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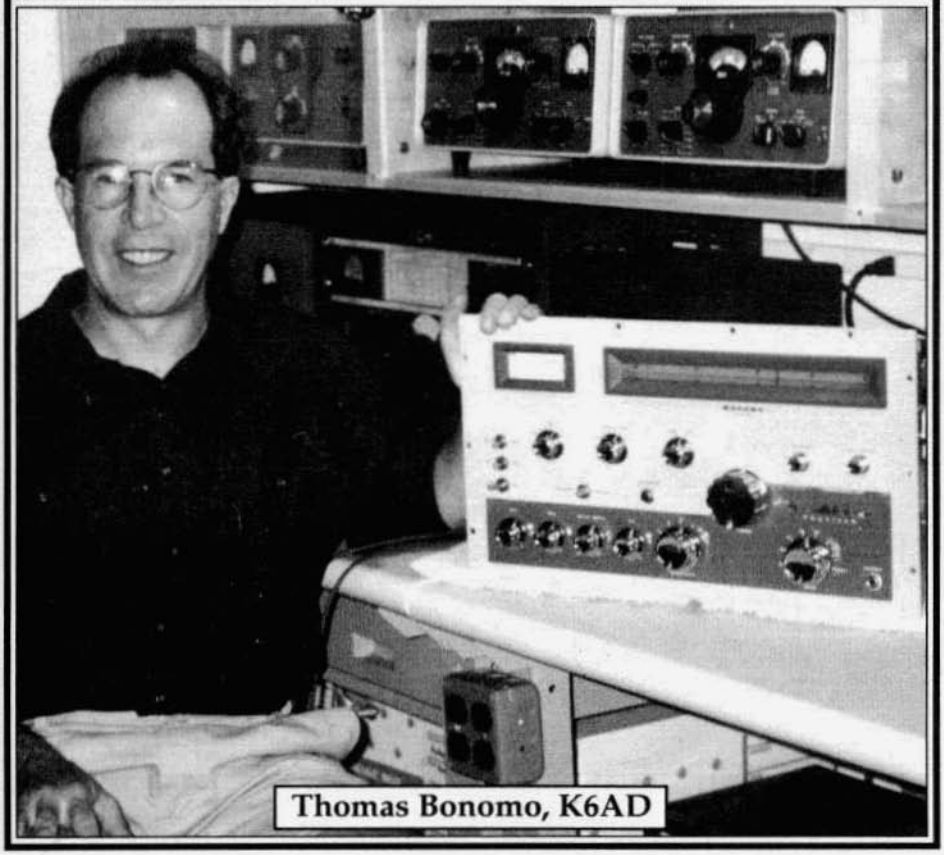
ELECTRIC RADIO

celebrating a bygone era

Number 102 October 1997



Thomas Bonomo, K6AD

ELECTRIC RADIO

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

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

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

Regular contributors include:

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

EDITOR'S COMMENTS

My wife (and office manager) Shirley has asked me to remind everyone that we've restocked our T-shirt supply to include XL and XXL. For some time we were planning to discontinue our present T-shirt design in favor of something new and 'flashy'. Our thinking was that all the people who had bought one of the old T-shirts would probably spring for one of the new ones. While I was dreaming up the new 'flashy' T-shirt design (a slow process for someone as unimaginative as myself) we kept getting letters and calls asking for the old design in XL and XXL despite the fact that we have been indicating in the ER Bookstore page that these were no longer available. Well, (to shorten this probably boring as hell story) I've decided to forego the new 'flashy' T-shirt idea in favor of our old CLASSIC ER T-shirt. So for all those who called asking for our old T-shirts; we now have them in all sizes at the same old price. See page 56 for ordering info.

Ten Meters --This is by far my favorite band and I'm anxiously awaiting good conditions. I've been thinking that it would be interesting to have a monthly report on 10-meter AM (and CW) activity here in ER. What I have in mind is a report on conditions and activity around the country and maybe other info on operating mobile, antennas for ten and so on. So I invite everyone to send in information on what they're experiencing and doing on ten. I hope (maybe in vain) that we'll have some good openings later this fall and through the winter. If that does happen it's going to give our hobby a tremendous boost and make a lot of ten-meter fans very happy. If the 10-meter column proves to be interesting we'll carry on with it all through this cycle and maybe beyond. N6CSW

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Cover: Thomas Bonomo, K6AD with his restored and modified Heathkit Mohawk (RX-1) receiver which will be the subject of a future ER article.

Looking Back

by Lew McCoy, W1ICP
1500 Idaho St.
Silver City, NM 88061
mccoy@zianet.com

I had promised I would write about George Grammer, W1DF, who was Technical Director of ARRL and Technical Editor of all the QST publications. Let me state at the outset, in my opinion, George was one of the greatest minds in electronics. He had an extremely inquisitive mind, plus a marvelous command of the English language. I could go on and on (and I will) but in all senses, he was one of the great minds in our hobby. In those days, during my time at ARRL and earlier (but certainly not later), the technical department was the place to be if one was going to work at ARRL.

George came to work at ARRL in the '30's, took a sabbatical during WW2, and returned to ARRL right after the war as technical editor. I may have related how I came to be hired in the technical department so forgive me if you have read or heard this before. I was hired during the CW/phone wars of the late 1940's as an Assistant Communications Manager in Charge of Phone Activities; man was I naive at that time. (The first job they gave me was in charge of code practice from W1AW!) I lasted about a year in the Communications Department and realized it was not going to work for me.

Dick Smith, W1FTX, left the technical department to go to work for the aircraft company in town, leaving a job open in the technical department. Joe Moskey, W1JMY, my immediate superior in the Communications Department told me that I ought to try for that open job in the Technical Department. What I didn't know but what Joe knew was that I would probably be thrown out on my ear!

In any case, I went down to the technical department and asked George if I could talk to him about the opening. George was always polite and as gently as possible told me I was not qualified. Naturally, I was very disappointed. About three or four days later George called me back into his office and said he wanted to talk to me. He had been so firm in telling me that he was not interested in hiring me that I was simply sure it was something else. In any case, he said he had heard that I had been a professional magician and entertainer in my past. (I actually was on the boards less than a year.) I told him that was true, that primarily I had worked night clubs and events strictly as a slight of hands card magician. In fact, I asked him that if he had the time I would run down to the local drug store and get a deck of cards and show him. He agreed so I came back in a few minutes with the cards.

One thing about slight of hand, misdirection is the key to all good tricks and there is nobody - I mean NOBODY - easier to fool than a scientist and George was definitely a scientist. They always look for the obvious and the obvious just is not there! Another thing, is that the cards in a brand new deck are arranged in order, in separate suits and if one knows how - and I did - it is a simple matter to false shuffle the deck and then deal out a pat poker hand. So I dealt George a royal flush (why fool around!!) and myself four nines. (For non-poker players a royal flush is the best hand one can have.) What started out that day to be a simple demonstration of my magic lasted for several hours with a rather large audience gathered around.

George later told me he wanted to see how I could handle an audience and he was more than pleased with my perfor-

mance. He said they wanted someone for a special job and they needed a person with talent such as I had (not technical) believe it or not. What the job was - and some of you may remember - I was to travel the U.S. and Canada giving television interference demonstrations showing the causes and cures. Also, just at that time, the Novice license became a real thing and George told me: "McCoy, you don't know a helluva lot so you ought to make a good Novice teacher so you can write a technical article every month and also, you can answer a lot of technical questions that come in from our members." (That last turned out to be several thousand a year). George also pointed out he didn't want me going around the department asking the writer/editors for answers. He said that one of the best libraries on radio and communications was right there in the department. Let me make it very clear that I learned and learned and learned and loved every minute of it.

George Grammer had a very appropriate last name as he was one of the very best grammarians I have ever encountered. I considered myself a fair writer but I learned very quickly how much in error I really was. I would write my technical article each month and George would then edit and give it back to me to rewrite. No matter how very, very careful I was, my copy would come back to me all chopped up. I suppose my problem was that I wanted my own style not George's but ninety-nine percent of the time the copy was much better for him having edited it. To give you an idea how tough George was, I once wrote an article and really went over it, time and again, trying to be perfect. I took it into George and later he handed it back to me all chopped up. I got a little mad and said to George, "George you would probably edit the Gettysburg Address." He looked at me with a cold stare for a minute and said, "Yes, I probably would."

When I first started writing I did an article on antennas and standing wave ratio. The copy went something like this, "When dealing with SWR you must first, etc.". George called me into his office, looked at me, and said, "What in hell does SWR mean?" I flustered and replied, "Why standing wave ratio, of course." He looked back and said, "Then dammit explain it the first time you use an abbreviation; your readers are not mind readers! I learned this lesson very well and have watched myself over the years. It drives me nuts these days when our smart computer writers throw around FTPs, protocols, and the jillions of abbreviations used in computer work, without bothering to spell them out to let the reader know what in heck is going on. Or am I wrong? Good editors are damned hard to find but "hack writers are a dime a dozen". That's a quote from George. George was a real legend. I can still see him at his desk, slide rule in hand, pipe in his mouth (did that pipe stink!), working on copy or ideas.

Phil Rand deserved tremendous credit for his work on TVI but George was really the guiding light. In fact, the story has never been told, and there are only one or two people still alive that know the facts, but the following happened. George was made a fellow in the IRE (now IEEE) for his work in SSB. While By Goodman, W1DX, who is probably reading this right now would say let historical sleeping dogs lie, the early work in SSB at the League was all done by By Goodman. Not that George didn't deserve being a fellow but I guess the IRE felt that work in SSB was more prestigious then work in TVI. George worked very hard on cleaning up TVI and worked my tail off in doing it. Filter design, shielding, harmonic suppression; George led the way.

George was pretty set in his thinking about power and antennas. He never believed in high power - 100 watts was plenty and he always argued that it was

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WW II Japanese Model 94 Mark 3A Wireless Set

Ken Lakin, KD6B
P.O. Box 310
Redmond, OR 97756
klakin@aol.com

The 94-3A is a low power set designed for field use. It was type accepted by the Imperial Navy in 1934 and in production at least through 1944. The frequency range for the transmitter is from 0.4 to 5.7 MHz and for the receiver 0.35 to 6 MHz. The frequency ranges are in five bands implemented with plug-in coils.

The single-tube transmitter power is approximately 15 watts output and it was designed to operate with a hand cranked generator producing 7 volts for the filament and 500 volts high voltage. The receiver is a five-tube superhet with regenerative detector and was run off dry batteries.

From a War Department manual (1): "Use: Suited to guerrilla warfare, since it can be used for months without replacements or battery charging. Chromium plated surfaces make it suitable for use in tropics. Used between divisions and regimental headquarters" In general the set was given high marks by the War Department in 1944.

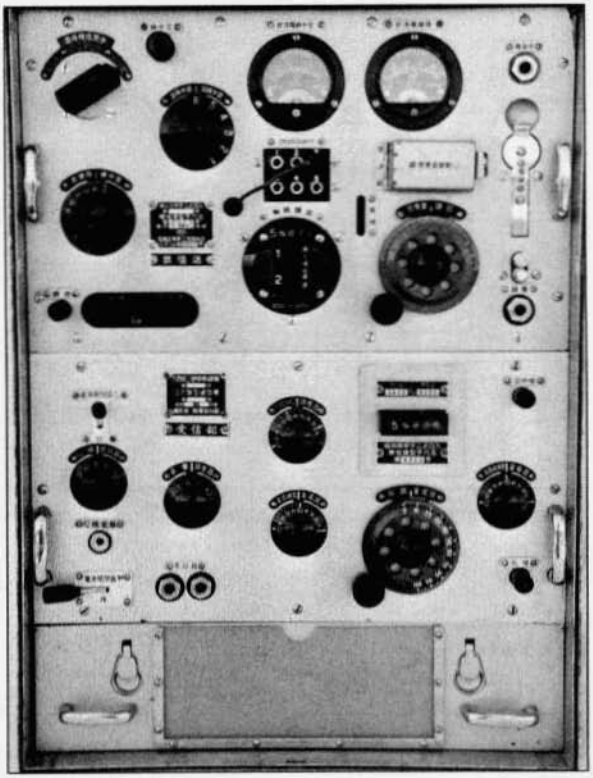
The main set, pictured in Figure 1, consists of a transmitter, receiver pair, and receiver battery drawer in individually shielded compartments in an overall metal enclosure having interconnects for T/R control. The receiver battery box houses a 1.5 volt A battery, -3 volt bias batteries, and a string of 22.5 volt batteries to make up the 90 and 67.5 volt B supplies. Banana plug connectors are use for various interconnections on the inside back of the cabinet. The cover for the cabinet is tight fitting, but not waterproof, and contains the schematic and parts list. The generator cable plugs into four combination banana pin and wire connectors on the front panel.

The transmitter front panel has the function switch for T/R control. In TRANSMIT the receiver filaments are switched off (unless overridden by a switch on the receiver) and in RECEIVE the negative side of the transmitter high voltage is removed from the keying circuit. The antenna and counterpoise terminals are grounded in the OFF position. In RECEIVE the antenna is connected to the receiver input and works against the case and external ground. In TRANSMIT the switch connects to the tuner to the antenna and a counterpoise which may be left ungrounded to the case. This feature removes RF from the chassis during transmit and makes the VFO much less sensitive to an operator touching the panel or controls.

The power on/off switch on the receiver is arranged so that the A and B voltages must be turned off before the front of the cabinet can be put in place, thus eliminating unwanted battery drain. The receiver draws approximately 1.5 watts from the dry batteries.

The set, made by NTK, is very well constructed. The function and antenna tuner switches are of the flat post and multiple wiper contact variety as found in fine laboratory instruments of the period. The variable capacitors in the transmitter are enclosed in celluloid shields. Fixed resistors are of the clip-in type, making repair and troubleshooting easy.

The plug-in coils fit with precision. The receiver RF coils and IF transformers are all shielded. The regenerative circuit components, except for the feed-



The Japanese Wireless Set Model 94-3A.

back control, are contained in a shielded module that can be easily removed for servicing. Adjustment points, such as trimmer capacitors, are sealed with red or black hard wax to prevent moisture from entering the circuit. Electrical contacts on critical elements are made with screws and wire lugs. Both receiver and transmitter use stranded wire and shellacked sleeving. The wiring is "daisy chained" between components and mostly tack soldered. The lack of "wrap around" soldering is an asset in component replacement servicing.

Keying of the transmitter is provided through a jack for an external key, an internal key that folds down from the center right side of the transmitter panel, and a polar relay accessible through another key jack.

Approximately one third of the transmitter is taken up with the antenna tuner. The extensive tuner is required by the wide range of frequencies available to the set and the use of short antennas at lower frequencies. The stock antenna was a 20-meter long horizontal wire center tapped with an 8-meter long lead-in going to the antenna terminal. The antenna could be fed against ground or a counterpoise. For most of the frequency range the antenna would be capacitive with low radiation resistance.

The antenna tuner is composed of reactive elements, including fixed and variable inductors and a variable capacitor, that are switched into six different series combinations. The variable capacitor is ganged with the variometer to save panel space. In the 80-M operation reported here, the series capacitor option was used with a small external inductor for loading into the 50 ohms presented by an external antenna tuner.

The transmitter circuit is relatively straightforward as illustrated in Figure 2. In Figure 2a the circuit is shown in simplified form, including the most interesting features, but without metering and most of the switching and T/R change-over elements. The functional circuit diagram in Figure 2b reduces the transmitter to the bare essentials. Basically this is a Hartley circuit with the optional inclusion of a crystal nearest the grid in the feedback path. In at least one reference (2) this is referred to as the Squier oscillator circuit when the crystal is used. Since the coil tap and the cathode (filament) are at the same RF potential (ground in this case) the circuit is an equivalent Hartley.

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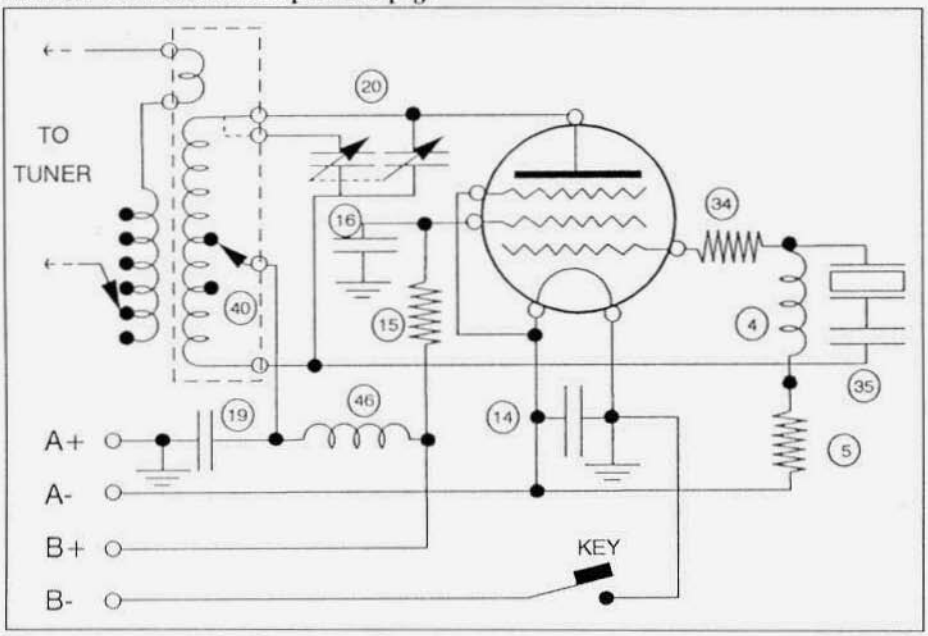

Figure 2a. Partial schematic showing essential features.

The tank capacitor is a dual stator type, having 250 pF and 460 pF maximum capacity respectively. The two sections can be paralleled by a connection within the plug-in coil as needed for a particular band.

The tank coil is made so that the plug-in element is coaxial with a fixed coupling coil wound around the plug-in coil holder. Provisions are also made for a link coil within the plug-in but this feature is not used on high frequency coil #5 that covers 80M. Six taps on the 8-turn fixed coupling coil are provided on the front panel with banana plug sockets to accommodate a plug and wire going to the counterpoise. The clever arrangement allows flexibility in coupling without the complexity of a large number of pins on the coil plug.

Also included in the plug-in coil is switch 40 which effectively changes the amount of feedback to the grid circuit.

An evaluation of the transmitter circuit was made by a series of measurements as well as on-the-air operation.

Measurements were made on the oscillator feedback circuit by feeding power into the circuit from the antenna side. A TS-430S was used as a low power signal generator for these experiments and an oscilloscope was used to measure the RF voltage at the grid and plate of the tube. From a bandwidth measurement at the grid the LC tank circuit Q was determined to be 25 in the VFO mode under light loading. The bandwidth at the grid with the crystal in the circuit was measured as 180 Hz, for an effective Q near 20,000. The tank circuit Q was still 25 as measured at the plate. The voltage at the grid end of the tank coil was measured to be 18% of that at the plate end.

