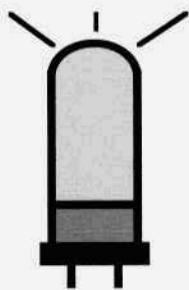


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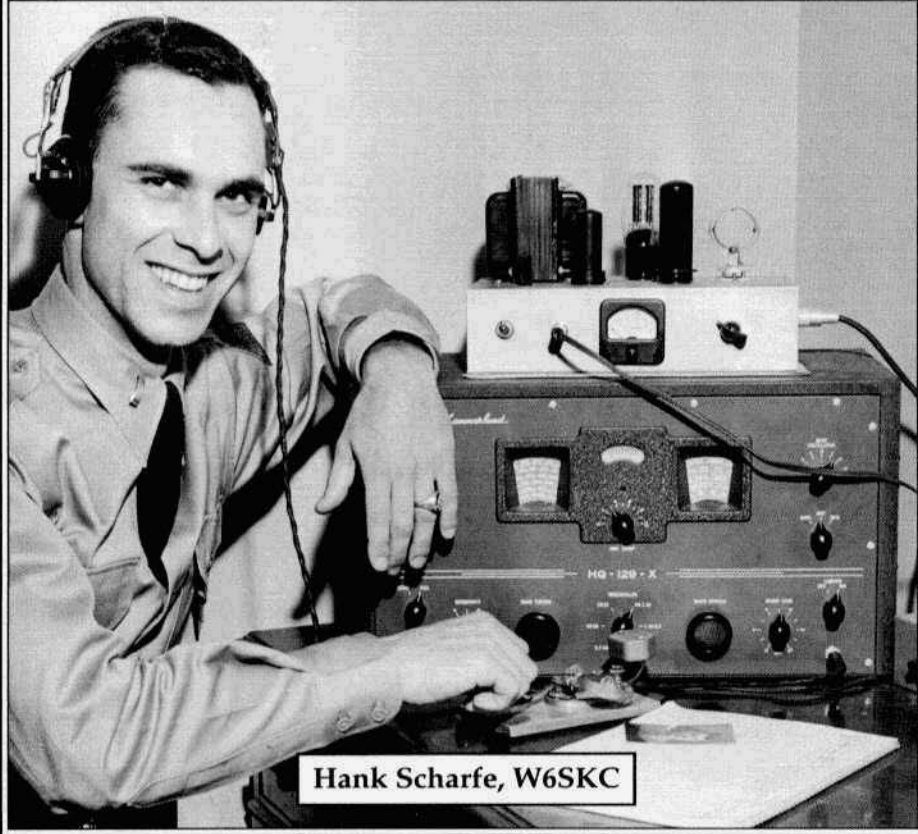


ELECTRIC RADIO

celebrating a bygone era

Number 78

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Hank Scharfe, W6SKC

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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; Albert Roehm, W2OBJ; Steve Thomason, WB4IJN; Don Meadows, N6DM; Bob Sitterley, K7POF (photos) and others.

EDITOR'S COMMENTS

In this issue we've printed a few of the many letters we received pertaining to the passing of Les Lester, K6HQI. Les was one of the most popular AM'ers amongst us. His memory will be with us for a long, long time. Andy Howard, WA4KCY, suggested in a letter - printed on page 3 - that we rename the 20-Meter AM Net in his honor. I mentioned Andy's idea to some of the regulars on 14.286. They all thought it was a great idea so I've made the changes on page 19 in the list of vintage nets. The net will now be known as the "K6HQI Memorial 20-Meter AM Net".

Although conditions on 20 have been poor, most evenings over the last couple of weeks there has been considerable activity on the net. Consider checking in, 5PM Pacific Time, seven days a week.

It has also been suggested that ER sponsor a jamboree on 20 in memory of Les. I thought that was also a good idea so I've picked Saturday, October 28th for the event. No prizes, no contest, let's just all get on 14.286 and have a good time.

So far we've been operating on 14.286 without any official net control and getting along quite well. I'm hoping that as time goes on a new net control will emerge. This person should be on either one coast or the other, have a formidable signal like Les had and have the same sort of dedication.

Our first book publishing venture, Chuck Penson's, WA7ZZE, "Heathkit, A Guide to the Amateur Radio Products" appears to be a big hit. Thanks to all the ER subscribers who have ordered pre-publication copies. The latest word from our printer is that the book will be ready October 23. Until then the book is still available at the pre-publication price of \$23, ppd from the Electric Radio Store. N6CSW

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Cover: Hank Scharfe, W6SKC, back in 1952. At that time he was in the U. S. Army based at Camp Roberts, Calif.

LETTERS

Dear ER

The article on the Central Electronics 600L ["The Central Electronics 600L" by KE6LFT, ER #77] brought back some old memories and rang a bell about how those broadband output circuits work. I was a transmitter engineer at Collins Radio in 1956 and was in the middle of all new SSB linear amplifier designs. The 600L caught our attention so we obtained one and measured the properties of the circuits. We too obtained a copy of the patent and I remember it stating that the theory of operation was not fully understood.

I now recognize that the circuit is basically a series-parallel network (as I described in *QST*, June 1986, page 21) but with the Q of the 50-ohm output side of the circuit increased by adding L_4 . Adding L_4 decreases the value of C_5 required. The S-P Network is also described in recent editions of the ARRL Antenna Book.

I named it the Series-Parallel Network because:

1. With the low resistance output terminal open circuited - the high resistance (plate) terminal looks like a parallel circuit (on center frequency).

2. When the high resistance (plate) side is short circuited to ground - the low resistance (output) terminal looks like a series resonant circuit at the same frequency.

The concept of a broadband output network sounds very attractive but "there ain't no free lunch". Any appreciable load SWR reduces the output power. An SWR of 1.5 to 1 probably drops power by about 1/3 and 2:1 by 1/2. Therefore, for nearly all commonly used antennas a Transmatch should be used to bring the SWR down to 1.1 to 1 or less.

The 600L probably needs the added harmonic attenuation of the transmatch - especially on the lower HF bands.

The question boils down to "Is a broadband power amplifier circuit plus a transmatch a better choice than a power amplifier with a tuned output network?" In most cases the answer is No - which is probably the main reason why the circuit didn't catch on more.

I think that we all have to agree, however, that it must have taken a lot of unusual ingenuity and intuition to develop this broadband circuit without fully understanding the theory of how it worked.

Warren Bruene, W5OLY

Dear ER

Sure do enjoy your magazine. In fact, you have gotten me on the air again. Just got my General 2 weeks ago, had my first contact in 33 years with KO6DT using my TCS-12 transmitter and SP-600 receiver. I've been collecting gear all that time, but let my novice expire in college and just never got around to getting the ticket.

I had forgotten the magic we get to participate in as radio operators. The thrill of hunting through the band for someone sending CQ and trying to get the rig tuned up and a response sent before another station gets there first. The magic of communication with someone a thousand miles away with half the power of a small light bulb, and that signal being sent out in all directions. Relearning the art of tuning the receiver to block other signals only 100 Hz away, compensating for the fading of the signal - just plain fun!

I guess I would have to add that if I can get the code back together (sort of) then anyone can do it. The result is worth the effort. Thanks for the inspiration of your magazine, keep up the good work.

Ron Hankins, KBØTME

Dear ER

Les, K6HQI, was one of a kind, a real ham's ham. A true gentleman in every sense of the word. One of the old breed of hams who designed and built his own equipment including a 3-element beam. Everyone who ever checked into the 14.286 net will miss Les.

I first met Les about ten years ago. I ran across him and the 20 meter group one night while just tuning around. Wow! Another chance to operate AM. I tuned my solid state rig to where I thought it would sound best and broke into the group. Les immediately recognized me and when it came my turn to transmit he assisted me in fine tuning my rig so that it sounded as good as possible on AM. What a nice group of hams. They were friendly, knowledgeable and best of all represented ham radio in the way that I remembered it.

I had to get a real AM rig. I put the word out and got a reply from a ham about 100 miles away that had an ART-13 that he would give me if I would come and get it. Well that was all I needed. After building a power supply and much tinkering I was on the air with a real plate-modulated transmitter.

This was the beginning of a long and meaningful friendship with Les. He would visit his brother in Florida once a year and would try to make it through Carrollton when he could.

I think that it would be a nice tribute to him if we named the 20 meter net in Les's honor. Hearing his call will always invoke fond memories for me.

Andy Howard, WA4KCY

Editor's Note: The change has been made. The Twenty Meter AM Net listed in the Vintage Nets on page 19 has been changed to "The K6HQI Memorial 20 Meter AM Net."

Heinz Gronemeier, WD8QVD Silent Key

It is with great sadness that I report the passing of Heinz Gronemeier, WD8QVD, on the eighth of August, 1995. He died at the age of 51, of complications from liver disease.

Heinz was born the eighteenth of January, 1944. He was reared and educated in Detroit, graduating from Finney High School and earning Bachelor's and Master's degrees from Wayne State University. He held an FCC First-Class commercial license that permitted him to work as a broadcast engineer for ABC and PBS stations in Detroit.

Heinz also taught high school electronics classes for 27 years in the Warren Consolidated School System. As an educator, Heinz was loved by his students, many of whom had kept in touch with him following graduation. His excellent rapport with his students influenced many to go into careers in electronics and ham radio hobbies.

As a radio amateur, Heinz spent a great deal of time communicating with friends and relatives in Germany. He had a keen interest in shortwave listening and in classic shortwave receivers. Many will remember Heinz best for the myriad hours he volunteered to teach radio theory classes to prospective hams - he "Elmered" literally dozens of currently licensed radio amateurs.

WD8QVD is survived by his wife, Susan, and his mother, Marga.
John F. Werner III, WB8IPG.

More letters on page 35

Radio Kon-Tiki

by Jim Hanlon, W8KGI
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Sandia Park, NM 87047

As readers of my past articles in ER have observed, I usually like to start a story about a piece of vintage equipment from my collection with some kind of story about it. This time, I can think of no better yarn to spin than one from Thor Heyerdahl's Kon-Tiki expedition, a classic true adventure of crossing the Pacific by balsa log raft. The date is August 9, 1947. Heyerdahl and his five companions have survived their 101 day voyage that began at Lima, Peru, and culminated in Kon-Tiki's running aground on the Raroia reef in Polynesia. As we join the story, they are on an uninhabited tropical island behind the reef. . . .

... The bitter salt water was so pure and clear that gaily colored corals in nine feet of water seemed so near the surface that we thought we would cut our toes on them in swimming. And the water abounded in beautiful varieties of colorful fish. It was a marvelous world in which to disport oneself. The water was just cold enough to be refreshing, and the air was pleasantly warm and dry from the sun. But we must get ashore again quickly today; Rarotonga would broadcast alarming news if nothing had been heard from the raft at the end of the day.

"Coils and radio parts lay drying in the tropical sun on slabs of coral, and Torstein and Knut coupled and screwed. The whole day passed, and the atmosphere grew more and more hectic. The rest of us abandoned all other jobs and crowded round the radio in the hope of being able to give assistance. We must be on the air before 10 PM. Then the thirty-six hours' time limit would be

up, and the radio amateur on Rarotonga would send out appeals for airplane and relief expeditions.

Noon came, afternoon came, and the sun set. If only the man on Rarotonga would contain himself! Seven o'clock, eight, nine. The tension was at breaking point. Not a sign of life in the transmitter, but the receiver, an NC-173, began to liven up somewhere at the bottom of the scale and we heard faint music. But not on the amateur wave length. It was heating its way up, however; perhaps it was a wet coil which was drying inward from one end. The transmitter was still stone-dead - short circuits and sparks everywhere.

"There was less than an hour left. This would never do. The regular transmitter was given up, and a little sabotage transmitter from wartime was tried again. We had tested it several times before in the course of the day, but without result. Now perhaps it had become a little drier. All batteries were completely ruined, and we got power by cranking a tiny hand generator (a GN58). It was heavy, and we four who were laymen in radio matters took turns all day long sitting and turning the infernal thing.

"The thirty-six hours would soon be up. I remember someone whispering 'Seven minutes more.' Five minutes more,' and then nobody would look at his watch again. The transmitter was as dumb as ever, but the receiver was sputtering upward toward the right wave length. Suddenly it crackled on the Rarotonga man's frequency, and we gathered that he was in full contact with the telegraph station in Tahiti. Soon



The author's 'dream' receiver acquired at this summer's Flagstaff hamfest for \$50.

afterward we picked up the following fragment of a message sent out from Rarotonga: '- - - no plane this side of Samoa. I am quite sure - - -.'

"Then it died away again. The tension was unbearable. What was brewing out there? Had they already begun to send out plane and rescue expeditions? Now, no doubt, messages concerning us were going over the air in every direction.

"The two operators worked feverishly. The sweat trickled from their faces as freely as it did from ours who sat turning the handle. Power began slowly to come into the transmitter's aerial, and Torstein pointed ecstatically to an arrow which swung slowly up over a scale when he held the Morse key down. Now it was coming!

"We turned the handle madly while Torstein called Rarotonga. No one heard us. Once more. Now the receiver was working again, but Rarotonga did not hear us. We called Hal and Frank at Los Angeles and the Naval School at Lima, but no one heard us.

"Then Torstein sent out a CQ mes-

sage; that is to say, he called all the stations in the world which could hear us on our special amateur wave length (13990 kc),

"That was of some use. Now a faint voice out in the ether began to call us slowly. We called again and said that we heard him. Then the slow voice out in the ether said:

"My name is Paul - I live in Colorado. What is your name and where do you live?"

"This was a radio amateur. Torstein seized the key, while we turned the handle, and replied:

"This is the Kon-Tiki. We are stranded on a desert island in the Pacific."

"Paul did not believe the message. He thought it was a radio amateur in the next street pulling his leg, and he did not come on the air again. We tore our hair in desperation. Here we were, sitting under the palm tops on a starry night on a desert island, and no one even believed what we said.

"Torstein did not give up; he was at the key again sending 'all well, all well,

Radio Kon-Tiki from previous page

all well' unceasingly. We must at all costs stop all this rescue machinery from starting out across the Pacific.

"Then we heard, rather faintly, in the receiver: 'If all's well, why worry?'

"Then all was quiet in the ether. That was all.

"We could have leaped into the air and shaken down all the coconuts for sheer desperation, and heaven knows what we should have done if both Rarotonga and good old Hal had not suddenly heard us. Hal wept for delight, he said, at hearing LI2B again. All the tension stopped immediately; we were once more alone and undisturbed on our South Sea island and turned in, worn out, on our beds of palm leaves. . ."

Wow!

Well, I'm not going to tell you that the NC-173 s/n 209 1370 B that I picked up at Flagstaff last July for a negotiated price of \$50 was THE receiver from the Kon-Tiki. But it sure is its kissin' cousin. Matter of fact, judging from some faded rubber stampings, it started out life belonging to A.E. Brockway, 4014 16th Ave., Brooklyn 19, NY. It hadn't quite traveled the 4300 nautical miles that the Kon-Tiki NC-173 did, but it did log a respectable 2400 land miles getting from 16th Avenue to Flag, and then another 360 back home to Sandia Park with me. Instead of getting thoroughly soaked in salt water at the end of its trip, it just got a rather thorough dusting and vacuuming. And I didn't have to wait for any coils to dry from the bottom up. Encouraged by its seller's report that it had been playing for him a couple of days before, I went ahead and plugged it in and turned it on. With just a little excess hum of protest, it came right to life with all circuits and bands reporting and operative. That's the way I dream of finding them!

You already know that the NC-173 is rugged. So let me tell you about some of its other virtues.

The NC-173 was the first of the newly

designed receivers that National brought out after the war. The initial postwar National offerings like the HRO-5 and 7, the NC-2-40-D and the NC-46, were updated versions of their prewar, old standbys. The NC-173 was a new departure, for National that is. It was a 1 RF, 2 IF, crystal filter, general coverage superhet in the mid price range, the spot previously filled by the NC-2-40-D. But instead of using Jim Millen's gear driven, catacomb coil deck, it had conventional, switched coils that National had used only in their cheaper receivers before then. With switched coils, it was not a whole lot different from its HQ-129-X competitor or its RME-99 predecessor. But it had a number of distinguishing features that made it a popular seller.

