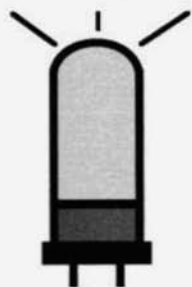


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ELECTRIC RADIO

celebrating a bygone era

Number 84

April 1996



Paul Johnston, KR9P

ELECTRIC RADIO

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

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

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

Regular contributors include:

Walt Hutchens, KJ4KV; Bill Kleronomos, KDØHG; Ray Osterwald, NØDMS; 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

Instead of writing, phoning or faxing us you can now contact us via e-mail. Our address is er@frontier.net. It's going to be much easier and cheaper to communicate with us from now on. We hope that everyone with the capability will now start sending their ads, articles or comments via e-mail.

The internet is changing our lives. Although I've been a reluctant participant until now, I think that communicating via the internet will soon become as commonplace as using the telephone. I've never had warm or good feelings towards computers but there's no escaping the fact that these machines have become an integral part of all our lives. I speculate that about one-quarter of all ER subscribers are on the internet now and I think more and more are getting on every day. I'll report back when I have better information.

With this issue ER is seven years old. As per our normal routine on each anniversary I've produced an index; see it on page 28. I've been thinking that a comprehensive cross-referenced index of all ER issues from #1 would be useful to everyone and I recently considered producing one in a separate volume. I've decided to leave that until we've completed ten years - three years from now. Stand by.

It's interesting to note that over the last few months several books have been published aimed at our niche of the ham radio hobby; the most recent of which is "Radios By Hallicrafters" by well known collector/historian Chuck Dachis. I think this book is absolutely splendid; see the review on page 8. Coming up is Ray Moore's book on transmitters. I should have a review copy by next issue. I'll talk it more about it then. N6CSW

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Cover: Paul Johnston, KR9P, (then WN9OPD) in his hamshack. See his article in this issue, "Chicago Is My Kind of Town" that describes his early experiences as a ham.

Jim Taylor, W4PNM, Silent Key

by Andy Howard, WA4KCY
105 Sweet Bay Ln.
Carrollton, GA 30116
SE Director, AMI

It is with deep regret that I report the death of Jim Taylor, W4PNM. Jim suffered a cerebral hemorrhage at his home in Augusta, Georgia and became a silent key on March 9, 1996. Jim's call and great sounding signal are familiar to hams all over the country. He had appeared on the cover of *Electric Radio* issue number 73 and had also written several construction articles for the magazine. His last article appeared in the December, 1995 issue.

Jim was born and grew up in and around Franklin, Ohio. He had a lifelong passion for radio following in the footsteps of his father Chick Taylor, W8DFV. During his working career he worked for Collins Radio Company, HY-Gain Antennas and the R.L. Drake Company. After settling in Augusta he started the Taylor Antenna Company and produced a line of amateur antennas. He had worked as a broadcast engineer for the past several years. About three years ago he and Hank Clark, W2IQ, had gone to Grand Turk Island and put a 50 KW broadcast station on the air. While there they worked many friends back home on AM.

Jim probably knew as much about Collins equipment as anyone short of Art Collins himself. If anyone in the southeast who knew Jim ran across a piece of Collins equipment at a hamfest, they were never afraid to buy it. Everyone knew "Jim could fix it". If he had charged for all of the work done for fellow hams he certainly would have been a wealthy man. Losing Jim will make everyone think twice about buying that piece of questionable Collins

gear. I think that his ability to overhaul a 75A-4 was second to none. There are a lot of 75A series receivers in the southeast performing superbly because Jim Taylor had a hand in their restoration.

Jim also had a passion for homebrewing equipment. I have had many complimentary reports on the audio of my 813 transmitter. All the credit goes to Jim Taylor since he designed the speech amplifier. Jim had built a reproduction breadboard transmitter for his father Chick Taylor, W8DFV, which was featured on the cover of *Electric Radio* issue No.16. Jim's son, Lonnie, WA4ASQ also operates AM and I once worked all three Taylors in the same QSO. I was awarded the "WATTS" certificate for "Working All Three Taylors Simultaneously". Jim possessed a rare combination of technical expertise and the mechanical ability to execute the design in a manner which looked like it was commercially built. Some of my fondest memories of Jim will always be the times when we attended the Dayton Hamvention. He, Hank, W2IQ, and myself would have blackberry cobbler and ice cream every night around 10 PM. Jim would spend hours drawing schematics and ideas on the back of the restaurant place mats. I bought a Ranger about six months ago from a friend in Augusta. When I opened the manual there was a schematic of a cathode follower circuit for the speech amp on the back of a Hardee's place mat. It was drawn by Jim Taylor.

I am proud to say that Jim was my friend. We had known each other for a long time. Augusta is my hometown and anytime I went back I always included a visit to Jim and his father if



A recent picture of Jim. Photo courtesy of Hank Clark, W2IQ.

time permitted. We had many things in common. His birthday was January 26th and mine was the 27th. Jim, Chick and I were members of the Masonic Order. That in itself made for a bond of friendship and respect. He will be greatly missed in the southeast. He loved AM and was a member of AM International. He was always glad to serve on the AM Forum at the Dayton Hamvention and share his knowledge with fellow AM operators. The knowledge that Jim had about AM radio can never be replaced. We can only hope that during the time we had with him we were able to absorb enough to keep these old radios going until we join him in the hereafter. **ER**

From Jim's son, Lonnie Taylor, WA4ASQ

The key has gone silent. W4PNM, Jim Taylor, my father, passed away on March 8th, 1996 at 00:16 hours EST. The

radio world, and myself, have suffered a great loss.

In the days following his passing, I had many stories related to me by other hams; stories from old timers and new tickets alike. The one thing that I heard repeatedly from all regarded my father's passion for radio, especially AM. The transmitters he built for himself and for other hams are legendary. One ham even expressed his sorrow that now he will never have a "Taylor Transmitter" on the air.

As for myself, I will always remember the image of my father from the time I was a child sitting on his lap helping him operate.

How proud he was when I got my ticket and we had our first QSO with each other; CW of course!

I'll always remember the first time W8DFV (grandfather), W4PNM and myself were all on 3885 kHz AM. Dad proudly proclaimed to all in the QSO with us that they were having the honor of working "The only three generations of ham radio, simultaneously, on the air"!

I learned a lot from my Dad, but more than just the basics of radio, he imparted to me the true essence of ham radio, the wonder of it all, the lasting friendships and the fond memories.

I would like to thank all those who attended my fathers passing and offered their support. In a sense he will always be on the air as he gave a part of himself to all of us who knew him.

My mother has often told me how Dad would tap his foot while he was asleep, sending CW. Somehow, I feel he is doing that even now.

W4PNM DE WA4ASQ. . . 73's See you on the air.

The RCA AR-77 Receiver

by Edward "Eddy" Peter Swynar, VE3CUI
3773 Concession Road 3, R.R. #8
Newcastle, Ontario L1B1L9
Canada

Background

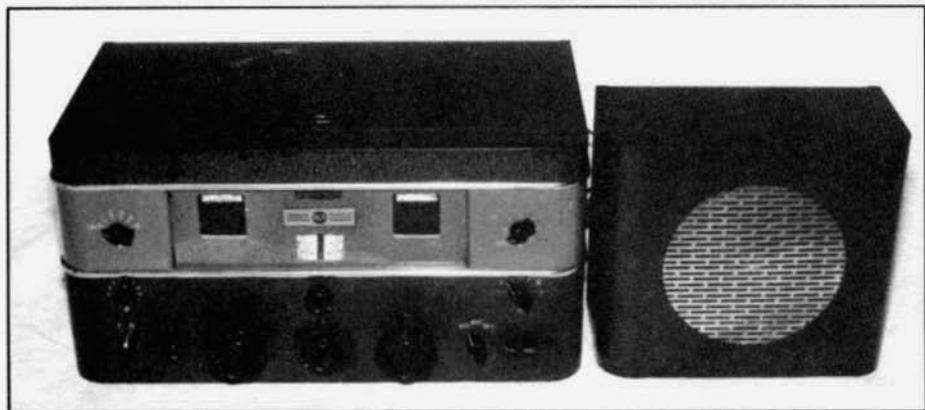
It has been my experience that the RCA model AR-77 communications receiver is nothing short of a "mystery rig" to many even die-hard aficionados of the vintage radio/AM scene. Most amateurs even remotely cognizant of this receiver regard it (perhaps somewhat disdainfully) as little more than a footnote in the historical evolution of the now near-legendary AR-88. This is a far cry indeed from 56 years ago, when RCA's flagship rig unabashedly competed for hard-earned Amateur Radio dollars with the best of what "made in America" had to offer at the time. . .

The AR-77 is a handsome example of pre-war state-of-the-art electronics which splashed upon the scene in a full page advertisement in the March 1940 issue of *QST* magazine. With its modern, almost art deco look, the receiver typifies the decade that spawned it: the cabinet is coated with a durable, wrinkle-finish coating of grey-green paint, divided by a very complimentary band of yellow-green accent finish. Chrome-plated moldings, in turn, border this accent. A unique synchronized shutter system automatically highlights just the band and bandspread frequencies selected by the bandswitch. Even the rounded front corners impart the AR-77 with a futuristic, "forward" look.

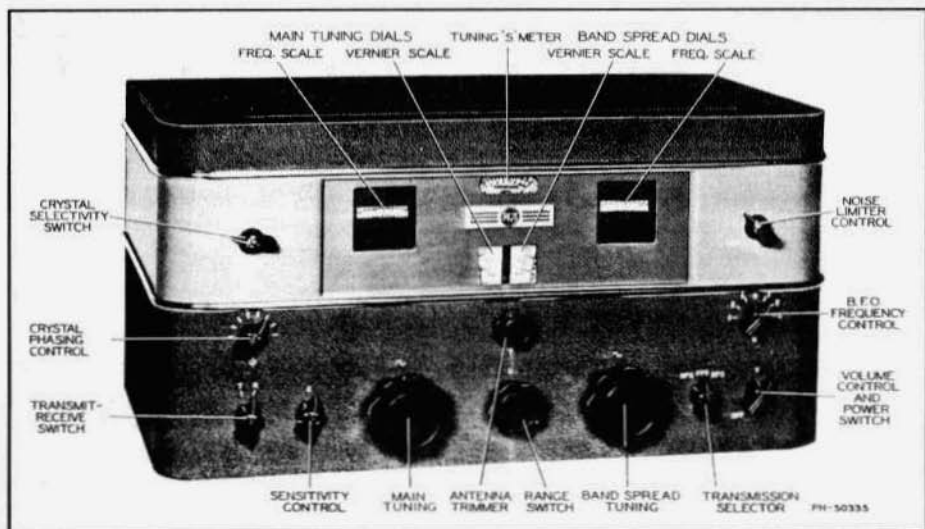
Control identification on the front face was accomplished with a white silk-screen painting process: unfortunately, time has not been particularly kind to this technique of labelling, as may be witnessed by worn lettering above the most often-used knobs, such as the main tuning and bandspread.

Electrically, the AR-77 is a 10 tube, single conversion (455 kHz IF) super-heterodyne, which tunes - in 6 bands - from 540 kHz to 31 MHz. Highlights of the receiver include calibrated electronic bandspread on 80-, 40-, 20-, and 10-meters, as well as an illuminated S-meter. RCA made special note of the adjustable noise limiter as a selling feature, together with (selectable) negative feedback in the audio chain. Like other competitive units of the day, a single crystal filter was designed into the IF chain: the degree of selectivity from this arrangement was at the operator's discretion through two front panel controls, i.e. a six position "step" select switch, and a variable phasing control. AGC is automatically disabled in the CW position of the mode switch.

The AR-77 was regularly featured in full page advertisements in *QST* magazine from March 1940, until January 1941, inclusive. It sold for \$139.50 per copy, while its matching speaker retailed at \$8. The price of the AR-77 was comparable to its contemporaries: the Hammarlund HQ-120X (\$137.40), the National NC-200 (\$147.50), and the RME-99 (\$137.40), to name a few. According to the manual that accompanied my receiver, amateurs were offered fully four versions, i.e. the domestic AR-77 proper (with either a full cabinet, or modified for rack mounting), and the export AR-77E (again, with either a full cabinet, or rack mounting). Curiously enough, the serial plate at the back of my rig identifies it as being a model AR-77F (an indicator, perhaps, of the fact that it was assembled in Montreal, Canada, and not in Camden, New Jersey. . .?). Like the receiver, the outboard



The RCA AR-77 with matching speaker



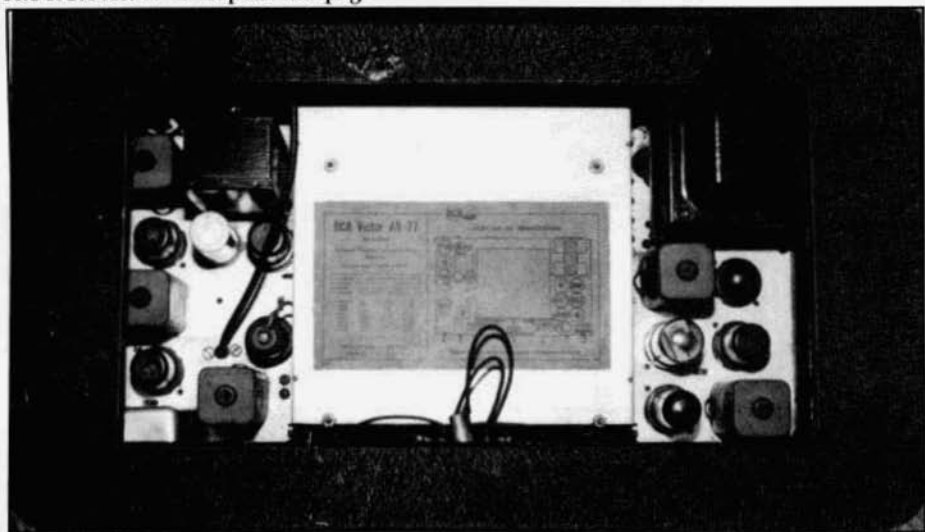
An illustration from the AR-77 manual

speaker was available in either a matching cabinet, or with rack-ready mounting.

It may interest vintage high fidelity audio purists to know that, shortly after introducing the AR-77, RCA made available a special 28-inch tall, extended range loudspeaker assembly to please the discriminating, the model MI-8314-A. Contemporary advertising copy, which featured the AR-77 sitting atop this behemoth, remains impressive to this very day.

Serial #C1005

I owned my AR-88LF receiver for about one year before the bug bit me (hard!) to find its predecessor. The decision to acquire an AR-77 was driven primarily by curiosity: today's focus on the considerable RCA line of communications equipment seems to be centered so much about the AR-88 receiver that I wanted to peer, first-hand, into the state-of-the-art as it was prior to WW II. .besides, the old full-page QST advertisements of the day grew more and



Looking down through the open lid of the AR-77

more persuasive the longer I looked at them!

Three years ago, I finally purchased my AR-77 from its second owner -- a fellow ham here in Ontario - for \$60 (the price included the manual, matching speaker, and a Heath QF-1 Q-multiplier). This receiver had been basement-stored for many years, but was used as a "loner" on at least one occasion in the Ottawa area for an aspiring would-be amateur learning the code. Cosmetically, the rig reflected its "...hand-me-down/in mothballs" heritage: the clear plastic window cover over the dials was cracked, yellowed, and had actually bulged with age; the chassis had accumulated the usual dust, grime, and cigarette smoke residue, which one would expect after five-plus decades of existence; apart from minor scratches and scrapes, the worst damage to the finish was inflicted by someone who had inadvertently (and perhaps, somewhat thoughtlessly) used the top of the AR-77 to support a can of open, white (and dripping!) house paint.

I removed the receiver from its cabinet, and proceeded to clean the chassis

surface with a combination of elbow grease, clean rags, and isopropyl (1) rubbing alcohol. The cabinet itself was completely immersed into a tub of lukewarm water, and bathed with a mild dishwashing detergent. Rather than run the risk of damaging any part of the original painted surface with strong solvents and the like, I mixed together a reasonably close, matching blend of Tamiya-brand model paints, and applied this touch-up - sparingly - right over top of the white house paint, and on the scratches, using nothing more elaborate than a toothpick applicator.

The aged, yellow dial window was replaced by a clear plastic material, referred to as "acetate" in this area. Tears in the speaker cone were patched-over on both sides with pieces of facial tissue soaked in clear nail polish. The AR-77 was given a complete alignment (per directions in the manual), and both receiver and speaker were finally reinstalled - after generous application and buffing of Turtle Wax "Clear Guard" on all of the external painted surfaces - into their respective enclosures.

Operating Impressions

It is always a thrill to fire up any "new old" communications apparatus, and the RCA AR-77 was no exception to this rule. Let it be known from the outset, however, that the AR-77, performance-wise, is the most assuredly NOT the equal of its successor, the AR-88. . .but then again, if money does, indeed, talk, with a price tag of \$445 for an AR-88 (gunning after lucrative, and demanding government and military contracts in war-time 1944), versus \$139.50 for an AR-77 (whose primary market target was the amateur radio operator of post-depression 1940), why would anyone be surprised at the difference?

