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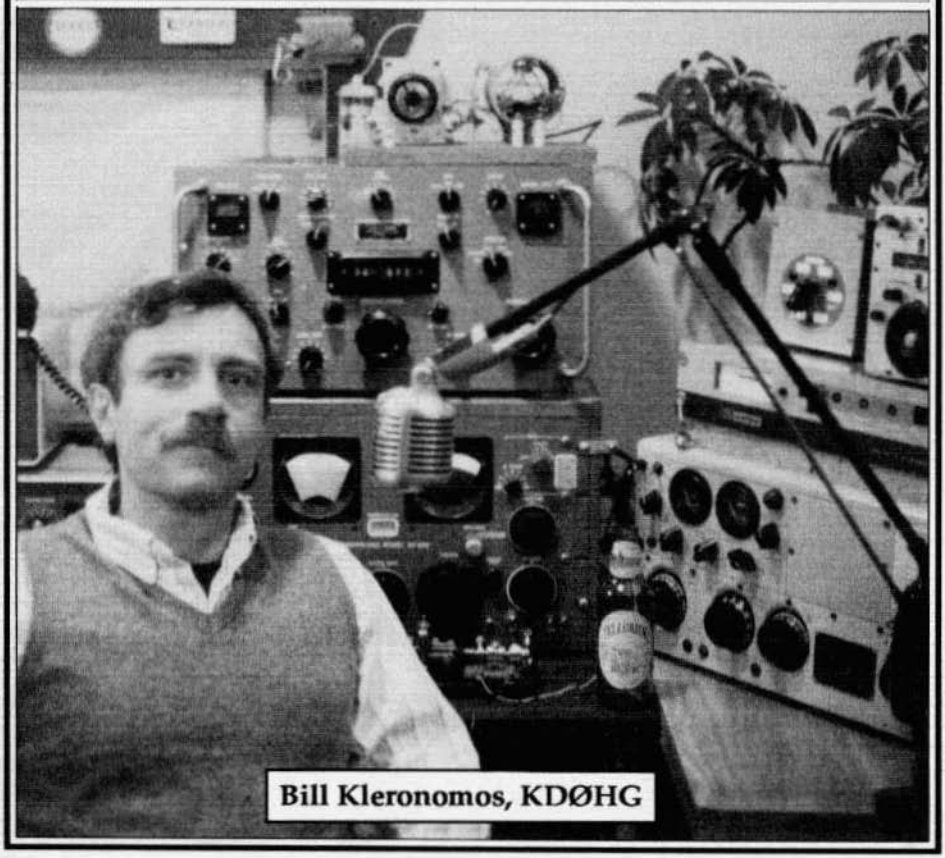
ELECTRIC RADIO

celebrating a bygone era

Number 37 May 1992



Bill Kleronomos, KDØHG

ELECTRIC RADIO

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WALT HUTCHENS,KJ4KV.....ELECTRIC RADIO IN UNIFORM
FRED HUNTLEY,W6RNC.....REFLECTIONS DOWN THE FEED-LINE
BILL KLERONOMOS, KDØHG.....VINTAGE PRODUCT REVIEWS
DALE GAGNON, KW1I..... AM REGULATION UPDATES

Electric Radio is published for amateur radio operators and others who appreciate the older tube type equipment. It is hoped that the magazine will stimulate the collecting of, and interest in, this type of equipment.The magazine will provide information regarding the modification,repair and building of equipment. We will also work to-wards a greater understanding of amplitude modulation and the problems this mode faces.

Electric Radio Solicits Material

We are constantly searching for good material for the magazine. We want articles on almost anything that pertains to the older amateur equipment or AM operation. From time to time we will also have articles and stories relevant to the CW operator and the SWL. Good photo's of ham shacks, home-brew equipment and AM operators (preferably in front of their equipment) are always needed. We also welcome suggestions for stories or information on unusual equipment. For additional information please write us or give us a call.

EDITOR'S COMMENTS Barry Wiseman, N6CSW/Ø

Last week I called Leo Meyerson, WØGFQ, out in Omaha, Nebraska, looking for information I needed for an ER article. In the course of our conversation I asked him about his Amateur Radio display at the Western Heritage Museum. How is it coming along?

Leo said that he is putting all his energy into the project. In fact, that day he said he had been all over Omaha looking for display cabinets. This summer while he's out there (he and his wife spend their winters in California) he says he's going to be working full-time getting the display together. (Don't we wish we could all be so energetic and dedicated when we get to be Leo's age - 81.) The gear is coming in he said, but very much more is needed.

He says he would like hams to consider that the Amateur Radio display at Western Heritage is theirs. He's trying to come up with a slogan, something like "the Museum that Hams built", something similar to the slogan he used in advertising for World Radio.

I'm behind Leo 100% and I think that all AM/Vintage operators should be too. This is the only museum of its kind in the country. There are other radio museums but none dedicated to vintage amateur radio equipment. This will be a place where amateurs can go to see what "real radio" was all about.

If you have a piece of vintage gear or old catalogs or magazines or tubes or whatever that you think might be of use to Leo, give him a call - (402) 392-1708. All gifts are tax deductible and a permanent record (on plaques) of all donations will be kept.

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Reflections Down the Feedline

by Fred Huntley, W6RNC
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Nevada City, CA 95959

Beyond the KW-1

Although the Collins KW-1 is considered the ultimate AM amateur transmitter and only 150 of them were made, there are still opportunities for acquiring equally impressive looking and sounding radio equipment.

Out here in the West, there is a definite trend involving a growing number of ex-commercial AM broadcast transmitters and king-size military transmitters showing up in amateur AM operation. Most of these transmitters are 'super' boat anchors, weighing around 1,000-3,000 pounds. They are a challenge to transport into the hamshack; requiring the skill and stamina of furniture movers.

But, all the effort involved is well worth it. These giant transmitters look great, sound great, and are a lot of fun to operate. In addition they are a good conversation piece.

Out here, the movement started on 160 meters. W6RBZ was one of the first when he put a Collins ex-broadcast rig on 1885 kcs. several years ago. Recently, his friend, WB6EWE, switched from a Globe King 500 to a Gates ex-BC transmitter. His audio is truly comparable to the best commercial AM stations in the Los Angeles area. Lately, these ex-BC transmitters are starting to show up on 75 meters in a small way.

Ex-BC transmitters are where you find them. Some hams have travelled long distances to bring them home. W6PSS drove from San Diego to Nebraska to pick up his Collins model.

Usually, an acquaintance with a working AM broadcast engineer is a good source of information on available surplus commercial AM rigs. It also can't hurt if you inquire of your local AM station manager whether he has anything for sale or disposal. Of course, other hams are a possible source because there occasionally is some fellow with a BC transmitter stashed away who might be susceptible to being talked into selling it.

Some months ago while listening around on 20 meters, one Sunday afternoon, I came across a SSB net of active broadcast engineers. I could't help thinking that the amateur AM community should make a connection with this group. This should be a good source of information regarding transmitters that might be available. Similarly, we should also be plugged into the National Association of Broadcasters for the same information. There is ample precedent for this and we are dropping the ball by not following up on it.

In the heyday of radioteletype there was a very good connection between RTTY hams and the telephone company. AT&T companies (including Teletype Corp.) made much obsolete teletype equipment available to radio hams. It was a widespread procedure, with two-way benefits.

In any event, ham AM activity with transmitters of all types from a Ranger on up, is doing well on 75 meters and 160 meters too. New stations are still arriving on the AM scene and the activity graph curve is definitely still going upward. ER

Les Babcock, W1FAT, 1915-1992

This April, Les, W1FAT, passed away after a short illness. Les had lived in Palermo, Maine, for many years. He was born in Brooklyn and was trained at the RCA Institute in New York City. He was first licensed in New Jersey in 1928 as W2EGM. Les was always involved in electronics. He was one of the first persons to install radar systems on the west coast at the start of WW II. He used to tell about driving up and down the coast in a big Cadillac working on these systems.

He married his wife, Doris, in 1941. After Doris passed on 4 years ago, Les cleared a lot on his tree farm and installed a brand-new trailer and outbuilding. He had a station in the trailer but his real installation was in the outbuilding; including a large W1FAT sign on the roof. Les had just about every kind of AM rig on his bench over the years. He was a skilled technician. He modified them all for high quality audio. Several years ago he acquired a commercial HF kilowatt which he restored and modified. It became the center-piece of his station.

Les was very active on the air, he was a friend to all. Many referred to him affectionately as "Old Buzzard Les" because of the crusty old yankee act he would put on. His passing marks the loss of a link to the earlier days of radio. Old-timers like Les cannot be replaced.

Les was active in senior citizen organizations and in his church. He was a devoted Christian and often used the phonetics, "Faith Always Triumphs" when signing his call. He had high standards for conduct on the air and he had a nice way of encouraging people to embrace those standards.

A SWL in Pennsylvania wrote the family after Les's passing to extend his sympathies and to note that listening to Les had prompted him to study for his license. He had his code speed up to ten wpm and expected to take a general license exam soon. He admired Les's values and personality and wrote in his letter something all of us who knew Les can agree with even though he's no longer here in person, "His spirit and thoughts have been passed on to many of us out here in radioland".

Dale Gagnon, KW1I

ELECTRIC RADIO IN UNIFORM

by Walt Hutchens, KJ4KV
3123 N. Military Rd.
Arlington, VA 22207

"The PRT-4 and PRR-9"

Part 2

The PRT-4 and PRR-9

With the decision to give most users only a receiver, the transceiver turned into a separate receiver and transmitter.

Since each was smaller than the combined unit (and construction methods had continued to improve) the problems of use with a standard helmet could now be solved: the receiver would clip to the lower outside edge of the helmet and the transmitter could be put in a pocket or attached to a suspender where it would be handy when needed.

In 1961 a proposed description of the military requirements for the radios (called a 'Qualitative Military Requirement' or QMR for short) was worked out. The new sets were to have a 500 meter range working with each other (one mile with the PRC-25), a total weight of one pound, a battery life of 24 hours and be in production by 1964. It seemed that modified commercial equipment might meet these requirements and since cost was very important the laboratory began discussions with various companies making small civilian radios.

Then – the proposed QMR was revised. As finally approved (May 1962), the set to set range was increased from 500 yards to one mile and the battery life increased from 24 hours to 72 hours.

'Low cost' had dropped to seventh place on the priority list. The new requirements (particularly range) were well beyond what could be expected of commercial gear so the laboratory dropped that approach and started a development program.

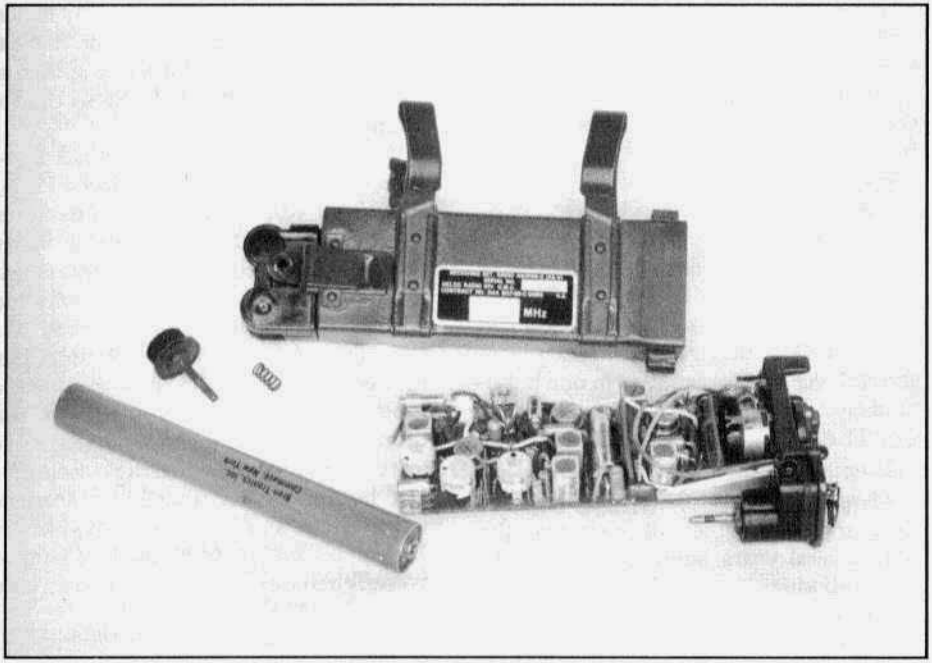
The new radios went through several prototypes as the labs struggled with the conflicting requirements – long range and battery life versus light weight, sturdy, small but effective antennas and so on. One critical decision was that to save weight the transmitter battery would have a cardboard case and be mounted in an open frame on the bottom of the set.

In August 1962, a contract was placed with the Delco Division of General Motors for 66 receivers, 41 transmitters, various test gear and channel crystal sets. These were delivered in April, 1964 and were sent out for tests and evaluations – among others, the Quartermaster Corps tested the sets for use with various types of clothing. Subsequently 50 more sets were ordered and sent to Vietnam where early results were good; follow-on orders raised the total to 5,000 and then eventually to 25,000.

The PRT-4 and PRR-9 In Vietnam

Here (with some editing) is Mr. Curtis' 1976 summary of what happened when these sets went to war:

"Yet, though initial reaction to the set had been good, its use in full-scale operations in Vietnam proved disappointing. In the dense humid jungles of Southeast Asia, the range of the PRC-77 (the fully transistorized version of the PRC-25 then entering service) was reduced to a few hundred yards and that of the squad radio to a few hundred feet. In addition, other problems arose.



PRR-9 Receiver disassembled. Case at rear is upside down; projections are helmet clips. Receiver chassis would be flipped over to insert in case. Battery pushes onto plug at near right corner of receiver chassis and is held by clip behind left helmet clip.

"One lay with the difficulty in properly aligning the equipment when channels were changed in the field. Another with the (transmitter) battery which disintegrated because, to save weight, it had purposely been left unprotected. And still another when operators, contrary to the equipment's capabilities, tried to obtain full range from receivers not mounted on helmets.

"All these difficulties served once again to revive the controversy over whether the helmet radio should be a single unit or a two-part affair. One conclusion reached at this time was that the Army had no need to provide individual members of squads with radio receivers. Still another was that under the harsh necessities of war and because the required quantities of sets had been drastically reduced from 250,000 to 30-40,000 units, extreme low cost in producing the equipment was no longer a primary objective.

"One had the impression at this time that many of the faults ascribed by users to the radio were really disguised dislike of the two-piece design of the equipment and the peculiarities of small radio operation. This dislike took the form of finding fault with the equipment and expressed itself in a vague desire to want something 'different'.

"The final chapter of the squad radio is yet to be written. Several thousand sets languish in depots unissued, with the Army finding it difficult to devise requirements for a modified or new squad radio which will satisfy users. As presently designed, the squad radio costs $107 for the receiver and $139 for the transmitter.

"The Marine Corps counterpart to the squad radio is the PRC-68, a one-piece (synthesized) radio having a much shorter range (one-third to one-half mile) at an estimated production cost of $1400. In

continued next page

ER in Uniform from previous page
addition to having less range, its battery costs four to ten times that of the Army's radio.

"In an attempt to satisfy users and meet the current requirements for small unit transceivers, the Army is considering using several foreign radios. Some other sets are also being considered. One is a version of the PRC-68 or a version of it that can be modified at low cost. Another is a repackaged version of the squad radio (the PRC-88, consisting of one PRR-9 and one PRT-4), a configuration that places the receiver and transmitter in one hand-held case."

On The Air With The PRT-4 Transmitter and PRR-9 Receiver

My transmitters came from various fleamarkets and other collectors over the past several years, some in good condition and others 'for parts'. The PRR-9(XE-9) receiver was bought 'unused' from Fair Radio Sales. I found a like-new BA-399 and a dead BA-505 at a fleamarket; replacing the insides of the -505 with 'N' cells and a midget phone jack produced a homebrew BA-4534.

The receiver came with a crystal for 51 Mcs; I got a transmitter crystal for the same channel from Crystek. And – it worked, with fine audio and good sensitivity. The only glitch is the receiver squelch, which will not unlock no matter how strong the signal – maybe this 'unused' set was dumped by the Army for a good reason?

I will take my PRR-9 and PRT-4 to the various hamfests this season; military FM nuts should look for KJ4KV on 51.0 Mcs.

Conclusions

The one outstanding feature of this equipment is the loudspeaker. It weighs only 1.1 ounces, is made of molded polyethelene and would be almost indestructible in normal service. Here – after decades of fragile civilian-type loudspeakers in olive drab metal boxes which give up after the first light rain or loud bang – here is a speaker which can take it, costs little, and doesn't add another few pounds to the radioman's load. With only minor modification this speaker would make a very useful accessory for many other late radios, either mounted on the set or as a helmet clip-on.