Its front end, starting with a 6SG7 RF and a 6SA7 mixer, is noticeably less noisy than the HQ-129-X, which uses a 6SS7 and a 6K8. Interestingly, the NC-173's RF stage input transformers have no padder or trimmer capacitors to adjust their tracking. Rather the operator just peaks RF stage performance with the antenna Trimmer control. And speaking of trimmer and padder capacitors, the NC-173 uses mica compression caps to tune the mixer and ceramics caps where they really count in the local oscillator. In an earlier era, they had designed mica trimmers out of the FB-7 and not used them again. The instruction manual I have, which is for the earlier NC-173 (no B), shows micas in the local oscillator circuit as well as in the mixer. Must have been a cost reduction that they later reversed. At any rate, the receiver holds its alignment well and has minimal drift after a short warm-up, not to mention being salt water resistant.

The NC-173 covers not only the expected 540 kc to 31 Mc, but also includes 6 meters in a 47.1 to 56.9 Mc range. I won't boast about its sensitivity or its image rejection on this band, but

it's plenty good enough for local QSOs and probably helped many an owner get started on this new band after the war. The IF stages are conventional, a pair of transformer coupled 6SG7's with a five-step crystal filter at the input of the first IF. The IF transformers, however, are another cost reduction departure from the earlier, air dielectric variable capacitor tuned units found in the HRO's and the NC-2-40. The 173 IF transformers are well built but less expensive slug-tuned coil units. There is also a 6AC7 "AVC Amplifier," a parallel IF stage to the regular, second IF amplifier. Its output drives the AVC rectifier half of the 6H6 second detector, but since its input which comes from the first IF amp does not include the BFO signal, injected as usual into the second detector diode, the AVC is not swamped by the presence of the BFO signal as it is on most of the contemporary receivers. As a result, AVC can be used while the BFO is on, a feature not common on amateur superhets until the advent of single sideband and product detectors. The AVC attack and decay are optimized for AM, so it sounds a little funny on slow CW. But it's there.

The 173 has the superior National variable threshold noise limiter common also to the NC-183 and the later HRO's. It offers a front-panel phono jack and a tone control in case you want to play your VM Tri-O-Matic changer through the 6SJ7/6V6 audio stages and speaker, where an unspecified amount of power is delivered to either 8 or 500 ohm loads or to headphones. B+ to the 6J5 local oscillator, the 6SJ7 BFO and to the screens of the mixer and RF amplifier is regulated by an OD3/VR150. The power transformer can be wired for either 110 or 220 volt input, and there is a back-panel plug for battery operation Kon-Tiki style.

Also, the NC-173 is pretty. With a sculpted front panel, fluted, chrome inlaid HRT tuning knobs, fluted, chrome

skirted HRS control knobs, white-filled engraved control markings on a light grey cabinet, big tuning windows, inverted S-meter, and red accents in the chrome National logo and on the tuning cursors, on the broadcast band tuning scale and the S-meter's dB over 9 scale, it was clearly a better "looker" than the down-to-business HQ-129-X.

About the only complaint I have with my NC-173 so far is that it comes stock with a pair of 0.01 mFd AC line bypass capacitors that make the chassis hot to the concrete floor in my garage! If I dump the current from this path through the third, "ground" wire of my AC plug, it's likely to trip the Ground Fault Indicator Breaker in my "fuse" box. So I've just disconnected the bypass caps.

At \$189.50 with speaker (1948 Handbook prices), the NC-173 was within pennies of the HQ-129-X, \$189.15 with speaker, and also of the SX-43, \$169.50 plus \$19.50 for the R44 accompanying speaker, and well below its NC-2-40-D cousin which was selling for \$241.41 with speaker at the same time. The other receiver in the mid-priced range was the RME-45 selling for \$198.70, also with speaker.

The serious competition in the medium-priced receiver bracket of the day was among the NC-173, the HQ-129-X, the RME-45 and the SX-43. I've owned and used all but the RME, and I'd have to call it neck-and-neck between the Hammarlund and National contenders. The HQ has always impressed me as having a sharper crystal filter and somewhat better basic IF skirt selectivity due to its three stages of IF and additional IF transformer. Its multi-section tuning condenser also optimized bandspread coverage on the traditional 80, 40, 20 and 10 meter bands. The 173 gets the edge in sensitivity, 6 meter coverage, and its superior noise limiter, a rather neat circuit that can be adjusted to do anything from clipping just lightning

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burst peaks to chopping the level of a strong local signal down to the size of a weaker one, almost like a second AGC. The bandspread on the National is not as good as the Hammarlund. For example, the 173 covers 10 meters in 4-1/4 tuning knob turns as compared to 8-1/3 turns for the 129. But the 173 10-meter range includes calibrated bandspread on 11 meters as well, which was also a ham band in those days. As I've mentioned before, they are both mechanically rugged, a legacy of both National and Hammarlund's making most of their own major components rather than buying broadcast receiver parts. Both the 173 and the 129 have direct-coupled gear-driven tuning condensers, in contrast to dial cord drives on the SX-43.

The RME-45 had quite a following back around 1950, especially among the 75 meter AM gang. It impressed me as being sound mechanically and electrically, a worthy successor to my RME-69. But I never did particularly care for its mechanical bandspread, essentially just a high reduction ratio mechanical drive to the main tuning condenser, in contrast to the separate bandspread condensers used by National, Hammarlund, and Hallicrafters. I wish someone who has an RME-45 would write about it for ER so the rest of us could appreciate its virtues.

In my experience of ownership and use for several years in the mid 50's, I'd have to rate the SX-43 as second rate to any of the above. The SX-43 does have some innovative electronics, including dual-conversion coverage of 6 meters and the FM broadcast band via an IF strip with gain both at 10.7 Mc and 455 kc. They ran the signal through twice on the VHF ranges. In this respect, it's a mini SX-42. It also uses a 6BA6 miniature tube in the front end RF amplifier and a lower noise, 7F8 dual triode oscillator/mixer. But its bandspread was fast tuning, and the bandspread dial

was tiny, crammed with 5 ham band scales and the FM broadcast band making it pretty hard to read compared to the general coverage dial. Most of all, it is mechanically flimsy! We had one at the St. Xavier High School station that would jump frequency when an energetic teen-ager bounced on the floor. It thankfully got replaced by an HQ-129-X that was much more rugged. And then there was the time that I was replacing a dial cord on mine and trying to take up the tension to eliminate the last of the backlash. I finally noticed that my additional efforts weren't doing any good, because as I tightened the dial cord all I was doing was bending the chassis!

There were several changes in the 173 through its life. The National ad in the December '48 *QST* points out that a bimetallic temperature compensator had been added to the tuning capacitor which cut down on drift and also that a vented back plate was now being installed on new 173's. These mods were available to current owners for \$6.75. The early models did not have 15 meter bandspread calibration. But A.E. Brockway's 173, evidently a later "B" model, has both 15 meter bandspread and an accessory socket for a Select-Object.

My first exposure to an NC-173 was in the fall of 1954 when my brother picked up a used one along with a Lettine 240 for his hamshack-away-from-home at Ohio State. It was an earlier model without calibrated 15 meter bandspread. I shared it with him for a couple of years when we occupied the same room in the Alpha Sigma Phi fraternity house. In all honesty, I don't remember listening to the ham bands on it all the much. What I do recall is it playing WBNS background music on Sunday afternoons while I studied EE or wrote a lab report. Along about 5 o'clock, the program would change to "Tales well calculated to keep you in . . .

My First Station

by Dave Hollander, N7RK
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Editor's Note:

I met Dave, N7RK, at the Flagstaff hamfest last July. In the course of our ragchew he mentioned that he was operating boatanchors back when he was 11 years old. I asked him if he had any photos of his station back then. He promised to send me one. Here it is with his cover letter. N6CSW



The photo is of me at 11 years old in early 1964. My call then was WN6IWX and I was in the 7th grade living in Tustin, California.

The equipment is self explanatory. The antenna was a Mosley NC-3 "El Toro". Despite the great gear, I had the misfortune of having my novice license through the bottom of the sunspot cycle. 15 meters was dead for the whole summer I was on vacation. My best QSO during that summer was another novice on Midway Island on 80 meter CW at 2 AM. He answered my CQ and you can imagine how excited I was! This station was good for 44 states and 10 countries as a novice.

I became WB6NRK at the end of the year and have been N7RK since 1977. The reason for all of the nice Hallicrafters stuff was that my father worked for Hallicrafters at the time. He was not a ham. He called all hams "members of the nitwit network" He became a ham about 3 years later and is now N6UC. Unknown to many was the fact that Hallicrafters had a small operation in Santa Ana, California, and that is where he worked. I don't believe they made any ham gear there.

My current boatanchor station is an NC-200 and a Ranger 2 (odd combination) to phased verticals (2 Hy Gain Hy Towers) on 80 and 40. I have quite a few other BAs in the garage. My main station is a Kenwood TS-830S, a Yaesu FT-900 and a homebrew 4-1000 that I built a few years ago. ER

R-390A Contract/Order Number Update No.3

by Les Locklear

1122 36th St.

Gulfport, MS 39501-7116

Who would have thought that two previous articles in ER #71 and #72 about a receiver that began production in 1954 and was last produced in 1984 would generate an avalanche of letters and telephone calls from around the world? The mystique generated by the R-390A/URR receiver has, it seems, captured our interest for over 40 years.

I received several letters from R-390A owners with the 35064-PC-62 contract number, but built by Teledyne Systems rather than Amelco, Inc. It seems that Teledyne purchased Amelco before the 1962 contract was completed and put their name on the nomenclature tags and completed the contract.

Another interesting purchase was Clavier Corp. purchasing Capehart Corp. Clavier then became Fowler Industries.

Fowler Industries was a small defense contractor located in Port Jervis, NY. They manufactured glideslope receivers, direction finders, signal generators, small radar units and IFF transponders. These items were produced in small quantities of 30 pieces or less. At peak employment levels, there were only 25 employees.

In 1984 Fowler Industries received a contract for R-390A's from Avondale Shipyards. The R-390A's were all hand-built as prototypes usually are, much of the sheet metal had to be hand-formed and cut from scratch. Mechanical filters were purchased from Dittmore-Freimuth Corp. (see 1968 contract), new modules were purchased when possible. In particular, they had problems obtaining new JAN Mil-spec tubes. The total costs for parts and labor came to over \$20,000 per receiver! !!

The owner of Fowler saw the downward trend in defense contracting and gradually downsized the company, selling it in 1990. The new owner has since passed away. All records were thrown out long ago.

An engineer at Avondale Shipyards said the R-390A specification was probably a holdover from the original series of LSD's first built by Lockheed on the West Coast. He went on to say that it wasn't uncommon in those days for the US Navy to leave the specifications in a contract for a particular piece of equipment that worked well. But, the navy never gave it a second thought as to how a contractor was to obtain that piece of gear for a new ship. In most cases, the military furnished the radios, but this time the builder was to furnish them. Avondale looked for "new" R-390A's, but were unable to locate any through their usual sources. They then put out a bid for contract, and Fowler Industries won the bid. (I might mention that new, in the crate, R-390A's were in military warehouses at that time, and still are.)

The R-390A's purchased by Avondale Shipyards were installed in the following ships: The Gunston Hall, LSD 44 and Comstock, LSD 45. These ships are 609 feet long, have a crew of 340 and are capable of 22 knots.

If you think the 80 Helena-Rubenstein R-390A's are rare, Fowler Industries only built five, that's right five 1984 R-390A's! To date only serial no. 2 has surfaced!

Joe Bunyard sent along the following tidbit. In the early to mid-70's, a company called Admiral Service Corp., later called Admiral Service Systems, was

located in LaPointe, Indiana. They manufactured several thousand receivers that were identical in every way to an R-390A. The nomenclature tags had different numbers on them. All of these receivers were shipped to Israel.

More on the 1985 US Navy manuals mentioned briefly in ER No. 72: the manuals are virtually unobtainable, the red tape involved with the US Navy and the price are ridiculous. They are identical to the April, 1970 NAVSHIPS manual 0967-063-2010.

Tom Marcotte, N5OFF, is compiling a database survey of R-390A serial and contract numbers. The Collins contract 08719-PH-55 is very revealing, the highest serial number on Tom's list is 4790. This should lay the "myth" to rest that Collins only produced 525 R-390A's.

Tom may be contacted via InterNet: n5off@wddl.aara.org@usl.edu, or write to the author with your information. This should help us determine the number of R-390A's built.

The above information was compiled with the help of Tom Marcotte N5OFF, Walter Chambers K5OP, Alan S. Douglas, Dennis Gibbs, Joe Bunyard, Victor Hatharasinghe KE6VHI, and the former general manager of Fowler Industries, Bill Szader. I am eternally indebted to all of you. ER

As of now the contract/order number list is as follows:

YEAR	MANUFACTURER	ORDER NUMBER
1954	Collins	14214-PH-51
1954	Motorola	363-PH-54
1954	Collins	375-PH-54
1955	Collins	08719-PH-55
1956	Motorola	14-PH-56
1958	Motorola	14385-PH-58
1959	Stewart-Warner	42428-PC-59
1959+/-?	Helena-Rubenstein (Collins)	*Unknown*
1960	Stewart-Warner	20139-PC-60-A1-51
1960	EAC	23137-PC-60
1961	Capehart Corp.	21582-PC-61
1962	Amelco, Inc.	35064-PC-62
1962	Teledyne Systems	35064-PC-62
1963	Teledyne/Imperial	37856-PC-63
1963	Stewart-Warner	DA-36-039-SC-81547
1966	Communications Systems	FR-11-022-C-4-26418 (E)
1967	Claviar Corp.	DAAG05-67-C-0016
1967	EAC	FR-36-039-N-6-00189 (E) (Sig.Corps)
1967	EAC	DAAB05-67-C-0155 (US Navy)
1968	Dittmore-Freimuth Corp.	DAAB05-68-C-0040
1984	Fowler Industries	N 00024-84-C-2027

