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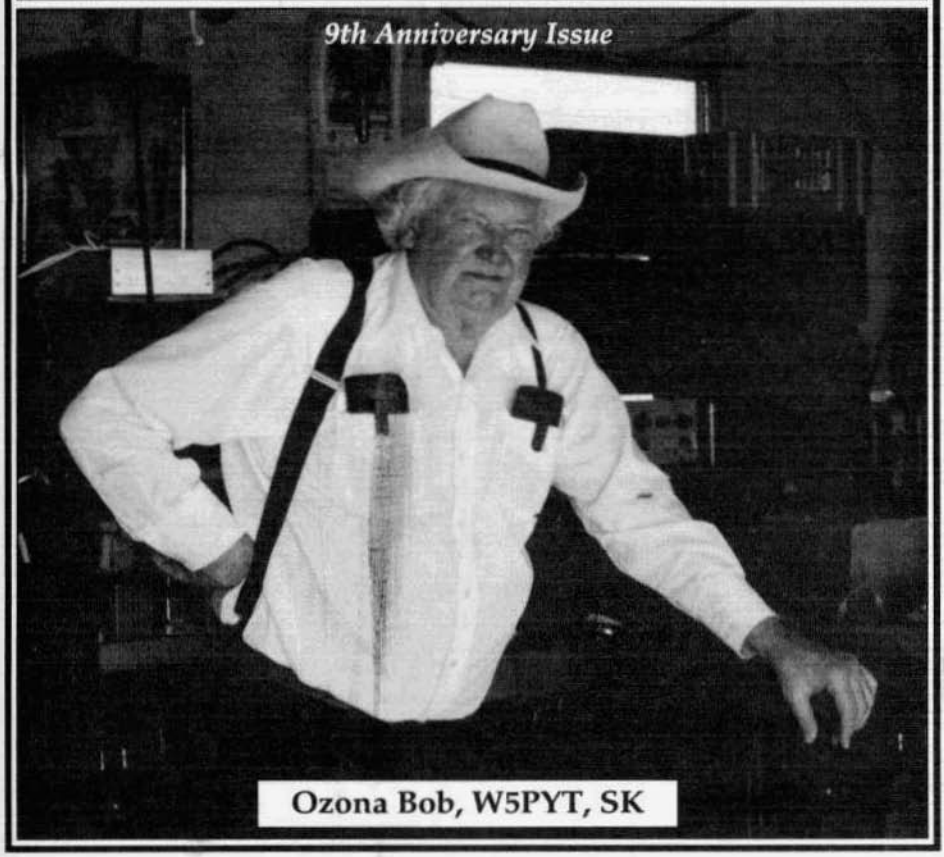
# ELECTRIC RADIO

celebrating a bygone era

Number 108 April 1998

*9th Anniversary Issue*



Ozona Bob, W5PYT, SK

# ELECTRIC RADIO

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

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

## Regular contributors include:

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

# Editor's Comments

In this issue on page 4 we have a tribute to Bob Hohertz, W5PYT, "Ozona Bob", who died March 6. He was certainly an icon in our little nitch of the Amateur Radio hobby and very well-known to all ER readers. Another radio pioneer who has passed away is John Chenoweth, W8CAE. We just learned from his widow that he died last November. He was plant manager at the R.L. Drake Co. for many years and also worked for Bob Lear as a chief electronics engineer. John is on the cover of ER #33 and there's also a story on his career in that issue. Another Silent Key is Esther Given, W6DBE. She died recently at the age of 86. She was associated with QCWA and QCWW for many years. I first met Esther back in 1989 when I was starting ER. She produced an article on QCWA for our 1st issue. I then became associated with her again when I was editor of the QCWA Journa, where she wrote a regular column directed toward YLs called "Sylver Bells". She was an outstanding person and always fun to talk to. All three of these people made notable contributions to ham radio and will be sorely missed.

**Second Annual ER Sponsored Vintage Field Day**

Last month I announced the date—the weekend of June 13/14. This month after receiving input from a number of people, I'm announcing the rules. There was considerable opposition to the idea that VFD should be a contest, so we've deleted that part of it. Instead, we'll print reports from as many stations as we can fit into the August issue. The reports should consist of station logs (with all the usual information), descriptions of equipment used/power source/antennas, etc and of course we would like photos. Reports must be submitted to arrive here no later than July 15. Jim Hanlon, W8KGI, will be producing a article on the event and extracting material from the reports sent in. The rules are pretty darn basic: The event starts at 7 pm local time on Saturday, June 13, and ends at 7 pm local time on Sunday, June

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# Looking Back

**by Lew McCoy, W1ICP**
**1500 Idaho St.**
**Silver City, NM 88061**
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I was talking to Barry the other day and mentioned a rare QSL that I managed to get some years ago. He thought the story would be worth passing on to the gang.

Back in November of 1958, I was avidly chasing DX at the same time I was employed in the Technical Department of the League. While none of us at ARRL Headquarters were allowed to be on the DX Honor Roll all of us at Hq. who happened to be on the DX committee had impressive DX totals.

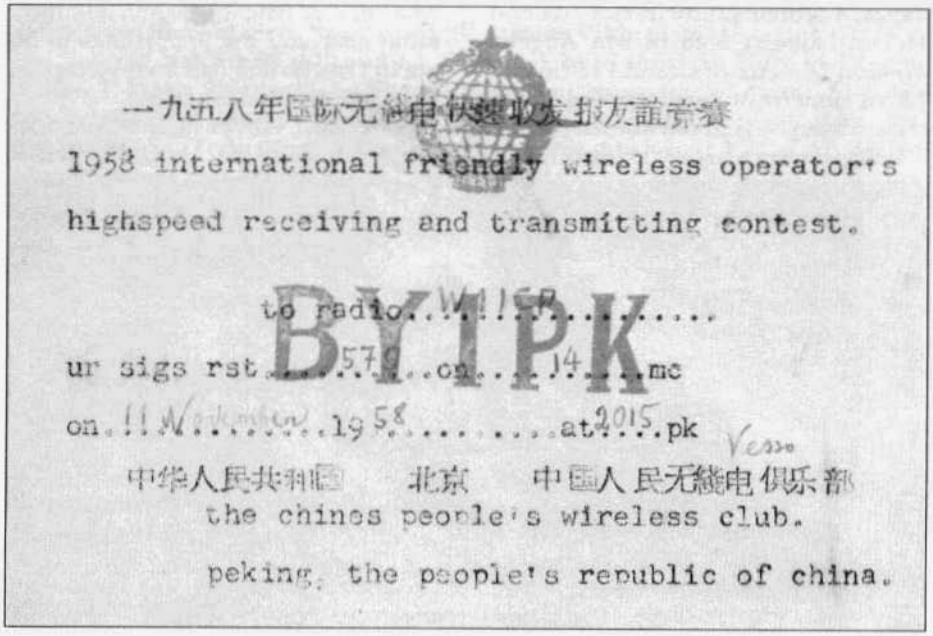
Many of you who worked DX will recall a happening that took place on 20 meters, on cw, at about 14.100. A station came on the band signing BY1PK. BY1PK was in China and China had only been on for a brief period after WW2—and their call sign had started with the letter "C". Years before, in Illinois, I had worked C1CH but no Chinese stations after coming to Connecticut. In any event, this BY1PK had a tremendous signal, he was always 599 when the band was open. However, BY1PK would never—and I mean NEVER—work any of what we called free world stations, and of course, the USA was considered a free world country.

Whenever BY1PK came on he would call CQ and always "WSEM only", the WSEM meaning only stations in the communist block. Of course, at first, hams over here would pile up and call him but they never got a reply. We had already had word at ARRL that this station was not permitted to work free world hams so it finally got to a point where no one over here even bothered to call.

It was very frustrating to get up in the morning, go into my hamshack, turn on my old HRO and hear BY1PK blasting through, calling WSEM, WSEM, and getting no response or very little response. All this time I had been hearing the station, I had never bothered to call. But one morning, I couldn't resist so after one of his long CQs, I called BY1PK, BY1PK, without signing my call and I did this for at least two minutes. I then signed, W1ICP. There was complete silence for about 60 seconds and then a dit, then another dit, and then a quick, "Your RST 599 vy loud, dit dit – dah dit, dah dit, dit dah, dah dit de BY1PK but the topper was his final— "gd lk Lew!" I knew I worked him and he knew who I was! Ahhhh, but how to get a QSL card-that was the trick.

I went into work and usually the gang there had a bull session every morning but I avoided it—no one would believe me anyway. At that time, I was doing some radio observing for a government agency (who will still remain nameless). I called my contact in Washington and told him that I had worked BY1PK (my contact was also a ham and like a lot of people in that agency, was a Dxer.) He sounded astonished, probably because he had facts that I was not a party to. I of course asked him how in heck could I get a QSL? He said he would see what he could do.

About a month past and I got a diplomatic letter from the Polish Embassy in Washington, from an SP who was also a diplomat. He wrote as if we were old buddies and said he would see what he could do. About another month went by and I got an envelope from the Polish embassy "buddy" that contained another sealed envelope from China. I have to admit that even with all my previous experience with DX, I was very nervous about opening the envelope. Inside was a letter and two QSL cards


from BY1PK, one for W6YY, Elvin and the other for me.

The guy running BY1PK was a Czech who had gone to China to build BY1PK. He said when he heard me, he couldn't resist working me even though he could have gotten into trouble. Why did he work me? He told me that he knew who I was when I called him and that his first rig was a McCoy 6L6-807 transmitter and he said it worked first time he turned it on. W1ICP

# A Tribute to W5PYT

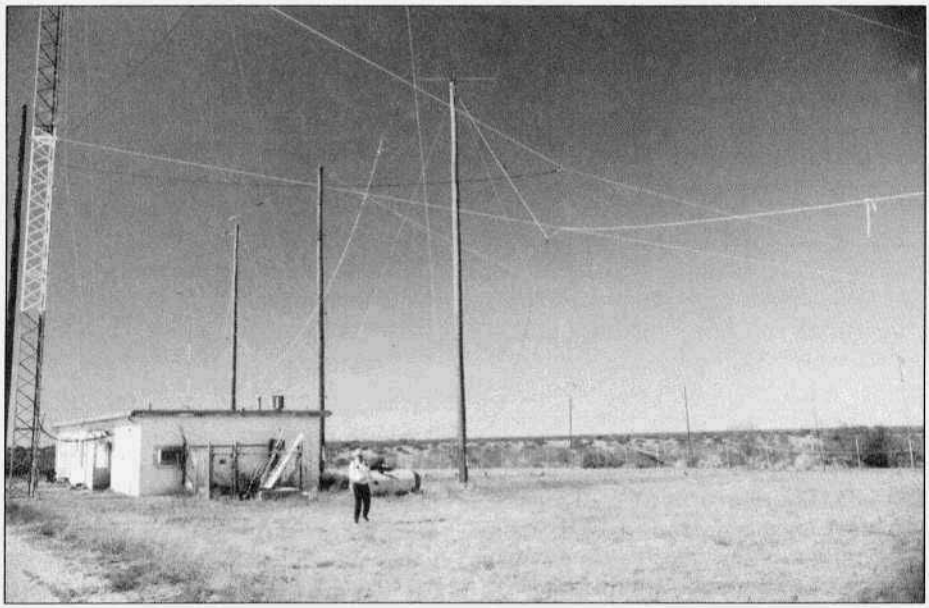
**by ER Editor, N6CSW**
**Photos courtesy of Bill Mason, W5SPT**

Robert Lee Hohertz, W5PYT, better known as "Ozona Bob", died suddenly March 6, 1998, in Ozona, Texas. He was 72. The official cause of death was a heart attack but his daughter Lorelei told me, "he never got over mom dying (she died about 3 months ago) and he just grieved to death." Grave-side services were held on March 9, in Mereta, Texas. He is survived by his mother, Alwine Meisner Hohertz of San Angelo, 5 children, Debbi Moore and Lorelei Rutherford of Ozona, Lisa Hohertz of Austin, Johnny Hohertz of Austin and Bobby Hohertz both of McCamey, Texas, 4 brothers, Edwin Hohertz and Helvin Hohertz both of San Angelo, Weldon Hohertz of Grand Prairie and Lloyd Hohertz of Pasadena, Calif., one sister Helen Nelson of Pasadena, Calif.

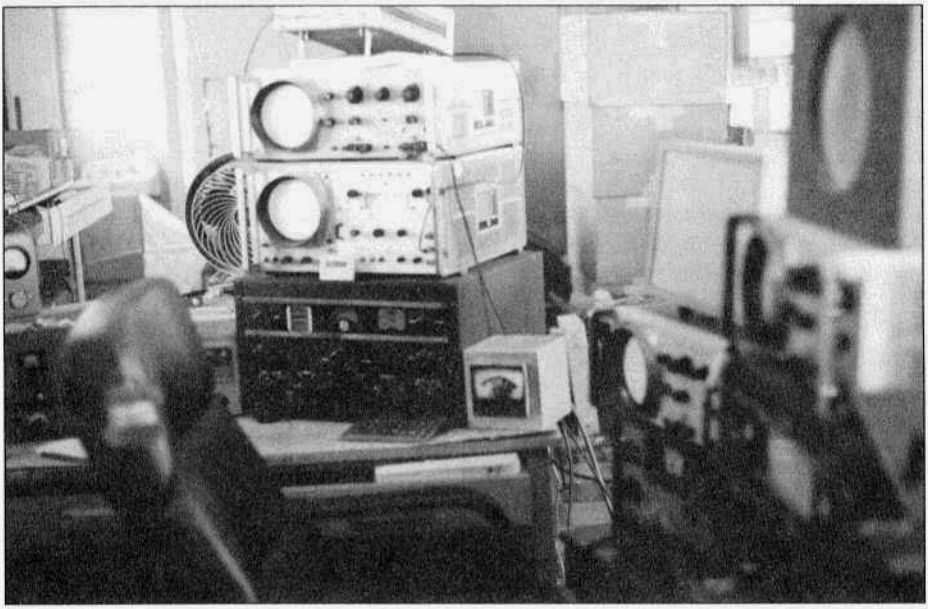
Bob was born March 3, 1926 in Priddy, Texas. He served in the Merchant Marines during WW II as a radio operator and in the U.S. Navy during the Korean War. He worked for El Paso Natural Gas Co. in Ozona from 1961 until he retired in 1993.

All of us AMers and vintage radio enthusiasts were shocked and saddened to learn of Bob's death. He was undoubtedly the most well-known and one of the best-liked members of our small fraternity. His signal blanketed the U.S. and he was as loud as some broadcast stations. He had a large following amongst shortwave listeners who enjoyed listening to him talk about radio gear and the happenings in his life in Ozona. Bob had a very original, very genuine, homey style.

Bob's best AM'er friend was Rick Miczak, K8MLV/Ø. I talked with Rick



**Bob's antenna farm and radio building. We had a photo similar to this one in ER #60, April, 1994.**



**Bob's operating position. You can see his famous Viking I on the far left. He liked his Techrad and his BC-610 and his Desk KW but I think he truly LOVED his Viking I. When asked why he liked that transmitter so much he would respond by saying that it was so simple he could tip it on its side and repair it between transmissions. To the right of the Viking I is his much-loved RCA AR-88. Bob bought two of these receivers in 1989. He wrote about how he acquired them in ER #8, December, 1989. I think that if Bob could have had only one receiver it would have been the AR-88. A couple of other receivers he liked very much were the HQ-140X (probably the receiver he used most over the years) and the NC-183D. Another receiver in the photo is a TMC GPR-90. I think Bob liked this receiver mostly for its excellent mechanical construction and not for its on-the-air performance. There's several pieces of monitoring gear in the photo. That was another passion of Bob's. He very carefully monitored his own signal as well as the signal he was receiving. His reports on how he was seeing your signal were very helpful.**

recently about Bob and how he remembered him. After reviewing his logbooks Rick supplied me with the following information.

His first contact with Bob occurred on August 14, 1978, on 7160. Rick says he was in QSO with a group of AM'ers that included Fred, W6QS, in Palo Alto; Bill, W6MSC, in Orinda, Calif; Zeke, W5LUT, in Roswell, N.M. and Rich, W9LDB/6 in San Diego; when this tremendously loud signal came on frequency. It was Bob, W5KDI, thereafter known as" Ozona Bob". At that time he had two calls, the other one of which was W5PYT. Back then it was possible to have two calls. Rick says that Bob preferred the W5KDI call but somehow he let it lapse and wasn't able to get it back. Bob was running a DX-100 transmitter and receiving on a 75A-3. His antenna was a 6-element 40-meter wire beam pointed into the northwest. He also had another 3-element wire beam for 40 oriented to the northeast. Rick says he was LOUD and that Bob's first



**continued next page**

**One wall inside Bob's radio building. When I see those R-42 speakers stacked up, it brings to mind something Bob told me at the Midland hamfest. He had just purchased one of those speakers for $100 and he said he would buy every one he saw at that price. He said it was the best speaker ever built.**

transmission was over an hour in length—a true 'old buzzard' transmission. But he says he enjoyed Bob so much that it seemed like 5 minutes.

In his log Rick says he has a big red mark beside that entry. And he had commented, "This is a red-letter day, I have found another AM'er and my mentor".

In that first transmission Bob told the group on frequency that he had thought AM was dead but had come across them the previous Saturday night while tuning around the band. Not having an AM transmitter that he could get on with that night, he spent the following week resurrecting an old DX-100. He was absolutely reborn having discovered that there were still hams operating AM. From that time on he was the most avid of all AM'ers. He put his SSB gear aside and Rick thinks that he never operated that mode again.

Rick and Bob were soul-mates from that first meeting and talked almost daily until their last QSO which was on the 13th of June last year.

Over the years Bob amassed an incredible collection of vintage gear. His hamshack was a large concrete block building that belonged to El Paso Natural Gas. This was where Bob spent any free time he could get. When he wasn't on the air - and I suppose while he as on the air too- he worked restoring and repairing his old gear. He became very knowledgable, probably as knowledgeable as anyone, about vintage equipment. He could recite from memory the specifications of almost any piece of gear built from day one up until the solid-state era. We all learned a lot from listening to Bob. And we all gained a lot of inspiration from him as well.

Besides the vintage equipment Bob had another passion and that was for

antennas. Over the years he constructed and used almost every kind of antenna that has ever been designed. He had a complete understanding of antennas and that was evident in the kind of consistently loud signal that he always had.

A couple of weeks before Bob passed away Bill Mason, W5STP, another ham and AM enthusiast in Ozona, called and told me that he was going up to Bob's radio building and would I like him to take some pictures for ER. I told him that I would, little knowing that these would be the last pictures of Bob and his beloved radios and antenna farm.

Back in April of 1994, issue no. 60 we had Bob on the cover of ER. It was our 5th anniversary issue. In March of that year I met Bob at the Midland, Texas hamfest. A few days prior to the event, during a QSO on 40 meters, I told Bob about our plans. He said that he would drive up to Midland to meet Shirley and me.

