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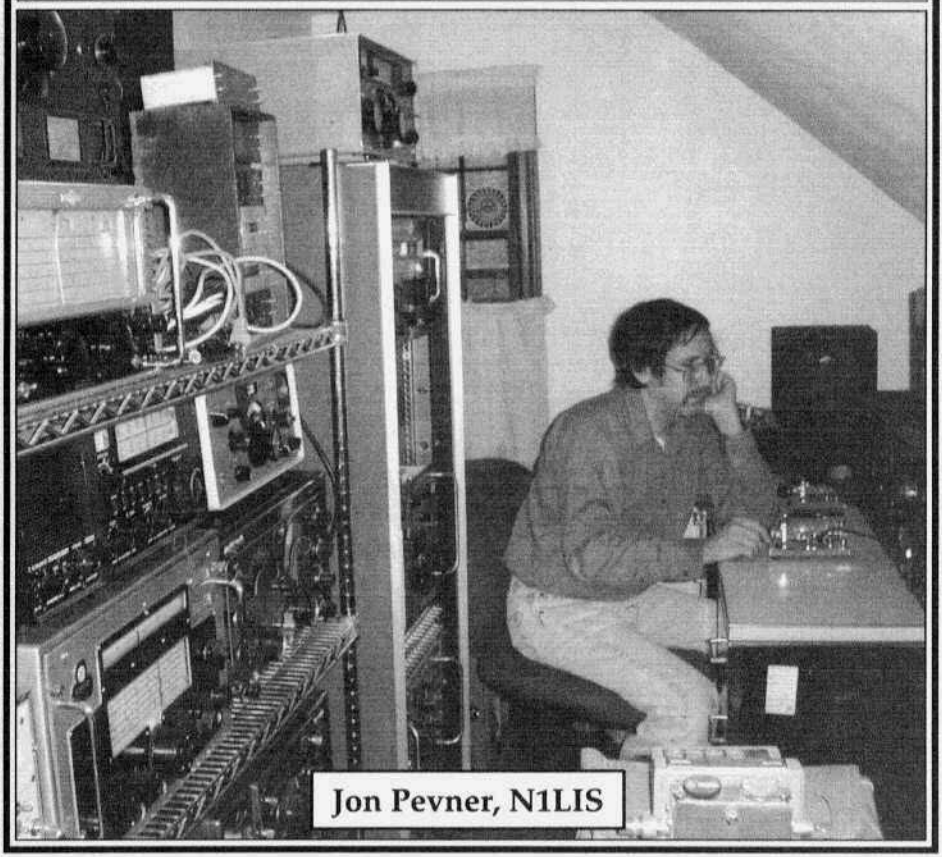
ELECTRIC RADIO

celebrating a bygone era

Number 138 November 2000



Jon Pevner, N1LIS

ELECTRIC RADIO

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

Authorization no. 004611
ISSN 1048-3020

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

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

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

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

Regular contributors include:

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

Editor's Comments

Holiday Season AM Jamborees

The first event of the season will be the **Colorado Morning Group Thanksgiving Day Bash.** This Jamboree which has been occurring regularly over the past few years on 3876 starts 'way early' (like 6 AM) and goes on all through Thanksgiving Day. The net control is usually 'OJ', KØOJ and others from the morning group. Mark this event on your calendar and see if your signal can make it to Colorado.

The second event is the **AMI Thanksgiving Jamboree** that starts on Friday evening Nov. 24 and goes on through Sunday, Nov. 26. See KW1I's AMI Update on page 3 for more information.

A new event suggested by Bill Kleronomos, KDØHG, is a **160M AM QRO Jamboree** on December 23. This could be a warm-up event for the annual ER/N2KSZ Memorial 160M Jamboree that this year will be held on December 30 and 31st. What Bill would like to see (or rather hear) is all the 'heavy iron' and broadcast transmitters converge on 160M for a sort of showcase of the high-quality audio that the AM'ers are capable of. He's posted notices on some of the SWL websites and has invited everyone to send in their comments and their vote for the best-sounding station to me at ER. I'll tabulate the results. Bill is going to provide a 'fabulous commemorative trophy' for the winner. I'd like to suggest that stations that can't put a big signal on 160 (like myself) leave 1885 clear for those that can. I think it's going to be a very interesting evening.

The Annual ER/N2KSZ Memorial 160M Jamboree/Contest will be held on December 30/31 this year. I think this is the 8th or 9th year we've sponsored this event and it's always been a great success. The logs should contain all the usual information and should arrive here no later than January 30. I'll have a full report on the event in the February issue. As usual there will be awards and maybe some kind of prizes for the winners. Happy Thanksgiving to everyone. N6CSW

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Cover: Jon Pevner, N1LIS in his vintage hamshack.

Weird and Wonderful Signals I Have Heard

by William Orr, W6SAI
48 Campbell Lane
Menlo Park, CA 94025

Time Frame: Height of Cold War
Frequency: 14,015 kHz
Message:

"Sky King, Sky King. This is Pine Tree. Do not answer. Do not answer.

Alpha. Romeo. Bravo. I say again: Alpha. Romeo. Bravo. Pine Tree out."

What was going on? Who were Sky King and Pine Tree? What was the one-way message about?

The answer to this riddle came out as the cold war ran down to a conclusion. Pine Tree was the Strategic Air Command Base at Offut Field in the mid-west and Sky King was a jet bomber carrying an atomic missile. It would fly towards the Soviet Union and turn back before it entered Soviet air space.

If the coded message broadcast on five or six different frequencies carried a certain code, the bomber would fly on to its assigned target, deep inside the USSR.

The theory behind this scary idea was twofold: the message would recall the bomber. On the other hand, if there was no message at all, it would signify that the SAC base had been wiped out. I don't know what the operational sequence would be if there was a solar fade-out during the transmission periods. There must have been some means of checking the absence of transmission before the flag went up, but I don't know what it was.

I occasionally tune across 14,015 kHz and each time I do I think of Pine Tree and Sky King. The ICBM made them obsolete.

Single-letter Beacons

During the mid-eighties there were interesting HF signals whose purpose was unknown. For simplicity, the listeners who were trying to solve the puzzle broke the beacons down into three families.

The first family of beacons sent the Morse code letter "K" in frequency-shift telegraphy. The location of the beacons seemed to be near the Petropavlovsk area on the Kamchatka peninsula on the western fringe of the Soviet union. Since there was a Soviet submarine base in that vicinity, it was a good guess that the beacon was connected in some way with that service.

The second family of beacons sent the Morse code letter "U", also in FSK. This beacon seemed to be in the Murmansk area of the USSR where a submarine base was located.

The third family of beacons were named "Cluster beacons". This was a large group of single letter beacons grouped close together in 4 kHz segments of the spectrum. As many as 20 beacons would be in a cluster, each sending an identifying letter in Morse code.

Listeners in various parts of the world heard these beacons and it seemed that the beacons were scattered all over the Soviet Union, with perhaps some beacons in adjoining Soviet-supervised countries. At least 150 beacons were logged, and probably more existed that were not heard outside the USSR.

Obviously a lot of time, money, manpower and electricity were expended to keep these signals on the air. What purpose did they serve? One guess is that they were used for ionospheric research and propagation alert. No one seemed to know and the Soviets weren't talking. With the collapse of the Soviet Union, the beacons gradually went off the air.

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AM International - November Update

by Dale Gagnon, KW1I, President

AMI Discovery Weekend

Last minute family plans prevented me from operating the Discovery Weekend from the home QTH, but I did get in some mobile contacts. AMI Headquarters received more logs than in previous years. My thanks for those of you who included, with your log, a brief note on your experience during the event.

Jack, W9GT was getting over the flu, but managed to make 20 contacts from Michigan to Australia! Jack used the Collins 30K-4 on 75 meters, the Federal 167-AY on 40 meters and a DX-100 on 10 meters. From Tim, N5DWV's log I can tell there was plenty of 20 meter AM, 11 of his 32 contacts were on 20. George, N7HR had 28 contacts. He commented that the AM QSOs were more congenial and personable in contrast to "sterile", "machine gun" SSB exchanges. Bob, KG2OK made 49 QSOs on 40 and 75 meters with his Warrior amplified DX-60B. John, W6MIT submitted a log with 28 contacts covering 160, 75 and 20 meters. 18 out of 21 contacts made by Don, K4KCL from Riverside, Calif. were with AMI certificate holders. Sounds like the AMI members are alive and well in southern California! Don, W6BCN sent in 28 contacts on 40 and 80 meters. He noted he will have 20 and 10 meter antennas next year. He said, "Great fun, I stayed up til the wee hours of the morning to work east coast hams — like when I was a lot younger"! Norm, N3RZU's log had 54 contacts. Bob, K7POF sent in a beautiful spreadsheet with his logging information. He led the pack with over 80 contacts from 10 to 160 meters. About 40% of his contacts had AMI certificate numbers. David, VK2BA reported last week that he made over 40 contacts from Australia. He said he would be sending in his log sheets. Recognition certificates will be sent out this month.

Thanksgiving AM Jamboree

If you missed Discovery Weekend you can have some operating fun over the Thanksgiving weekend. The Thanksgiving AM Jamboree was for many years promoted by the Society for the Promotion of AM (SPAM). It starts up anytime you get your filaments lit on Friday evening, Nov. 24 and extends through Sunday, Nov. 26. All bands are included, but give special emphasis to 10 meters if it is open. If 10 is dead, let's look for each other around 21.420 +/-. An endorsement will be cited on award certificates for those stations that work over ten different AM transmitters. For homebrew transmitters, log the final and modulators in use. Exchange of AMI certificate numbers is encouraged. You do not have to be a member of AMI to participate. Send logs to AMI Headquarters, Box 1500, Merrimack, NH 03054.

Collins Collector Association Monthly AM Night

The CCA is starting a monthly AM net to be held on the first Wednesday of each month. The first one was held on Nov. 1. Conditions were noisy in the Northeast on this first meeting and I did not check in, but there was quite a bit of activity. It is scheduled for 3885 kHz starting at 2000 CST (0200 UTC). You do not need to be a member of CCA, nor do you need to be running Collins equipment. CCA will continue running its quarterly AM night on its regular 75 meter net on months that have a 5th Thursday.

General AM News

About 135 QSL's confirming contact with the Dayton Hamvention AM Festival station this last May were mailed out in October. We had trouble finding addresses for only two QSOs. We probably made a mistake logging a callsign

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Restoring the RCA AVT-112A

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

The RCA AVT112A aircraft transmitter has been ably described by Norm Chipps back in ER number 129. Readers are referred to that fine article for a history of the rig. The purpose of this article is to describe some restoration methods I have recently used to make replacement parts. I hope this information will be useful to anyone in the same predicament; namely rigs with missing or severely damaged components.

On the afternoon of October 3, 1962, I was in a hurry to get home and catch the splashdown of Wally Schirra's Sigma 7 Mercury space flight. Sigma 7 was to be the longest US space flight to date, and of course there was much apprehension. Most people who were able gathered around their TV sets. No astronaut had ever flown in space that long before, and the future of the program depended on success of the previous mission. I mistakenly thought I had plenty of extra time to get home, so I decided to stop and see Eddy Sand, my Elmer.

Eddy was an old-time telegraph operator then in his nineties, and had spent most of his life copying 19s and 31s off the train wire. Get him going, and he could talk for hours about duplex telegraphy, bone-headed dispatchers, and the ham in some other station. (In those days, "ham" was a derogatory term for a poor operator.) Eddie answered my knock on the door, and as always he welcomed me into his old house that was part radio station and part museum. He leaned back in his chair, reached for the Prince Albert can and filled his pipe. He started spinning some yarn about a mix-up in an order that nearly cost someone his life. These stories always began with "I remember the time when....", so I always thought of them as the 'Remember When' stories. About halfway through his latest tale, the back door opened and his nephew Matt walked in off the rear porch. Matt was a character equal to his uncle, and he was usually up to something. I kind of avoided him, not that he was doing anything that would get a guy in trouble, but I just didn't have time for his schemes. One time he convinced me to help him pick up several pallets of Command sets from a surplus auction that had been purchased for 2 cents on the pound. Matt took them home and spent the next 3 weeks flattening housings and chassis with a big hammer. He used the aluminum to replace rusty floorboards on his Volkswagen bus, and I got a few 1625s for helping lift the pallets. A little while later he loaded the bus full of steel tubing and all of the new flooring ended up on the street.

Trying to be friendly, I asked Matt if he had run across any good stuff lately, because the guy lived at surplus sales and aircraft junk yards and was supplying all the guys around with antennas, selsyns, dynamotors, BC-348s, transmitters, whatever. He jerked his thumb over his shoulder and muttered "nuthin" except that old transmitter over there, and it ain't even complete."

I glanced across the room at the shelves holding their accumulation of radio and telegraph "treasures" and spotted the newcomer, the RCA AVT112A. It was a mess. The antenna loading and coupling coil forms looked like they had been smashed, the moveable coils inside the forms were broken,

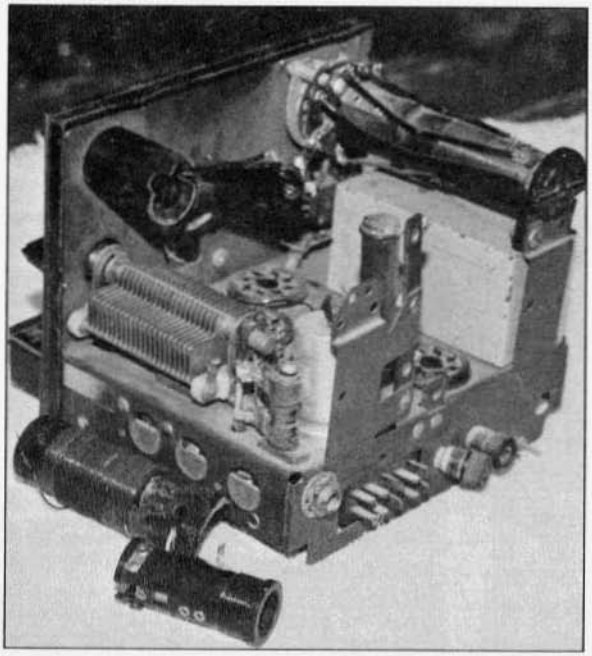

Figure 1. This photo shows the sorry state of the chassis as it awaited my efforts.

and many electrical parts underneath the chassis were missing. The ends of cut wires were hanging down from underneath. Broken bits of the tuning coils were wrapped in a piece of paper from the Union Pacific School of Telegraphy. I thought the front panel was great looking, and being a sucker for anything with a magic eye tube I decided to overlook the near-impossibility of fixing it up and go ahead and try to get it. I paid Matt one dollar for it, which was all I had on me. He said the mechanic he got it from claimed it had come out of an AAF plane that was returned from the European Theater. As he put it, "...yer getting a real veteran with that thing!"

At this point, Matt and Eddie Sand got into an argument about something that probably never happened, and not wishing to be involved with it, I beat a quick retreat out the front door. I got home, but the space flight was over, and the next shots were not scheduled until the next spring. What a contrast! In a couple of hours I'd gone from duplex telegraphy to space flight, and was the proud owner of an RCA aircraft transmitter.

The next 38 years saw no change in the transmitter's status. It remained a busted up mess with a good-looking front panel packed away in a box. I used to lose it for years at a time, only to rediscover it while looking for something else. It spent about 10 years in my Dad's attic. At one time the old rig spent 3 years in the trunk of a '40 LaSalle sedan I never did anything with. When I ran across it in a crate out in my parts shed in the summer of 1999, I decided that if it didn't get a restoration soon it probably never would.

Figure 1 shows the sorry state of the chassis as it awaited my efforts. Figure 2 shows the remains of the antenna-coupling coil, as it was unwrapped from the yellowed telegraph school paper. It is some kind of a miracle that the little bag of broken parts never got separated from the chassis. I did manage to lose the tuning chart that slips into the front panel, but fellow boat anchorites came to the rescue and supplied some original replacements.

I decided to start by taking a complete inventory of all the damage and I disassembled the tuning mechanism for inspection. It turned out that the antenna coupling coil follower tab that rides in the tuning thread was completely missing, the support piece at the back was broken, and the coil form itself was split into two parts with a large chunk missing. The outer coil forms are made out of a thin, brittle phenolic material. The antenna loading coil was still attached to the chas-

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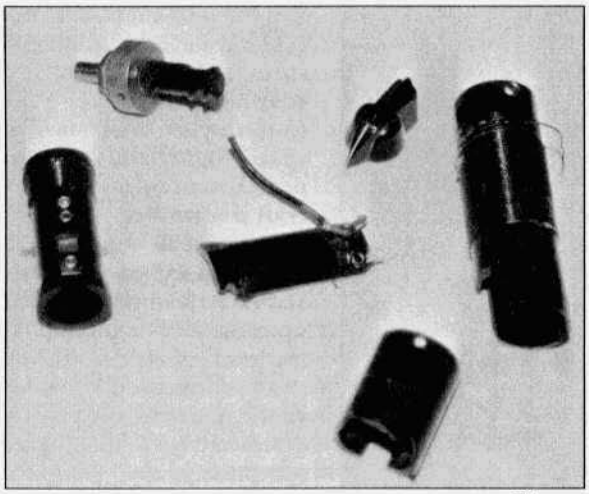

Figure 2. The remains of the antenna coupling coil.

Figure 3. The good loading coil with the intact coil follower.

sis, but the internal thread that drives the moveable coil piece was damaged and not moving the coil. I took apart the loading coil on the other side. To my surprise I found that the coil follower tabs were identical, having been cast in the same mold back in 1939. Close examination revealed the same tooling marks on each piece, and they had the same casting number.

This discovery sparked an idea. Some years ago I purchased a few small machinists' tools for a radio project from a mail order house called Micro-Mark. You get a catalog forever with any purchase, and I recalled seeing casting resin and mold material for sale. I looked over their latest catalog and ended up ordering silicone mold putty, two-part casting resin, and an epoxy putty called "Milliput" which is imported from England.

Figure 3 shows the good loading coil with the intact coil follower, and figure 4 is the tuning coil with the broken part. My plan was to remove the follower from the good coil, make a mold of it, and cast a brand new part. Having my doubts about the outcome, I nervously ground off the rivets holding the undamaged coil follower with a Dremel motor tool. These parts are shown in figure 5.

Mixing up the mold putty was easy. I used the cap from an empty spice jar to hold the mixed putty. I pushed the good part down into the goop before it set as the directions said, and found it very easy to work with. Next, I mixed the 1:1 casting resin and poured away. The results were excellent; I could have made dozens of them. Figure 6 is the good part sitting in the mold putty. Figure 7 is the old thread follower on the left and the brand new part on the right. A trip to the hardware store produced some small brass rivets identical to the original RCA parts. I installed both followers in the original manner.

