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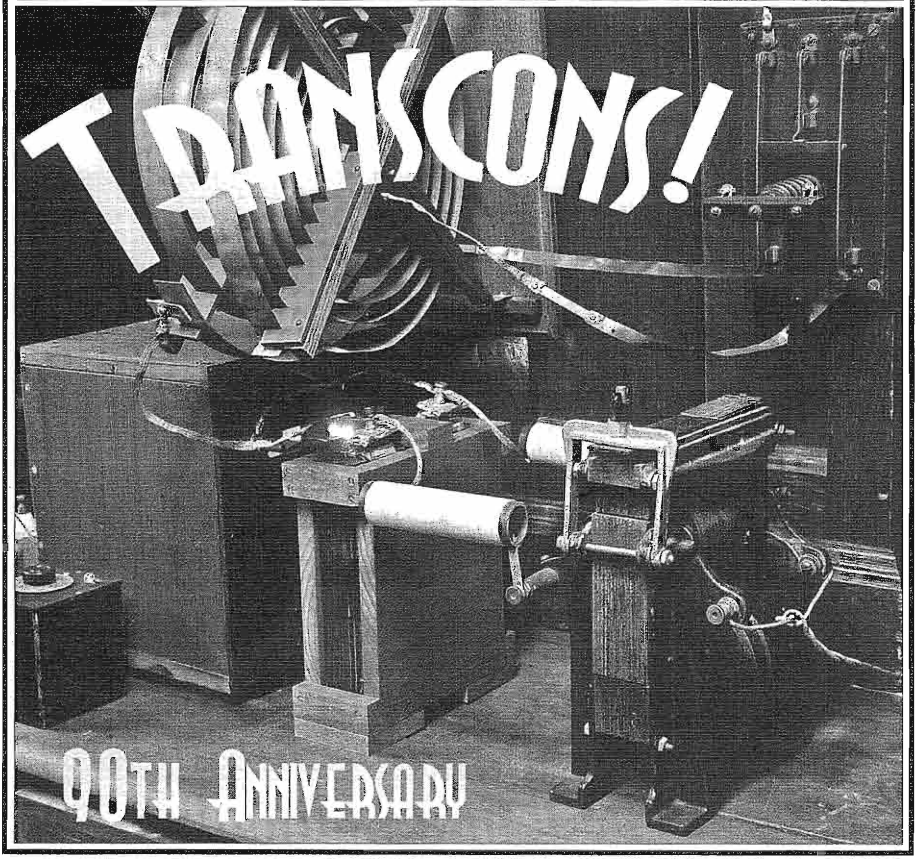
ELECTRIC RADIO

celebrating a bygone era

Number 212 January 2007



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Electric Radio is all about the restoration, maintenance, and continued use of vintage radio equipment. Founded in May of 1989 by Barry Wiseman (N6CSW), the magazine continues publication for those who appreciate the value of operating vintage equipment and the rich history of radio. It is hoped that the magazine will provide inspiration and encouragement to collectors, restorers and builders. It is dedicated to the generations of radio amateurs, experimenters, and engineers who have preceded us, without whom many features of life, now taken for granted, would not be possible.

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

Regular contributors include:
Chuck Teeters (W4MEW), Jim Hanlon (W8KGI), Tom Marcellino (W3BYM), Gary Halverson (K6GLH), David Kuraner (K2DK), Bruce Vaughan (NR5Q), Bob Grinder (K7AK), Bill Feldman (N6PY), Larry Will (W3LW), Dave Gordon-Smith (G3UUR), Dale Gagnon (KW1I), Brian Harris (WA5UEK)

Editor's Comments

Postal Rate Increase, May 2007

The U.S. Post Office has announced that rates will increase *again* in May 2007. We absorbed the last rate increase, but can not afford to it again. I will have an announcement about an increase in subscription rates next month.

Antique Wireless Association AM QSO Party 2007

Gary Carter (WA4IAM) is reminding us that it's time once again for the AWA AM QSO Party: "...Last year proved to be the most active and enjoyable QSO party yet, with stations participating from the US, Canada, and Europe! This year we've added 160 meters, so those of you with the great heavy metal broadcast transmitters can give them a workout. We are featuring two 'flagship' stations as an opportunity to add extra points. The AWA Museum station *W2AN* returns as the eastern flagship station using a variety of vintage AM equipment, including the 1930s personal transmitter of James Millen. Our western flagship station is James Millen Society member Dennis Petrich (KØEOO) of Lakeville, MN. He will be operating several vintage AM transmitters using James Millen's original callsign, W1HRX.

There was some confusion last year. Due to the nature of the mode, many stations ended up grouping together on a specific frequency with one station (usually the loudest) acting as a control station, keeping an informal order of stations participating on that frequency. QSOs in a 'round robin' fashion gave reports to stations they heard checking into the group. Once a report was received from another station on that frequency you could count a completed contact. After working everyone in the group on that frequency you could find another AM group and start working new stations. 'One-on-one' contacts usually took place on 20 meters. This year, on 160, 75 and 40 meters, don't hesitate to jump in and work a group of AM stations. They'll be more than happy to welcome you. Here are the rules for the 2007 AWA AM QSO Party:

Dates and Times: The QSO Party starts at 6 pm EST (23:00 UTC) on Saturday, February 17th and ends at 6pm EST (23:00 UTC) on Sunday, February 18th.

Objective: To promote and encourage the use of AM as a mode of operation in ham radio, and to have fun!

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Cover: An operating spark transmitter reminds us of an important event that occurred 90 years ago this month; the first transcontinental message relay. The story begins on page 5. (photo courtesy of Gary Halverson, K6GLH)

Inside the 5th and Kostner Plant

By Chuck Teeters, W4MEW
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The cover photo and article in the November 2006 Electric Radio about Hallicrafters with photos of the 5th and Kostner plant brought back memories. In 1948 the Signal Corps thought I should continue my education at Northwestern University just north of Chicago. My bosses at Squire Lab had submitted my name for school. My orders said for administration and payroll I was attached to 5th Army Headquarters at 53rd Street at the lake in Chicago. I got a small efficiency apartment around the corner next to the Illinois Central commuter line. The IC took me direct to school in Evanston. I found grad school was a snap as there was no financial pressure, and I was out of the mainstream undergrads way.

About the second month of school a notice on the bulletin board said that the Hallicrafters Company was looking for grad EE students to participate part time in a project. What attracted my interest was the statement that a company car would be provided. Since my schedule had open time, I called to set up an interview. Two days later I was in the presence of Joe Thompson, Hallicrafters' TV sales manager. He was putting together a group to evaluate their TV line and compare it to the competition. We would work our own hours, at the factory and in various locations around Chicago where TV reception was poor. We were to prepare reports of suggested improvements for the TV line. A Ford station wagon would be provided, which we could use as long as we were working on the project. I accepted the offer and was put to work the next day as an independent researcher. As I remember, I got a dollar an hour in addition to the keys and a gas card for the station wagon.

Joe Thompson had taken over a storage/maintenance room next to the loading dock on the West 5th Avenue side of the building for our operation. Hallicrafters had started TV production after the war with the T series, which had a push button tuner and a 7-inch tube, but when I got there they were building the 500 series with 10, 12, 15 and 16-inch tubes and a mix of push button and rotary tuners. Engineering was working on a new 600 series. Most of our evaluations were of the 500s and a few new 600s that we compared to Admiral, Zenith, and Motorola sets. A few RCAs, and Dumonts were also available.

On the west side of the factory they were building HT-18 and -19 transmitters and the S-38B, S-40A, S-53, and SX-62. Engineering had the SX-71 and S-76 in the works. In between the TV production on the 5th Avenue side of the building and the ham lines was the Echophone and Hallicrafters radio production lines, building AM/FM table and console radios. The TV and broadcast lines took up about 70% of the building. The engineering model shop was in the rear, the side away from Kostner. I was not very welcome cruising around the factory, and especially in engineering or the model shop with my Hallicrafters contractor badge. I tried using my Signal Corps Engineering Lab badge; doors were opened and people talked, so I continued to use it. Security never asked any questions about the badge.

The engineering offices were up front on the Kostner side by the main offices, which were in the front corner by the two fancy columned entrances. Executive parking was also on the Kostner side. There was an executive dining room and an employee snack bar/lunch area in the

front also. In the snack bar area I could mingle with the working class engineers and some of the 45% female work force. The senior engineers ignored us as they did not think much of our project and considered us troublesome interference.

Work started after school, usually about 3 PM when I would load up the TV sets, at least one Halli and one competitor, some times more. My working area was South East Chicago. Joe Thompson provided names of people who had volunteered to try out the TV sets. I would phone ahead and then head out. I would set up the two sets side-by-side with an antenna switch so they could try out each. I would call or drop in about twice a week to see how they were doing, usually bringing a pizza, a six pack, or some wine. In many cases I had to stay for dinner, or else! South East Chicago, Calumet City, and East Chicago were middle class, hard working, predominately Polish families that were easy to get along with. It was also in the middle of steel mills and heavy manufacturing. It was a very poor area for TV reception, with weak signals, lots of reflections or ghosts, and interference from the mills. Joe did not want them to have to record anything, they would just talk to us and we would do the written reports.

I remember one family on Berley Avenue where I had left a Hallicrafters model 600 and a Dumont. When I called to check, they were only using the Dumont. They said the Hallicrafters got the programs OK but with different people on the screen. I couldn't understand how until I got there and looked. The vertical linearity was too high and the vertical size low. As a result everybody on the Hallicrafters screen had a 4' head on a 2' body. It was easy to see why Joe wanted us to do the reports. That would have been a dilly if it got to engineering.

With our location next to the loading dock we could see TVs going out the door. The factory did not have room for sets waiting for distributor pick up, so a company truck would load up the boxed sets and take them to a warehouse about 30 minutes away. The truck would make one or two trips each day. When I came in one afternoon several of my fellow students were watching the TV loading operation. It seemed like every plant security guard was watching also. Two guards were counting each box as it was loaded, and then two others shut, locked and sealed the truck doors. Then a guard got in the truck with the driver, and two guards followed the truck in a company van. We figured it was some sort of a special TV order.

When the same thing happened twice the next day, we finally got interested. We speculated on all kinds of special TV sets for unknown secret uses. We asked Joe about the sets several times, but he was reluctant to tell us. After the third day of the same TV set loading procedure (except it now included two guards inside the rear of the truck with the TV sets), Joe finally let us in on the problem. Somebody was stealing TV sets. They would load 25 sets at the factory, and when the truck got to the warehouse they only had 23 or 24 sets in the truck. Joe told us not to tell anyone as the company wanted to keep it quiet. They were convinced it was an inside job, and wanted to catch the thieves themselves.

While everyone in security and the front office was trying to figure how someone was stealing TVs, Joe Frendreis, the company accountant, did an audit of TV set production. The result was that no sets were missing. Every set built at the plant was accounted for in the warehouse. Now, the question was why the difference between the loading and unloading count? The company switched to a rental truck with no change. Then, all of a sudden the company truck was back and the security guards were back to their normal duties. We pestered Joe for an explanation, and finally got one. One of the workers on the loading dock had been loading empty

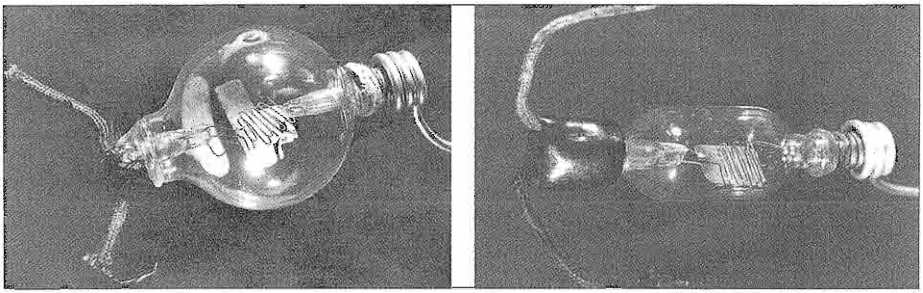
A typical Hallicrafters T-54 ad from late 1948 is shown above. The push-button set was style-matched to the SX-42 communications receiver, and the cabinets were designed by a noted industrial designer, Raymond Lowey. Lowey was responsible for many product styles, including the 1953 Studebaker Starlight coupe. The T-54 set had electrostatic deflection on the 7-inch "porthole" CRT, and at this time still included channel 1.

boxes, and when out of sight in the truck, he would tear up the carton and throw it on the floor of the truck. When the truck returned, he would sweep out the truck, removing the ripped up cardboard. We were never told who he was or what happened to him. We guessed they promoted him to internal security and gave him a raise and private parking spot.

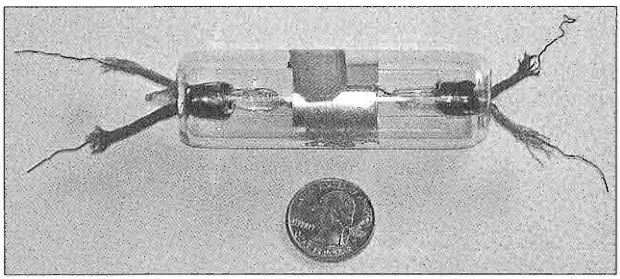
Shortly after the Great Chicago TV Heist, both grad school and the TV research project were grinding to a halt. Joe told us to get the TVs, but pick up only the one they didn't want, and very politely, try to find out why they wanted to keep the one they did. Boy, did I make friends on that round of South Chicago. I got Christmas cards for many years from many of the families, and I went back to Fort Monmouth with lots of hand knitted sox, sweaters, and home made cookies. To summarize my final report to Joe, I said they should copy the Admiral negative synch system and the Zenith time gated AGC, and give a 100% refund to anybody that had bought a Hallicrafters TV with the push button tuner. As for the test family's selection of a set to keep, it was mostly based on the cabinet fitting in with their furniture.

I kept in touch with Joe Thompson and Bud Zillinger, a fellow student and researcher for several years. Joe had a falling out with Bill Halligan, as Bill was more interested in his senior engineer's thoughts than those of his sales people. Joe went to work for a company called Igo Brothers but I lost track of him when he moved to Florida. Bud went to work for Hallicrafters after graduation, but only lasted a year or so, as he felt it was a closed group in engineering design and he was considered an outsider. As for me, the pictures in Electric Radio of the plant brought back lots of memories of good times. While I didn't have time for ham radio going to school and working, working in a plant called Hallicrafters was just about as good as it gets.

Incidentally, about 5-6 years after returning to Fort Monmouth, I had responsibility for a new frequency shift exciter to replace a Press Wireless unit. Hallicrafters won the bid, so I had a chance to remind them (and twist the knife just a tiny bit) of whom I was. *ER*



Above above are photos of prototype audions, and below is a production version.



that night. Everyone, except for Dave, wanted to quickly get it back to Gramps for another installment of what would hopefully be the Trans-cons story. Dave, however, took a ten-minute transmission to relate how he, as a kid, had built a spark transmitter from a Ford spark coil "borrowed" from his uncle's pickup truck and had gotten a behind-blisterin' with his old man's belt . . . and never could get the thing to work.

Eventually, it was Gramps' turn again. By this time, his blood pressure was pretty much back to normal. But, it had also dawned on him that these guys tonight were a little light in the ham radio heritage department and he recognized that this was the perfect opportunity to "enrich" them with some more history. He picked up the story.

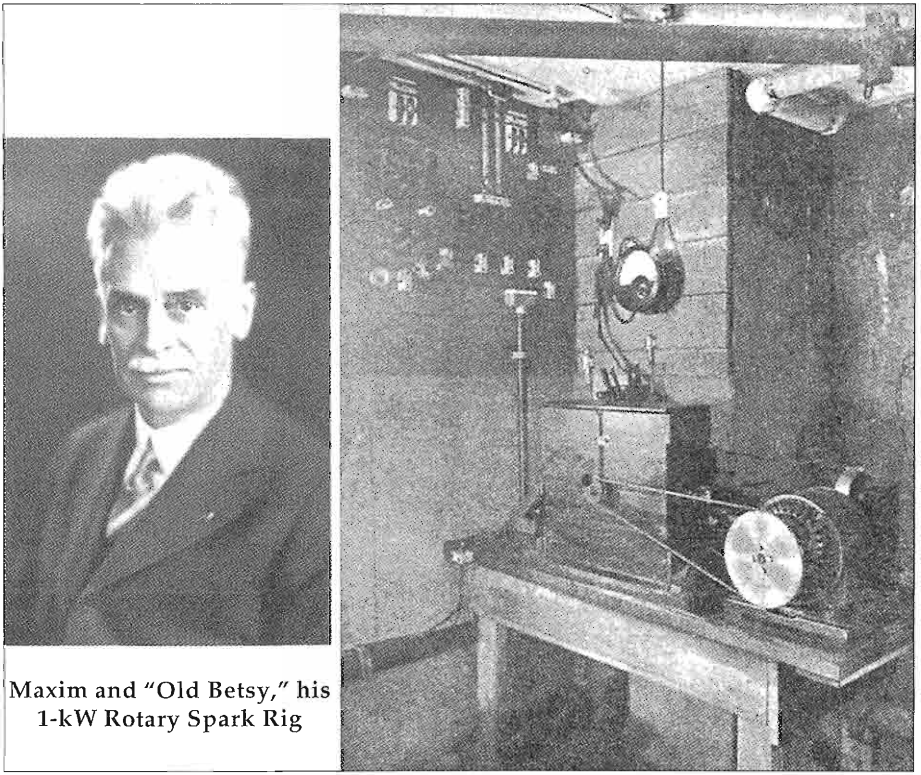
"OK, well, after the Radio Act of 1912, most of us figured this was a major setback to amateurs, but I gotta tell ya, it was also a time of good ole Yankee pioneerin' an' some fancy footwork. The amateurs installed basic tunin' on their spark rigs to be sure they were transmittin' at (or close to) 200 meters. Improvements in receivin' sensitivity and transmitter efficiency kept comin' and pretty soon amateur activity was growin' like gangbusters again.

