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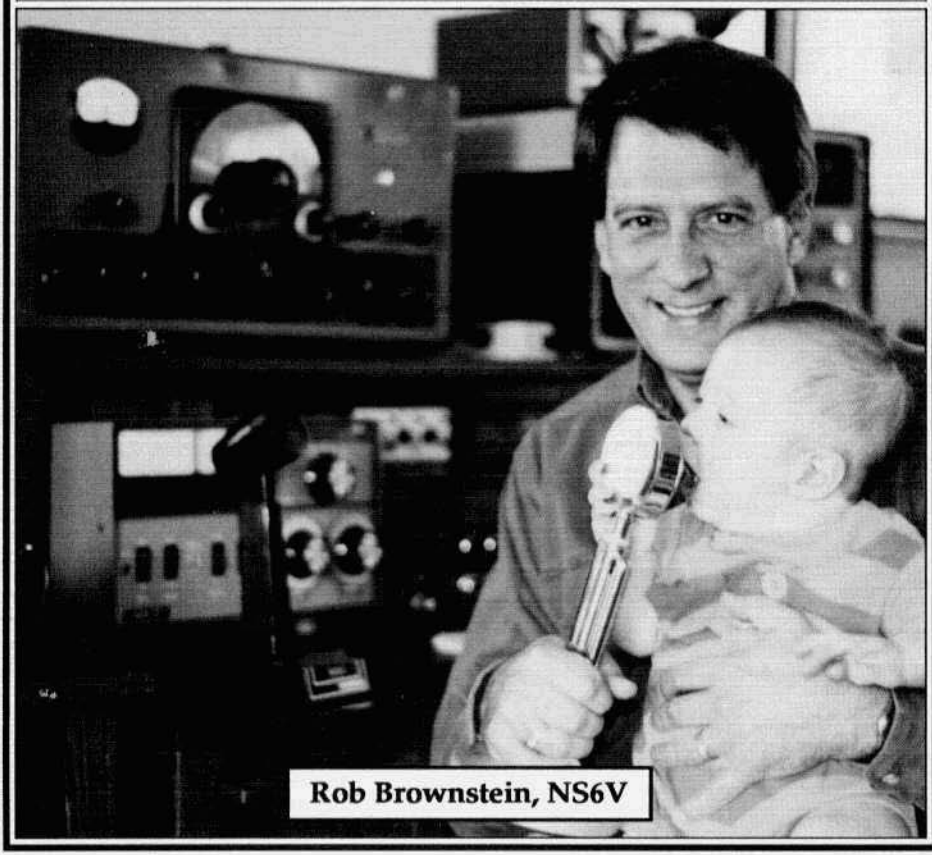
ELECTRIC RADIO

celebrating a bygone era

Number 61 May 1994



Rob Brownstein, NS6V

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

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

Regular contributors include:

Walt Hutchens, KJ4KV; Bill Kleronomos, KDØHG; Ray Osterwald, NØDMS; John Staples, W6BM; Dave Ishmael, WA6VVL; Jim Hanlon, W8KGI; Chuck Penson, WA7ZZE; Jim Musgrove, K5BZH; Dennis Petrich, KØEOO; Bob Dennison, W2HBE; Dale Gagnon, KW1I; Rob Brownstein, NS6V; Dick Houston, WØPK; Andy Howard, WA4KCY; Skip Green, K7YOO; George Maier, KU1R; Albert Roehm, W2OBJ; Mike O'Brien, NØNLQ, Bob Sitterley, K7POF (photos) and others.

EDITOR'S COMMENTS Barry Wiseman, N6CSW/Ø

Our first trip to Dayton was a real experience. Let me tell you all about it.

First of all the logistics of getting ourselves and our stuff to sell out there. We were blessed in this regard by having good friends... very, very good friends. Dan Mason (not a ham, he let his ticket lapse) along with his XYL Kacte hauled almost a truckload of books, back issues and other stuff out to Dayton for us. They live in Sante Fe, New Mexico, about 200 miles from here. Bill and Pam Leahy, AD6A and WA6SJL, respectively, took Shirley and me with the rest of our stuff (another few hundred pounds) along with them in their Suburban.

We met Bill and Pam in Albuquerque on Sunday night. We stayed overnight and got away around five the following morning. That night we were in Little Rock, Ark. That's a long haul by anyone's standard but we accomplished it almost painlessly. Bill and Pam are great travelling companions and the miles just slipped by. The next day we made it to Dayton. Total mileage... just over 1500.

It was my first trip through that part of the country and I was much heartened by what I saw and experienced. Contrary to what I get from the media, everything seened to be 'AOK' in the 'American heartland'. I also found all the people we met to be very friendly.

We arrived in Dayton on Tuesday night and had planned to visit the Air Force museum on Wednesday. The museum was closed on Wednesday because of former President Richard Nixon's funeral so Dan Mason and I went up to Lima, to visit Fair Radio. It was a fun experience. Everything was as has been reported in *ER* before. We spent about two hours there (it would really take days to see everything) and enjoyed meeting George and Phil Sellati.

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Cover: Rob Brownstein, NS6V, frequent ER contributor, in his shack with son Mitchell. Nothing like getting started young.

A Viking II Broadcast Transmitter....
an update from ER #24

by J.R. Powell, M.D.
548 Grove St.
West Point, MS 39773

Enclosed is a recent photo and an update on Radio Station HRXK (4.91) in Puerto Lempira, Honduras.

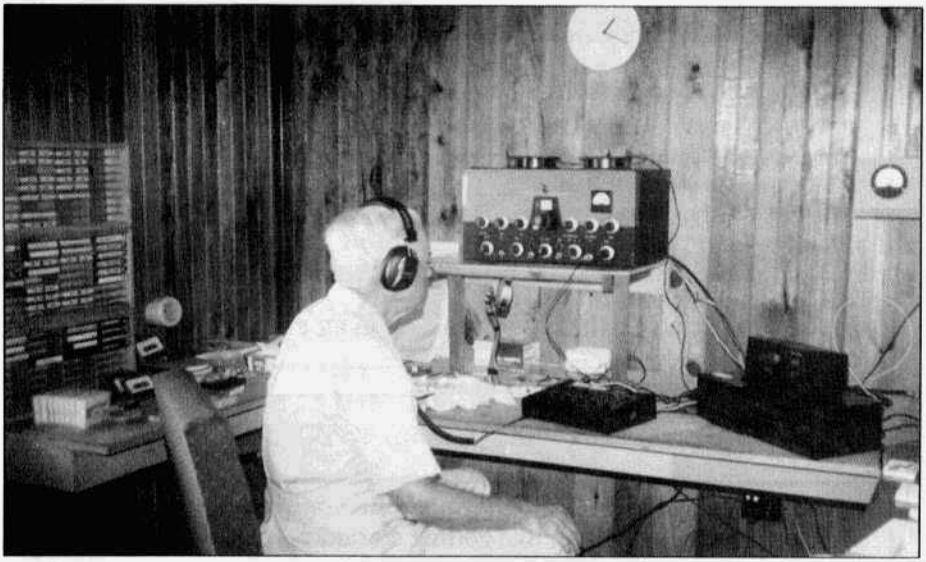
Four or five years ago our mission organization (Global Outreach of Tupelo, MS) was granted a license for HRXK. The government there neglected to notify us that the license had been granted until we had only three months to get on the air. After diligent research with the help of Randall O'Brian (KD5ZH) it was decided that the best transmitter would be a Johnson Viking II. We made a hasty search for one and after one or two disasters (bought one that I still refer to as the "chickenhouse transmitter" because it looked like it had been in a chickenhouse about 15 years) we persuaded ER editor Barry Wiseman to sell us one of his.

We stayed more or less on the air for several months and decided to increase our power with a linear amplifier, since we were licensed for 1000 watts and were putting out about 75. This did not work, at least in part due to the fact that the station is mostly operated by untrained Miskito Indians.

Later Dr. John Freeman gave us a T-368 surplus. This worked very nicely for about 3 weeks and then failed mostly for the same reasons. It put out about 400 watts and was widely received while on the air.

We are now back on with the original Wiseman Viking. We also have another that was donated which we use for standby. We would like very much to increase our output if anyone has any ideas.

HRXK is located in Puerto Lempira, Honduras and currently is the only station broadcasting in the Miskito Indian language. We also have a Spanish segment and a brief English segment. Our primary purpose is to spread the message of God's love. **ER**



The author at Radio Station HRXK. Note the muffin fans on the Viking II.

AM'ers Rally at Dayton

by Paul Courson, WA3VJB
P.O. Box 73
West Friendship, MD 21794

Dayton, Ohio -- This year's AM forum at the Dayton Hamvention drew another record crowd, and about two dozen people had to be turned away at the door.

An early sign-up tally found 111 names and calls listed among those who managed to get in to hear the discussions about classic radio and AM issues moderated by Dale Gagnon, KW1I, and Don Chester, K4KYV.

The presentation included a slide show of vintage radio museums around the country. There was also a special focus on WLW, a pioneer broadcast station in Cincinnati not far from the hamfest site.

A staff engineer Bud Parshall, N8FRP, took the audience back to the days when the station ran 500 kilowatts from a transmitter whose tubes were cooled by water that circulated through special outdoor ponds. The vintage pictures illustrated what a real 'big rig' should look like.

The forum then moved on to AM International and its membership that, as of Dayton, was just a few members shy of 600. Dale called on several regional directors to present the top issues in their areas as well as to discuss general philosophies and attitudes that could improve AM operations on the bands.

Andy, WA4KCY, AMI-Southeast Division director, described some chronic problems with a belligerent group of sideband stations in his region that he believes are on a campaign to 'drive off' AM activity near 3.880 Mcs.

This led to a review of some historic patterns of conflict and a spotlight on the most effective means of minimizing it. One suggestion included ignoring those who slide close to an AM conversation. This was supported by the notion vintage operators are more likely to be held accountable for bad behavior than those on sideband.

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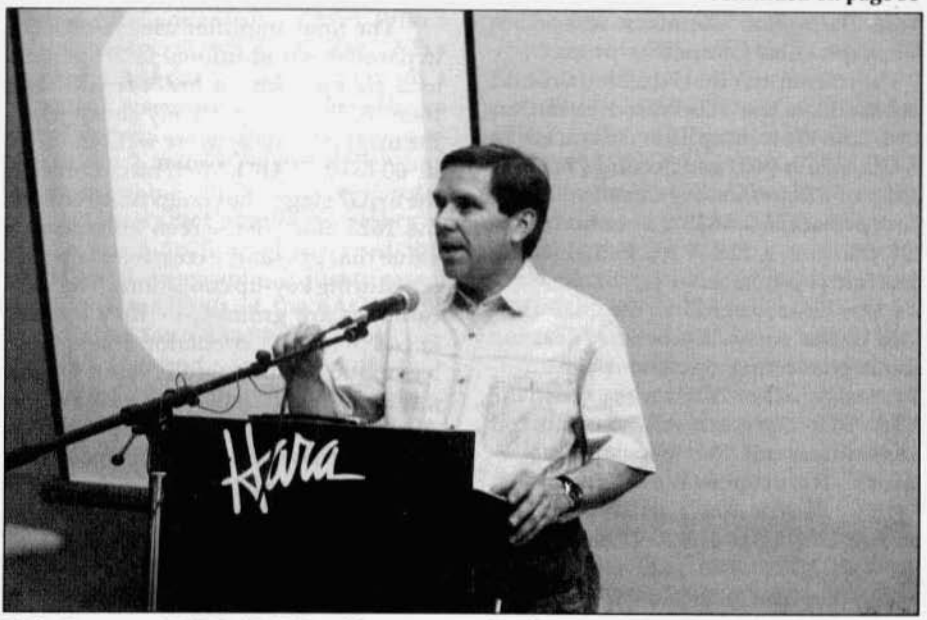


Dale Gagnon, KW1I, AMI President, opens the forum at the Dayton Hamvention.

6AG7/1625 100W 5-BAND CW TRANSMITTER

by Dave Ishmael, WA6VVL
1118 Paularino Ave.
Costa Mesa, CA

During a telephone conversation with Barry/ER in November '93, he asked me "if I ever built anything besides 80/40M QRP rigs? Had I ever considered building a bandswitching 100W class transmitter?". I didn't think too much about that conversation until Bob Dennison, W2HBE, sent me a photo of his DENNISON T-807 HF TRANSMITTER in a "post card" (ER#58, pg. 25). Bob sent me some additional pictures of this "beauty" in late December - what a gorgeous job of homebrewing! Soon after, Dave Mills, AJ7O, offered me a homebrew self-contained dual-6GJ5 bandswitching CW transmitter for $20 that he had picked up at the TRW swapmeet a couple of years ago - I bought it as a "parts unit". So with a little push from Barry and a little help from Dave, Bob Dennison was again the inspiration for another project.

The transmitter that I decided to build is based on the 100-Watt transmitter and 150-Watt amplifier featured in ARRL's First ('63) and Second ('71) Editions of *Understanding Amateur Radio*. Both projects use 1625's, a version of the 807 that has a 12.6 VAC heater and a medium 7-pin base.

I was "introduced" to the 1625 (VT-136) in the early '60's when I learned about converting command set transmitters. A pair of 1625's was used in the ATA, SCR-274N, and ARC-5 command transmitters and their associated modulators. Reference Walt Hutchens, KJ4KV, *Electric Radio In Uniform* column in *ER*#11 pgs 4-7, 20-23, and *ER*#12 pgs 4-7, 26-29. The 1625 is still relatively "plentiful" at local swapmeets and I have bought several NOS for $1 each. The 1629 "magic-eye" tube was also used in the command transmitters, has an octal base, is easier to find and is usually cheaper than its 6E5/6U5 6-pin counterparts.

The following are some of the highlights and comments about the completed transmitter:

* The 6AG7 oscillator is identical to and uses the same PCB that was used in my 6AG7/6E5 80/40M transmitter (ER#56). An 80-15M plate tuning network has been added to provide sufficient drive for the 1625 output tubes. The plate tuning network uses B&W miniductor stock, 36T of 3016 and 5T of 3011, and a 100 uuF variable. Centralab PA-6003 2-pole 5-pos. non-shorting steatite switches are used for the crystal/VFO and band switches.

* The final amplifier uses two 1625's in parallel. An additional 1625 operates as a clamp tube - a bit "overkill" but then 1625's were relatively cheap when the original articles were written (3/$1 in '60 from "TAB"). With no drive from the 6AG7 stage, the clamp tube reduces the 1625 amplifier screen voltage to a value that prevents excessive plate current during key-up conditions. The 1625 cathodes are grounded - they are not keyed with the oscillator stage. This technique is successfully used in the Johnson Viking Challenger, a 120W CW, 70W AM transmitter. I set up my Eico Model 666 Dynamic Conductance Tube Tester and tested 24 1625's and selected a matched pair for the amplifier. I then bench tested the remaining tubes and selected the 1625 that gave me the lowest screen voltage when used as a clamp tube - there was almost a 3:1 difference

The author with his 1625 transmitter (sitting on the 75A-4).

between the tubes - so the test was worthwhile. Tubes other than the 1625 can be used for the clamp tube - the Viking Challenger uses a 6AQ5. With a plate voltage of 620 VDC, the 1625's resting plate current is 80 mA with a clamped screen voltage of 65 VDC so the clamp tube's plate is only dissipating about 2 to 2 1/2 watts, depending upon the value of the screen resistor.

* While it's not usually necessary to neutralize a 1625 amplifier (and this amplifier is no exception), just in case, I insulated the shaft of the 6AG7's 100 uuFd plate tuning capacitor using a fiber shoulder and flat washer and then grounded the rotor. The rotor can be easily ungrounded and the neutralization components added if it proves necessary.

* The maximum power dissipation of the 1625's screen resistor occurs during clamp, when almost the full plate voltage is across it. Keep this in mind when selecting the screen resistor. According to the original article, the screen voltage should be about 300 VDC, when the output is fully loaded. If the HV is about 600V, use a 15K 25W screen resistor. Increase it to 20K 35W if the HV is 700 VDC or more.

* The 1625's pi-network coil assembly is an 18.6 uH Illumitronic Engineering Vari-Pitch PI Air-Dux P/N 1212D6 that covers 80-10M. The plate tuning capacitor is a Bud MC-1860 300 uuFd variable and the loading capacitor is a three-section "broadcast variable" with approximately 1100 uuFd total capacitance. The bandswitch is a large 1-pole 5-pos. non-shorting ceramic switch. All of these parts came from the "parts unit".

* The amplifier operates "straight-through" on all bands except 10, where it doubles.

* The 1625's plates choke is a National R-300S 1 mH 400 mA from the "parts unit". The E.F. Johnson 0-100 and National HRB die-cast knobs also came from the "parts unit".

continued next page

6AG7/1625 Transmitter from previous page

* The 1625's use National ceramic XC-7L 7-pin tube sockets and SPP-3 ceramic plate caps. National CS-6 ceramic crystal sockets are used in the oscillator. Use fiber or nylon washers to mount the 7-pin ceramic sockets and don't overtorque the mounting hardware as the socket can be easily cracked. Towards the end of this project, I needed to find a replacement 1625 socket. After about a dozen calls and no socket, I came to the conclusion that medium 7-pin 1625 sockets are a bit rare. My advice is to lay your hands on the sockets before committing your design(s) to 1625's - the 807's 5-pin socket is much easier to find.

* The 1629 "magic-eye" indicator tube assures that the transmitter is tuned for maximum output. The 1629 takes about -7.5 VDC to close the eye so I used a fixed 120K/10K resistive divider across the RF output. The tube's base is secured in a U-clamp mounted to an L-shaped aluminum bracket mounted against the front panel. The 1629 is rotated in its U-clamp to align the shadow. The L-shaped aluminum bracket was notched to clear the loading cap's plates at minimum capacity. Don't install the 120K/10K RF divider in the 1629's shell - the 1629 doesn't like the full RF voltage appearing near its base.

This transmitter is designed around a TES Industries RB-3U 19"x12"x5-1/4" racking enclosure. It's a bit pricey at $130, but it is a very high-quality enclosure. I "salvaged" it from a piece of test equipment that I built four years ago. The replacement 5-1/4" front panel was also purchased from TES Industries. There are other, significantly cheaper, rack mount enclosures available. SESCOM, for example, advertises their model 3RU10 (19"x10" x5 1/4") in *CQ Magazine* for $46.30. The E3120D (19"x13"x5-1/4") enclosure distributed by ALLTRONICS is $54.95. Whatever enclosure you select, make sure it is "modular" enough to repair and/or modify the transmitter.