A Radio Amateur's Holodeck

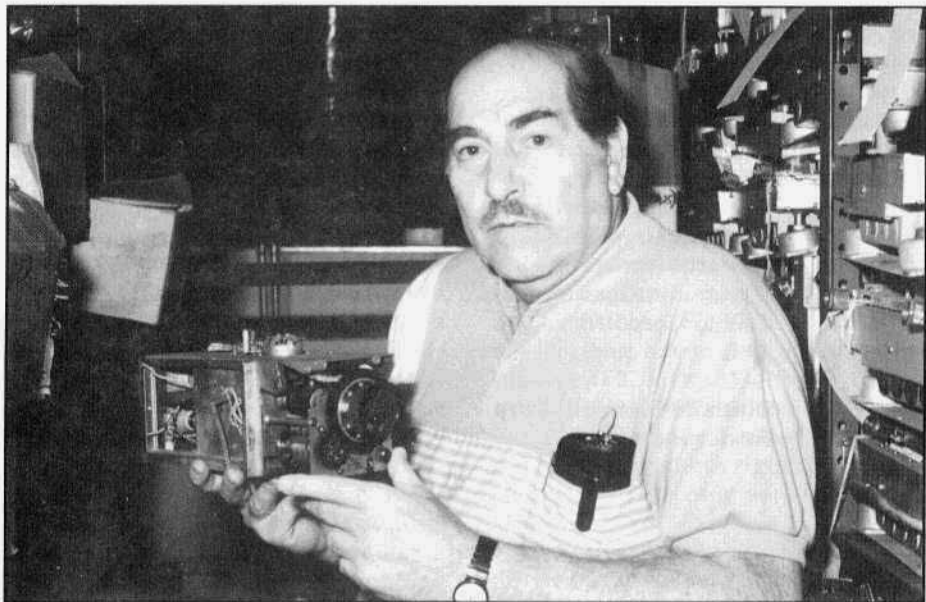
by Skipp Tullen, K2PXQ

26 Altamont Ct.

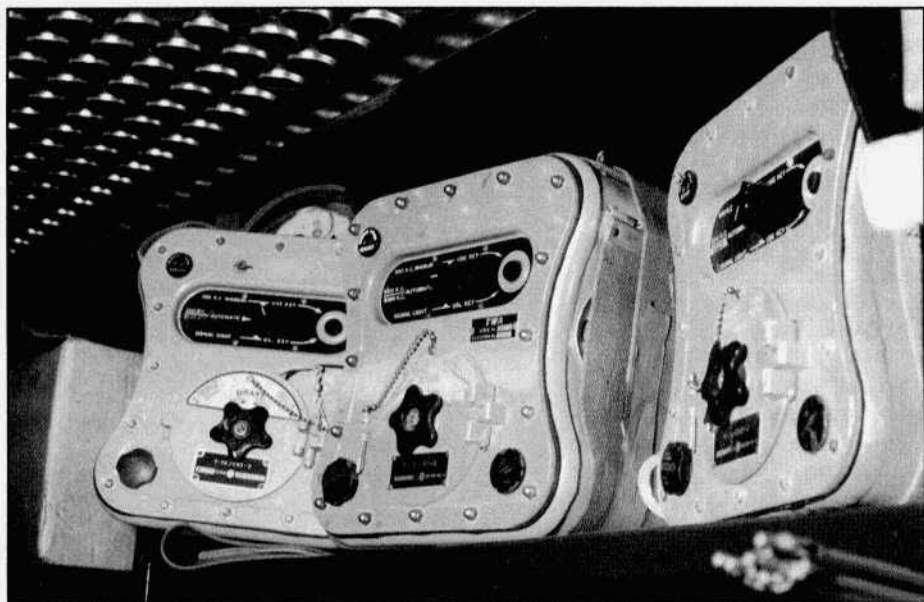
Morristown, NJ 07960-5325

Driving up to 131 Leeder Hill Drive, Hamden, Connecticut, is rather like approaching any other building in the average industrial park designed in the late 1970s. But entering the front door of Aircraft Radio Industries Co., Inc. is much more like becoming part of the virtual reality of a posthumously-written chapter in Orson Welles' "The Time Machine". The office space is furnished in the industrial office style of the 1940s and early '50s. The lighting, mostly fluorescent, casts a cold, unflattering light on the assortment of desks, shipping benches, and test equipment. There has never been a computer within the bounds of Aircraft Radio Industries! This article is about the history of Aircraft Radio Industries and about its current owner, Mr. Sidney Arotzky.

In the very late 1930s, Mr. Elihu Jacobson began working as a young technician at Tweed New Haven Airport in Connecticut. After a relatively short time as an airport employee, Mr. Jacobson was struck by the number of incoming telephone calls requesting various parts for aircraft electronics. An astute and adventuresome person, Mr. Jacobson took a bold step and struck out on his own. Housed in a facility no bigger than a large living room on Dixwell Avenue in New Haven, "Aircraft Radio" appeared as a business entity in the early 1940s. In the fall of 1945, Mr. Jacobson hired a local high school sophomore, Sidney Arotzky. Sidney worked part-time for Mr. Jacobson until graduation in 1948. At this point in its evolution, the company had moved



Owner of Aircraft Radio Industries, Inc., Sidney Arotzky, holding a piece of history. Can you guess what it is?



The CRT-3 "Gibson Girl" survival transmitter, batteries never included!

to larger quarters, and for two years, young Mr. Arotzky worked full-time for Mr. Jacobson until he entered military service in 1950. At the end of his military experience, Sid Arotzky had an important question to answer: What am I going to do for a living? The obvious answer soon surfaced: Go back to work for Aircraft Radio! To this day, Mr. Arotzky believes that the decision was good for him. He is never bored and he looks forward to going to work in the business that was his first, and only, employer!

As the owner, Mr. Jacobson continued to win the bids he had placed on government surplus equipment sales, and Aircraft Radio Industries needed still larger quarters. Again it moved, occupying 40,000 square feet of the former New Haven Clock Company main building in New Haven, Connecticut. Mr. Arotzky describes the facility as "nearly a city block long and half a city block deep, in which we occupied both the basement and the first floor. And there were some warehouses on

East Street also." As time passed, the demographics of New Haven changed, and for reasons of security, Aircraft Radio Industries moved from its monumental facility in the New Haven Clock Company building to its present location in Hamden in 1980. Because the current facility has about 9000 square feet of storage capacity, about 40 trailerloads of material were scrapped prior to the move. Among the casualties were approximately 200 ART-13s, a quantity of ARC-5s, and "perhaps a thousand of their shockmounts."

At age 76 in 1986, the founder of Aircraft Radio, Mr. Elihu Jacobson died suddenly of a heart attack. That same year, Sid Arotzky, former shop foreman, became owner.

During its most active years, Aircraft Radio Industries employed eight people. But the period from the 1950s to the 1970s, bracketed by the Korea and Vietnam conflicts, changed, and the market for 1940s and 1950s vintage avionics dwindled. Today there is less demand for ART-13 and ARC-5 parts, and

The William Howard Ordnance Technical Intelligence Museum

by Ken Lakin, KD6B

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Photos by Janet Lakin.

After conversing with William Howard (Col. US Army, retired) for several years regarding Japanese radios that I was working on, it was a real pleasure to meet him in person and take a tour of the considerable collection of radios and other items of military intelligence he has collected and organized at his home in Largo, Florida. The 300 plus items occupy approximately 1500 very crowded square feet from floor to ceiling!

The general theme of the museum is the role of military scientific and technical intelligence in the development of

U.S. armed forces from WW I through present times. The formal tour, which lasts approximately two hours, places equipment in the context of chronological world events and in particular the role the equipment might have played in intelligence gathering or how the need for the equipment was derived from previous military technical intelligence efforts.

Of greatest interest to ER readers would be the extensive private collection of radios and other signal equipment from WW I through the post Vietnam War era. Present are the usual ra-



William Howard beside Russian Army R105M series sets of the cold war period.



WW II German receiver on display.

radio sets described in ER over the past six years and quite a few foreign sets that are unknown to most of us and quite rare. Of particular interest to me were the German and Japanese sets from WW II and Chinese military sets from the Vietnam War. Some of these sets are remarkably complete with documentation generated by Allied forces of the time. The Chinese sets appeared to be near copies or adaptations of US sets from WW II and the Korean War.

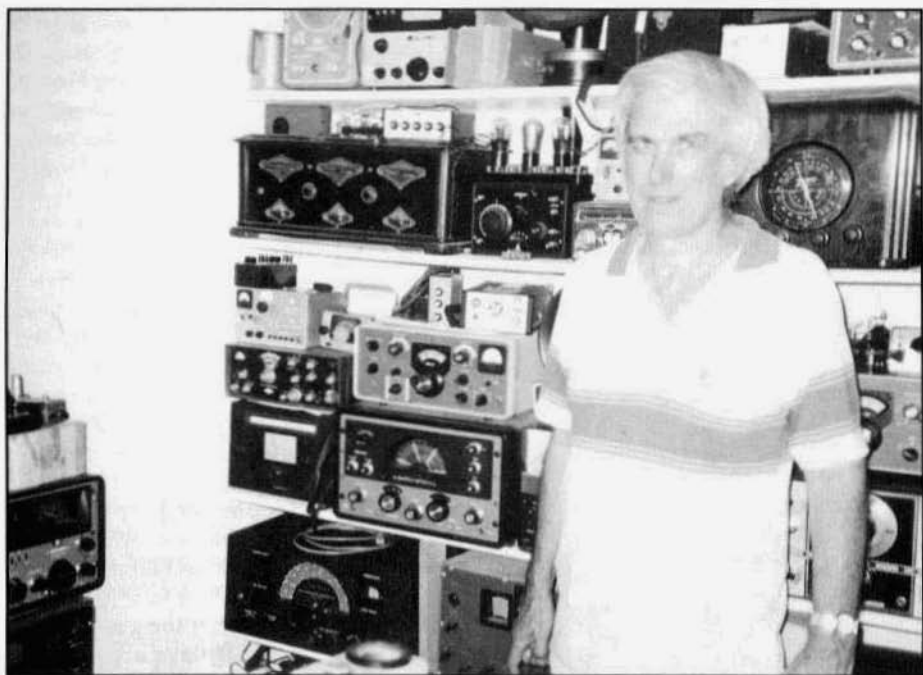
Some of the sets have been described by Col. Howard in previous ER articles. Upgrades with units in more complete

or better condition is an ongoing activity. Col. Howard is continually searching for sets whose purpose was intelligence gathering such as surveillance or spy radios in addition to captured sets. Almost as impressive as the many sets on display is the extensive documentation that is either displayed with the radios or immediately available. Where practicable, radio sets are displayed with some kind of relevant documentation. Some Axis sets of WW II are documented by War Department or other Allied manuals and intelligence reports.

Some of the general military displays are complete with mannequins wearing uniforms of the period and function. A considerable effort has been directed towards labeling equipment with proper identification and in some cases placards with more detailed descriptions.

Most sets appear in complete, or nearly complete condition, that could be made operational. However, given the large number of sets in the collection, making more than a few operational would be a major task.

Because communication equipment is an essential part of intelligence activities it is a substantial part of the museum, approximately two thirds. In addition to the radio sets are some encryption equipment and various kinds of weapons. There is, for example, a large collection of model tanks that tracks the evolution of this kind of armored warfare for US, Germany, the former Soviet Union, and Great Britain. ER



John Hurst, KU6X, in front of part of his vintage radio collection. *Photo courtesy of Steve Barnes, K6PFW.*



Pierre Dupuis, VE2MP who lives in Charlesbourg, Quebec. He uses the Ranger and Drake 2B on CW.



"Sweetwater Bob" Capozzi, WA401D, at his operating position. He drives a homebrew 813 final with a Collins TCS. *Photo courtesy of W2IQ.*



Bill Jensen, WØWI, at his Johnson operating position. The upper shelf holds a Viking II, 122 VFO and SX-125 with matching speaker. *Photo courtesy of James Jensen, WAØLEU.*

Heathkit Manuals

by John Hruza, KBØOKU
2521 S. Holly St.
Denver, CO 80222

For those of you who have not yet discovered it, the Heath Company is still in business, and still in Benton Harbor. They seem to be in two businesses these days. Primarily, they are still selling educational courses. And they also sell Reflex home security systems through local hardware stores such as Home Depot, Ace Hardware and even K-Mart.

Correspondence can be addressed to Heath Company, POB 1288, Benton Harbor, MI 49023. Product warranty returns should be made to Heath Company, 455 Riverview Dr., Benton Harbor, MI 49022. Phone (616) 925-3273 for repair information.

The Company's main telephone number is (616) 925-6000. Catalogs may be requested at (800) 444-3284 and orders for current products may be placed at (800) 253-0570. Technical assistance on current products may be had by calling (616) 925-4914. I have found the technicians who answer to be very friendly and helpful.

Possibly of most interest to our readers is the parts order phone number. Heath still stocks many (but not nearly all!) parts for older products. They can be ordered by calling (616) 925-5899. Have the part number and your credit card handy.

Finally, Heath keeps microfiche copies of most kit manuals. Prints of these manuals can also be ordered through the parts phone number above. Again, however, you must have the part number. Manuals cannot be ordered by kit model number. This is a bit of a 'Catch-22' because the only place the manual part number shows up is on the manual!

To make manual ordering a little easier, here is a cross reference of selected communications equipment model numbers to manual part numbers. If you know of others, or can correct any errors I may have made below, please contact me at the address above. I will add them to the list and make the expanded list available for a SASE.

All part numbers below must be preceded by "59" to be complete. For example the full number of the AM-1 Antenna Impedance Meter manuals is 595-79. Many have a suffix; I have seen "-01" through "-14". These suffix numbers seem to indicate a new printing, not a new edition, of the manual and aren't needed to order it.

The Heathkit Manual Cross reference List, Communications Products:

Model	Manual	Equipment
AK-5	5-236	Speaker
AM-1	5-79	Ant.Imp. Meter
AR-1	5-17	All-Wave Rcvr
AR-3	5-115	Comm. Type Rcvr
AT-1	5-64	Amateur Xmtr
DX-60B	5-944	Xmtr
DX-100	5-104	Xmtr
GD-1B	5-67	Grid Dip Meter
GD-125	5-775	Q Multiplier
GP-11	5-448	Vibrator Pwr Sply
GW-22	5-595	CB Xcvr
HD-10	5-703	Electronic Keyer
HD-1234	5-1563	Coaxial Switch
HD-1410	5-1692	Electronic Keyer
HD-1416	5-1732	Code Oscillator
HD-1426	5-1956	Field Strength Meter
HD-1984	5-1963	"Micoder II" Mic
HDP-242	7-2378	Desk Microphone
HG-10	5-452	Amateur VFO
HG-10B	5-886	Amateur VFO
HM-10A	5-618	Tunnel Dipper
HM-102	5-1272	RF Power Meter
HM-2102	5-1517	VHF Wattmeter
HM-2141	5-2203	VHF Dual Wattmeter
HN-31	5-527	"Cantenna" DL
HO-10	5-578	Monitor Scope

VINTAGE NETS

Westcoast AM Net: Meets informally, nightly on 3870 at 9:30 PT. Wednesday at 9:00 PM PT they have their formal AM net which includes a swap session. Net control rotates.

California Early Bird Net: Wednesday nights at 8 PM PT on 3835.

Southeast Swap Net: Tuesday nights at 7:30 ET on 3885. Net control is Andy, WA4KCY. This same group also has a Sunday afternoon net on 3885 at 2 PM ET.

Eastern AM Swap Net: Thursday evenings on 3885 at 7:30 ET. This net is for the exchange of AM related equipment only.

Northwest AM Net: AM activity daily 4 PM - 5 PM on 3875. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT.

K6HQI Memorial Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 5:00 PM PT, 7 days a week and usually goes for about 2 hours. Net control varies with propagation.

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 3808 Monday, Wednesday and Friday mornings at 7AM MT.

DX-60 Net: This net meets on 7290 at 2 PM ET, Sundays. Net control is Jim, N8LUV. This net is all about entry-level AM rigs like the Heath DX-60.

Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is usually Walt, KJ4KV, but sometimes it rotates to other ops. It starts at 5 AM ET Saturday mornings on 3885.

Westcoast Military Radio Collectors Net: Meets Fri. at 2200 local on 3990 and Sat. at 0800 local on 3990 + or - QRM. Net control is Tom, WA6OPE or Andy, KD6TKX.

Grey Hair Net: The oldest (or one of the oldest) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8 PM in the winter and 9 PM ET in the summer.

Vintage CW Net: For CW ops who enjoy using vintage equipment. This is not a traffic net, speed is not important. The net meets on 14.050, Saturdays at 1 PM PT. Net control is Tracy, WB6TMY.

Vintage SSB Net: Net control is Chuck, N5SWO. The group meets on 14.293 at 1 PM CT, Sunday afternoons.

Collins Users Net: The oldest of the 'users nets'. It meets on 14.263 Sunday afternoons at 2 PM CT. The net control revolves. This group also gets together for an informal ragchew on 3805 Tuesday evenings at 7 PM CT.

Drake Users Net: Another relatively new net. This group gets together on 3865 Saturday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, WZ8O; Rob, KE3EE and Huey, KD3UI.

Heath Users Net: A new net started by Marty, WB2FOU/5. Net control is shared by Fred, AA5LW. It meets on 14.275 at 4 PM CT Sundays. Check in on either AM or SSB.

Swan Users Net: This group meets on 14.250 Sunday afternoons at 4 PM CT. The net control is usually Dean, WA9AZK.

Nostalgia/Hi-Fi Net: Meets on Fridays at 7 PM PT on 1930. This net has been meeting since 1978.

K1JCL 6-Meter AM Repeater: Located in Connecticut it operates on 50.4 in and 50.5 out.

JA AM Net: 14.190 at 0100 UTC, Saturdays and Sundays. Stan Tajima, JA1DNQ is net control.