Success! Now all I had to do was restore the broken coupling coil form, insert the moveable coil, and replace some missing coil wire. The phenolic coil tube was repaired with the Milliput epoxy putty. This stuff is a two-part

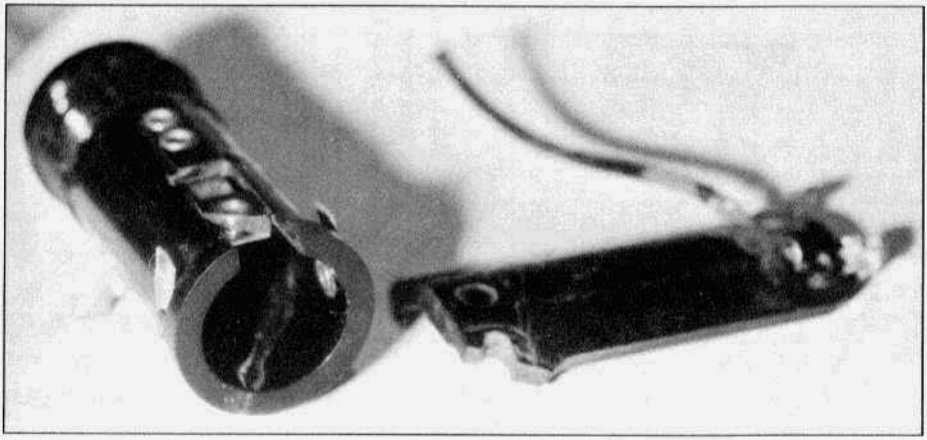

Figure 4. The tuning coil with the broken part.

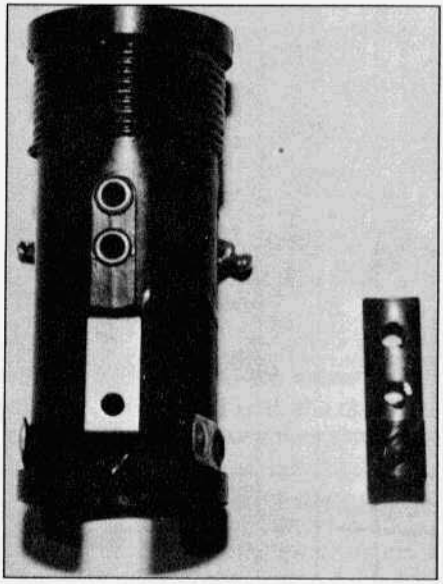

Figure 5. The good tuning coil with the undamaged coil follower.

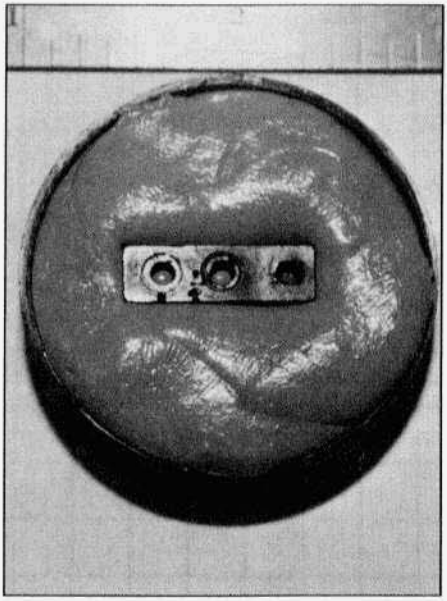

Figure 6. The good part sitting in the mold putty.

epoxy mixed by hand. The coil form was first glued with thin super glue along the unbroken edge to hold the tube in a straight line. Then, a thin piece of plastic from a product wrapper was slid down inside of the coil form to provide support for the epoxy putty while it was curing. The putty was applied to the missing portion of the tube, with the plastic wrapper providing inside support. Milliput cures very hard, hard enough that it can be milled, drilled, tapped, etc. Figures 8 and 9 are the before and after shots. All I had to do was carve and sand the cured putty until the shape matched the coil form. The coil form has since been painted brown to hide the patch.

Now I had a fully restored coupling coil. The loading coil had a damaged

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Figure 7. The old thread follower on the left and the brand new part on the right.

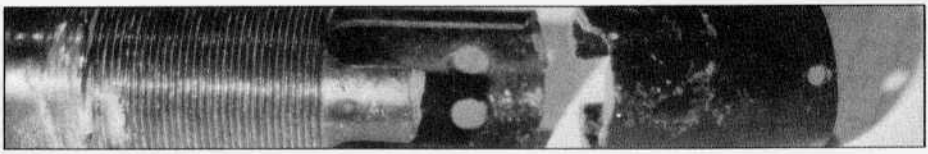


Figure 8. Before repair.

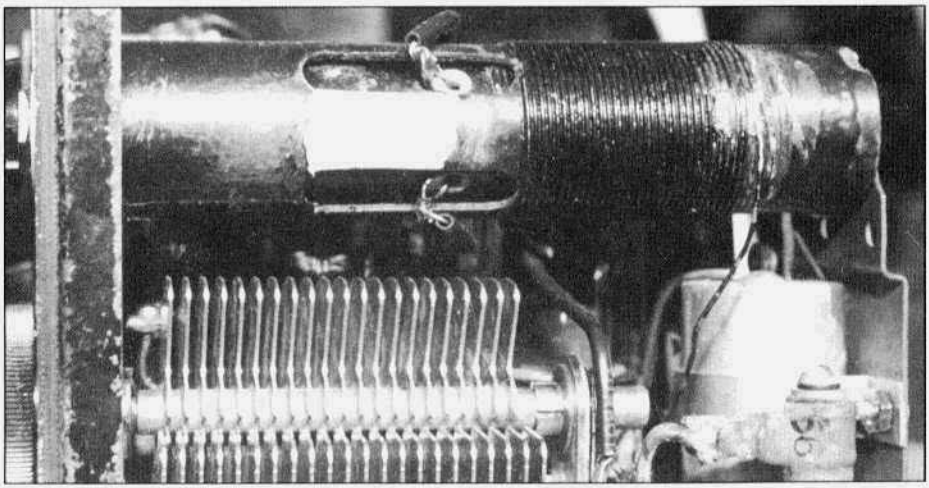


Figure 9. After repair and installed back in the rig.

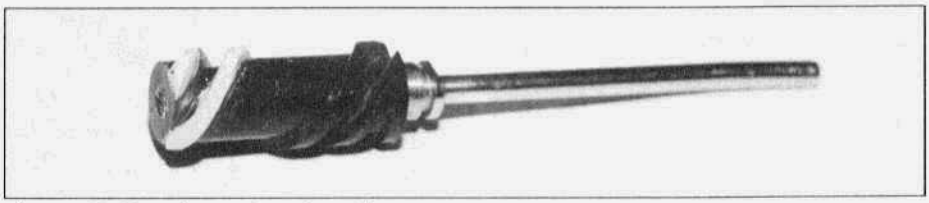
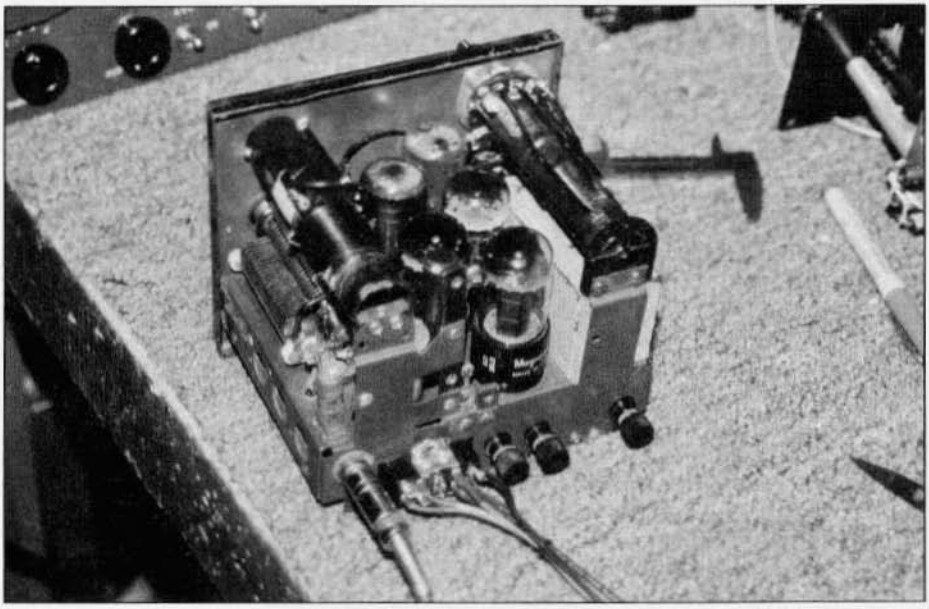


Figure 10. Repair tuning thread.

tuning thread, as mentioned before. About half of the length of the thread was missing. This was also restored using Milliput. This time when I mixed the material, I rolled out thin circular pieces on a sheet of waxed paper. These were placed around the thread shaft, following the path of the broken threads. I let it cure in place about a day, and then started shaping it with needle files and sandpaper. Results of this work are in figure 10. Shaping the new thread was probably the most tedious part of the entire project, but it was entirely satisfactory. Total time was probably about 4 hours.

Electrical restoration was performed like any other rig. The only place I could find electrical schematics was in Volume 2 of the Surplus Radio Conversion



The RCA AVT-112A restored to working condition.

Manual. I was fortunate to have a supply of generic vintage parts such as cotton-covered wire with the right color traces, genuine EBY terminal posts, and some old metal Jones plugs. Also on hand were the correct style Allen-Bradley carbon resistors. The toughest part to find was a missing 991 neon lamp that was in parallel with the oscillator crystal. The lamp base was also missing. Locating these parts turned out to be the worst part of the entire restoration. I eventually found not only the right lamp, but also the exact socket at a parts house in Denver, Colorado. Fortunately the original T-R relay was in place and it was good.

The AVT112A used Micamold capacitors throughout. One bypass in the modulator was shorted, and I was without the correct style replacement. I was able to make a new one using the original part as a pattern. No photos are available, but all I did was to make a separate mold of both sides of the old condenser. Then a casting was made of both pieces and a modern .47 uF 1 kV disc ceramic cap was pushed down into the resin before it set up. When cured, the two halves were glued together and painted. With the color dots painted correctly and the seam sanded, the results were very nice. This entire process only took an hour and the mold can be used again to "make" other condensers.

I used the rig last winter and worked eight states on 80 meters with 7 watts from the 6V6 final. Copy was always rough on the other end, so this winter I will be using a push-pull 1625 amplifier. Rig and amplifier will be running on 24 volts DC with B plus from a DM-49X dynamotor. Hope to see a few of you on 3579 kc this winter. Who knows, maybe we can work the ghost of Eddie Sand some dark winter evening! ER

Article notes:

Micro-Mark phone number is 1-800-225-1066. They are also on the Web.

Special thanks to Mike (N4FS) and Chuck (W4MIL) for supplying replacement tuning charts.

The 150 Watt Crystal Oscillator

by Chuck Teeters W4MEW
841 Wimbledon Drive
Augusta GA 30909

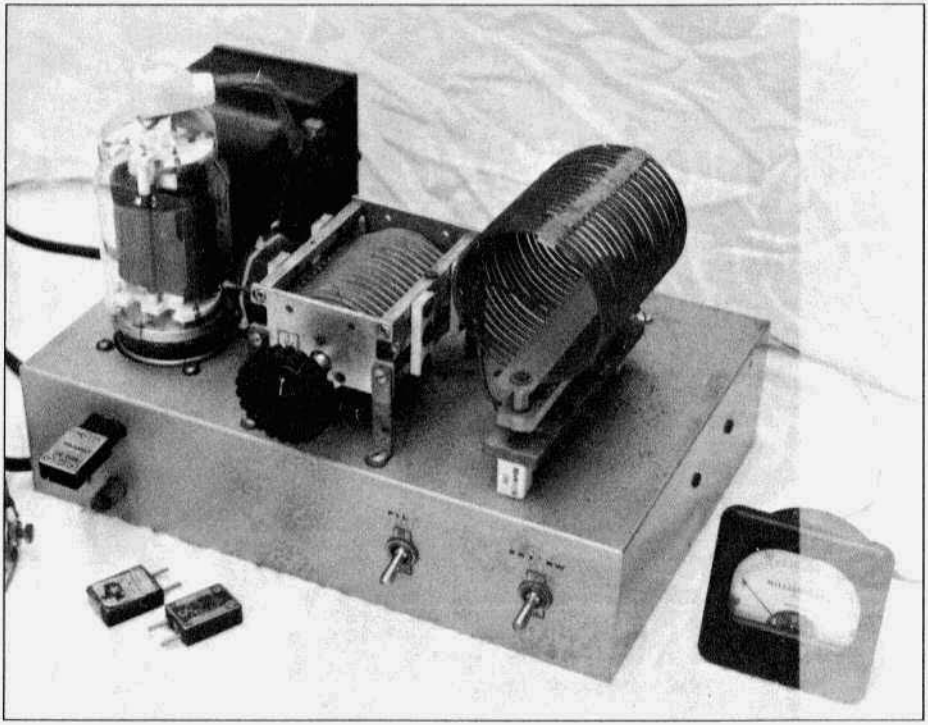
The passing of Lew McCoy, W1ICP, and his monthly articles "Looking Back" is a loss that all readers of ER will feel. His insight into the goings on at ARRL headquarters was something I always looked forward to reading. But to my mind, his best writings were during his days at *QST*. His great explanations of the equipment he designed and built for the newcomer to ham radio were always written in a manner the novice could understand. I think Wayne Green's suggestion that W1ICPs autobiography would have been called "My 40 Years As A Novice" is the best tribute anyone could offer to the McCoy easy explanations of circuit workings and construction techniques.

One of Lew's construction articles I always remembered was his 1961 one-tube 40 watt crystal controlled novice transmitter. The rig, with a 6146 grid-plate crystal oscillator, always amazed me. Why anyone would build a 40 watt crystal oscillator left me dumbfounded. How he did it without fracturing the crystal was beyond me. Apparently it caught the interest of Ralph Scott, K4AWY, also. Scott must have read the article and said I know how to top that and he did, with a 150 watt one-tube crystal oscillator transmitter.

I never met Scotty, as he was called by his friends in North Augusta, SC, I was introduced to his memory by Dick, K4FKJ at the local radio club. Dick was passing around a list of ham radio equipment he was selling for Scotty's wife, Jerry, K4AWZ. Scotty was originally licensed in 1934 as W4CVZ in Cornelia, Georgia. He joined the Navy in 1936 and was commissioned in 1941. He started WW II as commo officer on the aircraft carrier Wasp. He left the Wasp swimming when it sank in 1942. He spent the remainder of the war on various aircraft carriers, always as Communications Officer. After the war he held a series of calls, JA2AA, W1SOL, and F7ET just to name a few. He retired from the Navy to Edgefield, SC in 1961 where he picked up K4AWY and Jerry got K4AWZ. Scotty signed SK for the last time in November 1999.

When Dick didn't get rid of all Scotty's stuff, he had a Saturday morning ham estate sale. Never one to pass up a ham sale I was there bright and early. It was the first time I had a chance to see Scotty's stuff. He was a great builder, the numerous items of home brew equipment demonstrated super workmanship. I picked up a very nicely put together 808 push-pull amplifier and some spare 808s to send up to W3VU. I found some VT-4s for W4QBEs BC-375. There was some military stuff that I could send off also. A real work of art was a 2-meter amplifier with 4X250s that would be just what K2INA would want. I bought an old 2-meter converter that would have made Ed Tilton, W1HDQ, proud, in 1947. Scotty was a pack rat like myself, and I picked up lots of parts and tubes for some of my many uncompleted projects. Sure wish I had met him before he passed away. Going through his junk made me feel like we would have been kindred souls.

An interesting find was a one-tube 813 crystal oscillator transmitter. Scotty had apparently used it on Army MARS as the crystals were MARS frequencies. I looked at it at least 10 times while surveying what to buy. No one was showing any interest in the rig. I hated



The 813 crystal oscillator transmitter built by K4AWY.

to pass it up but I had no real interest in owning a one-tube power house and none of my ham friends had ever expressed any interest in something like that, so I had no place to send it. Scotty had a great collection of ham radio books, Handbooks from '39 to '98, taken by Ed, K4SZQ, and QST from '34 to '98. The QSTs were scooped up by Henry, KN4AV, but I talked him into letting me take the 1934 to '39 issues for a few weeks. I have QST back to '40, but never read the 1930 issues which proves I am a lot younger than I look. Finally with my trunk full I left for home.

Saturday evening while reading the March 1939 issue of QST I ran into an RCA advertisement on the back cover for the "Brand New 813". It said "At last—A single tube 150 watt xtal rig that can be plate modulated as well as keyed". This had to be the 813 rig that Scotty had built. I called Dick and said I wanted that transmitter. We got together a few days later and I was out some small change but was the proud possessor of a one-tube 150 watt rig. It matched the 1939 RCA schematic except it had the keying relay in the cathode instead of the screen. The RCA advertisement said the circuit was a Reinartz tetrode xtal oscillator. That I had to look up.

I found the Reinartz oscillator described in the July '37 QST. It is a cross between the grid plate and tri-tet. The cathode tank is tuned to half the crystal frequency, and the following multiplier supplies feed back to the oscillator when high order harmonic output is desired. There was no mention of crystal current. Neither the grid plate or tri-tet is noted for low crystal current, but it must have worked or Scotty would have a bunch of fractured MARS crystals. The crystals were FT-243s and were

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From the back cover of the March, 1939 issue of QST

good. Looking over the transmitter I tried to get an idea of when it was built. Lots of WW II surplus made it post WW II. The 24 volt keying relay power supply tucked under the chassis had silicon diodes in a voltage doubler running from a 12 volt winding on the 813 filament transformer. The filter caps had a 1963 date on them. The high voltage rectifiers in the separate 1500 volt power supply were top hat silicon. They were series connected with equalizing resistors and spike protection caps, typical of the '60s. My guess is that Scotty built it some time around the mid sixties. This would be the right time frame to follow the challenge of W1ICP's 6146 one-tuber.

