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ELECTRIC RADIO

celebrating a bygone era

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Paul Thekan, N6FEG

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; John Staples, W6BM; Dave Ishmael, WA6VVL; Jim Hanlon, W8KGI; Chuck Penson, WA7ZZE; Jim Musgrove, K5BZH; Dennis Petrich, KØEOO; Bob Dennison, W2HBE; Dale Gagnon, KW1I; Rob Brownstein, NS6V; Dick Houston, WØPK; Andy Howard, WA4KCY; Skip Green, K7YOO; George Maier, KU1R; Albert Roehm, W2OBJ; Mike O'Brien, NØNLQ, Steve Thomason, WB4IJN; Don Meadows, N6DM; Bob Sitterley, K7POF (photos) and others.

EDITOR'S COMMENTS Barry Wiseman, N6CSW/Ø

Rob Brownstein, NS6V, has completed the ER WAS-AM award (see a photo of it on page 23) so we're ready. Who's going to be the first to work all 50 states? No doubt there's quite a few AM'ers who have worked all states on AM and some that may have worked each state several times. But it's not going to be easy now, starting from scratch (January 1, 1995),not during propagation conditions like we have now. We're not expecting to endorse a certificate for all 50 states for some time.

The feedback that we've received regarding WAS-AM has been all positive to this point. And most of AM'ers like the idea of QSLing again. It's a tradition in amateur radio that died out amongst most hams except DX'ers. It's hard to say why it died out, but everyone is looking forward to sending and receiving QSL cards again. I think it's more meaningful to AM/Vintage hams because we're such a close fraternity and we're more tied to the history and tradition of amateur radio than mainstream hams.

In this issue, on page 16, we've printed some of the QSL cards and comments that we've received in the last month. As these cards and comments indicate, there is a real trend back to individual cards, with most of them having some homemade ingredient; whether it's a photo, a line drawing of some sort or something pasted up from artwork gleaned from old publications. Vintage hamshacks are going to start looking more vintage! How many of us can remember the hamshacks of yesteryear absolutely 'plastered' with unique, interesting and sometimes exotic QSL cards? It's back to the past...

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Cover: Paul Thekan, N6FEG, participating in the Armed Forces Day celebration May, 4, '94, with other members of the West Coast Military Radio Collectors Group. This station, which consisted of two ART-13s, a BC-348 and an R-390, operated AM on 20 meters.

LETTERS

Dear ER,

In my T-368 article last month I forgot to mention some sage advice that I received from Bill, WC7O, regarding the AC mains interlocks. Since mine were unmolested and performed flawlessly, I did not take Bill's advice to heart. After further review, one should probably disable them since the primaries actually run through the interlocks - weird! Any resistance that can be eliminated in the mains runs that also eliminates potential intermittents should be seriously considered.

Also, the T-368 appears to be very fussy with the 4-125 modulator tubes. Factory fresh performance is required. Old tubes can only modulate 400 watts at 100% <grin>. New tubes modulate 500-600 watts.

Randy Best, WA7CPA

Dear ER

My thoughts about the T-368 transmitter.

No more lying awake nights crying because we don't have a KW-1. Hi.

My T-368F was a horribly butchered mess, but a lot of TLC made it into as nice a transmitter as I ever expect to have.

My first T-368 was a 'C' or 'D' which I purchased in new condition from Sacramento Army Depot in the late '60's when they were changing over to the 'F' models. It was complete with two sets of Tech Orders, a spare exciter, a spare 6000 tube wrapped in foil and went for the princely sum of $75 for the whole package. Tough. But we found fewer and fewer contacts on DSB and one of my friends offered me the money I had in it and I went to a KWM2-A and 30S-1. Never learned to enjoy "Scientific Set Back" and the -M2-A was no fun on CW so that went away and I mostly lost interest in amateur radio. Until 1986 when I came home to the desert and met Tucson Bill, K7CMS. Still had my Johnson Viking Ranger and ten meters was good and we started getting back to real radio.

My T-368 is now basically stock, except the audio, which is like the Viking Ranger but with the clipper and low-pass filter left in. My friends voted for the audio with clipper pot set at midscale. The D-104 seems to be accepted by most listeners.

The transmitter quite willingly loads to more than its rated output of 500 watts on phone. Our main problem here is the poor line voltage regulation from the REA power company, which makes full modulation unattainable. Wish we had one of the power transformers from the first model, which allowed operation on 220 VAC. We are about to add some more filter capacitance outboard to see how much that will help hold the plate voltage during modulation peaks.

When we were first getting the bugs out of the xmtr, I received a very valuable tip from one of the faithful. He told me to bypass all those interlocks. It takes only a few minutes with a large soldering iron, and that is when the xmtr became dependable.

Originally the plate current was way out of spec on the 6000 tube, which is very serious. It took only a few minutes with the book and tuning tool to get that in resonance. And don't neglect to adjust the slow-dropout relay which allows the RF voltage to collapse before switching to the receiver. I set the plate protection relay by backing off till it dropped out on modulation peaks and then tightened till it held. It has never been necessary to readjust any of the relays.

I switched off the electric blanket on the PTO. This results in a few cycles initial drift, which is not a problem. No provision was made to balance the modulators, so we put the best tube on the positive side.

Bill Braden, WC7O

AM *International, February Update*

AMI South Central Regional Director, John Firey, WB5HRI

I have been listening to the bands nightly, some of what I hear is distressing. We have a serious problem with a group of "radio warriors" that started late last season near 3880 kHz. If an AM QSO is attempted, they tend to close in on 3880, and discuss which sideband they can use to cause the most interference to the AM QSO. To make matters worse, one of our AM colleagues has been trying to solve the problem in very non-diplomatic ways and this has resulted in this group "driving stakes" in their VFOs. The only way I can see us having 3880 clear for AM again is for a nightly operation of several legal-limit power stations with excellent antennas to get on 3880 first and to work others in a non-attacking manner. As we say here in Texas - those people are "rednecks". Any provoking will make them stay forever just to make a statement about themselves. I suddenly realize that some of the long-winded transmissions with big signals that many have complained about would serve a useful purpose here.

For now, it appears that in this region, AM operators have been splintered into using several different frequencies in defense of this interference. This has caused more "growing pains" for those wishing to work our mode. The good news is there continue to be new people showing up either on the air or at hamfests wanting to try AM and learn about its characteristics. At every hamfest I have attended this year I have given out all the AMI brochures I have taken. There is definitely lots of interest out there.

The best solution to get more people on AM will come with better 10 meter propagation. I predict the 29.0-29.2 MHz window will sound like 20 meters did in 1955 when we close in on the next sunspot peak. For the time being, I wish we could push for more 40 meter AM activity as an alternative to 75. It would allow many people to get on AM that don't have the real estate for a 75 meter antenna. Activity on 160 meters is limited in this area but there are a handful of guys that keep things going there.

Several of the AM/Vintage equipment operators in the Houston area had a field day and ran vintage gear at N4IU/5, Al's QTH. He has no neighbors so we could run just about anything. We tested the site by running a KW on 50 MHz from my Johnson 6N2 Thunderbolt. We did well, and no DX TVI complaints were received. Maybe other regions can push for more AM activity during major events; Field day and the June VHF QSO party would be best.

I contacted both of our ARRL West Gulf directors and section manager to introduce myself and discuss AMI. They were quite cordial and interested in hearing why AM is now a growing mode of operation.

Thanksgiving, 1994 AM Jamboree Report Addendum

I received four additional logs for this operating event from Dan, N3NQY; Bill, WBØBBM; Jim, N3FWK and Paul, W3HHC. The top performers were still Norm, KG9D, with 33 contacts; Al, N2SHG, with 32 and Dave, N2KSZ with 29. All twelve log submitters received an AMI recognition award certificate.

AMI Still Growing

AMI membership stands at 710 and organizational funds are about $300. Although this sounds like a comfortable margin in a low-budget operation I am planning on updating and reprinting the AMI brochure as the first 2,000 we printed are almost gone.

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The History of the U.S. Navy's Type TBL Transmitter

by Dennis Gilliam, edited by Gary Halverson, WA9MZU

About a year ago I discovered a manuscript sandwiched in a pile of manuals acquired in a horse trade. After glancing through the manuscript, I deduced it must have been written for a college English assignment since it was so well written, supported by dozens of references, and was marked and graded with a red pencil. It was dated February 1978. The paper concluded with the author stating he had acquired a pair of TBL's that were still in the original crate. Not recognizing what the TBL was and not being interested in WW II surplus equipment in general, I tossed it back in the box and forgot about it.

It wasn't until Ben, W6FDU, mentioned over lunch one day that a group of hams in Baltimore had painstakingly restored a TBL (from the inactive Westinghouse Friendship Amateur Radio Station W3GR) for the Historical Electronics Museum in Baltimore and put it on the air. Remembering the TBL manuscript, I dug through boxes of manuals and paperwork until I found it and lent it to Ben to copy and forward to the Westinghouse hams on the Baltimore team who were still looking for historical information on the TBL.

Upon relating this story to Tom Horsfall, WA6OPE (net control for the West Coast Military Collectors Net), Tom asked who the author of the manuscript was. When I said it was a guy by the name of Dennis Gilliam, Tom exclaimed, "I've got that transmitter!" He then explained how he had purchased from Dennis several years ago one of the TBLs that inspired Dennis to write the paper. Tom had Dennis' phone number and after a quick call, Dennis agreed to allow publication of his excellent paper. Small World - GH.

Christened the TBL by the Bureau of Ships, this transmitter provides an interesting basis for discussion about the people and the problems they faced in the design and production of military communications equipment in the mid to late '30's.

The Westinghouse Electric Company was ideally outfitted as a wartime contractor with a past record in design and construction of military communications equipment dating back to the late 1920's. The company had their radio research and construction laboratories at Chicopee Falls, Massachusetts, in 1936 when the TBL was designed. The design was based on several previous transmitters, two of which were the TAJ series of 1929 and the TBK series of 1934. Two engineers allying much of these early designs of their own into the TBL series were Mr. T.P. Kinn and Mr. Maynard R. Briggs. These and other individuals greatly upped the pace of completion for the project by their experience in such matters. Mr. Bruce Boyd, another Westinghouse engineer revealed the following:

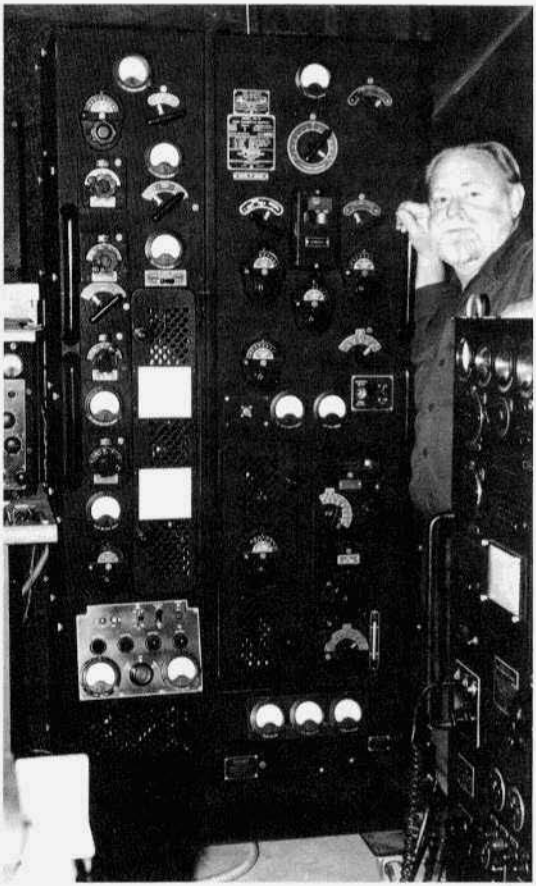
"Westinghouse was awarded a contract for a prototype of the TBL model equipment. The time allowed for the design and construction was very short - only 120 days. Since this was only 1936, no wartime pressure was involved; the pressure was economic."

"Of particular interest for the TBL was a size limitation that the set must pass through a 30 inch diameter submarine hatch. . .the set can be divided vertically into two parts to satisfy this requirement."

The TBL series is a large unit physically, and this led to design problems such as the one related above. A description of a finished unit is taken from the Westinghouse manual:

The TBL series is comprised of four units, the largest of which is the transmitter unit proper, weighing 803 pounds. It is 6 feet tall, 3 feet wide, and 2-1/2 feet deep.

One can see from this description that the units were somewhat hard to move around physically, and this had to be



Tom Horsfall, WA6OPE, with the TBL transmitter acquired from the author. Photo by Susan Krelle

taken into account in the initial design. The units had liberal fittings for lifting and the larger components could be easily dismantled for installation and maintenance.

The construction of the units in the pre-war years was carried on at a convenient pace for the company, but with the oncoming of the war record-breaking production was called for. Mr. Boyd recalled:

"--in 1939, after the German invasion of Poland, an order for 200 TBL's was received from the Navy. During the war many more TBL's were manufactured after the plant moved to Baltimore, MD."

The Westinghouse Company employed several hundred workers who were involved in the manufacture of the TBL equipment during the war. The exact figures are not available to give precise accounts of the work force.

Throughout the war the work force did two eight-hour day shifts six days a week, with frequent around-the-clock work taking place seven days a week. Data culminated from the two TBL units in the writers' possession indicates that a dozen of the finished units rolled off the assembly line per day towards the end of the war. This fact is interesting in light of there being over 10,000 individual components in a finished TBL equipment group. Mr. Boyd related that he personally was involved in the successful program to limit the final inspection and testing time for the TBL's to eight hours per unit per work crew. This is in itself no small fact when taking into account over 4,000 separate tests and checks were involved in the passing of the units for Navy acceptance. An employee of the Navy acted as liaison between the company and the government to assure quality control and operational ability.

The finished units accepted by the Navy inspector were individually stamped with a small anchor symbol on the nameplate of each unit. After being approved, the units were crated and made ready for shipment to various shipyards around the country.

After the units were delivered to the shipyards, quantities of them were installed onboard ships, the others re-

continued next page

TBL Transmitter from previous page
maining as back-up units for replacement or expansion of inventory. The shipboard installation procedures were straight forwardly outlined in the installation chapter of the Westinghouse TBL manual, the work consisting of mounting the units securely and then connecting them together in the approved manner of marine wiring. With the final interface of the unit to power, control and antenna circuits of the ship, the installation was complete. The TBL transmitter was a "sending-only" device, and was meant to be used with a compatible radio receiver for two-way operation. Operation in low-and high-frequency portions of the radio spectrum was obtainable with the TBL unit, and two types of emissions were available for use; CW, and radiotelephone. A quote containing usage of these terms in reference to the TBL unit is taken from a Navy publication:

"The TBL series radio transmitter is a very versatile low-power unit and is used extensively on smaller vessels. It operates in two frequency ranges and has a rated power output of 200 watts on CW and 100 watts on MCW. The low side covers the range of 175 to 600 kc, and the high side from 2 to 18 Mc. This means that the TBL can be used to cover two frequency ranges resulting in important space savings. Both sides of the transmitter cannot be keyed simultaneously; however, to shift from one frequency range to the other is merely a matter of throwing a switch. The relatively low-power output removes somewhat the requirements of large antennas, which are not available on the smaller vessels. This equipment requires a separate speech amplifier when used for voice transmissions."

As previously mentioned, the space saving feature of having more or less two transmitters in one enclosure was a step forward in several ways. Obviously, the saved space meant more radio equipment per cubic foot and consequently more ability to operate on a wider scope of frequencies. Also taken into account was the sharing of most of the components in the TBL for multifrequency use and the consequent reduction of spare parts necessary. The TBL could tune and operate on twice the number of frequencies for half the room devoted to older radio gear, resulting in fourfold gain. All this is well and good for what would seem to be an easy answer to a problem, but engineering had to go deep into the technology of radio as the result of a physical problem. To wit, a ship of the period usually had but one antenna onboard. This antenna was limited by the physical dimensions of the ship, and in most every case the size of the ship's antenna varied as did that of the ship.

This necessitated the engineering of a transmitter that would match properly any encounterable antenna and work with it efficiently. This in itself was no small task and was especially excellent of Westinghouse personnel considering the short contract duration and had to be shared with other aspects, such as structural design, tooling, subcontractor acquisition, etc. The TBL transmitter series carried a reputation of reliability and ruggedness throughout the world and to such an extent that the Navy continued their use for several years after the war.

Maintenance on the TBL was not exhaustive in required expertise nor in specialized tools. The actual operation of the unit was very simple and could be easily and quickly learned by Naval personnel. Untoward misadjustment of the operating controls had little damaging effect on the unit, and suitable circuit protective devices precluded failure of the unit in that event. The design requirement specified that adequate and reliable operation should be had at all times from the unit under all conditions it might encounter. Several abusive tests the TBL had to withstand were listed in

the accompanying manual. Included were shock tests that imitated the multiple firing of heavy shipboard guns, and the exposure of the TBL for extended periods to extremely high and low degrees of ambient temperature and relative humidity. In every recorded instance, the units met or exceeded the standards required by the Navy.

Today the TBL transmitters are a legacy of the time at war some fifty years ago. Few of the thousands produced exist today, and the Navy has long since replaced them with state-of-the-art models. Many collectors hoard what remnants are still available today, and from time to time another piece of memorabilia turns up. Two of the TBL series Model 12 transmitters were released by government auction when declared excess property by the Navy after 33 years of storage in California. The pair of transmitters and all the related equipment were secured by the writer in unopened condition. One of the TBL's has been modified slightly for use on the ham frequencies and the other is in storage again. The careful design and workmanship that went into the units in 1944 still are evident in the operation of the TBL as a ham rig. The aspect of communications in whatever form it takes is still as important today as it was in 1936, and the TBL still performs to that end.

Editors note:

The author has since sold the only remaining complete TBL to Tom Horsfall, WA6OPE, where it is in weekly use as the net control transmitter on the West Coast Military Collector's Net Sundays at 1500 hours PST. According to Tom, the other transmitter was parted out before he acquired the TBL. Tom also highly recommends visiting the Historical Electronics Museum in Baltimore where examples of WW II communications technology are well represented. The Historical Electronics Museum is located near the Baltimore/Washington International Airport and can be reached at (410)765-2345, or you can drop them a line at P.O. Box 746 MS 4015, Baltimore, MD 21203.

For the past several years Dennis Gilliam has been the Chief Engineer at stations KJZZ and KBAQ near Phoenix, AZ. He is also an ardent collector of military vehicles. Although it's been a long time since he did his research for his English paper, Dennis indicated he's willing to share his TBL memories with interested individuals. Dennis can be reached at (602) 839-1901 evenings. ER

Dennis Gilliam with the TBL in 1975.

Japanese Army 94-5 Receiver Restoration

by Ken Lakin, KD6B
701 SE Salmon Ave., Box 310
Redmond, OR 97756

At the end of World War II thousands of tons of surplus electronics flooded the market here in the United States and was sold for less than ten cents a pound. In Japan and throughout the war theaters Japanese and German equipment was destroyed by occupation forces in nearly as great a quantity, presumably out of some fear that it might once again be used by enemy forces. As a result the few Japanese radios that exist today are those "liberated" by GI's on the battle field, or obtained later in occupied Japan, and brought home by whatever means available. Most of the sets that exist in private hands today were obtained by those means. Although they are not necessarily rare, there is a special uniqueness about these sets that nothing from "Radio Row" could have.

After having acquired a 94-5 transmitter and putting it on the air (see *ER* May 1994) out of technical curiosity, I made an effort to find the companion receiver and then operate and evaluate the entire set. Thanks to an advertisement in *ER*, a receiver of the right type was located and acquired.

This article is documentation of the restoration of the set. The procedures used and lessons learned should be of value to anyone restoring vintage equipment in general.

The receiver has three tubes, one RF amplifier, one regenerative detector, and a two section triode-pentode audio amplifier. The set is band switched and covers the frequency range 370 KHz to 7.6 MHz in four bands.

Upon first inspection the set was clearly "severely cosmetically challenged", but not unexpectedly so since the previous owner had given an accurate description of the superficial condition. Dirt and corrosion were present as you might expect from an old radio that had been sitting with the cover off for twenty years in someone's garage. Inspection showed that the radio was electrically complete but missing the cabinet and front lid where calibration charts and the schematic would be.

What was most amazing was that the set was electrically complete, including tubes, all resistors, capacitors, etc. The only unexpected item was an attached power plug. Unexpected because this set does not use a power plug and cable except when on the bench for servicing. The regular power connector is built onto the inside back of the case above the battery compartment. Perhaps the set had been found on a service bench.

The main goal was to get the set operating in spite of its poor appearance. In preparation electrical measurements were made at terminals and components. The ohmmeter showed that the input resistance was much lower than calculated from the schematic (found in a WW II War Department Technical Bulletin). Given that situation a check was made for suspected leaky capacitors. In the process of checking capacitors it was discovered that there were no terminal strips or tie points in the set except those on the components themselves. That kind of construction makes servicing very difficult because one component's terminals may have several attached wires that have to be unsoldered with potential damage to the component itself during the desoldering operation.

The large capacitors in metal cans, ranging in values from 0.1 to 1.0 micro-Farads, were all leaking badly and

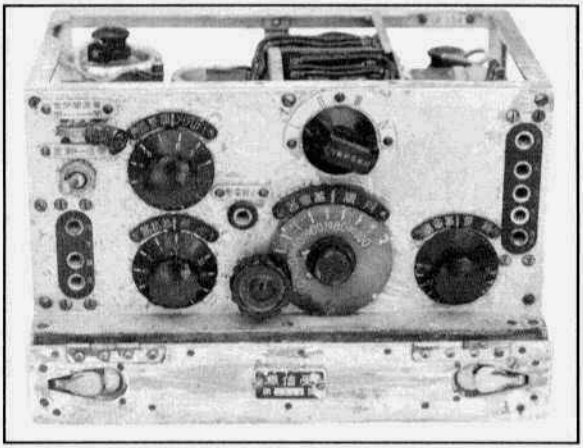


Figure 1, front view before restoration.

