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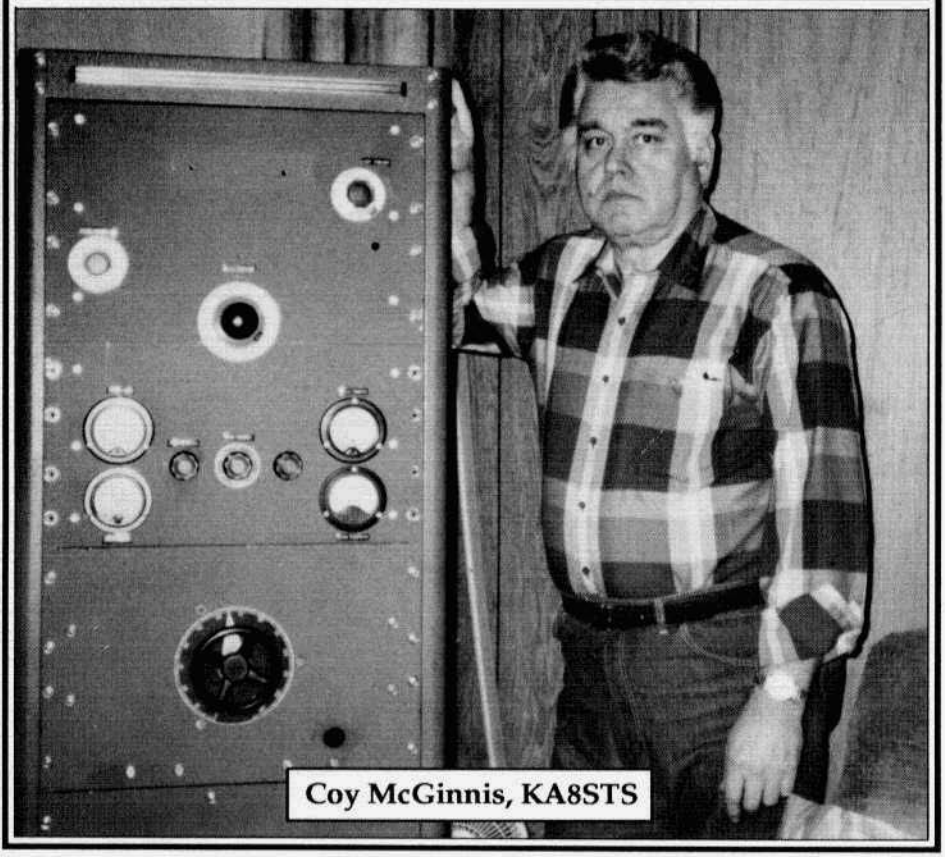
# ELECTRIC RADIO

celebrating a bygone era

Number 47 March 1993



Coy McGinnis, KA8STS

# ELECTRIC RADIO

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

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

## Electric Radio Solicits Material

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

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

The first order of business here this month is to correct an omission in last month's comments on this page. When referring to the AM related article in the February issue of *QST* ("Classic Rigs and Amplitude Modulation: Friendly, Nostalgic Ham Radio Partners") I failed to mention that Stephen Ickes, WB3HUZ, was co-author. My apologies to Stephen.

In other business I have to mention that Dar Electronics, who have been advertising in ER (National manuals), are for some reason acting like they're out of business. Maybe they are. Recently I received two complaints that money had been sent to them for manuals and that after 2 months in one case and longer in the other the manuals had not been received nor had money been refunded. I have put two or three messages on their answering machine with no response. I've also written them and there also has been no response. I feel it's my responsibility to advise ER readers that they should not send money to Dar at the present time. If anyone has any information regarding this Chelsea, Mass. company I would appreciate their contacting me.

Lately I've also been receiving complaints that people have been misrepresenting the condition of gear that they've been selling. As the demand for vintage gear increases and price of it rises I think that this problem will only get worse. I think it can only be resolved if buyers insist that sellers give them a money back guarantee. I think that this will become standard procedure with most radio collectors in the future. It should eliminate the problem.

In response to all those who have been asking about the status of AM International, next month Dale KW1I, will have another update.

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**Cover:** Coy McGinnis, KA8STS, with his homebrew KW. The rig uses 250TH's in the final and 304TL's as modulators.

# Medium Wave DX is Alive and Well

**by James Viele, N8IRL**
**161 Fox St.**
**Hubbard, OH 44425**

Many hams today had their first touch with the HF spectrum as SWLs. However, many of the "old timers" got their start listening a bit lower on the dial on medium wave, BCB, AM broadcasting or whatever else you might call it.

The Broadcast Band (BCB) extends from 530 to 1600 (soon 1700) kHz and is home to nearly 5000 stations in the US alone ranging in power from 1 watt (more on that later) to 50 kilowatts in the US and Canada and up to several megawatts in other countries.

The "old timers" who long ago abandoned their BCB pursuits in favor of two-way communications on higher frequencies might be surprised to know that today, in 1993, the hobby of DXing on this band is still around and doing quite well, thank you.

The National Radio Club, which began in 1933, is very much alive and has been in continuous operation since then. The NRC numbers nearly 800 members, many of them hams, and publishes its magazine, *DX News* ,30 times per year. Each issue includes loggings, FCC news, construction projects, receiver mods etc.

Although some BCBers have moved into the era of solid state, the most highly prized receivers for the hobby are the trusted old favorites, the Hammerlund HQ-180A, Hallicrafters SX- series, the R-390, even some vintage HQ-129s are still pulling in the AM DX. A few in the NRC are even using crystal sets for the ultimate receiving challenge.

And what is being heard? Well, the "golden age" of BCB DX may have passed as far as band conditions are concerned but many just consider the high density of stations on the band an additional challenge.

Recent FCC actions have increased the number of stations operating at night, the time most BCB DX occurs. Many stations which were licensed to operate in the daylight hours were granted low night powers and can operate 24 hours now. Powers were determined by figuring in antenna efficiency, location of stations on the same and adjacent frequencies and other factors. Most are in the 50 to 100 watt range but some are as low as 1 or 2 watts. Not all stations with authorization for these peanut powers are using them but some are! Your author has heard a station with 4 watts from New England in Ohio. Not any big deal for QRP hams but this was accomplished on 1510 kHz, a very crowded BCB frequency!

Antenna experimentation is hot and heavy in the BCB hobby. A number of directional receiving schemes are in use. Nearly every BCB DXer has at least one type of tuned loop antenna ranging from the large 4-foot square inductively coupled altazmuth loop (turns and tilts) to any number of store bought or homebrew amplified loops using ferrite rods or air cores. Recent experimentation using phased wire antennas is showing great promise. These arrangements typically consist of two inverted L antennas about 30 feet high and 40 to 60 feet long. Outputs from these two wires are phased against each other with homebrew phasing units to create a receiving null toward a strong local signal, making it possible to hear the weaker stations underneath. You can't buy these phasors, you have to build them. There is a surprising amount of homebrewing going on in the BCB ranks.

Here in my shack I am able to totally null out every one of my local stations, even one whose tower lights I can see, and receive others on the same frequency. Dick Truax, K8GVU, (also an avid Johnson collector and ER subscriber) has been



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# LETTERS

**Dear ER**

My interest goes back to the early 1930's which is as far back as I can remember. My father, Stanton Kirk, was licensed as W9JTE some time in the early thirties. I am now 61 years old and as far as I can determine he got his license in 1932 or 1933. I grew up thinking everyone talked to people around the world on amateur radio using Morse code! He was by profession a railroad telegrapher and also occasionally worked for the Western Union operator in Greensburg, Indiana. As far as I know, his first "store bought" radio was a Hallicrafters Sky Buddy purchased some time in the early 40's. He passed away in 1947 at the age of 46. I was working on getting my code speed up to 13 wpm at the time, the minimum speed for a license then. Unfortunately with his passing I did not pursue getting my license until after I married and had 2 children. I got my Novice license in 1958 or 1959 and went on to get my General and also got a First Class Commercial license. I recently upgraded to Extra and this past week when I talked to Australia on 20 meters using my 20 year old Swan, I knew that my father was smiling down on me from "Ham Heaven".

**Ann Williams, K9TJJ**

**Dear ER**

I was originally licensed in 1951. All of my gear back then was surplus or homebrew. "Radio Row" was only an hour away and was paradise for a kid in ham radio. Seeing your articles on that gear sure brings back a lot of fond memories.

About 8 years ago I came across a KW-1 at an estate sale. It was like the rekindling of a childhood romance. I had no real interest in AM, but I had to have that transmitter! I could recall standing longingly in the shadow of a KW-1 at Harrison Radio when I was a kid, my palms all sweaty, aching to fondle the knobs. SIX PANEL METERS! A front panel window creating no less than a stage setting for those magnificent 4-250's! The inner burning to possess such perfection overtook me again. This time however, such a dream fulfilled would set me back only a few days pay and the deal was consummated. Had a lot of fun getting it on the air. No serious problems - dried out electrolytics, etc.

I enjoy the infrequent times I get on AM but am disturbed by the childish and inconsiderate antics of some of our northeastern AM'ers. I'm sure SSB'ers are guilty of the same thing, but a lot of non-amateurs get their introduction to ham radio via amateur AM signals picked up on SW receivers. Obscenities, belching, overtalking other transmissions and other juvenile behavior certainly can't favorable impress anyone except perhaps other miscreants. Sure would be nice if amateur radio sounded just a bit more civilized than CB.

**George A. Flanagan, W2KRM**

**Dear ER**

AM radio is certainly on a roll! Since December, I have been active again, after a year and a half of being off the air, and I note three facts:

1. The amount of amateurs using AM seems to have doubled, at least.

2. We finally received long-overdue recognition in QST.

3. There is a habitual nightly contingent of people (of which most, if not all, are frequently heard on AM) that insist on using SSB on 3875 kcs.

The first two items are productive for the AM community while the third is about as counterproductive as is possible to attain! It is strangely coincidental that four years ago (exactly to the day) I wrote a letter to the editor of the AM Press Exchange, preaching about the very same topic. At that time, it concerned only one individual, who finally saw the light.



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# "R-8040-- A Homebrew 80-and 40-Meter Receiver"

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

**Part One**

No doubt about it, I'm a sucker for a challenge. When I saw Barry Wiseman's request in the October issue for interesting vintage homebrew projects I couldn't say something sensible like "NO!", or even "Maybe someday". Since I did not have a good receiver for general hamming I decided to build one -- a set I could listen to without fiddling while working in the radio room and also use to join the round table in progress.

This was the most interesting project I've tried and the set which resulted -- an 8-tube superhet covering 3800-4000 kcs and 7100-7300 kcs by band imaging -- works well enough to have become the main receiver here. But a receiver is a challenging project at best; building serial number 2 of a design is only for the true fanatic. Some of the other designs which turned up in researching this project are listed at the end of this installment.

**It's Tough Being A Receiver These Days**

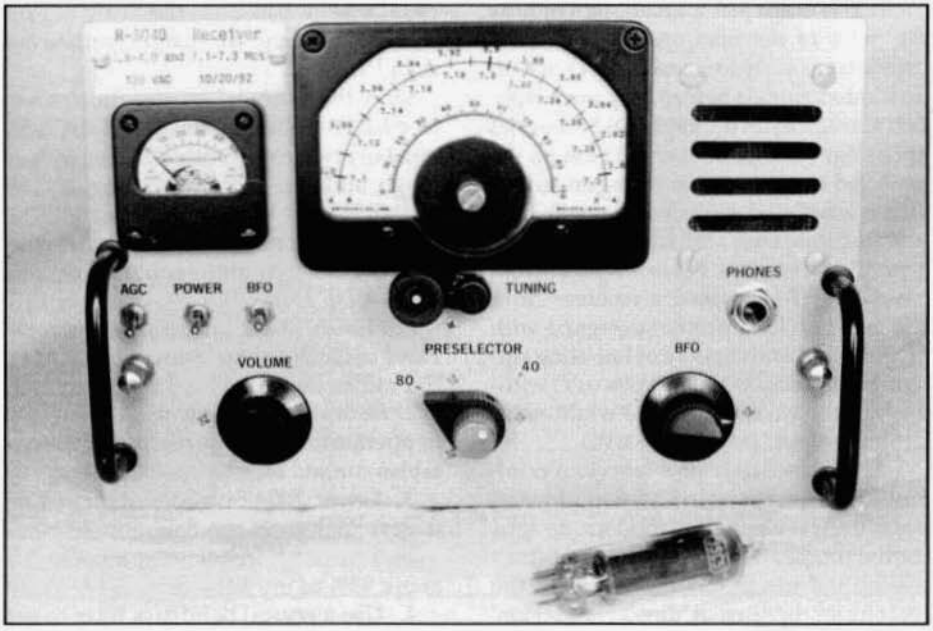
Though I wanted to build a vacuum tube set, I did not want to recreate all the authentic weaknesses of early postwar 'hollow state' gear. In the 1940's and 50's, the spectrum was relatively uncrowded; with the tubes and other parts of the time the main problem was getting enough gain. Quality receivers were built with two and three stage RF amplifiers, a mixer and perhaps three IF stages. With the signal up to at least several volts, a diode detector delivered the audio. The local oscillator was separate from the mixer in better sets but generally was bandswitched; often a harmonic of the oscillator was used on the highest bands.

In the last gasp of 'old design' (1960's and 70's), top of the line receivers went to multiple conversions to allow the tunable oscillator to work on a single range and reduce images while maintaining high selectivity.

From the 1960's on, all of these receivers had increasing trouble as the HF bands became so 'dirty' with strong interfering signals that their high RF gain could push the mixer or one of the nearby stages into nonlinear operation before the most selective filters (in the IF stages) were reached. Nonlinear operation means 'mixing': you might, for example, hear the modulation of an unwanted signal on the wanted signal even though the unwanted signal itself has been filtered out in later stages. This is called crossmodulation. If the interfering signal is unmodulated, its effect will be to reduce the receiver's gain on the wanted signal -- 'desensitization'.

Another possibility: two strong signals are mixed giving sum and difference frequencies strong enough to be picked up: for example a local BC station at 1390 kcs plus one at 570 kcs being heard together at 1960 kcs as they are on my R-392. This effect is called intermodulation distortion (IMD) and because the signals which combine are both fundamentals, the new signal at 1960 kcs is called a second-order product.