"One of the biggest improvements to come along during this time was the Armstrong regenerative circuit. But this danged invention also created big demand for the deForest audion. These tubes were rare as hen's teeth 'cause everybody wanted a regenerative detector in their receiver.

"So the story goes, sometime in March or April of 1914, inventor Hiram Percy Maxim learned of a fellow in neighboring Springfield, Massachusetts who had a deForest audion for sale. Maxim had been tryin' for some time to get one to evaluate in an Armstrong circuit and figured he'd try to raise another amateur in Springfield to deliver a message to the seller. His 1-kW station, 1WH, had a range of about 100 miles, but the band conditions were so bad then that it was impossible to raise anyone in Springfield, only 30 miles away from Hartford.

"As Maxim lit his pipe and cogitated on the situation, he recalled meetin' a young man at one of the early meetin's of the Radio Club of Hartford. The lad was from Windsor Locks, a small town midway between Hartford and Springfield and he said that he had a transmitter on the air. Maxim called the lad and asked him to relay a message to Springfield.

"By the following morning, Maxim had



Maxim and "Old Betsy," his 1-kW Rotary Spark Rig

struck on the idea of a series of relay stations that could be organized to pass messages to any desired destination. And along with this network of relay stations, he recognized the need for a national organization that could represent the needs of the amateur radio community. With the white curls of smoke rising from his pipe, the seeds, which were to become the American Radio Relay League, took root."

Gramps paused to hear his old dog Jake scratching the back door signaling he was ready to come in for the night and have his dinner. It was dark and cold outside by now, but Gramps was on a roll and continued... "With their own money, Maxim and his fellow ham Clarence Tuska started publication of QST magazine to recruit stations willin' to become relay affiliates and to promote the ARRL. Membership grew, and by 1916 they had relay routes set up with amateur stations from coast to coast." Gramps expelled a deep belly laugh. "Not to be outdone, publisher Hugo Gernsback formed the Radio League of America with honorary members includin' Nikola Tesla, Lee deForest, Professor Fessenden, and Captain Bullard, who was Superintendent of the Naval Radio Service. League news appeared monthly in The Electrical Experimenter, one of his publications. Most likely a stunt to sell more magazines," speculated Gramps.

The laugh got Gramps breathing again, and with fresh oxygen in his blood, he realized it was time to let the dog in and pass the rotation around again. Back over to Junior.

Junior remarked that he had never heard of an "audion" or the Radio Act of 1912, and that his grandfather was a ham but had died when Junior was five. The rotation went around quickly. Dave had gotten the chow call from the XYL and

didn't waste any time checking out. Everybody else was by now mesmerized with the history they were hearing from the old timer who was there when it was being made. Mike reported that he thought the band was starting to go long but asked Gramps to comment on what kind of gear he used back in 1917.

By the time Irishman Mike got it back over to Gramps, Jake was gulping down his dinner of leftovers excavated from the icebox and Gramps was back in his swivel chair in front of the Gold Dust Twins with a ceremonial glass of ruby-red wine. But like Jake's food, the band was also quickly disappearing. Gramps figured he'd better sign while he still had the chance.

About an hour later, Gramps' telephone rang. It was Junior. He told Gramps how much he'd appreciated hearing the story earlier that evening, and was wondering if sometime he might come over for an eyeball and have a look at that fancy new Collins gear. Turns out that Junior was only about 15 miles away, and they decided he'd drive over after work the next day.

The Eyeball

Around 4 o'clock the next afternoon, Junior pulled into Gramps' driveway. As Junior opened the door of his old '39 Ford Standard Coupe, Jake ran up to inspect him. Gramps was in his radio room and didn't hear Junior arrive.

The sharp knock on the front door startled Gramps for a millisecond. But when he opened the door and saw Junior for the first time, he was even more startled – Junior was a dead-ringer for a guy Gramps used to work regularly back in his spark days, although he was doggoned if he could place him.

Gramps opened the door and invited Junior in, still a little shocked at the resemblance to his old friend from the spark days. Gramps offered him a drink, but Junior declined, eager to have a look at the new Collins gear. Then they headed for the hamshack.

The hamshack was at the rear of the house in what looked to be converted bedroom. An oak desk against the far wall held the Saint James grey equipment, which Junior's eyes instantly locked onto. He had only seen pictures of the Gold Dust Twins in the ham magazines. He stopped in his tracks and stood in front of them staring for what seemed like an eternity. Finally, Gramps asked, "Would ya like to give 10 meters a try?"

"Would I? You bet!" exclaimed Junior.

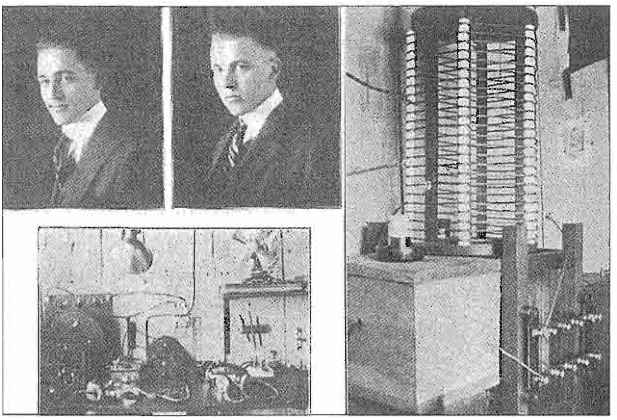
The band was open to Europe and there were phone stations scattered all over. Junior was on Cloud 9 tuning the 75A-4. He couldn't get over the direct frequency readout that his old HRO lacked. And the selectivity amazed him. But after about 30 minutes the band folded.

Turning his attention back to Gramps again, Junior commented on last night's Trans-con topic. "I was hopin' last night to hear the answer to the Irishman's question 'bout what gear you were usin' back in 1917."

Gramps once again picked up the story from where he had left off before the band went out. "Out in Los Angeles an ambitious pair of brothers known as the Seefreds shared a state-of-the-art rotary spark station havin' the call sign 6EA. By late 1916, these brothers, aged 22 and 21, had set up two successful ARRL trunk routes, consistin' of stations they could work regular. Every night, the trunk routes were busy passin' message traffic from city to city along the relay route."

Gramps related that the typical amateur of the time was around 18 years old, proficient in Morse code, adept at handling message traffic, and was well known among his radio peers. He also built most of his own equipment.

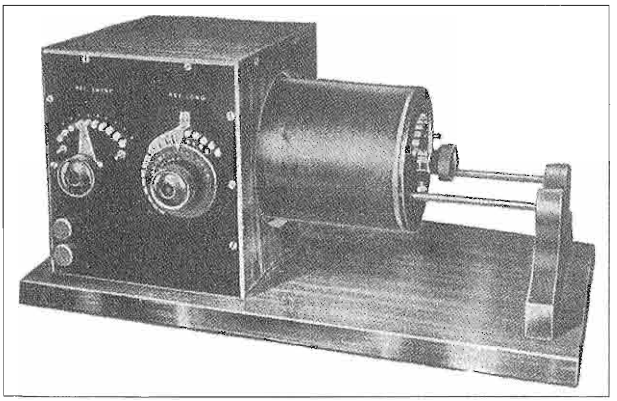
"The typical transmitter then was a rotary spark gap rig. The wheel was six or eight inches in diameter and had six to twelve rotary studs, each maybe an inch long and a quarter-inch wide. Mounted near the rotary gap was a pancake-type oscillation transformer, the type preferred by the Seefred brothers. The condenser bank was made up from a bunch of photographic glass plates sandwichin'



The Seefred Brothers and their Station in 1916

alternatin' + and – sheets of aluminum foil. The whole works was sometimes put in oil to improve the dielectric high-voltage handlin'.

"The popular receiver of the day was a loose-coupler type, but for relay work the Armstrong regenerative circuit usin' an audion proved to be a greater advantage over the old galena detector, if a feller was lucky enough to git his hands on one."



A Typical Loose Coupler Receiver from 1916

How It Was

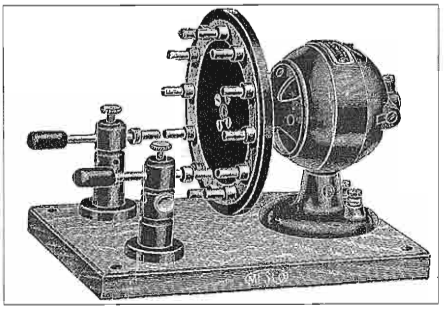
"So you worked a lot of DX back then?" Junior asked.

Gramps realized that Junior didn't have a clue what band conditions and operating was like in 1917. Gramps thought for a second, then responded, "Think of it like this: every ham in the country is on the low end of 160 meters. And 160 is a seasonal band. Summer static conditions generally make communications pretty much a lost cause for half the year. So when the winter season draws near and the band becomes useful again, the excitement in the air is electric and everybody's fixin' for their crack at breakin' some record from last year. And the bigger the event, the bigger the excitement.

"For example," continued Gramps, "on February 22, 1916, the *relay preparedness message* sent out by Colonel Nicholson of the Rock Island Arsenal at Rock Island, Illinois, addressed to the 'Mayors of Towns and Governors of the USA' caused a pretty big stir. This gigantic test was held on Washington's Birthday and was a huge success. Even President Wilson received a copy of the message. Imagine the thrill of deliverin' a wireless message that you received and copied over your own equipment to the Mayor of your city, or better yet, the Governor.

"But success didn't come easy," continued Gramps. "The official message handlin' protocol was strict. The message preamble had to include the origin, date and time filed, and the check number in order to qualify as a legitimate message. Most of the time, some of these items were missin' 'cause of improper message forms or lack of knowledge of how to put a message together.

"New developments in the radio art that happened since the last season also needed to be worked into our stations. The Armstrong regenerative circuit had become fairly popular by now, and received station DX records were being



A Rotary Spark Gap of 1916

broken regularly. The hard part was that it took some time and finesse to get the hang of usin' this doggone Armstrong circuit.

"A lost soul was the poor sap who didn't subscribe to QST magazine then. Every month the magazine was our lifeline to what was happenin' in the world of amateur radio. Descriptions and diagrams of new circuits, improvements to old, questions and answers to common problems, buy and sell classified ads, pictures of the other guys' station, and news about the latest relay contests held your attention from cover to cover. And the volume of information was a' growin'. By the end of its first year, QST had better 'an doubled in size."

The Challenge

"With the December 1916 issue of QST came the grand challenge from non other than Old Man Maxim himself. In an article titled *The First Trans-continental Relay*, he figures that the circuits are basically in place to pass a round-trip message from coast-to-coast. All that's required to accomplish the feat is a little organization and discipline. He ended the article with a fancy call to arms – lemme see if I can remember it: *'Let us see what we can do and prepare to give all honor to those destined to be among the fortunate pioneers in handling the first Trans-continental radio relay message.'*

"And, hams all across the country got busy. 'An I mean *real* busy. Many relay tries were made and with each attempt, the results were more encouragin'.

"Then, on January 27th, they finally got 'er done! The first private point-to-point message ever sent from coast-to-coast by amateur radio in the same day! And as I recall, there were three separate messages that all made it that night – two from the Seefreds to Maxim, and one from Winser in Bakersfield, California to Tuska, also back in Hartford with Maxim.

"Oh, and by the way, while these messages were received over more than one route, Captain Smith, 9ZF in Denver, was the one and only feller that <u>all</u> these messages went through.

"Well I tell ya, this whole affair put ginger into everybody and they stoked up the steam.

"On February 6th, they finally did the damn' thing <u>*round-trip*</u> in an hour an' 20 minutes," Gramps exclaimed. "Between the Seefreds and Maxim, there were only four hops; Denver, Jefferson City Missouri, Cleveland Ohio, and New York City. As a matter of fact, as I recall, there were <u>*three routes*</u> that all got the message across then.

"So everybody went nuts handlin' traffic after that?" asked Junior.

"Not quite," replied Gramps. His face lost expression. "War shut it all down."

W A R !

"On April 6, 1917, President Wilson got Congress to declare of war on Germany. The following month, the Navy shut down all amateur operation in the US," Gramps went on to explain. "With the Trans-continental in the bag and all amateur radio activity banned, young hams across the country immediately responded to the pleas in QST magazine to enlist in the Navy to help meet the demand for wireless operators. Every able-bodied radio man in the country QSY'd to the Service."

"Jeepers!" Junior reacted. "That musta really been sumptin."

Gramps paused for a second, "Some of the guys I used to work in the Midwest enlisted and got assigned to duty at NAJ, the Navy station at Great Lakes, Illinois."

Gramps spun his desk chair around

and, with a healthy kick against the desk, propelled it over to the barrister bookcase on the wall opposite the Gold Dust Twins. His arm went to the top shelf of his QST collection and he carefully ran his index finger over the spines of the magazines to the left, stopping at the August 1917 issue, which he then carefully extracted. He opened it to a dog-eared page and he began to read out loud:

"...Let me tell you a few of the incidents which were part of our training at NAJ, the Great Lakes Naval Training Station. After completing the days work, which consisted of putting away three squares per day, and putting in a few hours watch on the spark or arc set, we would gather in one of the tents in which we bunked and have an old-time wireless gab fest. Reclining upon one of the cots perhaps could be seen 'Swab' Bridges, otherwise known as 9ZL. Besides him might be seen our old friend, 8VP, or perhaps it might be our little red-headed 9GY, deeply engrossed in telling about the time he was heard in California. Strewn about the tent in many and varied postures were such lights as our 'Bill' Woods of 9HS, Sparks of 9LT, the well-known 9ABD of Jefferson City, Missouri, 9HN and 9DK of Saint Louis, Bonson, 9TM, of Dubuque, 9QF of Waterloo, 9VY, 9ALM, 9PR, 9SA, 9SB and a dozen or so of the lesser lights. In the center of the group could always be found the pet of 'Radio Row'—little Freddie Messing, 9AGK of Freeport, Illinois, the youngest and also the smallest of the radio bugs. Signals of all frequencies and wave-lengths ran rampant in that tent. The QRM flew thick and fast. QRT, QRX and QTA could be heard dimly above the general hubbub. I cannot begin to tell you all that took place in those often held meetings. One can easily imagine what happens when amateurs who had been working each other and exchanging correspondence for perhaps years, come together. With the blowing of taps by the bugler, the meeting would come to an end, and the participating 'stations' would shut down for the night."

Gramps laid the magazine down. "Those young pups were havin' the time of their life. Then the Navy asked for volunteers for shipboard duty. A lot of the lads signed up and the ones under 18 had to write home for permission.

"When the War ended, the young hams returned home. QST started up again with the July 1919 issue. Everybody was anticipatin' the Navy liftin' the ban on the amateurs and the excitement built."

Back to Business

"By September, many of the old relay circuits were reorganized to be ready for action when the Navy lifted the ban on amateur transmittin'. Then, finally on October First, the Navy officially lifted the ban, but they also told us that our old tickets had all expired and we needed to reapply to the Department of Commerce for new ones. They let us get back on the air with our old callsigns under a temporary permit, but most of us got issued new call signs. Anyway, by December '19, the first post-war transcon message was passed from Seefreds to Maxim and we were back in business."

"So, if it wasn't for these guys and the Trans-con work, the Navy might have left the hams shut down for good?" asked Junior.

"That's the way I figure it," said Gramps. "It was Maxim and all those young pups with spunk that saved our bacon. Kids like you, by golly."

Junior spotted a photograph of the top shelf of the bookcase containing the QST collection. "Jumpin Joesphat!" he shouted, reaching for the framed picture.

"You recognize that fella?" asked Gramps suddenly, making the connection.

"You bet!" replied Junior. "That's my granddad!"

ER

W9ARA and W9BSP

Two Who Made a Difference, Part 2

By Bruce Vaughan, NR5Q
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November 1938

Alan Glass, W5A??, had a Class-A license. FCC rules at the time permitted any holder of a Class-A ticket to administer exams to anyone living more than 125 miles from a FCC examining point. Those passing the exam would be issued a Class-C license which granted the license holder all the privileges of a Class-B license—at that time, Kansas City, 200 miles away, was our closest examination point. Early in November, Alan wrote the FCC and ordered three examinations. Carl, Raymond, and I, all took the examination before Thanksgiving. Carl received his license, W5HTD, Raymond's call was W5HTV, and I received W5HTX.

October 1938

Raymond ordered a truckload of lumber and started building his workshop and ham shack behind the neat bungalow he and his wife owned. The shack was not large—less than 200 square feet total. Raymond was a good carpenter and the little room was well built.

Two years before, Raymond had ordered a Sky Chief from Bob Henry. Now, all he needed to achieve his dream of getting on 160-meter phone was a ticket and a rig. He had the shack all finished before Thanksgiving, and moved all his radio gear into the small building. The shack was well insulated—a small portable kerosene heater kept it nice and comfortable.

Some years before, Raymond rented a Teleplex, a spring-driven machine that used punched paper tape to send code practice. A number of tapes were available for the Teleplex—about a dozen as I remember—and he had all of them. The tapes were a help in learning code, but Raymond was quick to credit W9BSP with getting him up to the required 13 WPM.

Raymond had little use for CW. He wanted 160-meter AM phone. Raymond was very impressed with ads in QST warning us about the dangers of RF loss in cheap capacitors, coil forms, tube sockets, etc. He had definite ideas—most of which were wrong.

Once the ham shack building was complete, he begin work on his transmitter. It was to use a 6L6 crystal oscillator, a T-20 buffer, and a pair of T-40s in the final. He was going to modulate the rig with a pair of TZ-40s Class B. Here is the strange part. He wanted each stage built on a separate chassis. So, with three chassis for the RF section, and two chassis for the RF power supplies, one more for the TZ-40s modulator, another for the speech amplifier, and two chassis for the audio power supplies, he had 9 separate chassis.