Also noteworthy is the compact lightweight design of these sets; for the 1960's, this is 'A+' work. The electronic design is clean, efficient and not too complex. When you hear the crisp, clear audio these radios produce it makes you wonder why we waited so long to abandon the carbon mic.

From there, it is rapidly downhill. The tiny coil spring on the receiver antenna mount falls out when you remove the thumbscrew to replace the antenna; if it is lost the new antenna will dangle uselessly. The bottom of the transmitter antenna will give you an RF burn that feels like the sting of a small wasp on the first joint of your right index finger if the antenna isn't pulled up all the way.

The condensed operating instructions inside the front cover of the PRR-9 manual say near the bottom of the page, "Receiver may be worn on combat suspenders or clipped to a pocket or belt if maximum range is not required". Why could they not say, "You can use the receiver off your helmet BUT YOU WILL ONLY BE ABLE TO HEAR TRANSMITTERS WHICH ARE NEAR YOU"? I don't think a designer should count on most infantry squad members seeing a technical manual so this and other key points from the instructions should have been printed on the sets.

When clipped to the uniform the receiver is attached with a 15" braided nylon lanyard so it won't be lost if it is knocked off. Had this been braided steel aircraft cable, I bet the range would have been greatly improved. Considering the problems with range and antenna breakage, I wonder if a continuously loaded flexible transmitter antenna (a "rubber ducky") was tried? The second time you do it, you will take the receiver away from your ear before you turn off the squelch by turning up the volume to max.

Radios for field use should be able to take being under a few feet of water for ten minutes or so; although the body of the set is carefully sealed, the PRT-4 and PRR-9 will get water in the antenna loading coils and be effectively dead in anything worse than a light rain. I can't help wondering if condensation in this area isn't part of the reason these sets did so badly in Vietnam.

It is inexcusable for the Signal Corps Lab to have ignored the lessons of WW II concerning the useful life of waxed cardboard in tropical jungle (maybe two days if it doesn't rain the first day) and left the transmitter battery unprotected. Ditto the short range of low-power radios in such condition.

I don't think batteries that fall apart or unexpected short range should be called "disguised dislike of two piece design" or a "vague desire to want something different". It is true that when there are specific problems, equipment users may have broad doubts but the answer is to fix the problems, not to blame the users.

Moreover, general misunderstanding about the use of equipment is never the fault of the user, it is caused by poor documentation and training -- both of which should be developed with the equipment.

As combat radios these sets deserve a "Turkey With Trimmings" award, but there isn't enough turkey in a whole Thanksgiving to do them justice.

One must be sympathetic to the spot the Signal Corps Lab was in, trying to hit a rapidly moving target as the Vietnam War raised the pressure. At the same time, it is not clear why a military lab is needed if it does not solve the problems particular to military equipment (use by untrained operators, channel changing in the field) and remember and apply the lessons of military history (the problems of radios in the jungle).

Mr. Curtis' story ends in 1976. SINCGARS (Single Channel Ground Air Radio System, the replacement system for the VRC-12, PRC-77, and all other field FM gear) was already on the drawing boards; its frequency hopping capability was expected to make a fully compatible handheld set impossible for some time. A PRC-68 being thrown into a HUMVEE was one of the few radios we saw in the Gulf War TV coverage. More than thirty years after hardware testing began it is my impression that we have neither a usable squad radio nor good data saying such radios aren't needed. **ER**

Ward Becht, W6IRK....Silent Key

It is with deep sadness that I must report the passing of Ward Becht in Burbank, California. Ward, whose many ads were seen in Electric Radio, was responsible for promoting AM operation and the use of big, old and classic amateur radio gear of the golden age of ham radio. He was first licensed in the early 1930's.

He rekindled my long-lost interest in amateur radio by introducing me to Electric Radio and its friendly family of authors, sellers and readers. I have restored my 1958 station thanks to Ward and ER.

Ward is survived by a wonderful and understanding wife who assisted many of us when Ward was hospitalized. He didn't let his illness stop him as he was involved in restoring a SX-42 up until the last days. He wanted to keep busy in the hobby he loved.

He will be missed by many of us. He leaves many footsteps for us to follow.
Donald A. Jeffrey

The RME-69

by Jim Hanlon, W8KGI
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Sandia Park, NM 87047

Paraphrasing Raymond Moore's report on RME in his wonderful book, Communications Receivers, the Vacuum Tube Era, this is some of the story of Radio Manufacturing Engineers of Peoria, Illinois.

RME was a small, sharply focused company started in 1931/2 by E.G. Shalkhauser, W9CI, and Russ M. Planck, W9RGH. Their first receiver, the RME-9, designed in 1932 and introduced in December 1933, was perhaps the first, modern communications receiver. With its directly calibrated "airplane dial," bandswitching over five ranges covering .55 to 22 Mhz, a "R meter," a stage of RF preselection, an IF crystal filter and AVC, it set the standard for most of the communications receivers built well into the post World-War II period. Only about 100 RME-9's were built, and those were made in W9CI's cellar. The '9 was redesigned to the '9D in 1934, adding a second dial for electrical bandspread and an antenna trimmer.

RME's most popular receiver, the RME-69, was introduced in November 1935 and built through 1940. The '69 followed the '9 and '9D with the same basic electrical and mechanical layout, but it added a sixth, high frequency tuning band to increase its coverage to 32 mHz, and the round "airplane dials" were replaced with more modern-looking, 180 degree, half-circle dials. Six-volt, six-pin glass tubes of the 6C6, 6D6, 6B7, 42 variety replaced the earlier 2 1/2 volt tubes used in the '9 and '9D. Overall, 6500 RME-69's were made.

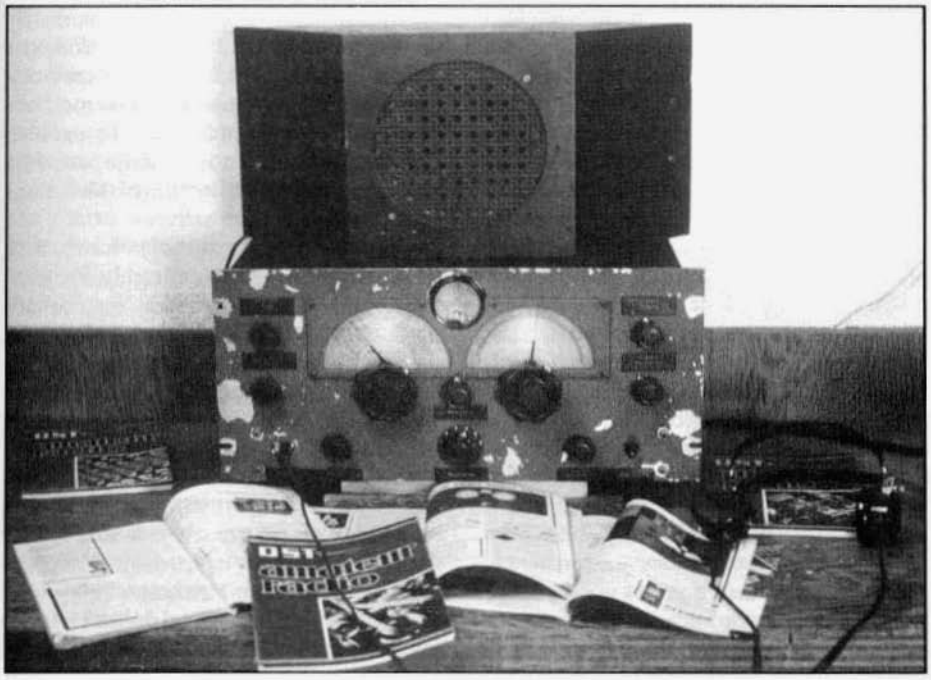
The '69 was joined by the RME-70 in 1938, which added a standard noise limiter, an optional extra on the '69 and which used metal octal tubes, The '70 also added labels on its controls, a feature strangely missing on the '69 - more about this later. And the RME-9 line went on through the '41, '43, and '99 to the RME-45 and '50 which I remembered in the early 50's as very popular receivers among the 75 meter AM phone operators.

RME was not a big success after the war. It merged with Electro-Voice in 1953, with Planck staying on to supervise the 4300, 4350, 6900 and 6902 receivers. In 1962, G.C. Electronics purchased RME, but the RME name disappeared within a year.

My personal acquaintance with RME began in August, 1979 when I answered an ad in a Columbus, Ohio, newspaper for a Hallicrafters Sky Buddy and an RME-69. The Sky Buddy was gone by the time I called, but the '69 was still there... waiting for me.

This particular RME-69 is serial number HA4, and it received its final manufacturing test on 2-27-40. So it is one of the last of the breed. As I found out later, following up on an Ohio State University inventory tag which it wears, it was purchased for use in the Electrical Engineering student laboratories as a "bridge detector" receiver, probably by Professor Bob Higgy, W8IB. Professor Jim Gilfert junked it when he bought a bunch of HRO 50's and 60's for the department in the early 1950's. Professor Dean Davis salvaged it and gave it to his father-in-law. Both Jim and Dean were hams, of course. After his father-in-law died, Dean sold the '69 to the person in Delaware, Ohio, who in turn sold it to me. Thus I became the fourth satisfied owner of this fine, vintage radio,

According to my notes on the cover of the manual copy obtained from HI, the '69



RME-69 with 'genuine' RME speaker

responded favorably to alignment in September of 1979 and went to work in my then growing vintage collection ham shack. I didn't revisit its insides again until 13 months later when I was looking for the source of an annoying amount of hum that was particularly apparent on 10 and 15 meters CW. Swapping out 6D6 local oscillator tubes made some improvement; but the hum persisted, so I thought I'd better check out the power supply filter.

The RME-69 manual has no picture or diagram of the under-chassis area. The upper chassis picture gave no hint of where the filter condensers might be, and I was having trouble finding them. It finally became apparent that my trouble was because they were not there! There was one area under the chassis near the 80 rectifier tube where the wires were dressed to clear a missing cylindrical component. I had been operating the receiver quite satisfactorily on 80 and 40 CW for more than a year without power supply filter capacitors! Needless to say, the addition of a tubular electrolytic did clear up the rest of my hum problem on 15 and 10.

Another peculiarity about the RME-69 is that its ten control knobs and one toggle switch have no labels! A casual observer can guess that the two large knobs under the main tuning and bandspread dials are the tuning controls and that the knob in the middle with the dial ring numbered 1 to 6 must be the bandswitch. But the identity and function of the remaining controls was a secret known only to the 6500 initiated user/owners of an RME-69. Imagine how a visitor to an RME-equipped shack felt to see the operator casually adjusting first one knob and then another with no idea of what they were or did! My '69, having started its life in service to a generation of largely non-amateur Electrical Engineering students, is fitted out with a set of neatly engraved Bakelite labels,as you can see from its picture. They are handsome and functional, but they do take some of the "mystery" out of its operation.

continued next page

By the way, if you have the feeling that you may have seen an RME-69 before, you are probably right. It is a movie star and not in some B-grade science fiction film from the fifties either! If you remember in Coal Miner's Daughter when Dooley and Loretta went to visit the DJ/Engineer of a country AM broadcast station, there was an RME-69 in the rack of equipment in the station's control room.

Another enjoyable feature of the RME-69 is its manual. Most receiver manuals, even from the pre-war era, are matter-of-fact technical treatises covering how to operate it and how to align it, with a schematic, a parts list and a pictorial diagram. The '69 manual is different. Most of it is in the form of a running commentary on how a superhet is designed and works and how to adjust it for best performance. It would have made a pretty good part of a chapter on communications receivers in a Handbook in its day. It also gets a little "salty" in some of its comments, as this quote from its introduction illustrates.

"The material and information compiled in the following pages has been gotten together for the purpose of providing the user of an RME-69 Receiver with the maximum receiver performance, and for the purpose of informing him as to some of the whys and wherefores regarding the care and operation of his receiver. The information contained herein will be found to be useful and should be read through thoroughly in order to avoid misunderstanding and incorrect procedure insofar as the operation of the receiver is concerned.

"It embodies the results of several years of observation which has been made in a great number of varied installations and a number of the points which have been emphasized are those which are most frequently the source of some misunderstanding. Although it is usually rather boring to carefully peruse printed matter of this type, it will be found in all cases to pay dividends where the instructions and the information contained herein have been thoroughly digested. Approximately seventy-five percent of all the difficulties which have been called to our attention regarding the operation of these receivers can be directly traced, not to the receiver, but to misunderstanding on the part of the user as to the exact function of the various components of the receiver.

"This is a direct result of failure to read the instruction book thoroughly. We hope that you will be rewarded by your conscientious following of the instructions given in this book and also that you will find adequate information for the proper procedure in making minor adjustments should such be necessary."

Now how's that for diplomacy?

One other interesting point of the manual, at least my copy, is that it contains no alignment instructions! All of the normal padders and trimmers are there to do the job, but the manual doesn't tell you what to do with them. This fact, along with the lack of control labels, suggested to me a certain "attitude" about the maker of the RME-69 which I was luckily able to investigate further at the Dayton Hamvention in 1981.

It was a sunny, Saturday afternoon at the Hamvention that year, and I was a little tired after my double round of the flea market plus fighting the crowds inside the arena. I retreated out to the area beyond the loading dock on the far east side of the building and sat down for a little rest on the hillside in some shade. There were a couple of "old codgers" having an "eyeball QSO" there, and I soon joined them.

To my utter surprise and delight, one of them was "Shaw" Shalkhauser, W9CI, the founder of RME!

Shaw turned out to be very sure of himself, a person with definite, strong opinions, just as I had come to expect from observing his work. There were no labels on the RME-69 controls, he told me, because any user worth his salt would soon learn what they were and how to operate them, and thus he should not need them.

Likewise, someone who did not already know how to align a superhet had no business messing with the internal adjustments of his RME-69; and anyone who did know what he was doing had no need of instructions.

We laughed together about the tone of the Instruction Manual. As Shaw related later in a letter bringing me his "Eyeball QSO QSL," posted with three of the 5-cent Amateur Radio Stamps, "Most of the manuals in the early RME days were composed right on my desk with the assistance of the engineers supplying the lab data as necessary. Hams were very particular about the inner workings of equipment back in the tube days. We answered many more questions direct from the factory than is done today. As you can see, it was possible to make your own repairs in the equipment after checking the manual. This is hardly possible with our modern units unless one wishes to tackle it." Shaw's letter is typed using what may well be the same typewriter he used for the RME-69 manual. His stationary announces that he is a Fellow of the Radio Club of America and that he is QCWA life member number 8873. His QSL says, "Hooked-Branded Inoculated since 1912," and lists his calls as "1915, MLA; 1916, 9AHO; 1920, 9XAF; 1921 9YAN; 1922, W9CSZ; 1952, W9CI."

I treasure Shaw's letter and QSL only slightly less than that personal meeting as one of the best experiences I have had as a collector of vintage amateur radios.

Before I finish this tale, I need to give you a report on how well the RME-69 performs. Overall, the RME-69 is one of the better pre-war receivers in my shack. Its drift is minimal, 6 kHz in the first hour after turn-on on 40 meters, with 3.3 kHz of that in the first 15 minutes. Its 40 to 1 vernier tuning dials operate smoothly. Mechanical stability, even after 50 plus years, is quite good. External vibrations have no effect, and the electrical tuning is just as smooth as the mechanical vernier drives. Even though Raymond Moore groups RME with Hallicrafters as building receivers from commercially available, broadcast receiver parts, the RME-69 is much more stable and well designed mechanically than several of my Hallicrafters receivers from the same era. The main tuning dial is calibrated every 100 khz on the 3.1 to 6.8 range and every Mhz on the 20 to 32 Mhz range. 160 meters spans 161 degrees or 18 turns on the bandspread dial, 80 meters 235 degrees or 26 turns, 40 meters 108 degrees or 12 turns, 20 meters 81 degrees or 9 turns, 15 meters 60 degrees or 6 1/2 turns, and 10 meters 80 degrees or 9 turns. On every band except 15 meters, that's better bandspread than on my HRO!

The two-gang antenna trimmer or "resonator" control peaks both the RF preselector and the mixer stage. One can hear "antenna noise" up to 20 meters, but not on 15, a good practical test of the sensitivity of any receiver, which shows that the RME-69 can hear any signal not buried in atmospheric noise up to that frequency. This is fairly typical of 1 RF, single conversion superhets. Images are not a problem on 20 meters and below. The image on 20 is down 55 dB. On 10, however, it is down only 20 dB, but the local oscillator is on the high frequency side, so images come from the higher end of the band, which ordinarily is not so heavily populated. These readings were obtained using the signal strength meter which is "calibrated in RME 'R' units." According to the manual, each R unit is 6 dB, R 0 corresponds to a 0.4 microvolt input signal, R 9 to a 100 microvolt signal, and full scale is 78 dB above R 0. RME's definition of a 6 dB R or S unit may or may not have been original to them, but it became pretty much a standard for all receiver manufacturers from this time on.