Fort Wayne Area 6-Meter AM Net: Meets nightly at 7 PM ET on 50.58 MHz. This net has been meeting since the late '50's. Most members are using vintage or homebrew gear.

Southern California Sunday Night 6 Meter AM Net: 8 PM Sundays on 50.4. Net controls are Dan, KV6I and Scott, K6PYP. Informal, supports restoring old gear and using it on the air. Loan gear available for those wanting to join in.

Homemade Radio Greeting Cards

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



In December 1990, I received a cute Christmas card showing Santa Claus and one of his reindeer sitting back-to-back. The reindeer was holding a phonograph playing 'Jingle-Bells'. I decided to 'borrow' the idea for my 1991 card. Instead of the reindeer holding a phonograph, he now held a book entitled "Old Time Radio". He and Santa were listening to a 1932 Philco cathedral radio. My friends said they enjoyed the design.

The following year the reindeer was holding a "Radio Log" book, the radio was a homemade battery type set with a loop antenna and both Santa and Blitzen were wearing headphones. One of my friends tried to guess the make of

the radio and that gave me an idea for my 1993 card.

This time the radio was a 1924 Freshman Masterpiece equipped with a Music Master horn speaker. Blitzen was holding a copy of the AWA's "Old Timer's Bulletin". Each year the music has been a different Christmas carol.

In 1994, I used an old 1930 post card showing Santa tapping out greetings on his spark transmitter. An excited youngster is receiving the message on his slide-tuner crystal set. Both sending and receiving antennas are multi-wire flat-tops.

This year's card will show Santa listening to the latest weather report before starting out on his annual DX ex-

cursion. His radio looks like it could be a Marconiphone two valve reflex set. This year, an extraordinary thing happened. I had exposed 10 frames of film expecting to get 20 prints. But the lab misunderstood and made 200 prints! Possibly the printer was mesmerized by Santa's kindly face and daydreamed while holding down the 'Print' button! I may have to use this design for years!

Making Your Own Cards

If you desire to make your own card, the procedure is fairly simple. Here's how I do it: The camera is attached to my homemade copy stand. This holds the camera at an adjustable height directly above the table holding the artwork. Two No. 1 photofloods illuminate the artwork. These are mounted on each side of the camera and shine down at about 45°. The camera (an Olympus OM-1N SLR) is equipped with a macro lens. This yields a greater camera-to-artwork distance so that the camera doesn't interfere with lighting the artwork. The camera is loaded with color negative film and an 80B filter is screwed onto the lens. After the height and focus

are adjusted to make the image just fill the camera frame, the artwork is temporarily covered with a Kodak 18% gray card so that the aperture and shutter speed can be set using the built-in exposure meter. My exposure usually runs about 1/15 second at f/3.5.

Most printing houses tend to crop too much so don't put any important details close to the edge of the frame or they may be cut off. And be sure to tell the printer exactly how many prints you want. Season's Greetings! **ER**



Measuring Distortion in AM Transmitters

by John "Robert" Burger, WB6VMI
5104 Newcastle Ave.
Encino, CA 91316

The quality of a signal on the air is often a major topic of discussion, if not the major thrust of AM. The frequency responses of the microphone and audio amplifiers are most obvious, including 60 Hz hum. Although not as obvious at first, distortion is painful to hear, since unnatural harmonics jar the nerves.

Distortion is the result of nonlinearity in a modulating subsystem when tubes and iron-core transformers are at their limits (nonlinearity means that an output does not follow in direct proportion to an input). Operating far from the limits of saturation minimizes distortion; negative feedback further reduces distortion.

Measuring Distortion

Distortion measurement systems are available (Fair Radio Sales Co. lists the Hewlett-Packard 333A for example). From California State University Northridge, his place of employment, the author borrowed a Sound Technology ST1710A, capable of measuring distortion as low as 0.01%.

Figure 1 illustrates a basic system. The Sine Generator produces audio at the microphone jack; the transmitter under test is adjusted to a given level of modulation, with power going into a dummy load. The AM detector retrieves the transmitted audio.

In Figure 1 the differential amplifier serves to compare the detected audio with the original. The difference is a distortion signal from

within the transmitter, with much lower amounts caused by the AM detector and possibly the dummy load. The root-mean-square (rms) voltage that represents distortion appears as a percentage of the total rms signal from the AM detector.

Note that the approach in Figure 1 cannot measure distortion in the microphone system. Microphones affect the tone of one's voice, but are assumed here to be distortion-free, since they operate in the low millivolt range.

AM detector subcircuits often have to be provided by the user of a distortion measurement system. The author prefers the AM detector circuit in Figure 2 because it distorts very little, owing to the greater conductivity of the germanium diodes. However, if the RF envelope drops to zero volts, this detector, like others, will distort the sine wave. So it is important to keep the envelope above zero volts.

Xmtr. / I _p	kHz	%
DX-100 / 240 mA	1	3.5
	4	4.5
Valiant / 340 mA (with the W6BM mod.)	1	5.1
	4	7.5
Viking II / 230 mA	1	12.5
	4	12.0
Viking II / 90 mA (note: reduced power)	1	9.0
	4	4.0
Viking II / 90 mA 10 dB audio feedback	1	2.0
	4	2.0

Table 1. Distortion data.

R1 in Figure 2 is adjusted for exactly 1 V peak to peak of audio for each measurement, to ensure that the distortions contributed by the AM detector and the ST1710A are constant. A special filter in the ST1710A eliminates the effect of 60 Hz pickup.

Since hams often operate at full power, meaningful measures need to be at maximum modulation and maximum power. At 100% modulation distortion is critically dependent upon the audio amplitude, so this is a poor place to measure. Also, not all rigs can deliver a modulation index of 100%. Adjusting modulation to 70% is a standard compromise - an important point suggested to the author by Ron, KB6WBO. This compromise also ensures that the envelope of the carrier does not drop to zero, and helps maintain the linearity of the above AM detector.

Particular Measurements

Note that vacuum tube transmitters give stable measurements only after reaching a stable operating temperature. Table 1 gives the measurements for the author's transmitters, the

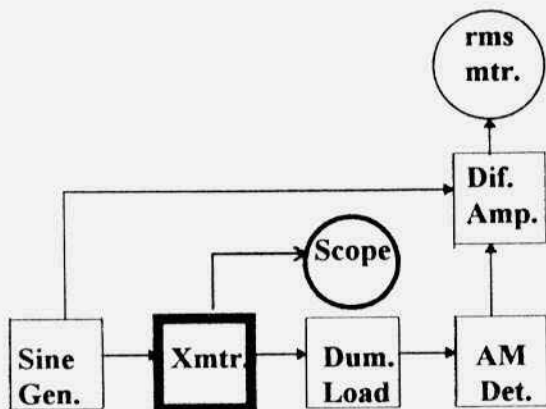


Figure 1. Distortion measuring system.

Heathkit DX-100, the Viking Valiant, and the Viking II. The measurements were done at 2 frequencies per transmitter: 1 kHz represents the midrange of a human voice; 4 kHz approaches the upper legal limit of 5 kHz for double sideband amateur radio broadcasts.

The Viking II was in shabby condition electrically prior to being repaired by the author, but now it serves admirably to illustrate certain basics. At full power it is capable of 95% at 1 kHz, and 80% modulation at 4 kHz. The 80% level at 4 kHz resulted after taking various steps to increase the audio bandwidth, thanks to the guidance of Mike,

continued next page

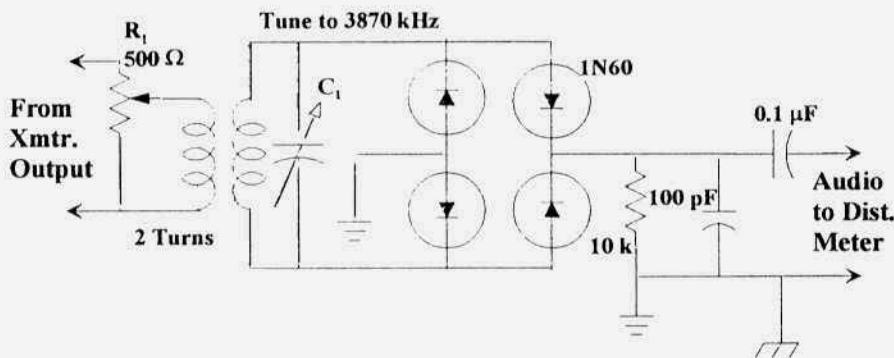


Figure 2. AM detector schematic.



The author with his modified Viking II.

KO6NM; John, W6BM; Dave, W7MBR and a few others from 3870 kHz. Note that 95% at 1 kHz and 80% at 4 kHz are the upper limits of modulation that can be achieved without obvious clipping of the sinewave. There is plenty of "rounding" distortion somewhat below these limits.

The 12.5% distortion in the Viking II seems to follow from the fact that the modulation capability is below 100%. In other words, testing at a modulation level of 70% as explained above, is too much modulation for this transmitter.

In contrast, the DX-100 achieves 90% and the Viking Valiant achieves 100% modulation at either frequency. Distortion is lower than in the Viking II.

Lowering the power in the Viking II via an extra 0.0045 uF loading capacitor across the output circuit allows 100% modulation at both frequencies, and significantly reduces distortion. Another big reduction occurs via approximately 10 dB of audio feedback (see Figure 3). (This is similar to the W6BM modification, ER April 1991, pp. 12-16). With feedback, the audio input must be

slightly higher, necessitating either a high-output microphone, or a small preamplifier. The author uses an amplified Astatic D-104, and occasionally indulges in a preamplified equalizer with a Shure Prologue dynamic microphone. As a result of the modifications, the Viking II actually distorts less than the other rigs in Table 1 according to the distortion measurement system.

Another feature of the above Viking II is that it nicely drives a Henry 2K-4 linear amplifier. For those who own linear amplifiers designed for AM, the above modifications could mean an economical entry into AM near the legal limit. The distortion in the Henry amplifier is specified to be less than 1%.

Conclusions

There are distortions not indicated by sinewave analysis. For example, the author's DX-60 with its controlled carrier (and no modulation transformer) has about 7% sinewave distortion at levels of 200% upward, as opposed to downward modulation. Although sinewave distortion is fairly low, the sound is quite unnatural. Characteriz-

ing a DX-60 nonlinearity is an unsolved mystery.

Any high fidelity amplifier can easily deliver distortion in the range of 0.1%, in contrast to the 2% of the author's Viking II. This is the result of large voltage swings in conjunction with real-world transformers and vacuum tubes. Note that two percent is the limit for the transmitter with 10 dB of negative feedback. That is, closing the loop reduces the audio gain by about 1/3. More feedback raises the risk of audio instability,

the expected result when loop gain is excessive. The author lives with 2% distortion, since this requires only minor modifications to the transmitter - a resistor and a capacitor are added; a few capacitor values are changed.

The main objective of using a distortion measurement system is to provide objective proof that a given radiotelephone unit operates correctly at full power. If distortion exceeds 5% or so, the author recommends corrective action. ER

Burger's Viking II Modification

Reference the schematic in the Viking II manual.

1. Remove C1, the 10 uF across the cathode resistor for the 1st audio stage.
2. C2 (0.003), is changed to 0.15 uF for coupling to the 2nd audio stage.
3. Remove C7, the 0.001 across the secondary of the interstage transformer T3.
4. Remove C55, the 0.01 uF across the primary of the modulation transformer.
5. C46 (0.01), is changed to 0.001 uF, 1 KV at the high voltage RFC from the final RF stage.
6. Bypass caps C3 (0.02), C4 (0.1), and C8 (0.5) are replaced with approximately 47 uF (>350V).
7. One bypass cap at least 47 uF is added between the output center tap of interstage audio transformer T3, and ground.
8. (Optional) 2 filter capacitors of about 47 uF each (>350V) are added across the -75V and +340 V power supply outputs; 2 are placed in series (each with a parallel discharge resistor of about 1M) and added across the +680V power supply output to reduce ripple to <1%.
9. The feedback network, Figure 3, is installed between the output of the modulation transformer T4 and the cathode of the 1st audio stage V1.

Notes: Audio gain, which now becomes "feedback gain" is set to about 5. If it is too high, the audio will oscillate; if it is too low, feedback is inadequate. Actual audio gain is now controlled externally by a preamplifier. ER

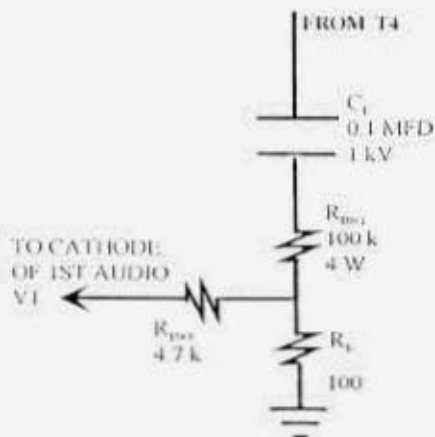


Figure 3. Burger's Viking audio feedback network.

The RME-9D "Single Signal Super"

by Dennis Petrich, KØEOO
6419 Berwickshire Way
San Jose, Calif. 95120

In this article I will try to communicate my thoughts on a receiver from Radio Manufacturing Engineers, Inc., RME for short. I think this set was far ahead of its time.

Several months ago at the Sacramento ham swap meet I came across a seller who had a nice selection of vintage artifacts, including one I had not seen before - the RME-9D. I asked him the usual questions about the condition of the rig and, then continued on to other booths thinking about what I had just seen and heard, wondering - does it really work? Did RME make a matching speaker? Has it been recapped? Has it been repainted? Are those the right knobs? Does the R-meter movement still move, etc...? I knew nothing about the history of the set, but decided to buy it just because it looked interesting, was in very good shape and seemed to be all there. Later I did some research and found out the following:

Radio Mfg. Engineers, Inc. built their first receiver in 1932. It was the RME-9 and according to Raymond S. Moore's "Communications Receivers, 3rd edition", they made only 100 of this first model before they started producing the 9D. The two models are virtually identical except for the style of knob used. In various pictures I have seen of the 9D the knob style was not always the same. I imagine they used knobs that were available at the time of production.

The earliest reference to the RME-9 I could find was in the May 1934 QST. In that issue they talked about its advanced features, the crystal filter, single-signal reception solving congested traffic problems and the moderate pricing.

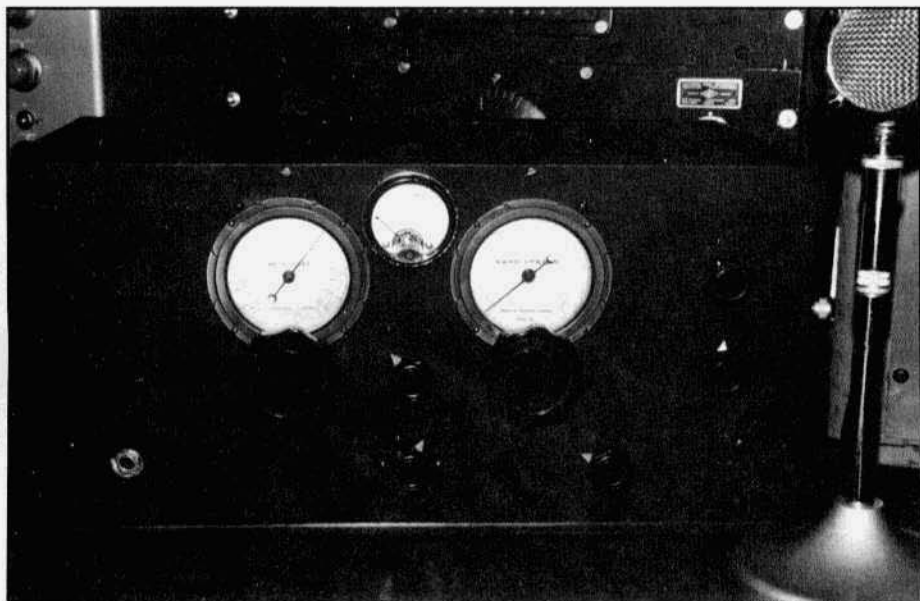
(By the way, in that same QST, I saw an ad for the "Here to stay" crystal microphone type D-104. Little did they know then what "Here to stay" meant.