Table-1 speaks volumes, quantitatively, about the side-by-side comparisons between both receivers. These numbers (gleaned from the spec sheets of each respective manual) simply do not add up in favour of the more senior AR-77. Qualitatively speaking, however (at least from the perspective of Amateur Radio operation), one thing that the AR-77 has over its more youthful "rival" is the independent calibrated bandspread dial. . .the AR-88 is limited in this regard to just a separate logging scale, gear driven by the main tuning dial.

The AR-77 plays well enough on 160-, 80-, and 40-meters. It does drift, like any receiver of its vintage (almost 3.0 kHz in the first hour, after 15-minutes of initial warm-up time on 7-MHz), which is no particular hardship when monitoring AM stations. The front-panel-adjustable crystal filter takes some getting used to, and doubtlessly will frustrate those amongst us who may be less patient, and perhaps grown somewhat spoiled, by the more refined mechanical/crystal lattice filter techniques adopted in radios of a later generation.

I oftentimes feel that the inventor of the Q-multiplier probably had a receiver like the AR-77 in his radio shack! Mine

benefits tremendously from the activation of its accompanying venerable old QF-1, both in "stand alone" mode (i.e. with the receiver wide open), and when enhancing the internal filter of the AR-77.

Is there anything especially "bad" about the RCA AR-77? Yes, two things, basically: first, the rig suffers from a severe case of imaging on frequencies at 14-MHz and above (when I first tried to check into the 14.286 AM net with it, I was surprised to hear foreign short wave broadcast stations across the 20-meter band!). Happily, this condition is easily and readily remedied with the insertion of a preselector ahead of the AR-77. I tried both a commercial Ameco unit, as well as a homebrewed regenerative circuit, with equal success. This is an absolute must should you be entertaining any notion of long-distance higher-frequency AM work in the coming winters with an AR-77 (an added bonus, of course, is the signal boost a good preselector offers to the deserving front end of this receiver).

A second pet peeve concerns the 6SK7 RF amplifier tube's tendency to break into oscillation on the higher frequencies, dependent upon the antenna used and the setting of the antenna trimmer capacitor. I installed a makeshift shield between the grid and plate pins at the base of this tube socket, with only limited success. It has crossed my mind that the ultimate solution to the instability of the stage may well be the incorporation of a small neutralizing capacitor across the tube, in the style of a transmitting final amplifier. Lethargy precludes me from attempting this to date. I would, however, appreciate knowing of the experiences of others in this regard, and welcome suggestions to this end from the readership of *Electric Radio*.

Finding Your Own AR-77

Prior to my acquisition, I was aware of no less than two AR-77's seen at vari-

Book Review

"Radios By Hallicrafters" by Chuck Dachis

Published by Schiffer Publishing, perfect bound, soft cover, 8-1/2x11 inches, 222 pages, 700 photos (20% in color), \$29.95 plus \$3 S&H from the ER Bookstore.

Reviewed by John H. Bryant, Rt.5, Box 14, Stillwater, OK 30116

The name Chuck Dachis is familiar to any subscriber to Electric Radio. Those of us who have subscribed to ER for years are familiar with Chuck's boxed ads which have highlighted his search for ever more exotic pieces of Hallicrafters gear. Chuck has developed what is surely the most extensive collection of Hallicrafters communications and consumer-oriented products in existence. Besides owning over 400 different pieces of Hallicrafters gear, Chuck has become a real scholar of Hallicrafters and its products during his twenty year quest. Since the corporate records of the company have been lost, Chuck's privately published product list has long been the standard reference, both for hobbyists and historians of technology. Those of us who know him personally have been aware for years of his dedication, scholarship and his dream to someday publish what would become (we all thought) the definitive Hallicrafters reference. I'm pleased to report that HE DID! (get it published) and IT IS AND WILL BE! (the definitive Hallicrafters reference from now on.)

Radios by Hallicrafters has just been released by Schiffer Publishing of Atglen, PA. It is an 8 1/2" by 11" perfect bound soft cover book of 222 pages of high quality glossy stock paper. There are almost 700 photographs, about 20 percent in color. The main body of the book might be called an "illustrated catalog" where text and photographs document every single known Hallicrafters model and accessory with brief technical descriptions and years of production. Almost all of the photographs are

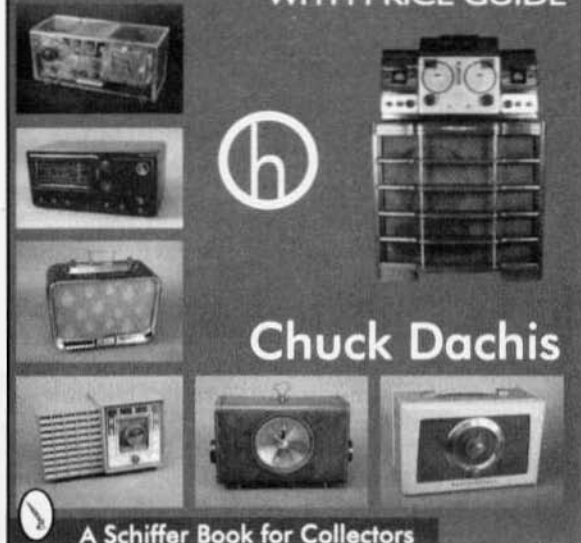
of fully restored gear in Chuck's own collection. In a few cases, primarily mid-30s consumer radios and some mid-50s televisions, catalog photos are reproduced. The illustrated and annotated catalog makes up 90 percent of the book.

The front section of the book, also well illustrated with photographs, contains a discussion of the development of Chuck's collection and the product list, a history of the Hallicrafters company, and a brief section on radio restoration. Chuck also presents a revealing short chapter on the genesis and lineage of the S-38, actually beginning with the original 5-T Sky Buddy of 1935 and ending with the closure of the S-120 in 1964. Behind the 190 or so pages of the illustrated and annotated catalog, Chuck has provided a 23 page mostly color supplement covering employee incentives (tie tacks, money clips, piggy banks and such) along with advertising memorabilia, such as counter displays, neon and other signs, banners and a too brief sampling of Hallicrafters print advertising.

You should know that this book, like every complex human effort, has some flaws. They are minor, but regrettable. Most of the photography (all professionally shot) is excellent. However, in four or five cases, there is "white out" reflective glare on portions of flat dial glass. There are also five or six shots which are too dark. No important information is lost, but those shots are simply not up to the high standards of the rest of the book. Also, the technical descriptions of each model are presented in upper case-only text (all caps) which I find much harder to read than

RADIOS BY hallicraftersTM

WITH PRICE GUIDE



normally capitalized text. I also wish that the descriptions could have been presented in a slightly smaller type face as well; they then could have been a bit more extensive. I'm sure that many readers would wish a bit more coverage in their own particular area of interest (my other one is print advertising) however, both Chuck and the publisher had to achieve some sort of balance between breadth/depth of coverage and keeping the book affordable by a fairly broad spectrum of readers. I believe that they achieved a very good balance: Radios by Hallicrafters is a wonderful work, the product of almost twenty years of intense effort by a real radio man! It will be the definitive Hallicrafters reference that should, and probably will, be on the shelf of every lover of tube gear, whether they specialize in Hallicrafters or not. With the success of this book assured, maybe we can hope

for similar works on Hammarlund, National and Collins in the future.

Since I'm a university prof and do some private publishing, as well, I'm very conscious of what the skyrocketing paper costs have done to the price of books in the last two years. If you haven't followed such, you might think that I'm stretching things to say that the current \$29.95 price of Radios by Hallicrafters is a MIRACLE. It really is. What's more, the price will certainly jump into the \$34 to \$36 range as soon as the first rather small printing is sold out. My personal sense of the situation is that this publisher, one of the largest publishers of "collector books" but relatively new to the world of radio, will have rather badly underes-

timated the market for this book and will have to reprint within a year. The paper and printing costs have and will continue to climb some more, so those costs will be passed along to those who don't get this beauty NOW!

In closing, I should point out that I am co-author, along with Dr. Harold Cones, of The Zenith Trans-Oceanic, The Royalty of Radios, which was also published by Schiffer Publishing. My co-author and I are currently writing Zenith Radio Corporation, 1919-1935: The Foundation Years which might interest those of you fascinated (as we are) by the early days of amateur and broadcast radio. Neither Schiffer's nor Chuck Dachis asked me to write this review, Barry Wiseman did. Further, I paid full price for my copy of this wonderful book and intend to buy a second copy (the first copy has already got lots of notes in it.) ER

The Not-So-Eternal Current Regulator 3TF7

by Reinhard Wieschhoff-van Rijn
7, rue du Debuché
F-78120 Rambouillet
France

Introduction

I was born in 1940. From childhood on I have always been fascinated by "radio". In my early years I repaired simple commercial (German) radios and built "new" ones from scrapped junkers in the poor post war German environment. As a teenager I travelled 20 miles back and forth to the "America House" in Cologne whenever a new "QST" or "Electronics" was to be awaited in their public library.

My interest soon spread beyond home-radios and so I found myself to be an owner of a real Collins TCS-12 receiver at the age of 16. I still remember to have been mightily impressed by the fact that the Cannon Company, the manufacturer of the connectors for this set, sent me the right connector without charging me after I had asked them about the availability.

Thanks to the many QST's read I managed to beef up its selectivity by upgrading two double tuned IF filters to a half lattice crystal filter structure using the famous FT-241/243 variety crystals. What great reception.

In student years my interest shifted from amateur radio to professional electronics and communications, fields I successfully studied including tube electronics to apply my knowledge when joining the famous Fisher Radio Corp., in L.I.C./N.Y. in 1966.

After leaving Fisher 7 years later and having conceived some of their Hi-Fi equipment, I never quit working in radio design and manufacture. From my own 1-1/2 man company, designing and

manufacturing (what is still today considered to be) one of the best FM high performance Hi-Fi tuners ever, something like a German "McIntosh". I worked for industrial giants like Bosch/Blaupunkt. Today I work for Philips Car Systems, where I am responsible for the radio development in Rambouillet, France.

In recent years my private interest went back to those tube beauties like the R-390A among some others, like the famous (in Germany) Rohde & Schwarz EK07-D2.

Today I own two R-390A's, a real Collins, #2292, which was previously owned by a renowned German amateur radio journalist (who believed it to be superior to all up to the arrival on the scene of the Watkins-Johnson HF1000). The other R-390A that I own is a '61 Capehart with an Amelco front label (anyone want to swap?) which was equipped with apparently brand new modules during a contract overhaul done by AEG/Telefunken for the US Army in '81. It was then stored without having been used near Hamburg until it was sold to me in 1989 in a sell out via a professional junker.

My professional background and my private lab, well equipped for all kind of developing and repairing tasks, allow me an unobscured glance back into tube technology to separate the myths from the facts.

In our fast living and forgetting societies one might call these activities "electronics archeology", - so let's dig into it.

The 3TF7 Current Regulator

As its name suggests, a current regulator is supposed to: "regulate", that is keep constant the current delivered into a load over a restricted and defined range of voltage applied across its terminals.

How well does the device used in the 390A perform this task?

Any specifications of the manufacturers are not known to me and the famous text books of the period, like the "Radiotron", the bible of tube design, gives little information in general. One hint is given in the "Audio Cyclopedica", 4th edition, Howard W. Sams, as to the fact that a ballast tube, as the current regulator also is called, is slow in response to voltage changes. This is something to come back to later.

So the performance has to be tested.

For this purpose 3 units were available to me. After a fourth had died shortly after acquiring one of my 390A's, two were bought through Fair Radio Sales, where the obviously original cartons read:

5905-00-681-4707
Resistor, Current Re
Amperite P/N 3TF7
DLA900-85-C-1935
A 8/85

The third unit came with my second 390A, this one has thus to be defined as used.

Whether all three units meet original specifications is not known. It may be after all that the new samples of Fair Radio Sales originated from a "reject" lot. There is a certain suspicion to that as we will see later.

What now is the specification to be tested?

From the definition we know that a current regulator shall not change the current flowing through it, when the voltage applied across its terminals is changed around its nominal operating point.

The value for this we get from page

83 of the manual "(Army) TM 11-58 20-358-35", edition July '75, as well from version -C3 of May 1980 for the R-390A to be: $25.2 \text{ V} \text{ minus } 12 \text{ V} = 13.2 \text{ V}$. This is somehow surprising, since it documents that the heater voltage for the tubes involved is 6V instead of 6.3V, as should be with standard design practice. Why that was done is not known. The reason might be a little secret of the Collins designer or simply be traced back to the fact that the original 3TF7's just allowed for this voltage. That in turn indicates that the 3TF7 might not have been designed specifically for use in the R-390A.

If we measure current and voltage across a regulator, we will call the current, when we change the voltage, "Delta I", the voltage change itself "Delta V".

The quotient "Delta V" / "Delta I" is "R diff", the differential source resistance.

For an ideal current source this R diff is infinite. For example changing the operating voltage from 12.6V to 12.7V the current should remain 300 mA:

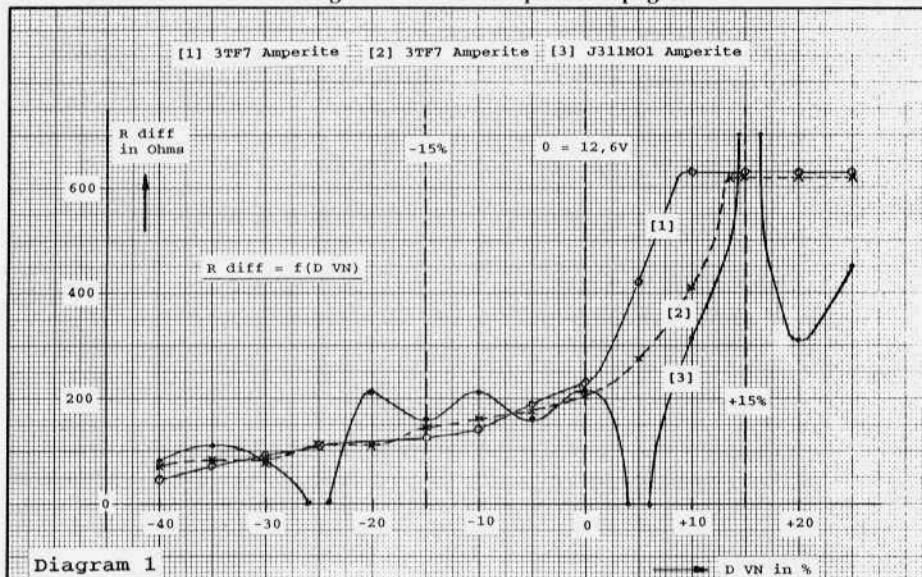
$$R \text{ diff} = \frac{12.7 \text{ V} - 12.6 \text{ V}}{300 \text{ mA} - 300 \text{ mA}} = \infty$$

Let's see now how this R diff looks like with my 3TF7's: diagram 1 shows R diff on the Y-axis, Delta VN (DVN), the change from N-ominal voltage, on the X-axis in percent around the operating point 12.6V.

Curves (1) and (2) represent the new samples of Fair Radio Sales, curve (3) is from the one called J 311 MO1, manufactured by Amperite. These curves lead to some interesting conclusions:

(1) All curves show a relatively low differential resistance for voltages equal to and lower than nominal operating voltage: 200 ohms and less. Only at what might be called "over voltage" of 10 to 15% the differential resistance is in the area of 600 ohms and remains constant with the exception of curve (3).

(2) This curve shows a very peculiar behavior with areas of negative differential source resistance up to positive



poles as at +15% Delta VN.

A close observation of the filament in a dark room reveals that when increasing the applied voltage from -40% upwards certain and different sections of the filament glow up differently (dark!) than neighboring sections, whenever a voltage is passed showing an irregular R diff in the diagram. This can be traced to an inhomogeneous diameter of the filament wire, or/and an irregular pitch of the filament spiral. The latter indeed can be observed with a magnifying glass. It might be that the irregular pitch results from fatigue and notifies a close end of operating life of the regulator.

(3) We would expect the highest differential resistance to be reached well below the nominal operating voltage at, let's say, $\Delta \text{VN} = -15\%$ to allow best current regulation. That is not the case! To examine the effect of this on the regulated current, we need to look first at diagram 2:

This diagram has two origins: A and B. Curves (1), (3), and (4) belong to origin A and show the amount of current, I (3TF7), flowing through the regulator versus the operating voltage, V

(3TF7), applied. Curve (2) belongs to origin B and shows the operating current, I (Tubes), of the two 6BA6W in series connection, as they are wired in the R-390A, versus filament voltage, V (Tubes).

This technique is similar to the diagram shown in the "Radiotronic", mentioned above, on page 1265 of edition May '68.