The RME-69's crystal filter is good but not great. It has variable selectivity and the usual phasing notch, but there is more stray coupling around it than there is in my HRO or SX-28. So the ultimate rejection off peak is not as great. I mentioned this to Shaw, and he essentially told me

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Broadcast Transmitters On The Ham Bands

by Rod Sheffer, WA7AMI
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Part two

In the first article I described a typical broadcast transmitter; this time I'll get into some specific transmitters. I'll also include some information on finding broadcast transmitters and converting them to ham band operation.

Over the last 60 years, many well known companies have produced broadcast transmitters. Most of the companies however, are now out of business. But their transmitters live on!

COLLINS

Collins Radio company produced broadcast transmitters from the early 1930's to around 1980. The broadcast division of Collins was purchased by Continental Electronics. Continental continues to produce Collins transmitters in addition to their own. Collins transmitters of interest are the 20K, 20T, 20V, 20V-2, & 20V-3. These are 1 KW transmitters dating from the late 1930's to about 1970. The 20K & 20T models use 833A tubes as RF amplifiers and modulators. The 20V series use 4-400A tubes as modulators and RF amplifiers.

There are lower power models such as the 550 series (500 watts) using 4-250A's and the 300 series (250 watts) using 4-125A's. The lower power transmitters were built in the same cabinet as the 1 KW units and look identical. These transmitters are well made and look down right good. They have a "viewing" front window with lots of chrome trim, especially on the 20V series.

GATES

Gates Radio company was first established in 1922 and has produced broadcast equipment as long as or longer than any other manufacturer. Gates Radio was purchased by the Harris-Intertype Corp. in the late 1950's. The name Gates Radio Company was changed to Harris Corp. in the early 1970's. Harris is still producing broadcast equipment.

Gates transmitters of interest are the BC-1 series. These are 1-KW transmitters that were made over a 40-year period ending in the mid 1970's. These units all have one thing in common - 833A - tubes two as RF amplifiers and two as modulators. Models to look for are BC1-E, BC1-F, BC1-J, BC1-T, BC1-G and BC1-H. (Suffix letters not in sequence). Early transmitters such as BC1-E & F are "double wide" cabinet construction while later transmitters are in a single cabinet. Lower power Gates transmitters were designated as follows: BC-500GY, BC-500K, BC-500 T, BC-500 G and BC-500H. These are 500 watt models that have a single 833A tube as an RF amplifier. Modulators are 810's in the early transmitters like the BC-500GY and 833A's in the later units.

BC-250 GY, BC-250L, BC-250 T, and BC-250GY-1 are 250 watt transmitters that have 810's, two as RF amplifiers and two as modulators. Lower power transmitters are similar in size to the 1-KW models.

The BC-1 J,T,G, &H are well made "single cabinet" transmitters with front viewing window. The later manufactured units, both 1-KW and lower power, are more plain looking. My favorite is the BC1-T as this model was the first transmitter I got the opportunity to work on.

RCA

RCA produced broadcast equipment starting in the 1920's and continued until late 1970's when the company was split up and broadcasting equipment sales were discontinued.

RCA transmitters of interest are the BTA-1 series, which are 1KW models. These include the BTA-1L, BTA-1 M, BTA-1MX, BTA-1R, BTA-1R1, and

BTA-1R2. The BTA-1L and M transmitters use two 833A tubes as RF amplifiers and two as modulators while the BTA-1R series use 4-400A tubes. The BTA-1L has two cabinets with a connecting section. The later transmitters were built in one cabinet.

Lower power RCA transmitters include the BTA-500M, BTA-500MX,and BTA-500R. These are 500-watt models. The BTA-500M series have one 833A in the RF amplifier while the BTA-500R has 4-250A's instead of 4-400A's.

RCA 250-watt transmitters include the BTA-250L and BTA-250M. The BTA-250L has 810's for RF amplifiers and 828's for modulators. The BTA-250M used 813's for RF amplifiers and modulators. Of interest is that a BTA-250L could be field upgraded to a BTA-1L with the addition of a 1KW amplifier/modulator cabinet and the connecting section. The BTA-1M and R series are "window" type transmitters that are very well made and have that look! Both the BTA-250L and M are also impressive looking transmitters as are the BTA-500 series. RCA was known for "over design",especially in the modulator. Many of the 1-KW models mentioned are still in service and sound excellent. Here, we are pulling a BTA-1M out of service as a "back up" and I hope to "swing" a deal for it.

WESTERN ELECTRIC

Western Electric company got into the radio broadcast business in the 1920's as the other companies did. They produced early transmitters with water cooled tubes and tried some interesting designs like the "Doherty" RF amplifier. A Doherty amplifier is an AM linear amplifier with an efficiency of over 60%! A modified version of this amplifier is used in a currently produced 50-KW AM transmitter. The Western Electric Company was forced out of the broadcast equipment business in the late 1940's by an anti-trust suit filed against them. Transmitters of interest are the 450A-1 (100 watts) and the 451A-1 (250 watts). These were made in the late 1930's. The last transmitter that Western Electric produced was the 443A-1 (1000 watts). Production ended in the late 1940's. Information on Western Electric transmitters is hard to get. I would like to hear from anyone who has info or data.

The 450A-1 and 451A-1 are grid modulated transmitters and use W.E. type 242C tubes as RF amplifiers. 4 tubes in the 450A-1 and 6 tubes in the 451A-1. The tubes are configured in "push pull parallel".

The 443A-1 uses a "Doherty" RF amplifier as mentioned earlier. Four type 357A tubes were used in the RF amplifier. Many of these transmitters were converted to use 833A tubes as was one here in Seattle.

SUMMARY

Obviously, I did not mention every broadcast transmitter ever made. There are companies like Bauer and General Electric who made good 1-KW transmitters, but not in the quantities that the "big three" did. If someone runs into an interesting model, I would like to hear from them. I did not mention the 5-KW models because of their size...maybe in the future! The models mentioned, with one exception, can be modified for ham use and parts are available for them. Western Electric transmitters are quite unique and make real "show pieces" when restored. However, I would choose one of the other brands for a ham band conversion.

Converting The Transmitter

Before you start, remember there are lethal voltages in broadcast transmitters. Be sure power is off and capacitors are discharged before working in the transmitter. There is a long list of people who did not observe these precautions while working on broadcast transmitters.

To start with, get the transmitter operating into a dummy load on whatever broadcast frequency it is set up for. After it operates properly it will be much easier to move it up to 160 meters. Now remove the original crystal and connect an RF generator or VFO to the point where the crystal was and apply signal (a small amount) at your new frequency. Considering you already took a complete set of

continued next page

all meter readings and noted all tuning adjustment positions and taps, apply power to the buffer/driver stages-leave (plate voltage) PA & mod off! Refer to the manual and observe readings-buffer plate, driver grid & plate, & PA grid current. As with any class "C" RF amplifier tune for minimum plate or cathode current while observing the next stage grid current, which should peak at the same time. If the buffer and driver will not tune and the readings do not agree with your "logged" readings, you will have to change a tap and/or change a capacitor to get the stage tuned.

Remember you are trying to duplicate the original readings you logged and what's in the manual on your new frequency. You are moving up in frequency so the values of "L" and "C" will be getting smaller. Make changes one at a time and in small amounts while observing readings.

Once the buffer/driver stages are tuned, you can do the same with the PA section. Reducing the plate voltage with a 'Variac' will make PA tuning easier. Be sure to use a good 50-ohm dummy load for tuning and testing. A Bird wattmeter is also very helpful. If you don't have the 'Bird', a SWR meter in the "forward" position will serve as a peak output indicator.

Assuming the transmitter has a "PI" of "PI-L" output network, tuning is similar to any ham rig. Refer to the manual and make adjustments on coil taps carefully. Once tuning is correct, apply full high voltage and recheck.

Neutralization should be checked on "triode" RF amplifier transmitters, once the tuning is completed. A final check of your work can be done by computing PA efficiency. EFF = output power in watts / (plate E x Plate I). If you can get around 70%, you are doing ok. Check static modulator bias adjustments per manual then modulate the transmitter while observing the modulated RF waveform (steady tone) (audio source). Waveform should show no distortion to speak of and transmitter should modulate 100%. Most broadcast transmitters have a "coupling circuit" for connecting a scope or modulation monitor. This should complete the retuning. As mentioned, compare readings and verify with the manual.

Converting to 75 meter operation is basically the same procedure except that more drastic component changes in tuned circuits will be required. Capacitors in the output section will have to be "down sized" considerably. Also sections of coils in the output section might have to be removed to reduce effects of the unused turns.

Last But Not Least

Before you light up the "on air" sign, there are some things that I strongly recommend you do.

1. Attach a #4 copper ground wire from the transmitter frame to a good "earth" ground electrode, such as ground rods (two) or underground water pipe. Keep the ground wire as short as possible.

2. Attach a #10 copper ground wire from the transmitter frame to the electric panel grounding point. This can be part of the power cable from the panel to the transmitter. This "safety" ground is very important.

3. Provide a safety disconnect switch (fused properly) or some means of safely disconnecting power from the transmitter. Both hot wires in a 240 volt circuit must be fused and switched.

4. Older transmitters do not have parasitic chokes on the PA plate leads. Copy a design from a high power linear amplifier diagram in the ARRL handbook and install them in your transmitter.

5. Attach a good quality low pass filter to the transmitter frame as close to the RF output as possible.

6. Have a nearby friend check for "out of band" emissions using his receiver. This will save you grief in the long run.

Transmitter Hunting

The place to hunt for a broadcast transmitter is where they live - in radio stations. Look for AM or AM/FM stations that have been in existence for a long time. Call or stop by and ask for the engineer (a nice

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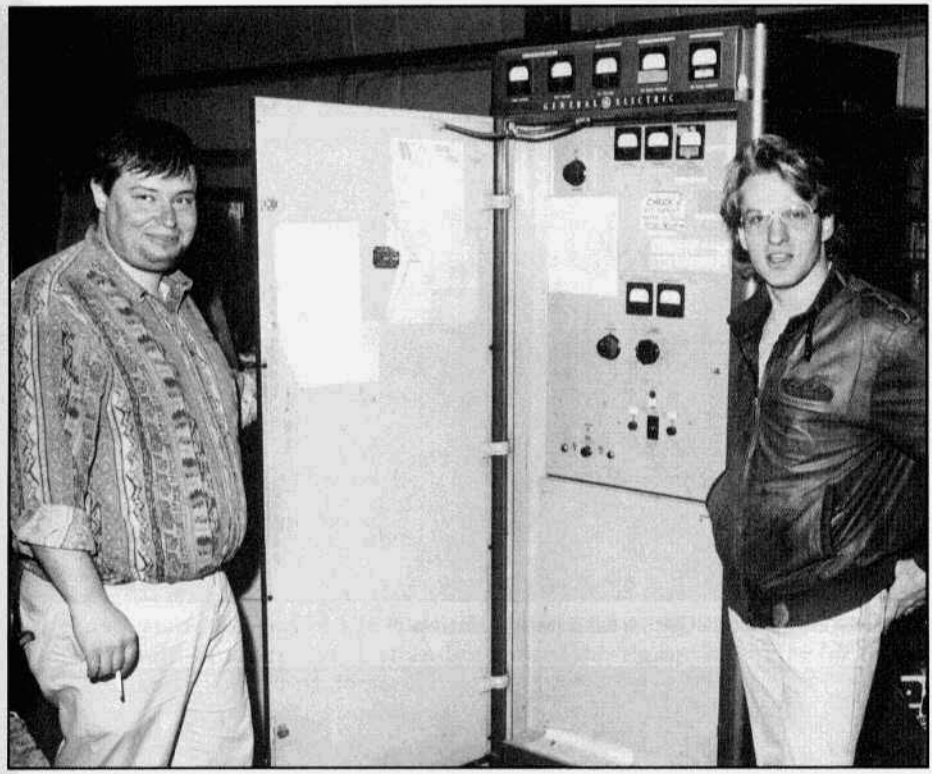


Pictured are (L) Sinan Mimaraglu, KA2BWH, and (R) Steve Ickes, WB3HUZ, in front of a 1948 General Electric BT-20-A. It has a pair of 828's modulating a pair of 810's, link coupled output @ 250W rated.

Back in March, Steve and I made a trip to upstate New York to collect not only the BT-20-A pictured, serial number SD-2, but also its younger sister, an identical BT-20-A, serial number SD-22! One was in Syracuse, having been traded in at a broadcast house that deals in used gear, the other was in Utica, N.Y., about 70 miles away.

We are now in the process of getting ready for a restoration and conversion of each. It was a happy coincidence that both transmitters turned out to be the same, since we had gotten on to them from two completely different sources and thought they would only be connected geographically as we got ready for the trip.

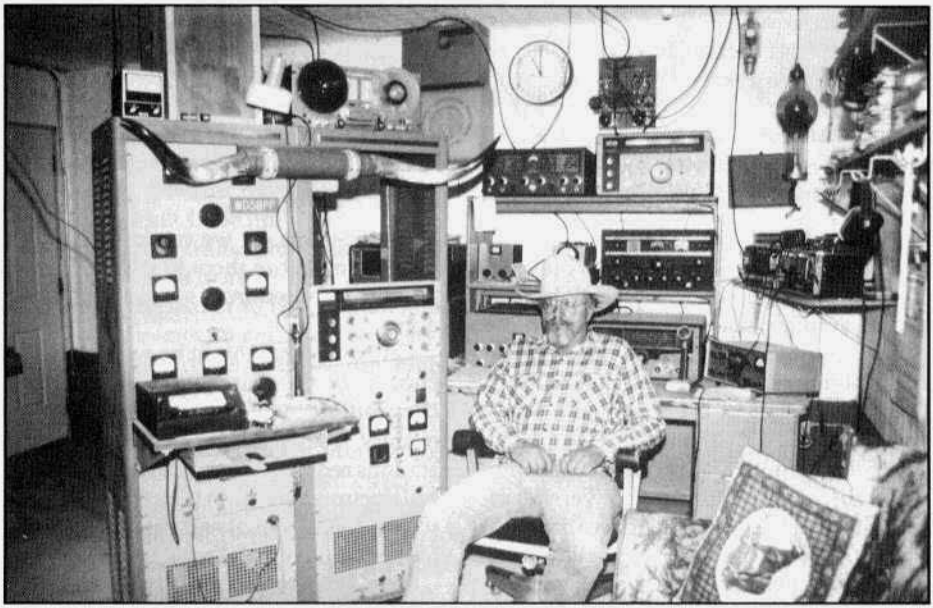
As it is, whatever's been modified in Steve's might not have been done to mine, and vice-versa, so we can use each as a pattern to restore them to stock or figure out how something is supposed to be done!

One thing that might be pointed out to encourage the acquisition of broadcast transmitters by members of the AM community is that FCC rules for broadcast stations require that the transmitters have full documentation on file and available at the station. This makes it very likely a new owner would get the book and schematic!

I look forward to more coverage in ER of this very important and available source of "big rigs" in this day of downsized, barely rated, consumer-grade, amateur transceivers on the market.

Paul Courson, WA3VJB

Kenneth Ball, WA6BQX, in his vintage station.



Fred Pomrenke, WD5BPP, one of the 'big' Texas signals. Fred has been operating AM for the last few years. He says he was inspired to get on AM when he ran across W5PYT one night while tuning across 75. The transmitter in the photo is homebrew.

This is a very rare (they only made 11) Multi-Elmac ATR-4 SSB transceiver. Lea Salter, KN4JW, a Multi-Elmac collector, recently acquired this rig and is looking for anyone who might know something about it. He's also gathering information on the Multi-Elmac company for an article which will appear in ER.

Edward Solomon, N5QVQ, in his station with mostly Collins gear. He has been licensed for only two years.

Collecting/Repair/Restoration...Tips

Silcone Oil...caution

Several authors in ER recently have advised using silicone oil in restoring old gear as a lubricant or a treatment for old wire insulation. Under certain circumstances, silicone oil can be quite harmful to switch or relay contacts. We found this out the hard way in the old Bell System when silicone oil wiped out several million Key Telephone Units and some PBX's.