He arrived early in the morning in his Buick Roadmaster, a car he was very, very proud of. He told me that he had not been to bed at all the previous night but had been on the air until he left for Midland.

Bob was an impressive figure. Mostly I remember the commanding presence he had and the way he stood out in a crowd. He was tall (6' 2"), wore cowboy boots, a big white hat and a western shirt. His fine white hair was long, down over his collar. He was right out of a western movie.

Bob was a very good and generous person. Every visitor he ever had in Ozona was taken to the Truckstop for dinner and treated royally. (Fellow AM'ers and SWLs will we ever forget Bob's descriptions of the food at the Truckstop—the chicken-fried steaks and the bowls of chili and the monster breakfasts. How many times, in the wee hours of the morning, did we hear Bob say that he was going to head down to the Truckstop for breakfast and then go to bed?)

We all have our memories of Bob. Ham Radio will never be the same without him. N6CSW

**Final comment:** Bob's family has asked me to say that at this time they have no plans regarding the disposal of his equipment. When and if they decide to sell it they'll put a notice in ER.

**Bob inspecting his ground radial system.**

## VOA ANTENNAS COME DOWN

**story via ARRL Bulletin, with additional text from Paul Courson, WA3VJB**

Visitors to Ohio—perhaps on their way to the Dayton Hamvention—sometimes found it hard to keep their eyes on the highway when passing the Voice of America's Bethany Relay Station. The vast antenna farm off I-75 north of Cincinnati consisted of 14 rhombics and a huge Sterba curtain, but now is being cleared for development.

A prominent AM-er, Bill Diggins, WA8LXJ, was an engineer at Bethany. A number of years ago, he acquired a transmitter "on junk surplus" that VOA sites such as his would use for interagency communications. The Collins 231-D as he found it was a pair of 450TL's modulating a pair of 750TL's, demanding 3-phase 240 VAC power.

Bill managed to disassemble the rig to get it home—it was a system of three racks, each three feet wide, containing RF, AF and power. After reassembling the 5KW, autotune, 3-30mc rig, he performed some modifications to allow nominal power and excellent audio, primarily for his use on 160 and 75m, now sporting a pair of 833A's modulating a pair of 450TL's, and running off standard house current.

At one time among the most powerful shortwave stations in the world, the Bethany Relay Station was shut down a couple of years ago. In December, the towers supporting the majestic Sterba curtain and other wire arrays came crashing down--to make way for commercial and recreational development and a university campus on the 625-acre site.

In a 75m AM QSO in 1990, Bill, LXJ described how he and other engineers would conduct regular "downtime" walk-throughs of the antenna farm, scheduled when the Voice of America could use other transmitter sites for shortwave broadcasts. The walk-throughs primarily were a mission to

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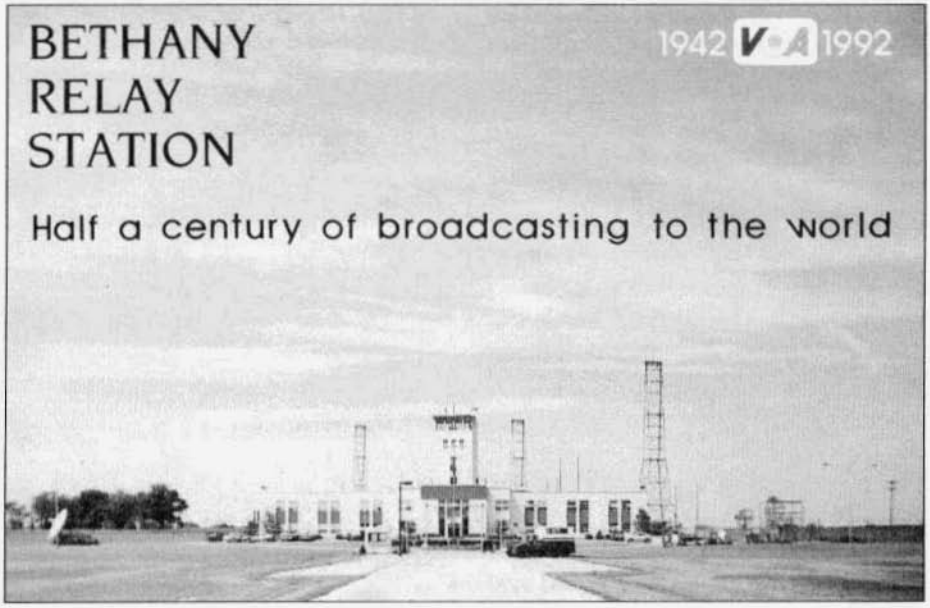
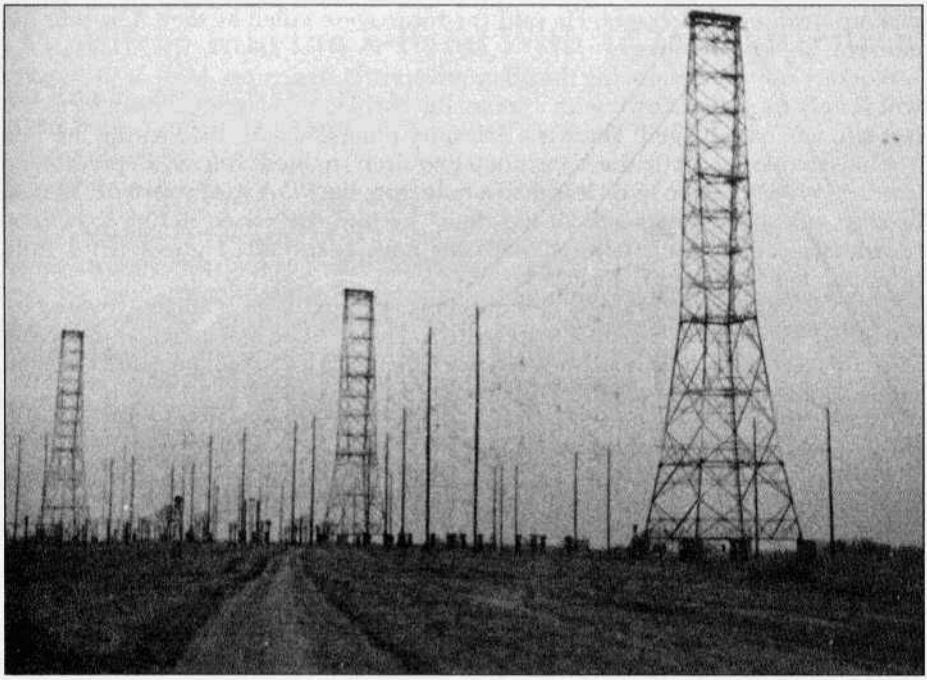
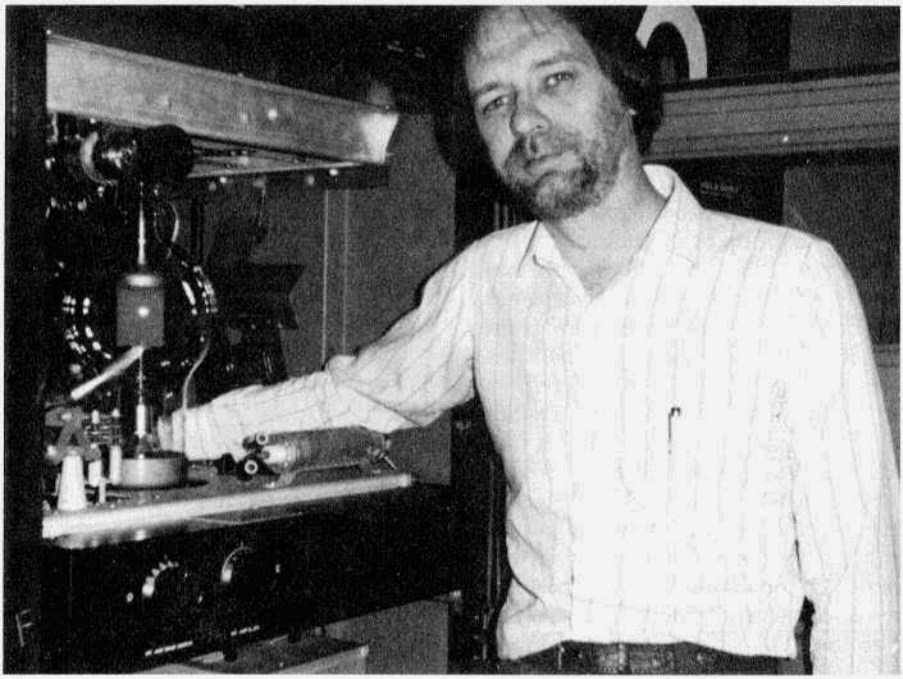




A high-gain curtain at the Bethany site.



Bill Diggins, WA8LXJ with his Collins 231-D transmitter.

pick up dead bird carcasses. He said the birds were killed as they flew into the massive, high-power arrays.

Workers continue removing the other towers and structures. Most of the towers will simply be pulled down with a crane. But forty towers, ranging from 90 to 150 feet tall, will be salvaged. There is a February timetable to finish clearing the site.

A newspaper report (in the "Cincinnati Enquirer") quoted ham radio operator Joe Goforth, WB8NFJ, who lived less than a mile from the VOA site for two decades. "I used to talk to the engineers all the time," he told the paper, noting that VOA broadcasts sometimes interfered with his ham gear. "But I guess I'm a little disappointed to see it go," he added.

Video footage of the antenna demolition is reportedly dramatic, as covered by broadcast TV crews and people with camcorders who had assembled at the scene. (Eds note: efforts continue to track down a Cincinnati TV cameraman, a ham, who might be able to supply a copy of his station's coverage)

For stills photo coverage of the Sterba curtain support towers coming down, see http://www.palmtop.net/img/voa.jpg.

For more info on the Bethany Relay Station, visit the Jim Hawkins' (WA2WHV) Radio Room, http://www.exit109.com/~jimh/voaohio.html. ER

**Editor's Note:** For more photos of Bill and his Collins 231-D transmitter see ER #13, May, 1990.

## Because The Wind Blows From East to West (Sometimes)

**by Bill Diggins, WA8LXJ**

Another event that Bethany VOA must take responsibility for is the licensing of WN8LXJ. My boyhood home was located across the road from the VOA - Bethany. Our front yard was about 200 feet from the end of a group of rhombics.

As a child, I liked to fly kites, and one rule we had around the house was never to fly kites when the wind blew from east to west. This would put the kites right into the VOA antennas. Well, as you might guess, one day I did fly my kite into the antennas. Actually, it was a day when the wind had slowly changed direction. After I saw, to my consternation, that my kite had gotten hung up in the antennas, it slowly dawned on me that the incident had not gone unobserved. I saw a man driving up on the VOA side of the fence and it was clear that he had been watching me. I was shaking with fear.

He turned out to be a VOA radio engineer, and while he wasn't exactly happy about my kite, he proved pretty friendly otherwise. He asked me if I was interested in radio, and put me at ease to the point that I began asking him a lot of questions. Before I knew it, he was giving me a tour of the VOA. I was hooked.

The engineer who befriended me that day was named Jack Gray (W8JDV). I remember riding my bike into town (Mason) soon after to visit him for the first time. It turned out that Jack's interest in radio extended to collecting and restoring old broadcast radio sets. That summer was spent working in his basement radio museum for fifty cents an hour helping clean and move his equipment around. He and I also took some enjoyable trips into the country searching out people's attics and barns on the



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# Venturing Into the X-Band With a Classic Klystron

**by Kurt H. Miska, N8WGW**
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As long as I can remember I've been fascinated by microwave technology, not the modern solid state approach but rather the vacuum tube and plumbing approach. To me there is something extremely exotic about generating millimeter wavelength electromagnetic radiation with strange vacuum tubes and plumbing to guide the radiation. My recent acquisition of two classic klystrons provided the initiative to do something about this old interest. The near total lack of microwave activity in this part of the country, much less the vacuum tube variety, was just one of the problems to overcome. Further, ARRL's microwave texts, while excellent for the solid state crowd, only treat the tube segment of microwave as a historical footnote. Then there was the risk of being labeled looney for voluntarily venturing into a part of the hobby that had been simplified considerably by the introduction of solid start parts, no-tune circuits and low-voltage power supplies. If that's the case, so be it. I'm interested in tubes. However, thanks to the Internet, I was able to learn a great deal and thanks to some of my e-mail correspondence make some headway in powering up these klystrons, a 2K25 and a 723A/B (CV 129 in the UK).

By the way, the two U.S. tubes are directly interchangeable and they were made by Western Electric and Raytheon. No doubt other companies also made them. While you may not see them glow in the dark because they are metal tubes, they are very much classic tubes that emit more than few BTUs of heat when powered up. But, first some background.

## What is a Klystron

If you refer to some of the ARRL Handbooks from the late 40s and early 50s, you'll find brief descriptions of this historically important electron tube. Readers learn that it was used as a local oscillator in microwave spectrum analyzers, as a microwave source for testing circuits, and other applications requiring a few milliwatts of microwave energy. Thanks to the Internet you don't have to dig very long before you find out a lot more.

With that in mind, here's a short historical note downloaded from the Stanford University SLAC website (SLAC = Stanford Linear Accelerator). "The klystron, or more correctly the reflex klystron, was invented at Stanford University in 1937 by the Varian brothers, Russell and Sigurd. It was named, with the assistance of the Stanford Classics Department, after the Greek verb "klyzo," which describes the action of waves breaking on a shore. The Varian brothers, could not possibly have known how closely a simulated klystron electron beam resembles breaking waves, as we now do using computers. Low-power klystrons served mainly as a local oscillator in radar receivers during WW II. After the war, however, very high-power klystrons were built at Stanford for use in the first linear particle accelerators. This opened the way for the use of klystrons not only in particle accelerators and radar, but also in UHF-TV, satellite communications, and industrial heating."[1]

In a reflex klystron a fairly conventional heater/cathode assembly (sometimes called a gun) is used to generate a



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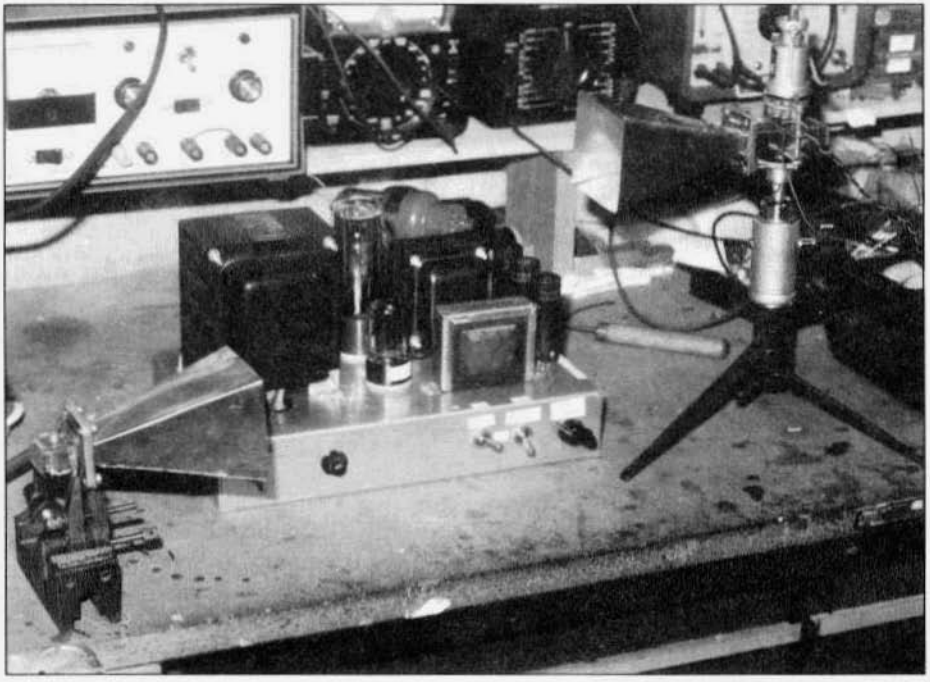


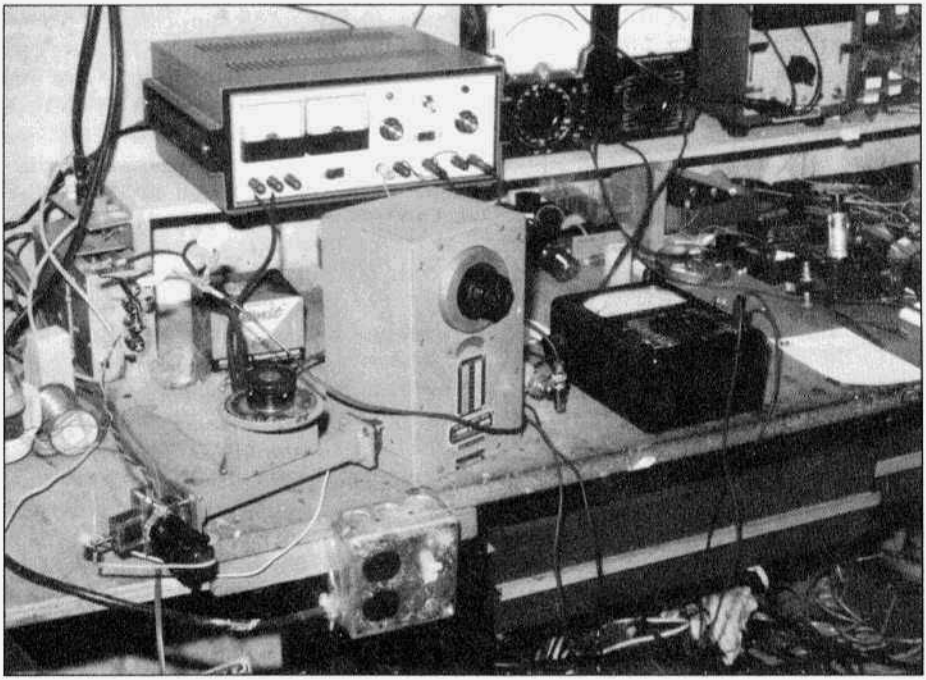
**The author's workbench setup. The microwavedetector is on the left, the power supply is in the center and the 2K25 mount is on the right.**

focused electron beam which is directed at a second electrode called a resonator. This consists of a cavity which is resonant at the design frequency of the klystron and operated at normal anode (plate) voltages and currents. In the 2K25 and 723A/B klystron the cavity can be mechanically distorted by a small amount to alter the operating frequency.

The resonator, also called beam or designated as the shell, has two central holes which part of the electron stream can pass. Beyond the resonator is a third electrode which is biased several hundred volts negative with respect to the cathode. Electrons approaching this electrode are repulsed or repelled and return either to the resonator body or back through the holes in the resonator. Because of this action, this electrode is called a repeller or reflector.