From curve (2) we see that a filament current of 300 mA indeed is reached at $12.6\text{V} = 2 \times 6.3\text{V}$, as specs of the 6BA6W's call for.

On the other hand, curve (1) shows an operating voltage of 8.3V for 300 mA current, or 12.6V for a current of 334 mA for the regulator!

Conclusion: something does not match properly, because we expect 12.6V at 300 mA on the tubes in series and the same voltage and current on the regulator, if a voltage of 25.2V is applied to both as in the R-390A.

Not knowing the mathematical formula describing the voltage/current relationship of tube and regulator we can't calculate the individual operating conditions. But we can make use of

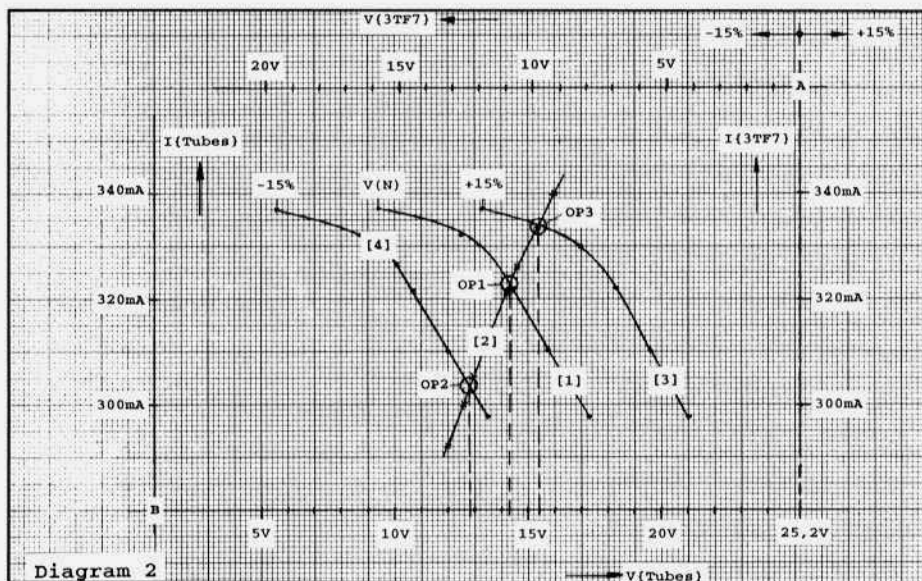


diagram 2 with both its origins to graphically determine the operating point for both.

You will observe that current scales for both sections are identical and that voltage origin A coincides with 25.2V, the sum voltage of both elements, of the voltage scale originating in B.

With these conditions, intersection of curves (1) and (2) give the operating point of all elements involved:

(A) For nominal (mains) voltage: curve (1), point OP1:

- tube operating voltage is 14.3V
- current flowing is 324 mA
- regulator voltage is 10.9V

These in fact are the values I can measure as well in my set, when regulator and tubes are plugged into their sockets.

With 10.9V the current regulator operates at -12% of its rated voltage. Going back into diagram 1 this shows us a differential source resistance of 160 ohms, far from the value of best operation of these individual regulators.

In order to evaluate or simulate a fluctuation from nominal mains voltage we have to move origin A in dia-

gram 2 (and with it naturally also curve (1)) horizontally in respect to origin B. Curves (3) and (4) show this for a +/- 15% change of mains voltage. The result:

(B) For (mains) under-voltage: curve (4), -15%, point OP2:

- tube operating voltage is 12.8V
- current flowing is 304 mA
- regulator voltage is 12.4V

This is almost "nominal", but unfortunately at -15% mains voltage!

(C) For (mains) over-voltage: curve (3), +15%, point OP3:

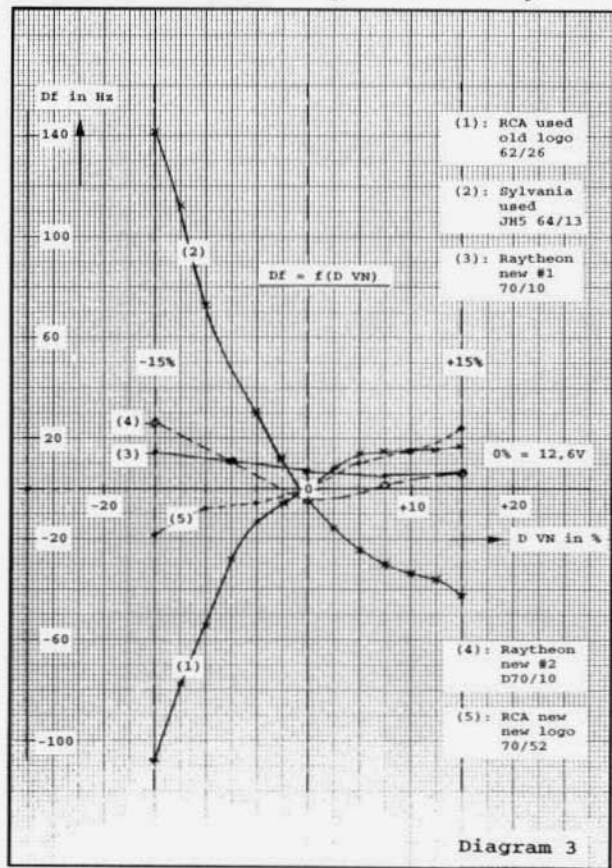
- tube operating voltage is 15.4V
- current flowing is 335 mA
- regulator voltage is 9.8V

The conclusions of these facts are simple and severe:

(1) Using these tubes there is no real regulation. For a 30% change of mains voltage we get a 10% change in current. OK: this is still better than no regulation.

(2) The tube operating voltage is far too high.

With a little geometric manipulation (not shown) of curves (2) and the flat region of curve (1) in diagram 2 (that is



sink the loss power of the device, which is a hefty 3.8W, into the front portion of the IF deck, heating this already pretty hot chassis up even more. In contrast, only a portion of the same heat of the 3TF7 was sunk into the chassis, most got into the air by convection and radiation.

Instead I mounted the LM317T on a multi-fingered heat sink on iron stand-offs, which, being bad heat conductors, block off heat into the chassis, in place of the original regulator. Thus the chassis will not be different (hotter!) than with the 3TF7 in place.

The silicon regulator has one more advantage: it also limits the so called in-rush current, which occurs when the system is switched on. When tubes are operated with constant voltage, this inrush current is up to ten times

the portion of the curve showing the highest and constant value of R diff), we would get a current change of only 3%, versus 10%, if we would make use of the 600 ohm region of diagram 1 around an operating point of 12.6V. This would not be too bad; but my 3TF7's just are not that way.

Since the nature of the regulating characteristics are not known when purchasing the 3TF7's today and since you need a variac and two current/voltmeters to test, it can not be recommended to use them.

For my part I have substituted the 3TF7 with a silicon regulator built around a LM 307 similar to the one described in ER #70. However with one important difference: I do not like to

the nominal rating. In case of the 6BA6 this measures to be 2A.

The silicon regulator is also quick to react on sudden line voltage changes, the 3TF7 does not.

Another question is what a tube really needs to see. After all, other tubes in the R-390A are driven from the transformer heater windings directly, which represents -aside from line variations - a constant voltage drive. They do in fact not last noticeably less long, but that may be a matter of closer observation.

From the text books we learn that a tube should be driven as closely as possible with the intended heater voltage (except for some "electrometer": type applications). Departing from this upwards will severely degrade service life,

The Uncommon R-725/URR

by Thomas F. Marcotte, P.E., N5OFF
111 Destiny Dr.
Lafayette, LA 70506
n5off%w5ddl.aara.org@usl.edu

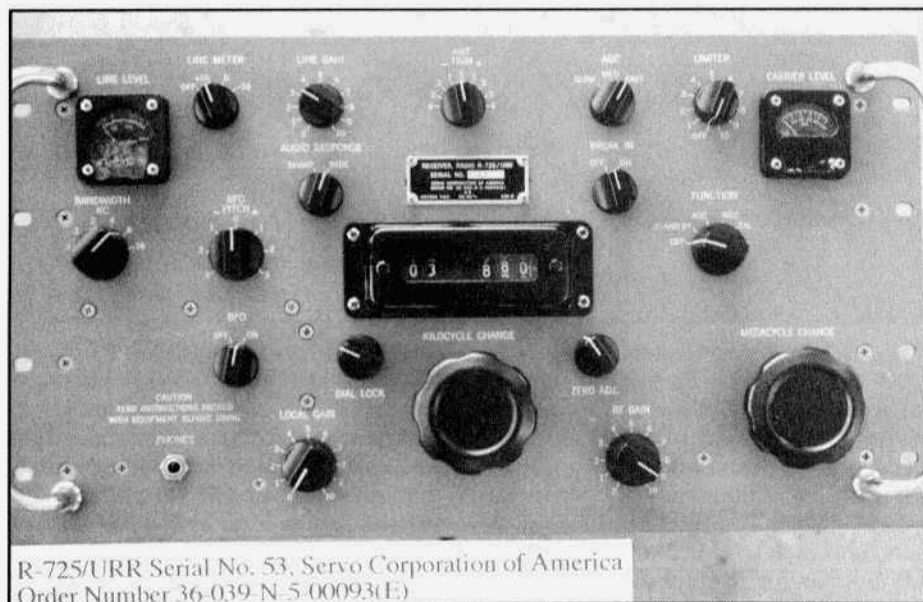
Were you aware that there was a cross breed radio in military service, part R-390 and part R-390A? The rig is the R-725/URR high frequency receiver, part of the TRD-15 family of direction finding sets (TRD-15, TRD-15A, TRD-23, TRD-23A).

When Collins Radio redesigned the R-390 radio in 1952 to make it less expensive, the result was the cheaper and improved R-390A. The major difference from a performance standpoint was the addition of mechanical filters in the later set. Over 50,000 R-390A's were built by a number of manufacturers. Production of the R-390A continued in on again, off again fashion until 1984 when the last five units were produced by Fowler Industries at a cost of \$38,000 each. The majority of the earlier sets cost less than \$2000.

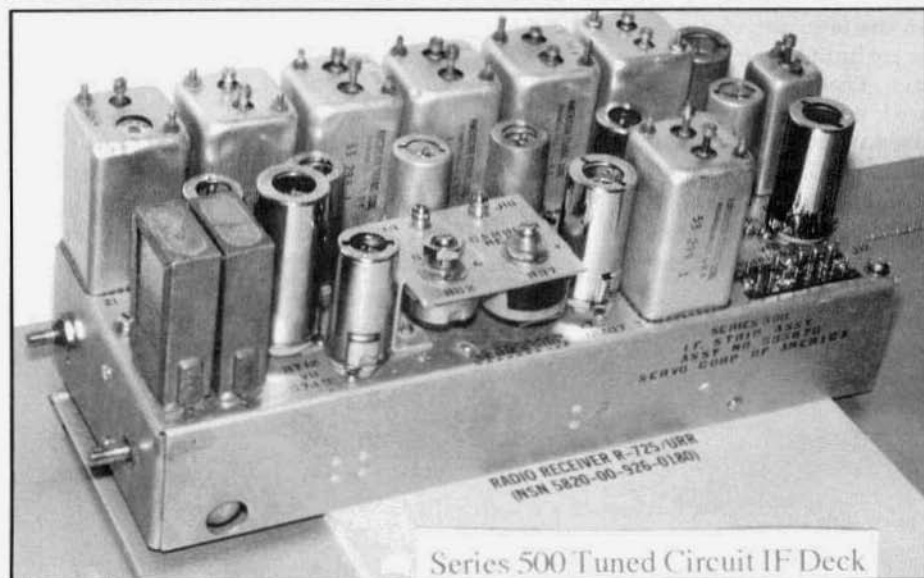
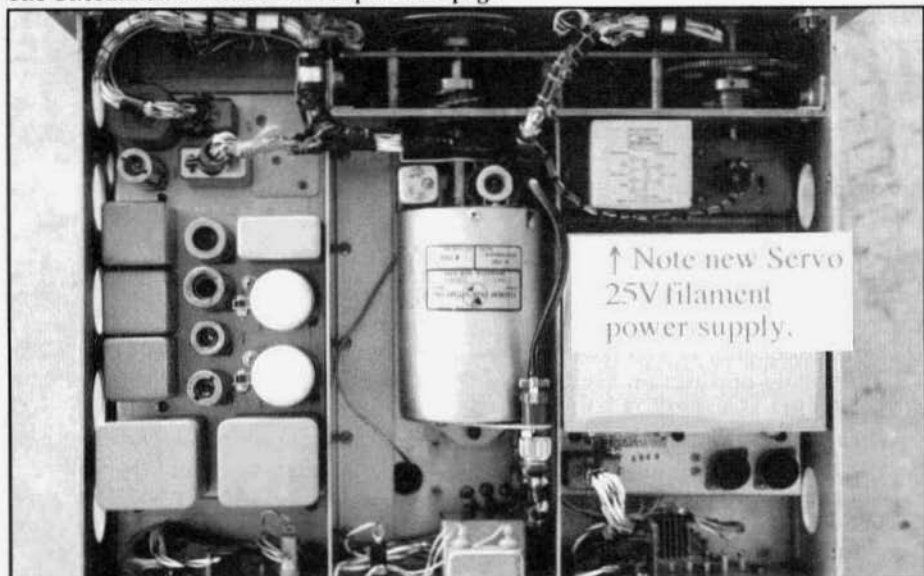
In an internal Collins engineering report published in 1952, Lou Couillard wrote of the improved R-390A, which at that time was called the R-390(XC-3), "Although the superior shape factor of the mechanical filter IF is desirable in most applications, consideration should also be given to an alternate tuned circuit design for use in special applications. The excellent shape factor of the mechanical filters precludes the possibility of linear phase shift across the passband. Where a linear phase characteristic is desired such as in direction finding equipment, a tuned circuit IF is necessary."

Utilization of a tuned circuit IF is exactly what was done for the receivers employed in the TRD-15 direction find-

continued next page



R-725/URR Serial No. 53, Servo Corporation of America
Order Number 36-039-N-5-00093(E)



ing set. In 1965, order 36-039-N-5-00093 (E) was let to Servo Corporation of America to build the TRD-15. This required the modification of R-390A receivers for installation of the tuned circuit IF, abandoning the mechanical filter IF for this special application. A later contract, DAAB05-67-C-2338, was let to Arvin for additional TRD-15 sets,

and subsequently more R-725's. Serial numbers as high as 236 have been reported from the Arvin contract.

According to Servo drawings, these are the steps that contractors took to convert an existing R-390A to the R-725 configuration. First, they built the new R-390-like tuned circuit IF deck, renaming it the "Series 500" deck. They also

built a small second power supply chassis to be installed in front of the regular R-390A supply. The purpose of this new supply was to furnish 25 volts to the series-wired filaments of the new IF deck, as well as furnish voltage to the PTO tube filament. The PTO was modified to reduce hum by installing a capacitor between pin 3 of its tube to ground, and wiring in the new filament source. Refer to the photos which show these new parts.

When Servo built the new Series 500 IF decks for the R-725, they used mostly new parts. I write mostly, because some of the required parts were salvaged from the existing R-390A IF decks, which presumably were scrapped in the process. The salvaged IF parts consisted of the ballast tube, 6BA6W, 6AK6, and 12AU7WA tubes, all tube shields, the BFO tuning unit and its hardware, and IF coil assembly Z501. All of the IF coil assemblies in my example match, except for Z501, which is from a different manufacturer indicating it could have been a salvaged part.

Signal connections to the R-390A chassis with the Series 500 IF deck are made with the more familiar mini-BNC connectors of the standard R-390A rather than the full sized BNC connectors common to the R-390. Contractors provided for new signal connect points on the flange which supports the IF gain and meter zero potentiometers.

On the Air

How does it work? Quite well, just like an R-390, but with the smoothness of the fewer gears in the R-390A gear train. It is actually more sensitive than my all-Collins R-390 and R-390A, and has none of the ringing caused by the mechanical filters in the R-390A.

My unit was apparently serviced by a repair depot before being sent to Servo for modification. The main frame is from a 1960 EAC unit, and none of the modules match this contract, or each other for that matter.

The manufacturing procedures documented by the Servo drawings do not call for any alignment or fix-up of the R-390A's they received for modification, so it is assumed that Servo was shipped good units to start with from Army stock, but not necessarily new units.

Why didn't the Army just employ R-390's in the direction finding service? I don't know the answer to that. It seems as there would have been ample supply of R-390's in 1965.

If you have the chance to snap up one of these crossbreeds, do it. It is an uncommon set in a sea of common R-390A's. The nice sound preserved by the lack of mechanical filters will be a relief to your ears.

As usual, I would be happy to hear from owners of other odd sets in the R-390 family, those from uncommon contracts, etc.

Special thanks for research assistance goes to Mr. Stephen Barre, CEO of Servo Corporation of America based in Hicksville, NY. ER

References

US ARMY Pub TM 11-5825-231-24, August 1973

US ARMY Pub TM 11-5825-231-25, May 1966

"Cost Reduction Program for Radio Receiver, R-390/391()/URR", L.W. Couillard, Collins Radio, 1952.

