $425; HQ-180A w/spkr - $450; HQ-205 - $225; TBS-50C - $150; TMC/SBE-2 - $400; R-208/CW-380% - $45. Sam Timberlake , KF4TXQ, POB 161, Dadeville, AL 36853. (256)825-7305, stimber@lakemartin.net

FOR SALE: Collins 32V3 - $500; National HRO50T1, A-F+AA coils, calibrator, Spkr - $500. Both exc, working. Steve Scott, KI3W, 712 Pine Hill Rd., Lititz, PA 17543. (717) 626-0991

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: Galena xtal radios, very sensitive & selective. L. Gardner, 458 Two Mile Crk Rd., Tonawanda, NY, 14150. (716) 873-0447

FOR SALE: NIB 6U8A - 2.50 each plus postage; 7553, 3253, 515F2 - $1150. Fred, W6YM, (209) 296-5990, fhonnold@juno.com

FOR SALE: Rack cabinet Zero brand, 50" H, 24"W, 26"D, (std 19"), top 16" is on 30 deg slant - $50 (pick up only); Heath SB600 spkr, nice - $55 shpd conUS; Nat'l HRO-60R w/4 coils - $275 plus shpg. Doug, OR, (541) 367-6486

FOR SALE: B&W coils HDVL 10 and 15 - $20 each shpd or trade for HDVL80. Collin Collier, N4TUA, GA, (912) 988-1276

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

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

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

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

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

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

WANTED: RADIO Handbook, First Edition, published May 1935. Lynn Stolz, N8AJ, OH, (614)885-5428

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

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

WANTED: HRO-5 coils "J" (50-100 kc) and "H" (100-200 kc). Also wood coil box. Don, (616) 451-9874, fsmv34a@prodigy.net

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

WANTED: 3.75 KHz AM filter for Heath SB-301. Joe Filice, KQ6GL, 11346 Red Cedar Ln., San Diego, CA 92131. (619) 625-2223, jpf@photon.com

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

WANTED: Allied A2516 receiver, any condx. David, WD6AF, CA (650) 851-2466, maggihouse@aol.com

WANTED: Collins 312A-1 spkr w/the light. Frank Scutch, W4FMS, (954) 472-9474, w4fms@aol.com

WANTED: Ballast tube BK29D. Eric A. Benedict, WD8MHR, 10235 Wentworth Rd., Streetsboro, OH 44241. (330) 274-2208, EABenedict@cvs.com

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

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

WANTED: Collins 310A-1 &/or 310A-3, any condx; 30J, 30K-(any); 302C-1, 312A-1. **FOR SALE:** SC-101 lamp hoods & grills. Butch, K0BS, MN, (507) 282-2141

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

WANTED: Noise Blanker PCB for KWM-380/HF-380 (Only PCB not assembled). T. Haruyama, JA1OZZ, t_haruyama@atg.mitsumi.co.jp

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

WANTED: Transmitter BC129, amplifier BC116, dynamotor BD46; pre 1940 aircraft radios or parts. James Treherne, 11909 Chapel Rd., Clifton, VA 20124. (703) 830-6272, treherne@erols.com

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

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

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

WANTED: Gearshift for Teletype Model 28, or complete machine with one. Ivan, WA6SWA, POB 248, Reno, NV 89504. (702) 329-7738, idh@cs.unr.edu

WANTED: PRC-68B manual and Navships 94200.1 "Directory of Communication Equipment" Joseph W. Pinner, KC5IJD, 201 Ruthwood Dr., Lafayette, LA 70503. kc5ijd@sprintmail.com

WANTED: Coil winding data for National FB7 "DET F" & "OSC F" Coils. Jim Clifford, KE4DSP, 108 Bayfield Dr., Brandon, FL 33511. (813) 654-7531, j.c.clifford@juno.com

WANTED: WE-11 pwr spy & VP-3 vibrator for Marconi CSR-5 rcvr. David Boardman, 10 Lemaistre, Sainte-Foy, Quebec G2G 1B4, Canada. (418) 877-1316

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

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

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

FOR SALE: Collins radio parts. Send SASE for list. Bill Mills, 188 Ellis Mill Rd. NE, Milledgeville, GA 31061-9020.