Klystrons come in all shapes and sizes and are capable of generating microwave power from a few milliwatts to megawatts, yes, megawatts, over an equally wide frequency range. When you first pick up a 2K25 or 723A/B, you get the distinct feeling that you've come face to face with a mutated, metal, octal-base receiving tube sporting some very strange headgear. They have an adjustable mechanical appendage that is vital to their function as oscillators. Next you note that they feature octal bases and to some degree that is correct until you spot the lengthy protuberance sprouting from where pin 4 is supposed to be. Gradually, very gradually, I learned that my particular klystrons were very commonplace and manufactured by the hundreds of thousands.

At one time, these klystrons were used by hams operating microwave systems in the 10,000 Mc (10 GHz) band, also called the X-band. The operating frequency range of the 2K25 and 723A/B



**In this photo the 2K25 mount is on the left. Next to it on the right is the attenuator and then the frequency meter.**

is from 8,500 to 9,660 Mc with 9,370 being the nominal value. With mechanical tuning, which distorts the cavity, the klystron can be taken 180 Mc to either side of this frequency. Small variations of the negative reflector voltage will also affect the output frequency. Also, they could (can) be modified mechanically to operate in the lower portion of the assigned amateur frequency but the modification had (has) to be done very, very carefully lest any carelessness kill the tube. In the late 40s articles in QST reported on the work done by enterprising amateurs using these war surplus microwave building blocks. I had no intentions of forcing my klystrons into the 10,000 Mc band since there are no hams in my part of country who share my interest in microwaves. I was happy just to get these tubes to crank out a few milliwatts. According to the Raytheon tube manual, 32 mW is the maximum output with 20 mW being the average. While this may not seem like much, there are many warnings that this amount is not to be trifled with since the overall power density is considerable. Don't look into the antenna horn!

Searching the WWW led to a microwave site in England maintained by Peter Day, G3PHO, who then very generously sent me two valuable articles that contained some much sought after construction information and thus gave me the courage to start mechanical and electronic construction.

## My Project

As much "stuff" as I have in my shop, my microwave project required more and different "stuff." The list of items needed to fire up the klystrons is short but the items required time and patience to build. To experiment with them you need a power supply, a microwave



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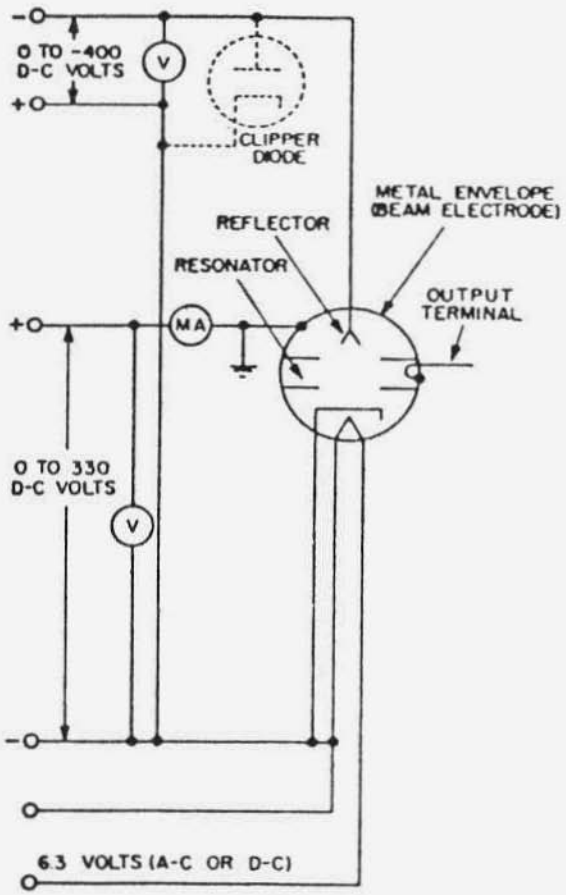


detector, a detector amplifier is nice to have, waveguide material has to be at hand, either homemade or found at a hamfest, as do antenna horns.

The very first part of this multi-part project was modification of a standard octal socket. Pin 4 had to be removed and drilled out to accommodate the klystron's coaxial output element. If only all of what followed was this simple.

Thanks to Ed Munn, W6OYJ, I now also have a schematic for a suitable five-tube (5U4, 6AX4 and three 0A2s) regulated power supply. In keeping with the tube approach to microwaves,

I elected to sacrifice a +375 volt DC power supply that I had laying around. The biggest stumbling block was the need for two 10 Hy 90 mA chokes. Actually, I had one choke of unknown inductance from my sacrificed power supply. It would have to do. Next, I thought I'd have nothing to lose by asking Dan McCollough at Purchase Radio in Ann Arbor, Mich. if he might not have the necessary choke. He sent me to his upstairs emporium and, lo and behold, there on a dusty shelf was a brand new, in the box, 15 Hy, 85 mA choke made by the long forgotten Merit Coil & Transformer Corp. of Chicago. In the course of building this weighty power supply I once again was reminded that one should never do any wiring, or other work for that matter, when tired. One day, after a good night's sleep, I returned to my project only to discover in horror that I had made a very serious and potentially costly mistake. Luckily I spotted it immediately and avoided smoke, frustration and all manner of other unpleasantness.

While busy building my power supply, I also tackled construction of two pieces of WR90 waveguide and a suitable horn. Waveguides are manufactured for specific frequencies and for the X-band, you need WR90. The inside dimensions are 0.400 x 0.900 inches. Not having or being able to locate waveguide in Michigan, I decided to make my own using blank printed circuit board. That merits a comment about mechanical construction. In playing with microwave devices, hollow state or solid state, familiarity with and a

good assortment of hand and power tools is, to my way of thinking, a must. Just to cut metal or printed circuit board, you need a decent saw and/or tin shears. I am fortunate in having a bandsaw and I used it to cut the printed circuit board material for my waveguides. I carefully cut a piece of wood to the 0.400 x 0.900 inch dimension to use as a form. Soldering the four pieces of PC board together proved to be very simple but I had to be very careful not to let any solder leak into the waveguide. All the microwave experts will tell you that solder is very "lossy." Mind you, I'm not saying that it can't be done without a cellar full of hand and power tools, but high quality tools make the job so much easier and safer.

A suitable antenna horn was next. Luckily I had the two main ingredients, a drawing and some sheet copper. The drawing from "Microwave Building Blocks - 10 GHz"[1], which showed just how to cut the sheet metal and how to fold it. I had some 0.010 inch sheet copper and folding it according to the drawing was fairly easy. Soldering its seam and then attaching it to a homemade flange was equally easy.

Flanges, how to make flanges? My X-band frequency meter came with a badly mistreated piece of flexible waveguide. There were flanges at each end and a hacksaw made short shrift of severing these from the flexible portion. Soldering my homemade waveguide to the salvaged flanges required very gentle use of a propane torch but careful fixturing and working rapidly ensured the survival of the waveguide.

## Test Equipment

Then it was my good fortune to receive an e-mail from a gentleman in Illinois who was interested in selling a Precision Frequency Meter, Type 559-A covering 8,200 to 10,000 Mc. Originally made for the Navy, this is not a true boatanchor but it comes close. This piece of gear is about the size of a Heathkit VTVM but is of much greater density. So, for the grand sum of $20 including shipping, I became the proud owner of my first piece of microwave test equipment complete with a massive attenuater.

In order to use the frequency meter, I had to make a microwave detector mount and amplifier. The key ingredient to this elementary piece of test equipment is a classic 1N23 microwave diode. The amplifier is not vacuum tube-based but rather centered around a 3140 operational amplifier. Construction notes are in "Microwave Building Blocks - 10 GHz".

## Firing Up the 2K25

When a free evening finally provided the time to fire up the 2K25, I approached the job with some hesitation. After all, +300 volts on one electrode and -150 volts on another are potential sources of trouble. The accompanying and highly simplified diagram shows the power connections to the klystron. Well, there were no sparks or funny hot smells but, by the same token, nothing came out of the antenna horn. So, I shut everything down and put on my thinking cap. I just couldn't figure it out. I tried another power supply with equally negative results.

Some weeks passed and in a somewhat discouraged mood, I cleaned my shop, puttered with a magic eye tube and just sat there thinking. Then one day I had an e-mail from Philip Hejtmanek, KF9US, who said that there was indeed someone else in Michigan who is interested in microwaves and who would be willing to help me. Within a couple of days, he came to my office on the way to his job as director of technical operations at one of the local TV stations. As promised, he brought me the insides of an ex-police radar gun. The insides are a Gunn diode in a suitable cavity and an antenna horn. Boy, those things are simplicity personified. Put +10 VDC on them and out



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# LETTERS

## Setting the Record Straight

I would like to comment on the letter by Sam Hevener, W8KBF (ER March 1998, #107) concerning the review of the November 1942 Special Corps issue of ***Radio News*** by W7QHO.

I believe that Sam is correct in that our government was certainly trying to put the best face on a bad situation during the first part of WW II. However, by November, 1942 some significant reverses were dealt to the axis powers. For instance, the Battle of the Coral Sea stopped the Japanese attempt to cut off New Zealand and Australia.

Of particular significance is the fact that the Battle of Midway took place on June 4, 1942, well before the November issue of Radio News was typeset. This was a resounding tactical and strategic victory for the United States. It was also the largest sea battle ever fought. In fact, this battle signaled the beginning of the end of Japanese sea power in the Pacific.

But, what really prompted my response was Sam's statement about the Tokyo raid by Jimmy Doolittle. Suggesting that in a similar situation two years later a squadron commander would be "Court-martialed and kicked out of the military" is a less than an accurate assessment of the mission and an unfair assessment of the leader.

Even though the mission was considered risky in the extreme, Doolittle was able to get all 16 Army Air Corps land based aircraft off the USS Hornet in a raging sea when at times the ship was taking water over the bow. These aircraft were loaded 2,000 pounds over their design limit. Add to this the fact that launch was initiated prematurely hundreds of miles short of the intended departure point because of possible discovery by a Japanese ship. In spite of all this, Tokyo radio reported enemy aircraft overhead almost to the minute the revised time over the target would have put the planes there.

Again, Sam is correct in that very little damage was done. However, that was never the intent. It was planned as a psychological blow to the Japanese and a morale booster for the U.S. I really do not believe that this would be considered propaganda, although, obviously much good press resulted.

As far as losing all the aircraft, it was anything but Doolittle's fault. The radio navigation aids that were supposed to be set up in China were not there because of a bureaucratic SNAFU. It is actually amazing that so many of the crews lived to fight again considering the onset of night and the instrument weather conditions they encountered after leaving the target. It is interesting that the only critical items that were out of Doolittle's control after the mission began were the navigation aids required for recovery. Actually, he and the squadron were let down by bureaucratic bungling.

Yes, Jimmy Doolittle did skip one rank and was promoted to Brig. General. However, history has proven that to be a very wise decision. His command of flight operations in North Africa and later the Eighth Air Force was remarkable during the subsequent years of the war.

I believe it is noteworthy to compare Doolittle to David Sarnoff the chairman of RCA (Since this is actually a radio magazine). Sarnoff went from a civilian to a full colonel and then appeared to use political influence for promotion to Brig. General. What makes the Sarnoff situation seem even worse is that for the rest of his life this "Staff Officer" wanted to be called "General Sarnoff".

A quick review of Jimmy Doolittle's life will show that he is a man to be respected for his leadership and accom-

plishments. He held one of the first earned PhD's in aeronautical engineering from MIT. He was chief of experimental flying for the Army Air Corps at McCook Field (Now Wright-Patterson AFB). In 1922, he was the first pilot to fly across the United States in less than a day and made the first "Blind" take off and landing in 1929 using only instruments. In 1932 he set a world speed record over a ten-mile ten-lap course. Moreover, he was instrumental in the development and production of 145 octane aviation gas that enabled our aircraft engines to develop more horsepower—just in time for WW II.

In 1946 General Doolittle quietly retired to civilian life without using his military rank or fame for personal gain.

Although Sam is correct to point out that propaganda is not limited to the enemy, I believe he could have used better examples in his letter. His response almost seems to malign the accomplishments of one of our best "Citizen Soldiers" who was recalled from the reserves just prior to the outbreak of war.

Actually Sam's position that the 1942 article was way too positive and upbeat for the realities of the time was exactly the way I felt. We only differ on some of the examples.

I do take exception to one other issue, however. Only 40% of the "Smart Bombs" used during the Gulf War hit the target!! That is at least a ten-fold increase over the accuracy of the Viet Nam war. And, many of these bombs not only hit the target, they actually went through windows, etc. But, that is a whole other issue involving CEA's and CEP's (Circular error actual and circular error probable).

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NASA Research Pilot
Former Navy Fighter Pilot

## A T-368 Owners Survey

With the resurgence of AM, the military T-368 transmitter has become very popular and for good reason. It's high quality, heavy duty construction is obvious and it is very undervalued. I consider the T368 to be the bargain in a legal limit AM transmitter, the average AM'ers alternative to the KW-1 price frenzy.

Although a number of articles have appeared on various mods, very little has surfaced on production statistics. For this reason I thought an owners survey would be in order. The information gathered should provide some estimate as to the number of models, total production, model series production, dates of production, etc. I think this data would be of interest to current owners, prospective buyers and correct some mis-information. (Yes Virginia, there is a "D" model.)

So I would like to invite all T-368 owners to drop me a note (preferably a QSL card for display) with some information. This example is my transmitter.

Model - T-368D
S/number - #33
Manufacturer - Stromberg-Carlson Co. (Division of General Dynamics Corp, Rochester, NY)
Approximate year made - 1961

The year made is not obvious, but can be determined from dates on capacitors, tubes and other parts. Also many transmitters had a military quality control acceptance paint stamp with the year someplace on the front panels in orange or white. Any other known historical info would be helpful.

I would hope to receive all replies in about four weeks from this issue. I'll compile the data and forward it to Barry for a future article(s).

Finally, another note of thanks to Tom, K6AD, on the Mohawk series. About ten years ago I bought a like-new RX-1, my first and last. The kit construction


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# April AMI Update

**by Dale Gagnon, KW1I, President**

### AM International at the Dayton Hamvention

The AM Forum will be at 11:00 am on Saturday May 16 in Meeting Room #1 at the Hara Arena. The forum will be just under an hour in length and will include a brief update of AM issues and future operating events. The main feature will be a pictorial tour of the radio rooms on the battleship USS Massachusetts and the cruiser USS Salem. Both of these ships have original radio gear currently active on AM on the amateur bands. For those readers who were veterans of WWII with radio experience, please drop me a line. I would like to have your personal radio remembrances and anecdotes from the WWII era for the forum attendees.

Just preceding us in Meeting Room #1 at 10:00 am is Mike, W1RC's forum on the Internet. He is planning to use the last 15 minutes of his forum to cover vintage, AM and military radio sites on the Web. He has speakers from the Boatanchors List and the Antique Wireless Association as part of his program. He invites AM ops who arrive early for the AM Forum to come in and make ourselves comfortable.

Plan to have an informal meal with AM'ers on Saturday evening at 7:30 pm at Marion's Pizza at Exit 57 off I75. Bring pictures of your shack and an a handful of QSLs.

### Armed Forces Day Operating Event

May 16 is Armed Forces Day, so May 16-17 has been designated by AMI as an AFD Operating Event starting sunup on Saturday and ending sundown on Sunday. Submit logs of your operation listing contacts and number of types of military transmitters and receivers used and worked. Send photos of setups if possible. Certificates will be awarded for any conspicuous operating event performance!

### New England Two Meter AM Calling Frequency 144.4 MHz Threatened

A few months ago AMSAT proposed to move the Automatic Position Reporting System (APRS) from 145.79 MHz to 144.39 MHz. This had been necessitated by a move of the Russian space station MIR from 145.55 MHz to 145.79 MHz. Apparently MIR was interfering with the popular 145.55 MHz simplex frequency in Europe. The new APRS frequency is incompatible with the long standing New England AM calling frequency of 144.4 MHz. Bill, KB1DX, a New England AM'er and member of AMI, has been corresponding and meeting with several groups including New England APRS, New England Weak Signal (NEWS) and the ARRL. Bill and other New England two meter AM operators would like to see an ARRL sponsored national band plan including a two meter AM calling frequency. Ideally they would like this to be 144.4 MHz. Though the matter is far from decided, the negotiations have been a good model of professional conduct and cooperation. All participants respect the New England AM community's position and are seeking an accommodation. If you have an interest in a national two meter AM calling frequency and think you can help, Bill would like to hear from you. KW1I

*To Join AMI send $2 to:*
*AMI*
*Box 1500*
*Merrimack, NH 03054*

# VINTAGE NETS

**Westcoast AM Net:** Meets informally, nightly on 3870 at 9:30 PT. Wednesday at 9:00 PM PT they have their formal AM net which includes a swap session. Net control rotates.
**California Early Bird Net:** Saturday mornings at 8 AM PST on 3870.
**California Vintage SSB Net:** Sunday mornings at 8 AM PST on 3835
**Southeast Swap Net:** Tuesday nights at 7:30 ET on 3885. Net control is Andy, WA4KCY. This same group also has a Sunday afternoon net on 3885 at 2 PM ET.
**Eastern AM Swap Net:** Thursday evenings on 3885 at 7:30 ET. This net is for the exchange of AM related equipment only.
**Northwest AM Net:** AM activity daily 3 PM - 5 PM on 3875. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT. The formal AM net and swap session is on 3875, Sundays at 3 PM.
**K6HQI Memorial Twenty Meter AM Net:** This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 3:00 PM PT, 7 days a week and usually goes for about 2 hours. Net control varies with propagation.
**Arizona AM Net:** Meets Sundays at 3 PM MT on 3855. On 6 meters (50.4) this group meets at 8 PM MT Saturdays.
**Colorado Morning Net:** An informal group of AM'ers get together on 3876 Monday, Wednesday Friday, Saturday and Sunday mornings at 7AM MT.
**DX-60 Net:** This net meets on 7290 at 2 PM ET, Sundays. Net control is Jim, N8LUV. This net is all about entry-level AM rigs like the Heath DX-60.
**Eastcoast Military Net:** It isn't necessary to check in with military gear but that is what this net is all about. Net control is Dennis, WA3YXN but sometimes it rotates to other ops. Saturday mornings on 1995 at 0500 ET. Will move to 3885 for summer.
**Westcoast Military Radio Collectors Net:** Meets Sunday mornings at 0930 local on 3975 + or - QRM, except the 1st Sunday of the month when the net meets at 2130 local. Net control is Tom, WA6OPE.
**Gray Hair Net:** The oldest (or one of the oldest - 44+ years) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8:00 PM EST & 8:30 EDT. URL: http://www.crompton.com/wa3dsp/grayhair.html
**Vintage CW Net:** Tracy, WB6TMY, who started the net and has acted as net control over the past few years is unable to carry on with it because of his new job. The net is temperarily inactive.
**Vintage SSB Net:** Net control is Andy, WB0SNF. The Net meets on 14.293 at 1900Z Sunday and is followed by the New Heathkit Net at about 2030Z on the same freq. Net control is Don, WB6LRG.
**Collins Collectors Association Nets:** Technical and swap session each Sunday, 14.263 MHz, 2000Z, is a long-established net run by call areas. Informal ragchew nets meet at 0100Z Tuesday nights on 3805 and on Thursday nights on 3875.
**Collins Swap and Shop Net:** Meets every Tuesday at 8PM EST on 3955. Net control is Ed, WA3AMJ.
**Drake Users Net:** Another relatively new net. This group gets together on 3865 Saturday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, WZ8O; Rob, KE3EE and Huey, KD3UI.
**Swan Users Net:** This group meets on 14.250 Sunday afternoons at 4 PM CT. The net control is usually Dean, WA9AZK.
**Nostalgia/Hi-Fi Net:** Meets on Fridays at 7 PM PT on 1930. This net was started in 1978.
**K1JCL 6-Meter AM Repeater:** Located in Connecticut it operates on 50.4 in and 50.5 out.
**JA AM Net:** 14.190 at 0100 UTC, Saturdays and Sundays. Stan Tajima, JA1DNQ is net control.
**Fort Wayne Area 6-Meter AM Net:** Meets nightly at 7 PM ET on 50.58 MHz. This net has been meeting since the late '50's. Most members are using vintage or homebrew gear.
**Southern California Sunday Morning 6 Meter AM Net:** 10 AM Sundays on 50.4. Net control is Will, AA6DD.
**Old Buzzards Net:** Meets daily at 10 AM Local time on 3945. This is an informal net in the New England area . Net hosts are George, W1GAC and Paul, W1ECO.
**Canadian Boatanchor Net:** Meets Saturday afternoons, 3:00 PM EST on 3745. For hams who enjoy using AM, restoring and operating.
**Midwest Classic Radio Net:** Saturday mornings on 3885 at 8AM Central time. Only AM checkins allowed. Swap/sale, hamfest info and technical help are frequent topics.
**Boatanchors CW Group:** Meets nightly at 0200Z on 3579.5 Mhz (7050 alternate). Listen for stations calling "CQ BA" or signing "BA" after their callsigns.
**Wireless Set No. 19 Net:** Meets the first Sunday of every month on 14.165 at 1900Z and 3760 at 2000Z. Net control is Dave, VA3ORP.