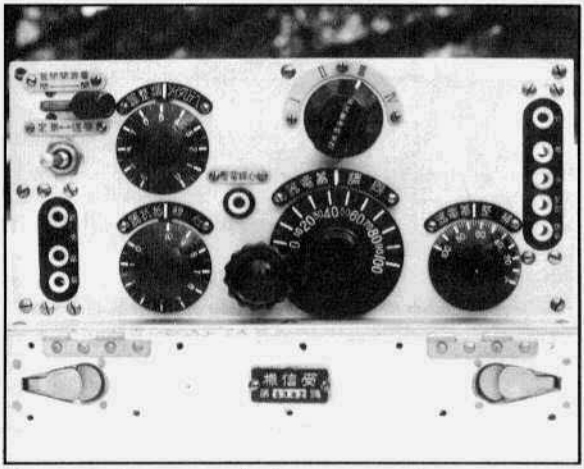


Figure 2, front panel after restoration.

would have to be replaced. No problem, assuming that any military set would have been designed to be repaired in the field if necessary. The large capacitors were mostly mounted in groups and fixed in place by aluminum brackets held with small screws and staked brass nuts, very professional construction. However, it was then discovered that the brackets could not be removed without getting at countersunk screw heads on the other side of the chassis that were in turn under coils or other components. It was further discovered that the coils could not be removed unless something else was removed first! In short, it became apparent that the radio would have to be significantly dismantled just to replace the can capacitors! The can capacitors, rated at 1000 volts in a 90 volt maximum radio, were apparently not expected to fail and probably didn't in the anticipated lifetime of the set.

In general, the sets and their components had little or no protection from the environment. Almost all components showed corrosion, even the plates of the "sealed" main tuning capacitor. Further electrical measurements revealed that the audio output transformer had an open-circuit primary. That at least cleared up some mystery about the set. With the audio output transformer defective the set would appear completely dead and, given the difficulty of replacing the transformer or finding a replacement, the set was probably just abandoned. The set would not have been a good source of parts, given the alternatives, and the tubes would be of little value to the experimenter. All that may account for the fact that the set had not been modified or repaired.

More extensive inspection revealed deeper damage and it soon became clear that if the set was to be operated it would have to be substantially restored.

Restoration started with complete dismantling of the set. Even this was a difficult process. At one point brackets on opposite sides of the chassis were found that covered each other's flathead countersunk screw heads! In the

continued next page

wiring, some wires were through-hole daisy chained between components while others were simply tack soldered with no apparent rhyme or reason.

The chassis, as shown in the photos, was heavily corroded as if the set had been in water for some period of time and corrosion was found between metal plates that had been riveted together. Paint stripper was out of the question because of the heavy corrosion, so all parts had to be cleaned by glass bead blasting. This produced a very nice matte finish on the metal at 80 psi air pressure. The use of "dummy" screws in tapped screw holes was a necessary step because bead blasting will destroy screw threads. Other metal parts, all electrical connections, etc. were also cleaned by bead blasting. After cleaning, the chassis and front plates were coated with Krylon clear matte finish that, in the end, closely resembled the finish on the companion transmitter.

Electrical connections were then electroplated with silver using a kit obtained from Antique Electronic Supply (AES). Although this sounds very elaborate it was the simplest and quickest way to protect connections where the original plating had been removed by bead blasting. Rather than use the plating brush that comes with the plating kit, the alligator clip of the positive lead was placed near the taper end of the cotton on a cotton swab and the negative lead was connected to the part to be plated. The swab and clip were then dipped in the electrolyte gel and the end of the swab scrubbed over the part to be plated. This worked very well and even allowed plating inside banana plug jacks and tube socket clips. A five volt supply with eight ohms of series resistance to limit current, was used for the power source.

The large can capacitors were dismantled by first bending back the metal tabs that hold the phenolic plates and then melting out the wax in a shallow pan on the kitchen stove using low heat. When the wax was hot a pair of needle nose pliers was used to extract the paper capacitor roll from the can. Finally, the remaining wax was dissolved in gasoline and after drying, the cans were bead blasted and painted.

New, and much smaller, capacitors were subsequently soldered to the phenolic board terminals and then mounted in the cans.

Repair of the audio output transformer was effected by disassembling the laminations and rewinding the defective section. A broken wire was expected near the solder connection as is usual. Instead, the defect was probably deeper in the winding and may have been due to an initial manufacturing error since the wire had not been sufficiently annealed and was pinched against the bobbin sides. It is a common tendency, and mistake, in winding bobbins to let the wire pile up in the middle and then occasionally let it fill up the crevasse formed against the bobbin sides. This procedure can place stress on wires pinched against the sides and eventually lead to wire breakage. In any case, the bobbin was chucked into a small lathe and the spindle turned by one hand while new 40 gauge magnet wire was guided onto the bobbin by the other hand. After reassembly, that transformer and the other two were checked for voltage breakdown on a capacitor checker.

The windings on the six open solenoid RF coils were particularly fragile because the original varnish had deteriorated to the point where the turns were loose on their phenolic forms and those coils having bank windings were ready to fall apart. The fix was to coat the windings with Super Glue. This worked very well because Super Glue has very low viscosity and a few drops easily wetted the entire surface of the windings. When used in this manner the glue sets over a period of several

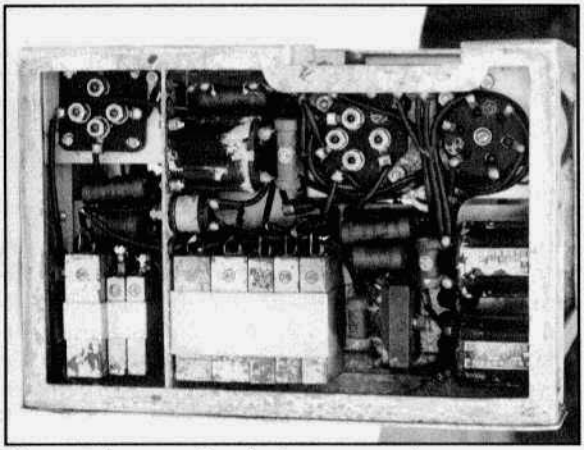


Figure 3, bottom view before restoration.

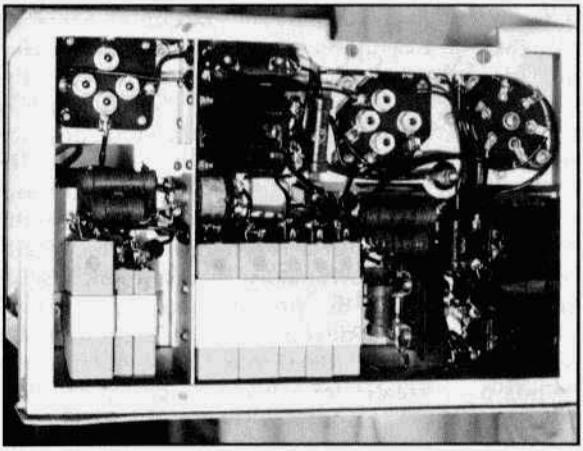


Figure 4, bottom view after restoration.

minutes rather than instantly as when bonding two closely spaced surfaces.

The main tuning capacitor was disassembled and the corrosion cleaned from each stator plate by polishing on a paper tablet. It would have been better to have bead blasted the capacitor, as later done on the antenna trim capacitor, because what appeared to be a precision capacitor before disassembly did not reassemble in such a manner. It would not turn at all! It seems the rotor and stator plates had been bent slightly when originally manufactured to keep them from shorting out as the shaft turned. Unfortunately, reassembly had not followed exactly the reverse of disassembly. It took nearly three hours to fix that little problem!

These are two potentiometers on the set, one is a 5-ohm wirewound for filament voltage adjustment and the other is a 100 K ohm wirewound for the regeneration control. The 5 ohm pot was simply bead blasted lightly and generally cleaned. The 100 K regen pot was a different story. In the first place 100 K is a large resistance value for a 160 degree rotation pot, even in these times, let alone in a vintage radio, and that didn't seem right. Secondly, the pot was so heavily damaged by corrosion that the fine details of its construction were not apparent. What was discovered about the pot is best described by inference from the reconstruction.

The pot was repaired by winding nichrome resistance wire around an annular form just as you would expect on any wirewound pot. However, next the winding was epoxied to the form on the inside area only taking care not to get epoxy on the top where the wiper arm touches or outside on the wire areas. Next the inside wires were cut through the epoxy with an abrasive saw except at the very ends of the form where the terminals press against the wire. Now the pot was composed of many one turn wires that are cut at the inside center. Upon reassembly of the pot the outer area of wires was pressed against a strip of resistive material that extends from one terminal around the form to the other terminal. Thus each cut turn of resistance wire was simply a

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The Simplex Short Wave Radio

A New Version of the Famous Twinplex

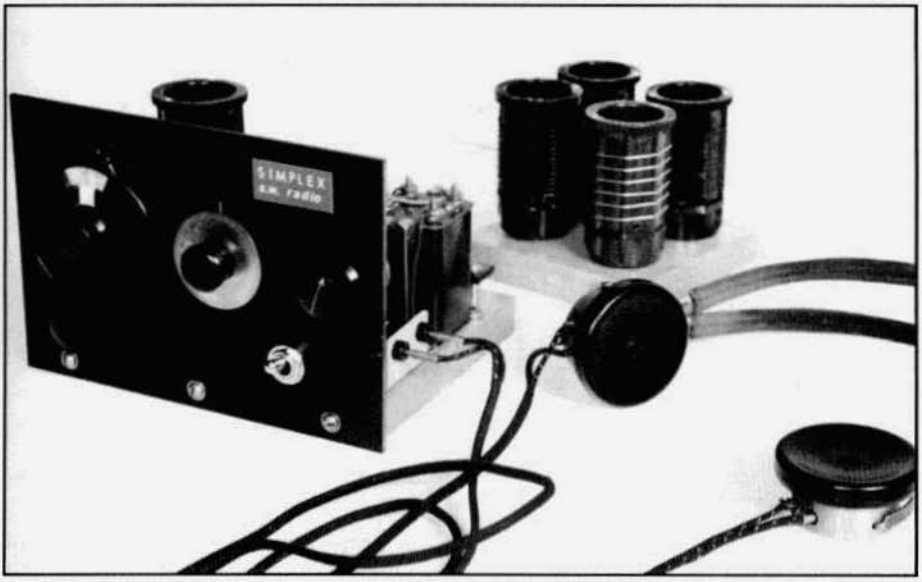
Bob Dennison, W2HBE
82 Virginia Ave.
Westmont, NJ 08108

In October 1933, a prize-winning article appeared in *Short Wave Craft* magazine giving details about a 1-tube radio dubbed the 'Twinplex'. The novelty was that the tube was a '53 which contains two triodes in one glass envelope. One triode was used as a regenerative detector and the other as an audio amplifier. Since the '53 was designed for use as a 10 watt class B modulator, it wasn't well suited for use as a grid-leak detector. Nevertheless, the Twinplex idea caught fire with the readers of SWC magazine and six months later the "19" Twinplex appeared. This set used the '19 tube which was a low-power class B output tube designed for use in battery operated farm receivers. After that, there was an avalanche of Twinplex designs. I have prepared a list giving 14 references on these sets plus several more on sets using twin pentodes. I will send a copy to anyone who sends a large size SASE.

For many years I have wanted to build a Twinplex receiver but was held back by the fact that the '19 tube filament requires 260 mA at 2 volts whereas two type 30 tubes would take only 120 mA. Thus the "19" Twinplex just didn't seem like all that good an idea. Then one day I discovered the 1G6-GT tube. It is a twin triode with a 1.4 volt filament that consumes only 100 mA. That's even less than used by two '30's! So I began to collect parts for an improved version of the Twinplex. I decided to call it the Simplex in memory of John Pyle who owned the Simplex Shop in Salina, Kansas and who gave me my first job, repairing radios, when I was a freshman in high school.

A class B amplifier tube is designed to provide high amplitude plate current pulses when the grid is driven positive. When the tube is idling, the emitted electrons form a dense cloud closely surrounding the filament or cathode. Tubes designed for zero-bias class B operation (e.g. 19, 53, 79, 1G6, 1J6, 6A6, 6N7, 6Z7) feature a high amplification factor-usually about 35. This is achieved by employing a grid having many close-spaced turns located very close to the filament or cathode. Thus the grid is engulfed by the electron cloud or space charge and at zero bias is literally shorted to ground. The resultant low input impedance results in poor performance in a regenerative detector circuit. Fortunately, there is a simple solution to this problem. During the breadboard development of the Simplex, I noticed that the volume would increase greatly for a fleeting fraction of a second each time I opened the filament circuit. During my investigation of this phenomenon, I connected a rheostat in series with the filament and discovered that best performance occurred with a filament voltage of about .8 volt giving a filament current of 65-70 mA. At this point, filament emission was just sufficient to yield optimum detector performance. This was exciting - now the filament power is even less than a single '30 requires! Cool!

At this point I should mention that in 1937, Raytheon introduced the RK43 tube, a twin triode having nearly ideal characteristics for a Twinplex type radio. Unfortunately this tube is quite scarce today and relatively expensive, but if you have one it should make a



The Simplex with plug-in coils and headphones.

nice set. You would have to change the circuit a little and you would probably be able to get by with just one 45 volt B battery. I found only one article (*Short Wave & Television*, Jan. 1938) where this tube was used in a simple 2-tube battery radio. The author appears to have thought that the RK43 was simply a '19 with a 1.5 volt filament. He used it as a two-stage audio amplifier following the detector (an RK42 which was essentially a 1.5 volt '30 tube) and he neglected to provide proper bias. Sadly, these tubes came along too late to benefit radio set builders.

The Simplex Circuit

The wiring diagram of the Simplex Short Wave radio is shown in Fig. 1. Be sure to connect the bottom end of the grid leak, R1, to the A+ side of the filament as shown. Resistors R3 and R4 are used to center-tap the filament. Thus the audio amplifier operates with an effective bias of zero volts. Using a plate voltage of 90 volts, the amplifier plate current is about 1 mA. Even with this low current, the audio output is quite adequate when using 2000 ohm headphones. A half-dozen audio transformers were tried and all gave nearly equal results. Turns ratios varied from 1:3 to 1:6. The final choice was made on the basis of size and appearance. I had a set of four Bruno Lab pre-wound plug-in coils so they were adopted. One coil in the set was missing so one was wound to replace it. Later, another coil was wound to get the upper half of the broadcast band. Winding data for these coils is given in Fig. 2. The Hammarlund tuning condensers, C2 and C3, that I used are the early style whose bearings are prone to be noisy. I found it necessary to add a pig-tail ground connection to each rotor using a short piece of .025" braided metallic dial cord.

Construction

The panel is .125" bakelite and measures 5.25 by 7.5 inches. To provide shielding, necessary to eliminate the scourge of hand-capacity, a piece of thin (.013") aluminum was cemented to the back side. A scribe mark filled with white 'lacquer-stik' provides an index mark for the 0-100 calibration dial on C2, the band-set tuning condenser. The

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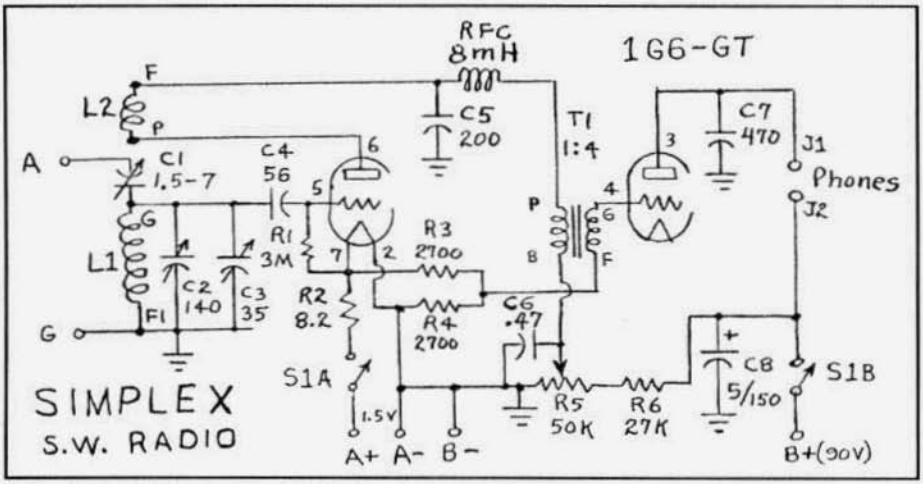
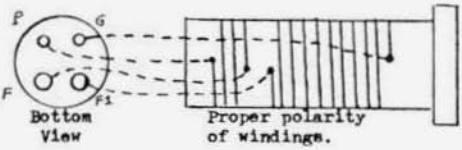


Figure 1. Wiring diagram of the Simplex Shortwave radio.

Simplex logo consists of white dry-transfer lettering on a piece of green cardstock which is cemented to the panel.

The baseboard is 3/4" poplar and measures 5-1/2 by 7 inches. After the various screw holes were drilled, it was given a driftwood stain and two coats of clear, semi-gloss polyurethane. The terminal board that supports the binding posts is 5/32" thick dark colored Lucite and measures .75 by 6 inches. The panel is fastened to the baseboard by means of three 7/8" brass No. 8 RH screws with a brass flat washer under each head.

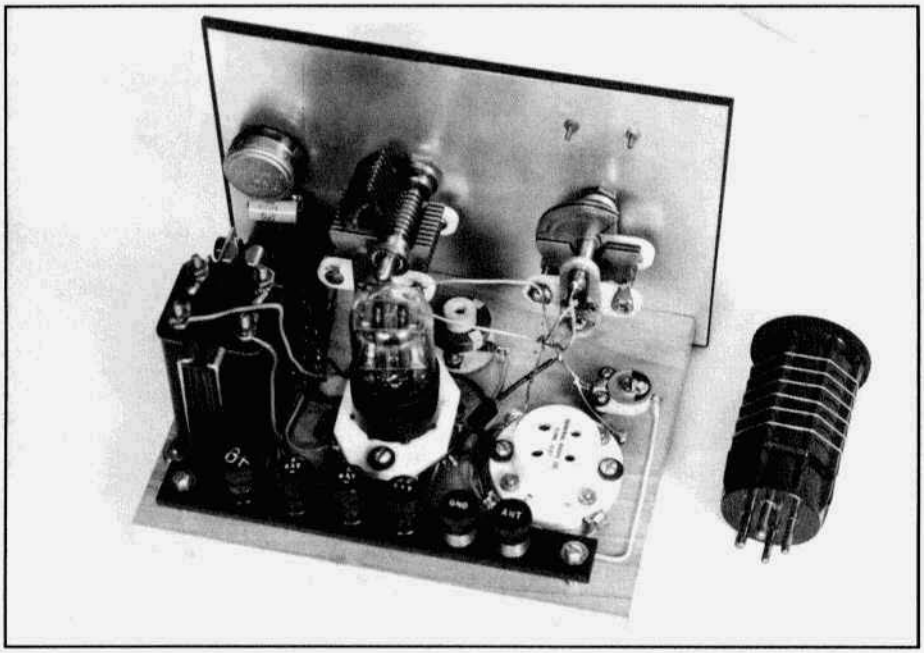
Location of most parts can be seen from the photos. Several parts (R1, R3, R4, C4 and C7) were soldered to the tube socket before it was mounted. Socket terminals at pins 1 and 8 were used as tie points for R3 and R4. The filament resistor, R2, is mounted on a terminal lug strip at one corner of T1. The optimum value for R2 was found to be about 8 ohms. It may vary slightly with different tubes. I found that the RCA GT tube was less microphonic than the GE G type. A small aluminum bracket holds the headphone tip jacks. These were not mounted on the panel as they carry +90 volts and present a mild shock hazard. Wiring was done with Belden 8530 No. 22 solid hook-up wire using a rainbow assortment of colors. The author has prepared a set of drawings, parts list and color photographs which is available for $3 ppd in the USA.



Freq. Range - Mc	L1 - Grid	L2 - Tickler
10.3 - 20	5.75 T #20 E	4.75 T #24 E
5.3 - 10.4	12.75 T #20 E	5.75 T #24 E
3.0 - 6.0	21.75 T #24 E	7.75 T #24 E
1.5 - 3.0	46.75 T #26 E	10.75 T #26 E
.85 - 1.65	84.75 T #26 E	13.75 T #26 E
.55 - 1.0	131.75 T #30 E	19.75 T #30 E

Notes: All grid coils (L1) occupy 1.5" space. All ticklers close-wound and spaced .125" below L1. Coil form Dia. is 1.625". Start and finish of each coil is aligned with corresponding prong.

Fig. 2. Coil winding data.



Rear view of the Simplex.

Operation

Since the Simplex draws so little current, your batteries will last a long time. I use the military surplus batteries sold by Antique Electronic Supply in Tempe, AZ. The A battery is equivalent to the old No. 6 ignition cell and the 45 volt B batteries are similar to the old Burgess No. Z30N.

An outdoor antenna is beneficial in securing good reception, lots of DX, strong signals and low noise. The antenna ought to be at least 50 feet long, as high as possible (at least 25 feet) and located in a noise-free area. After some experimentation, you will master the art of operating a regenerative receiver. You will learn which bands or frequencies are best at various times. You will learn how to adjust the regeneration control for best results. This receiver goes into oscillation so gently and quietly it takes some time to get used to it. Also you will be surprised at how exceptionally quiet the background is - there is no hum or buzz such as is common in even the best AC operated receivers. When an AM station is tuned in, turn down the regeneration until the squeal stops. To listen to CW or SSB, the regeneration must be advanced to just above the point of oscillation.

At certain frequencies, the antenna system will be resonant and it may absorb enough energy to stop the detector from oscillating even when the regeneration control is fully advanced. It is often possible to shift the 'dead spot' to another frequency by changing the setting of C1. In general, as C1 is increased, the signals will get louder but there will usually be a loss of selectivity and possibly even sensitivity if carried too far.

Conclusion

Every effort was made to make the Simplex both simple and excellent - the kind of set I dreamed of owning when I was in junior high school. All components had to be first-class and attractive. The coil socket is a General Radio type 657 in gleaming white porcelain. The tube socket and the tuning con-

continued on page 37

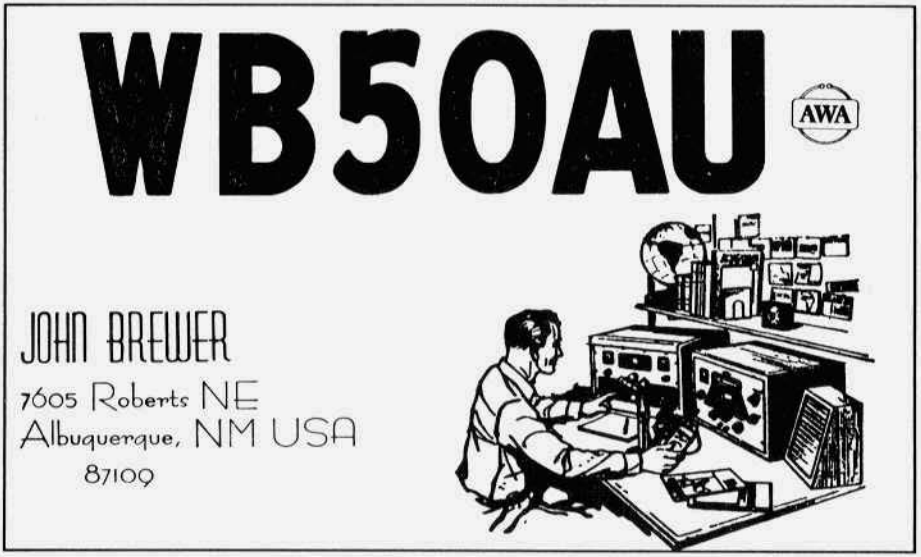
QSL Cards

"Because you expressed an interest (in January's ER) in AM/Vintage gear-oriented QSL cards, I thought the enclosed might catch your fancy.