If silicone oil gets onto the contacts of a switch or relay that is switching a "low level arcing load," it decomposes over a number of switching operations and turns into a nonconducting cinder. "Low level arcing load" means voltages from 11 up to 35 or so, at currents of a couple hundred milliamps or less. At these levels, cinders are generated with each arc and accumulate after several tens of thousands of operations to put the contact out of business. Above these levels, the arcs are sufficiently energetic to blow the cinders away. Below about 11 volts, arcs do not occur so no cinders are formed.

So use silicone lubricant in your rig only if you are sure that none of the switching devices in it carry "low level arcing loads."
Jim Hanlon, W8KGI

SM-1/SM-2/SM-3 Replacement Coiled Microphone Cable

For those owners of the Collins SM-1, SM-2 and SM-3 microphones that have a defective or worn coiled (retractile) cable that needs to be replaced, an original style cable is available from Belden that is an exact physical and cosmetic replacement. The Belden type number is 9466, which is a 28 AWG, 3 conductor cable that has one conductor shielded. The outer jacket is black neoprene with an outside diameter of 0.160 inches. The cable coil is 11 inches long in the retracted position and 6 feet long when the cable is fully extended, which makes it an exact match for the Collins microphones. In the case of the SM-1 and SM-2 microphones, which do not have a push-to-talk feature, only the white wire with its shield needs to be connected for the audio function. The SM-3, which has PTT, will require connecting the white wire and its shield for the audio function and one of the other cables (red or black) for the PTT function. The Belden cable is available from Newark Electronics and other Belden distributors. The price listed in the Newark catalog 112 is $14.50.
Jerry Brouwer, AB8U

Repainting R-390/390A Front Panel

1) Remove the panel and all accessories. Strip with water based paint stripper and after removing the heavy paint, immediately use 'Comet' and a brush to get all remaining paint off.

2) Very lightly sand with #400 paper and VERY lightly prime with zinc oxide primer. When dry, give 1 coat of your selection of the nearest grey color. Be careful, you want to cover but not fill up the stamping indentations. Let this dry a day.

3) From an artist's supply place get a water based latex white artist's paint. Smear this over 1 or 2 holes at a time filling the stamping marks. Immediately take a windshield squeegee and wipe off the excess on one pass only. Take a damp rag and immediately wipe off the squeegee lines without disturbing the stamped areas just filled.

3) Wait about 15 minutes and take a well squeezed damp rag and lightly wipe with your finger (not a ball) over the previously untouched stamped areas until fairly clean.

4) Wait about a week and lightly go over the entire panel with automotive rubbing compound which removes the last of the white paint. Wash with soap and water and reinstall.
Dave Metz

AM FREQUENCIES

2 Meters - 144.4, calling freq., activity in most cities; **6 meters** - 50.4 calling freq. **10 meters** - 29.0-29.2 operating window; **12 meters** - 24.985 calling freq.; **15 meters** - 21.400 - 21.450; **17 meters** - 18.150 calling freq.; **20 meters** - 14.286 for the nightly SPAM net starting at 5:00 CA time; **40 meters** - 7160, 7195, 7290 are the main freqs. Westcoast SPAM net every Sunday afternoon ,4:00 PM on 7160; **80 meters** - 3870, 3880 and 3885 are the main freqs. Westcoast SPAM net Wednesdays nights, 9:00 PM on 3870. AM Swap net Thursday nights, 7:30 PM on 3885; **160 meters** - Gray Hair net every Tuesday at 8:00 PM EST on 1945. Mostly sporadic summer-time activity but during the winter signals can be heard anywhere on this band.

From the Editor:

Vintage CW Net

Tracy Reese, WB6TMY, reports that the Vintage CW net is doing very well on 20 meters. He says that propogation has been excellent (much better than on 40 meters) and that QRM is almost non-existent.

The net welcomes new check-ins. It meets Saturday nights at 6:00 PM California time or 9:00 PM Eastern, on 14.062.

KE7KK To Start AM Net on 15

Bill, KE7KK, called to tell us that he is going to start an AM net on 15 meters. The net will be on Saturdays, at 2000 UTC on 21.415. I think we should all get tuned up on 15 and join Bill. This might be the beginning of some serious AM activity on this band.

2M Wireless Society Net in Boston Area

Jim Woodlock, N1FGO, informs us that the 2-meter wireless net is changing its Wednesday night meeting time from 7:30 PM to 8:00 PM. The net meets on 145.730. Jim also says that there's AM activity most evenings on this frequency in the Boston area.

Vintage SSB Net To Give Awards

Dennis Petrich, KØEOO, net control for the Vintage SSB net says that in an effort to boost interest in the net, he's going to start issuing awards for the oldest, most exotic , etc., rigs that show up. The net meets on Sunday afternoons at 1:00 PM California time . If you own a vintage SSB rig or are interested in vintage SSB, consider checking into the net.

ER Schedule of Contests Coming Up

Rather than announcing contests periodically throughout the year, we've decided to publish an annual schedule. I think that next issue or perhaps the one after that, we'll have the schedule put together.

In the meantime I'd like to have input from those interested. If rule changes are needed, let me know your thoughts. And should the contests be one day events or should they cover a week end? And what about all-night contests? And how often should we have contests?

From the feedback I've received over the last couple of years, I've concluded that there are a lot of 'serious' contesters in the AM fraternity. Some AM'ers are very competitive and enjoy the thrill of a contest. There are others (maybe a majority) who enjoy the contests more as 'jamboree'. I think the ER contests work out well for both groups.

Please let me know your thoughts and we'll get busy on drawing up a schedule for the next year. N6CSW/Ø

A 75A-4 -- One Piece At A Time

by Joel Thurtell, K8PSV
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K's longing for the finest ham receiver came at the worst of times. It was 1956. He was low on cash. Married, with a baby, the 23-year-old ham radio operator and University of Iowa student dropped out of school and started looking for a job. But K, who didn't want his name or callsign used, didn't buy his dream radio. He put it together, one piece at a time.

In the mid-1950's, the mainline amateur receiver makers all vied for top place in the hearts of hams. There was National, with a long line of HROs, or Hammarlund with its series of HQ receivers. For K, there was no doubt which radio was tops. A year earlier, in 1955, Collins Radio Co. whetted the imaginations of thousands of hams by announcing that the latest version of its famous 75A series of ham receivers for sale.

QST ads and the owner's manual boasted that Collins' 75A-4 was THE radio. The instruction book shrewdly hyped the A-4 in good old American car buying terms: "What does it have that last year's model didn't have?"

"PASSBAND TUNING...is so new that it was necessary to coin a new name to describe its function," the book bragged.

"Separate detectors for SSB and AM reception, a Q-multiplier Bridge-Tee filter, a new AVC system that works on SSB, a new low-crossmodulation RF tube, a noise limiter that works on SSB, a built-in crystal calibrator...all built into a cabinet nearly 4" narrower than the 75A-3."

All the pioneering features of the earlier 75A receivers were still in that smaller, lighter package: dual conversion for better image rejection, crystal controlled conversion and permeability tuned oscillator for increased stability and a choice of up to three steep-skirted Collins mechanical filters for unbeatable selectivity.

K had another reason for wanting a 75A-4: "I had an SX-71."

For K, that simple statement sums it up. Sure, his radio was a top-of-the-line Hallicrafters product. But, "It didn't have 15 meters. You didn't know where the band edges were. Compared to a 75A-4, it was a S-38."

I once had owned an S-39 too. That was Hallicrafters' least expensive, entry-level radio.

"It was the pits," said K.

The 75A-4 had everything, including a pricetag of more than $500.

K could daydream, but the old cash flow problem was forcing him out of school. He needed a paycheck.

Suddenly, Collins Radio was there but this time not in fantasy.

"I had to go to work somewhere," recalls K. "There was an ad in the newspaper for a drafting school being run by Collins, and I applied. They tested me and found out I would be a better lab technician than a draftsman."

K made prototype radios at Collins. "I worked for them for one year as an engineering technician -- till I got enough money to go back to school."

You don't get closer to your dreams than this. Imagine a Cadillac or Studebaker buff working in the very factory where the object of his passion was made.

K began to plan.

Meanwhile, the 75A-4 literally sold itself to K. " I was exposed to it by working there. There was a ham station set up in the engineering building and hooked up to a, God knows how big, antenna with a KWS-1 as a transmitter and a 75A-4 as receiver. During my noon hours I'd go over and work CW. The 75A-4 was the best receiver in the world at that time.

The "One Piece At A Time" 75A-4.

" I just want the best, and I knew this would be my only chance.

"At that time, you were allowed as an employee, to purchase one per year of anything they made at whatever the inventory cost was."

K guessed his cost as an employee would have been about $350.

"Even that was too much."

K had a fallback plan, otherwise known as the old ham approach. Homebrewing.

"The only way was to use my labor and their parts. You were allowed to purchase the parts for products the company made during your noon hour. You could go to the parts supply room and offer a list of part numbers and you had to pay cash for them as your paycheck permitted."

K bought a set of 75A-4 blueprints.

I learned of K's quest for a 75A-4 and of his unusual solution when he called me a few years ago after I advertised in QST looking for a 75A-4.

He offered to sell me a 75A-4. But he warned me there was no serial number on it. He explained that in nearly every way his radio was a ringer for a factory-built 75A-4. The knob was different, because he homebrewed that too. The panel and cabinet were standard, although in some instances he'd used better quality components than the factory-made A-4s. Three small holes in the back showed where he once used it to run a sideband exciter.

I think the 75A-4 is a marvelous radio. The idea that somebody had homebrewed one -- literally built it in his basement -- fascinated me. To K, though, his accomplishment was no big deal.

" In the year I worked for Collins Radio, there were at least half a dozen engineering lab technicians who were building their own as well. There's nothing distinguishing about this. I don't know why you think this is so noteworthy -- at Drake you would find the same thing. It's not a novelty -- there are other ones out there, you bet. It was just economy."

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75A-4.. One Piece At A Time from previous page

I believe it. But K's roll-your-own philosophy goes to the very core of what makes ham radio a unique hobby. The proof is sitting in my shack, connected to AC, a 40-meter dipole and my (factory built) 32V-3. Over the years I've referred to it as my "counterfeit" or "bootleg" 75A-4. Forty-two years later, it works great. K built a fine "Collins" radio.

I couldn't convince K to take credit in print for making the receiver. The last thing he wants, he says, is calls from readers. "There's a quip that applies to my feelings about class reunions -- I don't want to be with all those old people. It's like being an habitue of the local pub -- you hear the same people telling you the same lies all over again."

Remember the Johnnie Cash song about the mythical auto worker who smuggles parts out of a plant one piece at a time to build a car? At Collins, said K, "You couldn't smuggle anything out. They searched you every time you went in or out. If you carried anything, you had to have a receipt for it or you didn't get out with it. If you wanted to take your tools out, you had to get a pass from the supervisor and the guard inspected you on your way out. They would occasionally just pick people at random and pat them down."

Building the ersatz A-4 "took most of the year," K said. "Nine months or better, because you weren't always able to get parts when you went to the counter. Sometimes you had to wait because they were being used in production."

One part never was for sale -- the vaunted Collins permeability tuned oscillator, or PTO. "It was never available as an assembly. I had to build that, too. The slug in that moves up and down on a lead screw through the coil, which is powdered iron with a brass core. I can remember borrowing a double start tap from somebody and threading the slug because the main shaft for the PTO is double star threaded. Then I had to assemble it all and calibrate it and I did it in ovens in the engineering lab on my noon hour. There's a corrector stack in there for correcting non-linearity... It was never perfect, and Collins' engineers designed it so as the slug moved in and out, a little arm with a roller on it bore against .. a series of discs that were mounted on a long screw with two rather heavy plates on either end. Rotating corrected for displacement versus frequency error. I remember sitting there for hours with that thing held in a vise and a big two-foot wheel with 0-360 marked on it and I was turning that wheel watch a frequency counter. Once you got it right, you baked it in an oven and that's the way it was. If you ever lose the seal, put it in an oven for an hour at 150 degrees and put the cover on.

"My wiring wasn't as neat as it should have been. There's a (PTO) cover to go over all the wiring, but I couldn't get the cover under the tube sockets for the tubes in front of the PTO.

"I used different capacitors than Collins did. Collins used a lot of paper and disc ceramics. There's a mixture in mine. I changed (some of) them to hermetically oil impregnated Sprague capacitors."

K made the under-chassis wiring harness from Collins drawings. "You drive little inch finishing nails into the drawing with rubber bands at the top and lay wires in with branches as specified. When you're all done, you tied it. Collins does not lace, they tie. Lacing fails. If one lace fails, the whole thing unravels. You must spot tie also. This one is that way also.

"There's a tale, true or not, I don't know, about a test Art Collins used to administer while walking through the engineering lab. If he found a piece of equipment he wanted to test as to harness, he would pick up the unit by its harness and shake it. If anything broke loose, you would do it over again."

One thing I didn't like about his new 75A-4: The main tuning knob turned the PTO too fast for comfortable single sideband tuning. "Collins built a good radio when they built the A-4, but they screwed

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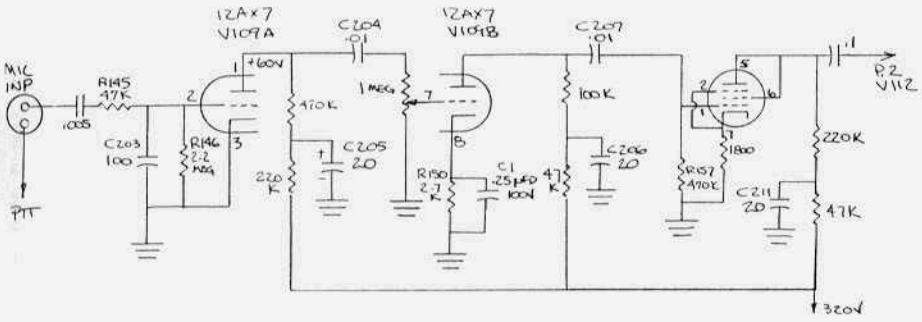
Audio Mod For The Johnson 500

by William Beatty, K7CMS
4721 N. Bamboo Cir.
Tuscon, AZ 85749



The following components are changed:

R145 from 10 K to 47K
R146 from 1 Meg to 2.2 Meg
C203 from 330 pF to 100 pF
C204 from .001 to .01
C205 from .1 pF to 20 pF
R150 from 680 to 2.7K
C1 (new) .25/100V
C206 from .1 to 20 Mfd/450V
R157 from 100K to 470K
C211 from .1 to 20 Mfd/450V

C207 off P1 of V110 to P1 of V111

Disconnect audio cable from P8 of V109B.
Disconnect all between P1 of V110 (clipper) and P1 of V111

Lee Faber, W7EH...Radio Pioneer

by Barry Wiseman, N6CSW/Ø
4 Aspen Place
Durango, CO 81301

Lee Faber was born in Paw Paw, Illinois, on February 2, 1900. Today, over 92 years later, he can look back over almost the entire history of radio. He was first licensed as 9EH in 1917, and is still active today as W7EH. He started with 'spark', saw the development of vacuum tube technology, and today operates entirely 'solid-state'.

Other interesting facets of his life: he was a great builder - about 10 big transmitters; he attended the first ARRL Convention in 1921; he started grinding crystals around 1932 and later started the James Knights Company; and he had at one time the largest (or tallest) ham antenna in the world.

I was introduced to Lee by his good friend Bob Samuelson ["Recollections of a Radio Engineer", ER #8 and #11]. After a couple of telephone conversations, I decided to visit Lee. That summer (1989) he was staying up in the White Mountains at Show Low, Arizona, where he said it was cooler and he was more comfortable than at his home in Phoenix. Show Low is about 250 miles from Durango. I left about 7 in the morning and arrived in Show Low around noon.

Lee was outside when I pulled up to his trailer in an RV campsite outside of Show Low. He was dressed casually in trousers with suspenders, a plaid shirt, and a British style cap that looked to be from the '20's or '30's. He was a small man, somewhat shrunken with age, but ramrod straight, and he looked to be in good physical condition. When I got up close I noticed that he had one glass eye. He told me later that he had lost the eye back in the '20's when a battery exploded. His face was that of a much younger man. I thought then that most people would guess his age at somewhere in the '70's rather than the '90's.

We shook hands, he asked me about my trip, and we went toward his trailer. It was small - about 25 feet long- and set on a concrete slab a little longer than the trailer and about as twice as wide. There was a metal storage shed to one side and a table with two chairs under a canopy by the door. In contrast to the neighboring RV's and trailers, Lee's area was totally devoid of anything superfluous, like the usual bric-a-brac, plastic or plaster ornaments, tools, bicycles, etc.