While checking out the wiring against the RCA schematic, I found the grid resistor was open so I replaced the 30K 5 watt with a similar one. There was no continuity through the keying relay until I cleaned the contacts. There were three plate coils, but only one had a coupling link. I put 120 volts on the primary of the filament transformer, and the 813 lit up and I had 24 volts DC on the Command set keying relay. I borrowed 325 volts from an old 20 watt 6L6 modulator power supply to get plate voltage for the initial test. I didn't want to take a chance with one of my favorite rocks so I found a 3691 kHz crystal for the testing. I put the plate voltage to the 813 and hit the key. Tuning the plate tank the crystal took off easily. Tuning on the high side gave a nice note and good starting. The plate current was 25 mA and no indication of crystal current on the 49 pilot lamp in series with the crystal. With a temporary 3 turn link around the tank coil, it loaded up to 40 mA giving 13 watts input. The off resonance plate current was 50 mA, a little over 16 watts plate dissipation which wasn't going to hurt the 125 watt 813. I shorted out the screen resistor to bring the screen voltage up to the 325 volt supply voltage. The rig loaded to 90 mA and the off resonance current was 135 mA. The output was now up to 17 watts. 63% efficiency, not bad for such a low plate voltage.

It was time to try the 1500 volts plate supply that RCA showed in their schematic of the crystal oscillator. I removed the screen resistor bypass and connected up the Variac I had borrowed from W1SUJ to Scottie's 1500 volt supply. I brought the voltage up till the plate current hit 200 mA. I dipped the final and brought the voltage up to 1500 volts. The unloaded in resonance current was 40 mA. Lightly loaded it was 100 mA with 100 watts output, 66% efficiency. The #49 lamp in series with the crystal was almost full brilliance, and did not change with changes in the plate tuning as long as I kept it oscillating. Running the rig for 30 seconds produced no noticeable heat in the crystal. Listening on my receiver, there was no short term frequency drift, which should be the first sign of crystal heating. I loaded the final up to 180 mA, and got about 130 watts out. The heavier loading dimmed the #49 crystal current lamp a bit. Tuning a bit on the high side of resonance gave good crystal starting when keying. But the keying was hard with very noticeable clicks. I found a choke in the junk box and put it in the ground lead of the keying relay contacts. A few tries with different caps and I had the clicks down to what seemed to be acceptable. While I was working on the keying the transmitter stopped with a bang. The xtal had shattered, didn't like that much current I guess.

Not to be discouraged I found a 3682 crystal and it tuned up fine. I connected up the antenna, and telephoned Richard, W1SUJ across town for a check. He gave me a good report with no clicks, and most important, no second harmonic. I set up a schedule with W8RM in downtown Bradford, Ohio for that evening. I got all the transmit receive switching worked out, and was ready

continued on page 36

Calling All Broadcast Transmitters

by Paul Courson, WA3VJB

I noticed this autumn that more and more members of the AM Community have acquired and converted vintage broadcast transmitters for use on the shortwave ham bands.

Here is the start of a "registry" of sorts, to encourage people to share conversion notes, documentation, and information on parts and operation.

To add or change a listing, please post it to the internet page bulletin board "The AM Window," available among the icons on www.thebizlink.com/am/

: Joe, N2YR,1948 Gates 250GY (pair of 810s into a pair) On 75M.
: Joe, WA3GMS, 1946 Gates 250C-1 (810s into 810s) AIR DATE TBD.
: Joe, WA2PJP, 1953 Collins 20V2 (4-400's into a pair) AIR DATE TBD
: Chuck, WA4HHG, Collins 20V2 (4-400s into a pair) On 160M.
: Tom W2KBW, Collins 20V on 160, 75 & 40M.
: Sam, KI4AE, RCA BTA-500MX current air status unknown
: Arnie, KØAS, Raytheon (pair of 304TLs into a pair).
: Keith, KØKE, Gates BC-1, pair of 833 into a pair, air status unknown.
: Bill, WA8LXJ, Collins 231-D, (pair of 450-T into pr. of 750-T) On 75M.
: Mike, WN3B, Gates 250C-1 (pair of 810s into a pair) On 40M.
: Dave, WB3ETN, Gates 250C-1, current air status unknown.
: Dale, KW1I, Collins 300-G (pair of 810s into a pair) On 160M.
: Jim, WA2WHV, General Electric XT-1 (833As into a pair) On 160M.
: Gary, N2INR, 1949 Collins 21E due on-air Winter 2000 on 75M.
: Jerry, KG2BK, Raytheon RA1000 (pair of 833As into a pair) AIR DATE TBD
: Scott, NØBST, Collins 300-G (pair of 810s into a pair) AIR DATE TBD
: Steve, WB3HUZ, 1946 General Electric BT-20A (pair of 828s into pair of 810s) on 160M
: Steve, N8JRJ, Gates BC-1G (75m), and Gates BC500T (160M) and General Electric BT-20A (160M)
: Mike, KO6NM, Collins 831-D (or D2). Pair 5-500s into a pair. On 75M.
: Jim, AA8XC, 1948 Collins 300-G, 160, 75, and 40M AIR DATE TBD
: Howard, W3HM, Collins 20V and a Gates BC-500. On 160M.
: Phil K2PG: One 20V on 160M and another in the process of conversion.
: Paul WA3VJB: 1949 Collins 300-G (pair 810s into a pair) on 40, 75 and 160M.
: Sam, W6HDU: RCA 250 (1937?) thought to be on 160M
: Bill, N2BC, RCA BTA 1R1 AIR DATE TBD
: Ed N2CWJ: Collins 20V AIR DATE TBD.
: Bob W2ZM: RCA BTA250K, and a Northern Electric 451A-1 both on 160M
: Sparks W4AES: Bauer 707 (pair of 4-400s into a pair) current air status unknown.
: Ed, VA3ES, '68 RCA BTA1-R3 (pair 4-400 into a pr.); and '70 RCA BTA1-S, not on air.
: Dale, VE3AAM, Gates BC5-P (pair of 3CX2500 into a pair) 75M
: Bill, K2LNU, Gates BC1-H (pair 833As into a pair) 160 and 75M
: Al, W1UX, RCA RCA BTA-500MX, (pr. of 833A's into a single 833A), AIR DATE TBD, 160 and 75M
: John, W6BM, Collins 20K (833X833) 160M, RCA ATA-1R (pr.4-400s into a pair), 75M.

QST...QST...QST...

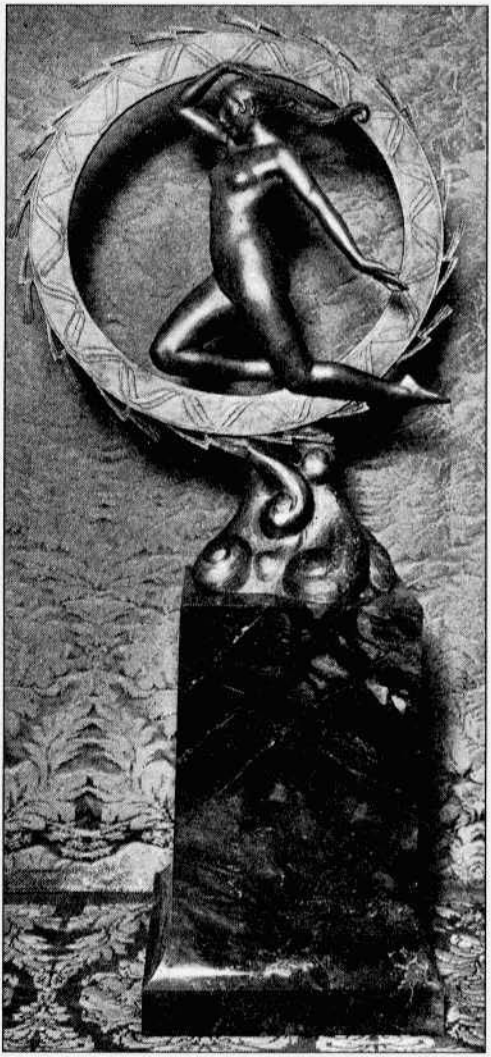
All owner-operators of broadcast iron [or any QRO gear using high fidelity broadcast components] are hereby invited to participate in the 1st Annual AMI/ Electric Radio Heavy Metal Rally and QSO Party December 23 on 1885.

The objective is simply to meet and greet friends and to hear some of the finest-sounding radio one could ever hear on the ham bands in one exciting night.

While everyone is welcome, participants are asked to run as close to the legal power limit as possible.

SWLs, other listeners and participants will be asked to send in their vote for the best sounding station to Electric Radio, with the winner receiving a fabulous commemorative trophy.

Bill Kleronomos, KDØHG



From the Editor:

KDØHG will be providing the "fabulous commemorative trophy" for whomever is voted to have the best audio during the 1st Annual AMI/ Electric Radio Heavy Metal Rally and QSO Party. I know Bill is still working up a suitable design for the trophy so I did some research and came up with this statue that might give him some inspiration. From "The Wireless Age", September, 1918:

"Shown is a sculptor's conception of "Radio". Much credit is due Edward Field Sanford, Jr., for his expression in bronze of the wildly onward-rushing electric waves. The figure of "Radio," rushing through space with an unearthly wind blowing her hair backward, and with every line eloquent of arrow-like speed, dominates the whole. Surrounding her is a circular halo, or ring, symbol of infinity and suggesting all the circular forms so common in radio apparatus. The coil, the winding, the rotary gap, and the dynamo all contain the circle, and all of these are closely associated with radio methods."

More Fun With a DX-60

by Bill Breshears, WC3K
6303 Homestake Place
Bowie, Md 20720
bbuck@ccconline.net

The article, "Fun With A DX-60", published in the May 2000 issue of *Electric Radio*, generated a surprising amount of additional interest in the Heathkit DX-60 and controlled carrier screen AM modulation. Surprised AM operators continue to give me unbelieving but good reports on the 80/40 meter AM bands. The following describes a significant circuit improvement and addresses a few of the most frequently asked questions that will be of interest to other users of the DX-60.

Easy AM Resting Carrier Adjustment Circuit

Some new discoverers of the DX-60 have continued to try to use linear amplifiers that really can't handle the resting carrier and/or peak power. Among the worst amps are those that use sweep tubes. Besides producing ugly distorted signals, this situation requires true sympathy for the poor straining tubes that surely must be running red hot, and have sagging power supplies. (Reminds me of my Ex.) Part of the problem is that the original circuit produces a resting carrier that is sometimes too high for the amplifier at levels approaching 10 watts. With the original circuit, these power levels vary as a function of plate voltage, final tube condition, drive, and final tuning/loading. A straight forward and simple solution was found as shown by the schematic of the improved DX-60 modulator, Figure 1. Replace the cathode resistor, (R26, 33K ohm, 2 watt) of the 6DE7 with a 50K ohm, 4 watt, potentiometer and rearrange (C36), the two capacitors making up 0.25 uFd, as shown. Now the DC screen voltage can be varied to set the resting carrier from less than 0.5 watt to greater than 12 watts with ease. Note that the full level of audio AC available at the cathode is still delivered to the screen via C36, resting carrier is almost independently set to the needed value and near full PEP audio still occurs. This makes a very convenient way to adjust the rig; modulated PEP level is set by the audio gain control, and resting carrier level is set by the new pot. This modification together with the previously described "Overmodulation Clamp/Indicator Circuit" make proper adjustment and operation of the screen modulator simple.

Modification Details

Unfortunately the Radio Shack pots are only 0.5 watts and will not handle the power in this application. The best pot is 4 watt, 50K ohm, however some are using a surplus Allen Bradley 2 watt, 100K ohm shunted by a 1 watt, 100K ohm, fixed resistor. This pot is so handy I have located mine on the front panel in the spot used by the xtal/VFO rotary switch. (I only use the VFO position anyway.) This is easily accommodated with a reversible modification by simply removing the 8 inch long xtal/VFO switch control extension shaft and panel bearing. W3BYM placed this control on the front panel together with the relocated audio control. They are positioned in a vertical line with the "Drive Level" in a space just to the right of the meter. They are convenient to adjust, and look good.

Additional Final Tuning Comments

I have received a number of ques-

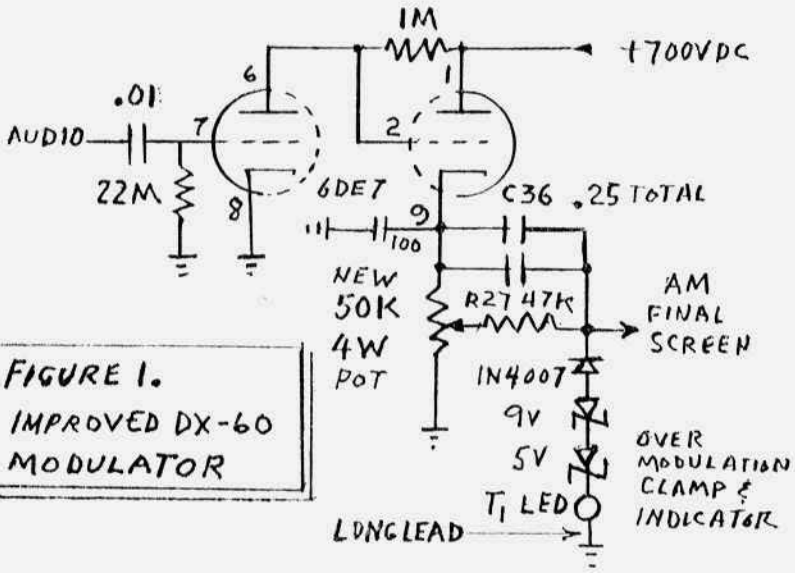


FIGURE 1.
IMPROVED DX-60
MODULATOR

tions regarding how I tune my 6146 final for screen modulation. The instructions in the original article are still appropriate, however the following additions are included here:

The tuning/loading of the final affects the output, carrier to PEP ratio, and the audio quality. I originally tuned for the, difficult to describe, 'Sweet Spot' as monitored by scope and audio derived from the RF output by a diode demodulator. Now the same desired adjustments are best summarized as minimum drive and maximum loading. When this condition is achieved my 6146 (in the CW position) has about 1 milliamp grid drive, and is heavily loaded for a faint dip at above 200 milliamps plate current. The values obtained are a function of the condition of the tube and the amount of plate voltage. I prefer and use 750 to 800 volts. The proper amount of grid drive can be found for a specific tube by lowering it until just before the point it starts to affect plate current/output power. This CW output power is also the maximum value of PEP this final tube is capable of producing without flat-topping.

With the screen modulator in the circuit, plate current drops to about 50 milliamps. With the original circuit the resting carrier output would be about 7 watts and full (97%) modulation audio produces controlled carrier output power of about 50 watts PEP.

Resting Carrier Power Output Levels

The AM signal sounds terrific when amplified by a linear amplifier but carrier is a little thin for barefoot. Boosting the barefoot resting carrier output with the new pot to 12-15 watts helps, but sometimes is still not enough for 'Arm Chair' copy. The new pot allows my amplifier to be driven to any carrier level output between 20 and 350 watts. However just two carrier power levels of 25 and 100 watts usually accommodate all conditions and properly respects the linear amplifier. Interestingly, 100 watts of resting carrier with 800 watts of modulated PEP seems to sound 'Bigger' than 350 watts with 1500 watts PEP. Is this a function of the listener's receiver AGC? Does controlled carrier have the much discussed 'Gravitas'? Can a bumble bee really fly? I don't know, I'm just having fun using it. ER

LETTERS

Heterodyne VFO's and frequency stability

Having always strongly advocated good frequency stability in AM transmitters, I particularly enjoyed Rob Brownstein's article "A VFO Bakeoff" (ER, October 2000). Although Rob's comments regarding the results of tests run on the HA-5 heterodyne VFO are technically correct, he overlooks one important aspect of VFO drift. The most annoying instability is not the initial warm-up drift, although it does seem a bit excessive in the HA-5 he tested. With a heterodyne type VFO, there is a simple solution; just turn it on a half hour or so before you plan to go on the air, to allow the variable oscillator to settle down. Better still, let the VFO run on all the time, so it doesn't have to warm up every time you turn on the transmitter. Once thermal equilibrium occurs, the stability of a good heterodyne VFO should be far superior to that of a typical "amateur radio quality" VFO of conventional design. The HA-5 may not be perfect, but the fundamental design was driven as much by technology as by marketing. The disadvantage of a conventional VFO is that the variable oscillator must be turned off during standby, because the oscillator signal is usually strong enough to interfere with reception. During standby periods the frequency determining components in the oscillator cool down, and next transmission there is a certain amount of warm-up drift until the VFO again reaches thermal equilibrium. By then, unless one makes an "old buzzard" transmission, it is time once again to stand by. Throughout the QSO, the VFO constantly goes through a warm-up/cool-down cycle, moving up and down in frequency because it is never allowed to achieve stability. The advantage of the heterodyne VFO is that it is possible to allow the variable oscillator to run all the time without spoiling reception since the variable oscillator and the crystal oscillator are far removed from the operating frequency. The VFO is silenced by turning off the mixer stage while both oscillators are left running.

The main difficulty with the heterodyne VFO is a tendency to produce spurious mixer products. Unless the variable and crystal oscillator frequencies are VERY carefully selected and the mixer stages properly designed, undesirable "birdies" and images will likely appear close enough to the transmit frequency to be heard over the air and potentially cause harmful interference and FCC citations. A well-known example is the Yaesu FT-101 transceiver that transmits an audible image spur when run at full power on 160. Even the Collins 75A-4 receiver had this problem; that's why the 15-meter tuning range was shifted on the higher serial numbered units. Nevertheless, with careful design, a heterodyne VFO can generate a signal with near perfect purity and stability, using ordinary components.