Two strong signals which are fairly close together may generate one or more pairs of spurious signals ('spurs') at multiples of their spacing above the higher and below the lower. The most common case is something like a signal at 3885 kcs and one at 3865 yielding a spur at 3845 kcs (2 x 3865 - 3885) and another at 3905 kcs (2 x 3885 - 3886). Since they involve a second




**A front view of the R-8040 receiver. The small knobs under the handles are locks to hold the unit in a cabinet. The preselector control has an outer pointer knob with a 1:1 ratio useful for band changing and an inner 6 :1 knob to allow peaking a signal. The AGC switch at the left isn't connected yet.**

harmonic and the fundamental, these new signals are called third-order intermodulation distortion products. This problem usually occurs before other large-signal problems so measuring how strong two equal signals have to be for it to be detected has become a standard way to determine how 'tough' a receiver is. The figure is often given as the ratio in dB of the strength of the signals required to produce a detectable spur to the receiver's internal noise (the 'noise floor'); this ratio is called the IMD dynamic range.

Signals which are generated intentionally also cause problems: a local oscillator intended to operate on its fundamental may be impure enough to bring in strong signals via a harmonic, particularly if on some bands a harmonic is actually used, forcing a compromise design. And every oscillator adds new possibilities! The R-392 is a triple-conversion receiver on some bands; until I added a low-pass filter, mine (intended to cover 0.5 to 32 Mcs) brought in a local FM broadcast station at just above 3800 kcs.

Strong narrow-band signals are the cleaner kinds of dirt. TV stations generate powerful video signals several megacycles wide and then there are leaky power lines, dimmer and automatic-on-at-dusk light switches, neon lights, oil burner igniters, radars – a whole ragged army of unwanted signals which become even worse than their natural ugly selves if problems like those just mentioned also let them in on frequencies you aren't tuned to. That wonderfully complicated 'classic' receiver you rarely use because signals sound bad may not be defective, so much as it is designed for an earlier time!

## Modern Receiver Design

The main problem in designing receivers these days is handling very strong unwanted signals. To minimize overload problems recent designs keep the gain in



**continued next page**

R-8040 Receiver from previous page
each early stage just high enough to hide the noise of the next one. Selectivity is provided as early as possible to knock off unwanted signals before they are amplified enough to do damage. And all stages are designed to be linear well beyond the expected range of signal strengths so that when unwanted signals do get in they will not mix with the wanted signal or generate harmonics. For example a recent issue of QST discussed a receiver front end using an RF amplifier designed with power FET's and capable of handling signals of about 20,000 microvolts (uV) without intermodulation effects – while maintaining a sensitivity of 0.15 uV!

To keep oscillator problems to a minimum and get the selectivity as close as possible to the antenna, modern designs use the simplest conversion scheme which will do the job; in fact this is one of the reasons for the current 'direct conversion' receiver fad. (A 'DC' receiver just heterodynes the signal to audio frequencies; with only one oscillator there are a minimum of possible spurs but the disadvantages are many).

Oscillator signals are made as pure as possible and mixer drive levels are carefully adjusted to generate the minimum of harmonics.

## Designing A Receiver

While I wanted to use modern design principles, I planned to make only a few changes to an existing design. This was going to be easy, right? I grabbed a pile of handbooks and started looking for a 'hollow state' receiver to copy. Whoops! Although there were some good designs, most of them were very complex such as including bandswitching of five or more bands with low-noise front ends. Most simpler sets were 'beginner' designs – a two tube regenerative receiver or the next step up from one. Almost none of the later sets provided for good AM reception. And by the time modern receiver design practices began to take hold, transistors were replacing vacuum tubes. The two or three designs which missed most of those pitfalls were based on the fairly expensive 7360 tube and were larger and heavier than I wanted.

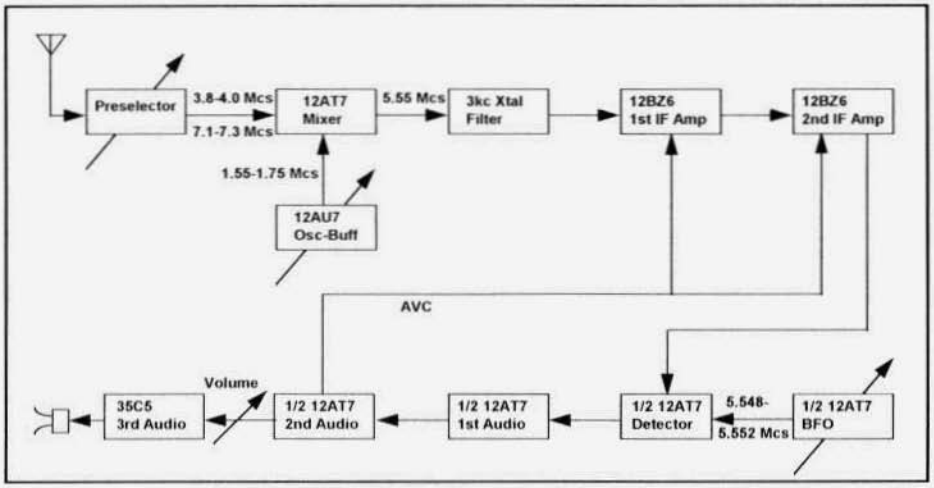
Since the receiver I wanted didn't seem to exist, I rushed in where angels (and most everyone else with good sense) fear to go and set about designing it. The design started with a list of 'wants'. The receiver (which I decided to call R-8040 because of the bands it would cover) was to:

1. Be compact and transformerless. How could all those series-string AM/FM radios be wrong?
2. Be designed mainly for AM but able to operate on SSB since many AM roundtables contain at least one SSB signal.
3. Cover 200-kcs pieces of 80 and 40 meters including the common AM frequencies; these frequencies account for about 95% of my hamming.
4. Use a crystal bandpass filter to get selectivity of about 3 kcs – enough to allow reasonable audio quality and accommodate the kc or so of 'spread' present on most AM round tables.
5. Be stable enough to 'set and forget' for hours at a time – say drift of not more than 100 cps per hour after a few minutes of warmup.
6. Have good AVC to handle the wide range of signals generally found in AM roundtables.
7. Include a reasonable good audio system and a panel mounted loudspeaker.
8. Use modern receiver design practices to minimize internally generated spurious signals.
9. Have a minimum number of controls.
10. So far as possible avoid the use of rare or expensive parts and use a minimum number of tube types.

## The R-8040 Design

The result of about five months of tinkering was an eight-tube set; allowing for the dual triodes the equivalent of 13 tubes.

The local oscillator tunes 1550 to 1750 kcs and the IF is 5550 kcs; adding the oscillator to the signal frequency gives




**A simplified block diagram of the R-8040. The AVC discharge tube and exciter mixer are not shown.**

4000 to 3800 kcs and subtracting it gives 7100 to 7300 kcs – the 'band imaging' technique. (Band imaging gives two band operation without oscillator switching or the use of a crystal oscillator and another mixer. The main drawback is that the two bands tune in opposite directions).

A preselector chooses the band; the Q of the circuits is such that it greatly reduces signals more than 10 kcs away from the wanted frequency on 80 meters; on 40 the bandwidth is about 30 kcs. To improve strong signal performance no RF amplifier is used and the mixer is a dual-triode circuit noted for good large signal performance at the expense of a somewhat high noise level. A crystal ladder filter follows the mixer and feeds two stages of 5550 kcs IF amplification. A plate detector circuit drives a three-stage audio amplifier. AVC is applied to the two IF stages.

The local oscillator is a 12AU7 in a Colpitts circuit chosen for purity of output. This is a 'not noticeably drifty' design with all the tuned circuit parts in their own closed box. A mixer will combine the BFO and local oscillator to provide an exciter output for an associated transmitter; this stage isn't yet wired.

The filaments are connected in series and operated directly from the 120 VAC line. Plate voltage is obtained from the line by half wave rectification. No voltage regulation is used.

## Results

The goals of the project were achieved, though more fully in some departments than other. Warmup stability is outstanding. Starting 30 seconds after turn-on the R-8040 does not drift more than 25 cps either way over several hours. Line voltage changes of a volt or two cause under five cps change in the local oscillator frequency.

Sensitivity is adequate; a signal of 0.2 uV can be heard and 0.6 uv gives a 10 dB signal+noise to noise ratio. The limit on what you can hear usually is atmospheric noise; with the antenna disconnected you



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R-8040 Receiver from previous page
can barely hear receiver noise even at full volume. There are, however, a few occasions when on 40 meters you can't hear either atmospheric noise or signals. In fairness, the KJ4KV 40 meter antenna is resonant somewhat above the high end of the band; with an antenna resonant within the band the receiver probably would always be able to hear atmospheric noise.

Rejection of the IF frequency is better than 70 dB when tuned to 3900 kcs and better than 50 dB at 7200 kcs. Rejection of 80 meter signals when tuned to 40 is at least 60 dB and of 40 when tuned to 80, at least 80 dB.

Selectivity near the frequency of the wanted signal is excellent. As you tune across an AM signal it abruptly becomes an SSB signal as the carrier goes over the edge of the filter response.

Further out selectivity is adequate. 10 kcs from the filter center frequency, response is down over 60 dB; at 20 kcs, over 80 dB.

The third-order IMD dynamic range for a 20 kcs signal spacing is better than 80 dB. For comparison my Collins 51S-1 has a dynamic range of 65 dB in the AM (6 kcs) position.

Compared to an S9 signal (50 uV) the AVC holds the receiver output to a rise of just over 6 dB at S9+60 dB and a 6 dB reduction at S6.

In a side-by-side comparison with the 51S-1 the R-8040's audio is distinctly 'crisper'. The R-8040's AVC circuit causes slight distortion of audio peaks when viewed on a scope but I could not hear the difference. The level of noise accompanying a weak signal is slightly higher on the R-8040; this is the price of using a moderately noisy mixer circuit with no RF amplifier. The continual drift of the 51S-1 (perhaps 500 cps down and back) during the first hour of operation is annoying – no drift is noticeable with the R-8040.

The R-8040 weighs about five pounds and would fit in a 6" x 9" x 7 1/2" (H x W x D) cabinet.

## Other Designs

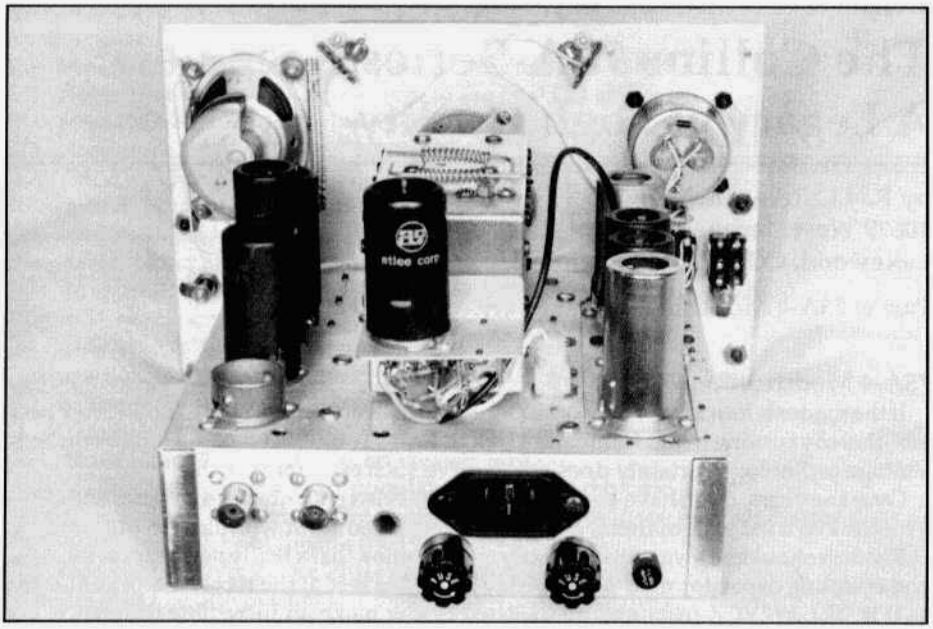
In researching this project I looked at a number of other superhet designs in QST and the various handbooks of the 1960's and 70's. Those listed below are either popular designs, better than average designs, or both. The tube counts given are 'envelope counts', comparable to the R-8040's eight tubes and they don't include rectifiers or regulators since today's builder would likely use solid state devices in these jobs.

Except for nostalgia reasons, I would not build a receiver from the 1950's or earlier. These sets use inferior tubes and design principles compared to those which arrived in the 1960's.

Beginning with simpler (but not trivial) sets, the 1960-63 Radio Amateur's handbooks offer the three-tube Simple-X Super Mk 11, an 80 and 40 meter band imaging superhet with a 1700 kcs single crystal IF filter, a regenerative second detector, and AM/CW operation.

The 2X4+1 four-tube superhet found in the same sources is similar but has a two-crystal filter, an IF amp and a grid leak detector. This would make a whiz-bang vintage portable unit; with minor changes it could become the heart of a ten-watt AM/CW transceiver using series filaments on a chassis no larger than the R-8040. Find one of the later books if you plan to build either the Simple-X or the 2X4 designs as both were improved and simplified.

For performance per tube it would be hard to beat the 'Junior Miser's Dream', a five-tube five band set using the 7360, which appears in the 1967 Radio Amateur's Handbook. This unit uses a two-crystal filter (the IF is 3300 kcs) to get selectivity. It includes a signal-frequency Q-multiplier to get very high rejection of unwanted signals (plus increased gain) and has amplified AVC. The local oscillator operates on (signal frequency +/-IF) in the conventional manner so this set will be 'noticeably drifty' on the higher bands.