In crystal control operation the LC tank circuit provides three functions; a) the necessary 180 degree phase shift to the grid from the plate, b) a fixed fraction of the magnitude of the plate voltage for feedback to the grid (voltage divider), and c) a means for efficiently coupling energy to the antenna circuit. The low Q of the tank circuit ensures efficient power transfer to the antenna

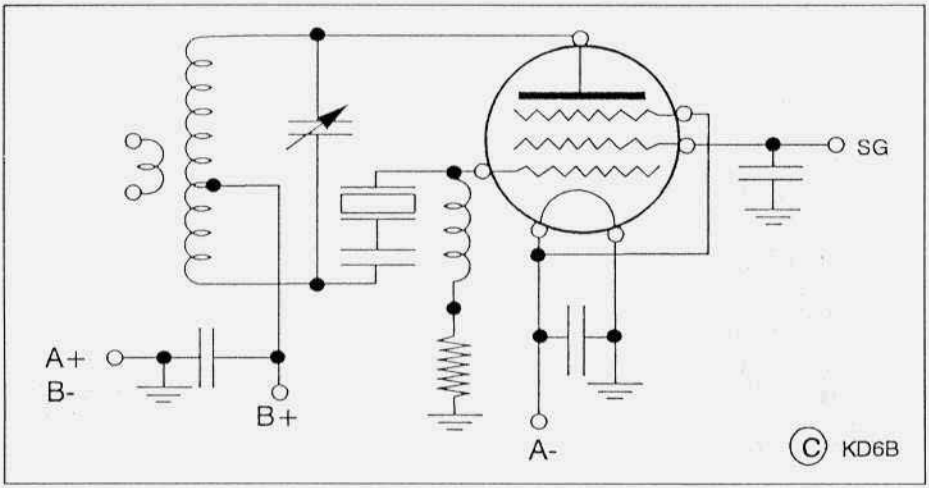

Figure 2b. Functional diagram of the most basic form of the oscillator.

while the high Q of the crystal portion of the feedback circuit ensures that the crystal has predominant control of the oscillation frequency. Consequently, the oscillator keys with very little chirp under crystal control. The signal is of excellent quality for a one tube transmitter, as verified by many on-the-air reports over the last two years, and sounds better that a lot of MO-PA transmitters.

Oscillator operation, is not perfect however. The crystals resonant frequency can be pulled slightly by external reactance and is lowered by series inductance and raised by series capacitance. Thus as antenna loading changes, such as from an antenna swinging in the wind, the antenna impedance changes are passed through the tank circuit to the crystal. This occurrence during a winter storm two years ago caused a slow frequency modulation of 50 Hz or so and prompted the report; "interesting signal you have there!".

In VFO operation the oscillator keys with a slight chirp that gets progressively worse as the loading is increased causing the feedback margin to drop. With less feedback the oscillator takes longer to reach steady state, and since the start-up chirp occurs over a longer period of time it is more apparent. The VFO keyed signal is actually quite acceptable except for frequency drift. Also, it is almost impossible to keep the VFO anywhere near the desired frequency during loading adjustments. This set was probably only use on VFO at the lower frequencies.

There are three tuning aids in the transmitter; the plate and antenna current meters and a neon glow bulb loosely coupled to the plate lead. Tuning is best started with loose coupling to the load and then progressively increased coupling until the CW note is unacceptable or oscillation ceases. It is best to periodically key the oscillator during the adjustment process to insure that it will start properly. The downside of this simple circuit is a tricky adjustment process and the nickname the 'Hardly' oscillator. Nevertheless, a great deal about oscillators can be learned from this simple but clever circuit. A well trained skillful operator could have made it work under the most difficult field conditions.

Four tube types, shown in Figure 3, were tested with the transmitter. The original 510B was operated at very low power but was considered too gassy for higher power testing (the plasma glow

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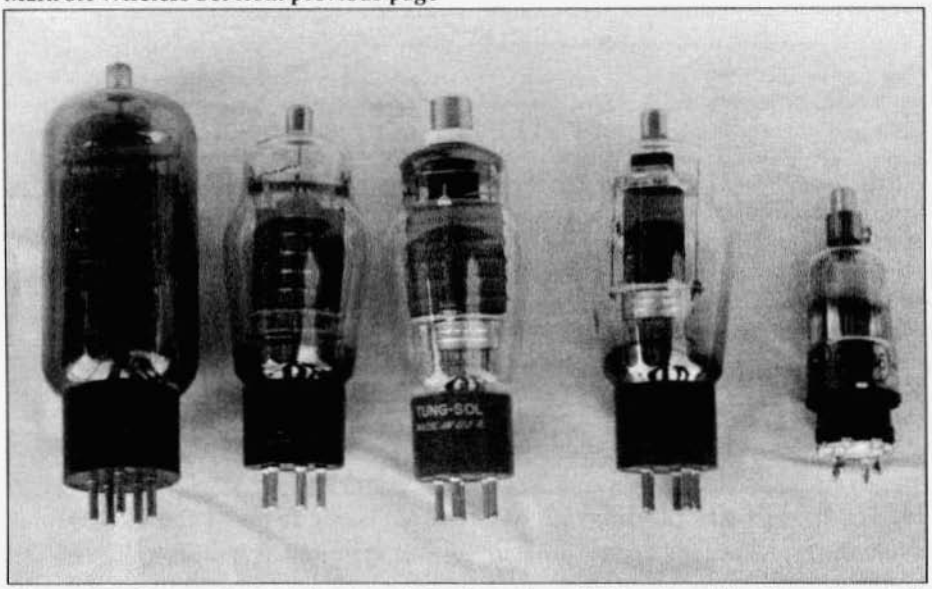

Figure 3a. Some of the tubes used in the set and plug-in coils. From the left, UY510B, 307A, 2E22, 807A, and 1N5 with grid cap and socket adapters.

was deep inside the tube!). Both the 307A (used in the BC-654) and 2E22 (used in the BC-1306 etc.) provided satisfactory operation but most operating is done with an 807 because of its low cost (Incidentally, the Japanese used a version of the 807 tube in many transmitters. Reportedly, the tube and its leads were much shorter and did not suffer from the instability of an unshielded 807 or 1625). Note that all these tubes work with direct plug-in with only the filament voltage needing to be adjusted to the correct value. The plate cap of the 2E22 also requires an adapter. Of the substitute tubes, the 307A is probably closest to the characteristic of the 510B but unfortunately the 510B was not alive enough to make an accurate comparison.

Using an 807 with 400 volts B+ and loaded to 80 mA plate current, the grid current was 3.5 mA (R15 = 10K) and the conduction angle around 80 degrees. The power output was 12 watts. Operation would be improved overall by a higher plate voltage and lighter loading for the same output power. A particular 307A operated with slightly less output for the same plate voltage.

The transmitter is keyed by grounding the negative side of the high voltage power supply. When using an external key that voltage level is on the key without benefit of a relay. The operator quickly learns not to absentmindedly adjust a Vibroplex key with the function switch in the transmit position.

The receiver is a superhet with the following stages: an RF amplifier, pentagrid converter, one 262 KHz IF amplifier, a regenerative detector running at 262 KHz, and two audio amplifier stages. Gain control is provided by adjusting the screen voltage of the RF and IF amplifier stages off the 67.5 volt supply. The RF and LO circuits are tuned by a three section variable capacitor having 180 pF maximum per stage. Front panel trimmer capacitors are used on both the input and output circuits of the RF amplifier to compensate for the lack of tracking.

The regenerative detector is a triode

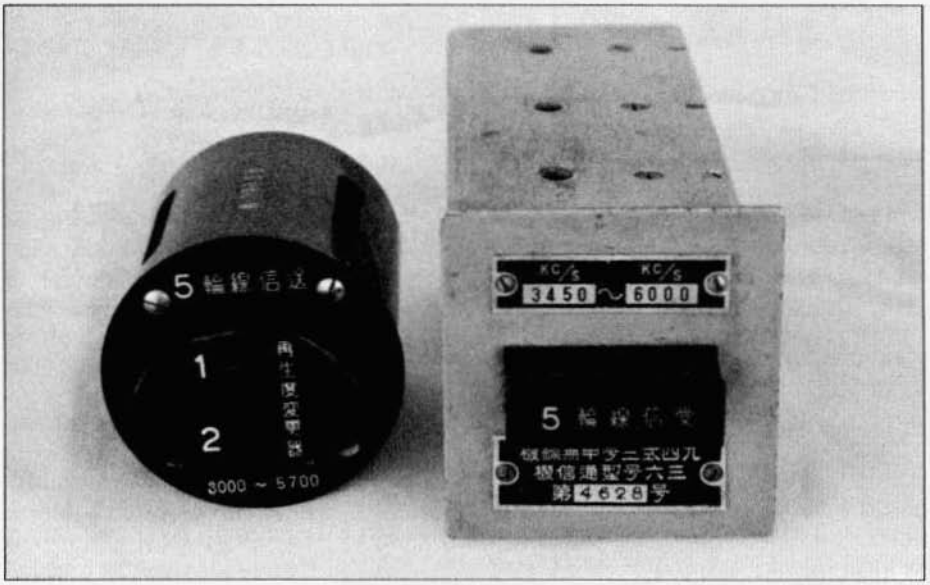

Figure 3b. The transmitter coil is on the left and three stage receiver circuit plug-in on the right.

that operates with full plate voltage (90 volts). Feedback is adjusted by a front panel variable capacitor that is in series with the plate tickler coil (Referred to in the TME as a Rheinartz detector.). This combination, superhet with regenerative detector, offers a good combination of selectivity from the front-end and IF tuned circuits with the Q multiplier effect of the detector. Consequently the receiver is very sensitive with reasonable selectivity.

Adapter sockets were made to allow the use of US tubes instead of the original Japanese tubes in the receiver. The adapters, one shown in Figure 3, consist of an octal socket attached to a phenolic disk (printed circuit board) fitted with miniature banana pins in the pattern of the Japanese socket. Two of the sockets, for the audio amplifier and pentagrid converter tubes, are of the conventional 6 pin type in which case old 6 pin tube bases were used to make the transition to the octal sockets. The result was 1N5 tubes being used for the RF and IF amplifiers, a 1A7 for the pentagrid converter, 1G4 for the detector, and 1D8 for the audio stages. The use of 1N5 required a different bias voltage than used by the Japanese tubes. The 1P5 might have been a better choice than the 1N5 since -3 volts cuts off a 1N5.

The receiver would normally use 1.1 volt tubes and a filament rheostat to drop the 1.5 battery voltage. Since the substitute tubes use 1.4 volt, a 2 volt 5 AH gel cell was used for the A battery and the rheostat used to provide the required voltage drop. This arrangement allows the A battery to run to near full depletion before the tubes began to drop in transconductance.

Alignment of the receiver was effected in the usual manner. Again the "all frequency" TS-430S was used as a signal generator with memory used to store and recall as needed the upper and lower alignment frequencies. The IF transformer was already tuned and it was not necessary to break the wax seals.

Operation of the receiver was straight

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The AM Corral at Gaithersburg

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

A major turnout of vintage radio fans and a premier Classic AM station helped celebrate the 40th Annual Gaithersburg (Md.) FARfest. The Foundation for Amateur Radio, sponsor of the hamfest near Washington, D.C., uses the proceeds to help fund academic scholarships.

This was the fourth year that members of the AM Community have established a showcase special event station here. FAR again lent its club call sign, W3PRL, for HF operations that began Saturday, September 6th ahead of the one-day hamfest on the 7th.

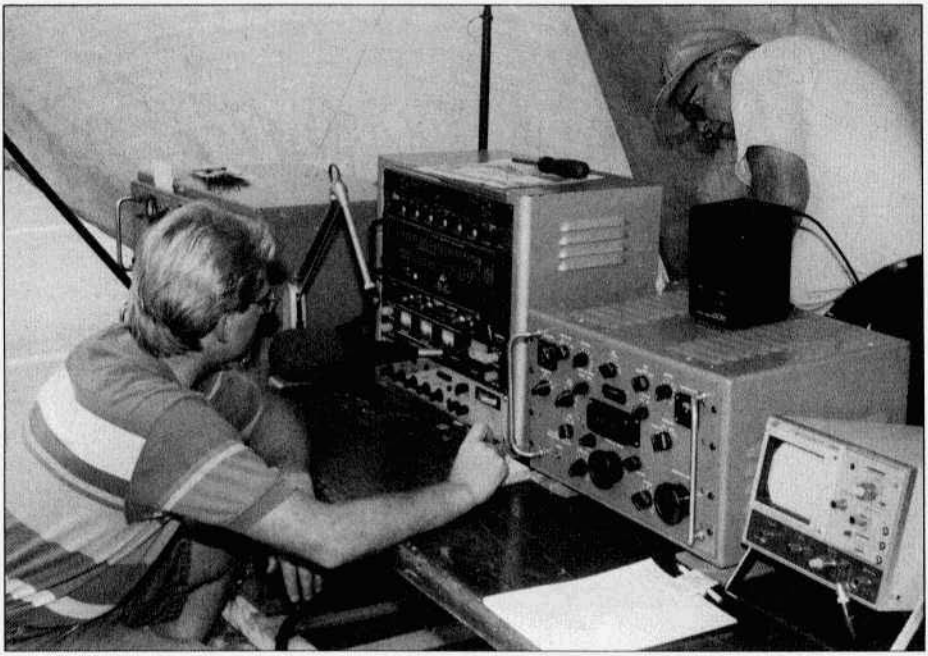
We logged nearly 140 stations on 75, 40 and 20 meters, exclusively on AM. The hamfest and anniversary celebration coincided with AMI Discovery Weekend.

W3PRL exchanged AMI certificate numbers with quite a few stations, using the author's No.7. The Foundation is one of the largest mainstream ham clubs in the country. It plans to join AMI, and may become the first club station with a certificate number.

The transmitter was a modified T-368 from Dennis, WA3YXN, who has made some changes to improve the audio quality. An audio rack from Steve, WB3HUZ, took full advantage with a broadcast audio compressor, a touch of EQ, and a mixing console for two Sennheiser dynamic microphones.

The receiver was a 1967 R-390A, in the matching cabinet first deployed during the Dobbins Island AM Expedition (ER, Sept. '93). High quality receive audio came from the stock "di-

Some of the AM gang. *Photos by the author.*



Steve, WB3HUZ and Norm, N3RZU put W3PRL-AM on the air Saturday.

ode" output, driving an external amplified loudspeaker.

The FARfest has long been one of the largest in the mid-Atlantic region. In recent years it has become one of the major gatherings for AM-ers from the eastern part of the U.S. and Canada. We noted about 50 members of the AM Community in attendance during the weekend.

Special coverage and promotion of this year's event included mentions on the Newsline ham radio service, in the ARRL's operating bulletins, and on Gannet-owned Channel 9 television in the Nation's Capital.

In addition, the WB3HUZ Internet page provided advance station schedule, equipment details, directions to the site, and subsequent snapshots and logbook tally. Steve's AM page is at <www.thebizlink.com/am>.

The station was situated along the promenade in a highly visible location. The site bordered a wooded, park-like area where we placed tents, chairs and the "AM Corral."

This term dates back to the Hosstrader's hamfest at Deerfield, New Hampshire. Until it relocated in 1992, this was considered the biggest AM draw in the northeast. We hope to keep up the tradition.

Among the high points this year, a trio of broadcast engineers stopped by Sunday as they cruised the hamfest. Inactive for about ten years, each took a turn at the mic, impressed at the setup and inspired to "get back on" the air.

We hope to eventually hear the return of Tom, K7QA, Ron, KAØPQU, and N3JVX after our pleasant eyeball contact at the hamfest.

Gladly participating in the QSO was Jim, K9RJ near Chicago, whose own high quality audio and strong signal from a Collins 30K-4 completed the demonstration in fine style.

Several times during the Sunday fleamarket, the operators of W3PRL

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The AM Corral at Gaithersburg from previous page

The Radio Camp at the AM corral.

would turn from the controls to find a semicircle of onlookers standing there regarding the scene.

At times like this, someone from the AM group would step up to answer questions, point out the AM Windows, and see to it the bystanders were warmly invited to take part. This allowed the operator of the moment to concentrate on the air signal.

The local audio system included a commercial quality loudspeaker driven by an amplifier which was connected to the hi-fi terminals of the R-390A. This allowed extended bass response and crystal-clear treble to project toward the fleamarket crowds. Many people were drawn to have a closer look.

Also during the hamfest, several tailgaters had tuned a variety of battery operated receivers and transceivers to W3PRL, to help demonstrate reception with their own rigs and to simply provide color as people walked by. What a kick to hear our station from all corners of the 'fest.

Another nice moment was when a young boy stopped by, asking a few questions. The story from Joe, WA3GMS:

"One of my biggest thrills was to see the enjoyment of one of the young operators who started off logging for me. Unfortunately I don't remember his name. He told me that he was working on his license.

"His interest for the AM mode was nothing less than passionate! After I operated a bit, he asked if I could act as a control op and let him operate? Seeing his enthusiasm, I couldn't say no.

"So he took over the controls at W3PRL and proceeded to shake like a leaf with the jitters, but you could just see the thrill that the AM operation was for him.

"It brought me back to when I was about 12 years old and I first operated the big homebrew rig at the W3FDY station. Only in time will he fully realize the impact."

Thanks, Joe for giving the kid a chance

Dennis DuVall, WA3YXN, at the console.

at the mic. I saw him at the operating table, and thought he was YOURS! Wish we had gotten his name, but I understand he was hanging around last year too. He will be back.

Looking back at the logbook, I see a lot of prominent names and rigs represented. It sure was nice to link up on the airwaves, and especially nice for the bunch of us who were able to get to Gaithersburg and visit with one another.

We appreciate the time and effort of those who helped out over the weekend for the blistering operation for the AM Special Event Station. The log shows one, 45 minute break in 24 hours from Saturday thru Sunday.

Our special thanks to Al Brown, WA3FYZ, an executive with the Foundation for Amateur Radio; to Norm Chipps, N3RZU, and to Bill Nagle, W3DUQ. These three have taken special steps to get the red carpet rolled out for the AM'ers. **ER**

Another angle on Gaithersburg - We just broke the record for the number of couples turning out for an AM event. I think the social orientation really has become a draw. Check this out:
Pam & Paul, WA3VJB
Pam & Dave, K3ZRF
Karen & Mark, WA1FAF
Cynthia & Mike, W1RC
Anna & Jamie, KF2VM
Emily & Norm, N3RZU
Kitty & Paul, N2JTD
Lori & Pete, WA3WBJ

AMI Update - October 1997

by AMI President, Dale Gagnon, KW1I

AMI Discovery Weekend - This year's event was the most successful yet. The east coast activity was anchored by W3PRL, the clear channel AM signal from the Gaithersburg Hamfest. Steve, WB3HUZ, reported W3PRL's 136 QSOs on three bands using Dennis, WA3YXN's T-368. John WA1ABI's, most interesting contact was Brown, WA1NZR on the battleship USS Massachusetts. Brown was using an original TCK transmitter. John reported two of his contacts expressed interest in joining AMI. John, WB9OVV, picked up a couple of new states for WAS AM. George, KB5WWO at one point heard six AM QSOs in progress on 20 meters. AMI membership requests peak up a bit after operating events with about ten being received following Discovery Weekend. Membership hits 1050 this month.

South West Regional Director - Randy Starace, KK7TV (formerly KE7TV), has been nominated to the post of South West Regional AMI Director. Confirmation by the AMI Board of Directors is expected to occur in October. Randy has been faithfully running the Wednesday night West Coast AM net from Phoenix. His powerful signal blankets the Southwest and can be heard regularly here in the Northeast.

A Note on AMI Regional Directors - They are responsible for encouraging AM operations in their regions. This is done by our Directors on a time available basis. Directors with more time have been able to run nets, mail out AMI info., organize meetings and present at Hamfests. Others are in more of a standby mode. One of their specific tasks is public relations toward ARRL Division Directors on behalf of AM. Sometimes this is not practical because they are not geographically close to them. This is where AMI members can lend valuable assistance. If you should have opportunity to meet ARRL officials, let them know that you are an AM operator, thank them for AM articles and notes in their publications over the last several years. If given an opportunity, bring them up to date on several aspects of AM operation in their division, e.g. nets, operating events, new hams on AM, etc. Let them know who the AMI Regional Director is, give them an AMI brochure and after your meeting, if possible, drop a note to your Regional Director outlining the contact with the ARRL official. A list of all AMI Regional Directors is sent out with every membership certificate. If you have lost track of your Regional Director, send a request to AMI Headquarters for an up to date list of all AMI directors and officers.