The inside of the trailer was neat and orderly as well. Lee told me that he had just 'restored' this trailer. It was a Royal Coachman which he said was the 'Rolls Royces' of trailers. I was impressed with the orderliness and good housekeeping I saw and I mentioned this to Lee. He said that this was how he had been brought up. The only piece of radio gear in sight was a 2-meter transceiver on an end table by the couch.

After I'd cleaned up in the bathroom (again I was impressed) and after Lee had offered me lunch (I declined as I had eaten on the road about an hour earlier) we went outside and sat at the table under the canopy.

At first Lee wanted to talk about the magazine. Although he liked ER he seemed to be very skeptical about my chances of success. "I like the magazine, he said, but how many people are going to buy it? Do you think there are enough hams out there who give a damn about the old days?" I tried to assure him that there was a market for a magazine like mine although after only 6 issues I wasn't that sure myself. I moved the subject over to radio as quickly as I could.

continued on page 26

Lee (on the left with headphones) and Art Schneider in 1913. This was Lee's first station ('wireless set'). He wasn't licensed until four years later, in 1917.

A recent photo of Lee with his present-day equipment. The plaque on the wall was given to him by the ARRL for 70 years of membership.

Lee Faber from page 24

My first questions were about the 'real early days' when he started operating with spark. How did a spark transmitter work? What did he use for a receiver? How many hams were on the air back then? What I really wanted to find out was just what it was like back at the beginning. Lee had detailed answers to all my questions and the afternoon passed quickly. I was very impressed with the way he could recall dates and details. I had expected him to be sort of slow and rheumy and hazy in his recollections as most men of his age would be but Lee is as bright and sharp now as he ever was. He never smoked or drank excessively; maybe that's been a factor in his preservation. I remember thinking how I wished I could be like him when I was old.

It was getting on to the time that I should leave as I wanted to make it home that evening. Lee said he had some photos and stuff in the shed that I might be interested in. He hauled out two large cardboard boxes, two smaller ones, and a large tin filing box. The large cardboard boxes contained six albums; the smaller ones old magazines, letters, two VHS tapes - one made from a 16 mm film on the erection of his 125' tower, another from a film on the James Knights Co. The tin filing box was stuffed full of QSL cards - about 5,000 I was to learn later - going right back to the beginning. The albums were neatly put together with everything arranged chronologically. The photos - which were surprisingly good as family albums go - were interspersed with yellowed newspaper clippings and other paper memorabilia. His logbook was there too (hardbound!), with the first entry being made in 1922.

I became totally absorbed going through this 'archive' of material. I had never, ever, seen anything like it. This man had his whole life chronicled. It was all there. As the afternoon wore on and as the shadows lengthened I was thinking about how I'd have to come back another day to get through all the material. As if sensing my thoughts, Lee said, "Why don't we load this stuff up in your car. You can take it home and go through it." I was shocked, how could he trust me with this treasure that he had put together so lovingly over the years? "It'll be alright he said, don't worry about it."

Almost three years have passed since that first meeting. I still have Lee's archives here and Lee still isn't worried about them. I've attempted to get an article together on Lee but for one reason or another it just didn't happen. We've talked many times - he's one of my references for information - and I think we've become good friends. I think that in retrospect I'm better prepared to document his life now than I would have been back soon after I met him.

Part One

Lee was always interested in things technical. So much so that the people in his town thought him slightly odd and he remembers being referred to as "Bart Faber's Crazy Kid". Bart Faber was his father and he operated a meatmarket or 'butchershop'. Lee remembers that he once repaired the freezer at the meatmarket, which incidentally was one of the first in the area.

How did he get involved in radio?

In Lee's words: " About 1913 I became acquainted with a young girl. I had found out that girls were different from boys about that time and the love affair got me involved with wireless telegraphy or ham radio as it was to become known as . This girl told me that her brother had something up in the attic that made a lot of noise and smelled like burned hair. I had to investigate so I went down to Earlville, which was about 8 miles away. There were no cars and I had a horse that I rode to go see a girlfriend, but 8 miles was too far to go on a horse, so I rode the caboose on a freight train down there. I heard my first wireless signal that afternoon. I think that was in 1912 or '13. And I also met Arthur Schneider, who became a good friend and mentor as you might say. The gear he had was very primitive; the sim-

plest spark transmitter, a crystal receiver, and a long-wire antenna. But I was impressed. To me this was the most exciting thing that I'd ever experienced.

Where did he start?

"I knew the first thing I had to do was get a receiver working and then learn the code. Art Schneider showed me how to put together a crude crystal set and I put up an antenna. It was interesting that at about that time the Illinois Watch Company at Springfield, Illinois, which was about 50 miles from my home in Paw Paw, started sending spark code signals every noon for an hour. Somebody there on their lunch hour thought they would teach people the code and encourage them to become wireless operators. So they started sending code for 15 minutes at 5 wpm and then 15 minutes at 6 or 7 wpm and then the rest of the hour at about 10 wpm. I learned the code from that. In order to get your license you had to swear that you could copy 5 wpm.

On the Air

"In the beginning we just worked across town or a mile or two. I got a friend involved with me. He was about my age, his name was Stanley Thorpe. I helped him build a spark transmitter using a Ford spark coil and a crystal receiver. We'd talk back and forth by code.

"I remember one winter evening I was working Stanley when my Dad came up into my room wondering about all the noise I was making. The spark transmitters - even small ones- made an awful lot of noise. I could best describe it as a squeal or rushing noise. Anyway, my Dad asked me what I was doing. I said that I was talking to Stanley Thorpe. He said,'Come now, don't tell the neighbors, they'll think you're crazy.'

"Well I am, I'm talking to him and would you believe it (we didn't even have a telephone then) if Stanley came over here in the next few minutes? Would you believe that I talked to him and sent him a message? He said, 'Yes, I would'. So I got on the key and told Stanley to come over because I wanted to prove to my Dad that I was talking to him. So Stanley came over and came in the kitchen door and there we were. We had at last proved to someone that we could communicate by wireless telegraphy. My Dad was not encouraging at all. He thought we were not playing with a full deck. Something like that.

"The call I got in 1917, 9EH, was almost all dots and when Stanley Thorpe got his about the same time, 9JM, it was nearly all dashes. We always marvelled about that; how I got all the dots and he got all the dashes.

"The first transmitter that I got on the air consisted of a Ford spark coil energized by a 6-volt storage battery. The spark gap itself was made of 2 binding posts with 2 pieces of pointed wire under the binding posts. The spark jumped between the two points. In parallel with that we had a plate glass condenser. This condenser was just a couple of pieces of plate glass with wrinkle tin foil in between. In those days they wrapped cigars in foil. I don't know for sure that it was tin foil but I think that aluminum came along much later. The plate glass condenser was connected across several turns - maybe 8 or 10 - of a coil made from quarter inch tubing. The coil was about 2 or 3 inches in diameter. This completed the tuned circuit. You could adjust the condenser and get the color of spark you wanted. I think a pretty blue color was what you were shooting for. When the spark jumped you could smell the ozone in the air.

"You keyed the transmitter in the primary (battery) circuit. We soldered two dimes on the contacts of the telegraph key in order to carry the current. Dimes were silver back then. The ordinary brass contacts would oxidize and finally the contacts would just stick together.

" The old single-cell dry cell telephone batteries that we used had nice brass nuts and bolts. We used those for nearly everything including switch contacts. Insulating material was also hard to come by. There was one product that was available

continued next page

Lee Faber from previous page

- I think it was Formica - but it was very expensive and hard to find. I remember using glass for insulating material. I would drill holes in the glass using turpentine and an ordinary twist drill turned by hand very slowly. Sometimes I would spend 30 minutes to an hour getting a hole through a piece of glass and then when I wanted to cut it to size it would break and I'd have to start all over again. Fortunately, time was no object in those days.

"You would couple the antenna - that was always just one wire - to a coil of two or three turns. One end of the coil would go to a ground or a wire leading to a ground. Since we were on the second floor with some of the early experiments, the ground wire was as long as the antenna so it amounted to a dipole with one end of the dipole grounded, apparently. But it still put out signals because every time you'd shock that tuned circuit and the antenna with a spark, a signal would be transmitted in the air and be received someplace, sometime.

"The receiver was a loose coupler, which consisted of two coils wound with double silk wire. I don't know why, but plans always specified "double silk wire" in any article you could find to read. The articles were very scarce and far between. One coil slid inside the other - that's why they called it a loose coupler. The outside coil was tapped every few turns and ran to a tapped switch that was homemade, of course. The loose coupler then was in turn connected to a crystal detector either of silicon or a piece of galena. And you'd use a cat-whisker, which was a sharp pointed piece of copper wire, very fine like 22 or 30 so it would not put much pressure on the detector. You'd hunt around with that piece of wire until you found a place where you could receive a signal.

"The signal you used on your test was from an ordinary door bell buzzer with the bell removed. You pushed the button and the thing would buzz and it would send out radio signals in the room. You would adjust the sensitivity of the crystal detector by the audibility of the signal from the buzzer. Nearly every time you'd transmit you'd lose the sensitivity. It apparently would arc in the receiver circuit because of the proximity of the transmitter. Then you'd have to reset the detector before you could begin to hear the incoming signals. How we found the frequency of the other fella Lord only knows, I don't. You'd have to tune the loose coupler, adjust the taps, slide the internal coil in and out and hunt and hunt very carefully and when you heard a weak signal you would have to make further adjustments very carefully.

"Now this is all about 1913 or 14 and about 1915 there were rumors that the power company was going to build a transmission line to Paw Paw, Illinois, so I began to gather up stuff that would work on 115 volts. Up to that time all we had was gaslighting in the house. I bought a Sayville rotary spark gap from W.B. Duck and Co. They were about the only company that put out a catalog then. I talked my Dad into letting me order a Navy type loose coupler for $13 and that was very beautifully built, mahogany cabinet, shellacked coils; it just glistened. It had taps on both the secondary and the primary coils. It had a crystaloy detector. That crystaloy detector was a cylinder filled with silver filings. At one end was a crystal cemented in with woods metal. As you would rotate that cylinder those silver filings would finally come on to a sensitive spot - a spot on the crystal that would rectify the incoming signals.

"We got alternating current in 1917. I had all this equipment ready to go and I remember turning it on for the first time. I used a Thordarson 1-KW transformer and the crashing noise brought my mother and father to the upstairs bedroom in a hurry. You could hear the crashing of the spark all over the neighborhood. And this new setup really created the ozone." ER

Part two next month.

Dayton 1992 Trip Report

by Dale Gagnon, KW1I
9 Dean Ave.
Bow, NH 03304

The trip to the Dayton Hamvention with stops at Fair Radio Sales and the Wright Patterson Air Force museum has been "Spring Break" for me for more than 15 years; the trip I look forward to for months. This year my brother,Dean, KK1K, my son Philip, N1HHG, and I embarked from our rendezvous point in Schenectady, New York, at about 7:30 PM on Wednesday, April 23. Our intention in previous years was to drive straight through the night, rotating drivers until we arrived in Lima, Ohio, at Fair Radio before their opening time at 9:00 AM the following day.

This trip was to be a little different. We were going to stop briefly to visit Dick, W2UJR, in Alden, New York, near Buffalo, about midnight. Dick is a regular each morning, before dawn, on 1.888 Mhz AM. Dick stayed up late for us and talked us in. As we toured his shack we heard a knock at the door and were surprised to see that two other acquaintances, Bob, W2PFF, and Ken, K2FJ, had adjusted their sleeping schedules to get up and see us as well! We had a good time looking at pictures, taking pictures and inspecting a soggy antenna range by flashlight.

We were on our way about 2:00 AM and arrived in Lima at about 8:00 AM at the precise moment to keep an eyeball schedule with Brown, WA1NZR, and his travelling mates for breakfast. We then proceeded to spend almost the entire day at Fair Radio Sales. As usual, Fair Radio had those hard to find parts that had been holding up completion of several WW II radio projects.

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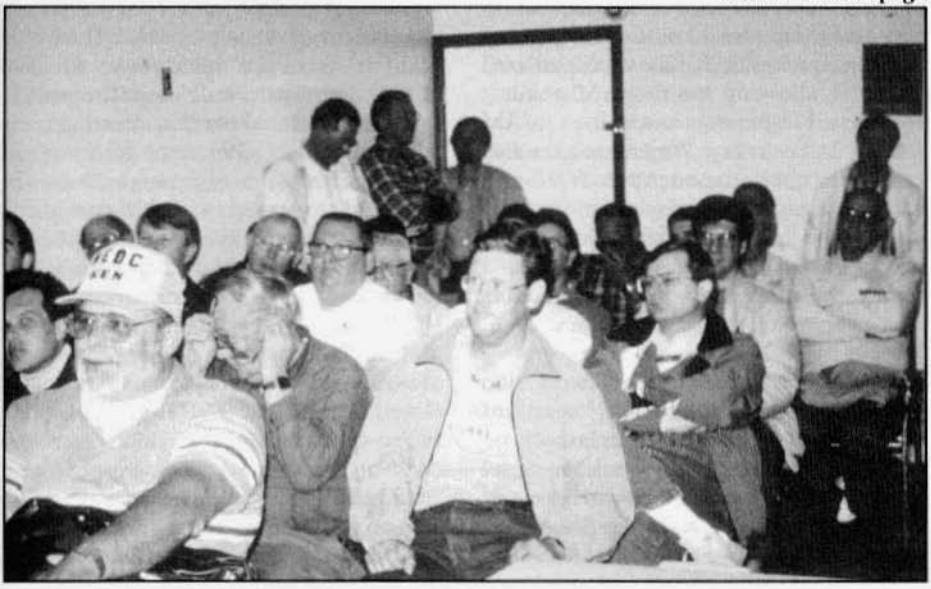


Some of the over 70 hams who attended the AM Forum

Members of the panel discussion: from left, Jim, W4PNM,Pete, WA2CWA, Dale, KW1I, Skip, K7YOO, Don, K4KYV, and John, WB5HRI.

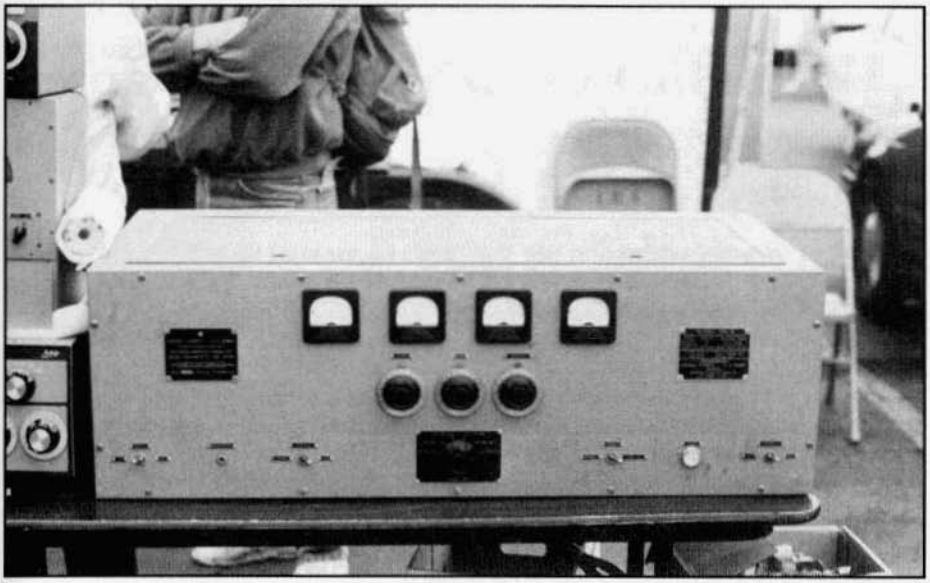
We drove the remaining hour from Lima to Dayton and arrived at 6:00 PM.

After checking into our motel, we headed out to the Hara Arena complex to see what was happening. Thursday, before the Hamvention, is fleamarket set-up day and there was a lot of activity going on. The Hamvention office was open until 7:00 PM, allowing me to get all the last minute arrangements made for the AM Forum on Saturday. We entered the flea market to check for our spot. We found our location quickly and were able to scout around the flea market for a while before darkness and fatigue set in. It had been sunny and mild giving us hope showers and cool weather in the forecast might pass us by.

We returned to the motel and were soon joined by Don Chester, K4KYV, who had driven in from Tennessee. Our last official act before turning in was to ask the motel desk to ring our room at 4:30 AM! It seemed a bit early, but it got us to the fleamarket before 6:00 ahead of the traffic.