**The R-8040 receiver from the rear. From the front panel at left, the BFO, 3rd audio and 2nd audio and AVC discharge tubes; at right the mixer, 1st and 2nd IF and detector/ 1st audio stages. The box in the center holds the local oscillator tuning cap, coil, and related parts; the tube on the shelf is the oscillator and buffer. On the rear of the chassis from left: exciter output and antenna BNC connectors, line fuses and line cord connector, S-meter zero adjustment.**

Judging by the number of articles, the most popular homebrew receiver of the late 1950's and early 60's was the HBR-8, 11, 14, 16 (etc.) series originated by Ted Crosby, W6TC. These receivers use plug in coils to simplify construction of an all ham band receiver; unfortunately the early units are not well designed, containing such obvious mistakes as the use of sharp cutoff tubes in AVC-controlled IF stages. A 19-tube late version which appeared in the Radio Handbook 17th edition, under the name 'A Deluxe HBR Receiver', corrects the problems and I'd suggest starting here (and simplifying if desired) rather than building one of the earlier units. This is a conventional double-conversion design which gets its 2-kcs selectivity in the 85-kcs second IF, avoiding the need for crystal or mechanical filters but giving in exchange much poorer strong-signal performance.

The best simple five-band receiver is the HB-67, found in the 1967 Handbook. Beginning as a 6-tube 80-meter receiver with a 7360 mixer and a 455 kcs mechanical filter for selectivity, this unit adds a crystal-controlled converter on the same chassis, yielding an 8-tube five-band double-conversion receiver. The HB-67 has only a product detector.

The W5OMX Communications Receiver, QST, January, 1968 is a 13-tube five-band single-conversion receiver based on the 7360 and using a 9-Mcs IF with a crystal filter. It has about everything you'd want in sensitivity, stability, and general usability and it is the only one of the designs surveyed to get single-conversion operation on five bands by mixing a single-range oscillator with various crystals. This is the most practical design for the builder who wants to in-



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# The Collins 75A-Series Receivers: A Legacy of High Quality

**by Ray Osterwald, NØDMS**
**10679 West Dartmouth Ave.**
**Lakewood, CO 80227**

**Part 6: 75A-4 Modification Summary**

**75A-4 Modifications**

If the reader is looking for a set of step-by-step instructions on how to do a 75A-4 'hack job', thereby turning it into some cold, dark, solid-state blob, he'd better look elsewhere. Vintage technology certainly does not deserve such crude treatment.

Over the years, there have been many different circuits published dealing with 75A-4 mods. I've tried a lot of them, and they have ranged from worthless to outstanding.

Readers should be aware that the only modification that's really necessary is the AGC and coupling capacitor mod per *ER*, May 1990. The rest of the receiver works just fine as it is. The W2VCZ front end mods listed below make an incredible difference, but without the proper tools, test equipment, and experience I would advise against tearing into a perfectly good 75A-4.

The following is a chronological list of modification articles which have appeared in the magazines over the years. This list is probably not complete, but is the best list that I have:

**12/14/55 Collins 75A-4 Service Bulletin #1, 3 pages:**
Improving noise limiter action (it really needs it!)
Revise Q-Multiplier
Eliminate random fuse blowing
Keeping RF out of muting circuit
**10/15/56 Collins 75A-4 Service Bulletin #2, 10 pages:**
"S" meter pot replacements
Hum reduction
Noise limiter modification & long discussion of noise pulses
**5/31/57 Collins 75A-4 Service Bulletin #2A, 2 pages**
More on "S" meter pots and replacements
**9/18/57 Collins 75A-4 Service Bulletin #3, 1 page:**
Elimination of RF pickup in standby
(I don't know if there are more Collins bulletins than these.)

**QST, 5/58, p.76: Audio Muting for 75A-4**
Ok, if you need to do it.
**QST, June 1959, p.60: Panadapter Connection for 75A-4**
**CQ, April 1960, p.32: 20 Kc Filter Adapter and SSB IF Noise Limiter**
(adds new 20-Kc IF strip for selectivity)
**CQ, June 1960, p. 81: 75A-4 Modifications**
Change 2nd mixer to 6U8A.

**QST, June 1960, p.16: 75A-4 IF Noise Limiter**
An SSB pulse clipper that works!
**CQ, June 1960, p.42: An SSB IF Noise Limiter (using a 75A-4)**
**CQ, November 1960, p.62: Addendum to the 6/60 CQ article**
**CQ, June 1962: 6U8 second mixer modification**
**CQ, November 1962, p.77: Update The 75A-4**
12AT7 first mixer, 6U8A second mixer.
Short article, not much explanation of mods
**CQ, May 1963, p.60: 75A-4 Receiver Improvements**
6BZ6 RF amplifier and 6U8 2nd mixer mods. Short article.
**QST, May 1963, p.55: Improving the CW Selectivity of the Collins 75A-4**
Plug-in 500-cycle crystal filter mod for CW. Good article.
**QST, July 1964, p.18: 7360 Mixers in 75A-4**
Classic article on beam-deflection mixers in 75A-4. See comments below.
**CQ, June and September, 1965: Improving the 75A-4 on SSB**
Dual-Triode 1st mixer, 6U8 second mixer, various AGC mods.
**QST, November 1966, p. 53: Station Design for DX**
Gives a short listing of the more popular A-4 mods of the time.
Be careful, some of these are goofy, such as drilling holes in the receiver bottom plate to compensate for dried out lube in the PTO.
**CQ, July 1967, p.22: A 2.1 Kc Filter for the 75A-4**
Inexpensive Lafayette mechanical filter for A-4.
**W2VCZ, October 1967: 75A-4 Conversion Schematic (publication unknown)**
This is the circuitry preferred by almost everyone. See comments.
**Ham Radio, April 1970: Improving Overload Response in the 75A-4 Receiver.**
Very complete, well- written article, with measurements and adjustments. Changes first and second mixers to greatly improve dynamic range.
**Ham Radio, January 1971, p. 67: 75A-4 Modifications**
Weak article describing various problems and changes.
**Ham Radio, April 1972, p. 68: 75A-4 Hints**
Cal. oscillator mods.
**73 Magazine, April 1972, p. 68 75A-4 AVC modifications**
Questionable value.
**73 Magazine, February 1973, p.105: Economy Filters for the 75A-4**
Plug-in 500-cycle mech. filter and L-C 6 Kc. AM filter mods.
**Ham Radio, December 1974, p. 24: Making Your Collins 75A-4 Perform Like New**
Excellent article by Bill Orr, W6SAI, on PTO maintenance.
**Ham Radio, September 1975, p. 58: 300-cycle crystal filter for Collins Receivers.**
OK article, but the filter is now hard to find.
**Ham Radio, September 1975, p. 63: Collins 75A-4 Mods**
Good, short summary of what works for DX'ers, by W9KNI.
**Ham Radio, November 1975, p. 70: Increased Selectivity for Collins 75A-4**
Short article by Jim Fisk (W1DTY) to replace IF transformer with 2.1 Kc filter. Also some minor info on resistor changes.
**Ham Radio, April 1976, p. 43: 75A-4 Noise Limiter Noise**
How to disable 6AL5 noise limiter. Not much good.
**QST, August 1978, H&K: Collins 75A-4 Oscillator Dropout**
Worth looking up. Good tips and some factory-advised checks.
**Electric Radio Magazine, May 1990, K7CMS: Collins 75A-4 Modifications**
The best AGC mod ever published; in use at NØDMS. Gives the 75A-4 the same fast-attack and slow-decay characteristic as imported rigs have, and reduces distortion.


continued next page

**75A-4 from previous page**

If you intend to use your 75A-4 on a regular basis, and not just look at it on a shelf, then the AGC circuit should be modified. On a stock receiver, the attack time is way too long, which allows the front end to go into distortion before the AGC can respond to prevent it. Also, the decay time is too short, which causes distortion between characters on CW and SSB. Switching from "standby" to "receive" charges up the AGC line and blocks the receiver momentarily, which is very irritating. The *ER* mods by K7CMS will take care of these problems. In addition to them, I use 5 Meg at R92 because I prefer a "slow" decay time of about one second.

The other common problem with 75A-4 performance is crossmodulation, or the transfer of modulation from a strong, unwanted signal onto a weaker desired signal. It is most noticeable on CW and occurs directly in the first mixer. There are several easy ways to get rid of it.

Before changing anything, the first step is to check every capacitor in the receiver for leakage. While this is a lot of time-consuming work, it will pay off later by elimination of strange and/or intermittent troubles.

I've heard a lot of questions on the air regarding the use of 7360 beam-deflection mixers in the 75A-4, specifically referring to the July, 1964, *QST* article. This modification has been evaluated at NØDMS.

The irony of beam deflection tubes is that they were introduced too late in the game to compete with solid-state devices, and at a time when the tube industry was running largely on momentum. (The integrated circuit was invented in 1959.) These are "really neat tubes" and most of them were experimentally developed to serve as color demodulators in TV receivers in the late 1950s. The 7360, unlike the rest, was supposed to be a balanced modulator in SSB transmitters. Its technical debut was in July, 1960 issue of the *RCA Review*, in an article by M.B. Knight, a research engineer working in the Receiving Tube Advances Development Department at RCA, Harrison, N.J. High performance, balanced beam deflection receiver circuits could have been perfected without much additional work, but the end of the hollow state era came instead. By 1964, the higher performance, lower cost, and extremely linear 6JH8 had been released. Properly applied, this tube could have given FET mixers a real run for their silicon. 6JH8 performance indicators were largely ignored in the industry, and they saw very limited use before the end came. The 6JH8 does require higher electrode voltages than most typical receivers can supply, making a retrofit difficult.

If contemplating the July, 1960 *QST* mod, readers should expect "sticker shock" when looking up the price of a new 7360. It is a difficult mod to make, with the additional components and adjustments that are required. It should be realized that in this design, the first mixer is not balanced, as you might hope. The author merely switches the second 7360 plate to ground at the rate of the 1st crystal oscillator. What he ends up with is a low-noise, linear pentode mixer with way too much conversion gain. It does eliminate front-end crossmodulation, but there are better and cheaper ways to do this. In his design for the 2nd mixer, I found further problems. He uses the mechanical filter's input transducer in an attempt to balance the signal plates with respect to ground, and recommends adding a 50 uuF trimmer from one plate to ground "if needed" to improve balance. Examining the mixer output with an analyzer, I found that 35 dB of signal imbalance was the best that it got. As built, I could see both RF and oscillator signal in the mixer output. Using both of these 7360 mixers increased overall gain so much that the filters were overloaded, and they were producing spurious signals of their own due to internal distortion. The Q-multiplier was also overloaded, and the notch was reduced to only 20 dB or so. Noise in the receiver was

greatly reduced, which was nice, but there was so much gain that I could hear light dimmers miles away! Needless to say, these mixers didn't last long in my receiver.

The front end mods which I kept in my receiver were adapted from W2VCZ. I made a few changes from his original design, which will be discussed. (These mods give even higher performance than the ones from April, 1970 *Ham Radio*, which would be my second recommendation.) When I first completed them, I thought I'd made some mistake, because the receiver was so quiet. I started tuning around, using a piece of short wire for an antenna. The first station I came across was using a low wire dipole in Italy, and he was loud. On CW, the only signals detected are the ones in the IF passband. The crossmodulation is completely cured. The third-order 2-tone dynamic range improved to 117.5 dB, and the single-tone blocking improved to 110 dB. This is truly spectacular performance.

I don't have a step-by-step procedure available, as most of the work is straightforward. Try to follow the original component layout as far as possible, and pay attention to original lead dress, especially around the mixers.

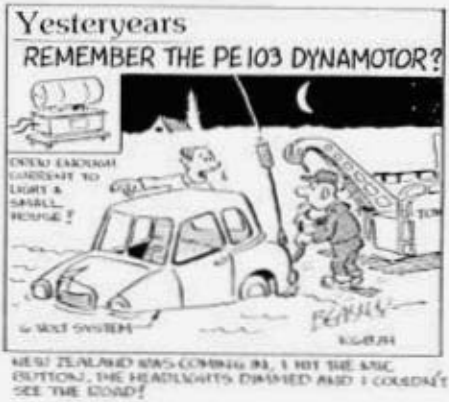
According to figure #1, W2VCZ has replaced the 6DC6 RF amplifier with a type 6GM6. The 6GM6 is a nice front end tube, as it has a more remote cutoff characteristic than the 6DC6, which means it is less likely to be driven into distortion. Its equivalent noise resistance (ENR) is only 447 ohms, 4 times quieter than the 6DC6. The bias needs to be adjusted to provide about -.1 volt with no signal applied, and that's the reason for the 3.3 meg resistors used in the grid circuit. Adding to W2VCZ's design, I have removed C20, and substituted a miniature 10 uH choke in series with the AGC line at pin 1. This was done to provide an even faster AGC response. It further lowers the impedance of the AGC line, but still allows for RF filtering of the AGC line, formerly performed by C20.

There is additional filtering, consisting of a 10 uH choke and a .003-uF condenser in the heater circuits of all the tubes preceding the detector. These were installed after an analyzer across the heater line revealed a terrific amount of intermittent and/or spurious trash, high-level power line harmonics, etc., coming in that way.

W2VCZ used a 6DJ8 twin-triode first mixer. This is an excellent design, with the first section serving as a cathode follower to feed RF voltage into the cathode of the second section. The cathode follower buffers the mixer's RF input against gain changes in the RF stage, and also provides a 50 ohm RF source for the mixer's cathode. LO injection is at the second triode's grid. For this design to work properly, the mutual conductance of the second section must be held down by reducing the plate voltage at the second plate.

Instead of W2VCZ's 6DJ8, I use a 6ES8 as the first mixer. This is a high-performance, frame-grid, low-noise tube, and was designed to be used in premium AGC-controlled TV tuners. At 160 ohms of ENR, it is 8 times quieter than the 6DJ8. It is about the only remote-cutoff triode I know about, and is very hard to overload. It has a cross-modulation factor of just 1% at cutoff with an input signal of 1/2 volt!

**continued next page**

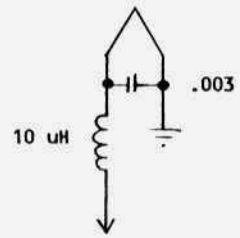


If you use it, try to get the Amperex variety, as they are the PQ (Premium Quality) types with low-resistance, gold-plated pins. There is a high-isolation internal shield; be sure to connect it directly to chassis ground at the tube socket with the shortest possible leads. Try to get the plate voltages close to what is shown, as I optimized them for minimum distortion with a 2-tone RF input.