A Note on AM Operations - AM'ers, without thinking, can compromise our strategy of promoting the AM windows for AM. The way we do this is by operating CW or SSB inside these windows. I know this can happen because I have done it. My rig is tuned to the AM frequencies, my tuner is set up there and I know my most frequently contacted amateurs friends will be monitoring. Unfortunately, this sends the wrong message to the larger amateur radio population. We should be careful to slide above or below our designated AM windows when we change modes to do what we can to promote them for AM use. KW1I

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

REVIEW:
COLLINS 75S-3/32S-3 VIDEO,

3-1/2 hours, $74.95 plus $4.50 S&H from the ER Bookstore or directly from the producer, Hi-Res Communications, Floyd Soo, W8RO.

by Michael Crestohl, W1RC
P.O. Box 24
Cambridge, VT 05444
mc@shore.net

Collins S-Line radio owners can now learn how to correctly operate, maintain, modify and service their equipment thanks to a 3 - 1/2 hour videotape produced by Hi-Res Communications. Collins "guru" Dennis Brothers, WAØCBK and Floyd Soo, W8RO, have teamed up to make this two-tape series that shows how to perform many procedures to these popular radios to keep them operating up to original specifications for many years to come.

Dennis shows us some basic and relatively simple things like how to interconnect the cables between the receiver and transmitter, how to synchronize the VFOs and even how to remove the 32S-3 from its cabinet without scratching the trim ring. Furthermore, Dennis shows us how to perform all these "peaks and tweaks" without a bench full of test equipment or a lot of tools. The only special tools that you'll need are a Bristol (splined) wrench and a swamping tool you can easily make.

Some of the receiver modifications include improvements to the AGC, calibrator, V4-T4, VFO output, tunable BFO, Q-multiplier gain increase, S-Meter stabilization and more. 32S-3 modifications too are extensively covered that improve circuitry such as VOX, PA screen, mic gain and others.

In addition receiver alignment is detailed including the 455 KHz IF, filters, bandpass IF tuning, RF alignment, as well as adjustments to the tunable BFO, IF gain, crystal calibrator, sideband frequency shift, and rejection tuning. Dennis also shows us how to calibrate the VFO, adjust the slug rack, set the end point spread and do a dial alignment.

In addition to the mods mentioned above, the 32S-3 transmitter portion of the video covers alignment and neutralization which includes VFO and RF stage alignments and adjustments to the carrier balance and first mixer circuits. Finally Dennis shows how to neutralize the power amplifier and driver tube circuits which is probably the most misunderstood aspect of working on these radios.

The videos cover the 75S-3 receiver and the 32S-3 transmitter. The other S-Line radios, 75S-1/32S-1 and 75S-3B/C are of course somewhat different but generally the lessons that are taught by Dennis are applicable to all S-line radios. I asked Floyd Soo about this and he replied that when asked, Dennis estimated that 80% or more is usable for the 75S-1 and 75S-3B/C models. It seems that the choice of the 75S-3 was a wise one given that it falls between the S-1 and S-3B/C in the production run and will have as much validity to all models as would be possible without making a longer video or three separate versions. Included is a printed sheet that tells where a given procedure is found listed by elapsed time which makes finding a segment of particular interest relatively simple.

In addition to the video under review, Hi-Res produces several other instructional videos that deal with the KWM-2 transceiver, 30L-1 and 30S-1 amplifiers, their newest videos covering the 75A-4 and KWS-1 and a seven hour treatise on the R-390A. I hope to review these videos in the future.

I found the video production quite well done with clear pictures of the equipment and components being changed, adjusted, etc. This is certainly adequate for instructional purposes and there is a lot to be learned from viewing

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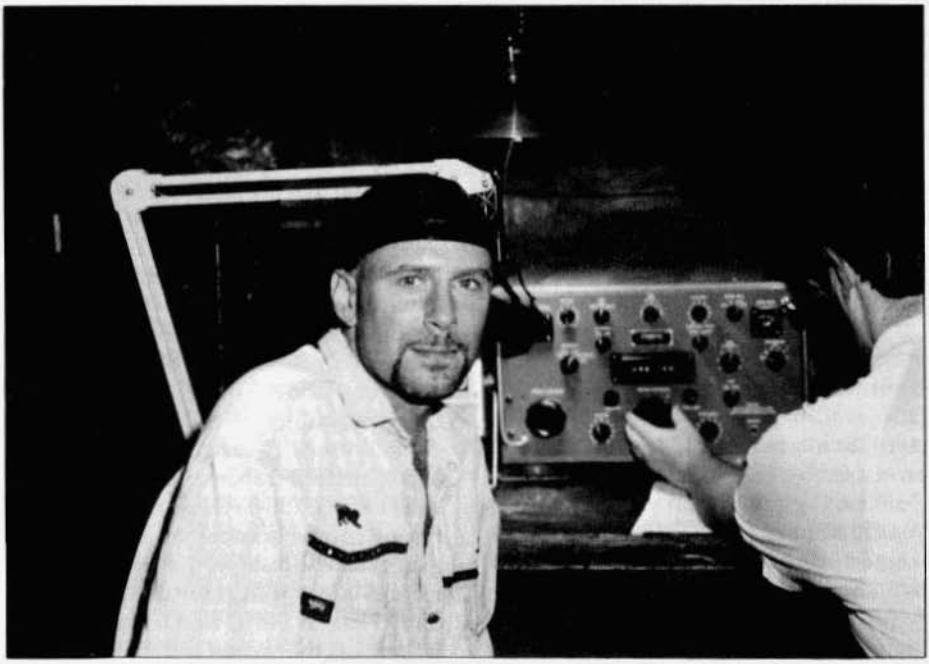


Another photo from the Gaithersburg AM Corral. Tim West, N3DRB, tunes the R-390A as Jamie Labadia, KF2VM prepares to make a transmission. ***Photo by Paul Courson, WA3VJB.***

Tim Tomljanovich, K9SB, in the mirror above his vintage operating position. Don't we all wish we could keep our hamshacks as neat and organized as that!

Mike Huey, W7ZI, with his vintage gear. The receiver is a Drake 2B and the transmitter is a Johnson Ranger. Mike operates on CW mostly.

Vin Legare, KQ4DZ, in his hamshack. He is presently completing an article on the Harvey-Wells TBS-50 that will appear in a future issue of ER.

Athens Surplus

by Cap Allen, WØXC
1045 E. 2nd Ave.
Durango, CO 81301

My wife and I were crawling down Agion Asomaton in the bumper to bumper traffic. In Athens, they use a single-lane roadway for two lanes of traffic and two lanes of parking, sometimes in futility.

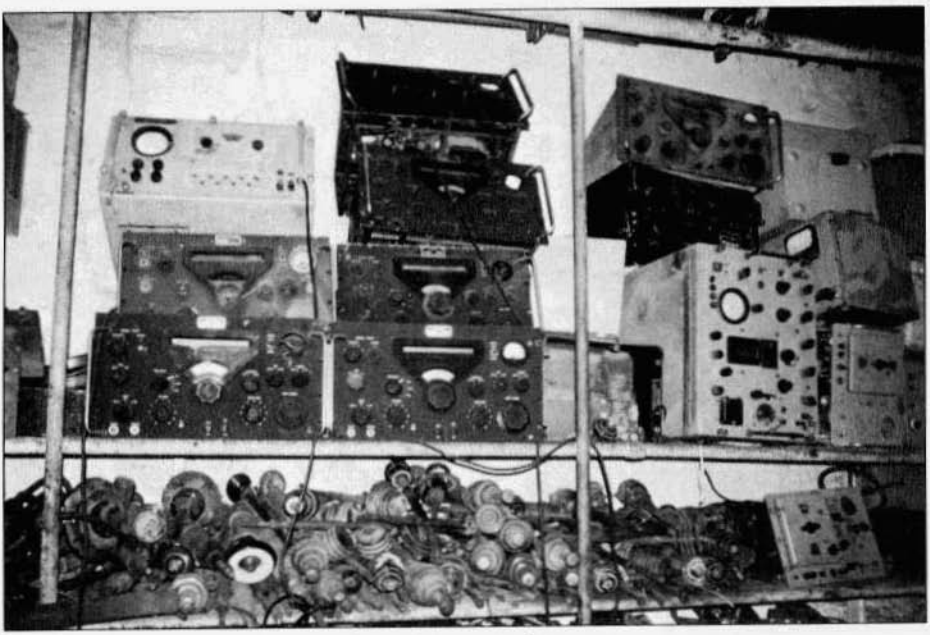
Just as the traffic freed up and we were able to go a little, we passed an enticing (to me) looking store front with various surplus electronic stuff stacked on tables outside. This would be an interesting place for me to visit so I made a mental note of where we were, not easy considering the nature of the alphabet the street signs were written with.

The next day we returned to the general area, the Monastiraki region of Athens. For blocks and blocks around, there is an open air flea market/real goods market and commerce abounds.

I was able to find the electronics store and was surprised to find the shelves inside brimming with old military gear, primarily Collins manufacture. Some of the gear was in sorry condition - dirty, banged up, scratched, knobs missing, etc., but for the most part it all looked restorable. I asked the price on a nice looking R-390 and was told it could be mine for less than $20 U.S.

The only attendant in the store was arguing with a gear box on the floor in the middle of the room and it was obvious from the surrounding paraphernalia that some sort of mechanical repair was the main activity of the place now. A little conversation (and sign language) revealed that the radios are relics of the past U.S. military presence in Greece.

Now a real test of the devotion of the ER reader would be to arrange shipment of these rigs to the U.S. Boatanchors take on a genuine meaning when the best method of shipping is considered. You can take your time, I don't think they are anywhere going fast. ER



One stack of boatanchors in the Athens surplus store.

VINTAGE NETS

Westcoast AM Net: Meets informally, nightly on 3870 at 9:30 PT. Wednesday at 9:00 PM PT they have their formal AM net which includes a swap session. Net control rotates.
California Early Bird Net: Saturday mornings at 8 AM PST on 3870.
California Vintage SSB Net: Sunday mornings at 8 AM PST on 3835
Southeast Swap Net: Tuesday nights at 7:30 ET on 3885. Net control is Andy, WA4KCY. This same group also has a Sunday afternoon net on 3885 at 2 PM ET.
Eastern AM Swap Net: Thursday evenings on 3885 at 7:30 ET. This net is for the exchange of AM related equipment only.
Northwest AM Net: AM activity daily 3 PM - 5 PM on 3875. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT. The formal AM net and swap session is on 3875, Sundays at 3 PM.
K6HQI Memorial Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 3:00 PM PT, 7 days a week and usually goes for about 2 hours. Net control varies with propagation.
Arizona AM Net: Meets Sundays at 3 PM MT on 3855. On 6 meters (50.4) this group meets at 8 PM MT Saturdays.
Colorado Morning Net: An informal group of AMers get together on 3876 Monday, Wednesday Friday, Saturday and Sunday mornings at 7AM MT.
DX-60 Net: This net meets on 7290 at 2 PM ET, Sundays. Net control is Jim, N8LUV. This net is all about entry-level AM rigs like the Heath DX-60.
Eastcoast Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is Dennis, WA3YXN but sometimes it rotates to other ops. Saturday mornings on 1995 at 0500 ET. Will move to 3885 for summer.
Westcoast Military Radio Collectors Net: Meets Sunday mornings at 0930 local on 3975 + or - QRM, except the 1st Sunday of the month when the net meets at 2130 local. Net control is Tom, WA6OPE.
Grey Hair Net: The oldest (or one of the oldest!- 43+ years) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8:30 PM EST & EDST. Call-up at 8 PM.
Vintage CW Net: For CW ops who enjoy using vintage equipment. This is not a traffic net; speed is not important. The net meets on 14037 Sundays at 7 PM Eastern. Net control is Tracy, WB6TMY.
Vintage SSB Net: Net control is Andy, WB0SNF. The Net meets on 14.293 at 1900Z Sunday and is followed by the New Heathkit Net at about 2030Z on the same freq. Net control is Don, WB6LRG.
Collins Collectors Association Nets: Technical and swap session each Sunday, 14.263 MHz, 2000Z, is a long-established net run by call areas. Informal ragchew nets meet at 0100Z Tuesday nights on 3805 and on Thursday nights on 3875.
Collins Swap and Shop Net: Meets every Tuesday at 8PM EST on 3955. Net control is Ed, WA3AMJ.
Drake Users Net: Another relatively new net. This group gets together on 3865 Saturday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, WZ8O; Rob, KE3EE and Huey, KD3UI.
Swan Users Net: This group meets on 14.250 Sunday afternoons at 4 PM CT. The net control is usually Dean, WA9AZK.
Nostalgia/Hi-Fi Net: Meets on Fridays at 7 PM PT on 1930. This net was started in 1978.
K1JCL 6-Meter AM Repeater: Located in Connecticut it operates on 50.4 in and 50.5 out.
JA AM Net: 14.190 at 0100 UTC, Saturdays and Sundays. Stan Tajima, JA1DNQ is net control.
Fort Wayne Area 6-Meter AM Net: Meets nightly at 7 PM ET on 50.58 MHz. This net has been meeting since the late '50's. Most members are using vintage or homebrew gear.
Southern California Sunday Morning 6 Meter AM Net: 10 AM Sundays on 50.4. Net control is Will, AA6DD.
Westcoast 40-Meter Sunday Net: Net control varies. The group meets on 7160 starting at 4PM PT.
Old Buzzards Net: Meets daily at 10 AM Local time on 3945. This is an informal net in the New England area . Net hosts are George, W1GAC and Paul, W1ECO.
Canadian Boatanchor Net: Meets Saturday afternoons, 3:00 PM EST on 3745. For hams who enjoy using AM, restoring and operating.
Midwest Classic Radio Net: Saturday mornings on 3885 at 8AM Central time. Only AM checkins allowed. Swap/sale, hamfest info and technical help are frequent topics.
Boatanchors CW Group: Meets nightly at 0200Z on 3579.5 Mhz (7050 alternate). Listen for stations calling "CQ BA" or signing "BA" after their callsigns.

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

Restoring the Collins KWM-1 Transceiver

Jim Garland, W8ZR
310 E. High St.
Oxford, OH 45056

"It will never catch on," I told my ninth grade ham buddies, as we contemplated the price tag and plain-Jane styling of the little grey box at the Collins Radio exhibit. It was September 1957 at the Central States ARRL convention in Kansas City, and we had elbowed our way through the crowd to check out the commotion. There, on a small linen-covered table next to its tiny matching speaker and power supply sat the newly announced KWM-1 single sideband transceiver. I listened to the Collins salesman explain to the crowd for the hundredth time that day why the rig had only one tuning knob for both receive and transmit, and that, no, it didn't run AM.

I wasn't impressed. Here was a thousand dollar radio that was hardly any bigger than my thirty dollar Heathkit AT-1 transmitter. I was also dubious about this transceive idea. No other sideband rig operated transceive, including the majestic KWS-1 transmitter and 75A-4 receiver on display at the adjacent table. With these other rigs, you talked yourself on frequency, and doing so seemed as natural as falling off a log. Why with the KWM-1, you couldn't even listen to yourself!

I didn't care that the KWM-1 only covered ten, fifteen and twenty meters. Who needed all those static crashes on forty and eighty meters, anyway, when ten meters was open nearly around the clock? Having acquired my ticket at the peak of legendary Sunspot Cycle 19, it would be several years before I realized one couldn't take such band conditions for granted.

The KWM-1 was the opening salvo of a communications revolution that was to spell the demise of separate amateur transmitters and receivers. The brainchild of Collins engineer, Gene Senti,WOROW, the KWM-1 was introduced to the amateur community in March, 1957. Intended primarily for mobile use, and prohibitively expensive for most amateurs, the rig's marketing life was only about two years. As a concept, however, it set the stage for its successor, the immensely popular KWM-2, and, eventually, the thousands of Icom, Kenwood, TenTec, and Yaesu transceivers that dominate today's HF bands.

Because of its historical importance, and because it is still a darned good transceiver, the KWM-1 has become one of the most collectable rigs in ham radio. Prices have soared, in part because of the limited production (fewer than 1300), but also because many were lost to citizen banders in the 1970's. Many KWM-1s also suffered an early demise because their owners attempted unsuccessful 40 and 75 meter conversions. Few KWM-1s are still around, and fewer still are in working order. A mint KWM-1 with accessories can trade today for more than twice its original price!

I hadn't seen a KWM-1 in years, but I've always had a soft spot in my heart for the rig. I was delighted, therefore, when a local amateur agreed to sell me his, along with the matching AC power supply. I knew the radio hadn't been used in decades, since thirty years earlier the owner had replaced the interconnecting cable from the power supply with one intended for a different radio. However, the transceiver itself

The rig that started the transceiver revolution - the Collins KWM-1, introduced in 1957.

seemed complete, and cosmetically it was excellent. Did it work when taken out of service?

"It may have had a few problems," I was told. Oh well, forewarned is forearmed.

Once I got the rig home, I turned my attention first to the AC power supply. The electrolytic capacitors looked in dubious shape, a wirewound bleeder resistor had opened up, the power cord was ratty, and the interconnecting cable was wrong, but the transformers checked out fine and everything else seemed intact. Fortunately, I had the mating twenty-five pin connector for the cable. I ordered some replacement parts from a mail-order supplier and in the meantime began studying the KWM-1 circuit description.

By modern standards, the conversion scheme of the KWM-1 is straightforward. In transmit, a 455 kHz double sideband signal is passed through a 3.1 kHz mechanical filter, the same filter used in the Collins 75A-4 receiver. The resulting lower sideband signal is mixed with the output from the permeability tuned oscillator (PTO), which tunes 3.545-3.555 kHz, resulting in a 3.9-4.0 MHz signal. This signal is mixed with the output from a crystal oscillator to the desired frequency in the 14-30 MHz range. Ten crystals are required to cover any 1 MHz frequency range, and these are contained in the plug-in "13C-1 crystal unit." Because difference mixing is used, the resulting signal is inverted to upper sideband. A pair of 6146 tetrodes amplify this signal to 100 watts PEP output.

In receive, the inverse conversion is used, with selectivity provided by the same mechanical filter. A peculiarity of this conversion scheme is that strong nighttime signals on the seventy-five meter phone band can break through the second IF, leading to what appear to be extraordinary ten meter band conditions!

CW operation on a KWM-1, if not exactly an afterthought, was definitely a secondary consideration. A CW signal is generated by injecting a 2000 Hz audio sidetone into the microphone preamplifier, with the VOX circuitry controlling the receive/transmit switching. The resulting signal is a CW carrier

continued next page

offset from the dial frequency by 2.0 kHz. There is no provision for receiver incremental tuning, and the 2000 Hz audio sidetone is too high-pitched for most users. The rig's designers undoubtedly were aware of this shortcoming, but were constrained by the 3100 Hz passband of the mechanical filter. In order to minimize spurious signals, it was necessary to use a sidetone frequency whose harmonics would fall outside the mechanical filter passband.

My parts arrived, and after a few evenings I put the finishing touches on the power supply, lacing up loose wires and double-checking with a magnifying glass my newly soldered pins on the mating connector. I plugged in the 5U4 and 5R4 rectifier tubes, powered up the supply and measured the output voltages. They were right on target. So far so good. Now on to the hard part--the transceiver itself.

What first catches the eye about the KWM-1 is its starkness. Unlike the later Collins "S-line" radios, the KWM-1 has no stylish trim ring, no color-coordinated cabinet with graceful curved edges, no elegantly textured front panel. The KWM-1 is just a basic grey box. And yet it all fits together -- the knobs borrowed from the military R-390/URR receiver, the chunky offset tuning knob, the exposed screw heads on the front panel. All these elements combine to give this ugly duckling transceiver an endearing quality. Yes, the KWM-1 has a no-nonsense military feel to it. But I could imagine it gracing a mahogany desk in a paneled recreation room, as easily as the equipment bay of a Strategic Air Command bomber.