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

# Barker and Williamson's 813-based Amplifiers
## L-1000-A / L-1001-A / LPA-1)

**by Brian Harris, WA5UEK**
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**Plano, TX 75075**
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### Introduction

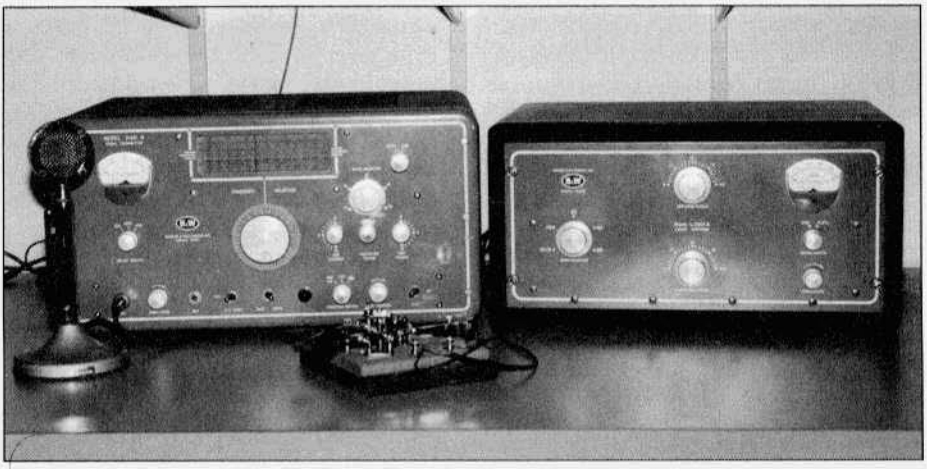
Looking back at mid-to-late 50's transmitters, one quickly realizes that most fell into two power categories, low or medium. Common examples in the first category are the Central Electronics 10A and 20A. Because SSB was still struggling to gain acceptance in this time, hams in the market for a new transmitter were still apt to purchase a CW/AM rig. More often than not, they opted for one with medium power. Popular at the time were the offerings of Heath (DX-100 and TX-1) and, to a lesser degree, E.F. Johnson (Valiant) and B&W (5100/B). Although these are CW/AM transmitters, each would support SSB operation when coupled with an appropriate generator and all three manufacturers offered one.

Amateur Radio experienced tremendous growth in those 'good old days'. With that growth came increasingly crowded bands, in spite of the reduced bandwidth of 'new' SSB signals. In the quest for DX, and sometimes just to participate in your favorite rag chew, higher power was often needed. Barker and Williamson realized there was a market for an amplifier that could be driven by the many medium power transmitters in service, whether they were operating SSB, CW or AM. Accordingly, in 1957, B&W introduced the L-1000-A amplifier. With a price tag of $460, it was an expensive match to the eye-appealing B&W 5100/B.

Even as early as the mid-30's, many amateurs accepted that receiver construction was better left to professionals. By the 50's, most felt the same about transmitters. One area of homebrewing that had not totally succumbed to commercial manufacturing was power supply construction. With that in mind, B&W elected to offer the 'RF Section' of their L-1000-A separately. This was called the L-1001-A. Having no cabinet or high voltage supply, it offered a cost saving to the amateur who could provide a power supply and appropriate housing.

Other than the nomenclature, the only noticeable difference in the two amplifiers is that the L-1001-A has no blower. According to B&W documentation, "Exhaustive laboratory tests have proved that the 813 type tubes do not require forced air-cooling, under the normal service to which they are subjected in the Models L-1000-A and L-1001-A." To aid in ventilating the tubes in the blowerless L-1001-A, a grid of twenty holes was punched in the chassis, directly under the tube sockets. The user was warned to install the amplifier in a location with adequate space beneath the chassis. In spite of B&W's 'tests', a former owner of my L-1001-A mounted an induction motor-driven fan to blow air horizontally across its finals.

In spite of their cooling quote, Barker and Williamson brought back the blower when they introduced their third amplifier, the LPA-1, in 1959. Although the LPA-1 matches the B&W 6100 that was introduced a year later, a close inspection reveals it is merely a repack-



**The B&W L-1001-A amplifier was introduced in 1957. It is shown here with the 5100B transmitter.**

aged version of its earlier cousins. The LPA-1 could be purchased with or without the separate high voltage power supply, the LPS-1. As with the amplifiers, the LPS-1 power supply is basically a repackaged version of the L-1000-A power supply. Other than cosmetics, the only apparent difference is that the front panel that holds the single control switch (OFF-ON-TUNE-OPERATE) can be removed for location near the amplifier. Pricing for the LPA-1 and LPS-1 was $375 and $210, respectively.

**RF Sections**

The L-1000-A RF section and the L-1001-A are mechanically and electrically identical except for the blower. The aluminum front panel measures 8-3/4" x 19". This panel mounts to a 14" deep steel chassis. Triangular side brackets formed from the chassis plate keep the assembly from flexing. In contrast, the LPA-1 panel is 9" x 18", has rounded corners and sits slightly recessed in a perforated cabinet with a hinged lid. Every component, with the exception of the plate choke, pi output network, panel meters and controls, is mounted on a 5-1/2" x 11" x 2-1/2" subchassis. With the added fan, my L-1001-A weighs 35 pounds, while the LPA-1 tips the scales just under 46 pounds. This includes an antenna relay box that has been appended to the rear of the cabinet.

It should come as no surprise that the amplifiers use the famous B&W 850A bandswitch/tank coil combination. Unfortunately, it is not the one that covers 160 meters, so the amplifiers are limited to 80-10 meters. Cardwell provided both the plate and the loading capacitors. The plate tuning capacitor has two stator sections. An arm attached to the bandswitch shaft engages with a lever when switching from 20 to 40 meters. This lever activates a switch that connects the larger stator in parallel with the smaller, adding the required capacitance for the two lower bands.

To reduce height, rather than mounting the pair of 813's horizontally, their sockets were recessed into the sub-chassis on standoffs. The 813's have their screen and suppressor grids at DC ground and their control grids at RF ground. Negative control grid bias comes from a selenium-rectified, half-wave supply. Filament current passes through a custom ferrite choke which has a third 'winding' that leads to a neutralization stub located between the



continued next page

two 813's. This feedback scheme offers no adjustment and was included to improve 10 meter operation. The input is untuned and the filaments are fed RF through a coupling capacitor. Because this configuration does not present a 50 ohm load, B&W offered impedance matching units for the L-1000-A and L-1001-A (LPA-MU-2) and the LPA-1 (LPA-MU). These allowed better matching to transmitters with fixed 50 ohm output impedances. I have never seen these matching units, other than in pictures, nor have I determined the difference in the two types. Given all the amplifiers are the same electrically, I have no idea why two versions were needed. Perhaps this was a marketing ploy.

On the front panels are five controls - Bandswitch, Amplifier Tuning, Amplifier Loading, Meter Switch and Bias Adjust. A single panel meter displays either plate (actually cathode) or grid current on a single 500 mA scale. Unlike the two '1000' series amplifiers, which have meters that match the beautiful meter in the 5100/B, the LPA-1's square black meter does not match the meter in the 6100. Similarly, the aluminum knobs on the nearly identical amplifiers are the same type as those used on the 5100/B, while the flat black and aluminum LPA-1 knobs differ from those of the 6100. At the rear of the amplifier chassis are two SO-239's (input, output) and a single terminal for the high voltage. On the top rear of the sub-chassis a terminal strip has connections for AC power, bias control and the high voltage return.

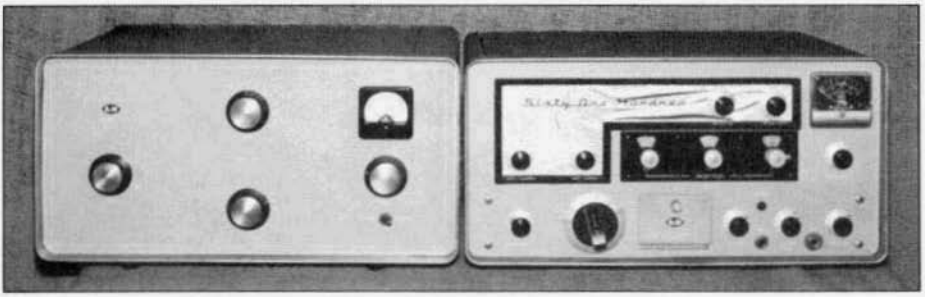
## Power Supply

At first I was disappointed that my L-1001-A did not have a factory power supply. This was before I realized one never existed and before I studied the design of the B&W power supplies. In addition to an input power limitation of 1 KW CW/SSB (peak) or 375 watts AM (2500 volts @ 150 mA), they have other weaknesses, one of which is a bridge rectifier built with 816's. As you may know, these tubes are not the toughest rectifiers on the block nor are they in plentiful supply today. Another shortcoming is the inability to accept 220 volts. While this is not a show stopper, most would agree that 110 volts is not optimum for large power supplies. Last on my complaint list is the use of eight series-wired 80 uF 450V electrolytics instead of a 10 uF (or greater) oil-filled capacitor. Testifying to the power handling disparity between the power supply and the amplifier, the B&W manual states the 813's can operate AM at 625 watts input with an external supply capable of providing 2500 volts @ 250 mA. To do so, and remain below the 813's maximum individual plate dissipation of 125 watts, would require 60% efficiency and perfect balance between the tubes. I won't be trying that with my 813's, fan or no fan!

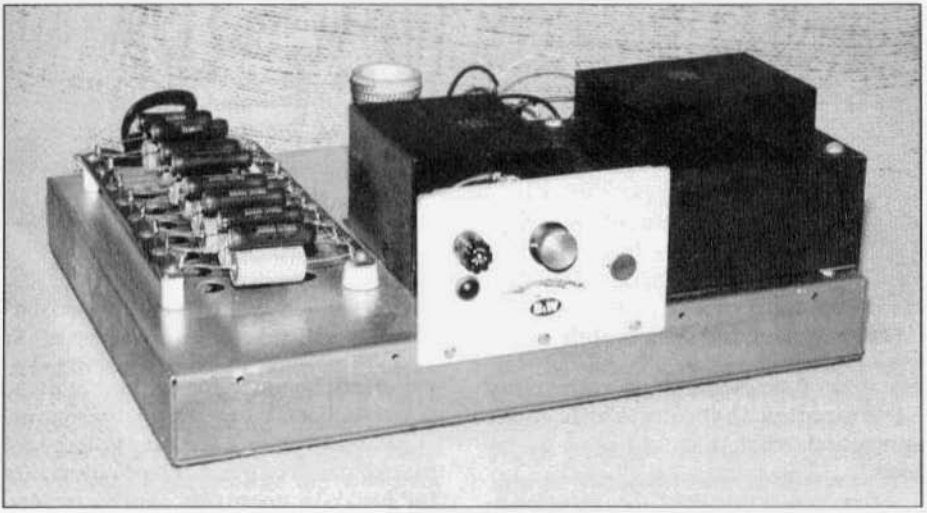
The LPS-1 power supply photographed for the manual and advertising (QST Dec '59) was probably a prototype, for it did not have a fuse holder on the front panel. At first I thought the fuse holder mounted to the left of the 'Off-On-Tune-Operate' switch on my power supply was an addition, however, another photograph in the manual shows a unit with this fuse. Apparently the plan was to mount the fuse on the right, in horizontal alignment with the pilot lamp, because there is a hole punched accordingly in the front panel. Interference with the plate transformer at the right front of the chassis prevents a fuse holder from fitting in this hole. As such, my LPA-1 and the units photographed for the manual have chrome plugs in these holes.

## Restoration

Other than cleaning, lubricating and, perhaps, rebuilding the often rotten 850A tank coil spreaders, there is little to restoring one of these amplifiers. All



**The LPA-1 amplifier shown here with the B&W 6100 transmitter.**



**The LPS-1 power supply with screen-type cover removed.**

my L-1001-A needed was removal of a wasp's nest and DeOxit on the meter switch. My LPA-1 and its LPS-1 power supply had been beautifully restored by a former owner. In doing so, the 816's were replaced with K2AW diodes mounted on a steel plate covering the holes vacated by the mercury vapor rectifiers and their filament transformer.

To improve the reliability of my amplifiers I replaced the selenium rectifiers in the bias supplies with silicon diodes. Before and after voltages were so close (25 and 30 volts) that adding a compensating series resistor was not warranted. A check of the precision shunt and series resistors used in the metering circuits verified that my 40+ year old VOM remains reasonably accurate. To soften the cold start filament current and to reduce the 10.6 volts present on the tube sockets, I added a Keystone CL140 inrush limiter and a 3 ohm wirewound resistor in series with each filament transformer primary. This reduced the filament voltage to 10.2 volts.

## Performance

The elevated filament voltage came as no surprise to me, as I am blessed (?) with a consistent 123 Volts at my QTH. Since the LPS-1 power transformer was designed for a 115 volt supply and tube rectifiers, I expected the high voltage would be a little...high. With the amplifier disconnected, I slowly brought the supply up on a Variac. With the light load of the bleeder (eight 20K ohm



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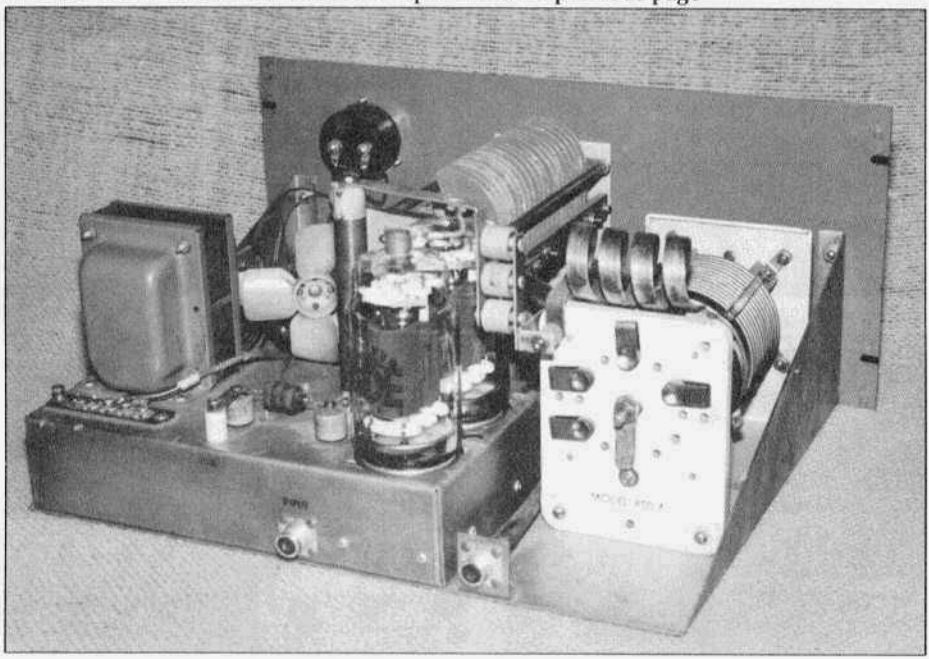

**Rear view of the L-1001-A amplifier.**

equalizing wirewounds in series), my VOM reported 3200 volts, which left me concerned what it would read under load.

After connecting the L-1001-A amplifier, I placed the power supply switch in the 'ON' position, energizing the 813 filaments and the fan. After a suitable warm-up, I placed the power supply in the 'TUNE' position. In this position, the high voltage is activated, but it is limited by a 13 ohm, 1000 watt (no mistake) resistor in series with the plate transformer primary. Moving the switch to the 'OPERATE' position removes this resistor, thus allowing full voltage and current.

In the 'OPERATE' position, with no drive and with the bias potentiometer adjusted to achieve the recommended 40 mA of plate current for AM/SSB, the high voltage dropped to 3000 volts. With any reasonable drive, it further decreased to a reasonably firm 2500 volts, the value the manual said was to be expected. So much for my high voltage concern. For CW operation, the manual suggests adjusting the bias voltage for plate current of 0 mA. Hard cutoff bias for break-in operation can be applied by replacing the jumper on the amplifier's terminal strip with a properly controlled relay contact pair.