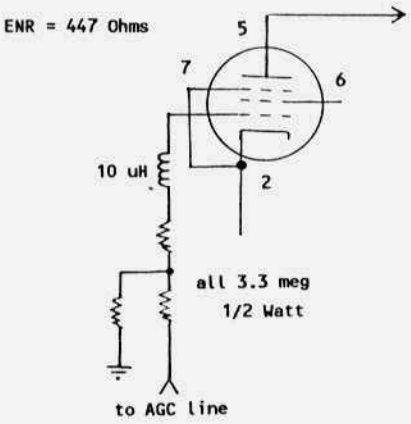
A 6EA8 is called out at the second mixer by W2VCZ. This is the best possible choice I could find, working better than the 6U8 pentode designs published elsewhere. To take full advantage of the low-noise resistance of this tube, a low noise oscillator injection system is needed as well, and it should have a source impedance close to 50 ohms for injection at the 6EA8 cathode. The most troublesome noise in injection oscillators is the broadband "white noise", which can mix to produce spurious signals of its own, also known as "noise modulation". That's the reason for the filter I've added in the LO injection line. The filter is a simple parallel-tuned IF trap. The other change I made was to put 123 volts on the 6EA8 screen. This is an optimum value which gave the lowest value of 3rd-order IMD response. Adjust the value of the 100K series resistor as necessary to get this voltage. The exact value of the resistor will be different from one receiver to another.

I've shown all of W2VCZ's modifications in the drawing. I don't use solid-state rectifiers in my rig.

I'm sure you will like the clean-sounding, rebuilt 75A-4. Its a real pleasure listening to a truly clean receiver, which is free of synthesizer and display noise. Side-by-side comparisons with modern rigs have shown the superior signal-to-noise ratio available with the modified 75A-4 to be a great advantage, especially at a relatively modest station. **ER**



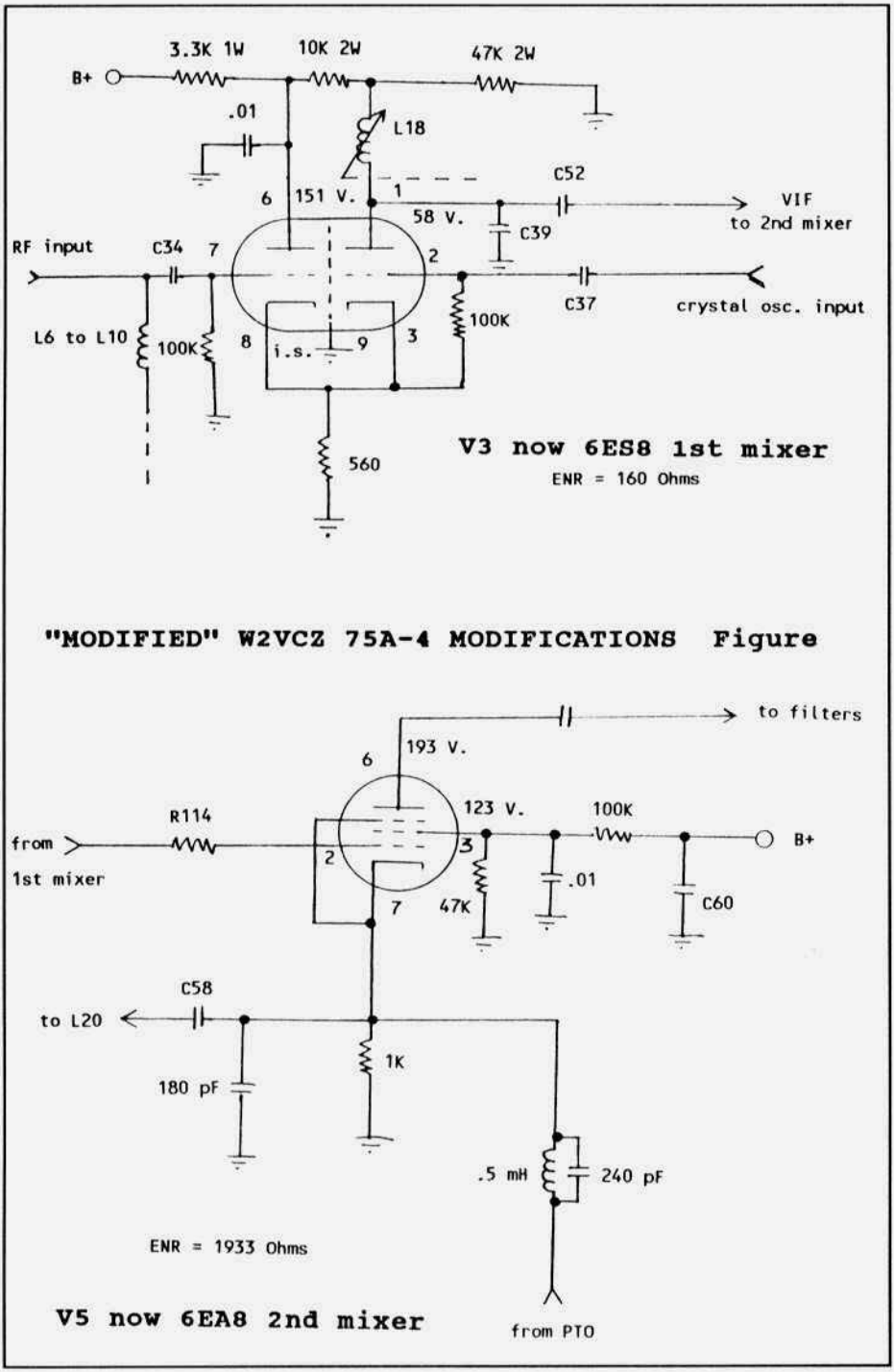

Heater wiring changes




**V2 now 6GM6 RF amplifier**

OTHER CHANGES:
Remove: R46-R29 in IF stages (see comments)
Add: Silicon diodes in place of 5Y3GT
200 Ohm/10 Watt resistor in C.T. of power transformer
Ground BFO coupling shaft to chassis
R98 to 1 Meg for improved muting
R30 to 56K/2W 1st IF amp screen (see comments)
C112 to .15 uF (AGC time constant)
C101 to .047 (audio coupling)

SPECS per W2VCZ:
noise figure = 4.8 dB at 14.3 Mc.
Sensitivity = .1 uV for 10 dB quieting


3.3K 1W
10K 2W
47K 2W
B+
.01
L18
C52
6
151 V.
1
58 V.
C39
VIF
to 2nd mixer
RF input
C34
7
2
C37
crystal osc. input
L6 to L10
100K
8
i.s.
9
3
100K
560
V3 now 6ES8 1st mixer
ENR = 160 Ohms
"MODIFIED" W2VCZ 75A-4 MODIFICATIONS Figure
to filters
6
193 V.
R114
123 V.
100K
B+
from
1st mixer
2
3
7
47K
.01
C60
C58
to L20
180 pF
1K
.5 mH
240 pF
ENR = 1933 Ohms
V5 now 6EA8 2nd mixer
from PTO

# A Simple Two-Tube VFO-Controlled Transmitter

**Horst Geipel, WAØNUH**
**2231 Hampshire Road**
**Fort Collins, CO 80526**

The following describes a simple two-tube VFO-controlled transmitter which was built to complement the three-tube regenerative receiver[1] described in the January 1993 issue of *ER*.

The circuit is fairly standard, but in order to work with the regenerative receiver, a few compromises had to be made.

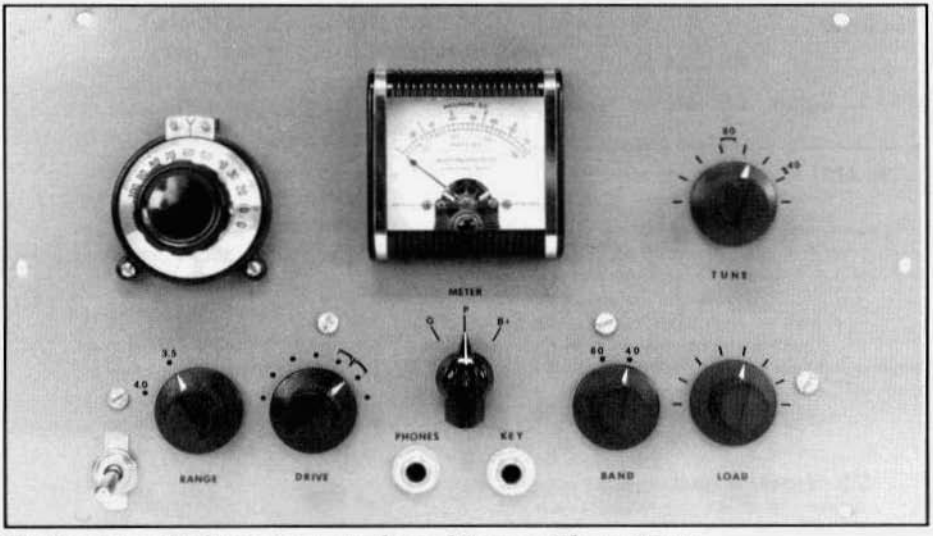
## The VFO

The grid circuit of the 6AG7 is tuned to 160 meters, doubling to 80 meters in the plate circuit. To minimize chirp, the VFO is not keyed. With the silver mica capacitors used in the grid circuit, the warmup drift of the oscillator was found to be 2.15 kHz during the first hour, with only 32 Hz additional drift during the next hour. Changes in ambient temperature will, of course, alter the drift characteristics.

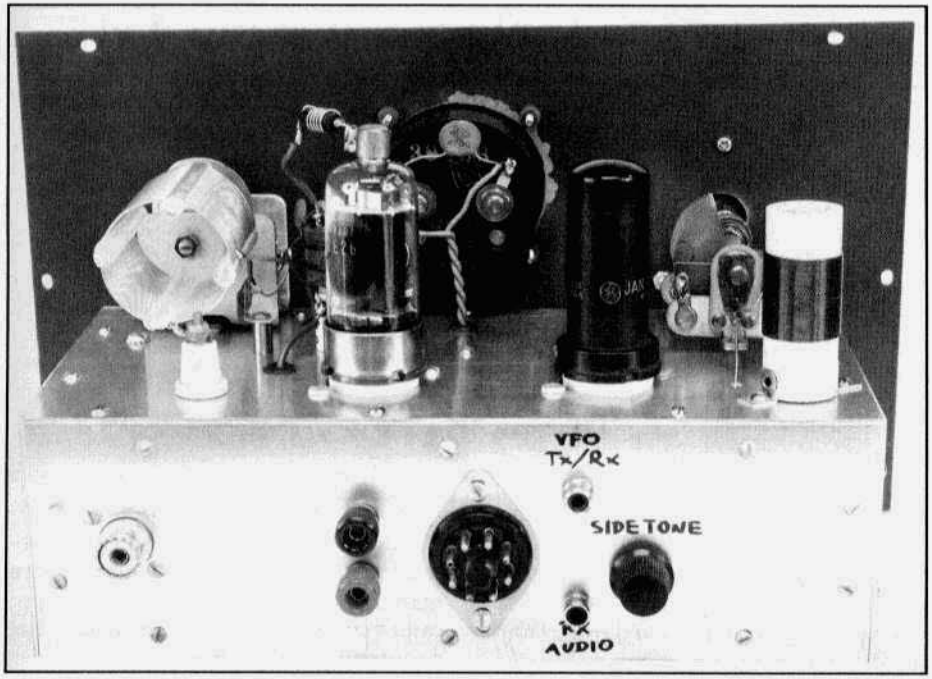
Only 32 Hz per hour drift would be nice and could, probably, even be maintained if the oscillator could be left running continuously by shifting the frequency during receive periods. If the receiver used with this transmitter were a selective superheterodyne, this method would be recommended. Unfortunately, to work with the broad regenerative receiver it was found necessary to turn the oscillator off during receive periods. This means that, depending on the length of the receive period, a slight to considerable shift in frequency has to be accepted.

As with the receiver, the tuning range is controlled with bandset and bandspread capacitors. This makes it simple to get full coverage of the 80-meter band with still adequate band spread on 40 meters. The grid coil consists of 42 turns on a 7/8-inch diameter ceramic coil form. The plate coil has 28 turns, also on a 7/8" ceramic form.

The operating voltages for the VFO are supplied by a power supply separate from the one used for the power amplifier. In that way, chirp caused by the voltage swings of a common supply during keying is avoided. The screen voltage is regulated by a VR-150 on the power supply chassis.




**The front panel. The meter was salvaged from an Elmac AF-68.**




**Rear view of the transmitter.**

## Power Amplifier

A 2E26 is used in a conventional class C amplifier with a pi network output circuit. Broadcast receiver type air variable capacitors are used for tuning and loading. The 730-pF loading capacitor is a dual 365-pF capacitor with the stators connected in parallel. The 2E26 works straight through on 80 meters and doubles on 40 meters. A portion of the pi network coil is shorted during 40 meter operation. The coil is an air-wound type of 1 1/2 inch diameter with 31 turns at 16 turns per inch. The 40-meter tap is 8 turns from the antenna end of the coil. A parasitic suppressor choke in the plate circuit consists of 5 turns #20 wire wound on a 100-ohm, one-watt resistor.

Since the construction of a plate modulator is planned, the high voltage lead to the plate and screen of the 2E26 is interrupted by two binding posts on the rear of the chassis. This allows for connection of the modulator. For CW use, a shorting plug is inserted. A single 0-1 mA meter is switched to read grid current, plate current and plate voltage. The numbered power supply connections on the schematic represent pin numbers of an octal plug mounted on the rear of the chassis. This mates with a socket and multi-wire cable connecting to the power supply.

## Send/Receive Switching and Side Tone Generation

I always like to listen to a transmitter's RF output for monitoring. This leaves no doubts about chirp or drift. However, not only in this case is the VFO not keyed, but with the use of a regenerative receiver several other problems must be considered. Even if the VFO were keyed, the VFO signal would seriously overload the receiver. This would result in loss of regeneration and, consequently, no sidetone.