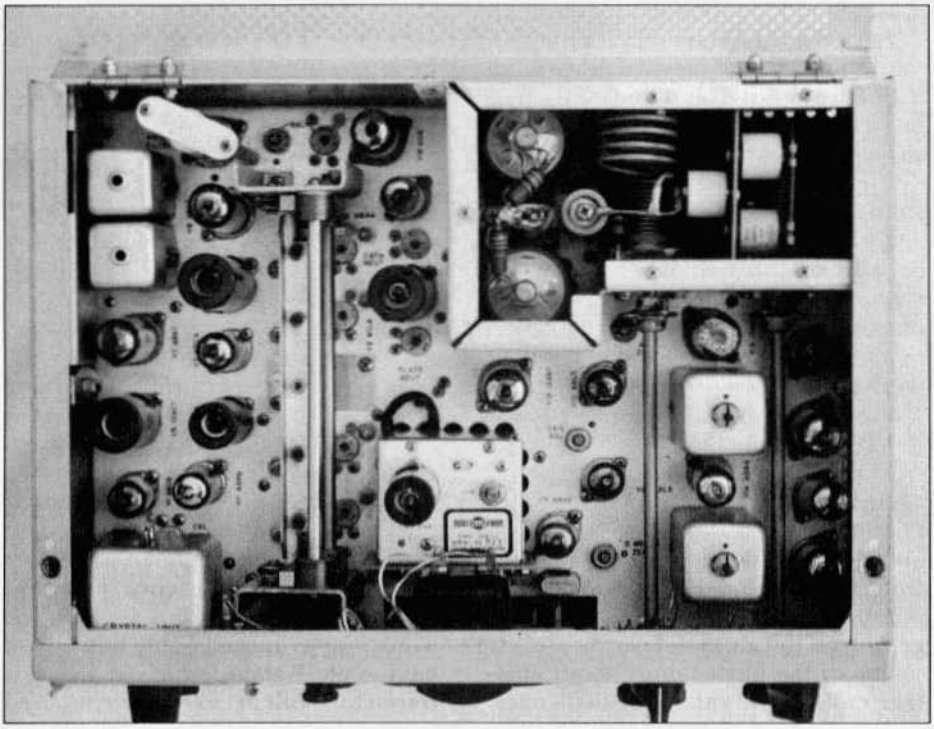
I set the transceiver on the carpeted surface of my workbench and gave it a closer look. The imprint of earlier Collins designs seemed clear. The rotary inductors and twin turns-counter dials for the 6146 finals were scaled-down versions of those in the KWS-1 kilowatt transmitter. Under the hinged lid I could see the slug tuning rack, a Collins innovation used in generations of earlier receivers and transmitters. However, instead of being ganged to the main tuning dial, as in the 75A-series of receivers, the rack was tuned by a separate preselector control -- an obvious concession to the limited 100 kHz tuning range of the tiny 70K-1 PTO.

The KWM-1 used "unibody" construction, with the aluminum chassis, panel, and cabinet a single rigid piece. Although a plus for mobile operation, this design made servicing difficult, especially for components tucked away in the far corners of the chassis.

To see what was in store for me under the chassis, I removed the transceiver's bottom plate. In typical Collins fashion, the plate was attached by twenty-two stainless steel machine screws, each with its own flat washer and split washer. No cheap sheet metal screws for this rig!

One glance showed that the KWM-1 had elevated the concept of wiring complexity to new heights. Here, in about one square foot, were twenty-four tube sockets, three relays, four aluminum shield cans, a transformer, and about two hundred resistors, capacitors, and RF chokes. An elaborate wiring harness snaked its way between rows of tube sockets to the far reaches of the chassis.

The workmanship of the point-to-point wiring was competent but not elegant. Because of the crowded quarters, many parts were layered above each other, with liberal use of "spaghetti" sleeving keeping bare leads apart. On the plus side, component leads and wires were wrapped carefully around each connecting point, and the overall soldering quality seemed high. However, the wiring lacked the tidy, symmetrical appearance of the later KWM-2's underside. I attribute this difference partly to the lower parts count of the KWM-2 (see sidebar on page 27), and partly to the use of innovative multi-terminal wiring "turrets" in the later design.



Under the lid of the KWM-1. The gang-tuned slug rack is visible to the left of the 70K-1 PTO.

On the underside of the radio were many black paper-type capacitors, several of which had lengthwise cracks and white electrolyte oozing out their seals. To be on the safe side, I decided to replace all of these capacitors with modern metal-coated polyester types. As a precaution, I decided to replace all of the electrolytic capacitors as well.

Replacing the capacitors turned out to be very time-consuming, since I wanted the replacements to meet the same high wiring standards as the originals. After a bit of experimentation, I found that the best technique was first to clip out the defective part, leaving behind about 1/8" of lead length. Then, I removed as much solder as possible from the connection, using a vacuum desoldering aid. While the solder cooled, I wiggled the wire stub to keep it mobile, and then, with the judicious use of tweezers and wire cutters, removed all traces of the original leads.

When installing the new parts, I took care to wrap and crimp the leads around the terminals before re-soldering the connections. I used black woven spaghetti on bare component leads, which closely matched the original.

Finally, about two weeks later, my job was done, and after testing the tubes and double-checking to make sure I hadn't left any wire fragments inside, the Sunday morning came when I was ready to apply power to the rig.

I connected a Bird wattmeter and dummy load to the output connector, plugged in a microphone, speaker, and key, and connected the cable from the power supply. I plugged the rig into my bench isolation supply, turned the Emission switch to the SSB position, ramped the line voltage up to 115 volts (the

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standard voltage in the 1950's), and with one eye peeled for smoke, I turned up the audio gain and sat back to see what happened. With a bit of luck, I figured to be on the air that day with my restored transceiver.

I figured wrong. There wasn't a peep from the speaker. The AF gain, RF gain and preselector control had absolutely no effect. I pressed the push-to-talk switch and whistled into the microphone. The relays closed, but there was no sign of plate current. The VOX didn't work.

Nothing happened when I switched to CW and closed the key line. In the ALC position, the meter pegged hard against the stop. I released the push-to-talk switch and rotated the Emission Switch to Calibrate. Instead of a tone from the 100 kHz oscillator, I heard a pop and the rig went dead. So much for getting on the air that day.

One of the great things about amateur radio is the variety of challenges. Whether you are a carpenter, bank president, or Nobel laureate, the hobby can stretch you to your limits. I have crawled out on masts a hundred feet in the air in the quest for an extra decibel of antenna gain. I have endured hours of static crashes on cold winter nights hoping to snag a rare DX station. I have driven myself to such exhaustion in contests that for days afterwards Morse code rang in my ears.

But nothing is quite like the challenge of tracking down the gremlins in a broken rig. For me it is a battle of wits, with my skills pitted against an implacable foe. I am Sherlock Holmes pursuing the evil Professor Moriarty. The trail is sprinkled with clues -- a wrong voltage here, an intermittent noise there, a hint of distortion on a waveform. But I know that if I keep my wits about me, threading my way past the twists and turns and false leads, I will eventually track down my villain. There it will be, buried inside a connector shell, or lurking in an IF can, or hiding underneath a wafer switch. With any luck my foe will be only a burned resistor, with a replacement in a parts drawer an arm's reach away.

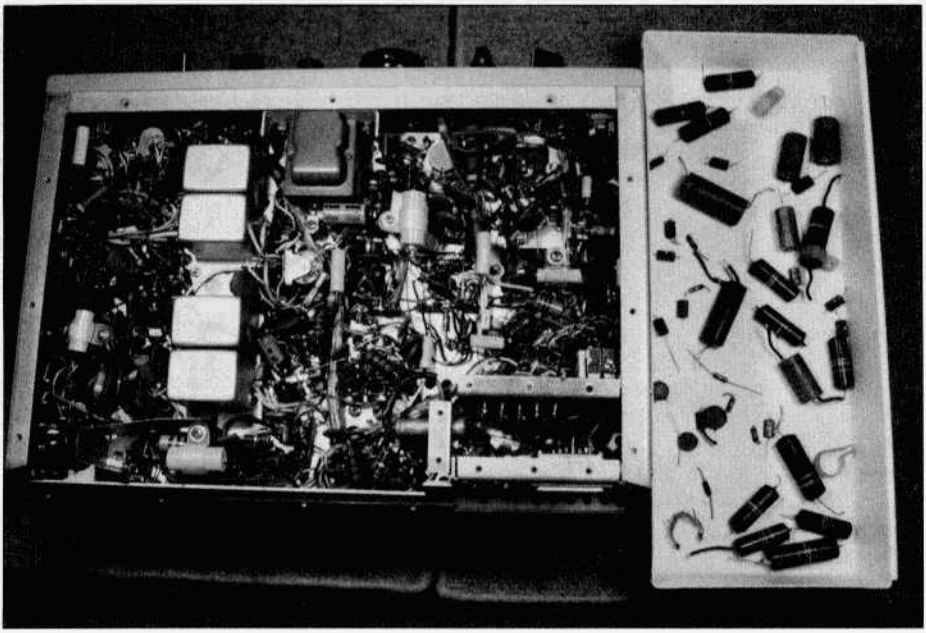
But then again, it might be a burned secondary wire in a custom power transformer that hasn't been made for half a century. And so, armed with a multimeter, oscilloscope, and soldering iron, the hunt goes on, victory uncertain until that final satisfying moment when the rig springs back to life.

There were times during the ensuing weeks when I doubted that moment would ever come. Each solved problem seemed to reveal two more of twice the difficulty. I repaired the broken contact on the Emission switch so the fuse wouldn't blow in the Calibrate position. But then the calibrator signal was so weak it didn't move the S-meter. The dead S-meter turned out to be a lack of gain in an IF stage, which in turn was traced to a fault in the AGC circuit. And on and on.

But gradually, bit by bit, I found myself making progress. Problems were traced to a bent relay contact, to a replacement capacitor mysteriously wired to the wrong pin of a tube socket, and to cracked insulation on a length of shielded wire.

Two problems drove me to the brink of despair. After hours of working properly, the receiver would gradually lose sensitivity, turning S9 signals into S3 signals. Circuit voltages checked out fine. In order to track down the culprit I had to disconnect the AGC circuit and, with a signal generator and oscilloscope, laboriously measure the gain of each receiver stage until the problem showed itself. Once I narrowed the problem to a defective stage, it was then possible to zero in on the bad part, in this case a heat-sensitive "postage stamp" mica capacitor.

The other challenge was a sidetone oscillator that wouldn't oscillate. Al-



Under the chassis view. The right at the right contains the parts that were replaced.

though the problem was obviously a bad part in the phase-shift network, there was no way to tell which part, except by trial-and-error substitution. Unfortunately, the dozen or so resistors and capacitors were crammed into a tiny space under a switch in the front corner of the chassis. I could barely see the parts, much less replace them. Eventually, after a couple of failed substitution efforts, I un-wired and removed the obstructing switch, stripped the tone oscillator tube socket of all components, and with the help of a magnifying glass, tweezers and micro-tip soldering pencil, rewired the circuit from scratch using new components.

It took me two evenings and a handful of aspirin to finish this job, but my efforts were rewarded with a healthy 2000 Hz sidetone. Unfortunately, it was too healthy! The tone oscillator in the KWM-1 runs all the time, and I was getting bleedthrough into the receiver audio. I finally eliminated the problem by moving the ground lead of a capacitor a half inch -- an easy fix, but it took me another evening to figure it out.

At last my job was done. The 6146s measured full output into a dummy load, and the receiver worked like a champ. I could easily hear a 0.1uV carrier from a signal generator. The transmit-receive switching worked smoothly, and all the meter readings were normal. Best of all, a 24 hour bake-in told me I had a reliable radio. It was time to lug the transceiver from the workbench to my operating desk and hook it up to a real antenna.

There is great satisfaction that comes from restoring a vintage piece of ham gear. Who among us would not derive pleasure from turning a lifeless box of parts into a working symbol of our hobby's heritage? By contributing to the preservation of amateur radio's history, we pay tribute to those radio pioneers whose hard work and inspiration made possible the communications achievements underlying so much of modern life. Amateur Radio is a unique interna-

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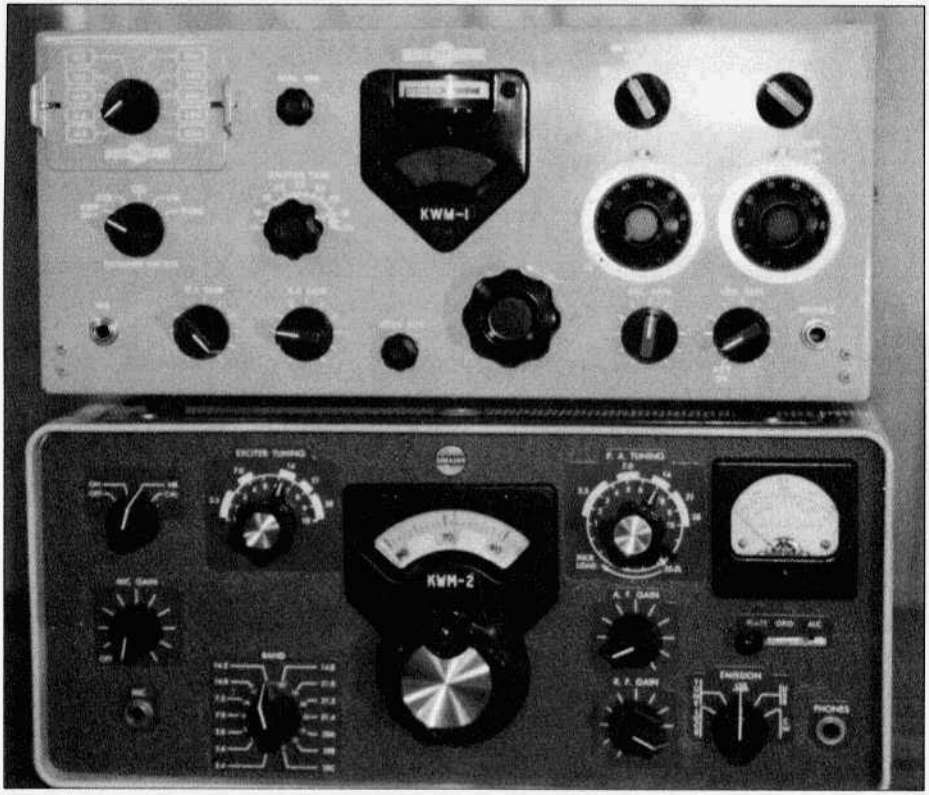


KWM-1 top, KWM-2 bottom.

tional fraternity. But our hobby spans not only the globe but the years as well. By preserving the classic radios from earlier times we strengthen and protect amateur radio's proud traditions for future generations.

It was Sunday afternoon at 2000Z. I tuned the KWM-1 to 14,263 kHz and loaded the final amplifier. I sat back to listen to the chatter from the Collins Collector Association net. The single-sideband signals came through crisply and clearly. I turned the mic gain to nine o'clock and whistled into the Collins SM-1 microphone. The relays clicked and the ALC voltage kicked up to mid-scale on the meter. I waited my turn and checked into the net.

"I'm using a KWM-1 transceiver," I told the net control operator.

"Just got it on the air and wonder how it sounds?" It occurred to me that I was still a youngster when this rig had last broadcast a voice into the ether. Now, a framed photograph of my wife and grown children graces the wall of my hamshack.

In June, 1958, QST reviewed the new Collins transceiver.

"It is the writer's opinion," the reviewer said, "that the KWM-1 may well mark the end of one era and the beginning of another. This unit is more than another piece of ham gear; it could be a way of life in amateur radio."

"Your KWM-1 sounds just like it's supposed to,"the net control operator said. His signal was peaking 20 dB over S9. "You can always tell that great Collins audio", he said. ER

Comparison of the KWM-1 and KWM-2 Transceiver:

The KWM-2 showed many layout and circuit refinements over the KWM-1, as one would expect for a second generation design. Despite its expanded frequency coverage of 80-10 meters, the tube count in the KWM-2 was reduced from KWM-1's 24 to only 17. This simplification was made possible by the substitution of complex tube types, e.g., a 6AZ8 instead of a 12AX7 for the microphone preamplifier (three 6AZ8s are used in the KWM-2), or a 6BN8 for the 12AU7 product detector.

Despite their generally similar block diagrams, there are extensive circuit differences between the two radios. In fact, a stage-by-stage comparison shows almost no common features at the component level. Even tried and true circuits, such as the microphone preamplifier, VOX relay driver, audio preamplifier and tone generator are completely different.

Like the KWM-1, the KWM-2 used a pair of 6146s in the final amplifier. However, the expensive tank circuit roller inductors and turns counter dials of the KWM-1 were replaced with less costly variable capacitors. The 6CL6 driver was moved inside the shielded amplifier compartment, and the L-shaped PA compartment of the KWM-1 was replaced by a simpler rectangular compartment. The compact front panel bezel of the KWM-1, which combined an edge-view panel meter with an offset tuning dial, was replaced by a conventional panel meter and separate dial assembly. The mechanical filter in the KWM-2 was narrowed from 3.1 kHz to 2.1 kHz bandwidth, which sharpened up the selectivity at some expense of audio fidelity.

On balance, the KWM-2 was a more mature design than the KWM-1. It was simpler, cheaper to build, easier to service, and had more features. With its attention to styling, and less rugged construction, the KWM-2 was also clearly designed for the consumer market. Ironically, however, Collins sold tens of thousands of them to military and government customers.

The author in his hamshack.

The Central Electronics 100-R

a ham's dream receiver

by Joel Thurtell, K8PSV
11803 Priscilla
Plymouth, MI 48170

When I was licensed as a ham radio operator in 1959, pounding a J-38 telegraph key attached to my cheap little Globe Chief transmitter, there was one rig that I worshipped above all others -- the Central Electronics 100-V. With its broadband, no-tune final amplifier pumping out a solid 100 watts, a nearly drift-free permeability-tuned oscillator giving it outstanding frequency stability and phasing system audio which other manufacturers could only fantasize about, the 100-V and its successor, the 200-V, were wonderful transmitters. They were wonderfully priced, too, and at $695 they were far beyond the reach of my paper route income.

Nearly 20 years later, I drove all the way across the state of Michigan to pay $175 for a very nice 100-V, and it was everything I wanted -- almost. It was a dream to operate, stable, quick to change frequency and the compliments on my audio came so often I stopped jotting them in my logbook. But one thing bugged me. What receiver to use with the 100-V? It's a question that must have occurred to every ham who has ever keyed a 100-V, and I often wondered what was in the minds of the Central Electronics engineers -- why no receiver to complement this fine transmitter/

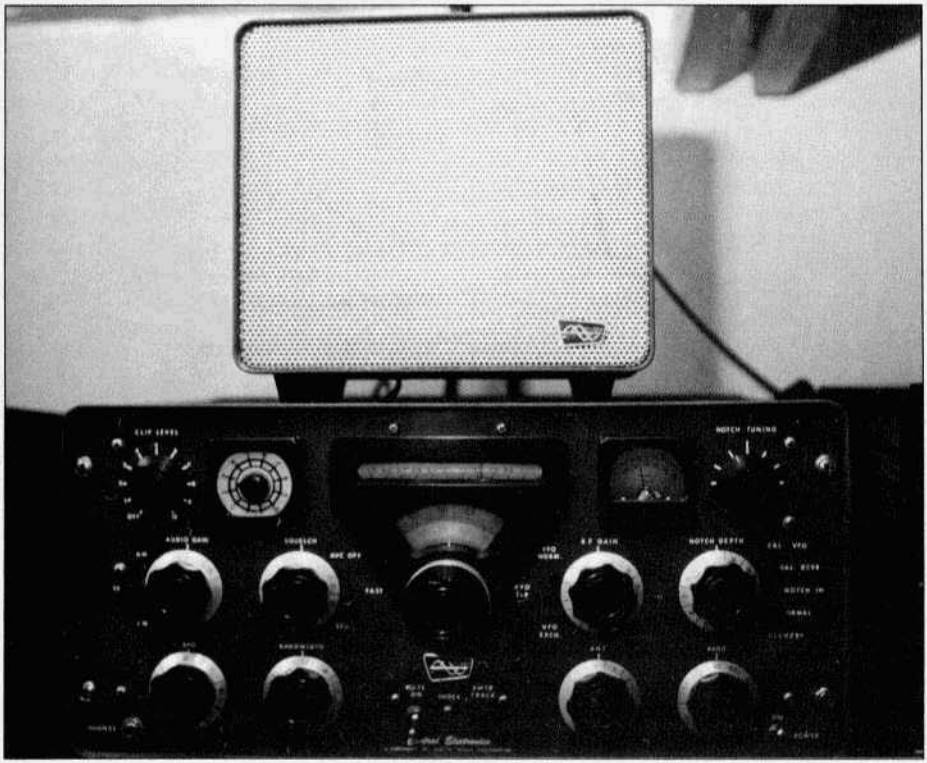
My solution was to pair a Collins 75A-4 with my 100-V. The 75A-4 is a high-class ham band receiver, nearly as stable as the 100-V and with a similar, though far from identical, look. There could be no transceive operation, but that was too much to hope for.