On 80 meters, the new Russian 813's in my L-1001-Amplifier easily pumped 650 watts into a Waters dummy load/wattmeter. This power level was achieved at the recommended SSB/CW loading point of 350 mA. Moving up from 80 meters caused no significant reduction in power output except for 10 meters, where 575 watts was the maximum power output attainable. As stated earlier, the B&W power supply limits the AM power level. In this mode, the 813's are to be loaded to only 300 mA. After doing so, the drive must be reduced until 150 mA of plate current is reached. Connecting the power supply to my LPA-1 revealed that its older JAN



continued on page 38

## Air Force 1 and Hallicrafters

**by Jim Riff, K7SC**
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**Scottsdale, AZ 85255**
**RTJV20@email.sps.mot.com**

In the early 1960's, during the height of the cold war, President John F. Kennedy was very concerned about world opinion and the foreign press coverage of his European and Cuban policies. One first hand source that was available to him was the worldwide international shortwave broadcasts, like radio Moscow and the BBC.

On one of President Kennedy's flights to New York City, he ordered one of the secret service agents on board Air Force 1 to go into downtown Manhattan and purchase a good shortwave radio that he could use on his many trips. The flight engineer on the Air Force 1 indicated that the had a back up receiver in the navigators area, a WW II BC-348, that could be piped back to his desk in the rear of the aircraft. Kennedy indicated that he would like to have a set near him that he could use at will. At this time Air Force 1 was a C117 (DC-7B), and was also used as the backup aircraft on the ill-fated Dallas trip. The secret service agent then proceeded into NYC and purchased the best radio available and returned to the aircraft for the return flight to DC.

The service technicians at Andrews AFB were instructed to install the new Hallicrafters SX-62B directly into the president's desk on Air Force 1. A long wire antenna was fitted from the top of the vertical rudder angling down to just behind the cockpit, and 110V ac was wired from the inverter bank back to the SX-62B. The speaker was built into the side panel of the desk, and earphones were sometimes used due to the high engine noise in the cabin.

Figure 1 shows this installation on Air Force 1, a location on the port side of the aircraft and to the right center in the president's desk. The metal case has been removed and the receiver dropped into a cut out on the desk. I am told both Kennedy and Johnson used this receiver frequently during their cross-country flights. Note, that when the president is in the aircraft it is Air Force 1, when the vice president uses the aircraft it is Air Force 2—they are never together on flights. When Johnson took the oath of office in SAM 26000, (B707) after Dallas, it changed during the flight from Air Force 2 to Air Force 1 at that moment. ER

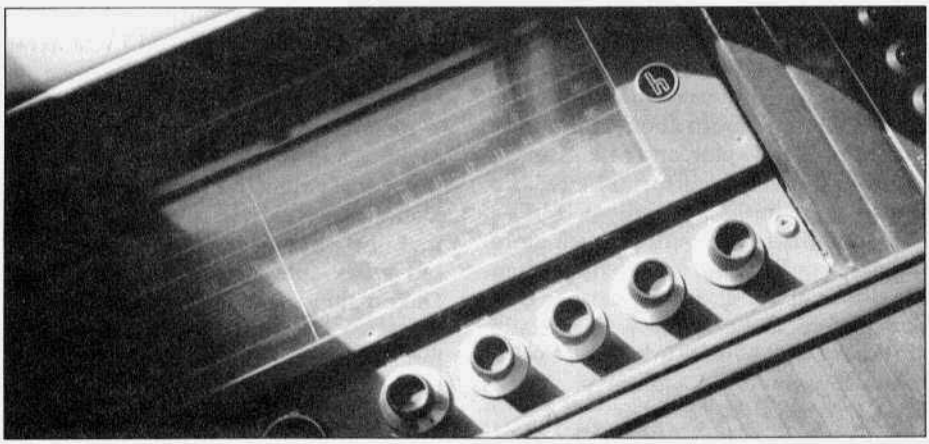

**Figure 1. The Hallicrafters SX-62B communications receiver mounted in Air Force 1.**

# HAARP - Villard Style

**by Chuck Teeters,W4MEW**
**841 Wimbledon Dr.**
**Augusta, GA 30909**

The current High Frequency Active Auroral Research Program, HAARP, is a project involving the ionosphere. Sponsored by the military, and funded partly by other federal agencies, it is an attempt to alter the ionosphere from the earth surface for various purposes. The most interesting aspect of the project is the idea of adjusting the ionosphere to improve radio propagation. The idea of being able to throw a switch and open up 6 or 10 meters to world-wide sky wave propagation certainly is appealing to amateurs.

The idea is not new, as far back as the thirties various theories were advanced on ionospheric control. Even the discoverers of the ionized layers, Kennelly and Heaviside, speculated on artificial influences. The first ham to build and use an amateur single sideband transmitter, Oswald G. (Mike) Villard, Jr. W6QYT, was also involved in ionospheric control. In fact it would be hard to name all the electronic frontiers that Mike opened up to the amateur fraternity.

An example is his article in December 1950 QST on Supermodulation. Mike seems to know more about it than the inventor, R. E. Taylor, and Mike's adaptation of the circuit performs better and is easier to build and adjust. Mike's explanation of the circuit is much more logical than Taylor's. Kind of like when Major Armstrong, Signal Corps, U.S. Army, told DeForest how his triode worked. Don't even think about building a supermod rig, unless you read Mike's article first.

Mike was a professor in the Electrical Engineering Department at Stanford University, Stanford, California. In his electromagnetics classes he taught that ionization can be produced by high energy particle collisions. But to get particles moving that fast, you have to hit them hard. He thought it might be possible with a big bang to stir up the ionosphere.

Mike, with the backing of Stanford, talked the War Department into a propagation experiment. The theory was that a large surface explosion could increase the ionization in the D and E layers of the ionosphere and provide long distance VHF propagation, while blocking MF and HF by ion recombination. The U.S. Navy was interested in the safety of ammunition storage so a joint experiment was planned.

The Navy would stack up 9 million pounds of TNT in three storage bunkers, then set off the one in the middle and see if the ones on either side go off. The Signal Corps was to see what the effect on the ionosphere would be. Somebody had decided that South Dakota needed some excitement, specifically Fort Mead, an old unused cavalry post. We hauled half of Fort Monmouth's test and radio equipment to SD for umteen experiments. We set up ionospheric sounders, VHF and UHF circuits, and one 2300 MHz circuit using our brand new and only AN/PRC-3s. The Signal Corps placed TV cameras to cover the blast, so the Navy could watch from a safe distance.

Results - we blew up 1/3 of South Dakota and $20,000 of our TV equipment, lost half of our radios in the South Dakota's vast snow covered expanses, including our AN/PRC-3s, and found out when they say it's cold in South Dakota they mean it. Propagation wise, there was absolutely no effect on the ionosphere. Incidentally, only the center bunker went off, so the Navy was happy. While it didn't work in 1944, a South Pacific nuclear test explosion in the ionosphere had the desired results



**continued on page 38**

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**Compiled by Don Buska, N9OO**





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**Miscellaneous - Operating**



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**Reviews**

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

# GRC-9 OPERATING NOTES

**Richard Brunner, AA1P**
**10 Brookside Dr.**
**Foxboro, MA 02035**
**richard.brunner@stoneweb.com**

The GRC-9 is an interesting army field set built at the end of WW II to replace the BC-1306—having wider frequency coverage, 2 to 12 Mcs versus 3.8 to 6.5 Mcs for the BC-1306, and also uses all the power supplies and accessories for the BC-1306. It was intended for short-range communication from 10 to 30 miles. It was probably too late for service in WW II but was widely used later by NATO forces, and was given or sold to various friendly countries. It was designed for use in vehicles and on the ground, with provision for feeding a whip antenna, perhaps 15 feet long, a half-wave long wire, and a 50-73 Ohm feed line. Output is 10-15 Watts CW-HI, 5-10 Watts CW-LO, 3-7 Watts AM-HI, 1-2 Watts AM-LO, and about the same on MCW. Output of course varies with input voltage and somewhat with frequency because there is no provision for varying loading.

Note that the transmitter will also cover at least the top 20 Kc of 160M! The receiver will go lower, depending on the model. I have a GRC-9 made by Rauland which tunes down and is calibrated to 1950 Kc and a GRC-9A made by Crosley which tunes down and is calibrated to 1900 Kc.

The tube lineup in the transmitter is a 3A4 oscillator, crystal or VFO, 3A4 doubler, and 2E22 final. There is also a 3A4 used as suppressor modulator and sidetone oscillator. There is internal provision for two FT-243 crystals on each band, the crystals being half the output frequency.

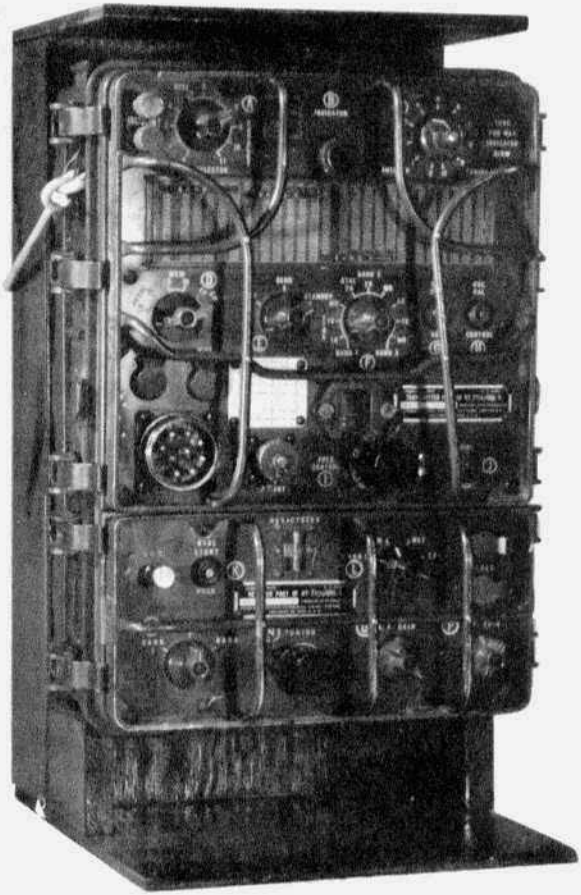
The receiver tube lineup is; 1L4 RF, 1R5 converter, 1L4 1'st IF, 1R5 2'nd IF & crystal oscillator, 1R5 BFO, 1S5 detector and 1'st audio, and 3Q4 audio amp. The 200 Kc crystal oscillator provides calibration markers. The IF is 456 Kc and bandwidth is about 9 Kc, a bit broad by today's standards but AM sounds marvelous, and it is perfectly satisfactory for casual CW operation. The receiver also has a "NET" function permitting zero-beating the transmitter to the receiver. Receiver sensitivity is as good as any receiver of the era, and perfectly satisfactory for Ham operation.

A wide variety of power supplies were used:

GN-58 Hand-Crank Generator
PE-237 Vibrator Power Supply 6, 12, 24 V.
DY-88 Dynamotor Power Supply 6, 12, 24 V.
DY-105 Dynamotor Power Supply 24 V.
PP-327 AC Power Supply 115, 230 V.
PE-162 Gasoline Engine Driven Generator
BA-48 Battery (receiver only)

If you make your own power supply it's probably wise to keep B+ within the intended range of 425 to 580 Volts.

I have been using my GRC-9 on all bands from 160M through 30M with pleasure, and an acceptable signal, for several years, and would like to share my experience in bringing this interesting set back to life. The design includes an interesting set of compromises; it had to operate over a wide voltage range and be operable by indifferent to incompetent personnel without destruction, and was a success. The following



**GRC-9 Transmitter**

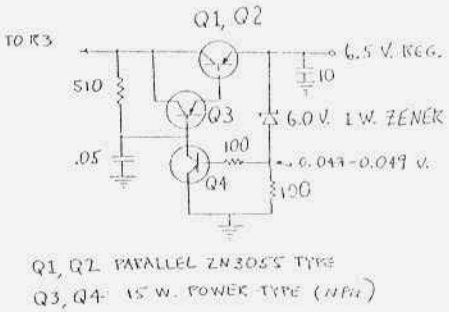



**Fig. 1. 6.5V filament voltage regulator.**

notes delineate the changes necessary to clean it up for use today.

## Chirp Elimination

The first thing the new GRC-9 owner learns is that they all chirp on CW. The higher the frequency the worse the chirp, and on 30M it sounds like the proverbial Sick Canary! This is principally a filament voltage regulation problem. In nearly all power supplies the nominal 6.5 volt filament line is supplied from dropping resistors and ballast tubes from 12 or 24 volts. When testing with the DY-105 power supply, I noticed that the filament voltage went UP 0.3 volts key-down, which was surprising! This happens because the plate current comes through the tube filaments, looking electrically like a resistor from B+ to the filament line, pulling up the filament line voltage. To eliminate this problem:

Substitute a transistor voltage regulator for the ballast tubes. (see Fig. 1). The components can be mounted on a 1/16" x 5" x 7" sheet of aluminum held in place by three of the screws holding the front panel of the DY-105 to the chassis. This change alone reduced chirp to about 100 cycles on 30M. Note that the original filament line voltage is about 7.5 volts at rated voltage, which seems alarmingly high, and slowly drifts as the ballast tubes heat and cool. This was one of the design compromises necessary to assure reliable operation from 28 to 24 volts, and perhaps lower.

The 3A4 filament line requires regulation at 2.8 volts (3.2 maximum). Mount an LM-317T regulator on a small angle bracket and mount it behind relay K102 using the existing hole (Schematic, Fig 2). Remove the two orange wires from the end of R110, leaving it in place. One goes to the selenium rectifier, which we



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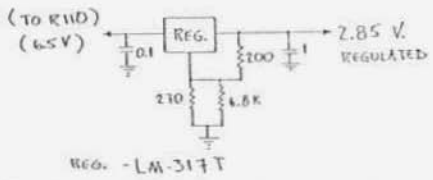


**Fig. 2. 2.8V filament voltage regulator.**

will not use now, so merely tape it. The other orange wire connects to the regulator output. The input to the regulator connects to the other end of R110. This change eliminated all traces of chirp on 30M! There is now a frequency shift of about 50 cycles over a second or so as the dynamotor slows slightly under load, which was heretofore undetectable. This is merely a sign of "Character," and makes it easy to copy.

### Vibrator Replacement

If the vibrator is beyond repair, there is a simple solution: Replace the vibrator with a pair of transistors in a multivibrator oscillator. (See Fig. 3). I used 2N3055 transistors mounted on 2" x 3" heat sinks, which run only perceptibly warm, so smaller components could be used. This circuit is slightly more efficient than a vibrator, and there is no noise leakage to the receiver.

### Replacing the 2E22 Grid Tank Bypass Capacitor C41

If you are unfortunate enough to need replacement of C41, which is inside the T104 can, and is the most inaccessible component in the set, the following procedure, worked out over 6 months of trial and error, is suggested.

* Remove all tubes and put them in a safe place.
* Remove the VFO tuning knob and condenser.
* Unsolder the small RFC from the tank coil.
* Unscrew the standoff insulator from the corner of the T104 can.
* Unbolt the 2E22 shield.
* Push the above components aside to provide "Wiggle Space."
* Remove 4 nuts attaching T104 to the chassis.
* Remove screw on the side of can T104.
* Run the tuning slugs all the way down. This is necessary due to an interference between the slugs and the top mounting screws if the screws are up when you try to remove the coils in Step 11. Pull the can up a bit to allow wiggle space, and remove 6 coil mounting nuts. This isn't easy.
* Push the coil mounting screws inside the can, and gently wiggle it out.
* Replace C41 with a 0.01 µfd. 250 volt Mylar capacitor.
* Make sure the coil mounting bolts are tight and will not rotate.
* For reassembly, make three thin 3/8" ID paper tubes to guide the slugs back into the coils. They may be removed later from the bottom, and if left in place will do no harm.
* Put the can onto the coils with the guidance tubes, wiggle into place on the chassis and attach with 4 nuts.
* Wiggle the coils to get the mounting bolts through the mounting holes. Put nuts on the top bolts only, as the bottom bolts are too inaccessible. Scrunch a length of solder into a nut to hold it, and thread onto the bolt with a small screwdriver. Tighten with a wrench.
* Lineup the bracket supporting C41 inside T104 and attach with a screw in the side of the can. A length of wire with a small hook on the end used to line it up, and to prevent turning, is a big help.
* Retrace steps 1 through 5.
* Retune the transmitter driver stage.

### Power Supply (See Fig. 4)

For authenticity I use a DY-105 28 V. dynamotor power supply, modified as noted. I use a home-brew 24/26/28 volt regulated power supply using the same basic circuit used in the filament supply, but scaled upward. The pass-block is (32) 2N3055 type transistors in parallel, with another 2N3055 type Darlington connected. The pass tran-

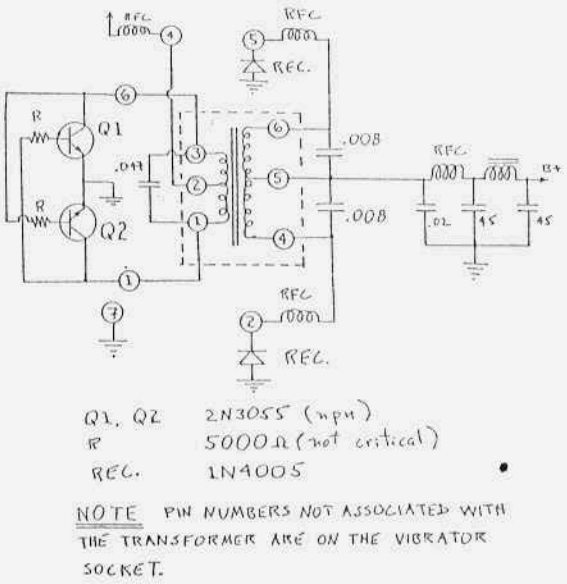


**Fig. 3. Transistor vibrator replacement.**

sistors are mounted 8 per heat sink, with the emitter fuses on an insulation strip attached to the edge of the heat sink. Be sure to use a fuse in each emitter lead. They provide a small amount of bias, but, more important, in event of failure you won't have to break it apart to test each transistor separately. (The voice of experience!) The experts all recommend 0.1 to 0.2 Ohm bias resistors in the emitter circuits to help current division, and 100 Ohm resistors in the base circuits to suppress VHF oscillation. My experience is that it helps, but not enough, and is not necessary. Some of my transistors are working hard and some are hardly working, and the overall result is very satisfactory. It regulates within about 0.05 volt from 0 to 30 Amps.

Small Zener diodes are too fragile for a power supply of this size, so use 10 Watt ones. Zeners vary plus and minus 5% from the nominal marked voltage, so buy a handful and you may get exactly the voltage you want. They can also be series connected with no degradation in regulation. Put the Zeners at the head of the air stream to keep them cool, and the regulated voltage will be very stabile.

Since a significant amount of power can be needlessly dissipated in the pass block, I use a Variac to supply the minimum voltage necessary for regulation.