He built the chassis—I forget the exact number he built as a starter—using ¾-inch wood for the back, front, and sides of the chassis, and ¼-inch plywood for the top. Each chassis was 14 by 14 by 6. He planned to line the things up in a row down the length of one side of the shack. As each wood chassis was built, it was sanded until it was smooth as glass. Then he gave each chassis three coats of aluminum paint. He carefully painted both the topside and underside of the plywood boxes.

He had enough Isolantite® parts to build a UHF rig. We tried to tell Raymond that losses meant very little on 160, but he was convinced that 200 watts out of a low-loss, 160-meter rig was much louder than the same power from a rig with 'lossy' insulation, such as plain old Bakelite®. Somehow, a miracle was going to happen if you used enough of the white ceramic material.

Well, the rig died before it was born. It never was completed. One QSO originated from the nicely built little ham shack. Clarence built a small rig in the shack and one Sunday afternoon, Wade, Clarence, Raymond and I were admiring the finished rig.

"Let me see if I can raise someone," said Wade. He called a CQ and got a reply from a ham in Oklahoma. That was the total result of all the work and effort put into the nice ham shack.

December 1938

My ticket arrived just before Christmas. I made it a practice for several months to go to bed early and get up at 2:00 AM to work 40-meter CW while the band was quiet. I have hundreds of QSL cards from my sleepless brotherhood.

Hallicrafters came out with an "improved" S-19. It was designated the S-19R. The difference was a bandspread capacitor. I called Bob Henry and we traded. He allowed me $20.00 for my almost new S-19 and I paid $10.00 in trade for a set with electrical bandspread. It was well worth it.

March 1939

I received a flyer from Henry Radio Shop in the morning mail. They were closing out the Breting 9 receiver for only $44.50. That was down from $79.95. I did not owe Bob any money at the time so I called and had one put on Railway Express. It was one of the best receivers I ever owned. Electrically it may not have been state-of-the-art, but mechanically it could stay up with the best.

April 1939

John Webb, W5BVT, retired from the railroad as a telegrapher and moved to Springdale.

He was a native of the area, but when the telegraph and radio were young John had gone to a telegrapher's school and learned to copy code. For a time he worked for Western Union, and then moved up to a better job with the railroad. He stayed with the railroad until he retired. As his call indicates, he was licensed around 1930. He had kept his license up but had never owned a ham station.

John heard I was probably the most active ham in town and came to see me. I was still in school, planning on graduating in May. John wanted to see my station and to hear me work someone on the air. I set a time of 4:00 PM. That would give me time to walk home from school and get the rig warmed up.

John arrived promptly and we were soon in QSO with someone—I do not remember who.

"Where would I go to buy a ham station," asked John?

"John," I replied, "I would not consider buying ham gear from anyone but Bob Henry. He is a ham himself and understands ham radio. He will treat you right. Any ham in Springdale will tell you the same."

John had a brand new 1939 Chevrolet. "If you would go up there with me and help me pick out the equipment I would pay you for the time," he said.

"John, I'd be glad to go, but I would not think of charging you. I have always wanted to go up to Butler and see his place." I was really enthusiastic. "Just name the day and we will take off. It is only a 150 mile drive."

I did not realize it at the time, but John's idea of high speed was somewhere around 35 MPH. We left here at 7:30 AM and arrived there around noon.

John had a budget of around $100.00 he wanted to spend on the station. He told me he would go more if necessary.

Bob Henry's Radio Shop occupied a building on Butler's Main Street. I understand that Bob's father was a farm equipment dealer in Butler and when he retired the building became vacant.

When we arrived we stepped into the busy office. As I remember he had about five women in the office answering mail, filling out contracts, and taking care of all

Bob. "I am going to just make a note and put on the spindle here that you are going to pay $50.00 a month."

George loaded all the equipment on a hand truck and pushed it out to my ten year old Lincoln. I popped the lid of the trunk and started loading up my gear. Bob was standing to one side while George and I did the work. "By the way," said Bob, "What is your present call?"

"Oh I don't have a ticket at the moment, Bob."

Bob looked like I had slapped him. "Bruce, I can't sell you all this equipment if you don't have a license." He stepped forward and removed the 2-meter Kenwood from the car trunk.

I started laughing. "Bob," I said, "Look at me. Do you really think an old time ham like me is stupid enough to think he can operate without a ticket? I had my local druggist, who has an Advanced Class ticket, give me the Novice exam. There is an exam scheduled for Tulsa in two months. I expect my Novice ticket to arrive anytime. I will have my Extra before fall. I promise not to work this rig into anything but a dummy load until the license is in hand."

Bob relaxed. "I just wanted to be sure I was not selling all this to a bootlegger," he said.

"Let's get this stuff loaded."

I paid for the equipment in 90 days—long before Henry Radio closed up shop. Once my credit was firmly reestablished Bob shipped me any thing I wanted on open account. It was sure convenient. When Henry Radio closed their door forever a wonderful era of ham radio ended.

ER

(Comments, from page 1)

Frequencies: 1.880-1.900 MHz, 3.835-3.890 MHz, 7.280-7.295 MHz and 14.275-14.295 MHz.

Exchange: Give your name and state, or province, or country if you're outside of North America. That's it! Of course, we encourage participants to talk about the transmitters and receivers they're using, antennas, microphones, etc. Take your time and enjoy showing off that station of yours!

Scoring and Classifications: For stations running 100 watts (or less) carrier output, each contact counts 2 points. For stations running over 100 watts carrier output, each contact counts 1 point. All contacts made on 20 meters, no matter the power class, count 5 points. You may contact each station once per band. See extra points for flagship station contacts below.

Flagship Stations: There will be two flagship stations participating in the AM QSO Party, but they will not be included in the final points standings (their totals will be listed apart from the other QSO Party stations). If you are lucky enough to contact a flagship station, your first QSO with them counts as a 10-point contact, but if you happen to contact them again on other bands then all subsequent QSOs with them are the standard point count for your particular power category. If you're fortunate enough to pull off a "grand slam" by making contact with both flagship stations that will give you an extra 20 points!

Logs: None really. We will have a downloadable summary sheet on the AWA website that can be filled out with all the information and final point total. For those without web access, send me a large SASE for a copy. If you only make a contact or two, please send in a report. All summary sheets must be postmarked no later than March 18th and sent to: Gary Carter – WA4IAM, 1405 Sherwood Drive, Reidsville, NC, 27320-5224.

Results: The results will be published in the AWA Journal, in Electric Radio and also online at Amfone.net."

Hallicrafters SX-117 Part 2 Article

Due to other circumstances, I have postponed part 2 of the SX-117 article until the February 2007 edition.

73, Keep Those Filaments Lit!

Ray, NØDMS *ER*

A Transmitter for the Novice: The DS-40, Part 1

By David Kuraner, K2DK
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Back in April 1960, my father was reading the current issue of Science and Mechanics. On page 180, he spotted the article, "Transmitter for the Novice" and brought it to my attention. Now, this was way cool, as a 75-watt CW transmitter was shown built inside a war surplus 30-caliber ammo tin. This became my first novice rig and actually did produce my first contact–even if it was with the ham around the block. Hey, for a youngster this was really something. But, the thing never really worked and a friend finally lent me a DX-20 which completed my novice career.

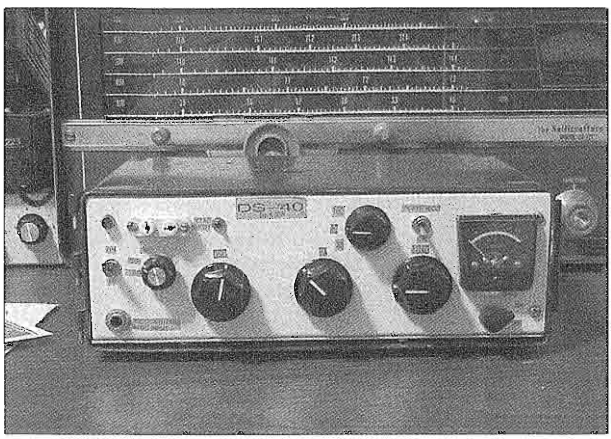
Over the years, I continually thought about that rig and why it didn't work properly. Like Captain Ahab, I eventually became obsessed with building a rig in an ammo tin. In fact, the idea keep running around in my mind for over forty years. It became something to do when I retired. Finally, a few years ago that youngster built a rig in an ammo tin and it worked! It was named the Desert Forty (DS-40), since it wandered in the "desert" of my mind for at least forty years.

The Original Article

Running an 807 fed by a 6C5, the rig used an untuned crystal oscillator and a link-coupled final. The tuning indicator was a small pilot lamp in series with the output. It operated on 80 and 40-meters with band switching. The author, Alice Rolf (KN5SEL), claims to have built it after her husband drilled the panel holes. She very well could have built it, as she described an interesting use for nail polish in the construction!

The final tuning capacitor was a typical broadcast 365-μμf variable with a homemade coil. It used a one inch coil form with 27 turns of #22 wire, tapped at 15 turns from the bottom for 40 meters. The link is another 10 turns wound around the bottom end. (The original article is available, please contact the author.)

Alice stated that even a novice YL would have no trouble building it. She never said anything about that YL getting it to work! I do know that as an inexperienced novice I could not get it going, and even after redesigning it decades later, it looked like it was destined to become a paper weight.

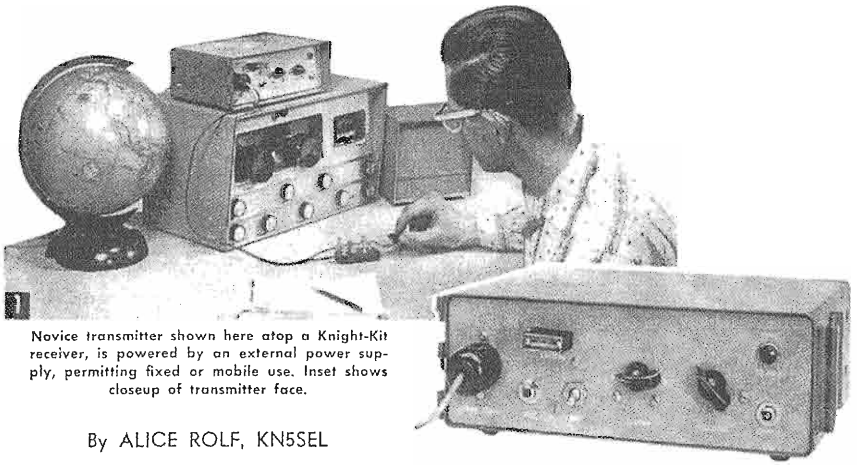


Here is my version of the "Transmitter for the Novice." Behind it is my SX-111.

The Redesign

Ok, so now I'm this highly educated and experienced ham/electronics engineer. Building a simple two tube CW transmitter should be a piece of cake. I was going to do it like the professionals would do years ago with a cardboard mock up for placement of parts and control panel layout. Nothing was going to

Transmitter for the Novice



Novice transmitter shown here atop a Knight-Kit receiver, is powered by an external power supply, permitting fixed or mobile use. Inset shows closeup of transmitter face.

By ALICE ROLF, KN5SEL

KN5SEL's original article from April 1960.

be left to chance and everything was going to be perfect. This was to be a thing of beauty and something to be proud of. The photo on page 18 shows that I was really serious about this.

The first design decision was that I was not going to prove that I could design and build a power supply. Besides, I had a spare Heathkit HP-23. The HP-23 was designed to feed a pair of 6146s. So, the next *modern marvel* of engineering disasters was to lay the 6146s on their side inside the ammo tin.

Next, I made the decision to use the PI network from a defunct HW-101. I had no reservations about gutting this one because the thing never worked from day one. After I disassembled it, I found all the wiring errors made by the original builder inside the final cage. Oh well, but it did provide unused parts for my project.

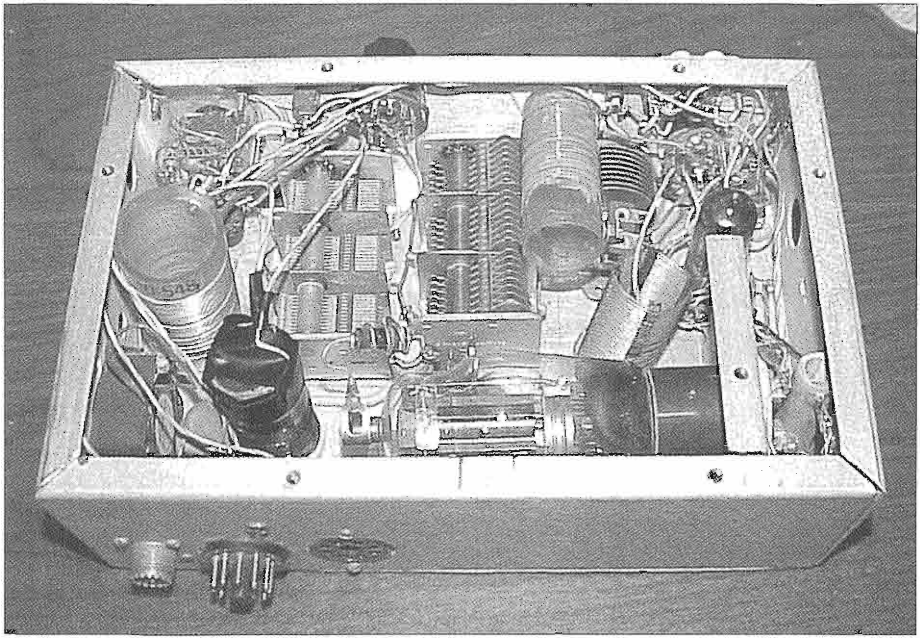
With its initial smoke test the results were very promising with almost 150 watts output. But what's this, I am seeing sparks within the final tubes? OK, so I have some questionable 6146s. So, in goes another pair that make some more sparks. Lesson learned: 6146's will not do the horizontal mambo. The only way to resolve this was to do a re-redesign.

The Re-Redesign

I needed to go back to the original 807 design. But, the HP-23 only has a 12-volt filament supply so I needed to fit two of them in there because the 807 uses a 6-volt filament. But, two 807s didn't fit. So, the simple solution was to use a 1625 which is the 12-volt version of the 807 and commonly available. In fact, it's so common that I have 2-dozen NOS tubes. This was a simple solution? *Not Quite!*

Everyone has that special 7-pin socket that only the 1625 uses, right? Wrong! OK, so there are ways around that, like soldering directly to the pins or some other less-than satisfactory engineering practice to circumvent the problem. To my rescue, I am indebted to Bud (WB8BIL) for sending me a care package of sockets. The AM community comes through. Now, I have the right tube in the right socket and everything should go smoothly. *Guess again!*

I had an intermittent, and suddenly the output would just die. Then, just as suddenly it would come back to life. No amount of troubleshooting revealed the cause. Finally, by accident, I realized that

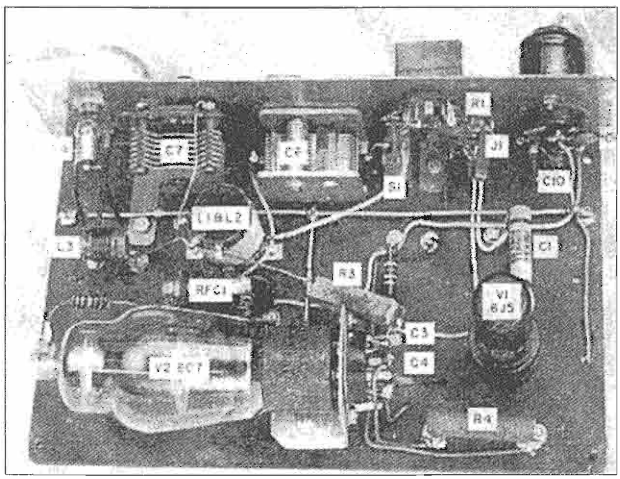


The DS-40 shown with the chassis inverted. Squeezing 160-meter operation in as an afterthought is a challenge! The horizontal Rx coil (on a container form) is the 160-meter oscillator. The add-on final 160-meter coil is below the Heath tank coil and covered with electrical tape to insure it does not short against the top of the ammo case.

the same thing would happen if I jiggled the crystal. The crystal socket was shorting intermittently against the panel. For a while it looked like this thing was going to take another forty years to get working!