Servo Drawings from order 36-039-N-5-00093 (E)

WIRELESS QUIZ

THE "EDISON EFFECT" IS:

1. "STICKER SHOCK" FROM YOUR LIGHT BULB.
2. THE "TINGLE" YOU GET WHEN YOU GET ACROSS THE 4800 VAC PRIMARY.
3. CURRENT FLOWING IN A POSITIVELY CHARGED PLATE IN THE PRESENCE OF AN "ELECTRON CLOUD."



LETTERS

Dear ER

A group of West Coast military radio collectors will meet on 18 May, 1996 in San Luis Obispo to discuss collecting, restoration and operation of military radios (primarily tube-type). The meeting is timed to coincide with the annual California Historical Radio Society/Southern California Antique Radio Society on 18 May in San Luis Obispo, but is not associated with this event.

A meeting room has been reserved at a local motel for 18 May, but the hardcore collectors will be arriving on the 17th and staying over for continuing bull sessions on the morning of the 19th. Most attendees will want to hit the swap meet from 8 to 11 AM on 18 May, and the meeting will begin at 10:30. The meeting will include presentations on several classic military systems including the Command Sets, a group discussion on how we can best work together to help each other, a possible "next meeting", and of course the usual late-night brain picking and general bull sessions.

The motel suggested for attendees is the Super 8 Motel, 1951 Monterey St., phone: (805) 544-7895. Due to the large number of events in the area around that time, it's best to make reservations now. The motel is only a few blocks from the meeting site (Los Padres Conference Room, Quality Suites, 1631 Monterey St.). Information on additional motel choices is available from the coordinators.

Contacts are: Ray Mote, W6RIC, CA, (805) 985-6048, <rmote@rain.org>

Hank Brown, W6DJX, CA, (805) 943-2027

Dear ER

Starting on April 7th the Vintage CW Net will be on Sunday, 14037 kHz at 4 PM Pacific Time.

I will be running it from the Bolinas transmitter site using remote control from my home in Santa Rosa 50 miles away. An SX-42 affords beautiful sound with a pair of 3-way crossover 12 inch woofer hi-fidelity speakers and excellent QSK.

My gracious host Ozzie, WB6ICM, is moving to Fort Jones soon, and the last net from his "Super Station" will be on Saturday April 6th.

In the meanwhile, I have held a net on Sunday, 7030 kHz at 7 PM Pacific Time in order to promote the use of the Collins transmitter at the remote site.

This will work out very "neatly" because with the arrival of Daylight Saving time, the Sunday net at 7 PM Pacific Time on 40 meters becomes 7 PM Eastern Time on 20 meters.

I think it represents just about the most perfect "hop" that can be made for an evening net across the time change.

Tonight's net yielded excellent signals and I expect the loss of Ozzie's station to be minimized by the Bolinas site. It was selected in 1914 by the Marconi Company as the site on the West Coast which yielded the highest field strengths using a team of engineers. It remains as one of the premier radio locations in North America. I am extremely lucky to have a transmitter at that location!

Incidentally, I will be observing Marconi Day, April 20th UTC from this site.

Barry, let me take this opportunity to thank you for the support you have given to the Vintage CW Net in Electric Radio over the years. It has provided an opportunity for ER readers who enjoy CW to fire up their vintage equipment & hear others doing the same. I have truly enjoyed the opportunity to facilitate this, and eagerly look forward to the years ahead.

Tracy "TR", WB6TMY

Letters can now be sent to ER
via e-mail; er@frontier.net

VINTAGE NETS

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

California Early Bird Net: Saturday mornings at 8 AM PST on 3885.

California Vintage SSB Net: Sunday mornings at 8 AM PST on 3835.

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

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

Northwest AM Net: AM activity daily 3 PM - 5 PM on 3875. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT. The formal AM net and swap session is on 3875, Sundays at 3 PM.

K6HQI Memorial Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 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 3855. On 6 meters (50.4) this group meets at 8 PM MT Saturdays.

Colorado Morning Net: An informal group of AMers get together on 3808 Monday, Wednesday and Friday mornings at 7 AM 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 Collectors Association Nets: Technical and swap session each Sunday, 14.263 MHz, 2000Z, is a long-established net run by call areas. Informal ragchew nets meet at 0100Z Tuesday nights on 3805 and on Thursday nights on 3875.

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, KD3UL.

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 was started in 1978.

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

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

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

Southern California Sunday 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.

Westcoast 40-Meter Sunday Net: Net control varies. The group meets on 7160 starting at 4 PM PT.

Collins Swap and Shop Net: Meets every Tuesday at 8 PM EST on 3955. Net control is Ed, WA3AMJ.

Old Buzzards Net: Meets daily at 10 PM EST on 1945. This is an informal net in the New England area.

The HW-101: The World's Most Popular Rig

Chuck Penson, WA7ZZE

Box 2414

St. Paul MN 55102

penson@sci.mus.mn.us

I'm not sure whether this is a story about a wonderful old piece of ham equipment or an editorial about the current state of ham radio manufacturing and marketing. You decide.

Now and then, quite by chance, a product hits the market with absolute precision. It is exactly the right product, for exactly the right price, at exactly the right time. The Hula-hoop, the Vegematic, and the Slinky (to name only a few) are all examples of such products. They were not the result of some calculated marketing plan—they were just ideas someone was willing to take a chance on. They succeeded on their own merits, and they made their creators rich. These kinds of products don't happen with any predictability. They occur with the irregularity of prime numbers, and as with prime numbers there is no magic formula with which one can find the next occurrence. Maybe that's what makes products like these so special.

In March 1968 Heathkit stumbled onto one of these products.

Looking to further capitalize on the very popular SB-100 transceiver they had launched in 1965, Heath began designing a lower cost version of the rig. To save money, Heath re-used as many of the SB-100's parts as they could while working around the real expensive items. Thus, they used the same PC boards, the same discrete components, and much of the same metal work of the SB-100, while re-engineering a new VFO and cabinet, and omitting a few details here and there. Simple really. Not a very big project at all. The engineering

staff thought the low cost rig probably would sell fairly well—at least well enough to get their development money back.

The rig they ended up with was designated the HW-100. No one could have guessed that within three months of its release Heath would be advertising it as "the world's fastest selling transceiver." What's more, in 1970 the HW-100 was replaced with a unit that proved even more popular—the HW-101. Today, some 13 years after the last 101 was sold, and nearly 30 years after the introduction of the original 100, it is impossible to know exactly how fast they really sold, but some simple division can give us an idea.

The last time the HW-101 appeared in Heath's catalog, the company boasted "more than 30,000 sold." It is likely that because the 30,000 figure was already several months old by the time it could appear in print, and because Heath seldom did chassis and paint production runs of less than 5,000 units at a time, the final number of combined sales of HW-100s and 101s was something much more like 40,000 units.

Do the Math

Forty thousand units divided by 16 years equals (in round numbers) about 2,500 units per year. Around 200 units per month. This number is not unrealistic. Data from the Fiebich Papers (Electric Radio #80) shows that 2,031 HW-101s were sold in 1972. All this assumes flat sales over the years which is, of course, almost certainly not the way it happened. It is likely that peak yearly sales may have approached 5,000 units.



Front view of the HW-101

This kind of demand was not uncommon for Heath and the company was tooled to produce at this volume and more. For example, Heath routinely sold 12,000 VTVMs every year (about 50 per day), and for a couple of years sold more than 50,000 digital clocks per year (almost 200 per day).

In any case, the HW-100 was something of a surprise for Heath. Company officials had no idea the rig would sell so well. The 100's popularity can be traced to several significant factors. First of course is price. At about \$300 (including the power supply) the rig was a steal. And while not abundant with features, it had all the basics and was attractively styled. Second, the enormous popularity of the SB-100 created a vast reservoir of hams who wanted one but could not swing the \$450 it took to land one. The HW-100 was their answer. Third, Heath's overall popularity was peaking just at the time the HW-100 was released. It is clear that all of these factors converged at just the right moment to propel the HW-100/101 series to unprecedented heights.

Basic Specs

The SB series used Heath's expensive tube-type Linear Master Oscillator or LMO as it was called. The HW-100 used a much simpler and more traditional (but solid state) VFO design. The unit uses 19 tubes and nine PC boards. The metal chassis, PC boards, most parts, and parts placement of the HW-100 are identical to those in the SB-100. Even the layout of the front panel is similar.

The HW-100's receiver sensitivity is 0.5 μ V. There are provisions for only one filter—SSB. A CW filter was never offered as an option. The rig tunes 500 kHz segments of the 80, 40, 20, and 15 meter bands, and the full 10-meter band right up to 30 MHz. The transmitter delivers 180 watts PEP SSB input and 170 watts CW input. Features include PTT and VOX operation, switch-selectable sidebands, and semi-break-in CW.

The HW-101, released for Christmas 1970, was a refinement of the HW-100 that added three principal improvements. The receiver sensitivity was improved to about 0.35 μ V, and the "Harmonic Drive" tuning mechanism of the 100 (which no one seemed to like) was



Front view of the HW-100

replaced with a more conventional ball bearing drive. Heath also added front panel switch selection of filters for SSB and CW and re-styled the front panel.

The Most Popular Radio in the World?

No doubt about it. No manufacturer, not even Collins, ever sold more of a single model of radio—transmitter, receiver, or transceiver—than did Heath with the HW-101. And when you add sales of the HW-100, no one else even comes close. Collins historian and author Jay Miller, KK5IM, believes Collins probably never sold more than about 24,000 KWM-2 and 2A transceivers combined. An impressive figure—when the military is your best customer.

Where Are They Now?

So what happened to all those "Hot Water" 100s and 101s? Many (perhaps even most) may still be on the air. A few have been consigned to a life of leisure on a shelf in the basement or the shed, a few more have been modified into oblivion, and alas, a few have "passed on"—reduced to parts, their empty shells discarded. Yet thousands are still around and can be heard on the air on a regular basis. Unlike many "vintage" rigs these days, HW-100s and 101s can

still be had at reasonable prices—at least two or three of them turn up at every hamfest in the world. As a result, they make excellent backup rigs (though many would argue they still make excellent primary rigs) and are perfect for the new ham, for the ham on a budget, and of course, for the ham who believes that real radios glow in the dark.

Though it may not seem obvious, the Hula hoop, the Vegematic, the Slinky, and the HW-100 have more in common than you might think. They were not any kind of technological breakthrough, and there was no market research that told their inventors how to make them, or what features to include. These products were the result of intuition, chance, and a little luck. Somebody was acting on a hunch and somebody else was willing to gamble the hunch might be right. These products, and thousands like them, were the result of a shoot-from-the-hip product development process of that disappeared with the products themselves. With a few very rare exceptions, it is no longer possible to manufacture anything without millions of dollars in market research, surveys, and focus groups. When it comes to

Chicago Is My Kind Of Town

by Paul Johnson, KR9P, ex W9OPD & W0NPD
8592 N. Creek Rd.
Roscoe, IL 61073

Well, I wasn't born in the Chicago area, but we moved there from Minneapolis when I was 15 years old. My first serious interests were sports, hunting, fishing and cars ... but I also found radio alluring. The thought of tuning in a foreign station intrigued me. I bought a little red Arvin AM BC radio and ran some wire around and did a little BC DXing. A family friend had a Zenith Transoceanic and I would tune that when we visited them ... but I didn't know any hams and that is about as far as my radio interests went in my early years.

My first recollections of Chicago are from a trip in 1950. We flew there from our home in Minneapolis on a Northwest Airlines DC-3, my first plane ride. We attended the Chicago Fair on the Lake Front, I still have a pennant and pin from that event.

In 1954 we moved to Maywood, Ill., a Chicago suburb, where I transferred to Proviso High School. I became acquainted with a group of guys and we always ate lunch together in the school cafeteria. It turns out that one of them was a ham and some of the others were studying to get their Novice licenses. Well, the guy with the license was Dave Mills, W9ZQC, (now AJ7O). Dave helped me with the code and I obtained the license manuals. Another friend loaned me some 78 RPM code instruction records. I also acquired an ARC-5 receiver to monitor code practice on W1AW. Some other high school ham friends were W9O1Y, W9DFY, (now W2CBU), W9ICE, (now AD6C), W9FIP and W9SQP, (now KK6Q) ... a few more followed after that. Those that followed

received K9 calls, K9AQO, (now AH8I) and K9BJH, (now KE0DO). The chemistry teacher at Proviso HS was Doc Appleton, W9LBJ, (now K4RR). We tried to revive the high school radio club, and got it going for a while with Doc's help. There was a big lattice wood tower on the roof of the school, with a wire running to the clock tower. I was told that the site was used for radio communications during WW II by the Navy.

A friend of my Dad's gave him an SX-42, with the big R42 speaker, "for his son who was studying for his ham license to use". If and when I received my license, the receiver would become mine. I passed the Novice test and was anxiously waiting for my license to arrive in the mail, but I needed a transmitter. I had earned some money and saved for a rig. My Dad drove me to Allied Radio one Saturday, where I was going to buy one of the new Viking Adventurer kits. There was a Stancor ST-202A on the used equipment shelf. It had an 812A final and looked impressive to me. I purchased the ST-202A, brought it home and placed it next to my SX-42. On that trip my Dad bought me a Weller soldering gun, which I have and use to this day.

I put up a Windom antenna between a tree in the parkway and a mast I made out of a 2X2 on the garage roof. The FCC and the US Postal Service came through and I was WN9OPD. My first QSO was with a W2CJX in New Jersey and W9ZQC was my second.

Once I became active on the air, I became acquainted with many local hams. I joined the CSRA, Chicago Suburban Radio Association, and suddenly

Chicago Is My Kind Of Town from previous page

there was a new world out there, new states and DX to be worked. Phone calls home to my mother from school to see if I received any QSL cards became a regular practice. I have fond memories of taking the bus to Allied Radio or downtown to Newark Radio and the FCC. We also made several excursions to "Surplus Row", Arrow and R&W Sales. I remember digging through boxes of crystals hoping I would find one in the Novice bands, never did find even one. I recall one trip to Allied Radio when Dave Mill's mother drove us. Dave had a huge list of parts to buy to build a new transmitter with 1625 finals. As a Novice I worked and confirmed all states except Delaware. I worked Delaware shortly after I received my General ticket. I also worked about 30 countries and all continents except Asia. It was pretty tough with only 4 or 5 crystals. My DX really picked up after I built a 15 meter rotary dipole.

After I passed my General license examination, at the FCC located in the old Federal building in downtown Chicago, I needed a VFO. I borrowed an HT-18 VFO/NBFM exciter to use for a while, which also provided a way for me to get on phone. Later I bought a Knight Kit VFO, with built in power supply. During one of my trips to Allied Radio, they were taking photos of people by a Knight Kit display ... I still have that photo in my ham scrapbook. I worked at Allied Radio for a short period of time in 1959 and I bought a Viking Valiant at an employee discount price. Some of the hams I met while working there, W9LKJ and W9OHH, (now W9OA) are still good friends and we belong to the same DX Club in the Chicago area. At that time I already had an NC-303 that I had purchased the previous year. I actually traded in my SX-42 for an NC-300 at a close-out price. It turned out to be defective and when I returned it they didn't have another NC-300 ... so I got a new NC-303 for the

same price. I continued to use the R-42 speaker, which I still have and use primarily for shortwave and broadcast listening.

This past summer a friend of mine, Lee, KØLW, and our XYL's visited the Monet art exhibit in Chicago. We also visited the Museum of Broadcast Communications in the old Chicago Library building. The building is now called the Chicago Cultural Center. I highly recommend taking in the museum ... it's free too. As I looked out over Lake Shore Drive and Lake Michigan from the museum, I thought of all the amateur radio history in Chicago. Hallicrafters, Instructograph, Chicago Transformer Co., Thordardson, Taylor Tubes, Stancor, Shure Brothers, Amphenol, McMurdo-Silver, Ohmite, Guardian, The Radio Amateur Callbook, and later Central Electronics and many other radio related companies called Chicago home. I worked Bill Halligan, W9AC, when he lived in the Drake Hotel. Bill had a cubical quad antenna on the hotel roof. The 9ZN early experimental DX transmissions were made from a site near the Edgewater Beach Hotel.