The following are highlights and comments about the construction:

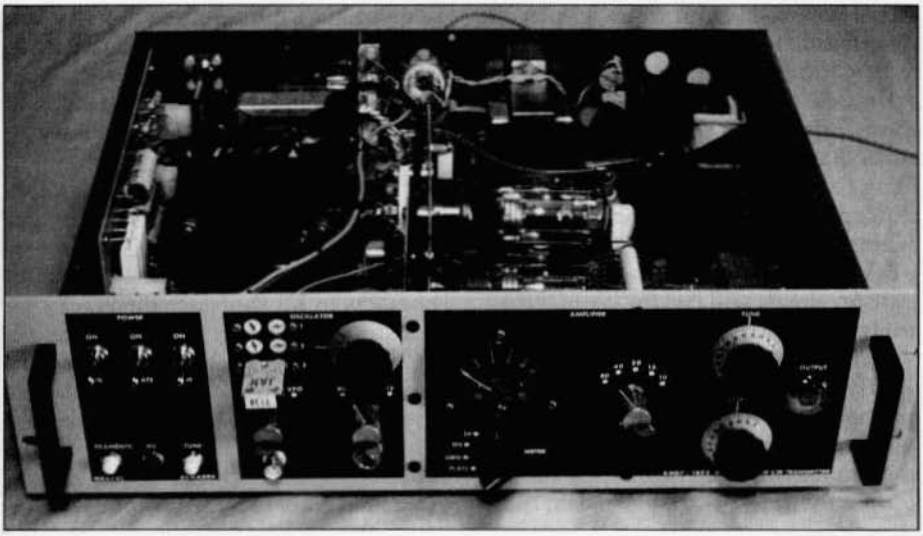
* You will notice that I didn't use a chassis base to build this transmitter. Almost all the parts are mounted to the front and rear panels. An L-shaped aluminum bracket attached to the front panel contains the "RF-deck" and serves as a shield between input and output RF circuitry.

* The front and rear panels were carefully laid out on a quad-pad. I didn't start the layout until I had all the parts. I used the original quad-pad layouts and taped them to the panels as a center punching guide. I used a sharp scribe as a center punch instead of the automatic type because I can more accurately and consistently locate the holes with the scribe. After center punching, I used a small #60 drill (0.040") as a pilot drill. The next hole size was the 4-40 holes for the meter so I drilled all the holes with this drill also. It took a bit more time to double- and triple-drill the panels but the accuracy is very good using this technique - especially if a drill press is used.

* Holes up to 3/8" were drilled. Holes from 3/8" to 1/2" were enlarged from 3/8" with a T-handled reamer. I don't like to use drills larger than 3/8" in soft aluminum - even with a drill press!

* All of the larger 5/8", 1", 1-1/8", 1-1/2" and 2-1/4" holes were done with Greenlee chassis punches. I used several pieces of paper between the chassis punch and the painted panels with the cutter portion of the punch against the inside/non-painted side. The edges of the punched holes were quite satisfactory cosmetically with minimal "scuffing" of the paint. Just a touch of oil under the punches drive screw will make the punching operation easier.

* The TES enclosure uses countersunk 4-40 screws to assemble it. The paint is very thick and there was no electrical connection between the various pieces so I spot-faced the counter-



Front view with top cover removed.

sinks to ensure good electrical connection.

* The location of the RF deck subpanel was dictated by the front panel's layout. As a result, the power supply components are a bit "tight", one of the reasons for stacking the filter chokes. The only mechanical support for the RF deck is to the front panel. The rear of the RF deck is unsupported.

* One last comment about the mechanical design. Mechanically, the transmitter will pose no problem in the shack. I suspect, however, that this transmitter could not survive UPS no matter how well it is packed. There are too many relatively heavy components (e.g., 12.6 VAC filament transformer, fan, plate transformer, ...) mounted on relatively light gauge aluminum. It's really a non-problem unless you intend to ship the finished transmitter.

The finish on the front panel is a bit "different". I have used this technique on both industrial test equipment and amateur equipment for almost thirty years and I kind of like it.

* After the front panel is drilled, punched and deburred, the painted surface is very lightly wet sanded with 400 WETORDRY paper.

* I use the thin 3M brown "packaging tape" for masking. I find that this tape has almost no "bleeding" when the edges are gently rubbed with the plastic tip of a ball point pen - something round but not sharp. Regular masking tape "bleeds" way too much, no matter how well the edges are prepped - I don't recommend using it. If you're not sure how your tape will perform, mask and paint a piece of scrap aluminum.

* After masking, the panel is painted with several light coats of Krylon, dark blue in this case. Don't let the paint build up at the tape edges. After about fifteen minutes, the masking tape is very carefully removed. This tape sticks to everything, so be very careful removing it or you will end up with something unexpected sticking to your newly painted panel. I remove the tape when the paint is still tacky so the paint doesn't peel. Even though the surface has been lightly sanded, the Krylon coat may peel after it has dried. Let the front panel dry overnight before applying the dry transfers.

* The dry transfers are applied using a very soft, somewhat dull, colored pen-

continued next page

cil. After a successful transfer, place a clean sheet of white paper over the transfer and lightly rub the transferred letter or words through the paper to "set" them. I don't have a preference for a particular brand of dry transfer - everything I have used works. Just remember to keep the back of the transfers clean, against the supplied protective backing when you are through using it. The transfer sheets will last for years if they are taken care of.

* The finished front panel is then lightly sprayed with a clear Krylon overspray in several light coats. I try to get a matte finish but consistency is very important. I let the panel set about a week before I start the mechanical assembly.

* Take it easy during mechanical assembly because the paint will still be relatively soft - especially when you are rotating screw heads against the surface. I use 3/8" and 15/32" flat washers between the panel and nuts on control shafts and toggle switches to keep from marring the front panel during assembly.

I will admit, right up front, that I got a little "carried away" with the AC control circuitry. There were a few things I wanted to experiment with and I thought this was a good platform to use.

* I used a separate 12.6 VAC CT 3A Radio Shack 273-1511B filament transformer, T1, for the 6AG7, 1629, and 1625 filaments. The first front panel DPDT switch, SW1 (FIL), applies power to the filament transformer. The filament transformer is connected to an Amperite 6NO45 octal-base time-delay relay, K1.

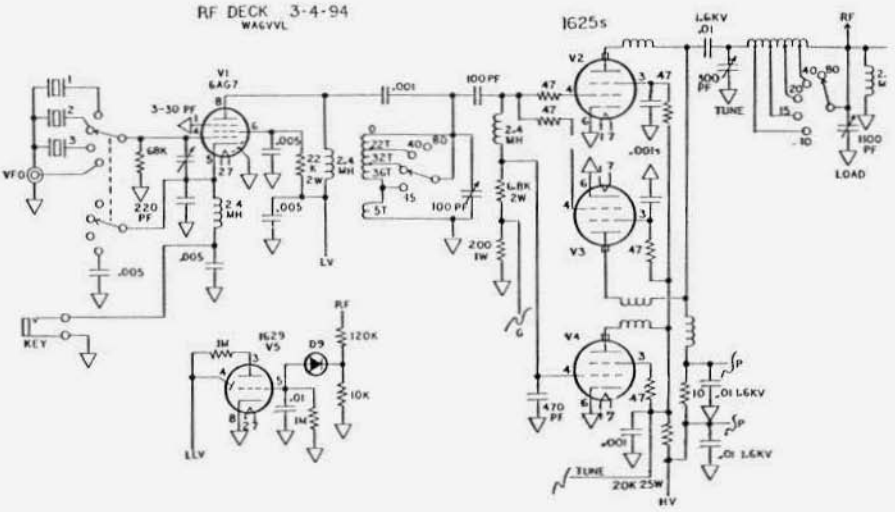
* The NO contacts of the 6NO45 control the coils of two Potter & Brumfield 120 VAC KRP11AN relays, K2 and K3. K2's DPDT contacts are in series with the second front panel DPDT switch, SW2 (PLATE), which applies power to the primary of the plate transformer, T3. The 6NO45 guarantees that the filaments have a minimum of 45 seconds to warmup before plate voltage can be applied. K2 and K3's relay coils are connected by a shorting link on the rear panel accessory socket for external T/R switching.

* SW1 (FIL) also applies 120 VAC to a rear panel mounted 4.2" fan through a 250Ω 15W resistor. When plate voltage is applied to the 1625's, a set of SPDT contacts in K3 short out the 250Ω 15W resistor, increasing the airflow to the 1625's during transmit. The fan is a Howard Industries 2-pole shaded pole motor with a 5-blade 4.2" nylon fan. This fan is relatively quiet and delivers about 100 CFM at full speed during transmit. After several days of CW QSOs with the new transmitter, I found out that the "relatively quiet" fan was driving me "nuts", so I am experimenting with different dual speed resistor values. The enclosure top, above the three 1625's, is cool to the touch after several hours of operation, so not much cooling is required.

* The remaining SPDT contacts in K3 are available at the accessory socket, J1. A separate 6.3 VAC 0.6A filament transformer secondary, T2, is also available at the accessory socket.

* The front panel incandescent pilot lights use Radio shack 272-340 holders with 272-1142 6V 100 mA bulbs (E-5 base). I reduced the bulb's current a bit with 22Ω 1W series resistors - they are too bright without them. An added advantage of the 22Ω series resistors is that they increase the life of the bulbs by limiting the inrush current when the bulbs are first turned on.

Since I used a separate filament transformer, the 5.0 and 6.3 VAC windings in the "plate" transformer were not used nor did I bring them out. This provides more margin in the HV secondary and the transformer runs much cooler - it's just barely warm after a 1 hour CW QSO. I stripped the transformer and bench tested it for several hours under



load. The primary and HV secondary leads were reterminated. A 3/8" and 7/16" grommet was added to the top of one end bell to bring out the new primary and HV secondary leads through the top of the transformer. The end bells were lightly bead blasted and repainted. The core was repainted. The transformer's core measures 4-1/2"H x 3-3/4"W x 2-1/4"D and uses EI-150 laminations. This transformer came from the "parts unit". The transformer's wrapper is date coded "4-52" so it is celebrating its 42nd birthday in a new, homebrew, transmitter.

The LLV/LV/HV power supply uses a standard full-wave bridge rectifier with choke-input filtering:

* The HV power supply section uses a choke-input filter with a 4 Hy 250 mA Triad C-15X choke. The filter capacitor uses two 47 uFd 450V electrolytics in series. Two 25K 10W resistors are connected across the two electrolytics to equalize the voltage and serve as a bleeder. The resistors equalize the capacitor's voltage by "swamping out" their individual leakage currents. The ARRL Handbook recommends a minimum value of equalizing resistance equal to approximately 100Ω/V of the individual capacitor voltage. The minimum value can be decreased to increase the bleeder current. The HV key-up output voltage is 620 VDC dropping to 590 VDC when the output is loaded to 100W input (180 mA).

* The LV power supply section uses a choke input filter with a 13 Hy 65 mA Stancor C-1708 choke. The filter capacitor uses two 47 uFd 350V electrolytics in series. Two 25K 10W resistors are connected across the two electrolytics to equalize the voltage and serve as a bleeder. The LV key-up output voltage is 310 VDC dropping to 288 VDC when the output is loaded to 100W.

* The LLV for the 1629 "magic eye" tube is obtained at the midpoint of the LV supply's 25K 10W equalizing resistors - about 144 VDC key-down.

* The full-wave bridge rectifier is made up of eight 1N4007 1KV 1A diodes. Each diode is shunted by a 560K 1W carbon resistor and 0.001 uFd 1KV disk ceramic capacitor. Even though the bridge's Peak Reverse Voltage (PRV) is 2KV, the maximum voltage is limited by the carbon film resistor's 1W maximum continuous voltage specification -

continued on page 34

Mechanical Design of Collins Amateur Equipment

by Fred Johnson
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Sachse, TX 75048
Part 4

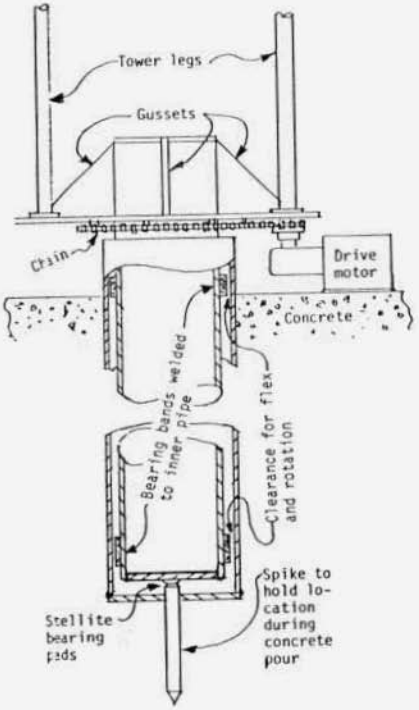
Amateurs who have rotators at the top of antenna towers will appreciate Arthur Collins' answer to rotator reliability problems. One day in the midst of other activities, Arthur stopped by to discuss the possibility of rotating the entirety of an 80 foot tower -- with antennas solidly attached at the top. I admit to a somewhat less than enthusiastic initial response. But, further thought showed it wouldn't be a tough job -- just unconventional. I had to get convinced that the tower could withstand the torque of available simple driving mechanisms. The start and stop jerks would have to now include the inertia of the tower in addition to the antennas. That turned out to be OK. The decision to go was made.

I calculated stresses and found 8 ft lengths of two appropriate sizes of large pipe. They were about 10 to 12 inches diameter. One nested within the other with about an inch clearance. I welded a half-inch thick, 3 inch wide band around the top and bottom of the inner pipe. The outside diameter of the selected band thickness produced a desired free fit to the inside diameter of the outer tube. Thus the inner pipe rotated freely in the inner diameter of the larger pipe. The inner pipe could bend slightly under load without binding. I welded Stellite pads in the center on the bottom of the inner pipe plug where it contacted the bottom plate welded in the bottom of the outer tube. This was an anti-friction non-galling rotary bearing for all the weight.

Trying to describe all this here convinced me a sketch could be more helpful than additional words. So, I'm including one. We keep being reminded that graphics is a potent method for communications among humans. Quite possibly the form of communication having broadest bandwidth, least distortion, greatest S/N, spread spectrum possibilities, and on and on. Still, we keep on with words, words, words. . .

The sketch shows a cross section of my design for the rotating tower support. On the inner pipe I welded a round platform that was gusseted to the top of the inner pipe. This inner rotating member comprised what I called a large lazy susan for the antenna tower. The outer pipe was buried in concrete in Arthur Collins back yard. The inner pipe was dropped in place and the space between it and the outer pipe was filled with diesel fuel. The tower was erected on the lazy susan. Antennas were mounted at the top. I had selected a large gear reduction motor which drove a large chain sprocket under the lazy susan plate. The antenna coaxes had slack loops at the bottom to allow somewhat more than a single revolution. Electrical stops determined the exact amount of rotary overlap. The scheme worked. Over time, a few more rotary towers were built and installed for high-level Collins engineering and marketing folks. I suspect some of them thought of that as a status symbol.

While the lazy susan was being readied for mounting, I applied bonded resistance strain gauges in selected high stress locations on the structure. When the tower was up, I climbed to the 40-ft level and attached a rope. An interested E.E. came with me and pulled on the rope with a calibrated fish scale at a



predetermined angle. I read the strains at highest stress locations at the base, converted to stress, and decided on additional gussets so the tower would handle anything short of a tornado. There was one unfortunate incident in this exercise. A construction truck backed into soft sod on Arthur Collins' next door neighbor's back yard. You can't imagine how fast that got fixed!

As amateur equipment development programs were fading, I was called to an in-progress meeting one Saturday morning as I came in to my office. I had come in to catch up on other things. Arthur Collins had collared perhaps a dozen or slightly more embryonic computer engineers. They were seated around a long table in a conference room. I took a seat in the on-going meeting. It took no time at all to see that things were not going well. Having missed the earlier part of the meeting, I didn't understand what the basic issues were -- and said so. Immediately! Arthur Collins stood up at the blackboard and gave me a 15-20 minute tutorial on how transmission lines work. It included impedance vs. geometry, terminations, reflections, and how they relate to applications in multilayer backplanes. Think back! The word backplane had hardly entered the language at that time. It was a very intense learning experience!!

Upon conclusion of that tutorial, the meeting broke up. I returned to my office to do what I had come in to do in the morning. At about 2:30 that afternoon I looked up from my desk. Arthur Collins was leaning against one side of my office door frame. When he saw he had my attention, he said: "You see, Fred, it's all mechanical after all". Having said that, he left. He knew my background. He had tailored the transmission line subject to my capability. He used terms he knew I'd understand.

I've often thought of that example of person-to-person communication. My receiver was turned on. Its bandwidth was as wide as I had. The transmitter put out a signal consciously shaped to my receiver's response characteristics. The message got through. Call it deliberate spread spectrum if you will.

As I thought back, I believe I saw a twinkle in Arthur's eye. I believe he got some jollies from getting his message across. Collins computers were early in the application of multilayer backplanes using controlled impedance transmission lines. Arthur's foresight had steered that course. I just happened to be in that path of progress.

Those of us who knew Arthur Collins often commented on how far ahead of his time he was. Estimates of five to fifty years were common. I couldn't have stumbled onto a more timely and relevant example than in the Dec. '93 issue of *Surface Mount Technology*. The magazine came out as this is being written.

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Viet Cong Home Built Radio

by LTC William L. Howard
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In the early stages of the Vietnam conflict, the Viet Minh and later the Viet Cong were equipped with a variety of leftover WWII weapons supplemented by what they could fabricate in their underground factories. Communication equipment was also in short supply. This began to change and by 1967, the Viet Cong and North Vietnamese Army were equipped with sets made in China. The XD6, copied in part from the US WW II SCR694, the Mercury Talk Set which resembled a WWII Japanese set and the Type 63 backpack set which looked like an AN/PRC-10 mounted in a BC-1000 were among the sets that were captured. Occasionally, a Soviet radio would show up but these were few and far between.

Captured radio sets were first evacuated to the nearest Radio Research Unit, the local version if the N.S.A. and responsible for signal intercept operations where information of immediate intelligence value was recorded. Primarily this was frequency and range of the set. When Radio Research finished with the set it was evacuated to the Combined Material Exploitation Center (C.M.E.C.) for detailed technical intelligence exploitation. In most cases this resulted in the destruction of the set as all the components were removed and the remaining hulks were sent to the scrap yard. Samples of each set were placed in the C.M.E.C. museum and used for training new intelligence personnel. There were very few radios used by the Viet Cong, fewer captured by U.S. Forces and very few came back to the states in private hands. Today these sets are very scarce.

In 1988, while a guest at the dedication of the new Foreign Material Intelligence Complex at Aberdeen Proving Ground, I went through the Ordnance Museum. The C.M.E.C. Museum in Vietnam had been evacuated and was now part of the Ordnance Museum. Many of the enemy weapons I had helped to evacuate were on display. One of the more unusual items was a Viet Cong "Home Brew" Radio built to fit into a standard U.S. 30 cal ammunition can. I took several photos through the glass case but these photos revealed very little other than subminiature tubes were used. Several years later through the efforts of Bill Seaby, the set was taken from the case and a set of detailed photographs was sent to me.

The set was originally designed to be two radios on one chassis. Only one side was wired so it is open to speculation what the other side was to become. One part was a shielded variable capacitor, tube and coil. The remainder had four tube sockets, two variable capacitors and a large hole in the chassis, possibly for a coil. The side that was wired seemed to be a regenerative detector with three stages of audio amplification. There was one tube ahead of the detector which could have been an RF amplifier but there was no coil for such a stage. Subminiature sockets were used throughout the set. The coil for the receiver was wound on the base of an octal tube and an octal tube socket was mounted in the center of the chassis. Without any tubes in the set and a broken coil, the set was inoperable and simply a display item. Without being able to examine the set in detail, it was impossible to trace the wiring diagram but it

appeared to be a regenerative detector with a capacitor coupled amplification system. The resistors went either to a bus bar wire or were grounded to the chassis. The final stage was connected to an output transformer which seemed to be for the purpose of isolating B+ from the chassis. The transformer output was grounded to the chassis and a red wire went to the headphone socket.