Friday morning started with moderate temperatures and patches of clear sky showing. As the sun came up and we made a few fast tours through the fleamarket we could see that it was even larger than the year before with over 2500 spaces. Unfortunately, a thunderstorm hit shortly after the bulk of flea marketeers had uncovered their exhibits. The inside exhibits were not open yet so we went back to our van to wait it out. The rain did stop for extended periods allowing fairly normal activity. We were glad we had brought boots and raincoats with us. The fleamarket was rich with AM gear and in some cases a potential buyer had to be rich to end up with any of it. There were at least 10 Collins 75A-4 receivers. Parker, W1YG, had a load of AM gear, that included a BC-610 and a beautiful Meissner 150, for sale. There were a couple of Rangers and at least one Johnson 500. Two good ART-13's were spotted and one BC-375, complete with all tuning units. There were of course good buys on almost everything depending on your timing, your negotiation skills and your ability to endure looking through all of the boxes and into all of the trunks.

We took several hours off mid-day to



A Meissner 150, on Parker, W1YG's, table. This transmitter consists of a single 813 modulated by a pair of 810's.

visit the Wright Patterson Air Force Museum. One of the hundreds of exhibits is a B-29 fuselage that can be walked through. There were a few minor flaws in the presentation of the B-29 radio room. The BC-348 and ART-13 were missing a few parts and headphones were plugged into the ART-13 speech amp!

We got back to the Hamvention later in the afternoon and checked out Meeting Room #7 in advance of Saturday's AM Forum. The audio/visual equipment was in place, but the room needed at least 20 more chairs to seat 60.

Saturday had a wet start, with off and on showers through the day. I spent the morning in the exhibit area. At 1:15 PM the AM Forum began with a standing room only crowd of over 70. Just before the Forum, Gerauld, K8AFP, who was heading overseas with the Army extended a unique offer. He was looking for an amateur who would use his Globe 500C while he was out of the country for a few years.

The Forum started with slides of Sam, W6HDU's, station. Sam has a fabulous collection of historic receivers and transmitters. I was able to report on his most recent addition, a Western Electric 443A-1 KW broadcast transmitter. The slide show ended with a brief view of Andy, WA4KCY's, and Jim, W4PNM's, stations and some photos of the vintage military radio exhibit at the 1991 Warbirds air show in New Hampshire.

A panel discussion of AM operators was the next feature of the AM Forum. Pete, WA2CWA, from the Northeast, Skip, K7YOO, from Northcentral, Jim, W4PNM, from the Southeast and John, WB5HRI, from Southcentral were the panelists. Don, K4KYV, questioned each panelist on the AM activity in their geography. Pete and John noted the increase in VHF AM activity in their geographies; Jim talked about a new organization, 'SEAMS', Southeast Amplitude Modulation Society, Skip described a great 160-meter AM activity in his area on the high end of the band. There was also discussion of interference between AM QSO's in different parts of the country near the same frequency and the desirability of stations in each QSO zero-

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VINTAGE PRODUCT REVIEW

The Hallicrafters SP-44 Panadapter

by Bill Kleronomos, KDØHG
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Lyons, CO 80540

Those of us who restore and use the radio gear made during the glory days of American manufacturing are not shy about pointing out that much of this "obsolete" equipment has performance in areas such as selectivity, sensitivity and audio fidelity that is unparalleled by any but the pricey modern models. So it is a matter of particular pride when one owns an item of classic equipment that has no modern equivalent - at any price. Such is the case with the Hallicrafters SP-44 Panadapter.

The SP-44 did not have a long production run; ads appear in the ARRL Handbooks for 1947 and 1948. Curiously, the advertised price in 1947 was $99.50 and in 1948 the price was half that at $49.50. Had the firm at 5th and Kostner in Chicago given up due to slow sales and had a clearance sale? It's hard to say; certainly the SP-44 is not as uncommon as some other Hallicrafters items surviving today but exact sales figures are strictly a matter of conjecture. It is possible that with Hallicrafters television, radio-phonograph and other consumer electronics sales growing rapidly, a decision was made to utilize the production line resources of a low volume product for one with more lucrative possibilities. In any case, the instruction manual is dated May,1946, with a revision dated April, 1947.

The SP-44 may or may not have been the only mass-produced panadapter Hallicrafters ever made... I hedge my bet here because of the mystery surrounding the model S-35 Panoramic receiver. Extensively featured in Hallicrafters ads in

The SP-44 "Skyrider Panoramic" with SX-28A receiver

Close-up of SP-44 front panel while in operation. Note the waveforms on the CRT.

QST during the war years as well as in a full page ad in the 1946 Handbook, this unit, consisting of a panadapter mounted in a tabletop cabinet with an SX-28A receiver, is quite familiar to anyone reading radio 'software' of the '40's. The problem is that no one I've asked has ever seen one! A number of years ago, Sam, W6HDU, advertised extensively in the ham literature to acquire one. A recent call to him confirmed that this search was in vain. If any ER reader has actually seen or owned an S-35, please drop me a note!

The SP-44 is a compact spectrum analyzer or panadapter designed to work with almost any receiver with an IF between 450 and 470 Khz. It contains 10 tubes, including the 2AP1 2" CRT. The circuit design is uncomplicated and is reminiscent of the televisions of the 1940's. Basically, a 6SG7 IF amplifier at 455 Khz feeds a 6SA7 converter which generates a 2nd IF at 226 Khz. A 6AC7 is used as a 'reactor' or a swept local oscillator. The sweep rate is fixed at 30 Hz or 1/2 line frequency; sync and horizontal sweep are handled by a single 6SN7. A rear panel jack provides an audio output so that high impedance headphones can be used to monitor the displayed signal (s). In order to compensate for the front end selectivity of the associated receiver which would cause displayed signals (separated at some distance from center) to appear weaker than they truly are, a feature referred to as an 'equalizer' is incorporated. This is accomplished by using an adjustable resistive pad across an IF transformer with a severely overcoupled response.

Hookup to any receiver is exceedingly simple. A two foot cable with a 50K resistor at the end is provided with the unit. The free lead of the resistor is wrapped around the plate pin of the mixer/converter in the receiver.

The unit featured in this article needed some work before it was ready to test and align. Many of the original paper capaci-

continued next page

tors were leaky and a number of the resistors were as much as 30% out of tolerance. In order to maintain an authentic look to the chassis, I removed the original capacitors, carefully picked out the end fills, and reloaded the innards with modern mylar types. I then melted the original beeswax/shellac end fill and put it back where it came from. After a quick wipe with mild solvent as a clean up and a dip in a pot of melted paraffin the capacitors looked like they just rolled off the assembly line at Aerovox or Tobe-Deutchmann. Nothing, but nothing, looks worse to me than the chassis of a nice '30's or '40's radio full of disc ceramic or other non-authentic replacement capacitors!

I have been told that many SP-44s have been junked or retired because the high voltage winding of the power transformer for CRT anode voltage has failed. The winding is rated at 2 ma so the wire must be awfully thin. A suitable replacement might be one out of a small scope.

During alignment I made a number of measurements as a performance evaluation. The manual makes absolutely no mention of what the vertical scale of the analyzer is, and the graticule is not marked. Using a Kay attenuator I found that the stock factory calibration was very close to 5 dB/division. Now, there is a lot of spectrum analyzer theory that I'm not expert on, but the key thing is that if you want a logarithmic display (decibels), then you need a log amplifier. The SP-44 uses a simple AGC loop in the 2nd IF to accomplish this purpose. However, with only four vertical divisions (5 if you use 'squint' factor), I felt this calibration range was not going to be appropriate - I wanted a lot more than a 20 dB rang, if possible. I spent an evening with a graph of the AGC voltage curve, a set of RCA tube manuals and a pint of Guiness and found that it might be possible to achieve a wider displayed range with a simple tube swap. Several types of tubes were tried as a replacement for the 6SG7 2nd IF amplifier and it appeared the 6AB7 was a good alternative. Subsequent measurements made with the use of the attenuator surprised me. This simple tube change made the vertical calibration within 2 dB of the desired 10 dB/division over a 50 dB dynamic range of input signal. Just the ticket for today's band conditions. I was more than pleased with the factory calibration of the scanning width control; its calibration was accurate to within about 10% of the panel markings. One last step was the replacement of the 6SA7 mixer with a 6SB7Y which eliminated much of the baseline 'grass'.

I hooked the SP-44 to a more or less contemporary SX-28 receiver for several weeks as a test and found the visual addition to AM hamming and SWL operations to be quite a treat. A well calibrated panadapter can be a highly useful piece of test equipment. With a little practice it is easy to identify overmodulation on an AM signal and it makes finding an open hole on a band for a quick QSY much easier. No more tuning around, listening, then tuning around some more. But the best thing of all is simply the ability to see what your listening to. The Hallicrafters SP-44 is a very useful addition to any hamshack. **ER**

LETTERS

Dear ER

I have some information that the readers of Electric Radio, especially the older old timers might find both interesting and useful.

Leeds Radio still exists. Yes, that's right, Leeds still exists. They are the last surviving radio store from the New York City Cortlandt Street radio row days (as far as I know). When was the last time you saw a REAL radio store, and that the owner knew radio, I mean?!

Leeds was started in the Cortlandt Street area in 1923 by "old man Leeds". Leeds' son took over the business in 1955. I remember him. "Yas suh,yas suh, what can I do you for?" was his stock comment upon spying a customer entering his store. Leeds moved to Warren Street in 1967 when the World Trade Center was built. The present owner of Leeds took over in 1974. He is Bernie Goldstein, W2MNP. Leeds was forced to move to their warehouse in Brooklyn in 1986 due to the skyrocketing New York City rents. This is where they are now located.

If you are in need of some old or oddball part, Bernie may be able to help you. It may take some digging, and I do mean digging. Leeds is stocked right up to the rafters with all sorts of components and assemblies. Leeds handles tubes and connectors as well as general miscellaneous parts. Bernie was able to supply me with a set of connectors for my newly acquired Jefferson Travis JT-350A, 1.5 to 12 MCS military surplus transceiver.

The address is: LEEDS RADIO, 68 North 7th St., Brooklyn, New York 11211

The phone number is: 718-963-1764

If you need a part and think that Leeds can help, drop them a line or give Bernie a call.

If you live locally, DO NOT JUST DROP IN! Give Bernie a call first.

Charles Croatman, WB2ZKS

Dear ER

The article by W6BM, "A Practical Synchronous Detector", was refreshing to me. I was the author of an early article on a synchronous detector in June 57 CQ. It used a third multiplier or phase detector to compare the output of the two quadrature multipliers to phase lock the BFO to the best average phase for the SIDEBANDS. Thus, it generated an optimum carrier for the two sidebands and did not use the transmitted carrier at all – in fact it would work with DSB-suppressed carrier. At the time I was working with Dr. J. Costas, W2CRR, at General Electric.

Previously, GE produced a YRS-1 "sideband slicer" with carrier operated phase/frequency control as in the W6BM design. Having worked with both techniques, I would say that an option to lock on either the carrier or the sidebands is a nice feature. Also, with a wideband audio phase shift network in the audio channels from the two multipliers (or demodulators), it is possible to reject ALL the interference or hetrodynes in one sideband or the other while still providing coherent addition of the two sidebands with either phase lock method.

Later we build a direct conversion synchronous receiver (sideband lock) that drove the multiplier-detectors with a synthesized local oscillator AT THE SIGNAL FREQUENCY from 2-30Mhz. It had no IF strip, most of its gain was at audio frequencies and it would reject interference from ALL of one sideband. The transmitters that went with it were DSB suppressed carrier rigs with high level Class C screen modulated output stages. One of these rigs was the subject of March 58 GE Ham News.

John Webb, W1ETC cum W5MVI/K2GZT/WØAHM

The Collins 20W-1 Broadcast Transmitter
The Transmitter That Wasn't!

by Dick Houston, WØPK
159 Sortais Road
Durango, CO 81301

Many ER readers are using or considering an older broadcast transmitter as a ham rig. They and others might be interested in some of the sideline events that shaped the course of such equipment. One such occurrence is the "out-of-school" tale I'm going to tell, and it might shed a bit of light on why some "unexplainable" things show up occasionally in the past equipment and the related literature.

AM broadcast transmitter techniques were in general slower to change to newer things, primarily because the requirements changed slowly, at least in the past. Collins Radio, following Art Collins' pioneering spirit, was frequently first in introducing new concepts. As a result, Collins came out in the mid-50's with a new line of transmitters that used the newer power tetrodes (or pentodes) instead of the conventional "old reliable" triodes. A typical example is the 20V series. The higher gains meant higher overall efficiency, lower power consumption, and smaller space requirements, all of which are of extreme importance in broadcast gear.

Of course there were problems, to a large extent caused by station engineers' lack of experience with the higher-gain circuits. These problems were solved, but the broadcast industry is a fairly tight-knit group, and the word got around. The industry was (and still is, even more so) also intensely competitive, the major players at the time being Collins, RCA, and Gates.

I joined Collins in 1957 and was assigned as project engineer to do the final design touches on a new transmitter, the 20W. Never heard of it? Well, here's why.

Both RCA and Gates were waging sales wars against Collins, citing the rock-stable dependability of the good old time-proved triode technology. Of course they were also taking pot shots at each other- but that would be another story! Collins' broadcast sales group ran into this barrage every time they tried to sell another transmitter and the RCA/Gates campaign began to make inroads into the Collins sales figures. In a really uncharacteristic move, the powers decided to surrender to reality and come out with a new triode transmitter - a better one of course - and that's where I got into the act.

Actually the transmitter, the 20W-1, was practically finished, and all I had to do was clean up some modulation distortion problems. That work was fairly well along when the 1958 National Association of Broadcasters (NAB) convention came up. That yearly convention provides the ideal showplace for introducing new equipment. So the sales department took the new, not quite ready, transmitter, touched up a few things on the cabinet, crated it up, and sent it off to the convention.

When the sales force arrived at the show hall, they began setting up their booth and (not coincidentally) snooping around the competition's booths. What do you suppose they found?

Both RCA and Gates had begun setting up their brand new, modern-technology, cream-of-the-crop lines of transmitters- using state-of-the-art tetrodes or pentodes!!

So the Collins guys set up their booth, but when they got through, somehow there in the back was a large wooden crate. They hid it as best they could, but still a few people asked. The reply? "Oh, that's some kind of air-conditioning equipment that was to be used in the hall, but it wound up here"!

Now you know why you never saw the 20W! So passed my one possible claim to fame in the broadcast equipment field!

continued on facing page

Broadcast Transmitters from page 14

person thats under paid) If he's not there call back, don't give up. When you finally corner the guy tell him you are a ham and what you are looking for. He might not have anything, but he could aim you in the right direction. There are trade publications like "RadioWorld" & "Radio Guide" where old transmitters show up. Be persistent, there are about 6000 licensed AM stations in the U.S.

THINGS TO CONSIDER

1. Look for transmitters with "PI" or "PI-L" type output tuning networks. RCA's "symmetrical" output network is also ok. These tuning networks have enough "out of band" attenuation when combined with a good low pass filter to keep you out of trouble.

2. Carefully inspect the wiring harness. Look for 'brittle' wire. If the harness looks bad, plan on a lot of work.

3. Look at the transformers, especially the HV and modulation transformers. Check for shorted windings. If possible inquire about overall condition, and when the transmitter last worked.

4. Verify AC power requirements. Some older transmitters require 3-phase power. In order to operate one of these you would probably have to replace the H.V. transformer and rework the supply.

5. Check tube types, as mentioned earlier, some are very hard to find. Try to get the manual; they are also hard to find.

Next time some information on broadcast audio equipment, how it works and what to look for- to use with your new transmitter! **ER**

Collins BC Transmitter from facing page

Postscript- In my later life as a broadcast consultant in the "four-corners" area of Colorado, New Mexico, Arizona, and Utah, I have had to work on the 20V-3 - an almost impossible job mechanically, although it was improved in later versions. That made me wish that the 20W had made it, even if I hadn't been connected with it! **ER**

Dayton from page 31

beating on their separate frequencies to minimize the width of each QSO. An open Q and A session followed the prepared questions.

Later in the evening about a dozen forum attendees gathered for pizza at a local restaurant.

Sunday dawned at the freezing point but turned out pretty nice as the sun came up. It was a lovely day by mid-morning. I attended the FCC Forum. Most of the discussion centered around status and proposed changes in the Volunteer Examiner program. There was no mention of any rule making proposals that would specifically affect AM. No time was allotted for questions and answers, although John Johnston and William Cross of the FCC volunteered to meet with anyone who was in the process of preparing a rule making petition.

We did not set off on our trip home until 3:00 PM, probably because we wanted to experience a more "normal" weather day in the flea market. Unfortunately, the weather had thinned out the cars, but there were still many bargains. On balance it was a good Dayton experience. The flea market was affected by the weather, but there was still plenty of activity. The rumor of no parking near the Arena this year was only half true. Free parking behind the fleamarket was gone because the land is being developed, but there seemed to be plenty of parking on adjacent pieces of land for $5-8 per day.