Or was it? A couple years ago, not long after I started my Radio Finder used ham equipment business, a collector called and regaled me with a story about what I half-assumed was a mythical receiver, one too good to be true. Supposedly, Central designed and built a receiver, the 100-R, to mate with the 100-V, but the company closed down before the receiver could go into production. My caller even gave me a name, Bill Van Slyck, who supposedly owned this one-of-a-kind receiver. Occasionally when playing with a 100-V, I would wonder where this guy named Van Slyck lived and whether he truly owned a 100-V look-alike receiver.

I started thinking this way more often last year after the Dayton fleamarket, when I found my dream 100-V -- a near mint transmitter with factory-installed 160 meter coverage. Wow! I brought it home, and unlike many of my hamfest purchases, the 100-V worked great. And the old story -- I wished Central had made a receiver to match this beauty!

One Monday morning early in September my Radio Finder phone rang. I sipped coffee nearby while waiting for the answering machine to take the message. A man 's voice came over: "Joel, this is Bill Van Slyck in Chicago. I have a receiver you may be interested in --"

I was on the phone instantly. I knew his story before he told me. The 100-R! Van Slyck gave me part sales pitch, part oral history. He had seen my "buy-sell-trade" ad in QST and wondered if I would be interested in a receiver he had been storing in his basement since 1961. But this was no ordinary receiver. It was one of those neat few radios sans serial number, a prototype.



One of a kind. The only prototype of a receiver that never went into production - the Central Electronics 100-R. *Photo by the author.*

Van Slyck explained that in 1958 he was an electrical engineer and head of the Special Products Division at Zenith when the Chicago company bought a small ham radio manufacturer called Central Electronics. Mainly known for its consumer radios and television sets, Zenith also produced a line of hearing aids and was manufacturing military night vision equipment and proximity fuses for artillery shells. Central was the company's first foray into the amateur radio market.

Central's president, Wesley Schum, W9DYV, had pioneered the use of a then new mode of radiotelephony known in its early days as Single Sideband Suppressed Carrier, or SSSC, later shortened to SSB, for single-sideband. In 1951, Central began marketing a small phasing-type single sideband exciter known as the 10A. Priced at less than $100, the 10A made single sideband affordable to many hams. And incidentally, this happened several years before Collins Radio Co. brought out their high-power, very high-priced KWS-1. By 1957, Central had added a top-of-the-line and technically advanced transmitter, the 100-V, to its line of ham products. Central was busily filling orders when Central founder Schum sold his company to Zenith. Schum stayed on as head of Zenith, and Central engineer Joseph Batchelor, W4EGK, who holds the patents on the 100-V broadband coils, also stayed with the firm. Schum and Batchelor had ideas for a companion receiver to the 100-V, and Van Slyck, W9EMB, their new boss, assigned two electrical engineers to develop the Central Electronics ideas into a marketable receiver.

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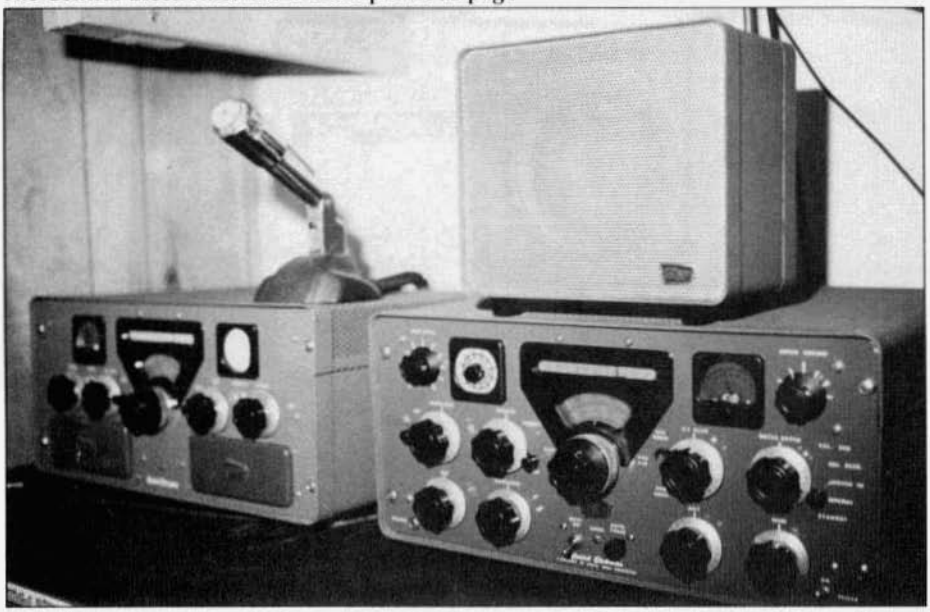
The Central Electronics 100-R from previous page



Matched pair. Central Electronics 100-R receiver (right) and 100-V transmitter.

"I had two top-notch electrical engineers and a couple of technicians working with the mechanical model shop, and they worked several years on this thing," said Van Slyck. "We spent a quarter of a million dollars when you think of all the company overhead."

Design began in 1958. Engineer Jim Clark's notes indicate the prototype was in use in 1960 and follow-up tests were conducted early in 1961.

I asked Van Slyck, What were Zenith's goals with the 100-R?

"Build the best receiver ever built, with an emphasis on single sideband," he replied.

Over the phone, Van Slyck told me some potential buyers from New Orleans were due to visit him and see the receiver the next day. He expected them to make an offer to buy it. Was I interested? How much did I think it was worth, given that development cost $250,000? I answered that I would be interested in making a somewhat lower offer. Please call me before you sell it to anybody else, I pleaded.

Over the next 30-some hours I thought about the 100-R often. I dusted off my recently-found 100-V and began mentally preparing a place for it and the 100-R in my small basement ham shack. But I doubted I would get the receiver, given that I was up against some heavy hitters traveling all the way from Louisiana to check this radio out.

The next evening, Van Slyck called again. His new Orleans visitors had looked and admired, but they had not bought the 100-R. Did I want to look at it? Let's see, does a bear ...

Next day I was on the road along with my new digital camera. In the basement of Van Slyck's home in suburban Chicago, I saw an amazing thing, one I hardly dared believe I would ever be lucky enough to view: On his desk sat a 100-V (he called it a 200-V, but it turns he didn't realize that it's a 200-V prototype) and next to it, the fabled 100-R. Atop the unique 100-R receiver sat a Central Electronics loudspeaker, also one of a kind, the product of Zenith's mechanical modeling shop.

They were look-alikes, and yet there were some differences. The two hinged, swing-down doors hiding minor controls on the 100-V were missing on the 100-R. In their place on the lower panel were several important knobs such as band change, selectivity control and on-off. But the panel itself with the identical megahertz/kilohertz bezel and two-speed tuning knob is identical to the famed 100-V, and the S-meter is nearly the same. Printed on the S-meter face is the legend "Model 100-R."

I reminded myself over and over that this radio was unique. It looked so much like a production piece of equipment with its neat lettering, Central Electronics logo and even the notice on the bottom that Central was a subsidiary of Zenith, that you could easily imagine it sitting in a 1960's dealer showcase.

Not wanting to lose the experience to the fog of memory, and suspecting I would never wind up as owner of this radio, I took some photos of the receiver. To achieve photographic drama, I even tried to have Van Slyck pose with the blue print schematic diagram of the 100-R. He refused. "The plan belongs to whoever buys it," he said. Oops, sorry.

But is this REALLY the only 100-R?

"There is only one," Van Slyck assured me.

It's a question that comes up every time I talk about this receiver.

According to Van Slyck, late in 1961 Zenith scuttled Central Electronics. Everything belonging to Central went to the dumpsters. Van Slyck bought the 100-R and the matching transmitter as surplus property and took them home. He set them on his desk and, so he claims, never used them.

I made an offer. "That's not nearly enough," said Van Slyck. Then I did something I have never done before -- I drove home without buying a radio.

Well, I thought, I had the thrill of being in the presence of a historic receiver. And I have images of the 100-R in my camera. Maybe that should be enough. Maybe on the basis of that I could write a little story for Electric Radio.

In other words, WHAT A DISAPPOINTMENT!

Next day, a little before noon, Van Slyck called. His other potential buyers either had not made an offer or were not prepared to pay what he wanted. Did I want the radio? If so, come get it -- soon!

I paged my wife, said I'd be late getting home, tossed cameras and note pad in the car and headed for the bank. With a hefty cashier's check in my wallet, I drove to Chicago -- four and a half hours -- for the second time in two days.

As I drove, questions occurred to me. Does the 100-R transceive with the 100-V? The day before, in the presence of this receiver, this question, fundamental as it is, had eluded me. Suddenly along I-94 I wanted badly to know. Wow! If it would transceive with the 100-V I could realistically compete for DX with the combination 100-V/100-R!

In Van Slyck's basement for the second time, I asked him .

"I'm not sure if it will transceive -- I personally never got too close to this thing. This was a small one compared to other things like night vision and proximity fuses."

I made my way around his desk and looked at the rear apron of the 100-R. Yes! Two RCA phono jacks marked "input" and "output" had to correspond to identical jacks on the 100-V. Normally, those jacks on the 100-V are jumpered for proper operation of the transmitter's VFO. It should transceive.

I had already noticed something odd -- what looked like a timer on the front of the receiver. I had at first mistaken it for a small oscilloscope, probably because there is a scope on the 100-V.

Van Slyck demonstrated the receiver. In truth, it wasn't performing very impressively. It didn't appear very sensi-

continued next page

tive, although on strong signals its sound on both AM and sideband was impressive. But I am accustomed to old radios misbehaving after long disuse. No question, I was buying it. I also bought the transmitter, which puzzled me. As Van Slyck noted, it said 200-V on the panel. But the controls came from a 100-V. Inside, however, the plug-in modular construction of the 100-V was missing. Instead, the more streamlined point-to-point wiring of the 200-V was in place. (Yes, it is a prototype 200-V, according to Schum)

When I got the receiver home, I squirted switch contacts with degreaser, but the receiver still seemed fairly lifeless. I took it to my friend Jim Karlow, WA8TUR, and pointed to a curiosity: A variable capacitor geared to track with the VFO. Jim looked closer at this capacitor. "The set screw is loose," he said. "The variable is supposed to tune the preamplifier to match the VFO frequency, but when it's loose it can't turn. No wonder the radio is dead!"

Along with the receiver and the big schematic blueprint, ownership of the 100-R brought me a set of Zenith engineer Jim Clark's notes and a typed sheet dated January 11, 1961 called "Data on 100R Receiver Prototype." This sheet indicates that the sensitivity was checked for a 10 dB signal-to-noise level using a 30 percent signal modulated at 1,000 hertz. Following are results:

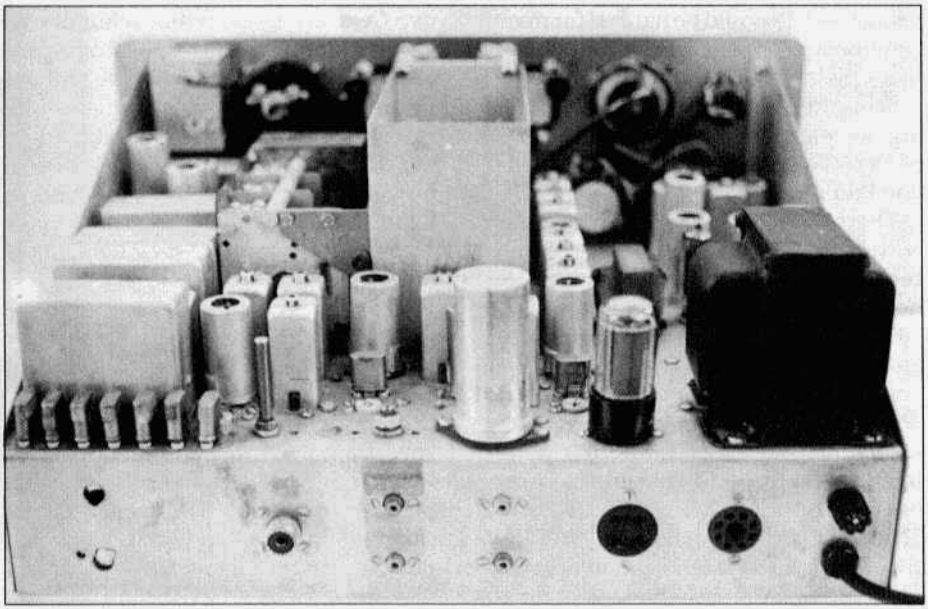
160 -- .6 microvolt
80 -- .55 microvolt
40 -- .55 microvolt
20 -- .7 microvolt
15 -- .8 microvolt
10 -- .9 microvolt

With the set screw tightened, the 100-R suddenly burst into life. Jim fed a .3 microvolt signal generator signal into it, and the receiver heard it loud on all bands, 160 through 10. "It has the sensitivity of something like an R-390-A," he exclaimed. "That's the only other receiver of that period with this kind of sensitivity."

I am not an engineer, but I recognized that this receiver uses no mechanical or crystal filters to set selectivity. Instead, it uses six tuned circuits in the second 50 kHz IF. But the more subtle circuits on the four-foot-by-eight-foot blueprint are beyond my limited knowledge. What, I wondered, looking at the left top of the diagram, is a "bifilar compressor"?

Ray Osterwald, a frequent contributor to Electric Radio magazine on receiver matters, had an answer. Furnished with a schematic copy and Clark's notes and data, Ray deduced that "you've got a real strong triode first mixer and probably the most unusual feature is what he calls a "bifilar compressor".

"From the schematic I can see it uses triple-loop AVC. IF amplifier voltage is coupled from a 6CN7 triode broadband amplifier into a 6BJ8 AGC amplifier and detector. The triode section of the 6BJ8 is an AGC amplifier, and AGC delay is set with a pot in its cathode circuit. The first 6BJ8 diode is the AGC detector. Its anode is DC coupled to the control grid of the 6DC6 front end RF amplifier, forming the first AGC loop. There is a selection of 2 time constants for AFC slow, fast and off. This is conventional AGC action, at least until you get to the bifilar compressor. This stage is an AGC level compressor. It compresses a normal AGC control range of maybe 80 to 100 dB in a conventional multi-stage IF amplifier to maybe 20 dB for the same range of control. It lies directly ahead of the first mixer. Then, all of the following stages can be biased so as to stay linear. The compressor is a 12AT7 double triode. RF signal from the 6DC6 plate is split, and AC coupled to each control grid. The plates are at AC ground, and each section becomes a cathode follower with a gain of one. In the cathode circuit is a broadband bifilar-wound transformer and an output



Rear view of the 100-R.

winding. The center of the bifilar winding is grounded for AC. Since the output signals from the two cathode follower stages are in phase with one another, the voltage developed across the output coil is the vector sum of the amplitude and phase in the bifilar windings. The second 12AT7 control grid has AGC nearly at the same potential as the RF amplifier. This common voltage is coupled to the second diode of the 6BJ8. The anode of this diode has an adjustable negative potential (labeled bifilar balance), so the first 12AT7 control grid AGC voltage doesn't change until the fixed negative voltage at the diode is overcome during strong signal reception. When it does, the signal level coupled into the first mixer falls exponentially, hence AGC compress. True genius!

"It probably would be tough to overload, even with a gain antenna on 40 meters at night."

"There is no AGC on the IF amplifiers or the mixers -- it's all in the front end. All the mixers and front end tubes are low noise and that's why it has such high sensitivity.

"The 50 kilohertz second IF is where the main selectivity is established, but the bifilar compressor is the heart of this receiver," said Osterwald.

"The bifilar compressor -- that was Joe Batchelor's baby," recalled Wes Schum. Like Joe Batchelor, the co-designer of the 100-V, Schum is gratified to see his creations receiving respect from modern engineers who recognize innovative circuitry.

Schum agrees that the 100-R's front end is "crunch proof."

"You could still crunch it, but it would take a whale of a signal to do that," Schum said.

I note that when I tried to transceive using the 100-R VFO to slave the 100-V, I was told my transmit frequency was off.

"It needs a tune-up," Schum advised me from his home in Tennessee. "It may be that a crystal has drifted off frequency."

My 100-R sat for 36 years without

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The Central Electronics 100-R from previous page

being used. It would be natural for many components -- capacitors as well as crystals -- to lose their original values.

Schum noted that Clark's engineering notes state that after a year, one end of the VFO had changed frequency by one kilohertz.

There may be a long-term problem with the 100-V-100-R transceive concept, however, because the Zenith engineers chose to use a 9 MHz first IF in the 100-R, while the 100-V transmitter uses an 8 MHz IF. "We had to put a clarifier knob below the receiver main tuning dial" to adjust the transmitter frequency so that the 100-V and 100-R first IF frequencies correspond. "I would have recommended an 8 MHz first IF," said Schum. "In fact, I did. I don't know why they went with 9 MHz, and everybody involved who knew about it is dead. Clark would have made the decision."

"This is the first working unit out of the model shop," said Schum. "I don't know whether it's practical to track it and have it stay tracked. If it's drifting apart, that is undesirable."

But Schum recalls using the rig and enjoying it. "It worked well -- I transceived with it one Sunday afternoon with a 200-V," Schum said.

"On the data sheets, it says that from 160 meters through 20 meters, there are no images detectable, which is amazing," notes Osterwald. "How did they do that?"

"That's because of the extra tuned circuits -- it wasn't built for cheap, it was built for good," said Schum. "All the tuned circuits in there reject the images."

Schum and Batchelor laid out the general plans for the 100-R, and Clark directed the team which made it a real thing. Jim Clark was a former Hallicrafters receiver engineer, said Schum.

The Zenith people didn't do everything according to Central's liking. The inclusion of a squelch circuit came from the two Central engineers, but Schum's suggestion that the receiver include a panoramic display went nowhere. Schum figures the Zenith number crunchers decided the scope would cost too much to develop and would add to the price, so instead they gave the receiver a timer to warn operators when they should give their callsign. In my 100-R, the timer is not complete -- in fact, it is a dummy, with no works behind it.

"I wanted an automatic match for nulling out heterodynes -- that had not been heard of at that time, but they (Zenith) didn't think that was worth spending the time on," said Schum. "Maybe they were right from the standpoint of marketing. We needed the receiver, and if we had had it, we would have had the whole market by the tail."