Even the famous Collins PTO is not immune to standby drift. My homebrew transmitter uses a Collins type PTO in a master oscillator unit removed from a T-368 transmitter. It originally drifted whenever it was turned back on after standby. Likewise, I have observed over the air substantial drift with the Collins 32V series transmitters, and even the KW-1. My solution to the problem was to build an RF tight shielded enclosure around my T-368 m.o. unit. I carefully added filtering to all power and control leads. The VFO now runs all the time, even when the rig is turned off. The oscillator signal is inaudible in my receiver when the antenna is connected, so my VFO has the same freedom from standby/warm-up drift as a heterodyne VFO. My signal seems about as stable

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VINTAGE NETS

Arizona 40M AM Group: Meets on 7293 kHz at 10:00 AM MST (1700 UTC) on Sat. and Sun.
West Coast AM Net meets Wednesdays 9PM Pacific on or about 3870kc. Net control alternates between John, W6MIT and Ken, K6CJA.
California Early Bird Net: Saturday mornings at 8 AM PST on 3870.
California Vintage SSB Net: Sunday mornings at 8 AM PST on 3860 +/-
Southeast Swap Net: Tuesday nights at 7:30 ET on 3885. Net controls are Andy, WA4KCY and Sam, KF4TXQ. This same group also has a Sunday afternoon net on 3885 at 2 PM ET.
Eastern AM Swap Net: Thursday evenings on 3885 at 7:30 ET. This net is for the exchange of AM related equipment only.
Northwest AM Net: AM activity daily 3 PM - 5 PM on 3875. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT. The formal AM net and swap session is on 3875, Sundays at 3 PM.
K6HQI Memorial Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 5:00 PM PT, 7 days a week and usually goes for about 2 hours.
Arizona AM Net: Sundays at 3 PM MT on 3855. On 6 meters (50.4) at 8 PM MT Saturdays.
Colorado Morning Net: An informal group of AM'ers get together on 3876 Monday, Wednesday Friday, Saturday and Sunday mornings at 7AM MT.
DX-60 Net: This net meets on 3880 at 0800 AM, ET, Sundays. Net control is Jim, N8LUV, with alternates. This net is all about entry-level AM rigs like the Heath DX-60.
Eastcoast Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is Ted, W3PWW. Saturday mornings at 0500 ET on 3885 + or - QRM.
Westcoast Military Radio Collectors Net: Meets Saturday evenings at 2130 (PT) on 3980 + or - QRM. Net control is Dennis, W7QHO.
Gray Hair Net: The oldest (or one of the oldest - 44+ years) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8:00 PM EST & 8:30 EDT. http://www.crompton.com/grayhair
Vintage SSB Net: Net control is Andy, WBØSNF. The Net meets on 14.293 at 1900Z Sunday and is followed by the New Heathkit Net at about 2030Z on the same freq. Net control is Don, WB6LRG.
Collins Collectors Association Nets: Technical and swap session each Sunday, 14.263 MHz, 2000Z, is a long-established net run by call areas. Informal ragchew nets meet on Tuesday nights on 3805 at 2100 Eastern and on Thursday nights on 3875. West Coast 75M net that takes place on 3895 at 2000 Pacific Time.
Collins Swap and Shop Net: Meets every Tuesday at 8PM EST on 3955. Net control is Ed, WA3AMJ.
Collins Collector Association Monthly AM Night: The first Wed. of each month on 3885 kHz starting at 2000 CST (0200 UTC).
Drake Users Net: This group gets together on 3865 Tuesday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, W8NS; Rob, KE3EE and Huey, KD3UI.
Swan Users Net: This group meets on 14.250 Sunday afternoons at 4 PM CT. The net control is usually Dean, WA9AZK.
Nostalgia/Hi-Fi Net: Meets on Fridays at 7 PM PT on 1930. This net was started in 1978.
K1JCL 6-Meter AM Repeater: Located in Connecticut it operates on 50.4 in and 50.5 out.
JA AM Net: 14.190 at 0100 UTC, Saturdays and Sundays. Stan Tajima, JA1DNQ is net control.
Fort Wayne Area 6-Meter AM Net: Meets nightly at 7 PM ET on 50.58 MHz. This net has been meeting since the late '50's. Most members are using vintage or homebrew gear.
Southern Calif. Sunday Morning 6 Meter AM Net: 10 AM Sundays on 50.4. NC is Will, AA6DD.
Old Buzzards Net: Meets daily at 10 AM Local time on 3945. This is an informal net in the New England area . Net hosts are George, W1GAC and Paul, W1ECO.
Canadian Boatanchor Net: Meets Saturday afternoons, 3:00 PM EST on 3745.
Midwest Classic Radio Net: Sat. mornings on 3885 at 8AM Central time. Only AM checkins allowed. Swap/sale, hamfest info and technical help are frequent topics. NC is Rob, WA9ZTY.
Boatanchors CW Group: Meets nightly at 0200Z-0300Z on 3578-80 kHz. During the day at 7050 or 7147. Listen for stations calling "CQ BA" or signing "BA" after their callsigns.
Wireless Set No. 19 Net: Meets the first Sunday of every month on 7.175 +/- 5 kHz at 2000Z (3760 +/- 5 kHz alternate). Net control is Dave, VA3ORP.
Hallicrafters Collectors Assoc. Net: Sundays, 1730-1845 UTC on 14.293. Net control varies. Midwest net on Sat. on 7280 at 1700 UTC. Net control Jim, WB8DML. Pacific Northwest net on Sundays at 22.00 UTC on 7220. Net control is Dennis, VE7DH.
Nets that are underlined are new or have changed times or frequency since the last issue.

Variable Link Antenna Coupling

by Bruce Vaughan, NR5Q
504 Maple Drive
Springdale, AR 72764
nr5q@aol.com

I belong to an on-line group of 'hollow state' radio enthusiasts. Many are quite advanced in radio theory, and more than a few are experienced builders. However, the bulk of the group's correspondence indicates that their technical knowledge leads their hands-on building experience. A sizeable number of the group are interested in regenerative radio receivers.

Recent threads in our group have included discussions of screen grid detectors versus the common triode, how to best attain smooth regeneration, optimum values for grid leaks, and the merits of tuned and untuned RF stages. All these items are worthy of study but seldom does anyone touch on the antenna coupling coil though it is here that a marked improvement of operation can be made with very little effort or cost. I too have been slow to explore the advantages of variable coupling.

One might very well ask, "Why become involved with regenerative receivers in the first place?" The answer is obvious to those who love Howard Armstrong's invention, while it will forever remain a mystery to others.

Sometimes a brief magazine article, a club program, or a group discussion is all it takes to kindle an interest in those early radios. I recall the exact words that moved me to learn all I could about regenerative receivers. I was reading a magazine article about the old National SW-3. The writer made this statement: "The National SW-3 is so sensitive you can hear a flea walking across Europe."

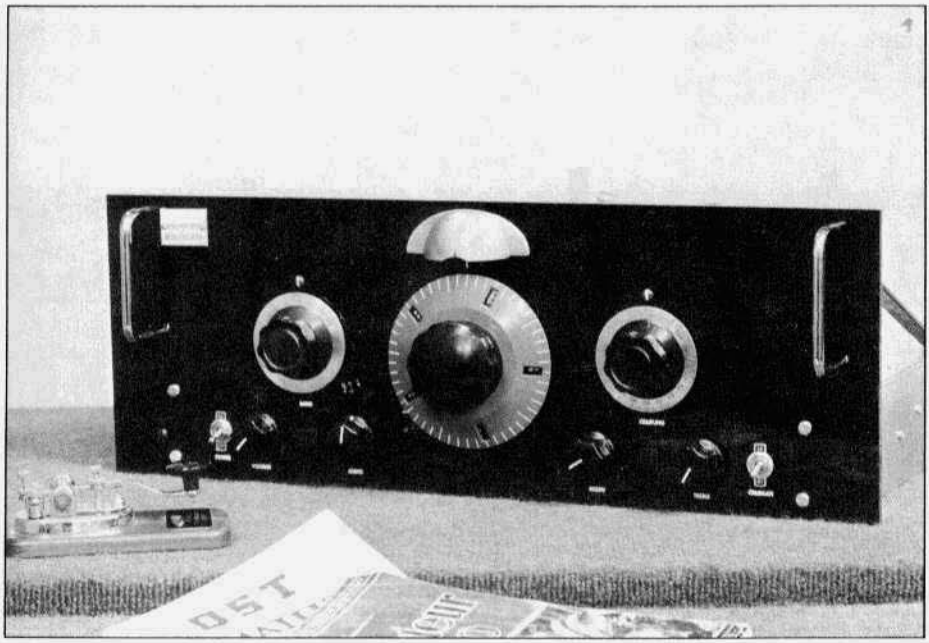
Of course this is a ridiculous statement but powerful enough to provoke thought. When I read that line I realized that even though I had been a ham for years and built many pieces of equipment, in reality I had very little knowledge and experience with regenerative receivers. Up until that moment I had built perhaps five or six, 1 and 2 tube receivers, and one, 4 tube circuit from an early Frank Jones Handbook. If my memory serves me correctly, not one of those early receivers was an outstanding performer.

When I mention regenerative receivers in a conversation with other hams the usual response goes something like this, "Oh yes, how I remember those old 'bloopers.' I can still hear the squealing and screeching as you tried to tune in a station. I suppose I must have built at least three of them before I gave up. Regenerative receivers are not for me."

A response like this tells you two things. The person you are talking to never built a good receiver, and he quit trying to do so much too soon. That is similar to saying "I tried to play a piano three times and I remember the sour notes that came from the musical instrument. The piano is not a practical musical instrument."

In the years following my rekindled interest, I built many regenerative circuits. When I hear signals from around the world booming in on a simple detector-amplifier receiver the thrill is as great as it was when I built my first receiver in 1933—give or take a year.

Many receivers later, I have learned how to attain smooth regeneration, how to avoid 'hand capacity' effects, and the answer to many other problems. I have also learned that I have yet to build the ultimate regenerative receiver. I have



A recently built receiver using one of the prototype units. It is painted black for appearances only.

only scratched the surface—there is so much left to learn. That is why I'll continue building 'regens' as long as I am physically able to do so.

I am convinced that there is a tendency among builders to couple the antenna too tightly in most regenerative receivers. Most of us old timers learned to build by reading Hugo Gernsback's publications, or from our 'Elmer.' And where did our 'Elmer' learn to build? He learned from Gernsback publications, of course.

The short wave radio craze swept our country during the early 1930's, the depression years. *Short Wave Craft* magazine, and the little ten-cent, yellow backed, Gernsback booklets carried dozens of articles on regenerative receivers that were simple and inexpensive to construct. To save money the antenna capacitor (condenser back then) was often two small squares of scrap metal, copper or aluminum if available, screwed to the breadboard and spaced about 1/4 inch apart. This simple capacitor saved the builder ten cents, and back then ten cents would buy a large loaf of bread. It did little to enhance operation of the receiver.

As I reread those articles today, I have the feeling that optimum performance was secondary to ease and cost of construction. The goal of most writers of the day was to present a radio that the average reader could build and get operating with a minimum number of problems. Because of this attitude many radios described in old magazines use a generous amount of plate voltage, thus making sure the set goes into regeneration and has a passable volume level with only one tube of audio amplification. It appears to me that tightly coupled antenna circuits were often recommended for the same reasons.

We must remember this was a time of great concern about 'losses.' Many builders insisted on ceramic tube sockets even though they never intended to

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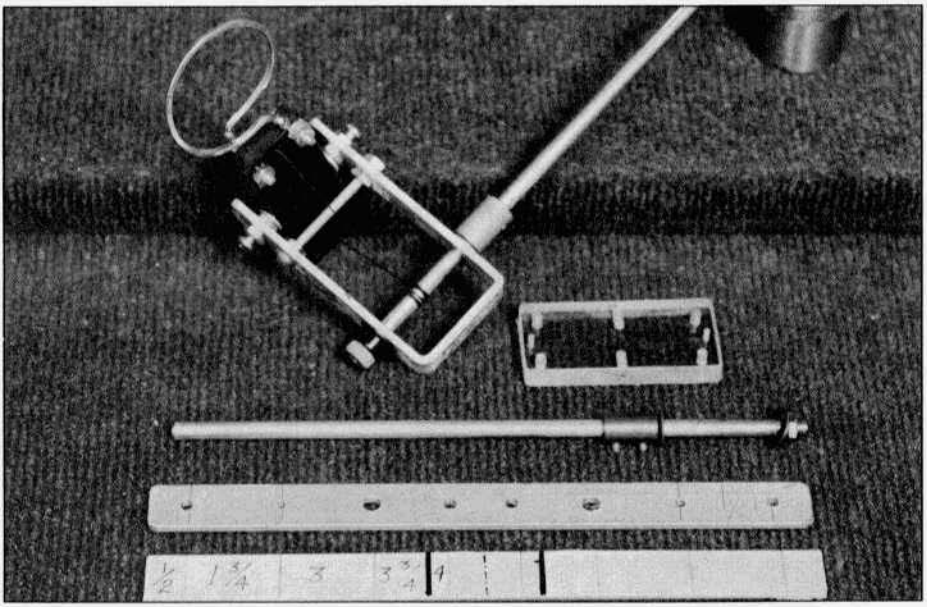

In the photo the measurements are given from each end of the aluminum strap. Heavy lines designate where strap is to be bent.

operate above 14 MHz. Most of the hams I knew were reluctant to surrender any signal that might come down the antenna lead-in. Perhaps we were victims of the depression—an era when a waste nothing attitude was imperative for survival. Whatever the reason, we all seemed to build as if more was better, even though any old timer could tell us of the desirability of 'backing off' when coupling the antenna to a detector. How else can I explain my delay in use of variable links in the antenna circuit?

I can recall at least two articles in *Electric Radio* featuring such circuits. My skull must be very thick-even after reading the articles it was some time before I rigged up a temporary link on one of my better receivers. I was amazed at the improvement. Even though many writers praised the one turn loop for the antenna winding, I wanted to use the receiver on 3.5 MHz up through 21 MHz without changing the loop so I made my first receiver using a two turn loop. After all, I could always move the loop further away from the grid winding. It seemed to work OK.

To control the movement of the loop from the front panel I used a rack and pinion gadget, obviously from some sort of military surplus, something I purchased for $1.00 at a local swap meet. It worked fine and looked great though the transport was a little faster than I liked, and it required more mounting space than seemed necessary. However, my major problem with the rack and pinion affair was that it was not repeatable. It is doubtful I'll ever find another. I like to build receivers that can be duplicated in my shop, or by others if they so desire.

Out came the *Electric Radio* file. I searched several years of the magazine and found that most builders used a simple, no frills shaft from the panel to the antenna winding. Some did not bother with the shaft—they just reached behind the panel and bent the wire supporting the loop. I tried both methods and was not pleased with the results.

The winding needed a vernier drive so that more precise adjustment of coupling, with the accompanying frequency shift, could be made. Why? Because I discovered that a slight movement of the coil was an ideal way to tune in SSB, it also proved to be a nice means of changing the pitch of CW signals. I wanted a mechanism that would require about three complete revolutions of the knob to get from 'lock to lock.' The useful travel of the winding would of course be much less-something in the vicinity of 360° of the dial should move the coil from a position level with the grid winding to a position less than two inches above the coil. By the way, in the evenings especially, it is not unusual to find that a spacing of more than one inch is desirable.

I went to work trying to design a mechanism that would do the job. My first prototype was a winner—if you wanted to take first prize in a Rube Goldberg contest. It was big, hard to construct, heavy, and generally impractical. Prototype number two was somewhat better. I will not go through the dozen or so prototypes that were built and discarded. I tried horizontal movements, vertical movements, and even something similar to the old variometer. Then, it all became very clear, I was trying to make something difficult out of something very simple. The mechanical swinging link shown is cheap, easy to build, and works smooth as silk. I have now built about six of this unit and can honestly find no flaws in the design. It takes me about two hours to build and requires a minimum number of tools—tools normally found in the average ham shack. Cost is so small it is difficult to estimate-probably no more than $2.00 at the most.

Here is a list of material needed:

One, 3/4 inch aluminum strap 10 inches long.
One small expansion spring.
One 2-1/2 inch long 8/32 machine screw.
Four flat washers and nuts for the above. (A 10/32 or a 6/32 will work just as well if you have one in the junk box.)
One, 18" length of dial cord or fishing line.
One, 10" length of 1/4" brass rod.
One small scrap of Plexiglas, Bakelite, or other plastics, approximately 3" X 1 -1/2", 1/2" thick.
Four, spade solder lugs.
One, 10" length of heavy wire anywhere from 10 to 14 will do—I prefer a 12 size.
Six, 6/32 X 1" machine screws.
Twelve, 6/32 nuts flat washers. A few extra nuts and washers may come in handy.
That is about it... Oh yes, if you want to use a sleeve bearing on the brass shaft you might need one old volume control to bust apart for the bearing.

I have a small drill press in my shop, a present from my wife on our first wedding anniversary 54 years ago. A drill press will make a project like this much easier. However, I see no reason why it cannot be built by using a hand drill. Your work will be a little slower and may not be as accurate but I'm sure it can be done.

I mentioned early in this article that I used a 2-turn loop or winding on my link even though old timers seemed to prefer one link. I need to clarify this apparent dilemma before finishing this article. The following is a true story and occurred less than two weeks ago. I normally use a Cushcraft R-7 for listening on my HB radios. Recently I moved my shop—not my shack—into new quarters. For the first time in my life I have central heat, air conditioning, and over 20 feet of well-lighted bench. I also have a bench just for 'burning in' my latest projects.

When I moved in I took five of my best receivers to the shop—partly for display, but primarily to have one to listen to while working. I prefer a good CW fist to Rock and Roll.

As an added luxury, I put up a nice

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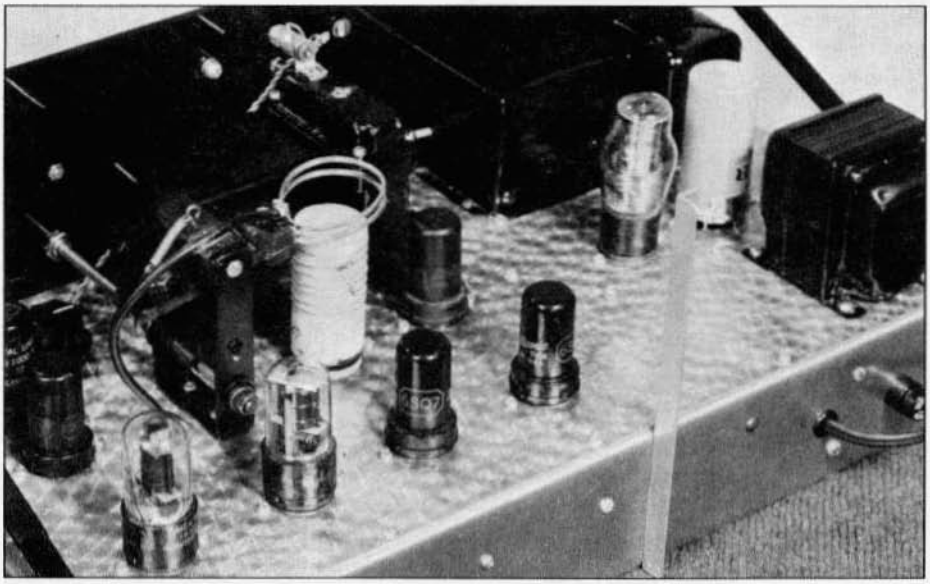


Rear view of the receiver with variable link antenna coupling installed.

old fashioned end fed antenna-one like we used out in the country when our radio used a 6 volt auto battery, three 45 volt 'B' batteries, and a small 'C' battery for power.