"This design is my own; it started out as a full-sized black & white print, to which I attached 'peel and stick' lettering and the report form".

Eddy Swynar, VE3CUI

Another 'homebrew' card from Howard Hartzell, WA3YKD. He says he fondly remembers when exchanging cards was the norm.



"Like many who want a suitable card without breaking the bank in the process, I sent a dozen letters off to printers listed in the classifieds in the back of QST magazine. What I discovered was that all the samples that came back (except one) all looked pretty much the same...modern in style, and lacking in any way a tie-in to vintage radio.

"One supplier sent a very different set of samples and catalog. Brownie's QSL's supplied a catalog of modern and vintage "cuts" that allowed me to mix and match traditional radio images, fonts, cardstocks and colors to create what I think is a unique card, at nominal prices. The image on the card appears in several vintage Heath advertisements of the era." **John Brewer, WB5OAU**

Another truly unique homebrew card.

ER 160 Meter Contest Results

Conditions for the 6th Annual ER 160 Meter contest on December 26 were very good and the level of participation was high. We received 11 logs and the results and some comments follow:

Gary, W7FG, came in first with 99 points. His comments, " The number of AM stations heard was gratifying to say the least."

Dave, N2KSZ, came in right behind Gary, with 96 points, for second place. "Conditions were great here in the northeast. I enjoyed the whole thing very much and talked to many, many, who felt the same. Met quite a few guys "just handing out points" and having fun doing it. Also ran across a few who were just curious about all the activity and were happy to learn about ER and AMI (sidebanders included)."

Norm, KG9D, came in third with 65 points.

Others who sent in logs were: Bill, WBØBBM with 57 points; "Had a good time. Band conditions were excellent for a change. Good to hear all the old transmitters sounding so well. Looking forward to next time."

Bill, KA9CWK, with 57 points; "Consider giving Norm, KG9D, a compliment in your writeup. He acted as informal net control on the freq. from about 5 PM to 3 AM and was responsible for a very good jamboree on 160 this year. Had a great time."

Eddy, VE3CUI, with 54 points; " Conditions were superb. I'll be very surprised if W7FG doesn't walk away with top prize. He was oustanding here, and had no difficulty working throughout the northeast! Most popular rigs heard were of E.F. Johnson extraction (8), followed by variations of the venerable BC-610 (6), and homebrew (5). I worked 2 former broadcast transmitters.

"The use of AMI numbers for bonus points is great. I'm sure Dale (KW1I) will be inundated this week with new applicants."

Ron. AA8AD, with 42 points; "During the contest I made my farthest ever 160 Meter contact to Gary, W7FG, in Bartlesville, Oklahoma. Conditions were quite good here in upstate New York. I was receiving the guys from the midwest and some of them were running only modest power (Rangers, etc)."

Bruce, WX1O with 33 points; "Had a great time."

Steve, KJ8L, with 32 points, no comments.

Doug, KFØVF, with 26 points, "I used a Valiant (put it on the air for the first time for the jamboree) and an SX-110 receiver. My antenna was a Hy-Gain 18HT vertical w/LC-160Q loading coil. Fortunately, Dec. 26 was a warm day and moving the loading coil tap was relatively painless."

Jim, W8KGI, scored 17 points, "It was a nice way to wind down from Christmas. I needed the break. Have to do it again next year."

Our congratulations to the winners. The prizes are in the mail. **N6CSW/Ø**

VINTAGE NETS

Westcoast AM Net: Meets informally, nightly on 3870 at 9:30 PT. Wednesday at 9:00 PM PT they have their formal AM net which includes a swap session. Net control rotates.
California Early Bird Net: Wednesday nights at 8 PM PT 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 4 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.
Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 5:00 PM PT, 7 days a week and usually goes for about 2 hours. Net control is Les, K6HQI.
Arizona AM Net: Meets Sundays at 3 PM MT on 3860. 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 3875 Monday, Wednesday and Friday 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.
Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is usually Walt, KJ4KV, but sometimes it rotates to other ops. It starts at 5 AM ET Saturday mornings on 3885.
Westcoast Military Radio Collectors Net: Meets Sat. at 2300 local on 3885 and Sun. at 1600 local on 3885. Night net control is Andy, KD6TKX, and daytime net control is Tom, WA6OPE. AM is the mode used at present. It is not necessary to check in with military gear.
Grey Hair Net: The oldest (or one of the oldest) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8 PM in the winter and 9 PM ET in the summer.
Vintage CW Net: For CW ops who enjoy using vintage equipment.This is not a traffic net; speed is not important. The net meets on 14.050, Saturdays at 1 PM PT. Net control is Tracy, WB6TMY.
Vintage SSB Net: Net control is Chuck, N5SWO. The group meets on 14.293 at 1 PM CT, Sunday afternoons.
Collins Users Net: The oldest of the 'users nets'. It meets on 14.263 Sunday afternoons at 2 PM CT. The net control revolves. This group also gets together for an informal ragchew on 3805 Tuesday evenings at 7 PM CT.
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.
Heath Users Net: A new net started by Marty, WB2FOU/5. Net control is shared by Fred, AA5LW. It meets on 14.275 at 4 PM CT Sundays. Check in on either AM or SSB.
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 has been meeting since 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.
Westcoast Broadcast Equipment Net: Tuesdays on 1959 at 9 PM PT. Anybody is invited to join the group, but the emphasis will be on broadcast equipment. Moderator is Mike, W6THW.

75A-4 Rejection Notch Stability

by Ray Osterwald, NØDMS
P.O. Box 582
Pine, CO 80470

One of the most common and most irritating problems with the Collins 75A-4 receiver is drift of the rejection notch alignment. The receiver maintenance procedure provides for a deep, sharp notch with at least 70 dB rejection, but after only a few hours of use the notch becomes wide and shallow. I've seen some come to rest with as little as 30 dB rejection. If this is a symptom in your rig, read on!

Figure 1 is the schematic diagram of the rejection notch circuit in the 'A4. The Bridge-T filter shown inside the dotted box is the plate load for the second half of V7, a regenerative triode IF amplifier. The first half of the tube acts as a cathode follower, so that changes in loading with various settings of the notch frequency control don't "pull" the preceding amplifier stage. Normally, a Bridge-T filter isn't sharp enough for good rejection characteristics when used above 100 Kc. The designer of the 75A-4, Gene Senti, increased the filter's Q by a factor of several hundred by using the filter in the plate circuit. Regeneration makes the notch filter effective at 455 Kc, at least for a while!

The filter center frequency is controlled by the parallel resonant combination of L26 (about 237 uH) and the

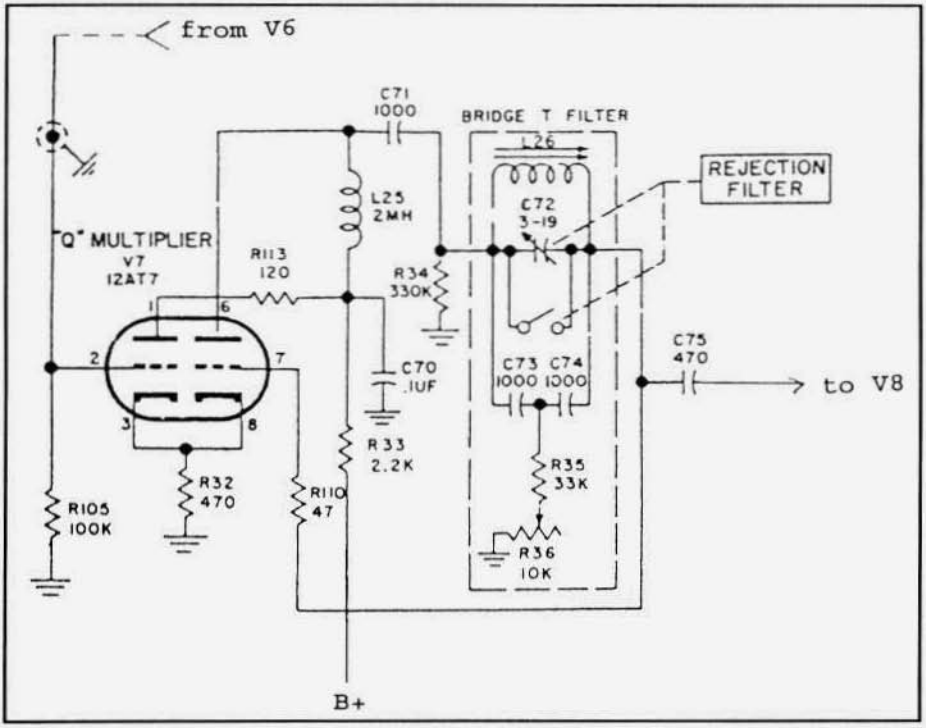


Figure 1. P/O 75A-4 schematic diagram.

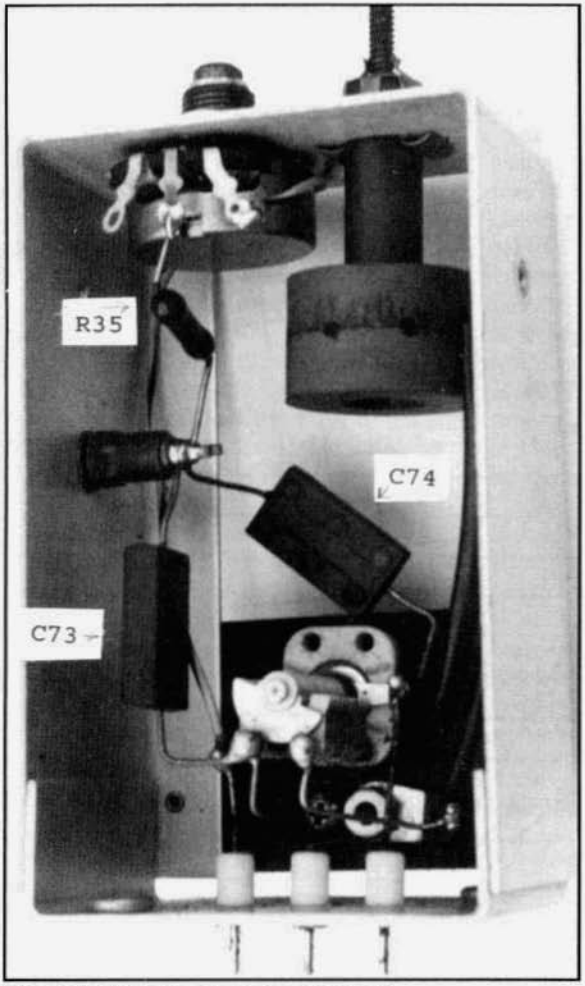


Figure 2. Rejection tuning assembly.

capacity of the C72, C73, and C74 network. The depth of the notch is controlled by the series value of resistors R35 and R36. This value controls the amount of regeneration in V7. Note that the value of R35 is 30K. The schematic calls out 33K, which is an error. This was never caught, even in the latest version of the instruction book which is dated 1968.

Heat is what makes the notch filter circuit "noticeably drifty". This is what I had always suspected, and recent measurements have proved my hunch. I removed the filter component assembly from the receiver (see figure 2) so that all of the temperature coefficients could be measured. (It is necessary to first remove the receiver front panel in order to remove the notch filter assembly). L26, R35, C74, and C73 were removed from the assembly, and heated with a hair dryer from an initial 68 degrees F to an average operating temperature of about 120 degrees F, or a total change of about 29 degrees C. The change of value with heat of each part was measured on a General Radio LCR bridge which is accurate to 1/10%.

The filter inductor, L26, had no measurable drift and was reinstalled. Although the capacitors were within 5% at room temperature, C74 had a positive .29% drift (+1021 parts-per-million), and C73 had a +.20% (+700 ppm) drift. While this doesn't sound like much error, it shifts the filter resonance nearly 8 Kc, and greatly lowers the filter Q at 455 Kc.

I did some checking with my usual parts distributors, and it turns out that many of the old temperature compensating capacitors are as scarce as congressional democrats. Phase locked loops don't need 'em! So, many different types of capacitors were checked for thermal stability on my trusty GR bridge. Disk ceramics were the worst, as expected. Next to worst were plastic capacitors, the mylars and polystyrene/polypropolene types. I tried some NOS mica "postage stamp" caps and the results got encouraging, but I couldn't find enough of them to do a good job of

continued next page

Temperature Coefficient Tolerances

Temperature Coeff. (ppm/degree C)	Tolerance (ppm)
P100	+-30
P030	+-30
NPO	+-30
N030	+-30
N050	+-30
N220	+-30
N330	+-60
N470	+-60
N750	+-120
N1500	+-120

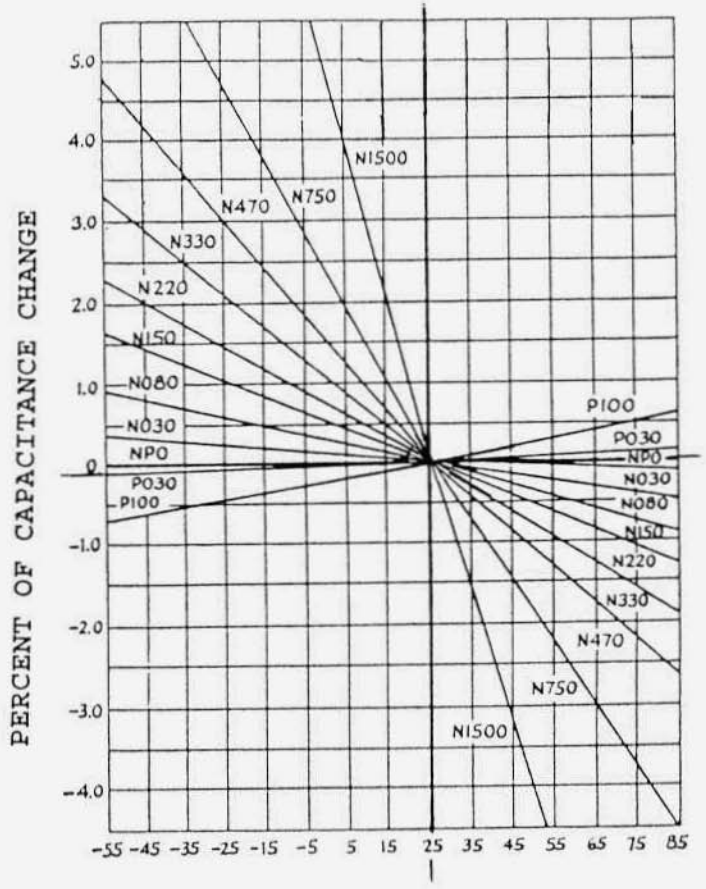


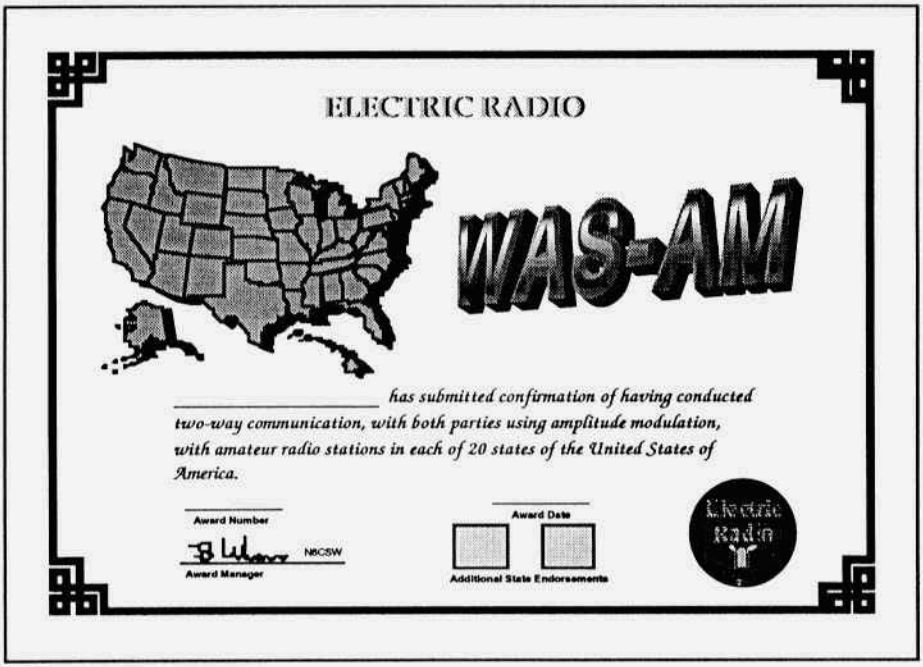
Figure 3. From QST, December 1963.

matching. Contrary to "conventional wisdom", the type that I found with the best thermal stability was 2%, 1000 volt, dipped silver micas. I bought a dozen of them, and got two with capacity values within 1/2%, and no measurable thermal drift, even when heated into the 'real hot' category. These two were soldered in, following the original layout.

Figure 3 is some general reference material regarding temperature compensating capacitors.

R35, even though it was originally a precision value resistor, had a -1.5% negative temperature coefficient, or about a drift of -2974 ppm. Its ohmic value at room temperature was within 1%, as specified in the parts list. I didn't calculate the amount of resistance necessary to produce a given change in feedback, but just replaced it. Generally, the larger a resistor is, the more stable it is. Luckily, there is plenty of room inside the filter component can for big resistors. R35 was replaced with a new 2 watt, 30K, metal film resistor which measured a -.1% change in value with heat. This is a 93% improvement in feedback stability. Modern metal film resistors are temperature stable, and the 2% tolerance distributor pack I bought had one resistor which was exactly 30K. Every resistor in the pack was stable. I'm now using metal film resistors throughout my 75A-4 in the critical locations, such as plate loads, screen voltage dividers, cathode bias, etc. The metal films have eliminated my S-meter zero adjustment drift, and have greatly stabilized the calibration oscillator. Most of the 1957-era carbon-composition resistors originally in these circuits are extremely unstable, in some cases drifting by over 100%.

What a change! With the new parts installed, the notch stays as sharp and stable as it is when first aligned. It's possible to achieve a stable notch deeper than 70 dB when C73 and C74 are well matched in capacitance. Using the notch filter in combination with the passband tuning and the mechanical filters, I say so long and good-bye to QRM! **ER**



The ER, WAS-AM Award designed by Rob Brownstein, NS6V.

Updating That R-390A

An Improved Current Regulator And Noise Limiter

by Bill Kleronomos, KDØHG
P.O. Box 1456
Lyons, CO 80540

One of the attributes of a truly classic radio is how well it maintains its utility as the years progress. The Collins designed R-390A in stock form or with a few thoughtful modifications can still match performance with modern solid-state equipment costing upwards of ten times more. Unfortunately, as we approach the 21st century, the support systems for hollow state equipment are tending to fade away making some parts replacements rather difficult and increasingly expensive. One of the best features of the R-390A is its use of commonly available tubes such as the 6BA6, 6C4, and 12AU7 (5814) - all made by the zillions for consumer electronic equipment. This is not the case with one of the most unreliable plug-in "tubes" in the set - the 3TF7 filament current regulator.

The Amperite current regulator internally consists of a length of iron wire contained in a hydrogen containing tube envelope. Its function in the R-390A is to regulate the heater temperature of both the BFO and PTO tubes to enhance stability. Its performance is OK for 75 year old technology but many of us have found out that it can be prone to failure when subjected to age, vibration or power surges. While this device is still being manufactured by Amperite, its cost is now over $30 from suppliers. Surplus dealers are charging considerably less for this device, and some still show up on tables at flea markets, but the bottom line is that the 3TF7 is becoming scarcer and more expensive in addition to its reliability faults.

This article presents a one-evening modification for the R-390A that replaces the 3TF7 with a solid state current regulator. The modification can be easily reversed leaving little or no cosmetic damage to the IF chassis. All of the parts can be obtained through the mail from Digi-Key or Mouser Electronics at a total cost of about $16 or less. Their addresses appear at the end of this article - I recommend calling them for catalogs before proceeding.

The heart of the circuit is a LM-117 adjustable voltage or current regulator. This device first appeared on the market some 20 years ago and its excellent performance makes it a classic. It is about as bulletproof a solid state device as can be made; if overloaded, short-circuited, or overheated it shuts itself down until the fault is cleared, while the 3TF7 it replaces would probably just burn itself out. Each LM-117 is 100% tested at the factory and part of the test is to apply full voltage, then short its output. Those that fail this harsh test never make it out the factory door.

The National "117" comes in several grades and packages. The part number indicates the temperature range over which performance specs are guaranteed: the LM-317 is rated 0 to +125° C, the LM-217 is rated for -25 to +150°C, and the LM-117 is rated for the full military spec range of -55 to +150°C. Additionally, the LM-117/217 have tighter electrical specs than the consumer grade 317. Several packages are also offered: the LM-117/217/317 K (recommended) is a hermetically sealed

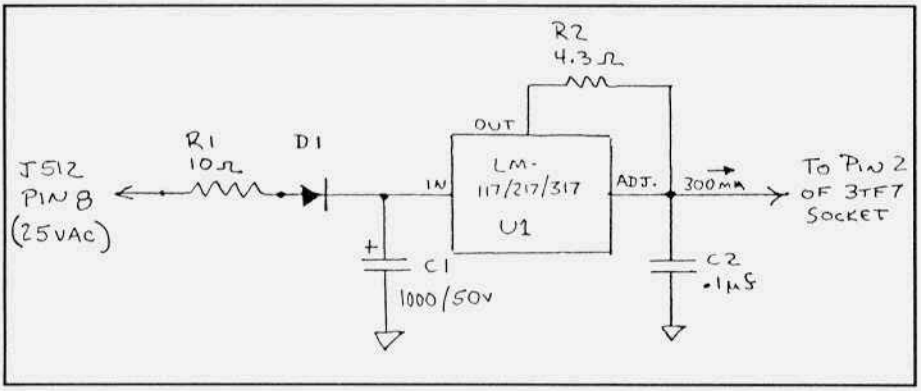


Figure 1. R-390A constant current regulator.

steel TO-3 power transistor case, the 317 T is a TO-220 tab transistor package, and the LM-317H is a small TO-39 non-heat sunk package unsuitable for this project. Prices range from $13 for the top-grade mil temperature range LM-117K to less than a buck for the somewhat easier to mount LM-317T.

