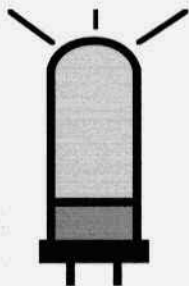


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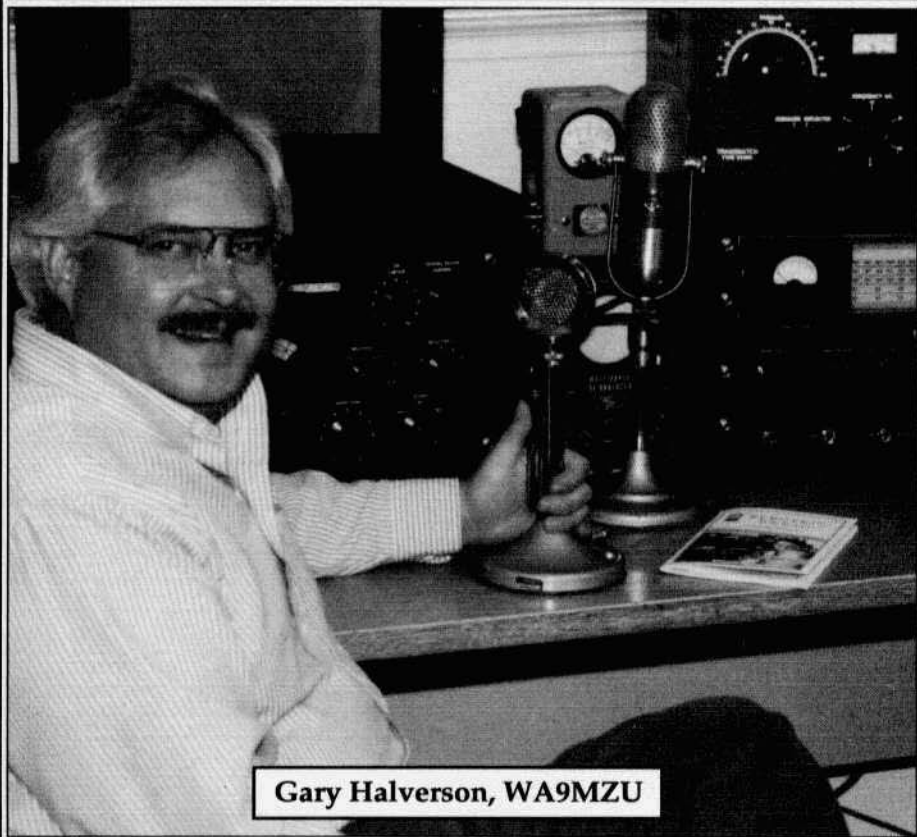


# ELECTRIC RADIO

celebrating a bygone era

Number 64

August 1994



Gary Halverson, WA9MZU

# ELECTRIC RADIO

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

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

## **Regular contributors include:**

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

## EDITOR'S COMMENTS Barry Wiseman, N6CSW/Ø

On page 3 Don Chester, K4KYV, Editor/Publisher of the AM Press Exchange, reports on the latest threat to amateur radio. This threat comes from the ham gear manufacturers and is supported by some of the mainstream ham magazines. They propose that the FCC lower the code requirement for HF operation from 13 to 10 WPM.

The rationale behind the proposal is that by lowering the code speed requirement access to the HF bands will be made easier for new hams and that the manufacturers will thereby sell more HF gear. After the no-code technician class license came into being manufacturers had a 'bonanza' selling VHF and UHF equipment.

Don points out that the HF bands are already crowded and that the influx of new operators there will only make them more crowded. Spectrum will become an issue and AM operation could be threatened.

Please read Don's editorial. If you feel that what is proposed is detrimental to amateur radio and a threat to AM operation, I urge you to start writing letters to ARRL Headquarters, and to your ARRL directors.

A few days ago I talked with Al Brogdon, K3KMO, the managing editor of *QST*. He told me that until ARRL headquarters hears from the directors they will not take a position on this issue. I called Marshal Quiat, AGØX, the Rocky Mountain Division director of ARRL and he told me that at this time he was opposed to lowering the code speed requirement. I also talked with the vice-director of this division, Bob Scupp, WB5YYX and he said that he was also opposed to the idea. Let's hope that all the directors will oppose the 'slow code' proposal. It would be nice to have the ARRL on our side.

**Silent Keys** Stu Meyer, W2GHK, President of the Radio Club of America and past President of Hammarlund Manufacturing Company; Zeke Adair, W5LUT, pioneer ham and well known AM'er; Ron Johnson, WA5RON. Our condolences to their families.

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Cover: Gary Halverson, WA9MZU, well-known collector and Westcoast AM'er. See the story on his Western Electric broadcast transmitters on page 23. Photo by KD6WLP

# LETTERS

Dear ER

It was with great interest and delight I read Tom Hoytenga's synopsis of the Squires Sanders equipment in the July, 1994, issue. As a long time fan of Squires and Clegg equipment, I thought I'd throw in my two cent's worth.

The SS1R is by far my favorite receiver of all time. As Tom mentioned, the advanced mixer scheme provides a receiver that is quieter and more immune to overload and cross-modulation products than other receivers unique to the time period, and rivaling today's best receivers.

The unique conversion scheme however, does mean the receiver is single conversion on 40 meters. The 1MHz IF also posed other problems. Living in South Central Michigan, Chicago is about 115 miles air distance away. WCFL in Chicago is on 1MHz. On many occasions listening to dead bands, I could hear WCFL faintly in the SS1R, no doubt due in part to the Windom antenna I use that does not meet the 50 $\Omega$  input requirement.

The "notch filter" mentioned is another enigma. One of my receivers was equipped with the notch filter. It really works, despite the conception that it would be impossible to achieve a narrow notch bandwidth at such a high IF frequency.

The SS1V panadapter is another marvel. It must be understood that with the entire 500 kHz bandwidth displayed on the screen, you can see each signal on the band. Frequency accuracy is great enough that you can look at a signal, determine the frequency via the display escutcheon, turn the volume down, and drive the receiver to the desired signal frequency, turn up the volume, and there it is. The marker "blip", when properly adjusted for stability, will always tell you exactly where you are tuned.

I still have a 1957 Clegg 62-T10, 150 watt 6, 2, 10 meter transmitter with 4X250 as the final.

James R. Buchanan, K8WPI

Dear ER,

Dave Ishmael's article describing how he added a 'start' relay to his 516F-2 (KWM-2, etc.) power supply caught me just as I was starting to work on mine, which already had the mod. I am writing to mention a few other points I discovered.

The starting surge with these supplies is negligible unless you replace one or both of the rectifier tubes (5U4-275 VDC receiver/exciter HV; 5R4-800VDC PA HV) with solid state diodes. This is because the set filaments are too small a load to cause a surge and with 'empty state' rectifiers, the capacitors charge gradually as the filaments heat up. Since Collins isn't cheap, I'd expect the power switch to last forever if you run the supply with vacuum tube rectifiers.

My supply had been 'solid stated' and a relay (as described by Dave) had been installed. It worked fine, but the receiver high voltage was 345 against Collins specs of 275 VDC nominal, 310 VDC maximum. 345 Volts means 20-40% extra HV power being dissipated, meaning some extra drift and wear and tear on parts, including those uncommon tubes - 6AZ8, 6BN8, etc. When I plugged in a real 5U4, the voltage dropped to 315. The supply was designed for a 115 VAC line and mine is 122 VAC, so a few extra volts are expected but why so much? I didn't have to look far. The original 275 volt supply circuit uses a two section choke input filter with L3 as the second choke. In order to install the relay, L3 had been removed and a 100 mFd cap installed on the output.

I wanted to bring the LV supply at least down to 310 but the only way to reinstall the choke was to remove the relay: could I go back to all hollow state? It turned out that I could. With the solid state '5R4', the

## Equipment Industry Code Proposal Could Push AM Off HF Bands

by Don Chester, K4KYV  
2116 Old Dover Rd.  
Woodlawn, TN 37191

A plan is being formulated by amateur radio equipment manufacturers and magazine publishers to ease licensing requirements for access to HF spectrum. The Amateur Radio Industry Association is proposing to lower the General Class code speed requirement from 13 to 10 words per minute. Association members discussed the plan at a closed meeting during the Dayton Hamvention, and indications are that they plan to petition the FCC. Giving advice to the group is former FCC Special Services Division Chief Ray Kowalski, who also served as the FCC's attorney in court when Glenn Baxter brought suit over the AM power reduction. Kowalski told Association members the timing for such a move is excellent, given the current political climate in Washington regarding emerging technologies.

It is no secret that the hottest selling ham gear lately has been VHF and UHF equipment, reflecting the strong growth in codeless Technician class hams. But equipment manufacturers are frustrated by marginal profits from big ticket HF items. They suggest that current code requirements act as a barrier to hams who would otherwise populate the HF bands.

*CQ Magazine* publisher Dick Ross, K2MGA, is a member of an internal industry committee that recommended the 10 w.p.m. license requirement. Ross insisted "they do not want to see this initiative become a point of contro-

versy". Evidently, the industry hopes to convince the amateur radio community to hop on the bandwagon without debating the issue.

"Slow code", the name given to the proposal, has reportedly gained far more support than criticism in "ham radio circles." According to Westlink Report, most of the packet radio postings have praised the industry group's leadership towards this goal. Some have responded that cutting the code requirement to 10 w.p.m. does not go far enough, suggesting five w.p.m. instead. Five w.p.m. code would allow some 60-70,000 "old" Technicians, licensed prior to Novice Enhancement in the mid 1980's, to buy high frequency radios and immediately go on the air, since these hams have already passed the General theory test and a 5 w.p.m. code exam. Some argue that a 5 w.p.m. code requirement would stimulate the sagging ham radio industry, and even the nation's economy. One industry member has calculated that it could conceivably generate an instant \$60-\$100 million in sales of transceivers, antennas and associated equipment, open new ham equipment factories in the U.S. and create, "thousands of jobs".

### Ten or Thirteen W.P.M. - Does It Really Matter?

Why would the industry make such a big deal over a mere reduction of 3 words per minute? They hope that most hams will see this change as too insignificant.

continued on page 36

### AMI Discovery Weekend, Sept. 10-11, on 160, 80 and 40 Meters

See how many AMI members you can discover by logging their certificate numbers. Special recognition award certificates for all logs submitted with more than 25 AMI members. Send logs to AMI headquarters.

# D-day Reenactment

by Sam Hevener, W8KBF  
3583 Everett Rd.  
Richfield, OH 44286-9723

As we are into the 50th anniversary of many important WW II events, many shows using WW II equipment and communications gear have taken place or are being planned.

June 4th, 1994, was the date of a large public display D-day reenactment of the sandy Montrose beach on the north side of Chicago. The event consisted of 550 WW II reenactors in authentic WW II uniforms and gear. We Ohio reenactors arrived early on Friday

morning along with reenactors from many other states as far away as California. I was the only Signal Corps Tech Corporal (T5) and was put in charge of installing and laying the field wire from the WW II vintage DB-71 switchboard to the WW II EE-8 field phones in the six field headquarters. Within about two hours, the system was installed and operating. Each "Unit Headquarters" had very interesting displays for the public. Many SCR-300 WW II backpack radios, BC-611 handie-talkies, SCR-245 field radios were seen in the American



Sam Hevener, W8KBF, shown with an original WW II BC-611 "Handie-talkie" before his ill-fated D-day reenactment landing on June 4, 1994 in Chicago. Note the 'combat medic' (Dave Little of Indianapolis, Indiana) talking to "General Eisenhower" (Flint Whitlock of Denver, Colorado). Troops were assembling before boarding the US Navy LCU 1680.



The author talking to the crew of a fully restored 1945 M4A1E2 "Heavy Sherman" tank on an original BC-1360 armored external control box. This is a heavy version of the M4 "Sherman" tank with the larger 76mm gun, large turret and double wide tracks. The tank gets 4/10 mile per gallon of gasoline.

encampments. The British-Canadian encampments also had many WW II vintage sets including operating Wireless Sets #38 with all the accessories. The German encampments also had many WW II era communications displays including backpack radios and field sets even a WW II German field switchboard.

The weather was great on Saturday morning as we all prepared for the landing aboard the four US Navy provided LCU landing craft, two WW II "DUKW" (duck) landing craft and the only original WW II plywood "Higgins" boat left in the world today. As with the real military, you don't know the full story until the last minute. To my dismay, I was in the "second wave" of the invasion. The beach was "bombed" by the vintage P-51 Mustangs, B-25 bombers and the British Spitfire with the explosions on the beach send-

ing sand in all directions very close to the "German" bunkers. After the smoke cleared, the first wave of several navy LCU's, the DUKW's and the Higgins boat came in against the "Germans". All of the "first wave" troops landed in knee deep water or less and stormed the beach destroying several "German" bunkers. When my "second wave" went in, the LCU ramp was dropped and the men started to storm the beach only to find themselves neck deep in water. Several of the men lost their rifles and helmets which were recovered by the US Navy "SEALS" on board. I was loaded with combat gear including a vintage BC-611 handie-talkie and I knew much would be ruined if I went in. Thirty years ago I was in the Army Signal Corps and when I was told to jump, I jumped. This time I knew I had a choice and I didn't go but 90% of the 60 or so men on LCU 1680 went in. Call me

## "The 1994 Summer Hamfest Tour"

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

Of course it didn't start as a hamfest tour, but when a cross country auto trip to visit my parents in Flagstaff, Arizona, offered the chance, I didn't fight the urge to see what the QST Hamfest Calendar could supply. The answer was 'plenty' and in mid-July, XYL Marie and I threw our bags, some of my more portable radio gear, and Puppy From Hell 'Judy' in the Colt Vista and began the tour. This year's crop of three 'fests (in a sixteen-day trip) was outstanding.

The first stop was the Zero Beater's ARC Hamfest held at the Washington, Missouri Fairgrounds on July 17. The lovely tree shaded grass-and-gravel location made this one hard to beat and the larger than usual proportion of great old-timers and current AM'ers and military radio enthusiasts kept me talking too much to find any real bargains. There were, however, many interesting parts and parts units and I came away with a Millen 10039 dial for some future homebrew project, some tubes, and (I confess) a box of transistors. Another 'find' was a five-inch piece of 3/4" 16 tpi coil stock -- perfect for an antenna tuner I plan to build for the take-along rigs.

Zero Beaters was also noteworthy for the number of people who saw Judy and said something like "My sister's dog looks just like her -- do you know what breed she is?" The answer is 'Street Dog' -- what all dogs would be if they were allowed to breed freely and nature sorted out the winners and losers. For some reason this answer seemed to bother the folks in Washington, Missouri a lot less than it does people around Washington, DC.

Next stop after Zero Beaters was the

Ft. Tuthill hamfest held at the Coconino County (Flagstaff) Arizona Fairgrounds. This was our third year at Ft. Tuthill and the place is definitely growing on me. It was the largest of the three -- I estimate a couple hundred outdoor sellers -- and unique for being a three day event. About half the sellers come in RV's and motor homes and stay overnight; this contingent usually arrives early and I suspect that the best deals take place among friends a day or more before the real event opens.

However, there's enough Classique Materiel at Ft. Tuthill for almost everyone to find something. A tired but restorable BC-610E sat with many coils and tuning units on a trailer both Friday and Saturday with no taker that I saw. Does \$275 sound reasonable? A GF-11 (the command transmitter before the ARC-5/SCR-274N series) in like new condition sold quickly for \$30. Vintage ham sets including a nice B&W 5100B, a Heath Seneca, an SB-220, an Eico 720, an HT-37 and HT-40. A dealer offered three Valiants at \$200 each. There was an HQ-110 with the clock and at least half a dozen other smaller vintage AM and SSB sets.

The highlight of the show for me was finding the rare SB1-LA 1 kW (PEP input) linear amp to go with my Sideband Engineers Model 33 transceiver. The linear was complete but had substitute meters and knobs. The seller said it worked; I took it away for \$80.

Other buys were another SB-33 (restoration or possibly parts, \$35 with manual, spare finals and driver tube), another box of transistors, more tubes, a small pile of filter chokes, a 516F-2





Part of the fleamarket at the Zero Beaters ARC Hamfest at Washington, Missouri on July 17.

'parts' unit power supply for the KWM-2, and a small homebrew item with another 10039 dial -- all cheap. Last but not least, I hauled away a couple of GPM-15A's plus some extra -15 parts from ER advertiser Gene Tucker. If you need small parts for vintage homebrewing -- fuse holders, crystal and tube sockets, air trimmers, shielded coils, meters, pilot lights, small hardware and the like -- these units are a bargain at \$15 or so (depending on condition), and Gene says he still has a pretty good pile of them. I'm working (in spare time!) on another homebrew transmitter and receiver based on GPM-15 parts, so you'll be hearing more about this unit in a future article.

In spite of a record hot summer in Flagstaff the weather was pleasantly cool in the mornings. Since July is the rainy season in Arizona and heavy showers around noon are common you have an extra reason to start early at this 'fest.

I like the way Ft. Tuthill makes its money. Admission is free but raffle tickets for the door prizes are \$2 each or three for \$5. The rising price of hamfest tickets -- now rarely less than \$5 per person here in the east -- is a problem for those on a tight budget and this is a good answer.

A hamfest should be fun not just for those of us who are out there peering under the tarps at the crack of dawn but for the casual visitor and the XYL and kids as well. Among other things that means both enough restrooms and restrooms which are not only clean at the start of the day but (at larger events) serviced from time to time later on. If you don't see why I'm a fanatic about this, ask your XYL for a frank and detailed discussion of ladies' restrooms at public events.

The Ft. Tuthill restrooms seem to have been renovated this year, there were an ample number of PortaJohns spotted around the fairgrounds and everything stayed reasonably clean.



**Judy in hamfest gear. The saddlebags are made by Eagle Creek and are available from some camping gear stores. Judy's Ft. Tuthill and Western Carolina tickets are pinned to the top.**

A PA system is necessary for health and safety reasons and to announce prizes, meetings and special events. That -- in my opinion -- should be it. No promoting vendors ("Drop by and see the Yaesu booth"), no talk show host material, and no idle chatter. They got this one wrong at Ft. Tuthill. I negotiated for the SB1-LA linear between blasts of gabble-gabble from a loud-speaker operating at roughly the threshold of pain. A small-time note in an otherwise first-class 'fest.