The trip home was uneventful but accommodations were tight with our returning load of treasures. Hourly schedules on 40 meters with amateurs at home made the trip pass quickly.

We have already confirmed our motel reservations for next year, hope to see you at the AM forum in 1993. **ER**

75A-4...One Piece at a Time from page 22

up. When they realized they made an error (in the tuning rate), they had to come out with this accessory knob." Collins offered an optional add-on black plastic knob and 4-to-1 gear reduction mechanism which could be mounted on the front panel in place of the original knob. "It was an after-thought. It should have been done inside, with a gear train."

When K built his 75A-4, "That knob was not available at the time. I had left Collins and returned to school, but I had a junkbox full of stuff from the vernier mechanics of old (military surplus) BC-375 units." K built his own gear reduction mechanism. With a 7-to-1 turn ratio, it's nearly twice as slow as the Collins add-on vernier, though it's also a bit stiffer.

He turned his drive with a big generic black plastic knob. "For years I ran it with just that knob on the vernier drive." The knob didn't hide all of the gear assembly, though. " I got tired of looking at it and decided 'I've got to have something prettier than that'." K found an aluminum bar. He spun it on a lathe to make a metal skirt to back the knob. "What you see is what you get."

What I got is a standard-looking 75A-4 with a distinctive black and silver knob that tunes nice and slow. Through the years, I modified his radio. "The 15 meter band moves slightly in later models and later models have different dial decals and different crystals. I changed mine from old to new. It has a circa 1961 dial.

He also replaced the mixers with quieter tubes. "Those 6BA7 mixers are bad news -- they hissed and roared at you all the time."

K isn't sure how much money he saved. But he notes that new 75A-4s were selling for more than $700 when the model was discontinued in 1957.

"I like to think the changes I made to it improved its longevity." Collins built a fine radio in the 75A-4. So did K. **ER**

RME-69 from page 11

that nothing was perfect and to stop complaining.

The AVC is obtained from a typical dual diode detector circuit. The BFO is injected into the plate circuit of the second IF. The manual suggests that AVC can be used on CW as well as phone, possible because the BFO injection pushes the R meter only up to R 5. Later receivers use much higher injection which improves CW (and SSB) reception, but which cuts back receiver gain severely if the AVC is left on.

If you get an RME-69, be prepared for its high impedance audio output. The audio output transformer will match 4000 and 600 ohm loads. If you want to drive a speaker, better look around for a matching transformer, or an RME speaker if you are a good scrounger. Plugging in headphones cuts off the 4000 ohm output, but not the 600 ohm line. You may want to change this if you are using a 600 ohm to voice coil matching transformer like I am.

An unusual feature of the '69 is a Phone Monitor. Provision is made on transmit to inject a signal directly into the diode detector via a short, auxiliary antenna. The operator can thus monitor his transmitter's audio through the receiver's detector and audio amplifier. To activate this feature, one must pull out on the audio gain control knob. This also cuts B+ to the local oscillator and RF preselector stages, disabling the rest of the receiver on transmit. This is one more example of a feature "well known only to those who know it well."

With 6500 RME-69's built, your chances of finding one should be pretty good. If you want a vintage receiver that will still turn in a very credible performance, be sure to look for an RME-69. **ER**

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VINTAGE EQUIPMENT ONLY

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DEADLINE FOR THE JUNE ISSUE: JUNE 3

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

FOR SALE: FET multimeter AN/USM-223 (ME-297/v). Ranges - AC/DC 20K ohms/V, 10K ohms/V, (measures up to 5K volts, 10 amps DC), ohms x 10,000. Completely overhauled, calibrated, fresh batteries, test leads, adapters, instruction sheets and schematic. Ideal for RF applications, military's finest multimeter - $49.95; Military tech manual listings, largest stock in the world, over 50k - $5 refundable with first order. SASE for inquiries. Lee Frank, POB 10776, Harrisburg, PA 17105-0776.

WANTED: Schematic or repair data for RCA Master Voltohmist, model WV-87A. John Kelley, 1175 Leisure Way, Lacey, WA 98503. (206) 438-5080

WANTED: Espionage equipment. Historian purchases spy radios, code and cipher machines and any equipment, devises or manuals pertaining to the world's intelligence organizations. Keith Melton, Box 5755, Bossier City, LA 71171. (318) 747-9616

WANTED: Howard 490 for parts; Hammarlund HQ-200 rcvr. Greg Richardson, WA8JPC, POB 405, Gallipolis Ferry, WV 25515.

FOR SALE: AF-67 and PMR-8 w/manuals - $100 for both; Heath DX-35 w/VF-1 vfo - $40; Knight vfo - $20. George Krickovich, W2YJ, 3654 Bowen Rd., Lancaster, NY 14086. (716) 684-3562

WANTED: For Hammarlund SP-600, RF input assembly T-11. Donald Spreeman, 542 E. 20th St., Kaukauna, WI 54130. (414) 766-1175

WANTED: No. 20 wire, enamel/cotton or double cotton covered. Can use up to 10 lbs. Alan Smith, 6368 Charing St., San Diego, CA 92117. (619) 268-3620

FOR SALE: HQ-170AC - $150; Collins 312B5 - $295; DX-100B - $150. **WANTED:** Any gear that does not work. Cliff Fleury, AI7Y, 64174 Tumalo Rim Dr., Bend, OR 97701. (503) 382-9162

FOR SALE: Modulation xfmrs, sizes from 10 watt to 1 KW. Send for list. W7SC, 2211 Bergeson, Boise, ID 83706.

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FOR SALE: Used technical books - radio, electronics, military, test equipment, catalogs, etc. List- $1 (stamps ok). Softwave, Dept. ER, 1515 Sashabaw, Ortonville, MI 48462

FOR SALE: Collection of 300+ rigs, PU only, all manufacturers - $20,000. Mike Horvat, POB 73, Stayton, OR 97383. (503) 769-6088 8 AM to 8 PM PDT

WANTED: Collins 32V-3, SC101 in good condition. Will pickup or ship. Chris Pezzutti, N8FWY, 11866 Kennington Sq. W., Pickerington, OH 43147. (614) 292-6990 days, 837-2838 eves.

FOR SALE: PPS-4 port. mil. field radar set. Used to detect troop movements. Rare, early example of portable radar. This is not junk, but high qual. mil. gear. - $500 for the complete set. Also collecting early radar equip. Buy and sell. Allan H. Weiner, 14 Prospect Dr., Yonkers, NY 10705. (914) 423-6638

FOR SALE: Paco T-60 tube tester; Sylvania 500 TV SWP/GEN; coil 'G' (180-430 Kc) for HRO-7 - $25 each plus shpg. Mohr, W3NCX, 1005 Wyoming, Allentown, PA 18103. (215) 435-3276

WANTED: ART-13 low freq. oscillator, 0-16/ART-13 (200-1500 khz). Thanks. Tom Smith, N5AMA, 13034 Elmington Dr., Cypress, TX 77429-2062

FOR SALE: Very thin shielded wire. Ideal for preamps or IF amp wiring. Two individually insulated stranded #32 inner conductors with a flexible shielding braid. No jacket. 65 cents per foot. Minimum order 10 feet. Please include $2 for shpg. V.P. McGinn, WA2QAP, 10714 E. 20th St., Tulsa, OK 74128.

WANTED: Hallicrafters SM-40 S-meter; mobile ps for Heath HR20-HX20. Bill Swiger, Rt 1, Box 142A, Bridgeport, WV 26330. (304) 842-4635

FOR SALE: New Eimac 4-400A's - $120/pair; Collins 618T tech. manual - $25; AN/WRR2/FRR-59 tech. manual - $20. **WANTED:** ART-13 LF oscillator or cover panel; ARB control box. Tom Brent, Box 1552, Sumas, WA 98295.

WANTED: HRO-60 coils type "G" and WE/ALTEC 755A spkrs. Barry Nadel, Box 29303, San Francisco, CA 94129. (415) 346-3825

FOR SALE: Lafayette radio operating and service manuals, schematics etc. If I don't have it,they never printed it. Pete Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964

FOR SALE: Clegg Zeus 2-6 meter xmtr, 100 watts, no power supply - $150. S.T. Carter II, W4NHC, POB 033177, Indialantic, FL 32903-0177. (407) 727-3015

WANTED: Hallicrafters SX-73 in excell. to mint cond. Ray Sumperl, POB 061444, Palm Bay, FL 32906.

FOR SALE: Collins KWM2, WE, no ps - $300; Elmac AF-68 - $50; Heath DX-20 - $10. U pay shpg. Gary Elliott, NO5H, 808 Clarice St., Delhi, LA 71232. (318) 878-8032

FOR SALE: Heath SB-10, no manual - $35; Electro-Voice 674, dyn. cardioid mike - $25. shpg included. Warren Dittmer, K2LXW, 10 Revere Rd., Ardsley, NY 10502. (914) 693-1040

WANTED: 'E' coils for the HRO-5TA-1, HRO-7R, HRO-50R and the HRO-60. I have a HRO-5TA-1 'F' coil for trade for one of the above. Peter Brickey, 25269 Terrace Grove, Los Gatos, CA 95030. (408) 353-1925

WANTED: CND 20131 power unit and manual for RAL-6 Navy rcvr; xtal calibrator for NC-300 rcvr. F.W. Nicholas, POB 37094, Phoenix, AZ 85069. (602) 864-9987

FOR SALE: Collins 204-A1, 5KW linear amp. Pair of 4CX1000A's in final, 6 ft commercial rack. Offers? Local pickup only. Jack Alley, K1SMM, 2100 Miscindy Pl., Orlando, FL 32806.

WANTED: 6 Meter gear, AM, CW or SSB. Clem Duval, W8VO, 33727 Brownlea Dr., Sterling Heights, MI 48312. (313) 268-2467

WANTED: Collins 30K-5 and remote control 177L-2. Tracy, WB6TMY, Box 4694, Santa Rosa, CA 95402. (707) 527-8124

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WANTED: Manual for HP600B; 3TF7 tubes; meters for R390A; TEK 465 or 475 scope, must be in very good cond. Clark Hatch, WØBT, 2546 SE Peck Rd., Topeka, KS 66605. (913) 235-2721

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

FOR SALE: Widow of Bill, W2SOT, asked me to sell: 32V-2 with manual; HQ-120 receiver with manual; scope from kit, model 10-102 with book; Eico signal generater 75 khz - 150 Mhz; Realistic Hi-Compliance 4" speaker, 80-15 khz, 8 ohm; muffin fan 115V, 60 H, 14 W, 4 3/4"; Icom mike IC-SM5 Electret TT Talk; 100 Khz crystal bar, 8 prong; 10 cans, each 100Mf @ 400V, 150 @ 350, 20 @ 250, 50 @ 250; 15 rectifier boards, 8 hi P diodes w/47K resistors and 0.001 ceramics; soldering gun, 2A @ 120V WEN #288; wall plug DC, 12W, 9.75V @ 650 ma & 5W, 9V @ 9 ma; Eimac 304TL, Kenrad pr 813s, EL8; Lafayette HE-45A 6M transceiver. None modified. George, W2WLR, (800) 724-7460

WANTED: RZ74, R389, R390A, R1433, R1513, others. Will purchase or trade: SX-100, R46B, manual copy; S-95; Telefunken 3-band; USN (National) RAS-5 complete. Gene, (800) 872-9680

WANTED: Manual for Heathkit DX-20 and DX-35, copy ok. Will pay for copying. Thanks. Alan Barlow, WA6FMZ, 8838 West Hill Dr., Pinon Hills, CA 92372. (619) 868-5994

FOR SALE: National VFO-62, good w/ manual, working cond. unknown - $40 OBO. Ed Turner, 174 1/2 East Main St., East Palestine, OH 44413. (216) 426-4968

FOR SALE: DX-100, needs work - $25; unique 13 tube homebrew 20-40 meter rcvr by W3QLV (SK) - $50 PU only. Jim Miccolis, NZ2Y, 126 Summit Ave., Upper Darby, PA 19082. (215) 352-5247

WANTED: NC-300; KWM2/2A/312B5; Gonset Twins; Collins 62S1, any condition. W3KC, (215) 449-5205 eves.

ELECTRON TUBES FREE 1992 Catalog, over 2,000 types in stock. **Electron Tube Enterprises,** Box 311, Essex, VT 05451. (802) 879-0611, FAX (802) 879-7764

WANTED: WW II military sets, racks, etc. Finders fee paid on non-owned sets purchased. Sam Hevener, "The Signal Corps", W8KBF, 3583 Everett Rd., Richfield, OH 44286. (216) 659-3244

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

WANTED: Ranger I mod xfmr or junker Ranger I; vfo knob for Ranger. Bernie, WA6HDY, 300 James Way, Arroyo Grande, CA 93420. (805) 481-6558

FOR SALE: Sprague TO-4 cap checker - $60; Heath HW 12A w/HP23 - $60; Hallicrafters S-38B - $35. Bob Kemp, Box 470, Lake City, MN 55041. (612) 345-5345 days

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FOR SALE: QST, the Vintage Years: 1945 to 1970, complete. Also Ham Radio magazine, complete. Will not break up a set, but will sell either set separately. Best offer. Ken, WB9OZR, 362 Echo Valley, Kinnelon, NJ 07405. (212) 512-1866 days, (201) 492-9319 eves.

WANTED: Johnson Viking Mobile w/ps, vfo and mike. Marty, N2QGU, (516) 374-6965 days, 223-6630 eves.

WANTED: Early HRO, clean required, operating cond. desired. Bob Gunshor, KD9B, 1025 N. Vine St., W. Lafayette, IN 47906. (317) 743-4053

FOR SALE: BC-610, 3 extra finals, custom made speech amp, DowKey relay, other extras too numerous to mention. Chuck, KØRFQ, (417) 863-7415

WANTED: Old dead linears, tube type. N6TSI, (619) 365-7224

CLASSIFIEDS

FOR SALE: High power roller inductor, square copper, with counter - $60; Hallicrafters S-20R - $55; dual capacitor, 150 pf/section, 0.13 spacing - $20; tubes CWL-860 - $15; F.T.C. F-102 - $15; VTVMs - RCA Senior Voltohmyst, HP-410BR, Ballantine 310 - $25 each; FM sig gens 25-470Mcs, Measurements T-1034A, 560FM - $50 each; HP 200AM audio osc. - $30; Hallicrafters R-42 spkr, clean - $50; Apelco AE-25M ship-to-shore, 5 channels - $20, pr for $35. Shpg xtra. George, WA7HDL, (208) 756-4147

WANTED: Collins 32V-3 and 75A-4. Robin, AF6CP, (808) 488-7214

FOR SALE: L&N XL 630 2 pin chart recorder - $300; HP 5245L, 5253B, 5262A - $185 for all. For list of many L&N units send SASE. Buddy Herring, 1310 Andover Rd., Charlotte, NC 28211. (704) 366-6600 after 7 PM

WANTED: Hammarlund HC-10 converter and a Q-Multiplier. Richard Gardenhire, (407) 453-5724

WANTED: VFO to drive Adventurer. Prefer Knight, Heath or Eico kit. Bill, N5LMX, POB 92007, Tillicum, WA 98492.

FOR SALE: Synchronous detector for 455 Khz IF rcvrs. Dramatically improves AM: Reduces fading distortion, selectable sideband cuts interference. Kit: $139. Built/tested: $199. Info: $3. Steve Johnston, POB 3420, York, PA 17402-0420.

FOR SALE: HQ-145X, excellent - $135; 814, used - $15; SB-10, good - $40; AR22XL rotor, excellent - $50. **WANTED:** Cabinets for 75A/51J, GPR-90. Bill, KE7KK, 6712 Lake Dr., Grand Forks, ND 58201. (701) 772-6531

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FOR SALE: National HRO-500, excellent condition, works great - $1100; Collins 51S1 and 55G1, RE -call; Drake R4C, T4XC, AC4, MS4, all like new, realigned by Drake July 1991- $550; Rare Hallicrafters FPM-200 xcvr, 80-10M, only about 150 made, sold for $2900 in 1963, excellent condition - $500. Also other rigs and stuff available. James A. Weil, 15915 Armada Center Rd., Romeo, MI 48065. (313) 784-9860 till 10 PM EST.