As mentioned in the description of the VFO, it would be desirable to shift the VFO frequency during receive periods and allow the VFO to run continuously. This was tried, but abandoned because



**continued on page 31**

# Report On The Vintage Sideband Net

**by Chuck Cluck, N5SWO**
**P.O. Box 1475**
**Alpine, TX 79831**

The Vintage Single Sideband Net is alive and well, meeting every Sunday at 1900 UTC, on 14.292 MHz, plus or minus the QRM and net control calibration error. Net control is usually shared by myself, N5SWO in Alpine, TX, and WB0SNF, Andy, operating from somewhere near Clark, NE.

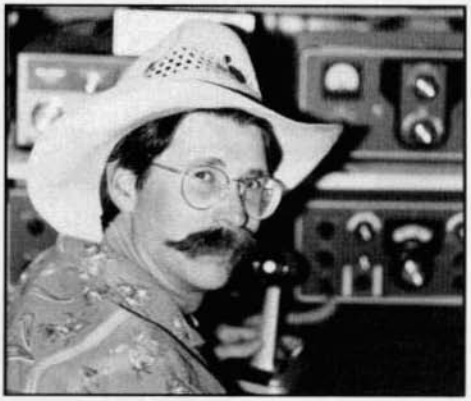
In the ten months or so that I've been keeping records, the net has attracted check-ins by 204 different operators of vintage rigs. Of these, perhaps 60 have become fairly regular participants. On a typical Sunday afternoon, we have 25 to 30 on the roster.

So what constitutes a vintage rig? On-the-air polling of net participants has led to the formulation of rigorous criteria; if your rig meets two of the following then it's definitely vintage.

Manufacturer defunct- advanced the state of the art- American made- designed at least 20 years ago- xtal controlled- analog frequency display- tube driver/finals- homebrewed- brief production run- square edges- glows in the dark- weighs > 50lbs.- contains rat droppings.

An amazing variety of vintage gear has been heard on the net, from B&W to WRL. Many of the guys have impressive collections and rotate through their rigs from week to week. For some of us, the net sets a target time for completion of that neglected repair or restoration project. There is probably no better place to get an on-the-air evaluation from knowlegeable fellow devotees of the hollow state sideband technology.

When people inquire as to the purpose of the net, they're told that we are an informal group meeting to exchange notes of technical and historical interest pertaining to antique or vintage SSB radio equipment. This rather pretentious



**Chuck, N5SWO, at his operating position.**

phraseology covers a lot of ground. Obscure parts can be located or offered, rare manuals and schematics found, cryptically marked parts indentified, technical problems examined and sometimes solved, advice solicited, history of defunct manufacturers illuminated, and general commentary heard. All this is possible due to the remarkable experience, expertise, and basically packrat nature of the guys in the group.

The net has its frivolous aspect as well - numerous rare, arcane, historically significant, desirable, (at least one of the preceding) artifacts have been awarded as trophies to winners of our occasional on-the-air contests. Most recently, N7ODM - Bob, Bozeman, MT - was the lucky recipient of a trophy awarded for having the most patch cables (13) entangled between the various bits of his rig. Other trophies have been won for high and low tube count, combined age of op and rig, most knobs to play with, and other sundry challenges.

There are some significant improvements that could, and I feel should, be made in the operation of the net. Several net controls, serving in rotation, would cover the country better than one or two operating from the same locality every week. More emphasis on technical



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## AM FREQUENCIES

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

## From the Editor:

**15-Meter AM Operation.. A Suggestion**

From a recent letter:

"I would like to make a suggestion for a frequency change for the 15 meter AM mode band use. In the past we have been using 21.400 and up, which is causing some problems. There are a ton of maritime, phone patches, religious and other SSB nets on 21.400 and up. We AM operators are constantly being chewed out (I love it) by these SSB groups. I would like to suggest a frequency of 21.310 +- which would give ample headroom for the general class AM operators too. We AM types have a tough sell, and it just seems like good public relations to avoid, rather than fight the nets who truly believe that they own certain portions of the band."

**Peter Brown, KH6IRT**

**Military Radio Contest, May 15**

Dale Gagnon, KW1I, sends information that AM International will be sponsoring a military radio contest on Armed Forces Day, May 15, from 7 to 9 PM local time. Next issue we'll have the all the other details but now is the time for all those who have miliary gear to mark their calendars. It should be an interesting contest for all the military gear enthusiasts.

**AM on VHF, A Letter From WB3IZX**

"In the Philadelphia area six meters is alive and well every day on 50.4 mHz at 0900 hours. The Coffee Pot net has been in operation for many years and is still going strong today.

The sound of AM on VHF is awesome especially if there is some power behind the signal. The audio quality from some VHF rigs really rivals that from some of the best HF rigs.

Come join us on six meters. Get that '460 or G-50 or whatever you have out of the closet and tune around, you might be surprised what you hear. If you have a 6-meter AM net in operation I would like to hear from you.

**William J. Bruno, WB3IZX**
**205 North Wayne Ave.**
**Wayne, PA 19087**

**More Logs From the 160/10 Meter Contest on Christmas Week-end**

Al Norton, K7IEY, made 27 contacts in 16 states using an Elmac AF-68 transmitter and a PMR-8 receiver. He says, "I had a ball and am looking forward to the next jamboree. Best audio quality goes to Gary, W7FG, on his Desk KW."

Dave Smith Jr., N2KSZ, using a BC-610-E on 160 and a DX-100 on 10 meters, managed to make a total of 51 contacts. He says, " I didn't put a lot of effort into the contest like some folks do, but I thoroughly enjoyed meeting new friends and making contact with some old friends I hadn't heard in a while."

# Get Started in Radio for $3.50!

## What It Was Like in the Good Old Days

**by Bob Dennison, W2HBE**
**82 Virginia Ave.**
**Westmont, NJ 08108**

In the early days of radio, many a young man was caught up in the excitement of building home-made radios. In those days there were several magazines capitalizing on this popular pastime. Our hero would be enthralled by the photographs and wiring diagrams of receivers ranging from simple one-tube sets to superhets using more than a dozen tubes. And there were interesting letters from other readers relating how they had built one of these sets and telling how well it worked and how many stations they had heard. Our young newcomer was bitten by the radio bug and filled with a desire to build his own radio. Typically, our first-time builder was short of funds and didn't have many tools so he had to proceed cautiously. He would build a simple one-tube radio and then, if that worked, he would move on to bigger and better sets.

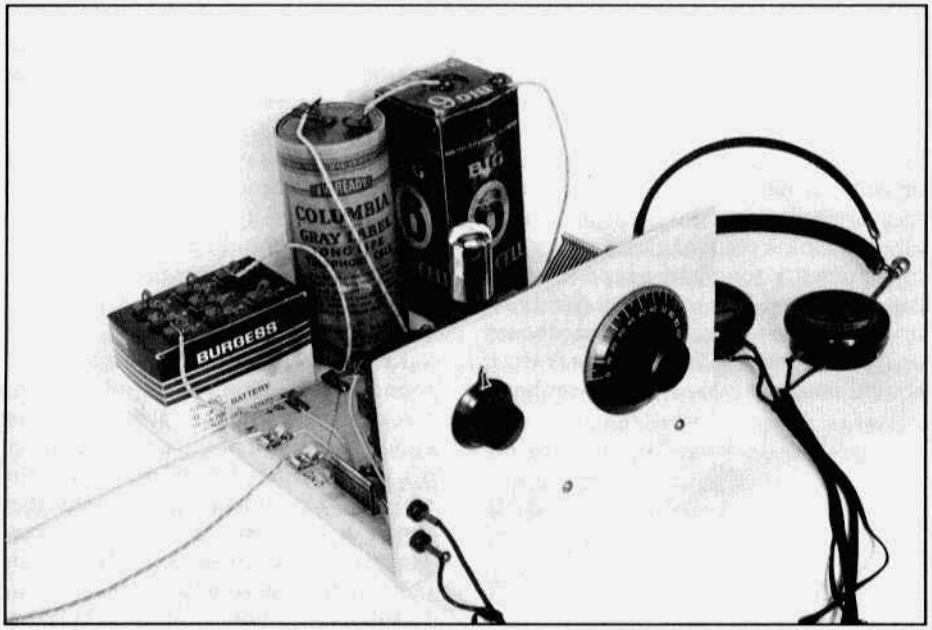
**A Low-Cost Circuit.** Fig. 1 shows the wiring diagram of a typical one-tube beginner's radio. The list of 'What You Need to Buy' shows prices as of the fall of 1934. It is assumed that most of these items will be used parts from the local radio repair shop. Other items could be ordered from Allied Radio in Chicago. Everything possible has been done to reduce cost and complexity to a minimum. A type UX-99 tube was chosen since its filament voltage, 3V, is the same as that of two dry cells, thus no rheostat is required. Since the filament current is only 60 mA, we can expect long battery life. In the early thirties, most radio repair shops had a shoe box full of used 99 tubes and our beginner could get one for $.25. Of course, he had to caddy nine holes at the local golf course after school to earn $.25.

**Gosh, A Variocoupler !?** Our beginner doesn't yet know about Ham Radio or Short Waves so he will be happy with a set that tunes only the broadcast band. He will hear about the really good stuff soon enough. So we can eliminate plug-in coils and the socket they require. If we use a 3-circuit tuner (variocoupler) we can eliminate the antenna trimmer condenser and the usual regeneration control in the form of a variable condenser or a 50K rheostat in the B+ lead shunted by a .5-mFd condenser.

WHAT YOU NEED TO BUY

| | |
|---|---|
| 3-Circuit Variocoupler -- | .25 |
| Var. Condenser, .0005 uF | .25 |
| Tube, type UX-99 -------- | .25 |
| Tube socket, 4 prong ---- | .15 |
| Mica condenser, w/grid clips, .00025 uF -------- | .10 |
| Mica condenser, .002 uF - | .10 |
| Grid leak, 2 megohms ---- | .10 |
| Knife switch, SPST ------ | .10 |
| Knobs (2) ---------- | .15 |
| Headphones, 2000 ohms --- | .96 |
| Tip jacks (2) ---------- | .10 |
| Fahnestock clips (6) ---- | .06 |
| No. 6 dry cells (2) ----- | .36 |
| 22½ volt battery -------- | .57 |
| | $3.50 |

If the idea of a variocoupler (L1, L2, L3) sounds strange, remember most beginners hate the idea of winding coils, which involves drilling tiny holes in slippery cylindrical coil forms, counting numer-




**Front view of beginner's radio. Panel is 1/4" plywood, base is 3/4" pine.**

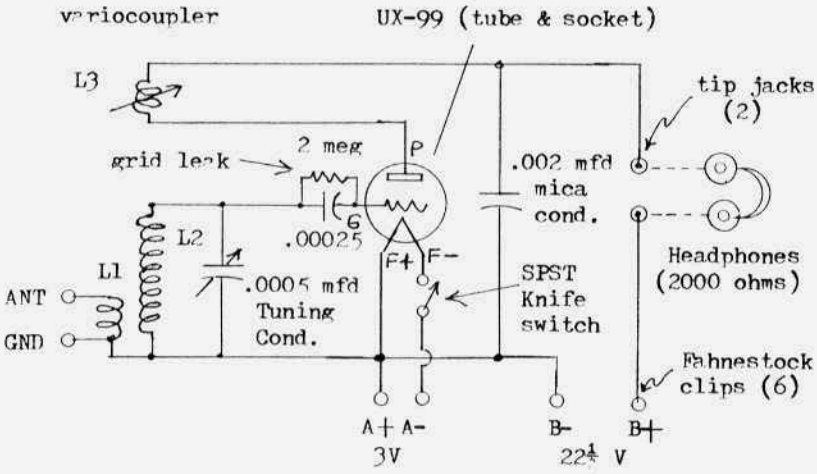



Fig. 1. Circuit details of one-tube radio.

ous turns of fine wire and soldering the end leads into those hard-to-solder prongs. In due time, the novice will try to talk his dad into buying him a set of manufactured plug-in coils.

Variocouplers come in two sizes. One requires a .00035 mFd tuning condenser - the other a .0005 mFd condenser. Ask your radio dealer which one you have. Select a variable condenser that is easy to

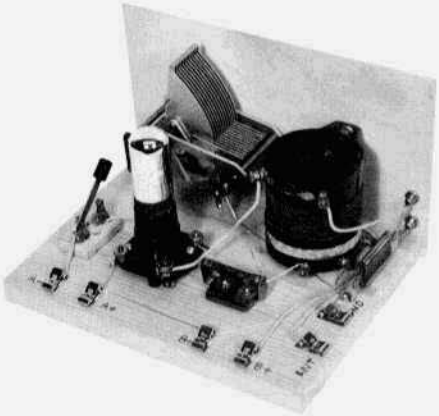


**continued next page**

**Get Started in Radio for $3.50 from previous page**

mount on the panel. Make sure the rotor plates don't rub (short circuit) against the stator plates.

**The Small Components.** Look for a .00025-mFd grid condenser that has clips to hold a grid leak. Those made by Muter or Dubilier have holes through them so they are easy to mount. Grid leaks usually resemble a piece of glass tubing 1/4" in diameter, 1" long with a tapered metal cap at each end. The resistance element is usually a piece of carbonized cardboard or fiber. Ask your dealer to check it - it should measure two or three megohms.



**Rear view. The variocoupler is mounted on the panel by means of its bushing.**

To keep wiring leads short, the .002 mFd bypass condenser is mounted directly behind the phone tip jacks. There is not much room here so it is mounted edgewise, being supported by two angle brackets. All wiring is done with No. 22 push-back wire. The ground wires and a few other wires can be bare wire made by slipping the insulation off of the push-back wire.

**Construction.** A Short Wave set normally needs a metal panel to eliminate 'hand-capacity' - an aggravating nuisance in which the tuning changes when the operator brings his hand near the tuning dial. If the beginner's set covers only the broadcast band, we won't be bothered by this problem and we can use a wood base and a plywood panel. The first-time set builder is usually in a big hurry to hear results so he won't bother with paint or shellac. Fahnestock clips are used instead of more expensive binding posts and still more money is saved by using phone tip jacks ($.10) instead of the standard phone plug and matching jack ($.40) The battery connections should be labelled (A-, A+, B-, B+) with pencil on the wood base. Similarly, mark the ANT and GND terminals.