Another minor low spot was the price of the food, for example \$2.50 for a 16 ounce rootbeer float and \$2 for a small ice cream cone made with indifferent 'homemade' ice cream. High priced food usually comes from independent concessionaires whom the hamfest committee can't control, but why not obtain their price list and publish a selection in the hamfest flyer: "Food will be available on the grounds; sample prices -- hot dog \$2, large soft drink \$1.50. . .?"

Monday, July 25th, saw us homeward

bound. Marie flew back in order to return to work while the puppy and I pointed the wagon toward the east and a stop the following Saturday at the Western Carolina Hamfest at the Haywood County Fairgrounds near Waynesville, NC. I was a bit uneasy about finding this one because I'm so cheap I don't have real 2 meter gear -- just a Radio Shack WeatherCube receiver converted for 2 meter operation. However, I needn't have worried: I found the right exit from I-40 by listening and as we came down the ramp the best hamfest signs I have ever seen took charge and led us to the site. These signs were bright yellow arrows about a foot high by 30" wide, with 'Hamfest' in black letters. Talk about "Can't miss it"! One of the club members said later that they had worked on making the signs easy to spot and I believe it. Other hamfest committees, please copy.

For that matter, other hamfest committees could copy a lot from this one. Talk in, ticket sales, parking control --



One winter evening's work or two? This is the 'haul' from the summer tour. The TR-4C works except on 20 meters; the SB-34 plays after replacement of the output transistor and an overhaul of the tuning cap gears but has an erratic drift, hum, and needs the volume control and meter replaced. Thank goodness there was no more space in the car!

everything was smoothly and professionally done. These things sound easy but I see each of them mangled at least once or twice a season. Would you believe a talk-in operator with no map but a real gift of gab? Howbout "We don't have the tickets yet" a few minutes after the starting time?

The hamfest itself was first class. With perhaps 75 tailgaters and modest covered space this was in the small to medium class but it was a gem. The site is a grassy hilltop with a stunning view of the Carolina mountains, shrouded on the morning of July 30th in mist. At 8 AM it was cool enough for a jacket but as the day went on a few trees would have been welcome.

I said "gem", and it was -- friendly people, reasonably priced food, clean facilities and interesting stuff. There was another HQ-110, several S-Line pieces, some Swan and Drake sets, an S-38E, an Echophone EC-1 in terrible shape and

lots of junk and parts. The seller told me that Hallicrafters bought Echophone in order to get the EC-1 which became the S-38; certainly the designs are very similar but does any reader know the story in more detail?

A BC-348 in restorable condition with the dynamotor sold for around \$25, most likely to be converted. The barely recognizable remains of another sat all day with no takers.

I came away with a SB-34 transceiver needing lots of work but with the VOX accessory for \$16. (Does anyone know where the other accessories for these sets -- those square blue mics, the calibrators and the carrying cases -- went? Articles on the SB-33 and 34 are in the works and it would be nice to have a complete set.)

I was delighted to give \$225 for a clean Drake TR-4C and MS-4. And of course I bought the usual odds and ends of tubes and parts.



The camping area at the rear of the flea market at Ft. Tuthill. *Photo by WA6VVL*



A well stocked surplus dealer at Ft. Tuthill. *Photo by WA6VVL*



A nice display of tubes, some of them very rare, at Ft. Tuthill. *Photo by WA6VVL*



**Dave Kamlin, AB6XK, owner of 'Wireless World' (right) had a good inventory of NOS parts for builders. Sitting next to Dave is Cal Eustaquio, N6KYR. Photo by WA6VVL.**

Here as at the other 'fests Judy drew many comments, ranging from "What breed. . . ?" to (jokingly) "Look at that cruel man, making that poor dog carry his stuff". My answer was "She's working off her vet bills" but that's a joke too -- at \$10 per hour and a dozen 'fests a year she'd need several years even if she never sees a vet again. Actually, Judy doesn't mind her saddlebags: she knows they mean a hamfest which (to her) means lots of attention, kids, other dogs and smells. And when she gets a pound or two of stuff in them, we head back to the car to unload.

Taking the three 'fests together, it seems that vintage ham and military gear is less common than it was even a couple of years back. I saw no Rangers or DX-100's at all and only a few of the other classic AM and military sets. I don't think that means that there are none left but rather that there's enough interest in this gear now that most of it trades between friends or goes quickly after the starting gun at a hamfest. That's the bad news, but the other news is that a lot less of it goes to the landfill so even if you don't get it now, you might someday.

In spite of the shortage of the 'old standard' classic sets I found plenty to interest me, as shown by the amount of stuff we hauled back. If you are interested in out of-the-mainstream gear -- something other than 1950's and 60's Collins, Heathkit and Johnson -- there are still plenty of discoveries to be made. That's particularly true if you're willing to take \$5 to \$35 sets (several or many problems, lots of dirt) and bring them back to life.

As for the trip, out of the area hamfests can be great fun. However, if extra travel is involved try to talk to someone who has been there so you won't be disappointed. We once went to a 'state convention' which had only a couple of dozen sellers and no vintage gear at all. At some places the gates are locked until 8 AM; at others (with the same scheduled starting time) you won't find a parking place within half a mile after 6:30. And if next year your travel plans take you near one of the 'fests mentioned above, stop in. I don't think you can do better than Zero Beaters, Ft. Tuthill and Western Carolina. **ER**

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# A "Station Controller" for SWLs

---

by Walt Novinger  
431 Norfolk Drive  
Pacifica, CA 94044

Listening to the West Coast AM Net and hearing operators like John, W6BM and Sam, W6HDU talking about their sophisticated station controllers, I got to thinking that it would be handy to have something like this for my ever-growing collection of radios that I actively use for SWLing.

Let's look at some common collector-user's problems such a device might solve. How many times have you had to search for a speaker to go with that new radio? Then, to make matters worse, all you could find was a low-Z speaker, but the new radio wants hi-Z. Or, you want to share a set of headphones among several radios, but get tired of swapping them between radios? How about being able to tape off the air? These are some of the issues I wanted to address; this article describes the controller I finally designed.

The controller has the following features:

- \*The ability to quickly switch among six receivers using a rotary switch.
- \*The (optional) ability to switch between phones and speaker at the flick of a switch, and to use low-Z phones, if desired.

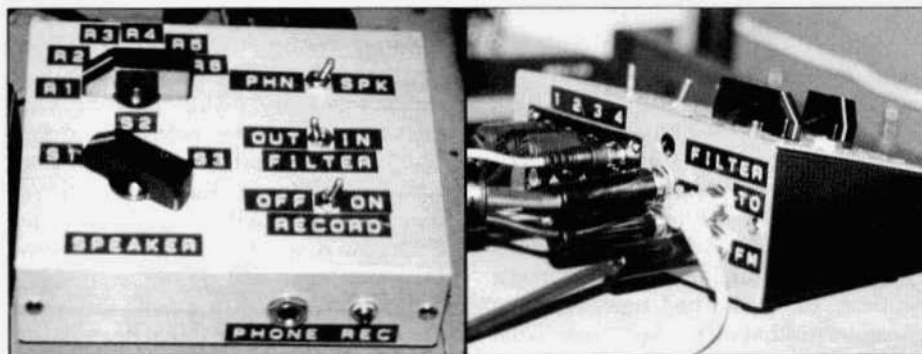
\*The ability to switch any radio to any of three speakers.

\*The ability to switch audio to a VOX tape recorder.

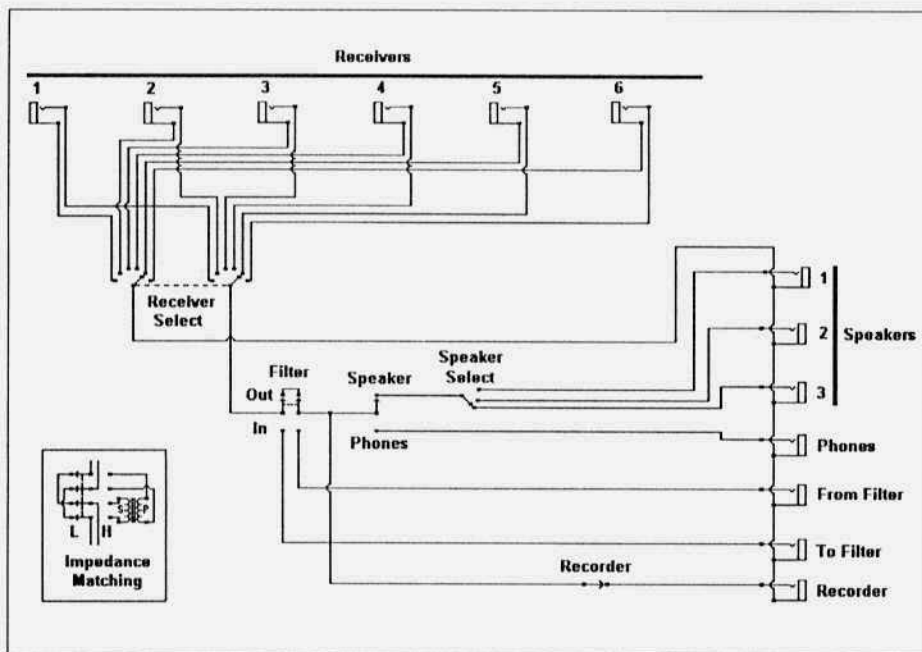
\*The ability to switch an audio filter in and out at the flick of a switch.

Rather than providing step-by-step construction instructions, I'll just include a few notes concerning building and using the controller. I have provided a parts list (from the latest Mouser Electronics catalog, 800-346-6873). I have left out the cabinet, as many of us have spares around the shop. I built mine in a sloping-front cabinet (5.5" wide, 2.25" tall, 4" deep).

Note that the receiver select switch switches both sides of each receiver's speaker lines. This is done to isolate the radios from each other, especially important if some or all of the radios are AC/DC types with one side of the speaker potentially tied to the chassis ground. For this reason, if the controller is built in a metal enclosure, be sure to isolate the six receiver jacks on a piece of Plexiglas or the like. Alternatively, use another type of plug and jack (insulated RCA jacks, as used in the prototype, perhaps).



Front and rear views of the author's station controller.



Description	Use	Mouser Part #
12 1/4" Mono Phone Jacks	receiver, speaker, phones, filter	502-11
1 Subminiature Mono Phone Jack	recorder output	502-TR-2A
1 DPDT toggle switch	filter in/out	10TC260
1 SPDT toggle switch	speaker/phones select	10TC230
1 SPST toggle switch	recorder on/off	10TC220
6 4PDT slide switch		10TC290
or	Hi/Lo impedance select	
4 pole, 2-3 position rotary switch (2 used)		10WA127
2 2 pole, 2-6 position rotary switch	receiver select (6 pos. used)	10WA125
	speaker select (3 pos. used)	
6 1 Kohm CT to 8 ohm CT transformer	impedance matching	42KM014

### Parts List

The audio filter I use (an early Autec QF-1 Active Filter) will work fine when hooked to a low-Z source; if yours won't, then add a transformer to match the impedances properly. Ditto for the tape recorder; my Radio Shack CTR-85 is happy hooked to low-Z speaker outputs, but yours might not be.

I put all of the jacks except for the phones and recorder jacks on the back panel of my controller, with the phones and recorder jacks being on the front panel, and the receiver select, filter in/out, speaker select, and recorder switches being on the sloping panel.

### Optional Impedance Matching

How many times have you had to hunt for a high-Z speaker when you were just itching to try a new radio? A useful option to the controller is the circuit shown in the inset of Figure 1. Substitute this for the "straight-through" connections between the receiver jacks and the rotary switch, and a simple flick of the 4PDT switch will normalize the receiver's impedance to low-Z. The impedance switches should be mounted above each receiver's input jack on the back panel.



The author in his SWL station.

The transformers specified are sub-miniature 200 mW units which are OK for normal listening levels; substitute bigger, more expensive ones if loud volumes or hi-fi sound are important. I suggest wiring the primary using the center-tap and one leg to match the typical 500-600 ohm output impedance of older 'boatanchor' receivers; the 8 ohm secondary matches well for 3.2-8 ohm speakers.

Be aware that if the impedance switch for a receiver is in the low-Z position (i.e., the transformer is out of the circuit), there is no load on the receiver's audio output when it is not selected. I haven't had any problems with any of my receivers, but then again, I keep the volume fairly low. If you're worried, I'd suggest manually turning the receiver's volume down when it's not hooked to a speaker.

Although the toggle switches specified for the impedance matching are nice to look at and take less room on the panel, they cost \$6.38 each, as compared to only \$2.29 each for the rotary switches...go figure.

#### Summary

This controller has proven to be very useful in my listening shack. I currently have my HQ-180C, SP-600-JX-17, R-390A, and SX-99 connected to three speakers (including a Minimus-7 that sounds really nice with the Kleronomos mods on the '390). My tape recorder is nearly always in the ready mode, just waiting for audio to trigger the VOX; when something interesting comes on the air, I just flip the Record switch and the tape starts turning. All in all, I'm very happy with the controller, and feel the few hours I spent putting it together were well worth the time. ER



# Announcements

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## **1994 Fall Classic Radio Exchange: September 25-26, 1900 UTC to 0400 UTC.**

The Classic Radio Exchange, "CX", is a celebration of the older commercial and homebrew equipment that was the pride of our ham shacks a few decades ago. Object is to restore, operate, and enjoy older equipment with like-minded hams. A Classic Radio is at least ten years old, an advantage but NOT required to operate CX. YOU CAN USE ANYTHING, although new gear is a distinct scoring liability and not as much fun!

Exchange your name, RST, QTH, receiver and transmitter type (homebrew send final amp tube or transistor) and other interesting conversation. The same station may be worked with different equipment combinations on each band and each mode. CW call "CQ CX", phone call "CQ Classic Exchange". Nonparticipants may be worked for credit. Suggested frequencies: CW up 60 KHz from low band edges; phone 3880, 7290, 14280, 21380, 28320 and/or AM frequencies; Novice/Tech 20 KHz up low band edges. 7060 and 3560 CW tend to be the most popular CX frequencies.

Scoring: multiply total QSOs (all bands and modes) by the following sum: (total number of different receivers and transmitters worked on each band and mode plus the total numbers of states/provinces/countries worked on each band and mode). Multiply that total by your Classic Multiplier: the total years old of all receivers and transmitters used, three QSOs minimum per unit to qualify. If equipment is a transceiver, multiply age by two. If homebrew, count as 25 years old unless actual construction date or design is older.

Certificates are awarded every now and then for the highest score, exotic equipment, the best excuse, and other unusual achievements. Send logs, com-

ments, anecdotes, pictures to : Jim Hanlon, W8KGI/5, POB 581, Sandia Park, NM 87047. Include SASE for next CX Newsletter.

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## **The Struggle for Freedom - 50th Anniversary of Operation Market Garden**

September 17, 1944, 50 years ago, thousands of allied paratroopers were dropped near Arnhem, Eindhoven, and Nijmegen in order to capture the bridges over the large Dutch waterways for the advance of the British army. Operation Market Garden has been vital to the restoration of freedom and democracy, though it is not generally known that the Nijmegen area was the linchpin of the operation to liberate the remaining occupied part of The Netherlands.

The Nijmegen Radio Amateur Club was invited to take part during the commemoration of Operation Market Garden. Our special event station, using the special call PA6OMG, will be operating from September 15 until September 20, 1994. The station will be located near the Liberation Museum in Groesbeek-Nijmegen. During the local planned activities in Nijmegen our major goal is to contact veterans and amateurs in the US, Canada, the UK and Poland. We will inform them about the ongoing ceremonies and events. We invite all amateurs to contact our station.

PA6OMG will be operating on all HF-bands during the week in CW and phone. If possible WW II radio equipment will be used to make connections.

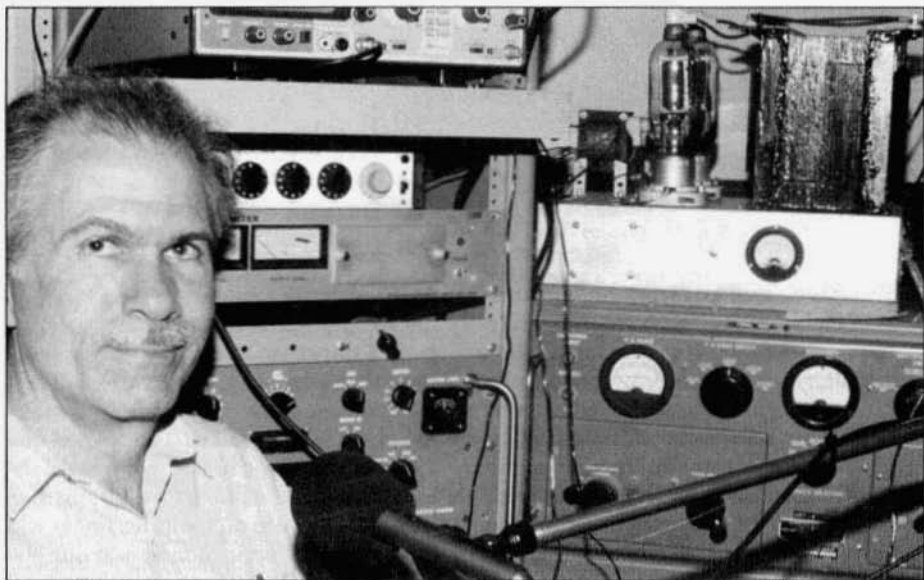
QSL cards should be sent to our local club station QSL manager, PA0KHS, NL-Region 35, via the Dutch QSL-buro. For local visitors, 2 m. and 70 cm. talk-in will be standby. A QSO with PA6OMG will be valid for the Noviomagum Certificate.



Fred Clinger, WA8KJJ, operating his vintage SSB station which consists of a Hallicrafters HT-32A and an SX-101A.



Tom Hoitenga, K8NGV, author of last month's article on Squires-Sanders, with some of his vintage equipment.



Fred Cresce, KC4MOP, with his modified T-368. Note the HB outboard 810 modulator sitting on the transmitter. Also shown is his R-390A receiver and some of his audio processing equipment.



Bill Bogart, KA9CWK, at his operating position. The gear shown consists of a DX-100B, NC-183D, DX-60B, HG-10 VFO. On the other side of the operating position is Bill's workbench where he says he tries to keep all of his equipment in good shape.

# Beware of Lethal Voltages

by Donald F. Meadows, N6DM  
1683 Daphne Lane  
Yuba City, CA 95993

Those who build or work on vacuum-tube transmitters and receivers—especially hams accustomed to modern, tame solid-state voltages—must never, ever forget the presence of quietly lurking, lethal voltages with no barriers separating human flesh from instant death. Therefore, the human brain must restrain the body from touching any part of the circuit behind the control knobs until all voltages are removed.

This means all voltages, including filaments. If the filaments are cold, chances are that the high voltage will also be cold. But even this step is not the last. Short all voltage terminals to ground with a screwdriver with insulated handle or similar implement. If you get a "pop" or a spark, you have probably discharged the power-supply filter capacitors and thereby possibly added years to your lifespan.

Changing plug-in coils in unshielded breadboard vacuum-tube transmitters (and also receivers) is especially risky, because in many circuits these coils are hot and they require use of the hand.

The truth of this advice was learned the hard way. I've been there. The brief slice of time 45 years ago when I grabbed the 807's hot plate tank coil will always live in vivid memory—I could use the term "flashback," but the implied pun would degrade the seriousness of this message. The 600 plate volts contacted dry skin on the right index finger whose resistance limited current flow through the body. My left hand rested on the transmitter chassis. The jolt threw

me backwards. I lost physical contact with the coil, and the nearby bed checked my body's impetus. The rig was in my bedroom, a haven where my parents didn't question too often their son's mad-scientist pursuits with radio. It happened quietly, no smoke or noise, just a seconds-long crisis where fate let the young man survive. The burn on the index finger was three-eighths of an inch long and one-sixteenth deep. These measurements were taken several minutes later as a footnote to the experience, measurements perhaps inaccurate but taken to symbolize and freeze an experience in the young man's mind, an experience never to be forgotten, never again to be relived.

The burned skin had a peculiar smell; its instant cauterization probably resisted further current flow through the body and caused no blood flow. If this true account smacks of melodrama, I apologize. I just want to remind homebrewers and restorers who work with vacuum tubes, especially younger nostalgists who may have worked only with solid-state voltages, of the risks attached to voltages in all vacuum-tube circuits, especially those built on breadboards or on chassis bases without protective shielding.

I always affix "high-voltage" warning labels to these projects as reminders to myself that a split-second's carelessness can equal eternity. I reinforce their message with a red pilot lamp which glows prominently when the breadboard is powered up." ER

# VINTAGE NETS

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

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

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

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

**Northwest AM Net:** Recently started by Pat, K7YIR, this net is on 3875, Mondays and Fridays at 9:30 PT. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT.

**Twenty Meter AM Net:** This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 5:00 PM PT, 7 days a week and usually goes for about 2 hours. Net control is Les, K6HQL.

**Arizona AM Net:** Meets Sundays at 3 PM MT on 3860. On 6 meters (50.4) this group meets at 8 PM MT Saturdays.

**Colorado Morning Net:** An informal group of AM'ers get together on 3875 Monday, Wednesday and Friday mornings at 7AM MT.

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

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

**Westcoast Military Radio Collectors Net:** Meets Sat. at 2300 local on 3885 and Sun. at 1600 local on 3885. Night net control is Andy, KD6TKX, and daytime net control is Tom, WA6OPE. AM is the mode used at present. It is not necessary to check in with military gear.

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

**Vintage CW Net:** For CW ops who enjoy using vintage equipment. This is not a traffic net; speed is not important. The net meets on 14.062, Saturdays at 3 PM PT. Net control is Tracy, WB6TMY.

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

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

**Drake Users Net:** Another relatively new net. This group gets together on 3865 Saturday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, WZ80; Rob, KE3EE and Huey, KD3UI.

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

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

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

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

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

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

**Westcoast Broadcast Equipment Net:** Tuesdays on 1959 at 9 PM PT. Anybody is invited to join the group, but the emphasis will be on broadcast equipment. Moderator is Mike, W6THW.

# Putting the 75A-3 on AM

by Dennis Petrich, KØEEO  
6419 Berwickshire Way  
San Jose, CA 95120

Be aware, I wrote this article on a business trip in the west of England in an English sitting room with a spot of tea and scones on the table next to my Mac PowerBook. If you notice some 'bloody good' English phrases don't be surprised.

## The story:

Ray Osterwald's excellent series on Collins receivers published in ER, 1992, has a very good description of the 75A-2, 75A-3, receivers as well as some interesting history. You can find the articles I'm referring to in issues #43 and #44. I just acquired an 'A3 the other day and already had the 'A2 so I was interested in the differences between these two classics. According to Ray the 'A3 had a four year production run making it second only to the 'A4 in units produced, so there should be a lot of 'A3's out there.

If you have ever taken a good look at the 75A-3 design you probably have noticed it's very similar to the 75A-2 except for one major difference. The 'A3 has a 3.1kc mechanical filter just after the 455kc crystal filter and the 'A2 does not.

The 'A2 has the usual string of IF transformers loosely coupled after the crystal filter to achieve reasonable good skirt selectivity. In fact, Collins provided two different IF alignment procedures for the 'A2. One for a narrow 2.4kc bandwidth and another for a broader 6kc bandwidth. Tuned for the broader bandwidth my 'A2 reproduces broadcast quality audio quite well and sounds much like an 'A1 on AM.

But, the 'A3 is another matter all together!! With the mechanical filter replacing some of the 'A2's IF transform-

ers my 'A3 has a 2.7kc bandwidth and a shape factor of 2.1! A bit narrow and steep for AM but quite good for the up and coming SSB market Collins was trying to foster and dominate in the early '50's.

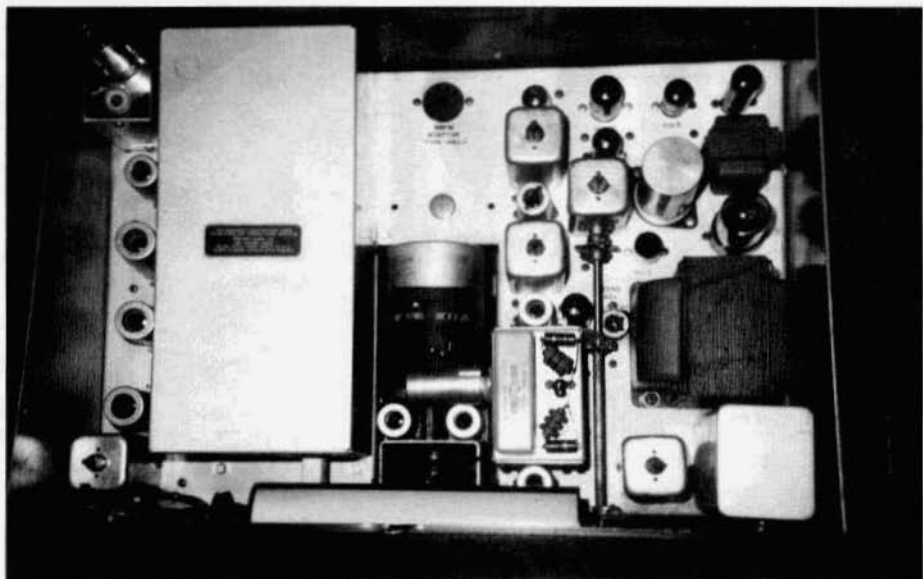
So, if you have an 'A3 and have tried to use it you probably have noticed a couple of things. On AM the 'A3 is very narrow so you have to tune in only one sideband to get even a bit of fidelity. Well, when one does that in a round table QSO invariably someone is off frequency making it necessary to constantly ride the tuning knob. A bit of a 'sticky wicket? And, on the other mode, if you have used your 'A3 for SSB you also have noticed your fingers on the RF gain control because the 'A3 lacks a product detector, even though it doesn't sound bad!

So here we have it folks, the proverbial bottom line, the 'A3 has a rotten bandwidth for AM and a rotten detector for SSB. Consequently, 'A3's have been more of a collector's item than something one would use regularly on the ham bands. I have talked to three or four other AM'ers with 'A3's and they all said the same thing (Would you make me a filter?). On AM the 'A3 is too hard to use and sounds very restricted.

## The hook:

As I mentioned earlier, I had just acquired a very nice 'A3 from Peter Brickley, KD6KDR, before I knew all of the above and decided to see if I could rectify the problem in some small way to make my 'A3 usable on AM, otherwise I had no use for it.

Looking at the inside of the A3 I saw the mechanical filter in 'A' slot and nothing in 'B' slot. Hark, an idea, could I



75A-3 filter installed in slot 'B'.

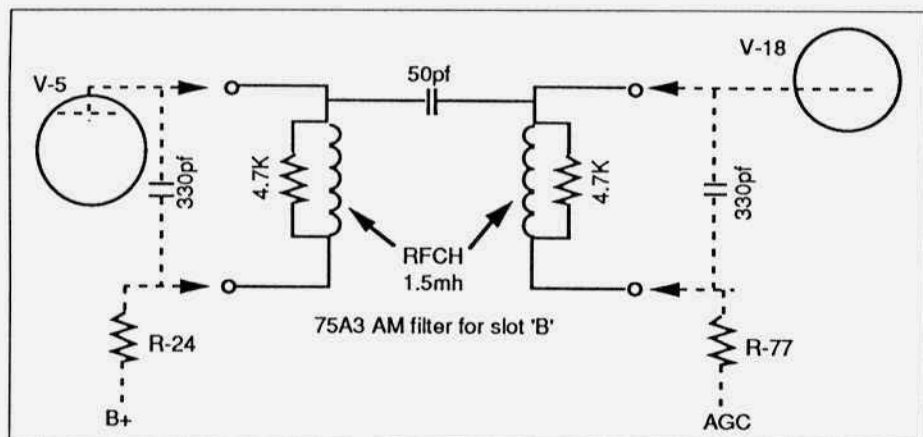
plug something into 'B' slot to give a broader bandwidth so I wouldn't have to hack up the 'A3' itself?? A quick look at the diagram for the 'A3' showed how the filter was coupled between the IF amplifiers. The easiest way to bypass the filter in 'A' slot was to couple the two IF amplifiers using a capacitor and several RF chokes in 'B' slot. The chokes complete the plate and AGC circuits of the respective amplifiers while the capacitor simply couples the signal on to the remaining IF's in the 'A3'. A switch behind the BFO control would then select 'A' or 'B' paths.

If I was lucky the crystal filter ahead of the coupled IF's would provide enough skirt selectivity to make up for the lack of additional IF transformers. I reasoned I was only trying to provide a broad bandwidth for AM not the perfect bandwidth for AM.

Oh, for those of you who have tried to modify newer 6kc or 8kc Collins mechanical filters for the 'B' slot and wondered why it didn't work too well, it was because the earlier Collins mechanical filters used 330 pF of shunt capaci-

tance while the later filters use 130 pF. The added capacitance loads the transducer of the newer broader filters distorting their bandpass. To do the job correctly one would have to remove the little metal housing with the added filter circuitry and rewire the 'A'/'B' filter sockets so 'A' socket had the 330 pF capacitance and 'B' socket had 130 pF. Well, if you did that your 'A3' wouldn't work if you ever wanted to plug in the stock 0.8kc CW filter designed for it; also, the Collins manual I had does not mention an AM filter designed for that receiver or 330 pF load. Another one of those 'wickets'.

This was the reason I opted for the RF choke approach, it was quick, easy and wouldn't harm the resale value of the receiver. The diagram that follows shows the final circuit I came up with. With the values shown the insertion loss of 'B' path is the same as 'A' path through the mechanical filter. I used the wires of the 4.7K 2 watt resistors as pin outs for the RFCH filter so it would fit into the 'B' slot socket snugly. As can be seen in the picture I assembled the



whole thing while in the slot 'B' socket. If desired the 50 pF capacitor can be replaced by a trimmer and adjusted to give equal insertion losses between 'A' and 'B' paths. This circuit is easily removed if desired.

Obviously, this approach is going to have a broader bandwidth than using another IF transformer or even a TOKO ceramic filter as discussed by Ray in issue #57. But, just how broad and would it be narrow enough to reject nearby SSB signals was still a question. (IF you want to use a TOKO filter, just replace the 50 pF cap, with one of Ray's circuits but couple them to the RFCH's using .01 mFd ceramic capacitors to block the B+ and AGC voltages on the IF amplifiers.)

So I took some data on the bandwidth of this configuration and used the 'A3 on the bands for a few weeks to see if I liked it or not. The main criteria were audio quality, ease of tuning, and rejection of nearby interference.

#### Bandwidth in kcs

Filter/crystal SW @6dB @60dB	Shape factor		
A/O	2.7	5.8	2.15
B/O	4.5	26.7	5.9
B/1	3.5	14.2	4.0
B/2	1.0	13.5	13.5
B/3	0.4	10.0	25.0

Table 1

Table 1 shows the results of bandwidth tests with the mechanical filter (A/O) and with the RFCH coupler with various settings of the crystal filter. For B/O and B/1 the bandwidth and shape factors are not too bad. As an example a nine tuned circuit IF in a more traditional IF transformer scheme should give a shape factor of about 3.5 to 4.0, so the 5.9 and 4.0 of the RFCH coupler should give great fidelity with a reasonable amount of selectivity.

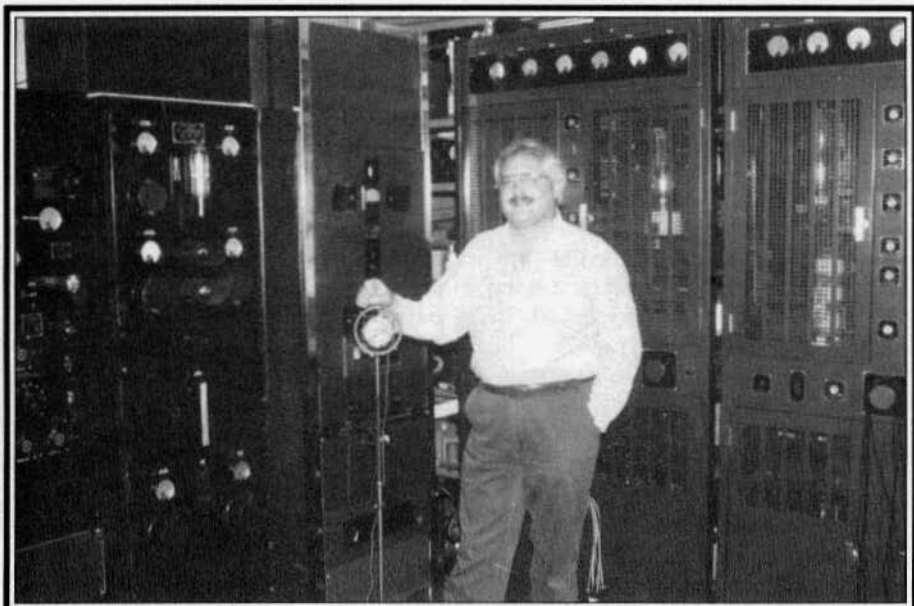
And that's exactly what I discovered using the new modification on the air. In the B/O setting fidelity was good and tuning was easy but SSB stations could cause problems if they were too near. But, when I switched the crystal switch to position 1, I could virtually eliminate the interference without seriously reducing the fidelity of the AM station.

Also, if you look further at table 1 you can see that positions B/2 and B/3 are too sharp for AM so consequently are not usable for that mode.

#### The sting:

I now use my 'A3 on AM and like it very much. Of all things, I use it with my Harvey-Wells TBS-50C conditions permitting, and I use it for the BBC news every morning at 7180kc and even for monitoring SSB signals when there are no AM stations to listen to. It sounds every bit as good as my broadly aligned





**WA9MZU's Western Electric Station**

*Photo by KD6WLP.*

Shown above is Gary with his Western Electric broadcast transmitters. The large double unit transmitter behind him is a model 353-E1 1,000 watt transmitter from 1937. It consists of a D-98653 100 watt Oscillator Modulator unit (directly behind him), and a model 71B 1,000 watt linear amplifier to the right. This transmitter was originally owned by WHDH in Boston. It was later sold to WFBL in Syracuse in 1946, where it was used as an auxiliary transmitter until 1986.

Gary plans to QSY the big rig to 160 meters. The 100 watt oscillator-modulator unit has been restored and is operational while the 71B amplifier will be refitted for single phase operation. Its impressive 279A final amplifier tubes are the largest convection cooled tubes that were made by Western Electric.

The 7-foot rack behind the double button carbon microphone is the companion speech input equipment for the 353-E1 transmitter. It includes a 110 limiter, a 106 line amp, and a 94A monitor amp along with patch bay and metering panels. A Western Electric 22D

portable mixer and 639 "birdcage" microphone are located on the operating table next to an early "pearl button" National HRO (not shown).

To the left of the speech input rack is a Western Electric D-90684 transmitter which was used by KMO in Tacoma during the mid to late '20's. This primitive broadcast transmitter was powered by motor-generators and featured front panel mounting of all vacuum tubes. It is not clear whether this unit was a stand-alone transmitter (10 to 50 watts), or if it was part of a larger unit.

To the left of the KMO transmitter is a companion speech input bay consisting of an 8-C line amplifier, 203B Transmission Unit meter panel, and patch and metering panels. Not shown in the photo is a model TP Navy LF transmitter from 1924.

Gary noted that a pair of Ampex model 200 tape recorders (1948) were recently added to the garage station thereby "eliminating the need for cutting lathes to record QSOs for audio play-backs". N6CSW/Ø

## The Western Electric Transmitter Collection at W6HDU

by Sam Thompson, W6HDU  
1031 San Antonio Ave.  
Alameda, CA 94501

I've often given praise to those wonderful people, the "packrat" collectors. It is through their wisdom and industry that fine old things are preserved, in their eyes it is not just old junk.

My three Western Electric transmitters indirectly came from such a per-

by John Staples, W6BM  
732 Cragmont Ave.  
Berkeley, CA 94708

son. A person who visited a lot of radio stations over the years and had a love for old equipment, combined with a passion for collecting unwanted station equipment destined for destruction.

My first acquisition was a 250-watt model 451A-1 (serial No. 200), built somewhere in the model run of 1939-1948. Its frequency coverage is 550 kc to 2750 kc and was promoted for broadcast, police and emergency services.

A 14" x 31" etched glass window displays three rows of tubes beautifully shown off by a blue anodized aluminum background. Transmitter styling was by the well-known industrial designer, Henry Dreyfuss. This 1000-pound transmitter is 76" tall and draws 1750 watts at 220 volts.

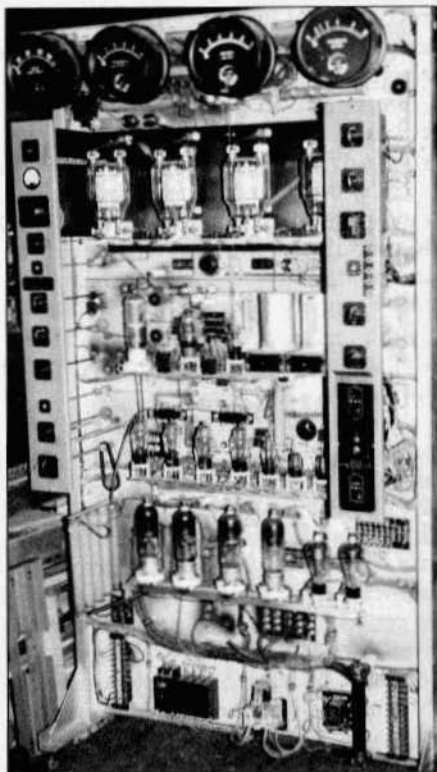
Second to come along was a 1 kW model 443A-1 (serial No. 235), also built from 1939-1948, and also with 550 kc to 2750 kc frequency coverage. These two transmitters were the last models in their power ranges built by W.E. Also reflecting Henry Dreyfuss' modern design, this transmitter has four 7" meters prominent near the top of the cabinet and a two-tone paint scheme of blue and gray accented by stainless trim. Windows show the final tubes and mercury rectifiers.

Double doors into my daylight basement had to be installed before this 2000 pounder could be moved inside - with much effort. It runs on 220 volt, single phase.

My third W.E. transmitter acquired was another 250 watter, model 23A (serial No. 150), built from 1936-1939. Like its successor it also uses six 242C tubes in the final amplifier. Aside from the high voltage rectifier and oscillator



Western Electric 451A-1



John Staples, W6BM, left and Sam Thompson, W6HDU, with the '443-1 cabinet. The cabinet must be removed when moving this transmitter.

Western Electric 443-1 with cabinet removed.

tubes, all tubes are mounted horizontally and are accessible through a full-length door at the rear.

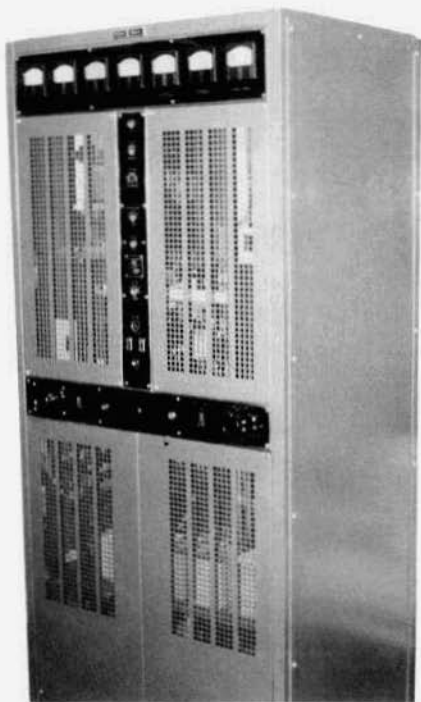
A classically beautiful W.E. square punched panel design was used in pre-1939 W.E. transmitters. It is interesting that the design persisted in the 50 kW model until production ceased.

As often happens when a newer transmitter replaces the older, the older finds a window of afterlife as a backup in emergencies. I often chuckle at the following instructions attached to my 23A transmitter: To Get Auxiliary Transmitter On The Air:

Find master control knob (center of transmitter)--Turn knob to filaments (clockwise), note there is a red mark on knob. Wait about one minute for transmitter to warm up, while your (sic) doing that hit button on phasing cabinet

that says: 'Auxiliary transmitter.' Take a patch cord and patch 'EBS out' to 'Auxiliary transmitter input', this is labeled in red and EBS out is one set of holes behind that on top..this is all in transmitter room. Now take master control knob and turn two more clicks to plates, you should now have meter reading on all meters and be on the air with the old beater."

The 250-watt 23A transmitter uses the W.E. 702A crystal oscillator, found in all three transmitters, followed by an untuned amplifier, which is followed by an 837A suppressor-modulated amplifier. The 837A was specially designed to give good service in this application. Two stages of linear amplifiers follow, using six 242C's in the final, running at 33% efficiency with the unmodulated carrier. The W.E. 242C is similar to the RCA type 211. As in all these transmitters, a fraction of the RF output signal is



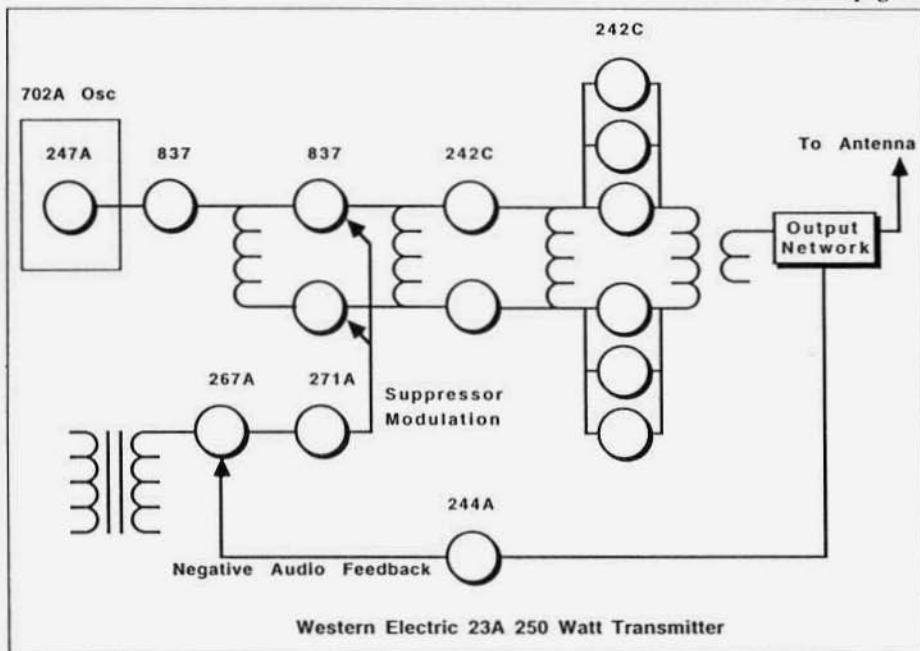
Western Electric 23A

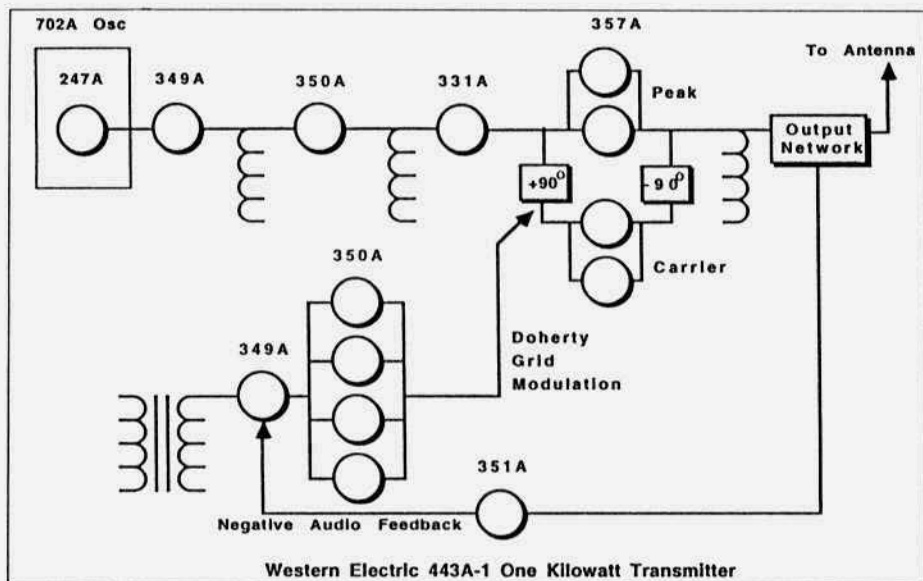
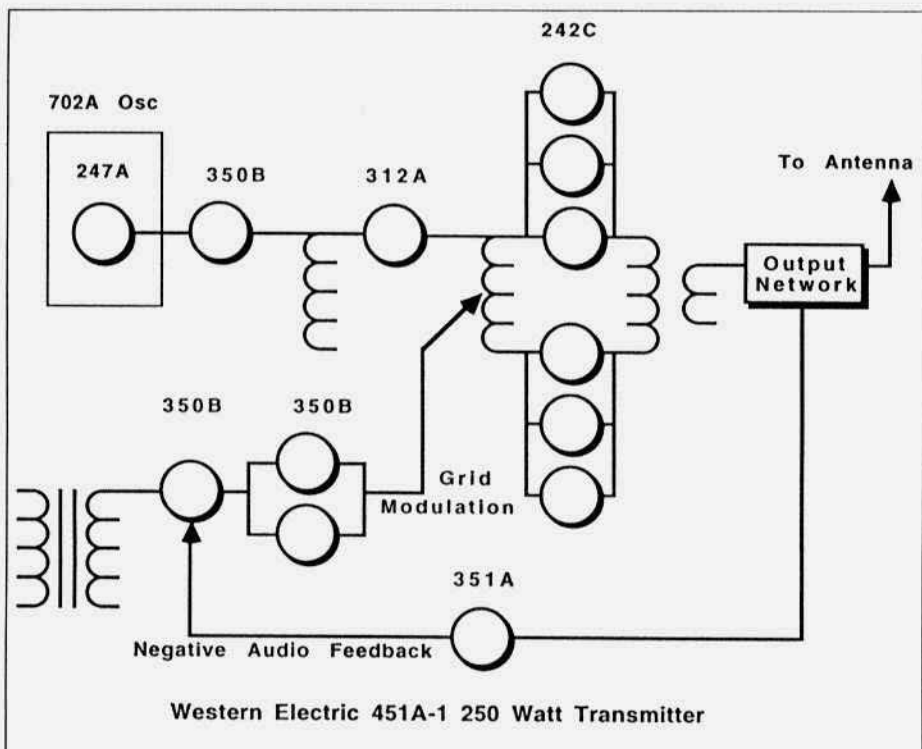
rectified and fed back to the first audio stage, giving about 22 dB of negative feedback.

In the 250-watt 451A-1 the 702A oscillator is followed by two amplifier stages driving the final, again using six 242C's, but this time, the final is grid modulated. As more power is required to modulate the final than suppressor modulate a driver stage, the modulator has been beefed up, using a pair of 350B's in its last stage. The W.E. 350B is similar to the 6L6 with slightly higher ratings.

In the one-kilowatt 443A-1 a 702A oscillator unit drives three amplifier stages which drive the final. In this case, the final is a Doherty high-efficiency linear amplifier, which Western Electric used in all its transmitters of one kilowatt or higher from 1938 to the end of production in 1948. Even though the final is grid modulated in this transmitter, it can be considered to be operating as a linear amplifier, as the difference is minimal. The W.E. 357A tubes have no

continued on page 35





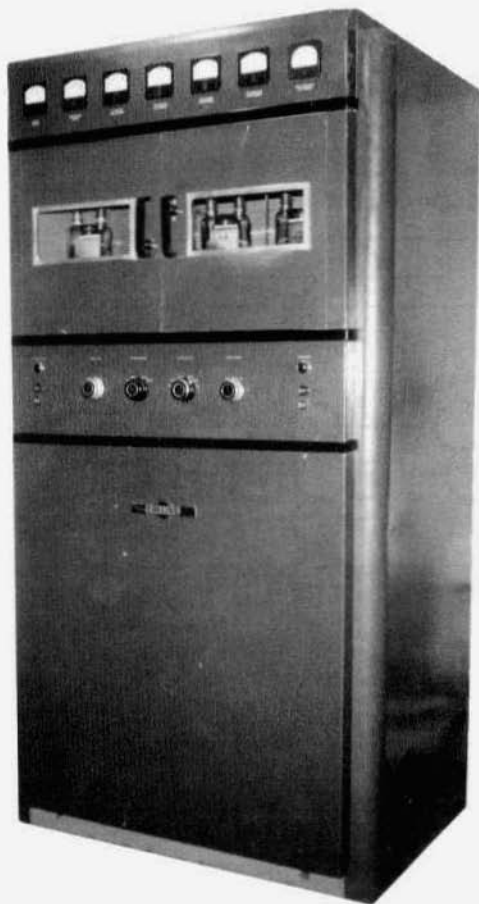
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## Saving an Old Broadcast Transmitter

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by John Staples, W6BM  
732 Cragmont  
Berkeley, CA 94708

This is a story with a happy ending about saving a broadcast transmitter that seemed too far gone to be helped. Last January, with the help of W6HDU, I acquired a 1938 Collins 20K one-kilowatt broadcast transmitter in poor condition, shot through with rust, with decayed wiring and failed components. I will describe many of the techniques used in the restoration of this transmitter.

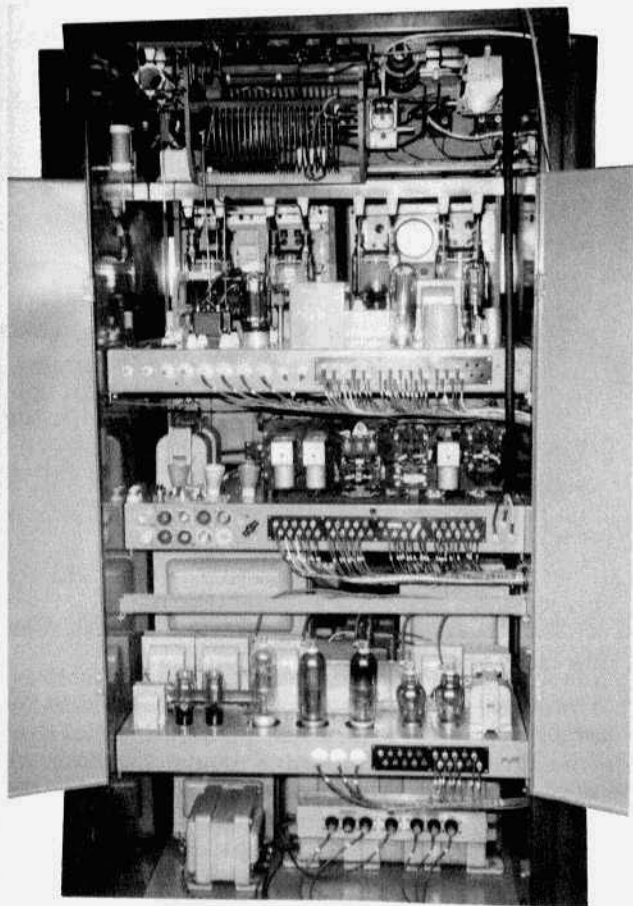


Restored 1938 Collins 20K transmitter.

The 20K is a plate-modulated one-kilowatt AM transmitter that uses a pair of 833's in the final driven by an 813, which is in turn driven by an auxiliary unit, the Collins 40E frequency control, using an 807 in its final. The modulator uses a pair of 833's, driven by push-pull 845's, in a shunt-fed configuration which removes the final amplifier plate current from the secondary of the modulation transformer.

A three-phase power supply produces about 2500 volts and separate units supply low B+ and bias voltages. Six reversible motors adjust four RF circuits and two filament rheostats. The front panel controls include on and off push buttons for the filaments and high voltage, a meter selector and the tuning motor controls. A pi-L output network is located on the ceiling of the cabinet and uses a fixed tuning capacitor and variable loading inductor. The transmitter weighs 1364 pounds, and most circuitry occupies three horizontal chassis in the 78 inch high cabinet.

The interior of the rig indicated poor storage conditions: the transformers and cabinet interior were rusty, the cloth-and-rubber insulation was peeling off the wiring and many components, particularly the wire-wound resistors, were bad. Several poorly-executed modifications had been made, probably under the time pressure of keeping the transmitter on the air. Fortunately, the outside of the cabinet looked pretty good. The "before" and "after" photographs show the appearance of the lower front of the transmitter, where the modulation transformer and reactor, and the plate power supply transformer and filter choke are located.



**Rear view of restored transmitter.**

To restore this transmitter to operation and original appearance, it was completely disassembled, refurbished and rebuilt from the ground up for documentation. The transmitter was photographed and videotaped before disassembly. The wiring harness and all cabinet hardware were discarded. Each component was checked and labeled and all low-power resistors and capacitors replaced. The power supply was converted to single phase, an RF driver was built to replace the missing 40E unit and the operating frequency was moved from the bottom of the broadcast band to 160 meters.

Fortunately, all the transformers and chokes were good and passed a hi-pot test. The transformers were partially disassembled, wire-brushed and refinished with a rust-inhibiting spray epoxy. All the chassis, cabinet interior, shelves and mounting brackets were stripped and repainted with a water-based spray enamel. The ceramic insulators and other components were cleaned in the dishwasher, which unfortunately, removed the enamel insulation from the plate RF choke wire, which had to be rewound. New scales were made for the meters with a laser printer. Of the six control motors, one was missing and one was not repairable, so the

remaining four were assigned to the four tuned circuits: two in the driver stage and two in the final. The two filament rheostats, originally motor-controlled, were left set at near maximum resistance to limit inrush current and appropriate transformer primary taps set the filament voltages.

As the dark gray metallic outside finish was in reasonably good condition with just a few small chips, it was preserved. The cabinet was rubbed down with polishing compound and then treated to a good paste wax finish. A small wooden platform was built for the transmitter to sit on, leaving room for cables to emerge from under the transmitter.



**Before and after shots. [Ed. How many of us would attempt a job like this?]**

A few modifications were made to the original circuit: an over-current protection relay was added to the final amplifier, external AC power control added to permit remote operation, fuses added to the high voltage transformer primary, and a variable vacuum capacitor substituted for the fixed capacitor in the 833 plate circuit. A modulated B+ pick-off provides sweep for a trapezoidal pattern modulation monitor.

As the rebuilding phase started, parts were remounted on each of the three chassis: the relay/control, the rectifier and the RF/audio deck. The pictures and notes taken before disassembly were useful during this stage. All the rubber components, the grommets, cable clamps and shock mounts were replaced. After the mechanical parts were remounted using new hardware, the task of rewiring began. Wiring lists were made up, including wire gauge and insulation requirements. A considerable amount of wire was required, including expensive 40 kV wire for the high voltage wiring. As the

wiring proceeded from one end to the other in each chassis, the bundles were laced for neatness and authenticity. As each deck was completed, individual circuits were power tested.

The three-phase plate power supply was reconfigured for 240 volt single-phase operation. The original configuration was delta zig-zag Y, in which each primary leg drives two series-connected secondary windings, one each side of the three secondaries connected to a central common in a Y configuration. This transformer can be operated from single-phase 240 volt power by connecting the single-phase three-wire 240 volt feed to the three ends of the delta primary, and then by finding the two secondaries that have the maximum voltage w.r.t. the center Y. The third secondary winding will show no voltage at all and is left unconnected as a spare. The output voltage is a little less than 90% of the three-phase output voltage. No additional hum filtering was found to be necessary. (This reconfiguration may not work with other three-phase transformer



configurations). The modulation transformer and reactor cases were electrically isolated from the cabinet by mounting on 1 inch thick Delrin blocks to reduce insulation stress between the windings and the cases.

Installing the new inter-chassis wiring harness was the worst part. Each of the three decks has up to 40 terminals that connect to the wire harness, and the metering and control panels provide a large number of additional terminations. To provide a neat, laced harness, I start at each deck connecting a wire to each terminal, route the wire to its destination and cut it off a little long, as the exact length of the wire in the laced-up harness is not yet known. Each wire has a terminal swaged and soldered on its near end with heat-shrink installed over the terminal shank and an adhesive wire label identification marker added. The far end of each wire is temporarily tagged with its destination ID number. As the wiring to each deck is completed, the cable is laced out as far as possible. The wiring is finished by lacing the unconnected ends up to their destinations, cutting off the excess length and terminating as above.

The RF output circuit components were pretuned to the final frequency. The distributed capacitance of the plate circuit was measured and a vacuum variable installed in place of the large fixed mica tuning capacitor. The Radio Amateur Handbook tables helped calculate component values for the output circuit. The large plate tuning inductor, an edge-wound coil almost a foot in diameter and 1-1/2 feet long was rewound with half the number of turns so most of the length of the coil is used. This inductor is tuned by moving with a motor drive a copper disk into its core: the disk is effectively a shorted turn, which reduces the inductance.

The initial adjustment of the final amplifier plate circuit was carried out with an easy and powerful technique, with the power off. If, for example, the final tubes

require a 2000 ohm load, a signal generator is connected to the plates through a 2000 ohm non-inductive resistor and a 50 ohm dummy load is connected to the output of the pi-L network. A dual-channel scope displays the RF voltage on each side of the resistor. (The internal impedance of the signal generator is not critical, and capacitive loading by the scope probes is small compared to the circuit capacitance.) The tuning and loading controls are adjusted so the voltage on the plate side of the resistor is one-half the voltage on the generator side with the two voltages in phase. (Swing the generator frequency to assure that you are on resonance.) These settings will be close to the final settings determined during the hot tune-up.

The check-out of a new rig is the most exciting part. The power supply was first operated with no explosions or smoke. A Viking Ranger was used in the initial check-out; later, a new 10 watt RF driver replaced the missing 40E unit. With only the 813 in place, the 813 grid circuit was adjusted for proper resonance and coupling. Then high voltage was applied and the plate circuit brought into resonance. The 833's were installed and the final amplifier B+ switch opened. (This switch removes plate voltage from the final so the neutralization can be set.) The 813 plate was tuned to resonance and the coupling was set for proper 833 grid current. Finally, the B+ switch was closed and plate voltage applied. Success! Full RF into the dummy load and the preset output circuit required no further adjustment.

Finally, the 833 modulator tubes were installed and full modulation achieved. However, the modulator gain was too high, indicating a problem in the negative feedback network, which should provide 22 dB of feedback. The value of a critical feedback resistor was found to be wrong in the manual. A computer-based circuit analysis found the problem.

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## Collins 516F-2 Relay Modification - Revisited

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by Steve Thomason, WB4IJN  
601 Black Oak Blvd.  
Summerville, SC 29485

### Background

Shortly before reading Dave Ishmael's, WA6VVL, article in the June, 1994 issue of ER, I had a QSO with a ham who had just replaced the ON/OFF switch on his KWM-2 to the tune of over \$40. Although I had never personally experienced a switch failure on any of my Collins gear, I decided to go ahead and make the modification. HOWEVER, the very thought of drilling holes in any of my vintage gear was out of the question; I had to find another way.

The underside of the 516F-2 is too crowded to mount a standard-sized 125 VAC relay. However, Radio Shack has a mini-sized relay with 10A contacts, but it has a 12 VDC coil that draws 38 mA. I considered rectifying the AC, filtering the resultant DC and using a dropping resistor to get to 12 V, but elected to use an external 125 VAC relay for simplicity and to eliminate the heat that the dropping resistor would generate.

The first problem to overcome was the connecting cable to the external relay. One of our local hardware stores carries 18 gauge thermostat cable in a 7-conductor configuration. However, there was no documentation with the cable. A quick look into one of my ARRL Handbooks indicated that each 18 GA solid conductor would carry 10A continuous. I checked with a local electrician who verified my suspicion that the insulation was rated for 300 V. With that information in hand, I felt like I had the cable I needed.

My parts list consisted of the following additional items, all available at your local Radio Shack:

1. Relay, 125 VAC coil, DPDT, catalog no. 275-217.
2. Relay socket, catalog no. 275-220.
3. 4-Conductor male connector, catalog no. 274-224.
4. 4-Conductor female connector, catalog no. 274-234.
5. Project box, catalog no. 270-235.

### Construction Details

1. Remove one of the wires from the thermostat cable; only six will be required.
2. Cut the white wire with the grey trace that is connected to the terminal strip next to CR1, the bias rectifier, leaving about 3/8" of the wire still soldered to the terminal strip (in the event your power supply is wired with a different color code, this wire is the one that is connected to pin 5 of the 11-pin connecting socket).
3. Attach the white/grey wire removed above to unused pin 1 of the 5U4 socket. DO NOT SOLDER.
4. Feed one end of your connecting cable through the easily accessed hole in the chassis that is located beside the power transformer, T1. Attach wire #1 of your connecting cable to pin 1 of the 5U4 socket.
5. NOW solder the two wires connected to pin 1 of the 5U4 socket.
6. Solder wire #2 of your connecting cable to the terminal on the above-mentioned terminal strip that has soldered to it the white wire from the AC line and the white primary lead to T1. On my 516F-2, this is the terminal nearest the side of the chassis where the cables enter and where the fuseholder is mounted.

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## A Gold D-104 Story

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by Larry McClelland, KBØLNV/AA  
6317 Bluebird  
Longmont, CO 80503

I was first licensed in 1956 as WN7DRM. After about 15 years I became inactive and let my license lapse; family obligations, business pressure, other interests, those were the reasons.

About a year ago I became aware of the vintage radio/AM activity and I got 'fired up' on ham radio again. I wrote my novice test at a hamfest in Houston last November and got my present call. In May I took the advanced test in Longmont, Colo. I passed the written but failed the code. I took the code test again in June at the Boulder, Colo. hamfest and passed it. Any day now I've expecting my Advanced ticket with a new call.

My first priority after getting my new ticket was to get some equipment. Back in the '50's my transmitter was a Viking II. I forget what my receiver was, but I

know that I always wanted an NC-300, the 'dream receiver'. Since getting interested in ham radio again, I've acquired both these pieces of equipment. But I'm still looking for other 'stuff' so I make frequent scrounging trips to junk stores, hamfests, etc.

On one of my 'scrounging' trips I visited a surplus electronics store in Longmont, Colo. near where I live. I came across a 'brass colored' D-104 that really caught my fancy. That day the owner didn't have a price set on it; but after a couple of return visits I bought it for \$80.

A few days later I received a call from a person who wanted to buy the D-104. He had got my name and number from the surplus store. He offered me \$180 for it. The call started me thinking... maybe there was more to this mic than met the eye. I had my secretary call Astatic to find out more about it.

Here's what she found out: The 'Golden Eagle' was manufactured for their Bi-Centennial year, from 1976 to 1978. It is real gold plate. No more than 10,000 were manufactured. A 'Golden Eagle' in excellent condition is selling for \$500-\$700 today. The people at Astatic also told her that they're making a new limited edition called the 'Diamond Eagle'. It's not gold plate - only brass - and is selling for \$229.

That deal really made my day as I'm sure it would for most vintage/collectors/Am'ers. Back when I got my first ticket, when I was a freshman in highschool, I never dreamed that someday I'd own a \$500 gold-plated D-104. ER



#### **D-Day Reenactment from page 5**

what you wish but my equipment is still in perfect shape. The Chicago Tribune estimated between 200,000 and 700,000 spectators were present for this show. Smaller D-day reenactments also on June 4th were in Virginia and California but the Chicago show was best of all.

We now have several 100% operating WW II vintage vehicles in Northeast Ohio including a 1945 M4A1E8 "Heavy Sherman" tank, a 1943 M5A1 "Light Stuart" tank, a 1944 White Motors halftrack and several 1943, 1944 Willys and Ford Jeeps. All of the vehicles are fully operational. The main vehicle is the 1945 "Heavy Sherman" which is the heavy duty model of the "Sherman" tank with double wide tracks, large 76 mm gun and larger turret. The 75,800 lb tank is powered by a Wright 9-cyl radial 973 cu. in. aircraft engine, with a five speed manual transmission and gets 4/10 mile per gallon of gasoline. The tank is outfitted with the complete original SCR-528 radio set, with the BC-604 transmitter, BC-603 receiver, CH-264 parts chest, FT-237 mount, MP-48 antenna mount and sections with crew member BC-606 control boxes. Each of the five crew members has his own BC-606 control box, T-17 mike and HS-30 headset. The radios are completely operational with the interphone system using the audio section of the transmitter. When a crew member keys his mike, the dynamotor starts in the transmitter. A BC-1362 armored external interphone box is located on the rear outside for communications with the crew.

The smaller M5A1 "Stuart" tank weighs 32,000 lbs and is powered by two Cadillac V-8 flathead engines and has a Hydromatic automatic transmission. This tank has a fully functional SCR-508 radio set which is the same as the SRC-528 except it has two BC-603 receivers instead of the CH-264 parts box on the FT-237 mounting rack. The four crew members communicate via the BC-606 control boxes and the audio section of the BC-604 transmitter. Top speed is 45 mph.

The WW II jeeps are outfitted with

the SCR-510 WW II radios which consist of the BC-659 transmitter-receiver, PE-120 power supplies, FT-250 mounts, the MP-48 antenna mounts and sections. The halftrack has a SCR-528 set installed which is the same type set that is installed in the Sherman tank. The combination of these sets was used to provide static free communications between any or all vehicles on any frequency between 20.0 and 27.9 MC.

With all these fully restored WW II vehicles it looks like a very interesting next two years at air shows, reenactments, military vehicle shows and parades. The original WW II radio sets add 100% to the vehicles. None of the vehicles are owned by me but a private collector who wishes to keep a low key. I did, however, supply some of the original WW II communications equipment.

**ER**

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#### **Putting the 75A-3 on AM from page 22**

'A2 and has that characteristic Collins stability not always found in other receivers of the day.

By the way, the "Standby" circuit used in the 'A3 was improved over the design in the 'A2. The loud "pop" in the speaker on the 'A2 is all but gone in the 'A3.

As far as selectivity goes, if I ever get into a real spot with QRM I can always switch in A/O and use the USB/LSB tuning approach Collins recommends with the mechanical filter; to date that's not been necessary. **ER**

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#### **Letters from page 2**

TXHV was 840 under full load. A real 5R4 gave 820 VDC full load. I found a suitable L3 in the junkbox and installed electrolytic caps of the original values. My KWM-2A still slaps the wattmeter against the 100 watt pin when I whistle into the mic, the low HV is 305 and the set runs cooler.

**Walt Hutchens, KJ4KV**

exact equivalent, and the transmitter has been converted to use 833A's instead.

The principle of operation of the Doherty linear amplifier is quite interesting. (Doherty himself worked for Western Electric). A normal linear amplifier correctly adjusted for AM service has a plate circuit efficiency of 33% at steady-state carrier level, increasing to perhaps 60% or so at the peak carrier power, which is four times the steady-state carrier level. This is a consequence of the reserve power capability required to linearly amplify a peak four times the average carrier level.

In the Doherty, one tube (in this case, the two tubes labeled "carrier") operate almost class-C, where they are efficient but saturated, and the other tube (the two tubes labeled "peak") are almost at cutoff at the unmodulated carrier level and supply the positive modulation peaks. Since the carrier tube is saturated, more drive will not produce more output, but downward modulation will be approximately reproduced.

Both the carrier and peak tubes are connected to the same output network. When the peak tube starts producing power on a modulation peak, the effective impedance of the network as seen by the carrier tube actually increases, as the peak tube is pumping power into it, which would reduce the loading on the carrier tube and reduce its output capability (just like reducing the loading on any class-C amplifier). However, the -90 degree network between the carrier tube and the output network has the effect of transforming the increasing impedance of the network on the upward modulation swing, caused by the peak tube feeding power into it, into a decreasing impedance, loading the carrier tube more heavily. On the positive modulation peak, the peak tube supplies half of the full output power, and the increased effective loading of the saturated (class-C) carrier tube doubles

its output power as well, providing the full four times peak envelope power to the antenna. This 90 degree network is called a reciprocal network and can be a length of transmission line or a lumped circuit, as in the 443A-1. The +90 degree network in the grid circuit corrects the phase shift of the -90 degree network in the plate circuit so the power from the two tubes is in phase. The efficiency of the Doherty amplifier is approximately 60% for both the steady-state carrier and the peak power, saving considerable power and allowing smaller tubes and power supplies to be used.

The Doherty, like any linear amplifier, is more sensitive to tuning and loading conditions, and is not quite as linear as a true linear amplifier. A large amount of negative audio feedback around the amplifier reduces the distortion to acceptable levels. The Doherty avoids to some extent the very high peak voltages present in a class-B high-level modulated amplifier, but the actual wall-plug power efficiency of high-power Doherty transmitters was no better and perhaps a little worse than high-level modulated transmitters, and was certainly more critical to tune and maintain. It does stand, however, as a very elegant alternative to other modulation methods. One advantage is that stations can increase their output power by adding Doherty amplifiers without having to buy an entirely new transmitter.

The first Doherty 50 KW transmitter was installed in Louisville (WHAS) in 1938, and room was left to install a 500 KW Doherty super-amplifier, which unfortunately never happened. The 500 KW WLW transmitter in Cincinnati, installed by RCA, used a plate-modulated final amplifier.

Western Electric discontinued broadcast transmitter production in 1948, to concentrate on the rapidly-expanding post-war telephone equipment supply business. ER

nificant to actively oppose. In reality, this would have a crucial impact on amateur radio as we know it. Code learners frequently experience a "plateau of learning" around 10 w.p.m. They quickly progress up to that speed and then stall out, seemingly unable to make further progress no matter how intensely they continue to practice. At this point many would-be Generals simply give up in frustration and resign themselves to being permanent Novices or Techs. Those who stick with the code, however, eventually break through the plateau, and progress once again becomes easy to speeds beyond 20 w.p.m.

Many beginners are puzzled by this learning phenomenon, but there is a simple explanation. Up to about 10 w.p.m., it is possible to memorize the Morse alphabet as a table of dots and dashes, and copy code by actually counting the dits and dahs in each Morse character as it is transmitted. Beyond about 10 w.p.m., this method becomes impossible, and further progress in code speed requires a completely different mode of learning. You have to become familiar with the *sound* of each character without consciously listening for dits and dahs, just as you read familiar words by instant recognition, without consciously thinking about the spelling.

Copying by sound pattern is the essence of telegraphy. Learning to copy code has been compared to learning to play a musical instrument or recognize spoken phrases of a foreign language. Persons who experience the plateau must completely re-learn the code as a table of sound patterns instead of dots and dashes, before further progress can be made. It is simply a matter of persistent practice, and not giving up as soon as the code becomes a significant challenge.

This was the theory behind the old CW-only Novice ticket. On-the-air ex-

perience is much more enjoyable than code practice sessions, and active Novices usually reached 13 w.p.m. before they even realized they were ready for the General code test. Novice Enhancement spoiled this by allowing limited phone privileges, and now the Novice ticket becomes a deadend for many licensees. With the advent of no-code, few beginners are choosing the Novice route to enter ham radio. Have you noticed lately how empty the Novice CW bands are? The FCC and ARRL have expressed concern that the Novice Class license may be headed for extinction due to lack of interest.

If the FCC adopts the industry's proposal to reduce the code speed to 10 w.p.m., amateurs will no longer have to learn the art of telegraphy, but simply memorize the Morse alphabet and learn to translate dots and dashes to dits and dahs. This will essentially extend the no-code ticket to include the HF spectrum. We will be left with nothing more than a nominal code requirement, a mere formality to meet international treaty obligations that call for some kind of Morse Code test for amateur radio.

Old timers may recall that the code speed used to be 10 w.p.m. For the reasons explained above, the ARRL Board of Directors felt the code speed requirements were too slow. In May, 1936, they voted to petition the FCC to raise the code test to 12-1/2 w.p.m. The Commission found 12-1/2 messy to calculate, so they rounded up to 13 w.p.m., effective June 2, 1936.

### **But What Does This Have To Do With AM?**

Why should this proposal be of concern to AM'ers? After all, many AM operators have little interest in CW. Some downright detest the code. The bottom line is simple: If This Proposal Passes, AMPrivileges On The HF Bands Will Be In Grave Danger. In none of the reported discussion of the Slow Code proposal has any mention been made of

its expected impact on present users of the HF bands. The industry is interested in the potential thousands of new HF operators who would purchase store-bought rigs. This would be good for the business of equipment manufacturers, and presumably, magazine publishers. No-code privileges in the VHF, UHF, and sparsely populated microwave bands is one thing, but is it in the best interest of ham radio to further reduce the requirements for access to the congested HF bands? Should we allow ham radio to be "dumbed down" to intentionally create a vast influx of new HF operators for the sole purpose of selling rigs? If Slow-Code passes, how will those thousands of new appliance operators fit into our already overcrowded phone bands without disrupting present operations such as AM?

Novice Enhancement and other previous attempts to bring newcomers to amateur radio failed dismally, but since the no-code ticket has become a reality, the growth of the Technician Class amateur has been phenomenal. It is quite possible that in the near future no-coders will make up the majority of U.S. amateurs. The response to no-code at VHF and above suggests that Slow-Code would create a population explosion on the HF bands. It does not take a genius to figure out that "bandwidth" and "spectrum space" will once again become popular buzzwords as the HF bands become further congested. If AM is not pushed off the bands by the QRM, there will undoubtedly be new pressure on the FCC to have it outlawed out of existence.

### **What Action Should the AM Community Take in Response?**

At press time there has been no reaction to this proposal from the ARRL. Remember, the League supported AM in the power limit proceeding, because many AM'ers who were League members wrote to their Division Directors. We need to take the time once again, even before any petition is formally

submitted to the FCC, to let them know in no uncertain terms our feelings on this issue. But AM'ers cannot act alone, without working with the greater amateur community. Once the amateur population as a whole becomes aware of this proposal and its likely impact, many SSB'ers as well as CW enthusiasts will be willing to work to defeat it.

Our immediate concern is to make the greater amateur community aware of the proposal and its significance. So far, the industry seems to be taking a low key approach. Let's make this a high profile issue, on the order of the incentive licensing debate in the 1960's. **Critics of this plan must be careful to maintain the image of a reasonable and responsible group of amateurs whose only interest is the preservation of our hobby. We cannot afford to be perceived as die-hard fanatics who wish to push ham radio into a state of divisiveness, pitting old timers against the "new breed" of amateurs. This happened in the late '60's with the AM versus SSB wars, and almost resulted in the death of AM. This time, it will be a grassroots struggle of amateur operators versus the big bucks of organized industry. Let's simply work to convince the ARRL, the FCC and the public that while it might result in a short-term boom for the equipment and publication industries, this proposal would not be in the best interests of amateur radio. Our most effective strategy will be to keep the issue high profile while making sure our facts are straight and our arguments well reasoned. The topic needs to be discussed and debated over the air, as well as at local radio club meetings and hamfests. AM P/X and *Electric Radio* will publish further news as the information becomes available. ER**

**References:** Westlink Report, May 20 and June 6, 1994; Worldradio, July 1994, page 4; QST, 1936, pg. 28, June, pg. 19, July, pg. 22, August.

### **Saving an Old Broadcast Xmtr from page 31**

The transformers and relays are fairly noisy, so the basement-located transmitter is normally operated remotely from the upstairs shack at the end of a 70 foot control cable. For local operation in the basement, a six-foot rack next to the transmitter includes an additional audio chain, modulation monitor, distortion meter, scope, audio test oscillator, T/R switching and a receiver. Upstairs, a remote control with power and T/R switching and a VFO was provided, and a Collins 212A-1 broadcast console provides the audio.

A few minor problems arose during the first weeks of operation: the insulators on the high voltage transformer sparked and needed to be recleaned, the high voltage rectifier filament transformer secondary opened up, and one 833 filament went south. These were quickly fixed and the transmitter is now giving excellent service on 160 meters.

Broadcast transmitters are in a different league from ham transmitters in terms of size, weight and conservative design and are a lot of fun to operate. More are becoming available to the amateur as broadcast stations change over to modern rigs which require far less maintenance and AC power. Check with a friendly broadcast engineer in your area to see if any stations are unloading old rigs. Some are available for the asking, others go for modest prices. But make sure that your floor can handle the weight.  
**ER**

### **Collins 516F-2 Relay Mod. from page 32**

Wires #1 and 2 will energize the primary of the external relay when S11, the ON/OFF switch on the KWM-2 is closed.

7. Solder wires #3 and 4 of your connecting cable to the portion of the white/grey wire left on the terminal from step 2 above.

8. Solder wires #5 and 6 of your connecting cable to the fuseholder terminal that also contains the white wire with

orange trace (in the event your power supply is wired with a different color code, this wire is the one that is connected to pin 7 of the 11-pin connecting socket).

When the coil of the external relay is energized by the closing of S11, the 4 wires connected in steps 7 and 8 are shorted together by the contacts on the relay, and thus energize the primary of T1. Note that I have paralleled two wires in the thermostat cable that carry the current to T1 just to divide the current load between them; this is probably not necessary, but is simply conservatism on my part.

9. Turning to the external relay, solder wires #1 and 2 to the coil terminals of the external relay. Wires #3 and 4 are soldered to the arm of the relay (relay contacts 5 and 6). Wires #5 and 6 are soldered to the normally open contacts of the relay (relay contacts 3 and 4). Jumper wires are also soldered between relay contacts 5 and 6, and between relay contacts 3 and 4, respectively. (BE SURE TO CHECK THE WIRING DIAGRAM OF YOUR PARTICULAR RELAY AND MAKE THE APPROPRIATE ADJUSTMENTS).

I chose to mount the female 4-conductor connector to the project box; you may want to use a portion of the thermostat cable and make a short run from the box to the connector. In any event, BE SURE TO OBSERVE CORRECT POLARITY IN YOUR CONNECTIONS.

### **Operation**

Since my relay contacts are visible through the smoke grey relay cover, I can watch the arcs from the contacts while operating the ON/OFF switch on my KWM-2. Considering the intensity of some of those flashes, I'm amazed that my switch has survived as long as it did. This is a modification that I am definitely going to make on all my Collins 325's and KWM's, and will consider making for some of my other vintage gear as well. **ER**



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**FOR SALE:** Hallicrafters SX-101A, exc. - \$175; HT-32 - \$75; Hammarlund HQ-170C - \$75; HFBC-100C; B&W CX62C, 10HDVL, 20HDVL, HDV base, 10BCL, 20BCL; BC-221-Q freq. meter - \$40; Heath IG-18, IG-28, IG-57A; Knight Span Master parts unit. **WANTED:** SX-25; Ocean Hopper. Robert Baumann, 1985 So. Cape Way, Lakewood, CO 80227. (303) 988-2089

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**TRADE:** My 9-1/2" Hammarlund round corner spkr for your 10-1/2" Hammarlund square corner spkr. **WANTED:** Double right angle 1/4" drive like Millen 10012. Mike, ACSP, POB 33, Bartlesville, OK 74005. (918) 333-2795

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

**FOR SALE:** Collins WE KWM-2/516F-2 w/ MM-1 mic, exc. condx, plug-in relays plus 8 other upgrades all done by the factory, one owner, also includes orig. Collins/Rockwell manual and copies of 9 service bulletins - \$850. Mike Kennedy, WA6AAJ, (209) 435-3159

**WANTED:** R4C accessories - 4NB noise blanker, filters or complete R4C. Also need R-390 and VLF rcvr. Ward Remkopf, K8FD, 116 Fairway Dr., Belmont, IA 50421. (515) 444-4396

**FOR SALE:** Just located a RT-91, AN/ARC-2. If interested, I can pick it up for you. Appears to be complete, no mods, missing case. Bob Bakinowski, 1524 Saint Tropaz, Tucson, AZ 85713. (602) 624-8029.

**FOR SALE:** Rare Rolph Brown bug - \$100; DX-35, VF-1 - \$65; mint RME 152A - \$40; BC-29 - \$30; Astatic JT-3 - \$25. All plus shpg. Kathleen Smith, VE3WKW, 951 Wonderland Rd., S, London, Ontario N6K 2X7, Canada. (519) 472-2738

## COLLINS

### Restoration/Repairs/Painting

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

**FOR SALE:** Collins manuals (copies) - R-390 (maint.) - \$18; R-390A (operating) - \$18; R-390A (maint.) - \$20 (partial). Vintage tube CB's, list - LSASE. Charles Zafonte, RFD 1, Box 75, Fort Kent, ME 04743. (207) 834-6273 (n)

**FOR SALE:** Hallicrafters HT-40 - \$40; new G5RV antennas, complete - \$30. U-ship. Richard Lucchesi, WA2RQY, 941 N. Park Ave., N. Massapequa, NY 11758. (516) 798-1230

**FOR SALE:** Complete set of Electric Radio magazines - \$65; Eico 232 VTVM, VG - \$30; Heath 2255 LCR meter, exc. - \$65; Sencore Mighty Mite II portable tube tester, w/ manuals, VG - \$35. Doug Carter, N5NWX, 1414 Maryland, Corpus Christi, TX 78415. (512) 855-6773

**FOR SALE:** Lafayette 2 meter, 12 channel, HA-146, xtal controlled, 1W and 25W mobile xcvr, very exc. condx, w/mic and 2 manuals - \$60; Knight VFO - \$15; Advance Schools sig. gen. - \$10. **WANTED:** Solid state grid dip meter, good condx, w/all coils. Don, WB5UIA, 903 Madison, Minden, LA 71055.

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

**FOR SALE:** Maybe, if not sold commercially. RCA 10 KW xmtr, Gates 10 KW xmtr, both recently taken out of service on high end of broadcast band. Information: Harry MacLean, VE3GRO, 500 Riverside Dr., London, Ontario, N6H 2R7, Canada. (519) 473-1668

**WANTED:** Hallicrafters part # 53A108 (RF choke, 3.2 ohms) for SX-43. Ronald De Feo, 1941 Ualakaa St., #A, Honolulu, HI 96822. (808) 955-1786

**WANTED:** Manuals or info for the following, Triumph model 120 sig. gen.; Supreme model 89-D tube tester. Randy Hull, WB3ECC, 1101 Hagy Lane, Dauphin, PA 17018.

**FOR SALE:** National NC-155 rcvr, fair - \$65; Hammarlund HQ-110 rcvr, nice - \$85; complete tube set for Hallicrafters SX-101 - \$12; Heath HW-12 75M monobander, HP-23A pwr sply, mic, manual - \$95; DowKey TRM-1 antenna changeover relay, NIB - \$35; Tektronix R564B, w/3A75, 2B67 plugins - \$25; 545A, 531A - \$25 each; CA, H plugins - \$15 each; 5CP1 RCA CRT (new) - \$15. **WANTED:** Johnson 500 modulator/pwr sply unit only; Hustler RM75S resonator. Dave, W1DWZ, (508) 378-3619

**WANTED:** Hammarlund HQ-170 slot freq. coil part no. K-42034-1 or junker chassis for parts. Gerald Liccione, W2TPL, 118 Hiawatha Trail, Liverpool, NY 13088.

**WANTED:** Pwr xfmr 700 VCT @ 120 mA, upright mounting, Thordarson 24R05-U, Triad R-14A or equiv. Al Bernard, N14Q, POB 690098, Orlando, FL 32869-0098. (407) 351-5536

**FOR SALE:** Collins 32S-3 - \$350; 312B-4 - \$120; 516F-2 (R) - \$120; 351E-2 - \$25; 440E-1 - \$20; parts, manuals, list - \$1. Joe Orngero, VE6RST, Box 32, Site 7, SS 1, Calgary, AB T2M 4N3, Canada. (403) 239-0489

**WANTED:** AN/PRC-74B for MARS use. Will pay market price and shpg. Harlan, K6JFW/NNNØBDF, (408) 996-2126

**FOR SALE:** Viking II - \$150; DX-100 - \$100; HQ-170C, w/clock - \$175; HQ-140X - \$100; Harvey-Wells R9A - \$100; R-390A parts unit - \$90. Marc, WC1X, (401) 846-6325

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

**WANTED:** My original National NC-125, SN 387 that I owned in highschool. Richard Smith, AB6MM, 1122 Via La Cuesta, Escondido, CA 92029. (619) 739-1835

**WANTED:** TecRad T-350XM owners where are you? KN6OR, W6FMY, K7INK, etc.? I've counted 15 surviving xmtrs. What's your story? Victor, 7224 NE 8, Portland OR 97211. (503) 289-6373

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

**FOR SALE/TRADE:** SX-25 Super Defiant. **WANTED:** SX-11, ACR-111, other '30's rcvrs. Prefer not working; restorables. Jim Dillon, 201 Seward, Juneau, AK 99801. (907) 586-3223, 10-6PDT

**FOR SALE:** NV2C Telegraph Key Illustration Index (TVC8). Tells where to find a picture of that key. \$2 ppd. TVC, Box 88-E, Maynard, MA 01754.

**WANTED:** E.F. Johnson Viking 500 and Pace-maker xmtrs. Also need swamping attenuator Johnson part no. 250-42-1. Bert, N8NN, 2150 Silentree Dr., Vienna, VA 22182. (703) 448-8016

**FOR SALE:** Panel meters, many types, various manufacturers, new, used. Write needs. No list, SASE. S.T. Carter, II, W4NHG, POB 033177, Indialantic, FL 32903-0177.

**WANTED:** Manuals for Navy WW II ARB rcvr and GF 11 xmtr. Copies OK. Pete Hamersma, WB2JWU, 87 Philip Ave., Elmwood Park, NJ 07407.

**FOR SALE:** FT-101ZD, one of the last xcvs with 6146 finals. 160-10M plus WARC. CW filter, P.S., APF. Nice conds - \$375. K8SJ, (216) 545-9632

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

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

**FOR SALE:** Please send SASE for list of radios 1940-1968 for sale; also 1000+ manuals available. Mike, KA7ASF, 112 E. Burnett St., Stayton, OR 97383.

**FOR SALE:** Hallicrafters SX-42, very nice, manuals - \$125; Heath ETW-3400 digital trainer - \$200; RCA audio consoles - BC-5B - \$100, BC-6B - \$150. Plus shpg. Jim, W8HPL, 13549 Morse Rd., Pataskala, OH 43062. (614) 927-2592

**WANTED:** Collins 75A rcvr (yes 75A is correct), 35C-2 low pass filter and 6 kHz filter for 75A-3. Butch, K0BS, (507) 288-0044

**FOR SALE:** Heathkits - DX-60A, HR-10, HR-10B, HW-7, Echophone commercial, Hallicrafters HT-37 - \$50 each; Heath PS4 - \$15; DX-60, HX-10, Gonset 2/6M VFO - \$25 each; Hallicrafters S-85 - \$85. Shpg xtra. Gary Lang, WN9U, 5129 N. Elkhart Ave., Whitefish Bay, WI 53217. (414) 332-5872

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**FOR SALE:** Post War communications rcvrs manuals by Howard W. Sams Volumes 1 & 2, with a total of 472 pages covering all the popular models produced from 1945-'52 by Heathkit, Gonset, National, Harvey-Wells, Hallicrafters, Hammarlund and Collins. Shown are schematics, alignment procedures, voltage & resistance charts, etc. These are quality 1994 limited edition reprints with a spiral binding. Price is \$36.00 including postage for both volumes or \$20 individually. New Wireless Pioneers, Box 398, Elma, NY 14059. Phone/FAX (716) 681-3186

**FOR SALE:** Collins S-Line, 75S-3B, CW filter, 32S-3, 312B-4, 516F-2, orig. Collins boxes, pristine condx, manuals - \$2200. Mike, (409) 693-1461

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

**WANTED:** Hallicrafter model S-29 Sky Traveler, model S-39 Sky Ranger. Must be in good cosmetic condx, but OK if not in working condx. Les T. Bird, N7YXW, 625 Concord Circle, Fernley, NV 89408. (702) 575-6705

**WANTED:** Monarch multimeter, any model; old oscilloscopes, panel meters, old computer equipment, telephone switchboards, open frame motors, etc. Chris Cross, Box 94, McConnell, IL 61050.

**FOR SALE:** Excellent reproduction of rare BC-223 manual which includes schematic, cost - \$7 which includes postage. Ted Bracco, W0NZW, Quincy University, 1800 College Ave., Quincy, IL 62301. (217) 228-5213 (n)

**FOR SALE:** HQ-129X - \$125; R1051B - \$550; AN3007/URT and T 827/URT - \$300; differential voltmeter - \$75; Rycom - \$75; Jack Meyers, 2656 N. Halleck, Portland, OR 97217. (503) 283-0821

**FOR SALE:** Gonset Communicator IV remote VFO (50, 144, 220 Mcs) - \$80; National NC-300/303 spkr - \$60, converter box (50, 144, 220 Mcs) - \$90, both \$130; Galaxy Hygain RF 550 wattmeter (w/scales to 4 KW and 5 position coax switch) - \$95. Craig, WA9HRN, (708) 367-1599



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**WANTED:** TMC SPU-2; Collins 26W; 7027A tubes; manuals for HQ-215 and RT-1113A/PRC-68A. Joseph Pinner, 201 Ruthwood Dr., Lafayette, LA 70503. (318) 981-7766

**FOR SALE:** Collins KWS-1, good condx, make offer over \$800. Cash pickup only. Write Dick Haungs, W2UJR, 11315 Cary Rd., Alden, NY 14004.

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**FOR SALE:** Repair! All makes and models, maximum labor per unit - \$96. Dan Rupe, W7HBF, WARRC Repair, 1302 S. Uplands, Camano, WA 98292. (206) 387-6312

**WANTED:** Hallicrafters SX-100 and SX-122A rcvrs, mint to exc. No dealers. James B. Geer, WBSLXZ, 1013 Overhill, Bedford, TX 76022-7206. (817) 540-4331

**FOR SALE:** Frontier Electronics, Box 218, Lehr, ND 58460 now offering a few goodies: .018 mF @ 1 KV, metal-glass-sealed Jan, axial - \$50 each; new, axial 25 mF @ 600 WVDC, 800V surge - \$7.50 each. We rebuild can capacitors, twist-locs - \$12 for rebuilding a single section to 100 mF @ 450 V, add \$1 per addition section. In stock - 10, 22, 33, 47, & 68 mF @ 500V, USA made, axial. Now .0035 mF @ 50 KV for Tesla builders - \$45 ppd. Everett Hoard, NØNVQ, (701) 378-2341. See U @ Rochester, NY.

**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:** QST's. All issues before 1930. Feb., July 1951; July 1952; Sept. 1956; Feb. 1958; Jan. thru May 1960; Aug., Dec., 1961. Howard Weinstein, 15 Lakeside Dr., Malton, NJ 08053. (609) 596-3304

**FOR SALE:** Couple of transistors, Gemtronics CB base, S/C #920; older military mics/headsets; older RF xfmr/antenna coils. J.H. Jacobs, 60 Seaview Terrace, Northport, NY 11768. Phone/FAX (516) 261-1576

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**WANTED:** RME 4300 manual, will buy or swap, looking for Heath, Eico, Knight, etc. manuals, buy or swap. Pete Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964

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**WANTED:** Heath SB-650 freq. display or equiv. compatible with HW-101; manual or copy for SB-614 monitor scope; 1960-'70's Heath catalogs.  
**FOR SALE:** Heath DX-60B, HG-10B VFO, clean - \$100, 1 ship. Bill Bogart, KA9CWK, 4146 S. Goff Rd., Hillsboro, IN 47949. (317) 397-3860

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**WANTED:** Black plastic escutcheon for the Collins 30L-1 amp. (frame around the plate and loading controls). Jack, WA2HWJ, (201) 927-7784.

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## WANTED

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

**FOR SALE:** Eimac 4-1000A xmtg tubes (6), filaments test good, two in orig. boxes, w/ spec sheet. Offers requested. Bill Ewald, POB 12163, Research Triangle Park, NC 27709. (919) 493-7608 (n)

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

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

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**FOR SALE:** HP 606A lab. quality HF sig. gen., w/manual, exc. plus - \$225; Browning Labs WWV standard freq. calibrator, model RH10, near mint - \$100; NOS Eimac JAN 4-400A/8438 - \$125. U ship. Joe Bunyard, 1601 Lexington St., Waco, TX 76711-1701. (817) 753-1605

**WANTED:** Jefferson Travis 350A cabinet, pwr sply, cable; need Hallicrafters HT-12 pwr sply, cable, info; need Abbot TR-4 and DK-3 parts radios; need military TCS mount for TX/RX; need tubes - 100TH, 812A, Taylor T-40 and 5647 wire-lead subminiature. Don Merz, 47 Hazel Dr., Pittsburgh, PA 15228. (412) 234-8819 (weekdays)

**FOR SALE:** Yeasu FT-101B, w/digital read-out - \$400; National spkr - \$50; Howard 430 - \$25; Howard 435-A - \$50; RME-69 - \$75. All units work. You pickup or ship. Art, W01WV, (719) 384-4990, day or night

**FOR SALE:** Early telegraph books! The New Wireless Pioneers have acquired the technical library of Teleglobe Canada consisting of many rare and out-of-print books on telegraphy and telephony dating back to 1850. Also included are various trade catalogs, 19th century telegrams, and misc. ephemera. For catalog #14 to be published this summer, please send \$2 (\$4 foreign) to: New Wireless Pioneers, POB 398, Elma, NY 14059. Phone/FAX (716) 681-3186

**FOR SALE:** DX-60B - \$65; VF-1 - \$30; T-60 - \$50; T-150A, including T-150 parts rig - \$80. John, W9CN, 420 Patrick Ave., Merritt Island, FL 32953. (407) 452-7904

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

**FOR SALE:** TS-175C/U and Gertsch FM-3 VHF freq. meters - \$30 each; Hallicrafters S-38B parts radio - \$15. Ken Johnson, N5US, POB 10063, Austin, TX 78766.

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

**FOR SALE:** Collins meatball lapel pin - \$5.95 + \$7.5 S & H. George Pugsley, W6ZZ, 1362 Via Rancho Prky, Escondido, CA 92029.

**FOR SALE:** National HRO 5, w/spkr, HB pwr sply and JA-JD coils and bandsread coils; Johnson Viking I, w/122 VFO; Johnson Thunderbolt amp, w/spare finals; Collins 75A-4 rcvr, w/spkr and filters; Gonset GSB-100 xmtg; Hallicrafters SX-24 rcvr. Danny, N5NBK, 1920 Mt. Pleasant Rd., Valley View, TX 76272. (817) 637-2657

**FOR SALE:** Service manuals. Most photocopies \$5, shpg \$50 each. Hallicrafters, Heath, Johnson, others. SASE for list. D5M Diversified (formerly Miller Radio), 909 Walnut St., Erie, PA 16502.

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**FOR SALE:** Hallicrafters HT-46 all band HF xmt, manual, spare driver & final, working order - \$100 plus shpg. (207) 963-7745

**WANTED:** Beginning collector needs anything Vibroplex. Send me your bug and key list. Mitch, WA4OSR, 11 Midtown Park, E., Mobile, AL 36606. (205) 476-4100, 342-7259

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

**FOR SALE:** Collins RE S-Line, 7553-B, w/ 500 Hz, 32S-3, 312B-4, 516F-2, manuals, cables - \$2500; RE KWM-2, 312B-5, 516F-2, manuals - \$1500. Call Mike, (209) 435-3159

**WANTED:** 455 kHz crystal with 3/4" pin spacing as used in early rcvrs. R. Haworth, W2PUA, 112 Tilford Rd., Somerdale, NJ 08083. (609) 783-4175

**WANTED:** Tuners for LTV-G175J bands D and E. Robert Folwaczny, 1701 Westminster Pl., Oklahoma City, OK 73120. (405) 721-7478 after 6 PM CT

**FOR SALE or TRADE:** Hallicrafters S-120; EMC211 tube tester, small radar screen, meters. **WANTED:** BC-348/BC-224; ARN7; SCR-720; SX-28; tube computers; meters; any obsolete electrical gear in danger of going to the dump. Chris Cross, Box 94, McConnell, IL 61050.

**FOR TRADE:** Warsaw-pact army xcvr R-104. UM-3 amplifier. **WANTED:** WW II ex-service equipment. Suitcase sets. Swap? Why? Rag Otterstad, OZ8RO, Hosterkobvej 10. DK-3460 Birkerød. FAX 011-45-4468 1514

**WANTED:** WW II Japanese military radio equipment of any kind; early wireless related like spark xmt, loose-coupler rcvrs; tube type pocket/portable radios; factory made crystal sets; anything Titanic related. Takashi Doi: 1-21-4, Minamidai, Seyaku, Yokohama, Japan

**WANTED:** Military radios. U.S. RT-136/GRC-13, Soviet R (P)-112, R (P)-113. Leroy E. Sparks, W6SYC, 924 W. McFadden Ave., Santa Ana, CA 92707-1114. (714) 540-8123

**FOR SALE:** Military manuals - MIL. HDBK-161A (Army TM 11-487A-1) dated 12 Mar 1964, 235 page illustrated listing of military communications equipment, also AFM 100-14, dated 1 Mar 1971, a lengthy listing (168 pages) of communications and electronics equipment used by the Air Force. Bound reproductions of originals \$25 each plus \$2.90 postage in USA. James Owens, NW00, 1363 Tipperary St., Boulder, CO 80303. (303) 673-9019

**WANTED:** Collins 51S-1, KWM-2/A RE, 312B-5, pwr sply. Dennis Gehrke, 6128 Sterling Dr., Boise, ID 83703. (208) 853-8711

**WANTED:** Viking 122 VFO; xtal calibrator for NC-300; set of knobs for SX-101A & HT-32B. W7RBF, (602) 864-9987

**FOR SALE:** Hallicrafters HT-44, no pwr sply - \$95. Bob Kemp, 304 S. Washington, Lake City, MN 55041. (612) 345-5345

**WANTED:** Collins R-64B tech. manual. **FOR SALE:** Heath GD-125, Q-Multiplier w/book - \$12.50; QF-1, no book - \$7.50; R-390A 16 kHz filter - \$15. Wes, WV51, (903) 838-0568

**WANTED:** Lafayette HA-410, HA-460; Hammarlund HQ-170-VHF. Steve, K6PFW, 848 N. Silverwood, Upland, CA 91786. (909) 985-1062

**FOR SALE:** Four near-mint Collins-made TCS-12 radios. Xmt, rcvr, dynamotor sply and noise blanker have been opened but never installed. Cables, loading coil and control box are used, good - \$475 each. Also four TCS-12 AC supplies (PP-280/U), opened but unused, near-mint - \$180 each. More: Mint, unused PP-114/VRC-3 vibrator supply for the BC-1000 - \$120 each, NIB AVR-104 RCA aircraft radios - \$100 each; NIB ZB-3 homing kit accessory for WW II mil sets - \$75 each. Used, exc. RS-6 'spy' radio, complete - \$395. Call Don, (412) 234-8819 weekdays, EST.

**WANTED:** Gonset G-28-10M xcvr. Cliff Duggar, W0WA, 205 E. 164 Terrace, Belton, MO 64012. (816) 331-2295.

**FOR SALE or TRADE:** Military collectors! A 1942 Signal Corps 18x24 poster produced by the War Dept. showing soldier talking on a headset; Fisher stereo tube amp, 1960 vintage. Joe Perratto, 1341 SW Evergreen Ln., Palm City, FL 34990. (407) 220-7362



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**WANTED:** Globe King 500; Greenlee chassis punches; Shurite meter 950 model 0-10 mA; Adventurer panel meter; 75A-4 filters. Rob Brownstein, NS6V, (408) 464-0505

**FOR SALE:** HT-17 w/10-80M coils, mint; Swan 500C - \$225, 500 - \$175, 400 w/406 VFO - \$200. All with 117XC's. Drake MN-2000 - \$170.

**WANTED:** Swan 117AC and TCU for 240 and Swan DD-76. Dean, (714) 643-7930

**WANTED:** S-meter for Hallicrafters SX-101. Joseph Falcone, AA8HV, 3000 Town Center, Ste. 2370, Southfield, MI 48075. Toll free 800-436-7026, leave message

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**WANTED:** 6 inch spkr with field or voice coil or advice on how to hook up P.M. spkr in older radio designed for spkr with field or voice coil. Don, WB5UIA, 903 Madison, Minden, LA 71055.

**WANTED:** Gates manual/schematic for MO 2639 modulation monitor; Gates SA-39B or SA-38 limiter; large script emblem for early Gates xmtr. Tom Smith, N5AMA, 13034 Elmington Dr., Cypress, TX 77429-2062. (713) 376-3436 (h), 957-6420 (w)

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**WANTED:** Collins 310B-3, 70E8A, CMS-3 500 W & diagram Thordarson 21M75 mod xfmr.

**FOR SALE:** Collins 32V manuals, redone, nice, complete. Jerry, W8EGD, (303) 979-2323

**FOR SALE:** Central Electronics 100V, 600L; Drake 2A/2AQ; Gonset G50, GSB100; Hallicrafters HT-37, HT-40; Heath AT-1, AR-3, HW-16; Johnson Invader 2000. Steve, WB4IJJN, (803) 873-7847 x 200 (d), 821-6931 (n)

**WANTED:** Schematics/manuals for Heath TS-3, IG-42, Precision E200C, RCA WR-49B sig. gen.; Knight R55A rcvr; Ballantine 300H AC VTVM. Jack, WA4CSM, 8109 N.W. 58 Ct., Tamarac, FL 33321. (305) 721-2337

**FOR SALE:** Gonset GSB-201 amp - \$195; GPT-750D - \$1195 OBO; TS-175U - \$18; roller inductors w/counters; BC-375 - \$30; 3" dia., 27 uH - \$35. Coils: Bud OCL-40 NIB - \$6; Johnson flatwound 330GL-5 - \$25. Parts units: BC-348R - \$60; R-388 - \$55. SASE for tube list. U-ship. WA7HDL, Rt 1, Box 178-A6, Salmon, ID 83467. (208) 756-4147 after 1730 MDT

**WANTED:** Hallicrafters HT-5B, C, D or E speech amp. Trade HT-5G or pay cash. Also need Hallicrafters AT-2 or AT-3 antenna tuners. Also wanted Gonset Communicator IV (2 meters) whole or parts unit with good case and panel. Don Merz, 47 Hazel Dr., Pittsburgh, PA 15228. (412) 234-8819 weekdays

**FOR SALE:** Manuals - Drake 2NT - \$11, Collins 310B-5, Subraco MT15X, Jones Micromatch, E-Z Way RBS 40, Eico 720 - \$8; RME-6900, PMR-8, S20R, S40, Johnson 6N2 rec. conv., Globe Scout 65 - \$9; SB33 - \$6; Eico 730 - \$7; Hunter Bandit 1000A - \$10; Heath QF-1 - \$6; Dentron 160XV - \$4; Autek QF-1/QF-2 - \$5. Copies postpaid USA. Others page 49, June, page 50 July, ER. Richard Prester, 131 Ridge Rd., West Milford, NJ 07480. (201) 728-2454

**WANTED:** Ranger and SX-101 MK III knobs; Ranger I front panel in good condx. Tom Henderson, KD4EMG, (615) 791-1355

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

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

**FOR SALE:** CBS Columbia tube portable #5220, gray, CD markings, small hairline crack - \$23 ppd. R.J. Eastwick, N2AWC, 224 Chestnut St., Haddonfield, NJ 08033. (609) 429-2477

**WANTED:** Collins 75A-2, spkr, F455B08, F455C08, F455J05 mech. filters; McElroy or narrow base Vibroplex bug; DX-20 manual. Brian Roberts, K9VKY, 3068 Evergreen Rd., Pittsburgh, PA 15237. (412) 931-4646

**WANTED:** HRO-60 coils: E,F,G,H,J,AA,AC. Also want HRO-60-SC2 spkr/coil rack. Need large tank coils by B&W, Johnson. Especially need 160 HDVL and 40 HDVL. Need TVL and BVL coils and sockets, and parts and pieces for same. Still looking for one SX-88 tuning knob. Write: Barrie, KF7VA, 125 Ben Hogan Dr., Missoula, MT 59803. (406) 728-7637 (d), 549-1921 eves and Sunday

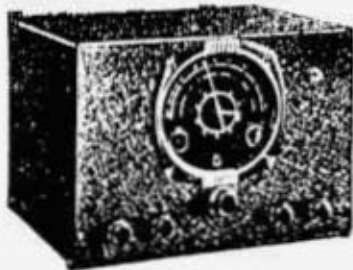
**FOR SALE:** Knight matching T-150 xmr and R-100 rcvr, exc. condx, completely serviced and aligned, 80-10M, w/general coverage rcvr - \$200 both; E.F. Johnson Ranger I, great for parts, all xmr's, tubes, mod. section missing, has VFO and meter, looks good, w/cabinet - \$55; Hammarlund SP-400, good for parts or restoration, w/cabinet - \$65. All prices plus shpg. S.E. Watkins, K4OWN, 13003 Fennimore Terrace, Midlothian, VA 23113. (804) 379-0521

**WANTED:** Hammarlund HQ-180AC. Top 5 for top condx radio. Gene Perroni, KA6NNR, POB 58003, Philadelphia, PA 19102. (215) 665-6182 (d)

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**FOR TRADE:** National HRO-60T for: AA and AB coils, bottom cover and calibrator of HRO-60 and AC, AD coils of HRO-50. **TRADE/SELL:** RAS (rough) - \$125; HRO-5 (incomplete) - \$150; NC2-40C & spkr (rough) - \$100; calibrator for NC-300 - \$30; HRO-50 E and F coils - \$75 each; Astatic AT-1 TV preamp (NIB) - \$50; Millen wavemeters in box - \$30; Hallicrafters floor bass reflex spkr - \$150; Eimac 4CX1000A guaranteed - \$100. All plus shpg. **WANTED:** Orig. National HRO-60 book, any HRO coil sets and coil boxes; Knight Space Spanner; Heath GR-78 RX; RCA 44BX mic. Dan Brown, (617) 964-3037 (eves)

**WANTED:** VG/mint Hammarlund S-100 matching spkr for HQ-110; Ocean Hopper coil set; current meter for IP-32 pwr sply; Collins book, Amateur Single Sideband; Collins No. 33 Amateur Radio Equipment catalog; HT-40 & SX-140 manuals, copies OK; relay for HA-1; Conar 500 rcvr manual or schematic; mint '57 Allied catalog; 9,000 MHz xtal for HA-5; E.F. Johnson Navigator wiring/assy instructions; VG/mint cabinet for RE KWM-2. David W. Ishmael, 1118 Paularino Ave., Costa Mesa, CA 92626. (714) 979-5858

**FOR SALE:** Surplus Schematics Handbook, 112 pages - \$17; timers, 30 sec., 120V - \$18; filament xfms - 6, 2-1/2, 24V, other sizes. Joe, W6CAS, (916) 731-8261

**WANTED:** Kleinschmidt equipment & literature (Kleinschmidt Electric Co., Morkrum Kleinschmidt, Kleinschmidt Laboratories Inc., Kleinschmidt Division of SCM Corp.) Trying to preserve some family history. Tom Kleinschmidt, 506 N. Maple St., Prospect Hts, IL 60070. (708) 255-8128

**FOR SALE:** Collins 75A-4 in VG condx, SN 3435 with 0.6 and 3.1 kc filters, clean, no scratches, with all knobs and manual - \$500; Drake C-Line, VG, clean condx, w/T4XC, R4C, AC4 & MS4, covers optional 160, 30, 17, 12 & 10M. R4C equipped with factory noise blanker and IF xtals for 8, 2.4, 1.5 and 0.5 kc selectivity, also includes (not installed) several Sherwood Engineering update kits, all manuals, update HR articles, etc. - \$550. U-ship. Ed Hammond, WN11, phone/FAX (207) 336-2858

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**WANTED:** Hallicrafters SX-17, only in VG condx. Jose Cangas, EA4JL, contact in the States is Kurt Keller, (203) 431-6850

**WANTED:** Clean SX-101 MK 2/3; cabinet for a GPR-90. Will trade, SX-100M2, 2B, NCX500, SB-310, DX-60B, Globe Scout/VFO and others. Bill, KE7KK, 6712 Lake Dr., Grand Forks, ND 58201. (701) 772-6531

**FOR SALE:** National FRR-37 manual - \$20; TU-10B for BC-375 - \$15; USM-159 freq. meter - \$60; Measurements 58 VHF rcvr - \$25.

**WANTED:** R-390 front panel; European PE 06/40P tubes; manual for HP 180A scope. Geoff Fors, WB6NVH, POB 342, Monterey, CA 93942. (408) 373-7636

**FOR SALE:** SX-71 - \$125; BC-312 modified - \$75; CCT-46076 - \$75; Swan 500C with PS, VOX, orig. box and manual - \$250; National Critereon tuner - \$45; Hammarlund HQ-140X - \$125; B&W 5100, w/515B, needs to be restored - \$150; Viking Adventurer - \$100; Gonset G-76 - \$125; Knight 80W PA w/807's - \$75; Jensen coax spkr in a cabinet - \$100; 65 low number TSM Sams - \$250, complete 27 volume TV Riders - \$250. Most have manuals, some pickup only, open to offers & some trades. Fred Watson, KB8WRF, 581 W. Summit St., McClure, OH 43534. (419) 748-8798

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**WANTED:** Hallicrafters HA-5 VFO person (Mr. Doppler?) who called and had the HA-5 VFO NIB. Please call. Joseph Falcone, 3000 Town Center, Ste. 2370, Southfield, MI 48075. 800-436-7026 leave message.

**FOR SALE:** Collins wattmeter/transmatch for URC-32 - \$150; Yaesu FLDX-400 xmtr - \$250; R-390A carrier meters, NIB - \$30. Clark, W0BT, 2546 S.E. Peck Rd., Topeka, KS 66605. (913) 235-2721

**FOR SALE:** Ranger I, mint; Hallicrafters SX-100, w/matching spkr, nice; Heath DX-100, nice; Galaxy 300 w/console pwr sply/spkr; 4-400 amp., AM/SSB; T-368 exciter w/6000 tube; Hallicrafters SX-24; pair of 4-400's final, no pwr sply, in Bud cabinet; much misc. Arnold, WD0HOP, (701) 652-3916

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**FOR SALE:** Viking Ranger, good shape - \$100 OBO; two ART-13 mod xfms - \$5 each; two caps 2400 mFd, 200 VDC - \$2 each; 4 caps 12,000 mFd, 60 VDC - \$2 each. U-ship. Mike Nichols, (303) 431-7298

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**FOR SALE/TRADE:** Transmitting/Receiving tubes, new and used. LSASE for list. I collect old and unique tubes of any type. **WANTED:** Taylor and Heintz-Kaufman types and large tubes from the old Eimac line; 152T through 2000T for display. John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455

**WANTED:** Collins SM-3 desk mic. State price and condx. Cory, N2AQ5, 1000 E. 14th St., M/S 178, Plano, TX 75074-6249

**FOR SALE:** R-109/GRC, 27-38 MHz, FM rcvr - \$25; TS-497 sig. gen., 2-400 MHz, as is - \$50; AT 892/PRC-25 ribbon antennas - \$5; M43PA mic - \$5. Mel Stoller, K2AOQ, 100 Stockton Ln., Rochester, NY 14625. (716) 671-0776

**WANTED:** Spinner knob and gear assembly for 75A-4; AM filter F-455J-60. Also looking for clean KWS-1. Don Gies, K4GIT, Box 2790, Melrose, FL 32666. (904) 475-3306

**FOR SALE:** HQ-170A, VHF, ex. ++ - \$165; SX-122A, Hallicrafters last classic vac. tube rcvr, gem mt - \$95; Bud wrinkle finish desk-top cabinet, 14x8x8, ex. ++ - \$12; orig. Roberts model 90 tape recorder, mint - \$30; Heath SB-600 spkr in cabinet, nr. mint - \$15; Hytron 2M RF xmtr from 1939, nr. mint - \$30. **WANTED:** Any info on where I can get a professional quality black wrinkle paint job - please be charitable and take a moment to call me with this information! E.W. Polk, MD, WA1YIW, (904) 893-3936

**FOR SALE:** Entire Hallicrafters collection nearing 50 pieces. All or none. Taking bids. Fred Clinger, WA8KJJ, 417 Beechwood Dr., Galion, OH 44833. (419) 468-6117 after 6 PM EST

**WANTED:** HT-33B amp, mint or near; SR-400A Cyclone III. Top price for top equip. Tom, WA4FJQ, (910) 887-0705

**WANTED:** Davco DR30 rcvr owners: Help repairing front end problem. Exchange info, find parts. Form users group? Mel Stoller, K2AOQ, 100 Stockton Ln., Rochester, NY 14625. (716) 671-0776

**FOR SALE:** TR4 w/NB, AC4, MS4, T4XC, R4B, AC4, MS4, extra xtals, exc. condx; D-104 & G stand; Kenwood MC-50 mic; Heath HD-15 phone patch; J-38 key; Nye Iambic paddle; 5 var. caps for 200-300W tuner; MFJ 948 ant. tuner; 28 uH roller inductor; MFJ 1702B and SW; SX-101 S-meter; Welz SWR and PEP pwr meter, 2KW. Gary Elliott, NO5H, 808 Clarice St., Delhi, LA 71232. (318) 878-8032

**WANTED:** Heath RX1 Mohawk and Hallicrafters SX-117 w/manuals. State condx. Reasonable prices please. Bob Smith, KC4WJO, 14779 Kogan Dr., Woodbridge, VA 22193-3314

**FOR SALE:** Collins identical rubber feet for S-Line, etc. Will not mushroom under torque. Cannot over tighten, each - \$1.50; 75S electrolytic filter caps, triple 40 mFd @ 250VDC, Mallory, will fit, few left, each - \$20; Collins front leg elevators for S-Line etc., each - \$7; 813 never used, orig. boxes, one pair left - \$25 each. Ed, W3WDF, 8245 Garden Oaks Dr., San Antonio, TX 78266-1710. (210) 651-9348

**WANTED:** Meter only for Johnson Navigator. Terry, AA6TN, (714) 546-9602

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**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, WIETC, Box 747, Amherst, NH 03031.

**FREE:** Send 2-stamp LSASE for Olde Tyme Radio's latest flyer, No. 194A to: Olde Tyme Radio Company, 2445 Lyttonville Rd., Ste. 317, Silver Spring, MD 20910.

**FOR SALE:** HRO-50R, w/cabinet & A thru D coils - \$375; Globe Scout 65A - \$75. **WANTED:** Mod xfmr UTC CVM-5 or equiv. Bill, N2WXX, (914) 356-6553.

**FOR SALE:** First user friendly circuit for early BC-348's. Send \$2 + (3) \$29 stamps. Ray Larson, 1224-1/2 Gorham Ave., W. Los Angeles, CA 90049-5214

**WANTED:** 2, 6, and 1-1/4 M converters for NC-303, with or without cabinet. One or all three. Ron Weaver, N6VO, (714) 559-6209, call anytime.

**WANTED:** If you're into vintage equipment and live the Ann Arbor, MI area, please call me. Kurt Miska, N8WGW, (313) 663-1642 (h) or (810) 641-0044 (o)

**FOR SALE:** Drake TC-6 6M xmtg converter. Exc. condx, w/manual - \$125. Joe, N5UX, 3700 Cliffwood Dr., Bedford, TX 76021. (817) 281-1128

**FOR SALE:** ATD xmtg related items - remote control accessories w/dynamotor - \$175, CRR 47206 antenna tuning unit - \$100, canvas radio cover - \$40; RME VHF 152 converter - \$60. **WANTED:** BC-924 FM xmtg; BC-603 FM rcvr; repairable RAX dynamotor. Steve Davis, KD2NX, 705 13th Ave., Belmar, NJ 07719. (908) 280-9760

**WANTED:** Drake R4C rcvr; (Hickok, etc.) mutual conductance tube tester; Kenwood T-599 xmtg; Radio Shack DX-400; Uniden CR 2021; RCA model CRM R6A; Heath SB-610 monitor scope. Rick, K8MLV/O, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

**FOR SALE:** DX-20, needs xfmr - \$40; (2) GE 810's - \$60 each; parting Viking I. **WANTED:** Info on correct adjustment of R-611 in CE 200V; need any info, manuals, etc for Palco Mobile xmtg. Joe, K7MKS, (206) 747-5349

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**WANTED:** SW-3 in working order, w/manual & schematic, in reasonable condx. Lee Phillips, K7NSB, 851 N. Garsden Ave., Covina, CA 91724. (818) 339-2464

**FOR SALE:** RCA type 810 tubes, tested - \$45 each or \$55 each for matched pairs. Gary Halverson, WA9MZU, 1751 Michon Dr., San Jose, CA 95124. (408) 266-2218

**FOR SALE:** TR-4C, looks VF, not working, fixable - \$75; RV-4C, VF - \$100; AC-4 - \$90; VL2100B, VF - \$425; SB200, VF - \$375. WA7IHN, (503) 749-1149 6PM PST

**FOR SALE:** SX-115 rcvr - \$350; Johnson Ranger - \$95; Johnson Thunderbolt - \$575; Drake C-4 console - \$350; Collins KWS-1 - \$1500. Ron, (404) 664-6931

**FOR SALE:** NOS tubes. SASE for list. **WANTED:** 7027A, 8874 tubes; F500B60 filter; and manual for PRC-36 and RT-1113A/PRC-68A. Joseph Pinner, KC5IJD, 201 Ruthwood Dr., Lafayette, LA 70503. (318) 981-7766



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

**FOR SALE:** Collins 75A-4, SN 5100+, w/500 Hz, 2.1 kHz & 3.1 kHz filters. Orig. spkr, manual, inexc. condx - \$750; National NC-240D w/orig. spkr, exc. condx - \$300; Heath SB-101, w/SB-600 spkr/pwr sply - \$185; BC-348R, unmodified - \$95; E.F. Johnson 250W Matchbox - \$95. Jeff Garret, KE0MT, (303) 455-5658

**FOR SALE:** FB-7 coil sets, 3.5-4, B, C, D in boxes - \$30 each, \$110 all ppd; Collins 180V-1 ant. coupler - \$50 ppd. Brown, (805) 943-2027

**FOR SALE:** Transmitters - Hallicrafters HT-37 - \$195; Heath DX-20 - \$30; DX-60 - \$75; HG-10 VFO - \$35; Lettine 242 6M - BO; ARC-5 units (new), BC-457A, T-19, T-21 - \$40 each, BC-645A xcrrs, NIB (3 total) - \$35 each. Rcvrs - Hallicrafters S-53A - \$35; Heath HR-10B - \$45; RME VHF-152A converter - \$70; Heath AR-3 - \$40; ARC-5, R-27 - \$35; R-27 NIB, w/dynamometer - \$50. Parts units - Heath AT-1 (no cabinet), Lettine 240 (no cabinet). These are complete except for the cabinets. I will consider selling them complete, or parting them out. All units are plus shpg. Kim Herron, KE8NE, 18141 24th Ave., Coopersville, MI 49404. (616) 677-3706. I will be on vac. between 8/13 and 8/19.

**WANTED:** E.F. Johnson KW Matchbox. Jeff Garrett, KE0MT, (303) 455-5658

**FOR SALE:** HRO-5TA1, good condx - \$200. Carter Elliott, WD4AYS, 1460 Pinedale Rd., Charlestown, VA 22901. (804) 979-7383

**WANTED:** 75A-2 parts - 1st IF can, main VFO tuning knob & S-meter. Richard Decker, WA2TUM, 135 Richards Ave., Piscataway, NJ 08854. (908) 968-1452

**FOR SALE:** R-390A, Amelco, no covers, all functions operational, all mech. filters, ready to restore - \$250. Randy, WA7CPA, hm: (602) 266-2256, FAX 263-0095

**WANTED:** Complete case for TV2 tube tester; manuals for URM-390, SG 3U, Boonton 225A sig. generators; Bird meter movement, 20W scale or other OK. Mel Stoller, K2AOQ, 100 Stockton Ln., Rochester, NY 14625. (716) 671-0776

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**FOR SALE:** Hallicrafters 1939 SX-24, good condx, w/manual - \$90; Horace Martin Vibroplex, pat. date 1912 - offers; Bunnell brass telegraph sounder - offers; Heath DX-60B, w/manual - \$50; Heath HG10 VFO - \$35; Heath HP-23A pwr sply - \$25; set of solid state tubesters for 7551, w/information - \$75; ceramic sockets 813, 4-400, 304TL - \$10 each; rotary inductor, 1KW, 22 micro Hy., solid silver wire - \$30; rotary inductor, 3 KW edge wound copper - \$30; rotary inductors, various sizes, ceramic - \$15-\$20; vacuum caps, various sizes, variable and fixed - \$10-\$50; turns counting dials (Groth) - \$15; 4-1000A, 7.5V filament xfmr - \$20; new and used Eimac 4-1000A's - offers; 872A's new and used - offers; desk rack cabinet, 10.5" panel, 13" deep, black wrinkle - \$40. Clean good condx. Roger Faulstick, KD4AS, 210 Mariah Ct., Merritt Island, FL 32953. (407) 453-3312, FAX 453-2258

**FOR SALE:** BC-610E, w/614 speech amp, extra 250TH and 100TH - \$250, PU only; National SW-3, w/7 coils - \$250 plus UPS. Jack Dubbs, 44 Monk St., Security, CO 80911. (719) 392-2043, eves only

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**WANTED:** Knight T-60 and T-150 xmtrs, any condx, dead or alive. If you have any, please write. Thank you. Dave Mantor, W9OCM, 2308 Fairlawn Way, Anderson, IN 46011.

**FOR SALE:** Collins R-391 rcvr, front panel looks new - \$325; R-390A (EAC) needs a little work - \$150; Hammarlund HQ-180A, w/ manual, no clock, very nice - \$190; HQ-170, w/ manual, xltnt - \$165; SP-600JX-17, needs some mech. work, front panel clean - \$140. Military - Grid dip meter, type AN/PRM-10, NIB - \$175; LM21 freq. meter - \$20, (both items, see ER in Uniform, previous issue); rcvr, R100/URR, 54-19 Mcs, w/internal pwr sply & spkr - \$35; dynamotor assy. #COL-21881-A, input 12VDC @ 17A, DC output, 12VDC @ 3A/220 @ .1A/400V @ .16A, w/several cables - \$10. Misc - Altec 1567A tube mixer, panel looks new - \$165; Heath HW16 CW, xtal contr. xcvr, needs a little work, complete, clean - \$50; Lafayette HA 460 6M tube type xcvr w/auto mount & manual, needs some work, clean - \$25; Allied/Knight C-22 tube type CB xcvr w/mic & manual - \$15; Tektronix #360.3" CRT mini indicator - \$50; 19" rack mount audio patchbays. Tube testers - Hickock #539B, needs some work - \$20; Eico #625, broke meter glass. Offers on all items accepted, + shpg, Franklin Albanese, 1610 Prince St., #6, Berkeley, CA 94703. (510) 845-2625

**FOR SALE:** Repair of TV-7 tube testers w/ calibration: I will fix and then verify calibration of your TV-7 tube tester for \$45 plus all shpg or return it no charge. Please no units with bad meter movements, book clips or case handles. Unit must be repairable and not a basket case. Daniel Nelson, 1025 E. Desert Lane, Phoenix, AZ 85040. (602) 243-7421

**WANTED:** National LF 10 tuner for cash or swap for Collins R-388 J3 rack mount w/orig covers. Call after 6 PM. (609) 393-4122

**FOR SALE or TRADE:** KWT-6/URC 32; Viking Ranger; SX-100. Mike McDermott, 305 N. Keith St., Scammon, KS 66773. (316) 479-2756

**WANTED:** Hallicrafters items - SX-28 parts (S-meter, steering wheel style tuning knobs, ANL and AVC knobs, spkr posts, etc.); older spkrs (R-8, R-12, etc.); AC pwr sply PS-150-120 for SR-160; FPM-300 parts rig. Orig manuals for Heath Mohawk (RX-1), National NC-101X, National NC-88, military R-100/URR, Hallicrafters SX-24, Hammarlund HQ-140X, Silvertone Precision model 5750 (also need R-meter face for this rcvr). Lee Shumway, WB8ZEY, 2820 Yankee Springs Rd., Middleville, MI 49333. (616) 795-3255

**Message:** Read the positive review of "The Signal Corps" in the Antique Radio section, August 1994 issue of Popular Electronics. Sam Hevener, W8KBF, "The Signal Corps" 3583 Everett Rd., Richfield, OH 44286-9723. (216) 659-3244

**WANTED:** Modulation reactor, approx. 40Hy, 40 mA. Dewey Angerhofer, W0ZUS, POB 540, Edgemont, SD 57735. (605) 662-7692

**FOR SALE:** Thousands of tested tubes w/ warranty! Both xmit and Rec tubes. 15% off current prices for all orders over \$25 during June and July '94 if you ask. Buy those spare tubes for your tube radio, audio, ham and electronics at about 25% of new. I have bunches of octal, older, 7 and 9-pin tubes. All tested and boxed. I give a 30 day warranty. Send wants or SASE with two stamps for list. Daniel Nelson, 1025 E. Desert Lane, Phoenix, AZ 85040. (602) 243-7421

**WANTED:** Heath HR-10B novice rcvr. Good operating condx only. Ros, WB0GKL, 355 Animosa Dr., Durango, CO 81301. (303) 259-0785

**WANTED:** Copy of schematic diagram for Knight Span Master rcvr. Copy of manual also appreciated. John Zitzelberger, WB6JJE, 5257 Lewis Rd., Agoura, CA (818) 991-8358

**FOR SALE:** Drake L7 amp; TR7 service manual; R4C CW filters; Collins 75A-3; 516F2. Paul, W5NTQ, (713) 776-0440

**FOR SALE:** T-368E - \$750, you pick up. **WANTED:** Manual for Navy RCA TDQ, 2M AM xmtr. Ken Lakin, KD6B, 701 SE Salmon Ave., Redmond, OR 97756. (503) 923-1013

**WANTED:** Manual (copy OK) for Hunter 20A Cyclomaster exciter (1948 vintage). John Kelly, N3GVF, 17510 Sir Galahad Way, Ashton, MD 20861. (301) 774-8186

**FOR SALE:** RME 45, nice shape - \$89, w/ Sam's service lit. Shpg xtra. Henry Mohr, 1005 W. Wyoming St., Allentown, PA 18103.

**WANTED:** Clean, working 51J1 or R-388 rcvr. K4NJS, (803) 585-2810

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

**FOR SALE:** Gorseet phone patch, model GPP-1 - \$35; Heath digital clock, model GC-1092D - \$25. Russ Mason, POB 4045, Lancaster, CA 93534. (213) 730-4216 (n) or (805) 940-3382 (d)

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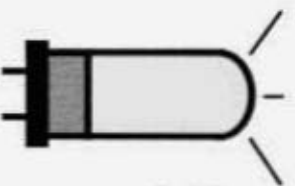
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