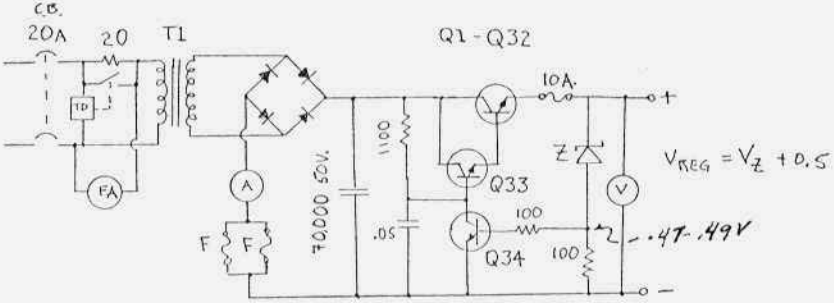


**Fig. 4. Regulated 28V power supply.**



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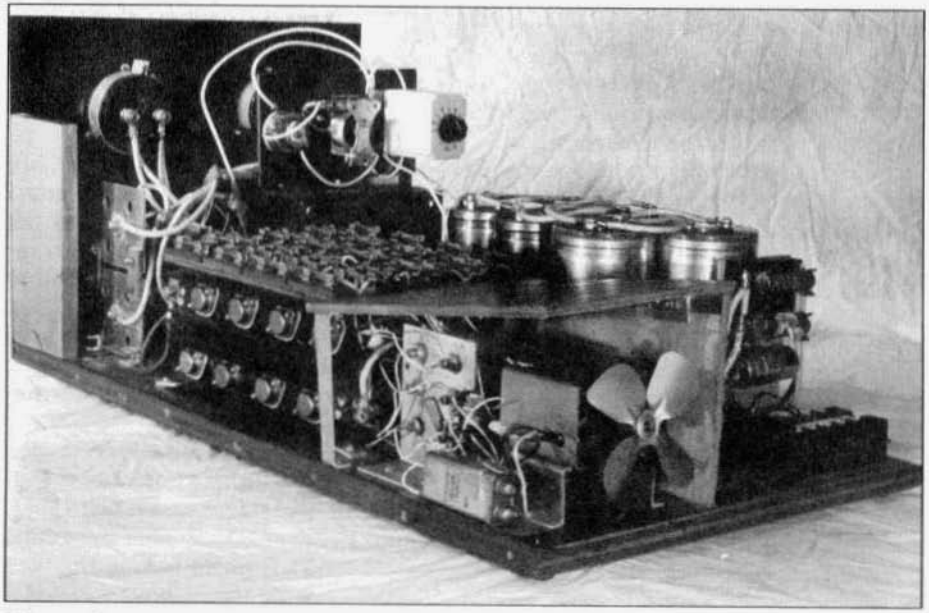
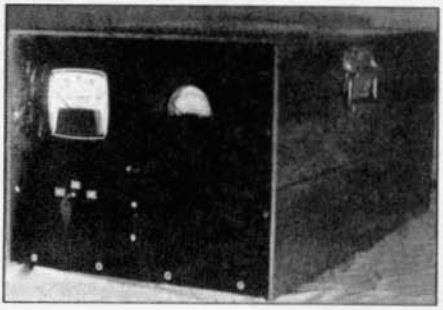


**The author's HB power supply, cover removed.**



**Front view of HB power supply with cover installed.**

## Hi-Z and Lo-Z Output

The GRC-9 is designed to load into:

"Reel" connection, a half-wave long wire.

"Whip" connection, on a vehicle or ground, approximately 15 ft or more.

"Doublet" connection, 50-70 ohm

Suspecting there may have been another compromise, I measured power output to resistive dummy loads.

Conclusion: Exactly the same power output, Reel and Dipole.

## Receiver Modifications

First, replace all those molded 0.01 mfd. paper bypass capacitors. If they haven't failed already, they very soon will. Use ceramic or Mylar.

Replace bias battery BT1 (4.5 Volts) with three 1.5 volt "N" cells (R.S. 23-023) wired in series and taped together. In the chassis space where BT1 was mounted I installed a pin jack for convenient battery voltage measurement in the future.

The filament voltage is regulated by a selenium rectifier, but, as we all know, they age badly and usually end up equally non-conductive in both directions. I ran a curve on the selenium rectifier in the transmitter and it looks like a slightly non-linear 23 ohm resistor! Bridge the selenium rectifier in the receiver with two series silicon power rectifiers in the forward conduction mode. The junction voltage drop is about 0.74 to 0.80 volts, and will give about 0.01 volt regulation which is quite acceptable. (See Fig. 5) The only limitation on this technique is that the regu-

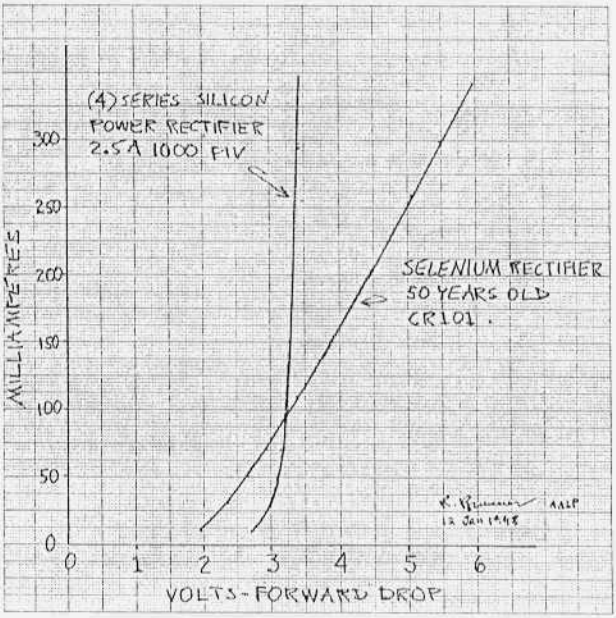



**Fig. 5. Silicon and selenium rectifier volt-amp curves.**

lated voltage must be a multiple of 0.80 volts.

**Conclusion**

The GRC-9, with insignificant easily reversible modifications, is perfectly acceptable for daily use and a pleasure to operate.

Also see the October 1989 Electric Radio for an excellent in-depth technical review on the GRC-9 by Walt Hutchens, KJ4KV. I will see you on 160/80/40/30M with the GRC-9! ER

## Military Radio Collectors Group to Meet in San Luis Obispo, California

The Military Radio Collectors Group (MRCG) is a loose-knit organization of collectors, with no officers, no by-laws and no dues, but we have scheduled our 3rd annual get-together for May 2nd in San Luis Obispo, CA.

We meet at Camp San Luis Obispo where we have lots of space and a campground available at the meeting site.

We'll congregate on Friday evening for a "Field Night" of QSO's using military radios. Saturday morning at 7AM the swap meet begins, followed at 9AM by the day long program of presentations of various military sets, demonstrations, displays, and plenty of time to share and socialize.

Among the military sets for this years program are ARC-5, SCR-284, Wireless Set # 19, TCS, GRC-6, -7, -8 and military entertainment radios.

Lunch will be a Bar-B-Que by a local caterer, or bring your own.

More programs for the day are still being finalized, including Tom Horsfalls' on the restoration of the WW II submarine Pompanito's radio room.

For more information, and to be on the mailing list, contact Andy Miller, KD6TKX, CA, (408) 484-2389. E-mail, amillertkx@aol.com


**Bob Simpson, NØNTC with his vintage gear. He collects military HF equipment.**

**Dave Wood, W4EJ, at his well-equippedwork bench.**

**Venturing into the X-Band from page 15**

comes GHz "goo." Well, that was enough incentive to once again haul out the klystron.

When in doubt, read the manual! I sat down with an old 10-page technical bulletin from Raytheon describing the ins and outs of the 2K25. I studied the graphs and suddenly it hit me as to what I had done wrong. Oh, in the meantime I had acquired a mint Heath-Zenith high voltage lab-type power supply delivering up to +400 VDC and -150 VDC with enough current for a lot of tube "stuff." Following Raytheon's instructions, I applied -100 VDC to the repeller and +300 to the resonator. The 50 microamp meter connected to my detector flickered ever so slightly. Having learned that changing the repeller voltage determines whether or not the tube goes into oscillation, I did just that. Lo and behold with 250 volts on the resonator and drawing 25 mA and -140 VDC on the repeller - success in form of 9,859 Mc out!

Another thing I had learned from careful reading of sundry klystron articles is that these are essentially unstable devices. That was driven home to me almost immediately on powering up mine. Output drifted, unlike my Gunn source with its modest +10 VDC on it is as steady as a rock.

Well, I accomplished what I had set out to do. Where do I go from here? The reality of things is that vacuum tube microwave technology for the amateur, especially klystrons, is impractical if only from the point of view of obtaining the necessary high voltages in the field. The inherent instability of these certainly very old tubes also cannot be discounted. The point of my exercise was, very fundamentally, sheer self satisfaction of waking up those long slumbering tubes of yesteryear. My future path down the microwave road will, probably by necessity, be solid state and +10 volts DC. Don't think for one minute that I am forsaking my beloved vacuum tubes. ER

The author wishes to thank Frank Adams, AE6L; Peter Day, G3PHO; Philip Hejtmanek KF9US; Mike Kana, AA9IL; Ed Munn, W6OYJ; Roy Morgan at NIST, and Stephen Muther, WF6R for their kind and patient assistance with my antiquated approach to millimeter wavelength RF experimentation.

**References**

(1) www.stanford.edu/

(2) "Microwave Building Blocks - 10 GHz", 1988, Chuck Houghton, WB6IGP

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**Because the Wind Blows from page 10**

prowl for more antique radios. (At that time, they were regarded as not much more than old junk). Jack always had a mobile rig in his car and would get into long conversations with his friend, W2ICE, Bruce Kelley.

Well, it wasn't long before I was ready to take my novice exams. Jack gave me the test himself, and I remember waiting for what seemed like forever to receive my license. I would run to the mailbox in anticipation every day after school. It finally came.

I guess the moral of this story is: if the wind had not changed direction that day, long ago, I might not be reading Electric Radio today—I'm glad it did. **Bill, WA8LXJ**

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**Editor's Comments from page 1**

14. Incidentally, the first FD held back on the weekend of June 10/11, 1933, used the same starting and finishing times. All stations participating in VFD must use vintage tube-type equipment, operate CW or AM and fullfill the following, taken from the original 1933 rules, "Only portable stations, actually in the field, away from home addresses are eligible to submit field day scores". QST will have a mention of our VFD in their May issue and I'm asking everyone with a website to help publicize the event. Let's hope this VFD is a big success. N6CSW

**B&W's 813-based Amplifiers from page 24**

RCA's were not so hot. All I could muster from them on 80 meters was about 450 watts. Fortunately I have lots of spares.

## Conclusion

Considering their respectable power output and that 813's are still available, these amplifiers seem a logical choice for anyone needing additional power. They are an obvious choice for owners of their matching transmitters. The rub is finding one. I have no idea of the number built. My L-1001-A has '146' stamped on the bottom of the chassis. Since there is no name plate, I suspect this is the serial number. Similarly, there is no name plate on my LPA-1, but the accompanying power supply has 'Serial Number 99' stamped on its chassis. Although far from a scientific sample, one might assume from these low numbers, coupled with infrequent sightings of these amplifiers at hamfests, that not many of the three flavors were sold. In order to better establish the production quantities, I invite any owners to contact me with their serial numbers.

My thanks go to Tom Taylor N7TM for providing copies of B&W literature that, in part, made this article possible. **ER**

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**HAARP - Villard Style from page 26**

in 1957. It blocked HF propagation for weeks.

Mike and the Stanford team were also vindicated 15 years later when they gassed the ionosphere. This time he talked Army Air Defense Command into shooting some Nike anti-aircraft missiles up with various gases in the war heads. This time it did the job and VHF communications was possible using the artificially inseminated ionosphere, providing you only wanted to talk for 15 minutes. The effects of the gas disappeared rapidly.

As a result of Mike's experiment we set up a nationwide last ditch VHF radio system. When the button was pushed and sent up the missiles, it allowed 15 minutes of communications between the bigwigs in Washington and our ICBM sites. It was supposed to work when every other means was gone. After the successful tests, I always looked for Mike and Ed Tilton, W1HDQ, to have the first trancontinental 2 meter QSO courtesy of an Army missile.

The next time I ran into Mike, he was picking up our two AN/FRT-33s (Continental Electronics 500 KW HF SSB transmitters). Mike and Stanford wanted the transmitters for an ionospheric propagation study. I noticed the Stanford club station, W6YX, did very well in the next few DX contests.

Mike is retired now, living peacefully by the ocean in California. I wonder if his days would be as peaceful if the environmentalists who are waging the war against HAARP had been around when Mike was in his prime. In Hock Veritas Mike. **ER**

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**Letters from page 17**

looked flawless, the tubes checked good, but the overall performance seemed poor, even compared with the entry level receivers in the shack. Many hours were spent checking wiring, testing voltages and resistances and alignment with no improvement. Totally frustrated I sold (more like donated) the receiver. If not for Tom's article, I may have always thought my failute to 'fix' the RX-1 was soley due to a lack of techanical skill!

Please send T-368 info to Bill, KE7KK, 6712 Lake Dr., Grand Forks, ND 58201.
**Bill Kipping, KE7KK**

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**Cleaning Tip**

I recently purchased a D-104 from a heavy smoker. I found that "Twinkle" an anti-tarmish cream from Johnson Wax (about $3) made it look brand new.
**Alex Perschino, WA2BMB**

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## DEADLINE for the MAY Issue: MAY 1

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

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

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

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

**FOR SALE:** Tubes, Penta Labs 811A - $20; 572B - $55; 3-500Z, matched pr - $300; US NOS 811A - $35. Many other US NOS. VISA/MC. Dee, W4PNT VA (800) 755-2365, soundnmind@rica.net

**FOR SALE:** Heath HW-101 w/PS & manuals, nice - $150; S-40B - $35; Johnson #211 tube sockets - $25 a pr. Bernie, WA6HDY, 300 James Way, Arroyo Grande, CA 93420. (805) 481-6558

**FOR SALE:** Reproduction National HRO-60 tuning strips. SASE, call, or e-mail for details. Larry Ware, POB 526, Goldenrod, FL 32733-0526. (407) 679-1597, lrware@pipeline.com

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

**FOR SALE:** Hallicrafters, RME, Gonset, other. Also power supplies, test equipment,VHF/RF amps, more. LASE, Don Jeffrey, POB 1164, Monrovia, CA 91017.

**FOR SALE:** HQ105TR - $75; HW29 (Sixer) - $45; Gonset G-50 - $65. All w/ manual copy. All plus shpg. Jay Budzowski, N3DQU, PA, (724) 654-6275, N3DQU@aol.com

**FREE:** 32KSR and 33ASR teletypes for pickup in Atlanta. **WANTED:** Filter capacitor for 600L. Tom Hoitenga, K8NGV, hoitenga@bellsouth.net

**FOR SALE/TRADE:** Galaxy-V/mk2; Knight/R-100A; PMR-6A/PSR6-12; NC-300; F-237/GRC; TR-68/GRC; R-109; R-110; R-125/GRC. SASE Sam Timberlake, KF4TXQ, POB 161, Dadeville, AL 36853. (205) 825-7305, stimber@lakemartin.net

**TRADE:** RAS-5 coils for HRO coils. **WANTED:** GRC-109; National Type 58805 ps. Carter Elliott, VA, (804) 979-7383.

**FOR SALE:** Spring antenna projects? Insulators, antenna wire, coax, much more. Receive via e-mail the K7FF Super List of parts/equipment. Derek, K7FF, (916)965-4904, <k7ff@inreach.com>

**Hamvention 1998**

The Manual Man will be at SPACES 1960 and 1961. Bring your excess amateur, audio and radio-related manuals to trade, sell, barter, etc. **manualman@juno.com**

**WANTED:** Still collecting early WW II radar equip. & manuals, what have you. Allan H. Weiner, 97 High St., Kennebunk, ME 04043. (207) 985-7547

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

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

**WANTED:** Western Electric aircraft radios, xmtrs pre-WW II. Also Telephonics RS-76 throat mic. James Treherne, 11909 Chapel Rd., Clifton, VA 20124. (703) 830-6272.

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

**WANTED:** Top dollar paid for Winchester Radios and Winchester related items. Donald Daggett 918 Casey Cove Dr. Nokomis, FL 34275. (941) 484-7371, wc2e@webtv.com

**WANTED:** Pwr xfmr for Heath SB300 rcvr. Cliff Fleury, AI7Y, POB 1233 Goldendale, WA 98620. (509) 493-8203, fleury@gorge.net

**WANTED:** Help for repair and others interested in Robot Slow Scan. Ned Winter, K8BZZ, ST RT 53N, Upper Sandusky, OH 43351. (419) 294-1213, hhkk05a@prodigy.com

**WANTED:** 28Q Q-multiplier for Drake 2B rcvr. Doug Knoll, KA9IQA, 1400 4th Circle NE, Waseca, MN 56093. (507)835-8821, dougsterr@juno.com

**WANTED:** 28Q Q-multiplier for Drake 2B rcvr. Doug Knoll, KA9IQA, 1400 4th Circle NE, Waseca, MN 56093. (507)835-8821, dougsterr@juno.com

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

**WANTED:** Info on converting BC-375E xmtr, TU-10-B tuners to ham bands. John P Nelson, NY0Q. Box 610, Nucla, CO 81424. jpnucla@compuserve.com

**WANTED:** Radio Handbook, First Edition, May 1935; Conar 500 80M antenna coil. Lynn Stolz, N8AJ, 428 Hopewell Dr., Powell, OH 43065. (614) 885-5428.

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

**WANTED:** Tektronix memorabilia & promotional literature or catalogs from 1946-1980. James True, N5ARW, POB 13280, Maumelle, AR 72113. (501) 851-8783, FAX 851-8784.