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

FOR SALE: Collins 75S-3C RX with AM & CW filters and 32S-3, CCA exc; HRO-500 NIB: S/N 102--228. Bob, (408) 991-3747, bob.struk@sv.sc.philips.com or

FOR SALE: ARRL Handbooks: 1953,1955,1962,1964 editions - $22 each shpd. R.J. Moraine, W5LX, 3700 Cliffwood Dr., Bedford, TX 76021. (817) 281-1128, w5lx@flash.net

FOR SALE: The K7FF Super List lives! In anticipation of being bought out, I discontinued my Super List. However, the fellow decided to move out of State instead. So, I decided to add items and make the Super List better than ever. If you need small radio parts, equipment, antenna stuff, and the like, e-mail for the 15-page plus K7FF Super List. Derek, K7FF, <k7ff@inreach.com>

FOR SALE: Heath SB-10 SSB adapter; Drake DC-3 mobile PS. SASE for list. Marvin, 2957 Gaffney Rd.,Richmond,VA 23237. (804)275-1252 wa4toj@juno.com

FOR SALE: Five 12DQ6B Tungsol tubes, NIB - $25; Johnson 500 manual, professional copy, new - $15. **WANTED:** HW32 manual. Dave, W1DWZ, (508) 378-3619

FOR SALE: At auction, no reserve, Sept. 12th, Lexington, NE. BC-610 in crate; 2ea ART-13, Navy CG-52206 xmtr; AF-68; and more. Gary Reiss, WA0JRM, Rt1 Box 141, Wilcox, NE 68982. http://hara.simplenet.com/

FOR SALE: Hand key for Canadian No.19 Mark III, NIB, dated 1962. Ted Bracco WØNZW, Box 730, Teutopolis, IL 62467. (217) 857-3351

FOR SALE: Multi-Elmac A-54 - $50; ARRL Handbooks 1952, 63, 64 - $25 ea; Radio Handbook 10th, 15th ed - $25. Gary, MN, (612) 496-3794.

FOR SALE: Amp sply LA-1000A 160-10 meters - $325; Heath TX-1 - $75. Ronnie, N1UDI, CT, (203) 371-6691.

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

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

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

FOR SALE: Unrestored Silver Marshall set w/ National Edial, 8 coils, #24, 26 & 27 tubes, complete - $110 + shpg. **WANTED:** NC-80 or NC-80 dial bezel; Esterline-Angus model AW instructions or copy; Harvey Radio Labs model FT-30 (FOS, pg 257) or (Tube-xmtr Guide, pg 57) note: has 3 meters & 6 switches on lower panel. Was my xmtr in 1941, $1000 paid + reward. Robert Enemark, W1EC, POB 1607, Duxbury, MA 02331. (781) 934-5043

FOR SALE: Heath AT-1, needs TLC - $75 shpd. Joe, FL, (561) 220-7362

FOR SALE: Nice Hallicrafters SX-117 w/book, full set of shortwave xtals; nice S-95 Civic Patrol rcvr. Fred Clinger, OH, (419) 468-6117 after 6 PM EST.

FOR SALE: Millen cathode coils for 90800 6L6/807 xmtr; #43660 (160 m), 43680 (80 m) - $5 ea + shpg. John Kelly, 17510 Sir Galahad Way, Ashton, MD 20861. (301) 774-8186

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

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

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

FOR SALE: (3) Radiomarine 85.10; (1) Radiomarine AR-8806B, all work, no mods or holes - $600 for all. PU only. Mike, CA, (209) 931-6059.