I searched for a soft place to drive a ground rod. Then, I spotted a 2-inch fence post left over from a dog pen I installed some 40 years ago. I decided the post might be far enough in the ground to suffice. After scraping the paint and rust from the post I fashioned a good connection by using a pair of 'U' bolts. It seemed OK but I decided to measure the voltage from my ground post to the hot side of my AC line. It was better than I expected—117 volts AC on my faithful but ancient analog Simpson.

I hooked up one of my better receivers—one written up in ER a few weeks ago. The reception was terrible. I ran measurements on the antenna and all seemed OK. The CW signals had a warble to them; I had a strange problem almost like the old hand capacity bug. This was body capacity—when I walked near the radio my CW signals changed pitch indicating a frequency shift. No matter where I set the regeneration or the antenna loop the set worked very poorly. I picked up a pair of side cutters and neatly snipped one turn from my antenna loop. After the loose end was re-soldered I gave the set a trial run. All my problems disappeared, and selectivity was much improved. It now rivals less expensive superhets, and runs circles around receivers such as the S-38 and Sky Buddy. The set is once again working perfectly—better than it worked on the R-7 antenna. When an old timer tells you that one turn is all that is needed on your antenna link—listen to him. Under certain conditions, but not in all, he is correct.

I think the pictures and diagrams should be easy enough to follow, however the following tips may be of value.

1. Once cut to the exact length, cover the aluminum strap stock with masking tape. Trim the edges with a razor blade. Do all your marking on the tape. When all the drilling is complete, you can remove the tape and have a nice unscratched part to work with.

2. Drill the 'rocker' holes, and the

holes for the all-thread brace, larger than the screws you plan to use. This will allow you a little movement of parts. Even if you are a great workman, when working with hand tools it is next to impossible to get all holes drilled exactly where you want them. Oversize holes will allow you to correct those errors by shifting those parts.

3. I do not believe a sleeve on the control shaft is worthwhile. Use a 1/4" drill bit for the shaft holes. Obviously a 1/4" rod will fit tightly in a 1/4" hole. Do not try to enlarge the holes. First, dress the ends down with a flat file. Give the ends a slightly rounded effect. This will make the knob slip on easier as well as the 'U' strap assembly. With fine sandpaper polish down the shaft until you have a snug, yet free turning fit.

4. If you do not have a thread cutting die you can taper the shaft end with a file and solder on a brass nut. This is not the best way to go. A nut is very helpful in adjusting tension.

5. If you cannot find 1/2" plastic stock for the rocker, glue two or three pieces together. I have found it necessary to do this and it works great.

6. Drilling holes off-center is easy to do, and really messes up a job. I find it helpful to drill small 'pilot' holes for every hole, then enlarge them with the proper size bit. I do much better work by drilling 'pilot holes' than I do by using a center punch.

7. Keeping your work square is all-important. When bending the strap into a 'U' check your work carefully with a square. It is here that the project can become a problem.

8. A certain amount of correction can be done after the 'U' is bent. Put the 'U' on a flat surface, press down on the bottom and move your square around checking in all directions. If found out of square, put the 'U' back in a vise and tap gently in the direction you need to move. A light hit with a hammer moves the bracket material significantly.

9. After stringing the dial-cord, (7) apply a small amount of glue to the knots in the cord. I use a toothpick for this-it is easy to get a larger glob on the string than you want.

10. Stringing the cord: I find it best to start with the rocker in a horizontal position. A pair of vise grips clamped to the shaft should help keep the unit rigid. Tie one end of the cord to the extension spring and pass the other end thru the small hole in the rocker. Pull the cord thru the hole until the spring will let you pull it no further. Pass the cord under the brass rod and complete two turns around the rod. Now, fish the cord thru the small hole you drilled in the shaft. Make sure the hole is centered between the upright sides of the 'U.' Pull the cord taut and make two more turns around the shaft. Do not overlap the turns. Pull the cord up thru the hole in the opposite end of the rocker, pass thru the eye of the expansion spring and stretch tightly—until spring is stretched from one end of the rocker to the other. Tie this end and apply a dab of glue to each knot.

About now I would bet you are wondering what the screws are for in the rocker arm opposite the loop. They serve no purpose other than act as a counterbalance. Notice that there are a total of six nuts on those two screws. The loop end is still a little heavier but not enough to cause the rocker to 'creep.' It is easy to add a longer machine screw and more nuts if the coil ever moves because it is unbalanced.

If you are into regenerative receivers this project is worth your time and effort—I'm sure you will be pleased with the improvement in reception. As usual, I am glad to answer questions, or just engage in friendly correspondence via e-mail. If you write me by snail mail please enclose SASE for a reply. Please e-mail me at NR5Q@AOL.COM. ER

The RME-70

Bringing a Boatanchor Back to Life

by Jim Hanlon, W8KGI
P.O. Box 581
Sandia Park, NM 87047
w8kgi@arrl.net

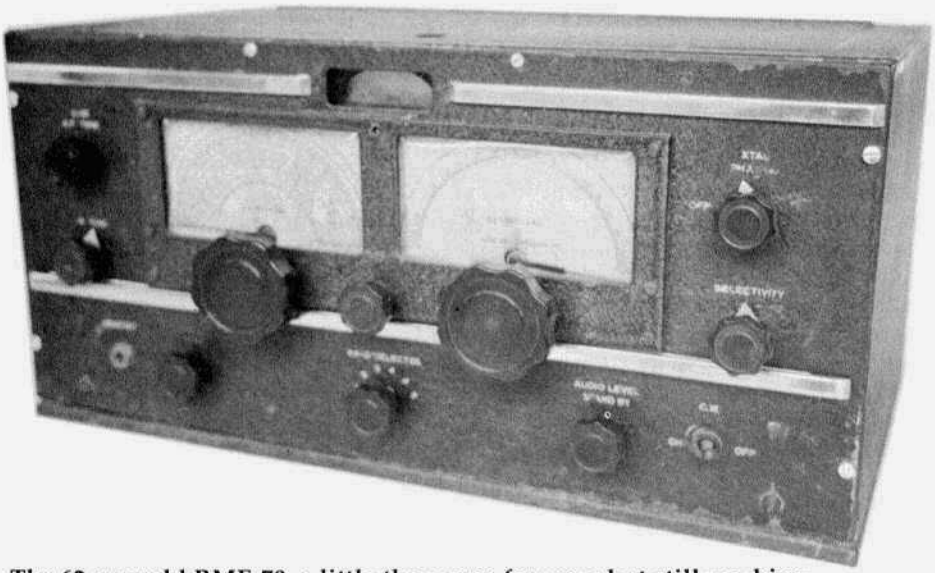
The RME-70 is an RME-69 with square tuning dials, a noise limiter, and racing stripes. Well, really it's a little more than that, but to a first order that's not a bad description.

The RME-69 came out in 1935. It was the fourth receiver model produced by E. G. Shalkauser and Russ Plank who were Radio Manufacturing Engineers in Peoria, Illinois. RME led all other receiver manufacturers with their classic, 1 RF, 2 IF plus crystal filter and R-meter design. They started with the single tuning dial RME-9 in 1933, which was followed by the 9D in '34 which added a second bandspread dial and an antenna trimmer, the 69 in '35, the 70 in '38, and on through the more familiar 43, 45 and so on series in the postwar years. The RME-69[1] was so well designed that it continued in manufacture all the way to 1940. During this same period, Hallicrafters went through seven comparable 1 RF, 1 or 2 IF plus crystal filter models from the SX-9 to the SX-24. The -69 started out without a noise limiter. In 1936, RME offered the LS-1, a Lamb noise suppressor circuit built onto a sub-chassis which plugged into the two sockets occupied by the 6D6 IF amplifier tubes and which provided both IF amplification and noise blanking. This was a relatively expensive add-on, however, bringing the $134.90 cost of the basic -69 up by another $11.40. Perhaps the competition from the Hammarlund HQ-120 at $129, which had a simple but effective audio noise limiter, was getting a bit stiff, because in October of 1938, RME brought out the -70 with a built-in "Dickert" noise limiter, more modern octal tubes, an illuminated R-meter mounted behind the panel, labels on the controls and a $138.60 price tag, $14.28 less than the -69 was selling for at that point.

You would think that with these clear advantages the RME-70 would take over the market from the -69, but for some reason that did not happen. The -69 continued to be more popular than the -70 until the RME-99 came out in 1941. Moore[2] estimates that there were 6500 RME-69's sold. Al McMillan of HI Manuals commented about the -70, "Not a lot made, but enough to find occasionally." He also said it was "Another goodie you can write-up for ER."

It's no secret to any long-time Boatanchor collector that good, restorable gear at reasonable prices is getting harder to find. This particular receiver was offered several years ago by Ron Merrill on the Boatanchors Reflector to anyone who would stop by his Kansas City QTH and pick it up. Since I travel fairly often to KC, I contacted him and he had it all packed and ready for me when I visited several weeks later. It patiently waited until this spring for its turn on my bench. Ron told me that it worked but that the signals were weak and that it needed some TLC he didn't have time to apply.

When I opened it up, I was pleased to find that despite having a few bruises it was basically all there and in very restorable condition. The topside of the chassis had a layer of crust, but a little scrubbing improved the cosmetics. The crystal filter can had lost its lid, which I



The 62 year old RME-70, a little the worse for wear but still working.

eventually replaced with some aluminum duct tape after using DeOxit to clean up the switch and condenser contacts inside. The crystal is probably not original, since it is a Bliley that says, "Made for the Hallicrafters, serial number 16592, frequency 455 kc." All of the tubes except the 6A6 noise limiter were present and tested good. The upper chrome strips were in place on the panel, and the lower chrome strip was in a plastic bag inside the cabinet. The lower right corner of the panel was bent outward, and the cabinet itself was a little whopper-jawed as though some UPS carrier had given it a drop test somewhere along the way. Fortunately the sturdy, cast aluminum RME chassis had protected all the vital interior parts and had not yielded to the blow.

The underside of the chassis was a good bit cleaner than the top thanks to the bottom plate having survived. Even though RME had upgraded the -70 to first generation octals, the layout downstairs was very similar to the RME-69 with the same bandswitch, coil shield boxes and mica compression trimmer capacitors all in the same places. The resistors were the old "body-end-dot" color code variety, and most of the condensers were brown, wax sealed papers by Cornell Dublier. There were several blue-bodied "Solar Sealdtite" wax molded paper "capacitors" that looked pretty old but that were obviously replacements.

Nothing looked particularly scorched or dripping with wax, and the manual, "Service Notes for the RME-70 Receiver" that I acquired from HI had a list of "continuity checks," so I proceeded to measure a bunch of resistances in the set. Everything fell within the 20% tolerance, pretty amazing for 62 year-old carbon resistors. The audio and RF gain pots were scratchy, but a slosh of cleaner straightened them out. I also cleaned the B+ and Noise Limiter switches, which have exposed contacts operated by pushing in the shaft attached to the audio gain control. Both switches were open circuits at the start, but rubbing a piece of paper soaked with DeOxit between their closed contacts soon brought them back to life.

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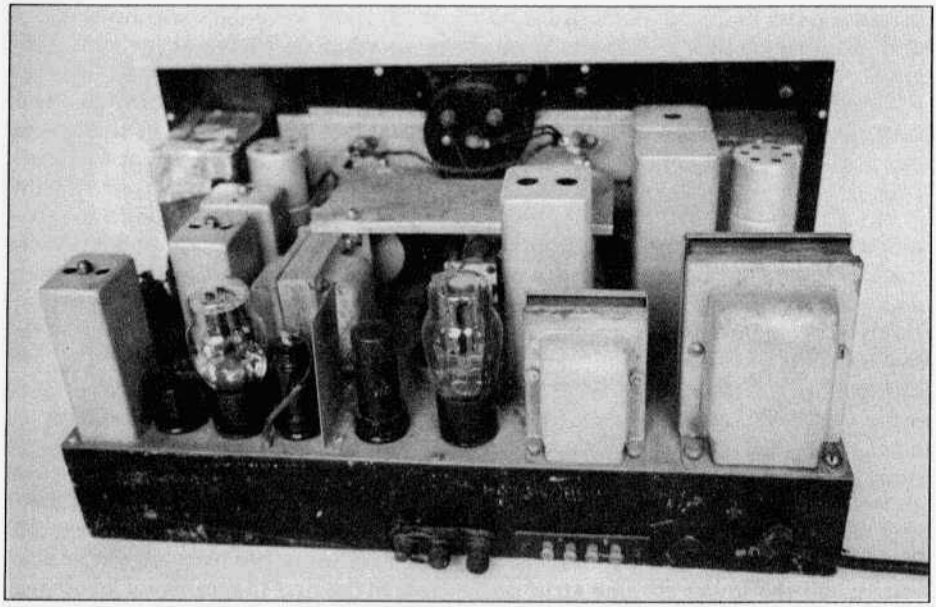
Since I'm not a member of the "replace all of the paper condensers at the start" school, I decided it was time to plug it in and watch for smoke. Preparing for the test, I plugged in a pair of Trimm Dependables into the phone jack since I didn't have a 600 or 4000 ohm speaker output transformer handy. I also clipped my 30-foot bench wire to the antenna terminal. All of the filaments I could see and even the two dial bulbs lit up in response to the initial shot of 120 volts, so I got up my nerve and engaged the B+ switch. Promising static greeted my ears and in a moment I had found 50 KW KOB on 770 kc from across the mountain, but the signal was weak and the R-meter barely moved on what should have been a 40 over 9 signal, so I knew I had work to do.

I decided to go through an alignment to see what problems would show up. Surprisingly the RME-70 manual actually contained IF and RF alignment instructions. "Shaw" Shalkhauser whom I had met at the Dayton Hamvention in 1981 had refused to include alignment instructions in the RME-69 manual. He told me that in 1935 when he personally typed the RME-69 manual at his desk, he knew that anyone who did not already know how to align a superhet had no business messing with the internal adjustments of his RME-69 and anyone who did know what he was doing had no need of instructions. But in 1938 he broke down and included a full dissertation on how to do an IF alignment by tuning in a handy broadcast station. I disobeyed Shaw and coupled my Heathkit signal generator to the mixer grid instead, but the result was the same. The IF stages aligned to the crystal filter frequency quite nicely, the S-meter responded as it should have, and even the BFO came alive when it was switched on. I did find that juggling the 2nd IF tube in its socket made a large change in sensitivity, so I sprayed the socket contacts with DeOxit and worked the tube in and out several times until it arrived at a stable condition where the amplifier would work without popping out. That gave me hope that I had solved my sensitivity problem. Not a bad start for a TLC case.

Next came the RF alignment. This time the manual had a page and a half of instructions. I got through alignment of the first three, lower frequency bands and I was actually hearing some signals on 80 and 75 meters. But when I switched up to band 4 and tried to find my signal generator at 11 mc I couldn't hear a thing, not even with the sig gen output up as high as it would go. Finally I set the RME-70 tuning in the middle of its range, about 9 mc, and started to tune the sig generator around to see if the receiver would pick up any frequency at all. At first I heard nothing, then I noticed a weak, very broad band, noisy response that sounded like the audio modulation on my signal generator and that changed to just a hiss when I switched the modulation off. What was going on? After a little rumination, I dug out my scope and coupled it to the 6K7 local oscillator plate. Sure enough, the LO was working on bands 1 through 3, but on bands 4 through 6 it was just putting out a little noise that peaked broadly around its tuned circuit frequency. I fished around and found the hottest 6K7 in my tube box, a real Hicock meter banger, and tried it in the LO socket. The oscillator came to life on band 4, but it still wouldn't work on bands 5 and 6. Something more than a flaky tube must be wrong. I started measuring voltages on the LO tube, and quickly discovered that the screen grid was running at 9.71 volts instead of the manual listed 115 volts. Aha, the screen bypass condenser measured 5.26K to ground!

At first I couldn't find the screen bypass condenser. Then it showed up right where it should be next to pin 4 on the 6K7, and buried under three layers of



Rear view of the RME-70. The three black terminals are for antenna and ground. The four screw terminals are for the "break-in relay" and for an external B+ switch.

parts and wires. (Did I tell you the Hanlons are related to the Murphys?) My skinniest wire cutters were just able to clip the wires to the offending part, and I snaked it out of the underbrush with my longest, slimmest needle nose pliers. I would never be able to unsolder the original leads without dismantling the upper layers, so I just poked an 0.01 ceramic down into the hole, wound its leads around the stubs from the original condenser, and soldered them with my longest, pointiest iron. Luck was with me, because the screen voltage hopped up to a healthy 155 volts and the original 6K7 now oscillated all the way up to the top of band 6. Before I left the scene, I put another 8.6K, 1/2 watt helper in series with the original 50K screen resistor that had sweated down to 41.9K due to the shorted bypass. And problem number two was found and solved.

I was feeling pretty good with two problems found and fixed, and I proceeded to go through the rest of the RF alignment. The higher in frequency I went, the worse the sensitivity became. Something else was still wrong. I was tracing the B+ feed to the mixer screen and LO plate when I found the culprit— sabotage! Someone had disconnected the original feed point and connected a 27 ohm resistor from the LO plate, right where the LO signal takeoff to the mixer was connected, to a B+ feed point bypassed to ground. This did get B+ to the LO, but it also bypassed to ground almost all of the signal that should have gone to the mixer! I removed the sabotage resistor and reconnected the LO to its originally intended feed point, whereupon things started working much better. Wow, three problems all contributing to lousy sensitivity!

By that time I figured out that whoever had tried to fix this receiver before me was capable of being rather "creative." I looked around for other, non-

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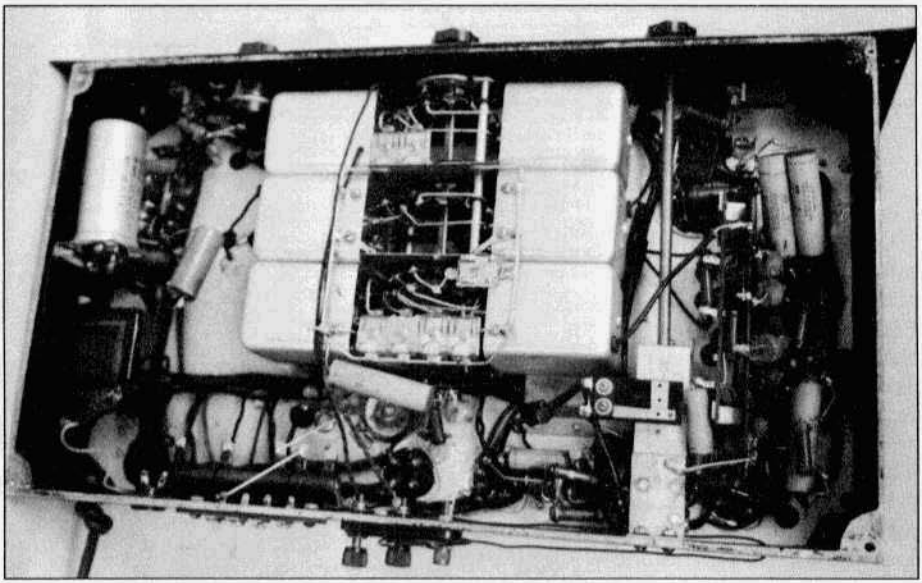
original parts and sure enough found one in the noise limiter. There was an extra 2-megohm resistor tacked in where it did not belong. I checked the operation of the limiter with and without it, and it didn't seem to do much so I removed it.