During the Worlds Fair/Century of Progress in 1933 and '34, amateur radio station W9USA operated from the Travel and Transport Building on the fairgrounds. The Century of Progress was a celebration of the 100th anniversary of Chicago becoming a village in 1833. Amateurs from around the World attended the World Wide Amateur Radio convention August 3, 4 and 5, 1933, which was held in conjunction with the Century of Progress. H.P. Maxim, W1AW; Don Wallace, W6AM; James Millen, W1HRX and Arthur Collins, W9CXX were there. Fred Schnell, W9UZ introduced H.P. Maxim, who made the principal address. A nine year old YL-W3BAK, was one of the winners of the CW contest. I have two variations of the station QSL cards with photos of the station and Exposition. I called a couple

friends to try to obtain more information for this little article. One was W9GSB, Lou. Lou has been licensed for over 60 years. It turns out that Lou spent a lot of time at the World's Fair and frequently operated W9USA. One day Lou heard that Marconi was coming to visit the exhibit at the end of the day. Lou got to meet Marconi and get his autograph. Marconi had to borrow Lou's pen to sign the autograph and he also signed the log book. Another friend of mine, W9FFQ, Milt, attended the convention. Milt sat at the same dinner table as Boyd Phelps - W2BP/W9BP who was presented a Gold Medal by H.P. Maxim, for his work "developing the short waves". Milt obtained autographs from W1AW, W9BP, W9UZ, W6AM and several others. Milt still has his name tag and program from the event. Clinton B DeSoto, W1CBD chronicles W1AW's feature address and the convention in the October 1933 issue of *QST*. Maxim remembered the past and was very perceptive about the future.

About a year later there was another major hamfest in the Chicago area. W9FFQ attended that one too where he won the grand prize, a new National HRO receiver. Milt said that hamfest was held on the Donnelly estate and was quite an affair. People and refreshments were shuttled around the estate on a fire truck. Milt later sold the HRO to the Federal Government for military use when receivers were in short supply during WW II.

The Nationwide Amateur Radio Show was held in Chicago in September of 1936. The ARRL National Convention was held in Chicago in 1957. I'm sure there were other events that I am not aware of. When reading through my old *QST*'s and *CQ*'s recently, I saw an article in the January 1950 *QST* with a photo of an old friend W9LLX, now a silent key, a true pioneer in FM two-way radio at Motorola. The picture was

taken next to Harry's Lincoln with the romanesque pillars of Soldier Field in the background. Heck, even my photo is in the May 1955 *CQ* Novice column, the issue with W6NAZ in her Jaguar XK-120 on the cover.

In 1955 I joined the Illinois Air National Guard, 264th Communications Squadron, at Chicago's O'Hara Field and served for six years. My primary reason for joining was for the experience of working with the radio equipment, R-388's, BC-610's, R-390's and T-368's. W9EXY was the only amateur in the outfit and later a friend of mine, W9LSL, joined.

Amateur Radio has meant a lot to me and still does. I have worked in the Two-Way Communications field for 29 years. I have worked for RCA, Motorola, E.F. Johnson and GE most of my life. I have met countless amateurs on the air, through my work and in the various locations I have lived. There is fraternal bond and camaraderie among us. Attending the Dayton Hamvention has become a tradition for me, one that I look forward to every year. It is a real pleasure to meet old friends and to become acquainted with new. The AM Forum, Collins user group activities, flea market and DX events are my favorite activities at Dayton.

I have had the opportunity to visit some of the amateur radio museums and exhibits. The Western Heritage Museum in Omaha, where Leo, W0GFQ, graciously met me and gave me the "Senators Tour" (that includes the basement storage area), which was very enjoyable. After the museum visit, Leo and I had lunch together. The E.F. Johnson Co., and Rockwell Collins Radio have not forgotten their roots, both have fine museum type displays of their amateur and other products. It was a real treat to have had the pleasure of seeing both of these fine displays. With my nostalgia running high and the advent of the FCC Vanity Call program, I

The Command Set Transceiver

by Larsen E. Rapp Jr., W1ØU, P.O. Box 313, Pyrite Creek, CO 81007

Electric Radio is privileged to present this article contributed by the son of a famous QST author who wrote many thought provoking articles in the 1940's and 50's. Lars Junior is indeed following in the footsteps of his illustrious father, and we hope to include more of this work in future issues.

It occurred to me while flipping the pages of *QST* recently that one of the reasons why so few ham radio beginners are taking up CW on our HF bands is a complete dearth of inexpensive, moderately powered, serviceable equipment. Today's cheapest Japanese transceivers run at least a kilobuck, far more than any enterprising young lad or lassie could accumulate by any legitimate behavior, and they contain more bells and whistles than a calliope! What the new ham needs these days is a good, old fashioned, do-it-yourself, dirt cheap way to get on 80 or 40 meters CW. And what better way to accomplish that end than to call upon that most ubiquitous piece of all-American war surplus equipment, the Command Set transmitter.

Command Set transmitters were once as numerous on the surplus market as lawyers at an accident are today. They still show up at ham fleamarkets for give-away prices. Thus they are the ideal basis for our new, beginner's transceiver. Fortunately, my father had laid away a stash of new-in-the-box Command Sets from the height of the surplus era which he passed on to me, so I had an excellent source of raw material for this development project.

The concept for the Command Set Transceiver is elegant simplicity itself. The original transmitter is modified to perform as a direct conversion receiver as well as a transmitter by the addition of a few parts, readily obtained at any Radio Shack. In receive mode, the trans-

mitter oscillator functions as the direct conversion local oscillator, one of the final amp 1625's is switched to perform mixer duty, and the other 1625 becomes an audio amplifier. Any of the commonly available Command Set transmitters may be used; the BC-696 and BC-459 which already cover the 80 and 40 meter bands respectively, or the BC-457 and BC-458 which can readily be moved into the adjacent bands as earlier described in *Electric Radio*.(1)

Figure 1 shows the schematic of an unconverted Command Set transmitter, and figure 2 illustrates the changes which convert it into a transceiver. Three Radio Shack DPDT relays are employed to make the switch. The 1625 on the left is changed from final amp to mixer by switching the control grid from oscillator output on transmit to signal input on receive. The screen grid is used for oscillator injection on receive, with an appropriate resistor included across the relay contacts to provide DC bias. The plate is switched from the final tank on transmit to an RC load on receive which drives the audio amplifier. The final amplifier tank circuit on transmit becomes the RF input circuit on receive.

The right hand 1625 becomes an audio amplifier on receive. Its control grid is switched to the volume control. Its plate is switched to an output transformer which drives earphones or a small loudspeaker. And finally, a suitable cathode resistor is switched in on receive to change the bias point of the 1625's from class C to class AB(1) which

SCHMATIC OF BC-459 TRANSMITTER (7-9.1 Mcs)

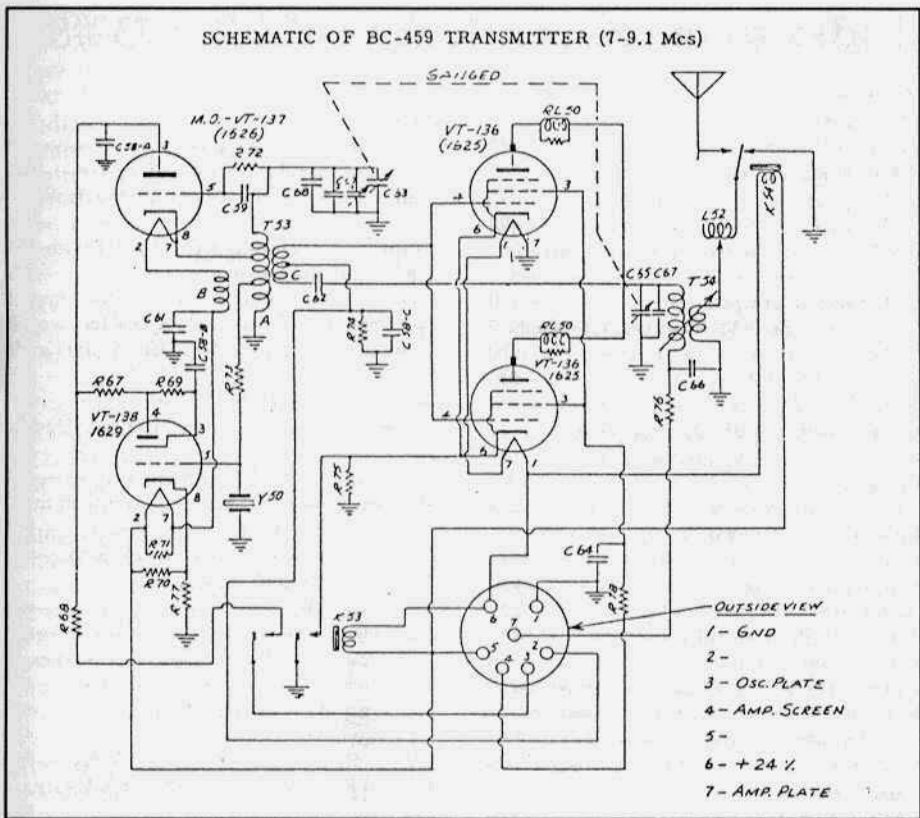


Figure 1

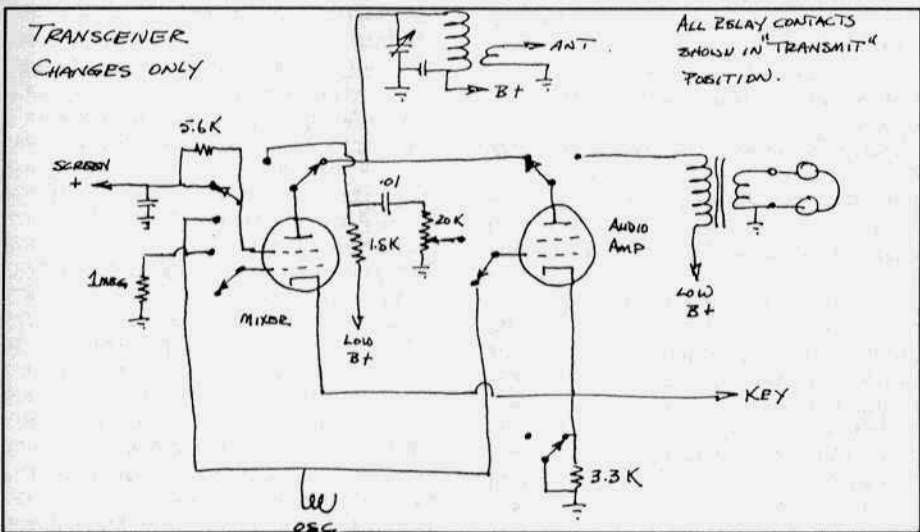


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Getting Grounded

copper tape for ground control

By Joe Roberts, N4WQC

Box 180562

Austin, TX 78718

As ER readers are well aware, the Collins 75A-4 receiver enjoys a legendary status as one of the leading examples of 20th century amateur receiver design. On the other side of the coin, it is common experience among 75A4 owners that this classic radio can become a rather flaky instrument with the passage of time.

As pointed out in ER and elsewhere, both the paper and mica capacitors in this radio tend to be leaky 40 years after it left the factory. Unless you're lucky to find an exceptional specimen, restoring an A4 to tip-top operating condition is a job that can easily take a few dozen hours or longer.

The environment where a particular radio has been living all these years can have a lot to do with its current electrical condition, but Time is the real culprit and you can't store a set away from that nasty stuff.

One "component" in the radio that really suffers with age is the ground system. Most ground connections in the 75A-4 are made through the grounded lugs of terminal strips bolted down into pressure contact with the aluminum chassis. The aluminum used in the A4 chassis tends to develop a layer of oxidation and there appear to be local oxidation processes at work where the ground terminals are bolted to the chassis.

The symptoms of a shaky ground system include, but are not limited to, oscillations, RFI, and crystal oscillator dropouts. If the ground connections are dubious, erratic operation is virtually guaranteed.

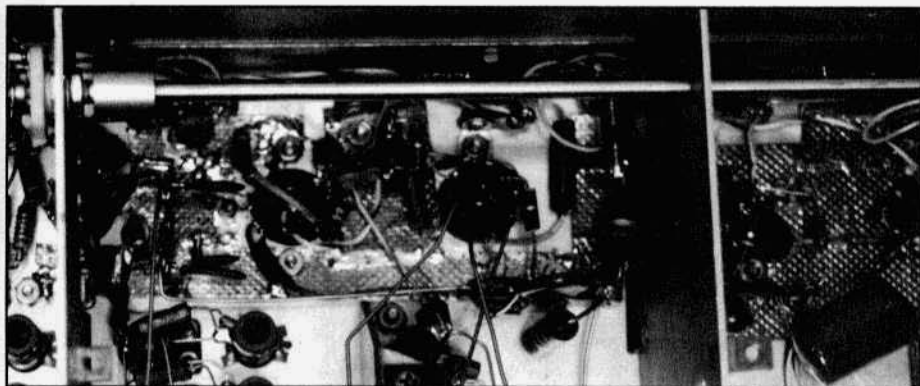
Last year I obtained an average condition early-model A4 which exhibited all of the problems listed above. As I tuned up and down the bands, the set squealed for 5 kHz and went silent for the the next, then it worked fine, then it squealed, and so on.

Ten meters was stone deaf except for some scratchy, pulsating modulation from a local BC station that was getting rectified somewhere inside the box. Looking at a few ground connections with a fast scope yielded some really ugly pictures. This poor-A4 was a mess.

I found evidence that other 75A-4 owners had the same problems in Hints and Kinks in QST (August 1978) which discusses cures for crystal oscillator dropouts. The writer quizzed Collins engineers techs and came up with a list of electrical tests and a suggestion to install zinc-plated lockwashers between the terminal strips and the chassis to insure good mechanical and electrical contact. Zinc-plated washers are specified, apparently to minimize galvanic action between the washer and the aluminum. Presumably by 1978 some of the 75A-4 chassis in the field were already getting corroded and ground problems were popping up.

I carefully scoured the terminal lugs and chassis with fine abrasive cloth followed with a blast of contact cleaner, then I installed lockwashers under every ground terminal in first five stages of the set, just like Hints & Kinks said.

This job was no fun at all but after the lockwasher treatment, the instabilities settled down somewhat but a radio ei-



3M brand copper grounding tape in place on the chassis of the author's Collins 75A-4. This material is a pressure sensitive copper foil tape with a conductive adhesive.

ther drops out and breaks into oscillation or it doesn't. Mine still did..

The solution came to me through the wise advice of my buddy John Camille W5FZT up in Addison, TX. John is the first guy I call with questions about mods because he was never satisfied with anything the way it came from the factory, usually with good reason. Last time John came through Austin, he was on his way to San Antonio to "beef up" his granddaughters swing set!

John's hobby is rebuilding Tek and HP test gear for higher performance. One of his standby techniques is to drill out the nickel plated brass rivets used to attach ground lugs to the chassis in HP gear, install runs of copper foil tape between the ground points, and solder everything together the way it should be. When (not if) the riveted grounds corrode, unacceptable voltages will be induced across those junctions, even in gear less than ten years old depending on environmental conditions.

For example, an HP 3490 Wave Analyzer with 1971 date codes found its way into John's operating room. The power busses had erratic noise peaking at 500 mV riding on 200 mV of 120 Hz hum. After rewiring the power supply and installing a good single point

ground with copper tape, the noise was reduced to the specified 1 mV.

Within days, the mail brought me my own personal roll of 3M brand copper grounding tape from John's personal stash. This material is a pressure sensitive copper foil tape with a conductive adhesive. It is available in a number of widths

The prime advantage of this tape over the lockwasher method mentioned above is that you can solder the ground connection, ensuring a solid electrical contact that will not degrade over time. The ground currents will follow the low impedance path provided by the foil, so you can steer the flow the way you want it to go.

The approach that I used on my 75A-4 was to unscrew all the bolts holding the terminal strip ground lugs and run copper tape along the chassis over the bolt holes. Once it is in position, press it down. Poke a hole through the tape with a soldering tool, tin the tape, reinstall the lug strip and solder the connection. The 3M tape is treated to promote solderability and with a hot iron the solder flows smoothly and a shiny permanent ground joint results.

The process I describe is actually a lot less work than it sounds. I spent

Getting Grounded from previous page

more time cleaning the contacts the first time around with the lockwasher treatment than I did installing the tape. The holes for the terminal strips are aligned on a few center lines so a simple geometry hits them all.

The tape is easy to slide under whatever you want it to go under with dental picks and hemostats. The best scheme I came up with is to peel off the paper backing then stick it back on. The second time around the paper backing doesn't stick too well, so you can slide it off the glue and out from under the foil with a pair of hemostats after the copper is in position. An "exacto" knife works great for close trimming after gluing down the tape.

Surface preparation with the tape scheme is much less critical than the lockwasher approach because the ground currents will move along the tape. The copper is what does the job. This is a real advantage because it can be real difficult to buff the chassis where you need to without major disassembly.

My first session with the tape, I ran grounds for all stages of the radio up to the 1st IF. I used a buss of 1/2" tape running parallel to the bandswitch shaft next to V2, V3, and V4, then I ran branches down to the terminal strips. Everything in this section of the set is accessible, so this is an easy procedure.

The 75A-4 uses the silver plated shields mounted across the tube socket pins as ground connections. If you don't want to strip out all the parts to get the tape under the shield, buff a clean spot on the and run a thin strip of tape from the shield to the ground buss. Solder both ends and you're set.