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

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

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

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

**WANTED:** James Millen 90831 modulator. Doc, W9VVN, MN, (218) 586-2952.

**WANTED:** Temco 75GA, or Supreme AF100 xmtr's; Panoramic Radio PCA-2 panoramic display. Robert Perlstein, W1IV, POB 642, Old Orchard Beach, ME 04064. (207) 934-9206, perls@compuserve.com

**WANTED:** BFO coil and hetrodyne xtals for Collins R-388. Cliff, WB4NKL, TN, (423)257-2100. wb4nkl@juno.com

**WANTED:** 80 HDVL in exc condx. Charles East, (505) 824-2155, ceast@elpasonet.net

**WANTED:** Ceramic Mic for Heath Lunchbox xcvrs. Bob, K6GKU, AZ, (602) 816-0660 ctxp98a@Prodigy.com

**WANTED:** Collins 500 or 800 Hz and 6MHz 75A-4 filters; 200 Hz and 6Mz 75S-3B/C filters. Carl Constanten, CA, (310) 542-9906, corvar@aol.com

**WANTED:** Automatic QSK antenna relay like B&W 308B or Johnson; schematic & documentation for Bud Codemaster. Tom Mackie, W2ILA, 14 Washington St., Jamestown, RI 02835. (401) 423-2474, wilax@aol.com

**WANTED:** RCA AVR 20A rcvr; RCA AR-88 rcvr; Harvey-Wells T90 xmtr; APS90 pwr sply. Mel Stoller, K2AOQ, 100 Stockton Ln., Rochester, NY 14625-1233. (716) 671-0776

**WANTED:** UTC A10, 11, 12 xfmrs; manuals or circuit diagrams of waveforms Signal Generator mod 510B. Fenton Wood, 109 Shoreline Dr., Star Harbor, Malakoff, TX 75148. (903) 489-0204

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

**NOTICE:** Central Wisconsin Radio Amateur Swapfest-Auction Sunday June 7, 1998, Junction City, Wisc. Featuring both big and small dealers. Tailgaters welcome. Contact John, W9JN, (715) 457-2506, jfw9jn@tznet.com

**FOR SALE:** Seth Thomas 24 hr. clock, 10" dia. 120 VAC, $15; Bud xtal calibrator, 120 VAC - $5; more. Roy Kramer, W3ZIF, 740 S. Carlton St., Allentown, PA 18103. (610) 797-9406, w3zif@enter.net

**FOR SALE:** Tubes, Penta Labs 811A - $18; 572B - $55; 3-500Z, matched pr - $300; US NOS 811A - $35. Many other US NOS. VISA/MC. Dee, W4PNT, VA, (540) 249-3161, soundnmind@rica.net

**FOR SALE:** Heath SB-201 linear amp, GC w/ manual, will trade for Johnson or Heath AM xmtr, P/U preferred. Marvin Fortune 2957 Gaffney Road Richmond, VA 23237-3551. (804)275-1252, wa4top@juno.com

**FOR SALE:** QST 1927- present; also NC-300, missing some tubes. Make offer, u-ship/pickup. Don, WA, (360) 834-1024 W6JL@e-z.net

**FOR SALE:** Browning WWV standard freq calibrator model RH10 - $75; Johnson 6N2 - $90. V. Field, W2OQI, NY, (516)878-1591, wreck_and_rescue@juno.com

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

**FOR SALE:** National spkr w/internal audio amp and pwr sply - $50. **WANTED:** Command set rcvrs. Dave, W1DWZ, MA, (508) 378-3619, w1dwz@juno.com

**FOR SALE:** 500KHz, USB, LSB, 2.7KHz 5151 filters - $35 ea. **WANTED:** Hallicrafters HA-20, SR400A, possible trades. John Hurst, KU6X, 2512 Euclid Crescent E., Upland, CA, 91784, (909) 981-6759, hurstjsj@gte.net

**FOR SALE:** First issue Ham Radio magazine, March 1968 - $20, pp. J. J. DeSousa, Jr., 29 Whiting St., Plymouth, MA 02360. (508) 746-6533

**HELP:** Lost coils for my Millen 90615 dip meter! Will buy defunct unit for coils. Wes, W5DPM, 1950 Chevelle Dr., Baton Rouge, LA 70806.

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

**FOR SALE:** Rare Collector's item, W.C. Field 'Red Nose' battery tester NOS - $22, ppd. S.T. Carter II, W4NHC, 680 Fernwood Dr., Melbourne, FL 32904-1995. (407) 727-3015

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

**FOR SALE:** New reproduction HQ129-X panels - $53, ppd. Ron Hankins, KK4PK, 555 Seminole Woods Blvd., Geneva, FL 32732. (407) 349-9150, rh8421@usa.net; www.gate.net/~rh8421/radio/html

**FOR SALE:** Telefunken E863 KW/2 HF rcvr, 2-30MHz, Nixie digital, good, working - $400; Telefunken E1500 rcvr, 0.5-30 MHz, Digital, good working but motorboating - $300; German version of Drake RR-2 rcvr, DEBEG 7220 rcvr, a tag of "Designed and manufactured by R.L.Drake CO." on rear chasis, Good, working, slight hum - $350. Dong-HyunCho, HL2DDK, Biology Department, Kang Won National University, Chun Chon 200-701, South Korea, dhcho@cc.kangwon.ac.kr

**FOR SALE:** 75A4, filter 3.1, ser#056, VGC -$750; Ranger, VGC - $200; Viking Valiant, VGC - $350. Bill, K6DUY, Alamo, CA, (510) 820-6966, hinterland@juno.com

**FOR SALE:** New 5894 tubes - $15 ea. **WANTED:** KWM-380 parts radio or 380 parts. Fred, W6YM, CA, (209) 296-5990, fhonnold@juno.com

**FOR SALE:** URM25E with cover, $100, U ship. Ed, N5BFW, TX, (817) 788-5256, ecuevas@juno.com

**FOR SALE:** The elusive 6DC6 tube now available! Philips/Sylvania (U.S.) mfg., NIB - $2.75 ea.; 6AZ8 - $3 ea.; 5749/6BA6W, 5750/6BE6W - $1 ea. Lowell Thomas, K6KC, POB 15026, Fresno CA 93702. (209) 227-1605, k6kc@lightspeed.net

**FOR SALE:** Xmtr rcvr clones by Eldico, no ps for TX, books - $300. Tom Berry, K9ZVE, 1617 W. Highland, Chicago, IL 60660. (773) 262-5360 or 262-0016.

**FOR SALE:** Hallicrafters HA-1 keyer, nice condx; Hallicrafters S-41-G rcvr, good condx, works! Fred Clinger, OH, (419) 468-6117 after 6 PM Eastern

**FOR SALE:** Heath SB-401 - $100 or BO; 1930's mic - $50; Heath Ham Radio Guide - $22.95; Heath T-Shirts - $18, state size. Marty, NJ, (609) 466-4519.

**FOR SALE:** Esterline Angus Universal current xfmr 2:1 to 160:1 ratios - $10 + shpg. Allan Lurie, W9KCB, 605 E. Armstrong Ave., Peoria, IL 61603. (309) 682-1674

**FOR SALE:** Heath Chippewa amplifier w/HB pwr sply, not pretty, but restorable - $350, w/wout sply, pictures available to serious buyers; Johnson KW tuner, near mint - $275; Hallicrafters R42 spkr - $100. All + shpg; ARRL handbooks & other stuff, LSASE for list. WA7IHN, POB 442, Aumsville, OR 97325. (503) 749-1149

**FOR SALE:** Pristine KWS-1 - $2600; w/75A4 - $3200, OBO. Len, NY, (718) 745-0048

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

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

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

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

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

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

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

**FOR SWAP:** Hallicrafters SX100; Hallicrafters 12" spkr, early winged logo; TCS12 ant tuner; HT40; Grebe CR5; Green Atwater Kent breadboard; WWI xtal set; keys, etc. Looking to swap for audio xfmrs, tubes, sockets, amps, etc by ADC, IPC, UTC, Peerless, Altec, ESP Western Electric. Michael Payne, 803 S. Taylor, Alvin, TX 77511. (281) 331-9217, fx 585-2727.

**FOR SALE:** Attn Globe King owners, free copy of orig 5514 data sheets, send SASE. Don Markl, KI5DT, 3205 Northridge Dr., Sherman, TX 75090.

**FOR SALE:** R390A, looks & works good - $325; HQ170, works - $95; SRR13A w/manual, unchecked - $75; FRR23, unchecked - $50; ICOM R7000 service manual - $35. + shpg from VA. Dave Metz, VA, (540) 885-7914 eves till 10 PM EST. metzd@cfw.com

**FOR SALE:** Swan 350, exc - $275. **WANTED:** Johnson Invader 200 & Central Electronics 600L amp. Robert Braza, N1PRS, 23 Harvard St., Pawtucket, RI 02860. (401) 723-1603.

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

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

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

**FOR SALE:** Globe King 500C; Viking Valiant; Viking Ranger; Heath DX-100B; Hammarlund HQ-180AC; Gates BC1G AM broadcast 1kw xmtr; Collins 32V2; CBS Volumax 4300 peak limiter; CBS Audimax I & II automatic level controllers; Urel BL-40 limiter; RCA BW-66F AM modualtion monitor; Gates MO-2639 modulation monitor; disassembled Gates 250-GY xmtr; B & K 700 tube tester; QST magazines from 1940's to present; many CQ's & Ham Radio magazines; will sell individually or as a pkge. Charles Frodsham, KØAYS, POB 7, Beloit, KS 67420. (785) 738-6538.

**FOR SALE:** Heathkits: Volt-Ohm-Meter IM-11 - $20; mobile DC pwr spy, HP-13B - $45. Frank S. Law, W8SET, 1 Wildacre Rd., Charleston, WV 25314. (304) 343-0415.

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

**FOR SALE:** Astatic model 335H mic - $25; Stromberg Carlson model SAU-70 mono amp - $60; Harmon Kardon AM/FM stereo tuner, 16 tubes - $60; Customusic loop tape player model CTC-60 - $75; Delco table model R1140 - $65; RCA table model 125A - $140; Majestic console model 2C60 - $165. All work. Philco table model 41-95 (battery) untested - $50; Mopar 6V auto radio model 606, works but needs vibrator - $45. Shpg extra. Upon written inquiry I will give detailed description listing scratches, missing knob or other imperfection, etc. E.P.Hayes, WØJFN, 3109 N. Douglas Ave., Loveland, CO 80538-2548.

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

**FOR TRADE:** Manuals for Hallicrafters, Hammarlund, National, Globe/WRL, Heath, Allied/Knight, Johnson Viking, Elmac, Gonset, EICO, B&W, RME, Conar, B&K, Harvey Wells, Morrow, Lafayette, Mosley, Drake, Regency, Ameco, Clegg, Genave, Utica, Polycomm, Pierson, Davco, Archer/Realistic, Subraco, RCA, Simpson, Triplett, HP, Superior, Swan, Howard, Echophone, Millen, McMurdo Silver, Paco, Precision & others. What do you need? What do you have?. SASE. N4AQ, POB 690398, Orlando, FL 32869-0098. (407) 351-5536.

**FOR SALE:** Galena xtal radios or parts, super sensitive, selective. Len Gardner, 458 Two Mile Rd., Tonawanda, NY 14150. (716) 873-0447.

**FOR SALE:** 75A-4 MHz drum decals, 20.5 or 20.8 MHz (you specify), buff color, install instructions - $8.50 ppd. W3HM, Rt 3 Box 712, Harpers Ferry, WV 25425

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

**FOR SALE:** Hammarlund HQ145A - $165; Heath tube tester TC-2 - $25. Ed Sauer, KC9SP, 787 N. Peterman Rd., Greenwood, IN 46142.

**FOR SALE:** Collins KWM-2A PM2 mods - $575; Globe Scout Deluxe parts unit - $20; freq counter - $40. John, KF7OM, POB 3548, Pahrump, NV 89041. (702) 727-8171

**FOR SALE:** Globe Chief, WRL 755 VFO, use weekly, works well, pair + tuner - $300. Jim, ND, (701) 852-4809 eves

**FOR SALE:** Heathkits: HD1410 keyer; AM-2 bridge; HRA-10-1 cal; HD10 keyer; CR-1 xtal rcvr; Yaesu SP101-PB phone patch; Astatic D104 mic. Mike Smaga, N1GVX, 22 Old Smugglers Rd., Branford, CT 06405. (203) 488-0197 eves.

**FOR SALE:** Collins, CE, Eldico, keys & more. Send SASE for list. PU, see at Dayton, Space 3352. Bob, WB2FOF, 23 Daniluk Dr., Camillus, NY 13031.

**FOR SALE:** National HRO500; Hammarlund HQ180AC; Heath DX60/HG10; Harris RF 590. All exc w/manuals. Doug, KG8JT, OH, (937) 335-1300

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

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

**FOR SALE:** R-390A Repro nameplates - $9 shpd. N5OFF, 111 Destiny, Lafayette, LA 70506. trinit698@idt.net, (318) 989-3430

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

**FOR SALE:** Heath complete 1960s operating AM-CW station; DX-60B, HR-10B, TR relay, manuals - $160. Sam Hevener, W8KBF, 3583 Everett Rd., Richfield, OH 44286-9723. (330) 659-3244

**FOR SALE:** RME 6900 & 6901 spkr - $350; Johnson 275W Matchbox - $100; National NC-303 - $200. Ron, K1BW, MA, (413) 538-7861

**FOR SALE:** Heath HW-7 QRP xcvr, very clean - $95. Ben, W6FDU, CA, (408) 374-0372

**FOR SALE:** Variac General Radio 200B, 3 amp w/ knob + 150 voltmeter - $20. Mervyn Ellsworth, 2309 N 25 St., Boise, ID 83702. (208) 345-6878

**FOR SALE:** Viking 2 & 122VFD; HQ-120X; HT32; SP-600 RF deck. W7RBF, AZ, (602) 864-9987

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

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

**WANTED:** BC348, EH Scott rcvrs only in very good condx. EA4JL, contact in the States, Kurt Keller, CT, (203) 431-6850

**WANTED:** Relay for National NCX-3 & spring for J-47 key. Howard Mintz, WA1CFX, 47 Goldsmith St., Jamaica Plain, MA 02130. (617) 522-8142

**WANTED:** Modulation xfmr for Globe 300. Bill Rieke, 1440 E. Melrose, Cleveland, OH 44145. (440) 333-6644, rieke@lerc.nasa.gov

**WANTED:** AR-88, CR-88, CR-91, junker or parts set w/manual. David Boardman, 10 Lemaistre, Sainte-Foy, Quebec G2G 1B4. (418) 877-1316

**WANTED:** Carrier control relay for Collins 32V3, part nr 970 1014 00, would trade Collins MM1 mobile mic or pay cash, also want a Johnson Viking Navigator. Dick Dixon, W7QZO, 16032 Lost Coyote Ln., Mitchell, OR 97750. (541) 462-3078

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

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

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

**WANTED:** Nixie tubes, National Electronics NL9055, NL5859CS, or Burroughs B5859S. Jim Clifford, KE4DSP, 108 Bayfield Dr., Brandon, FL 33511. (813) 654-7531. j.c.clifford@juno.com

**WANTED:** EV638/641; Astatic UT-38, 820, JT-30/40, T-3; Shure 54PE/54SS, CR81/80; Turner BX/CX. Tom Ellis, Box 140093, Dallas, TX 75214. (214) 328-3225, Fax 328-4217, tomsmics@flescomp.com

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

**WANTED:** RCA AR-88 or CR-88, etc.; R390A. Robert Harding, KC5LHR, 1321 Monte Largo Dr NE, Albuquerque, NM 87112. (505) 291-0950, robert.harding@abq.com

**FOR SALE:** Join SPAM, the Society for Promotion of AM. Learn about Advanced Modulation Certificate, Circuits - $1 plus large SASE 3 stamps. W4CJL, 202 Baker Dr., Florence, AL 35630

**FOR SALE:** SCR 624B UHF radio set unused in two metal trunks complete, will sell as complete unit or seperate radio & pwr sply + controls. Call or write for info. Robert Martin, 111 Bancroft Dr., Rochester, NY 14616. (716) 663-4182

**FOR SALE:** National SW-54; Lafayette KT-200. **WANTED:** Hallicrafters SX-28 or SX-28A or SX-32. Gerald E. Perkins, RFD#2 Box 34, Milo, ME 04463-9605. (207) 943-8742

**FOR SALE:** Collins 75A1 rack mount - $195; CE 200V xmtr rack mount - $350; 75A4 3.1 kHz filter - $125; National NCX-3 xcvr - $175; S-86 - $75; scope OS-8E/U - $40; TEK scope manuals, 556 - $35; 2430 - $25. U-shp. Keith, 384 S. 48th St., Springfield, OR 97478. (541) 726-1512 after 6 PM

**FOR SALE:** Sonar model E - $35; Karrphone TR333 - $45. **WANTED:** National NCX5 parts/parts rig. Bill, KE7KK, 6712 Lake Dr., Grand Forks, ND 58201. (701) 772-6531

**FOR SALE:** Hammarlund HQ110C w/manual - $100 + shpg. Jim, W8HPL, OH, (740) 927-2592

**FOR SALE/TRADE:** For keys: Tektronix P6137 10X 400 MHz, passive probe (2400 series scopes), new, sealed package. Robert, CO, (303) 988-2089, 6-9 PM mtn

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

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

**FOR SALE:** Turner 1.0-Z dynamic, model 253 mic, unchecked - $25; toy mic, rough - $10; several xmtg tubes, unchecked for display - $10 ea; NIB Centrala lever switches - $10 ea. James Fred, 5355 S. 275 W., Cutler, IN 46920.

**FOR SALE:** If there is enough interest we will manufacture replica National S-101 audio chokes. James Fred, 5355 S. 275 W., Cutler, IN 46920.

**FOR SALE:** Drake R-4B, manual (copy) - $125. Mark S. Rauber, POB 1077, Minden, NV 89423. (702) 782-3596, eves

**FOR SALE:** RBB, RBC rcvrs, pwr sply, cables, manuals - $250, PU only. James Owens, NW0O, 1363 Tipperary St., Boulder, CO 80303. (303) 673-9019

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

**FOR SALE:** Ham, antique, military, & test equioment. #10 SASE for list. **WANTED:** HTX-100. Dave Mantor, W9OCM, POB 1, Fairmount, IN 46928-0001. (765) 948-3781

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

**WANTED:** Military sets WS #29 Canadian A set; US DAS-2 Loran rcvr-indicator. Leroy Sparks, W6SYC, 924 W. McFadden Ave., Santa Ana, CA 92707-1114. (714) 540-8123

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

**WANTED:** National SW-3 model 1, 2 volt version; Taylor 203Z, T-21 tubes. Dean Showalter, W5PJR, 72 Buckboard Rd., Tijeras, NM 87059. (505) 286-1370

**WANTED:** R-901/GR rcvr; #48 key; manual for Navy DF-12 rcvr. Tom Brent, Box 1552, Sumas, WA 98295-1552. (604) 826-4051

**WANTED:** KWM-1 w/516F-1, 312B-1, SM-1, TRX should be working, orig & exc condx. Takashi Doi, 1-21-4, Minamidai, Seyaku, Yokohama, 246 Japan. Fax 011-8145-301-8069. taka-doi@kk.iij4u.or.jp

**WANTED:** Information-WW2 TCS Radio System: Design, Manufacturing & Operation for article. Any help appreciated. Thanks. Greg Greenwood, WB6FZH, POB 1325, Weaverville, CA 96093. (707) 523-9122 (message) greg6fzh6@aol.com

**WANTED:** CB radio equip. I am looking for all types of old/vintage CB radio, amps. manuals, magazines, mics etc. Walter, CA, (818) 297-7249

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

**WANTED:** Hammarlund SP600-VLF rcvr. Harry Weber, 4845 W. 107th St., Oak Lawn, IL 60453-5252.

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



**WANTED:** Huge Navy equipment: shipboard & shore radio, radar, & sonar, mint thru junkers. William Donzelli, 304 S. Chester Ave., Park Ridge, IL 60068. (847) 825-2630, integra@usr.com

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

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

**WANTED:** Globe King 500, A, B or C xmtrs, any condx., reasonably priced. Terry Collins, KB9AUP, 18 N. Tomahawk Ave., Tomahawk, WI 54487. (715) 453-3707 d, 453-4633 eves

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

**WANTED:** Cash for Collins: SM-1, 2, 3; 312A-1, 2; 55G-1; 625-1; 399C-1; 51S-1; 302C-3; KWM-1; KWM-380; also buy estates. Leo, KJ6HI, CA. Ph/Fax (310) 670-6969.