From there on out the repairs were mechanical until the very end. I dropped the front panel and straightened it out using some boards and my bench vise. I applied some well-placed whacks to the cabinet, cushioning the hammer blows with the same boards. Amazingly the black crackle paint survived all of this punishment. RME must have done better surface preparation on this 1938 RME-70 than they did on my 1940, rack mount RME-69 whose gray paint has peeled off in large blobs. Finally I reinstalled the lower chrome strip using some double-sided tape.

I really thought I was home free at this point, but the RME had one more "gotcha" waiting for me. Those ER readers who go back a few years know that I like to run break-in CW and that I use a fast mercury wetted reed relay to lift the ground at the bottom of the RF gain pot, whereby another external pot wired in series with the RF gain control ground lead then becomes an on-the-air gain control. Well, I wired up the -70 accordingly, but it didn't cooperate. The external gain control had no effect whatsoever. What was going on? I poked around a bit, found my relay was working properly, and then discovered that the swinger on the internal RF gain control was still grounded even after I had disconnected the wire from its terminal to ground! The swinger was electrically connected to the pot shaft and frame, and it was being grounded through the mounting hole. I scrounged in my junque box for a set of those old fiber washers that would insulate the mounting shaft of my pot from its hole. Once the washers were installed, my break-in circuit worked properly and the last of my repairs was finished.

So what do I have at the end of my fun? Well the RME-70 is a lot like the -69 in case you are familiar with one of those. It is at least as sensitive as any other 1 RF, 2 IF receiver in my shack thanks to its two gang "resonator" control which peaks both the RF and mixer stages tuning. I can hear antenna noise up to 20 meters, but not on 15 meters and above. Images are not a problem up to 20 meters. According to the R-meter, which is calibrated at 6 dB per unit, the image ratio on 20 is about 62 dB. On 10 it is only 20 dB, but the local oscillator is on the high side of the signal so images come from the upper end of the band which is not as heavily populated. Drift is not a big problem, 6 kc on 40 meters in the first hour after turn-on, with 3 kc of that in the first 15 minutes. Coverage is from 550 kc to 32 mc in six bands. Alignment produces accurate calibration on all bands. Interestingly, there is also a calibration scale that starts at 550 kc at the low end of band 1 and goes down to zero kc as the calibration on band 1 goes up. Perhaps it was meant to be used as a tunable, BC band IF for a low frequency converter. Bandspread coverage is very good on the ham bands and considerably more than my RME-69, 37-1/2 dial turns for 160, 48 turns for 80, 18 turns for 40, 14-1/2 turns for 20, 10-1/2 turns for 15, and 13-1/2 turns for 10. I have to reset the main tuning once on 160 and twice on 80 to cover the entire band. The crystal filter and phasing notch are functional, although the RME-70 does not have the skirt selectivity of my NC-200, HQ-129X or SX-28. Mechanical stability even after 60 plus years and all of the pounding that this radio has taken is quite good. External shocks have no effect, and the electrical tuning is smooth with no roughness or backlash on either the bandspread or main tuning dials. Unlike the -69, the -70 has factory-supplied labels for all of its controls. Shaw Shalkhauser told me



Under the RME-70 chassis. The RF, mixer and local oscillator coils are in shield cans clustered around the bandswitch. Surprisingly, those mica compression trimmers don't seem to bother the receiver's stability.

that he had not labeled the controls on the -69 because any user worth his salt would soon learn what they were and how to operate them, and thus he should not need labels. But he apparently broke down and added labels to his RME-70 in 1938, even though the RME-69 continued not to have them up to its end in 1940.

The RME-70 features a Dickert Automatic Noise Limiter. The circuit is described in detail by James E. Dickert of Highland Park, Illinois (about 170 miles from Peoria, was there a connection?) in the same November 1938 QST, a month after the announcement of the RME-70 in the October QST. It is a rather clever circuit in which a "zero bias" triode (53, 6A6 or 6N7) is arranged to clip any peaks that exceed twice the average level of the incoming carrier. Thus on an AM signal, the normal 100% modulated sidebands will pass without distortion but noise peaks above them will be limited. The averaging circuit responsible for setting the triode's conduction level is fast enough to permit good operation even on CW signals. The astute reader will recognize that the clipping level will be controlled by the BFO level on CW, but the RME receivers of that day used relatively low, R6 in the RME-70, BFO injection so the limiter still works fairly well on CW. In practice, I found that fluorescent light hash that peaked at 11 volts across the audio gain control in the presence of no carrier was cut to 3 volts when the limiter was turned on. With an R4 carrier, noise peaks of 1.2 volts were limited to 0.25 volts.

The same November 1938 QST also had ads by RME and Newark Electric Company touting the features of the new RME-70. They include, "Frequency Coverage from 550 to 32000 kc, designated controls lettered on front panel, variable phasing crystal filter circuit complete with crystal, 3 iron core IF transformers with extreme selective tuning, 1-stage radio frequency amplification, new automatic noise suppres-

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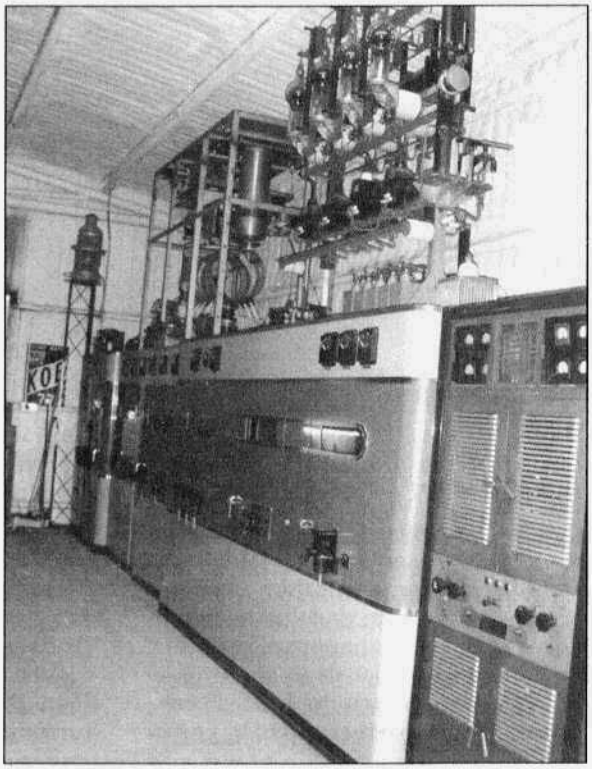
The RCA 50E 50 KW Broadcast Transmitter

by Barry Wiseman, N6CSW, ER Editor

For some time I have been aware that there was an RCA 50 KW AM broadcast transmitter at the Bolack Electromechanical Museum in Farmington, New Mexico, but it wasn't until recently that I got down to see it. Farmington is about an hour and a half drive south of where we live in Cortez, Colo.

I called the curator and owner of the museum, Tommy Bolack, a rancher and oil man, and arranged a visit for Shirley and me. The museum is located on the outskirts of Farmington on Bolack's 12,000 acre ranch and is open to the public free of charge. If you decide to visit the museum I think it's best if you call ahead so that arrangements can be made for someone to show you around.



The 50E to the left, part of the exciter unit 5-C to the right. The output network and rectifier unit sit on top.

When Shirley and I arrived we were met by Tommy Bolack himself and he took us over to the museum which is housed in a large metal building set apart from the main ranch operations. Besides the RCA transmitter the museum houses other radio/electronic/electrical oriented stuff that was also of interest to me. There were several other BC transmitters in the 250, 500 and 1 KW class, one of which was a very well-preserved 1 KW Western Electric. Other radio displays included a small tube collection, some test equipment and a few early broadcast receivers. There was also a display of TV broadcast gear including the associated cameras.

In the electrical department there were huge electrical panels from some of the first power generating stations in New Mexico. There were also some big old diesel motors connected to some early electrical generators. Also of interest were several early medical x-ray setups.

The RCA 50E 50KW transmitter sits along one wall and with the 10 KW RCA exciter (an RCA 5-C) takes up a total of 34 feet. It's very impressive. The 50E is about 25 long and the 5-C is about 9 feet. The units are both about 8 feet high and about 6 feet deep. The total weight of both transmitters is approximately 10 tons. The

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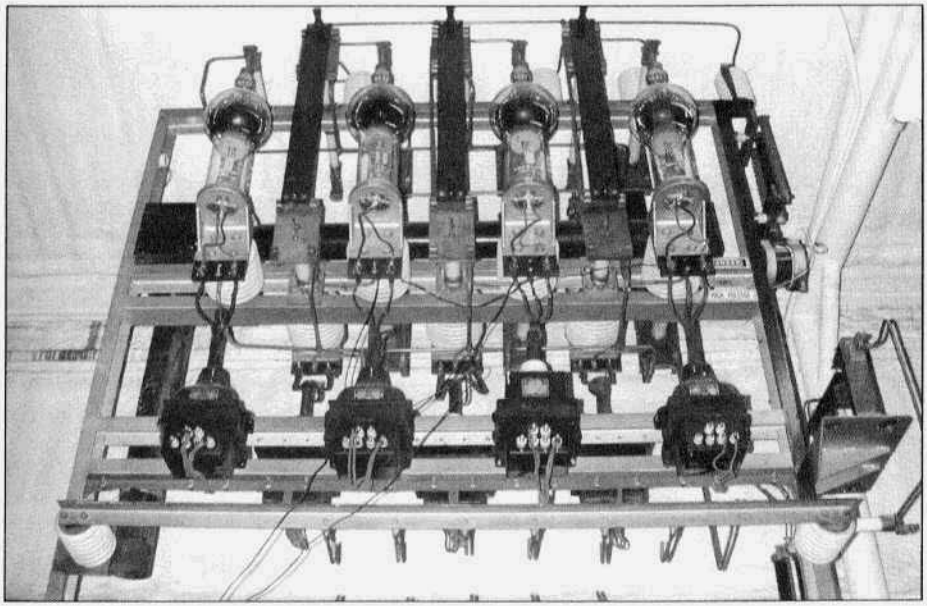
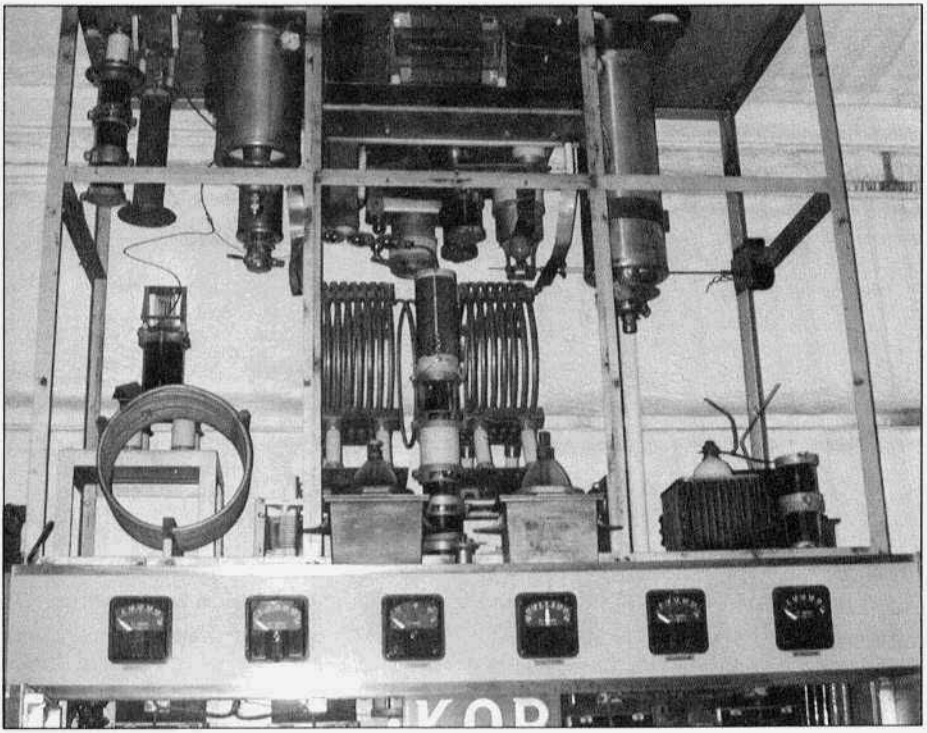
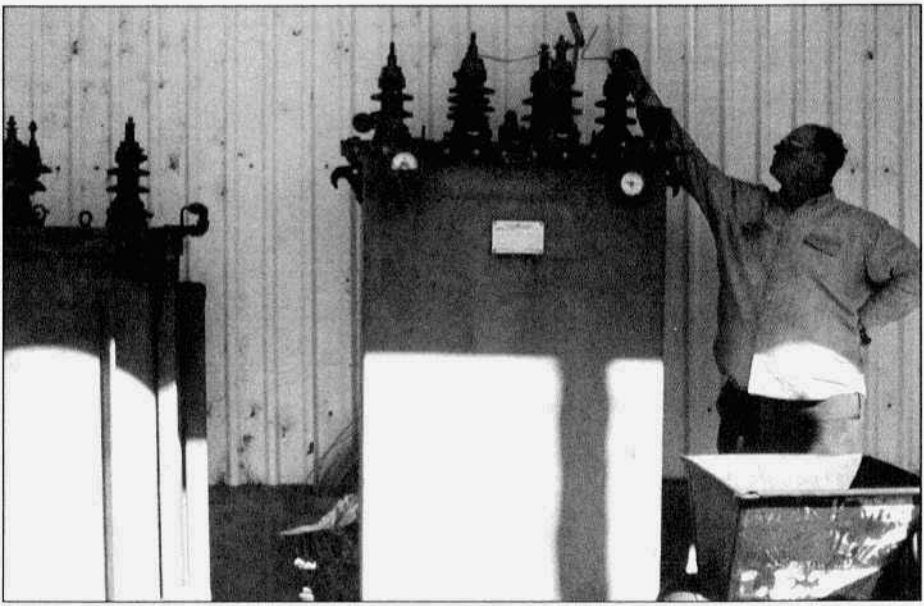


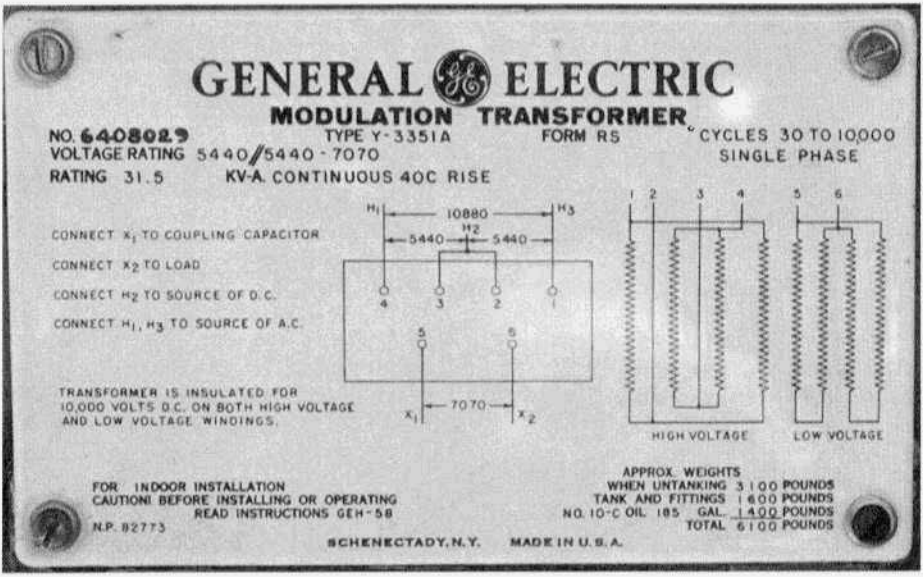
The main plate supply uses 6 857B hot cathode mercury vapor rectifiers. Note the filament transformers below each tube.



The output network sitting on top of the transmitter.



Museum curator Tommy Bolack standing beside the modulation transformer. He's well over 6 feet tall. The modulation reactor is to the left.



This is a closeup shot of the tag on the front of the modulation transforner.

transmitter was designed by artist John Vassos and with its artful curves and cobalt-blue windows is truly beautiful. Four 50Es were built with this one being the only one to survive.