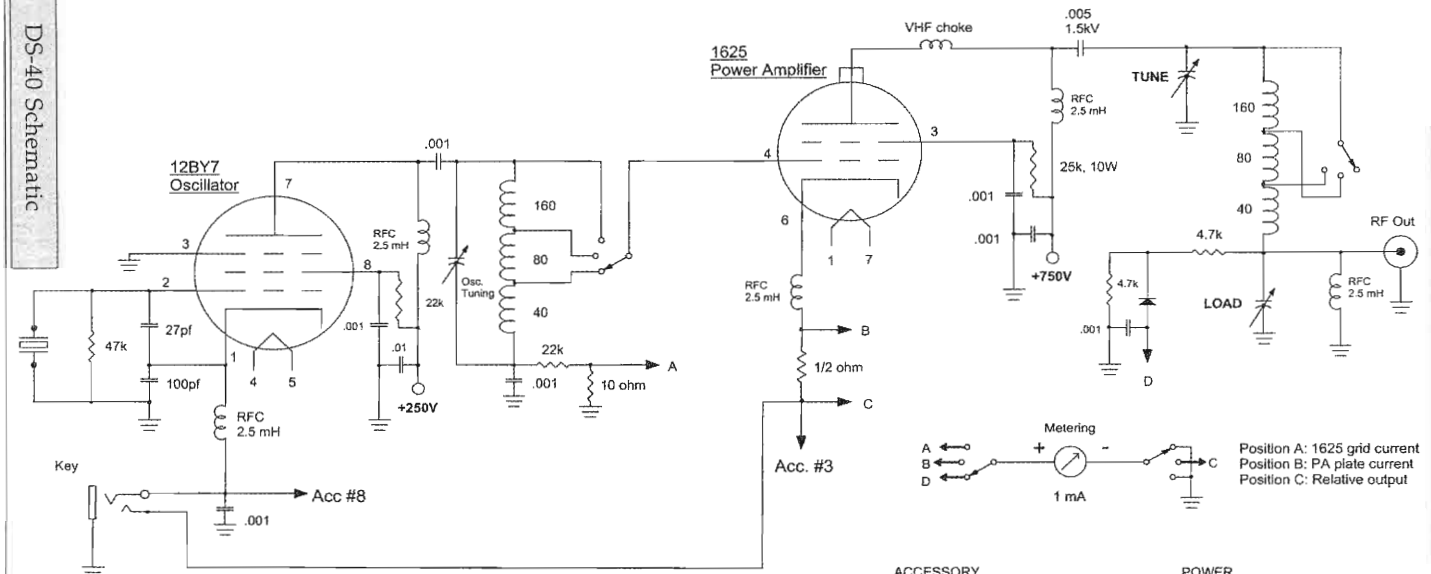
The Heathkit Connection

You may have recognized a few Heathkit parts in this rig. I have purchased numerous Heathkits at hamfests and from eBay. Some of the grungiest and least expensive have become the best performers, while often the cleanest and more expensive had more intermittent problems than anyone could deal with, or they were DOA. I have a great respect for Heath and their products, but often the builder is more like a butcher, or the storage environment has not been kind. The only solution is to take the thing apart and

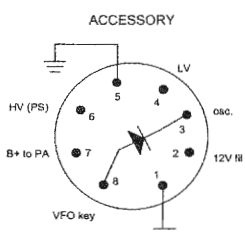


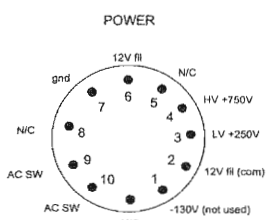
The original component layout in the 1960 article.

DS-40 Schematic



Note: This circuit is also known as a Master Oscillator-Power Amplifier (MOPA), which was common for the period.





rebuild it, assuming you can successfully deal with any corrosion, and have the time or inclination. Or, you can simply use the parts for another project.

It's the old adage, if life hands you lemons, you make lemonade! I have found that kits not useable for their original purpose to be a great source of parts; from resistors and small caps to meters, transformers, chokes, coils, tuning caps, knobs and even hardware. Please don't write me and complain that I'm destroying history by cannibalizing this equipment. There are plenty of these things in pristine condition for posterity. The ones being hacked up have been destroyed by neglect or by the original butcher. I challenge anyone to find a pristine unmodified Heath lunch box, enough said!

In addition to the tank circuit components and the meter, I reused the RF choke and meter shunt resistors. I have a defunct SB-401 which could have also supplied the components. Additionally, if I had needed a power supply, all the required components would have been right there. If individually purchased, the parts would have become rather expensive or required lots of hamfest junk box searching.

The Final Product

Now, with the chassis and panel drilled and parts mounted, I was faced with some serious internal physical modifications. Fortunately, the external appearance was not impacted, but internally it was not a pretty sight. It did work, and looked like the work of a young novice!

The oscillator is now a 12BY7 in a tuned circuit. The 1625 uses a PI network. It also sports that Heathkit meter to monitor grid and plate current and relative output. An accessory socket was installed to permit an external plate modulator or VFO to be used. Since this transmitter was intended to be used with the series-cathode modulator I described in ER #191, the cathodes of the oscillator and RF amplifier were separated and brought out in a ¼-inch stereo phone jack.

The ammo tin was cut in the back to permit all of the external connections, except the key, to be brought out at the rear. Vent holes were drilled above the final and oscillator tubes. Since originally two 6146s were expected to generate large amounts of heat, a small 12-volt computer fan was installed, powered from the 12-volt filament supply. With a little shoe horning, a small T/R relay, again from the Heath rig, could have been installed with some minor control circuitry. I did not find this to be necessary because I use an electronic T/R switch.

The original rig was supposed to work in the 80 and 40-meter bands. I also work 160, so I included that band as well. Coils were wound, and after a little experimenting everything worked just fine. The bandswitch now controls both the oscillator and final stages for all three bands. I am pleased with the results, and know that I have a far better designed and functional piece of equipment, compared to the original 1960 version.

The Final-Final

I was so delighted with the little rig that I built another series-cathode modulator with control relays in another ammo tin to match the first one. I even built a matching receiver in a 50-caliber ammo tin. The 30-caliber version is just too small to house anything other than a simple regenerative receiver or, heaven forbid, a solid-state superhet. The story of this HB receiver and a companion matching speaker/power supply for the entire HB station will be described next month in part 2.

This is my personal time machine. I invite you to try your hand at either my version or Alice's. If anyone gets her version on the air, for what it's worth, I will personally confer Knighthood. Good luck!

[Editor's note: Mr. Murphy strikes the printed word too! In the HW-100 AM conversion article last month, ER 211, in describing the final amplifier medications to the HW-100, the sentences should read: "First lift the ground side of the 2.2 ohm resistor from pin 8 of V8 ..., A wire is connected from the wiper to terminal back to ground."] ***ER***

Simple Upgrades to the TV7-Based Vacuum Tube Curve Tracer, Part 1

By Paul A. Bernhardt, KF4FOR
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Introduction

In my previous article (P.A. Bernhardt, "A Vacuum Tube Curve Tracer from a Converted TV-7 Tube Tester and a Transistor Curve Tracer," Electric Radio, #210, November 2006), a common military tube tester was modified for use with a Tetronix transistor curve tracer. This modification used one four-pole, double-throw switch, an electrolytic capacitor and a power resistor along with three tip jacks to permit measurements of vacuum tube plate characteristics while stepping the voltage to the tube grid.

Correction To Previous Article

There was a misprint in the steps needed for the TV-7 modifications. Steps (8) and (10) had the poles of the switch reversed. These two steps should read:

- (8) Using hookup wire, connect the CT pin of Pole-C for the 4PDT switch to the tip jack labeled P.
- (10) Using hookup wire, connect the CT pin of Pole-A for the 4PDT switch to the tip jack labeled K. Also connect a wire between pin 17 of the transformer and CT pin of Pole-A.

The schematics showed the correct TV-7 wiring.

Simple Upgrades

As mentioned in the earlier article, the primary limitation to the setup was the low voltage steps provided by the transistor curve tracer. The typical transistor curve tracer provides at a maximum 2-VDC steps but many vacuum tubes require 5-VDC or larger steps for full characterization of the tube operation. The purpose of this article is to describe a direct-current amplifier that can provide a factor of 10 increase in the voltage steps from the transistor curve tracer to drive the vacuum tube grid steps.

Operation of the TV-7 based vacuum tube curve tracer also showed that for many tubes the screen grid voltage derived by the TV-7 was not sufficient for typical operation. This paper provides an upgrade to the modified TV-7 with a provision to give an option of two values of screen voltage. For this upgrade, a single-pole, double-throw switch is added along with two diodes and a change in the electrolytic capacitor in the previous modification. Upon completion of these two enhancements, the combination TV-7 and Tektronix curve tracer can provide accurate measurements of the vacuum tube characteristics for all vacuum tubes that can be tested with a TV-7.

The test setup with the upgraded vacuum tube curve tracer is illustrated in **Figure 1**. The previous paper (Bernhardt, Electric Radio, #210, November 2006) had cables running directly from the collector-base-emitter (C/B/E) terminals on the transistor curve tracer to the plate-grid-cathode (P/G/K) terminals on the modified TV-7. The operation mode was selected with the tube tester (TT) and curve tracer (CT) positions on the switch added to the TV-7. With the upgrade described here, the base-emitter (B/E) voltage steps signals from the transistor curve tracer are amplified by factor of negative ten and fed into the grid-cathode (G/C) terminals of the TV-7 tip jacks. In addition, a second switch is added to the TV-7 providing a low voltage (LV) or ~140 VDC selection for screen voltage as well as a high voltage (HV) or ~280 VDC screen voltage to the vacuum tube under test.

Either upgrade can be independently

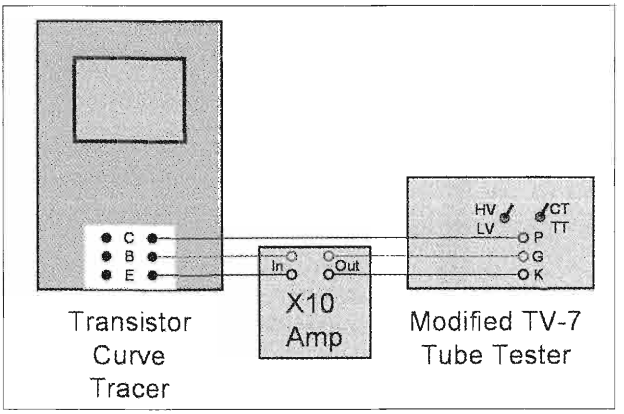

Figure 1: Connections between the Tetronix transistor curve tracer, DC amplifier, and modified TV-7 for vacuum tube characteristic measurements. The X10 DC amplifier and the LV/HV selection for screen voltage are the new features for the upgraded design.

implemented to the design previously described by Bernhardt (2006). The next section describes a times ten (X10) DC amplifier and the following section shows the simple modification of the TV-7 for addition of a screen voltage selection.

Times Ten (X10) Inverting Amplifier with DC Offset

DC amplifiers are made by putting negative feedback around a very high gain inversion amplifier. Solid state operational amplifiers (such as the Fairchild uA741) are available for this purpose but their output voltage range is limited to about ±15 volts. The grid drive on a vacuum tube should have a range of ±100 volts for useful operation. For this reason, a vacuum tube operational amplifier was used for the curve tracer upgrade. Vacuum tube op-amps (VT-OA) were used in the 1950s for analog computers. Heathkit had several electronic analog computers for sale that used relatively simple, but stable, vacuum tube op-amp circuits.

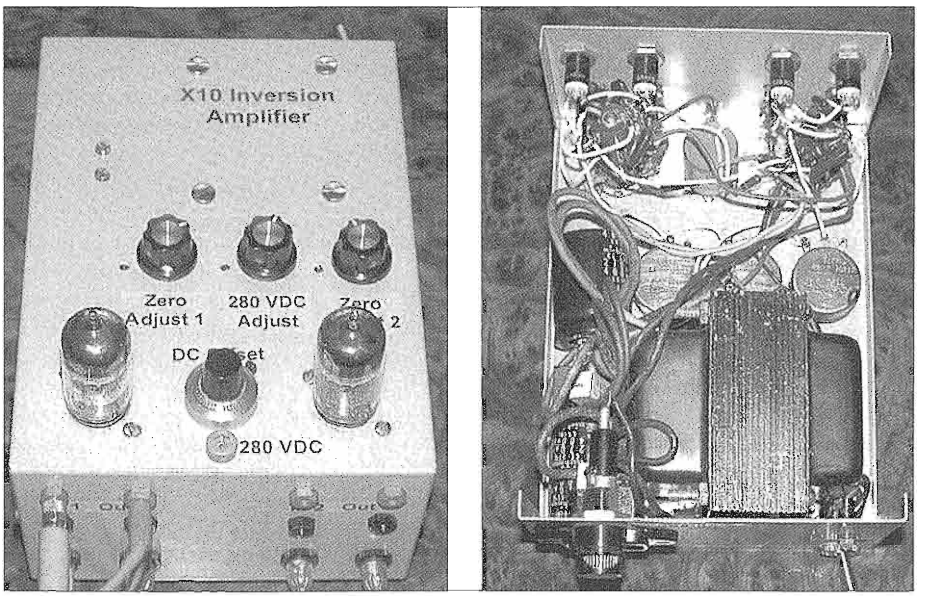

Figure 2: Vacuum tube amplifier with a gain factor of -10 and a DC offset up to 100 VDC. Box lettering is made with black printing on clear mailing labels.

Two of the Heath operational amplifier circuits have been considered for the times ten (X10) amplifier to drive the curve tracer grid voltage steps. The Heathkit model ES-201 DC amplifier, with an open loop gain of 50,000, used three vacuum tubes (12AX7, 6BQ7A, and 6BH6) and a NE-51 neon bulb for voltage stabilization. This amplifier was sold for $14.95 in 1957 as part of the Heath Inexpensive Electronic Analog Computer Kit (Heathkit Brochure, Benton Harbor, Michigan, 1957). The ES-201 was judged to be too complex for the TV-7 curve tracer upgrade. A simpler VT-OA was used in the Educational Electronic Analog Computer Model EC-1 sold in 1959 (EC-1 Operational Manual 595-235, Heath Company, Benton Harbor, Michigan). This operational amplifier circuit used a single 6U8A and had a nominal gain of 1000.

Based on the Heath EC-1 op-amp, the X10 amplifier circuit shown in **Figure 3** was designed. This amplifier provides high gain, high input impedance, low output impedance, good linearity and low drift. The pentode section of the 6U8A is operated with a large plate load and low voltage on the screen grid to give a gain of approximately 700. The output of the pentode is fed to the triode section of the 6U8A which is connected as a cathode follower. The two NE-2H neon lamps drop the output voltage of the amplifier to approximately 0 volts DC. The 150-pF capacitor and 1k-ohm resistor provide low-pass filtering to prevent oscillation. The X10 gain is obtained with the 100k-ohm resistor at the input terminal and the 1M-ohm resistor that feeds the output to the grid of the pentode section. DC offset is achieved with zener stabilized source of –100 VDC and a 10-turn potentiometer feeding a 1M-ohm resistor. These precision resistors were selected with a digital ohm meter for 1% accuracy. All the resistors in the circuit are ½-watt unless otherwise specified.

The resulting amplifier circuit gives an output voltage described by the equation:

$$V_{out} = 100\ P_0 - 10\ V_{in}$$

P_0 represents the position of the DC offset potentiometer with a range from 0 to 1, and V_{in} is the input voltage to the amplifier. This DC amplifier is called an inversion amplifier because of the minus sign in this equation. The "zero adjust" potentiometer at the cathode of the pentode section is set to give zero voltage out when no voltage is applied to the input of the amplifier and the DC offset is at the zero position.

The 10k-ohm resistor and 1500-pF capacitor on the input of the amplifier are provided, if a current source is used as input. Tektronix transistor curve tracers typically have base current outputs to test bipolar junction transistors. With a current I_B, the output from the X10 amplifier is

$$V_{out} = 100\ P_0 - 10^5\ I_B$$

so a 100-µA step in base voltage from the transistor curve tracer yields a 10-volt step in the output voltage to the grid for the tube under test. The 1500-pF capacitor is an input filter to eliminate output transients associated with the current steps.

A solid state power supply was designed to power the X10 Inverting Amplifier (**Figure 4**). The power transformer for the circuit was a Halldorson Model HVPT-3 with a 210-0-210 VAC, 50-mA plate output and a 6.3-VAC, 2-amp CT filament winding. The high voltage from the 420-VAC center tapped transformer is rectified by a full wave bridge and filtered by 400-µF, 400-VDC electrolytic capacitors to yield about ±300 VDC. The +300 VDC is reduced to a stable 280 VDC by a TL783 solid-state voltage regulator. The grid drive current will be low and no heat sinking is required for the TL783. The HV adjustment potentiometer is set to provide a measured 280 VDC for the DC amplifier. The X10 amplifier can be powered by any voltage near 300 VDC as long as the voltage is well regulated. The LED in the

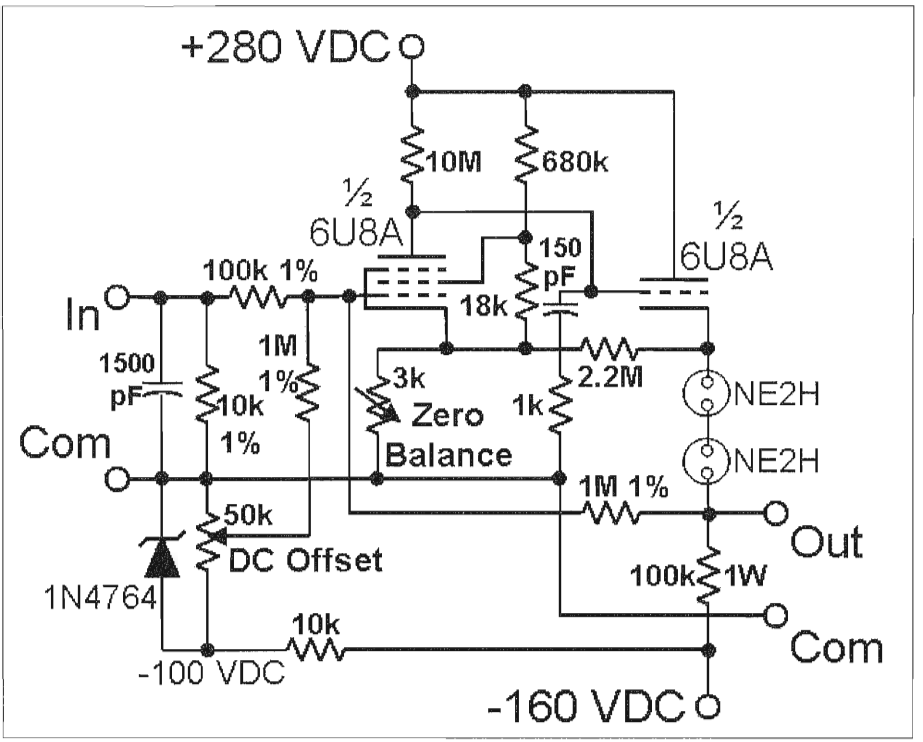

Figure 3. Vacuum tube operational amplifier with negative feedback to give a DC voltage gain of –10. Provision is made for providing up to 100 VDC offset of the amplified voltage.