FOR SALE: AIWA AR-141 portable, covers FM, AM, SW - $25; SASE list air capacitors. Bill Riley, W7EXB, 863 W. 38th Ave., Eugene, OR 97405. (541) 345-2169

FOR SALE: National NC-108 10 tube FM rcvr, fair - $24; T-22/ARC-5 7-9 Mc xmtr, very good - $25. Mervyn Ellsworth, 2309 N. 25 St., Boise, ID 83702. (208) 345-6878

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

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

FOR SALE: Used technical books - radio, electronics, math, military, magazines, etc. List: $1 (stamps OK). Softwave,2 Dept. ER, 1515Sashabaw, 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, WAØABI, 1117 Pike St., St. Charles, MO 63301. (314) 949-2210

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

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

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

FOR SALE: Two Elmac AF67 xmtrs, both - $125. **WANTED:** For Collins 310B, manual copy, plate coils 80 & 40, low band ant coil & link; Millen HV safety terminals 3700 black or red; AC PS for Gonset G76; Turner 25X mic; Master mobile ant; National NC183NR, VG or exc only; Select-O-Ject. Sam Champie, W7XXX, 105 W. McKenzie, Hermiston, OR 97838. (541) 567-2879

FOR SALE: HRO-60, 10-80M - $500. Chuck, KØRFQ, MO, (417) 863-7415.

FOR SALE: Building a scope? Have a 2BP1 tube Millen shield, socket & bracket - $9 + shpg. H. Mohr, 1005 W. Wyoming St., Allentown, PA 18103.

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

FOR SALE: Books: RCA Tube Manual RC-20 - $20; Radio Master 1957 - $20; LSASE for list. Charles F. Brett, 5980 Old Ranch Rd., Colorado Springs, CO 80901. (719) 495-8660

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

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

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

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

FOR SALE: 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@coffee.com

FOR SALE: Rider's Perpetual Troubleshooter's Manuals, volumes 1-21 & indexes, complete & in exc condx - $500 +shpg. Steve, N4CE, VA, (703) 299-8569

FOR SALE: Swan 500C new finals, mic, pwr sply/spkr, watt meter, all exc, all band vertical antenna - $400 + shpg. W7MXM, ID, (208) 522-5854.

FOR SALE: New dial cord CD-ROM; all Sams books DC1-DC8; - $49 ppd, cash or check. Radioera, (214) 358-5195 or http://www.electrosys.com/cds.htm

FOR SALE: Swan 117AC pwr sply/spkr combo - $75 + shpg. Bill, TN, (931) 433-7453.

FOR SALE: 75A4 S/N 3922, 2 filters (500 cycle & a 51J4 3.1kc modified to plug in 75A4), standard tuning knob, scratches on lid, otherwise VG - $795, consider trade for exc 51J4; Elmac AF67 w/Elmac AC sply, very nice, manual copies - $200; NC300 w/spkr, calibrator, manual copy, needs RF gain knob, one small ding & some scratches, works well - $195; SX99, near perfect, manual - $150. **WANTED:** Collins desk mic SM1 or SM2; Johnson Navigator. Dick Dixon, W7QZO, 16032 Lost Coyote Ln., Mitchell, OR 97750. (541) 462-3078

FOR SALE: GE TC3 Tube Tester. **WANTED:** Any Zenith 6 tube radio, reasonable. Noonan, SC, (843) 726-5762.

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

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

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

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

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

FOR SALE: Heath HR-10B w/xtal cal - $75; SB-614 - $110; unbuilt Heathkits; IG-18 sine & square gen - $90; EK-1 - $45; Heath SB-620 set for 455 kc IF, mint & working - $120; Heath catalog 1964 - $8. Marty, NJ, (609) 466-4519.

FOR SALE: RME 45 w/orig lge spkr & DB-22 preselector, a real nice package, about 9-1/2 out of 10 - $350. Bill Rieke, OH, (440) 333-6644 or k8dbn@hotmail.com

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

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

FOR SALE: R-390A Repro nameplates - $9 shpd. N5OFF, 111 Destiny, Lafayette, LA 70506. trinit6988dt.net, (318) 989-3430

FOR SALE: AN/PRM-10 grid dip meter - $50; 1-126B absorption wavemeter - $20. All + shpg. Don Knotts, 3158 NE Azalea, Hillsboro, OR 97124. (503) 648-1738