According to Moore the 9D ran from 1934 to 1935, and was available in two models. The standard RME-9D covered 500 kc to 22 Mc in 5 bands and the version in this article called the "Special", a variation of the original 9D, - covers from 1450 kc to 32 Mc also in 5 bands. A June 1935 issue of QST advertises both models saying the "Special" model was offered to "get you on 10 meters for this summer's 28 to 30 Mc activity".

A September 1934 issue of QST proclaimed the RME-9D as a "Single Signal Super". They go on to say that it "incorporates a highly selective tuned RF stage, series parallel quartz crystal filter, tone control, phone monitor, audio-beat oscillator, carrier current indicator or R-meter, built-in coil switching arrangement and power supply, all in one cabinet". In those days National Radio separated the receiver from the power supply for thermal stability. I'm sure that was the reason for their last statement "all in one cabinet".

Interesting Features

The RME-9D has two very distinctive airplane dials, one for main tuning and the other for bandspread. The R-meter was quite revolutionary in that it was calibrated such that 100 uV at the antenna would produce R-9 on the meter. It was also calibrated in microvolts as well as R units from 0 to 9. In those days most signal meters read around 10 to 25 uV to S-9. In the '60's and '70's Collins and other manufactures calibrated their meters to read 50 or 100 uV at S-9. I



The RME-9D in the author's hamshack.

don't believe any other receiver of the day was calibrated in this way. Quite innovative because it takes into account using the S/R-meter on strong as well as weak signals.

Another very interesting feature of the 9D was the "phone monitor" mode mentioned in the September QST ad. The 9D has the ability to monitor your transmit audio while you are in "send". They put an additional terminal post on the back of the receiver to connect a 10 to 20 foot piece of wire. They tell you to route the wire on the floor in the shack. When the receiver is put into "Monitor" or send mode two things happen: First, the wire is connected to the second detector and secondly the RF and IF stages are disabled. Consequently, you are able to hear your transmit audio in the headphones. They recommend you do not use the speaker because of potential feedback. In "receive" the wire is disconnected from the detector and shorted to ground. I wonder why this feature didn't take off with other receiver manufacturers? Audio monitoring is one of

the best ways to assure a clean undistorted signal and where could be a better place to put it than in the receiver.

In the 50's EF Johnson developed the "Signal Sentry" for the same purpose. Johnson added a CW tone mode but with the BFO on in the RME it performs the exact same function on CW as on AM.

Manufactured in 1935, the RME-9D represents the oldest receiver in my collection. Therefore I was not ready for the tube line-up used in this black beauty. Tube types such as 57, 58, 2B7 and 2A5 to name a few. These were 2.5 volt filaments tubes, not the usual 6.3 or 12 volt types I was use to . Oh well, just another type to add to my tube spare list.

Anyway, back to another more interesting feature of this classic set. The RF gain control they call the VC control is ganged with the BFO on/off switch. When you turn the BFO on and start to advance the control you are turning the RF gain down and like Collins and some

The RME-9D "Single Signal Super" from previous page

other sets, as the RF gain is turned down the S-meter/R-meter starts riding up the scale to indicate the microvolts/dB at the antenna required to be heard by the receiver.

So, as in other sets, one would adjust the RF/VC control to keep the signal from overriding the BFO injection on strong signals. I found this implementation to be quite effective and easy to use. In one motion the BFO is turned on and the gain set to the correct level. What a deal. For AM when the BFO is shut off the RF gain is at maximum so the gain of the receiver is controlled by the AVC, just like in the 75A-1.

Performance

After completing the recapping that someone had started some years ago and replacing resistors that were found to be out of spec I gave this set a fine going over with my alignment tools. This was not easy because the RME manual for this set has no alignment instructions. The IF's and crystal filter were easy but the RF section is not straightforward in the way the adjustments are designed in, consequently I had to do a bit of reverse engineering to try and come up with a technique that would work for all bands. Once that was completed I started to do some checks on the 9D's performance.

I chose not to use too big a magnifying glass in assessing the performance of this venerable old piece of radio history, mainly because the designer didn't have the benefit of '60's test equipment technology and insight when they were doing their designing in 1933. The field of radio communications back then was in its fledgling period, each year bringing new ideas and discoveries.

Even so, I was impressed with the performance of this radio while I was making the various checks. As far as sensitivity goes the following is the worse case value I found across each of the 5 bands and as you can see is quite respectable for 1934.

Band	Range(Mc)	Sensitivity (uV) @10 dB SNR @ 30% mod.
1	1.4-3.1	0.55
2	3.0-6.8	1.0
3	6.0-13.0	1.4
4	12.0-23.0	1.5
5	17.0-32.0	2.2

Selectivity at 6 dB down was 8.8 kc and really sounds full on AM over the permanent magnet 500-ohm R-42 speaker I was using. Also, with the early crystal filter design in this set the selectivity mode is switchable. Crystal filter designs of the '50's and '60's did not give you a choice of filter modes. They simply were in or out depending on the crystal filter switch position.

In the RME-9D the user can select series or parallel operation of the crystal filter with a control in the upper right hand corner of the front panel. Switching the control to the left position selects the series mode. In this mode the filter acts as a bandpass filter - by varying the crystal phasing control the user can select CW or AM operation. To select AM the phasing control is set for greatest band noise or response. If CW is desired the control is set for minimum response. In the AM mode I got the 8.8 kc bandpass for 6 dB down. With CW selected I got a very sharp 600 cycles for single signal CW operation.

With the selectivity switch moved to the right position the crystal filter is in parallel mode. In this mode the filter acts to null or reject interference in the pass-band. By rotating the crystal phasing control the user can move the selective notch to reject heterodynes or other interference.

General

Overall, I would have to give this set a definite two thumbs up. It has good sensitivity, is selective enough for good AM fidelity, has excellent AM quality audio and is stable enough for AM on

Book Reviews

by Barry Wiseman, N6CSW

"The Pocket Guide to Collins Amateur Radio Equipment 1946 to 1980 by Jay H. Miller, KK5IM; contributing editor Butch Schartau, KØBS. Published by Trinity Graphics Systems, 5402-1/2 Morningside Ave., Dallas, TX 75206. Pocket-size, 3-1/2 x 7 inches, 104 pages, B&W photos. \$19.95 plus \$2 S&H from the Electric Radio Store, Box 57, Hesperus, CO 81326.

A very classy production reflecting the author's background in graphic design. I am very impressed. I think this is another book that will be around for a long, long time. This is something we've needed; a complete guide to all the Collins amateur equipment from 1946 to 1980. There's a photo of every piece of gear and accessory item with a brief description, some history and then on a facing page the complete specifications. The specifications include size, weight, frequency range, price when new, etc.. All this information is nice to have at hand in one volume. I highly recommend this book.

"The Zenith Trans-Oceanic, The Royalty of Radios" by John H. Bryant, IAI, and Harold N. Cones, PhD. Published by Schiffer Publishing Ltd., 77 Lower Valley Rd., Atglen, PA 19310. 8-1/2 x 11 inches, 160 pages, color and B&W photos, softcover. Available from The Radio Professors, P. O. Box 592, Stillwater, OK 74076, for \$24.95 plus \$2 S&H.

This is the best looking radio-related book published in the last while. The print, the paper, the photos and the layout are all first-class. Bryant and Cones are both excellent writers and they have provided with this book a complete - down to the last detail - history of the Trans-Oceanic. From the first model - the 7G605 Clipper that came out in 1942 to the R-7000-2 that was the last model produced in 1981 all the history is here. Besides just history there is a section of the book on collecting and restoration and large appendices with all kinds of info including a price guide. A book for anyone who has even a remote interest in the Trans-Oceanic.

"Lew McCoy on Antennas" by Lew McCoy, WIICP. Published by CQ Communications Inc. 111 pages, 8-1/2 x 11 inches, softcover, B&W photos. \$15.95 plus \$3 S&H from the Electric Radio Store, Box 57, Hesperus, CO 81326.

In this book Lew McCoy covers the subject of ham antennas in a way that anyone can understand; even me. The book covers the whole gamut from wire antennas to beams to mobile installations. A bonus is Lew's introduction where he talks about his long involvement in amateur radio. An interesting book from a living legend.

"Tube Type Transmitter Guide" by Eugene Rippen. Published by Sound Values. 8-1/2 x 11 inches, 150 pages, B&W photos, softcover, \$17.95 ppd in US, from Sound Values P.O. Box 9, Auburn, CA 95604.

This book fills a long-standing need for a transmitter/transceiver reference book. I think there's a place for it on all our bookshelves. The author Eugene Rippen has done a lot of work putting this volume together. I have two complaints neither of which really detracts from the value of the book; the photos could be better and there could be more info on each rig. Perhaps these deficiencies will be rectified in a future edition.

The E.F. Johnson Viking Adventurer

Dave Ishmael, WA6VVL
1118 Paularino Ave.
Costa Mesa, CA 92626

Sitting alongside the Heath AT-1 in terms of classic transmitter designs right out of the pages of CQ, QST, or the Radio Handbook, is the E.F. Johnson Viking Adventurer. A classic 6AG7/807 CW transmitter, the Adventurer was first sold in 1954 and 6,142 were built before being discontinued in 1964 (ER #27, pg. 11). In '54, the Adventurer sold for \$54.95 in kit form which was a bit "pricey" compared to the Heath AT-1's \$29.50 and later, the DX-20's \$35.95. A separate speech amplifier/modulator was available for \$12.25. By the time the Adventurer was discontinued in '64, the price had increased to \$69.95.

The Adventurer is a 50-W input, crystal controlled, CW transmitter with single-knob bandswitching on 80-10M. The pi-network will accommodate output impedances in the range of 50-600 ohms. A MIN/MAX slide-switch on the

front panel adds a 700 pF SM cap across the 700 pF coupling cap in the MAX position. An RCA phono jack is used for the antenna output. The tube line-up consists of a 6AG7 Pierce-type crystal oscillator (serves as a buffer when an external VFO is used), 807 final amplifier, and 5U4G full-wave rectifier. The 807's socket is mounted 1" below the chassis which helps limit the front panel height to 8-1/8".

The power supply uses a capacitor input filter and filter choke that delivers >475V key-down @ 100 mA. The input and output filter capacitors are both 8 uf @ 700V. The 20K/25K divider/bleeder across the output of the power supply provides 200V for the 6AG7. The Adventurer's power transformer uses the same lamination as the AT-1's transformer and has about 1/4" more iron in the core - not exactly a



Front view of the EFJ Viking Adventurer.

"husky" supply for the 50W input power.

A dual-scale (0-20 mA/0-200 mA) undamped 2" meter indicates 807 grid or plate current. The crystal or VFO input uses an octal socket mounted behind the front panel. An accessory socket is available on the rear apron for powering the Johnson (or similar) remote VFO. The Adventurer's point-to-point wiring is very clean and straightforward and I suspect that it would have been a relatively easy kit to build.

The Adventurer is housed in a 10-3/8"W x 8-1/8"H x 7-3/8"D maroon aluminum cabinet. The front panel is aluminum and painted maroon and grey with green silkscreened lettering. The transmitter is utilitarian in appearance - not as cosmetically pleasing as (say) the Heath DX-20/DX-35 with their rounded-corner cabinets. The Adventurer is about 17% and 20% smaller

than the AT-1 and DX-20 respectively.

The Adventurer pictured was bought from an ER reader, Bob Braeger, WA6KER. It had a few "battle-scars", but generally speaking, it was in very good condition. It was original with the exception that the RCA phono jack had been replaced with a standard SO-239 antenna connector. For \$54.95, you would have thought that E.F. Johnson would have used an SO-239 in the first place! I removed the front panel and gave it several coats of Meguiar's Car Cleaner/Wax to bring out the original finish. The front panel hardware was replaced. Input power on 80/40M was just under 50W. Output power was 20-22W.

For additional reading, try the Adventurer review in the August, 1955 QST, pgs. 39-40. Send me a LSASE and I will send you the Adventurer's schematic and specs. ER



Rear view.

My Heath HX-10 "Marauder" Transmitter Story

by Phillip W. Harris, WB6MYL
12560 Kenobi Ct.
Cerritos, CA 90703

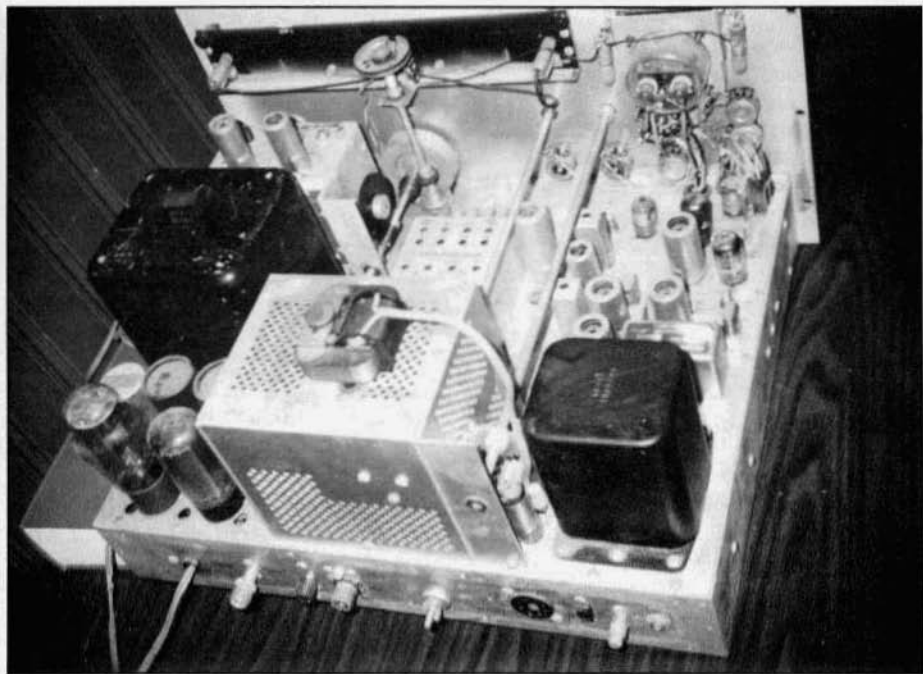
My "Marauder" story does not start out as such. As a new "general" class ham in 1964, I loved being (finally) able to use more than 75 watts and to use the VFO in my DX-100 on 40 meter phone. I also became intrigued with a neighboring ham's RTTY equipment. Ray, W6PNW, sold me an old Western Union model 15; You "rtty" guys of that era know what I am talking about; remember the noise that thing made, but loved that "end of line bell"! Anyway, I built the popular W2AU discrimination unit using TV width coils to get that 850 cps shift. That was before toroids became popular for such, and, of course, any computers out there were those that "glowed in the dark". That W2AU unit

worked pretty well, but my old Howard 430 receiver left a lot to be desired. Luckily, a ham I went to junior high with had built the superb Heath SB-300 receiver, lost interest in the hobby, and sold me the receiver cheap. I loved that receiver! The SB-300 was the first in a long line of such stylish Heath ham radios designed in an attempt to match the success that Collins was having with their new S-line.

A 1964 QST Hints & Kinks article showed me a simple FSK conversion for the DX-100 by simply hooking a wire under the 6AU6 VFO tube; but it was battery operated and the shift would continually change as the little 1.5V cell would drain; what a hassle! Plus, I had



Front and top view of the HX-10, cabinet removed.



Rear view.

to always remove it every time I wanted to join "heterodyne alley" on the upper end of the 40 meter AM band. After that fiasco, I wanted my faithful AM phone, but still yearned for RTTY, although I got "gun-shy" to modify another transmitter for this mode. I firmly believe that Heath came out with the HX-10 just for my benefit; here was a moderately priced transmitter with both AM and SSB but including an FSK mode; this was a first! (You guys with the Central Electronics 200V: granted, it had built in FSK, but it was out of the price range for a 14 year-old kid). The kicker was that the HX-10 was advertised at that time as the "matching" transmitter for my SB-300.