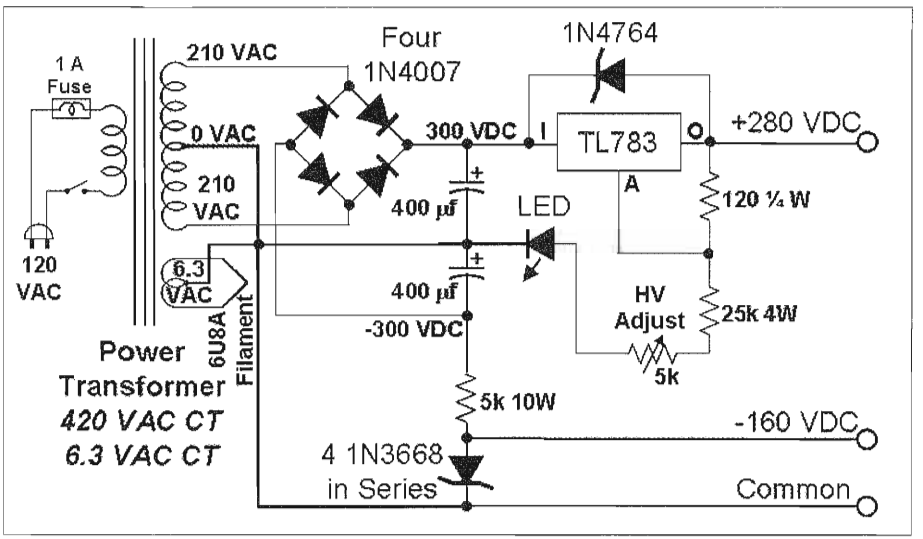

Figure 4. High voltage power supply with solid-state regulation for the DC amplifier.

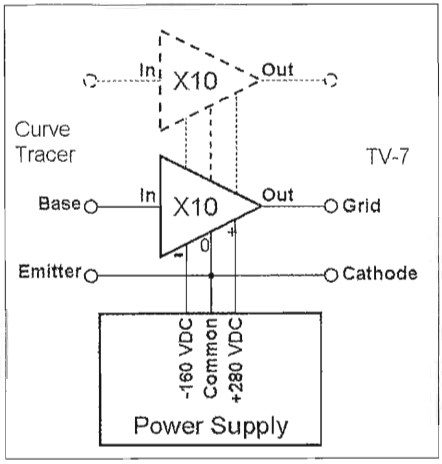

Figure 5. Interconnections of the high voltage power supply with two DC amplifiers.

10-mA adjustment leg provides a pilot light indication of the presence of high voltage. The –160 VDC needed by the DC amplifier is provided by three 39-VDC zener diodes in series and a 10-watt voltage dropping resistor. The power connections for multiple DC amplifiers are illustrated in **Figure 5**.

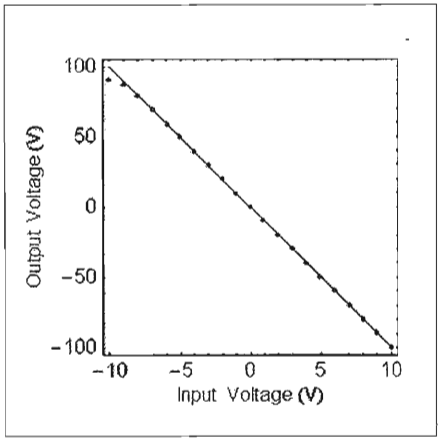

Figure 6. Voltage response of X10 inversion amplifier. The measured response (points) follows an ideal DC amplifier (line) except for saturation with output voltages above 90 VDC.

Two X10 Inverting amplifiers with the HV power supply are packaged into single box (**Figure 2**). The LED and neon lamps are mounted on the box to indicate the presence of high voltage. The neon lamps increase in brightness as the output current increases. With two DC amplifiers in one box, the left and right selections from a Tektronix curve tracer can be connected to drive two modified TV-7 tube testers. This permits rapid comparisons of the characteristics of two tubes for matching purposes. The electrical components for each DC amplifier are installed on a 9-pin turret socket made by Vector. Tip jacks are used for the input and output of each amplifier. The common connection for the amplifier circuit was not grounded to the box because some Tektronix transistor curve tracers have an emitter (or cathode) input that is floating above ground through a small resistor for current measurements.

The gain performance of the 6U8A amplifier was found to be excellent. After the plate voltage was adjusted to 280 VDC and the two DC amplifiers were set to zero output with no input, the dynamic range and gain was checked. **Figure 6** gives a comparison of measured output for 1-VDC steps in input voltage and a line of ideal gain of –10. The amplifier has a measured accuracy of 3% or better over the full range except for input voltages below –9 VDC when some saturation is seen in the voltage transfer characteristics for output voltages above 90 VDC. This is not a problem with vacuum tube curve tracing because the test grid voltages are never driven very positive. Before demonstrating the use of the DC amplifiers for vacuum tube curve tracing, a provision for adjusting the screen voltages is presented in the next section in part 2.

[Part 2 of Paul's article is coming up next month in February 2007, ER...Ed.]

ER

Restoring a National RBL-5 TRF Low Frequency Receiver

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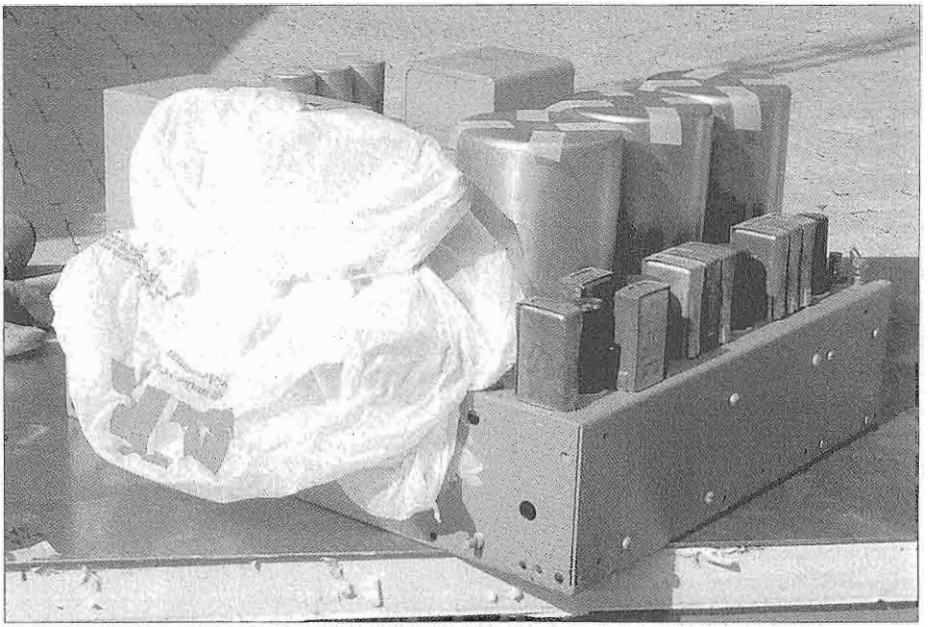
Introduction

A lonely National RBL-5 (Navy CNA-46161-B) was found about 16 months ago on the table at an antiques flea market and it wanted to go home with me. The price was way too tempting and the insides looked very clean. Only the cabinet paint was badly flaking.

The RBL-5 tunes from 14 to 640 kcs in 6 bands and has a very straightforward 7-tube TRF layout with a very smooth regenerative detector. The tube lineup is two 6SK7s in the 1st and 2nd RF amplifiers, and a 6SK7 regenerative detector. There is a 6SG7 first audio amplifier, a 6H6 full-wave noise clipper, a 6K6 audio output, and a 5Y3GT rectifier. The unit can operate directly from 110 VAC, or through a rear panel accessory plug with an external filament and B+ supply. Jumpers are required on the accessory connector between pins 1 and 3 and between 2 and 7 to utilize the internal supply. Stamped on the cover and inside the set was an MFP date of June 1945.

The set has beautiful shielded multiple pie-wound toroidal coils made with Litz wire. The tuning dial is a smooth National Velvet dial driving a 6-gang variable capacitor. A pot is connected to the rear of this capacitor and makes continuous adjustment of the gain of the RF amplifiers with frequency change. The front panel

The RBL-5 has been restored to working condition and the cabinet has been refinished.



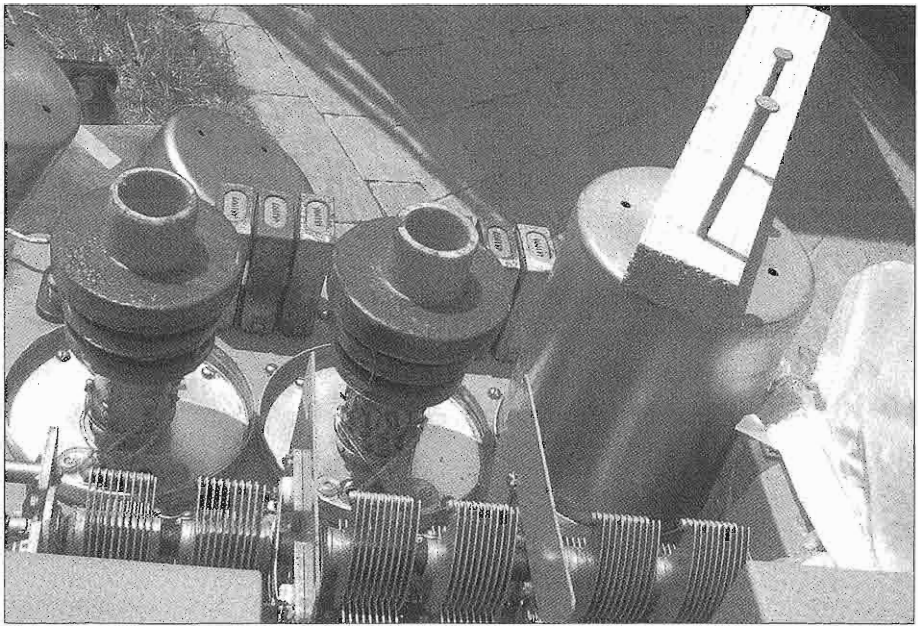
The main chassis is masked off and ready for the wash.

"Gain" control changes RF gain on both RF amplifiers. The set has no AGC of any kind. Tuning coils are used on the grid and plate of the first RF amplifier and on the plate of the second RF amplifier. A homemade spanner wrench was used to open and inspect the coils. The "Output Level" control to the right of the main tuning dial is used for adjusting the clipping level. It is out of the circuit when the "Noise Limiter" is turned off.

As received, the main tuning knob was from a BC-348 and this was replaced with the correct knob I found at a local hamfest. The BC-348 knob will be utilized on a BC-348 that's yet to be restored. The removal of the chassis from the cabinet is straightforward.

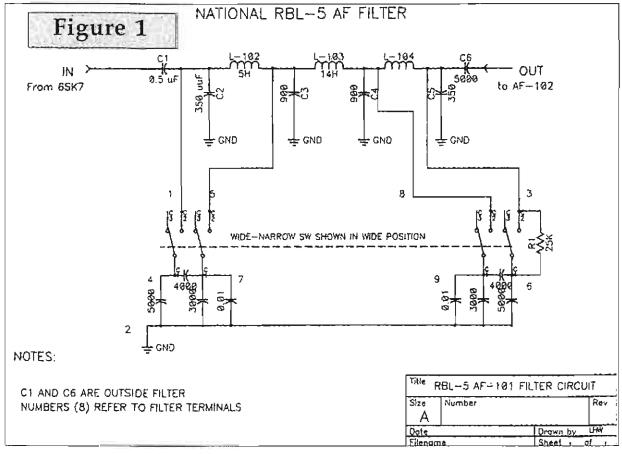
Tackling the Restoration

The RBL-5 has a painted steel chassis. The paint was in excellent condition, so I covered the critical parts with plastic and just gave the set a bath in the side yard on a sunny and warm summer day using Fantastic® and lots of water and some scrubbing.

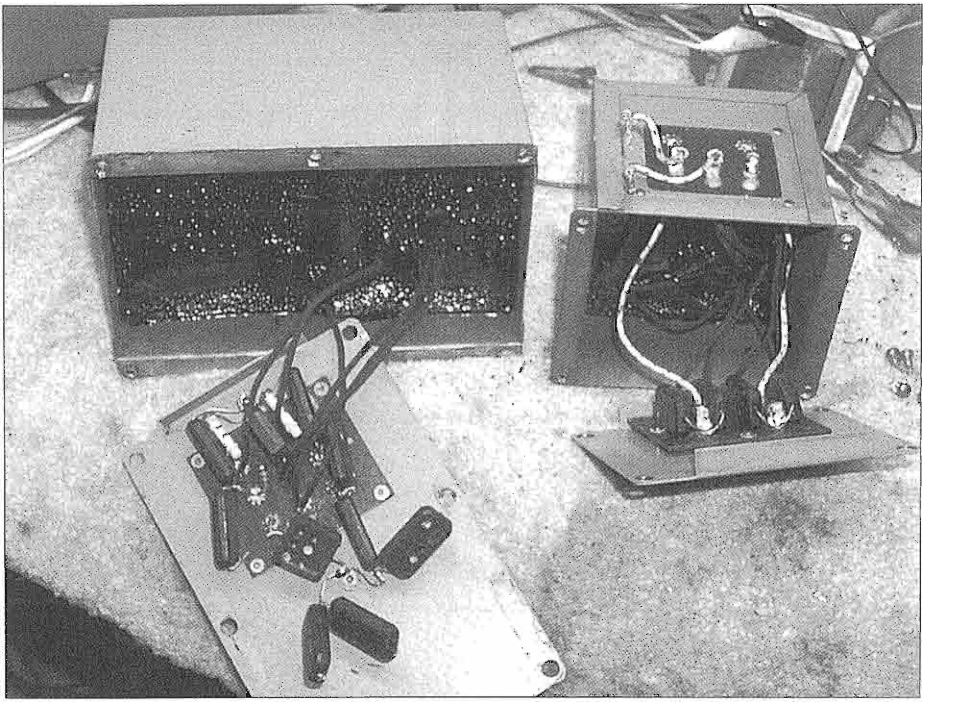


This is a view of the toroidal coils and homemade wooden spanner wench.

Generally, on old sets I do not put the unit under power without doing a lot of checking. Because of the MFP varnish and the apparent good condition, after checking the B+ line for shorts, I fired the set up. Much to my surprise, she came to life. With power applied, I looked for signs of leaking capacitors particularly in the detector area and all screen bypasses. I initially only found three large paper 0.1-µf caps and a 0.03 µf-cap that needed replacing and a 100k-ohm resistor in the regenerative detector in series with the "Regen" control had gone up in value, so it was replaced. Installing the correct value really smoothed out the regenerative detector. All work was completed with only a one page simplified schematic of the set found in the 1960 CQ Surplus Schematics Handbook[1].



After initial checking and replacing of obvious defective components and with just a long wire antenna, I was able to find 6 or 7 local non-directional beacons (NDB) in the 190 to 490 kcs range. In the middle of the day, signals were copied out to about 50 miles. A search on the Internet will find various pages with details of many of the NDBs. These NDBs generally operate with transmitter powers of from



The audio filters have been opened, and the old leaking capacitors are showing.

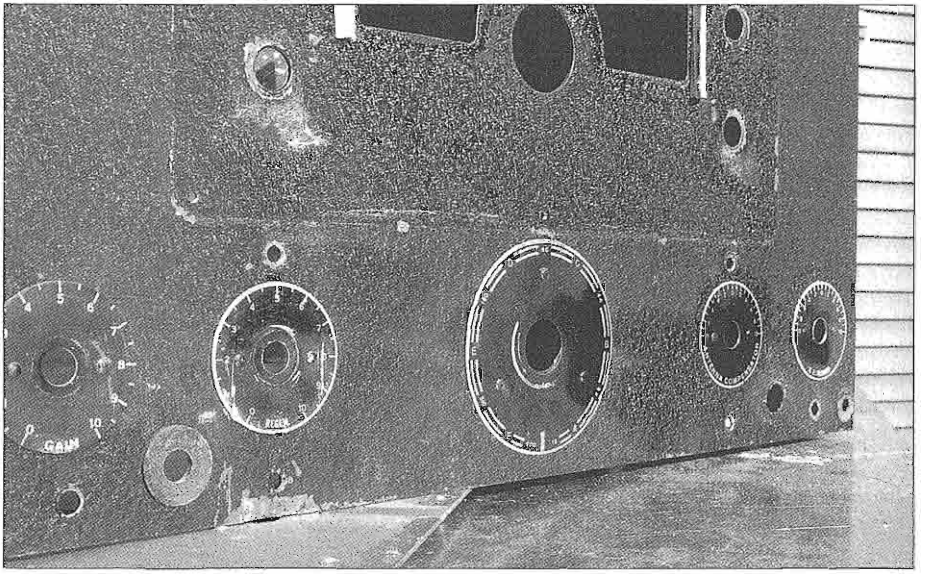
about 50 to 1000 watts. For the wavelengths involved, the transmitting antennas are rather short, so antenna efficiency is not that great. In addition to the NDBs and a couple of RATT stations, standard broadcast stations from 540 to 640 kcs and out to several hundred miles were copied just fine. Loran C at 100 kcs and WWVB at 60 kcs came in good. A local AM station on 610 kcs running the new HD radio, which has a phase component carrying the digital audio, had considerable "digital hiss." This was probably due to the fact that the regenerative detector can copy phase as well as amplitude modulation.

The Audio Filters and Trouble

Since this set is designed primarily for CW, MCW, and RATT, the audio quality on voice is only fair. A two-position audio filter system (Wide and Narrow) is inserted after the output of the first audio amplifier. "AF-101" is a switchable low-pass filter while "AF-102" is a fixed high-pass unit, which is always in the audio path. Because of the presence of capacitors inside both AF-101 and AF-102, these units were opened up to check all the internal capacitors. To open the filters, a series of rivets were drilled out, allowing the can cover to be removed. As expected, some of the capacitors were somewhat leaky and a few were out of tolerance. Because of the difficulty in removing the filters, all of the mica capacitors in both filters were replaced. The schematic I used is very simplified as to the makeup of AF-101. The actual schematic drawn from the circuit including the 4-pole "Wide-Narrow" switch and filter is shown in **Figure 1**.