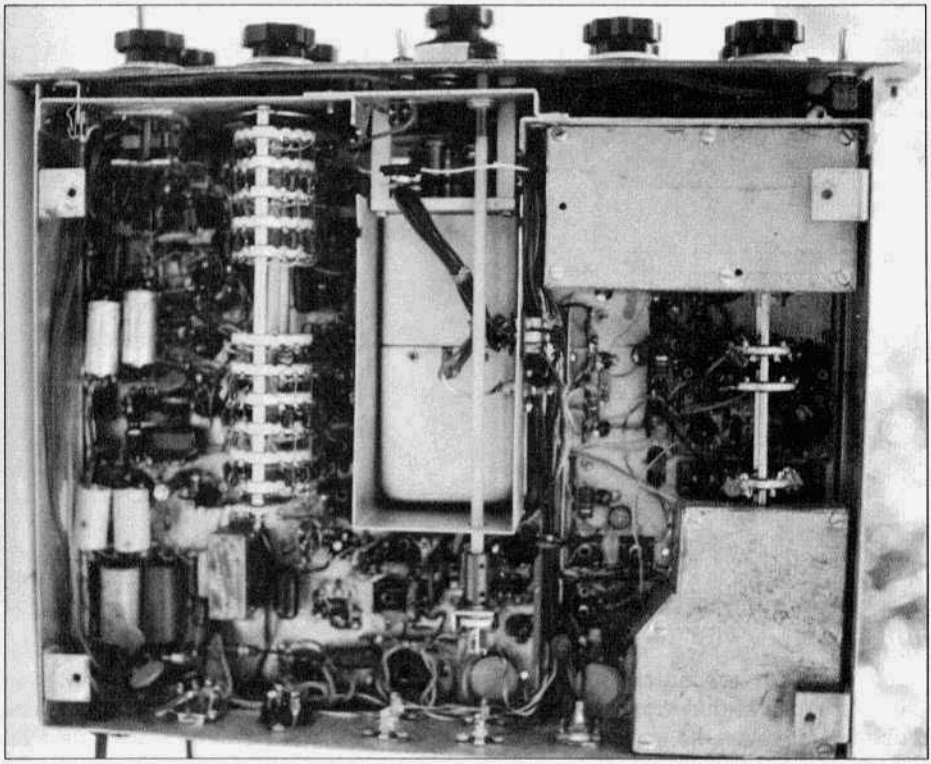
"I think it would have been a winner," agreed Batchelor, who lives in Georgia. "It is my idea of what a dream receiver should be." He noted that the radio has a trap in the RF section to eliminate the pulsing of airport radar, an annoyance of the time.

The 100-R is a great playing radio. It has three degrees of selectivity on AM, two each on upper and lower sideband and a narrow setting for CW. All selectivity settings are pleasant to listen to. The narrow sideband position is sharp enough to eliminate most interfering adjacent signals, yet the speaker's voice characteristics still come through nicely.

"In its day, I don't think anybody else had a 50 kHz IF for selectivity," said Schum. "Collins had mechanical filters and other folks were experimenting with crystal filters, but those six tuned circuits at 50 kHz have really high Q" and hence great selectivity.

Unlike Collins' VFOs, the permeability tuned oscillators in the 100-V and 100-R (they used the same PTO) could be adjusted by the owner very easily, said Schum.

Schum said a friend is giving him a Collins 75A-4 receiver, considered by



Underchassis view of the 100-R.

many to be the pinnacle of 1950's receiver design. He offered to run comparison tests between my 100-R and his 75A-4.

The end of Central Electronics came swiftly in late 1961, and with the company's demise the 100-R was scrapped. In fact, my 100-R came close to making a one-way trip to the dump.

"Bill Van Slyck is to be complimented -- it would have gone to the dumpsters," said Schum.

Zenith had planned to make six of the prototype models before swinging into 100-R production. "We ran stuff for six, but at the point when Zenith decided they wanted out of the ham radio business, whatever parts for the other five went to the dumpster, so you got a one and only," said Schum.

"The one existed at shutdown time, and then they were in there with shovels and barrels," Schum said.

Why did Zenith dump Central?

"I think they experimented with the market and found it was not deep enough for them," said Schum. "I was told by the big wheel at the time that it was simple economics, when you're already doing $279 million a year and if it takes 30 percent of your time to do another two or three million dollars, it doesn't justify. They were used to having a market that was just essentially bottomless. They had millions of customers, where we had only thousands of customers."

Then too, Zenith was worried about Central's latest product, the 100-R. Would it sell, and would it sell well? It was priced at $895, and at the same time, Collins had its S-line receiver priced under $500, said Schum.

The end of Central was just the beginning of slash and burn at Zenith, where

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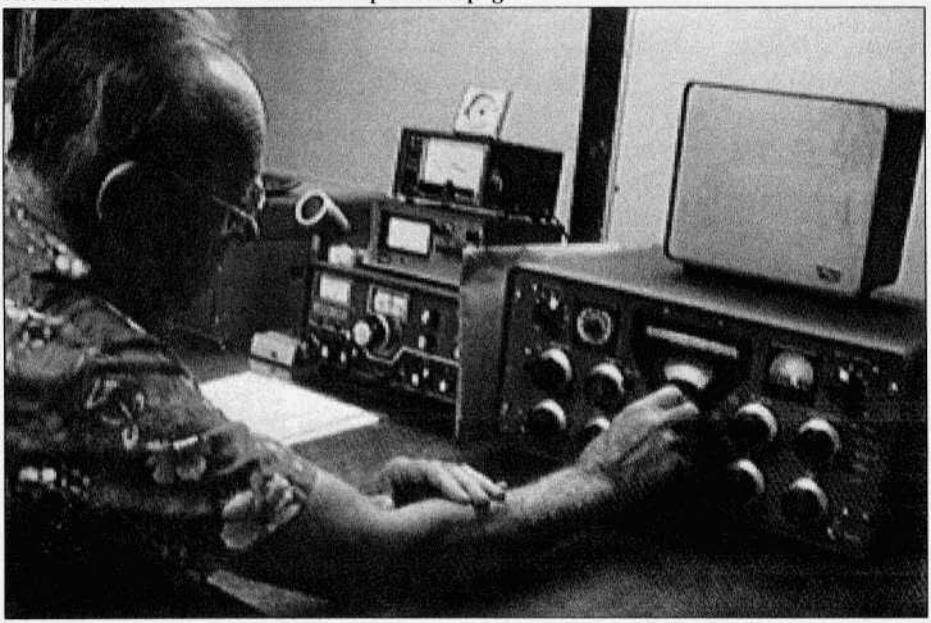
The Central Electronics 100-R from previous page



Bill Van Slyck with the Central 100-R.

soon the military contracts for night vision scopes and the proximity fuse business and even the long-established Zenith hearing aid business were shipped to the landfill, according to Van Slyck and Schum.

But why did Central sell out to Zenith?

By 1958, recalls Schum, "We didn't have the working capital to produce over a million dollars of backlog in orders for the 100-V. We had run ourselves out of money. I was president and one of two stockholders. The buyers did not pay cash. I'd had lots of pressure from dealers throughout the country to go ahead and sell the line through their dealerships. The first thing that happened to me, instead of getting money in hand when you opened the envelope, you got a purchase order -- the dealers had my working capital! That was a mistake, and I freely admit it. If I would have stayed on a direct sale basis, we would not have had to sell the company.

Schum comes back to the 100-R, now sitting in my shack. "I'm interested in what the 100-R does, and would love to go ahead and put it on the air for a bit just for the sake of a sort of fulfillment," said Schum.. "There I was creating this stuff and they pulled the rug out from under me. I didn't go on the low bands for 20 years. I was so disappointed that I just was on the local repeater channels with friends. I didn't want to talk to anybody about it.

"I am preparing my second ham shack with a 200-V, and I was looking forward to buying that receiver -- I wanted to get the 100-R and 200-V on the air at headquarters," said Schum.

Wait a minute -- did I hear him right?

Yes, Wes Schum in Chicago the day before I got there, bidding on the 100-R. ER

Editor: In a future issue Ray Osterwald, NØDMS, will provide a more technical look at the R-100.

Fall Classic Exchange Report

by Jim Hanlon, W8KGI
P.O. Box 581
Sandia Park, NM 87047

By any account, the Fall 1997 Classic Exchange was a warbling, chirping, humming success! Most of the nationwide activity wound up on 40 and 80 cw, but there were substantial regional showings on 75 and 40 phone, AM and SSB, and a few hearty souls managed QSO's on 20 and 15. Early reports show at least 35 stations participating, many with multiple transmitters and receivers.

Calls heard on the Fall 1997 CX include KØAL, KØOCC, N1QY, W2CQH, W2HUG, W2LYH, W3YK, W4CFF, K4HU, KT4NR, N4OSJ, N4QB, N4QY, AA4RM, NC4S, WB4SEE, N5AIT, AC5AM, K5BU, W5FRS, W5TVW, W5VBT, N6KN, K6LQI, K7DU, K7TM, W7ZFB, W8KGI, K8NU, W8ZR, KA9DZR, W9TGN, K9VKY, KB9W, and W9ZEN.

Transmitters filling the air with melodious tones included B&W 5100, Central Electronics 100V and 200V, Collins KWS-1, 32RA, 32V-2 and 32V-3, Drake T4X and 2NT, Eico 720, Elmac AF-67, Globe Chief 90 and Globe King 275, Hallicrafters HT-20, HT-37, HT-40 and HT-44, Hammarlund 4-20, Heath DX-20, DX-60 and DX-100, Homebrews including a 10 Hartley, a crystal controlled RK34, a pair of 24G's, a pair of 808's, a 25 watter, and an 813, Johnson Invader, Navigator, Ranger, Valiant, Viking II and Viking 500, Knight T-50, T-150 and T-150A, McMurdo Silver 701, and a WWII Surplus ARC-5.

Receivers pulling in those wonderful signals included Collins 51S1, 75A-1, 75A-3 and 75A-4, Drake 2B, 2C, R4B and R4C, Elmac PMR-6 and PMR-6A, Hallicrafters SX-101 and SX-117, Hammarlund HQ-129x, HQ-140, HQ-180 and SP-600, Heath HR10, Homebrews including W5TVW's Regenerative set, Howard 438, National NC-300, NC-303, HRO-5 and 1933 SW3 regen, RME 45 and 6900, and a surplus R-390A and ARC-5.

And there were even some "modern" and Classic transceivers on the air including AA4RM's Cosmophone and relay-clattering TCS-13, a Drake TR4, Galaxy GT-550, Hallicrafters SR-150 and W8ZR's famous FPM-200, National NCX-5A, Ten Tec Omni 5 and 6, and W5VBT's hombrew transceiver ending up in a 4-400!

Here are some notable comments from the early returns. (Dave, WB4SEE) "Most of the action appeared to be on CW, especially on 40. After being away from ham radio for 22 years my CW was too slow to participate, but I'll be ready next time." (Jim, W8ZR) "I also hooked up my old Hallicrafters FPM-200 which, to put it delicately, is not famous for its CW performance. The note sounds roughly like a parasitic oscillation from a spark gap transmitter ... The winner of the 'most tactful operator' award goes to Phil, W2HUG, who merely remarked that the FPM-200 had an 'unsteady tone.' That's unsteady like Mount St. Helens is unsteady." (Marty, AA4RM) "The TCS-13 is a relay-driven, full QSK clatterbox of unprecedented dimensions. My head is still pounding Potter-Brumfield headache #13." (Tom, N7TM) "Each piece of old gear that I used had various idiosyncrasies, but overall, everything worked out well without any surprises. What a pleasant afternoon." (Jim, W8KGI) "I'm amazed

continued next page

Exchange Report from previous page

at how well my Hammarlund 4-20 worked out. It's only 15 watts out of an 807, but I talked to everyone I heard ... What fun 80 is when it's open!" (Sandy, W5TVW) " I need to build a 'switcher' that will handle about 5-6 rig combinations at the same time, so that the antennas can be switched rapidly to other gear. Some means of audio muting has to be accomplished too so that you don't run yourself out of the shack with howls from the 'standby' gear ... Gee, I need at least four arms sometimes." (Bob, AC5AM) "Sure did remind me of my early radio days when one could tell who another op was by the sound of his xmtrs' keying. ... What a bunch of classy guys we have here." (Mike, VE3FGU who had to work and missed the CX) "Oh well, there is always the next one." And finally there's the comment from Greg, N4OSJ, that sums it up for all of us, "All in all it was a great weekend event, and have to say I had a ball ... I am looking forward to the next one."

The next Classic Exchange will run on the afternoon of Sunday, February 1, 1998, from 2000 to 0600 Z. ER

MY BEAM HEADING INDICATOR IS BROKEN, SO I USE THIS TO REMIND ME WHICH WAY THE BEAM IS HEADING-

TIP - Elmenco Plug Replacement

by Gary Peterson, KØCX
3288 Sandstone Ln
Rapid City, SD 57701-5388

Some ham gear manufactured by E.F. Johnson and others, during the 50's and 60's, made use of Elmenco fused plugs on the line cord. Much of this old equipment turns up without this hard-to-find item.

I discovered, quite by accident, an almost identical replacement in the electric fence supplies section of our local Country General Store. It is the American Farmworks fused plug for electric fencers, part #07063-92, for about $5. It is very nearly identical to the Elmenco except for the raised lettering that says "DARE 1624 FUSED PLUG HONG KONG". In the event that you have trouble finding this in your area, you might try the service department phone number printed on the American Farmworks package. It is 1-800-272-9877.

Looking Back from page 2

very hard to beat an ordinary half-wave dipole. He would argue that with a good dipole and 100 watts he could work anything anyone else could. I believed in beams with gain and power but in the long run, probably George was right; he was a very respectable DX man.

I'll continue about George Grammer in another column. W1ICP

Editor's Note:

Two weeks ago Shirley and I drove down to Silver City for a visit with Lew and his wife Martha. It was a trip we had been planning for almost 3 years and this was the first chance that we had to get away together.

Lew and Martha were wonderful hosts and we had a great time. In a future issue I'll share the experience with the readers of ER. N6CSW

forward with no problems other than the lack of any kind of band-spread. A switch on the receiver allows the filaments to be lit during transmit so that the transmitter's signal can be monitored. No other provision is made for monitoring keying, such as a side-tone oscillator.

Getting the set on the air was quite easy with the major effort spent in making tube adapters for the receiver. The set was in sufficiently good shape that only the numerous electrical contacts needed to be cleaned.

There is an old engineering saying: "The correct solution is the simplest one that does the job". In many respects the 94-3A set meets that goal.

The set has been taken to a number of hamfests and put on display. It has received much interest with many comments regarding the high quality of construction and unique features. The transmitter and receiver plug-in coils must have been removed and plugged in fifty times by hams just to see the precision fit and smooth operation, and needless to say lots of dial turning. It was a common occurrence for someone to listen to a description of the set and then to come back later with friends in tow and exclaim "look at this!" and then give their own description.

It is hoped that this article will inspire vintage radio study, operation, technical learning, and when necessary vintage restoration. The transmitter circuit should be of interest to the experimenter who wants to build a simple transmitter that works well and wants to learn more about oscillators.

Leads on other plug-in coils, particularly the 160M set #4, and other accessories would be appreciated.

The author wishes to acknowledge and thank Masakazu Kobayashi, 7M1SQP, Tokyo, Japan for providing information and identification of the set. Thanks go to: Mike Feher, N4FS, for providing a complete copy of the TME; to Henry Engstrom, KD6KWH, for source leads on a companion 94-3D receiver and other sets; to Wm. Howard for general information on Japanese WW II equipment; and to the many hams who have visited this and other sets at hamfests and provided the other end of many enjoyable QSOs. **ER**

References.

1. "TM E11-227A: Signal Communications Equipment Directory, Japanese Radio Communications Equipment", War Department, December 1944.

2. VHF/UHF Manual, 4th ed, Radio Society of Great Britain, 1883, page 4.12

Review from page 15

these tapes in conjunction with the schematic and manual. Dennis Brothers certainly knows his stuff having worked at Collins Radio Company for many years on this very equipment. His company, Western Nebraska Electronics is still recommended by Collins/Rockwell, so his credentials to demonstrate and narrate such a video are impressive.

Production work is professional but not "slick" which it doesn't have to be seeing it's an instructional tape and not an entertainment product. **ER**

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

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FOR SALE: Viking Ranger, very good, PTT, orig. assembly and operating manual, warranty card - $150; Adventurer, VG, manual - $75; VFO 122 - $30. All+ UPS. Pierre Dupuis, VE2MP, Quebec, Canada, (418) 626-0313, dupp@netrover.com

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

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

FOR SALE: New Ranger 1, Valiant 1 and Navigator plastic dials, 160-10, freq. numbers in green, w/all holes, like original - $17.50 ppd. Bruce Kryder 4003 Laurawood Ln., Franklin TN 37067. (615) 794-9692

FOR SALE: Cleaning out shack. LSASE for list of ham, military stuff, book, manuals, test equip. G. Cain, POB 521, Shakopee, MN 55379.

FOR SALE: 1940 Taylor Tube Manual, 50 pages, copies - $15; service manuals - SASE for list. DSM Diversified, 909 Walnut St., Erie, PA 16502. dsmdiversified@juno.com

FOR SALE: Original military wall charts/diagrams (up to 17"x28") for R-390/URR rcvr - $23ppd. R.J. Moraine, W5LX, 3700 Cliffwood Dr., Bedford, TX. 76021.

FOR SALE: KWM2A/PM2 complete except some tubes and crystals, restorable - asking $250 + shpg. Dennis, KE4QM, KS, (913) 782-9092 wbfins@sound.net

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

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

WANTED: Marantz, McIntosh, or similar tube audio amplifier in any condition; Heath catalogs. Mike Nowlen, WB4UKB, POB 1941, Herndon, VA 20172

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

WANTED: Mics Shure 55S,Collins SM3 SM280. 456-33 Kamimohara,Mohara-city, Chiba297,Japan Koji Mitoshi, fax 011-81475-24-9115, byj0172668@niftyserve.or.jp

WANTED: Drake TR-3 mobile pwr sply; Heath SB-401 working or for parts. Tom Thomson, W9CHP, 315 Wellhouse Dr., Kimberly, WI 54136. (920) 734-1068.

WANTED: National HRO or RAS Desktop spkr (Black Wrinkle); S-meter for HRO RX (L40s/E50s),would consider used RX & spkr, etc w/good meter & spkr; Globe Scout 40, 65 or 66; Gonset Monitone; 1931 ARRL Handbook; Philmore Catalog 1958-64; WW2-TCS stals (TX&RX); BC-456 modulator & FT-225 shockmount; FT-221 & FT-225 racks; C-30 control; R-27/ARC-5 (6-9mc); Mars 40/80 mobile TX(1960s); Vibroplex bug; & GRC-9 components. Greg Greenwood, WB6FZH, POB 1325, Weaverville, CA 96093. (707) 523-9122 message# gregs6zh6@aol.com

WANTED: Help, PRC-47 that does not want to transmit. Any help appreciated. Carl Banfield, 24 Fox Hill Dr., Franklin, NJ 07416. (201) 827-7441

WANTED: Info/specs on pre-WW II National RBL-5 Navy rcvr; spkr for NC-125 (NC-125TS); manual copy OK, to Heath audio VTVM, IM-21. Thanks to everyone! Bill Bowes, N7MOB, 31132 14th Ave. SW, Federal Way, WA 98023. (253) 839-8591

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

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

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

WANTED: Specific pre-1923 issues of QST magazine for my personal collection. Eddy Swyrar, VE3CUI, 3773 Concession Rd. 3, R.R. #8, Newcastle, Ont. L1B 1L9, Canada

WANTED: Hammarlund: Comet, Comet Pro, HQ-66, HQ-88, HQ-225, S-200 & any other Hammarlund rarity's. Charles P. Jedlicka, 1611 Clemens Rd, Darien, IL. 60561-3510. (630) 515-1836. sp6008@aol.com, Hammarlund site: http://home.aol.com/sp600

WANTED: Star rcvrs; schematic & spkrs for Star SR600 & SR700; other Star accessories. Harry Blesy, N9CQX, 95740 Clarendon Hills Rd., Hinsdale, IL 60521. (630) 789-1793

WANTED: Heath catalogs pre 1976; WW II BD-77 & PE-73 dynamotors; GN-37 & GN-44 hand crank generators; GC-7 cranks; P-19 headset. Warren Harding, K1BOX, POB 183, Harvard, MA 01451-0183. (508) 624-4340.