Knobs for this radio can be whatever is found at the radio shop or are donated by a friendly ham. If the dial on the tuning condenser is one of those nice big (3" or 4") jobs graduated 0-100, it will be possible to log stations you hear so that they can be quickly returned to at a later date. Make a thin pencil mark on the panel to indicate the dial setting.

**Results.** Even though our little radio has only one tube, it will receive many stations with good headphone volume. During the day the range is 25 to 50 miles but at night you can expect to hear some of the big stations several hundred miles away. Tuning is not critical so there is no need for an expensive and difficult-to-mount vernier dial.

Part of the fun in the radio building hobby is tearing up a set after a short period of use so its parts can be used again in a bigger and better set. Another order is sent to Allied Radio for an audio transformer, an RF choke, a vernier dial and some of those exquisitely beautiful Hammarlund variable condensers. Oh what joy it is! You just haven't lived until you've built a whole series of progressively more exotic receivers. Give it a try! **ER**

**Editor's Note:**

In next month's issue W2HBE will describe a receiver he calls "The Megadyne". He says it's a "hi-power oscillodyne" (?) and that it has loudspeaker volume with 1 tube! It should be interesting...

# My Last (?) Heathkit

**by David Ishmael, WA6VVL**
**1118 Paularino Ave.**
**Costa Mesa, CA 92626**

What do you do during a cold, rainy, overcast New Years holiday weekend? How about building my last (?) Heathkit! But first, a little background.

My wife Judy and I were running errands in Anaheim a few years ago and I (finally) decided to stop by the Heath Center on Ball Road to buy the Heath IP-2718 Triple Output Power Supply. I had been "dragging my feet" for months buying this kit. I thought I might do better at the local amateur swapmeets but I never found anything suitable in the IP-2718's price class ($140). I was really surprised when we drove up to the Heath Center and it was "closed" at 1 PM. I didn't find out until several months later that Heathkits were history. I don't recall any "warning" from Heath - no "going out of business sale" flyers or supplements. Their Winter 1991 catalog was disappointing with their concentration on education (16 pgs.) and home automation (28 pg. insert). Amateur radio was limited to 9 pages with 19 kits and lots of "private label" equipment (SBS-1400 from Yaesu, HK-232 from AEA, the SB-1000 from Ameritron, etc.). I suppose in retrospect, the writing was on the wall. The Winter 1963 catalog featured 31 kits and the 1969 catalog featured 42 kits that were amateur radio related. I really never once considered "life without Heathkits"!

My first kit was a Knight kit Ocean Hopper regenerative receiver in 1958 (ER#42). My second kit was a Heath CT-1 In-Circuit Capaci-Tester that I built in 1959. I bought it at a Heath store in Santa Barbara for $7.95. During the next 34 years, I built twenty Heathkits (5 of which I still have). They ranged from the simpler HN-31 Cantenna and HD-1416A Code Practice Oscillator to the 10-14 5" Scope and SB-200 Linear Amplifier to the harder HW-101 Transceiver and GR-900 Color TV. I still have seventeen Heathkits and have owned/traded/destroyed/cannibalized twenty more. Heathkits have very significantly influenced not only my amateur radio hobby, but more importantly, my career in industrial electronics.

Imagine my surprise when walking through the "old" General Dynamics swapmeet early last year when I found an original Heath IP-2718 Triple Output Power Supply still in kit form. The box had been opened but the contents had not been removed or disturbed - Heath "addicts" know when a kit box is original! I was pretty confident that all the parts were still there. I bought my last (?) Heath kit for $40.

I decided to build the IP-2718 over the New Years holiday. I was very tempted to leave it in kit form as a collectible but I gave in to the urge to build my last Heathkit. It took me 11 hours to assemble, check out, and calibrate the IP-2718. I had forgotten how much "fun" it is to build a kit. It still a "kick" to see something you have built "come to life" when the power is applied - as you give it the "smoke test" - even if I did "cheat" and use a variac. The 'kick' from building a kit is not that much different from that of building a completely homebrew project from scratch.

I'm really going to miss building Heathkits. For you Heath 'addicts' *Heath Nostalgia* by Terry Purdue, K8TP, is required reading. The title page says: " A brief history of the Heath Company of Benton Harbor, Michigan - with fond memories of and by those who were responsible for the Heathkit name becoming world famous. **ER**

# Radio of Today and Tomorrow

**by David Sarnoff, General Manager, Radio Corporation of America**

**Reprinted from the New York Sunday Herald, May 14, 1922**

**Part 3, the conclusion**

## An Internationalizing Agency

As an internationalizing agency, radio broadcasting is an instrumentality which, if properly used, may well break down prejudices, help men to understand each other, sway and even govern national and international motives by bringing the personality, the intelligence, and the thought of the world's great men to millions and hundreds of millions of people everywhere. It is right to think of this wonderful invention in terms removed from mere amusement; to conceive it as leading to something more than the hearing of a sound.

Radio communication of the future obviously tends to include all moving vehicles; it is already beyond the experimental stage for installations on ships at sea, submersibles, in aircraft, and railroad trains. It is reasonable to expect its eventual application to automobiles and even in some cases to individuals.

In a competitive sense, the future of radio is equally bright. Its opportunities in long distance communication are manifold, as evidenced in the single fact that messages can be sent through the air at tremendous speeds of transmission and, commercially, more words per minute mean less cost per word. With lessened cost, there will naturally be created new classes of service until the day may come when a business man will look upon the writing of a letter to Europe on an urgent subject as an archaic practice.

The practical vision of the future of radio does not include, however, the scrapping of undersea cable systems; radio will supplement, rather than supplant the cables. In the first place, experience has shown that new inventions usually result in the improvement of previously existing methods. In the second place, communication facilities always have been inadequate - just as new subways never quite relieve congestion - and the increase in facilities will cause increase in new services. It is inconceivable that the development of the transmission of intelligence will go forward at a leisurely pace; everything points to a very great acceleration. In putting an end to the single point-to-point limitation imposed upon the cable, radio will become the dominating method of conducting long distance communication and will hold that leadership.

In some measure, the same considerations apply to the future prospects of radio telephony over land. In the mobile services, in connecting up isolated communities, and the shore with the sea, there is a rich field for development. That radio will supplant the wire telephone is not to be contemplated. Wire telephone communication, as we know it today, has the greatest utility for the type of service rendered. It is a wonderfully developed and complete system for seeking out for the user, through a wire network and the central exchange personnel, the particular individual wanted. This entire system, this entire service, would have to be duplicated to establish radio telephony on a parity in usefulness; and even if this were technically practicable with radio telephony - which it is not - there is no economic justification for such duplication. The radio telephone, on the other hand, has a large sphere reserved for it in reaching locations where wires cannot be placed or maintained, in spanning inland

waters or connecting up islands off the coast. As a supplement to wire telephony alone, radio is assured of a great future - which again directs me to the subject of broadcasting, a field that distinctly belongs to radio.

**The Future of Radio**

To those of us who watched every step in the onward march of radio, who saw scientific principles shaping themselves into business facts, who sensed the trend of research in the development of wireless, the instantaneous success of radiophone broadcasting does not come as a surprise. In 1915, from the possibilities that could be foreseen I had worked out a plan for radio broadcasting in commercial detail, and submitted it for consideration by my Company.

The time was not ripe, however, for action on this project; we were in the midst of war activities and the devices for radiophone transmission and reception had not been perfected to the point to which they have been brought to at the present day. Broadcasting is a reality now, and it has been made possible only by fine co-ordinated effort within the industry, a large part of the credit being due to the Westinghouse Electric and Manufacturing Company for being first in establishing it on an organized basis. Radio telephone broadcasting is not in itself an invention; it is the application of principles previously established.

The hearth-side circle is only a small part of the unmeasured sphere of its influence, however. Country schools cannot afford to employ the best teachers or the most able lecturers. Think of a system of rural education, augmented through the setting up of a broadcasting station with a range of several hundred miles, and connecting up within that radius a thousand country schools. Appraise the benefit of having one skilled lecturer in history or geography, or hygiene, or whatever the subject may be, deliver his lesson as the children listen in their schoolrooms, possibly with the interspersing of appropriate items of entertainment and music to hold the children's interest.

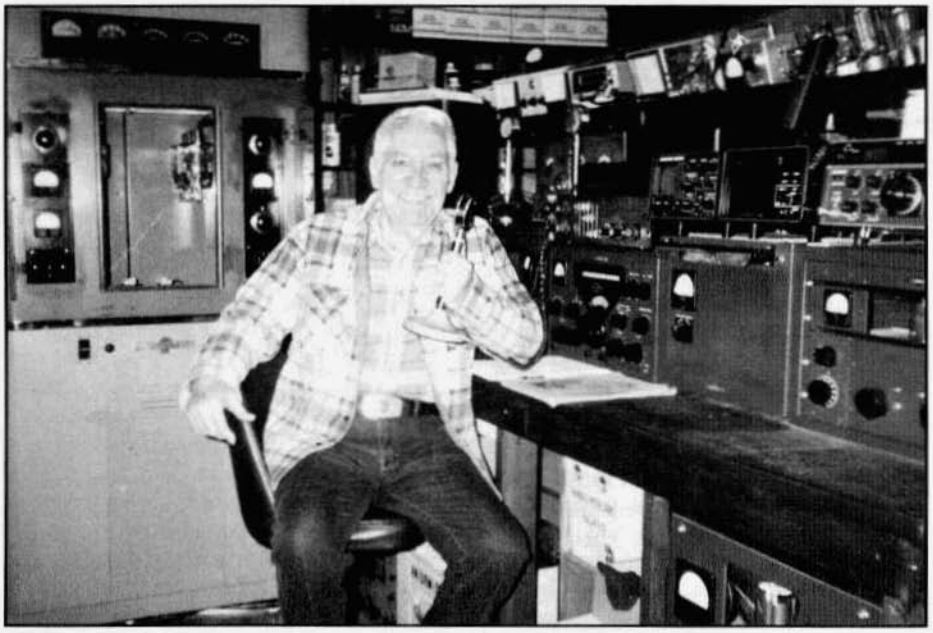
And what may we expect when the telephone reaches across the ocean? Up to the present time there has been no way for trans-oceanic transmission of the human voice, because the cables lying on the bottom of the ocean are not suitable for speech transmission. They can carry feeble currents for telegraphy, but not for telephony, because of the distortion of the speech, and other technical reasons. But with the radio telephone, it may be predicted that within the next few years, and possibly sooner, we shall be talking across the Atlantic Ocean. It will be possible then for a man in New York to pick up his ordinary wire telephone, secure connection with the radio telephone station which will carry his voice across the ocean and connect up with his partner or business associate on the other side.

Trans-oceanic radio telephony is not a theory; it is an accomplished fact. Speech was first transmitted to France by the American Telephone and Telegraph Company; and even a greater distance was covered by its engineers when their equipment at the Arlington Naval Station, near Washington, enabled speech to be heard in Hawaii. This company and the associated engineers of the Western Electric Company have attained very practical results in their experimental work in the ship to shore field enabling me a few evenings ago to talk from my home, over the ordinary wire, to the Captain of the steamship "America," 400 miles out at sea. The highly developed ship radio telephone transmitter on the "America" was due to the General Electric Company.

Consider also one application of international broadcasting by radio; an international conference to make open covenants openly arrived at - and the whole world "listening in." Some day, and perhaps in the not very distant future the dream will be a reality. When it is possible for the peoples of the world to listen to the deliberations of statesmen, to have



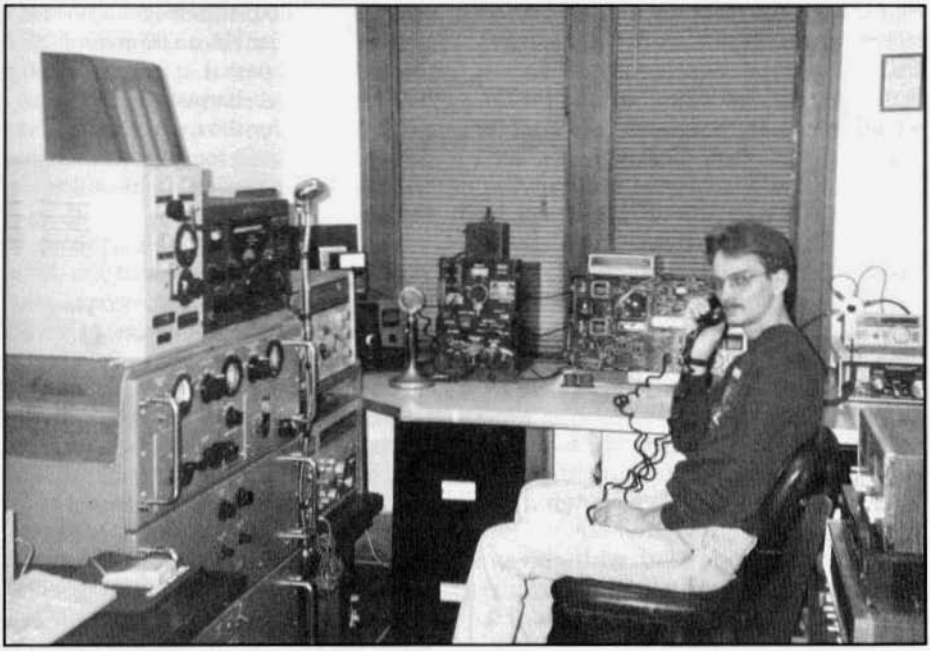
continued on page 33



I.D. Byars, W4KKO, who has been licensed for 51 years. He's been on AM all those years except for the 'silent years' during WW II. He has two broadcast transmitters on the ham bands; a Collins 20V-1 on 75 meters and a 20V-3 on 160.

Don Markl, KI5DT, in his vintage shack. The transmitter in front of Don is a Globe King 500. The receiver to the right is a NC-303. Above the NC-303 is a BC-1032 panadapter.

Joe Eide, KB9R, with a vintage SSB station. The transmitter is a Gonset GSB-100 and the receiver is a 75A-4. The tuner sitting on the GSB-100 is a Millen 92200.