FOR SALE: Yaesu Landliner phone patch less cabinet - $15; equip, parts, literature, list - $1. Joe Orgnero, VE6RST, Box 32 Site 7 SS 1, Calgary, AB T2M 4N3, Canada. (403) 239-0489

FOR SALE: Collins 310B1, working - $175; TU5B tuner, orig - $20; BC654A, PE103, PE104 - $175, OBO. G. Stevens, WØATA, Box 704, Longmont, CO 80502. (303) 776-9036, sywww90a@prodigy.com

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FOR SALE: Used 866-866A - $5 ea; new 866-866A - $10; used 807 - $5; new 807 - $10; used UV876 - $15; type 10, used - $15; 1 pair used 6CA7, Mullard - $12.50; used 2A3 RCA SP - $100; Sylvania DP - $20. All + shpg. James Fred, 5355 S. 275 W. Cutler, IN 46920.

TONY'S LIST AT LAST!!

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

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

http://www.meob.com

WANTED: CV-157URR SSB converter or CV-1982/TSC-26, or CV-591. Brenton Bailey, KC4IEL, 604 Marshall Rd., Greenwood, SC 29646. (864)-227-6292 brent@emeraldis.com

WANTED: MFJ-259 SWR analyzer. John Snow, W9MHS, 4539 N. Bartlett Ave., Shorewood, WI 53211-1510. (414) 964-0194

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: Pwr xfmr for a Swan 500 HF xcvr, or pwr sply. G.R. Skinner, K4LVZ, FL, (407) 679-4244.

WANTED: Taylor-Globe 866 MV rect. w/silver writing on glass, glass must not be dark. Robert, CA, (562) 928-8820 or rrjlife@earthlink.net

WANTED: Manual for antenna preselector CU-286/FRR-33 used w/R-391 rcvr's. Weber, 4845 W. 107th, Oak Lawn, IL 60453-5252

WANTED: Pwr xfmr for Hallicrafters SP-44 & audio outut xfmr for Hallicrafters SX-25. Val M. Johnson, K9GAW, POB 51, Henry, IL 61537. (309) 364-3160

WANTED: Element, stand & wiring diagram for Electrovoice 664 microphone. Doug McArtin, K2JJ, 4 Portland Pl, Yonkers, NY 10703. (914) 968-3560, after 5PM EST

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

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

WANTED: Valiant II; Swan 600R Custom; Hammarlund SP600-JX21A; TMC GPR-92. Ric, C6ANI, POB N4106, Nassau NP, Bahamas.

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

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

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

WANTED: WW II Japanese, German, Italian radios & communication equip for display in intelligence museum. LTC William L. Howard, 219 Harborview Ln., Largo, FL 33770. (813) 585-7756, wlhoward@gte.net

WANTED: Collins 32V2 or 32V3, w/ manual in exc and unmodified condx. Richard J. Taylor, 11 N. Cypress Dr., Wichita, KS 67206. (316) 682-9151, rjtaylor@feist.com

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

WANTED: TBY, complete set unmodified, or accessories; also BC-611. Roger Sewing, N6TNF, Novato, CA, (415) 898-4412, rsewing@cmc.net

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

WANTED: Pwr sply for Radiola 60 or complete unit if priced fair. Jack Busk, 926 Rio Verde E, Cottonwood, AZ 86326. (520) 634-2028

WANTED: Heath GW-10 CB rig; cabinet for Johnson Invader. George, N2GBY, NJ, (609) 848-6699.

WANTED: Service manual or schematic for a Harris/RF Communications RF-505A rcvr. Al Jenkins, WA1RWB, POB 1162, Nantucket, MA 02554. (508) 325-7122

FOR SALE: R-390A RF deck/xtal deck, counter, some tubes missing - $50. George, K1ANX, MA, (413) 527-4304

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@coffee.com

FOR SALE: Three operational R-390A rcvr's w/ orig meters; two mounted in orig military 6-ft cabinet, one in the orig R-390A singel cabinet w/ shock mounts, one is the US Army Security Agency, special project number one set w/extra modules installed, all exc condx - $1950 for all, PU only. Sam Hevener, W8KBF, The Signal Corps, 3583 Everett Rd., Richfield, OH 44286-9723. (330) 659-3244