\$335 was still a lot of money for a kid, but I did want to build an HX-10. I sold my DX-100, a bicycle, mowed lawns every day and borrowed from my parents. When I got the package from Heath my first response was "Whoa! I think I should have started with an easier kit,

say a grid dip meter, or even the Cantenna!" Anyway, after five weeks of after school kit building (nestled between homework and little league practice) I finished my project. The only "during construction problem that I can remember was my mother complaining of me tying up her muffin pan (Heath's suggestion for separation of parts into categories) and the nightly question from my Dad on why he wasn't getting any corn muffins. Installation of the frequency tuning mechanism was a bear for me and several cold solder joints took a lot of trouble shooting time. Nonetheless, once these were resolved, the HX-10 was on the air! I used it about 90% of my hamming time for 40 meter rag chewing; it was funny that even though I now had SSB capability, my daily round table group on AM was intact and in the four years of regular use of the HX-10, I would very seldom use the SSB mode. The other 10% of the time was used for 40 meter RTTY. In all



For "Extra" versatility . . . HEATHKIT "MARAUDER" SSB TRANSMITTER

Complete . . . nothing else to buy . . . all power supplies are built-in . . . all crystals furnished for full 80 through 10 meter coverage. Operates SSB (upper or lower side-band), CW, AM & FSK. 180 watts PEP on SSB & CW. Multi-section hermetically sealed crystal bandpass filter; preheated, temperature compensated VFO; dual conversion heterodyne circuitry; automatic level control; air-cooled shielded final amplifier; VOX controlled break-in CW operation; 165 to 1 gear drive tuning; and more! 92 lbs.

Kit HX-10 . . . no money down, low as \$22 mo. . . \$334.95

three modes it performed admirably, as it still does today (never tried it on CW). The loud fan (that cools the 6146 final tubes) noise is a little bothersome today; I don't remember this as any issue at all thirty years ago. However, Heath gave the amateur the option; the fan can easily be plugged in and unplugged from the top of the chassis.

The HX-10, at ninety pounds, was the last of the "boat anchor" rigs from Heath. It was replaced by the SB-400 transmitter which "mirror-matched" my SB-300 receiver; the matching amplifier, the

HA-20 "Warrior" amplifier (distinguished by its two beautiful "tail lights" red pilot lights) was replaced by the still-popular SB-200 amplifier. The HX-10 operated in all modes, except AM, at a full 180 watts of input power on all bands 80 thru 10 meters, covered in 600 kc segments. The AM mode consisted of a transmitted carrier and lower side-band, but because of high plate dissipation, it was limited to 75 watts. The transmitter used heterodyne conversion circuitry and had a temperature compensated VFO for maximum frequency

stability. As mentioned above, the frequency tuning mechanism was somewhat of a chore to install, but once complete, the spinner type tuning knob, with the 165 to 1 gear ratio, and a ten inch slide rule scale, made tuning a pleasure (with absolutely no backlash). Other neat features were a spotting position on the function switch and a "monitoring scope" output jack in the back. I wish the new rigs had this latter feature. Also, it would be nice if more modern rigs had the front panel adjusted controls for all VOX functions like the HX-10 did. Twenty-one tubes were used in the HX-10, including the rectifiers (5U4) and voltage regulators (0A2, 0B2). However, silicon diodes were used in the bias supply for (as advertised) "longer life and trouble-free operation".

Heath was accurate when they stated that the Marauder was designed with flexibility in mind. I have now had this fine rig for thirty (+) years. Despite all the boat anchors I have in my shack, many non-hams (and a few hams) comment first on the HX-10 (probably because that distinctive Heath two-tone green color and "chrome-like" plastic knobs do indeed stand out in my "sea" of Collins St. James gray boxes). Although it has taken a back seat to my S-line in everyday operation, the HX-10 still sits there to remind me of both the fun I had building it, and of simpler times, in using it. ER

To join AMI send \$2 to:
AMI
Box 1500
Merrimack, NH 03054

Letters from page 3

Dear ER

I just received the September issue of ER and with great anticipation sat down to feed my habit of great radio. Well, it was with great sorrow that the first article I came across was the passing of 'Les', K6HQI.

I got my license in 1978 after serving as a CW op in the Army in the late 60's. I worked ten meters from the late 70's to the early 80's. Then, I just lost interest in the low bands. Around 1989, I dragged out my old DX-60 which had never worked on AM. I decided to fix it. I worked a lot of 10 AM until it went out again about '91 or '92. I looked around for more AM and found it on 20 at 14.286. When I finally got the nerve to break in one night, I was warmly received by Les, Doug and some of the other fellows. Les, as stated, was the power of 20 meter AM, but he never held that over anyone. He usually acted as informal net control since he had one of the biggest 20 meter antennas I ever heard of - a 70 foot tower with a 30 foot boom and 3 elements. Wow!

Les was never critical of a station's lower power and always tried to make everyone, including SSB stations, feel welcome. His philosophy of helping other hams with parts or expertise, made me proud to have known him. The profit motive seems to have crept into this hobby. But, like Les said, "Hams don't operate that way." I try to live by that ideal as much as I can - helping others with parts and/or knowledge.

All I can say is that Les exemplified what I think amateur radio is all about.

We'll miss you, Les - and thanks for being a real "Amateur Radio Operator".
Bill Bogart, KA9CWK

Dear ER

Sorry to learn of Les Lester's, K6HQI, passing. I heard him on 20 meters many times, although I worked him only twice. When I sent him a QSL he responded immediately with his QSL.

Letters from previous page

thus carrying on the QSL exchange traditions as I remember it in the 1950's. Listening to K6HQI and a handful of others five or six years ago, and reading ER in '89, are the contributing factors which inspired me to get back on AM after a 32 year absence.

I hope to be applying for the AM-WAS (20) soon. I've had the contacts since last March - just can't get the QSL cards!

Wayne, NØTE

Dear ER

I'm slowly reading my way through the back issues of ER. Here are a few comments along the way.

Vintage RTTY: You may have a hard time finding conventional RTTY signals on just any day of the week; but Baudot RTTY is still used in contests. Of course these days they all use computer programs that grab the other station's call sign, send the signal report with one button and QSL with another, and keep track of the log, score, and duplicates. I guess it's used in contests because a contact can be established so rapidly (if you can copy the other station's call). There is a net at 8 PM Pacific every week night on 80M, around 3620 using Baudot.

February 20 is the anniversary of the legalization of FSK on the HF bands. Last Feb. 20 I put on a small event called "Green Key Night" (an obvious pun on "straight key night"), which was not a contest and had no rules but guidelines were to use vacuum tube gear if you can, use a mechanical teleprinter if you can, use 850 Hz shift if you can, and in any case have fun, wallow in nostalgia, and remember the pioneers like W6AEE, W6NRM, W0BP, W2BFD, and anybody else you can think of. I intend to operate this way again next Feb. 20 and forever after henceforth; so you might publicize Feb. 20 as the date to get your old RTTY gear on the air even if you only do it once a year. I'm not sure if the FSK

privileges began at 0001Z or 0001 EST or 0001 local time on Feb. 20, so calling it a "night" is stretching the point; just get on the air some time during that day. At the first one I made about a dozen QSOs, each lasting half an hour or more, and talked to several people who remembered mutual friends on RTTY in years long past.

Last Feb. 20 I did most of my operating on 20 M; and I realized later that 20 meter operation was something few of us dared attempt in the olden days. If you had modern gear, like the Collins 75A-4 receiver, you could probably operate on 20M with ease; but many of us had transmitters that frequency multiplied and receivers like the Super Pro that drifted horribly, so even with 850 shift it was a hand on the tuning knob and an eye on the tuning indicator all the way.

There used to be a RTTY contest on the weekend near Feb. 20, called the Anniversary Contest, sponsored by Merrill Swan's original RTTY magazine. I don't know what happened to these; I ignored contests for many years; but now it seems to have turned into the ARRL RTTY Roundup and to have migrated to January. I'll have to ask my ARRL officials if it can't be moved back to February because of the significance of the date.

You may not find much in the way of vacuum tube RTTY converters, since so many of them were home made. Most of the military stuff was pretty poor. There's the CV-89/URA-8 which is fair-to-good. There is a TMC converter, CFA-1 (with variations for 850 and 170 and other shifts. As it is a diversity unit, I modified mine so one channel does 850 and the other does 170.) There was a unit for the ham market made by Electrocom, and another by Alltronics-Howard. The granddaddy of 'em all was the AN/FGC-1, a diversity converter made by Western Electric and filling a 7 foot rack. There was a companion re-

ceiver AN/FRR-3, in another 7 foot rack. Some of the military gear did the conversion at audio frequencies and some at IF. There were many amateur designs, probably beginning with W2BFD, and then the W2PAT and the W2JAV and the W6NRM designs and the W6FFC "Mainline" designs. People who operated only VHF could get by with a pretty simple terminal unit. Those who operated HF were constantly experimenting with elaborate filtering and detecting schemes to try to pull a little more signal out of the soup.

Jim Haynes, W6JVE

The RME-9D from page 28

the first 4 bands. The 5th band drifts more than it should so I plan to track the problem down some day after 10M opens up again, otherwise it's fine for now. Mechanically the set is very stable and shows no sign of jitter even when dropped or if the table is thumped.

I like the special features RME engineers put into this set, like the AM/CW monitor mode, the single knob BFO/RFG control, the wide dynamic range R-meter and the unique crystal filter design. RME engineers showed much forethought and planning in the way this communications quality set was designed. Also, the AGC is able to handle 1 to 100,000 μ V (R-1 to 60 dB over R-9) signals without distortion - a feat not many receivers can perform, not very well anyway.

Currently I am trying to figure out what transmitter to use with this very fine quality RME radio from the '30's. I see it as a keeper and a receiver I will look forward to using for many years to come. ER

Heathkit Manuals from page 18

Model	Manual	Equipment
HP-10	5-332	Trans. Pwr Sply
HP-13	5-638	DC Pwr Sply
HP-20	5-363	Utility Pwr Sply
HP-23	5-635	AC Pwr Sply
HP-23A	5-924	AC Pwr Sply
HP-23C	5-2022	AC Pwr Sply
HS-24	5-698	Mobile Speaker
HS-1661	7-1477	Station Speaker
HW-7	5-1455	Low-Power CW Xcvr
HW-8	5-1754	Low-Power CW Xcvr
HW-12	5-631	80-M SSB Xcvr
HW-22	5-632	40-Meter SSB Xcvr
HW-30	5-364	"Twoer" 2-Meter Xcvr
HW-101	5-1277	SSB Xcvr
HWA-7-1	5-1467	Accessory Pwr Sply
HX-10	5-414	"Marauder" Xmtr
MK-1	5-229	Modification Kit
MT-1	5-240	"Cheyenne" Xmtr
PS-23	5-2314	AC pwr sply.
QF-1	5-113	Q Multiplier
RX-1	5-193	"Mohawk" Rcvr
SA-2060	5-2514	Deluxe Ant. tuner
SB-10	5-201	SSB Adapter
SB-100	5-672	SSB Xcvr
SB-101	5-840	SSB Xcvr
SB-104A	5-1992	SSB Xcvr Ass.
"	5-1994	SSB Xcvr Op.
SB-200	5-682	Linear Amplifier
SB-221	5-2201	Linear Amplifier
SB-300	5-639	SSB Rcvr
SBA-104-3	7-1390	CW Filter Accessory
SBA-300-4	5-712	2-Meter Converter
SBM-102-17	5-538	Modification Kit
SW-717	5-1293	Shortwave Rcvr
TX-1	5-192	"Apache" Xmtr
VF-1	5-91	VFO
VF-2031	5-2085	Hand-Held 2M Xcvr
VHF-1	5-212	"Seneca" Xmtr
XC-2	5-282	2-Meter Converter
	7-308	Guide to Circuit Brds

Editor's Note:

In an upcoming issue John will do a similar article on Heathkit test equipment.

Radio Kon-Tiki from page 8

Suspense." Ten or fifteen minutes into the program, it would creep into my level of consciousness and eventually completely distract me from my work. By the time the show was over, I'd hang it up and go out for dinner.

My recent acquisition of Brockway's receiver fulfilled a dream/wish I'd been having for quite a while now of finding another NC-173. My dream occurred again the night before I went to Flagstaff, and then there was my NC-173, out on a table in the RV section of the parking lot waiting for me. It was even more special because I'd been given the accompanying Lettine 240 that completed the recreation of our college days station by a friend in Albuquerque only about a month earlier. I only had to evict the resident mud-dobber wasps and replace a few components . . . but that's another story.

Now as I gaze into the 173's light brown "eyes" and listen to the CW music on the bottom of 20 meters, I can almost hear the faint echoes of LI2B calling once again, "all well, all well, all well. . ." ER

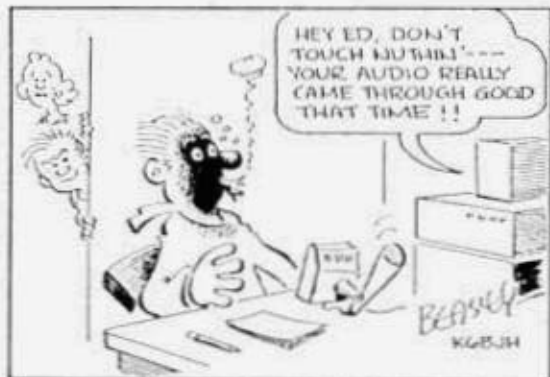
More Information

For DXpedition buffs, I've found a little more Kon-Tiki info. National also built their main transmitter. They carried a 6995 kc crystal which they used on 27.980 Mc CW and they were capable of operating on 14.142 Mc phone, but results were not good. They carried 41, 6-volt batteries and 30, 45 volt batteries. During the trip, they tore down some of the 45's to make 6's due to the transmitter's filament drain. National's inside-back-cover ads in QST during 1947 and as late as October, 1951 featured pictures and news of the Kon-Tiki expedition. For more info and thrills, look up the book "Kon-Tiki" by Thor Heyerdahl in your local library.

A Radio Amateur's Holodeck from page 13

components for BC-348s. Complete SCR-522s wait for the next call. There are Bendix-built HF transmitters and receivers, and ARN-5 and ARN-6 units patiently poised for the next request. Is that a Collins 18S4 transceiver in that spot? Look! ARC-1s and ARC-27s. Gosh! This box contains BC-348 dynamotors! Are these BC-433s? . . . Good grief! All this Collins VHF gear. . . .

Aircraft Radio Industries' most important clients today are companies in the same business, including firms in Europe. And while Mr. Arotzky is not currently buying surplus technology from the 1960s and 70s, he knows where to find a component if he doesn't stock it. When he gets a call for a complete unit or for a part, Sid Arotzky or his son Lon will rise from his office chair to check stock in the warehouse portion of the business. The only existing "inventory" is cerebral. Mr. Arotzky agrees that there is an almost "spiritual" experience derived from simply being in the presence of this technology and this history. I regretted leaving the building and returning to the present. The access code to the past is 1-203-281-0563. His address is 131 Leeder Hill Dr., Hamden, CT 06517. ER



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FOR SALE: 2 racks of tube ham gear: R390A, Harris-Gates HFL1000, more - \$3000 V. Vogt, 2311 Pimmit Dr. #114E, Falls Church, VA 22043.

FOR SALE: HT-32 - \$85; TR2950 - \$230; NC-300 - \$235; Heath keyer - \$50. U-ship. W7RBF, AZ, (602) 864-9987.

FOR SALE: Drake MN-2000 antenna tuner - \$175; Knight T-150A AM-CW xmtr - \$100. Charles Stinger, W8GFA, 404 Ross Ave., Hamilton, OH 45013. (513) 867-0079

FOR SALE: 30K-1; companion 75A-1. Both in exc cond. Many other items too numerous to list. Mark Schraut, NG7A, 801-879-2434.