I decided that it would make an interesting project to duplicate this set and see if it could be made to work. The original set was made from a series of panels held together by brass machine screws. I obtained an ammunition can and began the process of making a cardboard chassis. Side panels, back panel and front panel were then cut from aluminum. The center panel and shields were also cut from aluminum. A template for the center panel was laid out, after all the parts were assembled and a second template was made for the front panel. Finding parts that duplicated the original set was difficult. Subminiature tube sockets of the same color as the original were finally located as were other parts. Then the main chassis and all panels were taken to a local metal working shop where holes and cutouts were done and the chassis was assembled.

The tuning capacitor was mounted on the center divider panel and a local machine shop was contacted to turn a dial/drive pulley. Once the mechanical work was completed, the other components were mounted and the set began to take shape. The filaments were wired first, one lead to chassis and one lead to the main power switch. The chassis was A+ and B-. B+ was then wired to a bus bar wire and the output transformer was wired into the circuit. This set does not have a lot of room for wires and the lead to the headphone socket was buried under the other parts. The amplifier section was then wired. Resistors with proper values that resembled the original set were easy to find but capacitors were difficult. I used modern capacitors as I felt they were more reliable.

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The P. R. Mallory Story

by James A. Fred
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Cutler, IN 46920

The year of 1916 is one I'll never forget. One reason is because that was the year that I was born, at home, in South Bend, Indiana.

Another reason is that was the year P. R. Mallory founded the electronic parts company that bore his name. He founded the company on April 10, 1916, which preceded my birth by exactly eight months.

I will skip PR's early years and start the story in April 1916. The first product his company manufactured was tungsten filament wire for incandescent lamps. The first factory he owned was in Port Chester, NY. The peak production for one year was enough wire to provide filaments for 200,000,000 standard size lamps. The tungsten filament wire continued to be a good business for eight years. However, he lost a lawsuit filed by General Electric alleging patent infringement. He was forced to stop making tungsten filament wire.

In 1923 with a building and a competent work force he decided to buy the Knapp Electric and Novelty Company. Knapp made 6 volt motors and fans for automobiles and electrical toys. This business brought in barely enough cash to keep the factory doors open. At this time General Electric decided to sell the Elkon Works in Weehawken, New Jersey. This plant manufactured all of the products made from molybdenum and tungsten except filament wire. On June 11, 1925, after several months of negotiations P. R. Mallory became the owner of the Elkon Works.

One of the largest segments of the radio parts business was the manufacture of condensers (now called capacitors). A royalty agreement with Samuel Rubens led to the manufacture of dry electrolytic capacitors. Up to this time most radios used wet electrolytic capacitors. The dry capacitor usually was smaller, thus allowing smaller radios to be built. Another patent of Rubens was for a copper-sulphide-magnesium rectifier. By 1928 Mallory's business occupied 6 buildings in Port Chester and 4 buildings in the Weekawken area. After obtaining a minority interest (GE held the majority) in a new alloy called Carbaloy, Mallory purchased a plant in Indianapolis, Indiana where he could manufacture Carboloy.

The move to Indianapolis had just been made and manufacturing Carboloy had just begun when the 1929 crash occurred. It was only a short time later that Mallory lost its contract and machinery for making Carboloy.

With a large plant and a large debt, but very little business Mallory decided to buy the 38 year old Yaxley Mfg. company of Chicago, Illinois, and moved it to Indianapolis. This was the beginning of a long line of radio and electronic components. Some of these components were switches, jacks, plugs, grid bias batteries, pilot light assemblies, etc.

Since one of Mallory's products was tungsten contacts, management decided to make vibrators for automobile radios. In 1932-'33 Bill Lear came to work at Mallory's, and developed the vibrator into a viable product and obtained the original patents on it. He was an outside consultant for a number of years thereafter. He went on to found a number of companies, the best known being Lear Jet, Inc. Manufacturing vibrators became a very successful part of Mallory's business. In the early 1950's Mallory made 10,000 vibrators per day for the Delco Radio Division of Kokomo, Indiana.

The author in his workshop working on his micro lathe.

In 1934 the Distributor Products Division was set up to supply radio parts for replacement use. One of the most important services of the Division was the production of radio service literature introduced by Howard Sams. Many old time radio repairmen will remember the Mallory-Yaxley Encyclopedia or "MYE." Howard Sams left and established his own company that supplied Sams Photofact folders and published many books on electronics.

One product that enjoyed a long production run was the Inductuner. Paul Ware, who had at one time owned a factory that made neutrodyne radio receivers, came to Mallory with a variable inductance tuner he wanted someone to market. It took years to develop a commercial product during which time Paul Ware was on the payroll as a consultant. The first TV set manufacturer to use the Inductuner was the Allen Dumont Company. Mallory and many other companies used the Inductuner in UHF TV converters. However, the greatest numbers were used in military communications equipment. Mallory manufactured front ends for several radio receivers made by Western Electric Company. As late as 1982 they were still building Inductuners for the VRC-12 radio set.

With the entry of the United States into World War II Mallory's efforts were committed 100% to the war effort. Sam Rubens had developed mercuric oxide batteries which were ordered into immediate production by the Fort Monmouth Signal Corp Laboratories. Mallory received five "E" awards between 1941 and 1944.

Mallory had labor problems after WWII and when a strike shut down production in the Indianapolis plant they bought a factory in Frankfort, Indiana. Frankfort was about forty miles north of Indianapolis. The factory had been built at the turn of the century and once housed the McDougall kitchen

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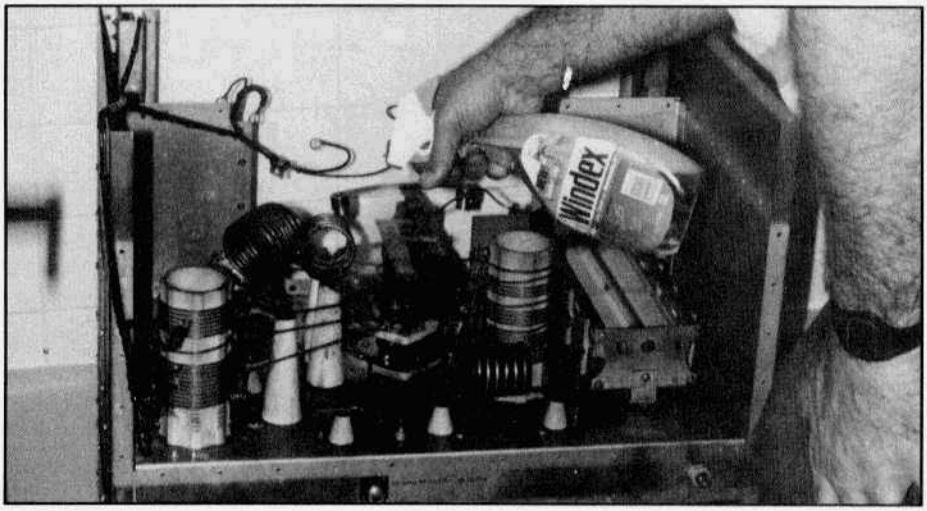
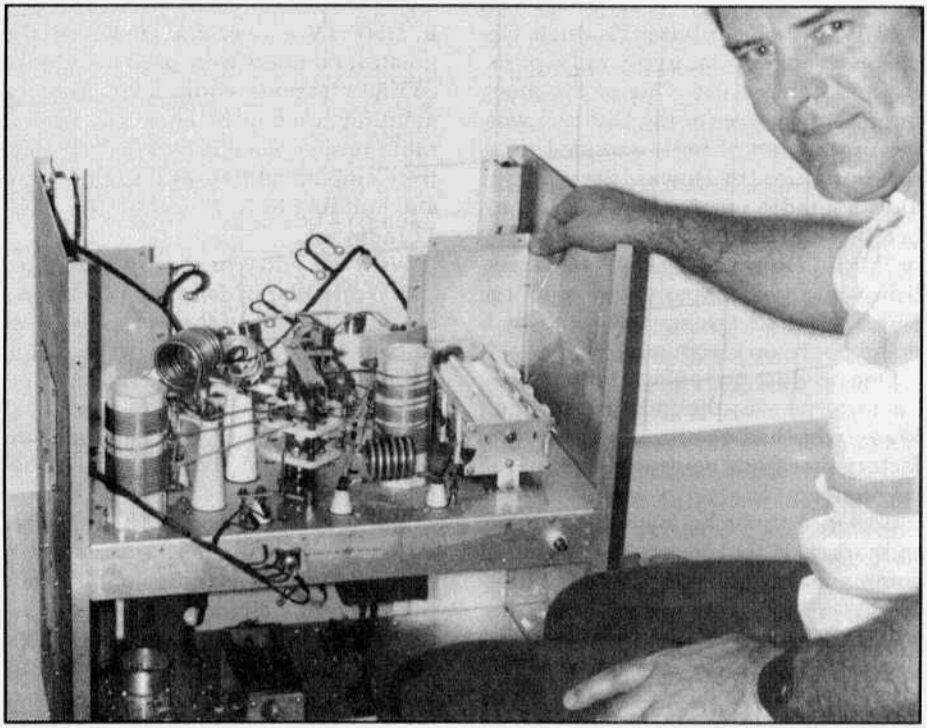
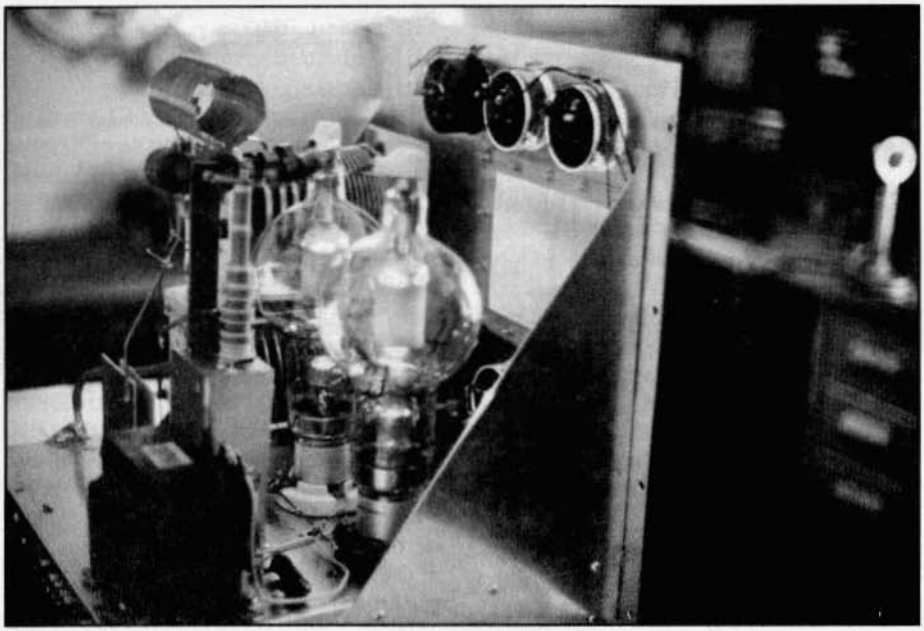


Jim Jorgensen, K9RJ, cleaning a very dirty KW-1 RF deck. First he sprays with Windex and then rinses with water (preferably distilled water). He likes to dry the chassis as quickly as possible with a hair dryer. He finds that Dow Bathroom Cleaner does an excellent job on St. James Gray wrinkle paint but sometimes dulls other paints (e.g. Johnson). He says it's somewhat of an art finding the best cleaning method for each brand of equipment.



The final result.



This is the RF deck of Gary Gompf's, W7FG, new 450TH rig. We'll have more on this rig in a future issue.

Electric Radio booth at Dayton. Shirley Wiseman, ER Office Manager, is on the left; in the center is a visitor to the booth, good friend Andy Howard, WA4KCY; on the right is Barry Wiseman, N6CSW/Ø, ER Editor. Photo courtesy of Bill Shortz, KA9BZM.

Cathode Degeneration

by George Watson, WØLOB
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Does the audio gain of your transmitter seem low? You have to run the "Mic Gain" nearly wide open to adequately modulate the carrier? Several causes are possible such as weak tubes, low-Z microphone feeding a high-Z circuit, crystal element of the microphone getting tired, poor design, etc. The one cause I have found more prevalent than others is the bypass capacitors in the cathode circuits of the audio amplifiers. For some reason I get a quiet "uh?" from various hams when I discuss this problem--especially when I mention that the problem is "signal degeneration."

Do you remember the rust-colored Sangamo capacitors the Johnson Co. used in most of their transmitter circuits--in the Ranger, Viking I, Viking II, and Valiant? These units are 10 mFd/25V and are used as cathode bypasses in the mic circuits.

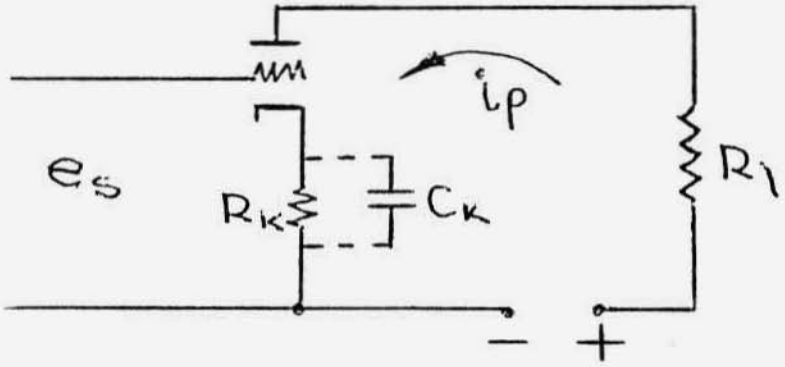
Looking at the basic circuit:
ip = ues / (rp + Rk(u+1) + R1), where
* ip is plate current, w/o Ck
* ues is plate signal voltage
* rp is plate resistance
* Rk(u+1) is effective k resistance
* R1 is load resistance
* u is tube transconductance
* es is grid signal input voltage

At a given instant rp and R1 are fixed in value (constant), so to simplify the equation, ip = ues / (constant + Rk(u+1).

Thus the gain has been reduced by the factor Rk(u+1). What the circuit experiences is an IR drop across the cathode which is approximately 180 degrees out of phase with the input voltage--that is, there is signal degeneration. This drop in signal is due to the alternating current (signal) loss in Rk--different than the bias developed across the cathode resistor caused by DC current flow.

To prevent any signal loss across Rk (degeneration), a capacitor, Ck, is placed across Rk of such value as to bypass the signal around Rk. The reactance of Ck (1/2pifC) is typically set at about 1/10 the value of Rk at the lowest frequency (f) of interest--100, 300 Hz, or whatever. Note that the signal distortion will increase nearly inversely as the degeneration decreases. This distortion increases should not be a problem as proper cathode bypassing is merely returning the circuit to its original design condition of gain and distortion.

Check those cathode bypass capacitors, stop the degeneration, and get the gain your microphone circuit was designed for. ER



VINTAGE NETS

Westcoast AM Net: Meets informally, nightly on 3870 at 9:30 PT. Wednesday at 9:00 PM PT they have their formal AM net which includes a swap session. Net control rotates.
California Early Bird Net: Wednesday nights at 8 PM PT on 3835.
Southeast Swap Net: Tuesday nights at 7:30 ET on 3885. Net control is Andy, WA4KCY. This same group also has a Sunday afternoon net on 3885 at 2 PM ET.
Eastern AM Swap Net: Thursday evenings on 3885 at 7:30 ET. This net is for the exchange of AM related equipment only.
Northwest AM Net: Recently started by Pat, K7YIR, this net is on 3875, Mondays and Fridays at 9:30 PT. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT.
Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 5:00 PM PT, 7 days a week and usually goes for about 2 hours. Net control is Les, K6HQI.
Arizona AM Net: Meets Sundays at 3 PM MT on 3860. On 6 meters (50.4) this group meets at 8 PM MT Saturdays.
Colorado Morning Net: An informal group of AM'ers get together on 3875 Monday, Wednesday and Friday mornings at 7AM MT.
DX-60 Net: This net meets on 7290 at 2 PM ET, Sundays. Net control is Jim, N8LUV. This net is all about entry-level AM rigs like the Heath DX-60.
Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is usually Walt, KJ4KV, but sometimes it rotates to other ops. It starts at 5 AM ET Saturday mornings on 3885.
Military Radio Collectors Net: Meets Sundays at 4 PT on 3905. Net control is Tom, WA6OPE. It is not necessary to check in with military gear.
Grey Hair Net: The oldest (or one of the oldest) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8 PM in the winter and 9 PM ET in the summer.
Vintage CW Net: For CW ops who enjoy using vintage equipment.This is not a traffic net; speed is not important. The net meets on 14.062, Saturdays at 3 PM PT. Net control is Tracy, WB6TMY.
Vintage SSB Net: Net control is Chuck, N5SWO. The group meets on 14.293 at 1 PM CT, Sunday afternoons.
Collins Users Net: The oldest of the 'users nets'. It meets on 14.263 Sunday afternoons at 2 PM CT. The net control revolves. This group also gets together for an informal ragchew on 3805 Tuesday evenings at 7 PM CT.
Drake Users Net: Another relatively new net. This group gets together on 3865 Saturday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, WZ8O; Rob, KE3EE and Huey, KD3UI.
Heath Users Net: A new net started by Marty, WB2FOU/5. Net control is shared by Fred, AA5LW. It meets on 14.275 at 4 PM CT Sundays. Check in on either AM or SSB.
Swan Users Net: This group meets on 14.250 Sunday afternoons at 4 PM CT. The net control is usually Dean, WA9AZK.
Nostalgia/Hi-Fi Net: Meets on Fridays at 7 PM PT on 1930. This net has been meeting since 1978.
K1JCL 6-Meter AM Repeater: Located in Connecticut it operates on 50.4 in and 50.5 out.
JA AM Net: 14.190 at 0100 UTC, Saturdays and Sundays. Stan Tajima, JA1DNQ is net control.
NBFM Net: 3885 at 10.30 PT, Thursdays. Net control is Dennis Petrich, KØEOO.
Fort Wayne Area 6-Meter AM Net: Meets nightly at 7 PM ET on 50.58 MHz. This net has been meeting since the late '50's. Most members are using vintage or homebrew gear.
Westcoast Broadcast Equipment Net: Tuesdays on 1959 at 9 PM PT. Anybody is invited to join the group, but the emphasis will be on broadcast equipment. Moderator is Mike, W6THW.

Follow-Up to "The Multi-Elmac Company" in ER#39

A letter to Lea Salter,KN4JW

by George H. Goldstone
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Bloomfield Hills, MI 48304

Quite some time ago, you talked to me about MULTI-ELMAC equipment, and an ATR-4 SSB Transceiver prototype, which I then owned. I sold it (in a weak moment) to a ham operator who just had to have it for his collection. I believe he later sold it to you, so I know it is now in good hands! In fact, I believe it is the one pictured in *Electric Radio* for July, 1992, accompanying your article on MULTI-ELMAC equipment and the Multi-Products Company.