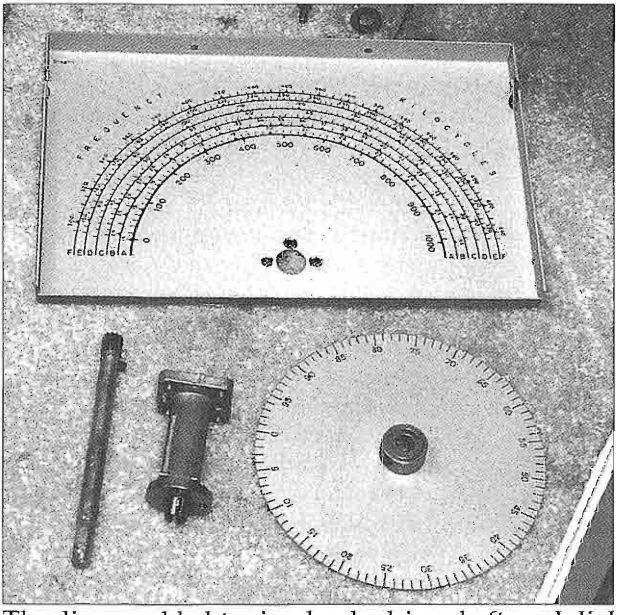
Restoration Details

The cabinet is removed easily as it is in two pieces. First remove all knobs. Four screws, washers, and nuts hold on the escutcheon over the tuning dial and upper controls. There are ¼-inch shaft extensions for the "Antenna



Closeup of the front panel, as received, showing minor cabinet damage.

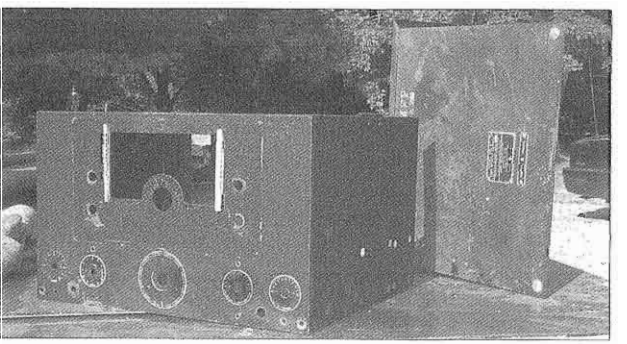
Compensator" and the "RF Trimmer" controls which disconnect at flex couplings from the remainder of the long shaft within the radio. Associated with these shafts are bushings holding the front panel to the front of the chassis and these also need to be removed. The Band switch shaft and its gear were also removed but the rest of the gear train was not touched. While handling the cabinet front, care should be taken not to break off the fixed pointer on the chassis used to mark the logging scale of the radio. The scales for the lower knobs are riveted to the chassis front and were left in place. While working on the set, I noticed that the main tuning dial shaft was bent fairly significantly causing the rotating logging scale to "wobble" noticeably. Upon inspection, it appeared that this shaft might be removed for straightening. Removing four hex head screws that secured it to the reduction gear assembly, I disassembled the tuning



The disassembled tuning knob, drive shaft, and dial parts.

The underside of the chassis. Some new capacitors can be seen along with 3 of the toroidal coils.

dial shaft and pointer assembly. This task was made easier by loosening the mounting straps on two of the chassis mounted bypass capacitors near the shaft, and also by using a ¼-inch, box-head miniature "ignition" wrench. As shown in the photo on page 32, bottom, the shaft was taken out and



The 2-piece cabinet is ready for painting.

carefully straightened on the bench. It came out almost perfect with only a very slight wobble remaining. The National hamfest tuning knob was for a 3/16-inch shaft like those found on the BC-191 tuning units, and the brass insert was carefully drilled out to ¼-inch ID barely leaving enough thread for securing the knob to the shaft. The found knob is not weighted, but a solid brass National copy knob borrowed from K3JPB really makes the tuning "fly."

The entire cabinet was bead blasted in my garage unit[2] after carefully masking over the artwork for the control knobs and removing the nameplates, clips for hex wrenches, and the two pull-up handles on the top of the cabinet. These handles were also blasted in preparation for painting. The RBL-5 has a copper plated steel cabinet and care was taken not to remove any copper. In fact, the 65+ year old black wrinkle paint flew off the cabinet with the blaster nozzle over 10 inches away and was finished in minutes. I found some Krylon® black wrinkle spray paint at my local auto parts store and since K3JPB had used that on the SP-200 power supply[3] before, figured it was the trick for the RBL-5. K3JPB and I had a discussion about whether to first paint the cabinet with semi gloss black and then overlay the wrinkle or just apply the wrinkle to the copper plating. A test on a bare piece of scrap cad plated steel suggested that 3 coats of semi-gloss applied first followed by the three coats of wrinkle (after the semi-gloss was entirely dry) proved to make a slightly more authentic look. By that, I mean the wrinkle was a bit more pronounced closer to the look of the cabinet under the escutcheon before disassembly where it had not been damaged. Following the can directions, 3 heavy coats were applied in 5-minute intervals and then each piece was "cured" at about 140 degrees F in an oven. By using heat, the wrinkle appears in 15-30 minutes instead of several hours and results in a better texture, in my opinion.

Filter Repair Results

WIDE	
200 cps	-21.6 dB
400	-11.4
600	-0.2
800	-0.2
1000	+0.0
1200	+0.4
1400	+1.0
1600	+2.2
1800	+4.5
2000	+7.4
2200	+8.0
2500	+3.0
3000	-6.5
4000	-35

NARROW	
500 cps	-27 dB
600	-4.0
650	+0.0
700	-3.2
800	-7.0
1000	-36.0

After replacing all the capacitors, the filters were set up on the bench and tested for response with a 100k-ohm termination using my HP 334 VTVM/Distortion Meter. The results for each case are shown in the two accompanying "wide" and "narrow" tables above.

In the wide position, the peaking in the 2000 cps region is countered somewhat by the roll off in the 6K6 stage. The actual subjective audio quality after these extensive repairs was only slightly improved.

Reassembly of the Radio

The two-piece cabinet along with its separate bottom cover is easily reinstalled to the chassis. Again, while handling the cabinet front, care should be taken not to break off the fixed pointer on the chassis used to make the logging scale of the radio. After cleaning the plastic tuning dial cover with Novus® plastic restoration products[4], I reinstalled the escutcheon and the ID labels and hex key clips. The plastic dial cover is secured with strips of double sided sticky tape.

If you take the tuning shaft apart for straightening, upon reassembly, leave the 4 hex head screws a trifle loose to allow a smooth mesh of the gear drive. Some trial and error is needed to insure that the tuning capacitor and dial pointer rotate through the full 180 degrees. Somewhere

inside the reduction drive are stops and things have to be centered. I rotated the shaft counterclockwise until it stopped and then set the capacitor to fully meshed and tightened the pointer at zero.

HF Alignment

The HF alignment of a TRF normally is a simple task. However, not having any alignment information, coupled with the fact that the RBL-5 uses two separate sets of switches geared together to the "Band Change" knob, this job was made somewhat different. The front panel "Antenna Compensator" is the only tuning on the 1st RF grid on all bands. The front panel "RF Trimmer" peaks the plate of the 1st RF amplifier on all bands. These two controls essentially provide manual tracking for the alignment. C-110, C111, and C-112 (accessible through a cover on the bottom plate) are used to peak the 1st RF plate. Likewise C-113, C115, C-116, and C-114 (in that order) are used for the plate of the 2nd RF amplifier. Using known frequencies in the center of each band, my alignment was completed per the following table on this page. The table shows that some capacitors are in-circuit on multiple bands, but in fact are only adjusted on the highest band in each case. For example, as shown below, C-113 is only adjusted on Band F.

Alignment was started at the center of Band F. First, center the "RF Trimmer" control. Adjust the "Antenna Compensator" to mid-position. Then adjust C-110 and C-113 for maximum signal. Switch to Band E and check the performance. You should be able to adjust the "Antenna Compensator" and "RF Trimmer" for a good signal. Do not readjust C-110 or C-113. Switch to Band D, and again, the alignment should be OK with just the "Antenna Compensator" and "RF Trimmer." Switch to Band C again with the "RF Trimmer" centered and "Antenna Compensator" peaked; adjust C-111 and C-114 for best performance. Switch to Band B, and again with the "RF Trimmer" centered and "Antenna Compensator" peaked, adjust C-115 and C-112. Finally switch to Band A, again with the "RF Trimmer" centered and "Antenna Compensator" peaked, and adjust C-116 to complete the alignment. That's it! The receiver has more than enough sensitivity so that input noise at these frequencies dominates and one is merely just peaking gain.

C-110	B,D,E,F	C-113	B,C,D,E,F
C-111	C	C-115	B
C-112	A,B	C-116	A
		C-114	C

HF Alignment table, showing the adjustable capacitors and the bands that they control.

I now have two LF receivers, the National RBL-5 and a Navy AN/WRR-3B to play with. With new amateur work starting up on 160 and 500 kcs, maybe you should too.

References:
1. Kenneth B. Grayson, W2HDM, 1960, Surplus Schematics Handbook , CQ Technical Publication, Page 76.
2. See Electric Radio #206, July 2006, Page 5.
3. See Electric Radio #202, March 2006, Page 8.
4. NOVUS® products are available from Radio Daze, Victor, New York, 877-653-8823, www.radiodaze.com or Antique Electronic Supply, Tempe, AZ 85283

ER

The Allied Radio A-2516 Receiver (AKA Trio/Kenwood JR-500SE)

By Bob Wallace, K8BYQ
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Sardinia, Ohio 45171

Since I became a collector, I have tended to collect receivers that were not the usual items. That perhaps explains why I have in my collection a Mosley CM-1, Rycom R1307A, Regency ATC-1 (converter), Ameco R-5, Breting 14, and a Cushman CE-24 (modified as a great low frequency receiver). This attraction for the somewhat unusual was my motivation for bidding, when I recently found an Allied Radio A-2516 listed on eBay. The gentleman who listed the receiver was very careful to note that it had serious sensitivity problems so I was able to purchase it for a fair price. It looked very good cosmetically in the listing and when it arrived I discovered to my delight that it had been packed very carefully and was indeed in mint cosmetic condition (**Figure 1**). I have often purchased receivers that were physically in very good condition with the arrogance of feeling that I can take care of any electronic problem easily. This has resulted in a number of humbling experiences for this old technician.

The Allied A-2516 was produced by Trio (Kenwood) for Allied Radio and sold from 1969 through 1971[1]. The price was in the $170.00 range. This receiver uses 7 tubes, 2 transistors, and 6 diodes and is probably one of the last tube-type receivers offered by Allied or Trio. The two transistors are used in the VFO. Three of the tubes are dual function tubes and the rectifier is solid state so this is equivalent of a least a ten tube receiver (plus the VFO and buffer). The January 1970 issue of QST had a review of the

Figure 1: The Allied A-2516 receiver as I received it.

receiver.

Since the eBay listing said the receiver had poor sensitivity, I decided to open the receiver and see if all of the tubes were OK and in the proper sockets. The tubes were good and all were where they belonged. The poor sensitivity problem was really quite simple. The RF gain pot was open at the point where maximum sensitivity should have occurred. This pot is in the cathode circuit of both the RF amplifier and two IF amplifiers. I normally would have replaced the RF gain potentiometer but this one is somewhat special as it has a pull-on switch that is intended to turn on a calibrator. My receiver doesn't have a calibrator but that item was listed as an option. I am not certain it was ever produced, however, as the copy of the factory manual which came with the receiver has detailed instructions on how to construct and install a calibrator (**Figure 6**). I think this will be a nice weekend project.

A shot of control cleaner restored the RF gain pot to normal and it has worked fine since the repair.

The published specifications regarding sensitivity are very conservative at 2 microvolts (or better) for 10 dB S/N ratio at 14 MHz. My tests with a calibrated laboratory signal generator revealed that this receiver is between .3 and .4 microvolts for 10 dB S/N ratio, depending upon the band. These are approximately the same results that QST found in their review of the receiver[2].

The receiver is very stable mechanically and my standard six inch drop test to the test bench top caused no noticeable VFO drift. From a cold start this receiver drifted 120 Hz in two hours. This is probably due

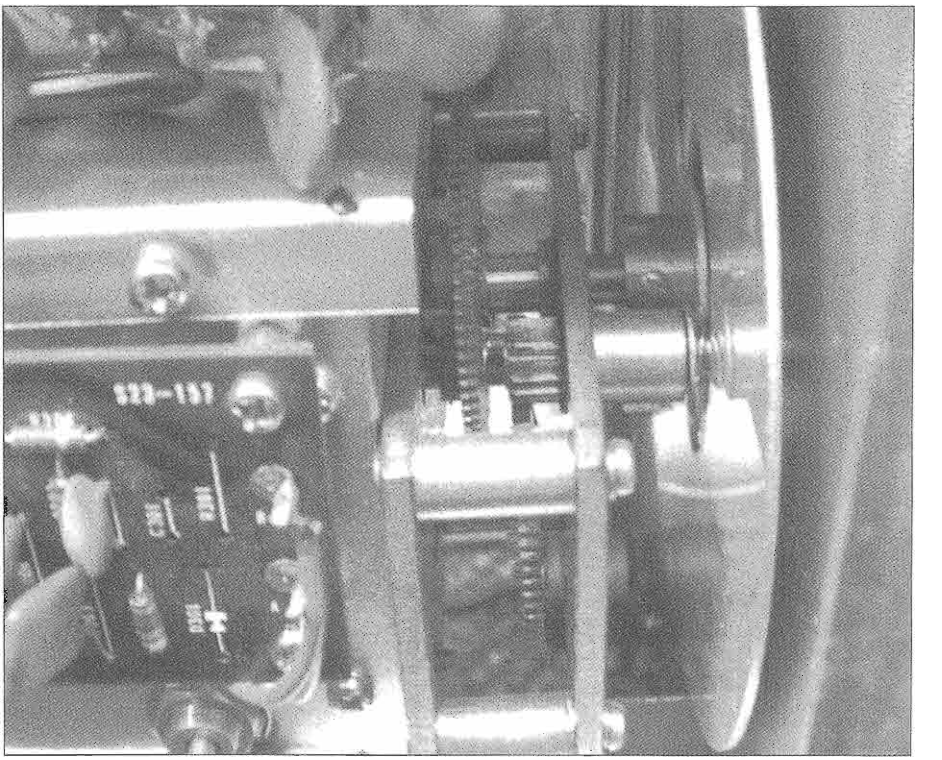
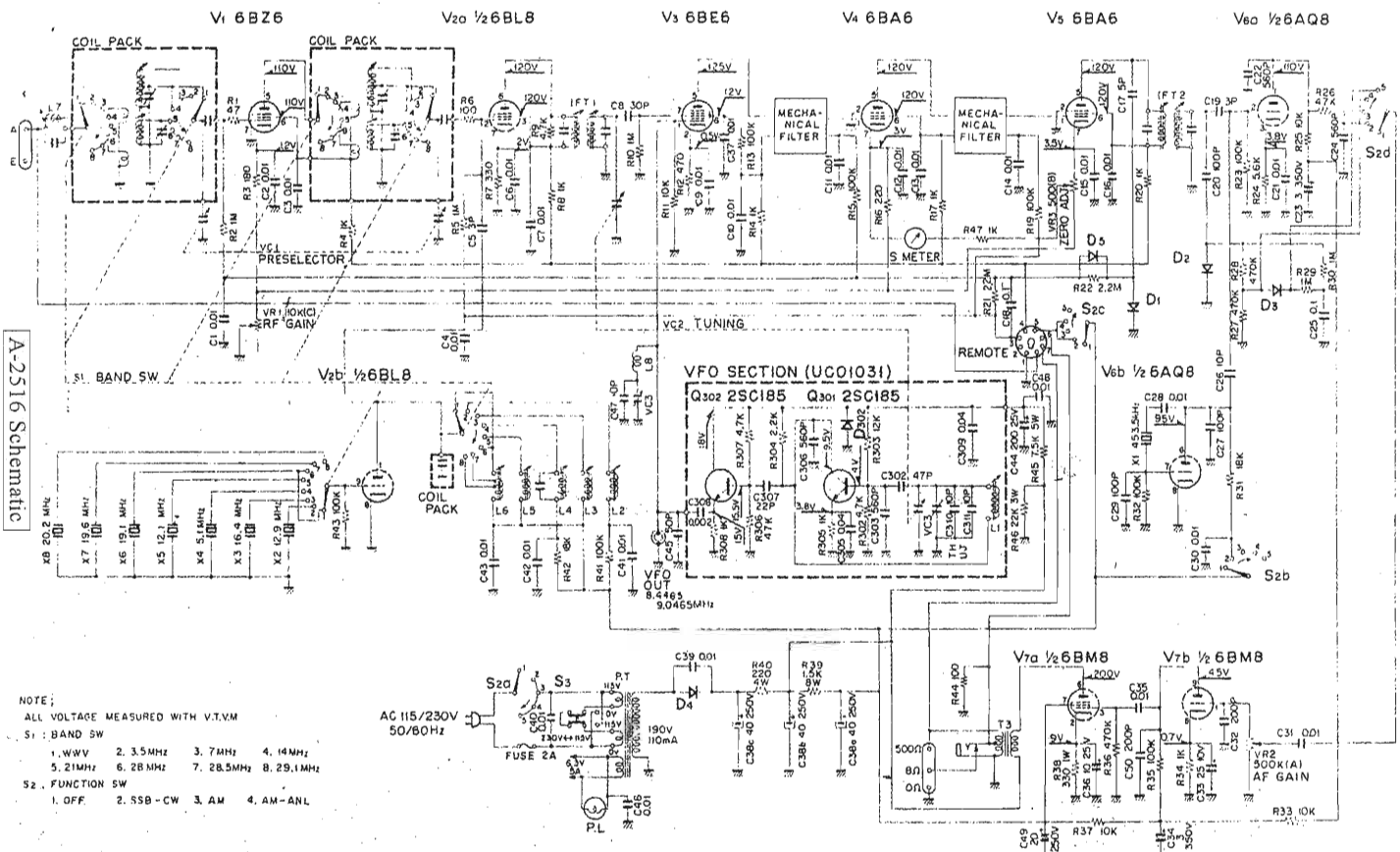


Figure 2: This is a bottom view of the dial mechanism.