I am happy to report that once I put in a reliable ground for the first half of the radio, most of the erratic behavior went away. No more tuning dropouts and no more wild squealing oscillations. The ground repair settled the radio down to the point where I could

make a reasonable attempt at routine restoration and alignment.

Inspired by my initial success with my new copper ground scheme and having most of a roll of tape left, I eventually did the whole radio. Took four or five evenings to get all the ground points pinned down and it wasn't half as tedious as I thought it would be. Most of the times I tested the set after running a few new grounds, I could hear the noise level drop perceptibly over the previous level.

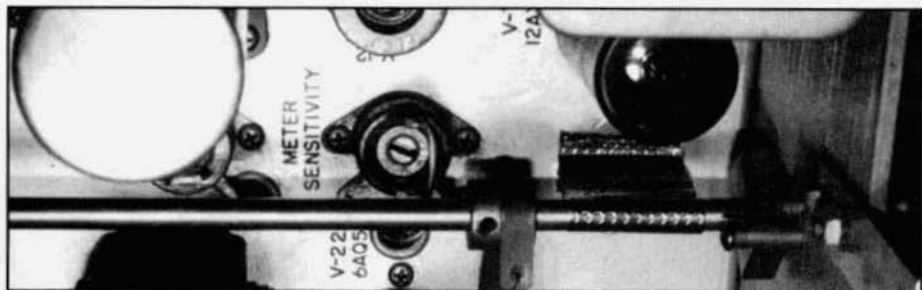
The subjective effects of the changes were impressive. There is much less background crackle and pop and much crisper audio with a good ground system, even though its still lousy mechanical-sounding, hum-ridden 75A-4 audio. Real audio for the 75A-4, that's my next project!

1001 Uses

Obviously, a conductive adhesive solderable material has 1001 uses for the BA enthusiast. Use it for shielding wires or cracks in enclosures. You can wrap it around a wire for an instant shield. Great where you need low impedance leads for RF.

Situations pop up where a flexible self-stick conductor is just the ticket. For example, after coming up empty handed after weeks of trying to figure out an elegant way to ground the BFO shaft of my 75A4, as suggested in the W2WCZ mods reported by N0DMS in ER #47, I buffed the shaft and a small area of the chassis with fine abrasive cloth, wrapped some tape around the steel shaft and glued the end to the chassis. A ten second job.

One of the beauties of copper tape for vintage gear work is you don't need to drill any holes for new electrical connections you decide to add to an existing layout. You can transfer a bit of RF superior "ugly" construction technique to your boatanchor chassis. Use high value resistors and extra decoupling caps as standoffs where appropriate.



75A-4 BFO shaft grounded with copper tape.

This approach also transfers well to aluminum "bud box" homebrew projects. I keep my copper tape right next to my chassis punches. No more lug and screw ground connections.

Look Ma, no holes!

The reversibility of copper tape mods is a real benefit when working on classic radios. The tape allows you perform many kinds of modifications on classy vintage equipment like 75A receivers and not ruin it for museums of the future and fussy collectors who have to have it "stock". Just tell the boys down at the club to unsolder the connections and peel the stuff off before the estate auction.

To each his own, I suppose. I joke about purist "collectors" because I'm the kind of guy who can't keep my hands and soldering iron off anything. Nonetheless, I can really appreciate what the preservationists are saying. They ain't making no more 75A-4s, after all.

However, after living with super high performance modified vacuum-tube receivers such as the NØDMS/KDØHG "Colorado mod" R390-A, it's hard to settle for second rate nostalgia-grade performance from a set that occupies a few cubic feet of my precious shack space. No room for museum articles around here!

Not to mention that a really tweaked-up 75A-4 is worth the space on any operating table.

Copper tape gives me a measure of psychological relief from the tension of

of preserving our history vs. getting my radios to work better and learning the practical nuances of obsolete radio electronics by diving in head first with a hot soldering iron.

I don't buy gear for its investment potential so I'm not worried about shaving down the eventual resale value. If I paid myself ten bucks an hour for the work I did on this 75A-4 to bring it up to snuff, I could probably buy a Watkins-Johnson HF-1000 with the loot! But who's counting?

Anyway, the last thing I want to do is to kill the radios I love under the guise of "fixing them up". I'm pleased to report that even after I spent at least 100 hours "boogering up" my 75A-4 with NØDMS mods and other elaborate upgrades, somebody patient enough (and crazy enough) could reinstall the noisy old stock circuit in a few weeks. No holes and no metalwork necessary with the copper tape at hand. Call it a "politically correct" modification strategy.

3M brand EMI/RFI Copper Foil Shielding Tape grounding tape is available in 1/4", 1/2", and 1" sizes through Digi Key. An 18 yard roll costs about \$20. A roll is a lot of tape given that it only takes a few feet to reground a whole 75A-4. Chip in with a few friends and make a group purchase. I'll buy a refill in a flash when I use up my stock. I heartily recommend 3M copper tape as an essential tool for the hands-on vintage gear enthusiast. **ER**

Product Review: Kiwa Filter Modules

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

Some time ago I received a Kiwa "Filter Module" for review from the Kiwa Electronics Company. Kiwa produces these filters as an accessory item for receivers using a 455 kc IF, and they are available from stock with 6 dB bandwidths ranging from 3.5 kc to 8 kc in 500 cycle increments. Their literature points out that Kiwa can supply any custom bandwidth from 2.5 to about 8 kc. This would allow an operator to tailor IF response to one's own needs.

The filter I received is a small, black epoxy-potted rectangle measuring 1.875 x .875 x .680 inches. It is specified as having a bandwidth of 3.2 kc at -6 dB, came with clearly identified red and black power leads and input/output miniature coax cables.

There is another model available which uses solder pins for the same leads, and is designed for mounting on an optional filter switch board. The filter switch board allows users to select from several bandwidths.

A power supply board is available which will power the filter module from a high-potential plate supply.

Also shipped with the review package were two self-adhesive "Velcro" mounting strips and some small tie wraps for securing the filter and its leads once placed inside a receiver.

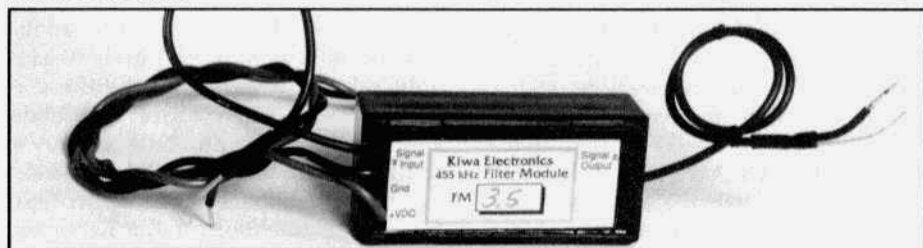
For experimenters, the beauty of these active filters is that Kiwa has already done the hard work for us! Electrically, the modules consist of cascaded ceramic filters with input and output buffer amplifiers. The buffer amps result in very light loading of the IF channel, and produce lots of output drive. Kiwa selects the ceramic filters in production to provide the required bandwidth and shape factor.

The stated specifications from Kiwa regarding these filters are:

1. -6/-60 dB shape factor of 1.65 to 1, which is excellent performance.
2. Zero insertion loss.
3. Negligible passband ripple.
4. No impedance matching required.
5. DC power required is 4.5 to 36 VDC at 10 mA.

To check the filter's performance, I swept them using a Tektronix 7L5 spectrum analyzer/tracking generator in a 7633 storage mainframe. Figures 1 and 2 are photos of the resulting response curves.

As seen from figure 1, the tracking generator output level is 0 dBm, and zero reference level (the top line of the graticule) is between -16 and -15 dBm, center frequency is 455 kc. The vertical displacement is 10 dB per large division at 3 kc resolution, and horizontal dispersion is 1 kc per large division. The overall passband shape is very nice, quite an improvement over the passband of single



The 455 kHz filter module (\$45) from Kiwa Electronics, 612 South 14th Ave., Yakima, WA 98902. 800-398-1146

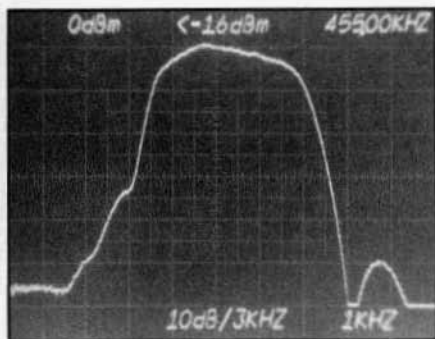


Figure 1

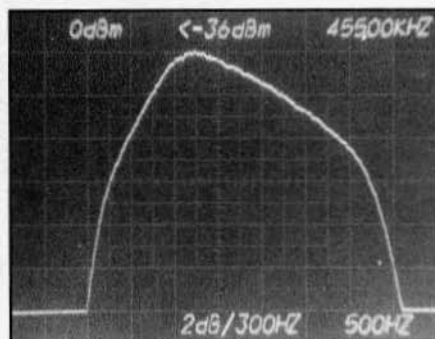


Figure 2

ceramic filters (see ER #57 for a review of Toko ceramic filters). The filter response from the curve is shown as 3.2 kc at -6 dB and 6.5 kHz at -60 dB. This gives a shape factor of 1:2.03. This is an 18.7% difference in shape factor from what was quoted, but I don't feel the difference is significant. The response curve would probably improve if I didn't drive the filter at 0 dBm, but I wanted to simulate the voltage present in a typical tube IF amplifier.

There is a spurious response on the high side at 458.600 kc which is 50 dB down from the peak response and is 1.4 kc wide. This is a response in the filter, not in the analyzer, as 3 dB of generator attenuation produced a 3 dB reduction in the spurious level. The spurious response is nothing to worry about, as it is 50 dB down and will be attenuated by additional selectivity in the following IF stages. Some high-priced crystal filters have similar spurs.

Figure 2 is a plot of the filter's peak response, only this time using 2 dB per vertical division at 300 cycle resolution and 500 cycles per horizontal division. As can be seen, the peak response is relatively smooth, increasing by only 1 dB for a 1 kc increase in frequency near the design center. This meets the spec of "negligible ripple" in my opinion. In an actual installation, the top of the response curve could probably be made almost flat by careful adjustment of the IF transformer trimmers, at a sacrifice of some overall gain.

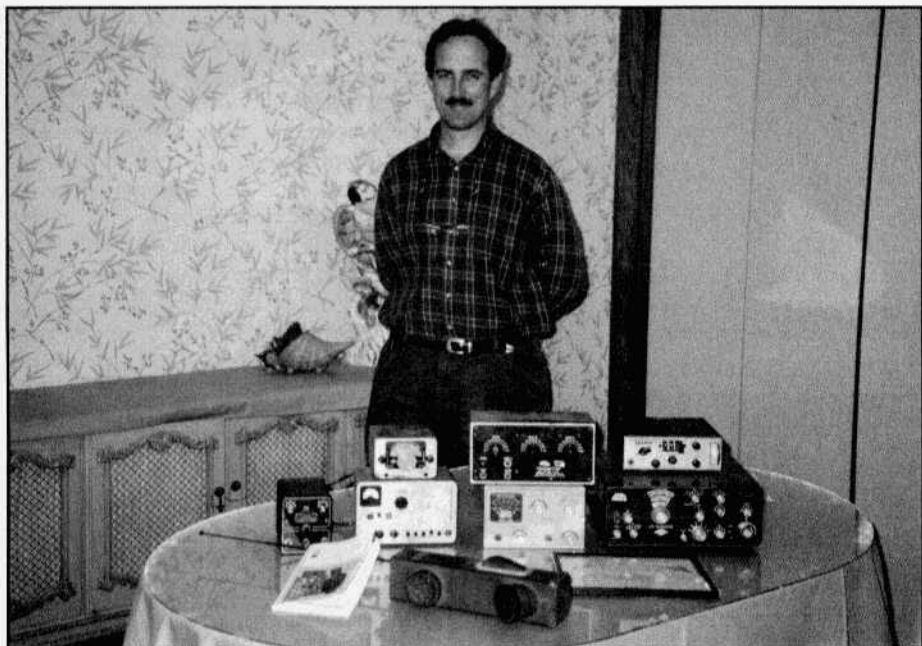
Using the spectrum analyzer, I measured an insertion loss of .12 dB, which in reality is zero loss. Probably the loss I measured resulted from slight impedance mismatches at the analyzer ports.

The filters were terminated in my testing as specified by Kiwa, 10K in and 100 ohms out. Changing the terminations +/- 100% made no difference with shape factor. I agree that the filters are termination insensitive.

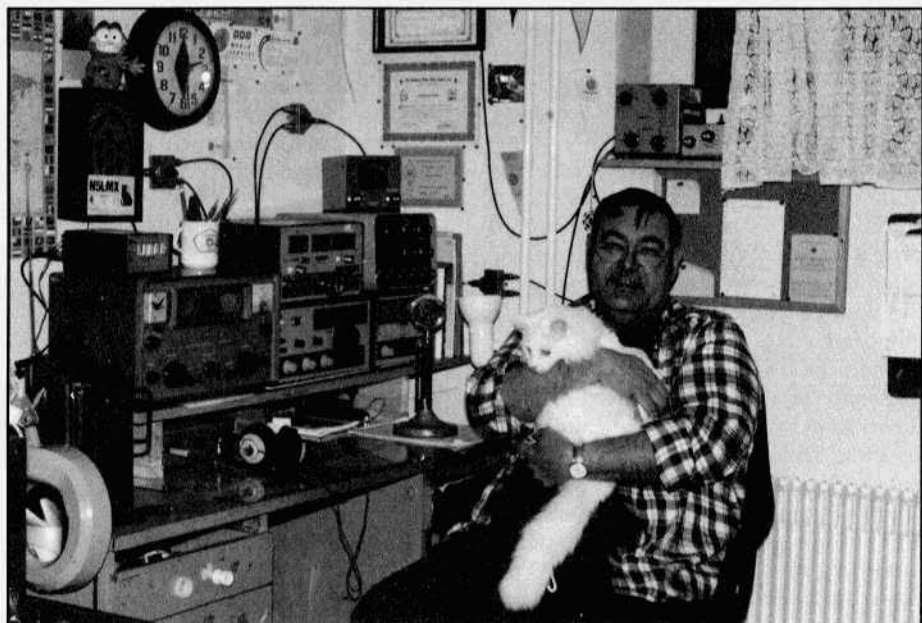
The input voltage was varied between 4.5 and 36 VDC. The current stayed at 10.45 mA, and the insertion loss did not change by any significant amount.

My conclusions are that Kiwa Filter Modules are well made, meet specifications, and are a good value. I would recommend them to anyone wishing to upgrade the selectivity in a receiver with a 455 kc IF, and I would use them in my receivers.

I temporarily installed this filter in my 1939 Hallicrafters S-20R, which I have owned since 1965 and am rather familiar with. On SSB phone it always was fairly good if the band wasn't crowded with kilowatt splatter. The S-20R has differential temperature compensation of the L.O., and if the bottom plate is left off and allowed to warm for 30 minutes it is as stable as any Collins beast. Tuning across the 80 meter phone band showed just how nice the filter performs, which is just as expected from the measurements. Now I wish I had Kiwa's 6 kc version of the filter! ER



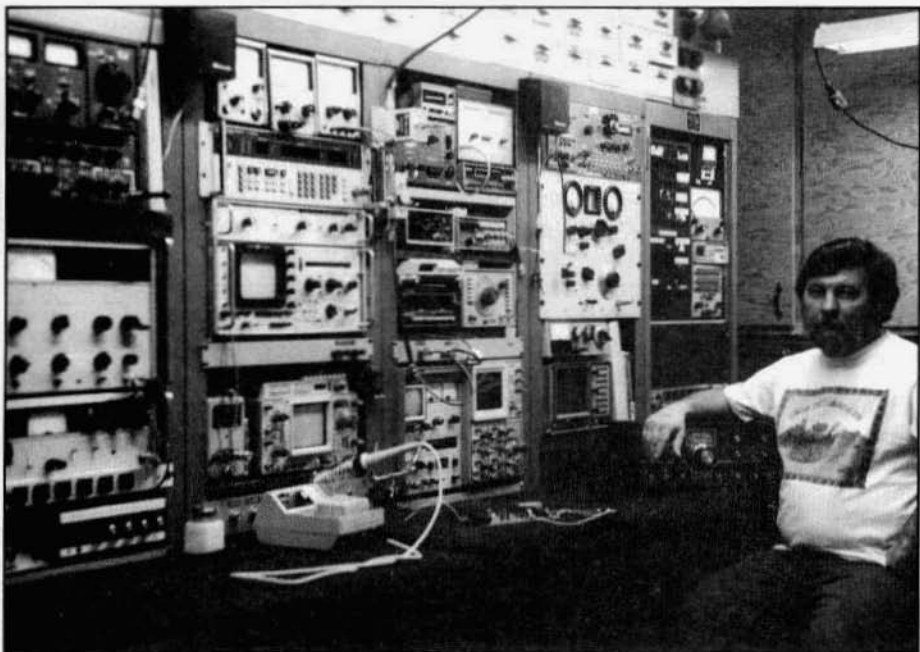
Jim Wilson, NU6H, giving a talk on "AM Operation Using Vintage Equipment" at the Floyd "Lucky" Henderson Chapter of QCWA in Riverside, Calif. *Photo courtesy of Steve Barnes, K6PFW.*



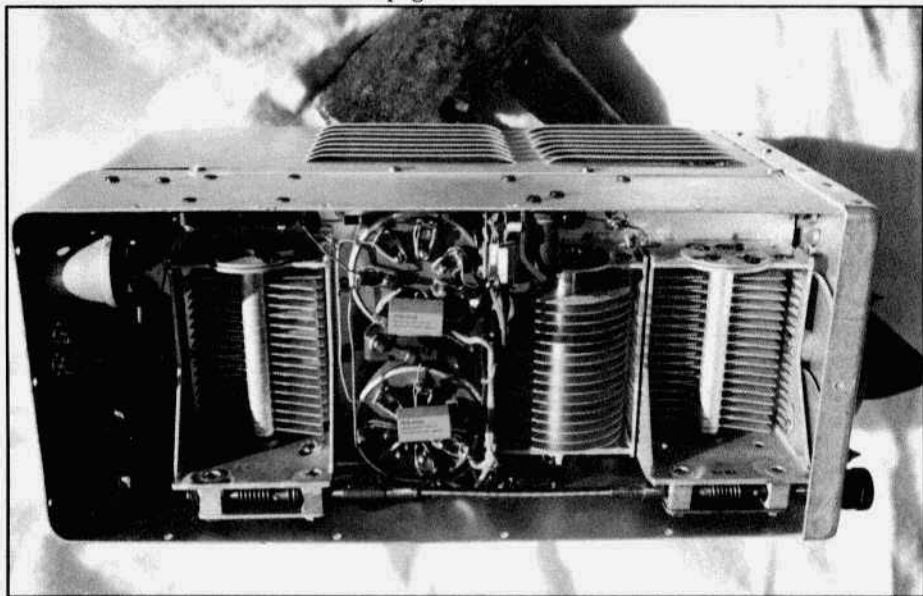
Bill Graham, N5LMX/DA1WG in his hamshack. He is presently working in Bosnia for the U.S. Army.