In the display the output network and the rectifier section for the 50E are both sitting on top of the transmitter. When they were in use they sat behind the transmitter along with the heavy iron—the

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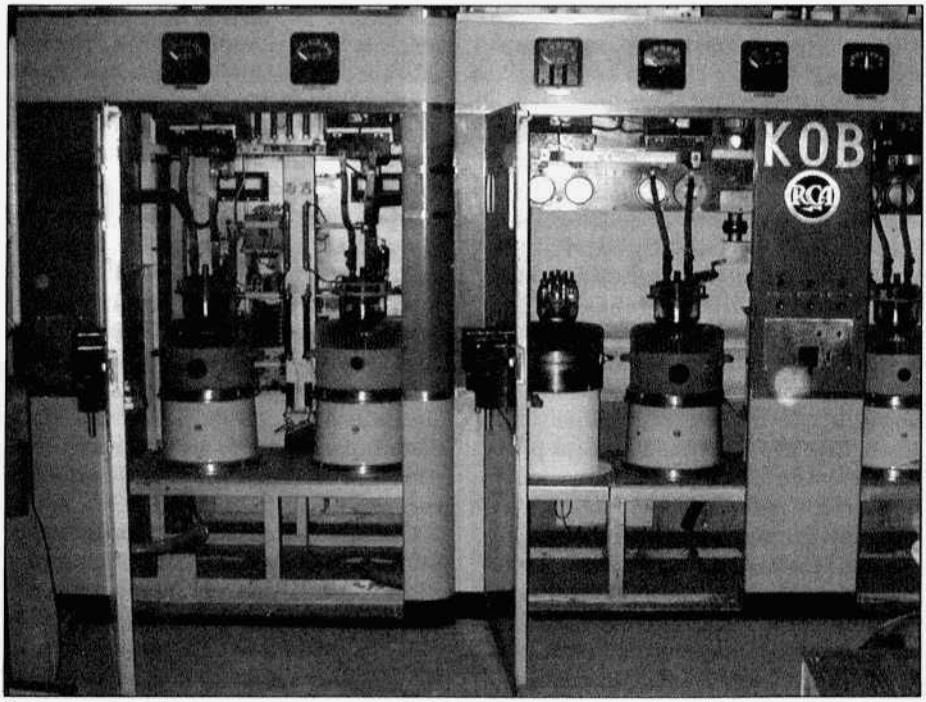
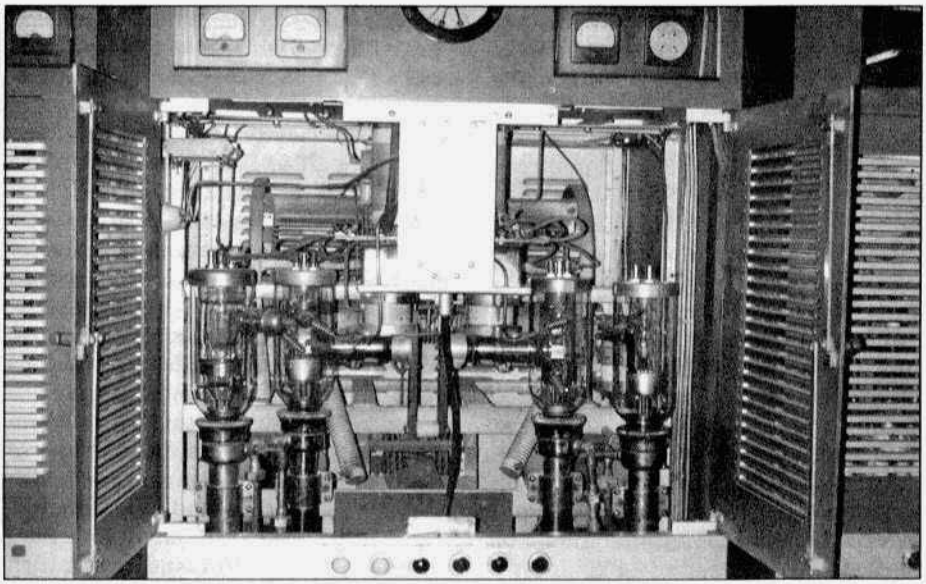


This is a front view of the transmitter with the doors open. Because of other stuff in the way, I couldn't get all of the transmitter into the picture. There is one more final output tube to the right. Each of these tubes weighs about one hundred pounds. A special jack/dolly is used to move them.



A view of the water-cooled finals in the 5C exciter unit.

modulator transformer, the reactor, the plate transformer and the big power supply choke.

The 10 KW exciter unit (both audio and RF) is in itself quite impressive. It has 4 water-cooled tubes (892s) in the final which are quite unlike any tubes I've ever seen. Distilled water was used because it does not conduct electricity but it had to be changed regularly as contaminants were picked up from the radiator and copper pipes. There are a dozen 872A rectifier tubes in the power supply.

The 50E uses 2 5671 tubes in the modulator and 4 in the final. Originally the tubes used were 893Rs. The main plate supply uses 6 857B hot cathode mercury vapor rectifiers with a heated spare. A special switching arrangement allowed a failed tube to be removed from the circuit and the spare placed in service without dismounting either tube. Slightly under 10 KV was needed as plate voltage. Overall efficiency at 100% modulation was around 30%. The transmitter was cooled with an air blower that had a 15 HP motor!

The RCA 50E first went into service at KOB in Albuquerque on July 17, 1941. It is estimated that the transmitter had accumulated one-third of a million hours of airtime when it was finally decommissioned on November 30, 1992. ER

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505-325-4275

Corrections to the article "A Valiant For the 21st Century" that appeared in the October issue of ER.

I made two errors on the modulator circuit.

1. R9 should read 1 meg.
2. Open the wire from V12A plate to top of gain pot and insert a .1/600v cap

Also on Fig 1, the 866A diode should be marked "cap" instead of "4".

Tom Marcellino, W3BYM

Crystal Oscillator from page 13

for the big DX test. A few minutes before my sked I heard AF4BD call CQ one kHz above my frequency. I gave him a call and Marvin became my first contact with the one-tuber. When I signed with him there was Dick, W8RM calling me. A 579 from Ohio proved the rig was working well and sounding good. We carried on for 30 minutes or so and then the 813 lost its plate current intermittently. I felt the crystal and it was hot. I had a piece of shrink tubing so I blew on the crystal and it would oscillate enough to let me make a quick sign off. Apparently FT-243s will take 60 mA of current for only about 35 minutes. I guess I need a water cooled xtal for long QSOs.

CW operation with the 150 watt crystal oscillator is fine except for the keying relay noise. If you are not careful you start sending Morse instead of International. Most hams don't recognize I E F as CQ sent in Morse. I found that unbolting the relay from the chassis and letting it float on its leads, the noise is acceptable. I'll mount it on a rubber block some time soon. Also I found the heavier the antenna loading the less the crystal current. The efficiency falls off but with a 125 watt plate dissipation the 813 doesn't seem to care much. By running 200 mA plate current the output stays at 130 watts but the crystal keeps cool enough to keep working beyond 35 minutes.

Overall this has been a fun project and the rig is a real keeper. It generates a lot of interest on the air from the old timers. I'm going to try 40 one day, but for now I'll just stay on 80 in the evenings and have fun. RCA said that the oscillator can be plate modulated on 80 so that's something I can try in the future. Every time I fire it up I think of Scotty and the fun he must have had in the sixties building and operating this rig. It is too bad that he and Lew are not around to see who could outdo each other, Scotty had some 4-1000s so I'll

bet he was ready for a challenge. And since W1ICP's 5 wpm novices can now run a kilowatt on 80 I'll bet he would be ready for the competition to see who would be the king of the crystal oscillator power house race. Rest in peace you two, I'm going up in the attic and see if I can find that 4X5000 I put away. Anybody got a 75 amp filament transformer? ER

Wonderful Signals from page 2

The "Commercial" Beacons

About 1983 these beacons were noticed, first in the newly opened 10.1 MHz amateur band. A loud beacon heard in California was thought to be a point-to-point transmission. However continual listening revealed the station did a lot of transmitting but devoted no time to listening. It was purely a one-way transmission. The identification in Morse code was: XUQC de YQBF. It soon developed that this signal was not unique. Listeners found other identical transmissions such as 8L6S de 2RC8, FM30 de 9YVB and the like. Every so often the signal sequence would be broken, then 5-letter code groups would be transmitted at a very high speed. When the code groups were finished, the signal would go back to its identifier.

Where were these beacon signals? What was their purpose? They seemed to come from the Soviet far East, possibly from the Vladivostok area.

One clue surfaced in early 1986. A "P" beacon on 4031 kHz suddenly interrupted its transmission and signed the call UMS. This was the call of a well-known USSR naval station Wether, if the UMS call was in error or not is unknown. If it was an error, it was one of the classic mistakes of the game, it "blew its cover", as the spy thrillers have it.

Today's Spooky Signals

In the early months of this year there was a signal near 10 MHz that sounded like someone playing chimes or bells. It lasted for about a month. What was it? Where was it?

Russian Naval beacons have shown up again. Sending the Morse letters C, P, and S. A loud signal heard in Europe is a P beacon on 4557.8 kHz. And you might hear LZLG de V9BE on 13969.7 kHz sending code groups. There are plenty of other "spooks", both in and out of the ham bands. If you operate a lot you can't miss them! ER

Product Review
Collins 2001 Calendar produced by Jay H Miller, KK5IM

I just received a copy of Jay Miller's new Collins 2001 calendar. Titled "A COLLINS ODYSSEY TO THE NEW MILLENNIUM", it covers fifteen months from December 2000 through to February 2002. Each month features a fine photograph or illustration, many in color, from Miller's extensive archives.

A few years ago Jay produced a Collins calendar that featured different radios from the amateur line. The 2001 calendar is definitely not a rehash of the earlier effort. Each month's photo shows a Collins radio of some kind, either in use or models that never made it into production. There's a nice shot of a KWM-2 being operated mobile, 32S-3s and ART-13s being built, Art Collins' 1923 ham shack and some of his QSL cards as well as a few shots of military use of the equipment.

The calendars highlight important dates in radio history, holidays and other significant happenings, hamfests, etc. It is definitely a nice piece of quality work. It is priced at $14.95 including postage to North America. More information may be had at the author's Web site: http://www.kk5im.com

Michael Crestohl, W1RC

Letters from page 18
as that of any of the currently manufactured transceivers with digital VFO's, and I don't have to worry about spurious mixer products.

An overlooked source of frequency drift in tube type oscillators is unstable filament voltage. I started out using regulated DC voltage on the oscillator plate, but it would still drift up and down constantly. It was nearly useless when the 160M output was multiplied up to 40M CW, where the drift translated to plus or minus several hundred cycles. I noticed significant drift whenever a line voltage change was great enough to be observable on an analog voltmeter. When I transmit my line voltage drops a couple of volts. I fixed the problem by putting regulated DC on the oscillator tube filament. The VFO will now hover within a few cycles of a 40 meter broadcast carrier for hours at a time. I still had a drift problem with the 75A-4, due to the same line voltage variations. The R-390 series receivers use a thermal ballast tube to maintain constant filament voltage on the oscillator tube. My receiver problem was solved by powering the 75A-4 with a little 60-watt Sola constant voltage transformer I picked up at Dayton this spring. It was manufactured for use with a PC, and unlike older designs of this transformer, the laminations in this one are perfectly quiet.

Don Chester, K4KYV

Letter to Rob, K6RB regarding his VFO article in last month's issue.

Rob— I just wanted to let you know how much I enjoy the articles you write for Electric Radio Magazine, and especially the one concerning VFO drift in the October 2000 issue. If you don't mind, I would like to share some experiences I have had with a Globe 755A VFO.

I do not know what differences there were between the 755 and the 755A models, but I picked up a nice 755A in really good condition about five years ago at a hamfest. The seller said it worked "last time I tried it", so after bringing it home, I approached it with all the due caution regarding reforming the electrolytics, etc. I found it did work, but not to the quality I was hoping for. I did some simple checking and found that the B+ was too low due to the selenium rectifier being simply worn out. I replaced it with a single 1 amp, 1000 PIV silicon diode and the B+ came up to normal. I restored the filter capacitor over a period of two days starting at a low value of B+ and slowly working it up to the rated value.

I found that the tubes were fine and once it warmed up it was quite stable— to an extent. By this I mean that the frequency would suddenly jump several kilocycles without anything bothering it. Then I found that by tapping on its cover, it would go all over the band. I also noticed that it was very difficult to zero a frequency at one end of the band, which I believe was the low end if I remember correctly. Something seemed to be binding up in the dial cord.

So, as much as I hate messing with dial cords, I took it off and cleaned and re-lubricated all the pulleys. I then re-strung the cord and once that task was completed, the VFO played fine. It appeared that the frequency drifting along with the sudden jumping in frequency was being caused by side loading being placed on the shaft of the tuning capacitor. I noticed that the capacitor turned sort of rough while I had the dial cord off, so I cleaned all the old grease out of its bearings and re-lubed it while I had it apart.

I was doing some checking on it a few months later in the dead of our North Idaho winter and the outside temperature was at a very cold -20 degrees F. I wanted to see just how stable it was, so I set it outside overnight. The cold ambient temperature, combined with

the wind chill factor was -33 F. that night. The next morning, I set up the frequency counter and at the last moment, I brought the 755A inside and immediately plugged it in and turned it on. I did not touch any dials, as they were too stiff and about two minutes after bringing it inside, it grew a coating of frost nearly 1/4" thick!

As soon as it was oscillating, I noted the frequency on the frequency counter and I set a timer to check on it every half hour. Throughout the entire day, it sat there cooking away, and the very most drift I got out of it was slightly over 1600 cycles, being 1608 if I remember right. I am sorry, but I misplaced (lost) the chart I made up covering this test. This particular test was on the low band and the next day, being that it was still so cold out, I repeated it and used the higher frequency band for that test. The results were very similar, being a total drift on the higher band of about 1718 cycles, if I remember correctly.

This was a very torturous test! I had water from the melting condensation all over the table both days. Most thermal cycling tests on this sort of equipment are only taken from a cold room temperature start to the elevated testing temperature that the internal heating of components creates.

These two tests are the only ones that I have ever done on any gear because, fortunately, we don't get that cold that often! However it was interesting to see just what it was capable of and I was rather surprised at the findings. Over most of the testing period, I thought the frequency counter might have stuck, it was so stable.

I can set it up to beat with an incoming SSB signal with the receiver BFO off and use the VFO output to demodulate the SSB and I can sit there for hours on end without touching the dial. I can not say the same for either my Kenwood TS-830 or TS-130SE models. I used the TS-130SE mobile and I got tired of retuning constantly as the interior temperature of my van changes as it warms up on a cold day, so I no longer run mobile with it.

Incidentally, I also looked at the output waveform with a scope, and I found that a lot of 2nd harmonic current appears on the 80 meter position. This harmonic can be tuned out by adjusting the slug tuned coil in the output circuitry. If that is done, 40 meter drive drops considerably, though. The length of the coax from the VFO to the transmitter can be critical. There is sufficient adjustment range of the slug tuned output coil to compensate for lengths between two and ten feet when driving a Viking II transmitter.

You indicated that the Globe #3 in your article drifted badly. I would first check the B+ to see if the VR tube is lit properly. Then check for the binding in the dial or dial cord and smooth rotation of the capacitor. I know it sure worked wonders for my unit.

In conclusion, I just wish some of these modern solid state rigs were built as rugged as some of the older Hollow State stuff!! But if the Kenwoods, Icoms, and Yaesu's all had to build stuff rugged like this stuff, they would not be able to bring out more glitzy rigs each year!!

Curt Reed, N7AH

Regarding Chuck, W4MEW's amplifier article in the September issue of ER.

The article on homebrew amplifiers by Chick Teeters, 9/2000 ER was most interesting, and one must commend the excellent experimental work that he did. I have some minor corrections to this article concerning a mix-up between the WW II Long Ranger Radar SCR-270, and the Searchlight Director/Anti-aircraft set SCR-268.

In 1942, I was a radar instructor in the USMC on both of the above sets. The radar which sensed the Japanese planes

that bombed Pearl Harbor was not the SCR-268, but the SCR-270. Development of the -270 was started in the fall of 1937 by the Westinghouse Co., whereas the SCR-268 work started in the summer of 1940. The SCR-270 transmitter, BC-405 used Westinghouse water cooled tubes VT-122/WL-530 or in later units VT-141/WL-541.

It was the SCR-268 transmitter BC-407 that used 8 - 100TS/VT-127's in a ring oscillator configuration. The BC-407A superseded that with 16 of the VT-127's in the ring oscillator. The SCR-270 preceded the -268 by several years, time enough to have been in place before the Japanese bombing of Pearl Harbor. Production of the -268 began at Western Electric in 1941.

I have collected the -270 receiver, BC-404,--one that had been used for tests at Ft. Monmouth NJ, and which included the old antenna input stage using a VT-128 orbital-beam tetrode. This tube looks like an overgrown acorn, but about 3 to 4 times bigger. It had a very large transconductance for wide-band gain, but at the expense of excess noise; hence its signal-to-noise ratio was not ideal. Early in WW II a modification was introduced for the -270 receiver using the newly invented cascode circuit, which, while having less gain had a better S/N ratio for picking up weak radar returns.

Another item I have collected is the BC-439 Frequency Meter used to keep the SCR-270 oscillator in tune. This was manufactured by Link, and used a National Radio type "N" vernier dial for readout.

I also have the safety/shorting solenoid switch from the -270 power supply (RA-60 rectifier.) This supply was housed in a cabinet that could be entered by stooping down after opening an access door! This relay shorted out the high voltage just in case someone forgot to turn off the power.

Robert Enemark, W1EC

References

1) War Dept. Manuals TM-11-466 and 467

2) "A History of Engineering & Science in the Bell System (1925-1975)" published in 1978

3) Helgeson, Don "Radar History."

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

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

(1) Publication Name: Electric Radio (2) Publication No.: 1048-3020 (3) Filing Date: Nov. 10, 2000 (4) Issue Frequency: Monthly (5) No. of issues published annually: 11 (6) Annual subscription price: $28. (7) Complete mailing address of known office of publication: 14643 County Rd G, Cortez, CO 81321-9575 (8) Complete mailing address of headquarters or general business office of publisher: Same as #7. (9) Full names and complete mailing addresses of publisher, editor and managing editor: Electric Radio Press, Inc. 14643 County Rd G, Cortez, CO 81321-9575. Barry Wiseman, 14643 County Rd G., Cortez, CO 81321-9575 (10) Electric Radio Press, Inc. 14643 County Road G, Cortez, CO 81321-9575. (11) Known bondholders, etc.: None. (12) Not applicable. (13) Publication Name: Electric Radio (14) Issue date for circulation data below: Nov. 2000. (16a) Statement of Ownership will be printed in the Nov. 2000 issue of this publication.

15. Extent and Nature of Circulation	Average No. Copies Each Issue During Preceding 12 Months	Actual No. Copies of Single Issue Published Nearest to Filing Date
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B. Wiseman

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The RME-70 from page 31

sor, break-in relay control circuit, monitor circuit incorporated (an RME-69 circuit that allowed monitoring of an on-the-air phone signal which was not incorporated in production RME-70's), and either black or gray crackle finish - optional." The Newark announcement added that it had "Streamlined cabinet design, (I haven't noticed that it has less wind resistance than other receivers of its day), total complement of ten tubes, and sturdy construction, detailed engineering and exceptional quality throughout." The price for the -70 was $138.60 with speaker. In comparison, the Henry Radio ad in the same issue listed the latest RME-69 for $152.88, the NC-101X for $129, and the Super Skyrider, probably an S-16 without crystal, for $99.

I can't finish this story without at least a few comments on the RME-70 manual. Like the RME-69 manual, it's pretty obvious that Shaw Shalkhauser typed the mimeograph stencil for the -70 manual on his own desk. It contains a lot of good engineering information about the operation, alignment and trouble shooting of the receiver. Topics covered include Alignment, Outline of Procedure for Correct Alignment of the Intermediate Frequency Amplifier Transformer of the RME-70 Receiver, Phasing Control Operation, Alignment of Radio Frequency Section of the RME-70 Receiver, Adjustment of the Beat Oscillator, Noise: Its causes and a method of elimination, (What to do when) Receiver Inoperative, Conditions Indicating Loss of Automatic Volume Control, Hum, Noise Caused by Faulty Variable Resistors, Frequency Instability, Microphonics, The Noise Silencer, Test Voltages Obtained at Various Points in the Receiver, Continuity Checks, a Parts List, and a Schematic. Shaw tended to write not just an operating manual but a small textbook. And I must say that it was helpful when I was trouble shooting this sample of his handy work.