I have intended for some time to write you, with more details of MULTI-ELMAC. There were a few small errors that could be cleared up, although the article was very interesting, and a story worth telling.

Multi-Products Company - which hams always called "ELMAC" - was a spin-off from Weltronic, Inc., a manufacturer of welding equipment controls that catered largely to the automobile industry and its suppliers. It was founded and owned in its entirety by the late Cletus ("Clete") Collom. Its engineering staff included Gustav E. Undy ("Gus", W8YNC), whose wife was a sister of Mable Collom, Clete's wife. When it became evident that there was a good market for radio controls for garage door openers, Multi-Products Company was formed. All the stock stayed in the family; Mable Collom owned a majority of the shares, and the other stockholders were Jack Bourassa, Phillip Cummings, Gervase (Jerry) McKeon, and Gus Undy. Bourassa was president of the company; Cummings was Treasurer; McKeon was Production Manager; and Gus Undy was Chief Engineer. All four were related by marriage to Clete Collom and his wife, Mable. They were a warm, friendly group. The business did well, primarily because Gus Undy had invented a patented circuit which used discrete audio frequencies to frequency modulate the RF carrier used in their radio controls. Initially, these operated in the 11 meter band. Besides their principal use in controlling garage door openers, they were also used to control factory doors and gates, and even railway crossing signals inside factory yards. At a later date, they were incorporated into security and alarm systems of various sorts. The company did NOT then make marine radios; that came much later.

While their plant was located in a small shop in Hazel Park, Michigan, Gus Undy designed a mobile transmitter for his personal use. This was actually the design prototype for the A-54. Two of Gus' friends were Jerry Richards, W8VQD, and George Wilde, W8CYL. Jerry was a manufacturer's representative for a welding products company, and was acquainted with Clete Collom. Both Jerry and George were convinced that Gus' transmitter would have a good amateur radio market, as no other ham mobile rig then included a VFO. Also, it was considerably smaller than the Harvey-Wells TBS-50, (then the mobile rig of choice), which had no internal VFO.

In 1951, after a long discussion, Jack Bourassa agreed that the company would build 10 production prototypes of what was to be called the A-54. These used many off-the-shelf parts, such as a dial made by National, a stock 2" Simpson meter, etc. I was not then Multi-Products Company's legal counsel, but was one of the group urging production of the transmitter.

Since I was driving to Seattle to attend that year's National ARRL convention, it was decided to install one of

Gus Undy, Multi-Elmac Chief Engineer

the 10 A-54's in my Buick, and get it some exposure in Seattle. I spoke to my friend, Leo Meyerson, owner of World Radio Labs, in Council Bluffs, Iowa, about this new mobile rig about to be put on the market, asking if it could be displayed in his convention exhibit. Leo - who was then the country's largest ham radio mail order dealer - agreed at once. I recall that when I described the rig, he said, "George, when can they make deliveries, and what are my discounts?" You can imagine my reaction; here I was, simply a friend of the principals at Multi-Products - generating sales of a new but market-viable product!

Seattle was more fun than I can describe. I parked my car, with the A-54 in it, right outside the front door of the convention hotel - where everybody looked inside at this new rig. (A little grease to the doorman took care of this spot!) At that time, 75 meter mobile was the "big" item, along with 10 meter mobile for Civil Defense work. Gus flew out from Detroit, bringing another prototype A-54, which Leo featured in his exhibit. When the convention exhibit area opened, there was a big crowd around World Radio Labs' booth, all looking over this new mobile rig. Other dealers were there, too, and they were referred to me by Leo when they asked him how they could order the rig. Mind you, this was before the rig went into production! By the time I got back to Detroit, I was getting phone calls from Bill Harrison (Harrison Radio, in New York) and others about the A-54. I considered it some sort of a marketing triumph!

In describing the PMR-6 manual, you said that "The manual for this receiver is very good" - and spoke favorably of the details it included. Lea, I wrote that manual! Gus was not satisfied with the A-54 manual, written by a local Bell Telephone type. When I concurred with his opinion, Gus asked me, "Would you like to write the manual for our new receiver?" (The design of which he had about completed). I said I would - and I did. The layout of the manual copied the subdivisions of a typical military equipment manual, with which I was

continued next page

Multi-Elmac from previous page
more than familiar. Its style was used in all later MULTI-ELMAC manuals, a great source of satisfaction to me.

ELMAC did not have a dealer organization. I suggested that they sell only to Collins Radio dealers, who had been carefully screened by Collins. When that suggestion was followed, I told Dick Bellew, Collins' amateur radio sales manager, that ELMAC was restricting its sales outlets to Collins dealers. Dick - another personal friend of mine - was very pleased -- and inevitably, he told Collins dealers about this new product! Most of them took on the ELMAC line. (At that time, Collins was not manufacturing any mobile rigs. The KWM-1 came much later).

The AF-67 was designed by Gus Undy; you will see his name in the title block of the circuit diagram, dated September 26, 1953. I now have Gus' original production prototype of that rig, which I am about to restore. (Or is this something you want for your Multi-Elmac collection?)

I do not remember when Jack Bourassa died; but upon his death, Gus Undy was elected president of the company. Bob Leland, W8GBT, was made Chief Engineer. Bob had been working to a considerable extent on new variations of the patented Undy circuit for radio controls, and even patented a unique clam-shell case for the radio control transmitter! Bob, like Gus, was a brilliant engineer. It was Bob who designed the ATR-4 circuit, not Angelo Diamontoni. "Angie" - as we all call him - started working for Multi-Elmac after graduating from high school. He had remarkable talent in the mechanical design of radio equipment - and as I recall, he was charged with putting Bob Leland's concepts into physical form. The clean lines and layout of the ATR-4 were a demonstration of Angelo's ability. The ATR-4's dial assembly is, I think, as smooth a dial as I have ever encountered. It can be compared with German and Japanese products, and will come out ahead. Your article in *Electric Radio* seemed to confirm that.

It should be mentioned, perhaps, that the name "MULTI-ELMAC" was adopted after Eitel-McCullough objected to use of "ELMAC" standing alone as too similar to their trademark, "EIMAC".

George Wilde, W8CYL, served for a while as Sales Manager for Multi-Products. During his tenure in that office, the company developed several marine products: a marine radio sold under the name "Sea-Rad"; a gasoline vapor detector called "Sea-Fume"; and a depth finder called "See-Deep". These lines, although well-received, were abandoned due to the high cost of sales development in competition with Raytheon, Jefferson-Travis, and other established manufacturers of marine electronics. A further reason, which ultimately led to dropping everything but radio controls, was that it was more economic to devote a production line to the controls (where Multi-Products Company was already an industry leader) than to use that same production line for products where a market had to be developed. George, W8CYL, was made General Manager of the company's Canadian operation in Windsor, Ontario (across the river from Detroit), which post he held until he retired.

I had heard the story about Bob Drake visiting the Multi-Products Co. plant (then in Oak Park, Michigan) and his examining the prototype ATR-4. Supposedly he adopted one of its features - crystal pre-mixing - in his TR-3 design. The TR-3 came out at $495, I believe, and that is what killed the ATR-4 project. Multi-Elmac had hoped to sell the ATR-4 for just under $1,000; but the TR-3 preempted the competition! The Hallicrafters SR-160 was also pushed from the market by the low-price of the TR-3.

The A-54, Multi-Elmac's first transmitter that was introduced in 1951. It featured an 807 in the final and was modulated by a pair of 6L6's. It operated on 80,20, 11 and 10 meters and had an extra position on the bandswitch 'X' for installation of 160M, 40M or 6M coils. This rig sold for $139 and was capble of a maximum of 50 watts input.

Multi-Products also entered the CB market, and had a good position there using the trade name "Citi-fone", which had earlier been applied to a 450 MHz transceiver of Gus Undy's design; a product which never took off. The name "Citi-fone" was applied to a new 5-channel CB unit, which sold well. Later, the Citi-fone Model SS was regarded as the Cadillac of CB sets at the time. They left this market because of rising production costs, and the influx of Japanese produced units. They did design a tiny transverter (to be used with the auto radio BC set), which was to be produced in Japan; but that project was dropped along with the entire CB line.

Management finally decided that the most profitable part of their business was the original product - a radio control that would make or break a circuit. In the area of garage doors openers, there are 3 major components: The garage door; the mechanical operator; and the radio control. The Stanley Works already owned Overhead Door Co., a manufacturer of the doors, as well as Vemco, Inc., a manufacturer of the mechanical operators. Multi-Products Co. was selling Vemco its radio controls - so it was a logical step for Stanley to integrate its business by buying multi-Products Co. This was accomplished by merging Multi-Products into Stanley Works. The company now operates as Stanley Electronics, a division of The Stanley Works, with its plant in Novi, Michigan, northwest of Detroit.

Gus Undy lives in Michigan during the summer, and in Mesa, Arizona, during the winter. All the other officers of Multi-Products are deceased, as are

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A Transmitter Story

by Donald F. Meadows, N6DM
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Yuba City, CA 95993

The story begins in the American Sector of West Berlin in May, 1956. My U.S. Army tour of duty was about to end. I had been off the air for three years and I dreamed about returning to the ham bands. It had to be on a low budget, as I was engaged to be married later that year. I could delve into my junk box filled with war-surplus material, possibly resurrecting a chirpy ARC-5 transmitter, possibly homebrewing something from scratch, but this would take time. And I was eager to get back on the air immediately. During my stint in the army, the Novice license had created a growing market for a low-cost CW transmitter in kit form, simple but dependable bandswitching rigs that were TVI-proofed. It seemed more practical to invest a few dollars in a kit transmitter.

I purchased the Knight 50-Watt Transmitter kit marketed by Allied Radio. A model designation was never assigned to this kit--it was always promoted simply as the "Knight 50-Watt Transmitter." Referring to my Allied Radio catalogs of the period, I find that it cost $43.75 in 1957. In 1958 and 1959 the price had dropped to $38.95, possibly to compete with the Heathkit DX-20 which sold for $35.95. In 1961, its last year on the market, the price of the Knight 50-Watt Transmitter had risen to $42.95. In the 1962 Allied Radio catalog it was replaced by a new, completely redesigned transmitter called the "Knight T-60." This new kit sold for $49.95

The Knight 50-Watt Transmitter consisted of a 6AG7 crystal oscillator stage capacity coupled to an 807 final with a pi-network output. One had the bandswitched option of 80, 40, 20, 15, and 10 meters. Operation on 20, 15, and 10 required excitation from a 40-meter crystal or VFO. Efficiency on 10 meters was marginal and the 807's plate would blush due to low excitation from the 6AG7 operating as a frequency quadrupler. The self-contained power supply used a 5U4G rectifier tube into a capacitor-input filter with a smoothing choke. The transmitter was assembled on a steel chassis and was housed in a steel cabinet painted gray on the outside. The chassis and all interior surfaces of the cabinet and panel were copper plated.

The Knight 50-Watt Transmitter represents perhaps one of the last novice kits that used no solid-state components. The introduction of inexpensive silicon-diode power rectifiers around 1960 began a new engineering trend in ham equipment which gained momentum during the vacuum tube's final years -- the gradual replacement of vacuum tubes by solid-state devices. The Knight 50-Watt Transmitter also was among the last of its genre that still used power tubes already considered obsolete. According to old RCA tube manuals, the 6AG7 was originally designed for use in the output stage of video amplifiers in TV sets. Around 1950, however, its merits as a crystal-oscillator tube were recognized and it became a traditional standard in ham transmitters. For this application, the 6AG7 was unique in its time. Its 9-watt plate dissipation was combined with excellent power sensitivity (11,000 micromhos) and its internal shielding was outstanding. Its grid-plate capacity (0.06 pF) was roughly one-tenth that

The Knight 50-Watt transmitter.

of beam tetrodes such as the 6L6. By the mid-fifties, the 6AG7, a metal tube with an octal base, was already obsolete, having been superseded by the 6CL6, its miniature equivalent. The 807, too, was obsolete, completely overshadowed by the 6146. During the decade of the fifties, Allied Radio's Knight 50-Watt Transmitter with its 6AG7/807/5U4G tube complement continued to sell. But during this time, tube technology prompted by the television boom had been creating newer and more efficient power-tube designs. These tubes, produced in great numbers, were also relatively cheap. Therefore, it is not surprising that the Knight 50-Watt Transmitter's successor, the Knight T-60 which appeared in 1962, used a 6HF8 oscillator-multiplier, a 6DQ6B final amplifier, and silicon-diode rectifiers in the power supply. My Knight 50-Watt Transmitter is both a technological artifact and a sentimental relic. It represents a specific period in transmitter-kit evolution and its use also resurrects fond memories of yesteryear's hamming.

In 1956, I could have purchased other manufacturers' kits for roughly the same price. Why did I choose the Knight? Probably because in Germany at that time I had access only to an Allied Radio catalog. My army intelligence unit worked closely with an electronic communications section. I vaguely recall my commanding officer once saying that certain maintenance parts could be gotten much faster via direct order from Allied Radio than through normal army channels. I'm not sure how the finances were handled. I probably chose the Knight because its final was the venerable 807, driven with a 6AG7, which had been promoted in *QST* articles as a superior crystal-oscillator tube that keyed well and gave good output on harmonics. I probably thought of TVI protection because of the 16 screws securing the Knight's panel to its cabinet

continued next page

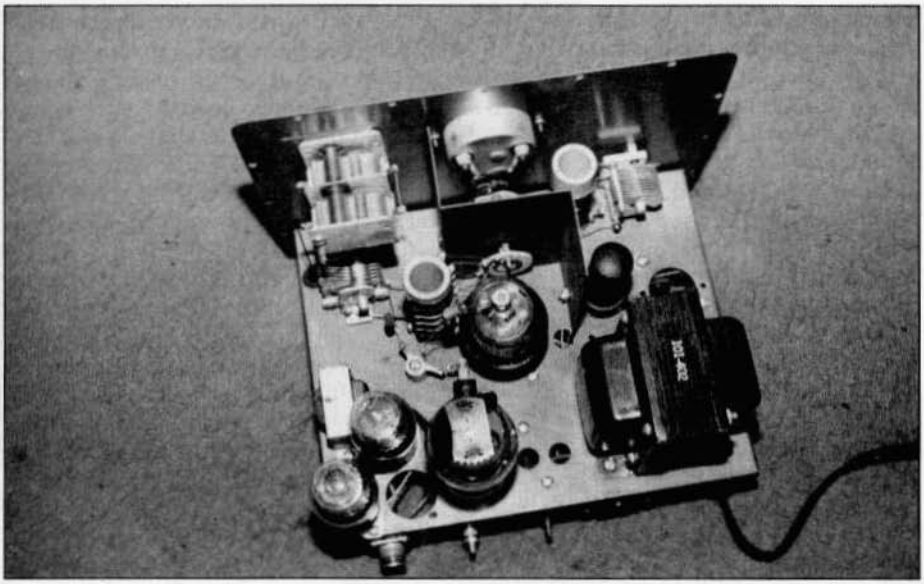
A Transmitter Story from previous page
which gave the rig a solid look of quality. It seemed to be in keeping with traditional, proven ham-transmitter technology as I then understood it. Allied Radio had a good image for standing behind their merchandise. The Knight transmitter's catalog description seemed adequate, even rather exciting. It was TVI-proofed. It used a pi-network output circuit. It was bandswitching, 80 through 10 meters. So I ordered my first Knight kit. My mustering out of the army took place at Fort Ord, California in June, 1956. I remember sending off a money order to Allied Radio in early May from West Berlin so that the kit would be waiting for me when I arrived home as a civilian, eager to put W6ZGM (my old call) back on the air.

The Knight 50-Watt Transmitter served me well for two years. My old logs of the period show dozens of entries. Well over 50 percent of calls resulted in a QSO, most of which were on 40 meter CW. There were a few DX contacts with VK, ZL, and UAO. There also must have been some fine extended ragchews. Back then, the FCC required logging of all transmissions with a time-on/time-off entry. My logs show that most contacts ran from about ten minutes to well over an hour. In 1958, the Knight transmitter was finally shut down because the operator, now fully occupied in graduate school at UC Berkeley, no longer had time for hamming. My very last operation with the Knight 50-Watt Transmitter was on April 3, 1958. My wife and I were spending Easter vacation with my parents in Southern California, at whose residence the station was located. The log shows that this last QSO was on 40-meter CW with VK4SS. It began at 2335 local time and lasted ten minutes. The entry shows a 579 signal report both ways, gives the op's name as Al, and indicates that he was lost in QRM.

It happened that an old ham buddy and his new wife had just become established in Northern California about this time. He, like me two years before, desired quick access to the CW bands and was glad to become the new custodian of the Knight 50-Watt Transmitter. The old buddy was Jim Maxwell, W6CUF, a hometown friend both on and off the air. Under his present call, W6CF, Jim is now recognized worldwide as a DX authority, writer, and radio historian. Jim used the Knight transmitter briefly until he could upgrade to better equipment. The rig was boxed and forgotten for 35 years.

In September, 1993 fate awakened the Knight 50-Watt Transmitter from its long sleep. During a remodeling project, Jim stumbled upon it lying quietly in its dusty carton. A long-distance phone call informed me of the discovery. Jim was scheduled to give his popular talk on the evolution of Morse code at a ham club meeting in my area. He suggested that I attend the meeting as then he could return the Knight rig to me personally. Suffice it to say, that evening was nostalgic ecstasy.

The Knight transmitter was remarkably well preserved. The flecks of rust penetrating the original gray finish were easily removed with steel wool soaked in WD-40. The copper-plated interior surfaces had not suffered. Examination on the bench showed that the transmitter had undergone some modifications. Some of the mods were probably mine, some Jim's. Someone had added VR tubes. I recall once having received an Offical Observer notice for chirp on 15 meters. Someone had added an RCA phono jack on the front panel for shielded VFO input. However, the original RF circuitry hadn't been touched. After removal of the dust and grime accumulation of decades, the time seemed right for the smoke test. Resistance checks showed all to be in order, so I plugged the power cord into a Variac beginning at zero line voltage. Thirty-



Looking down from the rear on the Knight 50-Watt transmitter.

five years of dormancy can do funny things to electrolytic filter capacitors. A gradual increase of line voltage to normal caused nothing to smell, sizzle or pop.