FOR SALE: Globe King 500, complete, almost mint, orig, PU only - $1200. Sam Hevener, W8KBF, 3583 Everett Rd., Richfield, OH 44286-9723. (330) 659-3244

FOR SALE: Low freq coils (2) for Heath GD-1-A - $10 ppd. R.J. Eastwick, N2AWC, 224 Chestnut St., Haddonfield, NJ 08033. (609) 429-2477

FOR SALE: TX-1 - $250; HT-37 - $200; HW-101 - $125. Robert Braza, N1PRS, 23 Harvard St., Pawtucket, RI 02860. (401) 723-1603

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

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

FOR SALE: Hammarlund HQ180, exc - $250 shpd; Hammarlund SP-600-J11w/Northern Radio factory modifications - $350 shpd; Yaesu FT-101-EE, CW/SSB filters, processor, exc - $275 shpd; parts units: Collins 75A-3, no knobs/no cabinet; Collins R388, no knobs or cabinet; Heath Apache; Heath HW-101; Hallicrafters SX-28, no meter, most knobs, rough cabinet; National NC-300 no meter, most knobs, no cabinet. **WANTED:** Viking 122 VFO; National NC-183DR (rack mount only) inoperative OK but must be complete. Trades positively considered. Abe, DE, (302) 349-5389, before 10 pm EDST please.

FOR SALE: UTC CVM-4, new - $350; Gonset VFO - $85; Hallicrafters S-53A - $85; Hunter Baudit linear - $425; Millen 3 kw+ transmatch - $250; Globe Matcher Senior AT-4 - $145; more, free list. Richard Prester, 131 Ridge Rd., W. Milford, NJ 07480. (973) 728-2454

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

WANTED: Collins R389, 30K-, 310-, 399C-1, KW-1, HF80 i.e. HF8014, 851S-1, Hallicrafters SX-115. Richard, WAØAKC, NE, (402) 464-8682.

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

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

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

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

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

WANTED: VOX unit for Galaxy 550A. Fred, WØBMT, NE, (402) 887-5201.

WANTED: BFO xfmr, Miller No. 65163 & B&W 3015 miniductor. David L. Muse, 510 Minturn Ave., Hamlet, NC 28345.

WANTED: SX-28 knobs; AF67 AC sply. N8FOX, MI, (616) 948-3651.

WANTED: Cabinet for 1934 International Radio Corp Kadette, All-Wave Duo Rcvr. Dan Kraft, 18 Laird St. Box 68, Ramsay, MT 59748. (406) 782-3347.

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

WANTED: For Hallicrafters SX-101A - antenna coil L3, P/N 051-202196 (Band 3). John B. Keil, 4618 Norwalk St., Union City, CA 94587. (510) 471-4838.

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

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

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

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

WANTED: Broadcast gear, compressors, limiters, old mics, consoles, EQ, tube recorders, thanks! Mike States, Box 81485, Fairbanks, AK 99708. (907) 456-3419 ph/fax.

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. navradi@enter.net

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

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

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

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

WANTED: ART-13 homebrew pwr sply; low pwr compact home brew; mobil AM xmtr; S40. Darryl Dippel, WA5AAO, POB 335, La Grange TX 78945.

WANTED: Help for repair and others interested in Robot slow scan. Ned Winter, K8BZZ, St Rt 53N, Upper Sandusky, OH 43351. (419) 294-1213 HHK05A@PRODIGY.COM

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

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AMATEUR RECEIVERS: COLLINS 75A-2; 75A-3; 51S-1 rack mount; 75S-3; 75S-3B; 312B-3 speaker; 516F-2 case only w/speaker; CP-1. **DRAKE** 2-A; 2AQ; R-4A; **HALLICRAFTERS** SX-115; SX-101A; SX-88; SX-99; SX-71; SX-62; SX-42; SX-25; SX-17; S-40B; R46/R46B speakers; **HAMMARLUND** SP-600-JX w/prod. det.; SP-600-JX-17; SP-200 (BC-779) w/power supply; HQ-120; HQ-100; HQ-129-X; HQ-150; HQ-180; **NATIONAL** RAS-5 WW II complete rack HRO-like rx; HRO-60 w/ABCD coils; NC-2-40-D w/spkr; NC-183D; NC-300; NATIONAL RBL-5 WW II LF receiver; **NATIONAL** speaker; **SCOTT** SLR-F "anti-submarine" receiver; **TMC** GRP-90