Darlene Kokinakis, WB7DZX, XYL of K7HK pictured below at one of their operating positions. On AM she uses a Valiant and Drake 2B.



Harry Kokinakis, K7HK, at his workbench where most of the equipment shown with his wife, above, was restored.



The modified Command Set Transceiver showing two relays installed beneath the 1625 tube sockets.

is more suitable for both mixing and audio amplification.

Power for the DC relays can be readily obtained by rectifying and lightly filtering the output of the same source used for the Command Set filaments, in my case a Lionel type R transformer.

And that, dear reader, completes the conversion. As the accompanying picture shows, the Command Set Transceiver continues to be a thing of beauty

to grace any newcomer's hamshack. The simple addition of a few readily available parts, a pair of earphones, a flea market key and power supply, and our fledgling young amateur is ready to experience the joys of HF band CW for an investment that can readily be garnered from a few hours of honest grass cutting or baby sitting. **ER**

1. "On The Air With the Command Set Transmitters," *Electric Radio* Number 75, July 1995.

The HW-101 from page 22

product development these days, intuition plays no part. Imagination is not required. Nothing is left to chance. No hunches are involved. No risks are taken. No gambles are permitted. I will not comment on whether this paradigm shift has actually resulted in better products, nor will I comment on the reasons for the shift itself. But I will assert that lack of intuition, imagination, and risk in today's "bring out a new product every six months no matter what" marketing mentality all but precludes the

reoccurrence of truly phenomenal products like the HW-100. I am tempted to suggest that nothing would be greater for ham radio than for Ron Popiel to get a license.

I have a feeling I may be preaching to the choir here in *Electric Radio*, but anyone with a desire to experiment with vintage ham radio could hardly do better than to pick up a Heathkit HW-100 or HW-101, built with intuition, imagination, and risk—the stuff of legends.

ER

The RCA AR-77 from page 7

ous local hamfests, and heard of two others listed on provincial on-the-air swap nets. A price of \$60 (Canadian) was the going rate for all of these, and seems to be about right for a radio of this caliber and vintage. Be forewarned again, however, that it seems to be primarily the proverbial old-timer who has any active recollection of the AR-77. . . I have no doubt that many remain half-forgotten and buried in the crawl spaces and attics of these veteran hams.

The former Royal Canadian Air Force was one known non-amateur user of the AR-77 (or at least, a derivative thereof). I do not know the military model number(s), but I vaguely recall advertisements in *QST* magazine not too many years ago, placed by an American surplus clearing outfit which was disposing of a quantity of these ex-RCAF units. To date, I have seen but one example of this rig: it differs most from its amateur radio counterpart by its monotone blue paint finish. Additionally, I can not remember the military version of the receiver bearing any of the characteristic AR-77 chrome trim. As well, I do not know which frequencies were calibrated on the bandspread dial. Perhaps a watchful reader may share his/her expanded knowledge on the matter with others in a future issue of *Electric Radio*.

Conclusion

Anyone hoping to discover a "...cut-rate AR-88" in this receiver is doomed to disappointment. The AR-77 - dramatically unlike the AR-88 - is most assuredly NOT a stand-alone receiver: it needs the care and the feeding of extra peripherals, such as preselectors and Q-multipliers, if it is to even hope to serve as a true, "...Compleat" all-band communications receiver.

Sadly, the testimonial ads of the day - "It beats receivers costing twice as much" (W3EOZ), and, "It's the last word in receivers" (W8CPC) - simply do not apply in 1996. Despite its shortcom-

ings, though, the AR-77 remains a nifty piece of hardware: it continues to hold its own in casual rag-chew style AM, SSB, and CW QSOs (and SWL'ing), in defiance of its half-century-plus vintage.

One thing is certain: if you've ever had an AR-88, and grew tired of describing its features to inquisitive amateurs during the course of your AM QSOs, you will become absolutely weary narrating the specifics of the AR-77 to the curious! It may, perhaps, be best summarized by this more modern day testimonial from VE3CUI: "For a boat anchor that's been around as long as this one has, it ain't too shabby!". ER

References:

Haworth, Bob (W2PUA), "A Biographical History of the AR-88", *The Old Timer's Bulletin* (Antique Wireless Association), May 1991.

Thompson, Sam (W6HDU), "RCA AR-88 - A Classic in Radio Design", *Electric Radio*, July 1990.

TABLE 1

Feature	AR-77	AR-88
Total # Tubes	10	14
# RF Amp Stages	1	2
# IF Amp Stages	2	3
Sensitivity: AR-77 - less than 2 uv for 0.05 W output with 30% mod. in AR-88 - 1.7 to 3.1 uv for 20 dB S to N		
Image Ratio (+/- 1 MHz)		
31 MHz	25	375
18 MHz	88	3100
3.3 MHz	1000	100000
540 kHz	50000	1000000
Weight	48.5 lbs	100 lbs

Current Regulator 3TF7 from page 14
downwards will lead to early cathode layer emitting fatigue. All this is aside from changes in the dynamic parameters of the tubes which will influence output voltage and frequency of the oscillators as in the BFO and VFO of the R-390A.

The change in frequency, Df , caused by up to $\pm 15\%$ change in heater voltage, DV_N in %, in the VFO of a R-390A for five different 6BA6W's, new and used ones, is shown in diagram 3. Although the used ones still show ample life reserve on a tester, they cause much more frequency shift than the new ones.

This alone might justify a regulation of the heater drive; in fact that may be the real reason for having it applied in the R-390A.

Since emission of the cathode is a matter of applied power, that is the product of voltage and current, one could also ask for the tubes to be driven with constant voltage disregarding inrush current effects. So one might pick ones choice. In realizations of other famous communication receivers one rarely sees current regulation for tube heater filaments.

It is known however that in large professional installations AC mains voltage regulation was used to drive the transformers of tube equipment to deliver constant heater voltage.

Later articles will deal with tuning mechanism, tuned RF-filter performance, VFO characteristics and the IF part of R-390A's. ER

Chicago from page 25
intend to either get my old call back or a two letter, 1 x 2, call.

I have obtained so much material, photos and first-hand information from people who attended the 1933 Century of Progress and the World Wide Amateur Radio Convention, that I could write another article just about the convention. For the past 18 years I have lived near Rockford, Ill., about 70 miles NW of Chicago. I am planning a little breakfast or lunch get-together and am going to bring a few people together who do not know each other but who attended the convention in 1933. The purpose being for the mutual enjoyment of all and to obtain more information for another article.

Back in Chicago in 1959 I had an NC-303, Viking Valiant, three element tri-bander and a fuel injected '59 Corvette ... how can I top that? Well now I have a basement full of equipment, mostly Collins, things I dreamt about as a kid, but couldn't afford ... and I do have some modern equipment, another SX-42, NC-303 and Viking Valiant. The Corvette is a little too expensive to replace in this day and age ... however, I do have a '91 Mustang GT that I bought new, don't drive in the winter and plan to keep it for a long time. ER

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WANTED: I'm looking for any old Hammarlund literature, i.e. sales catalogs (20s, 30s, 40s) spec sheets i.e. HQ-225, HQ-140XA, HQ-120X, SP-600, SP-400, SP-200, SP-150, SP-110, SP-10, MX-10, Comet Pro versions 1, 2, 3, 4, 5, or any others not listed, also manuals on Comet Pro versions 1 & 5, SP-110, SP-10, MX-10, HX-55, HQ-225; also any of the military MIL-HDBK-161/a 1st, a 2nd, a 3rd, TM-11-896, TM-11-896-A, TM-11-897, TM-11-899, TM-11-4054, TM-11-487, TM-11-487A, A-1, A-2, A-3, TM-11-5820-471-12, TM-11646, TM-11-807, TM-11-851 - series of manuals; also I'd like to find the July-August issue of Signal magazine. I am looking for orig. material only please. I need this info to complete my research. If you have, or know where I can find any of these items, please let me know. Robert Fowle, The Hammarlund Historian, 1215 Winifred, Jackson, MI 49202-1946. Phone/FAX (517) 789-6721. ammarlund@vixta.voyager.net

FOR SALE: 811A (2) - \$15 ea; 805 - \$30; 4-65A (6) - \$15 ea. Joseph R. Forth, WA2TRT, 321 Long Vue Acres, Wheeling, WV 26003. (304) 277-3154 schematic@aol.com

FOR SALE: AC VTVMs HP400, H&D Ballantine 300's operable - \$15 ea; S-38C fair, works - \$20. Norm, W1CIX, POB 402, W. Bridgewater, MA 02379. (508) 583-8349

FOR SALE: Heath DX60 - \$70; HW12.75 mtr rcvr w/HBPS - \$65; rcvr model 1680 - \$95. Norm, W1CIX, POB 402, W. Bridgewater, MA 02379. (508) 583-8349

FOR SALE: Mint Drake 2B, 2BQ, Drake 160 meter converter for 2B, orig. manual. Dusty Rhodes, W8MOW, 1324 N. Dorset Rd., Troy, OH 45373. (513) 339-1546

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8311, Essex, VT 05451. (802) 879-1844, FAX (802) 879-7764

FOR SALE: Clegg Zeus (front panel w/tuning assembly), includes dials & glass, not new, but in VGC - \$60; Hallicrafters SR-400, (front panel), brand new - \$125; Heath VF-1 VFO, exc. - \$80. Craig, WA9HRN, IL, (847) 367-1599.

FOR SALE: Swan 700CX w/117XC (new tubes), exc. condx. - \$375; Swan 500C w/117XC (new tubes), exceptional condx. - \$325; National NCX-5 w/NCXA, partially restored - \$200; RME pre-selector, mint - \$80. **WANTED:** Radiola 26 (tube coverplate); Swan 700CX manual, orig. only. Craig, WA9HRN, IL, (847) 367-1599.

FOR SALE: Collins 75A4, 3 filters, manual, mint - \$795; National HRO-60 spkr, exc. - \$75. Bob Needleman, KD4ZV, 395 Meadowbrook Rd., North Wales, PA 19454. (215) 661-9283

TRADE: HT32, HT32A, parts. **WANTED:** Manual for Barker & Williamson 5100B & SSB unit; Drake repairable rcvrs & xmtrs. W7RBF, AZ, (602) 864-9987.

FOR SALE: ARRL Handbooks: 1937/39 - \$40 ea; several 1950's - \$20; several 1960-70's - \$15. Joe Moraine, 3700 Cliffwood Dr., Bedford, TX 76021. (817) 281-1128

FOR SALE: APN 1 altimeter - \$30; Polycom 6 - \$40; Polycom 6-2 - \$50; Heath 3400 - \$60. Van, W2OOL, 17 Inwood, Center Moriches, NY 11934. (516) 878-1591

FOR SALE: Parting out Communicator III/144; also NIB pwr & audio xfrs for same. JeRB, MI, (616) 382-5401.

FOR SALE: Thousands of tested tubes w/ warranty, send for new list w/improved discounts & monthly specials. Both xmr & rcvr tubes. I have acquired many common tubes recently. Buy those spare tubes for your tube radio, audio, ham & electronics, most tubes are used at about 33% of new, many are about \$1. I have bunches of octal, older, 7 & 9 pin tubes. All tubes are tested on TV-7D tester & then boxed. I give a 30 day warranty. Send wants or SASE w/two stamps for list. Daniel Nelson, 1025 E. Desert Ln., Phoenix, AZ 85040. (602) 243-7421 even. djn@findirect.com

FOR SALE: Homemade galena xtal radios & parts. Write for details. L. Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150. (716) 873-0447

FOR SALE: Ranger - \$200; 20A & VFO - \$95; Viking I - \$160; Zeus - \$800. Bill Schmidt, 9925 S. Broadway, St Louis, MO 63125. (314) 544-1515

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FOR SALE: New Release: Send 2-stamp LSASE for Olde Tyme Radio's latest flyer, No. 196 to: Olde Tyme Radio Company, 2445 Lyttonsville Rd. Ste 317, Silver Spring, MD 20910. Ph/FAX 301-578-5280

FOR SALE: Collins 305-1 winged emb., made in 1968, superb condx. - \$1700, includes 2 spare 4CX1000, one used, the other NIB/manual. Mike, KSFZ, 16707 Creeksouth Rd., Houston, TX 77068. (713) 444-7737

FOR SALE: Mechanical filters: F455J-15 - \$185; F455FA-21 - \$55; LSB for PRC-47 - \$50. **WANTED:** PP-1175/SR. Joseph Pinner, KC5JJD, 201 Ruthwood Dr., Lafayette, LA 70503. (318) 981-7766

FOR SALE: Repair! Radio repair, tube or solid state, reasonable rates. Jim Rupe, AB7DR, Western Amateur Radio Repair Co., (WARRC), POB 697, Grayland, WA 98547. (360) 267-4011

FOR SALE: CQ mags, July 1990 thru Dec 1995 - \$20 complete. Francis Waggoner, W2PTI, 268 Barben Ave., Watertown, NY 13601. (315) 788-1621

FOR SALE: National NC60 - \$50. **WANTED:** Hallicrafters S series rcvrs; HT xmtrs & Tektronics osc. John Adams, 908 E. Southmore, Pasadena, TX 77502. (713) 477-2048

FOR SALE: Heath AMI Classic Radio Log Book, not like any other log - \$6.50. Marty Drift, POB 21, Blawenburg, NJ 08504.

FOR SALE: Valiant, needs work - \$150; Heath HM102 SWR/I'WR/VCC - \$50; Heath SB610 scope, mint - \$125. Clint, KB5ZHT, 107 Forest Oaks Ln., Lake Jackson, TX 77566. (402) 297-3338

FOR SALE: SRR-13, 2-32 MHz - \$150; NC-98, spkr, Q-multiplier - \$200. Ken Kolthoff, KRAXH, 5753 David Pl., Fairfield, OH 45014. (513) 858-2161

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

TRADE: Mint condx No. 19 Mark II, for Canadian made No. 19 Mark III. Ted Bracco, Quincy University, 1800 College Ave., Quincy, IL 62301. (217) 228-5213

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

WANTED: Info on the old Allied Radio in Chicago. I'm researching the company for an article in ER. Need anecdotes, stories, history, etc. Kurt H. Miska, N8WGW, 3488 Wagner Woods Ct., Ann Arbor, MI 48103. (810) 641-0044 wk. FAX (810) 641-1718. 76247,14228@compuserve.com

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

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

WANTED: Manuals for 5G-6 sig gen & S-53, copies OK. Bill Bowers, N7MOB, WA, (206) 839-8591.

WANTED: Collins TCS-12 xmtr, complete, partial or parts. James Owens, NW00, 1363 Tipperary St. RR3, Boulder, CO 80303-1621. (303) 673-9019

WANTED: Any information on Les Logan model 515 "Speed-X" key. Gary Payne, KE6CZ, 5251 N. Fresno #202, Fresno, CA 93710.