Mike Affeldt, N8CLZ. The big rig to the left is a T-368 transmitter. On top the transmitter is an antenna tuner and 75A-4 receiver. The military gear on the table includes a R-808 and a T-195.

# The Silver 701

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

Early amateur radio gear was developed and produced by men whose names are still well known to their owners, in contrast to today's faceless, impersonal plastic appliances. What reader of *Electric Radio* has not heard of Art Collins, Bill Halligan, or Jim Millen? R.L. Drake and Oscar Hammarlund also gave their names to firms and equipment we all prize.

But there was one early radio entrepreneur who might not be immediately recognized by today's *Electric Radio* enthusiast but whose name is still better known to the overall public, and that is McMurdo Silver[1]. Silver was an amazing young man with tremendous foresight and energy. He founded and lost several radio manufacturing companies in the depression era, and worked for other companies as well. His first venture, begun in 1924 when he was 21, was Silver-Marshall in Evanston and then Chicago, IL. They manufactured a variety of components, and by 1928 had 10% of the US parts market. They also manufactured broadcast receivers and all-wave regenerative receivers. Silver-Marshall went bankrupt in 1932, and was picked up by none other than Bill Halligan who used the name and corporate address until 1934 as he began Hallicrafters.

Meanwhile, Silver formed McMurdo Silver, Inc which manufactured the Masterpiece line of all-wave superhets in competition with E.H. Scott and Lincoln Radio. They were the kind with chrome plated everything, chassis, multiple tube and transformer shields, the works! He furnished a Masterpiece II, a twelve tube, one-RF, three-IF receiver covering the broadcast band through 10 meters, for the 1933-34 Byrd Expedition to the South Pole. Byrd, in appreciation, gave him a lasting memorial by naming the great Antarctic Bay, McMurdo Sound, after Silver.

McMurdo Silver, Inc closed in 1938, selling out to rival E.H. Scott. Silver went on to work as a design engineer for E.I. Guthman, Lear, Fada and Grenby. In 1945, he formed his last venture, McMurdo Silver Co. Inc in Hartford, CT, which produced test equipment and some basic amateur gear. His line included a VTVM with an RF probe, an R/C bridge, a Signal Generator, a Signal Tracer, a Wavemeter and an SWR/Power Bridge, two sets of basic transmitters and receivers, the 701/801/802 (the 802 was a superhet and the 801 was a regenerative) for the HF bands and the 700/800 (superregen) pair for 2 meters and 235 mHz, an 80 meter NBFM vfo and a band pass frequency multiplier for 80 to 6 meters. It must have been quite a come-down for the man who had once designed and built for the top of the line. This venture ended with his suicide at age 45 in 1948.

This article will tell you a bit about the Silver 701 transmitter which I'm fortunate to have found alive several years ago. It is the product of the last of Silver's companies.

It was on one of my visits to Starr Surplus in October, 1984 that I spotted the Silver 701. Starr Surplus is one of those total junk shops in the "Short North" area of Columbus, Ohio where you had better keep one hand on your wallet while you are picking through the piles. But on rare occasions you can find some real goodies, like a complete set of coils for a Millen 90800 strip exciter or two sets of new-in-the-box coil forms for a National SW3, so it was a place that I risked occasional visits to despite the neighborhood. I


**The McMurdo Silver 701 transmitter. This is a product of the last of Silver's companies. Only 10 x 5 x 5-1/4 inches, smaller than a shoe box, it packs a two-stage transmitter plus modulator that will run on all bands from 80 through 6 meters.**

parted with about ten bucks for the 701, not bad for a semi-rare addition to my collection.

So what did I get? The Silver 701 "Atom-Z" transmitter is a small box with a lot of function for its day. Only 10"x 5"x 5 1/4", smaller than a shoe box, it packs a two-stage transmitter plus modulator that will run on all bands from 80 through 6 meters. As originally furnished for $36.95, the coils, tubes, power supply and everything else were "accessories." Sort of like the heater and defroster in a 1947 Chevrolet.

The transmitter uses a 6AQ5 tri-tet crystal oscillator, with plug-in cathode and plate coils, to drive an 807 final, also with plug-in coils. The oscillator coils are wound on 5-prong forms the size of tube bases. I suspect that a lot of Silver 701 owners made their own coil forms by salvaging them from burned out tubes. There is room in the final compartment for the full-size 5-pin coil forms, although higher frequency coils were wound on the tube base forms for the final as well. The popular B&W Baby or Junior coils won't fit into the final compartment because the socket is oriented the wrong way. The modulator uses push-pull 6AQ5's driven by a carbon mike. My transmitter is serial number 815, and the manual I got from HI is for serial number 1373, so there must have been a fair number of these little fellows made. I even found a picture of one in the January 1956 *CQ*, holding down a Geloso vfo in the shack of ZL2AFZ in Napier, New Zealand. George had worked 150 countries and 38 zones with his "Atom-X". I'm sure the ZL prefex helped, but that's still impressive.

The controls, across the front from left to right, are oscillator cathode tuning, oscillator plate tuning, and final plate tuning. The light bulbs you see on the panel indicate oscillator crystal current and final plate current. Output from the final tank link goes to the two ceramic feedthroughs on the right side wall or to a coax connector on the rear, both added by a previous owner.

The tri-tet crystal oscillator rather warmed my heart, since I had used a 6AG7 tri-tet in my first novice rig in 1952. It dates from about 1933 and was the first crystal oscillator circuit developed that generated harmonic as well as fundamental output. It is basically a tetrode oscillator circuit, except that the crystal is returned to the cathode and there is a parallel-resonant circuit between the cathode and ground. Tuning a tri-tet may be something of a disappearing art, so I will briefly mention how this works.



**continued next page**

**The Silver 701 from previous page**

The 6AQ5, like the 6AG7 and the 6CL6, is one of the few "well-screened" tubes that has sufficiently low coupling from plate to control grid so that the tri-tet's crystal current will not go destructive when the plate is tuned to the crystal's fundamental frequency. The earlier 59, 6F6, 6L6, and 6V6, often featured from the mid '30's till the early '50's as single tube tri-tet transmitters, were not so gentle, and they had to be operated as straight tetrode or pentode oscillators on the fundamental with their cathodes grounded. My reading and experience with a 6AG7 tri-tet was to tune the cathode circuit to midway between the fundamental and the second harmonic for good output up to the fourth harmonic of the crystal.

McMurdo Silver's manual says to tune the oscillator plate off resonance on the low frequency side, tune the cathode to just a bit higher than the point of maximum crystal current (I presume the tank could not tune down to the crystal frequency, which would be a definite rock crusher), then dip the plate as indicated by minimum crystal current - there was no plate current meter or bulb in the oscillator - and finally to adjust the cathode tank for good keying.

Now you see why the tri-tet, although a good performer, lost favor to the easier to adjust grid-plate or Colpitts circuit.

The power leads for the oscillator, modulator and final are all brought out separately. You can put as much as 750 volts on the final on CW, which allows the 807 to run at its maximum 75 watts. For phone you are advised to run no more than 350 volts and 30 watts to the 807. The modulator is limited to only about 15 watts of audio out.

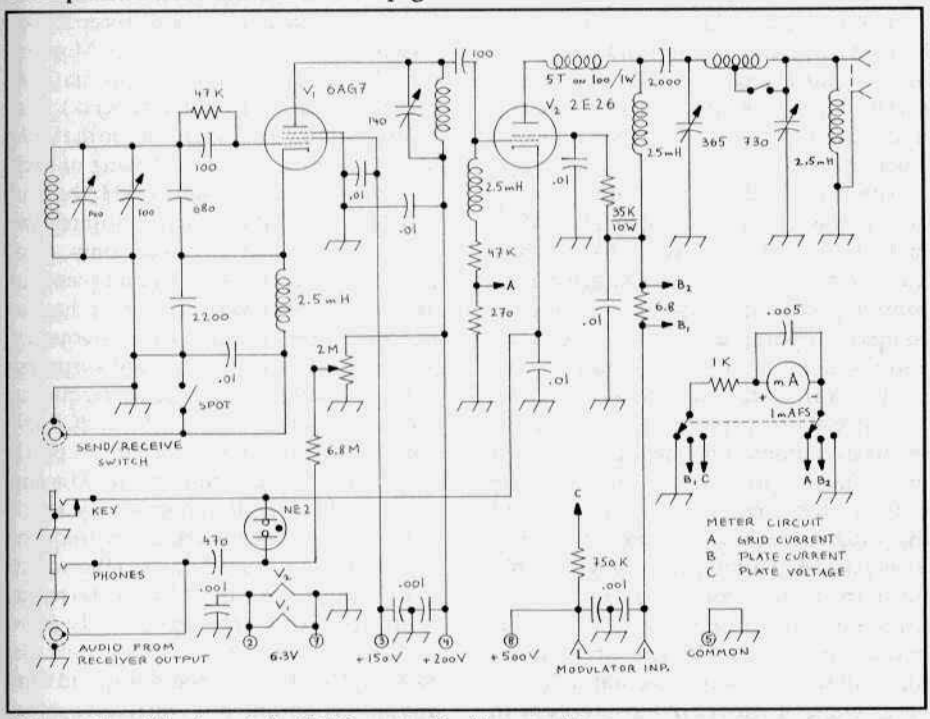
The Silver 701 was not designed for fast QSY. The crystal plugs into a socket inside the cabinet. It can be driven by a vfo; I use one of the Collins PTOs from the T-195 that Fair Radio was nearly giving away a few years ago. But the Silver's size and capabilities suggest that it may have found some popularity as a 10-or 6-meter, trunk-mounted mobile rig back in the later '40's and '50's where QSY wasn't highly valued.

On the air, it works like a lot of other typical, low-to medium-powered transmitters. It tunes up as advertised, seems to have no tendency to parasitics - which was always a bother with the 807 - and perks along with a good CW note. The modulator sounds like a carbon microphone, decent telephone quality but surely not high fidelity. But that's what you would have been after in a rig of this size and power level. On occasion, when I've talked to people and told them I was using a "Silver 701," they thought it was some special edition of a rig made by Icom. No Way! This little trooper is much more interesting than that.

Perhaps someone out there has some more McMurdo Silver gear. The 802 or 801 receiver companion would be fun to find and pair up with the 701. Some of his earlier, more sophisticated Masterpiece receivers from the McMurdo Silver, Inc days are probably real gems. If you have one of these, get busy and write an article about it for *Electric Radio*! **ER**

**References:**

1. The information on Mc Murdo Silver comes from *Communications Receivers* by Raymond S. Moore, from the 1934 *Official Short Wave Radio Manual* edited by Hugo Gernsback and H. Winfield Secor, republished by Lindsay Publications, from the March 1938 issue of *Radio Craft*, Hugo Gernsback editor, reprinted by Vestal Press, and from John Kelley, N3GVF who furnished copies of articles about Silver from June 1929 *Radio News* and from October 1925 *On The Air*, a copy of McMurdo Silver Inc's post-war catalog, and lastly his own recollections which confirmed some of my own.




**Schematic of the two-tube VFO controlled transmitter.**

the frequency could not be shifted far enough to allow copy of a weak signal. Due to the poor selectivity of the regenerative receiver, the shifted VFO frequency was still blocking regeneration. Because of this problem, the following system was decided upon:

A coaxial antenna relay with two sets of external contacts disconnects the screen and plate circuit of the receiver's detector tube from the power supply during transmit periods and, at the same time, completes the cathode circuit of the transmitter's VFO. For monitoring purposes, a simple neon tube saw tooth oscillator[2] is energized when the cathode of the 2E26 is keyed. The sidetone signal produced by this oscillator is fed to the phone jack of the transmitter, which is also connected via a shielded cable to the receiver's audio output.

During receive periods, the relay contacts open the cathode circuit of the VFO and connect the plate and screen of the receiver's detector to their power supply. A spotting switch allows the VFO to be turned on during receive periods for spotting purposes.

## Operation

The grid drive for the 2E26 is kept below 3 mA by adjusting the 140-pF variable capacitor in the VFO plate circuit. The PA plate current is adjusted to about 55 mA with the pi network loading capacitor. Power output with these settings is about 17 watts on 80 meters and 12 watts on 40 meters. **ER**

**Footnotes**

1. The schematic on page 21 of ER, January 1993, shows the B+ from the power supply incorrectly connected to ground. The correct connection is to the leads supplying B+ to the two audio amplifier anodes and the send/receive switch.

2. QST, September 1957. A $1.69 keying Monitor, McCoy

**Medium Wave DX is Alive and Well from page 2**

able to null out his local 50,000 watt station, WHAS, and hear stations in Alabama, Georgia, Louisiana and elsewhere on the same frequency! And, of course, a few who have the luxury of space are still using the trusty old Beverage antenna, one in Massachusetts was 4800 feet long!

Although BCB DX is a listening-only hobby, it is a two-way hobby also. Most BCB DXers want to have a QSL for their rare catches and most stations are glad to comply provided a few basics are met. A reception report is sent to the station with a log of items heard that would be particular to that station such as local ads, word-for-word copy of local announcements and other items heard that would prove the reception. A great many DXers now enclose a cassette with portions of the broadcast as they received it. A letter is enclosed explaining the hobby, describing the receiving setup and reception conditions along with a request for a confirmation and, ALWAYS, return postage. Many of the wide coverage stations have ham-type QSL cards but most reply with a letter. The colorful collections of letterheads in binders are great conversation pieces and many of them evoke a story of the night this rare catch was heard. Your author has accumulated verifications ("veries" we call them) from over 1700 AM stations in all 50 states and over 50 foreign countries. A few long-time listeners have over 4000 stations confirmed.

So what can be heard? Constantly changing propagation on the BCB provides endless possibilities. Often stations are heard very well for a short time only once and are not heard again in years, or ever. For those who can't stay up to the wee hours of the morning a lot of very impressive greyline DX is possible an hour before and several hours after local sunset. Many low power daytime stations on crowded frequencies will propagate several thousand miles for a 10 or 15 minute period. Even after 30 years of BCB DX hearing a nice clear signal from a 250 watt Arizona station in Ohio still sends a chill. And what about foreign DX? On the BCB? Sure! The most recent issue of *DX News* shows confirmed reception of dozens of foreign stations such as Morocco (612 kHz), Senegal (765 kHz), Albania (1395 kHz), Saudi Arabia (1521 kHz) and Lithuania (1557 kHz) right here in the USA. Many zones have 9 kHz spacing of their BCB stations rather than 10 kHz here in North America, thus placing most of their stations in the spaces between ours. A receiver with good selectivity and plenty of RF gain combined with an antenna that can knock out an interfering adjacent frequency domestic stations can yield many surprises.