TRANSCEIVERS: **COLLINS** KWM-1; 516F-1 AC, 516E-1 DC; KWM-2 w/blanker, Waters; **KWM-2A**; prototype 312B-5; CC-2 KWM-2 in suitcase; **DRAKE** TR-4C w/AC-4/MS-4; TR-7; **GONSET** Communicator II, III, IV; **HEATH** SB-102; HW-101; Twoer; **KENWOOD 830-S; NATIONAL** NCX-1000; **YAESU**; FT-101-E, FT-101-E accessories: remote VFO, Landliner phonepatch, digital readout; FTDX-560

MILITARY RECEIVERS: **COLLINS** R-388; R-388 w/spinner knob; **COLLINS/Miltronix** R-390-A w/ER "Competition Grade" mods; Arvin/Miltronix R-725; good just-serviced, working R-390; R-390-A; CEI 354; BC-348-Q; **MOTOROLA** R-644/URR 20-30 MHz AM/FM receiver

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

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

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

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FOR SALE/TRADE: ARB w/control box & tuning head - $75; ART-13 w/pwr connector - $100. **WANTED**: R-1134/WRR-3 LF rcvr; manual for DP-12. Tom Brent, Box 1552, Sumas, WA 98295-1552. (604) 826-4051

FOR SALE: R390As, working w/meters - $225; working, no meters - $150; not checked w/meters - $150; no meters, not checked - $100. Pete, PA, (610) 847-2214 eves.

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

FOR SALE/TRADE: Transmitting/rcvng tubes, new & used. $0.55 LSASE for list. I collect old & unique tubes of any type. **WANTED:** Taylor & Heintz-Kaufman types & large tubes from the old Eimac line; 152T thru 2000T for display. John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455, johnh.walker@alliedsignal.com

FOR SALE: Collins 32V owners, new Raytheon 4D32 tubes - $19 while they last. Don Gies, W4GIT, FL, (352) 475-1950

FOR SALE: TMC-GPR-90 rcvr - BO over $700; HQ-120X - $165, PU Phoenix only. W7RBF, AZ, (602) 864-9987.

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

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

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

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

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

FOR SALE: Variac, General Radio, 20 amp model W-20, exc condx - $60. Frank S. Law, W8SET, 1 Wildacre Rd., Charleston, WV 25314. (304) 343-0415

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

FOR SALE: Signal Corp SA-13 DP/PT switch test set 1-139-1. Bill Coolahan, 1450 Miami Dr. NE, Cedar Rapids, IA 52402-2911. (319) 393-8075

FOR SALE: Watkins-Johnson 235-1000 mc rcvr - $400; Lavoie Laboratories LA-239A oscilloscope - $200. Gary, WA9IYF, 3429 Gaddy Ct., Falls Church, VA 22042.

FOR SALE: ARC-5 & BC 274N xmtrs. Ken Kolthoff, 8967 Scott Dr., DeSoto, KS 66018. (913) 585-1196, kkolthoff@gvi.net

FOR SALE: BC-610 coil storage unit, CH-88-A part of SCR-399 - $80. Wayne, NØTE, 1212 17th Rd. NW, New Strawn, KS 66839. (316) 364-5353

FOR SALE: AN/UPMC radar test set w/manual, PU only, too lge to ship - $100. Robert Martin, 111 Bancroft, Rochester, NY 14616. (716) 663-4182

FOR SALE: HF amps; QRO tuners; amp parts; meters; xmtr micas; edge wound inductors; sockets. KBØBY, 852 Sunrise Dr., Salina, KS 67401. (785) 823-8455