In keeping with the quality of the receiver, built to military specifications, I chose to spend the extra money to buy the LM-117K. It gets HOT in an R-390A and the tighter specs and 150° C rating of the -117 make it a good candidate. I certainly wouldn't disparage the more easily available LM-317T; its 125° C rating is also more than adequate for the job, and a buck is a bargain!

Please note that whichever device you choose, it will need to be insulated from the chassis with a standard mica washer/shoulder washer semiconductor mounting kit. Obtain the correct kit for the device you use.

In keeping with the theme of high reliability, carefully select the rectifier diode and filter capacitor used in the circuit. The capacitor is the most critical - there is a rather heavy ripple current through the device and temperatures are high - a lethal combination for both your and my typical junkbox capacitor. In recent years new non-water based electrolytes for electrolytic capacitors have been developed. These glycol-based electrolytics offer operation at temperatures of 105° C instead of the old 85° C. Seals are better and current handling capability (internal resistance or ESR) is greatly improved as needed in modern switching power supply applications. The 1000 uF/50 volt electrolytic I used is sold by Digi-Key at a cost of about $2.60.

They are rated for at least 7000 continuous hours of operation at 105° C with full rated voltage and over 2 amps of AC ripple current simultaneously applied! Since they are used well below these ratings in this circuit, I'd expect at least 5 to 15 times longer lifespan, or effectively for the life of the receiver.

An article like this would be remiss without a brief explanation of circuit operation. The 24 VAC that formerly fed the input of the 3TF7 is half wave rectified and filtered. This approximately 25 VDC is fed to the input of the LM-117 regulator IC. Its operation is such that it is always looking for and will adjust its output voltage so that 1.25 volts appears on the adjustment pin. At the correct regulated current value of 300 mA exactly 1.25 volts will appear across the 4.3 ohm resistor connected between the device's output and adjustment pin. Any deviation from 300 mA will alter the voltage drop across this resistor and the regulator will adjust its output until the value is correct

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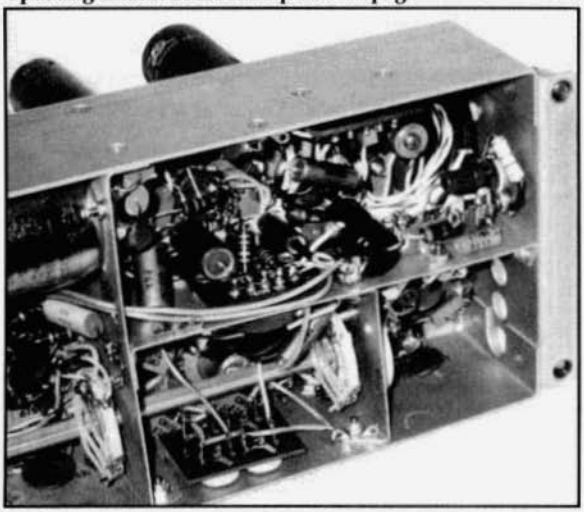

Figure 2. Note new terminal strip mounted on top right of horizontal divider. New C1 is located just to left of strip.

in a servo-like manner. The response time for this device is in the microsecond range and output voltage or current will deviate less than .2% over the entire temperature range of the IC! R1 is present to limit the peak current through the rectifier and to act as a fuse in the event of something catastrophic happening like a wiring or capacitor short. C2 is present to improve the response of the circuit and to prevent any noise or instability problems. Finally a note on the rectifier, D1. As a half wave rectifier, the peak to average current through this device requires a stouter current rating than would seem obvious by the nominal 300 mA consumption of the tube heaters. Excellent diodes are cheap - try to avoid using a diode rated at less than 3 amps and use a 400 V RMS device or better in deference to all-too-common AC line spikes. Overkill in the rectifier's rating is cheap insurance. Also, don't use a "fast" diode here, or one designed for high frequency switching supplies. Such diodes could possibly generate small amounts of RF noise at harmonics of 60 HZ. Haven't ever had this happen around here, but it has happened to others who have homebrewed solid state DC supplies used near sensitive communications receivers. Why look for trouble?

Once all the parts have been procured, set aside a weekend day or evening to complete the project. Begin by removing the IF subchassis of the R-390A. It is secured by three green-headed screws as well as the shafts for the BFO and selectivity switches. A "Bristol" spline wrench is required to loosen these shafts. Pull the loosened shafts forward away from the IF chassis. Carefully unplug the power connector at the rear of the chassis, J 512, and the three mini-bayonet RF connectors, P 513, 514 and 518. Make sure the tags for these connectors are still on the cables; if they're missing use a marking pen to label the cables so they can go back correctly. Carefully remove the chassis by lifting it out of the receiver.

As shown in the picture, the new LM-117 is mounted on the rear of the IF chassis directly behind J 512. If a TO-3 device is used, four small holes will have to be drilled to accommodate the device's mounting screws and leads. The LM-117T only requires one hole and is mounted inside the chassis. Use the insulator from the mounting kit as a template to mark where the holes will be drilled. The sizes of the holes depend on the sizes of the insulating shoulder washers supplied with the mounting kit - the hole must pass the neck of the washer and not allow the shoulder to pass through. The two holes for the device's leads can be the same diameter. Finesse is required in the drilling operation - not only must the holes be correctly spaced but you don't want to drill into the bunch of wires that run to

Figure 3. Location of regulator IC on rear of chassis. It is centered with relation to internal compartment.

J 512! I'd recommend starting the holes with a sharp 1/16" bit and enlarging them to the correct size in a two-step operation. Use a piece of scrap PC board to protect the wiring harness.

Once the holes are drilled, it is imperative that they be correctly deburred. ANY sharp edges or metal fragments will puncture the thin mica insulator sooner or later causing a short and failure. Use a large drill bit, Exacto knife, jeweler's screwdriver, reamer, or any combination thereof to de-burr the holes. As a final check, gently rubbing a Q-Tip swab or a cotton ball across the holes will show where burrs exist as they will snag the cotton fibers.

Prior to mounting a TO-3 device, shorten its leads by about 1/8" to ensure clearance. Do not at any time apply sideways torque to the leads of this device as fracturing of the seals might result. Mount either the TO-3 or TO-220 devices using standard techniques using the mica insulators, shoulder washers and a dab of silicone grease on both sides of the insulator . The leads of the TO-220 devise will be oriented towards the open bottom of the chassis. Don't overtighten the mounting hardware - snug or just firm is fine. Use an ohmmeter to check for shorts.

Mount a small five terminal strip under a nearby screw. R1, D1, C1 and C2 will be connected to it. R2, the 4.3 ohm resistor connects directly to the "ADJ" lead of the regulator and a lug electrically connected to the device's case. The judicious use of vinyl sleeving is very worthwhile.

Now comes the final finesse part. The wire that connects to J512 pin 8 is removed and connected to the output of the regulator circuit at the junction of the LM-117, the 4.3 ohm resistor and C2. This is (was) the 25 VAC feed to the socket of the 3TF7. Then a new wire is soldered to pin 8 and connected to R1. This routes the 25 VAC coming into the IF chassis via pin 8 to the regulator circuit. Space here is tight, it's going to be easy to scorch or melt wiring insulation during this operation. Manipulate the wires away from pin 8 as much as possible and use small pieces of thin cardboard to shield wiring during the soldering operation. This basically completes the modification. The final thing to do is to short pins 2 and 7 together at the socket for the now removed 3TF7 so the regulated 300 mA DC voltage goes directly to the BFO and PTO oscillator tubes.

continued on page 36

RF Attenuators

The Key To Using Grid-Driven Amplifiers

by Steve Thomason, WB4IJN
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Background

Classical grid-driven amplifiers, such as the Central Electronics 600L, the Hallicrafters HT-33, and the Johnson Thunderbolt, only require about 10 watts of drive in order to produce full output. Drive one of these amplifiers with 100 watts, and the grids of your PA tubes become "crispy critters!"

Although the output of many transmitters and transceivers can be readily adjusted downward in their CW mode, such is not generally the case for SSB operation. Tube-type SSB rigs require loading them close to their rated power output. This loading requirement is necessary in order to achieve the rated dynamic stability and linearity, and in the case of SSB, carrier and unwanted sideband suppression.

Since I own all three of the above-mentioned grid-driven amps, I needed a way to drive them with my 100 watt rigs. My research revealed that the only practicable way to accomplish this task was to use an external swamping attenuator.

Attenuator Design

Both Johnson and Hallicrafters literature give design information for 50-ohms swamping "pads". The basic design is shown in Figure 1. Johnson used fewer physical resistors in the network represented by R2, whereas Hallicrafters used an equal number of resistors in all three parallel networks. I have constructed attenuators using both designs, and I prefer to use between 8 and 14 resistors in each parallel

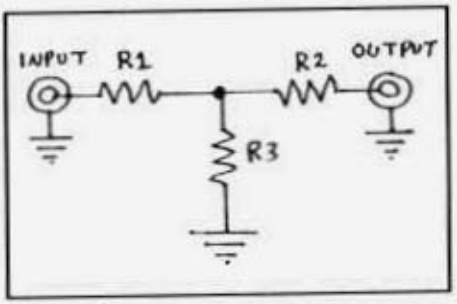

Figure 1

network, depending upon what resistor values are most readily available, and depending upon how much power they must ultimately dissipate. Design parameters are shown in Table 1.

For example, if you have a rig in the 50 watt category, such as the Hammurland HX-50 or Gonset GSB-100, a 6 dB attenuator pad would dissipate approximately 75% of the rig's output, leaving about 12 to 13 watts of drive available to the amplifier. The attenuator would have to dissipate the remainder, so I would use eight 2-watt carbon resistors in each parallel network, for a total of 24 resistors, and 48 watts of rated dissipation. In this example, R1 and R2 would consist of eight 150 ohm, 2-watt carbon resistors, and R3 would consist of eight 560 ohm, 2-watt resistors. Figure 2 gives the equivalent circuit of this example.

If, on the other hand, I were using a rig with 100 watts of output, I would construct a 9 dB attenuator to dissipate approximately 87.5% of the rig's output, again leaving around 12 to 13 watts of driving power for the amp. However, I would now use 14 resistors in each of the networks, for a total of 42 resistors, and a dissipation rating of 84 watts. In this example, I would use fourteen 330 ohm, 2-watt carbon resistors

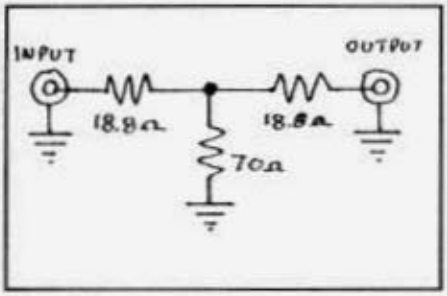

Figure 2

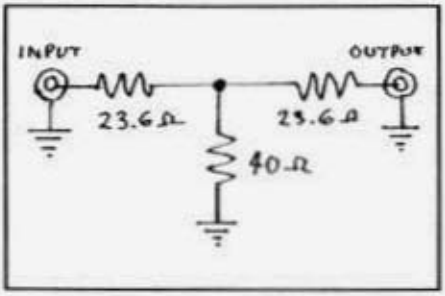

Figure 3

for R1 and R2, and fourteen 560 ohm, 2-watt resistors for R3. The equivalent circuit in this example is shown in Figure 3.

Construction Details

I have constructed my attenuators in Radio Shack aluminum project boxes, catalog no. 270-238. To form the parallel resistor networks, I solder the leads of the resistors to pieces of solid #12 wire, laid out parallel to each other. Once all the resistors are soldered to the #12 wire, forming a "ladder", I then bend the whole assembly into a "horseshoe" configuration. Keep the leads of the resistors as short as possible, so that the network will fit into your enclosure without danger of shorting to its walls.

Use heat sinks while soldering the resistors to prevent overheating them. As a precautionary measure, I use small "stick-on" rubber feet as "stand-offs" within the aluminum enclosure.

Although I have only used non-inductive, old-fashioned carbon resistors in constructing my attenuators, metal film "flame-proofs" would probably work just fine, since it is my understanding that they are essentially non-inductive below 30 MHz. DO NOT, however, attempt to use wire-wounds.

I use a Radio Shack double-pole, double-throw toggle switch, catalog no. 275-652, in order to by-pass the attenuator when tuning the amplifier. Radio Shack's catalog rates that switch at 6 amps at 250 VAC, and it seems to work just fine in switching 100 watts of RF.

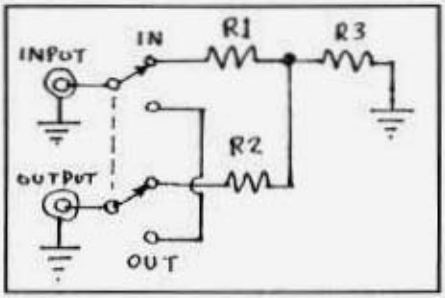

Figure 4

I mount the switch at one end of the box, and the two coax connectors at the other end. A schematic of my units is shown in Figure 4.

Using a drill, I perforate the top and the sides of the enclosure in order to promote cooling of the resistors.

Operation

I have constructed several attenuating pads for use with rigs ranging from a Kenwood TS-50S to a Johnson Ranger. I am currently using one with a Collins S-line to drive a Thunderbolt. I have not noticed any significant RF leakage from the attenuator enclosure, and I have not noticed excessive heating of the resistors. I would not recommend that you apply steady, full carrier excitation except for very brief test periods, for fear of exceeding the dissipation rating of the resistors.

Monitoring my RF output with an oscilloscope does not show any loss of linearity or any distortion. On the air reports are also most favorable.

continued on page 38

The Hallicrafters HT-40

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In November of 1960, Hallicrafters introduced the SX-140 6-band amateur receiver and matching HT-40 6-band crystal-controlled CW/AM 75W transmitter. The receiver and transmitter were priced $109.95 and $99.95 respectively. They were also available in kit form, Halli-kits, with a "K" suffix added to the model number for $94.95 and $79.95 respectively.

My first introduction to these kits was during high school when my boyhood friend, Mike Arevalos, WV6RYC (now KV7Z), built them for his novice station. After using homebrew 6DQ6 transmitters and a BC-454 SCR-274N surplus receiver at home on 80M, I thought the Halli-kit twins were pretty sharp.

I have owned several sets of the Halli-kit twins since my high school days, and have never thought very highly of them. When Monte Allen, KB6NHG, offered me a factory-wired set in very good condition, I decided to give them another chance. I met Monte at the '94 Flagstaff Fort Tuthill Hamfest and their condition was as promised - the nicest set I have seen since high school. This article describes the HT-40 transmitter. A follow-up article will describe the matching SX-140 receiver.

The HT-40 is a 75W CW, 75W peak power AM, crystal controlled, CW/AM transmitter with single-knob bandswitching on 80-6M. The pi-network will accommodate output impedances in the range of 50-75 ohms. The tube line-up consists of a 6CX8 oscillator/buffer, 6DQ5 final, 12AX7 speech amplifier, and a 6DE7 controlled-carrier modulator. On CW, the 6DE7 is used as a +190 V regulator for the crystal oscillator and the 6DQ5's screen. The 6DQ5 operates straight-through on 80-10 M, doubling on 6M. The 6DQ5 is neutralized by a "gimmick" cap - a wire from the 6CX8 buffer's plate circuit to a terminal strip located on top of the chassis adjacent to the 6DQ5's plate.

The pi-network consists of a dual-section broadcast-type 140 uuF PLATE TUNING variable, an 80-19M coil 1-1/2" dia. x 1-3/4"L of 21 turns at 12 TPI, a 6M coil 5/8" dia. x 3/4"L of 4 turns mounted at right angle to the 80-10M coil, and a triple-section broadcast-type 1290 uuF PLATE LOADING variable.

A single-scale 0-5 mA 2" x 3/4" edgewise meter indicates 6DQ5 grid current or RF output. An errata sheet that accompanied the HT-40 Mark I manual indicates that in the RF OUTPUT position, the output power with a 1:1 VSWR into 50Ω is approximately 18 W/division. I don't care for this little meter and I miss the ability to monitor the 6DQ5's plate current with this metering scheme.

There are two additional front-panel indicators. A neon power-on indicator with a red lens cap above the BAND SELECTOR switch and a neon modulation and keying monitor with a clear lens cap above and to the right of the CRYSTAL/VFO switch. In the AM position, the microphone gain adjust on the rear panel is increased until the modulation monitor just starts to flicker on and off indicating about 80% modulation. In the CW position, the neon is always on, dimming as the HT-40 is keyed.

Front view of the Hallicrafters HT-40 6-band transmitter.

The HT-40's power supply uses a full-wave voltage doubler using two silicon diodes. The doubler circuit uses two 40 uF 350V electrolytic capacitors. A fairly "beefy" 5 Hy filter choke and two series connected 40 uF 350V electrolytic output capacitors complete the filter. The two output caps have 56K, 2W resistors across them to equalize the voltage and serve as a bleeder resistor. The power supply delivers 570V @ 115 VAC key-up in the CW position, falling to 416V key-down with the HT-40 loaded to 50 W output. The power transformer's core measures 3-1/8"W x 3-11/16"H x 1-3/6"D, about the same size as the Heath AT-1 (without the extra 15W for the 5U4GB rectifier tube) - not exactly a "husky" supply for the HT-40's 75W input power rating. An LC filter is connected in series with the power transformer's primary and the transformer's primary is NOT fused.

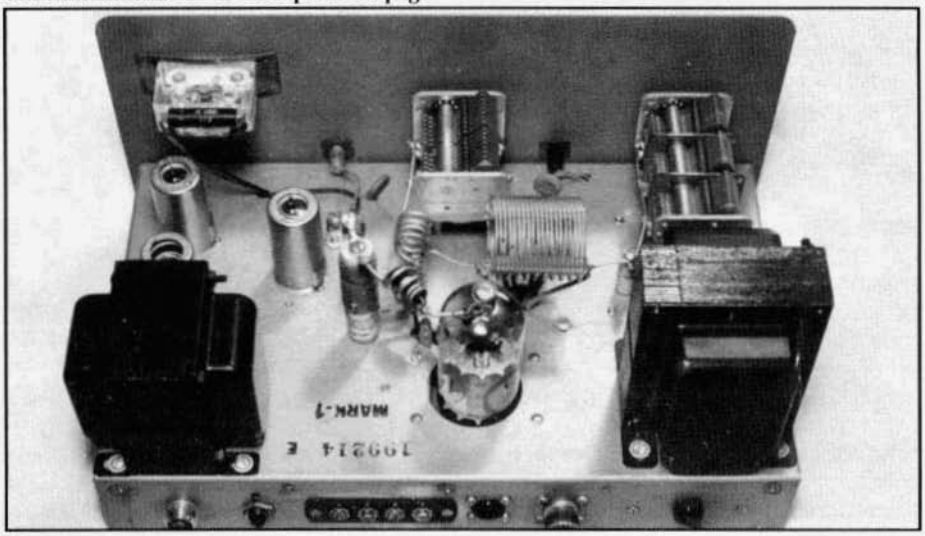
The HT-40 is housed in a 7-3/16"H x 13-3/8"W x 8-1/4"D light-gray wrap-around steel cabinet - the same size as the matching SX-140 receiver. The HT-40's cabinet is ventilated above the 6DQ5 in a 4-1/2" square pattern of 986 0.1" holes. The front panel is dark-gray with light-gray silkscreened lettering. The transmitter weighs about 17 pounds. The 6DQ5's socket is mounted 1-1/4" below the chassis to minimize the height of the HT-40's front panel.

Referencing the under chassis view, the HT-40 appears to have been a relatively easy kit to assemble and wire. In addition to the supplied wiring harness, there are eighteen terminal strips under the chassis to minimize point-to-point wiring burdens. The layout is clean with no "bunching" of components to complicate troubleshooting or repair.

Monte's HT-40 had the original Hallicrafters tubes installed. Based on the date codes on the tubes and several parts under the chassis, this transmitter was probably built in mid '62. I replaced the 6DQ5 with a NOS GE for a little bit more power but the others were OK. The front panel was rubbed out with several coats of Meguiar's Car Cleaner/Wax and the meter face was cleaned up with Novus #2 Plastic Polish. The chassis had no corrosion and cleaned up very nicely. I left the transformer's endbells a little rusty but painted both the transformer's and choke's laminations.

continued next page

The Hallicrafters HT-40 from previous page



Rear View of the HT-40. The 6DQ5's socket is mounted 1-1/4" below the chassis to minimize the height of the front panel.

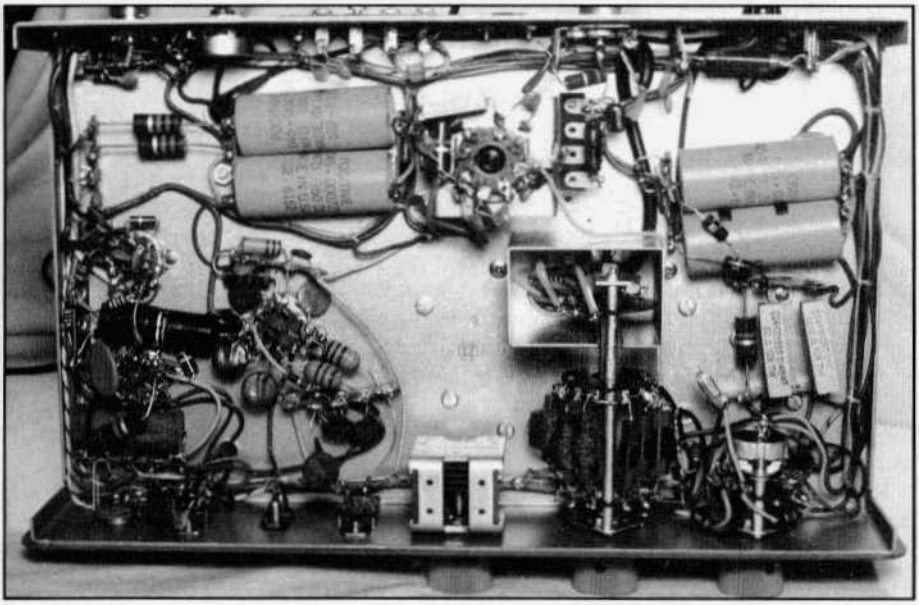
The cabinet had been repainted but it had been nicely done. Since a previous owner had added a remote power connector to the rear apron (which I removed), I replaced the Amphenol 75-PC1M mic connector with a standard 4-pin mic connector w/Radio Shack P/N 274-002. The original 3/8" hole must be increased to 5/8" for the 4-pin connector. There is just enough clearance between the new 4-pin mic connector and the microphone gain control.