A-2516 Schematic

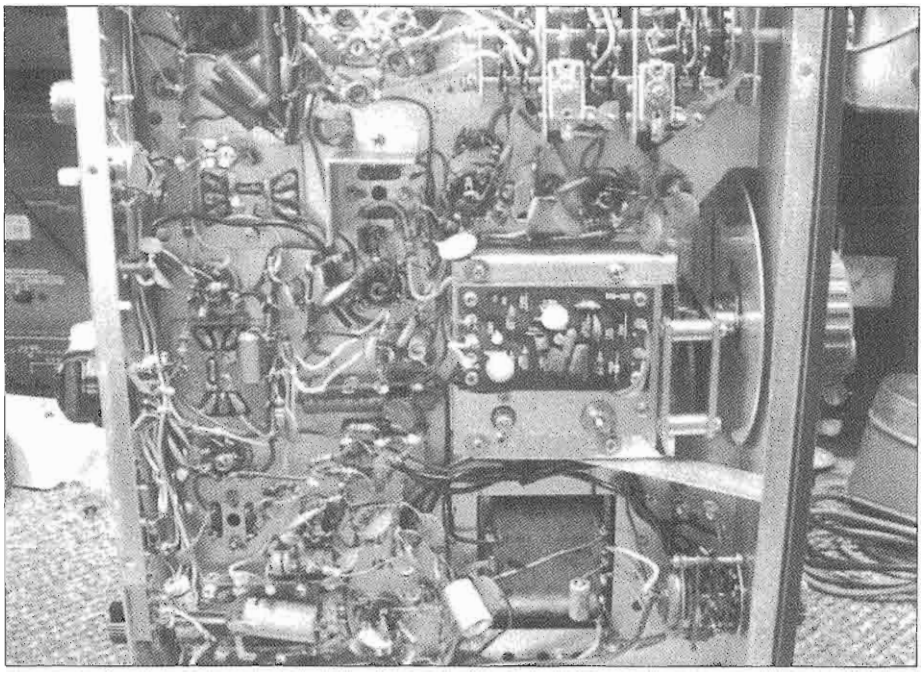


Figure 3: Underneath the A-2516 chassis, showing the dial and VFO.

to the good mechanical construction and the transistorized VFO. The mechanical tuning of the VFO is excellent with the anti-backlash gearing and the linear calibration of the dial and tuning knob (**Figures 2 and 3**). The tuning knob is comfortable to use and has a finger indentation making it easy to rapidly tune the band. The VFO tunes 600 kHz, providing coverage outside of the ham bands. The 3.5, 7.0, (MHz.) and WWV bands tune on a red scale which tunes higher in frequency by counterclockwise rotation of the dial. The 14.0, 21.0, and all of the three 10-meter positions tune higher in frequency on a black scale by advancing the dial clockwise. This tuning is somewhat like my Drake 2B receiver and only takes a few minutes to be a non-issue in using the receiver. Coverage is 3.5, 7, 14, 21, 28, 28.5, 29.1, and 9.6 to 10.2 (for WWV) MHz in eight band-switch positions. An interesting, though obviously unplanned feature of this receiver, is the inclusion of coverage of the 10.1 to 10.150 MHz WARC [World Administrative Radio Conference] band. This is because of the WWV (10.0 MHz) bandswitch position. To tune the 30-meter band I use the red scale, and 10.1 is at 400 with 10.150 at 450. WWV is received at 10.0 MHz at 300 red on the scale.

The audio quality for voice communications is excellent. The selectivity is ±1.5 kHz at -6dB, as mentioned in the manual, and my tests indicate this is correct in my receiver. It is a little wide for conditions on most bands today, but it is great on AM nets. The receiver does have an AM automatic noise limiter position which is somewhat effective in reducing noise pulses from reaching the audio stages. A good audio filter improves the overall performance especially when used for CW reception.

One of the interesting features of this

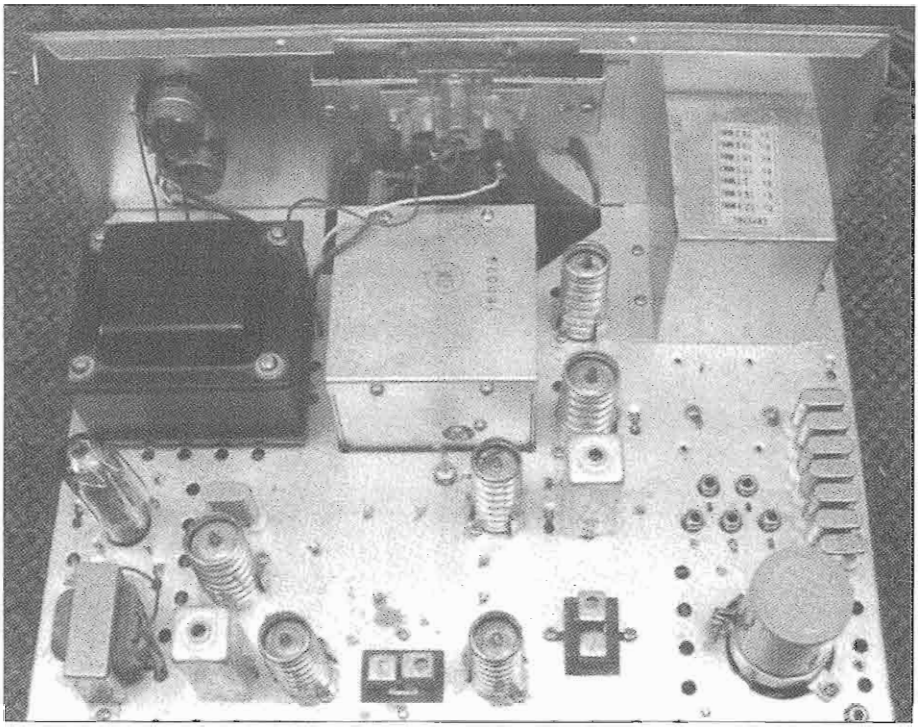


Figure 4: Top-chassis view of the receiver. The mechanical filters are the two units in the bottom center that look like minature IF transformers. Crystal bank is on the right, in front of the shielded preselector.

receiver is the use of two mechanical filters in the 455 kHz IF. These are not mechanical filters as I have always thought of them, such as Collins mechanical filters. They are, by today's terminology, piezo ceramic filters, which is the way they are described in the QST evaluation. The service manual refers to them as mechanical filters (**Figures 4 and 5**).

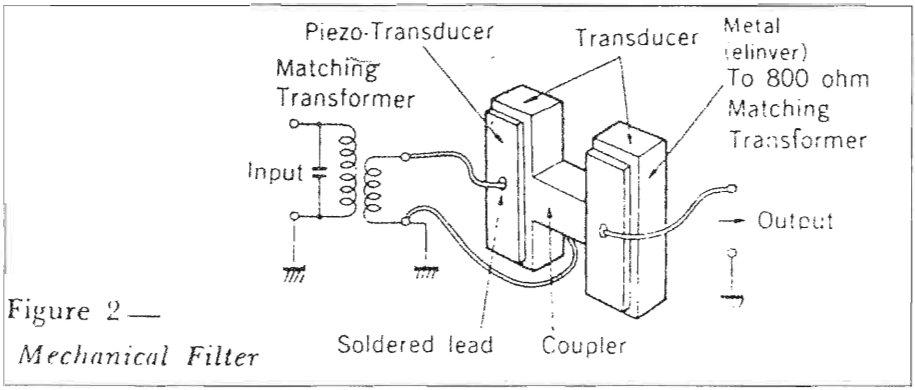


Figure 5: Mechanical filter information, reproduced from the service manual.

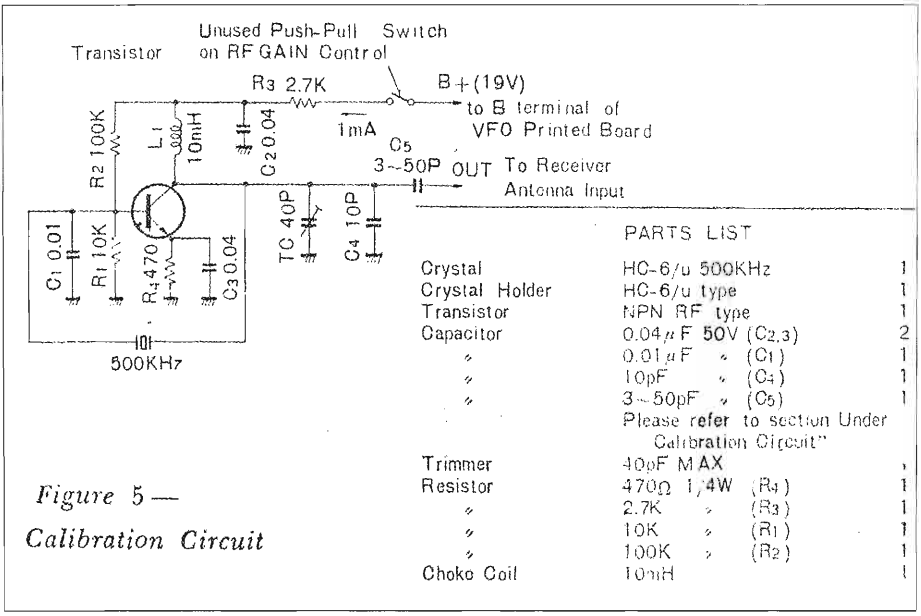


Figure 5 — Calibration Circuit

Figure 6: Construction information for the calibration circuit, reproduced from the service manual.

The receiver is a very low-noise unit, and in the AM mode the signals seem to *pop* out of a quiet band. The CW/SSB mode does have more gain than the AM mode, but the internal noise level is still quite low. As with my Drake 2B, this receiver seems to perform best with the tunable preselector tuned a little off of peak sensitivity.

There is a jack that brings out the VFO for use with a transmitter, which to the best of my knowledge was never produced. This would make a nice project. The VFO ranges from 8.445-to 9.045 MHz. There is also provision for muting the receiver when used with a transmitter through an accessory plug on the back apron of the unit.

This receiver would be excellent to use as a tunable IF with VHF/UHF converters, and it is really a nice receiver to use for both AM and CW/SSB on the HF bands. I can imagine a converter project for WARC band coverage, and perhaps that companion transmitter using the A-2516 VFO as the transmitter frequency control. Maybe the addition of other switchable mechanical or piezo filters for CW/SSB could be another project to improve an already well-engineered receiver.

I purchased my Allied A2516 on eBay for $95.00, plus shipping. I consider this a good buy because of the near-perfect condition. I have seen them sell lately for as little as $52.00 in somewhat less than perfect condition. It is a lot of receiver for a low price and nice for an experimenter.

Selected References:

1. Fred Osterman, Shortwave Receivers Past and Present, Third Edition, Chapter 6, Page 40 and Chapter 44, page 231. Universal Radio, 1997

2. QST, January 1970, "Recent Equipment," Pages 38 - 41, ARRL

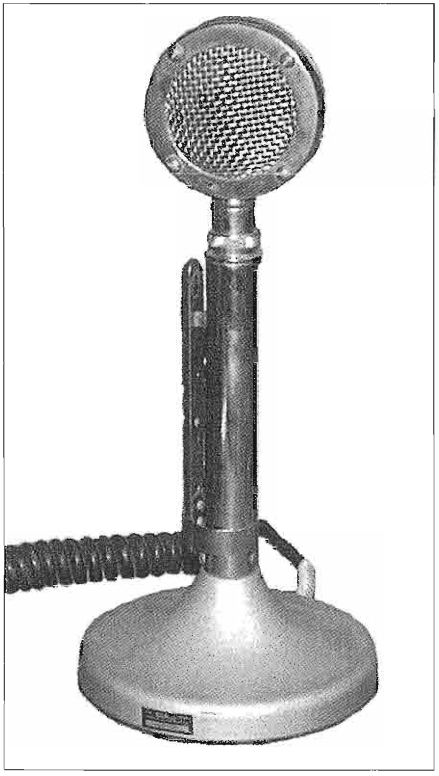
ER

Improvements to the D-104 Microphone

By Steve Johnston, WD8DAS
2309 Tulare St.
Fitchburg, WI 53711

The G Stand Has Got to Go!

I've used and enjoyed the Astatic D-104 microphone for nearly 30 years now, and it always sounds great on my vintage gear. Lately, I've been thinking that the stock "G" stands on my D-104s are not the ideal physical design for the casual postures I tend to assume when running AM. Resting the microphone stand on my midsection as I leaned back was not only undignified, but led to a painful condition of the abdomen I came to call "The G-Spot."



The Astatic D-104 mic mounted on its traditional Model G desk stand.

Thus stimulated, my mind began contemplating alternatives. I tried the Astatic mobile-style, hand-held crystal and ceramic mics, but they didn't quite fit the bill either. Studying the connector on the stalk of the D-104 head, I was struck by its similarity to the A3M / A3F series of audio connectors—also known as XLRs or Q-G connectors—so common in professional broadcast and music microphone applications. See **Figures 1 and 2.** I found the Astatic three-pin male connector on the D-104 has a different pin size and spacing, and would not mate a Switchcraft A3F directly, but I soon realized that the plastic connector insert diameters were nearly the same. If I replaced the D-104 connector's *guts* with the innards of an A3M, I could then plug in an A3F cord directly and discard the G-stand. See **Figure 3**.

Careful disassembly of the D-104 head (crystal elements can be fragile) via the four obvious ring screws showed me the wiring entering the connector. There was plenty of slack in the wires, so I closed the mic head back up and just removed the connector set screw and slid the plastic insert out. I unsoldered the wires and prepped them for attachment to a new A3M insert. It seemed possible that the new, slightly longer insert might bottom out and short the pins to the metal shell, so I trimmed their back ends about 2mm and soldered the wires in place. The particular connector insert I used was one from an XLR sold by Radio Shack[1], and by luck the set-screw holes lined right up. An insert from a Switchcraft A3M looked like it would require a new hole, but would probably work fine with a bit of extra work. I also cut and removed the screw-ring around the D-104 connector, as it would no longer be

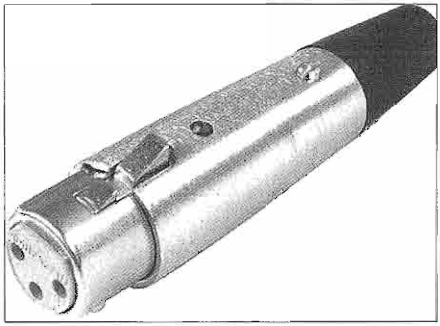


Figure 1: the A3F connector.

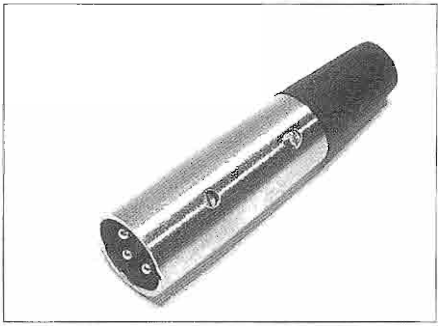


Figure 2: A3M connector.

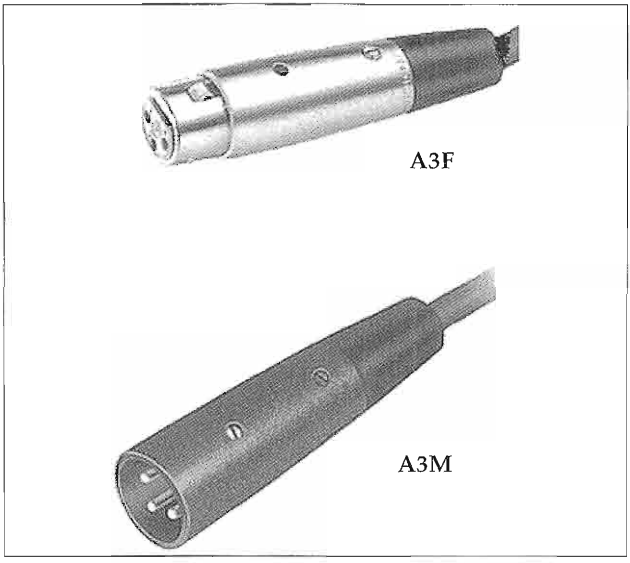


Figure 3, left:

Above, A3F connector that mates to the modified D-104 and also acts as a handle.

Below, the A3M connector. The insert will fit the D-104 head.

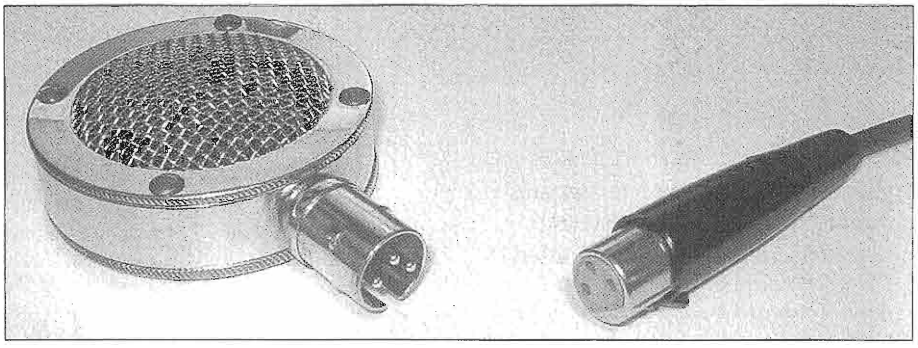


Figure 4: The modified D-104 microphone connector and its new connector.