The Knight 50-Watt Transmitter used the 6AG7 as a modified-Pierce tuned-plate oscillator-multiplier. This circuit performs well with crystals of normal activity. With some crystals, however, it tends to be fussy. A given crystal might sound marginally decent on the fundamental, but chirp atrociously on harmonics. The basic Pierce oscillator circuit depends upon a ratio of tube interelectrode capacities in establishing the magnitude of feedback. Thus variations among tubes of the same type can be significant, as differences of a few picofarads can change this ratio. This probably explains why either Jim or I added VR tubes to the Knight transmitter. We assumed the chirp on crystal harmonics was a power-supply problem of voltage regulation, not realizing the circuit itself might be the culprit. It is unclear why the designers of the Knight 50-Watt Transmitter chose this particular oscillator circuit. The "hot-cathode" Colpitts circuit was also common at the time and had distinct advantages. Crystals would oscillate over a wide frequency range without adjustment of feedback. The circuit was thus quite tolerant of varying crystal activity. One side of the crystal is grounded, simplifying crystal switching . The oscillator's anode (screen grid) is grounded for RF, producing an electron-coupled configuration which, with the 6AG7, permits grid input and plate output on the same frequency with minimal interaction. The Knight version of the modified-Pierce, however, operated the screen above RF ground, thus forfeiting the benefit of input-output isolation. A possible explanation why the Allied Radio engineers chose the modified-Pierce circuit may have been mechanical expediency. This circuit permits introduction of VFO input by simply removing the crystal and plugging in the VFO. Without the crystal this circuit resembles a typical RF amplifier stage willing to accept RF input between grid and ground. The typical VFO

continued next page

crystal substitute of the time was designed to produce about ten volts of RF across a load of approximately 50,000 ohms shunted by about 30 pF. The output of these VFOs required that one conductor be at RF potential, the other at RF and DC ground. The Knight 50-Watt Transmitter used an octal tube socket for VFO/crystal input. Two holes accept the crystal; two other holes accept the VFO. The "hot-cathode" Colpitts crystal oscillator circuit, on the other hand, performed brilliantly with crystals, but VFO input required bypassing the series cathode choke to ground for RF. This may have posed a mechanical problem for the design engineers. They needed a simple way to introduce both crystal and VFO input into the transmitter without internal switching in the oscillator circuit.

The Knight 50-Watt Transmitter keys the 6AG7 and 807 cathodes in parallel. Back in the fifties, dissatisfied with its performance with crystals, I drove it with a Heathkit VF-1 VFO. I recall with nostalgia the receive-transmit routine. First, flip the antenna knife switch from receiver to transmitter. Next, switch on the VF-1 whose steady carrier was loud in the receiver. Then back off RF gain of the receiver. Now key the Knight 50-Watt Transmitter whose signal almost blocked the receiver, but still let me follow keying. The Heathkit VF-1 VFO, not being keyed, caused no chirp and only presented the problem of drift, which was well under one kilohertz during an average transmission.

After 35 years, the Knight 50-Watt Transmitter is now back on the air. The original tubes in it still perform. Its undamped meter needle vibrates as wildly as ever during keying, evoking memories. One remembers to ignore the meter and just tune the rig for maximum output. Switching the meter to the grid-current position reduces the needle's travel and the noise it makes by hitting its stop. For a steady-carrier mode such as AM, this meter behavior would not be a problem. The 807 pi-section output circuit feeds a 50-ohm resistive antenna load with ease, and it's also nice to know that a weird mismatch at full input won't blow the final. I now use the Knight 50-Watt Transmitter several times a week on CW skeds with full break-in. I drive it with a homebrew tube VFO based on the series-tuned Colpitts circuit (also known as the Clapp oscillator) with a remote tuned circuit connected to the oscillator tube unit through two coaxial cables, four feet long. One cable feeds the oscillator grid, the other the oscillator cathode. The tuned circuit is thus removed from heat sources. This series-tuned configuration provides very loose coupling to the VFO oscillator tube and permits keying its cathode in parallel with the cathodes of the 6AG7 and 807. The keying is state of the art. After a 20-minute warmup, the drift is less than 40 Hz per hour. I receive on my Kenwood TS-940S on a separate antenna. Yep, I admit this is intellectually dishonest for a true nostalgist. I rationalize by considering the Kenwood merely as a piece of precision test gear which helps provide measurable insight into the performance of yesteryear's transmitter technology. The Knight 50-Watt Transmitter's return to the shack is like a nostalgic reunion with a long-absent family member. Each contact it produces has a special meaning. ER

ER Classifieds Ads--Fun On The Phone

by George Babits, WA7HDL
Route 1, Box 178-A6
Salmon, ID 83467

For about the past 15 years I've "worked" the classified ads. This has been not so much as a "for profit" venture, but to keep things moving, meet interesting people and support my hobbies (radio, antique firearms, horses and Land Rovers).

Over this time I've bought and sold through the local "nickle ad" type papers, the blank-blank and the blank-blank-blank. I doubt that I could ever claim a profit from the accounting side, but it has been a ball.

I've been using Electric Radio exclusively for the past 3 years and find that ER subscribers are head and shoulders above some of the people I've dealt with in other sources.

If you aren't using the classified ad section in Electric Radio, you are missing half the fun of your hobby!

First of all, the classified section provides a wonderful means of cleaning out the basement or storage shed. That helps a lot of other people by getting vintage gear you no longer want back into circulation. So often someone is looking for just that piece of equipment gathering dust in your pile of plunder.

Secondly, most of us are willing to pay for what we want, so you can turn your unwanted equipment into dollars or trade for things you need. Everybody comes out on top that way.

Finally, if you live out in the sticks like I do, you will meet a lot of people with common interests. It's like having a hamfest in your own living room when you use the classifieds. In the February issue I ran three adds, mostly for WW II surplus. Not only did all the gear sell, but I spent hours on the phone talking with people all over the country who like the same sort of equipment that I do. Since the few hams in this area are mostly "appliance operators," the conversations and contacts would have been worth the cost of the adds even if I didn't sell a single thing! That is a real plus when the nearest hamfests are 300 or more miles away.

A few words of advice for you when you use the classified ads.

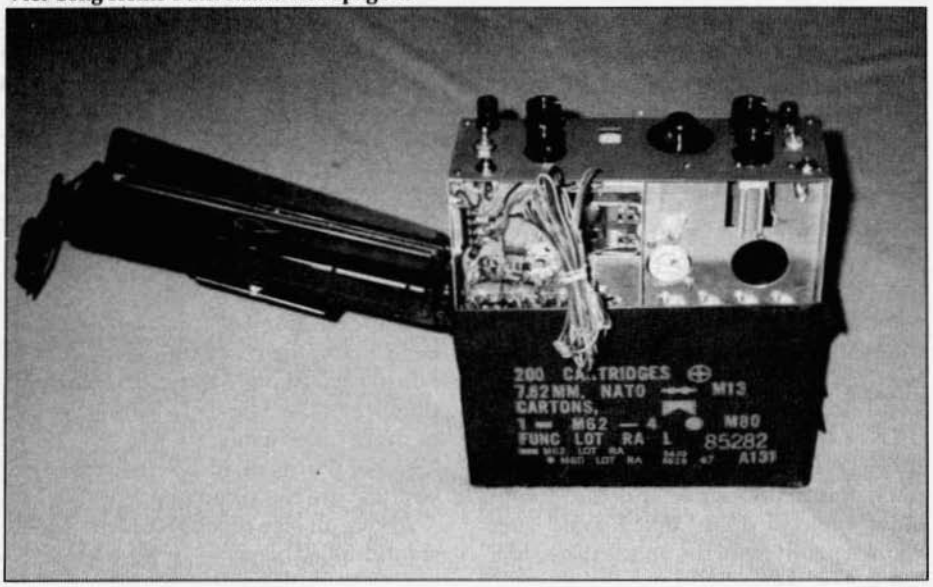
Above all else BE HONEST. Honesty should be adhered to in all your dealings. When the calls and letters start coming in, describe whatever you have for sale in the greatest detail you can. There have been a lot of times I had to bring equipment to the phone so I could describe every defect I could see or knew about. That is the only way to avoid a lot of hard feelings and bitterness later on. If the thing doesn't work or if the meter glass is broken, say so. Most collectors of vintage equipment are knowledgeable enough to fix what they collect, but they want to know what they are buying.

If you don't know what something is worth, read the ads to see what people are asking for the same equipment. Hamfest prices are generally poor indicators of value. Pristine equipment will almost always command a better price than well used or abused gear. If you put an outrageous price on something you won't even get a call. On the other hand if the phone rings off the hook for a couple of weeks, you probably left a lot of money on the table. Do a little research and come up with a reasonable asking price.

Electric Radio readers are scattered all over the world. If you have equipment that can be shipped and want to

continued on page 38

Viet Cong Home Built Radio from page 13



Completed set partially inserted into ammo can.

The detector portion was then wired and coupled to the amplification stages through an RF choke. Since I could not find a circuit for an RF amplifier that did not use a coil, I decided to eliminate the first tube. The coil was wound on an octal tube base with a cardboard insert and plugged into the socket. The set was powered up and nothing happened! I had a local collector go over the set and we reached the conclusion that the problem was in the detector circuit. After several further attempts to get the set operational I gave in and took the set to Don Dean in Sarasota who repairs old time radios. Don went over the set and finally got it to work. He rewired the coil and eliminated two stages of amplification. The end result was that a 1S5 tube was used for the detector and a 1T4 was used as an amplifier. In Sarasota, with a good antenna the set picked up 5 local AM Stations. In Largo it got three stations using a 30 foot copper wire antenna. The set now sits on the shelf as part of my Technical Intelligence Museum Displays.

Several conclusions were reached as a result of this project. The first is that the set could have been made much smaller and still put in an ammo can and there would have been room for batteries, head set and antenna. The second conclusion was that it would have been easier to use a long strip of aluminum bent to shape than to have made it from separate panels. Of course, the Viet Cong may not have had a long strip of aluminum and were forced to use small scraps for the chassis.

It is questionable if the original set ever saw service or was captured when U.S. Forces overran the underground factory. It is also possible that they could not get the original set to work which is why it was dropped and the other side was never wired. If anyone who reads this article has any thoughts on the use of the first tube ahead of the detector or the possible use of the unwired section, I would be interested to hear from them.

ER

The P.R. Mallory Story from page 13

Cabinet Company. Some engineers and other key employees, plus locally hired production workers were soon making vitreous enamel power resistors, power rheostats, switches, jacks, plugs, variable wire wound resistors, and carbon composition volume controls and attached switches. Another part of the plant made Inductuners and government electronic equipment. Employment rose to over 1000 persons in Frankfort. In 1962 a new plant was built on Highway 28 about 3 miles west of town.

In 1957 through an exchange of stock Mallory acquired the Radio Materials Corp. Radio Materials had a plant in Chicago, IL, and in Attica, IN. Their main product was disc capacitors. About the same time Mallory bought the General Dry Battery Co. of Cleveland, OH. General made zinc carbon batteries. This was intended to make Mallory a full line battery company.

During 1962 P.R. Mallory retired as president of the company and served as chairman of the board until the end of 1964. He then moved to Florida where he lived until he died.

Several things led to the demise of the P.R. Mallory Co., Inc. These events were:

1. Dart Industries wanted the Duracell Battery Division. Through a stock buyout they gained control and separated the battery division from the rest of the company.
2. They then sold all but the battery division to the Emhart Corp.
3. The Emhart Corp. was acquired by the Black and Decker Co.
4. At this time most of the capacitor plants were sold or closed. The Distributor Products Division was closed.
5. The Timers Division, which made washing machine, clothes dryer, dish washer, etc., timers, was purchased by the Emerson Electric Company.

I am happy that P. R. Mallory wasn't alive when the company ceased to exist as it was when he retired. **ER**

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Ask your distributor for technical data on Vibrapacks, or write for Form E-555.

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Editor's comments from page 1

Thursday morning we were at the Hamvention to set up. We let Shirley, Kacte and Pam do most of this while Bill, Dan and I roamed around the flea market area which was also setting up. The vastness of this area is awesome. Try to image 2880 spaces! It's a long walk from one end to the other, but I sure didn't hear anyone complaining.

Friday morning we were at the hamfest before light. It was raining cats and dogs and it was cold. This was going to be the weather for the entire three days. There were periods when the rain stopped, but these were short. Once the sun came out (I think it was the last day) and a mighty cheer went up and car horns were honking. It didn't stay out long and the cold and wind and intermittent rain returned. I'd heard about the rain in Dayton but I hadn't even bothered to bring any rain gear. I learn the hard way... next year I'll be prepared.

I bought a Viking II that first morning - in the dark (and in the rain) - not knowing what I was really getting. When I got a chance to have a good look at it, it turned out to be a nice unit. Factory wired yet!

At noon on Friday we opened our booth inside and the rush was on. We did very well selling our books, back issues, T-shirts, hats, etc., but the real excitement was meeting our subscribers. They all seemed to be there. I met literally hundreds of people I had come to know on the phone or over the air. I won't mention any names for fear of leaving someone out but it was wonderful meeting everyone.

One of the things we AM'ers and vintage folk have going for us is a sense of community and camaraderie. We are like an ethnic minority.. trying to keep our traditions and history alive. The fellowship we enjoy with one another is probably better and richer than that in any other facet of ham radio.

Saturday was just a repeat of Friday but there was a gloom settling over the flea market because of the rain and cold. Some spots were empty and I think the attendance was lighter than Friday. Walking around in the early morning and later in the day (I took a couple of short breaks from our booth) I felt a sense of sadness. There are a lot of hams who come to Dayton hoping for a good 'payday'. They've gathered up parts or rigs and other stuff all year to sell here. For many of them this year at Dayton was a bust.

Sunday at 2 PM we started packing up our booth. We had over half of our stuff to get back to Durango (I guess I was a little overly optimistic regarding sales) and I had to ask Dan and Bill to haul loads back. It's a blessing to have good friends.

Travelling back on Monday we had a great experience with Les, K6HQL, and a few other AM'ers on 14.286. We checked in when the net started at 5 PM PT and stayed on until we reached Oklahoma City two hours later. Bill, AD6A/5 had a Kenwood TS-50 in the Suburban with a Hustler mobile on the back bumper. Les was giving us reports of 10 and 20 over 9 for the entire 2 hours. Not bad for about 25 watts out!

Next years, the Lord willing, we will be back at Dayton. There will be a few adjustments - like rain gear - and maybe a huskier mobile unit with a Bugcatcher. Bill and I are making plans. Maybe ER will sponsor an "On the Road to Dayton" event.

We arrived back home Tuesday night, May 3 somewhat anxious about what had occurred during our ten-day absence. There was a mountain of mail and of course we had a magazine to get out but as I write this Sunday, May 8 we're caught up and the magazine will be in the mail in the normal time frame.

As a last comment I would like to thank the organizers of the Hamvention for organizing the event and to congratulate them on a job well done. N6CSW/Ø

An article titled: "Packaging To The Year 2000" contains this quote: "Signal integrity of most 50 MHz systems will be dominated by transmission line effects. If the designers are not aware of transmission line properties, there is a good chance that the board will not work".

That author's point is precisely the message I got in the semi-private tutorial from Arthur in the mid '60's. IC's were still very new. IBM's 360 computer had just a few gates on each of its Solid Logic Technology ceramic chips. Arthur understood where all this was going!! Controlled impedance transmission lines were seen as an important element of it, as history has now proven. This is but one of thousands of examples of his clear view of technology's future.

The privilege of working with Arthur Collins has a priceless value never to be forgotten. As many will attest, it wasn't always easy at the time. However, the standards of excellence one learned, plus the brilliant and fundamentally correct ways of approaching design, were an inspiration. Many agree that, all together, it was a culture. I certainly believe that. As one looks over the employee alumni association from Collins, it's hard to miss the point that it was a unique and valuable environment for learning and growth.

A really keen insight to the native genius of Arthur Collins is illustrated by the following quote from an article he wrote on request of the magazine *Radio Age*, May 26, 1926. Arthur was in high school at the time. He had been communicating with the MacMillen Arctic expedition via his own design radios, where the "professionals" had failed.

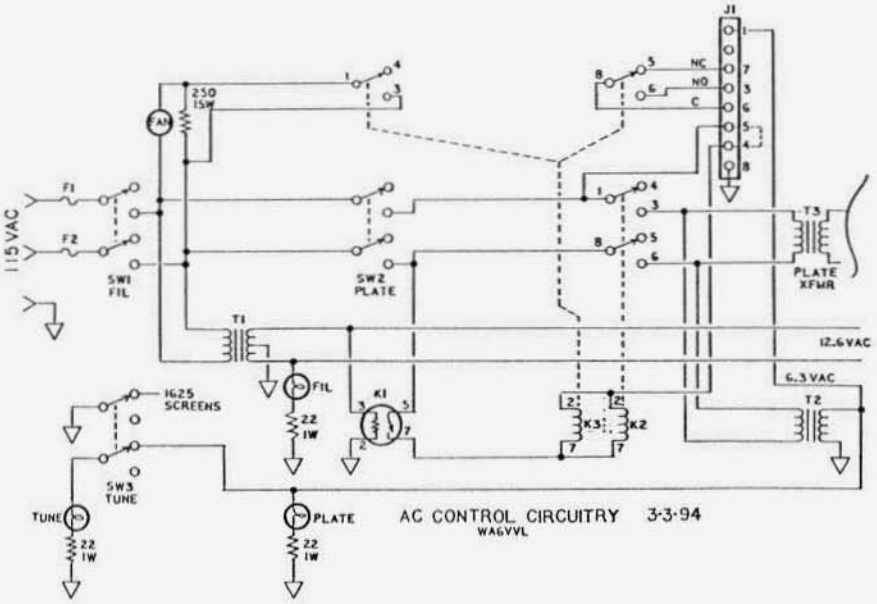
"The real thrill in Amateur work, comes not from talking to stations in distant lands, nor from receiving multitudes of "QSL" cards from all over the world - although these are things that stir the imagination - but comes from knowing that by careful and painstaking work and by diligent and systematic study, you have been able to accomplish some feat, or establish some fact that is a step toward more perfect communication".

I am indebted to Warren Bruene for reminding me of this most inspirational quotation from the youthful Arthur Collins.

As a post script, there are a couple of accounts which are really a part the overall picture, but which didn't fit in as part of the subjects covered above. Yet, they demand to be related. They both deal with the survival of S-Line equipment which fell and "hit the deck", so to speak. The first is a letter we got from a ham shortly after the S-Line was on the market. The owner wrote of his unit being blown out a second story window by a high pressure fire hose that was dowsing a fire in his upstairs ham shack. The unit landed between houses on a concrete drive. The owner said that replacing a tube or two restored it to operation. He was ecstatic!!

What brought that forgotten story to mind was a conversation I had with Arlo Meyer as I was writting this. He mentioned that he had recently dumped his 30-L from a desk to the concrete floor by accidentally pulling a wrong coax. It landed on the upper rear corner by the tube compartment. His first thought was that the 30-L was surely totalled. The cover and sheet metal were heavily damaged. But, after prying the chassis out, and straightening panels with a soft hammer, and a two by four, the tubes were still solidly in their sockets, and the unit is in use almost every day -- as we speak.