The HT-40 is designed for the crystal oscillator to run continuously in the CW mode. To accomplish this, pins 3 and 4 of the accessory terminal strip on the rear apron must be connected together. With the oscillator running, the HT-40's keyed waveform has extremely steep rise and decay times. I had Dave Mills, AJ7O, check my CW signal for key clicks. He said that there was " a slight amount of click audible but not enough to keep the rig off the air". I used a simple external LC filter to slow the edges down and that should take care of any key clicks.

The HT-40's output power in CW measured 58W on my Kenwood AT-230 into a 50Ω dummy load. The measured 6DQ5 cathode current was 200 mA at a key-down plate voltage of 428 V for a calculated input power of 86W. The 6DQ5's plate showed no color after long periods of key down when the transmitter was properly tuned. An off-resonance condition, however, shows color very quickly.

The AM performance of the HT-40 is very similar to that of the Heath DX-35 or DX-40. One important difference is the addition of a microphone gain control located on the rear apron. Using my Kenwood SM-220 monitor scope, I adjusted the HT-40's mic gain just below 100% modulation. This adjustment was a bit more audio gain than was indicated by the front panel neon "just starting to flicker". The unmodulated output power was about 5W. Dave Mills, AJ7O, Terry, AA6TN, and Chuck, KC6ARU, gave me good audio reports using an amplified-base D-104 mic so I left the speech amp "stock".

I did not have a manual for any of the Halli-kit twins I have owned, and this set was no exception. I called Robert Fowle, a Hammarlund "specialist" who advertises in *ER*, and he sent me two NOS



Under chassis view of the HT-40

operating and kit assembly manuals. Without manuals, it is possible to jump to the wrong conclusion about the HT-40's CW performance, which is exactly what I have done for many years! Without manuals, it's not intuitively obvious that pins 3 and 4 of the accessory terminal strip on the rear apron need to be connected together. The owner's manual doesn't say anything about the crystal oscillator running all the time in the CW mode and the discussion about pins 3 and 4 doesn't include the oscillator. So what happens if pins 3 and 4 are **NOT** connected and an crystal is installed and the HT-40 keyed? It works like a charm. The keying characteristics are a bit "chirpy" and the tune-up procedure is a bit "finicky", but full power output can be achieved with minimal chirp. The problem is that the triode section of the 6CX8, the crystal oscillator, is non-operational if pins 3 and 4 are open - its cathode is open. It's the 6CX8 buffer section that is operating as the crystal oscillator and that's exactly how I used my first two HT-40's!! Every one of my FT-243 crystals will work in the HT-40 in this (illegal) configuration. What a revelation!! I wonder if any of the ER readers have used an HT-40 without shorting pins 3 and 4 on the accessory terminal strip? If so, drop me a note.

So, how do I like the Hallicrafters HT-40 now? I still don't care for the smallish edgewise meter, but tune-up IS pretty quick. The HT-40 puts out an honest 50 W on the lower bands in a package that is smaller than Heath's DX-20 and AT-1 - both CW only transmitters. I like the front panel mounted crystal socket and the clean design, both electrically and mechanically. I like it!

Send me a #10 envelope w/SASE and I will send you the schematic of the HT-40 and above and under chassis views. **ER**

Selected References:

1. "Recent Equipment - HT-40 Transmitter and HT-40 K Kit", QST, Dec. '61, pgs. 56-58.
2. "Recent Equipment - SX-140 K Receiver", QST, Dec. '61, pgs. 58-60.
3. "The Hallicrafters Story, 1933-1975", Max De Henseler, HB9RS, Antique Radio Club of America, Inc. 1991, pgs. 198-200.

Armed Forces Day Celebration by Westcoast Group

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San Ramon, CA 94583

Well, better late than never! Enclosed are some photos from our observance of Armed Forces Day '94. I apologize for sending them late. . maybe mid-winter is a good time to think of warm-weather pursuits.

We set up on the Treasure Island Naval Station in the middle of San Francisco Bay and operated on Saturday, 21 May. I am in the Naval Reserve and I arranged with the base for permission to operate there.

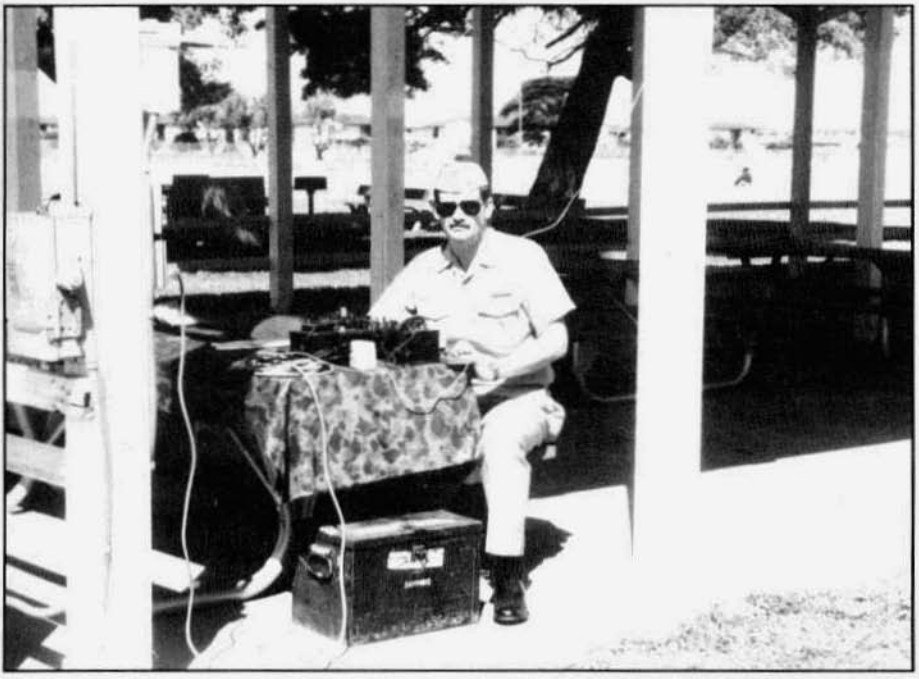
The crew consisted of many of the members of the "West Coast Military Radio Collectors Group" which is presided over by Tom, WA6OPE. The others were Alex, KB6IDO, Paul, N6FEG, Roger, N6TNF and myself. We planned the expedition on our 80 meter AM net.

We operated the following equipment: GRC-109 on 40 CW, PRC-47 on 80 CW and SSB, GRC-9, BC-1306 and BC-611's on 80 AM and "stereo" ART-13's with the BC-348/R-390 on 20 AM. One of the highlights of the day was Tom working the USS Pampanito, a WW II fleet submarine on 3905 KC AM. They were operating their TBL from the subs' berth at the San Francisco marina district. Paul, N6FEG operated the "Wingless B-29", our high-power station. Paul installed the ART-13's, BC-348 and R-390 in the radio operators position of his pickup truck which towed a 5 KW generator. Mounted on the trailer was his crank up 20 meter yagi to complete the effect. The transmitters were powered by dynamotors, of course!

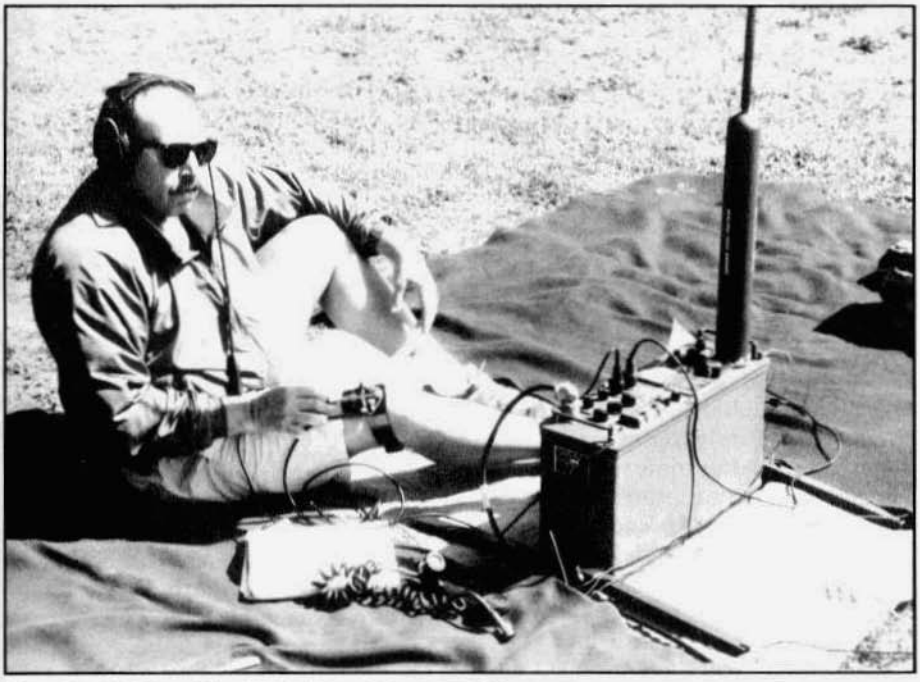
We are planning to operate this Armed Forces Day again, either at Treasure Island or possibly from one of the Coastal Defense sites overlooking the Golden Gate. We have a pretty active group out here and plan to include additional PRC-47's (LSB), BC-654's, TCS's and some PRC-6/PRC-10/RT-68 systems on 6 meters this year. We will let you know of the frequencies/times for the next one.

We are also planning a "Battalion Comms Center" at the 27-30 April '95 Military Vehicle Collectors Club annual campout near Modesto, CA as we did last year. We will be operating much of the above equipment on 3905 AM and 7120 CW from 1500-2300 local with liaison on 145.33 (-) and 146.52 FM. Stay Tuned! ER

The "Wingless B-29", from left to right: Tim, N6CC; Roger, N6TNF; Paul, N6FEG; Tom, WA6OPE and Alex, KD6IDO.



Tim, N6CC, operating a GRC-109 on 40 meter CW.



Alex, KB6IDO, with a PRC-47 on 80 meter CW.

Updating that R-390A from page 27

A staple shaped jumper of #16 wire can be stuffed into the correct holes in the 3TF7 socket. Correct operation of the current regulator can be verified at any time by removing the jumper in the 3TF7 socket and instead inserting a DC milliampmeter. Current should be 300 mA, + or - 5% or less.

And, While You're In There. . . .

The noise limiter in the R-390A works real well. Not only does it effectively limit noise but it creates severe audio distortion when turned on even at the lowest setting. There is a quick modification that can be performed while the IF chassis is removed to fix this problem. Locate R527 - it is a 27K, 1/2 watt resistor soldered to a terminal board inside the IF chassis (TB5OZ). Unsolder one end of this resistor and butt-solder a 33K in series with it to make a total revised value of around 60K. Solder the free end of the added resistor to the lug that one end of R527 was attached to. That's it. What you'll end up with is a limiter that works effectively when turned on at the lowest setting that doesn't noticeably degrade the sound of an AM signal. Increasing the limiter control will now offer a smooth increase in noise limiting action with the midpoint setting now being the maximum you'd want to use.

Putting It Together. . . .

To re-install the IF chassis, simply drop it in place, reconnect the connectors and loosely start the three green screws. Attach and correctly index the selectivity and BFO knobs ensuring they're not rubbing against the front panel. Now firmly tighten the three green screws. After some warmup, you can correctly "tweak" the BFO setting: Tune in a strong AM broadcast station with the selectivity at .1 kc. Zero the receiver on the station's carrier by carefully tuning for max on the carrier meter - this ensures the carrier being on exactly 455 kc. Switch on the BFO and adjust the shaft coupling or knob so that zero beat occurs at the zero position of the knobs.

These two modifications are easy to perform and enhance the reliability and utility of a great receiver. The total cost of parts is less than the cost of single Amperite current regulator and only minutes are required to restore the chassis to "factory stock" form, if desired. Given that the new regulator ought to last the life of the receiver one would have to ask why? Enjoy! **ER**

Parts List:

R1 - 10 ohm, 2 to 3 watt
R2 - 4.3 ohm, 2 to 3 watt film type, "flameproof" or wirewound
C1 - 1000 uF, 50 volt high quality electrolytic, suggested types are:
Panasonic FA Series, 105°C
Digi-Key P/N P5656A-ND
Xicon 105° Series, Mouser P/N 140-HTRL 50v1000
C2 - .1 uF, 100 volt film or ceramic
U1 - LM 117/217/317 regulator I.C. See text for details.
D1 - 3 amp, 400 volt rectifier
Misc-5 terminal strip, transistor mounting kit & insulator, solderlugs

References:

Mouser Electronics
240 Hwy. 287 N
Mansfield, TX 76063-4827
(800) 346-6873
Digi-Key
P.O. Box 677
Thief River Falls, MN 56701-0677
(800) 344-4539

AMI February Update from page 3

Dayton Hamvention - AM Forum

Hamvention personnel have contacted AMI Headquarters and asked us to deliver another AM Forum. They have tentatively committed to a larger room (again). More on this 'end of April radio phenomenon in subsequent issues. **Dale, KW1I**

Japanese Receiver Restoration from page 11

tap on the resistor strip. Neat...except it took several days to figure that out due to the extensive corrosion damage (the pot and windings are all open to air etc.). The replacement resistor strip was made by putting some Super Glue on a strip of paper (0.25" wide and about 3" long) and then mixing in lots of graphite powder (normally used to lubricate locks) and the black slurry was then spread along the strip. After drying, the end-to-end resistance was near 500 K. Using a number 2 pencil, additional graphite was applied until the resistance got down to near 100 K ohms. A strip of resistive plastic would have been better but could not be found at the time.

Reassembly of the entire radio proceeded much like a typical Heathkit of old except there was only the schematic and lots of photographs of the "before" to guide the wiring. The original wiring was done with solid or stranded wire inside of black sleeving (spaghetti) that was then painted with varnish. Modern black sleeving was obtained from AES and used with 20 gauge solid wire for the new wiring. The sleeving was not varnished in the reconstruction.

My wife, Janet, took care of the fine details of repainting the numbers, dial graduations, and Japanese engraved lettering on the front panel components using white Acrylic paint and later a lacquer stick purchased from AES.

The 95-4 receiver and transmitter have been used on 80 and 160 meter CW in recent months. A detailed description of the operation of the set will follow soon.

Thanks go to William Howard for providing helpful information on the 95-4 set. **ER**

Simplex Shortwave Radio from page 15

densers are made by Hammarlund and are universally admired for their classical design and beauty. An RF choke wound with green, silk-covered wire on a white ceramic form, red and black nylon tip jacks and the ON-OFF switch with its red plastic housing all lend an air of quality and distinction. Even the audio transformer is pleasing to look at with its outer metal shield painted red and supported by bright nickel brackets. Easy to use Eby black bakelite binding posts are used instead of the cheaper Fahnestock clips.

More important, the front panel had to be attractive and inviting. Instead of the more common aluminum, I chose polished black bakelite held in place by brass hardware. The National BM bandspread dial suggests accuracy and precision as does the calibrated logging scale of the band-set dial. As a final touch of elegance, the panel displays a simple but attractive logo bearing the Simplex name. Even the cheapest ready-made set is given a distinctive name so its owner can proudly exclaim - "I have a Hashiscratcher Sky Sweeper!" I too am having fun telling everyone about my 1-tube Simplex Short Wave Radio! **ER**

I CAN HEAR MORSE CODE !

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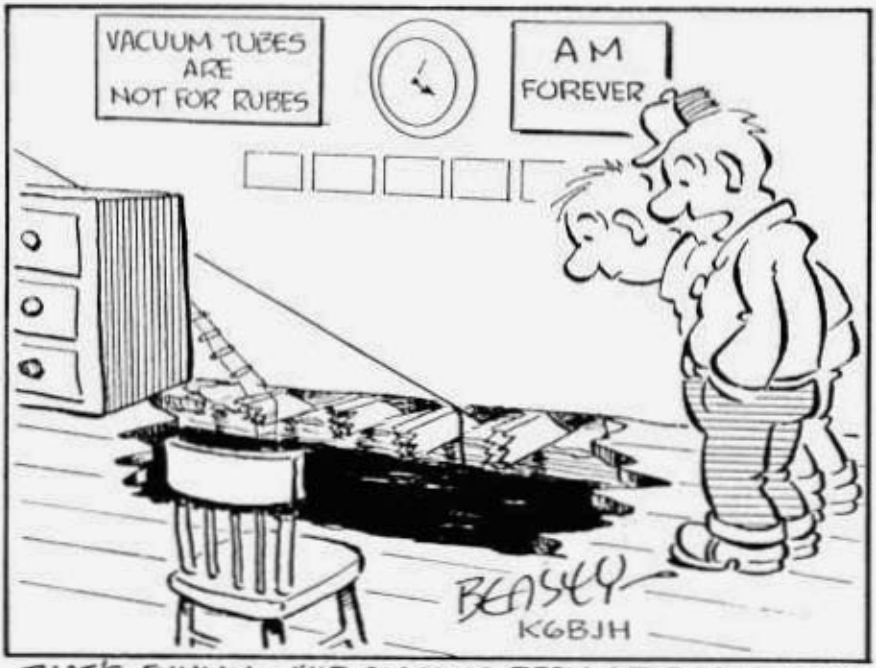
RF Attenuators from page 29

Attenuation	R1-Ohms	R2-Ohms	R3-Ohms	Power Loss
2 dB	6	6	215	36%
3 dB	9	9	142	50%
5 dB	14	14	82	66%
6 dB	17	17	68	75%
7 dB	19	19	56	80%
9 dB	24	24	41	87.5%

Table 1

Conclusion

Using home-brew attenuator swamping pads can make practicable the use of vintage grid-driven amplifiers with "modern" SSB rigs. Although such amplifiers usually run only about 600 watts output, they are generally built like the proverbial "tank", and will provide many years of faithful service. Considering that running the full legal limit would barely make a noticeable signal difference in comparison to the 600 watts available from these vintage amplifiers, and considering the price tags of some of the new linears available today, why not put one of those old "workhorses" back on the air? ER



THAT'S FUNNY—I'VE ALWAYS BEEN ABLE TO STACK AS MUCH GEAR AS I WANTED ON MY OPERATING DESK--- OF COURSE, MY GEAR IS ALL SOLID STATE

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DEADLINE FOR THE MARCH ISSUE: MARCH 3

FOR SALE: Repair and restoration on all vintage equipment; 35 years experience. Barney Wooters,W5KSO, 8303 E. Mansfield Ave., Denver, CO 80237. (303) 770-5314

FOR SALE: Hallicrafters SX-110, exceptionally nice condx - $125. Kurt Keller, CT, (203) 431-9740.

FOR SALE: HQ-170AC, has working 24 hour clock and orig. manual - $200; Hammarlund S-100 spkr (absolutely mint) - $75; Drake 2A & 2AQ, w/manual - $150. 1 package, you ship. Al, KØAL, 328 Norman Dr., Cedar Rapids, IA 52402. (319) 377-4367

FOR SALE or TRADE: KWS-1; 75A-4; 75A-2A; 75A-1; SX-101 MK III; SX-71; SX-62A; HRO-50T, w/10 coils, calib, NBFM, spkr; NC-300; Invader 2000; Viking II; BC-610. **WANTED:** KW-1; Desk KW; T-368; HT-20; SX-88. Joel Thurtell, 11803 Priscilla, Plymouth, MI 48170. (313) 453-8303

FOR SALE: Swan 350, sply - $175; Swan Cygnet 270 - $125; TR4C, AC4, MS4 - $275. Richard Lucchesi, WA2RQY, 941 N. Park Ave., N. Massapequa, NY 11758. (516) 798-1230

FOR SALE: Hammarlund HX-50 SSB/AM/CW xmtr. Several bad xtals, otherwise looks/works great, w/manual - $80. Steve Johnston, 3350 Oakham Dr. York, PA 17402. (717) 755-3920

FOR SALE: Collins 75S-3, mint - $350; Swan - 700 CX, SS-16, VG - $350; 500C, VG - $250; VX-1, VX-2, FP-1, 14C. KO6IJ, (714) 643-7930

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 22075. (703) 822-5643

FOR SALE: Heath GP-11 vibrator pwr sply for Sixer, Twoer. Send LSASE for list of hundreds of manuals and schematics. David Crowell, KA1EDP, 40 Briarwood Rd., North Scituate, RI 02857-2805.

FOR SALE: Heath HW-99 unbuilt kit, complete - $350; Heath HW-8, w/ps & manuals - $125. Donzil Worthington, WSØF, 9842 Juniper Cir., Prescott Valley, AZ 86314. (602) 772-1297

FOR SALE: 28VDC @ 25A ps - $75; MN-26Y radio compass - $125; R-390 pwr cables - $30; 19x8-3/4x15-1/2 cabinets - $20; BC-348P - $75; HRO dial - $40. Bob Bakinowski, 1524 Saint Tropaz, Tucson, AZ 85713. (602) 624-8029

FOR SALE: Navy aircraft rcvr model CBY-46104, 1.5-3 MHz, w/built-in AC pwr sply - $30 plus shpg, 8 lbs. Bill, OR, (503) 345-2169

FOR SALE: Stancor PC830A plate xfmr, 1500VCT, 265 mA - $35; Heath VTVM meter movement - $10; 4E27 tubes - $20 ea. Shpg included. Neil Berg, WØMXX, MN, (612) 763-4857

FOR SALE: Collins PTO w/sliderule dial; Gates Solidstatesman AGC - $100; Shure mic mixer M68 - $50; Electrovoice 630 - $100. Steve, KA9QLF, IL, (217) 243-3920.

WANTED: Johnson Valiant II mod xfmr or entire dead/dying xmtr. John Russo, KF2JQ, 8582 Greenway Ct., E-Amherst, NY 14051. (716) 741-3177

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: Globe King 500 modulator deck and Globe King 400 RF deck. Jim Roseman, W9UD, 2716 W. 3rd St., Coal Valley, IL 61240. (309) 799-7447

WANTED: Old QSL cards; Drake ham radio equipment; General Radio publications; tube books/manuals; early callbooks. Joe Holstein, N8EA, 1515 Sashabaw, Ortonville, MI 48462.