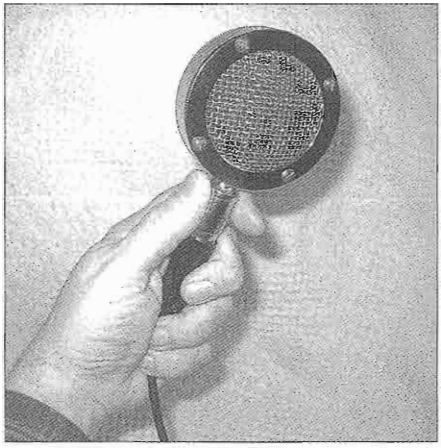


Figure 5: My hand-held D-104.

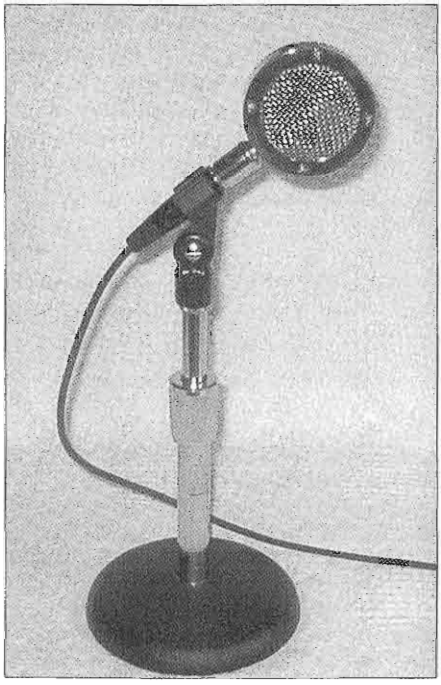


Figure 6: The modified D-104 angle-mounted to an Atlas desk stand.

needed. **Figure 4** shows the modified D-104 and its connector.

The moment I held the *Hand-held D-104* I knew I would enjoy this new, old mic, show in **Figure 5**. But, a stand would be nice too. I pulled out an Atlas DS-7

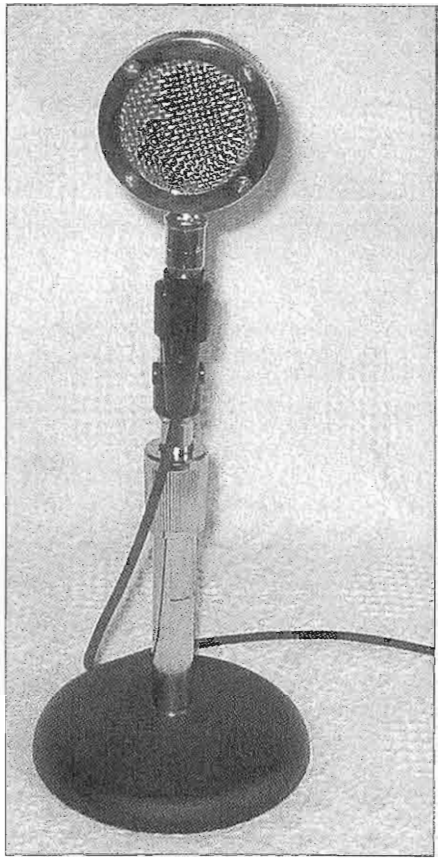


Figure 7: The D-104 in another configuration on the Atlas disk stand.

adjustable desk stand[2], screwed a standard plastic mic clamp on the top, and slid the D-104 into the clamp. Now, I had a mic that could adapt at a moment's notice from hand-held to desk mounted, 11 to 18 inches high. See **Figures 6 and 7**. In other installations, a flexible gooseneck or professional mic boom could be used; they are available with built-in XLR connectors too. A floor stand and mic clamp can be used as well for on-air lectures and extreme old-buzzard transmissions.

1. RadioShack XLR connectors: P/N 274-010 and 274-011.

2. Atlas mic stands: http://www.atlas-soundolier.com/products/partNumber.cfm?pn=DS7 *ER*

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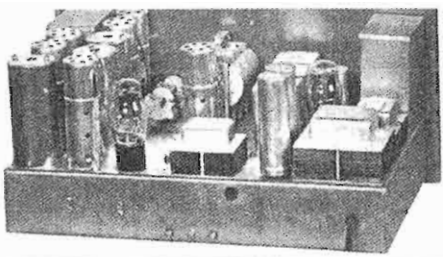

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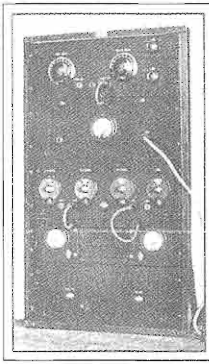

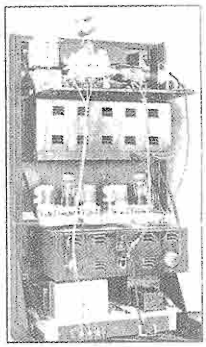

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WANTED: DY-17 dynamotor or equivalent, and PP-1104, PP-2293 or similar 28v 50A power supply, contact Mike, VE7MMH, at mike46@shaw.ca

WANTED: Technical Materiel Corp (TMC) power supplies PS4 (low voltage and bias) and PS5 (high voltage) for the TMC PAL 1K kilowatt linear amplifier, also known as the RFD or RFA. Gary K2PVC; gschonwald@earthlink.net 917-359-8826

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Or on-line: www.ermag.com

WANTED: Squires-Sanders SS-1R and SS-1V. Bob, WØYVA. 703 450 7049; robert@isquare.com

WANTED: Coils for National SW3-SW5. I need a power supply, 1.1-1.5 kv/350-500 ma for my BC 375. Headsets: H140/U, H140A/U for RT 654A/TRC77 transceiver; also other accessories: key, power supply, etc. Ward Kremer, KI4JHA, 1179 Petunia Rd., Newport, TN 37821, Ph/Fax: 423/625-1994, E-mail: witzend99@bellsouth.net website: http://www.radioattic.com/kremer

WANTED: TCS receiver BFO (Z204) module. FOR SALE: SX-25, nice, $145. U-ship. Ken, K8AXH, 913-634-3863

WANTED: Nixie tubes for Heath SB650 digital display: National Electronics NL1220 or Burroughs B-5859A. Shannon, 540-867-9294, w3sml@hotmail.com

WANTED: May 1945 CQ Magazine. I have an extra July 1945. Lynn Stolz N8AJ 614-885-5428 n8aj@yahoo.com

WANTED: Pyrex insulator. AM-CW exciter. Msr. Claude Fleureau, F6GGF, 14 Sentier Du Buvier, 92130 Issy-Les-Moulineaux, France

WANTED: One of my "KN8GCC" QSLs from the mid-1950s. Tom Root, 1508 Henry Court, Flushing, MI 48433, 810-659-5404, wb8uuj@arrl.net

WANTED: Test leads or plug-in lead ends for Triplett 630 VOM. Robert Harding, KC5LHR, 7917 Pickard Ave NE. Albuquerque, NM 87110, 505-293-1074, rehardingiii@yahoo.com

WANTED: Harvey-Wells APS-90 power supply in good working condition for my newly acquired TS-90 transmitter. Alan W. Fremmer, KB2HEI, 550-H Grand Street, New York, NY 10002, 212-777-3630, awfremmer@aol.com.

WANTED: Hallicrafters HT33 with salvageable power supply. The RF section is not required to be useable, need a power supply to contribute to one that is. Gary Schonwald K2PVC. gschonwald@earthlink.net phone: 917-359-8826

WANTED: Technical Materiel Corp rack mounted antenna tuner and RF /SWR meters to be used with the 350-watt or 1000-watt TMC linear amplifiers. Will consider other TMC transmitting equipment and accessories for collection and on-air use. Gary Schonwald K2PVC. gschonwald@earthlink.net phone: 917-359-8826

WANTED: Need two Westinghouse RT35 0-1 RF amps, 3-1/2" round Steve Bartkowski, 1-708-430-5080

WANTED: Meter movement for Western Electric transconductance tube tester KS-15750. Walter Hughes, WB4FPD, 6 Academy Ct., Berryville, VA 22611 540-955-2635

WANTED: Vacuum Tubes: 279A, 212E, 249B, 258B, 271A, 242A, C120, C100A, 804, RK20, CK70, GL805, C201, ZB-120, 802. Components for rebuilding Collins 30J RF output deck, including Cardwell or equivalent dual section variable 440 pF and 240 pF capacitors. Components for Collins 12H /12N speech input console, including preamplifiers and program amplifiers. Rod, W5CZ, 303-324-2725, rodperala@aol.com

WANTED: Will buy SP-600 and some other Hammarlund equipment, working, not, or incomplete. Al, W8UT, anchor@ec.rr.com 252-636-0837

WANTED: Pearce-Simpson manual/ schematics for VHF marine radio, model "Catalina", JR Linden, K7PUR, PO Box 4927, Cave Creek, AZ 85327, jrlinden@usa.net

WANTED: Clean National Select-O-Ject, NC-183DTS and Heath VX-1. Contact RIC at c6ani@arrl.net.

WANTED: ITT-Mackay Marine 3010-C Receiver, late S/N, complete and in good or VG conditions, with original box and manual. The item has to be shipped to a friend in Ohio (not outside U.S.). Send your offer to Paolo Viappiani, Via Valle 7, 19124 La Spezia, Italy, or pviappiani@tin.it

WANTED: Early QSL cards from my Grandfather, Hal Smith (SK). His calls were KH6KA, K6YJR, K6OQE. Gladly reimburse postage plus modest finder's fee! Phil Wilson, 1355 Big Otter Dr, Blue Ridge, VA 24064 k6cra@arrl.net

WANTED: National NTE-30 Transmitter. Any condition, any price! I love National. Sylvia Thompson, n1vj@hotmail.com 33 Lawton Foster Rd., Hopkinton, RI 02833. 401-377-4912.

WANTED: One of my "KN8GCC" QSLs from the mid-1950s. Tom Root, 1508 Henry Court, Flushing, MI 48433, wb8uuj@arrl.net 810-659-5404.

WANTED: Any TMC equipment or manuals, what have you? Will buy or trade. Brent Bailey,109 Belcourt Dr., Greenwood, SC.29649, 864-227-6292, brentw2@earthlink.net

WANTED: Seeking unbuilt Heathkits, Knight kits. Gene Peroni, POB 7164, St. Davids, PA 19087. 215-806-2005

PRESS WIRELESS, NY: Photos, information wanted on Hicksville, Baldwin, Little Neck, Centereach, Northville facilities. George Flanagan, 42 Cygnet Dr., Smithtown, NY 11787 w2krm@optonline.net 631-360-9011

WANTED: Top prices paid for globe shape radio tubes, new or used. Send for buy list or send your list for offers. Write or e-mail: tubes@qwest.net. See www.fathauer.com or send for catalog of tubes for sale. George H. Fathauer & Assoc., 123 N. Centennial Way, Ste 105, Mesa AZ 85201. 480-968-7686, Call toll free 877-307-1414

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

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

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

WANTED: QSL card from W9QLY, Frank (Mac) Maruna, from 1956 or before. WILL PAY TOP DOLLAR. Don Barsema, KC8WBM, 1458 Byron SE, Grand Rapids, MI 49506, 616-451-9874

WANTED: Top dollar paid for WWII radios, PRC-1, PRC-5, AR-11, SSTR-1, SSTR-5, British B2, need pts for PRS-1 mine detector. Steve Bartkowski, 708-863-3090

WANTED: Sonar CB transceiver model J23 mobile set. 23-channel, tube-type CB radios, also 23-channel mobile sets. Ed, WA7DAX, 1649 E. Stratford Ave., Salt Lake City, UT 84106. 801-484-5853

WANTED: TCS & TBY Navy radios. Ken Kolthoff, K8AXH, PO Box 215, Craig, MO 64437. 913-634-3863.

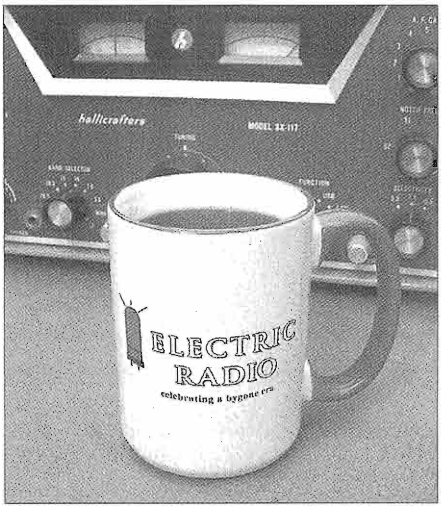
WANTED: ARC-5 rcvrs, racks, dynamotors. Jim Hebert, 900 N. San Marcos Dr. Lot 77, Apache Junction, AZ 85220

WANTED: Looking for a National NTX or NTE transmitter/exciter for use in my vintage hamshack. Any condition, even basket cases or parts, considered. Will pick up in New England, or arrange shipping if outside of area. Paying any reasonable price, and most unreasonable ones! Please email with details or photos, all considered and most likely bought! Thanks! Bruce, W1UJR, 207-882-9969 or w1ujr@arrl.net

WANTED: Harvey-Wells Odds-'N-Ends: Speakers, phones, mikes, manuals, supplies, prototypes, military, aircraft. Kelley, W8GFG, 219-365-4730, 9010 Marquette St., St. John, IN 46373

WANTED: Collins R-389 LF receivers, parts, documentation, anecdotes, antidotes. W5OR Don Reaves, PO Box 241455, Little Rock AR, 72223 501-868-1287, w5or@militaryradio.com or www.r-389.com

WANTED: Incarcerated ham seeks correspondence w/others on mil (R-390's &backpacks) & tube radios. Also copies of postwar-90's surplus catalogs, backpack specs & photos. W.K. Smith, 44684-083, FCI Cumberland Unit A-1, POB 1000, Cumberland, MD 21501.



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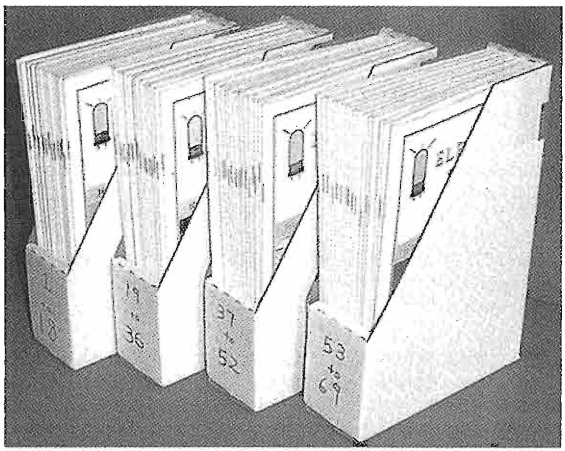

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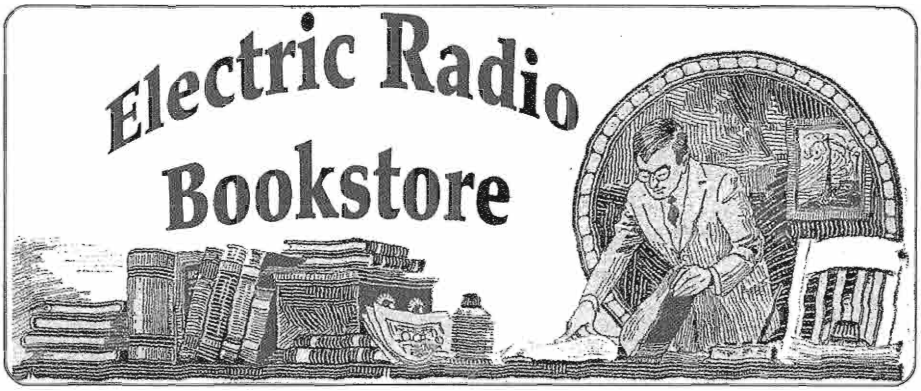

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Heath Nostalgia: Written by Terry Perdue, K8TP, an ex-Heath employee, this 124-page book is a great history of Heath and the Heathkits that we all remember. ------ $14.95-10% = $13.45

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Miller's Collecting Science and Technology: 160 pages of high-quality color photographs from museum collections make this hardback volume an excellent introduction to this new collecting field. Written by Lindsay Sterling ---------- $29.95-10% = $26.95

The Collector's Vacuum Tube Handbook: This is a 205 page book that is full of unique, hard-to-find information on tube types that were released before 1934. Includes history and good photos. ----------$25.95-10% = $23.35

Radio-Craft: 50 Years of Radio by Gernsback: This is a high-quality 656-page reprint of the March 1938 edition of Radio-Craft magazine and is about the first 50 years of radio, and contains hundreds of vintage advertisements. ---------- $15.95-10% = $14.35

Radios by Hallicrafters : High-Quality photos, descriptions, approximate values, and short histories of nearly everything made by Hallicrafters. By Chuck Dachis -- $29.95-10% = $26.95

Radio Tubes and Boxes of the 1920s by Fathauer: If you appreciate the rare and colorful vacuum tubes and advertising art from the early days of radio, then this great 104-page book will be very interesting and informative. ---------- $26.95-10% = $24.95

The All-American Five Radio: Although this book is about classic American 5-tube broadcast receivers, it also contains a wealth of accurate information on vacuum tube receivers, proper trouble-shooting, and alignment and is recommended for experienced repairmen and novices alike. 92 pages by Richard McWhorter ----------$21.95 - 10% = $19.75

Transmitters, Exciters & Power Amplifiers: This is the companion volume to Moore's communication receiver book, 144 pages. ---------- $21.95-10% = $19.75

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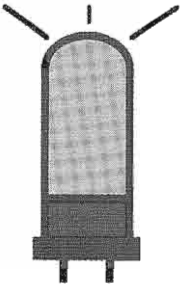

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