The schematic of the -70 is very close to that of the -69, even down to the way it was drawn. The -69 used a 6B7 triode dual diode for detector, AVC and first audio, where the -70 uses a 6H6 and 6K7 in order to accommodate the 6A6 dual triode in the Dickert noise limiter. It is interesting that RME chose the older, non-octal 6A6 instead of the 6N7 for the job. Perhaps the 6N7 was not yet available when the -70 design was solidified. In updating the -70 schematic, the RME draftsman used the more modern symbols for tubes with dashed lines for grids rather than the zig zag resistor-like lines found in the -69 schematic.

In my 5 decades being a ham, this is the only RME-70 I've ever seen up close and personal, so I doubt that there are very many of them still around. It is certainly one of the better, prewar receivers, and quite capable of turning in a good performance in my classic ham shack. If you see what looks like an RME-69 that has knob labels and chrome stripes, don't pass it up. It's probably an RME-70. **ER**

AMI Update from page 3

in these cases. If your name is Bud and you are 25 miles west of Cleveland running a pair of 811s and you worked us on 40 meters on May 20, please send a note with your call to AMI Headquarters. And, if your name is Paul in Shelby Township in Michigan and you worked us on Sunday, May 21 on 40 meters please send your call in.

The application has been sent in for another AM special event operation at the Dayton Hamvention in 2001. Also, there will be an AM Forum late Friday afternoon of the 2001 Hamvention. More on AM at the 2001 Dayton Hamvention in future updates. **ER**

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

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

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

FOR SALE: TenTec Mod 1220, 2M xcvr with 1222 30 Watt RF amp -$240. Ed Sauer, KC9SP, 787 N. Peterman Rd., Greenwood, IN 46142. (317) 881-1483

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FOR SALE: Heath SB610 monitor scope, exc condx - $95 plus shpg. David W. Burns, WA3WHR, 5709 Dun Horse Ln., Derwood, MD 20855. (301) 963-0122 daburns926@aol.com

FOR SALE: Hallicrafters HT-40 xtal cont. CW/AM 75 watt input, 6-band xmtr w/manual, works, 65.00 plus shipping. Fenton Wood, 4716 Stonebriar Circle, College Station, TX 75845. milordwood@aol.com

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FOR SALE: (3) Valiants; Viking II + parts unit; Ranger; Viking Challanger; National NC-300; BC-312N; BC-348R; Rider Perpetual manuals. Jim, MT, (406) 826-5093.

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

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

FOR SALE: NOS TCS baseplates still in factory shipping wrap - 2/$15 plus shpg. Carl, KN6AL, POB 3531, Laramie, WY 82071. (307) 742-0711 kn6al@uwyo.edu

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FOR SALE: Connectors, meters, relays, transformers, misc. parts, list $1. Joe Orgnero, VE7LBI, 1349 Leask Rd., Nanaimo, BC V9X 1P8 Canada. (250) 722-2707, joseph@pacificcoast.net

FOR SALE: R-390A rcvr, GC. No S/N available, has Motorola PTO, top cover, manual reprint - $500 plus packing and shpg. John, WB9OVV, (708) 431-2693

FOR SALE: Harris 505A rcvr, BCB to 30 MHz; Harris 551A preselector for the rcvr. Both in a new cabinet that is the size of a SP-600. Orig service manual for the rcvr. Included is a Timewave DSP-9 unit - $700, you ship. Wes, k5ap@ics.com, (870) 773-7424

FOR SALE/TRADE: Misc. parts, tubes, for tube gear. Sandy Blaize W5TVW, 40460 Edgar Traylor Rd., Hammond, LA 70403. ebjr@i-55.com

FOR SALE: Transformers for Collins 32V3, Hallicrafters HT9, BC610 & RF xfmrs for Hammarlund SP600. Roland V. Matson, POB 956, Lake Panasoffkee, FL 33538

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

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

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

FOR SALE: 40's Radio 1920-1930 period: horn spkrs, headphones, tubes, parts, etc. Like to sell entire collection to one person, SASE for listings. Lawrence Gross, 11040 70th St., S, Cottage Grove, MN 55016. (651) 459-3233.

FOR SALE: R105A/ARR15 rcvr, unmodified, complete + 1 spare unit for parts - $125 + shpg. Ron Rausch, K5HZ, S 97 W 37059 Serenity Ct., Eagle, WI 53119. (262) 594-3063

FOR SALE: Stromberg Carlson, mono amplifier SAU33 Signet, 6L6s - $50; Teletone Catlin 239 restorable - $25. Onerio Sabetto, 1717 Burgess Rd., Cleveland, OH 44112. (216) 481-1036

TRADE: 211 & 242 xmtg tubes for 100TH or 250TH tubes. **WANTED:** BC-344 w/good front panel for parts. Steve Davis, KD2NX, 11 Vineyard Ave., Middletown, NJ 07748. (732) 495-3241

FOR SALE: (2) BC659 FM xcvrs: SCR-609 carry on unit, SCR-610 mobile unit - $300/the pair. PU preferred. Frank Sheldon, POB 297, Arkport, NY 14807. grandpashcldon@hotmail.com

FOR SALE: Counter measures rcvg set AN/WRL-1 50 MHz - 10.75 GHz, 9 band, simultaneous display freq spectrum & pulse info using dual displays, manual, apprx wt 1200 lbs - $4500. Carl Bloom, CA. (714) 639-1679. 3778111@mcimail.com

FOR SALE: Triplett panel meters, pulls, 5-3/4" x 4-3/4", mirror scale, 0-125% pwr, FS=11V - $15 ppd; LED bargraph w/digits, pulls, 6" x 2", 0-125%, 115 VAC pwr, FS=10V - $20 ppd. Jay Lyter, WA3BNG, 455 Melrie Dr., York, PA 17403. (717) 741-4270

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

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

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

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

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

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

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

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

WANTED: Pair 26Z5Ws and the .1, 1, and 2KC filters for an R390A. Dick Dixon, W7QZO, 16032 Lost Coyote Ln., Mitchell, OR 97750. (541) 462-3078 richdix@bendnet.com

WANTED: Oddball old 1930s Army and Navy dynamotors. Any condition, any weight! William Donzelli, 15 Gen MacArthur Drive, Carmel, NY 10512. (914)225-2547, aw2888@osfn.org

WANTED: 1927 and 1937 editions of the ARRL Handbook. Complete books with intact covers please. Doug, K2JJ, (914)968-3560 or K2JJ@aol.com

WANTED: Meter switch for Ranger I. Tom Marcellino, W3BYM, 13806 Parkland Dr., Rockville, MD 20853. (301)871-7463, W3BYM @arrl.net

WANTED: Knob ("Final Tuning" or "Final Loading" for Lafayette Starflite xmtr. This is same knob as used on tuning dial of Lafayette HA-225, HA-226, HA-230, HA-340, HA-500, HE-80 and Allied A-2515 SW rcvrs. Will consider buying basket case/parts radio. Vern Weiss, W9STB, POB 805, Twin Lakes, WI 53181. telegrapher@hotmail.com

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

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

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

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

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

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

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

WANTED: HF-300 tubes. Don Chester, K4KYV, 2116 Oldover Rd., Woodlawn, TN 37191. (931) 647-2179, k4kyv@hotmail.com

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

WANTED: Electro-Voice mic desk stand model 419; large stud 5/8inch-27 thread for 1960 era E-V 664 mic. Bob, KD9GI, (815) 332-9520, KD9GI@aol.com

WANTED: 160 meter FT-243 crystal any where in the band, but the CW area is preferred. Jim Riff, 9411 E. Happy Valley Rd., Scottsdale, AZ 85255. (480) 473-1098, k7sc@cybertrails.com

WANTED: Info on power requirements for National AGS rcvr, orphaned Vibroplex/McElroy bugs. Brian Roberts, K9VKY, 130 Tara Dr., Fombell, PA 16123. (724) 758-2688. k9vky@stargate.net

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

WANTED: Any info on the Eldico company and the Eldico SSB Twins for future article. Joel Thurtell, finder@radiofinder.com

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

FOR SALE: Military radio TM's, origs & reprints. New list. Send $1 & address label to Robert Downs, WA5CAB, 2027 Mapleton Dr., Houston, TX 77043-2410. (713) 467-5614

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

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

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

FOR SALE: Homemade galena xtal radios, SW or BC. Pix available, also parts. Len Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150.

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

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

FOR SALE: Hallicrafters S20, S40, SX101A; R38 spkr; Regency HR212 2-meter; Lafayette Starflite 390 xmtr; 50 lbs Motorola FM 2-way mobile radio manuals. Bill Coolahan, 1450 Miami Dr., NE, Cedar Rapids, IA 52402. (319) 393-8075

FOR SALE: BC-348 - $75; BC-610 pwr sply, PU only - $295; Drake TR-4 & pwr sply - $295; 813s - $15. U-shp. W7RBF, AZ, (602) 864-9987

FOR SALE: Swan 410 VFO; Heath Mohican; HP-23B; TMC GSB-2; EFJ 250-35 LoPass; NovaStar AeroEar; U-ship. **WANTED:** Clean AF-67/8. WA7HDL, ID, (208) 756-4147.

FOR SALE: Gonset Communicator III w/6 xtals, 2 mics & 4 spare tubes - $75. David W. Rego, W1GCA, 45 Howland Ln., Wellfleet, MA 02667. (508) 349-0401 or daverego@c4.net

FOR SALE: Heath SB-301, exc - $85; SB-401, needs work - $60; Gonset GSB-100, exc - $130; Heath Ham Scan, exc - $70. All above come w/manuals. PU only. Jerry, N1ILD, CT, (203) 426-4551

FOR SALE: New Eimac 4-1000A - $240; Glass chimney - $55; aluminum air socket - $60. Joel, W4SLH, 337 Compass Point Dr., Oriental, NC 28571.

FOR SALE: WACO-5NWX telephone filters. Just plug in. 1/$13.95, 2/$25, 3/$34. Money back. Cecil Palmer, 4500 Timbercrest Ln., Waco, TX 76705. (254) 799-5931, w5nwx@juno.com

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

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

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

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

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

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

FOR SALE: 1964 ARRL Handbook - $10; Swan SW 240 SSB w/Heath pwr sply, receives OK, low out put on transmit, w/manual - $95; Hammarlund HQ100A w/clock (missing adj rod) - $120; Federal T/V 6-meter AM864/U (2) 1 blk, 1 grey - $35 ea; Gonset Communicator 2-meter xcvr - $45; Heath AM 2 SWR meter - $5; Heath VF1 - $35; multi/Elmac PMR8 w/homemade A/C pwr sply - $75; RME clipper - $15; Drake R4A, rusty chassis, works, very good; T4X, very good, no pwr sply; L4, very good, no pwr sply; MS4 very good; Orion 2550 Hz band pass filter 8 kΩ (4 ea); Chicago xfmr 1000 Hz 0dB 250-20,000 T203, 500 Ω in + output; Collins made by Chicago, xfmr #677-2010-00 20 watts, 200-5000 Hz, 6 kΩ, one to one turns ratio, new; same as above, but have 2 of them, but only 2.5 watts, new; no name modulation xfmr, 3 watts #901821-501; CRV 301849, new; misc UTC mini trans 0-1 thru 0-20. Best offer on anything. SASE 12 page misc list. Clayton Vedder, 1037 Rte 23A, Catskill, NY 12414. (518) 678-0475, cvedder@mhonline.net

FOR SALE: Kenwood Trio #9R 59 DS, general coverage tube radio, looks & works well - $150. Hoover, SC, (843) 726-5762

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

FOR SALE: Collins 75S-3B (w) #17358 exc unmarked orig condx, 500 Hz CW/manual/new tubes & spare tubester set - $900; 75S-1 #3343 VGC/manual/new tubes/500 Hz CW + 6.0 kHz AM filter fitted/inc 136A-1 blanker not fitted - $600; 3023-C RE exc - $300; 440F-1 ext lead, new in pak - $50; late RE 136B-2 blanker #MCN 1467 exc inc. inst kit/manual tested - $140; DX Eng LCI proc/manual, suit 32S tested - $120; HF8010 orig service manuals part 1 & 2 - $100 /pr; orig AM filters suit most Collins models - $150; 65S-1 meter/new - $50; NIB Phillips 6AZ8 - $3.50; many parts for Collins ham models available. Garry Marcon, VK3GY, POB 557, Heathcote 3523, Victoria Australia. Phone 0011-61-3-54 333 973

FOR SALE: Radar, APS-88, ex Grumman S2A Tracker, complete, antenna and mount, rcvr/xmtr, synchronizer, control amp, display, antenna control box, system control box, 65KW, X-band - $1500, no cables, manual available, extra. Carl Bloom, (714) 639-1679, 37781116@MCIMAIL.COM

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

FOR SALE: Tubes: buy, sell. SASE for list AD. Selling sockets, savers, Amphenol, Cinch-Jones plugs, HV ceramics. **WANTED:** 9-pin mini plug, phenolic, like bottom end of a 12AT7 tubes, any quantity. Typetronics, Fred Schmidt, N4TT, POB 8873, Ft. Lauderdale, FL 33310. (954) 583-1340, fx 583-0777

FOR SALE: Heath HR-10B & DX-60A combo w/manuals & NIB 6146-B tube; Vocaline mod JRC-400 xcvrs (465 MHz) 3 units; RT-298/ARC-2A Navy Command xcvr; OQ-1 Weston tube tester (Navy); Hallicrafters HT-9 w/manual untested; EICO 720 & 723 xmtrs; Hallicrafters S-40B, S-130, S-108, SX-110, SX-24; Hammarlund HQ-129X, HQ-145-X; National NC-46, 2-40 w /pwr slpy & manual; RME mod 22A-DB & 23 preselectors.; Drake R4-B, T4X-B, MS-4, MN-2000 station w/manuals & cables; Pilot AC Super Wasp; Lafayette KT-320, HA-600A; Echophone EC-1A. Jim Koehler, 242 Guy Lombardo Ave., Freeport, LI NY 11520. (516) 623-0035

FOR SALE: Or prefer **TRADE:** Drake R4C, T4XC, AC ,spkr; Drake TR4 CW (rare); Collins 75S3 wing. Darryl, WA5AAO, TX, (979) 968-3384.

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

WANTED: Cash for Collins: SM-1, 2, 3; 312A-1, 2; 55G-1; 399C-1; 625-1; KWM-1; 302C-3; 515-1; 75S-3C; 32S-3A. I buy any Collins equip. Leo, KJ6HI, CA, Ph/Fx (310) 670-6969, radioleo@earthlink.net

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

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

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

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

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

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

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

WANTED: GF-11 coil sets; CW-47137 3000-3675 kHz; CW47141 6000-7350 kHz. Bob Lackey, W4QBE, 1252 Worley Creek Rd., Lakemont, GA 30552. (706) 782-3670

WANTED: Schematic diagram or manual for RCA AVR-15 aircraft rcvr. Al Kaiser, W3LEQ, 713 Marlowe Rd., Cherry Hill, NJ 08003. (856) 424-5387

WANTED: PRC-64. Darryl Dippel, POB 335, LaGrange, TX 78945.

WANTED: Manual or photocopy Autronic Electronic Keyer (Electrophysics Corp.). Cash or trade. Thanks much! Robert Baumann, 1985 South Cape Way, Lakewood, CO 80227, (303) 988-2089, RGBdenver@aol.com

WANTED: Dynamic mic; amateur band xtals for BC-610; BC-348; SX-28. Gary Willey, W4ZXS, 8125 Lunenburg Rd., Keysville, VA 23947. (804) 736-9029

WANTED: HRO 5TA1 or earlier HRO receiver. Ivan, WA6SWA, POB 248, Reno, NV 89504. (775) 329-7738, idb@cs.unr.edu

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

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

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

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

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

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

WANTED: Ampex tube type decks, mixers, amps. George, OH, (216) 486-6489, blksub480@yahoo.com

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

WANTED: QSTs before 1936 and various years ARRL Handbook for personal collection. Gary Yantis, WØTM, 800-844-9860, gary@w0tm.com

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

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

WANTED: Westinghouse MW2 pwr sply or xmtr; models 15 and 28ASR teletypewriters; BC779; WL5736 tube. Gary, WA4ODY, Houston, TX, (281)-291-7701, myctpub@earthlink.net

WANTED: Spare 26Z5 rect tubes, used or new, for my R-390A. Thanks. Dennis Olmstead, WB9EMD, 431 Ridgewood, Glen Ellyn, IL 60137. Phone/fax (630) 469-0531, wb9emd@aol.com

WANTED: Hallicrafters SX-73 radios, any condx, pristine, fixer-upper or for parts only; esp. need Hallicrafters knobs, all types. Pete, WØEWQ, (651) 767-4794, pcpatton@mediaone.net

WANTED: Manual and accessories for GRC-13; AN-29 antenna for BC-222. Joseph Pinner, 818 Hill St., Kingston, TN 37763. (865) 376-0996, kc5ijd@sprintmail.com

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

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

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

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FOR SALE: Lafayette HA650, 6 mtrs - $100; Heath Two'er - $25; Realistic DX160 rcvr - $75; Navy CBY41604, 1.5 to 3mc rcvr - $60; BC454 - $35; BC455 - $35; Polycomm Sr. 23 tube CB - $100; RCA AVT-112A xmtr - $50. Norbert C. Wokasch, WAØKJE, 3312 W. Bijou, Colorado Springs, CO 80904. (719) 633-5661

FOR SALE: Johnson Viking II - $150; & really nice Invader 200 - $225. W/manuals. Robert Braza, W1RMB, MA, (508) 222-5553.

FOR SALE: Gates BC250-GY broadcast xmtr w/manual, spare finals & Gates accessory equip such as modulation & frequency monitors - $500; BC-223-A xmtr w/2 spare tuner boxes - $125. **WANTED:** G coil to fit my HRO-5. Thanks. Tom Smith, N5AMA, 13034 Elmington Dr., Cypress, TX 77429. (281) 376-3436 or tsmith@hal-pc.org

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

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

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

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

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

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

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

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

WANTED: Searching for RMEC T-100 or 3R9 xmtrs and info about them. David Edsall, W1TDD, 156 Sunset Ave., Amherst, MA 01002. (413) 549-0349, dedsall@crocker.com

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

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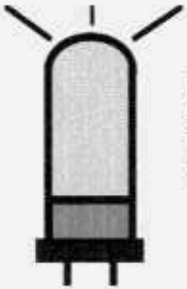

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