WANTED: Expertise, diagrams, info on converting TCS-12 xmtr for USS Requin restoration project. Brian Roberts, K9VKY, 3068 Evergreen Rd., Pittsburgh, PA 15237. (412) 931-4646

WANTED: SC-101; SC-301; KW-1; 30K-1 thru 5; 302C1; 75A thru 75A-4 rcvrs and spkrs, any condx. Purchase entire estates, pick up 48 states and top $ paid. Rick, (800) 462-2972

WANTED: Old Hallicrafters spkr such as the one pictured on the cover of last month's ER (Jan.); Hallicrafters HT-37 parts (filter choke, etc.); Heath RX-1 Mohawk orig. manual; knob for old (1940's) Hammarlund Super Pro. Lee Shumway, WB8ZEY, 2820 Yankee Springs Rd., Middleville, MI 49333. (616) 795-3255

WANTED: NAVSHIPS 0 967-LP-427-4010 or any other manual for R-1051B rcvr. Geoff Fors, WB6NVH, POB 342, Monterey, CA 93942. (408) 373-7636

WANTED: J. Miller Co. broadcast band AM tuner 565, 585, 595; ant. coil 241A, 242A; coupling coil EL55, EL56. Al Kaiser, 713 Marlowe Rd., Cherry Hill, NJ 08003-1551. (609) 424-5387

WANTED: Air variable cap, E.F. Johnson Part # 250-D-70 or equiv. 250 pF w/.175 spacing 4" wide x 10" long. Steve Dewey, N8JRJ, 1581 Force Rd., Attica, MI 48412. (810) 664-0624

WANTED: Lightning arresters, ceramic or others with 2 terminals (radio/ground) or 3 terminals. Bob Puttre, 637 Stratford Rd., Baldwin, NY 11510. (516) 223-9667

WANTED: Still looking for Sky Buddy S-19 and National SW-4. Will pay accordingly. Robert Enemark, W1EC, POB 1607, Duxbury, MA 02331. (617) 934-5043

WANTED: Any model/shape Cosmophone and info for registry; B&W coils #2175 thru #2179; Johnson 500 ps/mod. Brian Harris, WA5UEK, 3521 Teakwood Ln., Plano, TX 75075. (214) 596-2914

WANTED: Collecting pre-1950 commercially built amateur gear; xmtrs, rcvrs, accessories. Dean Showalter, WA6PJR, 7816 Redberry St., NW, Albuquerque, NM 87120. (505) 899-9376

WANTED: Eldico SSB-1000 amplifier; S-line spkr 312B-3. Jim, (310) 430-5164

WANTED: Original manuals for a Hammarlund HQ-129X and a Viking Challenger. Charles Stinger, 404 Ross Ave., Hamilton, OH 45013. (513) 867-0079

WANTED: Manual for 51J4; GRC-86 w/antenna coupler; R-1051C, D, E, F, G, H version; RT-618B/AM3007; ARC-133/AT-440 1 KW amp; also looking for the following units, must be in good or exc. condx - ant. coupler for GSL-1900A/1 KW; Harris RF amp HFL-1000/W.P.S.; KWM-380 w/manual; URG-1; KWS-1; RF-131, any condx; SP-600JX; RT-834 and any HF SSB exciter with 100 mW output. Mitsugu Shigaki, JA6IBX, 2825-2 Jozan Kamidai Machi. Kumamoto. 860 Japan. FAX Japan-096-329-4601.

WANTED: RME DB-20 preselector in nice condx; Jewell or GR#127 RF ammeter (hot wire or thcple); any Jewell surface mount meter. Mack, KC5AQO, POB 149, Lewisville, AR 71845. (501) 921-5874

WANTED: WW II Japanese xmtrs and rcvrs (and parts) for restoration to operating condx and ER articles (restored 94-5 RX now on the air!); manual or info on TS557; manual for GF-11/12 and TBX-8. Ken Lakin, KD6B, 701 SE Salmon Ave., Redmond, OR 97756. (503) 923-1013, e-mail, Klakin@aol.com

WANTED: Bench freq. counter, a DG-5 or whatever; schematic for Heath IG-102 sig. gen. Tnx. John, K6UU, Box 687, Ashland, OR 97520. (503) 488-1506

WANTED: L-75 amp; 4NB noise blanker; Collins 516F-2 and 7553 filters. Stu, K2OA, (914) 691-7957

WANTED: Millen 90800 exciter, complete or parts unit; need coils and ceramic coil plugs for 90800; RF thermocouple ammeters 1.5 & 2.5A; external thermocouple. Richard Cohen, 11802 Willow Point Way, Tampa, FL 33624. (813) 962-2460

WANTED: Pwr xfmr for SX-28A; main tuning knob for KWM-1. J. Dennis Bohroten, 2472 X Ave., Grimes, IA 50111.

FOR SALE: 75S1, 32S1, 516F2 - $450; 51J4; 75A-2A; HQ-180A; NC-98SW; NC-125; SX-28 rack; HRO-M; NC-300. Prefer PU or buyer pays pkg & shpg. **WANTED:** Early National items - SW4, SW5, any coils, etc. Larry Tinkler, Cerritos, CA, (310) 860-3131 eves & wknds.

FOR SALE: Receiving tubes, new and used; multi-section twistlock electrolytic caps to 500-VDC; SAMS photofacts. Send stamp for lists. Turner Electronics, 16701 Main St., Ste. 121, Hesperia, CA 92345.

FOR SALE: Multi-Elmac AF-68A, exc. w/pwr sply - $175; Eico 723 CW xmtr kit, new, never assembled - $75; Heath DX-60B - $75; Swan TV2, unused - $100; Swan 250 - $90; National NC-300 - $170; NC-183D - $175; Gonset 2M amp, pr of 826 tubes, mfg in '50's - $80; Johnson Invader 2000 - $600; NCL-2000 - $450; HQ-129X, cabinet only, unused - $60, DX-100B cabinet, unused - $65; Magnum 6 processor for Collins - $75; Clegg 22'er - $90. Orig. manuals for most of above. Plus shpg. Bill Smitherman, KD4AF, Rt 4, Box 79, East Bend, NC 27018. (910) 699-8699 after 5 PM.

FOR SALE: Crystal radio kits, complete with face panel, base board, variable capacitor, prewound coil and many parts for old style radio. Remit $22.50. Carl & Grace Ent., 5636 Romeyn, Detroit, MI 48209.

FOR SALE: Radio tubes; repair and restoration of all vintage amateur and commercial radios, 25 years experience. Herbert Stark, 321 N. Thompson St., Hemet, CA 92543. (909) 658-3444.

FOR SALE: KWM-2 fan bracket lowers internal temp 20 deg.C using two 60MM micro-boxer fans. Drop-in, no mech. mods - $15; replica Ocean Hopper front panels - $20; 516F-2 mod-kit (ER #62) - $13. All $ ppd. DWI Engineering, POB 3611, Costa Mesa, CA 92628-3611.

FOR SALE: Vibroplex Lightning Bugs, Champions, Originals, Presentations - $60-$90; rare Deluxe Blue Racer - $225. Randy Cole, KN6W, 1216 Alvira St., Los Angeles, CA 90035. (213) 939-9847.

FOR SALE: Hallicrafters S-36A AM/FM UHF rcvr, 28-143Mc; SX-71; SX-101; SX-101A; Gonset G-50 6M Communicator; Cushcraft R-7 vertical. Jon, OH, (513) 831-3195.

FOR SALE: Kenwood Twins R599/T599 - $300 + shpg; Kenwood R-599 - $125. Gordon, AA7FC, WY, (307) 684-5496.

FOR SALE: BC-348R, works good, wiring changed to 6V - $40. Bud, ID, (208) 466-2803 after 8PM MST.

FOR SALE: Drake AC-4 - $95; Yaesu FL-2100B, w/10M - $425; Hallicrafters S-38s w/manual & shpd USA - $85; many older rcvrs, xmtrs, ARRL Handbooks, parts. LSASE for list. WA7IHN, POB 442, Aumsville, OR 97325. (503) 749-1149.

FOR SALE: NOS pwr xfmrs, will work in NC-173, NC-183D, HRO-60, SX-99 and others - $30 ppd. Charlie Svoboda, 1501 West 'S', Lincoln, NE 68528. (402) 474-4272.

FOR SALE: ART-13 parts & other interesting stuff. SASE for "The Bone Yard List." el Kay electronics, 231 Shenandoah Trail, Warner Robins, GA 31088-6289.

FOR SALE: 6JH8s (replaces 7360), modification included, 5763s, NIB - $6 each ppd; Heath AR-3s - $35 each. **WANTED:** Chassis punches. Jack, KL7GKY, OR, (503) 863-7804.

FOR SALE: Homemade galena crystal radios, detectors and galena crystals. $1 regular, $2 super. Radio parts. What do you need? L. Gardner, 458 Two Mile Creek Rd., Tanawanda, NY 14150.

FOR SALE: Johnson Adventurer - $75; Johnson Viking II - $75; Johnson Ranger - $150. All working. All plus shpg. Evan Haydon, 4308 N. 15, Lincoln, NE 68521. (402) 435-4083.

FOR SALE: KWM-380, all Collins, loaded, fan, all filters - $3750; Henry 3K Classic X MK II, export, heavy duty ps, orig. owner, exc. - $2250 plus crating; KWM-2A, round, like new, collector - $2500; 30L-1, round, collector - $1975; Drake TR4CW, exc. plus, MS-4 ps, mic - $575; SB-110 6M xcvr, HP23 ps, good, clean - $375; SBE Sidebander 6, AM/SSB, mobile, good - $250; surplus KWM-2A, good, clean - $575; Heath SB-200, very good, retubed - $395; RF sig. gen. URM-25F, good, lab calibration - $250; audio generator AN-URM 127, solid state, very good, lab calibration - $125; AN/USM-413 multimeter, exc., lab calibration - $150; RF sig. gen. Leader LSG-11, like new - $30; Clegg 99'er, good, mic and xtals - $85. All reconditioned, plus shpg, 10 day MB guarantee. Cory, N2AQS/AFA4TZ, 1000 E. 14th St., Bldg. 178, Plano, TX 75074-6249. (214) 751-7535 (24 hrs.)

FOR SALE: ARC-5 accessories - C-38 - $20, BC-473-B - $10, NIB BC-450 - $10, connectors - $8 each; Harvey-Wells XN-30 rack-mounted rcvr - $25. U-ship. James Owens, NW0O, 1363 Tipperary St., Boulder, CO 80303-1621. (303) 673-9019.

FOR SALE: Drake "C" twins, supply, spkr, prefilter kit - $450; Milen Variarm - $50; Stancor 10P - $50. **WANTED:** Tentec Century 21 or 22. Berk, W0REP, 402 Kingridge, Ballwin, MO 63011. (314) 394-0441.

FOR SALE: Drake T-4XC, exc. - $165, R-4C - $185, xtals - $8 each, PS-75 (NIB) TR-5 sply - $120; Collins 30L-1 (R), VGC - $525; parting out R-4B. Plus UPS. Bill, WA1APX, MI, PH/FAX (810) 781-9717

FOR SALE: Vintage parts. Send stamp and request "Vintage Flyer". USA only. 40 years of mail order electronics. Bigelow Electronics, P.O. Box 125, Bluffton, OH 45817.

FOR SALE: Rare SCR-506-A set, complete, 1944, BC-653 xmtr, BC-652 rcvr, FT-253 mount, dynamotors, etc. - $1300; new 54 page catalog of other WW II sets - $2 US, $5 foreign. "The Signal Corps", Sam Hevener, W8KBF, 3583 Everett Rd., Richfield, OH 44286-9723. (216) 659-3244

FOR SALE: Heath HO-13 pan adapter - $70. **WANTED:** Drake DSR-2 rcvr. Frank Scutch, WB4AYJ, 11780 NW 24th St., Plantation, FL 33323. (305) 472-9474

FOR SALE: Tubes, hundreds NIB, cheap. SASE or E-mail garywa7rgq@AOL.com for list. Gary Stigall, WA7RGQ, 3619 Pershing Ave., San Diego, CA 92104. (619) 294-7895

FOR SALE: S-line - $1100; Conset Twins - $295; BC-375 TUs (NIB) - $50; NC-300 - $275; SX-100 - $249; Riders manuals. Jim, MO, (816) 524-1541

FOR SALE: Modulation xfmrs 1.45 to 1 ratio, 220 mA DC, 50 watts - $25 each; Collins TCS-12 xmtr/rcvr, matching serial numbers, w/connectors - $200. U-ship. James Owens, NW0O, 1363 Tipperary St., Boulder, CO 80303-1621

FOR SALE: Heath DX-60B w/HG-10 VFO in exc. condx - $150; HF/KWM-380 compatible keypads - $75; Collins S-line and KWM-2/2A instruction books - call for pricing and availability; I have 5 new and orig. 32S-3A instruction books - $40 each. Plus shpg. Jerry Brouwer, AB8U, OH, (513) 429-5457

FOR SALE: Repair! Radio repair, tube or solid state, reasonable rates. Jim Rupe, AB7DR, Western Amateur Radio Repair Co., (WARRC), POB 697, North Cove, WA 98547. (360) 267-4011

FOR SALE: Boonton Q-meter 170A, orig. manual - $65; GR1417A audio osc. - $25. Norm Roscoe, W1CIX, POB 402, West Bridgewater, MA 02379. (508) 583-8349

FOR SALE: Collins 651-S1 HF rcvr, physical & electrical condx very good - $800. Gary Gleicher, Box 427, Little Neck, NY 11363. (718) 423-1911 eves.

FOR SALE: KWM-2 w/Waters; 75A-3; Drake TR4CW/RIT; Swan 350; RCA RC; 300W Johnson Matchbox; National military Doghouse ps. Joel, WB2BMH, NY, (516) 757-7641

FOR SALE or TRADE: Ameco TX62 w/matching VFO 621, GC - $75 or trade for Johnson Matchbox. John, WB9OVV, IL (708) 964-3020

FOR SALE: National MB40L multiband tank coil assembly, NIB - $40. **WANTED:** Heath SB-301 and Hallicrafters HT-40 parts units. Dave, W1DWZ, MA, (508) 378-3619

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WANTED: BC110, BC121, BC120, BD43 dynamotor, BC126, BC123, BC116. All part of SCR-135. James Treherne, 11909 Chapel Rd., Clifton, VA 22024. (703) 830-6272

WANTED: Very early Hallicrafters and Hallicrafters/Silver Marshall equipment including Skyriders with entire front panel dull aluminum color, S-30 radio compass, S-33 Skytrainer, S-35 panadaptor, wood console speakers - R-8 & R-12, HT-2, HT-3, BC-939 antenna tuner, parts, advertising signs, paper memorabilia of Hallicrafters. Also want RCA model AVR-11 airport tower receiver. Chuck Dachis, WD5EOG, "The Hallicrafters Collector", 4500 Russell Dr., Austin, TX 78745. (512) 443-5027

WANTED: Collins, Signal One, Squires-Sanders. Collins 651S or 1B (should be w/LED display); Signal One CX-7; Squires-Sanders SS1B. Taka, (415) 697-6719

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

WANTED: Johnson gear, all models, any condition. Also parts and literature. Please state condition and shipped price. Wen Turner, AD7Z, Box 451ER, Cal-Nev-Ari, NV 89039.

WANTED: All items in WW II B-26 radio compartment, BC-461 antenna control box, clock lamps, oxygen, chair, etc. Greg Greenwood, WB6FZH, Box 1325, Weaverville, CA 96093. Msg (707) 523-9122

WANTED: Military BC-312, BC-342 rcvr, working,prefer BC-342, will purchase either. Karl Kegley, Sr., 211 Boyd St., Johnson City, TN 37604. (615) 926-0456

WANTED: QST's. All issues before 1930. Feb., July 1951; July 1952; Sept. 1956; Feb. 1958, Jan. thru May 1960; Aug., Dec., 1961. Howard Weinstein, 15 Lakeside Dr., Malton, NJ 08053. (609) 596-3304

WANTED: Lafayette Dynacom, 5-channel CB walkie-talkie in good order. Will pay reasonable price; also clean Gonset G-66B w/pwr sply. Maybe there is one in your attic. Mary, NY, (718) 471-6140

WANTED: Kenwood T-599 xmtr w/all connections for my R-599 rcvr. P. Vaughn, 2317 Williamson Rd., Williamson, GA 30292.

WANTED: Restoration parts - Jefferson Travis 350A cabinet; BC-222 T-24 mic, HS-22 headset, other accessories; Wireless #19 MK II remote box and cable; Abbott - rear cover for DK-3, clean front panel for TR-4, any accessories for TBX-8, key and bag for TBY. Don Merz, 47 Hazel Dr., Pittsburgh, PA 15228. (412) 234-8819

WANTED: CQ magazine issues May, 1945; Sept. 1945 and Feb. 1946. Editors and Engineers Radio Handbook 13th or 14th Edition. (800) 225-0256 ext. 14733.

WANTED: Eico 720 xmtr; Electrovoice 664 mic. Dave Edwards, 611 Burtis St., Brick, NJ 08723. (908) 920-9611

WANTED: Western Electric radios 20A, 20B, 9A, 9B, 27A control, 8B xmtr; wind generators; RCA sets AR594, AR1496, AR60. James Treherne, 11909 Chapel Rd., Clifton, VA 22024. (703) 830-6272

WANTED: SLR-12-B Navy E.H. Scott mfg and SLR-M marine E.H. Scott mfg rcvrs. Prefer working, not working OK if complete. Karl Kegley, Sr., 211 Boyd St., Johnson City, TN 37604. (615) 926-0456

FOR SALE: Sprague TVL series multi-section can capacitors, over 300 NOSB - $325 shpd; 2M Motorola amps, 60W, 12VDC, SS - $75 shpd; 10 and 6M 100W amp modules, SS, 12VDC - $40 shpd; Tektonix 7603, 7A22, 3 ea. 7A26, 7B53 - all $975 shpd. Trades on military equip. Dennis, Box 95, Cross Timbers, MO 65634. (417) 998-6517

FOR SALE: Crystal radio set kits and parts. Send SASE for brochure. Carl & Grace ent. 5636 Romeyn, Detroit, MI 48209.

FOR SALE or TRADE: DX-60B, Bird 100W D.L.; NC-183; HB 2M AM xmtr; Ameco AC-1; rare Micamold TX, 6AG7/6L6. Joe Perratto, K2QPR, 1341 SW Evergreen Ln., Palm City, FL 34990. (407) 220-7362 anytime

FOR SALE: 1964 Allied Radio Lincoln model L-201 (post Knightkit??), 500W motor speed/light control w/manual, 3x4x1-1/2" - $10 ppd. Ken Greenberg, 4858 Lee, Skokie, IL 60077. (708) 679-8641

FOR SALE: Heath HD-1410 electronic keyer, w/manual - $20; Regency MR33D Monitoradio (30-50 Mc), NIB, w/manual, warranty card - $70; National SW-54 (VG) - $60; Collins 51M-2 fixed rcvr - BO. Robert Baumann, 1985 So. Cape Way, Lakewood, CO 80227. (303) 988-2089 eves

FOR SALE: R-392 audio modules, NOS - $25 each; T-798 xmtr - $25; Collins CP-1 xtal pack - $150. U-ship. SASE for list. Bob, WB2FOF, 123 Daniluk Dr., Camillus, NY 13031. (315) 672-3701

FOR SALE: HP410C, manual, no AC probe - $50; 2 each HP8708A, manual, both - $200; D-104 - $30; Fluke 8600A, no manual - $200; URM25F, manual - $125. Kurt, AZ, (602) 443-0896

FOR SALE: Tubes, capacitors, sockets, NOS and reproduction parts for antique radios and TV's. Large SASE for tube list or $2 for 20 page catalog; refundable with 1st order. Vintage TV-Radio, 3498 West 105 St., Cleveland, OH 44111.

FOR SALE: Drake 2B & manual w/2AC & 2AQ; parts unit for Heath Seneca xmtr. **WANTED:** Stancor 20-P xmtr; B&W BVL coils especially BVL-15. **TRADE:** My nice Ranger II & cash for nice Eldico SSB100-F. Thanks! Tom Smith, N5AMA, 13034 Elmington Dr., Cypress, TX 77429-2062. (713) 376-3436 (h), 957-6420 (w)

FOR SALE: Service manual copies. Most $5, shpg $1 each. Hallicrafters, Hammarlund, Heath, Johnson, others. SASE for list. DSM Diversified, 909 Walnut St., Erie, PA 16502.

FOR SALE: Repair & restoration of all classic & vintage radio equipment, reasonable rates, prompt turn around, 25 yrs experience. Mike McKean, N3HJQ, 726 McClellan St., Philadelphia, PA 19148. (215) 336-6111

FOR SALE: Collins KWS-1, 75A-4, SR # 5749, mod. by W3HM, 312A1 lighted spkr & 302C1 wattmeter, near mint conds, will not seperate, PU only - $2500; NC-303 w/converter - $375; GPR-90 w/SSB adapter, mint - $800. KB8QF, MI, (616) 795-3923

WANTED

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

WANTED: Schematic and/or manual for Navy RAL-7 rcvr. Wayne, N8MS, Rt. 2, Box 1500, Fairmont, WV 26554. (304) 825-6102

WANTED: QST 45-55. If you are cleaning out your basement, I'll give them a good home and pay postage. Bob Napoli, Box 158, Riverhead, NY 11901. (516) 722-5737

WANTED: Knob, band selector for Hallicrafters SX-96. Robert Burger, WB6VMI, 5104 Newcastle Ave., Encino, CA 91316. (818) 881-5834

WANTED: Heath Mohawk RX-1 rcvr; SB-10 SSB adapter; Marauder HX-1 xmtr; Collins KWS-1 xmtr. Gary, K8BKB, MI, (616) 685-5792

WANTED: Racal RA-17 C-12 or C-13 mint cabinet or repairable condition. Roger Giannini, 217-793-8275 serious only, 1000-1400 local time midnights plus minus hour collect.

WANTED: Swan gear, 2M FM or Swan 160. Eric, KBØXP, Box 98, Stanton, IA 51573. (712) 829-2446

WANTED: WW II German military radios. Suitcase sets. WHY? **FOR TRADE:** Cold war Warzaw-pact army sets; WW II British Bomber Command set; Swiss 4 wheel cryptomachine. OZ8RO, Rag Otterstad, Hosterkobvej 10, DK-3460 Birkerod. FAX: 011-45-4468 1514, Tel: 011-45-4281 5205.

WANTED: 75S3C, RE; KWM2; KWM1 accessories; Hallicrafters R46B spkr. For personal use. **TRADE:** 30S1, RE plate xfmr, new 312B4, RE, excellent. Stan, K5YY. (501) 756-5010

WANTED: Gonset G-50 6M xcvr in very good or better condx. Also any Clegg. Marc, WC1X, 641 E. Main Rd., Middletown, RI 02842. (401) 846-6325

WANTED: Orig. schematic & manual for SX-100. John, Colorado. (719) 481-4564, (4th ring ans machine).