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

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

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

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

**WANTED:** PRC-34 or 36; CX-4655/GRC cable for PRC-25; TM11-6130-232-12P or copy. Bruce Haffner, WD9GHK, 8515 W. 165 PL., Tinley Pk, IL 60477. (708) 614-6134, haffner@mcs.net

**WANTED:** Atwater Kent cabinet mount type F-4 spkr for model 55-C radio. Pat Stewart, W7GVC, 1404 Ruth Ave., Walla Walla, WA 99362-3558. (509) 525-1699

**WANTED:** Matching spkr for Hammarlund HQ-150 rcvr, also "A" coil for National HRO-60. Winston Burt, N1WNB, 185 N. Poland Rd., Conway, MA 01341. (413) 369-4469

**WANTED:** Manual or copy for General Radio RC oscillator 1210-C & pwr sply 1203-B. Walter Opdycke, 18001 Bell Creek Ln., Livonia, MI 48152. (734) 421-6888

# R-390A Components

**RF & xtal deck - $75**
**audio deck - $50**
**IF deck - $65**
**power supply - $20**
**PTO - $45**
**complete knob sets - $10**

**Complete units available minus top and bottom cover, minus some tubes & without meters - $125, 5 or more units - $100 each**

**George Rancourt, K1ANX,**
**82 White Loaf Rd.,**
**Southampton, MA 01073.**
**(413) 527-4304**

**FOR SALE:** Receiver collection: 50 Hallicrafters; several National; Hammarlund; Zenith TO 2700 new; 4000 used tubes; bound QST 1931-1938; NIB BC611 - $350; new Collins filters; new ICOM service manuals up to 70% off & more, lge SASE for list. RF Radio, POB 8681, Reston, VA 20195.

**FOR SALE:** Stancor A3894 125W Universal modulation xfmr w/impedance ratio table - $95, ppd US. Joel Ekstrom, W1UGX, MD, (301) 469-6562.

**FOR SALE:** "Electronic Designers Handbook" by Landee, Davis, Albrecht - $10 ppd. R.J. Eastwick, N2AWC, 224 Chestnut St., Haddonfield, NJ 08033. (609) 429-2477.

**FOR SALE:** Drake TR4C, MS3 spkr/ACPS, RV-3 remote VFO - $500; Bird dual line coupler - $85; BC1031A Panoramic adaptor - $125. Parker, W1YG, 87 Cove Rd., Lyme, CT 06371.

**FOR SALE:** Hallicrafters HT-18 VFO- $75; Hallicrafters HT-7 Frequency Standard - $25; Hallicrafters SR-75 coil set - $25. Globe LA-1 linear amplifier - $200; Military PRM-10 GDO - $85; B&W 600 GDO - $50; Lafayette GDO - $45; Meissner Frequency Standard 9-1073 - $75. Norbert C. Wokasch, WA0KJE, 3312 W. Bijou, Colorado Springs, CO 80904. (719) 633-5661.

**FOR SALE:** Repair & restoration, tube & transistor vintage radio. FCC licensed. Mike Zaccaro, 8795 Corvus PL, San Diego, CA 92126. (619) 271-8294.

**FOR SALE:** Hammarlund HQ-129X & Collins 32V3 w/manuals - $595. PU only. Chuck Klawitter, W9VZR, WI. (414) 962-9366 or cokwfb@juno.com.

**FOR SALE:** Simpsom 260 VOM plug-ins, transistor tester, milliohmeter - $15 ea; more, list - $1. Joe Orgnero, VE6RST, Box 32 Site 7 SS1, Calgary, AB T2M 4N3 Canada. (403) 239-0489.

**FOR SALE:** EICO 720 - $125; EICO 730 - $125; HRO-60 rcvr w/3 coils - $400; amp sply LA-1000 linear - $400. All in good condx, w/manuals, shpg extra. Greg Richardson, WA8JPC, POB 405, Gallipolis Ferry, WV 25515.

**FOR SALE:** Elmac A-54 xmtr - $50; radio & electronic books. SASE for list. Gary Cain, POB 521, Shakopee, MN 55379.

**FOR SALE:** Collins 20V-3 AM broadcast xmtr - $1200. Dan Mason, RRT 1 Box 204F, Santa Fe, NM 87501. (505) 455-3416.

**FOR SALE:** Knight T-150A - $145; HQ180AC, needs work - $175; Millen 3 kw transmatch - $250; free list. Richard Prester, 131 Ridge Rd., W. Milford, NJ 07480. (973) 728-2454.

**NOTICE:** Watch Radio Finder web site http://www.radiofinder.com for new listings of old keys and bugs, including a 1920 Vibroplex, an old McElroy and plenty more. Old QSTs, CQs, and Radio magazines now are part of the web catalog plus many old Handbooks and other radio publications.

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**FOR SALE/TRADE:** KWM-1 plugs & sockets; brand new DPA-24HV2-33S-2 plug, DPA-24HV2-34P-2 socket. **WANTED:** 51S-1 T4 600 ohm, part No 667-0522-00; 5 sided skirted Rejection tuning knob; PTO locking lever; 75A-4 small bakelite cylindrical spinner; knob for 4:1 pto knob; KWM-1 main tuning knob; xtal drawer dust cover; 75S-3C 200 Hz xtal filter. Steve Darveniza, 20 Scott Rd., Herston Brisbane, Australia 4006. phone/fax 61 7 38562543

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**FOR SALE/TRADE:** R-390A, avg condx - $275; Apache, needs work on 75, avg condx - $100; will trade for mill type equipment EI T-631/GRC-14, ART-13, BC-344, BC-342, R-648/ARR-14, ATC, RBL, TCS, etc. **WANTED:** Surplus schematics handbook, schematic or manual for Konei Radio Telephone model KR-105SB. Ronnie, N1UDI, CT, (203) 371-6691

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**FOR SALE:** BC-906, absorption type radar frequency meter, schematic - $20. shpg included for USA. Louis L. D'Antuono, 8802 Ridge Blvd., Brooklyn, NY 11209. (718) 748-9612

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**FOR SALE:** 3-500Z linear amplifier w/separate pwr sply, beautifully built - $100 + packing & shpg. George Shute, W4BDG, 2910 Virginia St. NE, Albuquerque, NM 87110. (505) 298-7347

**NEW FROM VINTAGE RADIO KIT FOR 1998**
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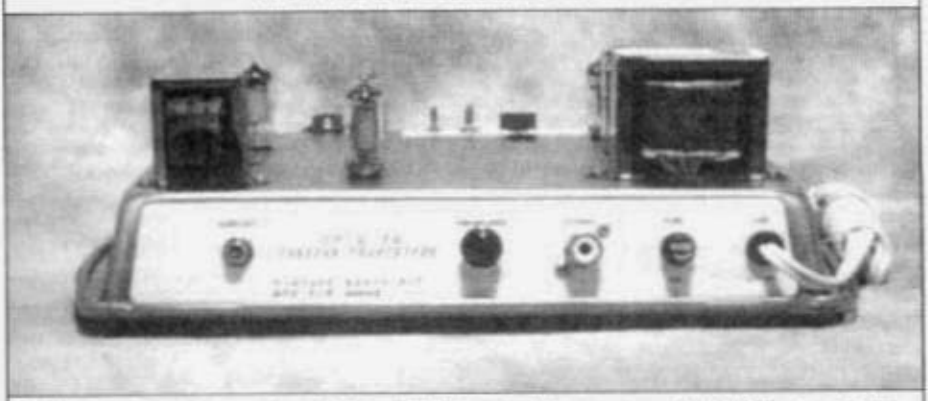
**HF TRANSCEIVER KIT**
**CW, AM FONE, FULL QSK, SOLID 5 WATTS OUTPUT**
**160 THRU 40 (30 METERS OPTIONAL)**



**With a handful of crystals and a headfull of nostalgia, you can still feel the warm glow of old time radio at your finger tips. For more information and a spec sheet on the new CPTR send for the new expanded 1998 catalog showing more kits and fun projects. Please enclose $1.50 or a 9x12 self-addressed envelope with $1 for postage for the new Vintage Radio Kit 1998 catalog. Vintage Radio Kit, 427 North Main St., Sharon, MA 02067. 781-784-0847, cpcw5@aol.com, Website @mnsinc.com/bry/vintage.htm**

**FOR SALE:** Free! QST's for years '90 thru '94, '96, in binders, to anyone paying shpg costs. Bill Riley, W7EXB, 863 W. 38th Ave., Eugene, OR 97405-2375. (541) 345-2169

**FOR SALE:** Tube list, new & used, wide variety audio, ham. Recently expanded. SASE 52¢. Bill McCombs, WB0WNQ, 10532 Bartlett Ct., Wichita, KS 67212-1212.

**FOR SALE:** Homebrew amplifier, ex-K4ENQ(SK) in Premier 36" cabinet, appears complete & like new w/paperwork, utilizes 2 8802/3-500Z, 10-75 meters, (+MARS), SSB output 2400 watts, 4500 watts (PEP), 100 watt exciter required. PU or truck freight - $300. May take military TMs on trade on radios preferred, other subjects too. Military Marketing, Inc., POB 741, Norcross, GA 30091-0741. (770) 729-9315

**FOR SALE:** Fisher SA300B tube amp. **WANTED:** UTC CG-16 round gray tranny; Hallicrafters tube amp; other tube amps. Robert, (815) 226-6123 rbtr@snds.com

**FOR SALE:** Yaesu FTDX-560 80-10 meters, needs work - $175; Tram D-201A, manual, D-104 mic, nice shape - $375; Ham III rotor & control box, clean & VGC - $175; Heath HP-1144 pwr xfmr - $30. All items, U-ship. **WANTED:** L4-B amplifier working or not. Dan Langston, KO4RA, (912) 453-9066

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

**FOR SALE:** Swan 500X, new finals, exc, pwr sply/spkr, mic, RF output meter and manualcopy - $400. W7MXM, ID, (208) 522-5854, w7mxm@juno.com

**FOR SALE:** RME 6900 - $275; Hallicrafter's PM-23 spkr - $90; Hammarlund HQ-129X - $147; Vibroplex Champion bug, 1950 - $135; Tecraft Model C3/21 converter - $35; GSB-100 parts unit - $60; Gonset Communicator II 2m - $49. Shpg included. Larry Wright, N4QY, 170 Heritage Ln., Salisbury, NC 28147. (704) 633-3881

**FOR SALE:** 2 pcs Collins 75A4, 1 pc spkr, manual, 6pcs filters - $175; 19 pcs modulaiton xfmrs - $400; write for list; 30 pcs orig Collins, books, manuals, paper - BO. V. Vogt, 2311 Pimmit Dr. #114E, Falls Church, VA 22043. (540) 856-8277

**FOR SALE:** Hallicrafter SX-16 - $125, SX-71 - $125, Russian Mark II - $200. All + shpg. Cleaning out shack - send SASE. John Walsh, W3GLE, 577 First St., Whitehall, PA 18052. (610) 264-4645

**FOR SALE:** HT-32, bad xfmr - $100; HT-37 - $200; (3)S-38B's, all - $150; BC-779 - $200; Knight T-60 - $100. Gary, WA9IYF, 3429 Gaddy Ct., Falls Church, VA 22042.

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

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

**FOR SALE:** Vintage Heath test equip, parts, more! 2-stamp SASE or $1 for list. Jim Miccolis, N2EY, 126 Summit Ave., Upper Darby, PA 19082. (610) 352-5247

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

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

**MESSAGE:** See me again at Dayton, Space 1353. Look for the WWII uniform. Sam Hevener, W8KBF, "The Signal Corps", 3583 Everett Rd., Richfield, OH 44286-9723. (330) 659-3244

**MESSAGE:** "Transistor Network." Free sample! Magazine for collectors of regular & novelty transistor radios. Articles & ads. Free 20 word ad monthly. Subscription: $17 (US); $28 (Canada); $36 (Foreign). POB 43, Live Oak, FL 32064-0043

**FOR SALE:** Collins radio 1958 to 1966 Avionics & ground communication service manuals, specifications, technical data, 618T-1, 2, 3 manuals; Hammarlund spkrs; Cedar Rapids key; 1937 portable training key w/tapes; Radio Handbooks 9, 11, 29; 1944 ARRL Antenna book, others; UTC LS-55 xfmr; 55 QSL cards 40's up - $25; dollar & stamp for photo. Bill Coolahan, 1450 Miami Dr. NE, Cedar Rapids, IA 52402-2933. (319) 393-8075

**FOR SALE:** Rohn tower, 50 ft. ladder type, all controls & prop pitch - $550. Joe, CA, (916) 731-8261

**FOR SALE:** Pete & Jan Grave will be at Dayton Spaces 2532 to 2534 w/all vintage gear. Pete, PA, (610) 847-2214

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

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

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

**FOR SALE:** Hallicrafters SX43 - $120; Clegg 99'er - $30. + shpg. Les Mathews, WB2DQV, 421 Carvin St., Clayton, NJ 08312. (609) 881-5603

**FOR SALE:** Cannon 105L-4S connectors for R-1051 audio, used - 2 for $11 ppd CONUS. Geoffrey Fors, WB6NVH, POB 342, Monterey CA 93942.

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

**FOR SALE:** Millen 90651 GDO w/orig box & coils - $85. Fred Watson, KI8BP, 581 W. Summit St., McClure, OH 43534. (419) 748-8798

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

**FOR SALE:** Interference Measuring Set NM-20B by Stoddart Electro Systems, w/90780-2 pwr sply & pwr cables, no antennas or manual, exc condx - $170 + shpg; similar set by Singer as made for Air Force, w/manual, pwr cord & extra tuning unit but w/out antennas - $180 + shpg. Bob Simpson, NØNTC, 9570 Haney Dr., Houston MO 65483. nontc@train.missouri.org

**FOR SALE:** ARC T-21 5.3-7 MHz, orig - $55; BC 454 3-6 MHz - $30. U-shp. Ken Kolthoff, K8AXH, 8967 Scott Dr., DeSoto, KS 66018. (913) 585-1196

**FOR SALE:** Knight Star Roamer rcvr - $42.50; Realistic DX150 rcvr - $57.50, exc, all + shpg. Henry Mohr, W3NCX, 1005 Wyoming St., Allentown, PA 18103.

**FOR SALE:** Clegg 22'er 2 meter AM - $75; National VFO62 - $35; new coax switches MFJ 1700B 14 connections - $60; MFJ1704 4 position - $50. K2MAC, NY, (716) 876-3259

# The Collins Video Library

## featuring Dennis Brothers, WAØCBK assisted by Floyd Soo, W8RO

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

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

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

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

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

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

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

**R-390A Video** 7 hours
Here it is! Long awaited by serious "boatanchor" enthusiasts! The ultimate receiver now has the ultimate video to go along with it. R-390A expert Chuck Rippel, WA4HHG, covers an absolutely incredible array of information in this "heavy duty" video. This video looks at operation, its modules, circuit description, front and rear panel details, complete mechanical and electrical alignment, PTOs, performance evaluation, modifications, troubleshooting and restoration. There is nothing like this video available today, at any price!
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Produced by Floyd Soo, W8RO (ex-KF8AT)

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

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

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

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

**WANTED:** Hallicrafters S-40B, 1950-55 short-wave radio. Will pay top dollar for an S-40B in mint or near-mint condx, or an S-40B electronically & cosmetically restored to mint condx. Thomas R. Larry, 9960 S. Ocean Dr. Apt 501, Jensen Beach, FL 34957. (561) 229-5243

**WANTED:** CW filter for Kenwood 520. Paul, WB4KVB, TN, (615) 227-8361, ptyandell@aol.com

**WANTED:** BC-610; BC-614; BC-939; TU49; TU52 & TBY manual. Pete Hamersma, WB2JWU, 87 Philip Ave., Elmwood Park, NJ 07407.

**WANTED:** Good/new 4CX1000; unbuilt xmtr kits; reasonably priced Vibroplex Zephyr or Presentation bug. Brian Roberts, K9VKY, 130 Tara Dr., Fombell, PA 16123. (724) 758-2688

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

**WANTED:** SX-73, Hallicrafters, communication rcvr, including service manual. J.L. Bessaneto, S. Paulo, Brasil. Fax 055-011-5505-7528

**WANTED:** Pwr cord for Tempo 2020, will buy parts radio w/cord. John, WA2FNS, FL, (813) 846-7958

**WANTED:** AF67 pwr sply; small P.A. system using 6L6's. Joe, K2QPR/4, FL, (561 220-7362 anytime.

**WANTED:** Manual &/or schematic for Sargent Stream-Liner 39. Harry Blesy, N9CQX, 95740 Clarendon Hills Rd., Hinsdale, IL 60521. (630) 789-1793

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

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

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**WANTED:** Command sets ART-13's; Collins radios & all accessories top $ paid; also most radios repaired reasonable. FCC licensed. WA1DEJ, MA, (781) 485-1414 eves, hobfact@tiac.net

**WANTED:** Data sheet & schematic for EF Johnson model 250-28 xtal calibrator. John B. Keil, 4618 Norwalk St., Union City, CA 94587. (510) 471-4838

**WANTED:** Info on Signal Corps US Army radio xmtr & rcvr, Forest Service type SPF built by Spokane Radio Co., #500A. George, K1ANX, MA, (413) 527-4304

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

**WANTED:** VFO & AC pwr sply for my Harvey Wells TBS-50D; 1957 or 1958 WRL catalog. George Shute, W4BDG, 2910 Virginia St. NE, Albuquerque, NM 87110. (505) 298-7347

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

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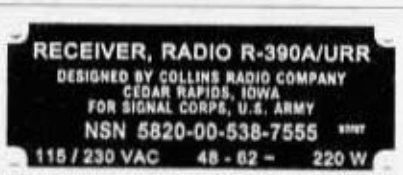

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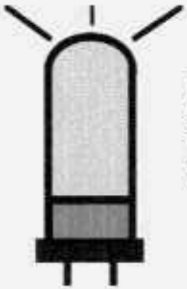

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