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WANTED: Astatic mic model 805, 600 & JT-30/40; EV638; Shure 705, 520, CR80/88. Tom Ellis, Box 140893, Dallas, TX 75214. (214) 328-3225, Fx 328-4217, 74053.3164@compuserve.com

WANTED: Very early broadbead type home made ham gear; WW II Japanese military radio of any kind. Takashi Doi, 1-21-4, Minamidai, Seyaku, Yokohama, 246 Japan. Fx 011-8145-301-809. takadoi@kk.iij4u.or.jp

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

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

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FOR SALE: Please send SASE for long list of radio, electronics books & mags. Vic Edmondson, Rt. 1 Box 2599, Lee, FL 32059.

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FOR SALE: Are you looking for a good AM xmtr? Here is a good one! Barker Williamson 5100B + the 515B-B SSB generator, above average condx, all - $425 + shpg. Don, FL, (352) 475-3306.

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FOR SALE: Collins 30L-1 linear & Millen 2KW antenna tuner; SASE for Collins literature list. Bill Mills, 188 Ellis Mill Rd. NE, Milledgeville, GA 31061-9020. (912) 452-2957.

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

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

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FOR SALE: Crystals made to ordered frequencies in FT-243, DC-31, and CR-1 holders for vintage equipment. 160-2 meters. 4 stamps or $1.00 for catalog/circuit package. C-W Crystals 1714 N. Ash Nevada, Mo. 64772 phxtal@nava-link.net

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

FOR SALE: Used 807 tubes, tested OK, guaranteed - $5 ea + $3 priority mail. James T. Schliestett, W4IMQ, POB 93, Cedartown, GA 30125. (770) 7485968, imq@bellsouth.net

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FOR SALE: Collins manuals (copies) R388, R390, R390A, R391, Fisher 400 tube stereo rcvr w/wood cabinet & manuals - $325. N1FRX, ME, (207) 834-6273.

FOR SALE: Nice SX-140 SSB rcvr; SX-43 rcvr, nice; SX-22 rcvr. All work. Fred Clinger, WA8KJJ, OH. (419) 468-6117 after 6 PM EST.

FOR SALE: Copy Army TM for maintenance of Collins KWM 2/2A - $12.50; 30L1 - $7.50, + postage. Bob Rolfness, W7VZX, 2327 Malaga Rd. NE, Moses Lake, WA 98837. (509) 765-4721

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FOR SALE: Collins 75A-3 w/4:1 dial, gd/exc condx - $389; Hallicrafters SR-400 w/ps, collector condx (9.95) - $549; Heath Chippewa 2KW linear w/pair 4/400's, w/ps - $889; Hammarlund SP600JX17, beautiful, w/new panel - $579; Heath Apache - $229; Heath SSB Adaptor (for Apache) - $149; Millen 2KW antenna tuner - $289; Meissner EX Signal Shifter - $179. PU only on 75A-3, Chippewa, Hammarlund, Apache. Allen Smith, AC9K, WI, (414) 228-8036.

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FOR SALE: Collection of WWII Japanese mil. xmtrs, rcvrs, assort. elec. equipment, and assort military parts (ships compus, aircraft parts, etc.). Discovered in friends grandfather's attic after death. Too much to list, all untouched since WWII. Need to sell whole lot for best offer. Serious collectors should contact me at e-mail address for photographs. Grayson Evans, AZ. (520) 749-1647 grayson@compuserve.com

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FOR SALE: HQ180AC - $300; Knight R100A - $100; S-21 - $80. Prefer pick up or you pay packing and shpg. Larry, Cerritos Calif., (562) 924 7282, 110242.1646@compuserve.com

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FOR SALE: Gonset 2M combo VFO/mic preamp - $50. BC-1000 w/accessories, good condx - $100; RAX 7-27, converted - $60. Ken, WB9OZR, NY, (212) 512-1866 or 288-1310.

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FOR SALE: Swan 1200 amp - $250; Galaxy 300 xcvr - $150, Clegg22er - $40; DX-60 - $70. Carter, VA.(804) 979-7383

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

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

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

WANTED: JW Miller RF coils, IF trans, chokes. Buying JW Miller & Millen parts, esp. need Miller B-727, B-727C, S-27, 912-C2, 912-C4, 912-C5. WA5THJ, Rt9 Box 163, Alvin, TX 77511. (281) 331-2956.

WANTED: AR-88, CR-88, CR-91 w/manuals, junkers or parts OK. David Boardman, 10 Lemaistre, Sainte-Foy, Quebec G2G 1B4, Canada, (418) 877-1316

WANTED: Collins 310B-3 parts or parts set; need antenna tuner parts & coils; final parts & coils; Browning Labs preselecter; other pre-1950 ham gear. Dean Showalter, WA6PJR, 72 Buckboard Rd., Tijeras, NM 87059. (505) 286-1370

WANTED: Tubes: Taylor 203Z, Ampex ZB 120, 45, any brand, new or used; National SW-3 first model, 2 volt version, uses 32-32-30 tubes; knobs for SW-3; other pre-1950 ham gear. Dean Showalter, WA6PJR, 72 Buckboard Rd., Tijeras, NM 87059. (505) 286-1370

WANTED: Hallicrafters SX-43 in repairable or better condition at reasonable price. Jim Hanlon, W8KGI, PO Box 581, Sandia Park, NM 87047. jthanlo@sandia.gov

WANTED: Information - WW2 TCS radio, system, design, ffg & operation for article. Any help appreciated. Thanks. Greg Greenwood, WB6FZH, POB 1325, Weaverville, CA 96093. (707) 523-9122 message#, greg6fzh@aol.com

WANTED: Manuals for Sylvania rcvrs type R-1451A/WLR6 & R1414/URR. Weber, 4845 W. 107th St., Oak Lawn, IL 60453-5252.

WANTED: My KN3OMI QSL card from 1961-62 & my KR6MI QSL card from 1969-71. Gary Wagner, K3OMI, 11124 Oak Hollow Rd., Knoxville, TN 37932. (423) 690-4217 days

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

WANTED: NC44, NC45, any version. Paul Dennis, POB 5186, Tucson, AZ 85703. (520) 743-7755, pdennis@rtd.com

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

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

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

WANTED: Mics: Shure 705, CR88, CR80, 520/440, 707A; EV638/641/605; Astatic T-3; parts & elements. Tom Ellis, POB 140093, Dallas, TX 75214. (214) 328-3225, fx 328-4217. 74053.3164@Compuserve.com.

WANTED: Manual/accessories for National HRR-59A rcvr. James Cavan, 6 Timberline, Norfolk, MA 02056. (508) 528-0908

WANTED: Top dollar paid for Winchester Radios and Winchester related items. Donald, NY, (914) 985-7249, WC2E@webtv.com

WANTED: Collins SM-1 mic. Grayson Evans, AZ, (520) 749-1647, grayson@compuserve.com

WANTED: A pair of good 8236 tubes. Kevin AA2CB, NJ, radioman@writeme.com

WANTED: For BC610H: BC939 tuner, BC614 speech amp. M.B. Moore, 2117 Stonecrest Dr., Fort Collins, CO 80521. w0as@aol.com

WANTED: 1942 ARRL handbook. Bill, WA2DVU, NJ, (609) 463-9179, richesb@algorithms.com

WANTED: Calibrated plastic dial strips for HRO50T1. Don Christensen, W8WOJ, 2004 Ivy Ln., Midland, MI 48642. (517) 835-1307, dfcsenior@juno.com.

WANTED: Clegg Interceptor spkr. Dick Bean, K1HC, 422 Everett St., Westwood, MA 02090-2218, (781) 461-0101, k1hc@aol.com

WANTED: Harvey Wells VFO. Dave Kiker, W5YSA, FL, (850) 479-1684, ohmguy@aol.com

WANTED: Barker-Williamson 5100B manual, original or good copy. Offer $20 if complete. Ellsworth O. Johnson, 364 S. Coeur Dalene St., Spokane, WA 99204-1063, (509) 838-2161. eojohnsonww2@worldnet.att.net

WANTED: Bud Codemaster; Collins 26U/W; Altec T1401/402; other B'cast gear. R. Robinson, 868 S. Main St., Plantsville, CT 06479. (860) 276-8763

FOR SALE: New list -hundreds of manuals, schematics and service information. Send 2-stamp LSASE. David Crowell, KA1EDF, 40 Briarwood Rd., North Scituate, RI 02857-2805. (401) 934-1845

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

FOR SALE: Navy RBL-3 rcvr, 15k to 600k, good cosmetic condx, needs elec. work. Doug Knoll, KA9IQA, 1400 4th Circle NE, Waseca, MN 56093. (507)835-8821

FOR SALE: Sovjet agent sets: R-353 (1950s) and R-354 (1970s). Both with burst capability. Encoder. OZ8RO, Rag Otterstad, Hosterkobvej 10. DK-3460 Birkerod. Denmark 010-45-4281 5205. otterstad@inet.uni-c.dk

FOR SALE: SX-99, VGC with orig. tubes; Drake TR4 w/blanker, MS-4,PS, W-4, exc - $275; CE-GC1 and sideband slicer - $100 ea; Heath HP-10 - $25; Clegg 22'r VGC - $35; TX-62/VFO621. JeRB K8WPI, MI, (616) 382-5401.

FOR SALE: GRA-4 dipole center insulators, NIB - $5; 2300pF/500V feedthru caps, NOS - $.50. Lowell, K6KC, CA, (209) 227-1605, k6kc@lightspeed.net

FOR SALE: Galena stal radios &/or parts to make your own. Len Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150. (716) 873-0447

FOR SALE: New Collins 500 kHz filters 2.75 kHz wide, plugs into 51J-4 for extra 12 dB gain - $125. Walter M. Chambers, K5OP, POB 241371, Memphis, TN 38124-1371. (901) 761-9381

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

FOR SALE: New Release: Send 2-stamp LSASE for Olde Tyme Radio's latest flyer NO. 197 to: Olde Tyme Radio Co., 2445 Lyttonsville Rd., Ste 317, Silver Spring, MD 20910. Ph/Fax (301) 527-5280

FOR SALE: Ancient (30s - 40s) neons, one watt 110V, size 1-1/4 inch globe - $5 ea, 7.50 for two, etc. Request info. Charles Graham, 4 Fieldwood Dr., Bedford Hills, NY 10507. (914) 666-4523

FOR SALE: Johnson Viking Ranger good condx, w/manual and spare 6146 - $100; Sprague TO4 Tel-Ohmike, good meter, bright eye, surface blems on case, no book - $20; Sencore TC136 tube tester, 1972 data - $20. Shpg extra. Bill McCombs, WB0WNQ, 10532 Bartlett Ct., Wichita, KS 67212-1212. (316) 722-7669, wmmccombs@aol.com

FOR SALE: Heath-Zenith pwr sply SP-2712-A, 0-100 negative 0-400 positive - $40; Heath signal tracer IT-12 - $12.50; Hewlett-Packard 3400-A RMS volt meter, no manual - $60. All + UPS. Ken Tountas, TX, (254) 772-7303.

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

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

WANTED: Collins R389, 30K-, 310-, 399C-1, KW-1, HF80 i.e. HF8014, 851S-1, Hallicrafters SX-115. Richard, WA0AKG, NE, (402) 464-8682.

WANTED: Info/history on WW2 TCS Radio System for article. Any help appreciated. Thanks. Greg Greenwood, WB6FZH, POB 1325, Weaverville, CA 96093. (707) 523-9122 message, gregf6fzh@aol.com.

WANTED: Orig "Boat Wheel" style tuning knob & band spread knob for Hallicrafters SX-28. Michael, CA, (650) 871-4034, chodrick@ix.netcom.com

WANTED: ARC-5, 40 &/or 80 meter xmtr w/pwr sply, good working condx. Will consider complete ARC-5 station. Richard, KF2V, OH, (419) 531-5000.

WANTED: BC-610 + BC-614, coils & tuning units; 160-75M northeast-mid Alantic prefered. Pete Hamersma, WB2JWU, 87 Philip Ave., Elmwood Park, NJ 07407.

WANTED: Help! restoring my 35-yr old Globe Champ, need AX9009 tubes, various parts & help. Please. Dave, K9HDQ, IN, (765) 354-2884.

WANTED: Viewstar amp 3-500s, trade RAL6 rcvr. Phoenix or Prescott area. W7RBF, AZ, (602) 864-9987.

WANTED: Knight Spanmaster schematic & manual; all four knobs for Hallicrafters S38B. Gale Roberts, POB 152, Clyman, WI 53016.

WANTED: Seeking low-priced junker National SW3 rcvr; service manual for HP VHF detector, model 417A. Al Kaiser, W3LEQ, 713 Marlowe Rd., Cherry Hill, NJ 08003-1551. (609) 424-5387.

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

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

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

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

WANTED: In pristine condx.: Collins 32V3, 75A1, 30S1, 270G-1, 32S3A (RE), 310B3, 30K1, mech filter adapters. Lee, W9VTC, IL, (847) 439-4700 d, 726-1660 eves.

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

WANTED: Cash for Collins: 5M-1, 2, 3; 312A-1, 2; 55G-1; 625-1; 399C-1; 515-1; 302C-3; KWM-1; KWM-380; also buy estates. Leo, KJ6HI, CA, Ph/Fax (310) 670-6969.

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

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

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

WANTED: AN/ULR17 & AN/MLQ34 documentation & equip. Geoff Greer, 1530 Hampton, Mt. Clemens, MI 48043. (810) 465-1844, wj8617b@ix.netcom.com

WANTED: Comm IV for 220. Don Hilliard, WOPW, 8630 Nighthawk Rd., Neosho, MO 64850. (417) 451-5892

WANTED: One or more old-style QSL cards, such as 8AP, 2JU, etc. Chuck Brumley, KB2SWI, 32 Glenwood Rd., Saranac Lake, NY 12983. (518) 891-5704

WANTED: Source/purchase military battery type BA 1100/U, 6.5 volts, measures 2" length x 1.25" width, for early US military nightscope. Claude Pennington, W4PN, POB 1916, Macon, GA 31202. (912) 746-1231, fx 742-2037

The Radio Finder©

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SEPTEMBER SPECIALS

AMATEUR TRANSMITTERS: COLLINS KW-1; 30-K; 30S-1; 32S-1; 30L-1; 312B-4; **WRL** Globe King 500-B; **JOHNSON** Invader 2000; Valiant; Thunderbolt; Ranger; Adventurer; Johnson mobile VFO; **GONSET** GSB-100; **HEATH** DX-100; **CENTRAL** 100-V; **HALLICRAFTERS** HT-32B; HT-32; HT-37; **MULTI-ELMAC** AF-67; AF-68;

AMATEUR RECEIVERS: COLLINS 75A-4; 75A-1; R-388 w/prod det; R-388 stock; 75S-3B; 75S-3; 312B-4 console; 312B-3 speaker; 516F-2 case; CP-1; 270-G-2/3 speakers; **HALLICRAFTERS** SX-88; SX-96; SX-73; SX-71; SX-62A; SX-101A; SX-28; SX-17; S-40B; R46/R46B speakers; **HAMMARLUND** SP-200; HQ-180; military HQ-180; **NATIONAL** HRO-60; NC-300; RAO WW II Navy receiver; **NATIONAL** speaker; **SCOTT** SLR-F "anti-submarine" receiver

TRANSCEIVERS: ROCKWELL-COLLINS HF-380; KWM-1; 516F-1 AC; 516E-1 DC; 312B-1 speaker; **DRAKE** TR-4C; TR-7; **HALLICRAFTERS** SR-150; **HEATH** SB-102; HW-16; Twoer; **NATIONAL** NCX-1000; SBE SB-34; **YAESU** FTDX-560; FT-101-EE accessories: remote VFO, monitor, Landliner, digital readout

MILITARY RECEIVERS: R-390; R-390-A; R-392; Rare Servor R-725/Miltronix; Arvin R-725/Miltronix; **COLLINS** R-390/Miltronix; Collins R-390-A/Miltronix; R-1051E; CEI354; **WATKINS-JOHNSON** DMS 105A; BC-348-Q; ARC-5 Command receivers

MILITARY TRANSMITTERS: AN/ART-13; ARC-5 Command transmitters, racks.

FILTERS: 75A-3 – 6 khz, 800 hz; **DRAKE** R4C – 250 hz

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

FOR SALE: B&W low pass filter, new, type FL10/1500 rated 1.5 kw - $15. Bill Riley, W7EXB, 863 W. 38th Ave., Eugene, OR 97405. (541) 345-2169

FOR SALE: Taking offers - model ATD xmtr by ARC, good condx, 4 tuning units. Kelley, W8GFG, IN, (219) 365-4730

FOR SALE: WW II communications equip catalog #11 revised, 54 pgs, historical info - $3 US, $5 overseas. Sam Hevener, W8KBF, "The Signal Corps" 3583 Everett Rd., Richfield, OH 44286-9723. (330) 659-3244

FOR SALE: Xtals 7010 kHz, type CR-1, NOS military - $2 ea, quantity pricing available. WA5THJ, Rt 9 Box 163, Alvin, TX 77511. (281) 331-2956

FOR SALE: National rcvr tuning capacitor complete w/right angle drive, exc condx - $25. Frank S. Law, W8SET, 1 Wildacre Rd., Charleston, WV 25314. (304) 343-0415

FOR SALE: BC 221 AK frequecy meter - $60; parting Johnson Ranger, Valiant & Viking 2 xmtrs - call for what you need. Larry, VE3RF, Box 509, Ayr, Ont. N0B 1E0. Canada, (509) 632-7921, eves

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

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

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

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

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

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

FOR SALE: NOS/boxed Trimm headphones, #50-14-03 type L (?Z) & #24-03 (3.2 ohm) - $12 ea, shpd. Robert Baumann, 1985 S. Cape Way, Lakewood, CO 80227. (303) 988-2089

FOR SALE: SX-99, VGC w/orig tubes; Drake TR4 w/blanker, MS-4, ps, W-4, exc - $275; CE-GC-1 & Sideband Slicer - $100 ea; Heath HP-10 - $25; Clegg 22'r, VGC - $35; TX-62/VFO621. JeRB, K8WPI, MI, (616) 382-5401

FOR SALE: Hammarlund HQ-140X rcvr - $150. Hoover, SC, (803) 726-5762.

FOR SALE: DX-60 - $75. **WANTED:** Central Electronics 100V & Hallicrafters HT-37. Robert Braza, N1PRS, 23 Harvard St., Pawtucket, RI02860. (401) 723-1603

FOR SALE: Heath-Schlumberger (not a kit) test equip for solidstate Delcotron voltage regulators; Delco stock numbers 1116383, 1116385 & 1116387, mint condx; model Heath CTW-1170 - $75. Ed Schaad, W3WDF, 8245 Garden Oaks Dr., San Antonio, TX 78266-1710. (210) 651-9348.

FOR SALE: Collins 75A-4 with 270A-2 spkr, 3 filters, professional alignment, collector quality - $1400; Collins 75S-3B, 4 filters, professional alignment, collector quality - $900; Collins KWM-2A, PM-2 pwr sply, very clean - $850; National NC300 w/xtal cal., collector quality - $380; R390A in cabinet, meters,etc. excellent - $435; 5 ea. HRO 50T coil modules - $160; Yeasu SP 901 spk/patch - $90. If you don't like it return for refund. You ship. Dave, IL, (630) 790-8436.

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

FOR SALE: KWM-2 fan bracket - $15 ppd. Dave Ishmael, WA6VVL, 2222 Sycamore Ave., Tustin, CA 92780. (714) 573-0901

FOR SALE: Collins gear: KWM2/A; 516F2; 312B5; PM2; CC2; xtal pak; 30L-1; w/manuals. All above W/E. Joe, K2QPR/4, FL, (561) 220-7362.

FOR SALE: Collins 312B-5(R) - $625; KWM-2A(R), 516F-2 - $750; Drake AC-4 - $90; T-4XB - $150; TR-4 - $160. +UPS. Bill, WA1APX/8, MI, (810) 781-9717

FOR TRADE: Nice 75A-4 for nice Viking 500. Dave, IN, (765) 354-2884.

FOR SALE: 75A-4 SN 5397 - $725; Collins R-388 - $400; 75A-1 w/matching spkr - $525; HQ-170C - $225; Hallicrafters R-45/ARR-7 - $175; SX-25 - $125; Hammarlund SP-110 w/pwr - $225. Gerald, ND, (701) 347-5018 after 5, leave message if no answer.

FOR SALE: Complete set of Ham Radio Magazine, 3-68 thru 6-90, every issue, 268 issues - $250 ppd. **WANTED:** Manuals for the following, good copies OK: Heath SB-634; Heath ID/SD 4850 digital storage scope adaptor &/or software; Cushman CE-15 spectrum analyzer; Heikimian 3701 test set; EIP 371 frequency counter; Motorola S-1344 deviation meter. Kirk Ellis, KK4YP, 203 Edgebrook Dr., Pikeville, NC 27863. (919) 242-6000 eves

FOR SALE: Drake 4NB noise blanker; National XCU27 calibrator; Heath CR-1 xtal rcvr - $50 ea, shpd. James Geer, WB5LXZ, 1013 Overhill, Bedford, TX 76022-7206. (817) 268-1985

FOR SALE: Globe Champion 300-A, restored, exc condx - $325; R-46B spkr - $50; Drake 2B w/calibrator - $140; new 100TH tubes - $50 ea; Globe Electronics Tenna meter - $15; 36 inch relay rack - $50; new B&W 851 tank - $70; new B&W 800 plate choke - $15; Eldico TR-1 modified w/VFO - $250; Stancor ST-202A - $75, many parts available. John, AE4EN, NC, (910) 686-4236 before 2PM. ae4en@aol.com

FOR SALE: Coax cable RG-11AU - $ .20 per ft. Francis Waggoner, W2PTI, 268 Barben Ave., Watertown, NY 13601. (315) 788-1621

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This video is the perfect companion to the 75A-4 video for owners of the "Gold Dust Twins"! Butch Schartau, KØBS, shows you how to operate, maintain and repair your KWS-1. Watch as Butch goes through the entire alignment and neutralization process, as well as showing you how to properly operate this famous transmitter.
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This video is four hours of information on how to repair, maintain and restore this classic receiver. Butch Schartau, KØBS, guides you through all aspects of keeping your own 75A-4 running like a top.
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WANTED: Orig manual for the National AGS rcvr, or might accept good copy. Pat Stewart, W7GVC, 1404 Ruth Ave., Walla Walla, WA 99362-3558. (509) 525-1699

WANTED: Collins 310B-3 parts or parts set. Need antenna tuner parts & coils, also final parts & coils; Browning labs preselecter; other pre 1950 ham gear. Dean Showalter, WA6PJR, 72 Buckboard Rd., Tijeras, NM 87059. (505) 286-1370

WANTED: Restoring National rcvr model NC-101-X, need variable tuning condenser section, type N-PWX (or type N-PW3 from model 100 series). Wes Chatellier, W5DPM, 1950 Chevelle Dr., Baton Rouge, LA 70806.

WANTED: SX-101 MK3 front panel; Viking Invader 200 HV filter chokes. John, W7KPA, 2445 S. Hillside Dr., Springfield, MO 65804. (417) 889-0233

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

WANTED: Johnson off/on key fits Desk KW or Viking 500. Thanks. Merle Crowley, W1GZS, POB 476, Sumterville, FL 33585. (352) 568-1676, lal@sum.net

WANTED: (2) Eimac HR-3 heat dissipating connectors for 35TG tubes. Dan Knipe, W7IGE, 3750 Highgrove Ln., Nampa, ID 83687. (208) 888-9575.

WANTED: Manual/schematic for Heath model numbers IB-2A impedance bridge & QM-1 Q-meter. Pete Cullum, KØWRX, 1332 Harlem Blvd., Rockford, IL 61103.

WANTED: Drake 2B, 2BQ, 2AC, good condx or better. Richard, K1MD, RI, (401) 732-4026, eves.

WANTED: Schematic for Palomar Engineers VLF converter. R.J. Eastwick, N2AWC, 224 Chestnut St., Haddonfield, NJ 08033. (609) 429-2477

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

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

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

WANTED: Nems Clark radio rcvrs, service & operating manuals, parts, etc, any condx. Chuck Dachis, The Hallicrafter Collector, 4500 Russell Dr., Austin, TX 78745. (512) 443-5027

WANTED: 1963 WRL catalog, will buy or trade older ones; or Allied; Walter Ashe; Lafayette; etc. Al Bernard, POB 690098, Orlando, FL 32869-0098. (407) 351-5536

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

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

WANTED: Keyer paddles of all kinds. Cap. WØXC, CO, (970) 247-0088. capallen@frontier.net

WANTED: Collins S-line, KWM2A, 30L-1, etc. Mark pays the most for clean gear. WD4AAS, FL, (954) 776-5996 (d), 566-0014 (n).

WANTED: WW2 Japanese military radio of any kind; spark xmtr & loose coupler xtal rcvr. Takashi Doi, 1-21-4. Minamidai, Seyaku Yokohama, 246 Japan. Fax: 011-8145-301-8069. taka-doi@kk.iijtu.or.jp

WANTED: Navy xmtrs: TCA, TCE, TCN, TCX, TDE, rcvrs: RAX, RBD, TBM; modulator CAY-50065. Steve Finelli, N3NNG, 37 Stonecroft Dr., Easton, PA 18045. (610) 252-8211

FOR SALE: Johnson Viking II, exc appearance - $275; Johnson Ranger - $250. Bill, NY, (914) 356-6553 after 6 PM EST

FOR SALE: Incomplete 1930s Magestic B battery car radio & instructions - $45 + shpg. L. Schimmel, POB 1234, Spanaway, WA 98387.

FOR SALE: WW II military communications catalog, #11, 52 pgs, historical info - $3 US, $5 overseas. Sam Hevener, W8KBF, "The Signal Corps", 3583 Everett Rd., Richfield, OH 44286-9723. (330) 659-3244

FOR SALE: Collins 500 kHz, 51S1 filters NIB, LSB 2.75 kHz, USB 2.75 kHz - $35 ea. John Hurst, KU6X, 2512 Euclid Crescent E, Upland, CA 91784. (909) 981-6759. hurstjsj@gte.net

FOR SALE: Two R105A/ARR-15 rcvrs w/o dynamotors or trade for good looking BC-224. James Taylor, KG5LB, POB 126, Los Alamos, NM 87544. (505) 662-5452

FOR SALE: Two National HR07s, good condx outside, exc condx inside, ABCD drawers for each plus one AC drawer, two pwr splys, one for each, no spkrs - $410 for all. Terry, AA6TN, CA, (714) 546-9602 tmneal@netcom.com

FOR SALE: Homebrew radio w/1917 DeForest adjustable 3-coil (honeycomb coils) tuner, 2-01A's & grid-leak - $155; exc Hammarlund HQ-150 w/ manual - $250; Heathkits, all exc w/manuals, HW-12A xcvr - $110; HP-23 pwr sply - $45; HW-30 Twoer - $40; SB-614 station monitor scope - $90; IT-12 signal tracer - $39; AM-2 SWR bridge - $10; IM-11 VTVM - $25; CM-1 capacity meter- $25; IT-22 capacitor testor - $25; HP 400C VTVM, fair, w/ manual copy - $20; Lambda Model 71 regulated pwr sply, 0-500,VDC@ 200mA & bias & filament voltages - $140; George Voron Test Set I-181B w/ manual - $35; Allied Radio Catalogs, '65, '68, '69, Christmas '69, '70, '71 - $15 ea; microphones, EV600D, EV602, (3) T-17s - $15 ea; Bud Code Master - $20; (3) NIB EIMAC 4X150A tubes - $35 ea; DM-21 dynamotor for BC-312 - $15; Northern Radio Dual FSK type 153 Model 2 - $150; Collins PM-2 - $125; Johnson Pacemaker, good - $265; CV-591 A/URR SSB converter, exc, w/manual - $350; all + shpg. George Shute, W4BDG, 2910 Virginia St. NE, Albuquerque, NM 87110. (505) 298-7347

FOR SALE: Meissner Signal Shifter Coils, 5 bands - $50; BC654 rcvr section - $50; pair Sylvania VT-52 tubes, new - BO. Norb Wokasch, WA6JKE, 3312 W. Bijou, Colorado Springs, CO 80904. (719) 633-5661

FOR SALE: Surplus Conversion Manual III; The Surplus Handbook; & 1938 Jones Radio Handbook - $35 ea; KY-65 keyer w/conversion data - $10; LM-21 w/matching ACPS, shock mounts, book - $25; USM-32 freq meter w/ACPS, book, manual - $60; accessory box for GRC-19 - $10. Gary, MN, (612) 496-3794.

FOR SALE: National NC-183, plays fine, w/orig manual, minor case scratches - $175; URC-35B USN Radio set w/AM-3007 amplifier, RT-618 xcvr, H-169 handset, custom rackmount, cables & manuals (copies), checked/operates fine. AM, CW, SSB (100W PEP) - $ 400, all + UPS. **WANTED:** Military TMs on radios, all others considered. Military Marketing, Inc., POB 741, Norcross, GA 30091-0741. (770) 729-9315

FOR SALE: Collins 32V3, no cabinet - $325; Johnson Viking II - $250, manuals, cash, PU only. Stuart T. Carter, II, W4NHC, 680 Fernwood Dr., Melbourne, FL 32904-1995. (407) 727-3015

FOR SALE: Measurements Corp, model 59 megacyle meter - $50; Heath GD1A grid dip meter - $25; B&W 80HDVL coil - $15; EFJohnson SWR bridge #250/241 NIB - $15; ME165/G SWR/PWR meter (matching unit for T368) - $75; Knight P2 SWR/PWR - $15. Dave, W1DWZ, MA (508) 378-3619.

FOR SALE: Yaesu FRG-7, w/manuals, mint - $225; Heath xtal set, mint - $100. K2LGO, NY, (516) 722-5737, 5-8 PM EST only.

FOR SALE: NC46, nice condx, w/Sams printout, recapped, no spkr - $99 + shpg. H. Mohr, W3NCX, 1005 W. Wyoming St., Allentown, PA 18103.

FOR SALE: Davco DR-30 & spkr pwr sply - $500; GRC-109A in orig box + many accessories - $500; Hallicrafters collectors, BC-610 xtal in orig box "The Hallicrafters Company" - $8 shpd; Ham Radio Magazine 1st issue, like new - $25 shpd; (2) HRO coils, BC band - $100; (3) HRO coils LF - $75; URM-25D cover & accessories - $75; HRO-M, 4 coils - $175. George Rancourt, K1ANX, MA, (413) 527-4304.

FOR SALE: ARRL Handbooks 1933 - $40; '48, '49 - $25 ea; '54, '56 - $20 ea; '65 - $10. Mike, W7MS, NV, (702) 827-6643.

FOR SALE: (2) CB testers - $30 & $50; BC 604 xtals NOS - $100; 1626 NOS - $3.50 ea; 50 for $150. Ken Kolthoff, 8967 Scott Dr., De Soto, KS 66018. (913) 585-1196

FOR SALE: Drake TR-3, ps & spkr, good condx, working - $175/offer or trade for 2M HT. Scott, CO, (970) 749-0178.

FOR SALE: PRC-25/antennas, handset, bag - $225; PRC-10(A) backpack, accessories, manual - $125; connectors for BC375/191, ARC-5/274-N + others; much misc military, ham/military manuals, ARC-5/274-N rcvrs/xmtrs; RA-120 A/C sply for BC-659; send wants w/SASE. Henry Engstrom, KD6KWH, POB 5846, Santa Rosa, CA 95402. (707) 544-5179

FOR SALE: New, orig front panels for Hallicrafters SR-150, SR2000, various NIB meters for Halli gear. **WANTED:** Parts for NC-173, NC-183, NC-300 & 303, HQ-129X. Bruce, N9KGR, WI, (414) 693-3247

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WANTED

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

FOR SALE: Radio & electronics related books, 160 titles, call or write for list. Paul Washa, WØTOK, 4916 Three Points Blvd., Mound, MN 55364-1245. (612) 472-3389.

FOR SALE: R-390As complete units, modules, small parts, call & ask, no covers or meters; M/C, Visa,Discover. Howard or Tony, NC, (919) 441-1360. fax 441-7322. 9 AM - 6 PM EST.

FOR SALE: Shack clean-up, Heath, EICO, Millen, etc., etc. Lge SASE for list. Bob Napoli, K2LGO, Box 158, Riverhead, NY 11901.

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

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R11A/APR-5 - $425
RT-45/ARQ-1 - $350
RT-226/GRC-30 - $175
ASB-5 radar, less receiver and antenna
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AN/APS Search Radar, complete
BC-939 antenna tuner for BC-610 - $125
AN/FRR-60 dual diversity rcvr, 2 rcvrs in one lge cabinet 47"x30"x72" with 19" racks. Each contain RF Tuner, Signal Generator, AFC, Multiple SA adaptor, MUX Carrier Generator, Decoder Rcvr, Signal Converter; bridging panel with 2 spkrs and 2 pwr splies for each rcvr - $2500.

FOR SALE: Hallicrafters S-40B, mint - $100; SW-41W, white, rare - $110; R-47 spkr - $45; SM-40 S-meter accessory for S-40 rcvr, also for S-20R & S-18 - $35; Crosley REO navy entertainment radio - $85; Minerva Tropic-Master - $85; Magnum six speech processor for Heath - $45; Drake wattmeter W-4 - $35; Conar model 500 rcvr AM/CW 80/40/15 - $25; Conar xmtr, model 400 (mate to rcvr) - $25; Heath WSM amplifier w/KT-66's, exc w/cages, have 2 - $210 ea; many manuals for ham, military Heath equip. Henry Engstrom, KD6KWH, POB 5846, Santa Rosa, CA 95402. (707) 544-5179

FOR SALE: CE 100V xmtr - $300, PU only; RBB1/RBC4/ps/man - $300, PU only; Collins filter F455C12, (522-9041-002) - $75; Heath GD1B GDO, coils, manual - $50; SBE 33 DC PS, new - $50; R1/ARR1 - $25; BC453B, mint - $50; TCS5 spkr - $25; orig manuals: 3253, Johnson Pacemaker, TCS14, HQ200, Gonset G50, CQ Command sets, CQ Surplus Conversion - $25 ea. Mel Stoller, K2AOQ, 100 Stockton Ln., Rochester, NY 14625-1233. (716) 671-0776

FOR SALE: DX-60B; DX-100; Swan 350, 500C, 410 VFO; Johnson Adventurer, Viking II, Invader 200. Matt, WB2VZS, CA, (310) 476-2129

FOR SALE: Heath HW-99 CW xcvr w/manual copy - $250; Hallicrafter S-119 shortwave rcvr - $60. Steven Whited, 3637 W. 71st St., Indianapolis, IN 46268. (317) 298-9967

ANTIQUE ELECTRONIC SUPPLY DISTRIBUTES 1998 CATALOG AND ANNOUNCES WEBSITE ADDRESS

(TEMPE) -- Antique Electronic Supply announced recently the release of their 1998 Catalog which will be mailed to 35,000 active customers. Antique Electronic Supply is the leading supplier of most new old stock (N.O.S.) vacuum tubes and currently manufactured vacuum tubes. They also supply many hard to find parts and supplies for the audio, guitar, amateur radio and antique radio restoration markets. They have an excellent variety of books and literature for any tube gear enthusiast at excellent prices.

The catalog has been expanded again this year to 60 pages with lots of new and exciting tubes, parts, supplies and books. If you are not a customer already, just call (602-820-5411) or fax (800-706-6789) for your free copy of the catalog or visit Antique on their new web site at www.tubesandmore.com. Visit Antique on the web to place orders, browse the catalog, see items not in the catalog, and find answers to frequently asked questions.

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

FOR SALE: Knight Ocean Hopper, two coils - $85; exc Space Spanner (nonworking) - $34; TenTec 243 remote VFO - $95; HQ-140X - $120; Drake 2-NT - $110; EICO 730 modulator - $70; Ameco TX-86 - $45; Vibroplex Champion in orig box - $100. Shpg extra. Larry Wright, N4QY, 170 Heritage Ln., Salisbury, NC 28147. (704) 633-3881.

FOR SALE: Collins gear: KWM-1 pwr sply; 51J-4, R-388; 1934 6' xmtr rack; NJE high voltage pwr sply; orig 50TH yearbook; BC-312F; WRL 4C-6A. Bill Coolahan, 1450 Miami Dr. NE, Cedar Rapids, IA 52402-2933. (319) 393-8075

FOR SALE: Ameco CN-50, CN-144, PS-1, (CN-144 partially assembled) with all instructions, exc - $50. **WANTED:** Cabinet for Crosley Model VIII. Patrick Marineau K9HF, 6300 Kingsway Dr., St. Louis, MO 63123.

FOR SALE: National HRO-60, spkr, orig manual & 4 coils w/box, needs pwr xfmr - $190 + shpg. John, NC., (910) 686-4236. aelen@aol.com

Digital Frequency Display for Collins S-Line

The C75S Digital Frequency Display, displays the receive **Frequency** and **Mode**, by first counting the crystal HFO, the VFO, and the BFO, it then calculates the receive frequency. The correct frequency is always displayed since all of the oscillators which determine the receive frequency are actually counted. Aged crystals or misaligned VFOs simply don't matter. Installation is simple. Plug in three cables into existing RCA jacks in the receiver and you're done. The unit uses a backlighted LCD display and is 2"H X 4"W X 4"D. Power is from a wall adaptor. The cost is $145.00 plus $5.00 shipping.

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FOR SALE: Harvey-Wells T90 - $60; Johnson Adventurer modulator - $30; Drake, early TR4, tube PTO - $100 (needs restoration); heavy-duty foot switch, 10A/500 VAC switch rating, great for PTT & QLF - $5. All + shpg. Dale Mecomber, N2DM, POB 87, Skaneateles Falls, NY 13153. (315) 685-3730.

FOR SALE: Tektronic dualbeam oscilloscope 555 - $120; General Radio WWII Navy LP-3 signal generator 9.5 to 30 kc - $75. Allan Lurie, W9KCB, 605 E Armstrong Ave., Peoria, IL 61603. (309) 682-1674

FOR SALE: HRO-50 - $295; Mohican - $95; HQ-100C - $90; HQ-170AC - $185; Klug DB-68 Preselector - $45; Monitoradio MR-10 - $35; Globe 303 - $95; Knight T-150A - $145; Gonset VFO - $75; Swan: 14A - $30, MMBX - $20; Johnson SWR - $75; Viking phone patch - $30; Free list - write/call. Richard Prester, 131 Ridge Rd., W. Milford, NJ 07480. (973) 728-2454

FOR SALE: HQ180A, VGC - $275; rare S72L portable, GC - $125. Bob, K8RNE, OH, (440) 322-5722.

FOR SALE: Nicely restored National SW-4 Thrill Box SW-4, rare - $575; National FBX (FB-7 w/xtal) - $250; some items still left from sale, see Aug., ER, pg 54. **WANTED:** Large old telegraph keys. Thanks. Bob Enemark, W1EC, POB 1607, Duxbury, MA 02331. (617) 934-5043

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WANTED: Collins 75A3 tuning dial bezel, and knob. Larry Steeno, K9LWI, 1838 Bluespruce Ct., Green Bay, Wi. 54311. Lsteeno@execpc.com

WANTED: UTC LS-47X audio transformer, James Owens NW0O, 1363 Tipperary, Boulder, CO 80303-1621. 303-673-9019

WANTED: Knife switches - Leviton, white porcelain base, copper, SPST 1-1/8" X 3-1/8", SPDT 1-3/8" X 3-7/8". Charles A. Hill, Rt 3 Box 400, Buhl, ID 83316. (208) 543-6081.

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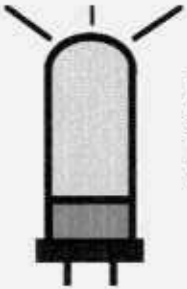

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