WANTED: Good 450TL tube, good 304TH tube. Jack Wheeler, KH6CC, POB436, Paauilo, HI 96776. (808) 776-1422

WANTED: Manual for RBM type radio; schematic for or tube lineup for Knight Space Spanner. Larry, (602) 892-4618

WANTED: Hallicrafters HT-9, HT-32 and HT-37, good condx. Bob Braza, N1PRS, 23 Harvard St., Pawtucket, RI 02860. (401) 723-1603

WANTED: 7HTF3 Ballast tube or equivalent. Howard Hood, WA7QQI, 5670 SW 44th St., Port Orchard, WA 98366. (360) 674-2179

WANTED: McIntosh and Thordarson amplifiers any condx. Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53228-0803. (414) 545-5237

WANTED: Intelligence museum wants German, Japanese, Italian, Russian and Chinese communication equipment and any British or U.S. spy radios. LTC William Howard, 219 Harborview Lane, Largo, FL 34640. (813) 585-7756

WANTED: Telegraphic apparatus and keys by collector, not a dealer. Will pay top dollar. Pete, WB2BYQ, (201) 818-4311

WANTED: W.S. (Canadian) no. 29, A&B sets; Soviet R (P) 112 xcvr; U.S. RT-136/GRC-13. Leroy E. Sparks, W6SYC, 924 W. McFadden Ave., Santa Ana, CA 92707-1114. (714) 540-8123

WANTED: Drake Q-Mult. /spkr for 2-B rcvr; orig. spkr assy. for a National HRO-5TA1. (We'll trade the NC-2-40D National spkr we're now using); the following crystals for the Collins 32S-1/75S-1: (1) 6555.000, p/n 290-9009-00, 80m (replacement); (2) 13155.000, p/n 290-9042-00, 30m; (2) 10577.500, p/n 290-9082-00, 17m; (2) 13977.500, p/n 290-9116-00, 12m. A replacement (top center/front) label for a Collins 51J-3 (apparently its 4-screws removed/label lost during its previous history); a Johnson bug, Model 114-520 (w/blk crackle yoke); Replacement pwr xfmr for a DX-40 xmtr; **SWAP or GIVE AWAY:** National HRO-5TA1 S-meter and upper R.H. front label. John Bipes, KØYQX, 906 Adams St., Mankato, MN 56001. Phone/FAX: (507) 345-7169 (w), 387-3840 (h)

WANTED: For cosmetics only, a Weston Model 741 meter; any movement, any scale, working or non-working, 4" wide x 4-1/4" tall. Arne Sjoneling, KØAS, 16 Peck St., Deadwood, SD 57732. (605) 578-2195

WANTED: Before I go to the big 'Shack in the Sky', I would like to own, sit in front of, and operate an SX-28A. H.R. Quales, Jr, 9021 Weldon Dr., Richmond, VA 23229. Many thanks.

WANTED: BC-375 antenna output binding posts/insulator; tubes - 10Y, 843, 211, 801, 1616, 803, 5Z3, 5Z4, 5R4, 807. Freeman, POB 1773, Pinehurst, NC 28374

ELECTRIC RADIO PARTS UNIT DIRECTORY

If you need a part for a vintage restoration send $2 and an SASE (.55 postage) for a 7 page list of parts units. If you have a parts unit, consider putting it on the list. Your dead unit can help bring others to life!

WANTED: Combination IF oscillator coil for Majestic 15 grandfather clock radio. Joe Bentrovato, 1802 Sagebrush Rd., Plant City, FL 33567. (813) 754-3856

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

WANTED: Teletypes and any other teleprinter machines, parts, literature or information from the 1940's to the '70's. Gary Ashbaugh, POB 2008, Corvallis, OR 97339. (503) 758-8006

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: 270G3 spkr for 75A-4 rcvr. OA4ACT/KP4. Manuel Echeandia, 116 Villa Sonsire Miradero, Mayaguez, PR 00680-7830. (809) 833-4021

WANTED: HT-9 transmitter to use with my SX-28A. I'll pay cash, throw in maple syrup and an Adirondack canoe trip, it'll seal the deal. Charles Brumley, KB2SWI, 32 Glenwood Rd., Saranac Lake, NY 12983. (518) 891-5704

WANTED: Steel case for my SX-28A and R-388. Masuto Iida, 1919 Crestwood St., Rancho P. V., CA 90275.

WANTED: Heath Mohawk RX-1 rcvr; Heath SB-10 sideband adapter. Gary, K8BKB. (616) 685-5792

WANTED: WW-2 Japanese military radio equip. of any kind; Japanese made shirt pocket transistor and tube portable radios. Takashi Doi, 1-21-4, Minamidai, Seyaku, Yokohama, Japan. FAX: 011-8145-301-8069

WANTED: Old tube amps and xfmrs by UTC, Acro, WE, Peerless, Thordarson, Audio Dev Corp., Jensen, JBL; Altec spkrs. Mike Somers, 2432 W. Fargo, Chicago, IL 60645. (312) 338-0153

WANTED: Info on Bendix Marine ADF100 auto direction finder; also to buy RBA, RBB, RBC recvrs. John Hartman, 11 Woodhenge Cir., Londonderry, NH 03053. (617) 437-2819

WANTED: National spkr to match NC-300 rcvr; will buy or have other spkrs for trade. Mike Sanders, KSØF, 3409 Henry Dr., Imperial, MO 63052. (314) 282-0787

WANTED: Paying immediate cash for old Fender and VOX guitar amplifiers. Frank Czaja, AI9T, 8968 W. Forest Home #4, Greenfield, WI 53228

WANTED: Lettine Model #130 xmtr. Bernard E. Hansen, W7BIL, 15240 88th Ave. NE, Bothell, WA 98011. (206) 488-8535

WANTED: TMC GPR-92 HF Rcvr. Hank, W6SKC. (602) 281-1681 FAX: 281-1684

WANTED: WRL-70 xmtr; HB xmtrs for display, must be museum quality; thousands of QSL cards to paper walls of Amateur display. Call Leo, (402) 392-1708, Western Heritage Museum, Omaha.

WANTED: Hammarlund manuals, parts, parts units, from the series Comet, HQ, SP. Also accessories, catalogs, spec sheets, memorabilia. Robert, Amateur Radio Surplus, (517) 789-6721

WANTED: Collins 30J, 30FXB/C, other pre-1940 Collins amateur gear for my collection. John Firey, WB5HRI, 14818 Delbarton, Houston, TX 77083. (713) 5615-KW1

WANTED: Vintage tube CB's; pwr sply/modulator for Johnson 500. Send card or call with model you may have. Steve White, WB5UGT, Box 1086, Clute, TX 77531. 800-374-6477 - 9008 (leave message)

WANTED: Hallicrafters S20R & SX-42, only in very good condx. Jose Cangas, EA4JL. Contact in the States Kurt Keller, (203) 431-6850

WANTED: HRO-60 Dial strips E-F and AC, cash or trade, G-H strip for either. KØOCC, 8240 Grogan Ferry Rd., Atlanta, GA 30350. (404) 396-1312

WANTED: Collins S-Line; Electrovoice 664, 674, 676 mics; HRO-7 orig. condx. Gary, KE6MS. (310) 696-0177

WANTED: B&W 5100B w/51SB-B adapter; B&W LPA-1 and L-1000. Generous prices for good working equipment. David Stewart, NI5M, 815 Johnson Woods Dr., Paris, TX 75460. (903) 785-1418

WANTED: Test equipment (IE-17E) for WW II walkie-talkies (BC-611); test unit I-135E and artificial antenna A-82A. Richard Mollberg, K6PWF, 2340 Almond Ave., Concord, CA 94520 (510) 283-6786 (n), 827-4056 (d)

WANTED: Drake R4C rcvr; (Hickok, etc.) mutual conductance tube tester; Kenwood T-599 xmtr; Radio Shack DX-400; Uniden CR 2021; RCA model CRM R6A; Heath SB-610 monitor scope. Rick, K8MLV/Ø, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

WANTED: Any AN/GRC-14 components to complete a museum showpiece. AN/PRC-74 antenna and mounts, W.H.U? Nice 1.3 to 2.1 MHz ARC-5 Tx. S.C. Signal Corps Museum, 5 Rollingwood Dr., Taylors, SC 29687. (803) 244-0324

WANTED: 1969-70 Heath catalog; Heath HM-10 or earlier SWR meter; Heath VTVM; 1960's handbook. Bill Graham, N5LMX, 417 BSB Unit 26124, Box 1360, APO AE 09031

WANTED: Navy manuals ATB, ATC, GP, TBG, TBK, TBL, TBM, TBW, TCA, TCC, TCE, TCZ, TDF, TDO, TEG. Steve Finelli, N3NNG, 37 Stonecroft Dr., Easton, PA 18045. (610) 252-8211

FOR SALE: TMC GPT-750D2, the ultimate boat anchor - $850 or trade for anything I can lift! BC-348M, w/ACps - $70; Collins TCS-12 xmtr - $80; TCS rcvr - $65; BC-610 plugin set - $70; parting out BC-610E, R-388, BC-348R, TS-382, TS-452C/U. U-ship. WA7HDL, ID, (208) 756-4147 after 1730 MST.

FOR SALE: KWM2, 516F2 & 312B3, RE, orig. manual, exc. condx - $575; Heath SB200, very good, orig. manual - $300; R388/URR, exc. - $225; Gonset GSB100, very good - $110. I pack, U pay shpg. Dick, W7QZO, 6655 NE 33rd St., Redmond, OR 97756. (503) 548-2847

FOR SALE: RAL-6 rcvr - $150; SP-600JX21 - $200, PU only. F.W. Nicholas, AZ, (602) 864-9987

FOR SALE: Large (11x17) Xerox copies of orig. schematic diagram of Radio Receiver R-100/URR and complete parts list - $10 each or $18 for both. Send large SASE and money to Karl Kegley, Sr., 211 Boyd St., Johnson City, TN 37604.

FOR SALE: Gonset Commander TX, tiny HF AM, good - $49; Gonset G-76, scratched, works - $189; Gonset G-76 AC sply, scratched, works - $189; Gonset G-28, fair, works - $65; National wooden coil case for 3 HRO-60 coils, good - $39; Barker & Williamson 5100B, exc. - $289; Clegg Apollo 700, 10 watts input, 700 watts out, matches Clegg Venus, needs 8236 finals - $269; RMCA 8021 Radiotelephone marine TX/RX, restorable - $169; Hallicrafters S-36A, unworking, unmodified - $109; Hallicrafters HT-5G speech amp for the HT-4 (BC-610), exc. - $99; Polarad 1.9-4.3 GHz RX, klystron-type, heavy - $189. Don, N3RHT, PA, (412) 234-8819

FOR SALE: Tubes/semiconductors/parts/meters/phono needles/radios - LSASE for 20 page list. W.F. Horn, 13110 Marsh Rd., Bealeton, VA 22712. (703) 439-9781

FOR SALE: New Collins PJ-068 mic plugs for S-line/KWM-2 - $8 each. Clint Hancock, KM6UJ, 6567 Ashfield Ct., San Jose, CA 95120-4502.

FOR SALE: Clegg Thor 6 AM/CW xmtr/rcvr, 60W input, in good condx - $85. Cliff, W3LVC, Elkridge, MD, (410) 796-1070

FOR SALE: Knight Space Spanner, good condx, w/cabinet, fair condx, copy of manual - $40; Ten-Tec PM-3 w/manual, exc. condx - $100. Plus shpg. Harry Blesey, N9CQX, 95. 740 Clarendon Hills Rd., Hinsdale, IL 60521. (708) 789-1793

FOR SALE: Rare Western Electric 9-B Airline HF rcvr, w/manual. Will consider trades or ? $900. Nick Oland, W3DSE, 821 Kenhorst Blvd., Reading, PA 19611. (610) 378-1411

FOR SALE: R-390A manuals, new, never opened OP manual TM-11-5820-358-10 - $18, orig. maint. manual TM-11-5820-358-20 - $20. **WANTED:** 51J4 non-working for parts. John Miller, AK time, (907) 337-9157

BUY/SELL/TRADE: Misc issues of U.S. Amateur Callbooks, 1914 thru 1980. SASE for list. Bob Arrowsmith, W4JNN, POB 166, Annandale, VA 22003. (703) 560-7161

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

WANTED: Spkrs for National NC-183D (183DTS) and Hallicrafters SX-28A (R8). Marv Murray, WB7DWC, 1751 McBee Rd., Philomath, OR 97370. (503) 929-3543

WANTED: Amateur frequency quartz crystals and holders of the 1930's and 40's; anything amateur related made by Bliley. Dean Showalter, WA6PJR, 7816 Redberry St. NW, Albuquerque, NM 87120. (505) 899-9376

WANTED: Hallicrafter SR2000A, FPM 200, SX88, SX73, Collins 75A4, KWS1, 32V3, 51S1. Hank, WD5JFR. (800) 364-4265

WANTED: Old tube amps and transformers by UTC, Acro, WE, Peerless, Thordarson, Audio Dev Corp. Jensen, JBL, Altec spkrs. Mike Somers, 2432 W. Fargo, Chicago, IL 60645. (312) 338-0153

WANTED: Still looking! F & G coils for HRO-60; 480-960 kc and 180-430 kc; also Select-O-Ject. Joe, WA9LAE. (708) 795-6761

WANTED: Collecting WWII military avionics. Seeking BC 1151 dual scope display for SCR-720 radar. Jeary Vogt, 3 Brampton Rd., Malvern, PA 19355. FAX/Phone (610) 640-2955

WANTED: 6 kHz Collins mechanical filter, type F-455-FA/K/N/Y-60, preferably "N". Will pay all expenditures including phone calls for serious offers. Reinhard Wieschhoff, 7 rue du Debuche, F 78120 Rambouillet, France. 33-1 304 111 02

WANTED: Dead Atlas 180, 210X, 215X and 350XL radios for parts. Dennis Hatch, WAØWAB (316) 225-3736 (d), 225-2961 (n)

WANTED: Altec 1592B or rackmount tube type audio mixer, 4 to 6 inputs; AB-40 switchboard meters; 50 watt size line to voice coil xfmrs. Dennis, (602) 839-1901

WANTED: Manuals or any help - Collins ARC-2 xcvr; Federal Telegraph BC-325 xmtr; Jefferson Travis 350A xmtr/rcvr; Waterman S-11A Pocketscope; Abbott DK-3 and TR-4. Don Merz, 47 Hazel Dr., Pittsburgh, PA 15228. (412) 234-8819

WANTED: Field type military and similar radio equipment wanted. Any vintage or country. Trade list $2 or swap for yours. Dennis, Box 95, Cross Timbers, MO 65634.

WANTED: Xtal cal for 75A-3 & 6 KHz filter; would consider purchasing 75A-3 rcvr w/these items. James, N6IFO (404) 429-8189

WANTED: Heathkit HRA-10-1 crystal calibrator for HB-10A rcvr; Microcraft Code Star. Al Kaiser, W2ZVR, 713 Marlowe Rd., Cherry Hill, NJ 08003-1551. (609) 424-5387

WANTED: National NTX30 exciter and NSM modulator; Hallicrafters HT-6, or other similar xmtr. Also need HR-10B VFO. Thanks. John Zitzelberger, WB6JJE, 5257 Lewis Rd., Agoura, CA 91301. (818) 991-8358

WANTED: Hallicrafters HA-4 keyer; enclosure for SR-400 Cyclone (junker SR-400 OK) and PS-500-AC pwr sply. Cosmetic condx important. Bob Smith, KC4WJO, 14779 Kogan Dr., Woodbridge, VA 22193-3314

WANTED: 1960's single lever keyer paddle (not iambic) to use with vintage amateur station. Tom French, 120 Great Rd., Maynard, MA 01754. (508) 897-2226

WANTED: T-19/ARC-5, T-22/ARC-5 & T-17/ARC-5 transmitters or the BC equivalents, prefer unmodified. Wayne LeTourneau, WB0CTE, Box 62, Wannaska, MN 56761. (218) 425-7826

WANTED: Help! Have you modified an RCA 250L broadcast xmtr for 160? Need hints or suggestions on modifications. Many thanks. Jerry, N8IRL, 161 Fox, Hubbard, OH 44425-2122

WANTED: National HRO-500TS spkr in mint condx; National NCL-2000. Sam Macy, N9WAF, 486 Glenwood Trail, Elgin, IL 60120. (708) 695-0218

WANTED: Spkr for SP-200/400 or HQ-129X. Cal, N6KYR, (805) 594-0302

WANTED: Highest quality, early-mid 1930's commercial (Collins/National) or homemade exciter or xmtr, 10W - 100W, CW, 160, 80, 40, 20 capable, as companion to HRO. John Petrich, W7HQJ, 8301 - 161 Ave., NE, Ste, 300, Redmond, WA 98052-3858. (206) 868-1256

WANTED: 4:1 Vernier knob for 75A-4. Peter, VE3URO, (416) 595-4340.

WANTED: Any condition, Hallicrafters S-30 radio compass and S-35 panoramic adaptor as shown. Chuck Dachis, 'The Hallicrafter Collector', 4500 Russell Dr., Austin, Texas 78745. (512) 443-5027

FOR SALE: Viking II, Heath VFO - $160; Elmac AF-67, PMR-7, ps - $95; HRO-5AT, 4 coils - $250. Sue, MI, (616) 229-4318 till 10 EST

FOR SALE: Military - TBX-6 WW II Marine Corps TX/RX, complete, near-mint in transit case - $999; TBX-6 TX/RX only, no accessories, very good - $199; EF-8 gas generator for TBX-8, unused in transit case - $119; SCR-300/BC-1000 WW II Army backpack radio, w/straps, pads, antenna - $139; PP-114/VRC-3 vibrator sply for jeep-mounted BC-1000, fine - $59; ID6/APN4 WW II LORAN indicators, one good, one for parts - $89; BC-1335 jeep radio w/battery box, good - $65, w/matching battery charger - $95. Accessories for Wireless Set #19, MK II - mount, pwr sply, dogbone, unmodified - $99. Don, N3RHT, PA, (412) 234-8819

FOR SALE: Hammarlund HQ-170 w/clock, just aligned - $200; Heath DX-60 xmtr - $70; DX-60B - $80; HG-10 VFO - $45; HG-10B VFO - $55; BC-221 A/H freq. meter - $40. All w/manuals, plus shpg. Kim Herron, KE8NE, 16141 24th Ave., Coopersville, MI 49404. (616) 677-3706

FOR SALE: Heath HW8 xcvr - $125; HW16 xcvr - $100; DX-60 xmtr - $60; HG10B VFO - $40. Ron Eveland, W6HFZ, 13169 Briarwood St., Cerritos, CA 90703-7367. (310) 860-3623

FOR SALE: Hallicrafters S-38B, works fine, cabinet needs paint, includes Sams - $40, plus UPS; National NC-98SW, works fine, cabinet needs touchup, both tuning knobs not orig., free spkr, no spkr cabinet, includes reprint manual - $100 plus UPS. Joseph R. Forth, WA2TRT, 321 Long Vue Acres, Wheeling, WV 26003. (304) 277-3154

FOR SALE: Ranger, AF-67, AF-68, PMR-8, R4A, T4X; MSAC4. **TRADE FOR:** DX-100; Viking II; 75S1; SBE-33/34; Elmac 1070; R-390A. Darryl Dippel, WA5AAO, Box 335, LaGrange, TX 78945.

FOR SALE: Apache TX-1 - $225; Elmac AF-67 w/pwr sply - $149; NC-300 - $100; B&W 52-500A - $40; 250TH - $75; 813 - $25; 4CX1000A - $199; 6' cabinet w/rear door - $150. John, NM, (505) 894-3464

FOR SALE: Enlarged schematics orig. Collins 75A-4 or 51J4 on 2x3' sheet - $15. Vy eye friendly. Mike, AC5P, POB 33, Bartlesville, OK 74005.

FOR SALE: HQ-180C - $185; S200 - $55; NC-173 - $85; R4C - $225, OBO. **WANTED:** DB20; 51J2 manual; HQ-129X spkr; mint dials, NC-183. Doug DeWeese, 502 East 80th St., Tacoma, WA 98404. (206) 472-3478

FOR SALE or TRADE: R-392 w/spkr - $150; RAK-7, w/AC ps - $125; RMCA AR-8511 - $150; BC-778D Gibson Girl TX, w/bag & manual - $125; MacKay 168B lifeboat TX - $200; ARC type 12 stuff - portable VHF-AM set (T11B/R19/CM10) w/case - $250; ARN-30, R-11A, R-22 all w/dyn. & control boxes - $40 each; C-22 control boxes - $20 each; BC-450 ARC-5 control boxes - $40/pair; TCS-12 control box - $35; RME VHF-152 - $50; CRR-47206 LF tuner for ATD TX - $75; Bendix MN-52 azimuth indicator - $35. Prefer PU. Will trade for the following: BC-610 (prefer 'E' model), TBW, BC-683, FT-237, Gonset 2M Communicator III; ARRL 1954, 1980 and 1985 Handbooks. Steve Davis, KD2NX, 705 13th Ave., Belmar, NJ 07719. (908) 280-9760 before 10 PM EST.

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

FOR SALE: Good 810 tubes - $55 each; new RCA 4-250A's - $95 each. Don Gies, K4GIT, Box 2790, Melrose, FL 32666. (904) 475-3306

FOR SALE: R1051 rcvrs, exc. condx, cleaned, completely checked, various models to choose from. Shawn Daniels, (314) 343-5263.

FOR SALE: National NC-183D rcvr w/matching spkr & orig. manual, exc. condx - $400; National NC-173 matching spkr, w/orig. box - $65; Racal 6117 communications rcvr w/orig. manual, exc. condx - $750; Gonset Comm. III, 2M AM xmtr w/ Gonset VHF 6/2 meter VFO, like new w/orig. manual - $100. All plus shpg. Ron, KC6WTG, Box 783, Santa Rosa, CA 95402. (707) 539-8319

FOR SALE: 3' x 5' reprint of factory schematic for Collins KW-1. Please send $25 ppd US to Tom Berry, K9ZVE, 1617 W. Highland, Chicago, IL 60660. (312) 262-5360

FOR SALE: Viking II - $65; PM23 cabinet - $50; 1948 - 1992 QSTs - $100; HA-1 - $65. George, WAØZYX, 515 17th St., SW, Rochester, MN 55902. (507) 288-0242

FOR SALE: "Introduction to Key Collecting" 64 page softcover illustrated guide, $11.95 ppd USA. Start now in this fascinating hobby. Artifax Books, Box 88-E, Maynard, MA 01754.