FOR SALE: Pamona high voltage meter/probe - $15. **WANTED:** NCX parts; Sams CB11; SP600 meter. Bill, KE7KK, 6712 Lake Dr., Grand Forks, ND 58201. (701) 772-6531

FOR SALE: Paddle code key, J-36 Signal Corps, US Army serial#87 Bunnell & CO - Make offer. Allan Lurie, W9KCB, 605 E. Armstrong Ave., Peoria, IL 61603. (309) 682-1674

FOR SALE: Millen 92200 2 kw antenna tuner - $250; SBE 34 xcvr - $150; Heath HO10 scope - $100; Ameco CN50, CN144, PS - $50; PRC 9 - $75; TCS5 spkr - $25. Mel, K2AOQ, NY, (716) 671-0776.

FOR SALE: Multi-Elmac PSR-6, 6 v pwr sply, NIB - $35; matched pair of 8122's - $80. Larry Wright, N4QY, 170 Heritage Ln., Salisbury, NC 28147. (704) 633-3881

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Gonset Communicator 2, 2m looks new
Gonset GC-105 2m xcvr like new
Gonset G-50 6m xcvr w/vfo brand new
Gonset G-76 xcvr's fair cond
Gonset Communicator III, great cond
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Hallicrafters SX-110 rcvr good cond
Hallicrafters FPM-300 just tuned, cal, mint
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Hallicrafters S-85 recv coll qual
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Hammarlund HC-10, very rare, mint cond
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Hammarlund SP-600's many, coll qual
Hammarlund HQ-145 vgc
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Heath Apache xmtr vgc
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Heath DX-100B xmtr exc to coll qual
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Heath SSB adapter fair cond
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Heath SB-630 station console call
Heath HW-2036 xcvr w/ps mint
Heath Mohawk RX-1 recv mint
Heath pwr &swr bridge fair
Heath HW-101 w/ps, great cond
Heath HW-202 2m xcvr exc
Johnson Viking phone patch coll qual
Knight R-100A rcvr's good & coll qual
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Knight T-150A xmtr exc cond
Knight R-100 recv's good
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Collins promotional literature, catalogs and manuals for the period 1933-1993. Jim Stitzinger, WA3CEX, 23800 Via Irana, Valencia, CA 91355. (805) 259-2011. FAX (805) 259-3830

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

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

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

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

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

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

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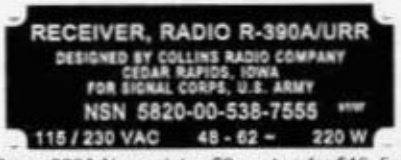

Repro 390A Nameplates $9 ea, two for $16, five for $35, w/screws, shipped. Tom Marcotte N5OFF, 111 Destiny, Lafayette, LA 70506

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

WANTED: Xmtg tube sockets, 813s, etc. Send SASE for list 4 tubes & socket extenders. Typetronics, POB 8873, Ft. Lauderdale, FL 33310-8873. (954) 583-1340, fax 583-0777

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

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

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

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

WANTED: Heath HS-24 spkr. Louis L. D'Antuono, 8802 Ridge Blvd., Brooklyn, NY 11209. (718) 748-9612 after 6 PM.

WANTED: Hammarlund SP600-JX17; XC-100F xtal cal; ARRL Antenna Handbook 2nd-Ed; EFJ Ranger II in VG-exc condx. Brian, IL, (888)-851-4202

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FOR SALE/TRADE: SCR704 Superpro. **WANTED:** Audio OPTS, ceramic tube sockets, console, organ, HiFi tube amps, stuff. Robert, (815) 226-6123, RBTR@SNDS.COM

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FOR SALE: Hallicrafters SR10A rcvr, near mint, w/Sams Photofact Folder. Dean, KK1K, VT, (802) 878-8298, dean.gagnon@juno.com

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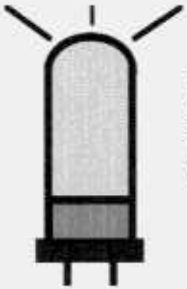

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