A few years ago I had a related experience with a then new (almost all plastic) FAX machine. It slid off the top of my four drawer file cabinet to the carpeted floor. It didn't end up as well as the S-Line equipments! **ER**



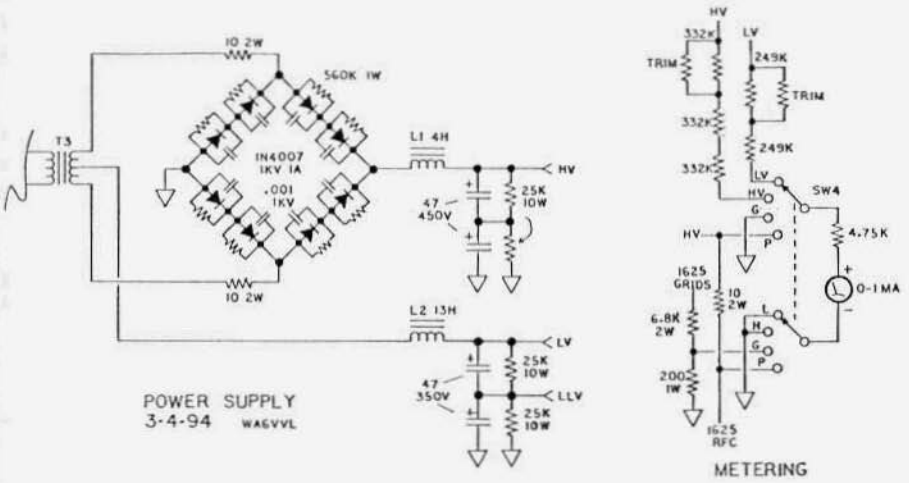
6AG7/1625 Transmitter from page 9

typically 500V. Since there are two resistors in series, the bridge's PRV is limited to 1KV continuous. However, the bridge is now capable of 2 KV transients. The resistors guarantee voltage division across the 1N4007's in the reverse direction by "swamping out" their individual leakages. Even so, make sure that the rectifier diodes are the same number and manufacturer. The ARRL Handbook recommends multiplying the diode's individual PRV by 500 to determine the value of the swamping resistor. The capacitors guarantee voltage division for voltage transients by "swamping out" the individual junction capacitance. Two 10Ω 2W resistors are in the bridge leads to the plate transformer's HV secondary to minimize peak surge/charging currents when the supply is first turned on.

* The power supply PCB is single-sided 0.062" pre-sensitized positive acting board material from GC Electronics. It is 3.6"W x 9.0"L. The PCB was laid out 1:1 on a quad-pad, taped on a clear vinyl sheet protector, and the resultant artwork used to expose the board. The etched board was cut to size with a shear. The power supply PCB is mounted against the sidewall of the enclosure. Three AMP 2x3 0.25" box-style Mate-N-Lok connectors on the power supply PCB are used to connect the plate transformer's HV secondary filter chokes, and DC outputs. Pins were removed from the connectors to increase the pin-to-pin spacing to minimize voltage breakdown problems and to make the PCB easier to lay out. A jumper plug can be used to change the filter configuration from choke-input to capacitor-input if higher output voltages are desired.

* The LV choke is mounted over the HV choke on 2" 8-32 hex spacers to save room.

The metering circuit uses a 0-1 mA Weston model 1521 with dual 0-5 and 0-25 scales. The meter switch has four positions: LV = 0-500V, HV = 0-1KV, GRID =



0-25 mA, and PLATE = 0-500 mA. A small single-sided PCB was designed to accommodate the LV and HV series resistor string. The meter and resistors were bench tested and trimmed to maximize accuracy. A large Mallory 2-pole 5-pos ceramic switch from the "parts unit" was used as the meter switch.

This project required over 70 hours to complete over a three month period, $103 in parts and material, and $130 for the TES Industries enclosure.

Like many of my homebrew projects, several friends have contributed parts and labor: Dave Kamlin, AB6XK's Wireless World - ceramic plate caps, ceramic 7-pin 1625 sockets, and parasitic plate suppressors; Dave/AJ7O - ceramic plate caps in addition to the homebrew dual-6GJ5 transmitter that he sold me for $20 which was the source for many of the major parts for this transmitter; Bradford/N4YYP - 1625's; Barry/N6CSW - 6AG7's and 1625's; Sid/KD6NIM who bent the sheet metal; and Hal/N6ECY - 1629 U-clamp.

Since I did a lot of bench-testing on the various subassemblies as this project went together, the long awaited "smoke test" was without incident or surprises. I had three enjoyable CW QSO's the same day I finished installing the last screw. The transmitter easily loads to 100W input and the output waveform on the SM-220 monitor scope looks pretty clean. The transmitter can be easily loaded to 150W on 40M where I use it the most. The 1625's resting plate current is about 80 mA. The required grid drive is 7-8 mA. The keying characteristics are OK. My first QSO was with Alan, N6RNP, in Paradise, Northern CA, on 40M. Alan gave me a 589. Dave Mills/AJ7O's new QTH in Capistrano Beach is about 30 miles away. Dave gave me a 549. I have had over a dozen CW QSO's with the new transmitter and it has performed very well.

A large SASE with $ .52 stamp will get you full-sized schematics, copies of the original ARRL articles, and copies of the artwork and PCB layouts. **ER**

AMers Rally at Dayton from page 3

Others favored a direct, on-air challenge and questioning of those causing the interference. AMI-South Central Division Director, John Firey, WB5HRI,- said he has disarmed critics of AM by comparing our specialty to the old car hobby. He pointed out just about everyone enjoys sharing the road with antique cars as they travel alongside modern vehicles.

Don later highlighted problems when AM operators fail to zero-beat with others in a roundtable. He said that can aggravate interference with both AM and other operators on an adjacent frequency, and he urged that greater care be taken. Hank Clark, W2IQ, reacted strongly to the criticism by noting he and other operators are crystal-controlled and have no means to adjust frequency.

The discussion moved on to frequency diversity, and a feeling that we are limiting ourselves unfairly to "AM Windows" that some say are not respected by the broader amateur community. Several people noted new gathering points that had gained popularity in the past year along the mid-Atlantic region, including 1900 kcs on 160 meters, and 3825 on 75 meters.

Ultimately, there was some consensus that there's a need for both an established window where people can expect to find AM activity, and a willingness to move elsewhere after making initial contact.

As an aside, there was some grumbling that AM operators themselves fail to allow enough room for other AM QSOs when they establish another conversation nearby. AMI-Northeast Division Director, Steve Ickes, WB3HUZ, prepared a chart showing technically why a minimum of seven to eight kilocycles is a practical spacing to consider adequate.

The size of some roundtables came up for some criticism. One person pointed out how, after about a dozen

It was 'standing room only' at the AM Forum room at Dayton's Hara Arena.

check-ins, it can take the better part of an hour for it to come around again. There was some debate about the merits of 'break-in,' conversational-style QSOs as an alternative to monologues from prepared (and extensive!) notes.

Another idea was to announce that it was time to break a few people away from the group and establish a second conversation elsewhere. The need for this was illustrated by someone who said he has found a dozen people in one roundtable, and no AM activity anywhere else on an uncrowded band.

Many in the audience said they would not consider it rude if someone volunteered with such an initiative, and others said they'd be glad to join the new and smaller group that resulted.

Dramatic hikes in prices for vintage gear also came up for discussion. There was general agreement that this is getting to be an expensive time for a newcomer to join vintage radio. But it was also a chance to stress the need to reach out more warmly to those who are stuck with modern radios for the meantime.

Don suggested it would leave a lasting bad impression if we, as vintage operators, harshly responded to a newcomer with nasty comments about his or her audio -- instead of taking the time to kindly bring the person through the adjustments needed to make that rig sound okay -- and even good -- on AM.

Also at Dayton, the author had the opportunity to have lunch with Dave Sumner, K1ZZ, the executive vice president of the ARRL. Sumner said he envisions higher visibility for AM and vintage radio in the League's operating guides, as well as in continued, occasional articles on the specialty in *QST* magazine.

Sumner said the ARRL Handbook, which in recent years has condensed and minimized its coverage of tube-type vintage radio, may in the future begin to cover modern ways of generating high-quality AM.

I was left with the impression the ARRL top management considers AM one of the many facets in ham radio it supports. I also felt the League is leaving it up to enthusiasts for the mode to bring our activities to their attention. ER

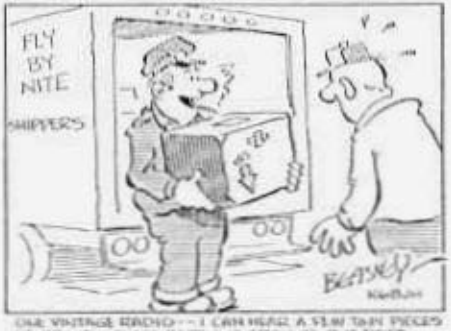
Announcements

Armed Forces Day Operating Event

Don't miss participating in the AMI sponsored Armed Forces Day operating event. For details see ER #60, page 3. Listen for bulletins on the Westcoast 20-M AM net on May 12, 15 and 19. This net operates on 14.286 nightly, starting at 5 PM PT.

Vintage Radio Unique Society Tradefest/Show, May 27-29 in Columbia, SC at the Quality Inn.

This is a three day event that is unique in that it focuses entirely on pre-1970 amateur radio equipment. There will be displays, contests and tailgating. For more info contact Jerryl Sears, WB4JGZ, 312 Auburndale St., Winston-Salem, NC 27104. General info: (910) 765-4302, 6-10 PM



Multi-Elmac from page 23

George Wilde and Bob Leland. I am in contact with Gus, W8YNC, and talk to Angie, W8ERN, every now and then. He has a successful manufacturer's representative business and has a fine family (including grandchildren!). I still think of him as an enthusiastic high school kid, knee-deep in ham radio! He would be a fine role model for a lot of young people.

Getting back to the ATR-4: I had excellent luck with it. It ran hot (like all the prototypes) and could have used a small muffin fan for cooling. I think the perforated steel cover did not allow enough hot air to escape by convection. Despite that, drift was not bad at all. The worst problem I had was in operation of the two control relays. I believe these were operated in tandem by the 6146 cathode current, which had to be carefully adjusted (on the rear chassis apron). I used it mainly as a mobile rig - and my best DX was a fantastic QSO one morning at daybreak, when I had a call on 3.9 MHz from VR4DX on the island of Guadacanal! Yes, I have the QSL to prove it! That surpassed my QSO on 10 meters using my AF-67 with ZE1JK in Southern Rhodisia in 1958.

The AF-67 I just acquired has been identified by Gus Undy as his prototype. He always applied serial No. 100 to his prototypes, so he told me - and that is its number! The 160 and 80 meter coils are missing, but I have B&W coil stock to replace them. I must find a piece of that brass timing chain that operates the band-switch; the present chain is broken. Know any source?

This letter has been long delayed; I had been wanting to write you for some time to make your history of the company more complete. I hope I haven't bored you! **ER**

Fun on the Phone from page 29

sell it, be willing to ship it. UPS will now take up to 150 pounds in the lower 48 states. If you are unwilling to pack equipment for shipment, you might be better off advertising in the local newspaper. You really limit the possibility of selling something when you say "pick up only," unless it is over 150 pounds, or too big like a KW-1 or a lot of navy shipboard gear.

When you pack gear for shipment, visualize the box being run over by a Sherman tank after falling 20,000 feet from the bomb bay of a B-24. If you pack that way it will arrive in one piece. Remember, good vintage equipment is getting harder and harder to find, let's not have it destroyed by careless packing. The heavier something is, the more padding it will need. Fragile equipment needs to be boxed and then that box needs to be placed in a larger box with at least 4 inches of "popcorn" or other padding. One inch thick foam sheets (4 by 8 feet) are inexpensive and can be purchased at any lumber yard. You can make cutouts for knobs and meters to protect them. UPS says you should pack to withstand a 36 inch drop.

When you place a "Wanted" ad, be prepared to pay for whatever you are asking for. If you want something for nothing be honest enough to say so in the ad. An awful lot of classified readers respond to "wanted" ads. Most all of us expect something for our time and equipment. As a matter of courtesy, you should answer everyone who responds to your advertisement.

Watch your timing. It doesn't make much sense to have an ad come out when you will be on an extended trip to Afghanistan looking for vintage gear!

Use the classified ads honestly and wisely. You can find what you are looking for, get rid of what you no longer want, and have fun meeting a lot of good people while doing so. **ER**

CLASSIFIEDS

Advertising Information

Subscribers receive 1 free - 25 word- ad per month. **Extra words are .15.** Here's how to count the words in your ad: the heading - For Sale, Wanted, etc count as **1 word.** Your name, call, address and telephone number count as **6 words.** Hyphenated words count as **2 words. Please count the words in your ad and if you're over 25 words send payment for the extra words.**

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

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DEADLINE FOR THE JUNE ISSUE: JUNE 3

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

FOR SALE: Panaramic Products panadapter PCA-2, w/manual - $50; Hallicrafters panadapter SP 44, w/manual - $35; LM14, w/ book - $30; Galaxy V MKII, w/VFO, 400 W pwr sply & manuals - $90; Harris Communications RF403 VHF xcvr - $50; Heath IP 23 tube tester, w/manual - $35; CE model DQ Q-multiplier, new condx - $40; CE 100S cabinet - $15; Hildrith audio processor - $25; Waters model 359 mic compressor amp - $15; 2 new (recent mfg) Eimac 2E27A's - $45 each; Eimac 304TL w/socket and filament xfmr - $40; 2 new GE 811A's - $15 each; 2 new GE 211's - $15 each; 2 Taylor TZ40's - $15; old 1922 GE 211E - $25. Roger Faulstick, KD4AS, 210 Mariah Ct., Merritt Island, FL 32953. (407) 453-3312, FAX 453-2258

WANTED: Globe King 500 or Johnson 500 within 50 miles of my QTH. Jim Schnecker, N3JUH, Bethlehem, PA (610) 868-4159

WANTED: All types of military electronics, especially RDF and radar items, manuals too. Also need URD2 antenna. William Van Lennep, POB 211 Pepperell, MA 01463. (508) 433-6031

FOR SALE: Collins S-Line aluminum knob inlays: small (exciter/PA tuning) - $1; 30L-1 - $2; spinner/plain (main tuning) - $3. Charlie, K3ICH, 13192 Pinnacle Lane, Leesburg, VA 22075. (703) 822-5643

FOR SALE: T.R. McElroy "Mac Key" s/n 73xx. "9-34", WDS. Fastest RD TGHR, Boston, Mass." - cast on underside. A scarce bug. Best offer. Franklin Albanese, 1610 Prince St., #7, Berkeley, CA 94703. (510) 845-2625 eves

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

FOR SALE or TRADE: Collins S-Line clone, mfg by Eldico - rcvr/xmtr/pwr sply/stn monitor, exc. condx; Fisher tube stereo amp; Kenwood Twins T-599/R-599. **WANTED:** KWM2/A, w/PM2. Joe Perratto, 1341 SW Evergreen Ln., Palm City, FL 34990. (407) 220-7362

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

WANTED: Hammarlund HQ-180 for parts. Barry, N6CSW/Ø, (303) 247-4935

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S-Line etc. and St. James boxes. Also have KHZ dials and hoods for SC101 and 312A-1. Butch, KØBS, (507) 288-0044.

FOR SALE: NOS tubes. Send SASE for list. **WANTED:** Hammarlund HQ-215 and manuals for RT-427/ARC-39 and RT-1113A/PRC-68A. Joseph Pinner, 201 Ruthwood Dr., Lafayette, LA 70503. (318) 981-7766

FOR SALE: .206 stereo plugs used for mics on Collins, Drake, etc. These are true mil-spec machined brass cut offs, like new. Two for $5. We also have a full line of C, HN, SC, SMA and other military connectors available. Call for information or send $.52 for catalog to Texas Connectors, POB 940375, Plano, TX 75094-0375. (214) 423-9625

FOR SALE: Hard bound copy "Radio Digest Illustrated, Vol. 1, Nr. 1 thru Nr. 13; April-July, 1922, offers? John Koehler, W9DGB, 1646 E. Newton Ave., Milwaukee, WI 53211. (414) 964-3656

FOR SALE/WANTED: Tube CB's, list - SASE. **FOR SALE:** Zenith Transoceanic 5G-40 - $75 + UPS; Fisher 90R AM/FM tuner (rare) - $75 + UPS. Charles Zafonte, RFD 1, Box 75, Fort Kent, ME 04743. (207) 834-6273 (n)

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

FOR SALE: Collins WE 75S3-B - $350; 32S1/516F2 - $375; 312B-5, mint - $550; CP-1 - $150; complete RTTY/HAL set-up & acc. - $150. Mike Kennedy, WA6AAJ, 3417 Magill Ave., Fresno, CA 93911. (209) 435-3159

FOR SALE: They're beautiful! Replacement VFO dial numeral bezels for Collins 51J, 75A and B&W 5100 units. Easy to install - not an adhesive decal. $10 postpaid. Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53228-0803.

WANTED: Original manuals for Collins 51S-1, 3rd or 5th editions and 51S-4, want latest possible edition dated 1961 or later. Kurt, (602) 443-0896

FOR SALE: Jennings vac. var. 9-302, new - $45; Westinghouse current relay, type SC, new - $10; 800 to 1 sealed reduction gear, new - $10. Joe, W6CAS, (916) 731-8261

FOR SALE: SB-401, SB-303, transcv. cables, manuals, xtra tubes - $235 + shpg. Vern, (404) 381-6636

WANTED: WW II surplus Collins R-105A/ARR-15 or 51H3 rcvr in exc. and unmodified condx. John Snow, W9MHS, 4539 N. Bartlett Ave., Shorewood, WI 53211. (414) 964-0194

FOR SALE: Hallicrafters SX-122A, mint - $265; Heath transistor tester, IT-10 - $8; 1939 Hytron HY-Q75 pioneer 2-meter xmtr, near mint - $40; Tecraft cascode VHF converter, exc. - $15; brand new in box, orig., unbuilt, unopened, Heath 80-10 mtr SSB xcvr, HW-101, w/manuals - $425; Gonset SSB xmtr GSB-100, nr mint - $110; Heath crystal radio CR-1, near mint - $50; B&W SSB generator 51SB-B, ex. - $85; Ameco novice xmtr AC-1, nr mint - $75. All plus shpg. **WANTED:** Philmore novice tx & rx; Clegg 62T1D Climaster tx; Eldico SSB-Jr.; Johnson Navigator; Hallicrafters HT-31. These need not be operating but cosmetics should be exc. or better. E.W. Polk, M.D., WA1YIW, (904) 893-3936

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

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

FOR SALE: Collins CP-1 crystal pack - $140; Hallicrafters SX-17 - $140. Mike Palmer, K5FZ, 16707 Creeksouth, Houston, TX 77068. (713) 444-7737

WANTED: 1957 Allied catalog - will pay your asking price for VG to mint copy; VG matching spkr and 2.580 MHz xtal for HQ-110; meter for Johnson Navigator; schematic for Globe Chief Deluxe; current meter for Heath IP-32 pwr sply; 2AP1 CRT. **FOR SALE:** NIB Knwd TS-530S front panel - $40. David W. Ishmael, WA6VVL, 1118 Paularino Ave., Costa Mesa, CA 92626. (714) 979-5858

TRADE: Riders 16 for 17, need 18-21. **FOR SALE:** BC-639A - $25 + UPS. Ted Stewart, W6NPB, 2157 Braemar Rd., Oakland, CA 94602. (510) 531-7042

WANTED: AC pwr sply APS-50 and VFO for Harvey-Wells Bandmaster Deluxe model TBS-50D. Gil Parsons, WA8JIW, POB 192, Ross, OH 45061. (513) 867-8380

FOR SALE: Motorola call alarm no. TU585A-1 - $5 + $3 shpg; Heath SW-717, solid state rcvr, 4 bands, has been restored - $35 + $10 shpg; Heath GRS4, tube type shortwave set, unchecked, as is - $50 + $15 shpg; RME small gray cabinet, dial calibrated 10 thru 80M, use unknown, a nice find for RME collectors - $25 + $5 shpg. James Fred, R1, Box 41, Cutler, IN 46920. (317) 268-2214

FOR SALE: TMC GPT-750D, SSB, ISB, CW, AM; pair 4-400's in final - $1200. WA7HDL, (208) 756-4147 after 1730 MDT.

ELECTRON TUBES FREE 1994 Catalog, over 2,000 types in stock. **Electron Tube Enterprises,** Box 311, Essex, VT 05451. (802) 879-0611, FAX (802) 879-7764

FOR SALE: Radio tubes; repair and restoration of all vintage amateur and commercial radios, 25 years experience. Herbert Stark, 321 N. Thompson St., Hemet, CA 92543. (714) 658-3444

WANTED: Collins literature, manuals, catalogs, SM2, SM3, MM2 mic's, TD1, 647T dipole ant, 35C low pass filter, 55G1. Rick Coyne, KD6CPE, POB 2000-200, Mission Viejo, CA 92692. (714) 855-4689

WANTED: B&W 5100B/515B-B. Anyone have a B&W 6100? Prefer working condx. David Stewart, NI5M, 815 Johnson Woods Dr., Paris, TX 75460. (903) 785-1418

FOR SALE: Collins 312B4, RE, nice - $150; Scott SLRM - $50; National SW-54 - $65; Drake TR-4C, AC4, MS4, nice - $275. Ron Follmar, 1409 W. Willis, Alvin, TX 77511. (713) 331-1074

WANTED: HRO-60 - E coil with E/F dial strip, xtal calibrator; SP-600-JX-17 - bottom cover, bottom cover for bandswitch, tune/bandswitch knob; R-388 - 5 Hy ps choke (L123), meter rectifier (CR101); also want excellent condx, unmodified HRO-500, LF-10 preselector and/or orig. spkr a plus. Walt Novinger, 431 Norfolk Dr., Pacifica, CA 94044. (415) 738-0370

WANTED: Manuals for Globe 755 vfo and Temco model 250 GSC xmtr, copies OK; also any winged emblems from Collins equipment. Gary, K7MHE, (503) 257-6525.

FOR SALE/TRADE: New receiving tubes. SASE for list. TBE, POB 806, Lake City, MI 49651.

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3TF7/RT510 Ballast tube, unused - $17.50

Shipping charges additional! Ask for our 1993 catalog!

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

FOR SALE: 75S1 w/Waters rejection; 500 Hz CW filter; 32S1/516F2 - $550; National type 697 6 volt ps, unused - $75. Carter Elliott, WD4AYS, 1460 Pinedale Rd., Charlottesville, VA 22901. (804) 979-7383

WANTED: Dynamotor DY-34; R-105A/ARR-15; need two BC-348's for friends, Tom, N5OFF, (318) 989-3430

WANTED: Collins 75A-2, w/spkr. Will pick up within 200 miles of Joplin, MO. Also want G-76 manual or copy thereof. Don Hilliard, WØPW, Rt 5, Box 219, Neosho, MO 64850. (417) 451-5892

WANTED: HQ-180; S-38 and S-53A. **FOR SALE:** Drake TR4, RV4 & MN-4 - $400. Bob Braeger, WA6KER, (909) 682-5084.

WANTED: Johnson 6N2 Thunderbolt, Thunderbolt and Desk KW; RCA velocity or ribbon mics; Collins KWM-1 and accessories. Paul Kluwe, Box 84, Manchester, MI 48158. (313) 428-2000 (h), 998-1000 (w), 428-1000 FAX

FOR SALE: Heath MT-1 Cheyenne and MR-1 Commanche plus HP-20 pwr sply and mic - $200. All operating and VG condx. Neil Berg, WØMXX, 2219 Ridgewood Dr., NW, Alexandria, MN 56308. (612) 763-4857

FOR SALE: ARRL Handbooks 45-48-49-52-54 thru 59-62-64-65-68-75-77. Radio Handbooks 42-46-62-81 - $18 each ppd. Brown, (805) 943-2027.

WANTED: GN-43 handcrank generator and CN-690 voltage regulator for GRC-109. Also WW II radio chests. Paul Thekan, 335 Rutherford Ave., Redwood City, CA 94061. (415) 367-1499

FOR SALE: Galena crystals - $3 ppd. Pat Person, Box 1063, Bothell, WA 98041.

WANTED: Drake 2-C rcvr; manuals/schematics for DX-40 and DX-35. B. Lee Cornwell, KD3KD, HCR #1, Box 95, Mt. Pocono, PA 18344. (717) 839-2710

FOR SALE: Repair! All makes and models, homebrew, maximum labor per unit - $96. Dan Rupe, W7HBF, Telo Technology, 1302 S. Uplands, Camano, WA 98292. (206) 387-3558

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For more information contact Leo at (402) 392-1708, May-Nov.; 619) 321-1138, Nov.-May.

WANTED: Collins KW-1. Joel Thurtell, 11803 Priscilla, Plymouth, MI 48170. (313) 453-8303

FOR SALE: Drake T4XB xmtr, w/AC4 pwr sply, mint, like new - $175. Joe Moraine, N5UX, 3700 Cliffwood Dr., Bedford, TX 76021. (817) 281-1128

WANTED: BC-654 w/cover, dynamotor & vibrator pack. Had one as a kid - sure would to replace it! Randy Guttery, 2412 C St., Meridian, MS 39301. (601) 693-5958

WANTED: Manual for Australian A510 wireless set, 1955 vintage, 2 piece HF portable, 2-10 MHz, battery operated. Mel Stoller, K2AOQ, 100 Stockton Lane, Rochester, NY 14625. (716) 671-0776

WANTED: S-meter for SX-100 (working or non-working, I need a good cover); non-working DB22A; Drake 2B and spkr. Doug DeWeese, 502 East 80th St., Tacoma, WA 98404-1014. (206) 472-3478

FOR SALE: Military manuals: MIL-HDBK-161A (Army TM 11-487A-1) dated 12 Mar 1964, 235 page illustrated listing of military communications equipment, also AFM 100-14, dated 1 Mar 1971, a lengthy listing (168 pages) of communications and electronics equipment used by the Air Force. Bound reproductions of originals - $25 each plus $2 postage in USA. James Owens, NWØO, 1363 Tipperary St., Boulder, CO 80303. (303) 673-9019.

TRADE: Excess. BC-456-B, FT-225-A, CD-132s, CD-695-As, CX-4232/ARN-59, F-202/U, TM1-460, new BC-345s. I'm looking for Navy stuff. William Donzelli, 304 South Chester, Park Ridge, IL 60068. (708) 825-2630

FOR SALE: We rebuild twist-loc, wet style, rectangular, can capacitors. Mail your can to us, typical in shop time is 10 days. We custom build tubular & can capacitors & rebuild your capacitor. Inquire. Frontier Electronics/Everett Hoard, NØNVQ, Lehr, ND 58460. (701) 378-2341

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

FOR SALE: Hallicrafters SX-17 - $125; SX-23 - $100; SX-25 - $115; S-38 (as-is) - $35; SX-100 - $125; HT-19 (as-is) - $50; National HRO (as is,4 coils, less pwr sply) - $90; NC-183D - $195; HRO-50T (AA,B,C,D,E,F) - $350; Hammarlund HQ-140X (as is) - $95; SP600-JX-17 - $165; Heath AA-151 amplifier - $35; HR-1680 spkr - $90; surplus R-390A, covers, meters, cabinet - $195; HP-606A sig. gen. (as is) - $40. Joe Watson, N5ZYA, 3005 Broken Bow Rd., Edmond, OK 73013. (405) 359-8084

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

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

FOR SALE: Plate xfmr, 2500 volts @ 3 amps C.C.S. (used in RCA and Gates broadcast xmtrs), have 2 @ $100 each; heavy duty 7' RCA broadcast 19" rack cabinet, w/casters and rear door - $75; filter caps (4) 10 MFD @ 7.5 KVDC - $35 each. (PU only on above items). Murata ceramic filter #CFM-455E, 455 kc center freq. w/5.5 kc @ 3dB bandpass, ideal AM filter for Collins 75A-4 and others - $8 each ppd. Ron, KC6WTG, POB 783, Santa Rosa, CA 95402. (707) 539-8319

WANTED: RME 4350; 2 to 3-1/2" Weston, Jewell or General Radio panel meters; 1920 - 39 QST. FOR SALE: 3 RCA 800 tubes - $30 each, all for $75; 2 Jan 838's NIB? - $20 each. Mack Lester, POB 149, Lewisville, AR 71845. (501) 921-5874

WANTED: Hammarlund HQ-170 slot freq. coil, part no. K-42034-1 or anyone who has Hammarlund parts. Gerald Liccione, 118 Hiawatha Trail, Liverpool, NY 13088.

Photofacts and Parts for Collectors Electrolytics, high voltage capacitors, power resistors, plugs, switches and more. Free catalog. **A.G. Tannenbaum, WA2BTB, P.O.Box 110, East Rockaway, NY 11518. (516) 887-0057, FAX 599-6523**

FOR SALE: Subscribe to "The Amateur Market Place". A Canadian newsletter, listing new/wanted Amateur/Computer equipment. 10 issues per year $16.50 US. Benefit from $ exchange. P.O. Box 8180, Ottawa, Canada K1G 3H7

WANTED: HT-5 control unit and AT-2 or AT-3 antenna tuners for the Hallicrafters HT-4B xmtr, also need manual copies for HT-4B, BC-614, CY-1218 (from the SCR-399 truck), SCR-284, TBY, Millen 90881 RF deck. Don Merz, 47 Hazel Dr., Pittsburgh, PA 15228. (412) 234-8819 wkdays

FOR SALE: Viking I front panel refinishing this summer. Call or write for details. Ron Eisenbrey, KC5DFX, 115 First St., Sugar Land, TX 77478. (713) 491-7823

FOR SALE: Tektronix and HP test equipment manuals, originals, SASE with needs. **WANTED:** Amateur related manuals. Do some spring cleaning. Pete Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964

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Communications Receivers, The Vacuum Tube Era: 1932-1981 by Raymond S. Moore.....3rd Edition $19.95

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Electric Radio, P.O. Box 57, Hesperus, CO 81326

WANTED

Collins promotional literature, catalogs and manuals for the period 1933-1983. Jim Stitzinger, WA3CEX, 23800 Via Irana, Valencia, CA 91355. (805) 259-2011. FAX (805) 259-3830

FOR SALE: Collins 75A-4 filters: 6 pole ceramic for high quality AM, 6 Khz - $83.50 ea.10% discount for two filters. Money back guarantee. Calif. residents please add sales tax. Vector Control Systems, 1655 No. Mountain, Ste. 104-45, Upland, CA 91786. (909) 985-6250

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

WANTED: Buy and sell all types of electron tubes. Harold Bramstedt, C&N Electronics, 6104 Egg Lake Rd., Hugo, MN 55038. (800) 421-9397, FAX (612) 429-0292

FOR SALE: National UHF converters for NC-300, NC-303 rcvrs. Includes 6, 2 and 1-1/4 meter units, cabinet and manuals. Excellent. Roger C. Zaun, W9UVV, 4902 W. Parkview Dr., Mequon, WI 53092. (414) 242-4931

WANTED: "The Radio Collectors Directory and Price Guide" by Grinder and Fathawr, Iron Press, 1986. State price and availability. Lys Carey, 13495 W. Center Dr., Lakewood, CO 80228. (303) 986-5420

WANTED: Knobs for late model SX-101A - main tuning and mode (pwr on-low-upper, etc). These have flat areas around the knobs. Tnx. Sam, N4VIB, (706) 695-5658

FOR SALE: 19" equip. console for 10 pieces, exc. - $200. **WANTED:** Elmac PMR7 rcvr, ESS-3 and PSR 117 acc. Richard Smith, 1122 Via La Cuesta, Escondido, CA 92029. (619) 739-1835

WANTED: Single plate to class B grids driver xfmr, single plate winding capable of 80 mA minimum. Bill, W7US, (602) 721-1842

FOR SALE: Unbuilt Heathkits - digital indoor-outdoor thermometer (ID-1390), digital windspeed & directional indicator (ID-1590), w/manuals - $85 each. Ros Hawks, 355 Animosa Dr., Durango, CO 81301. (303) 259-0785

WANTED: AN/SRA-17B shipboard miniature receiving antenna. Made up of RF unit with small whip and antenna control unit. Bob Bakinowski, 1524 Saint Tropaz, Tucson, AZ 85713. (602) 624-8029

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

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

WANTED: Speaker for Collins 75A-2. David A. Clark, K5PHF, 9225 Lait Dr., El Paso, TX 79925. (915) 591-4184

FOR SALE: "All-Star Junior" ham rcvr, looks great, one coil - $199; RCA AVT-112A Aircraft TX, poor - $26; RCA AVR-20A aircraft RX, good - $89; Meissner 9-1050 Signal Shifter, tuning eye, both pwr splies, nice - $149; Meissner 9-1008 Signal Booster, very good - $109; Conset G-76 AM xcvr, very good, w/poor DC sply - $399; Hallicrafters HT-17 TX, one coil, good - $99; Echophone EC-1 "Commercial", good - $85; Johnson Pacemaker, nice - $299; Knight T-60, very good - $49; Conset GSB-100 SSB TX, near mint - $189; Johnson Invader 2000, factory-built, nice - $889; Collins R-392, looks good, works bad - $145; URC-64, good - $69; BC-306A antenna tuner for the BC-375, new - $69. Military TMs (originals - $29 each): 11-242 (SCR-300A), 11-245 (SCR-511), 11-351 (TG-5/5A), 11-800 (BC-191); CQ Magazine: Vol. 1, Number 1 - $35; Callbooks: 1936 - $39, 1940-41 - $25, 1976 - $14. Catalogs: Allied, Lafayette, Radio Shack, WRL, more - call. 2-stamp LSASE for big list. Don Merz, 47 Hazel Dr., Pittsburgh, PA 15228. (412) 234-8819 (weekdays)

WANTED: Heath RC-1 geiger counter. Harold Deppe, NY7Y, POB 31656, Tucson, AZ 85751.

WANTED: Clean Ranger II in working condx. Lloyd Cabral, AA6T, POB 970, Aptos, CA 95001. (408) 722-4349.

FREE: For shpg cost - nice Weston 982 VTVM w/manual and rough RCA Voltomist. Both inoperative but restorable. Jeff Duntemann, KG7JF, 6840 E. Lowden Dr., Scottsdale, AZ 85331. (602) 483-0192

ELECTRIC RADIO PARTS UNIT DIRECTORY

If you need a part for a vintage restoration send $2 and an SASE (.52 postage) for a 6 page list of parts units. If you have a parts unit, consider putting it on the list. Your dead unit can help bring others to life!

Repair & refurbishment of older tube-type amateur equipment. Fully FCC licensed; 35 years experience. Chuck Banta, N6FX, Claremont, Calif. (LA area) (909) 593-1861

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

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

FOR SALE: Hallicrafters manuals. Copies $5 postpaid for most models. Some Johnson, Hammarlund and others. SASE for list. Miller Radio, 909 Walnut St., Erie, PA 16502.

FOR SALE: R4-C, T4X-C, AC-4, MS-4, NB-4, 160M,1.5 kHz and 250 Hz filters, works great, exc. shape - $450 U-ship. Grant Youngman, NQ5T, 511 Cross Timbers Dr., Double Oak, TX 75067. (817) 491-2393

WANTED: Eico 720 xmtr, 730 modulator and 722 VFO, w/manuals. Must be in good condx and at a fair price. Thanks. Marvin C. Fortune, WA4TOJ, 2957 Gaffney Rd., Richmond, VA 23237-3551. (804) 275-1252

WANTED: Shielded BFO coils - 455, 456 and 460 kcs. David L. Muse, 5401 S. Sumac Circle, Fayetteville, NC 28304.

WANTED: Schematics/manuals - HP425A, Ballantine 300H meters; Allied Knight R55A rcvr; Heath TS-3; RCA WR49B; Precision E200C sig. gen. Jack Bertholf, WA4CSM, 8109 N.W. 58 Court, Tamarac, FL 33321. (305) 721-2337

FOR SALE: Drake R4A - $125; MS4 spkr - $50. Both in exc. condx. KØOCC, (404) 396-1312

WANTED: Vibroplex presentation model gold and chrome bug; National SW3 dial/knobs; National SRR rcvr (looks like small SW3). Niel Wiegand, WA5VLZ, 12105 Mustang Chase, Austin, TX 78727. (512) 219-8548

FOR SALE: Rare Collins R-1247 w/GRC-129 synthesizer modules CV-1693, 0-1203, and CV-1694 SSB converter - $2000 + shpg. Will export. Walter M. Chambers, K5OP, POB 241371, Memphis, TN 38124-1371. (901) 761-9381

WANTED: British and Canadian military radio equipment, WW II and later. Leroy E. Sparks, W6SYC, 924 W. McFadden Ave., Santa Ana, CA 92707-1114. (714) 540-8123

FOR SALE: Collins 30L-1 amps, clean condx - $350 each, 3 for $1000. 200+ in stock. Mike, (619) 444-7717

FOR SALE: Travler T203 - $30; Motorola 59H121 - $30; RCA 65X2 - $35; RCA 3RC11 - $20; Crosley 46FB - $40; Sentinel 118BT - $35; National Union 571 - $35; Silvertone Farm Radio - $25; Emerson 190 - $25. Polaroids $1 each plus SASE. Bud Santoro, 3715 Bower Rd., Roanoke, VA 24018. (703) 774-9153

WANTED: Collins, still looking for the KWM-2 into KWM-2A conversion kit. Please call or write. Ernst Schroeder, DJ7HS, Pinkenburger Str. 25 D, 30655 Hannover, Germany, int'l tel no: +49-511-547-0486

FOR SALE: Hallicrafters SR42A 2-M AM xcvr w/mic, works fine, finger nail scratches around knobs - BO plus UPS. Lou Gagnon, 3207 W. Mandalay Ln., Phoenix, AZ 85023. (602) 942-5670

WANTED: Manual or complete schematic for ARB rcvr; panel name plate for RCA BC-342N. Pete Hamersma, WB2JWU, 87 Philip Ave., Elmood Park, NJ 07407.

FOR SALE: Manuals - Harvey-Wells T-90 - $16, R9 - $12, TBS-50/TBS-50A - $9; B&W 5100B/51SB-B - $20; HRO-50T-1, HRO-60 - $16; SX-100 MK2 - $11. Copies, ppd. Dick Prester, 131 Ridge Rd., West Milford, NJ 07480. (201) 728-2454

WANTED: Copy of manual for Eico 722 VFO. Tnx fer the relay Brian, K9VKY. John, KA3SDO, 44 Leisure Lands, East Stroudsburg, PA 18301. (717) 223-8615

WANTED: Manual/schematic for USN CMX-46159 (TCS-12) rcvr; manual for Heath IO-12 scope. Copies OK. FOR SALE: 1946 Weston 785 "Industrial Circuit Tester" exc. condx electrically/mechanically, oak carrying case - $40 plus shpg; Continental Instructograph Code Machine, 10 boxed paper tapes, Gardener & Co. "Automatic Sender" all working, in VG condx - $50 takes all, plus shpg. Carl Gottsmann, KN6AL, 3290 6th Ave., Apt. 1-E, San Diego, CA 92103. (619) 295-5611

WANTED: Ameco 6 & 2-meter converters models CB-6 & CB-2. Wayne LeTourneau, WDØCTE, Box 62, Wannaska, MN 58761. (218) 425-7826

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FAX 602-281-1684

WANTED: Medium pwr AM xmtr in good condx - Viking 500, Valiant, Globe Champion 350, 32V-3, etc. Prefer driving range of Dallas, TX area for pickup. Top price for extra nice unit. Grant Youngman, NQ5T, 511 Cross Timbers Dr., Double Oak, TX 75067. (817) 491-2393

FOR SALE: Collins crystal packet CP-1 - $100; 12 VDC pwr sply MP-1 - $75; carrying case CC-2, CC-3 - $40 each; dummy load DL-1 - $40. All VG. Bruce, N7DDT, (602) 814-6590 (d), 979-4626 (n)

WANTED: Either of the main tuning knobs for SX-100; pwr splies for Invader 2000 & Eldico T-102 xmtrs. Keith Perry, 384 S. 48th St., Springfield, OR 97478. (503) 726-1512

WANTED: SX-28 w/matching floor spkr in mint condx. FOR SALE: SB-200, VG condx - $275. WB6TMY, Box 4694, Santa Rosa, CA 95402. (707) 527-8124

FOR SALE: New Ranger I, Valiant I and Navigator plastic dials, 160-10 meters, all freq. numbers in green, w/all holes just like original - $17.50 ppd. Bruce, W9LWW, 4003 Laurawood Ln., Franklin, TN 37064. (615) 794-9692

FOR SALE: Nice Viking Challenger - $125; Elmac AF-68 - $100; DX-35 - $85; Hallicrafters SR-42A - $40. Don, K5DUT, 6080 Anahuac Ave., Fort Worth, TX 76114. (817) 732-3976

Please remember to count the words in your ad. If you are over 25 words, please send 15 cents for each extra word.

FOR SALE: Two year old sixty foot crankup U.S. Tower. Mosley Pro-57A, seven element, five band beam. Gordon Electric heavy duty rotator and tilt-over stand. You remove. $1850. I.D. W4KKO, (615) 668-8451

FOR SALE: HQ-170 gen. cov. rcvr, 160 thru 6 meters, w/clock - $165; velvet vernier, w/dial plate - $5; Cardwell XC-100-XS, 3/16" spacing - $12; Heath remote coax switch HD-1481 - $10; Eico AM tuner HFT-94, FM tuner HFT-90, 12 watt amp HF-12, stereo preamp HF-85, Eric hifi AM-FM tuner - $15 each. All for $60; Hallicrafters rcvr S-120 - $45. WANTED: Large bristol wrench for 75A-4 main knob. Mel, WØMLT, 67750 Ridge View Dr., Montrose, CO (303) 249-1544

WANTED: Collins KWM-1, w/516F-1; KWS-1; 75A-4; 51J3/4. Masahiro Nada, 1473-26, Kamishizu Sakura Chiba, 285 Japan. FAX 011-81-43-487-1688

FOR SALE: Gen. Rad. 1607 immittance (impedance) bridge; 3x1x1 foot mahogany box contains 50 pieces including bridge unit (similar to 1602), standards, adapters, cables and other hardware for impedance measurements from 20-1500 MHz. Steve, KD2ED, (609) 795-9250 before 9 PM EST.

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FOR SALE: Eico 730, 50-W modulator, like new, w/manual - $55; Eico 710 GD meter - $35. Shpg xtra. Henry Mohr, W3NCX, 1005 Wyoming, Allentown, PA 18103.

WANTED: Looking for ATJ/ATK TV cameras and related equipment. Any condx. Please state price and condx. Gene Schraut, NG7A, 103N 3880W 317-6, Hurricane, UT 84737.

FOR SALE: "History, Theory and Practice of the Electric Telegraph" by Prescott,1866 (508 page hardcover reprint), $18.95 ppd USA. Artifax Books, Box 88, Maynard, MA 01754.

WANTED: Colins xmtrs - models 30A, 30W, 30FX, 32B, 32G, 32RA, 40B; pre-1940 - National HRO, Hallicrafters Silver Faced Skyriders. Paul Christensen, N9AZ, 11142 Raley Creek South, Jacksonville, FL 32225. (904) 721-9111

FOR SALE: RME-69 in VG condx, w/orig. manual - $275; Heath antenna tuner MN SA-2560, unbuilt in orig. box - $225; Crosley model REP rcvr in VG condx - $175; Gonset Communicator III, 6-meter xcvr in VG condx, w/ orig. manual - $100; Gonset Communicator VFO for 6, 2, and 1-1/4 meters in good condx, no manual - $90. Clyde Sakir, N7IOK, 4243 E. First St., Tucson, AZ 85711. (602) 323-1120

WANTED: Manual for Heath HX-10 Marauder xmtr. Michael Pinto, N2XVR, 47 Harding Dr., Rye, NY 10580. (914) 835-4634

WANTED: Knight VFO for T-60, or other that will work with it. WA4YRK, (615) 966-9811

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

FOR SALE: C-43/ARC-5 control head with two good splined cables. Pot missing on right side, otherwise exc. - $45 + shpg. Dave Dintenfass, 7549 - 27th Ave., NW, Seattle, WA 98117. (206) 784-4803

WANTED: Ranger xtal/VFO switch (SW2). Also schematic for GPR-90 rcvr. Jack Taylor, VE3DUV, RR 2, Box 34, Roseneath, Ont. K0K 2X0 Canada. (905) 352-2732

FOR SALE: Collins ART-13, w/o pwr sply - $125; National NC-300 - $125. SASE or call for details. Kent Miller, K4HN, 3155 Old Salisbury Rd., Winston-Salem, NC 27127. (910) 788-0670

WANTED: Manual/schematic for "Trans-Meter" model 905 field strength/modulation meter mfgd by Electronic Specialty Co., Los Angeles. Jack C. Shutt, N9GT, 1820 Dawn Ave., Ft. Wayne, IN 46815. (219) 493-3901

FOR SALE or TRADE: SX-28 (rack), SX-25, Ranger. **WANTED:** NC-100; RCA ACR111; early Skyriders; other tuning eye radios. Jim Dillon, 201 Seward St., Juneau, AK 99801. (907) 586-3223, 10-6 PDT

WANTED: SX-101 MK III, w/spkr; also Ranger I. Bob Kemp, POB 470, Lake City, MN 55041. (612) 345-5345 (d)

FOR SALE: Hammarlund HQ-129-X, needs knobs - $75; Meissner EX Signal Shifter, complete - $60. John Hruza, 2521 S. Holly St., Denver, CO 80222. (303) 758-4377

TRADE: RCA BTA-250L. **WANTED:** Johnson Navigator, Pacemaker & Desk KW. Cal, (805) 772-4366

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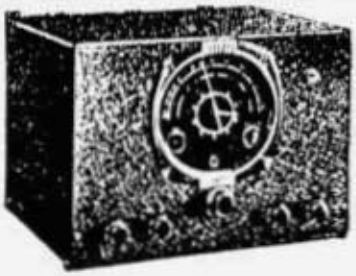

WANTED: Any condition, Hallicrafters Sky Master and EP-132 as shown. Also want SX-46, S-48 and S-49. Chuck Dachis, 'The Hallicrafter Collector', 4500 Russell Dr., Austin, Texas 78745. (512) 443-5027

WANTED: Clean unmarred front panel from dead or dying HQ-180A, or the whole dead radio for parts. Grant Youngman, NQ5T, 511 Cross Timbers Dr., Double Oak, TX 75067. (817) 491-2393

FOR SALE: BC-348, modified - $75; R-390A - $225; RBC w/ps and cable - $135; R-19D/TRC-1 rcvr - $30; incomplete BC-375 tuning units - $5; BC-453B - $10; FT-226A xmtr rack - $15; I-95BM - $15; SCR-511 plugins - $2; CE 10B - $20; Hallicrafters R-48 spkr - $25; SWR bridge - $8; Hickock 1600B VTVM - $15; Heath VX-1 VOX - $12; Heath HD-1 keyer - $12; Heath Cantenna - $18; parting out R-388, R-390A, HA-10 amp; several KW xfmrs - call. U-ship. WA7HDL, (208) 756-4147 after 1730 MDT

WANTED: Type E (900-2050 kc) plug-in coil for HRO/HRO-5; Johnson Viking 122 VFO. John Zitzelberger, WB6JJE, 5257 Lewis Rd., Agoura, CA 91301. (818) 991-8358

WANTED: KWS-1 PTO for KWS-1, 70E-23. Gordon Battles, N6FUJ, (510) 635-4083

WANTED: 110-V DowKey coax relay. Will pay anything reasonable. Gary, VE3MPQ, (519) 944-2962

FOR SALE: Restorable RME-99 w/matching spkr cabinet & manual (copy) - $85 + shpg. Martin Piepenburg, W9OLD, RR1, Box 56B, Monterey, IN 46960. (219) 542-2591

FOR SALE: Panel meters, some NIB including a Hallicrafters "S" meter. Send SASE and $1 for 3 page list. Frank Law, W8SET, 1 Wildacre Rd., Charleston, WV 25314.

WANTED: Hallicrafters S-20R and SX-71 rcvrs. Hank, W6SKC, (602) 281-1681

TRADE: Hammarlund HC-10 for TMC GSB-1 sideband converter. **WANTED:** NCX-A; VX501; G-77; Harvey-Wells gear. Bob Nickels, KEØT, 1444 S. Rotzler, Freeport, IL 61032.

WANTED: Cabinet for 51J3/51J4/R-388. Tom Marcotte, N5OFF, (318) 989-3430

FOR SALE: Measurements 111B freq. standard - $35; HP 5262A time interval plug-in - $40; RT556/APX-46 radar xcvr - $40; more, list - $1. Joe Orgnero, VE6RST, Box 32, Site 7, SS 1, Calgary, AB T2M 4N3. Canada (403) 239-0489

Electric Radio T-Shirts

The front displays the logo from the cover of ER (the tube outline, Electric Radio, and celebrating a bygone era). The back has "Real Radios Glow in the Dark" (used with the permission of Classic Radio).

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FOR SALE: HF/KWM-380 compatable key pad unit complete with low profile weighted housing and cable/connector. $99 shpd US. Jerry Brouwer, AB8U, (513) 429-5457.

FOR SALE: Heath DX-40 - $60; VF1 - $25; HW-16 - $80; SB-610 - $75; SB-102, HP23 - $150; Shawnee - $80; Pawnee - $90; SB-500 (50 Mcs) - $125; Commanche - $40; SB-401 - $100; Drake 2C, NB, cal - $150; 2B - $135; 2NT - $125; R-4A - $150; T-4XB - $150; Collins 32S3 WE - $225; 51J-4 (3 fil.) - $550; 312B4, WE - $90; KWM2A, RE - $425; KWM2 WE - $350; 75S3B - $450; ARR-41 - $175. Misc. - T-368 - $550; ART-13 - $125; 50 watt 2-meter plate mod. xmtr (TV6) and tube rcvrs, AM 6154 (2) spare modules, new 8930 tubes - package call. Byron Tatum, WA5THJ, 2800 Mustang Rd., #1116, Alvin, TX 77511. (713) 331-8633

WANTED: WW II Japanese military radio equipment of any kind; wireless sets like spark xmtrs; loose coupler rcvrs; tube type pocket/portable radios; crystal sets; toy crystal radios. Takashi Doi, 1-21-4, Minamidai, Seyaku, Yokohama, Japan

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WANTED: Knight signal tracer and Heath signal tracer; manual/good copy for Heath model RX-1 Mohawk rcvr; tubes NOS - 6146B, 7360, 1614, 5763, 7027A, 807A, 6HF5, 6DQ5; cabinet for SP-600JX. Roger Quickel, K8MSS, 5511 S. Ridge W., Geneva, OH 44041. (216) 466-6808

FOR SALE: Rare Western Electric model 9-B aircraft rcvr (1932). **WANTED:** NC-101X; S-35; Eddystone 740-940-1000. Nick Oland, W3DSE, 821 Kenhorst Blvd., Reading, PA 19611. (610) 378-1411

WANTED: Copies of "Western Electric Amateur", 1955-1961 and "Electronics Journal", 1962-1970. Bob Grinder, 7735 N. Ironwood Dr., Scottsdale, AZ 85253. (602) 948-2743

HEATHKIT FANS: Don't mourn their passing; enjoy learning more about their past in historic pictures and personal insights from many company oldtimers in 124 page book - $9.95 pp. Heath Nostalgia, 4320 196th S.W., Suite B-111, Lynnwood, WA 98036-6754

FOR SALE: 829B, 2E25, 836, 1616, 3B22 - $3 each; 5933, 802, 35TG, 10, 4-65A, 804, 6550, 866 (globe, world box) - $7 each; 304TL, 4E27 - $20 each. Lots more - SASE for list. U-ship. WA7HDL, Rt 1, Box 178-A6, Salmon, ID 83467. (208) 756-4147 after 1730 MDT

WANTED: Desperately need manuals/schematics on Nems-Clarke rcvrs 1502 and 1907. Will buy or rent to copy. Dave Sundheimer, WØNBZ, 13020 Lakeview, Burnsville, MN 55337. (612) 890-1844

FOR SALE: Large rotary inductor, 93 uH, 61 turns of heavy silvered wire on 3-1/4 inch dia. ceramic form, new, no end plate or knob, clean and beautiful - $50. Gary Cain, 1775 Grand, #302, St. Paul, MN 55105.

WANTED: Drake MN2000 antenna tuner and L4B power amp, any condx. Bill Kirk, W6RQQ, 9020 Balboa Ave., San Diego, CA 92123. (619) 279-0411, x 3454

WANTED: Restoring WW II Navy xmtr model TDO, need manual, modulation & other xfmrs, meters, output network deck & other misc parts & accessories. Steve Finelli, N3NNg, 37 Stonecroft Dr., Easton, PA 18042. (610) 252-8211

FOR SALE: Tubes, tested, clean, boxed, lowest prices, good selection. Business size SASE for list. Bill McCombs, WBØWNQ, 10532 Bartlett Ct., Wichita, KS 67212-1212.

WANTED: Valiant in VG or better condx, electrically and cosmetically. POB 4854, Wheaton, IL 60189. (800) 225-0256, x 14733

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WANTED: Collins 310B-3 antenna coil assembly; F455B08 mech. filter; Drake 1A manual; Eico 723, DX-60B schematics (Xerox OK). Brian Roberts, K9VKY, 3068 Evergreen Rd., Pittsburgh, PA 15237. (412) 931-4646

FOR SALE: Viking Challenger - $60; R-390A - $150; parting Viking I and II, SX-28, SX-43 and HRO-50 (no coils). **WANTED:** SM-40 and Babcock mobile xmtr. Joe Sloss, K7MKS, (206) 747-5349

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WANTED: Hallicrafters HT-19 transmitter. Hank, W6SKC, (602) 281-1681, FAX (602) 281-1684

WANTED: Valiant in VG or better condx, electrically and physically. POB 4854, Wheaton, IL 60189-4854. (800) 225-0256, x 14733.

WANTED: Band change, tuning and beat osc knobs of Hammarlund SP-600; phasing knob for NC-183D. Thanks! Oscar Steila, Via Bardonecchia 83, 10139 Torino, Italy.

FOR SALE: Restore a classic, Hammarlund Comet Pro rcvr, 1932 - $200; Heath tube tester TC-2 - $30; Heath HW-101, SB-600, HP-23, CW filter - $175; tubes - 810 - $25; V-70D - $25; 4-125A - $25; 4-250A, w/chimney - $40; 4CX250B - $25; 4X150A - $20; 813 - $10. U-ship. Richard Lucchesi, WA2RQY, 941 N. Park Ave., N. Massapequa, NY 11758. (516) 798-1230

WANTED: Panoramic Radio Products P.R.1 panadapter; also wanted Johnson KW Matchbox, w/SWR meter. Jay Spivack, 325 S. Washington Ave., Kent, WA 98031. (206) 859-2680

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WANTED: Collins 312B-2 console for KWM-1, 302C1 wattmeter, 310B-exciter, 75A-1 filter adapter, speech processor, NB, SM-3 mic, 32V-3; tubes - 4-400, 8122, 6LQ6 (4) matched, 810's, tubes NIB only wanted. Rick, WA1DEJ, (800) 462-2972

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FOR SALE: Hammarlund S-200 spkr, Hallicrafters R-48A spkr - $40 each; National NC-183 spkr (repainted) - $35; 2 RME DB-23 preselectors - $35 each; Johnson TR switch - $35; Johnson and Drake low pass filters - $25 each; National Select-O-Ject (light grey) - $35; Hallicrafters S-38C - $40; Hallicrafters R-47 spkr (deep scratch by logo) - $25. All includes shpg. Eugene Santilli, W3ETF, 2415 Martha St., Aliquippa, PA 15001. (412) 378-7419

WANTED: WW II Navy xmtrs models TBK, TBL, TBM, TBW, TCA, TCC, TCE, TCK, TCM, TCN, TCU, TCZ or any accessories. **FOR TRADE:** ATD new in crate, complete with all accessories. Steve Finelli, N3NNG, 37 Stonecroft Dr., Easton, PA 18042. (610) 252-8211

FOR SALE: Tested tubes w/warranty! Xmit and Rec tubes: recent acquisition has increased my stock. Buy those spare tubes for your tube radio, audio and electronic gear. Prices are about 35% of new for tubes with a warranty. I have bunches of octal, older, 7 and 9-pin tubes. All tested on TV-7 tester and boxed. I give a 30 day warranty. Send wants or SASE with two stamps for list. Daniel Nelson, 1025 E. Desert Lane, Phoenix, AZ 85040. (602) 243-7421

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WANTED: Bill the fellow in Calif. with the O16 - ART-13 please contact me again. I lost your note. Bill Kleronomos, KDØHG, POB 1456, Lyons, CO 80540. (303) 823-6438

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FOR SALE: Radio schematics - $2.50. Also, tubes, books, Riders, extra Sams. LSASE for lists. Joseph R. Forth, WA2TRT, 321 Long Vue Acres, Wheeling, WV 26003. (304) 277-3154

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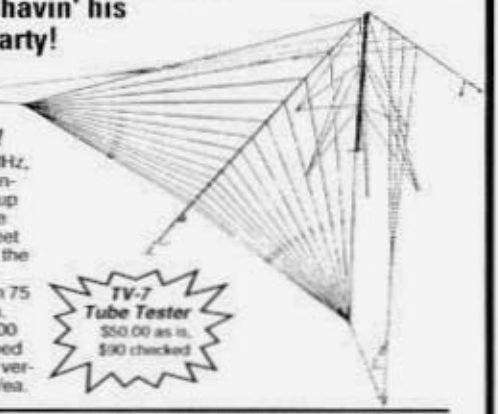

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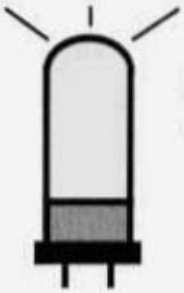

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