FOR SALE: Janes Avionics 82-83 + 87-88 Milcom 79-80+86. All 4 volumes - $200 + UPS shpg. Weber, 4845 W. 107th St., Oak Lawn, IL 60453-5252

FOR SALE: Hallicrafters S22 Skyrider Marine, VGC - $125; Drake 2AQ Q-multiplier, VGC - $85; National NC-270, w/spkr, manual, exc. - $235; Heath HW-16 w/manual, exc. - $125; vintage manual copies - request list. Richard Prester, 131 Ridge Rd., West Milford, NJ 07480. (201) 728-2454

FOR SALE: Spy radio station RS-6, cold war HF CW set, crystal-controlled 2E26/6AG7 TX w/fold-out key, VFO tuned RX, 110VAC/6VDC ps and ps filter. See AWA Old Timers Bulletin 2/93 for details. Accessories include waterproof bags, antenna w/ clamps, earphone, instruction cards (copies) and manual copy - $269 per good condx set w/all accessories (2 available). $239 per fair condx set (2 available). Some accessories available separately - call. Don, N3HRT, PA, (412) 234-8819

FOR SALE: Level meters for Collins R-392/URR rcvrs, new - $35, UPS prepaid. Dennis, WAØWAB, (316) 225-3737 (d), 225-2961 (n).

FOR SALE: See previous ER ads since October. Legal 3-stamp SASE for list. Heath SB-1000 linear, kit in unopened box - $800; National NC-300 - $125; NC-300 6M converter - $50; new, Collins freq. dials for KWM-2/S-line - $50; used, Collins MP-1 mobile splies - $50; new, J-45 knee keys - $25; used, exc., Jennings vacuum variable, 25-1000 pF @ 10KV - $100; used, 10 GHz Gunn diode units used in security devices, adjustable for 10 GHZ ham use - $25 pr.; used, Telonic Berkeley 50 ohm step attenuators, 102 dB in 1 dB steps - $40; new, like new, JAN Tung-Sol 6L6WGB's - $5; used, Collins DL-1 dummy loads, without cabinets - $45; new, black plastic Fluke cases, for handheld multimeters/radios and accessories, 4"H by 13"W by 10"D, handle - $10; exc., Lafayette crystal converters, 2M HE-71, 6M HE-56, 7Mc-11Mc output - $150/pr.; new, variety of Amphenol/ Kings silver plated RG-213 connectors - $6; TRW air variable capacitors, new pulls, 4-section, 10-450 pF/section (2160 pF), 3-1/2" wide by 2" tall by 7" long, 1/4" shafts - $20; Heath HA-14 KW mobile HF amp, pr of 572B's, w/HP-24 AC pwr sply, w/ cables - $375. Derek, KI6O, callbook address, CA, (916) 965-4904

FOR SALE: Globe King 500C. A bit rough around the edges, but very resurrectable, cabinet good, some corrosion, missing a xfmr on the modulator deck. All orig. knobs and meters, silkscreen fair to good, lettering good - $425 pickup; Gonset GSB100, good - $110; Collins ART-13, rough but all there - $100. Dick, W7QZO, 6655 NE 33rd St., Redmond, OR 97756. (503) 548-2847

FOR SALE: First user friendly circuit for early BC-348's. Send $2 + (3) $.29 stamps. Ray Larson, 1224-1/2 Gorham Ave., W. Los Angeles, CA 90049-5214

FOR SALE: National H.F.S. w/all plugin coils on rack inside unit in exc. working condx - $275. Larry Drago, 383 Lincoln Dr., Cheshire, CT 06410. (203) 272-6030

TRADE: Nice HQ-170A front panel for an HQ-170 in same condx. **WANTED:** DX-100B & SX-101. Bill, 6712 Lake Dr., Grank Forks, ND 58201. (701) 772-6531

FOR SALE: Beckman L6C Megohmmeter, 0-600 volts, adjustble, clean, w/clip leads, good condx - $50; Tek 575 curve tracer, exc. condx, w/manual - $350; Heath AV2 ACVM, working, calibrated, w/manual - $10; HP412B VTVM, probes, VG condx - $25; GR 1191B 50 MHz freq. counter, works, great for HF station readout, manual - $30; GR 716C passive capacitance bridge - $20; Freed 1110C passive inductance bridge - $20. Shpg xtra or pickup. Used tube list, many bargains, SASE. Bill McCombs, WBØWNQ, 10532 Bartlett Ct., Wichita, KS 67212-1212. (316) 722-7669

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: 75A-4, 3.1, spinner knob, spare set of tubes, s/n 28xx - $725; Eimac 4-400A's - $40 each; Yaesu FV-101B VFO - $125; single 3-500Z plate xfmr - $75; DX-60 (as-is) - $60; (2) HM-102 wattmeters - $45; Mosley HF vertical - $65; thrust bearing - $55; (3) 4CX300's - $95; Viking I, no manual, w/VF-1 VFO - $235; NC-300 w/spkr - $285; SX-96, SX-99 parts radios - $70 each. Lane, CA, (619) 462-3857

FOR SALE: Parting Viking II (panel, meter, cabinet, drvr xfmr gone). **WANTED:** Guthman U17 and U50. W3NCX, 1005 W. Wyoming, Allentown, PA 18103.

FOR SALE: PRC47 LSB/USB kit - $40; new machined coax antenna panel - $9. All restorable. Jay Craswell, WBØVNE, 321 West 4th St., Jordan, MN 55352-1313. (612) 492-3913

FOR SALE: Heathkit lives on in historical anecdotes by employees. Quality 124-page illustrated book. $9.95 postpaid. Heath Nostalgia, 4320 196th S.W., Suite B-111, Lynnwood, WA 98036-6754

FOR SALE: National HRO-60, 4 coils, good - $299; HRO-60 AC coil, w/scale - $25; National wooden coil case for 3 HRO-60 coils - $45; Gonset gear - G-76, good - $189; G-76 AC sply, scratched, works - $199; G-28, 10M, fair (2 knobs wrong) - $69; G-50, 6M, near-mint - $209; Commander HF mobile xmtr, good - $59; Clegg Apollo 700 6M linear, needs 8236 finals - $299; military RS-6 spy radios, several sets - $190-$300/set. Some accessories available. Don, N3RHT, PA, (412) 234-8819

FOR SALE: URM-25E AM sig. gen., 10 kHz to 50 MHz, metered/calibrated output and modulation levels, all accessories, manual - $125; National NC-270 rcvr, spkr, manual - $150. Chase Hearn, 104 Glenwood Dr., Williamsburg, VA 23185. (804) 229-7263

FOR SALE: Handbook, many schematics, Collins 75S-3, Drake, Hallicrafters SX-100, SX-117, HQ-110A, many others, TX & RX, 128 pages - $17; brass surplus key, new - $25. Joe, W6CAS, CA, (916) 731-8261

FOR SALE: British made Leak Hi-Fi tube-type amplifier mod (T/S50 Plus) w/matching pre-amp and tuner in very nice condx - all for $375; also Elco (tube-type) HF 87-A stereo amp w/matching ST 84 stereo pre-amp - $450 for all. Larry Drago, 383 Lincoln Dr., Cheshire, CT 06410. (203) 272-6030

FOR SALE: Heath HR-10B rcvr. Clean, working, U-ship - $60. Ken Johnson, N5US, POB 10063, Austin, TX 78766.

FOR SALE: Eico 720 - $85; National NCX-5 - $150; Swan 350 - $150. All plus shpg & handling from Seattle. Pat, K7YIR, phone/FAX (206) 487-1230

FOR SALE or TRADE: McIntosh MC30 and compensator C8 - $150 or vintage ham, other Hi-Fi amps. Earl Russell, WR1Y, 98 Skyfields Dr., Groton, MA 01450. (508) 448-5822

FOR SALE: Hallicrafters S-120 shortwave rcvr, unchecked - $30 + $7.50 shpg; Hallicrafters WR-600 - $30 + shpg; Heath GR54 or 64, hard to read, as-is - $25 + $10 shpg; Morrow model 5BR, unchecked - $25 + $5 shpg; Gonset Super 6, unchecked - $25 + $5 shpg. James Fred, R1, Cutler, IN 46920. (317) 268-2214

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

FOR SALE: USSR issue radio sets for collecting (not to be operated) models R-105M, exc. cond'x, w/acc. in transmit case. $280 ea., 3 for $750. Mike Murphy, (619) 561-2726, FAX 390-8611

FOR SALE: Heath Warrior, KW amp (chassis & cabinet only), front panel clean - $100; Johnson Challenger, needs restoration - $85. Offers accepted. Franklin Albanese, 1610 Prince St., #6, Berkeley, CA 94703. (510) 845-2625

TRADE: Military BC-222 walkie-talkie; ABA/BC-645 control box; orig. RBZ manual. **WANTED:** ARB accessories - mount, control boxes; Hallicrafters AT-2 or AT-3 antenna tuner; HQ-140 spkr. Don Merz, 47 Hazel Dr., Pittsburgh,

FOR SALE: Western Electric audio amp, 300W beach assault unit, uses all JAN tubes, working - $250 or trade for R-390; WECO (Weston) 6" dia. meters, 0-8 RFA, uses ext. thermo - $100 each; Teletype printer calibrating machines - $50; TT-98 printer/keyboard, working - $50; HF dipole kits, 150' spool of copperweld and center term. w/type N jack, really neat - $35; 40' fiberglass whip & guys, ultimate field day vertical with small takedown - $150; BC-348-O, minty - $100; RBB, so-so, w/ps - $100; porcelain insulator 1x8 - $2 each; 300 ohm line spacers, top quality - $3 each; B&W 3KW terminators for "V" antennas - $50 per set; NOS Westinghouse USN WW II xmtr stop-start control box - $50; Millen 3" scope, like new - $75; original TM for R-220/URR228 - $25; complete AN/TIQ-2 PA system, amp, turntable, horns, etc - $300. All items plus shpg. Dennis, AZ, (602) 839-1901

FOR SALE: R-390A carrier level meters - $30 each; overhauled R-390A Cosmos PTOs - $30 each. Plus shpg. Clark Hatch, WØBT, 2546 SE Peck Rd., Topeka, KS 66605. (913) 235-2721

FOR SALE: Repair of TV-7 tube testers and calibration: I will fix and then verify calibration of your TV-7 tube tester for $45 plus shpg or return it no charge. Unit must be repairable and not a basket case. Daniel Nelson, 1025 E. Desert Lane, Phoenix, AZ 85040. (602) 243-7421 eves

Collins 75A-4 Modification Compendium - all the factory modification bulletins from Collins Radio Company, all the articles printed in CQ, Ham Radio, QST and ER, 85 pages - $18
Service Modification Compendium for the S-Line, KWM-1/2/2A series - 260 pages - $40
Service Modification Compendium for the KWS-1, 32V and 75A series - 42 pages - $12
Prices include shipping. Money Back Guarantee.

ER, Box 57, Hesperus, CO 81326

FOR SALE: Collins 208U-3A 3KW xmtr - $4500; Collins 208U-10 10KW xmtr, new condx - $10,500; URG-II remote control unit - $475; Western Electric 22C portable audio mixer - $750; early RCA 77 desk stand - $125; Rockwell Collins HF 8032 solid state pwr sply - $850; HP 182T with 8558 spec. analyzer - $1850; SunAir DCU-100 digital antenna coupler - $450; Frequency Electronics FE1100A-A crystal freq. standard - $375; Andrew 1-5/8 flanged rigid coaxial transmission line elbows, adapters, lot - $250, also, 1-5/8th antenna switch - $75; Collins 51J - $200; Collins S-line 800 Hz filter; KWM 380 main filter board - $100, oven board - $175, DC cable - $35, blower kit - $150; S-line rackmount - $75; 637T-1 adj. dipole - $225; orig. Collins 50th year medalion - $20; orig. Collins 50th year paper weight - $50; Gates, Collins, RCA broadcast catalogs - inquire. Jim Stitzinger, WA3CEX, CA, (805) 259-2011, FAX 259-3830.

FOR SALE: Millen model 90651 grid dip meter, w/coils and manual, good condx - $65; Measurements Corp. model 59 GDO pwr sply and meter - $50; 4-400/3-500Z and 813 sockets, square Johnson ceramic - $10 each; more Dow Key antenna relays - $20-$30; RCA model 75 dual wedge mic - $75; R-390A chassis and front panel, ready for modules, good condx - $50; Knight Globe Hopper chassis w/coils - $25; Speedx model 450 practice key and buzzer - $20. R. Faulstick, KD4AS, 210 Mariah Ct., Meritt Island, FL 32953. (407) 453-2258, FAX 453-2258

FOR SALE: National HRO-60R, A-D coils - $200; National silver anniversary NC-200 w/crate & spkr - $350; Collins R-388 - $250; 75S1 - $200; 1936 QST home-brew superhet - $100; HP 333A distortion analyzer - $200; National metal coil box rough - $25; rough NC-240 spkr - $40; EV RE-11 mic - $50; tubes NIB - 4X150G, 2K54, 2K55 - BO; EV RE-11 mic. All pick-up only or trade some for. **WANTED:** Orig. National HRO-60 book; Heath GR-78 Rx; RCA 44BX mic; National diamond spkr emblem, 2V doghouse ps; **TRADE:** Knight Ocean Hopper for Space Spanner. Dan Brown,MA, (617) 964-3037 eves.

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FOR SALE: TS-497B sig. gen., 2-400 Mc - $50; Tek RM-504 scope - $50; Sprague interference locator model 500, 550 kcs - 220 Mcs - $40. **TRADE:** T-195, good condx for military rcvr. **WANTED:** Manual for model USM-207 freq. counter or a USM-207 parts unit. John Richardson, 1163 Highland Pl., Dubuque, IA 52001. (319) 556-5504

FOR SALE: SP-600; HX-50. **TRADE:** HRO-5TA1 for older HRO. **WANTED:** Skirted knobs (audio gain, CW osc) for older HRO; ant. relay for HX-50; Drake 2AQ, 2.5V ps Carter Elliott, WD4AYS, 1460 Pinedale Rd., Charlottesville, VA 22901. (804) 979-7383

TRADE: RACAL RA929 manpack HF digital rcvr, .5 to 30 MHz, manuals, charger, carry case, amplified weatherproof vehicle spkr, handset and antenna. Trade for interesting radio such as 32V-3, SX-88, SX-115, NC-400, GPR-90, etc. Harry T. Enmark, WA6IUR, 680 Auburn Ave., Sierra Madre, CA 91024. (818) 355-0290

TRADE: Orig. manuals for NC-2-400, NC-100 ASD and Millen 90811 high freq RF power unit; **WANTED** original manuals for NC-44 and NC SW-54. Hank, KD6TJQ, 2440 Adrian St., Newbury Park, CA 91320-3342. (805) 498-8907

TRADE: ARRL Handbooks, similar publications. Wish to complete my collection and dispose of duplicates. Charles Moizeau, W2SH, 33 Old Forge Rd., Millington, NJ 07946. (908) 647-4950

FREE: Looking for antique radios, parts, tubes, schematics and restoration service? For free catalog send 2-stamp LSASE to Howard W. Granoff, 2445 Lyttonsville Rd., Ste. 317, Silver Spring, MD 20910. (301) 585-8776

FOR SALE: Collins ARC-2; **WANTED:** RAL receiver. Tom Brent, Box 1552, Sumas, WA 98295. (604) 826-4051

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Toledo, OH 43608

FOR SALE: Oscilloscope - HP 180F scope, exc. - $175. Signal generators - URM25D, URM25H - $95; URM25E, overhauled, w/acc. - $115; HP 606A, lab quality, exc. - $195; HP 608D VHF/UHF, exc. - $175; SG297, 18-80 MHz FM, near mint - $150. Tubetester - TV-7 B/U w/latest tube update info - $75; update info for TV-7/TV-2 - $18. New tubes - Eimac 4-400A - $100; 805 - $30; 810 - $90; 250TH - $125; 3B28 - $9; Eimac 100TH - $40; many new and good pulls, no list, please send wants. Test set - electrical pwr UPM93D, mint - $15. Headphones - military w/mic, as new - $10. TM 11-662, Electron Tube Application, near mint - $15; ME26/HP410B test leads, new - $30. All items shpg additional. Joe Bunyard, 1601 Lexington St., Waco, TX 76711-1701. (817) 753-1605

FOR SALE: Hallicrafters parts - SR400/400A DC pwr cable, new - $10; 2 bandpass filters, 2.7 kc and 3 kc, new - $7 each; new metal coil covers for various rigs including 'SR' xcvrs and others; open style relays, new. Hallicrafters manuals, hard cover, spiral bound, service manuals for all rcvrs, xmtrs, xcvrs, access. and TV's - $5-$25 each. (3) Hallicrafters round dials, (1) black (frequency), (1) white (bandspread), (1) large white (blank), used - $5 each. Meters - SR-400 (S/Plate) - $40; S-meter, silver background (unknown rcvr) - $10, pair; Heath (oval) plate and screen current from linear - $20. Craig, WA9HRN, IL, (708) 367-1599

FOR SALE: NOS tubes. List SASE. PRC-47 LSB filter - $20; **WANTED:** RCA/GE ham tips. Joseph Pinner, KC5IJD, 201 Ruthwood Dr., Lafayette, LA 70503. (318) 981-7766

FOR SALE: Soviet P-105 field radio with all accessories - $250, local pick-up only; **WANTED:** ART-13, T195B or similar military xmtr. Greg, WA2ORO, (516) 661-2846

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FOR SALE: BC1306, complete w/cover, ruff condx - $100. Dean, KK1K, 20 Jackson Hts., Essex Jct., VT 05452. (802) 878-8293

FOR SALE or TRADE: Heath SB101 - $100; HD15 patch - $35; HM15 SWR - $25, SB200 - $275; IM28 VTVM - $30; SG8 - $20; Twoer, Sixer - $35; HQ170 - $100. **WANTED:** 275W/KW Matchbox; R-388A; 51J3/4; 75A4; NC-183D/spkr. Chris, KA8WFC, MI, (616) 373-0265 after 6 PM EST.

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FOR SALE: I've recently acquired the much sought after E.H. Scott Type C2C-46139 rcvr w/tuning eye and cabinet. This historical radio was built to specification by the Navy Dept. and used on most of the Liberty ships during WW II. It is in decent condx, has cabinet, works and sounds beautiful - $375. Larry Drago, 383 Lincoln Dr., Cheshire, CT 06410. (203) 272-6030

FOR SALE: British KWM2 clone, KW Electronics KW2000B, AC ps, beautiful - $350; 1970's American-made Edgecom 3000A synthesized 2M xcvr - $250. Michael Crestohl, KH6KD/W1, 263 Nahant Rd., Nahant, MA 01908-1342.

FOR SALE: AF-67, PRM6A, DC sply - $55; Silver 701 xmtr - offer. Sue, MI, (616) 229-4318 till 10 EST.

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TRADE: Collins R390 (not 'A') in good, unmodified, working condx for likewise Racal RA-17 or RA-117; trade NIB pair of 811A tubes in JAN boxes marked "ATC Spares" for an Eimac 250TH or a pair of 803's, 812's, 801's or 2A3's. Don Merz, 47 Hazel Dr., Pittsburgh, PA 15228. (412) 234-8819

FOR TRADE: Modified SX-115; reconditioned R-390 & cabinet; reconditioned R725 & cabinet; modified R-390A; T195; R-392; MD203GR; CV278GR. **WANTED:** Late 75A-4; 75A-4 spkr & filters; HRO-60; VLF rcvr; KWM2A; 7553Bor C. Ward Rehkopf, K8FD, 116 Fairway Dr., Belmond, IA 50421. (515) 444-4396

FOR SALE: Collins manuals (copies) - R-390 Maintenance - $20; R-390A Operators - $20; R-390A Maintenance (196 pages) - $69; R-391 Maintenance (partial) - $45. N1FRX, ME, (207) 834-6273

FOR SALE: Millen 3" scope, repainted - $55; military T-67 ARC-3 xmtr - $69; Drake R4B, looks good, works poor - $119; T-4XB, very good - $119; AC-4 - $79; 3-500Z sockets (2), used, as-new - $19/pr.; Hallicrafters HA-6 manual, as new - $19. Don, N3RHT, PA, (412) 234-8819

FOR SALE: Collins type improved rubber feet, will not mushroom, cannot over torque, mates with front leg elevators - $1.50 each; Collins S-line and other cabinet front leg elevators, aluminum, new - $7 each; Collins pwr sply 516E-2, w/manual, exc. - $150; tower clearance lamps, FAA type, Crouse-Hinds, red lense, fixture only, never used - $25 each. Ed, W3WDF, 8245 Garden Oaks Dr., San Antonio, TX 78266-1710. (210) 651-9348

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WANTED: Wind speed/direction roof apparatus for either Taylor or Heath weather stations. Craig, WA9HRN, IL, (708) 367-1599

WANTED: Anything pertaining to WW II aircraft - radios, instruments, photos, histories. Chris Cross, Box 94, McConnell, IL 61050.

WANTED: PL172/8295 tube. Also want TV2C tube tester. Jay Spivack, 325 S. Washington Ave., #244, Kent, WA 98031. (206) 859-2680

WANTED: Collecting early Heathkit gear 1940's-'50's; early Heath catalogs and literature; Heath mics, spkrs, supplies, access.; any parts units. Byron, WA5THJ, 1215 Fresa Rd., Pasadena, TX 77502-5017. (713) 941-3631

WANTED: Green pilot jewel for Valiant; also course loading switch or 10-pos. additive ceramic waferswitch; (10) 300 pF, 2500V micas. Ken Sands, K8TFD, MI, (313) 522-8645

WANTED: ARRL and Bill Orr Radio Handbooks from '40's, '50's and '60's. Joseph Falcone, 3000 Town Center, Suite 2370, Southfield, MI 48075. (800) 436-7026. Lve msge, mention books.

WANTED: Help Vibroplex build its Company collection of Vibroplex bugs, keys and memorabilia. Call Mitch, WA4OSR, at The Vibroplex Co., (800) 478-8873

WANTED: Any info on RACAL 6830JD HF DF rcvr; any wireless items (pre-1920) for collection. Bill Jensby, W6JEOM, 645 Giannine Dr. Santa Clara, CA 95051. (408) 296-6071

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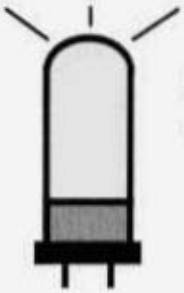

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