WANTED: Johnson VFO 122. Manny Block, W0PKG, 70 Orme Ct., St. Paul, MN 55116. (612) 699-7932

WANTED: Motorola/US Army signal corp radio set AN/TRC-22 or AN/TRC-28; xmtrs T-417/GR, T-416/GR; rcvrs R-257/U, R-394/U; electrical cabinet CY-1221/G; amplifier pwr sply group OA-442/GR; RF amplifier AM-495/GR, AM-494/GR; pwr sply PP-638 A/U. Tim, N3PFC, PA. (717) 323-4055

WANTED: Collins 312A-1 spkr w/light; HRO 500 spkr. Jim Wilson, NU6H, 3540 Carnation Cir., Seal Beach, CA 90740. (310) 430-5164

WANTED: RITTY Magazines & Nov. 1920 Radio News. Tom Kleinschmidt, 506 N. Maple St., Prospect Hts., IL 60070-1321. (847) 255-8128

WANTED: Collins KW-1, 30S-1, KWS-1, WA0AKG, NE, (402) 464-8682.

WANTED: Drake SPR-4 & accessories. Gene Peroni, KA6NNR, POB 58003, Philadelphia, PA 19102. (215) 665-6182

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

WANTED: SP400, EH Scott rcvrs, only in very good condx. Jose Congas, EA4JL. Contact in the States, Kurt Keller, CT, (203) 431-6850.

WANTED: Mics-Shure 5455, 54PE/D, 588, 533VC-Hi/dual Imp., Turner BX/D, CX/D, VT-73, EV641, 638, 619, 605-Hi Imp. Ready buyer. Tom Ellis, Box 140093, Dallas, TX 75214. (214) 328-3225. Fax, 328-4217

WANTED: DXCC certificate stickers, old style translucent ones over 300. Dick George, W0TRF, 15245 Lynn Terrace, Minnetonka, MN 55345.

WANTED: Pwr xfmr for Tempo 2020 or junker w/good xfmr. W7RBF, AZ, (602) 864-9987.

WANTED: Lafayette HE-50 or HE-50A 10M scvr; Lafayette HE-30 rcvr. Bill Smitherman, KD4AF, 9401 Hwy 67, E. Bend, NC 27018. (910) 699-8699

WANTED: Military technical manuals w/respect to space diversity reception; R390/391 or SP600 related. Peter, NY, (212) 725-7163

WANTED: Manuals/schematics for RAL-7 rcvr CND-46156; RBL-2 rcvr CNA-46161. Peter, NY, (212) 725-7163.

WANTED: Mint Viking Valiant II w/SSB adapter, TRbox, orig manuals. Ciano Strachan, POB N4106, Nassau NP, Bahamas.

WANTED: HRO-500TS, mating spkr for HRO-500. Sam, KG9AM, 486 Glenwood Trail, Elgin, IL 60120. (847) 695-0218

WANTED: Meissner signal shifter. Robert Braza, N1PRS, 23 Harvard St., Pawtucket, RI 02860. (401) 723-1603

WANTED: Matching 6DQ6A xmtr for Novice Special from July 1956 (Chambers). Louis D'Antuono, 8802 Ridge Blvd., Brooklyn, NY 11209. (718) 748-9612 after 6 PM.

WANTED: Eddystone general coverage rcvr. James B. Geer, WB5LXZ, 1013 Overhill, Bedford, TX 76022-7206. (817) 540-4331

WANTED: Silk-screening & wrinkle finish cabinet painting for my DX-40 & VF-1. Howard Kraus, K2UD, 372 Callodine Ave., Amherst, NY 14226. (716) 838-2406

WANTED: Mics-Turner BX/CX, BD/CD, VT-73; Astatic JT-30, W80, T-3; EV 605; Shure 707A, 708, 545. Call/FAX if you have others. Tom Ellis, Box 140093, Dallas, TX 75214. (214) 328-3225 FAX-328-4217

WANTED: Gonset model 3201 pwr sply & modulator, Eico model 722 external VFO. John Lewis, WB9NWO, 3526 N. Elmcroft Terr., Peoria, IL 61604. (309) 685-5865

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FOR SALE: Clegg interceptor VHF 55B-CW rcvr - \$200; Swan VFO 210/508 - \$150 ea; xtals Drake-Collins - \$8 ea; CP-1 - \$115. WA1APX/8, MI, ph/ FAX (810) 781-9717.

FOR SALE: KWM2-A, W/E, plug-in relays - \$495; Heath Marauder, PU only - \$125; Gonset GSB100 - \$75. Randy, W9ZR, OH, (614) 965-5331

FOR SALE: PMR-6 rcvr - \$45; TCS xmtr cabinet, w/shocks - \$20; Henry TP-400 DC/DC sply for KWM-2, Swan, etc. - \$40; 25 assorted shock mounts - \$15; BC-221, works, no box/book - \$12; Kilowatt xfms - \$35; xfmr 30V, 50+ amps - \$45; capacitor, 17.0 mFd, 5000 VDC - \$15; metal T-17 mic - \$12; T-32 carbon desk mic - \$25; U-shp. **WANTED:** Manual/copy for Gonset G-66B. WA7HDE, ID, (208) 756-4147 after 1730 MDT.

FOR SALE/TRADE: Gonset Coerr III AM CD 2 meter xcvr, mint w/manual, 3 xtals, canvas carrying bag - \$ offers. Pat Stewart, W7GVC, 1404 Ruth Ave., Walla Walla, WA 99362-3558

FOR SALE: Central Electronics 100V, 600L, Gonset G-50, Panasonic radio PR-1. **WANTED:** PRC-64; Delco 5300; RS-6. Gary, W8MFL, MN, (612) 496-3794.

FOR SALE: AM xmtr, c. late 30's, used for airport tower communications made into ham band xmtr, has 2 100THs for modulator & 4-400 final, works, pwr sply & externals orig. Willing to part out or sell complete. Many interesting parts. PU only! Make offer. **TRADE:** 74A-1 & 32V-2spkr & manuals for a 32S-3 RE or 75A-4. John, AE4EN, NC, (910) 686-4236, before 2 PM.

FOR SALE: Hallicrafters 5X96 - \$100, or trade for Harvey Wells R-9 rcvr; SB scope - \$70. John, KF7OM, POB 3548, Pahrump, NV 89041. (702) 727-8171

Message: Talk to me again at Dayton. Look for the WW II uniform w/Corporal stripes. Sam Hevener, W8KBF "The Signal Corps", 3583 Everett Rd., Richfield, OH 44286-9723. (216) 659-3244

FOR SALE: New 1996, 50 pg. WW II Military Radio Catalog, 100s of items - \$2 US, \$5 Foreign. Sam Hevener, W8KBF, "The Signal Corps", 3583 Everett Rd., Richfield, OH 44286-9723. (216) 659-3244

FOR SALE: New list - hundreds of manuals, schematics and service information. Send 2-stamp LSASE. David Crowell, KA1EDP, 40 Briarwood Rd., North Scituate, RI 02857-2805. (401) 934-1845

FOR SALE: Sparton #136 chassis, 14 tube, 550 kc-24 Mc - \$125; Lafayette HE-80, weak, orig. box - \$60. U-shp. Bob Bakinowski, 1524 St. Tropaz, Tucson, AZ 85713 (520) 624-8029

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

WANTED: McIntosh and Thordarson amplifiers any condx. Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53228-0803. (414) 297-9310

WANTED: Help Vibroplex build its Company collection of Vibroplex bugs, keys and memorabilia. Call Mitch, WA4OSR, at The Vibroplex Co., (800) 478-8873

WANTED: Collins - Amateur catalogs, sales literature, manuals, promotional items & Signals. Richard, KD6CPE, POB 992, El Toro, CA 92630-0992. (714) 855-4689

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

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

WANTED: TMC transmitting mode selector SBE-2, TMC PMO-5 VFO, TMC GPR-92 rcvr. Bill Marvin, KA2VJV, 2 Venice Rd., Patterson, NY 12563. (914) 279-5035

WANTED: Navy xmtrs TBW & TCE & accessories; modulator for TBM type CAY-50065. Steve Finelli, 37 Stonecroft Dr., Easton, PA 18045. (610) 252-8211

WANTED: Cabinet for 75A-3 or junker rig w/ cabinet, operator/main, manual for Hickock scopes CRO-5002 & 5002A. Rudy, W2ZLA, NY. (716) 937-9279 call collect.

WANTED: Orig. manual & stal cal for HR-10, small grey knob for DX-60. Guy, WA6OQQ, CA, (909) 337-8928, evs.



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WANTED: Information from the following WRL catalogs: '37, '38, '39, '46, '47, '48, '50 & '63. If you can help call - Leo Meyerson, W0GFQ, CA, (619) 321-1138.

WANTED: ARC /5 equipment, R25 1.5-3 Mc rcvr, T17, T18 xmtr. Pete Hamersma, WB2JWU, 87 Philip Ave., Elmwood Park, NJ 07407.

WANTED: XCU-303 or XCU-300 stal calibrator for NC-303 rcvr; Heath DF-2 Navigator rcvr; VLF eqpt. Al Kaiser, W2ZVR, 713 Marlowe Rd., Cherry Hill, NJ 08003-1551. (609) 424-5387

WANTED: Two, working, light duty antenna rotators & controllers similar to Alliance Tennarotor. Bob, K6GKU/7, AZ, (602) 816-0660.

WANTED: Need programming instructions for old Regency WHAMMO-TEN scanner. Joseph Mente, KP9RY, 916 Olive Rd., Homewood, IL 60430.

WANTED: Heath SP-620 Panadaptor in good condx., working or not; also additional parts for other IFs w/w-out Panadaptor. Cash or Trade. Dave Sundheimer, W0NBZ, 13020 Lakeview, Burnsville, MN 55337. (612) 890-1844

WANTED: Heath Mohawk rcvr; cabinet for Warrior amp or basket case unit; Collins S 75 rcvr; Swan 117XC or 230XC pwr sply; front panel for DX 100. Gary Reiss, WA0JRM, R11 Box 141, Wilcox, NB 68982.

WANTED: Viking II parts, main tuning knob, stal board, paint source; NC-300 parts, dial, front panel plates. Tom, W3BYM, 13806 Parkland Dr., Rockville, MD 20853. (301) 871-7463

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

WANTED: Coil cover, 8R1 calibrator for 75A2/3, 3253A, 30L-1, 62S1 front panels. Brian Roberts, K9VKY, 3068 Evergreen Rd., Pittsburgh, PA 15237. (412) 931-4646

WANTED: Hallicrafters S-29, S-39 radio. Bill Gustavson, N5YGM, 1819 Green Tree Ln., Duncanville, TX 75137. (214) 939-4510, M-F, 7 AM-5 PM EST or lve messg.

WANTED: HP-13 pwr sply for HW-12, &/or manual in working condx. please. Bill Bogart, KA9CWK, 4146 S. Goff Rd., Hillsboro, IN 47949. (317) 397-3860

WANTED: BC 348 w/AC working; small homebrew CW or AM/CW xmtr or non-completed chassis (6L6, 807); HT 40. Darryl, WA5AAO, Box 335, La Grange, TX 78945. (409) 968-3384

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WANTED: Hammarlund manuals, parts, parts units, from the series Comet, HQ, SP. 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 Firey, WB5HRL, 14818 Delbarton, Houston, TX 77083. (713) 5615-KW1

WANTED: Paying immediate cash for old Fender and VOX guitar amplifiers. Frank Czaja, A1PT, 8968 W. Forest Home #4, Greenfield, WI 53228

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

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: Very good-mint EFJ Ranger II; CQ Magazines - May & Sept., 1945; Hammarlund XC-100P xtal calibrator; 1975 WRTVH. Brian, (800) 225-0256 x 14733.

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

WANTED: Drake 34PNB noise blanker for TR-4C. Doug McArtin, N2QPX, 4 Portland Pl., Yonkers, NY 10703. (914) 968-3560 after 5 PM EST

WANTED: Schematics of Northern mod 550, SBA mod 312B Marine radios. John, POB 905, Grover Beach, CA 93483

WANTED: To buy any lunch boxes & related items. Arthur Fritz, N3SFE, 104 2nd St., Montgomery, PA 17752. (717) 547-2674

WANTED: EL38/6CN6 tubes; Hallicrafters SR46, SR46A. **SELL/TRADE:** UTC'S-18 modulation xfmtr (NIB). Al Bernard, N14Q, POB 690098, Orlando, FL 32869-0098. (407) 351-5536

WANTED: Complete speech amp or just driver xfmtr or complete modulation deck for T-368 TX; Millen or other high quality grid dipper; Johnson KW matchbox w/ or w-out meter; KW low pass filter; info on SSB HF net (time-freq) "Hams For Christ"; nice radio related gift for info. I will pay premium + for aluminum sheet in the following sizes: hard or soft OK; 1 piece 14"x18" & 1/8" to 1/4" thick; 1 to 3 pieces 18"x30" & 1/16" to 1/8" thick. These are minimum sizes, larger OK. If any sheet metal man or shop is reading this, call & I will give exact sizes to shear, collect if you wish. Joe, AB5LL, AR, (501) 257-2567.

WANTED: Collins 5-line filters: F455FA-05 (part #546-9494-00) &/or F455FA-08 (part #546-9446-00). B Lee Cornwell, KD3KD, HCR 1, Box 95, Mt. Pocono, PA 18344. (717) 839-2710

WANTED: 300pF, 600pF, 900pF & 1200pF mica or doorknob capacitors rated 250VDC or more. Joel Steenis, KB7RYU, 4319 E. Vista Dr., Phoenix, AZ 85032. (602) 867-0659

WANTED: Pwr xfmtr Stancor 10P31; 1939 & 1955 ARRL Handbooks, good or better condx. John Zitzelberger, WB6JJE, 1673 Devonshire Ct., Thousand Oaks, CA 91361. (805) 449-1036

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FOR SALE: Lafayette HA-225GC RX w/matching spkr, nice - \$75; Johnson Viking 6-2 meter receive converter, looks good, untested - \$59; BC-348R, modified, complete, unworking - \$35; ID6/APN-4 WW II Loran indicator, good - \$25; FT-220A 3 rcvr command set rack, no shock or fuse covers - \$70; FT-226A xmtr command set rack, black, missing rear cover & 2 connectors - \$50. Don, N3RHT, PA, (412) 234-8819.

FOR SALE: Collins 625-1, 30L-1 & KWM-2 w/mobile mount & pwr sply. Will be at Dayton. Larry, N9HRQ, IL, (847) 658-7328.

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FOR SALE: Heathkits: DC pwr sply HP-23B - \$50; VTVM IM-11 - \$20; capacitor checker IT-28 - \$30. Frank, W8SET, 1 Wildacre Rd., Charleston, WV 25314. (304) 343-0415

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WANTED: R808 rcvrs p/o GRC14 w/mounts & racks, inop/dmgd considered. Wes, 84 Oaklawn Dr., Metairie, LA 70005. (504) 834-4584

WANTED: PE97, PE117 or PE120 for display, guffed or damaged considered. Wes, 84 Oaklawn Dr., Metairie, LA 70005. (504) 834-4584

WANTED: Globe King 500C 7H @300 mA filter choke, AB6MM, 1122 Via La Cuesta, Escondido, CA 92029. (619) 739-1835

WANTED: HT-44 w/ps, Collins 312B5, B&W 515B-Bsideband adapter, Hallicrafters R46 spkr, Collins spkr. Bob Kemp, POB 470, Lake City, MN 55041. (612) 345-5345 days

WANTED: (2) 40MEL, 400E5, 40BLV coils for WRL-175A. Donald L. Hillard, 8630 Nighthawk Rd., Neosho, MO 64850. (417) 451-5892

WANTED: KWM/HF 380, 451S-1, AC-3814. Koji Mitoshi, 456-33, Kamumobara, Mobara-city, Chiba 297, Japan. Tel/FAX: 011-81475-24-9115

WANTED: Manual, users guide schematic, Allied Knight KE687 sweeper; Squires Sanders SS1B5. Weber, 4845 W. 107th St., Oak Lawn, IL 60453.

WANTED: Viking 122 VFO in good condx., pwr sply for Invader 2000. Ed, K0BKA, 514 8th St. NE, Waseca, MN 56093. (507) 835-3665

WANTED: Reward for National SW-4, has 4 tubes but only one set of coils. Robert Enemark, POB 1607, Duxbury, MA 02331. (617) 934-5043

WANTED: Old tube amps, spkrs & xfmrs by Western Electric, Altec. Have Hallicrafters SX9 w/ cabinet to trade. Mike Somers, 2432 W. Fargo, Chicago, IL 60645. (312) 338-0153

WANTED: RCA AVR5A, AR60, Western Electric, or equipment marked Civil Aeronautics or any airline. James Treherne, 11909 Chapel Rd., Clifton, VA 22024. (703) 830-6272

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