FOR SALE: Hallicrafters S-40A&B, good - \$50 each; S-41G&W, fair - \$40 each; S-53A, good - \$60; S-85&86, VG - \$60 each; SX-99, exc. - \$90; S-108, exc. - \$90; SX-110, exc. - \$110; S-118, fair - \$40; S-120, good - \$50. Don Jeffrey, POB 1164, Monrovia, CA 91017.

FOR SALE: Variacs, 0-140 VAC, 20 amp, panel mount, now 1/2 price - \$30. Bob Bakinowski, AZ, (520) 624-8029

FOR SALE: KWM-2A, 516F-2, 30L-1 round, exc., no shpg. Jon, K0DTA, 8311 5th Ave. S, Bloomington, MN 55420-2329. (612) 881-9037

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

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FOR SALE: WW II connectors, PL61, 63, 64 - \$8 for one-56 ea for 3 or more, + \$5 shpg. Jeary Vogt, 3 Brampton Rd., Malvern, PA 19355. (610) 296-2162

FOR SALE: TV-7 operator's & organizational maintenance manual w/changes, 62 pgs - \$18; TS-323/UR manuals, 80 pgs - \$20. Bob Bakinowski, AZ, (520) 624-8029.

FOR SALE: R-390 Motorola contract, has meters, top & bottom covers missing, working, good cosmetics - \$175. **WANTED:** RCA comm. rcvr's, all models. Frank Francowski, 440-A Jemez Rd., Santa Fe, NM 87501. (505) 473-4150

WANTED: Collins pre-WW II xmt models 30W, 32A, 32B, 32G, 30FX & 40B, desperately needed to finish my station. Paul Christensen, N9AZ, 11142 Raley Creek S., Jacksonville, FL 32225. (904) 646-0129

WANTED: National/RCA/Hammarlund. National AGS w/coils for 5 bands; National SW-3 w/588-AB ps; RCA RAL; HRO-60 (rack mount type). Taka, CA, (415) 697-6719.

WANTED: Old meters & any aircraft stuff. Chris Cross, Box 94, McConnell, IL 61050.

WANTED: HRO plug-in xtal for HRO variation two (only xtal). Tajima, JA1DNQ, c/o The Nakagawa's, 22942 Cedarspring, Lake Forest, CA 92630.

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

WANTED: Johnson gear, all models, any condition. Please state asking price. Wen Turner, AD7Z, Box 451, Cal-Nev-Ari, NV 89039-0402.

WANTED: SX-42, SP-400 only in very good conds. Jose Cangas, EA4JL, Contact in the States, Kurt Keller, CT, (203) 431-6850.

WANTED: B & W HDVL coils; 500 watt multi-match mod. xmt. Martin Peipenburg, W9OLD, RRI, Box 56B, Monterey, IN 46960. (219) 542-2591

WANTED: Globe King 500B; Swan mono banders; GM tube amp, 6/2 AM gear. Scott, K6PYP, 210 Mantua Rd., Pacific Palisades, CA 90272. (310) 459-0337

WANTED: 365 pF variable capacitors; Microcomputer Design by Donald Martin, 1976. David Dameron, KG6BP, 819 Boundary Pl., Manhattan Beach, CA 90266-6621.

WANTED: Coil & dial scale E & F for the HRO-60. Richard J. LaMark, N2TXL, 6822 Tuckahoe Rd., Williamson, NY 14589-9589. (315) 589-2552

WANTED: Collins 30S-1 round emblem only; 32S-3A (R.E.) late model w/plastic finger hole ring; 302C-3 watt meter wing & RE; equipment must be in exc to mint cond for personal use. Kerry, N5CET, TX, (800) 776-4976 (d), 214-271-0017 eves.

WANTED: Collins mech. filters for S-Line: F455FA-05-500 Hz, X455Q200-200 Hz, F455FA-31-3.1 kHz; F455FA-60-6.1 kHz. Kerry, N5CET, TX, (800) 776-4976 (D), (214) 271-0017 eves.

WANTED: Collins mics SM-1, SM-2, SM-3, Electrovoice 664 w/desk stand only Kerry, N5CET, TX, (800) 776-4976 (D), (214) 271-0017 eves.

WANTED: TBY-7; BC-222; WW II Japanese military radios of any kind. Takashi Doi, I-21-4, Minamidai, Seyaku, Yokohama Japan. FAX: 011-8145-301-8069.

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

WANTED: KWS-1; HF-380; 62S1; R-389 and SP-600JX. Need exc. conds. Mitsugu Shigaki, JA6IBX, 2825-2 Jozan Kamidai Machi, Kumamoto, 860 Japan. FAX Japan 96-329-4601

WANTED: Tektronis memorabilia & promotional literature or catalogs from 1946-1980. James True, NSARW, POB 13280, Mannelle, AR 72113. (501) 851-8783, FAX 851-8784.

WANTED: Hi-Fi spkr's & enclosure by Altec, Electrovoice, Jensen, JBL, tube components. Tim Phelan, 845 Lilybud, Ballwin, MO 63011. (314) 227-9264.

WANTED: Heathkit, Eico, Fisher, Dynaco or similar tube audio amplifier in any condition or manuals for same. Mike Nowlen, WB4UKB, POB 1941, Herndon, VA 22070. (703) 716-1363

WANTED: Military sets, US GRC-13, ABK, APX-1; British WS No.21, Canadian WS No. 29 A & B sets. Leroy E. Sparks, 924 W. McFadden Ave., Santa Ana, CA 92707-1114. (714) 540-8123

WANTED: Collins KWM 380 late model high serial number. Must have speech processor, noise blanker & accessory filters. Kerry, N5CET, (800) 776-4976 (d), (214) 271-0017 eves.

WANTED: Hallicrafters PS-500-AC pwr sply w/ spkr; Galaxy F-3 CW filter; Galaxy RV-1 remote VFO; manual for Hallicrafter SR-500 Tornado; manuals for HP140T, HP8552A & HP8553B Spectrum Analyzer system. Bob Smith, KC4WJO, 14779 Kogan Dr., Woodbridge, VA 22193-3314.

WANTED: Multi-Elnac AC pwr sply for a PMR series rcvr, prefer model w/S-meter. Will pay reasonable price plus shpg. Gary, WA5NCX, TX, (713) 787-0040.

WANTED: Help!! I will pay top US \$'s for manual for GRC-86/GRT-12 or any information about it's manufacture "Republic Electronic Industries Corp". Mitsugu Shigaki, JA6IBX, 2825-2 Jozan Kamidai Machi, Kumamoto, 860 Japan. FAX: Japan 096-329-4601.

WANTED: R-390A. I have a Hallicrafter SX-42 in exc condx to trade for a nice R-390A; audio output xmt for Hammarlund SP-600 or SP-600 parts unit. John Richardson, 1163 Highland Pl., Debuque, IA 52001. (319) 556-5504

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

FOR SALE: USN URT-2 xmt, complete w/ manuals. **WANTED:** Desperately, GRC-14 (MRC-55); RT-135/GRC-13 manuals/schematics/copies OK; W.S. #19 Mark 2 access's (dynamotor, variometer, connectors, manual). Meir, WF2U, 36 Deer Path Rd., Central Islip, NY 11722. (516) 234-1697

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

FOR SALE: NOS filter choke, 4.0 Hy DCR 50 ohms 0.425A @ 20 KV, 20 lbs - \$17; NOS tuning unit for TCS-12 xmt, dial, cursor, var. cap - \$10; RCA 59C TV sweep gen - \$20; Eico 955 capacitor tester - \$17; Eico 222 VTVM - \$22; Heath IT22 capacitor tester - \$20; Heath IG4505 scope calibrator - \$30; Narda 8201 microwave leakage tester - \$60; RCA tube manuals: RC14, RC15, RC16, RC22 & RC24 - \$8 ea. U-ship. **WANTED:** manuals: Heath HW2036 2M scvr; Heath HD1418 active audio filter, Eico 150 signal tracer. Robert Morrison, Box 555321, Camp Pendleton, CA 92055-5321. (619) 385-0481 after 5 PM PST

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FOR SALE: Clegg Zeus front panel w/ tuning assembly, dials & glass, not new but in VGC - \$60 or trade. Craig, WA9HRN, IL, (708) 367-1599

FOR SALE: Johnson KW matchbox/meter/manual - \$225; Ameco TX-62 - \$25; CE-20A VFO kit - offer. Dan Gresson, KH6P, 98-1145 Kahapii St., Aiea, HI 96701. (808) 486-8879

FOR SALE: WW II BC 973-BDF w/manual - \$275; Tek-HP test gear, send for list. Fred Honnold, W6YKM, 17890 Sharon Ct., Pine Grove, CA 95665. (209) 296-5990

FOR SALE: Johnson TR switch - \$40; Vector CW filter for 75A4 - \$50; Eico 722 VFO - \$40. All + shpg. Rob, NS6V, CA, (408) 464-0505.

FOR SALE: Collins KWM-2; 516F-2; 312B-4; 351D-2; MP-1; 30L-1; 62S-1; R-388. All w/manuals. Larry Wright, N9HRQ, 131 Hilltop Dr., Lake in The Hills, IL 60102. (708) 658-7328

FOR SALE: Heath SB101/supply/CW filter - \$250. U-ship. Ken Kolthoff, KSAXH, 5753 David Pl., Fairfield, OH 45014-3507. (513) 858-2161

FOR SALE: Drake RA, T4X & MS-4 spkr/pwr splly, w/160 xtals, exc cond. - \$375. Larry Wright, N9HRQ, 131 Hilltop Dr., Lake in The Hills, IL 60102. (708) 658-7328

TRADE: Hallicrafters SR-42 or Clegg '99ER' for Hallicrafters SR-46 or SR-46A. Al Bernard, POB 690098, Orlando, FL 32869-0098. (407) 351-5536

FOR SALE: Collins 300G AM broadcast xmt, 250W - \$1500; Heath SB620, 455 kHz input - \$75. Evan Haydon, N0GMR, NE, (402) 435-4083.

FOR SALE: Professionally produced reprint of "Gilbert Radio Apparatus, 1919", 64 pgs, written by Clarence Tuska, Assoc. IRE. For your copy send \$10.95 + \$2 shpg. James Fred, R1, Cutler, IN 46920. (317) 268-2214.

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FOR SALE: QST yr 28 - \$49; 48 from 21-31 - \$5 ea; Lot - \$249 + shpg. H. Mohr, W3NCX, 1005 W. Wyoming St., Allentown, PA 18130.

FOR SALE: Schematics (copies) for radios, also kit radios 1922-1950; manuals, test equip, ham gear, etc - no list, contact me for prices, availability. Duane Ballew, KB7QZK, 6813 152nd St. Ct. NW, Gig Harbor, WA 98332. (206) 851-4505

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FOR SALE: National NCX-3, manual (copy), no ps, VGC - \$75; Johnson 6N2, orig. manual, GC - \$20. Includes shpg for both. Patrick Marineau, K9HF, 5055-1/2 Lakewood Ave., St. Louis, MO 63123. (314) 752-3611

FOR SALE: Inst. manual, reprint, for National SW-3 Universal rcvr, 12 pgs - \$5 ppd; high voltage mic capacitors, 01-1200, 002-1200, 02-600 & 0001-2500 - \$1 ea + \$2 per order shpg. James Fred, R1, Cutler, IN 46920. (317) 268-2214

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WANTED: Junker Halli. SR-150 or xtal lattice filter for same; orig. manual for R648; VFO knob for T4X. Greg Richardson, WA8JPC, POB 405, Gallipolis Ferry, WV 25515.

WANTED: Crystal knob cover for Ranger I. Tom, W3BYM, 13806 Parkland Dr., Rockville, MD 20853. (301) 871-7463

WANTED: Knight Ocean Hopper; anyone w/info on a Hallicrafters model CR-3000 AM FM stereo shortwave rcvr. David Mazza, KB9EL, 366 S. McKinley, Kankakee, IL 60901. (815) 933-8824

WANTED: Service manual schematic R1451A (V) 3/WLR-6 (V) HF rcvr; Squires Sanders, SSIBS, Weber, 4845 W. 107th St., Oak Lawn, IL 60453-5252.

WANTED: SRR-11-12-13 or FRR 21-22-23 rcvrs, manuals or schematics. Ray Blackford, WA1ZYE, Box 6591, Edison, NJ 08818. (908) 892-6537, 9-10 PM

WANTED: Collecting early Heath gear 1940's - 1950's; early Heath catalogs and literature; Heath mics, spkrs, supplies, access., any parts units. Byron, WA5THJ, 1215 Fresa Rd., Pasadena, TX 77502-5017. (713) 941-3631

WANTED: Collins 75A1, A2's, A3's, 75A4's; coil set for the 310B1 exciter. Bob Kemp, N0B470, Lake City, MN 55041. (612) 345-5345 (d)

WANTED: RAI & AN/BRR rcvr's. Tom Brent, Box 1552, Sumas, WA 98295. (604) 826-4051.

WANTED: National FB-7 & 1-10 coils; HRO-50 A coil or faceplate; NC-45 rcvr. Wayne Childress, KC7KUE, 1903 Jerome Pl. #3, Helena, MT 59601. (406) 443-7255

WANTED: Xmtr, indicator, antenna unit for ASB series 515 MHz radar. Rich, K9RLE, 11405, Taylor Ave., Oak Park, IL 60304. (708) 383-4579

WANTED: Power sply for Johnson SSB adapter. Gary, AA9QT, 18615 Big Cypress Dr., Spring, TX 77388. (713) 355-6153

WANTED: Magazines: pre 1936 'Radio', pre 1934 'R'. Have some duplicate 'Radio' for trade. Wayne, N0TE, 1212 17th Rd. NW, New Strawn, KS 66839. (316) 364-5353

WANTED: BC-611. Andy, WA4KCY, 105 Sweet Bay Ln., Carrollton, GA 30116-8519.