WANTED: An Eico 753 w/ps. G.D. Van Nortwick, K8TTK, 145 N. Rocky River Dr., Berea, OH 44017. (216) 234-6324

FOR SALE: Heath HR-10; DX-60A w/extras; Hallicrafters S-77A. **WANTED:** HRO-5 or 7 w/ coils, ps and spkr. Jim Leathem, K7BTB, POB 50355, Parks, AZ 86018. (602) 635-2117

FOR SALE: Miscelaneous equipment, parts, magazines, manuals. List - $.75 in coins. WANTED: Collins SM-1/2 or 3 mic; any Collins literature. Joe Orgnero, VE6RST, Box 32, Site 7, SS 1, Calgary, AB T2M 4N3. Canada (403) 239-0489

WANTED: Manual for Collins ARC-2 WW II xcvr. Don Cossaart, 21194 7th Pl., W, Bradenton, FL 34209. (813) 795-3731

FOR SALE: Miscellaneous odds and ends, antique radios and parts. LSASE for list. Hidyne Research, POB 3342, Williamsport, PA 17701. (717) 326-2148

WANTED: 3.75 Kc crystal filter for Heath SB-303. Ed Sauer, KC9SP, 787 N. Peterman Rd., Greenwood, IN 46142. (317) 881-1483

WANTED: Hammarlund SWF 4 and 5 pin 1 1/2" coil forms; late 1930's 455 kc IF xfmrs. Pete Hamersma, 87 Philip Ave., Elmwood Park, NJ 07407.

WANTED: Manual or copy for Heathkit Ham-Scan scope and IG5280 RF oscillator. Will compensate. Roger Zaun, W9UVV, 4902 W. Parkview Dr., Mequon, WI 53092. (414) 242-4931

FOR SALE: Superior tube tester, model 1130-S, test tubes 4,5,6,7 and octal bases, case is in good cond. - $35 plus $5 shpg; Electro-voice mic desk stand - $5 plus $3 shpg; coil forms for SW-3 and Pilot shortwave radios, information packets for both radios, list for SASE. **WANTED:** Tube set up information and user manual for a Simpson Roto-Ranger, model 220; Clinton or Universal battery radios. James Fred, R1, Box 41, Cutler, IN 46920.

WANTED: XCU-300 xtal calibrator for NC-300; any mods or andenda by National for NC-300; copy of manual for National HRO-5TA1. W3BPZ, 1039 N. 21st St., Allentown, PA 18104. (215) 437-1608

WANTED: Tech manual for AN/FRT-24A xmtr. NAVSHIPS 0967-009-2020 Vol. I. W6RNC, POB 478, Nevada City, CA 95959.

CLASSIFIEDS

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

FOR SALE: NC-183 rcvr; G-66 rcvr; 2B w/Q-multiplier rcvr; HT-37 xmtr (2); HT-41 amp. Write for more info. **WANTED:** NC-303 rcvr; DX-100 xmtr; Ranger I or II. Chuck, WØIUH, 9917 Irving Ave., So., Bloomington, MN 55431.

WANTED: HQ-140XA schematic. George Merryman,4103 Pratt Dr.,NewIberia, LA 70560. (318) 365-5884

FOR SALE: Collins mech. filters from R-390, work fine in 75A-4. Set of 4 (2,4,8,16 Khz) - $90. Larry Asp, VE3DRA, (416) 722-5853

FOR SALE: Viking II w/122 vfo - $150; Gonset Twins, no mod. or ps - $50; Gonset GSB201 MK 3 - $200 OBO. **WANTED:** SX-100; SX-96 and manual for HT-46. Jack, K4GYK, (904) 755-0318

WANTED: Does anyone know of a 6B8 metal tube in any piece of gear except BC-348? Ray Larson, 12241 1/2 Gorham Ave., W. Los Angeles, CA 90049-5214

FOR SALE: New Collins parts: 30L-1 blower motors - $35; 51S-1 PTO osc., 70K-7, P/N 522-2918-000 - $200; silver plated 30S-1 tank coils - $7. Dennis Brothers, WAØCBK, HC 84, Box 1, Potter, NE 69156. (308) 879-4552

WANTED: E.F. Johnson milliameter; Collins 51S1; Taylor 203Z; E.F. Johnson bug; Collins spkr; vernier knob; LM-13 calibration tables. Brian Roberts, K9VKY, 3068 Evergreen Rd., Pittsburgh, PA 15237. (412) 931-4646

FOR SALE: Hallicrafters (Navy) RBK 16 - $175; Penta PL6569's (3) - $125 each; CUE 860's (4) - $40 each; ARC-5 System Service Manual - $50. Steve Harmon, N9IGF, (812) 474-0842

WANTED: Help! I need information about the Multi-Elmac Company. Would like to talk to any former employees. Please contact Lea Salter, KN4JW, 310 So. Park Dr., Spartanburg, SC 29302. (803) 582-8237

WANTED: 6L6GX or HY6L6GTX tube. Have cash or parts to trade. Bob Mattson, 10 Jane Wood Rd., Highland, NY 12528. (914) 691-6247

WANTED: Collins SM-2/3 microphones. Mike Student, KB7TH, 6585 Canoe Hill Dr., Sparks, NV 89436. (702) 673-2046

CLASSIFIEDS

FOR SALE: Rare 1940's Meissner TRF AM-BCB Hi-Fi tuner, good shape - $35; Sideband Engineers SB2-LA, 1 KW ham SSB linear, matches SBE-34, excellent - $125. Plus shpg. Ed Romney, N4DFX, Box 96, Emlenton, PA 16373. (412) 867-0314

WANTED: For SCR-284 (BC-654): GN-45 handcrank gen. (complete or part); con. cable CD-501; PE-104 vibrator ps; 6 volt synchronous vibrator for same (VS-3); any other parts or accessories. Tom Horsfall, WA6OPE, 1862 Tulare Ave., Richmond, CA 94805. (510) 237-9535 eves. or wknds

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FOR SALE: Hammarlund HQ-140X; National HRO-60; HRO-50T1; NCX-3; Collins 310B3; Drake SPR-4; Gonset Comm. III; Hallicrafters S-76; SR-150. Carter Elliott, WD4AYS, 1460 Pinedale Rd., Charlottesville, VA 22901. (804) 979-7383

WANTED: 1942 edition,"Radio Engineers Handbook", F.Terman; Radio Physics Course book by Ghirardi; NC-183D. Mike, AC5P, POB 33, Bartlesville, OK 74005. (918) 333-2795

WANTED: 1910-1930 Gov't & Amateur Callbooks. Bob Arrowsmith, P.O. Box 166, Annandale, VA 22003.

FOR SALE: National NC-125 - $80; Hallicrafters S20R - $40; Matchbox tuner, 275 w - $85; MFJ differential tuner, 3 KW, as new - $125; Collins filters for 75A-4, 3.1 kcs. - $45. Jerry Boles, N5KYE, 14857 Redbud Ln., Piedmont, OK 73078. (405) 373-2228

FOR SALE: Units to assemble 1960 RCA type SSBR3 diversity rcvr. Less rack. New cost $35,000., now $2,000. plus UPS. J.M. Etter, 16 Fairline, East Quogue, NY 11942. (516) 653-5350

WANTED: Collins KW-1, KWS-1, KWM-1, R389, R390a, 75A-4 with 3 filters; SX-115. F.H. Werry, DJ3OE, Saturnweg 18, D-4056 Schwalmtal, Germany. phone: 01149-2163-20528, FAX: 20552. 24 hrs., will call back.

ELECTRIC RADIO PARTS UNIT DIRECTORY

At this point the directory has 200 units in it. If you need a part for a vintage restoration send $2 and an SASE (.52 postage) for the list. If you have a parts unit, consider putting it on the list. Your dead unit can help bring others to life!

CLASSIFIEDS

WANTED: Machine shop work. Knobs shafts bushings, etc. made to your sample or drawing. Reasonable. Jim Dill, Box 5044, Greeley, CO 80631. (303) 353-8561 evenings.

FOR SALE: Parts by mail since 1954. Vintage parts available. Send stamp and request "Vintage Flyer". USA only. Bigelow Electronics, Box 125, Bluffton, OH 45817

FOR SALE: Scott 12 tube Allwave, coils and ps, no cabinet, PU only - $300. Jim Barrows, W7BCT, 15121 41st Ave., SE, Bothell, WA 98012. (206) 337-4880

WANTED: Manual or copy for Heathkit HR10B, HW12A; info on military VHF amp AM494/GR; need ps info for Elmac AF-68. Al Norton, K7IEY, 1008 Liberty St., Lynden, WA 98264.

FOR SALE: Atlas 210X & console ps; Globe Champ 300; TBS-50A & ps. All have manuals and are very clean. Gene, W7MXM, (208) 522-5854

WANTED: Viking I, II, 122 vfo; Apache; DX-100; Ranger (all VGC + please); DX-100 for parts. Todd Zelasko, KA8GEF, 9401 Grand Division, Cleveland, OH 44125. (216) 883-5134

FOR SALE: Like new BC-1306 w/manual & connectors - $95; KWS-1, late SN - $800; 310B-1, has been modified - $75. Joe Sloss, K7MKS, (206) 747-5349

WANTED: Qty of Johnson ceramic transitting tube sockets, 4-pin bayonet type for tube display purposes. John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455

FOR SALE: (4) E.F. Johnson isolantite 50 watt sockets - $7 each; (4) E.F. Johnson isolantite octal sockets - $3 each. All brand new. Bill Riley, (503) 345-2169

WANTED: National SW-3 coils; un-paired bandspread coils or non-working ok; coil forms; S-101 audio xfmr; Hallicrafters HT-1, HT-2, HT-4; Drake 1-A tuning knob, NB-7 card; Meissner Deluxe Signal Shifter coils 160M, 40M, 20M; #10 tubes. Rich Oliver, KC9CQ, POB 1872, Flagstaff, AZ 86002. (602) 774-7527

FOR SALE: Majestic variable frequency generator M-100, No. F-64619, 115 VAC, complete with four electrodes and two spare United Electronics Tubes No. 4C22-HF100. O.T. Hinton, Jr., 115 Hagood St., Pickens, SC 29671. (803) 878-9750

WANTED: NC-300TS matching spkr cabinet for NC-300 rcvr. Tom Jurgens, KY8I, 3920 Jim Dr., Bridgeport, MI 48722. (517) 777-2257

FOR SALE: BC-610 RF deck cabinet. **WANTED:** Sylvania 6J6 tubes; clean Viking Ranger, preferably Ranger II. Rick, K8MLV/0, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

WANTED: Western Electric mid 1930's aircraft xmtr 138, 208 rcvr, 53A test set and manuals; W.E. 282B and 254B xmting tubes. Charles Preston, K4LJH, 48N. Ivandale St., Hamilton, VA 22068. (703) 338-4152

FOR SALE: Tube testers - I-177 - $30, Heath TC2 - $20, Knight - $20; RT-594/ARC-38A, AM/SSB/CW, 100 W, w/2 control boxes (see ER, Oct. 90) - $120; SP-600 vernier knob - $75; new GE 813's - $15 each; new variacs, panel mount, 500W and 1 KW - $15 and $25 each; Globe Champ 300A, complete except for cabinet and tubes - $120; dynamotors #4151 12/24 volt, new for IFF equip - $15; Eicor 12V, used - $10; Heath monobander 75M SSB - $25, HP23A, w/books - $40. Roger Faulstick, KD4AS, 210 Mariah Ct., Merritt Island, FL 32953. (407) 453-3312

WANTED: Radio Engineering Labs xmting coils (REL) to build 1929 vintage xmtr, diameters of 3,5, and 8 inches, wound on glass, supports on bakelite rings; B&W 3400 series inductors with center link wound on brown phenolic ring supports (pge 88, 1949 ARRL Handbook under Brown & Williamson. Roland Matson, RFD #1, Box 2943, Kennebunk, ME 04043. (207) 985-3751

WANTED: Parts to convert Heath panadapter HO-13 to 455 Kc IF, #40-588 coil, #45-33 choke. Greg Lewis, WØBTW, 11415 33rd St., SE, Valley City, ND 58072. (701) 845-3441

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

CLASSIFIEDS

WANTED: Clegg Interceptor Rcvr; Zeus xmtr; Thor 6 Meter xcvr; Drake 2BQ Q-multiplier. Must be clean and working units. Brian Hemmis, K3USC, 7575 Hamot Rd., Erie, PA 16509. (814) 866-2585

FOR SALE: R-390A's, complete units in various stages of tune; partial units; modules; cabinets; repair/restoration service available. LSASE for list. AFS, Dept. E, 107 Fayton Ave., Norfolk, VA 23505.

FOR SALE: Special transformers for your vintage equipment. We rebuild transformers for all equipment. Max Kunz, Top Tech Inc., 10811 Fairbanks, North Houston Rd., Houston, TX 77086. (713) 440-9909

WANTED: Looking for info on any National HRO-500 or Squire-Sanders SS1R mods. Also need Viking Ranger manual. Pete Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964

WANTED: For National HRO-60 rcvr: Coils AD, AB, E, F, G, H and J. Also need gen. coverage dial scale for coil A, as well as the above coils. Also looking for matching spkr and xtal calibrator. Will pay top dollar for any or all of the above items. Dennis Gibbs, 3863 Beech Down Dr., Chantilly, VA 22021. (703) 631-8539

WANTED: To share a lifetime of accumulated radio - xmtrs, rcvrs, tubes, parts, etc. Cdr. Glenn W. Ritchey, USN Ret., W7SAB, 219 Naval Ave., Bremerton, WA 98310. (206) 373-9631

WANTED: Drake 1A rcvr, restorable. Art Charlap-Hyman, W6ZNO, 18151 Rancho St., Tarzana, CA 91356. (818) 342-91356

WANTED: 1 & 2 tube radios; old magazines (Radio Craft, etc.) S. Kalista, WB2LKN, 9 Maple Dr., Jim Thorpe, PA 18229. (717) 325-4120

FOR SALE: Weston 15" lab std. voltmeter, 6 ranges - $38; Western Electric 19C audio gen. - $42; WW II xmtr 604DM - $42; HP200CDRM audio gen. - $38. Richardson, WI5D, 1040 Cleveland, Stephensville, TX 76401. (817) 968-3365

FOR SALE: Front grille/panel for Collins 55G-1 w/312B-3 spkr. Make your own pre-selector for 51S1 - $50. Bill, KDØHG, (303) 823-6438

CLASSIFIEDS

FOR SALE: SCS-2 and 3 technical manuals (BC-638, 639, 640, 686, EE-99, RC-81, 93 and RM-18, 25). SASE or call for list of these and over 100 other 1940's and early 1950's military technical manuals. August J. Link, 2215 Faraday Ave., Suite A, Carlsbad, CA 92008. (619) 438-4420 Mon-Sat.

FOR SALE: Transmitting/Receiving tubes, new and used. LSASE for list. I also collect old and unique tubes of any type. Looking for Taylor and Heintz-Kaufman types. Maybe you have something to trade? Large tubes and sockets from the old Eimac line; 450T through 2000T for display. John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455

WANTED: High voltage plate xfmr (T1) for Johnson Viking II (Stancor #1781) or junker Viking II. Will pick up in So. Calif. Dick Ridinger, 3487 Bayberry Dr., Chino Hills, CA 91709. (714) 597-3865

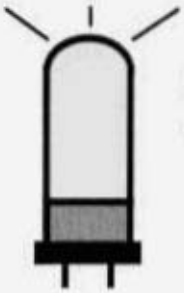
WANTED: Original manual for National NC-200 rcvr. John Chenoweth, W8CAE, 9130 Yankee St., Miamisburg, OH 45342. (513) 885-2566

FOR SALE: Hammarlund Comet Pro - $400; Echophone EC-1 - $70; BC-342; SX-101; Skybuddy - $60; BC-454B w/dynamotor - $60; BC-603 - $50; BC-645 - $150; 4-prong ceramic tube sockets - $5; new HV electrolytics and other caps. **WANTED:** 51J4. Frank Tamilio, WA1VNR, (617) 641-2055

FOR SALE: Active AM'er, KH6IRT's unsolicited comments about the Tri-Mark Receiver Marker; "What a little gem! Strictly first rate construction, and I am utterly delighted with it...I am telling as many Ham friends, both on the air and off, about your nifty products". Thanks Peter. Send a large SASE for our latest catalog of parts and kits. Visa/MC. Steve, NW2F, Two Fox Electrix, POB 721, Pawling, NY 12564. (914) 855-1829

WANTED: Looking for WW II aircraft radios and radar equipment, gunsights and bombsights.Taigh Ramey, 456 Tyndall St., Los Altos, CA 94022. (415) 941-9029

NO, I DON'T HAVE A PILOT LIGHT REPLACEMENT. THIS ONE IS SO OLD IT'LL TAKE A NEW WICK AND A PINT OF KEROSENE!



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ELECTRIC RADIO
145 CR 123
Hesperus, CO 81326

TO: