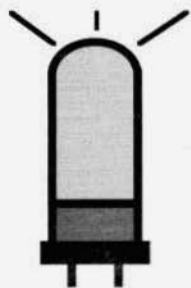


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ELECTRIC RADIO

celebrating a bygone era

Number 68

December 1994

IT'S THAT TIME
OF YEAR
AGAIN!



SEASON'S
GREETINGS

BEASLY
K6BJH

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

The AMI Thanksgiving Jamboree was a huge success. I hope that the ER Sixth Annual 160-Meter Jamboree/Contest coming up on December 26 will be also be successful. I've decided to give prizes for the first time. For First Place there will be an ER hat, an ER T-shirt and a nice frameable award certificate; for Second an ER hat and a certificate; and for Third just a certificate. The rules are the same as other years except that this year we will be giving an extra point for stations worked that have an AMI number. Please send in your logs as soon as possible with all the usual information; time, callsign, signal report, transmitter, receiver, antenna etc. Each station worked counts as one point plus an extra point if the station has an AMI number. The contest will start at 12:01 AM PST on December 26th and end at 11:59 on that same day.

One of the things I noticed while participating in the AMI Thanksgiving Jamboree was that there were a lot of AM'ers who did not have an AMI number. I'd like to urge everyone who has not joined to please do so. Send \$2 to AMI, Box 1500, Merrimack, NH 03054-1500. It's important that we have a strong organization to assure that AM continues to thrive as a mode of operation on the hambands.

For some time I've been considering providing certificates for Worked All States on AM. I'd like to have your input on this idea. For starters I have Rob Brownstein, NS6V working on the certificate design. Rob operates a graphic design firm out in California and I'm sure that the certificate is going to be first class. I'm thinking that the certificate would be given to those who have worked 20 states; with endorsement stickers to follow for each additional 10 states up to 52. QSL cards would have to be provided as evidence of working the state. Is this a good idea? Am I going about it in the right way? Please give me your input.

Shirley and I send our best wishes for the holiday season. We wish everyone a very Merry Christmas and a Happy New Year.

TABLE OF CONTENTS

2	AMI Update	KW11
4	The Quest for the Perfect KWM-2	AA8ID
10	The Econodyne Four Tube Superhet	W2HBE
15	One Christmas Far Away	N6DM
16	Photos	
18	Restoring LSB for the Collins PRC-47	WBØVNE
19	Vintage Nets/Contest Information	
20	The Hallicrafters HT-20	W8KGI
24	The Hallicrafters SX-122	WA6VVL
26	Box-o-Rox	KØAS
29	1995 Classic Radio Exchange	K8SJ
30	Summer of '52: A Novice Does Field Day	W4UJT
38	Classifieds	

Cover: Another fine Christmas cover by artist/cartoonist Bob Beasley, K6BJH.

AMI Update

Dale Gagnon, KW11, President
9 Dean Ave.
Bow, NH 03304

Thanksgiving AM Jamboree, Preliminary Report

It was gratifying, after experiencing awful propagation on both 160 meters and 15 meters for the duration of the Jamboree, to receive reports from a number of stations reporting low QSO counts, but high enjoyment levels. Within one week of the Jamboree I received reports from KDØHG (see Bill's report that follows); N2KSZ (Dave), WØDOZ (Ansel), N2SHG (Al), WA6IPD (Art), WA3YXN (Dennis), KFØVF (Doug) and KG9D (Norm). KG9D and N2SHG had over 30 contacts, WA3YXN and N2KSZ had over 20. Only WA6IPD reported any 15 meter contacts (4). Most of the logs had very interesting transmitter and receiver information received from their contacts. WA3YXN sorted his data and reported the R390A as the most frequently used receiver and the BC-610 the most frequently used transmitter. All Jamboree reports this year will be awarded a special certificate to recognize radio achievement under extenuating circumstances!

KØOJ Expands Colorado Morning Net on Thanksgiving

OJ sent a letter to AMI Headquarters to report 31 checkins to a Thanksgiving AM net. He started promoting this special session of the Colorado Morning Net early in October. He passed the word in MARS channels, on packet networks and to his two meter friends. Sure enough his homework paid off. Before 7:00 AM the net opened up. It lasted until 3:00 PM with a Thanksgiving dinner break in between. OJ logged the transmitters in use. Most of the checkins used vintage gear, but quite a

few used their modern radio's AM capabilities to join the fun. OJ is planning a similar event for next year. See his report that follows.

AM Swap Net in Northeast Moves to 160 Meters for Winter Season

Mark Ryan, Net Manager for the AM Swap Set has moved the Thursday, 7:30 PM (Eastern) net to 1.885 +/- MHz as of the beginning of December. For most of the year the net is found on 3.885 MHz. This net is the most successful AM net in the Northeast with dozens of weekly checkins and multiple net control operators. Lengthening propagation paths on 75 meters by net time made a regional net impractical.

17 Meter Christmas Eve Propagation Test

KW11 will be conducting propagation tests (and exchanging Holiday Greetings) from 2:00-4:00 PM Eastern Standard Time on 18.150 +/- MHz on AM on December 24. If not in QSO I will be calling CQ AM near this frequency every 15 minutes starting at 2:00 PM. I will be using a T368. ER

The Colorado Morning Net on Thanksgiving Day, A Report by 'OJ', KØOJ.

On Thanksgiving I woke up at about 6:45 AM to the aroma of baking turkey. The first thing I did was turn on my 75A-2 and Viking II to get ready for the big event. When I came back at 6:55 activity had already begun. I started seeing who was there and noting the calls and transmitters. The guys who were there first were mostly newcomers on AM with their solid state transceivers. The regular AM'ers on vintage equipment showed up later. As the day progressed I was just amazed at the turnout. The Thanksgiving special session was a huge success. There were 31 calls logged when it ended at 3 PM.

Following is the list of hams who came on board and what they were running. Ed, NØAUB, FT-101; Jim,

NØBLU, TS-680S; Phil, WBØLRO, IC-725; Mike, WAØZOV, Viking II; Wayne, WA2KEC, FT-1000D/ Henry, 2K Ultra; Hank, WØAEE, Viking I; Bill, KDØHG, ART-13; Art, WØIWW, Valiant II; Barry, N6CSW/Ø GPT-750; Chuck, NØCKW, TS-940S; Hunter, WB9NJB, Apache; Neil, KEØXL, FT-757GX; Rick, K8MLV/Ø, DX-100; Scott, KGØMR, R4A/T4X; (?), WØAGU, Sonar SRT-120; Don, KØPVI, DX-40; Jim, WD5BKO, FT-757GX; John, KFØOU, TS-850S; Bob, NØNFI, Ranger; Fred, KFØOW, Globe King 400; Bruce, KBØTJ, IC-751A; George, WØLOB, 32V-2; Loren, KGØHM, TS-950S; John, KØGH, TS-140S; Ed, NRØP, TS-850S; Duke, NØHNR, TR4; George, K7DU, Viking I; Jim, N7SPH/John, K17XZ, FT-840; Kevin, NØBQV, 32V, and of course OJ, KØOJ, Viking II.

Rocky Mountain Region AMI Jamboree Report by Bill Kleronomos, KDØHG

Conditions for the weekend 10/160 meter AMI event looked like they'd be excellent. Judging by AM broadcast band conditions on the evenings of the 24th and 25th 160 meter propagation held some real promise. Even low power AM stations in the southwest were putting great signals here into Boulder County. Then, of course, Murphy struck. We were hit by a solar storm Saturday that creamed propagation from afternoon into evening. 10 meters was mostly dead in all directions. At sundown, the usual 50 KW AM broadcast stations audible here in Colorado from the midwest were totally gone, replaced by a number of weak Mexican and Latin Americans. Fortunately, conditions slowly got better as the evening progressed and actually weren't too bad after midnight.

During the early evening hours of Saturday some of the better signals here were from N6CSW/Ø in Durango and NØBD, Apache Jct., AZ. Thanks to a

new high elevation QTH and a big antenna, Barry's Viking II was notably strong. In spite of weak signals and QSB there were dozens of 160 meter AM stations on in the early evening and a number of interesting rigs made their appearance on the band. Chip, NWØO had a 10 watt output TCS-12 up and running. Mike AI8Z/Ø was on with a ART-13 and BC-348, and Gary, WA7WOQ put Flagstaff on the map with his Bauer broadcast transmitter handicapped with a 32' vertical. As the evening progressed, not only did band conditions slowly improve, but the AM Big Guns began to show up on the band - K7YIR in Bothell with a Collins 440 transmitter, KØAS in Deadwood with a Raytheon RA-1000 and its pair of 833As, K7YOO from Winona and his 30K-1, and yours truly throwing caution (and neighborhood relations) to the wind lighting up the 304TL class C final.

As conditions improved a number of stations 'out east' were worked here in Colorado often with surprisingly good signals. Included in the "Long Haul List" with 'stinky band conditions' were WB8JBT, Monroe, Mich. and his BC-610, W8VYZ in Ashtabula, Ohio and WA3YXN, Dennis in Maryland running a T-195. And WB9GKZ, Green Bay, Wisc. with a pair of 4-440s.

I'd like to thank all those who participated during the weekend bash - there was a surprising number of AM stalwarts who showed up in the area. I'd also like to thank the Collins Radio Company, designers of my R-390A which once again proved its merit in digging out those weak ones from the muck of the bands and the occasional QRM; Eimac and RCA, whose tube products once again proved the phrase, "Takes a Licking and Keeps on Ticking" in hamshacks all over the country.

See you all December 26 on 160 for the ER 160 Contest/Jamboree. ER

The Quest for the Perfect KWM-2

by David M. Tumey, AA8ID
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This is the story of one man's quest for the perfect KWM-2. It's really a story about how anyone with a modicum of electronics knowledge can professionally restore one of America's dearest treasures - a Collins radio. It is my objective here to describe my restoration projects in enough detail and provide enough resource information to enable anyone with an IQ of 59 or above to do exactly what I did - restore a KWM-2A and 30L-1 - to original factory condition. I want to emphasize that it is not the intention of this article to transform Dennis Brothers (and other experts) into the Maytag repair man! Dennis, arguably one of the world's experts in Collins repair, has provided countless hours of assistance which helped enable me to do what I did. In addition, Dennis acted as a sort of "safety net" for me because I knew if I got into real trouble, my radio was just one UPS ride away from the emergency room staffed 24 hours a day by the eminent Dr. Brothers. What I will try to accomplish here is to provide you the reader with all of the background resource information that I have acquired since I was officially diagnosed with the Collins flu (an incurable disease causing one to obsess about and drool at the sight of any Collins gear) back in April of 1992. At the end of this story, you will find a list of the key players and their phone numbers and hopefully this piece will make a difference in your own repair or restoration project.

To begin, please indulge me as I quickly give you some background on myself as a starting point and to illustrate that anyone with some electronics knowledge can do what I did. I had zero

knowledge about Collins equipment when I started these projects. I graduated from the University of Massachusetts, Amherst, in 1985 with a B.S. degree in Electrical Engineering. I was then commissioned as a Second Lieutenant in the USAF and was stationed at Wright Patterson Air Force Base in Dayton, Ohio. Over the next seven years, I became the Principal Scientist for the Brain Actuated Control Laboratory at Armstrong Aeromedical Labs and developed the world's first flight simulator that was controlled by brain waves. (If you would like to learn more about this work, obtain a copy of the May 1994 issue of *Discover* magazine, page 58.) After eight years in the military and with prospects looking bad for a continuing career, I separated as a Captain in 1992. From February 1992 on, I have been the Senior Scientist for Lifeline Biotechnologies, a Dayton based medical research firm. I have a good foundation in gaseous state electronics, provided graciously by my father (W1V5X), coupled with a solid education in solid state from UMASS, plus I am handy with a soldering iron.

How I Caught The Collins Flu

Since I was 11 years old, my dad has been prodding, poking, cajoling and coercing me to obtain an Amateur Radio license. Finally, after years of unabated provocation, I gave in and began studying for what was hoped to be a General class ticket, which is the equivalent license class of my father. After studying the material for several weeks, I quickly became interested in the higher class licenses. I purchased a copy of "Morse Tutor", a software based code training aid, which turned out to



The author doing an alignment on his KWM-2.

be the best investment I ever made and in early April, 1992 I passed my Novice, Tech, General and Advanced theory exams and the Novice code. By the end of this same month after 3 to 4 hours per day of code practice, I was solid at 25 wpm and I took the Extra theory and code exams at the 1992 Dayton HamVention. Having passed the tests, and now finding myself an Extra Class Amateur, I decided it was time to learn something about Amateur Radio. I toured the flea market area at the HamVention and was introduced for the first time to the Collins line of equipment. I was struck by the elegant lines and beauty of the S-Line and KWM-2 and decided for many reasons to make Collins the choice component of my future station. I didn't realize at the time, but I had caught the Collins flu. (I have never let my dad live down the fact that I am now an 'Extra' and he is just a 'General'. I send him the advanced license study guide every Father's Day.)

To Restore Or Not To Restore, That Is The Question

Like most people I have met who are involved with Collins equipment, it is important to me to own gear that is in top flight condition. Therefore when I acquired my late Round Emblem (RE) 30L-1 S/N 40129 from the 1993 HamVention, and my RE KWM-2A S/N 24413 from the "Ham Trader Yellow Sheets" in April of '94, I had to grapple with questions of what to do to get this equipment into new original condition. By this time, I was aware of the Collins net that meets on Sunday at 14.263 MHz and I began to listen in and occasionally ask questions about people who could do a "frame off" restoration of my equipment. The linear was in fair condition, having spent the better part of its life in military service and having received a less than professional paint job from Uncle Sam. The KWM was in good shape, perhaps a 7 maybe 7.5 which, although advertised as "Perfect... Collector Quality", failed to operate on two bands and had other quirky problems that needed attention. My first thought was to turn the entire project over to the experts like Brothers et al. However, after much thought I believed that I had the capability to restore this equipment as well as the esteemed Dr. Brothers, and who, I asked myself, would be as fussy as me when it came to the minute details of the work?

The Tire Meets The Road

At the end of April, 1994, I decided it was time to get down and dirty. The first thing that I did turned out by sheer luck to be the smartest thing. I purchased from Mr. Floyd Soo of HI-RES Communications the video repair guides for the KWM-2 and the 30L-1. Little did I know how important these videos would be in aiding and instructing me through the duration of the project. I received three video tapes, two for the KWM-2 and one for the 30L-1. I sat down one Saturday afternoon

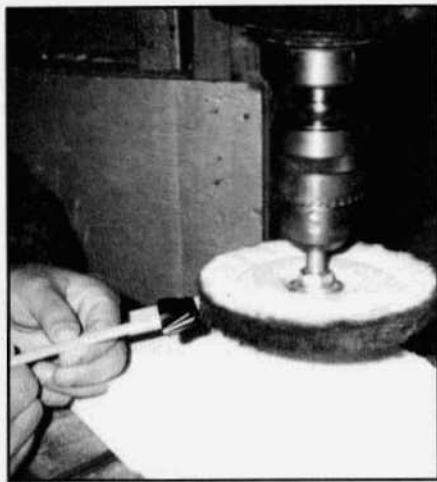
and watched the KWM-2 videos from beginning to end twice. I emphasize twice because there is just too much information for anyone to absorb the first time through. I used the first viewing as a sort of introduction then took copious notes during the second viewing, marking things down like which sections show the alignment for T1, T2, L4 or Z5, and which sections talk about the adjustments for neutralization, carrier and mixer balance. Since the video is clearly divided into carefully timed segments, it is easy to identify where in each video the important issues are discussed, then fast-forward to them later when you need immediate information. The first part of the video describes the different tools that you must have in order to complete an alignment. I would recommend, as did Floyd, that the first place to start with a KWM-2 is the alignment. I found every problem with the radio jumping out at me as the alignment progressed, which makes perfect sense. For example if there is a problem with a trimmer cap in the 20 meter band, you will find it when you go to peak the grid drive during the RF alignment procedure! I was able to locate most of the necessary tools locally, however, the most essential tool I found was the RF voltmeter. I was unable to locate an HP-410B as used in the video, however I did find and purchase an HP-410C, which is the solid state version of the 410B. I bought this meter from Tucker Electronics for \$199, which included a complete calibration and a free AC probe. I found this meter to be extremely accurate with some test measurements I made. The second most important tool was a fiberglass tuning rod necessary for the adjustment of all of the ceramic capacitors. You should never, never use a metallic tool for this application. It is important to note that if the ceramic capacitors have not been adjusted in many years, they might be frozen in place. I recommend that you work the

tuning tool back and forth gently until the rotor breaks free, otherwise the stator might come unglued and you will have to disassemble the entire capacitor to repair it.

After removing the radios from their cabinets, I carefully assessed the esthetics of each cabinet. For the 30L-1 it was a no-brainer, this item was carefully packaged in a double box and promptly shipped to Butch Schartau, KØBS, for some TLC. Incidentally, 99% of the people I spoke with about cabinet refinishing recommended Mr. Schartau, and having seen his work on a friend's radio, I must say that I agree. He probably is the best man for the job when it comes to collector grade equipment. The KWM-2A, however, was original finish and was nearly perfect except for some small scratches in the top lid. Since the scratches were hidden among the perforations, I purchased touch-up paint from Nebraska Surplus, who stocks an excellent assortment of matching paint for the style-ring, faceplate and cabinet. I was able to touch up the lid with a small artist's brush and now the scratches are visible only from certain extreme viewing angles. The faceplate was in very good condition, save someone's attempt to tighten the MIC jack nut with a pair of K-Mart pliers. I was able to touch up this scratch also and make it nearly unnoticeable.

The first thing I did with the radio itself was to check for obvious electrical or mechanical problems. I located some bad solder joints and poor repairs that were initiated by whoever had the unit before me. Next, using a high quality Hickok tube checker, I verified that all of the tubes met electrical specifications. Two or three of the tubes required replacement, however they might have been OK if I wasn't so picky. Once everything looked OK, I started the step-by-step alignment procedure.

The first problem jumped out at me during the IF alignment. I was not able



Using a stitched cotton buffing wheel and some fine buffing compound (Dico #TC6 Tripoli) the author buffs the finish of the knobs to a brilliant shine. You will probably need to insert a wooden dowel in the shaft hole of the knob to avoid buffing your fingers to a brilliant shine also.

to repeat the procedure detailed by Dr. Brothers on the video and obtain the same results. A careful inspection of the associated circuitry revealed that some "technician" had jumped C25 with a 180 pF disk capacitor. C25's highest value in the later radios is 6 pF.

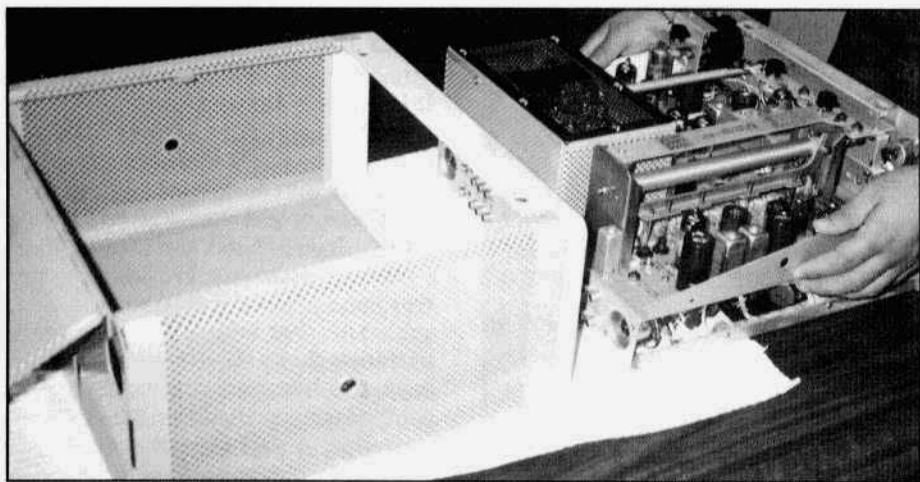
The big capacitor was overwhelming the secondary of T2 and L4 might just as well not have been there. Dennis confirmed later that he has also seen this "non factory modification" in some units where the capacitor's value is increased in an attempt to get more grid drive. I would recommend that you never do this, or perform any other modification unless it is Factory Authorized. Incidentally, all of the important modifications for the radio are covered in the KWM-2 videos!

Other problems reared their ugly heads during the RF alignment. The biggest culprit, as mentioned earlier, was bad capacitors. Two of the bands

had capacitors that needed repair. The video describes how to fix the capacitors but I wish to elaborate a little here. It is really quite simple to repair these little buggers. First, using a pair of needle-nose pliers, slide the clip off the bottom of the capacitor. This action will free the rotor and allow you to pull it up off the chassis. Next, remove the stator (which is normally broken free anyway) and clean the stator contact and rubber washer with a Q-tip soaked in trichloroethane. If either the stator or washer is damaged, you can obtain new components by disassembling a spare capacitor. I found many spares at a surplus electronics house locally that I keep for this occasion. When the capacitor is ready to be reassembled, mark the center of the stator-plate on the back side of the stator with a pencil. Put two or three drops of CA glue on the top of the washer and drop the stator in place using the pencil mark for alignment. Wait a few seconds and then push the rotor through and clip it into place. Wait an hour or two before trying to adjust the cap to give the glue adequate time to set up.

Relays, salvation is thy name. If you remember nothing else from reading this piece please remember this: **CLEAN YOUR RELAYS!!!** The single most important step in making my radio right was the delicate and painstaking cleaning of my relays. By doing this, I cleared up 3 or 4 problems with the radio. I cannot emphasize enough how important it is to follow the procedures outlined in the HI-RES video for relay maintenance!

I completed the alignment, balanced my carrier and mixer, and neutralized the radio without further incident. The radio was then tested into a dummy load then on-the-air and everything worked fine - except - it sounded funny in LSB. The radio had a strange sort of ringing to it when operated in LSB, also the tone of the background static was



The fully restored KWM2 going back into its cabinet.

different from USB. I fiddled around with it for a while and finally contacted Floyd Soo, who recommended I test the BFO crystals, which I did and found to be correct. I then contacted Dennis, who told me to detune C54 slightly to see if the condition changed and it did. Come to find out, the mechanical filter had a very steep skirt on one side and it was causing this strange effect on LSB. I purchased a used filter from Ron Follmar, K5GIT, and was able to correct the difficulties I was having with the LSB reception. Lastly, I had to replace the 100 kHz calibrator crystal because mine drifted a bit and was microphonic.

I acquired a new replacement from JAN Crystal and it only took two and a half weeks to get it from the time I ordered it. In late June 1994, I officially pronounced the radio completely fit for on-air service.

After re-installing the radio in its cabinet, I noticed one last cosmetic problem that was begging for attention. Some of my knobs looked like doggy duty. The inserts for Exciter Tuning, Plate Tuning and the Main Tuning knob were scratched. Also, the RF Gain, Emission, AF Gain and Power knobs were showing wear. The knobs had been factory coated and the finish was starting to

Key Players

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Ron Follmar, K5GIT
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Kerrville, TX 78028. (210) 896-8830

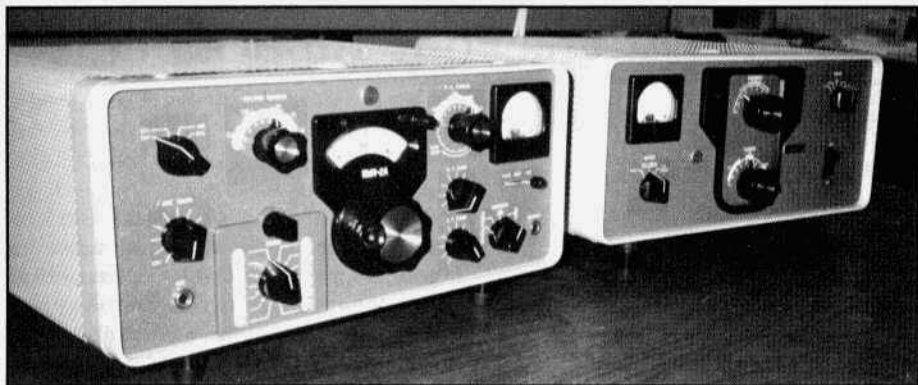
Charles Talbott, K3ICH
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Leesburg, VA 22075. (703) 822-5643

Butch Schartau, KØBS
5361 St. Mary Dr.
Rochester, MN 55901. (507) 288-0044

Tucker Electronics
POB 551419
Dallas, TX 75355-1419

Surplus Sales of Nebraska
1502 Jones St.
Omaha, NE 68102. (402) 346-4750

JAN Crystals
2341 Crystal Dr.
Ft. Myers, FL 33907. 1-800-JAN-XTAL



Collins KWM2 and 30L-1 fully restored both electrically and cosmetically to original factory specifications.

fail. I contacted Charles Talbott, K3ICH, who provided volumes of expert advice concerning my knobs. First, Mr. Talbott offers replacement inserts that look incredibly fabulous when installed in the old knobs. He has three sizes of inserts including the one with the cut-out for the Main Tuning knob. If you order the inserts, he provides instructions for replacing the old inserts with the package. Mr. Talbott recommends that the insert be pried from the edges with a sharp tool. I recommend that you drill a tiny hole in the center of the old insert then pry it up from the inside out (try using a heat gun to help soften the glue). This technique will prevent any damage to the recessed edge of the knobs. Make sure you use a "soft" glue like contact cement for the new insert. Never use CA or glues that harden, and never place a new insert directly over an old one without first removing it! Secondly, Mr. Talbott described an excellent technique for refinishing the worn knobs. First, after removing the retaining clip or set screws, let the knobs soak in a powerful paint stripper for 20 to 30 minutes. Then using a wooden scrubbing tool such as a popsicle stick or half a clothespin, scrape all of the paint from the knob. Rinse thoroughly with warm water. This will leave you with the original black finish bakelite

knob. Next, using a stitched cotton buffing wheel and some fine buffing compound (DICO #TC6 Tripoli) buff the finish of the knob to a brilliant shine. You will probably need to insert a wooden dowel in the shaft hole of the knob to avoid buffing your fingers to a brilliant shine also. Clean all of the compound off with a soft cotton cloth then repaint the pointer line (Liquitex #2002-432 acrylic paint available from K-Mart.) After coating the groove with paint, place a moist paper towel flat on the surface of a desk or table, and sweep the knob across to remove the excess. The acrylic paint is perfect for this application because it is water soluble when wet making it easy to remove the excess, and it is very durable when it finally dries. The net result of this endeavor will be a set of knobs for your radio that look "factory fresh".

The 30L-1 by comparison was dreadfully boring requiring only a few alignment touch-ups. The amplifier easily delivers 600-650 watts RMS into a 50 ohm NI load. Refinishing the cabinet was a wise decision as the unit really has a new appearance.

Enough Already

In closing, I want to thank everyone who spent countless hours with me over the telephone enabling me to complete my project. Without their help, I am

The Econodyne Four Tube Superhet

Part One, The Crystal Filter

Bob Dennison, W2HBE
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Westmont, NJ 08108

Item 3 in the Amateur's Code (see any ARRL Handbook) states that he is progressive - he keeps his station abreast of science. For several years, I have operated in the Antique Wireless Old Timer's contest using a 42 xtal oscillator as my transmitter and a 57-56 regenerative receiver. I was in compliance with the rules regarding use of pre-World War II equipment; but, was I progressive? No! So last year I built the T-807 transmitter (see ER #60) and it paid off in a better score. Now it was time to make some progress in the receiving department.

A study was made of the simpler receivers described in QST during the period 1938-1941. There were several simple superhets using the new 1600 kc IF that looked interesting. But today's ham bands are much more crowded so it would be nice to have more selectivity. Some pre-war sets used a 455 kc crystal filter to achieve good CW selectivity. Isn't it possible that a progres-

sive pre-war ham could have built a receiver using a 1600 kc crystal filter? And if he worked for Bell Labs, he probably would have used a 1/2-lattice crystal filter. Yes, that's the reasoning that led to my "progressive" pre-war design. In Part 1 of this article, I will discuss the design and alignment of the crystal filter. In Part 2, I will cover the remainder of the receiver and the RF alignment. To whet your interest, I include a top view of the receiver, a block diagram and the goals that were to be met.

The receiver has the following features:

1. Covers 80 and 40 meters-the only bands I use in the AWA contest.
2. Bandswitch allows quick check of the activity on the other band.
3. One dial calibration serves both bands,
4. Lots of bandspread (120 kc) for easy tuning.
5. Crystal lattice filter for good selectivity.

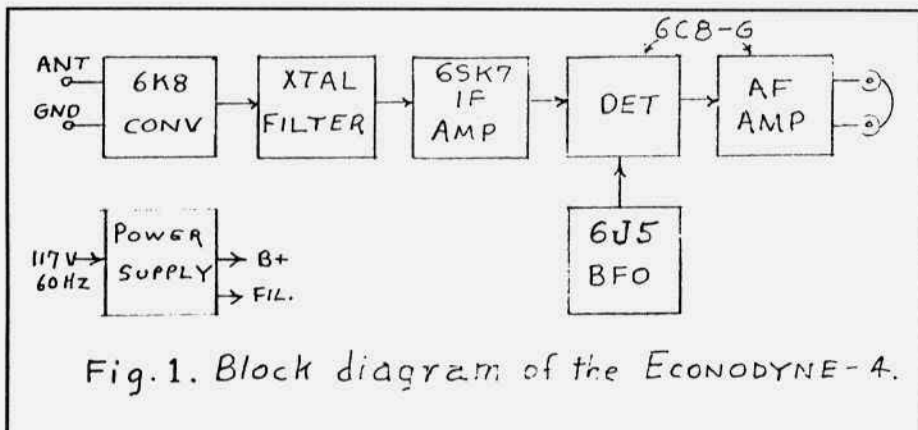


Fig. 1. Block diagram of the ECONODYNE-4.

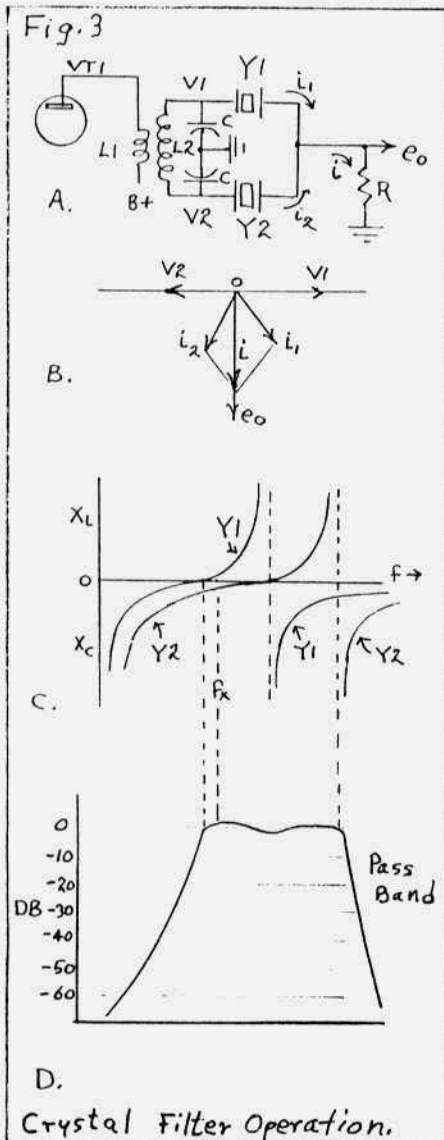
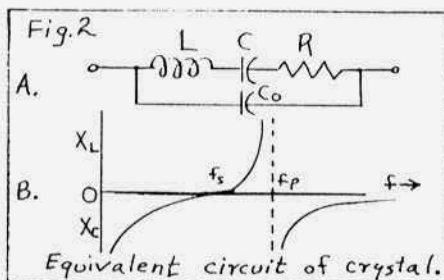
Crystal Basics

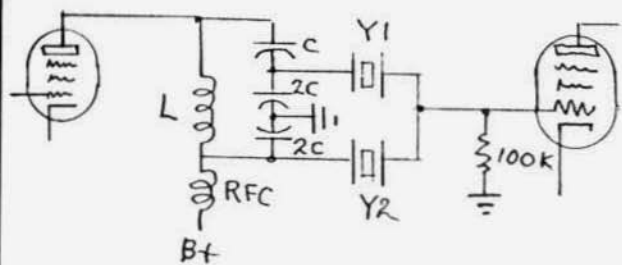
The electrical equivalent of a mounted quartz crystal is shown in Figure 2A where L , C , R are the electrical equivalents of the crystal's mass, elasticity and internal friction. C_0 represents the capacitance of the holder and its electrodes which contact the faces of the crystal. At a certain frequency, f_s , the reactances of L and C are equal and opposite and the equivalent circuit becomes series resonant. At a slightly higher frequency, f_p , the R, L, C branch becomes inductive and resonates with C_0 yielding a very high impedance. Above this frequency, the circuit again becomes capacitive. The graph at B shows how the reactance varies with frequency. When properly cut, ground and mounted, most quartz crystals exhibit extremely high Q and this is what makes them attractive for use in sharply selective filters.

Crystal Filter Theory

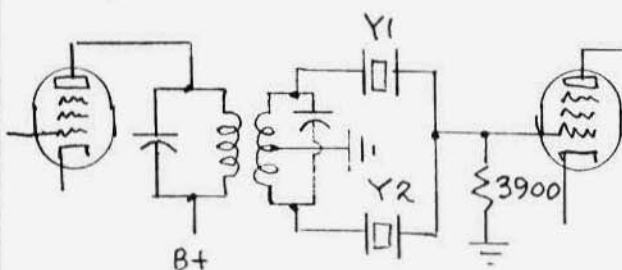
A simple 1/2-lattice filter is shown in Figure 3A. The IF signal produced by VT1 appears across the tank circuit $L_2, C; C$ producing equal and opposite voltages V_1 and V_2 . These are shown in vector form at B. Assume crystal Y_2 is ground to resonate at a slightly higher frequency than Y_1 . Then their reactance curves will appear as shown at C. Now consider what occurs at frequency f_x . Here Y_1 has an inductive reactance so its current i_1 will lag V_1 . At the same time, the reactance of Y_2 is capacitive, so i_2 leads V_2 as shown in Figure 3B. The sum of these two currents is i and produces an output voltage e_o . A little study will convince the reader that when Y_1 and Y_2 have opposite reactances there will be a pass band. Outside the passband, both Y_1 and Y_2 are capacitive and i_1 and i_2 tend to cancel. The width of the filter passband is usually approximately twice the difference in the frequencies of Y_1 and Y_2 .

continued next page

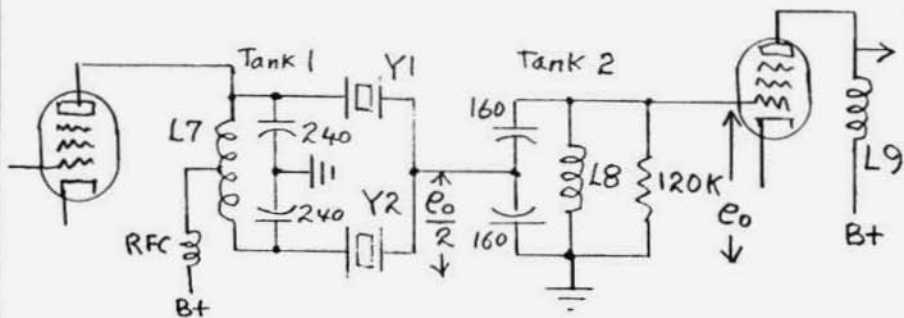




A. Circuit from ARRL Handbook.

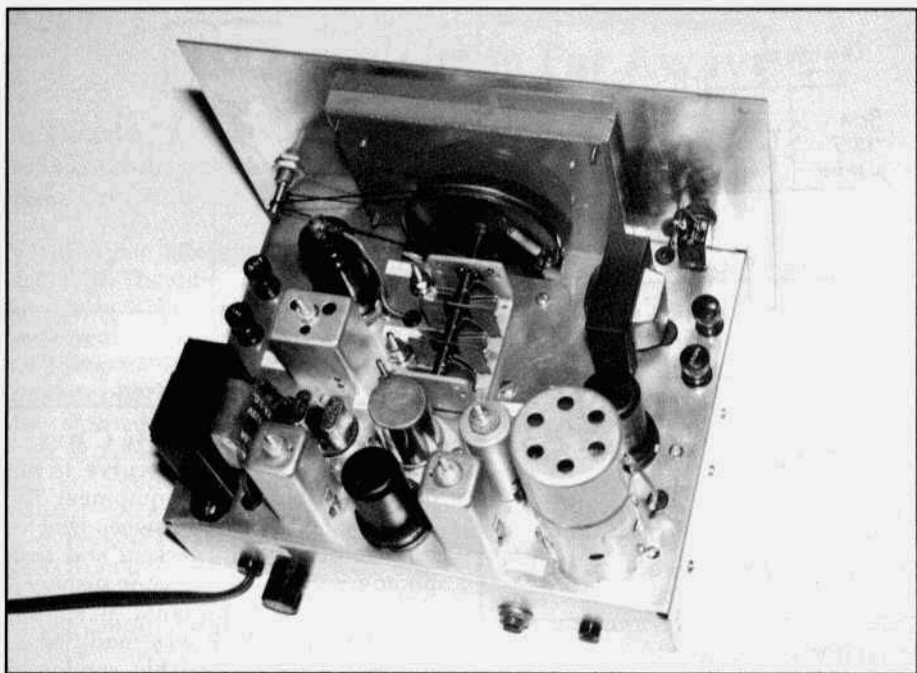


B. Circuit in Heath HR-10B receiver.



C. Circuit used in the Econodyne.

Fig. 4. Typical $\frac{1}{2}$ -Lattice Crystal filter circuits.



Rear view of the four tube superhet.

Impedance Matching

In order to secure adequate attenuation in the stop bands, the filter should be terminated in a reasonably low impedance and, likewise, the driving source impedance should have a similar value. If the impedance level is too low, the gain of the driving stage (VT1) will be low. A certain amount of experimentation and compromise is often necessary. Some typical circuits are shown in Figure 4. First consider the circuit at A. If the resonant impedance of the tank is 80,000 ohms, the impedance seen looking into a-b is $1/4$ this, or 20,000 ohms. Thus each crystal sees a source impedance of 10,000 ohms and works into a load of 100,000 ohms. Heath used the circuit shown at B. By proper design of the IF transformer, it is possible to get a low driving impedance. The terminating impedance is 3900 ohms.

At C is shown the circuit used in the Econodyne. Using the same reasoning as in A, here each crystal sees a source

impedance of 20,000 ohms. The second tank circuit is loaded by means of a resistor so the crystals see a terminating impedance of 12,000 ohms. The equivalent circuit may be drawn as shown in Figure 5A. In the passband, the converter tube works into an impedance of 7,500 ohms so its conversion gain is slightly less than 5. Without the filter we would get about 10X more gain. Thus the filter introduces a loss of about 20 dB. But this is the price one must pay for the great increase in selectivity. Part of this loss is recovered by designing the IF amplifier to give about twice the normal gain. The sensitivity of the receiver is such that signals of only a few microvolts give very good headphone volume.

Alignment of the Filter and BFO

The alignment procedure is fairly simple if you have access to the proper equipment. This should include an RF signal generator, an ac voltmeter and a frequency counter. Connect the signal

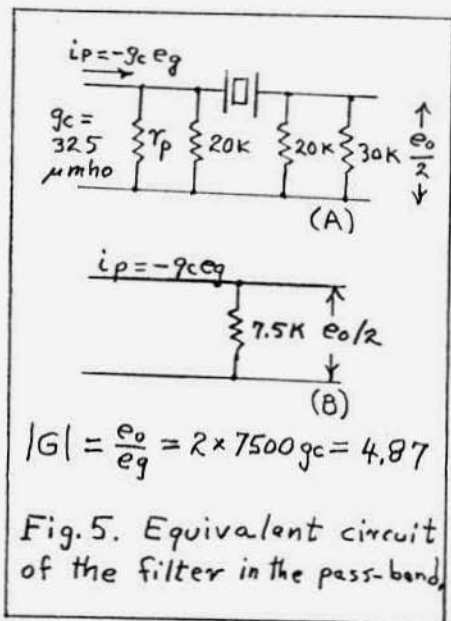
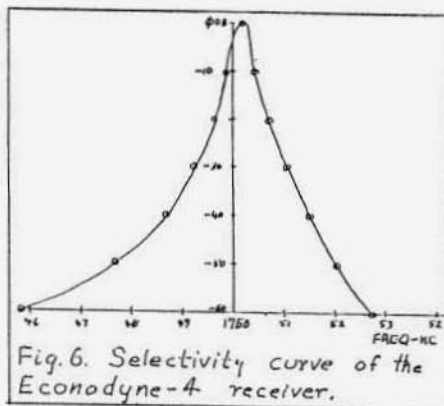


Fig. 5. Equivalent circuit of the filter in the pass-band.

generator to the grid of the 6K8 converter. Lift the grid connector and connect directly to the grid cap. Connect a 2200 ohm resistor to the receiver's headphone (output) terminals and connect the ac voltmeter here also. Set the voltmeter to its lowest scale. Turn the receiver BFO off. Set the signal generator to 1750 kc, turn on the 400 Hz modulation and peak L7, L8 and L9 (see Figure 4C) for maximum output. If the output rises above 2 volts rms, turn the IF signal generator level down. When all three coils are peaked, slowly rock the IF signal generator back and forth across 1750 kc looking for the peak which may be one or two hundred Hz from 1750 kc. Note this frequency as it will be used to calculate the proper BFO frequency. If necessary, repeak L7, L8 and L9 at this frequency. Now turn off the 400 Hz modulation and turn on the BFO. Connect the frequency counter to TP1. Adjust L12 (see Part 2) until the BFO frequency is 800 Hz lower than the peak IF response frequency. This completes the IF-BFO alignment. The RF alignment will be covered in Part 2 of this article.



Plotting the IF Response Curve

Obtaining a response curve is not easy, even with good equipment. The ideal method is to use a sweep generator equipped with markers and then photograph the oscilloscope display. I used a Heath Lab Signal generator, Model IG-42, which was modified as follows: A small variable condenser (about 15 pF) was mounted inside the oscillator compartment and connected to the main tuning condenser. This condenser was coupled to a 1.5" Japanese vernier dial mounted on the front panel at about the 1:30 o'clock position on the main tuning dial. This permits very fine (slow) tuning. I also installed a BNC fitting on the front panel and connected it by coax cable to a point in the generator that gives about 50 mV to feed to the frequency counter. Thus the exact frequency in use can be seen at all times. The RF output meter on the signal generator was not accurate so I replaced the 51 ohm termination at the end of the output cable with a potentiometer fitted with a 0-10 scale.

Crystals were ordered from both Petersen and CW Crystals. The Petersen crystals were wire-mounted in HC6/U cases with .093 sleeves on the pins to fit into an octal socket. The CW Crystals were standard FT-243. Results were similar but the wire-mounted crystals probably have higher Q giving slightly sharper skirt selectivity. The frequen-

One Christmas Far Away

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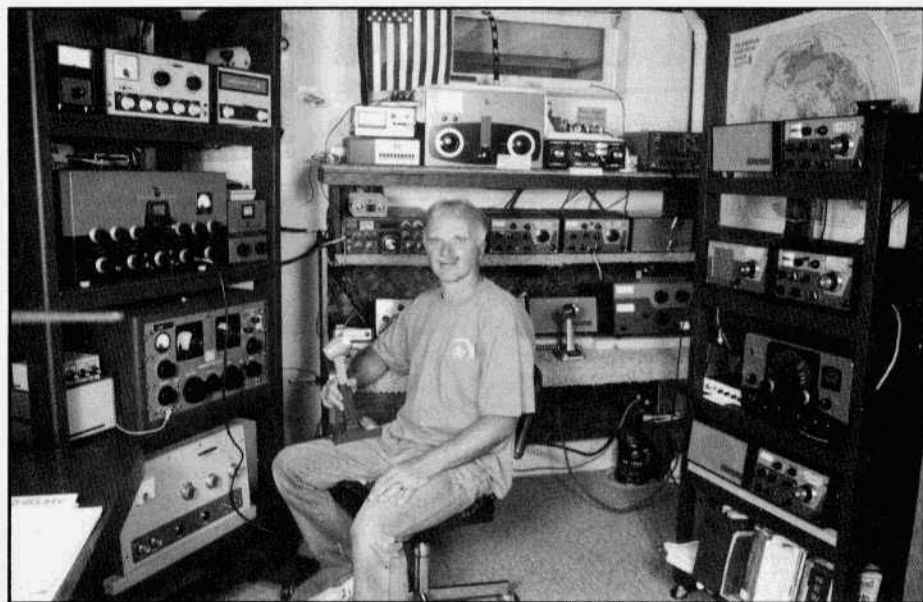
It was late afternoon on Christmas day, 1954. The sidewalks of West Berlin lay under inches of snow turning into ice. Streetcars continued their scheduled stop at the Kadettenweg gate of Andrews Barracks. One streetcar window showed a breath hole through the frost, as if the passenger, a lonely American ham, needed visual contact with his outside world now cloaked everywhere in snow. One's warm breath against the glass from the inside would melt a hole in the outside ice, a principle quite new to the young California ham, who for the first time was really experiencing a white Christmas.

Contrary to daily custom, this early Christmas evening saw many more American GIs returning to their barracks than were leaving. Usually, this hour would crowd the No. 74 streetcar with young soldiers escaping into pleasures of the coming night and nightlife of West Berlin. An informal survey had shown that one could visit a different West Berlin pub each night of the year without repeating, not including those off limits. But tonight most young soldiers seemed drawn back to the barracks, their overseas home base, back to thoughts of their families and friends far away. Despite the flare of intruding new experiences in a foreign land, the young soldiers tonight let quiet light of Christmas trees remind them of hometown people, of girls left behind, of hobbies interrupted.

On Christmas day, the military leaders saw to it that the troops got fine treatment. No extra duty. No inspections. A fabulous dinner in the mess hall. Warm Yuletide relaxation and

good will, just like it would be Stateside on this day. But some small groups of American GIs, called "teams," worked shifts round the clock. Tonight as usual in West Berlin the shift on duty did its thing quietly in a secret location where one spoke little and listened constantly through headsets plugged into racks of electronic gear. Some equipment was tapped into telephone trunk lines. Some input came via directive antennas beamed toward sources of radio traffic. These teams, each of only a dozen or so people, comprised specialists in translation or electronic skills, sometimes both. Team members kept to themselves, both on and off duty. Other GIs called them "spooks," especially since these intelligence gatherers were sometimes seen in transit in the dead of night. Members of different teams knew each other and were friendly, but never talked shop. On this Christmas evening in West Berlin, two off-duty members of different teams found themselves by chance side by side partaking of the Yuletide atmosphere. Mutual recognition quickly led to conversation soon focusing on electronics, but no security was breached. The topic was mostly ham radio.

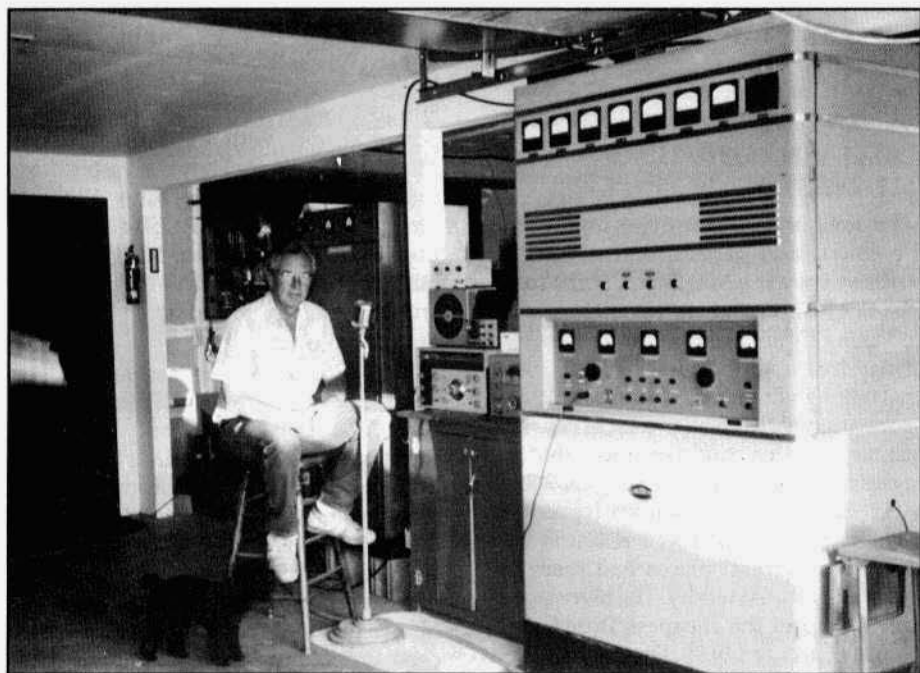
The guy beside the young California ham in the Yuletide-decked mess hall had seemed at first rather quiet, as if reflecting on things far away. He was clearly a type who contributed more to his country through brain than through muscle. He was a WI and his name was Bill. More about him fades and isn't really important. Small talk disclosed that he wasn't a linguist and that his team worked in electronics. We both



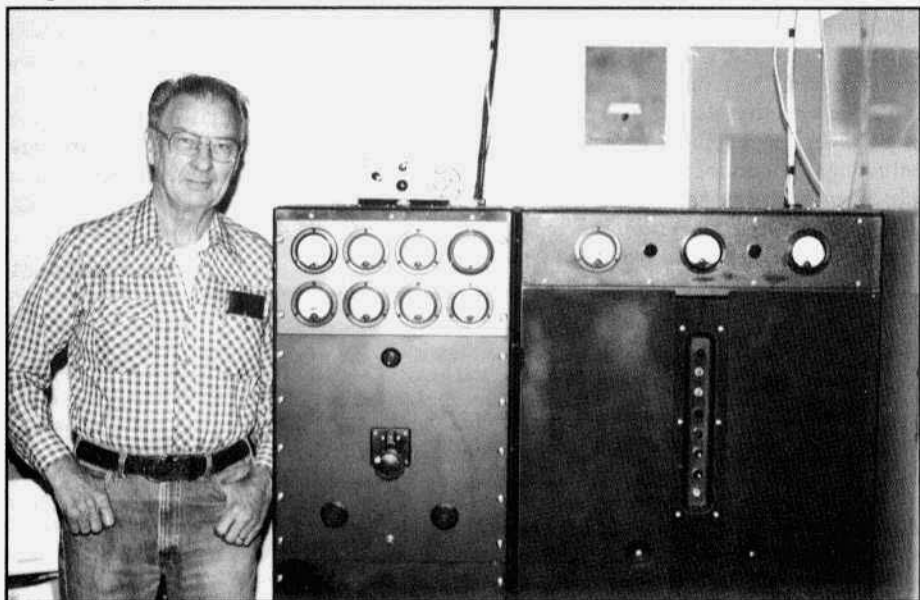
Don Hansen, WDØI, with his vintage equipment. He says that half of the equipment was restored with parts from the ER's classifieds. He's active on 160, 75 and 40 meters.



Another beautiful, well-organized hamshack. James Buchanan, K8WPI, says this is operating position #3; his favorite and most used position. He says the 'prize' of his station is the 1930's "antenna field strength" meter, which has been mounted on a mahogany face plate, located far lower left.



Arne Sjomeling, KØAS, at his 160 meter operating position. The transmitter is a Raytheon RA-1000 from the '40's. It uses 833A's in both the modulator and final. It weighs 2400 pounds!



Dewey Angerhofer, WØZUS, posing with his last winter's homebrew projects; RF amp on the left and power supply/modulator on the right.

Restorable LSB For The Collins PRC-47

by Jay Craswell, WBØVNE/AAV5TH
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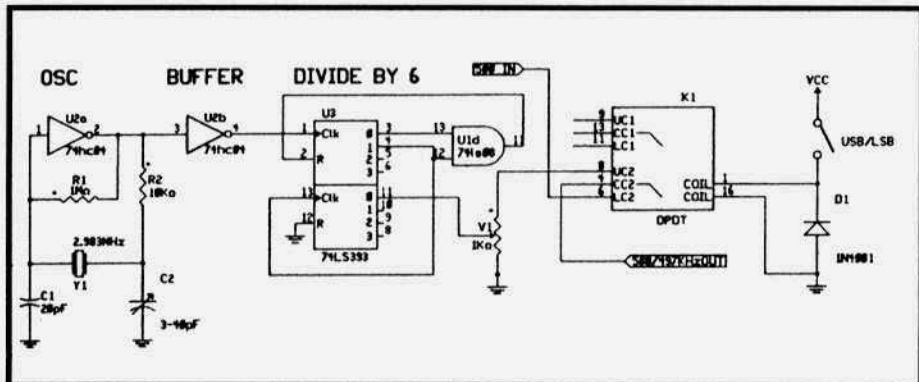
I'm not quite sure how I got involved in the conversion project for the PRC-47. Suffice to say the Magic of Collins radio was not lost on me. However the cost of collecting Collins gear put it in the realm of daydream stuff. However, one day I was talking with a friend about radio and he mentioned that he had a lot of fun with Military surplus stuff. One piece that got my attention was an HF SSB rig for 2 to 12 MHz SSB and made by Collins. It sounded interesting so I did some research and found that several places had them for sale. Prices varied wildly. The highest was over \$200 and the cheapest Tartan Electronics was only \$49.95. I got talking with Gene, the owner, and he confided to me "I musta bought 10 zillion pounds of em!" (All gone by now, I believe). I kidded him about that. "10 zillion lbs eh,? How many radios is that? 5 or 6?" Fortunately Gene is a good natured guy and we got to be quite good friends. The problems as far as we could see was that the rig was USB only, 28 VDC (or 115 VAC 400 cycle), and the only way to connect an antenna was through a weird screw on the whip antenna. I ordered a pair and dissected the schematic. Power supply was not a prob-

lem as I had access to an old computer power supply with the proper output. The antenna (to me) seemed to be a case for some machine shop time. The only remaining problem was USB only. USB is fine if you are 100% into MARS or CAP but not really great for hamming the 80 and 40 meter phone bands.

How It Works

The PRC-47 uses a mechanical filter scheme. Swapping the USB mechanical filter for a LSB filter would technically work but the cost to obtain a Collins 500 kHz LSB filter made it prohibitive. Besides I wanted both USB and LSB! What I decided to do was inject a different carrier frequency to the balanced modulator and make the USB filter function as a LSB filter! The radio normally uses a 500 kHz oscillator frequency. I did some experimenting with my nifty Dover Digi VFO (0 to 20 MHz) card and tried different frequencies to see how the audio sounded at different points. I found that at 497 kHz LSB sounded pretty good. Once this was determined I went to the junk box to see what parts I had on hand to make a more permanent gadget that would fit inside the radio. Crystals for 497 kHz are rare and expensive. I decided to start with a higher frequency and divide down with some TTL parts. See schematic #1.

continued on page 33



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 7 AM MT.

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

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

Westcoast Military Radio Collectors Net: Meets 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 14.050, Saturdays at 1 PM PT. Net control is Tracy, WB6TMY.

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

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

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

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

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

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

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

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

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

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.

The Hallicrafters HT-20

by Jim Hanlon, W8KGI
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Sandia Park, NM 87047

Despite the recent experience of our esteemed editor-publisher, most Dayton HamVention weekends are accompanied by fine weather. And Saturday, April 26, 1980 was no exception, a bright, warm spring day - perfect for this fleamarketeer.

The fleamarket at Dayton is BIG - the entire paved parking lot and then some for the Hara Arena, a sprawling series of buildings including a hockey arena, an ice rink and convention meeting areas. It takes discipline to shop such a large collection of goodies. For my first round, which could take as much as two hours to complete, I would set my mental filters to reject all the non-essential electronic test equipment, used computers and dollies dressed in hand crocheted outfits and to pass only vintage ham gear. I'm ashamed to say that, when in full mental set, I would walk right past good friends and not even notice them. I kept a notebook of things that looked interesting, recording the parking space number where they were located, asking price, etc.

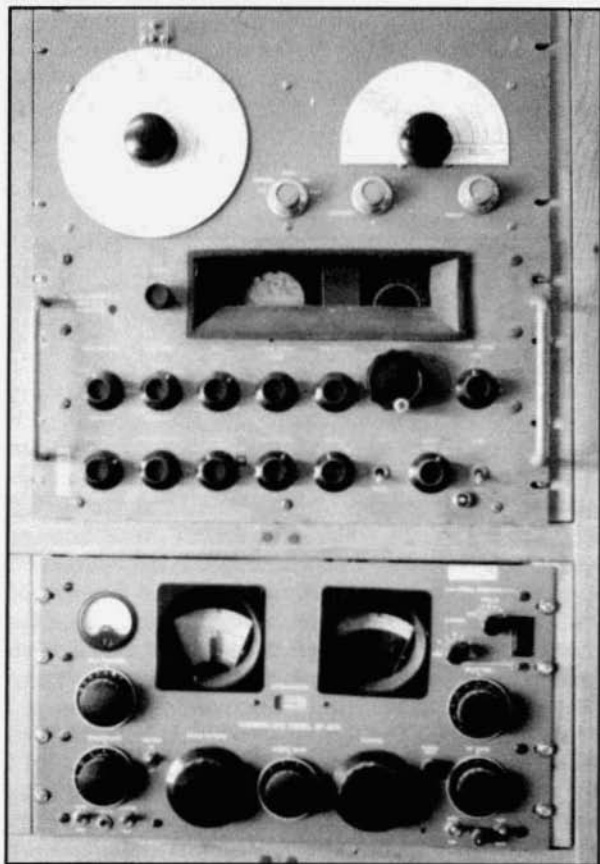
On that particular day, one of the things that went into my notebook was a Hallicrafters HT-20. It was in a single stall space, buried midway in one of the aisles north of the buildings, sitting on the ground in front of its owner's open car trunk. It looked to be in "fair" condition, no cabinet (C) and looking a little dirty and worn, but it did come with a manual. The asking price was \$40. I dutifully wrote it down, and since it didn't come under the categories of "gotta have regardless" or "too good to miss," I went on. You have to keep your cool and know on what and when to

make a bid at such a giant fleamarket.

Early in the afternoon, after I'd shot the breeze with the Classic Exchange crowd gathered around Stu Stevens, K8SJ's spacious booth, I walked by the HT-20's spot again. It was still there, only the \$40 price tag had been crossed out and \$30 written below it. Hmm... this was getting interesting.

About 20 minutes before closing time, sunburned and with fatigue well settled into my calves and flat feet, I made one more visit. Now the price was down to \$20, and the hapless owner was loading his unsold clunkers back into his trunk. The moment was ripe! "You don't want to lift that boat anchor back into your car, do you?" I said gesturing to the grey hulk on the ground. "I sure don't", he replied. And then came those magic words every fleamarketeer longs to hear, "Make me an offer I can't refuse." "Ten dollars," sez I. "Sold!" sez he - and we were both delighted at the transaction. I hustled over to Stu's encampment and borrowed his furniture dolly, which came complete with his teenage daughter as a helper, to haul my 90 pound prize away. And that was how I came to be the third hand or so owner of a Hallicrafters HT-20.

So what did my ten spot buy? Well the HT-20 is something like a Viking I, only it came ready built and was a lot more expensive. It is featured in the Hallicrafters ads in my 1952 ARRL Handbook as the successor to the HT-9, and it's listed at \$449.50. Its 17 page manual includes tune-up charts that cover the complete spectrum from 1.7 to 30 Mc, not just the ham bands. (You couldn't even get all of the legal dis-



I keep the HT-20 in a wooden rack. It normally sits just above my SP-600 and below its VFO. The VFO combines the PTO and multiplier/driver string from a T-195 transmitter which I obtained a few years back from Fair Radio Sales. The PTO covers 1.5 to 3 MHz in ten turns, and the multiplier/driver string has outputs at 1.5 to 3 MHz, 3 to 6 MHz, 6 to 12 MHz and 12 to 24 MHz. The big round dial on the left of the VFO is a National Velvet Vernier (from a BC-375 tuning unit) that controls the PTO, and it is calibrated for the ham bands. The dial on the right is another Velvet Vernier that tunes the multiplier/driver string.

claimers into 17 pages in any of today's new manuals.) Mine had apparently started life working for the USAF Air Material Command, Measurement Unit, All Weather Branch, WADC according to some stamps and extra pages in the manual, and then it passed on to W4BFZ. I didn't ask, but perhaps he was the guy who sold it to me.

At first glance, the circuit looks pretty mundane for 1952, a 6AG7 Colpitts oscillator with ten switched crystals inside the box and a port on the rear for VFO drive, a 6L6 buffer/multiplier, and a 4D32 final. The 4D32 was a popular tube in that era. A Raytheon design, it was roughly the functional equivalent of a pair of 807's in parallel, but a lot more stable and easier to work with. It shows up also in the Viking I and in all of

the Collins 32V family transmitters. Unfortunately, when the Korean War came along, it became very scarce. Johnson substituted the somewhat smaller but available 829B for it in their later Viking I's. And then RCA brought out the 6146 which beat all the competition for price, performance and stability, and that was pretty much the demise of the 4D32.

Audio-wise, the HT-20 is also straightforward. Two resistance coupled triode amps in a 6SL7 drive a 6K6, which pushes a pair of 807's running AB2, plenty of power to 100% modulate the 4D32. Reports from on the air contacts rated the HT-20 audio highly, better than my 32V3 and Valiant and as good as my Globe King 275.

Hallicrafters HT-20 from previous page

But "the devil is in the details" as is so often said. The HT-20 came on the scene just after that one-eyed monster Television had completed its first, post war sweep of the American countryside. TVI was THE problem for hams, literally putting quite a few guys with older, harmonic and parasitic rich rigs off the air. It was a difficult problem to clean up an unshielded transmitter full of class C multiplier stages and a class C final amplifier. QST and the other ham publications of the day offered ideas, like harmonic traps in your plate leads, power line filters, low pass filters in the output, and even rigs built inside of wooden framed cages shielded with copper window screening. In the midst of all of this, the wizards at Hallicrafters came out with a smart looking, cabinet or panel mounted transmitter with knobs on a normal front panel, completely bandswitching so there were no hatches to open for plug in coils, and most amazingly of all NO TVI!

How did they do it? Let's let the HT-20 manual tell its own story for a little bit.

"Exceptional engineering ingenuity has been employed throughout the design and construction of the HT-20 to eliminate spurious and harmonic radiations that may cause television interference. The TVI problem was given full consideration in the design of every circuit as well as in the selection and layout of parts.

"The tuned circuits are specially constructed to provide low impedance paths to ground for all harmonic frequencies. Many of the components were selected to avoid self resonance at harmonic frequencies and arranged to eliminate parasitic oscillation. The final amplifier tube was chosen partly because of its suitability for connection to low-impedance circuits. A unique balanced bridge arrangement provides fixed neutralization of the buffer stage and parasitic suppressors are strategi-

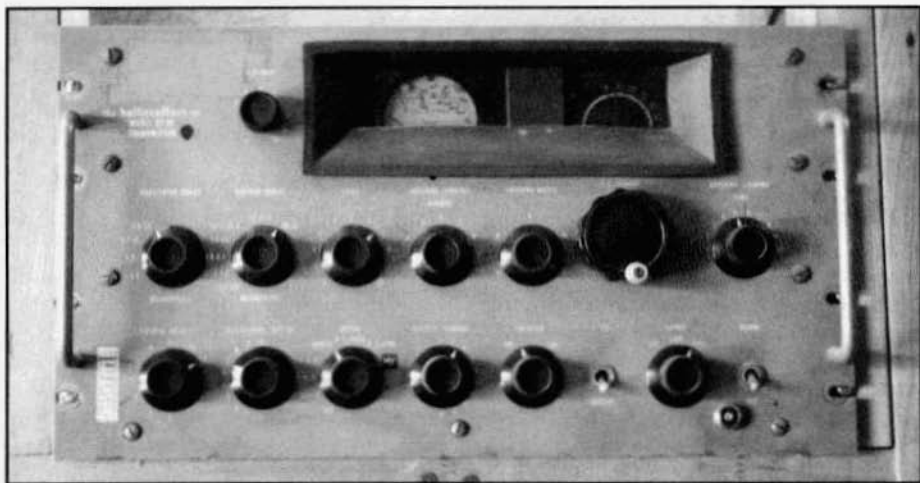
cally placed in the circuit. All of these measures tend to eliminate TVI by preventing the generation of interfering signals.

"Two important TVI proofing features are employed in the output coupling circuits. The tuned output circuit is basically a pi network that has inherently excellent harmonic suppression ability. This network may be connected directly to the high impedance output connector that will permit the use of antenna systems having an impedance in the range of from 50 to 600 ohms. For use in locations where TVI is especially serious a second 50 ohm output connector has been provided. This connector is coupled to the pi network through a special Hallicrafters low pass filter. For maximum efficiency it is important that the antenna be sufficiently well matched so that the standing wave ratio on the 52 ohm coaxial line is less than 1.5. With proper matching all harmonics above 40 Mc will be attenuated by at least 90 dB in the output coupling circuits without fundamental power loss.

"In addition to all of the above measures to prevent TVI special construction or filters have been employed in all connecting leads to the transmitter including the microphone input circuit."

In addition to this, Hallicrafters also grounded every shaft that came through the panel bearing, shielded the meter and P.A. Tuning dial window with screening, and secured the top, back and bottom covers with about a jillion screws, one every two and a half inches, to give RF only one way out of the box, through the low pass filter and the coax jack behind it. The great thing about all of this was that it really worked, as I had occasion to find out and will tell you about a little later.

I found out when I hefted the HT-20 onto my bench at home that it was, indeed, in "fair" condition. All of the big, important parts were there, but it needed some fixing. The bias supply filter caps



The HT-20 is a knob turner's delight. On the top next to the meter is the A.F. Gain control. Next row down, left to right, it's the Oscillator Range (bandswitch), Driver Ranger, Drive (pot in the 6L6 screen), Antenna Loading Coarse switch, P.A. Tuning Control, and Antenna Loading Fine control. Bottom row contains the Crystal Selector switch, Oscillator Tuning switch, Meter range switch, Buffer Tune control, Emission switch (AM, CW), Send/Receive switch, Output Off/Low/High switch, mic connector, and Power switch. And they're all big enough to get a hold of without using tweezers.

were no longer functional and needed replacement. A few other epoxy potted capacitors looked "wet" so I changed them out for good measure. The line cord had decayed. The meter movement was open, so I swapped in another meter pending finding another movement I could use to repair the original one. The "Antenna Match" switch which configured the pi-match in several different ways for the 1.7 to 3.5 mc range was missing its wafers - so I just wired it for the 3.5 mc and up range til that great day when I could locate some replacements. The plate tank coil, a roller inductor ganged to the plate tuning capacitor as in the Vikings, had a liberal coat of black silver sulfide which I carefully polished away. Have you ever done a repair job on an RF choke? I had to on the choke feeding plate current to the 4D32 final amp. It had burned open - perhaps when the Antenna Match switch met its demise. It was a hold your breath tweezer and small soldering iron job, but it held!

When all the parts seemed functional, I went to the tune-up stage. Gratifyingly, everything perked right along - up through 15 meters. But on 10, I just couldn't get any grid drive to the final. It took a while to figure out, but it finally turned out that the particular 6L6 in the buffer socket just dropped dead and refused to work above 26 Mc. (2) Perhaps it was afraid of being drafted to work on the CB band? In any event, the judicious selection of another 6L6 from the junk box yielded ample ten meter drive - and we were on the air!

I used the HT-20 quite a bit on CW, along with a VFO that I built up from a T-195 PTO and multiplier string obtained from Fair Radio Sales. It didn't bother my own off-the-air TV reception at all, and things were great - until my wife and I caved in to our teen age kids and got CABLE. Northwest Columbus, Ohio was a trial market for a new, user-interactive Warner cable system, first in the nation, and it came with a box full

The Hallicrafters SX-122

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Costa Mesa, CA 92626

In late May '94, while again "hanging out" at Dave Kamlin's Wireless World, I "discovered" the Hallicrafters SX-122. While chatting with Dave and drinking more than my share of the coffee, I spent a couple of hours getting familiar with an SX-122 that Dave had taken in on trade. I connected the SX-122 to Dave's R7 vertical and was surprised by its low warm-up drift and very good mechanical stability while listening to the 40M swapnet. It didn't sound or feel like the "typical" vacuum tube vintage radio. Removing the top cover revealed an extremely clean layout. This receiver was decidedly different from the SX-96/SX-100 and I was quickly getting the urge to add one to my collection.

In early September, while talking with Robert Fowle, a Hammarlund "specialist" who advertises in *ER*, I found out that Paul Montgomery, N6SFC, had an extremely clean SX-122 for sale. I called Paul, discussed packaging for UPS, and purchased his receiver. Paul's packaging was superb and the SX-122 arrived at my work in pristine condition via UPS. I spent some time "detailing" the receiver which included cleaning, tube testing, and alignment, but other than two "weak" tubes, it needed very little actual work - it was in "like new" condition - about as good as it gets for a thirty year old used receiver. Removing the top and bottom covers revealed date codes that indicated that this receiver was possibly manufactured in early '67, about the time that the SX-122A was announced.

The Hallicrafters SX-122 is a 12-tube dual-conversion general coverage superhet receiver that tunes from 540-1600 KHz and 1.75-34 MHz in four

bands. Calibrated electrical bandspread covers 80-10 M. Introduced in April '64, the SX-122 sold for \$295 and was available through '67. The SX-122A appeared in '67, sold for \$395, and was available through '70. Max De Henseler's book, *"The Hallicrafters Story"*, indicates that the two were "almost identical...with only few changes in capacitors" (and price).

The SX-122 shares the new Hallicrafters look that was introduced with the SR-150 transceiver and SX-117 receiver in late '62. The new front panel colors were black, silver, and gray. The TUNING and BANDSPREAD dials were white with black lettering. The new gray wrap-around cabinet was quite a change from the older SX-100 type cabinets and featured removable top and bottom covers. The cabinet is painted with a medium-gray crackle finish.

Some of the more salient features of the SX-122 are:

- * four bands from 540-1600 kHz and 1.75-34 MHz.
- * calibrated electrical bandspread for 80-10 M.
- * 0-100 logging scale on the TUNING dial.
- * tuned RF stage w/front panel ANTENNA adjust.
- * double-conversion on all bands. 1st and 2nd IF frequencies are 1650 and 50 kHz respectively.
- * 3-position selectivity from 0.5-2.5-5 kHz.
- * optional 100 kHz crystal calibrator (HA-7) w/front panel CAL switch.
- * BFO frequency is 50.85 kHz and is adjustable +/-2 kHz. The front panel is marked with USB, LSB, and CW for nominal BFO settings.



Front view of the Hallicrafters SX-122. This general coverage receiver sold for \$295 when it was introduced in April '64.

- * 3.2 ohm speaker output impedance, 50-5000 ohm headphone impedance.
- * 85 watts, 105-125 VAC, 50/60 Hz.
- * 8"H x 18-3/4"W x 9-13/16"D overall cabinet dimensions.
- * 28-3/4 lbs.

If you compare the schematics of the SX-96/SX-100 with that of the SX-122, the lineage of the SX-122 is unmistakable. The SX-122's tube line-up gives some insight into the SX-122's design: 6DC6-RF Amp, 6AU6-100 kHz Cal, 6AU6-1st Mixer, 6C4-1st Conv Osc, 6DC6-1650 kHz IF Amp, 6BL8-2nd Mixer/Crystal Osc, 6BA6-50 kHz IF Amp, 6BE6-Prod Det/BFO, 6BN8-AM Det/AVC Rect/AVC Amp, 6GW8-1st Audio/Audio Out, 5Y3-Rect, and 0A2-Volt Reg.

Mechanically, the SX-122 is a brand new design. It is not an extension of the SX-76, SX-96, SX-100 series. After restoring my SX-100 (ER#58), it was only natural to do a side-by-side comparison between the two receivers.

* The mechanical stability of the SX-122 is really superb compared to the SX-100. A stiffening bar and integral shields in the RF compartment minimize flex in the chassis.

* The SX-100 uses a precision gear drive tuning mechanism. Both tuning and bandspread dials have a 0-19 logging scale. Using the 0-100 scale on the knob skirts with the logging scale, better than one part in 1900 can be set on both dials. The SX-122 uses a more conventional dial cord/flywheel arrangement. The TUNING and BANDSPREAD knobs have no skirts and only the TUNING dial has a 0-100 logging scale. If precision tuning and logging is a requirement, the nod definitely goes to the SX-100 - no contest.

* Both receivers require a 100 kHz calibrator. The SX-100's is built-in while the SX-122's is an option (HA-7). Incidentally, Paul homebrewed the calibrator in this receiver. He did such a great job that I originally thought it was an

Box-o-Rox

A Practical Synthesizer for 160 Meters

by Arne Sjomeling, KØAS

16 Peck St.

Deadwood, SD 57732-1375

Following the lead of HB9AIS in his article on synthesizers in the January '91 issue of *QEX*, I decided some months ago to build a monoband synthesizer for my 160 meter AM transmitter, a '40's vintage Raytheon.

This unit offers simplicity and convenience: set the knobs to the desired frequency, peak the output and tune up the rig. The output is as stable as the single crystal in the box and the accuracy has been measured to within 1 Hz of the desired frequency. Set up in increments of 1 kHz, the Box-O-Rox replaces the 200 crystals it would take to cover the 160 meter band.

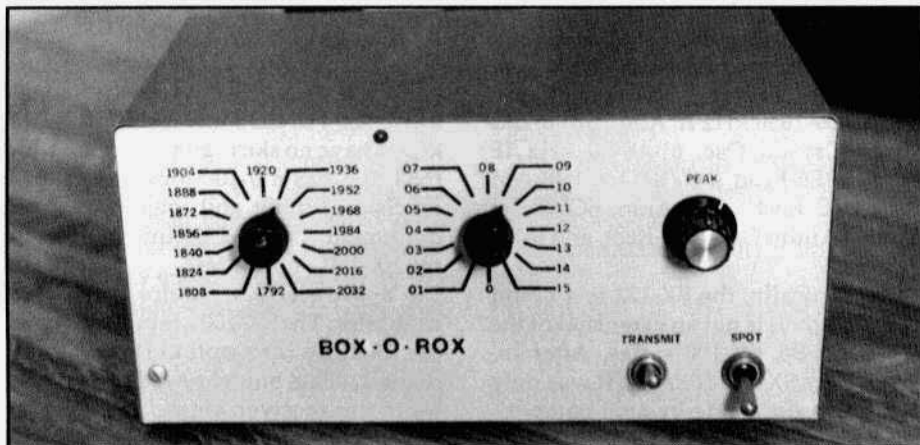
Excluding the 12 volt power supply, it contains the following parts: the PLL synthesizer, VCO, buffer and amplifier. Let's look at the simpler boards first.

The amplifier is right out of Jan. '76 *Ham Radio*. It is capable of about 4 watts output, and with a large heat sink it barely gets warm during a typical "old buzzard" transmission. The output coil

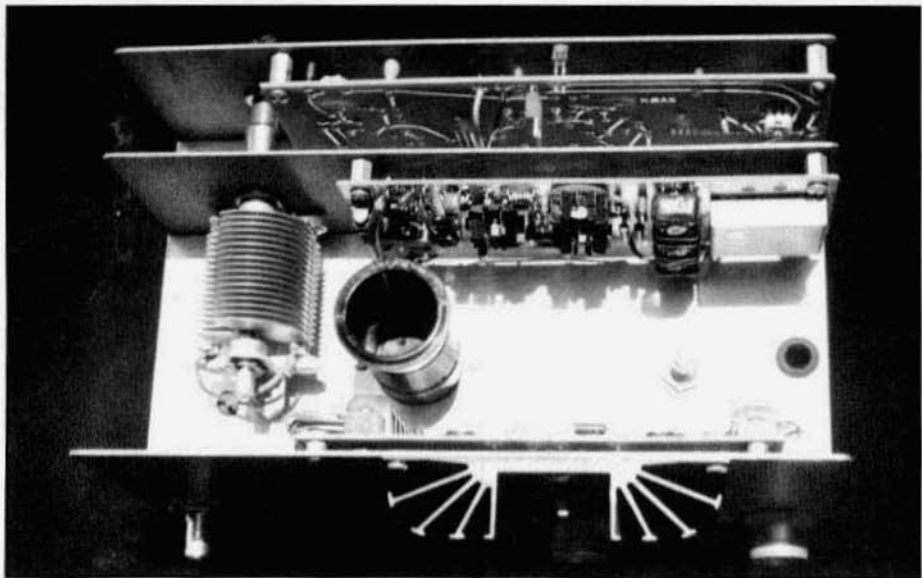
with its tickler is a plug-in unit - to simplify removing turns, should that become necessary for the builder. It converts the 50 ohm output of the amplifier to the input of the transmitter's crystal oscillator stage, 15K ohm at 80 pF.

The buffer stage is taken from the ARRL publication, *SOLID STATE DESIGN FOR THE RADIO AMATEUR*, page 206. The half-watt output would have been more than adequate, but I used the 1-watt option - and chose to waste a lot of its output power - simply because I already had it built and working. (It was the output stage of an experimental QRP rig I'd built about 5 years ago.)

The synthesizer chip is a Motorola MC-145151-2 "parallel input PLL frequency synthesizer", and here's how it functions, as I understand it. First - and this is the easy part - it has a 2.048 MHz crystal oscillator. This 2.048 MHz is divided down (by an internal 14-bit di-



Front view of the BOX-o-ROX.



Top/rear view.

vide-by-R counter) by 2048, resulting in a stable reference signal of 1 kHz. This reference signal is sent to one input of a phase detector, another subsystem within the guts of the chip.

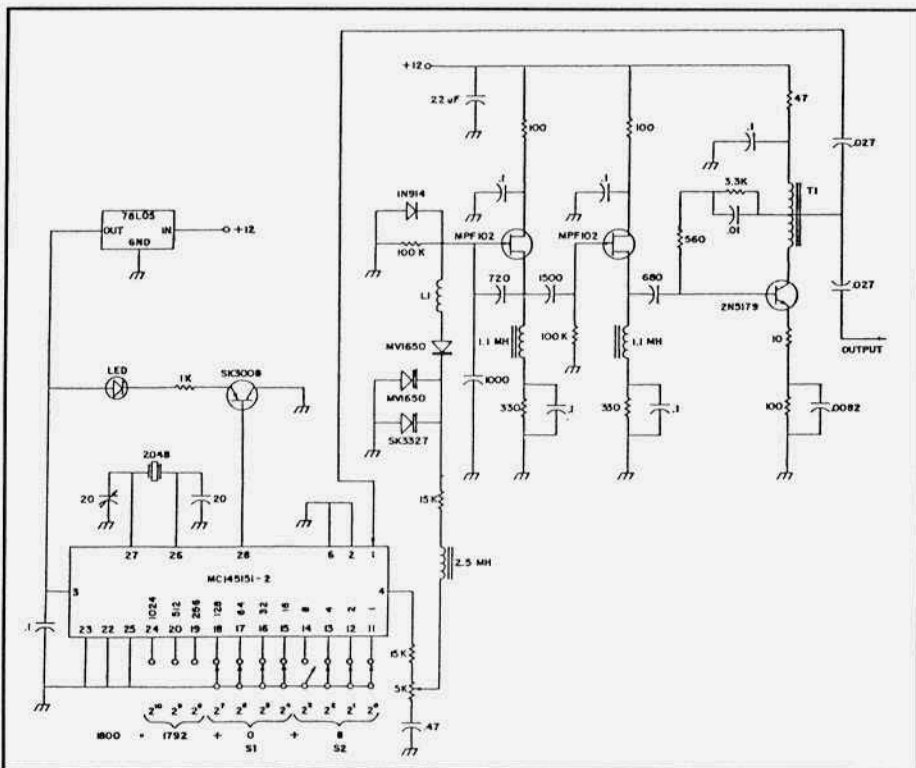
Now let's take a 160 meter VFO and replace the tank coil with a hi-Q toroidal coil of somewhat higher inductance, and let's replace the tuning capacitor with a couple of varactors or "Epicap" tuning diodes. When the VFO is powered up, it will start to oscillate at its free-running frequency - and that signal is sent to the synthesizer chip where it is divided by a value determined by the setting of the switches. (This is done by what is termed the divide-by-N counter.)

As an example, if the switches are set at 1.945 MHz, the VFO signal, whatever it may be, is divided by 1945, resulting in another signal somewhere near 1000 Hz. This signal then is sent to the other input of the phase detector. If it is higher in frequency than the reference signal, a series of negative going pulses is sent to the varactor diodes, increasing the capacitance of the tank circuit, thereby decreasing the oscillator frequency. And

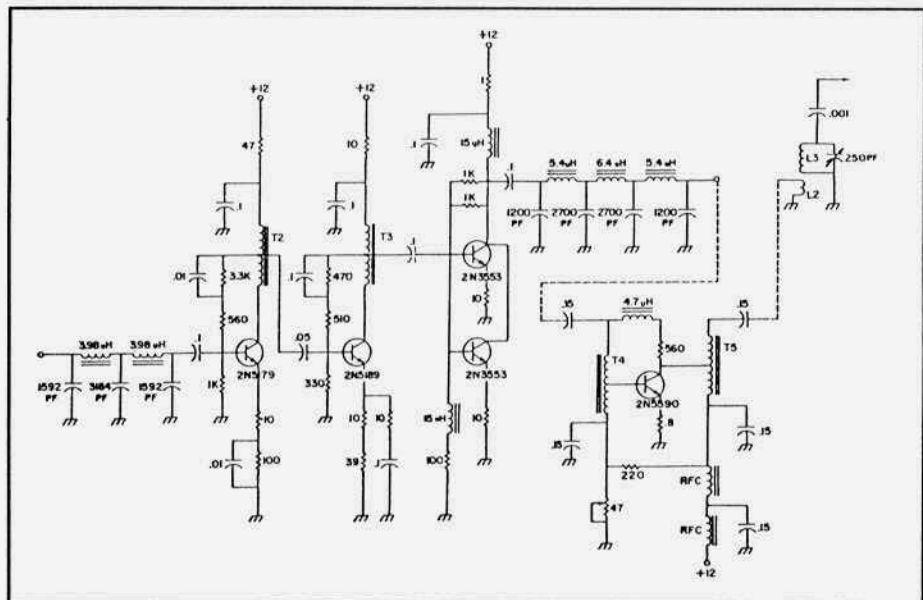
the converse is true; that is, if the oscillator frequency is lower than the reference frequency, then a series of positive pulses is sent to the varactors to decrease the tank capacitance, resulting in raising the oscillator frequency. Within 200 to 500 milliseconds, the 1000 Hz signals are in phase and the system "locks" onto the frequency to which the switches are set - hence the term "phase-locked-loop."

An important part of the PLL is the deceptively simple RC filter referred to as the loop filter. Its basic function is to provide a smooth and steady DC voltage to the varactor diodes. By trial and error, I've found that (1) if the filter is not right, phase noise from the detector passes through the VCO, is amplified, and "sounds like a swarm of angry bees" on your signal. (2) If the filter is not right, it may take nearly forever for the system to lock up; that is, it is "overdamped." The pot in the loop filter is used to optimize filter response.

I found out from Dick Hanson, the PLL specialist at Motorola, that the recommended VCO is the MC1648 chip. For those of you who are interested



Synthesizer and VCO.



Buffer and amplifier strip.

enough to give it a try, I would recommend going that route. Also, the driver could probably have been eliminated, but, as with any prototype, it is generally better to have too much than too little drive available. Also, 4 watts output may seem excessive, but I had the parts on hand, so what the heck.

This little project has been more fun than frustration, and the result is a neat box which has replaced part of my bigger box of rocks. If any of you readers build one, I'd sure appreciate hearing about your results. ER

SW1 & SW2 = Hex Complement (DRAC16PB)
L1 = 43T. No. 30 on FT50A-61 (138 UH)
T1 = 10 bifilar turns No. 30 on FT-37-43
T2 = 10 bifilar turns No. 28 on FT-23-43
T3 = 12 bifilar turns No. 30 on FT-37-61
T4, T5 = BN73-202
L2 = 5T. No. 28, L=3 58T. No. 30 on 1.25" form
RFC = 2T. on ferrite bead.

1995 Classic Radio Exchange: February 5-6, 1900 UTC to 0400 UTC.

by Stu Stephens, K8SJ
749 E. Prospect St.
Girard, OH 44420
216-545-9632 eve.

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 "CQCX", phone call "CQ Classic Exchange". Non-participants 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 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, comments, anecdotes, pictures to: Jim Hanlon, W8KGI/5, PO Box 581, Sandia Park, NM 87047 or Marty Reynolds, AA4RM, PO Box 13354, Atlanta, GA 30324. Include SASE for next CX Newsletter. ER

Summer of '52: A Novice Does Field Day

by Larry Guenther, W4UJT
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Richmond, VA 23233

Remarkably, Field Day comes together despite the energy, resourcefulness and commitment of a new licensee.

As an eager lad of thirteen, my hopes for a ham license were given sudden and welcome direction by members of the Kingsport (TN) Amateur Radio Club, who organized activities in response to the newly-announced Novice class. Dozens of us received instruction during that unforgettable Fall in 1951 for our written examinations and code tests. This is an account of how that experience gave new life to the club and became a valuable introduction to the logistics of Field Day (FD). (There are striking similarities between the Novice class popularity at that time, in fact, and the codeless Technicians entering ham radio today).

Since we were the first batch of Novice applicants, and the instruction was geared more to General or Conditional class students of the day, we suffered a certain amount of overkill. Not surprisingly, nearly all passed the tests, and as licenses began trickling through the mail, the club stepped up recruiting efforts to capitalize upon our enthusiasm and to fill vacancies on committees. Consumed by gratitude to all those Elmers, we were fresh meat. In less time than it took to memorize new call signs, our dues were extracted and we "volunteered" for activities. I drew Field Day.

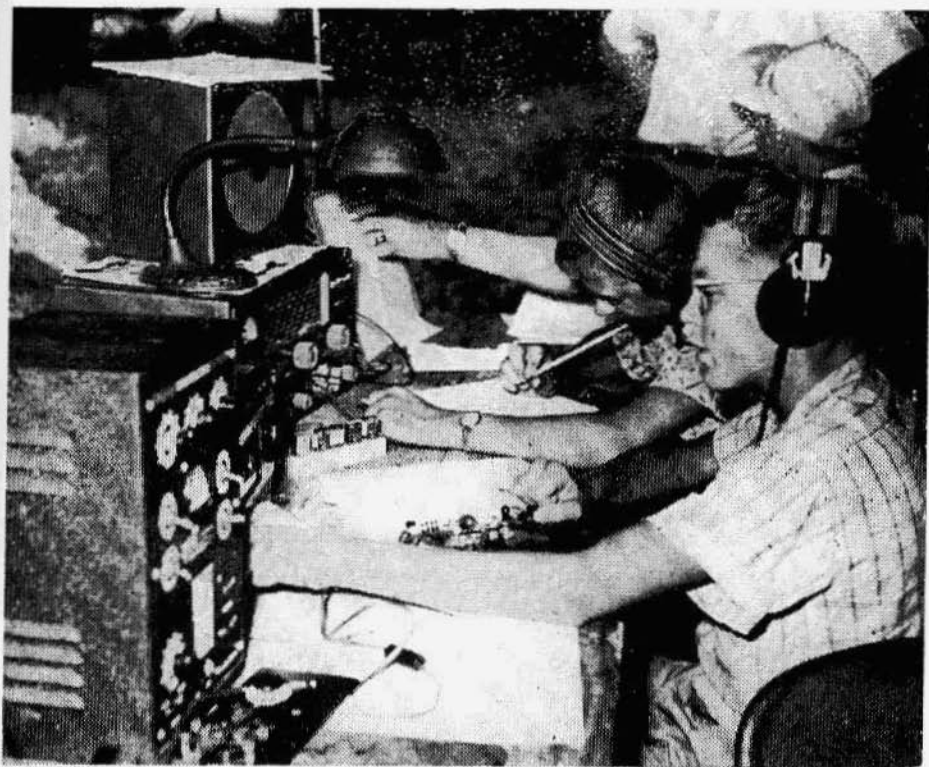
Springing the Trap

To be sure, more than one new ham in those times absconded with his license and was neither seen again, nor ever heard on the air. For active club members, however, there was no free lunch.

A Charter Member would get to his feet each meeting and make an impassioned speech reminding us how we are licensed for public service. Since many of the attendees at any given club meeting were - to be charitable - detached from any business at hand, service activities fell to a few movers-and-shakers, supplemented by us grateful newcomers. Most of my group had the good sense and busy schedules to resist over-extending themselves, whereas I had neither.

A conspiracy soon developed to exploit my boundless enthusiasm for the hobby. Someone had noticed that I would invite myself to any occasion remotely associated with ham radio. There was a lot going on in the early '50s: Kingsport, with its industrial and manufacturing foundation, was a hotbed of ham activity. Thus, if someone had a mobile rig to be installed, I was the kid who would crawl around the trunk installing connections for dynamos, modulators and RF sections. If the rotator balked on top of your creosoted pole, I was your instant line-man. And, why use a bow-and-arrow or slingshot to put that new Zepp haphazardly up in a tree when I would climb it and place the halyard through just the right fork?

Less popularly, I telephoned nearly every active ham in the area for a visit to his shack "that very evening," bicycled across town to his QTH, and parked myself before his rig until early yawning. It wasn't my fault that people had to get up in the morning and go earn a living - I was collecting design ideas about antenna systems and sta-



The author, then WN4UJT, pounds brass in the '52 Field Day while Fritz Pilgrim, now AB4H, hones skills he will use later as a top DX contester. Separates of the day include a Harvey-Wells Bandmaster and National NC-125.

tion layout. It came as an awful shock when I was gently reminded at the home of one ham, whose state-of-the-art rig and antenna farm attracted me regularly, that I was not considered a member of the family.

The Moment of Truth

It all reached a head at a club meeting when I was nominated Chairman (and only member, it later developed) of the Field Day Site Preparation Committee. I graciously accepted the unanimous vote. There must have been some apprehension among club officers over whether preparations would in fact materialize, but since my Dad was on City Council, they probably figured that if I defaulted, the city would supply tents, tables and other equipment for this public service occasion. Regard-

less, I was given authority for procuring shelters for the multiple stations to be operated on FD, and for having them installed at a preselected hilltop location.

The only source I knew in town with an ample supply of canvas tents was the funeral director. Now, Mr. Dobson was a friend of the family. When he saw how the radio club insidiously took advantage of my youth and naivete, he made available a large tent for each operating position. More importantly, he placed at my disposal two grave diggers, three box lunches, a truck, and tools for this expedition.

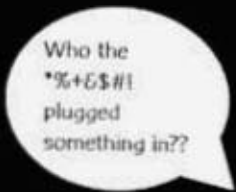
On the appointed June day, one of East Tennessee's classic broilers, Digger 1, Digger 2 and I retrieved a half dozen tents, poles, stakes and rope from

the bowels of the mortuary. I was given the obligatory, if irrelevant, tour of the casket room, the body preparation area, and the cooler. As the piece de resistance, I was invited to witness a new client being prepared for what anthropologists call "life's final performance." My composure was regained only when we arrived at the sweltering Field Day site.

Initial plans called for locating the tents between trees which would hold various wire antennas of the day, typically dipoles and random wires. There were minor tactical challenges, such as displacing grazing cattle from their hill-top turf, and sidestepping meadow muffins of truly astonishing proportions. In due time, the tents were erected and guyed, we packed up the truck, had an RC and a Moon Pie at a Mom-and-Pop grocery on the way back, and I conveyed the news of our success to the Field Day chairman. It was D-Day minus 1 and the contingency plan could be junked.

Preparing for Zero Hour

The most extraordinary feature of Field Day, even to the present time, is how it all comes together in such a short period. When I went out to the site next day, tables were in place, a generator was running, transmission lines and wiring cables were everywhere, and equipment (separate receivers and transmitters, of course) formed several operating positions. Antennas were positioned at right angles to reduce interference among the stations, and all CW transmitters used key-click filters. As the shadows lengthened, operators were recruited from the legions of helpers, observers, and "supervisors." About dark, someone rigged a counterpoise (for grounding) a few inches above the ground. Those thirty-odd feet of wire were to victimize more participants, chiefly late night-shift operators drowsily shuffling between tents, than all the bee stings, heat exhaustion, RF burns,



Who the
*%+E\$#!
plugged
something in??

"Restoring" power to the
receiver shows everyone the
Novice's skills.

and half-cooked meals put together!

My chosen role had been to help with a few antennas, to gather as much credit as I could for getting the shelters in place and to make the rounds of each station for any unusual happenings. A veteran FD-type who resembled the Ghost of Field Day Past took a look at me and prescribed some shuteye. Just as I headed for a nap on someone's unoccupied cot, expecting to be in top form on 80 meters that night, I spotted a National NC-125 receiver sitting at an operating position. It had, to all appearances, a power cord without its plug. I found a two-prong plug, skinned the zip cord conductors about an inch, attached the wires, inserted it into an outlet, and --WHAAM!-- all the lights went out! Forty-odd years later, I can still recall the sound of the generator winding down, a period of deafening silence, and then an agitated shout: "Who the *%\$&?! plugged something in?" I was struck mute, but in a minute or so an Old Timer came over with a flashlight and unplugged my receiver. It turned out to have an intact power cable and plug, of course, but someone had temporarily attached a short length of zip cord (popular then as a feedline)

to the antenna terminals. The generator restarted, lights resumed and Field Day was on. Remarkably, the receiver antenna coil survived meltdown. Old Timer, sensing my embarrassment, said we wouldn't tell anyone, and to my knowledge he never revealed the culprit.

The Challenge of Public Service

It was some years later that the objectives of Field Day, then, as now, to train operators and to test equipment for communications during emergencies, became clear to me. A few decades after my first glimpse of disaster preparedness training, in the course of which hurricanes, tornadoes, earthquakes, and other tragedies have brought hams to their finest hour, the lessons of that summer of '52 are still poignant.

The service ethic in amateur radio is really no different today. Field Day has the same combined goals of emergency preparation and unbridled fun. And there is still a reliance upon new blood to help with the planning process, assemble equipment, erect antennas and operate the stations - especially during the wee hours.

Just think about it. If you squeeze up to the front of the room at club meetings looking even moderately interested, all this can happen to you. ER

PRC-47 from page 18

The 74HC04 runs the crystal up to TTL levels. The 74LS393 and 74LS08 provide the desired divide by 6 needed with the crystals I could get my hands on. The local parts fellows had 2.983 MHz xtals (close enough) on hand and I grabbed onto those. The pot allows you to adjust the output to match the normal 500 kHz input. I laid out a board with the CIRCAD for Hams program. The final board fits neatly inside the rig with some double sided tape. The relay and switch allow you to flip back and forth between USB and LSB. Instead of gouging a new hole in the radio I un-

screwed the battery test switch and put my USB/LSB switch in that location. I taped up the battery test switch and tucked it behind the front panel. A local machine shop took care of making a new antenna panel so I could use SO-239 connectors instead of that weird screw on jobbie. Of course everything is 100% restorable should the value of the PRC-47 in its pristine condition become an issue. By the way all the drawings were done with CIRCAD, which sure beats the heck out of my old drafting table! The boards I laid out are available as kit or blank boards with doc.

On The Air:

With the standard handset and external speaker I felt a little like Radar O'Reilly talking to Skippy. My first contact was with Jerry, W9JIF and Dave, W9OC on 40 meter phone. Because of the new injection frequency the dial was 3 kHz lower than the actual frequency (no big deal). 5/9 signal reports were exchanged and surprisingly the audio with the HT-33 handset was pretty good. I worked a number of other stations with a few commenting that a slight 400 cycle power supply noise was faintly audible. One fellow insisted I was in an airliner because of it! Another guy I talked to somehow knew I was on a Collins rig. My buddy Roger, WAØVLL attributes this to the distinctive sound of SSB through a Collins mechanical filter. All in all a fun project. One of the rigs is now being used by the Farmington Civil Air Patrol for its HF communications. ER

USB/LSB Semi Kit (with antenna panel)

\$49.00

USB/LSB raw board \$19.00

Antenna panel \$9.00

Include \$2.90 for 2 day air shipping.

One Christmas Far Away from page 15

knew better than to pursue further anything concerning our jobs. We then compared notes about duty in West Berlin, which at that time was considered the ultimate in desirability, especially for enlisted personnel. Being ensconced about a hundred miles inside the Iron Curtain, the troops could face morale problems. The military leaders therefore showed wisdom in placing minimal restrictions on the GI's off-duty time. One had free run throughout the American, British and French sectors. The American enlisted man's dollar then wielded a buying power that earned respect and envy of the British and French occupation troops, and of the German nationals. Almost every night was party time, except when the next morning scheduled an inspection, or when a practice alert was called. But the teams, whose mission was highly classified, were governed by a special unwritten policy. One could be with a different German girl each night of the week - no problem. But being with the same girl more than two or three nights a week could pose a threat to security, because an emotional entanglement might cause the trooper to talk. A few team members didn't associate with German girls at all and faced intense scrutiny by superiors for "abnormal" behavior.

Bill was one of these. He scorned the commonplace GI sensual excesses in West Berlin - all German girls who ran with Americans he considered, without exception, whores. He longed for his teen-aged maiden in New England, and he portrayed in interesting detail both her body and soul, but mostly her body. He worried that she might not accept his hobby of ham radio, should they decide to get married. Ham radio. Now there was common ground for animated conversation. He wanted to talk on and on. The mess hall closed. We retired to the enlisted men's service club where Christmas cheer provided a warm, friendly ambience conducive to soul contact.

That Christmas night, two hams far away from their shacks had a fine ragchew in the eyeball mode, a single contact logged only in memory. Our tastes in hamming had much in common, it turned out. We both preferred CW because it was the cheapest way to get on the air. Bill said he could work Europeans on 80 and 40 meter CW almost anytime that long skip was in. Not to be outdone, I replied that working ZL and VK on 40 CW was a piece of cake for a W6 when skip was in. He asked about Japan. I confessed I had only worked one or two. Bill probably enjoyed this brief put-down. But I informed him that in 1953, when I shut down the station to enter the service, about the only legitimate ham stations in Japan were American occupation forces. Relatively few of these were active. Observing Bill's sudden loss for words, I rubbed it in. I asked if he had ever heard anything out of Japan. He changed the subject.

Bill's station, like mine, was in a flux state when we entered military service. We both were using surplus Command Set transmitters. These items were problematic in two areas. The BC-459 transmitter, the "HF" member of the series, wouldn't work above 9.1 MHz. These transmitters on CW could also chirp like an aviary of agitated birds. Bill said he never had gotten a ticket for chirp. Asked about how he had cleaned up his signal, Bill first asked how I had cleaned up mine. He listened alertly without comment. His ego had enough class to know when to shut up, as not to interfere with new incoming facts. I told him that one simply keyed the parallel 1625 cathodes and let the 1626 oscillator stage run during the transmit period. Bill said he didn't change the wiring at all; he keyed the oscillator and final in parallel. With a superior attitude, he indicated that his unmodified signal often got through pile ups on Europeans. He figured there must be something that made his signal stand out, apart from

his operating skill. He said it was probably his end-fed long wire, "exactly two wavelengths on 40 meters, cut to within a half inch of formula." He said the wire ran above some animal enclosures on the family farm; this enhanced ground conductivity. Asked about signal reports, Bill said he usually got RST 579c or better. He explained that the "9c" tone report obviously meant "c" for crystal quality. The possibility of clicks or chirps under the "c" heading escaped him. Bill seemed oblivious to his good fortune - that the military had gotten to him before the FCC.

We'd been talking about transmitters. The topic shifted to receivers. I spoke with pride about my fairly-new Hallicrafters S-40A receiver coupled to a surplus BC-453 Q-5er, a very effective combination for CW selectivity. Bill said that was probably okay if I could handle the typical Hallicrafters drift. I detected a tinge of envy. Bill had only a BC-454 surplus receiver for 80 meters and a BC-455 for forty. He claimed his surplus FL-8 audio filter gave all the selectivity he needed and added that his surplus receivers drifted far less than any Hallicrafters. He was probably correct. But he knew I could hear signals on bands above 40 meters and he couldn't. No one pressed the point. Just about then Bill stood up and said it was his sack time.

The young ham now sat alone reflecting on this unique Christmas QSO, imprinting it subconsciously into the bank of life's memories. He never saw Bill again. The clock approached midnight, the club's closing time. The young ham from California headed for the exit, passing by the table of some grizzled master sergeants still nursing remnants of their adult beverages.

Outside, beams of electric lights were reflected on the snow covering the yard, which helped guide the young ham back to his assigned barracks room and, like a silent chorus, underscored the experience of his first white Christmas. **ER**

The Perfect KWM-2 from page 9

sure I would still be puzzling over some nasty little problems. I highly recommend the KWM-2 and 30L-1 videos and believe that if you have Collins equipment, regardless of its condition, you should get the matching video! You will never regret it.

On a more critical note, I will say that I did not like the looks of washing the radio chassis with cleaning solution as shown in the video. Even though both Floyd and Dr. Brothers swear that washing the entire radio does it no harm, I chose to clean the surface of my chassis by hand with controlled amounts of mild cleaning solution. Even though it might not shine as brightly, I believed it was much safer to steer clear of submersing my radio.

If you would like to see the final results of my tireless efforts, both the KWM-2A and 30L-1 described in this article will be on display at the HI-RES booth at the 1995 Dayton HamVention. Thanks for letting me share my story with you. **ER**

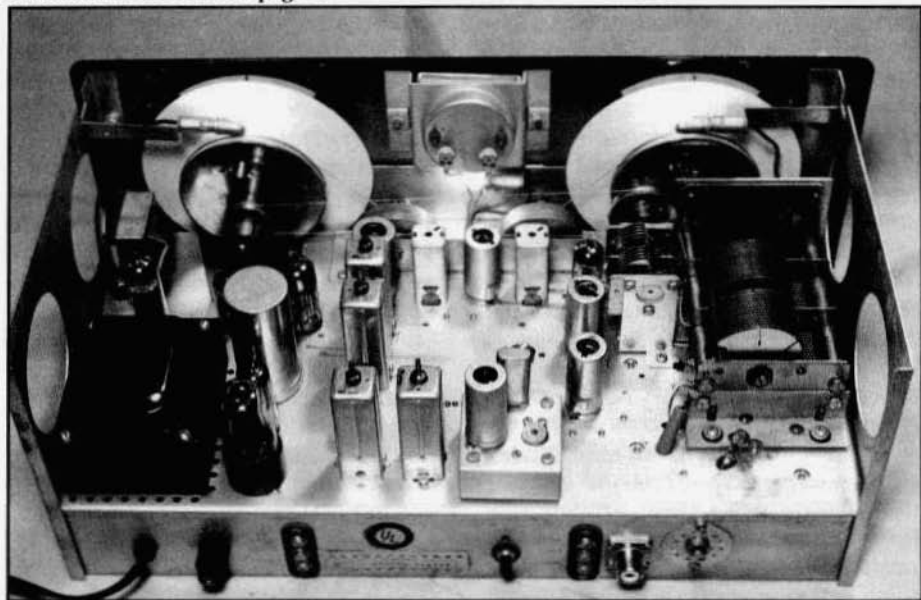
Four Tube Superhet from page 14

cies shown for Y1 and Y2 are their series resonant frequencies. The overall receiver selectivity is shown in Figure 6. The 6 dB bandwidth is about 530 Hz, which is less than theory predicted. It is great for CW but too sharp for SSB but that suits me fine. With the BFO set 800 Hz below the peak IF frequency, the audio image is 40 dB down. That's one hundred times better than the old regenerative receiver!

Part 2 of this article will show the complete wiring diagram and cover RF alignment and dial calibration will give more information on the requirements to be met by the BFO. **ER**

References:

1. The 2X4 - Superheterodyne, 1946 ARRL Handbook.
2. High-Frequency Crystal Filters for SSB, D.J. Healey, W3HEC, QST, Oct. 1960. This article gives a good bibliography on crystal filters.



Rear view. Does Paul's 100 kHz calibrator look homebrew? Compare this view with the "cluttered" above chassis view of the SX-100 in ER #58, pg. 15.

HA-7 variant or the newer HA-19.

* The SX-100 has a front panel RECEIVE/STANDBY switch, the SX-122 doesn't. However, the SX-122 can be switched from receive to standby using the STD BY and GND terminals on the rear-apron. The SX-100 can also be remotely controlled through the rear-apron DC POWER SOCKET. I prefer a front panel mounted switch.

* The SX-122 has no notch-filter but it does have a product detector.

* The SX-100 has an AVC ON/OFF switch, the SX-122 doesn't.

There are other differences between the two receivers, but the ones mentioned above are the ones that really stand out with me. The real test is using the receivers on the air and I like both. A slight nod goes to the SX-100 on CW/SSB because its tuning is a bit finer and easier to control. After alignment, the sensitivity of both receivers is similar. The warm-up drift of the SX-122 is better.

The matching Hallicrafters R-47 speaker is adequate for CW and SSB reception with an advertised flat response from 300-2850 Hz.

Bottom line? I really like the SX-122 but it's clear that there was some cost-cutting from the SX-100 to the SX-122. Something was lost in the "translation". From a purely nostalgic point-of-view, I prefer the SX-100. The nod again goes to the SX-100 when I consider my CW requirements. But mechanically, the design of the SX-122 is superb - the last of the large Hallicrafters vacuum tube general coverage receivers - the end of an era. **ER**

Selected References:

1. "The Hallicrafters SX-100 - Restoring a Classic", Vintage Anthology - Book 1, David W. Ishmael, WA6VVL, 1994, pgs. 32-35.

2. "Recent Equipment - The Hallicrafters SX-122A Receiver", QST, Aug. '70, pgs. 50-51.

3. "Recent Equipment - The Hallicrafters SX-100 Receiver", QST, Dec. '55, pgs. 52-53, 180.

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DEADLINE FOR THE JAN. ISSUE: JAN. 3

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

FOR SALE: Hallicrafters HT-40 - \$50; Utica 650 and VFO - \$85; Clegg, 99'er - \$40; Galaxy III and 12V sply - \$95; tube manuals, GE, RCA, Sylvania, various years - \$5. Plus shpg. Howard Hood, WA7QQI, 5670 SW 44th St., Port Orchard, WA 98366. (206) 674-2179

WANTED: All types of military electronics, especially RDF and radar items, manuals too. Also need URD2 antenna. William Van Lennep, POB 211 Pepperell, MA 01463. (508) 433-6031

FOR SALE: Johnson Viking Thunderbolt 2 KW amp in exc. condx - \$425; Electrovoice 664 mics - \$35. Ron, (404) 664-6931

WANTED: KC5FDL, age 10, bought Kaar 10Z xmtr, age 7, that dad AB5L, age 49, has never seen and cannot identify. It has 6N7s and 807 PA and looks pre-war. Can you help us put this Morse code technician on the air with his anachronism? Michael Hopkins, AB5L, Box 226841, Dallas, TX 75222.

FOR SALE: NOS tubes list - SASE; Seneca - \$100; 75A-4 filters - 1.5 kc - \$130, 3.1 kc - \$50. **WANTED:** Manuals for PRC-68 and ARC-58. Joseph Pinner, KC5JID, 201 Ruthwood Dr., Lafayette, LA 70503. (318) 981-7766

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: Johnson Valiant I, D-104 mic; Johnson KW Matchbox, w/meter and coupler, exc. condx, w/manuals - \$590 package. (312) 807-5455

WANTED: Schematic or copy for GPR-90 RXD. Jack, VE3DUJ, RR2, Box 34, Roseneath, Ont. K0K 2X0, Canada. (905) 352-2732

WANTED: VLF rcvr - R-389, R-1401A, SP-600 VLF; late 75A-4 or HRO-60. Ward Remkopf, 116 Fairway Dr., Belmont, IA 50421. (515) 444-4396

FOR SALE: Collins 75S-1, exc., w/factory installed 136A-1 noise blanker, manual - \$375, 1/2 shpg; 312B2 spkr - \$100. John Miller, (907) 337-9157

WANTED: Manual, operating and service, plus schematic for Hallicrafters S-38B. Sam's, Rider, etc. Randy Hull, WB3ECC, 1101 Hagy Ln., Dauphin, PA 17018. (717) 921-2966

FOR SALE: Parting out SP-600JX. Any part for FREE plus shpg. SASE for inquiries. Itsuo Yano, 80 Lehua St., Kahului, HI 96732

WANTED: January, 1979 CQ magazine. L.A. Locklear, 1122 36th St., Gulfport, MS 39501-7116. (601) 864-8384

FOR SALE: I've sold my FM station, now I am selling my RCA mic collection. Please call with a bid. BKSD w/wind screen; SK46; 77B, exc. condx; 77DX TV grey in orig. box; 91B horseshoe type desk stand; 44BX w/orig. 3 leg floor stand; RCA KS3A floor stand; BK6B miniature; BK12A sub-miniature; BK1A "Icecream Cone"; 44BX, chrome and black; 44BX "NBC" switch plate on bottom; 44BX "NBC" cast aluminum flat; Junior "44" chrome and black; Junior "44" stainless with WMRI flag; program stand 90 satin chrome-cable guide; 44BX in box; remote amp; etc. All mics are new or as new, new ribbon, all work excellent. James F. Phillips, 414 Washington Ave., Defiance, OH 43512. (419) 782-8591, FAX 782-3299

WANTED: Any shape Cosmophone and info for registry; B&W coils #2175 thru 2179; Johnson 500 pwr sply/mod.; PMR7 cabinet. Brian Harris, WA5UEK, 3521 Teakwood Ln., Plano, TX 75075. (214) 596-2914

FOR SALE: Collins SM-1 mic - \$125; Heath SB-101 w/HP-23 sply - \$200; SB-110 6M w/SB-500 2M transverter and HP-23 sply - \$240; SB-604 spkr - \$35; DX-60 xmtr - \$70; SB-220 linear - \$525. All units w/manuals. Plus shpg. Kim Herron, KERN, 16141 24th Ave., Coopersville, MI 49404. (616) 677-3706

FOR SALE: ARC-52X; TBX-6 SCR-610, complete; BC-611; BC-1000; PP114. All equip. good condx. Steve Bartkowski, 4923 W. 28 St., Cicero, IL 60650. (708) 863-3090

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FOR SALE: Replica Ocean Hopper front panels - \$20 ppd. Includes copy of Ocean Hopper manual; 516F-2 mod-kit (ER #62) - \$13 ppd. DWI Engineering, POB 3611, Costa Mesa, CA 92628-3611.

FOR SALE: Cover BG-153 for BC-620, 659, light green - \$35; BG-67-A for MP-37, 57 - \$15; BG-173 for BC-1306, light green - \$45; BG-96 for SCR-508, 608, 808 - \$45; A-28 Phantom antenna - \$10; CD-515 - \$25; bag for M-209-B - \$45; CH-264 - \$55; BC-605-D - \$90; Y209D shock mount base plate for TCS - \$25; DY-17A/ART-13 - \$45; C-87/ART-13 - \$27.50; DY-88/GRC-9 - \$90; GC-6 crank, GC-7 crank, LG-3, LG-3-B - \$7.50; LG-2-B - \$15; MC-284 clamp - \$5; MC-423 clamp - \$3; MP-50 - \$45; PL-114 for BC-312, 342 - \$25; SA-35 cord for Super-Pro - \$25; NT-50159 TCS noise limiter kit - \$10, all NOS or NOSB; DY-88/GRC-9 - \$75; DY-105/GRC-9 - \$65; CD-501-A - \$35; all used/good. Plus UPS. Vibrators for military sets, including VB-16, some NOS, some used. Several TCS rcvrs, xmtrs, dynamotors, cables and accessories, BC-611 parts, other military radio parts, manuals, plugs, etc. Label and 3 stamps for large list or send wants. Mostly WW II but some Korea and Vietnam. I also buy & trade. Looking for BC-683, BC-684, BC-721 & accessories, IE-37, manuals and other items. Send your list. Robert W. Downs, WA5CAB, 2027 Mapleton Dr., Houston, TX 77043. (713) 467-5614

WANTED: WW II German sets. **FOR TRADE:** Swiss crypto gear; Warza-pact field radios; German WW II duplicates; telegraph equip. circa 1880's; German HRO copy. Rag Otterstad, OZ8RO, Hosterkobvej 10, DK-3460 Birkerød. 011-45-4281-5205, FAX 011-45-4468-1514

FOR SALE: HT-32 and SX-101 MK II - \$175; Collins 75A-3, 2 filters - \$400. **WANTED:** Collins 75A-1 and a dead or dying Atlas 350XL. Bob Kemp, 304 S. Washington, Lake City, MN 55041. (612) 345-5345 days

WANTED: National NTX-30 exciter, NSM modulator, National NTE exciter, NSA speech amplifier. Please indicate condx and price. Thanks. John Zitzelberger, WB6JJE, 5257 Lewis Rd., Agoura, CA 91301. (818) 991-8358

WANTED: Manual for Radio Industries Loudenboomer Mark II amp. This was the pre-runner of the HT-45. Please call and mention RI amp. Joseph Falcone, 3000 Town Center, Ste. 2370, Southfield, MI 48075. (800) 436-7026, lve msge.

FOR SALE: Viking II xmttr w/matching model 122 VFO, both in mint condx - \$150; DX-100 - \$75. Jerry, WB9TKO, (414) 452-3635

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: Good complete USN RBU/RIS rcvr (HF). Have Garrad 301 turntable to trade. Ed Allison, 5525 - 20th Ave., Sacramento, CA 95820. (916) 454-1788

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

WANTED: Globe 755 or 755A VFO; Johnson 122 VFO; Lafayette or Allied catalogs, 1957 thru 1960 (any or all). Rob, NS6V, (408) 464-0505

FOR SALE or TRADE: Ameco TX-62 6&2 AM/CW xmttr, w/matching VFO - \$75, U-ship. John Vercellino, WB9OVV, (708) 964-3020

INFO: Would the person who asked for 15 meter HRO coil information please write again. I found the articles. Jim Hanlon, W8KGL, POB 581, Sandia Park, NM 87047.

FOR SALE: KWM-1; 312B-2; 516F-1; 32V-3; Eldico SSB-100-F; HQ-170A w/clock & spkr; RME 6900. Joel Thurtell, 11803 Priscilla, Plymouth, MI 48170. (313) 453-8303

WANTED: Old QSL cards; Drake ham radio equipment; General Radio publications; tube books/manuals; early callbooks. Joe Holstein, NREA, 1515 Sashabaw, Ortonville, MI 48462.

FOR SALE or TRADE: Model 55 Atwater Kent breadbox radio; Atwater Kent model 84 cathedral radio; Heath HW-12/HP-23. **WANTED:** SX-88. James Thomason, AB5TE, (501) 741-2338 (w), 743-2582 (h)

FOR SALE: February 1944 U.S. Army Signal Corps issue of Radio News. Very good condx. Ted Bracco, W0NZW, Quincy University, 1800 College Ave., Quincy, IL 62301. (217) 228-5213

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

WANTED: Large winged emblem for KWS-1 pwr sply door. Gary, W8MFL, (612) 698-4851

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

FOR SALE: Selling my old AM gear, Collins 32V-3 xmttr, 75A-4 rcvr and Viking Ranger II. No ship. Bill, N0ZXX, 11608 Davenport Plz., #23, Omaha, NE 68154. (402) 330-6562

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

WANTED: Meter function switch for Johnson Ranger. Bill, KO4XF, (404) 887-7567

FOR SALE: R-1051B, manual, spare modules - \$150, U-ship. **WANTED:** CEI 357, 340, RS-111, others, paperwork, trade Collins for CEI. Terry O'Laughlin, WB9GVB, 306 Van Deusen St., Madison, WI 53715. (608) 258-1810

WANTED: HQ-180, fully functional and nice looking, but will consider all. David Benedict, 11050 SW Gaarde, #14, Tigard, OR 97224.

FOR SALE: Knight Ocean Hopper, coils, orig. manual, VGC - \$100 shpd. James B. Geer, WB5LXZ, 1013 Overhill, Bedford, TX 76022-7206. (817) 540-4331

WANTED: Front panel from Globe King 500 modulator deck. Jim Roseman, W9UD, 2716 West 3rd St., Coal Valley, IL 61240. (309) 799-7447

FOR SALE: Altec 1570B, 175W forever - \$175; Electro Voice 644 Sound Spot, broadcast grey on 418 stand - \$110. Jim Buchanan, (616) 382-5401

FOR SALE: Collins 75A-1, good electrical condx, looks nice except for hole in front panel; Drake 2A/2AQ/2AC - \$125; 'B', 'C' & 'D' HRO-50 coils - \$40 each. **WANTED:** LS-3 spkr, any condx. Cal Eustaquio, N6KYR, 1313D Foothill Blvd., SLO, CA 93405. (805) 594-0302

WANTED: Manuals or schematics for Lysco 600 xmttr, Clegg 22'er scvr, Johnson 6N2 xmttr, Harvey-Wells AR3A aircraft rcvr. Al Kaiser, W2ZVR, 713 Marlowe Rd., Cherry Hill, NJ 08003-1551. (609) 424-5387

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

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

WANTED: Someone with experience repairing Hallicrafters SR-2000's who can fix mine. Will ship to someone who has the supply or deliver whole unit within 100 miles of northern Illinois. Craig, WA9HRN, (708) 367-1599.

FOR SALE: B&W Matchmaster #651, Hallicrafters R-46B spkr; Bird Thermaline dummy load; Heath HW-16; Ameco AC-1; rare Micamold TX, 6AG7-6L6 CW rig, Joe K2QPR, (407) 220-7362 anytime

FOR SALE: My beautiful Collins 75A-4, serial # 45XX purchased from orig. owner. Has 3.1 and 6kc filters, plus matching spkr and orig. manual. This has the rare 136C1 Collins noise blanker installed - \$1000 or best offer. May take mint 75A-1 as partial trade. Ed, WA7DAX, 1649 East Stratford, Salt Lake City, UT 84106. (801) 484-5853

FOR SALE: Morrow MBR5, MB560A, manuals, parts unit - RTS600 AC sply, good appearance, untested - \$260 shpd U.S. Merle, W7YOZ, 12411 86th Place, N.E., Kirkland, WA 98034. (206) 823-8139

WANTED: Lil-Lulu 6M rcvr and/or xmtr; Knight T-400 xmtr; Clegg Comet 2M xmtr; early 6M/5M/2M/2.5M gear. Steve, K6PFW, 848 N. Silverwood, Upland, CA 91786. (909) 985-1062

FOR SALE: Drake 2B and manual w/2AC and 2AQ - \$225; EH Scott RCK VHF rcvr; parts unit for Heath Seneca xmtr. **WANTED:** Base for EV664 mic. Thanks! Tom Smith, N5AMA, 13034 Elmington Dr., Cypress, TX 77429-2062. (713) 376-3436 (h), 957-6420 (w).

FOR SALE: Gonset 2M Communicator III w/ 6 & 2M Gonset VFO, orig. manual, mike & cables, like new - \$145, plus UPS. Ron, KC6WTC, POB 783, Santa Rosa, CA 95402. (707) 539-8319

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WANTED: All items in WW II B-26 radio compartment, BC-461 antenna control box, clock lamps, oxygen, chair, etc. Greg Greenwood, WB6FZH, Box 1325, Weaverville, CA 96093. Msg, (707) 523-9122

FOR SALE: R-390A w/a cabinet & manuals; several older German portables; 2 cigar boxes full of resistors; old Hammarlund spkr. Sell as one lot. Joe Overmeyer, (312) 663-0150 (d), (708) 328-3134 anytime

FOR SALE: Repair! Radio repair, tube or solid state, reasonable rates. Jim Rupe, AB7DR, Western Amateur Radio Repair Co., (WARRC), POB 697, North Cove, WA 98547. (206) 267-4011

FOR SALE: Collins 75A-3 - \$345 PU only. Art Rideout, WA6IPD, 2235 Gum Tree Ln., Fallbrook, CA 92028. (619) 728-0490

WANTED: WW II Japanese military radio equipment of any kind; Japanese made shirt pocket transistor and tube portable radios. Takashi Doi, I-21-4, Minamidai, Seyaku, Yokohama, Japan.

FOR SALE: Items priced to sell. QST in binders, 1960-74; Olsen AM-158 tube amp w/box & manual; older D-104 mic; Westinghouse KU-618 tube w/box. Ed Turner, KB8MPR, 730 East Martin St., East Palestine, OH 44413. (216) 426-4968

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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

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FOR SALE: Collins 75A-4, serial #4031, up and running, nice shape, will accept best offer. Rich, WA2TUM, (908) 968-1452

WANTED: Hallicrafters HT-20. Still looking: E-V 664 mic, HT-20 xmtr unmodified, have all knobs, decent front panel. Roy, N5QQM, (504) 272-2563, FAX 272-4913

FOR SALE: TBY xcvr - \$25. Ed Guzick, 916 Lenox Rd., Glen Ellyn, IL 60137. (708) 469-3183

WANTED: Twinax connectors UG-102/U, UG-970/U and UG-971/U, have UG-104/U for trade; SP-600 BFO knob (0-10kc) and selectivity knob (5-pos.) Bob Bakinowski, 1524 Saint Tropaz, Tucson, AZ 85713. (602) 624-8029

FOR SALE: Collins 75S-3B, exc. reconditioned, guaranteed - \$475 ppd. Cory, N2AQ5, 1000 E., 14th St., Bldg. 178, Plano, TX 75074-6249. (214) 751-7535 (24 hrs.)

WANTED: Schematic or operating manual for Hallicrafters TO' keyer, copy OK. John P. Nelson, NYØQ, Box 610, Nucla, CO 81424

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FOR SALE: HQ-160 w/manual, exc. condx - \$175; HRO-50 'AA' coil w/dial scale - \$40; HRO-50 'E' coil - \$75; HRO-50 'F' coil - \$75; Heath AT-1 w/manual copy, exc. condx - \$100; Drake W-4 - \$65. All plus shpg. **WANTED:** Drake 2A. Al Culbert, KOAL, 328 Norman Dr., N.E., Cedar Rapids, IA 52402. (319) 377-4367

FOR SALE: Just received large amount of rcvg, xmtg, military, industrial tubes pulled from U.S.S. Hornet. Also a few 1943 telephones. Write or call Bill Hanks, Box 1004, Salome, AZ 85348. (602) 859-3797

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FOR SALE: Meters - Collins #521, Central 200V, 600L - \$15 each; Jewell round 5V & ohm - \$6; Narda directional coupler, 95-2GHz, -10 dB - \$20. Harry Blesey, N9CQX, 9, 5740 Clarendon Hills Rd., Hinsdale, IL 60521. (708) 789-1793

WANTED: McIntosh and Thordarson amplifiers any condx. Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53228-0803. (414) 545-5237

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

WANTED: Escutcheon & coils for Pilot Super Wasp; ARRL Handbooks 1926, 1931, 1936, 1940; early callbooks. Jim Henderson, K6JAD, 3136 Ronald St., Riverside, CA 92506. (909) 682-8935

FOR SALE: Clegg Zeus xmtnd pwr sply; SX-96; S-40; TR4CW. Write for details. Greg Richardson, POB 405, Gallipolis Ferry, WV 25515.

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WANTED

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

FOR SALE: Hallicrafters CB-3A CB xcvr in orig. box (w/mic) - \$75 OBO; Hallicrafters S-120 - \$40; 6V Dowkey (new) - \$25; Heath HW-101 w/manual, ps, SWR bridge & mic - \$150. **WANTED:** Exc. to mint S-20R. Bernie, WA6HDY, (805) 481-6558

FOR SALE: Repair & restoration of all classic & vintage radio equipment, reasonable rates, prompt turn around, 25 yrs experience. Mike McKean, N3HJQ, 726 McClellan St., Philadelphia, PA 19148. (215) 336-6111

BUY/SELL/TRADE: Misc issues of U.S. Amateur Callbooks, 1914 thru 1980. SASE for list. Bob Arrowsmith, W4JNN, POB 166, Annandale, VA 22003. (703) 560-7161

FOR SALE: Collins KWS-1, good condx - make offer. Cash PU only. Write: Dick Haungs, W2UJR, 11315 Cary Rd., Alden, NY 14004-9547.

WANTED: BC-696/T19 & BC-459/T22 ARC xmtrs in orig. condx; Surplus Conversion manuals #1 & #2; schematic for RCA Radiomarine Radiotelephone 2-3.5 MHz, model ET-8037. Wayne LeTourneau, WB0CTE, Box 62, Wannaska, MN 56701. (218) 425-7826

FOR SALE: Webster Bandspanner - \$85; TS-382, TS-452C - \$25 each; D-104 - \$20; BC-610 coil set - \$75; BC-610 plugin set - \$80; tubes - 304TH, 304TL - \$18 each; 4E27, 812, 802 - \$12 each; 4-65, 804 - \$8 each; parting out TMC GPT-750D2, BC-610E, R-388, BC-348R. U-ship. WA7HDL, (208) 756-4147 after 1730 MST.

WANTED: 1930-1950 Popular Mechanics magazines for radio projects; G-410 or G-415 or G-521 Temple brand portable radio. Harry L. McCall, KB4CSY, Rt 1, Box 244, Ennice, NC 28623-9641. (910) 657-8248

FOR SALE: Crystal radio set kits and parts. Send SASE for brochure. Carl & Grace ent. 5636 Romeyn, Detroit, MI 48209.

FOR SALE: Johnson Invader crystal filters, numbers 22-1772-1670 and 22-1772-1698. Both with 5/11 - \$45. Jim Cunningham, K4DEE, 1045 Fairway Dr., Winter Park, FL 32792. (407) 679-8086

FOR SALE: RX-1 Mohawk rcvr w/spkr, HX10 Marauder xmtr w/mic - \$450 PU only. Michael Pinto, N2XVR, 47 Harding Dr., Rye, NY 10580. (914) 835-7401 lve. msg.

FOR SALE: 25th Anniversary NC-200 w/spkr - \$325; Hammarlund HQ-150 "as new" - \$295; RCA AR-77 rack version, rare - \$250. Gary Lee, KE6MS, (310) 696-0177 phone/FAX

FOR SALE: Attn. 160M affectionadoes: (1) BC-441-D Navy xcvr, 1700-2800 kHz, w/shock mounts. Trade for BC-348, 312, 342 or ? \$125 outright, PU only. Could meet equal miles for exchange, 100 mile limit. K9IDB, 603 Killarney, Greenville, IL 62246-1350. (618) 664-2748

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: Service manual copies. Most \$5, shpg \$1 each. Hallicrafters, Heath, Johnson, others. SASE for list. DSM Diversified (formerly Miller Radio), POB 675, Erie, PA 16512.

FOR SALE: 500CX - \$275; 500C - \$250; 350A - \$250; 410VFO, 510X, VX-1, FP-1, 14C, all VG. **WANTED:** New 8950's, M2057's, 6KD6's, 6LQ6's, KO6J, (714) 643-7930

WANTED: 1972, 1977, 1988, 1989, 1990 issues of Ham Radio Magazine. Have many issues of Ham Radio, QST, CQ or 73 to trade. George, WA0ZYX, (507) 288-0242

WANTED: Shop manual for Collins R-391 rcvr, copy OK. Call Wes, WV5L, (903) 838-0569

WANTED: S-meter for SX-24 or trashed SX-24/25, WW II TBY unmodified; 1950's vintage, working crystal mic for AM station. Bob, K6GKU, (619) 792-8227

WANTED: Tech manual for WW II telegraphers "mill". Signal Corps MC-88, Remington Rand, Model Seventeen. John Elwood, WW7P, 5716 North 34th Dr., Phoenix, AZ 85017-1911.

FOR SALE: Knight G-30 GDO - \$35; Heath HW-101, HP23B, mic, books - \$175; Heath SB-614 - \$40; Heath HG10B - \$40; Heath HD10 - \$20; Heath SB100, SP600, HP23B, Shure mic, books - \$190; Swan 120, Heath HP20, Astatic mic, books - \$125; Heath SB-630 - \$50; Jerrold TC2 coaxial switch - \$50; Jerrold SS 3007F sweep gen., 0-300 MHz - \$150; Sig. Corps BC-221 AH in custom case (call) - \$75; Swan Cygnet 270B - \$50. Clayton Vedder, POB 2823, Durango, CO 81302. (303) 247-2969

WANTED: 2/6 meter AM rigs, amps, converters, etc. Conset, Clegg, Lafayette, whatever? Scott Swanson, K6PYP, 210 Mantor Rd., Pacific Palisades, CA 90272.

ELECTRIC RADIO PARTS UNIT DIRECTORY

If you need a part for a vintage restoration send \$2 and an SASE (.52 postage) for a 7 page list of parts units. If you have a parts unit, consider putting it on the list. Your dead unit can help bring others to life!

FOR SALE: Johnson Viking 500 (RF deck only), spare final, manual - \$250; Hallicrafters SX-71 - \$100. Dave Roscoe, WIDWZ, 49 Cedar St., East Bridgewater, MA 02333. (508) 378-3619

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

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: TSI 361R rack mount 35 MHz freq. counter, clean - \$20; General Radio 1191B 50 MHz freq. counter, works, manual - \$30; Realistic TM8C tube AM-FM mp. tuner - \$25; Tek 545 scope w/CA plug-in, exc. condx, w/manuals & extra 1A2 plug-in - \$75 for all. Shpg extra or P.U. Used tube list, SASE. **WANTED:** Wood cabinet for Revox A77. Bill McCombs, WBOWNQ, 10532 Bartlett Ct., Wichita, KS 67212-1212. (316) 722-7669

FOR SALE: NOS TV and radio tubes, parts, SAMS, mostly from '60's and '70's. Send large SASE for list. Charles Preston, K4JH, 48 N. Ivandale St., Hamilton, VA 22068. (703) 338-4152

FOR SALE: New Ranger I, Valiant I and Navigator plastic dials, 160-10, freq. numbers in green, w/all holes, like original - \$17.50 ppd. Bruce Kryder, 4003 Laurawood Ln., Franklin, TN 37064. (615) 794-9692

FOR SALE: Atlas 210X w/console ps, exc.; Drake T4X. **WANTED:** Schematic for tube type Fender amp. Gene, W7MXM, (208) 522-5854

WANTED: Info on Bendix Marine ADF100 auto direction finder; also to buy RBA, RBB, RBC rcvrs. John Hartman, 11 Woodhenge Cir., Londonderry, NH 03053. (617) 437-2819

FOR SALE: R-390A (Amelco), exc. working condx, w/op. manual - \$275 firm, U-ship. W8PAL, (802) 814-6387 days

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WANTED: RF enclosure cover for Collins 32S or KWM2 series rig. Will pay up to \$20. Cliff Fleury, A17Y, POB 961, Mesquite, Nevada 89024. (800) 622-3687 or (702) 346-7089

FOR SALE: Hallicrafters SX-43, very poor - \$25; Hallicrafters SR-500 xcvr, no finals, fair, homebrew pwr sply, manual - \$80. U-ship. Rick, 9031 Troulon, Houston, TX 77036. (713) 774-5102

WANTED: W.S. (Canadian) no. 29, A&B sets; Soviet R (P) 112 xcvr; U.S. RT-136/GRC-13. Leroy E. Sparks, W6SYC, 924 W. McFadden Ave., Santa Ana, CA 92707-1114. (714) 540-8123

WANTED: WW II Japanese TX/RX sets (and parts) for restoration to operating condx and ER articles (now restoring 94-5 three tube rcvr); manuals (or copies) for GF-11/12, PRC-14 and RA-34F. Ken Lakin, KD6B, 701 SE Salmon, Redmond, OR 97756. (503) 923-1013

FOR SALE: SB-220 amp - \$575; RAL-6 rcvr - \$150; ART-13 & dynamotor - \$150. U-pickup. W7RBF, (602) 864-9987

WANTED: Pay dearly and/or trades for National SW-4, also Sky Buddy S-19 (not S-19R). Robert Enemark, W1EC, Box 1607, Duxbury, MA 02331. (617) 934-5043

WANTED: Collins 75A-4 for my station. Top dollar for quality condx. Bill, WC3K, Bowie Maryland, (301) 464-6969

TRADE: Johnson Valiant, factory wired and speech mods have been made for one linear amp. that covers 1.8 and higher, homebrew or factory. Bob Bricker, K4CSV, 821 South 14th St., Fernandina Beach, FL 32034. (904) 277-7061

WANTED: Hallicrafters SX-28 or A' in exc. or better shape. Will pay top dollar for best condx. Possible trade for Hammarlund SP-200 w/ps in good condx. Will pick up anywhere on west coast. Bruce, KE6GLS, 47 Windmill Ct., Brentwood, CA 94513. (510) 634-0739

FOR SALE: 1933 ARRL Handbooks - \$50 each; Collins 75A-4 manuals - \$30 each; Tektronics 531A oscilloscope manuals - \$10 each. Shpg. extra. Paul Mezzapelle, WA6N1J, Box 883, Carmichael, CA 95609. (916) 481-0145 eves

WANTED: Heath SP600 grill, 1805-1 antenna post, lever knob for Hallicrafters SR. **TRADE:** Nice HQ-170A front panel for HQ-170. Bill, KE7KK, 6712 Lake Dr., Grand Forks, ND 58201. (701) 772-6531

FOR SALE: Clegg Venus 6M SSB xcvr, exc., pwr sply, manual - \$175; Hallicrafters S-20 Sky Champion (N.W.) - \$75; S-22R Skyrider Marine (N.W.) - \$75; National SW-54 (V.G.) - \$70; Regency MR-33D (N.I.B.) - \$75. All 'OBO' + UPS. Robert Baumann, 1985 So. Cape Way, Lakewood, CO 80227. (303) 988-2089 eves.

FOR SALE: Heath manuals (Xerox): DX-20 - \$8, HW-29 (Sixer) - \$10, HR-10B - \$9, QF-1 - \$5 ppd. Send long SASE for list of hundreds more. **WANTED:** GC-1A, AA-100, AJ-30, AJ-41 manuals. David Crowell, KA1EDP, 40 Briarwood Rd., North Scituate, RI 02857-2805.

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

FOR SALE: Cushman CE-3 service monitor with the following plugin modules, 301 oscilloscope (2), 302 FM deviation meter, 303 wideband mixer, 305 VHF preselector, 306E UHF preselector, and 312 freq. extender, includes all manuals - \$1200 plus shpg. Paul Mezzapelle, WA6NLJ, POB 883, Carmichael, CA 95609. (916) 481-0145 eves.

WANTED: Very good SX-115; SP-600JX cabinet; Collins 516F1 and 312B2 KWM1 spkr and 312A1 spkr (75A-4). **FOR SALE:** 75S3B, WE, VG - \$450; 312B4, RE, exc. - \$175. San, KSY, (501) 756-5010

WANTED: KWM-2/HF-380/KWM-380 noise blankers or junkers for rework. Call Clint, KM6UJ, (408) 742-4582

WANTED: Early RCA or Continental AV series AM aircraft radios or accessories. Allan T. Michasiow, 70 Turner Rd., Troy, NY 12182. (518) 237-9494

FOR SALE: Weston 785 multimeter, VG condx - \$25 + shpg. **WANTED:** Schematic, service data for Conelrad Monitorradio CMD3; vertical mounting brackets for USN TCS-12. Carl Gottsmann, KN6AL, POB 5670, Chico, CA 95927. (916) 899-8675

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FOR SALE: PJ-068 mic plugs for Collins S-line/KWM-2, new gov't surplus - \$8 each shpd in USA. Clint, KM6UJ, (408) 742-4582

FOR SALE: TV-7B/U tube tester, VG condx - \$65; TV-7(U)/U or TV-2(U)/U late date tube data information reprints - \$18 each; new Eimac 4-250A, 4-400A - \$100 each; Kepco 24V, 5 amp pwr sply, exc. - \$35. Shpg. extra. Joe Bunyard, 1601 Lexington St., Waco, TX 76711-1701. (817) 753-1605

FOR SALE: HRO coil "C", 3.5-7.3 MHz, gen. coverage - \$25, \$4 shpg. **WANTED:** Manual for Outcom-Hammarlund Model FM50a. Al Kaiser, W2ZVR, 713 Marlowe Rd., Cherry Hill, NJ 08003-1551. (609) 424-5387

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WANTED: Collins 32G xmtr, CC-3 suitcase, MM-1 mobile mic and TD-1 dipole antenna. Paul Mezzapelle, WA6NLJ, POB 883, Carmichael, CA 95609. (916) 481-0145 eves.

WANTED: Any AN/GRC-14 components to complete a museum showpiece. AN/PRC-74 antenna and mounts, W.H.U? Nice 1.3 to 2.1 MHz ARC-5 Tx. S.C. Signal Corps Museum, 5 Rollingwood Dr., Taylors, SC 29687. (803) 244-0324

FOR SALE: Johnson Ranger, good - \$150; Viking II, CD model, needs work - \$100; Viking II - \$135; Matchbox 275W - \$75; Hammarlund SP-110 w/ps, exc. - \$250; National HRO5TA1 w/4 coils & ps, very nice - \$250; NC-240D w/spkr, nice - \$235; NCX-5 w/external VFO & ps & calibrator, super nice - \$265; Hallicrafters SX-62A w/spkr, nice - \$150; RCA ACR 136, good - \$95; Heath DX-100B, very good - \$125. Always open to offers. Thanks & Merry Christmas. Fred Watson, KB8WRF, 581 W. Summit St., McClure, OH 43534. (419) 748-8798

WANTED: Heath VFO knob, 1-1/2" diameter, same knob as DX-100 VFO and other Heath equip. Bill, W7US, 11720 E. Twin Hills Tr., Tucson, AZ 85748. (602) 290-6064

WANTED: Diagram or manual for oscilloscope Dumont 301-A (USM 32). Hans Zimmermann, POB 209, CH-3780 Gstaad, Switzerland.

FOR SALE: Collins 32S3, 75S3, 516F2, DL-1 dummy load; Drake R4B, T4XB, MS4, manuals; Atlas 210X/console ps; (2) Eimac 8930 tubes, new in cans; Drake C-line + MS4 + FS-4 synthesizer+Eatek freq. readout & counter for C-line, T4X xmtr; Morrow Twins MBR-5 & MB560A + ps & spkr, mic, cables; Heath Apache TX1; Multi-Elmac AF-68 xmtr, 1070 AC/DC sply; RCA 813, Raytheon 4D32, new. W7MXM, (208) 522-5854

WANTED: Panadaptor BC-1031C (455 kc IF) & manual. John, (Colo.) (719) 481-4564 (4th ring answering machine).

FOR SALE: Exc. Drake T4XC, R4B, AC4, MS4 - \$400; TR4, AC4, MS4 - \$250. U-ship. Gary Elliott, N05H, 202 Clarice St., Delhi, LA 71232. (318) 878-8032

WANTED: 32V-2 or 32V-3 in good, unmodified condx. Can possibly pick up from a west coast location. Henry Rogers, WA7YBS, POB 511, Virginia City, NV 89440. (702) 847-9047

WANTED: Military HF xmtr for submarine restoration project; Collins mech. filters and accessories; old semi-automatic key. Brian Roberts, K9VKY, 3068 Evergreen Rd., Pittsburgh, PA 15237. (412) 931-4646

FOR SALE: Pair of 833A sockets/hardware - \$120.

WANTED: Two (2) 250TH tubes. Sue, (616) 229-4318 till 10 PM EST.

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

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

FOR SALE: Drake R-4A, T-4X and MS4 spkr & pwr sply, exc. condx - \$325; Heath HM-102, exc. - \$35; DX-60B, exc. - \$65; HG-10B, exc. - \$50; Mohawk RX-1, exc. - \$150; Hammarlund HX-50, exc. - \$200. Plus ship. Bob, (317) 881-9083 anytime.

WANTED: Schematic/info on Sonar SR-9 2M mobile rcvr (1951) and Bromeco CD-10X mobile 10 meter xmtr. Al Bernard, N14Q, POB 690098, Orlando, FL 32869-0098. (407) 351-5536

FOR SALE/TRADE: Hallicrafters S-120, Palomar VLF converter, both w/manuals - \$50 each or trade for Drake items. Jim Leatham, K7BTB, Box 50355, Parks, AZ 86088. (602) 635-2117

WANTED: Hallicrafters linear amp. and Eico or Heath grid dip meter. Will consider incomplete or non-working units. Don, WB5UIA, 903 Madison Ave., Minden, LA 71055. (318) 377-0651

FOR SALE: 75A-4 or S-line spinner knobs, new - \$60; 75A-4 - \$500; Shure 555 mic & boom, exc. - \$200; Collins parts. Ron Follmar, K5GTT, 332 Camino Real, Kerrville, TX 78028. (210) 896-8830

FOR SALE: Viking 500 - BO over \$650; BC-137, circa 1928 - BO over \$400; I-177 tube tester - \$20; Conar CW xmtr - \$35; 5BR converter - \$10; 2M Communicator II - \$20; new case for Heath CA-1 - \$5; SCR694C manual - \$7; AN-GRC-9 manual - \$10; 4 Millen wavemeters - \$20; BD-AR-93 dynamotor - \$20; 220V, 2A Variac - \$15; 115, 7A Variac - \$20; several Ige variable caps - call; parting out SX-28 (no S-mtr), ART-13, Johnson Ranger, Viking I, AF-67. FOB Joe Sloss, K7MKS, (206) 747-5349

WANTED: Hallicrafters SX-100 MK2 needing to be well taken care of. I'll pay top dollar. John Berenyi, (800) 484-6689 ext. 9291

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. *

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FOR SALE: Heath HR-10 - \$40; HO-13 Ham-Scan - \$50; HM-15 SWR - \$20; Hallicrafters S-41W - \$40; Drake R-4B, 2NT, MS-4 - \$240; Swan Cygnet 270 - \$125. Richard Lucchesi, WA2RQY, 941 N. Park Ave., N. Massapequa, NY 11758.

FOR SALE: Tubes/semiconductors/parts/meters/phoneneedles/radios - LSASE for 20 page list. W.F. Horn, 13110 Marsh Rd., Bealeton, VA 22712. (703) 439-9781

FOR SALE: Vintage 55B scvrs that need work: Yeasu FTDX-560, 500 watt HF - \$140; Swan 500 w/SX-117 AC ps - \$120; Hygain GT-550A - \$140; Gonset Communicator II w/VFO, clean - \$75; Philco 16 (cathedral) chassis w/spkr, working - \$75; S19R Sky Buddy - \$80; Heath GW-12 tube CB, new - \$60; GR 916AL RF bridge (to 3 MHz) - \$125; GR 1932A dis. anal. - \$75; Sencore TC-154 tube tester - \$40; Millen 90651 GDO, 1 coil - \$30; RCA TBV-75 field strength meter from 1930's, 515 kHz - 20 MHz, with all plug-in coils - \$125; RCA portable 3BX-671 in leather case - \$75; Type 12 ARC-5 rcvrs (190-550 kHz) - \$15 each; last call on ART-13 parts chassis - \$35 ea. U-ship, I'll pack. Thanks and my best holiday wishes to all the nice ER folks I've met over the past few months. J.B. Jenkins, W5EU, Box 5087, Red Oak, TX 75154. (214) 723-1835

FOR SALE: See my nine ads in the November issue of ER, plus new ads this issue. Most items from November still available. Send legal size SASE for complete list. Derek, K16O, callbook address, (916) 965-4904

WANTED: WRL SS3 Q-multiplier (1965); Brown Brothers straight key and Knight DX'er, transistor regenerative rcvr. Gary Wagner, K3OMI, 11124 Oak Hollow Rd., Knoxville, TN 37932. (615) 690-4217 days

WANTED: Bandswitch assembly for Johnson Valiant. Rear wafer burned up and shaft is worn. Anyone know of replacement source? Henry, N4VHK, (910) 761-8223

WANTED: RCA Radiomarine rcvrs, especially AR-8504 & AR-8516, also manuals for Collins 75A-1 & 75A-2. Dan Mason, RRT.1, Box 204F, Santa Fe, NM 87501. (505) 455-3416

FOR SALE: Hammarlund HQ-170A VHF, 160-2M, w/clock & manual in VG condx - \$250 or trade for SP-600JX-21 or '26. Victor, (805) 581-5317

Electric Radio T-Shirts

The front displays the logo from the cover of ER (the tube outline, Electric Radio, and celebrating a bygone era). The back has "Real Radios Glow in the Dark" (used with the permission of Classic Radio).

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FOR SALE: Very rare Heath AT-1 xmtr, exc. condx - \$150; VF-1 VFO - \$50; rare Heath Model SB-1000 HF linear amp, new kit in unopened box, single Eimac 3-500Z, almost identical to Ameritron AL-80A amp - \$800; very rare Millen model 90800 and Millen model 90801 50W exciter/xmtrs, both in exc. condx, with photostat manuals - \$150/each; National NC-300 rcvr, good condx - \$150; (6) Hallicrafters S-38B and (2) S-38C rcvrs, mostly complete and suitable for restoration - \$35/each, all for \$250; mostly complete Heath DX-40 for parts - \$40; knobs used on BC-614 speech amp (for BC-610), 1/4" shaft, 1-1/2" brass skirts with numbers 0-9 - \$4/each. Plus shpg. Derek, K160, callbook address, (916) 965-4904

WANTED: Copy of schematic or manual for AN/URC-32 pwr amp unit. Thanks. N4GL, 3840 Laguna Loop, Hernando, FL 34442.

FOR SALE: Swan 270D. **WANTED:** Skirted knobs (audio gain, CW, Osc.) for older HRO; antenna relay for HX-50; Drake 2AQ. Carter Elliott, WD4AYS, 1460 Pinedale Rd., Charlottesville, VA 22901. (804) 979-7383

FOR SALE: SP-600-JX6 tuner modules - 1, 2, 3, 4, 5 - \$10 each; Stancor chokes C-2307, C-2308 - \$25 each; pwr xfms - 1500 VCT/ 265 mA, 800 VCT/ 200 mA - \$35 each. Neil Berg, W0MXX, (612) 763-4857

TRADE: Collins 32V-3 and cash for Collins 32C, 45, 150 or 600 transmitters. Happy holidays to all ER readers - the nicest people in ham radio. Gary, WA9MZU, 1751 Michon Dr., San Jose, CA 95124. (408) 266-2218

FOR SALE: Services. To introduce you to our schematic service, we will send you one schematic of your choice for \$1 cash plus stamp. Applies to radios in the 1920-1960 era, except communications receivers. Regular customers included. Offer ends Jan. 1, 1995. Joseph R. Forth, 321 Long Vue Acres, Wheeling, WV 26003. (304) 277-3154

FOR SALE: PRC47 LSB/USB kit - \$40; new machined coax antenna panel - \$9. All restorable. Jay Craswell, WB0VNE, 321 West 4th St., Jordan, MN 55352-1313. (612) 492-3913

WANTED: Military manuals: Jefferson Travis 350A, Federal Telegraph BC-325; also need R-390 AF, IF and PS modules (not R-390A) Don, N3RHT, 47 Hazel Dr., Pittsburgh, PA 15228. (412) 234-8819

FOR SALE: R-390A carrier level meters - \$30 each; overhauled R-390A Cosmos PTOs - \$30 each. Plus shpg. Clark Hatch, W0BT, 2546 SE Peck Rd., Topeka, KS 66605. (913) 235-2721

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

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FOR SALE: National HRO-500, cosmetically and electrically exc., slight mechanical problem, copy of manual - \$500. Peter, (810) 435-1754

FOR SALE: 3' x 5' reprint of factory schematic for Collins KW-1. Please send \$25 ppd US to Tom Berry, K9ZVE, 1617 W. Highland, Chicago, IL 60660. (312) 262-5360

TRADE: MacIntosh MC-240 or MC-40's for Collins equipment. Gary, WA9MZU, 1751 Michon Dr., San Jose, CA 95124. (408) 266-2218

FOR SALE: Phillies novelty transistor radio, NOS Emerson P3400B with Phillies logo, nice - \$35 ppd. R.J. Eastwick, N2AWC, 224 Chestnut St., Haddonfield, NJ 08033. (609) 429-2477

FOR SALE: Chokes, new - 16 Hy. .05 A - \$8; 8 Hy. .05A - \$6; 8 Hy. .35 A - \$30; used - 8 Hy. 4A - \$15; 15 Hy. 25 A - \$10; tubes - new, rcvg - SASE for list (\$2.75 each); 832 - \$5; 833A w/sockets - \$300/pr. or swap for new 4-1000 socket/chimney; used - 4-400A/socket - \$65; 4-125 - \$30; 872 sockets - \$3; mics - RCA/Shure 444 - \$20; Astatic #332 - \$15; D-104 (no amp) - \$15; Utica 6M VFO - \$15; Radio Apparatus #5-19 squeelch - \$10; Ameco 6M preamp - \$15; RME VHF 152A - \$40; HD-20 remote 100 Hz calibrator - \$20; Heath WA-P2 audio preamp w/ps - \$25; Monitor Radio 150-174 MHz FM - \$20; Raymer 35W PA - \$18; blower, Dayton #2C782 - \$8. Crafts, POB 806, Lake City, MI 49651. Sue, (616) 229-4318 till 10 PM EST

FOR SALE: Used technical books - radio, electronics, mathematics, military, magazines, catalogs, handbooks, etc. \$1 for big list (stamps ok). Softwave, Dept. ER, 1515 Sashabaw, Ortonville, MI 48462

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

FOR SALE: Used goose-neck 12 VDC lights, California Highway Patrol cruiser pulls, about 11" high, small base with on/off switch and holes for mounting on dash, ham table, etc., bulb included, great for field day - \$7.50/each; new SO-239 female UHF chassis mount connectors with hard to find UC-177 shield for solder pin side - \$3/each; new, small (1-3/16" W x 1-1/8" T x 3/4" D) 12 VDC SPDT relays, in plastic cases with solder lugs out bottom - \$1.50/each; round 500-0-500 DC microamp meter, used pulls, 5DCUA movement, 2-5/8" diameter - \$5/each; circuit board/chassis insulated terminal solder studs, 100/bag, requires 1/4" 4-40 screws - \$2/bag; new military (army-green) straps 1" w by 9-1/2" long with squeeze to release buckles - \$1.25/each; new color coded 4-conductor 18-gauge 100' lengths tinned/stranded rotor cable, grey jacket - \$10/100'; new color coded 10 conductor 20-gauge 100' lengths tinned/stranded rotor cable, parallel two sets of two conductors and you have a superior rotor cable for heavy duty rotors (Tailtwister etc.), 1/2" dia., black jacket - \$20/100'; new color coded 8-conductor 20-gauge tinned/stranded rotor cable, fine for light/med. duty rotors (Ham IV, etc.), grey jacket, lengths to 500' at \$2.00/ft., \$75/500' roll, new antenna wire, tinned #14 stranded, \$.09/ft., \$80/1000' roll, \$150/2000' roll. Plus shpg. Derek, K160, callbook address, (916) 965-4904

FOR SALE: B&K tube tester model 700 - \$50; CRT checker model 445 - \$35. John, K6UU, Box 687 Ashland, OR 97520. (503) 488-1506

WANTED: Hallicrafters SX-17, only in very good cond.x. Jose Cargas, EA4JL. Contact in the States Kurt Keller, (203) 431-6850

WANTED: Pre-war "Pearl Button HRO's"; WW II German, Australian, Japanese HRO's; manual or copy for McMurdo Silver 5B and 5C; dial assembly for 5B. Thanks. John Orashood, N55PQ, 5819 Miller Valley Dr., Houston, TX 77066. (713) 440-5598

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

FOR SALE: 75A-4, real clean, ven. dial, 3 filters, serial #2666 - \$895. Bud, (208) 466-2803 after 8 PM MST.

WANTED: Test equipment (IE-17E) for WW II walkie-talkies (BC-611); test unit I-135E and artificial antenna A-82A. Richard Mollberg, K6PWF, 2340 Almond Ave., Concord, CA 94520. (510) 283-6786 (n), 827-4056 (d)

FOR SALE: Service. Collins radio equipment repair and insurance appraisals. Clint Hancock, KM6UJ, 6567 Ashfield Ct., Room A, San Jose, CA 95120-4502. (408) 742-4582

FOR SALE: USSR issue radio sets for collecting (not to be operated) models R-105M, exc. condx, w/acc. in transmit case. \$280 ea., 3 for \$750. Mike Murphy, (619) 561-2726, FAX 390-8611

WANTED: Hallicrafters SP-44 Sky rider Panoramic (any condx), any older Hallicrafters parts (or entire "as-is" units), spkrs, orig. manuals. Lee Shumway, WB8ZEY, 2820 Yankee Springs Rd., Middleville, MI 49333. (616) 795-3255

FOR SALE: Collins HF-380 xcvt, like new condx, would consider possible trade - \$2700. Ron, (404) 664-6931

WANTED: Panoramic Radio Products P.R.1 panadapter; also wanted Johnson KW Matchbox, w/SWR meter. Jay Spivack, 325 S. Washington Ave., Kent, WA 98031. (206) 859-2680

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: SX-71 - \$100; ID226/APR9, NIB - \$50; TV8/USM31 tube tester - \$100; TS-497C sig. gen. - \$50; BC-342 (poor) - \$50; R105/ARR15 (poor) - \$50; R109/GRC - \$25. Mel, K2AQQ, (716) 671-0776

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

FOR SALE: New copy of GE UPX 003A pre-amp, for magnetic pickup cartridge - \$50 shpd postpaid. James Fred, RI, Cutler, IN 46920.

WANTED: Tube amplifiers and xfms by UTC, Acro, Western, Peerless, Thordarson, Audio Development Co., Hadley, Jensen and JBL spkrs. Mike Somers, 2432 W. Fargo, Chicago, IL 60645. (312) 338-0153

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FOR SALE: New military, red banana tip plugs (for test leads) - \$1/pk of 5; new military PL-55 1/4" key plugs (for hand keys/bugs, etc.) with 60" black cords - \$1.50/each; new military spark gap units, 1/4" chrome balls, brass adjustment screws, 5/8" maximum spacing, brass end plates, lugs for connections, fiberglass mounting block, unit is 2-5/8" long by 1-1/4" H x 5/8"D, great for static discharge for open-wire lines etc., or as spark gap for spark gap simulator as described in a recent QST article - \$10/each; new, ferrite cores, 2.4" OD (mix 43), great for HF baluns, etc. - \$5/each, same, like new pulls - \$4.50/each; as new, silver BNC T and T connectors - \$1.50, used (near new) Variac model V20120 VAC, 20A Variac with knob, without dial plate - \$40, used, Powerstat Variacs 0-240 VAC, 12A, 60 Hz, (works fine on 120 VAC), one with dial plate and knob, two with knobs only - \$28/each; new Powerstat 120 VAC 2.25 A Variac, with knob but without dial plate - \$12, used pulls, Solitron Model SCA 104 solid state rectifier blocks, 17 KV at 1-1/2 amp, 1-11/16" H x 3-7/8" L x 5/8"D, threaded holes in bottom for surface mount - \$4/each, \$15/four; near new pulls, 6AG7 metal tubes - \$2/each; unused 100' lengths, Amphenol RG-58/ CU coaxial cable, tinned shield braid - \$15/each; new in boxes, Jettron thermal 117 VAC 5-second time delay relays, SPST normally open heavy duty contact, looks like a glass tube about the size of a 6V6, 8-pin octal male base, exc. for inrush delay in amplifiers - \$7.50/each. Plus shpg. Derek, K16O, callbook address, (916) 965-4904

WANTED: PL-175A tubes and anything else for the Johnson Thunderbolt. Don Bertone, KK6AN, (415) 467-9669, FAX 468-9669

FOR SALE: Pulse xfmrs, Freed, new (1 Msec) duty cycle, 0004Z - \$4 each; 60 cycle 2" meter, new - \$10; Ham Radio Circuits Handbook, 1963, 128 pages - \$17; brass surplus key, new - \$25. Joe, W6CAS, (916) 731-8261

FOR SALE: Air inductors - 'Baby' - \$6 each; Jr. - \$7 each, 150W - \$10 each; 500/1000W - \$12 each. B&W, EFJ & Bosd. All NOS. All plus shpg. Robert, Amateur Radio Surplus, (517) 789-6721

FOR SALE: HT-37, HT-41, SX-111, NC-183D w/ spkr; B&W 5100, HQ-160 w/spkr; NC-108, Galaxy 5 MK 3, w/pwr sply. Don, W6TVW, (702) 475-0211, d/n

FOR SALE: Hallicrafters (SX-73) R-274/FRR manual, 100+ pages - \$10. **WANTED:** Collins NBFM 148C-1 adapter. Dan Mason, R.R.T. 1, Box 204E, Sante Fe, NM 87501. (505) 455-3416

WANTED: Owner's and Service manuals for circa 1980 Magnvox model 1K8878 reel-to-reel tape recorder. Gary Payne, 5251 N. Fresno, #202, Fresno, CA 93710.

FOR SALE: MFJ916 mobile antenna matcher - \$10; Microcraft code star - \$30; Heath 1424A active antenna - \$15; Heath MD-1422A antenna noise bridge \$15; Heath MD-1420 VLF converter - \$15; AA10 active antenna - \$10. All items in exc. cond. w/manuals. **WANTED:** #19 Mark II sets and accessories any cond., will consider for trade with any of the for sale items listed above. David L. Muse, 510 Mintum Ave., Hamlet, NC 28345.

FOR SALE: Eimac 3CX1200A7 tube, new in the box, never had pwr applied, filament or otherwise - \$400; new military 50 ohm, 150W dummy load, "N" conector, DC-3 GHz, approx. 6"W x 7"H x 12"D, black finned case - \$75/each; MP-1 12 VDC mobile pwr splies for Collins KWM2-A xcvr, w/cables - \$75/each; same but without cables - \$50/each; PM-2 115 VAC pwr sply for rear of Collins KWM2-A xcvr - \$85; same but case needs painting and other minor refurbishing - \$65/each; new, non-inductive pwr termination resistors, 450 ohm at 750 watts, 2" dia. by 24" long, with end clamps, great for terminating antennas such as beverages, rhombics, etc. - \$20/each; same but set of four mounted in shielded housing - \$75/set. Plus shpg. Derek, K16O, callbook address, (916) 965-4904

FOR SALE: Ten-Tec accessories: (5) #1145 knobs, (1) #1175 VFO knob - \$10 each; (4) #1150 overvoltage protectors - \$15 each; (2) #679 keyers for Century 22 - \$30 each; (1) #207 amp meter - \$20; (1) #241 crystal osc. - \$55; (4) #224 audio CW filter for model 525 - \$34 each; (1) orig. filter for Argosy - \$35; (1) Corsair II new improved NB - \$40; (1) #1170 circuit breaker, Century 21 - \$10. (3) monitor AC-2's, (1) VO-1 oscillator, (1) KR3 keyer, (1) #235 filter for model 315 - all \$20 each. All NOS. All plus shpg. Robert, Amateur Radio Surplus, (517) 789-6721

WANTED: Collins AN/ARR-15 rcvr (51H3), unmodified. John Snow, W9MHS, 4539 N. Bartlett Ave., Shorewood, WI 53211. (414) 964-0194

R-390A Sales-Service-Parts

SASE for info

Miltronix, POB 3541

Toledo, OH 43608

FOR SALE: RMCA 8021 "Radiotelephone", restorable - \$199; General Radio 724A Wavemeter, nice + - \$109. Military - SCR-300/BC-1000 backpack radio, WW II Signal Corps, w/straps/pads - \$149; military TBX-6, complete in transit case, includes all canvas, key, generator, everything - \$1095; Navy E.H. Scott RDO rcvr, UHF, nice - \$139; ID6/APN4 indicator, good - \$70 each; Navy RBC-6 HF rcvr w/ps, good - \$199; Collins TCS-12, 110VAC supplies PP-380/U, poor - \$35, exc. - \$169 and in between (\$55-\$119); BD-71 field switchboard, good - \$45. Don, N3RHT, (412) 234-8819

WANTED: Drake R4C rcvr; (Hickok, etc.) mutual conductance tube tester; Kenwood T-599 xmtr; Radio Shack DX-400; Uniden CR2021; RCA model CRM R6A; Heath SB-610 monitor scope. Rick, K8MLV/G, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

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: Pristine BC-348-J, FT-154-J, DM-28-J, pwr conn. and orig. pkg slip, filaments converted to 6.3 VAC but no mech. mods, pickup only - \$250; VG HA-1 keyer - \$60. WANTED: Stancor A-3893 60W mod xfmr; Hallicrafters VG R-47/48/48A spkr. Dave Ishmael, WA6VVL, 1118 Paularino Ave., Costa Mesa, CA 92626. (714) 979-5858

FOR SALE: AN-29C telescoping whips, 27-29, part of SCR-610A (BC-659-A) - \$36. Unused orig. pack, includes UPS. Abe, POB4118, Jersey City, NJ 07304.

WANTED: Orig. amateur, audio, communications and test equip. operating and service manuals to buy or swap. Pete Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964

WANTED: Western Electric radios 20A, 20B, 9A, 9B, 27A control, 8B xmtr, wind generators, RCA sets AR594, AR1496, AR60. James Treherne, 11909 Chapel Rd., Clifton, VA 22024. (703) 830-6272

FOR SALE: Tempo 2020 xcvr - \$195; Gonset G-50 6M AM xcvr - \$85; Hallicrafters S-108 rcvr - \$85. W/manuals. Burt Ostby, 2424 F-30, Mikado, MI 48745. (517) 736-8020

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WANTED: Have broken WW II aircraft instrument from Selfridge Field, MI. It has A.A.F. repair tag dated April 30, 1945 by Otto Wessner. Would like to correspond with anyone who remembers this airfield. Also wish to correspond with WW II pilots, radio ops, and others interested in this era. Free list of electricals for trade. Chris Cross, Box 94, McConnell, IL 61050.

WANTED: Eico, Fisher, etc. audio amps (tube type); audio output xfmrs by Triad, Acro & Peerless. FOR SALE: PRM 10 tube-type GDO, w/ reg. sply (see ER in Uniform #63), new - \$80 + shpg. Franklin Albanese, 1610 Prince St., #6, Berkeley, CA 94703. (510) 845-2625

FOR SALE: Cabinet for your R-390. WANTED: Manuals for Heath AA-100 amp and AJ-41 rcvr. Marty Drift, POB 21, Blawenburg, NJ 08504.

FOR SALE: Eldico SSB 100F; HQ-140X; SX-71; NC-300. WANTED: BC-610 TU-61 tuning unit & C454 coil for 160M; BC-610 pwr coord. Joel Thurtell, K8PSV, 11803 Priscilla, Plymouth, MI 48170. (313) 453-8303

FOR SALE: HW16 & manual - \$125; NC-109 & manual & spkr - \$175; S53A - \$75; Multi-Elmac C-2-B rcvr - \$45. All vgc/exc.; vintage manuals - request free list. Richard Prester, 131 Ridge Rd., West Milford, NJ 07480. (201) 728-2454

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FOR SALE or TRADE: R1051, R1051B's, gtd. good electrically & physically - \$295 plus UPS. **WANTED:** Looking for any type military RF electronics, radio, radar, desperately need manuals for military equip., especially WLR-6 submarine intercept rcvr, ASQ-19 and GRC-144. Please call if you have leads on these or other military manuals. Tony Snider, 512 Princess Anne Rd., Virginia Beach, VA 23457. (804) 721-7129

WANTED: National HRO-500TS spkr in mint condx; National NCL-2000. Sam Macy, N9WAF, 486 Glenwood Trail, Elgin, IL 60120. (708) 695-0218

FOR SALE: (1) B&W KW balun, 1:1, 80M - \$45; (1) B&W KW balun, 1:1, 40M - \$45; (1) Cescostanding wave reflectometer, nice - \$50; (1) Mars standing wave bridge #SW-10 (movement needs repair) - \$30; (1) CE/GC-1 kit - \$150; (1) Gonset #3098 DC pwr sply - \$75; (1) AC-500 (National) for NCX-500 - \$100; (1) Morrow TV-600 pwr sply - \$50; (1) Dentron HF-ACS pwr sply for HF-200A - \$100; (1) Geloso wooden ship crate for G-212 - \$65. All NOS. All plus shpg. Robert, Amateur Radio Surplus, (517) 789-6721

FOR SALE: SP-600JX-6, good shape - \$200. Tracy, WB6TMY, Box 4694, Santa Rosa, CA 95402. (707) 527-8124

WANTED: Nice orig. NC-100X; also need wood type HRO coil box; NOS red felt tipped feet to finish restoration of HRO-60 spkr. Greg Gore, 11528 Watermoss Ln., Charlotte, NC 28262. (704) 549-4719

FOR SALE: Military radio GRR-24, AM UHF rcvr, 225 MHz to 399.975 MHz, solid state, AC & DC, used - \$95. Bob, WB6EZX, POB 1081, Sausalito, CA 94966. (415) 332-3905

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Ex-Collins Service Division trained tech will professionally repair your Collins or other classics. References available. Very reasonable rates. Bob Mattson, KC2LK, Highland, NY 12528. (914) 691-6247

FOR SALE: Repair of TV-7 tube testers and calibration: I will fix and then verify calibration of your TV-7 tube tester for \$45 plus shpg or return it no charge. Unit must be repairable and not a basket case. Daniel Nebson, 1025 E. Desert Lane, Phoenix, AZ 85040. (602) 243-7421 even

FOR SALE: New, ME82/U military wattmeter/dummy load; 52 ohm, 120W, 50-600 MHz, dummy load OK DC to 600 MHz but meter accuracy is impaired at lower freqs, black case 5-3/4"W x 7-1/2"H x 13"D, cooling fan increases dummy load power considerably, "C" connector feed ("C" to BNC adaptor included) - \$75/each; unused military fully adjustable 3-element beam antennas, 50-100 MHz, great for portable/fixed six-meter beams, 2" by 74" boom, "C" connector feed ("C" to BNC adaptor included), easily disassembled (elements unscrew and telescope) for transportation, freq/element chart included - \$50/each; military tunable VHF bandpass filters, model F-1451GRC, 116 MHz to 150 MHz, dimensions, 3-1/2"H x 6"W x 13-1/4"D, use with your 2-meter rig to eliminate adjacent channel interference, use two for 2-meter repeater cavities - \$75/each, \$130/pr.; unused 1/2" x 3" copper-clad steel ground rods (great for hard ground), threaded ends and heavy duty removable brass ground-wire clamps - \$5/each; same, but set of two ground rods (6' total) with h/d brass coupler and steel bolt for driving rod in ground - \$12/set; 1/2" brass ground clamp only - \$1/each; used Barker & Williamson (or other manufacturers) Matchmaster Model 52-500A wattmeter/SWR/dummy load, 500W dummy load (considerably more with external fan), 600 W forward/reverse, straight through position, N connectors input/output, 9-1/2"H x 8"D x 13"W - \$45/each. Plus shpg. Derek, K16O, callbook address, (916) 965-4904

WANTED: Collecting early Heathkit gear 1940's-'50's; early Heath catalogs and literature; Heath mics, spkrs, supplies, access; any parts units. Byron, WA5THJ, 1215 Fresa Rd., Pasadena, TX 77502-5017. (713) 941-3631

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WANTED: Navy TDE xmtr; modulator type CAY-50065 for TBM xmtr. **FOR SALE:** ARC-5 connectors. Steve Finelli, N3NNG, 37 Stonecroft Dr., Easton, PA 18045. (610) 252-8211

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FOR SALE or TRADE: BC-610 mod. driver & input xfmrs - \$125; BC-610 RF deck complete with 1 coil, 3 osc. & tubes - \$150; pr of 100TH's - \$50; (2) BC-1000A's w/bat. box & bat. eliminator, no other accessories - \$85 each. **WANTED:** (2) RK-65's & (4) 5514 tubes. Will trade all BC-610 stuff for HRO rcvr. Mike, WA7NPA, (206) 837-3560

WANTED: Johnson Matchbox accessories - directional coupler (250-37), low pass filter (250-20), TR switch (250-39), orig. manuals. Frank Scutch, WB4AYJ, 11780 NW 24th St., Plantation, FL 33323. (305) 472-9474

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FOR SALE: Eimac 100TH tubes, (1) NIB (6371 date code), (1) used - \$40 for both. Jim Miccolis, N2EY, 126 Summit Ave., Upper Darby, PA 19082. (610) 352-5247

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FOR SALE: Drake 2NT, exc. - \$80; HQ-170 works well, missing clock cover and has a few paint spots on panel - \$90; NC-183D, works well, poor cosmetically - \$110; WRL Globe Scout, very nice - \$45; Heath VF1, good - \$40; Hallicrafters S-85, near mint - \$75; SX-99 exc. except cloudy S-meter cover - \$90; Eico model 753, AM/SSB/CW, 80/40/20 w/751 AC/spkr module and 752 mobile sply; perfect condx, all orig. manuals - \$90; SX-25, very nice - \$90 TRADE: Unique 51J4, very exc. in solid oak cabinet, 3 filters, orig. manual, homemade oak spkr cabinet, for exc. 75A-4. Dick, W7QZO, 6655 NE 33rd St., Redmond, OR 97756. (503) 548-2847

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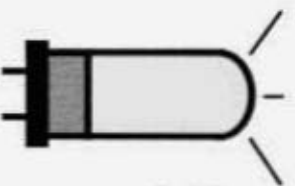
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