WANTED: Microphone & pwr sply for Heath HW-12. Write or call w/price. Fred Hooper, W0BMT, 205 E. 4th St., Neligh, NE 68756-1506. (402) 887-5201

WANTED: Hallicrafters HT-9 xmtr & spare parts, info, etc. Robert Braza, N1PRS, 23 Howard St., Pawtucket, RI 02860. (401) 723-1603

FOR SALE: 1 pr. AR2 AX's - \$185; Audio Research SP6C, mint - \$1600; Ashly FET500 stereo pwr amp, mint - \$650; Craftsmen C-800 FM & AM tuner - \$75; 1 pr Heath W-5 mono pwr amps - \$250; SAE A-205, 400W stereo pwr amp, mint - \$350; Teeco preamp PR35 + match pwr amp - \$75; mod Dyna PAS-3 tube stereo preamp, mint - \$85; Grunow model 588 SW & AM radio - \$65; Zenith model 5D811 AM radio - \$30; Zenith model 6D029 consol-tone - \$65; 1000 radio's & TV's new & used tubes - \$100; Western Electric radio model 6A - best offer; Stromberg-Carlson AU35PA amp - \$90; 1 pr. MAC 30 pwr amps - best offer; pwr sply 120 AC to 12 DC 250 amps - \$300; pwr sply 120 AC to 13.8V reg 2.5 amps - \$20. Buy any one radio get the second one half price. Mint Audio Research Classic 60 list \$4995 - \$2500; JBL C36 cabinet - best offer; Drake 2-NT xmtr - \$150; Heath model SB-610 monitor scope - \$200; Heath model TX-1 Apache xmtr - \$175; Hallicrafters HT-37 xmtr - \$260; Eico amateur model 720 xmtr - \$95; The Radio Amateur's Handbook 1973 - \$10; The Radio Amateur's Handbook 1977 - \$10; The Radio Amateur's Handbook 1978 - \$10; The Radio Amateur's Handbook 1962 - \$20; The Radio Handbook 1963 - \$20; The Radio Amateur's Handbook 1947 - best offer; How to Fix Transistor Radios & Printed Circuit by Leon - \$10; Everybody's Radio manual by Popular Science Publishing - \$5; The Oscilloscope 3rd ed. by George Zwick - \$10; Tested Electronics Troubleshooting Method by Walter H. Buchsbaum - \$5; Fundamentals of Radio by Edward C. Jordan - \$8; Applied Electronics by Truman S. Gray - \$15; Radio Data Book, The Radio Electronics Handbook by William F. Boyce - best offer; Radio Engineers Handbook by Frederick Emmersonsterman Sc.D., 1st ed. - best offer; Modern Radio Servicing by Alfred A. Ghirardi, 1st ed. - best offer; Second-Level Basic Electronic - \$5; Elements of Electronics by Hickey & Villines - \$10; Grob Basic Electronic, 4th ed. - \$5; Modern Electronics by TAB - \$6; Eico 324 RF single gen. - \$30; Heath AF & RF single gen. model G-5 - \$20; HP 650 A AF gen. - \$35; HP ABR 200 gen. - \$40; pwr sply 117 AC to 13.8 VDC at 15 amp - \$35; Heath vac tube voltmeter model V-4 - \$25; pwr Stat 120 AC to 0-140 at 10 amp - \$60; pwr Stat 120 AC to 0-140 at 7.5 amp - \$35; Simpson 260 meter, nice - \$100; Eico 1100 resistance box - \$10; Pioneer SX828 stereo rcvr - \$85; Olson RA720 AM & FM stereo rcvr, one bad ch - \$20; Scott 330D stereo tuner, as is - \$25; Dynaco PAT5 preamp, as is - \$40; Dynaco SCA35 Amp - \$75; Dewald L-803 mono AM & FM tuner - \$20; Hallicrafter S20R - \$50; pwr sply 120 AC to 12 DC 100 to 150 amps - \$200; 100 radios & TV's new & used tubes - \$75; G&I 120 AC at 1500 to 1650 RPM motor great for tape records new - \$80; Viking reel to reel deck - \$85; Eico 377 audio gen. - \$35; Eico 950 resistance & capacitance bridge - \$10. All + shpg. Dale Shuler, 1208 Greenwood Ave., Akron, OH 44320. (216) 869-8227

FOR SALE: New list - hundreds of manuals, schematics and service information. Send 2-stamp LSASE. David Crowell, KATEDP, 40 Briarwood Rd., North Scituate, RI 02857-2805. (401) 934-1845

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FOR SALE: Drake TR4C w/NB - \$275; C4 console - \$250; RV4 VFO - \$90 + shpg. Kathleen Smith, VE3WKW, 951 Wonderland Rd. S #607, London, ONT N6K 2X7 Canada. (519) 472-2738

FOR SALE: Collins KWM-2 & 516F-2, nice clean condx. - \$575 + shpg. Merle Crowley, WIGZS, POB 476, Sumterville, FL 33585. (904) 568-1676 dys

FOR SALE: NIB RCA 6JE6C - \$6; used pair 6JB6 - \$6; used 6JE6 - \$3. + shpg. Pete Hamersma, WB2JWU, 87 Philip Ave., Elmwood Park, NJ 07407.

FOR SALE: Antenna-Engineering Classics: Laport, good copy, very rare; Kraus-1st edition, VG; Terrman, good. All \$125. **WANTED:** Ranger II. Brian, IL. (708) 762-5240.

FOR SALE: Manuals (copies), spiral bound: R90A, 400 pgs - \$58, SP-600-JX-17, 332 pgs - \$55; R-648/ARR-41, 363 pgs - \$45. Bob Bakowski, AZ, (520) 624-8029.

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FOR SALE: Collins RE 51S-1, s/n MCN 5569, 1976/77 production, plastic finger hole & trim ring, tuning tool, weighted knob, orig. manual, exc condx/collector quality - \$2250; RE 55G-1, s/n 700+, plastic trim ring, orig. manual, exc condx/collector quality - \$1500. Mike, WA6AAJ, 3417 W. Magill Ave., Fresno, CA 93711. Tel/FAX (209) 435-3159

FOR SALE: KWM-2(W), 516F-2 - \$500; 312B-4 (R) - \$225; CP-1 xtal pack - \$120; Conar 400 xmtr/500 rcvr - \$150; EV-911, NIB - \$95; Astatic 77 - \$65. Bill, WA1APX/8, MI, (810) 781-9717.

FOR SALE: Johnson Valiant xmtr in VGC, new caps & aligned, working great, includes "parts" Valiant - \$350 OBO. Prefer PU. Would consider exc condx Viking Ranger as partial trade. Henry Rogers, WA7YBS, POB 511, Virginia City, NV 89440. (702) 847-9047

WANTED

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

WANTED: McIntosh and Thordarson amplifiers any condx. Marcus Frisch, WA9XP, Box 28803, Greenfield, WI 53228-0803. (414) 297-9310

WANTED: Radar equipment, the bigger the better! Also early TV cameras. Allan H. Weiner, 507 Violet Ave., Hyde Park, NY 12538. (914) 471-9500

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WANTED: Collecting Pre-1950 commercially built amateur gear; xmtxs, rcvrs & accessories. Dean Showalter, WA6PJR, 72 Buckboard Rd., Tipton, NM 87059. (505) 286-1370

WANTED: Old tube amps & xmtxs by Western Electric, UTC, Acro, Peerless, Thordarson; Jensen, JBL, EV, ALTEC, WE spkrs. Mike Somers, 2432 W. Fargo, Chicago, IL 60645. (312) 338-0153

WANTED: Kleinschmidt Teletype equipment, literature, 7/8" paper tape, Hallicrafters elevating base for SX-42. Tom Kleinschmidt, 506 N. Maple St., Prospect Heights, IL 60070. (708) 255-8128

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

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WANTED: Interesting Navy stuff, xmtxs, rcvrs, radar, etc. Bigger is better! Surprise me! William Donzelli, 304 S. Chester, Park Ridge, IL 60068. (708) 825-2630 integrat@tusa.com

WANTED: Historical data & info on the American amateur radio manufacturing industry (1936-1986). Submittals will be used as part of my Masters in History thesis which examines the rise and fall of the American amateur radio industry. This work is being done under the direction of Dr. Castenadas, Professor of History, California State University, Sacramento. I can be contacted by the following methods: Robert M. Miller, KE6F, 9655 Appalaichian Dr., Sacramento, CA 95827. (916) 362-5481 (h) 732-5908 (w) FAX 369-6277, rmillerr@netcom.com

WANTED: WW II radio equip. PPI-PPN-2 parts & acc. also TRC-10. Steve Bartkowski, 4923 W. 28th St., Cicero, IL 60650. (708) 863-3090

WANTED: Instruction manual for the Wilson 204 beam & duo bander DB44. Al Sturko, RR, 57A C13, Peachland, BC V0H 1X0 Canada. (604) 767-6447

WANTED: Communications Electronics, Inc. or Watkins-Johnson equipment, manuals, catalogs or parts rigs. Terry O'Laughlin, WB9CVB, POB 3461, Madison, WI 53704-0461. (608) 244-3135

WANTED: Johnson 500/desk kilowatt, TMC GPT-750, T-368 or other quality commercial high power AM rig. Alan Gray, WJVL, PA, (215) 795-0933.

WANTED: HELP! Does anyone have a Hallicrafters SX-17 parts set? I need the cabinet & the bottom plate. Bill Fizzette, K3JW, Rd1, Box 55, Henryville, PA 18332. (717) 629-0637

WANTED: National NTX-30, Hallicrafters HT6 or RCA ACT20 xmtx. John Zitzelberger, 1673 Devonshire Ct., Thousand Oaks, CA 91361. (805) 449-1036

WANTED: Groth type ferris counting drive, 6T9 tubes, James Millen 403R5 5-pin ceramic coil plugs, 100 uF 450V can-type electrolytics. Howard Kraus, K2UD, 372 Collosine Ave., Amherst, NY 14226-2971. (716) 838-2406

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

WANTED: Military radios, any URC/PRC, manpack, walkie-talkie, survival, particularly URC-4, 64, 68; PRC-63, 93, 68, 47; RT-10, 20, 60. Pref. working/repairable. Additional contacts appreciated. Daniel Cahn, 3444 Greenwood Ave., Los Angeles, CA 90066. Msg/FAX (310) 398-7159

WANTED: Hammarlund manuals, parts, parts units, from the series Comet, HQ, 5P. Also accessories, catalogs, spec sheets, memorabilia. Robert, Amateur Radio Surplus, (517) 789-6721

WANTED: Collins 30J, 30FXB/C, other pre-1940 Collins amateur gear for my collection. John Fincy, WB5HRL, 14818 Delbarton, Houston, TX 77083. (713) 5615-KW1

WANTED: Uniden CR-2021, Kenwood T-599 xmtr; Radio Shack DX-400; SB-610 scope. **FOR SALE:** Viking I parts unit - \$45, U-ship. Rick, K8MLV/O, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

WANTED: Paying immediate cash for old Fender and VOX guitar amplifiers. Frank Czaja, A19T, 8968 W. Forest Home #4, Greenfield, WI 53228

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

WANTED: Best price or TRADE for your National SW-4 or Hallicrafter Sky Buddy 519 (not 519R). Robert Enemark, W1FC, POB 1607, Duxbury, MA 02331. (617) 934-5043

WANTED: Ham short stories for my next book. I will edit, and will pay nothing, but writer gets credit as author. Stories should have general ham appeal. Accompanying photos appreciated. Eugene Rippen (Tube Type Transmitter Guide) POB 9, Auburn, CA 95604.

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

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WANTED: Lafayette HA-350 S-meter, junker or working rcvr. Dave, WB2TBB, 611 Burtis St., Brick, NJ 08723. (908) 920-9611

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

WANTED: ARRL Handbook-1946, 1948, 1950; Radio Handbook 4th Ed. (1937). Lynn Stolz, N8AJ, 2461 Bear Oller Rd., Delaware, OH 43015. (614) 369-9777

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FOR SALE: National NCX-1000, factory incomplete unit, w/meter, hardware, RF components, etc. - \$75 shpd. George, KIANX, MA, (413) 527-4304.

FOR SALE: Listed items are very clean, no junk & orig; Heath collector guide - \$22; Lafayette catalogs - \$5 ea; Heath catalogs 50's, 1970 - \$8 ea; Heath TX-1 - \$100; ARRL Handbooks, 40's-70's - \$8-\$10 each; Johnson Invader - \$250; Heath manuals, SB-220 - \$12; TX-1 - \$15; DX-100 - \$15; DX-40 - \$12; Collins bulletins, #1031B, #1018A, #1031A, #1018B - \$50; Collins toroid catalog, Marty, NJ, (609) 466-4519.

FOR SALE: New Amperite time-delay relays for the 305-1 amp. Part number 115NO120 - \$20; WE KWM-2A, 516E-2 - \$395. Steve, WB4JN, SC, correct no. (803) 873-2499 x 200 (d), 871-7749 eves

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FOR SALE: RTTY stuff: Hal ST-6 - \$40; ST-6000 - \$90; Flesher TU-170/TR-128 - \$60; Dowetron MIC-1000R - \$95; Frederick 1200A demod - \$25; 1250 scope - \$50; military CV-483C/URA-17 demod - \$50; Teletype 2880TR - \$50. Plus shpg. Jack, WA2HWJ, "The Teletype Nat", NJ, (201) 927-7784.

FOR SALE: "Teletype" T-shirts. The Teletype Corporation's "T" symbol in black on a yellow (what else?) Hanes shirt - \$15 ppd. Sizes L or XL only. Jack, WA2HWJ, NJ (201) 927-7784.

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FOR SALE: Level meters for Collins R-392/URR rcvrs, new - \$35, UPS prepaid. Dennis, WA0WAB, (316) 225-3737 (d), 225-2961 (n).

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FOR SALE: Near mint Clegg Interceptor, Allbender, Heath HX 30, 6 sideband books. Dusty Rhodes, W8MOW, 1324 N. Dorset Rd., Troy, OH 45373. (513) 339-1546.



WANTED: Any condition, Hallicrafters S-35 panoramic adaptor and S-33 Sky Trainer as shown. Chuck Dachis, 'The Hallicrafter Collector', 4500 Russell Dr., Austin, Texas 78745. (512) 443-5027

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WANTED: Cabinet for a Collins 32V-2. Mark S. Rauber, POB 1077, Minden, NV 89423. (702) 782-3596

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WANTED: Collecting early homebrew ham radio & related: Spark, parts, books, magazines, etc. John H. Dilks, K2IQN, 125 Warf Rd., English Creek, Egg Harbor Twp., 08234-8501. (609) 927-3873. john.dilks@academia.com

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FOR SALE: Nat NC-270 + spkr - \$175; Buckmaster QST microfiche, includes Micron 780 reader. PU only - \$350. Dave, WA6VVL, 1118 Paularino Ave., Costa Mesa, CA 92626. (714) 979-5858

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WANTED: Clean or mint spkrs for NC-300 & NC-183. Clint, KB5ZHT, 107 Forest Oaks Ln., Lake Jackson, TX 77566. (409) 297-3338

WANTED: Mars; Babcock; Palco; Pierson; Lyso; Subraco; Gonset Commander; other AM mobile xmtr's/rcvr's/pwr sply's, dead OK. Capt. Larry Rau, KF6WV, Box 1139, Occidental, CA 95465. (707) 874-1000

WANTED: 500 watt modulation xmtr UTC CMS-3 or same as in Johnson Desk kilowatt, NC183D or NC303 in very good cond. Jay Spivack, N7JDT, 325 S. Washington Ave. #244, Kent, WA 98031. (206) 859-2680

WANTED: 10-80 final amplifier tank coils for Globe King 500. Jim Wilhite, W5RXC, 2404 S. Hughes, Amarillo, TX 79109. (806) 371-7233

WANTED: Hammarlund MLW-125 variable condenser (see June '95 ER ads for picture); SX24/25S-meter, Cosmophone &/or info; B & W plug-in coils 2175 thru 2179; Drake 1A vernier knob; 4-pin coil forms by Shortwave & Television Laboratory of Boston; Viking 500 sply/mod. Brian, WA5UEK, (800) 399-2914.

WANTED: WW II Japanese xmtrs & rcvrs (and parts) for restoration and ER articles, information on T1083 30's vintage British aircraft xmtr. Ken Lakin, KD6B, POB 310, 701 SE Salmon Ave., Redmond, OR 97756. (503) 923-1013, e-mail klakin@taoL.com

WANTED: Hallicrafters SR-75 in good condition. **SELL/TRADE:** Two ART-13 xmtr's. Sandy, W5TVW, 417 Ridgewood Dr., Metairie, LA 70001. (504) 836-2134

WANTED: Regency ATC-1HF converter, Ameco TX-62 manual/schematic. Thomas E. Koch, W4UOC, 8170 Habersham Waters Rd., Dunwoody, GA 30350. (770) 391-0914

WANTED: Drake C Line, TR4CW/RIT, 2B, late production, very clean. KB0W, 11456 Fortyniner Cir., Gold River, CA 95670. (916) 635-4994

WANTED: Drake RV6 remote VFO; National VX-501 remote VFO, Polycorn 6 & 2. Pete Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964

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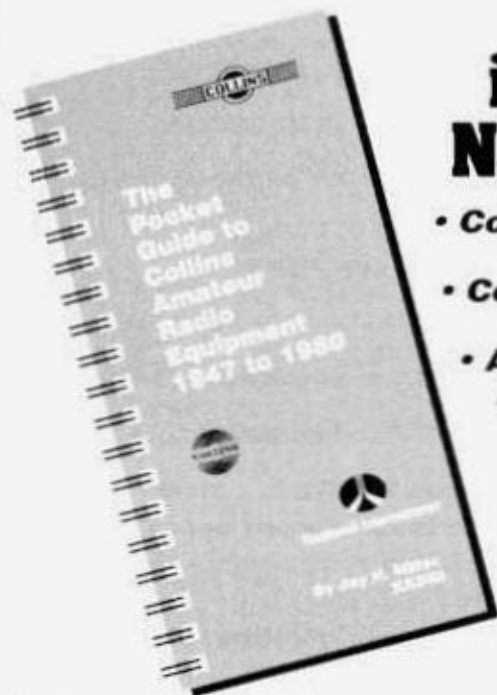
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