A good understanding of low frequency propagation is helpful and the BCB DX hobby has bred a number of highly knowledgeable propagation experts. The top portion of the BCB behaves very much like 160 meters while the lower frequencies seem to have mechanics of their own.

So what do you need to get started or re-started? You probably already have most of it now. One of those nice old glow-in-the-dark receivers is a good start and any type of antenna will receive something on the BCB. A directory of AM stations is pretty much a necessity and once again the NRC comes to the rescue with its AM RADIO LOG. For less than half the price of a Callbook, it includes call letters, frequency, power levels, address and phone, format and operating schedules for all US and Canadian stations and is updated every year. In addition, a membership in the NRC (non-profit, all volunteer operated) will give you 30 Log updates per year along with plenty of tips and reception information. The NRC also publishes an impressive number of books specifically aimed at BCB DX from receiver manuals to antenna design books, map books showing the locations and directional coverage patterns of all stations as well as over 100 reprints and compendiums of projects and articles from past issues. We also have an annual national convention, this year near Hartford, CT.

So the next time you're all talked out but still feel like some shack time, fire up that receiver and pop the bandswitch down to the broadcast band. You might be surprised at what you'll find.

For information on the National Radio Club write to : Ron Musco, PO Box 118, Poquonock, CT 06064-0118. The NRC also has a VERY informal ham net in the advanced portion of 75 meters Sunday nights year round.

(Author has been an editor with *DX News* for 25 years, holds an Extra Class amateur license, is a Volunteer Examineer liaison with ARRL and has been employed in broadcasting since 1957, a profession he was led into directly from his interest in BCB DXing. He is the proud owner of a restored Heathkit TX-1 and Johnson Valiant II and Adventurer in addition to his prized one-owner Hammarlund HQ-180A.)

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**Radio of Today and Tomorrow from page 25**

first hand knowledge of the functioning of their Executives in power, then the voice of the people may literally be heard.

Another vision of radio telephone utility was expressed to me recently by that eminent soldier-scientist, Major-General George O. Squier, Chief Signal Officer of the Army. Replying to my inquiry as to the reason for the number of devices installed in his office to bring in the etherwave concerts, he explained that this radio equipment served a dual purpose; in addition to the scientific interest it held for him, he employed it to create a mental background. For years he had noted that the concentration demanded by his daily duties was subject to the handicap of distractions caused by noises from the street outside. Radio could be employed to end all this, he believed, by bringing music into his office, enabling him to create his own background. By replacing noise with harmony, he would in time become oblivious of all outside sounds and work without injurious distractions. The basic thought here followed the experience of the Post Office in its installation of phonographs and the resultant speeding up of the work of men employed in sorting mail. The General carried the idea further, however, in asserting his conviction that the day was not far distant when radio broadcast receiving sets would attain a fixed position in certain classes of factory operations; more particularly could they be effectively introduced among the sweatshops to lighten the burden on the toilers subjected to the daily monotony there encountered.

The position of radio at the moment is a conspicuous one, not alone in the fact that it has suddenly caught the public fancy, but because the country wide buying movement of radio devices was begun in a period of business depression and the public's welcome to the new art brought needed stimulus to the great electrical industry. It will grow more conspicuous from day to day, with new uses and new developments. Thus, radio communication will be a force of vast and beneficial influence to civilization and humanity. **ER**

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**Letters from page 3**

AM have radio did not enjoy this tremendous resurgence of interest by chance. It was through the tireless efforts of those who fought the anti-AM FCC dockets, printed publications, created organizations, and (last, but not least) the handful of us who never gave up for "almighty SSB", and continued to operate AM, even through the lean years of the early to mid-70's, when AM almost died!

We have finally established nice "AM windows" from 3870 to 3890, and around 3825 or 3830 kcs. Come on, fellas! Please! Either operate AM in the AM window or operate your SSB elsewhere! Please show the AM community a little consideration! Thank You.

**Rick Miczak, K8MLV/Ø**

**R-8040 – A Homebrew 80 and 40-Meter Receiver from page 9**

timidate the 75A-4 and NC-303 owners on his block.

The dirty little secret of ham receiver history is that at least up to the last couple of years the use of transistors made our sets worse rather than better. The main reason is that all but the latest semiconductors have smaller dynamic ranges (the ratio of signal strengths between their internal noise and the point where they become nonlinear) than suitably chosen vacuum tubes. Exhibit 'A' for the prosecution is the most sophisticated homebrew receiver I found: the G2DAF Mk 2 receiver, described in the Radio Society of Great Britain Radio Communication Handbook, 5th (1976) edition. This is a 15-tube six-band double-conversion set using push-pull triode amplifiers of carefully limited gain in the RF and tunable IF and mixer stages. (Because they greatly reduce even harmonics, push-pull amplifiers mean less chance for odd-order intermodulation products to be generated). The Mk 2's noise figure is quoted as 7 to 8 dB and its dynamic range is said to be greater than 100 dB; both figures are close to state of the art even today. A 455-kcs mechanical filter is used to obtain selectivity. The RF stage is a European variable-mu dual triode for which there may not be an exact U.S. equivalent; a 6ES8, however, probably would work well.

The biggest weakness is the local oscillator: the use of an ECO circuit (a potent harmonic generator) and conventional rather than 'unit oscillator' construction will give performance much below what the rest of the design deserves; the drift goal was an unimpressive 100 cps/hour after a 30-minute warmup.

Other than the local oscillator this set should be able to wipe the floor with all but the best and most modern of ham semiconductor radios and it would be easier to build than a solid-state rig of even close to this performance. If I were planning to tackle a receiver of this complexity, this is the set I'd choose, though it would be interesting to combine the RF and first mixer circuits of this receiver with the frequency conversion scheme of the W5OMX set and thus get rid of the tunable IF.

(A circuit diagram and a more detailed description of the R-8040 circuit will appear next month). **ER**

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**Vintage SSB Net Report fom page 18**

discussion has been rather pointedly proposed in these pages in past issues. Perhaps splitting up our time on the air into general commentary, locate/swap/sell, and technical portions might be a viable structure. Having fought the 20-M QRM for months now, maybe we should move to a different time/frequency.

At any rate, these ideas and more should be addressed. Send your comments to ER, or check in next Sunday and air your opinions. **ER**

**Editor's Note:**

In upcoming issues we'll have reports on other nets like the vintage CW net, the Swan users net and the newly formed Drake users net.

# CLASSIFIEDS

## Advertising Information

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**VINTAGE EQUIPMENT ONLY**

**ER**
**P.O. Box 57**
**Hesperus, CO 81326** **Phone/FAX 303-247-4935**

## DEADLINE FOR THE APRIL ISSUE: APRIL 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

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**FOR SALE:** Two 4D32 tubes, used but checked , full power - $25. **WANTED:** Drake spkr and Q-multiplier. Mack Wilson, 900 Duskin, El Paso, TX 79907. (915) 598-3396

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**FOR SALE:** Military paint, many colors. **WANTED:** Power plug for T-195 xmtr; R-392 rcvr, reasonable. Mike Affeldt, N8CLZ, 4505 Sobieski, Detroit, MI 48212. (313) 891-5229

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**WANTED:** Early Globe Champ, rack mounted, 150-175-watt model, circa 1949-'50; also a Knight T-150 xmtr. Bill Smitherman, KD4AF, Rt 4, Box 79, East Bend, NC 27018. (919) 699-8699

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**FOR SALE:** 32S-3, 75S-3B, 312B-4, 516F-2, 30L-1, 664/419, 3202A, 520R, SX-25. Ray, (314) 428-1963

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**WANTED:** Johnson Valiant II band switch assembly; Hammarlund HQ-170 band switch assembly; Hallicrafters R-46-A spkr; spkr for Hammarlund HQ-170. J. McCollum, W8VBC, 6078 Price Rd., Loveland, OH 45140.

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**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

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**FOR SALE:** Conset Sidewinder SSB 6-meter xcvr - $100; BC-1306 HF xmtr/rcvr - $125. Don Winfield, K5DUT, 6080 Anahuac Ave., Fort Worth, TX 76114. (817) 732-3976

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**WANTED:** Top and bottom covers and original cabinet for R-390A; data on Cetron UXCVII triodes; manual for HP 606B. Clark Hatch, WØBT, 2546 SE Peck Rd., Topeka, KS 66605. (913) 235-2721

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**FOR SALE:** New list of 1000's of tubes! Includes new, used, antique, collectible, Majestic and Western Electric types. Send SASE to Jim Cross, 2817 Parklawn Dr., Dayton, OH 45440-1538. (513) 298-5827

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**WANTED:** B&W 5100B milliammeter. Bob, KL7HDY, 9501 Brien St., Anchorage, AK 99516. (907) 346-1169

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**WANTED:** The grid dipper head and the coils for a Measurements Corp, low freq. GDO, model 59 LF. N5LTP, Box 465, Los Alamos, NM 87544.

**FOR SALE:** Used technical books - radio, electronics, math, military, magazines, etc. $1 for large list. (stamps ok). Softwave, Dept. ER, 1515 Sashabaw, Ortonville, MI 48462

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**FOR SALE:** Globe Champion xmtr, model 300. PU only. (602) 953-0279

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

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**FOR SALE:** Heathkit Chippewa linear, vg cond., wrong PA current meter, RF deck and separate pwr sply. Jack Alley, 2100 Miscindy Pl., Orlando, FL 32806. (407) 851-6258

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**WANTED:** National Select-O-Ject and NFM-83; Hallicrafters S-76 and SX-100 rcvrs; mutual conductance tube tester, preferably Hickock. Above with manuals preferred. Rick, K8MLV/Ø, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

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**WANTED:** Manual and schematic for Century CT-1 in-circuit cap checker. David L. Muse, KD4FEB, 5401 S. Sumac Circle, Fayeteville, NC 28304.

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**FOR SALE:** 32V-2, exc. cond., PU - $375; 75A-2, good cond. - $275; 75A-3, below average - $175; Collins 75S3C-32S3-516F2, winged, near mint - $1100. Duane Vasold, K8CCE, 5768 N. River Rd., Freeland, MI 48623. (517) 695-5140

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**WANTED:** Unbuilt kits by Heath, Johnson and Knight. Gene Peroni, POB 58003, Philadelphia, PA 19102. (215) 665-6182 days

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

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**FOR SALE:** Mod xfmr PP 811s to 4-125 - $35; case only for Ranger II - $25. Evan Haydon, NØGMR, 4308 N. 15, Lincoln, NE 68521. (402) 467-1345

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**FOR SALE:** Tektronics IL10 analyzer - $150. **WANTED:** C-81A control box for R-344 ARC-15F rcvr. Brown, POB 3514, Lancaster, CA 93536. (805) 943-2027

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**FOR SALE:** General Radio Co. VTVM type 1800A, decade resistance box type 602K, variable air condenser type 539B - BO. Richard Lucchesi, WA2RQY, 941 N. Park Ave., N. Massapequa, NY 11758. (516) 798-1230

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**FOR SALE:** Johnson Invader 200 - $150; Heath SB-10 - $80; parting out Viking II, Ranger I, NC-303 and SX-28; manuals for vintage equipment - see our ad this issue. Gary, W7FG, (918) 333-7893

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**FOR SALE:** Collins 75A-3, w/matching spkr, orig. manual, product detector, 800 Hz CW filter and 6 kHz AM filter. Jack, KL7CKY, (503) 863-5893

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**FOR SALE:** Heath Seneca, nice - $75; BC-348 - $75; BC-221 - $35; CB tube sets - $45; old transistor radios; Rider, Sams, Beitman manuals; Bosch 28 AC, wks nice - $85; Navy TCS rcvr - $40; Heath GR-88- $25; G. Perkins, RFD #2, Box 34, Milo, ME 04463. (207) 943-8823

**FOR SALE:** Johnson Messenger 100 - $25; Johnson SWR bridge - $35; Johnson Viking Navigator - $75; Johnson Valiant - $240; National NCL-2000/KW - $525; National NC-173 NBFM plug-in adapter - $35; Bird Termaline load (30-500 MHz, 500 W) - $125; Collins 1051B HF rcvr - $450; Heathkit scope calibrator, IG-4505 - $45; Eldico SSB-100F xmtr - $175; rcvr diagrams, orig. 001 thru 030 for R390/URR - $20. Bill, K6DUY, (510) 820-6966

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**FOR SALE:** R-390A service, module repair to complete remanufacture, cosmetic restoration, 20 years experience, expert service, 1 week turnaround, very reasonable, any cond. accepted. Rick Mish, (419) 726-2249

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**WANTED:** Collins 32V-3, 75A-3, spkr, acc. items; Lettine 240; MacElroy bug. Brian Roberts, K9VKY, 3068 Evergreen Rd., Pittsburgh, PA 15237. (412) 931-4646

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**FOR SALE:** WE ground magneto, flameproof keys, NOS, 1955 USN; telegraph items etc, 8 page list - $1 + SASE. J.H. Jacobs, 60 Seaview Terrace, Northport, NY 11768

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**FOR SALE:** Two tube National NFM-73B narrow band FM adapter made to plug into National NC-173 rcvr, w/complete instructions and service sheets - $15 ppd. Ken Greenberg, 4858 Lee, Skokie, IL 60077. (708) 679-8641

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**FOR SALE:** KWM-2A. **TRADE:** 6251. **WANTED:** Hallicrafters SP-44 panadapter; RCA AR-88; National SW-3; HRO-50/60. Micheal, WM1O, (914) 834-7678

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**WANTED:** Central Electronics MM-2 RF Analyzer; meter for RCA AR88 and clean NC-303. Joe Eide, KB9R, 2623 Clare St., Eau Claire, WI 54703. (715) 834-4582

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**WANTED:** Copy of Ryder's manual for SP-600; also SP-600 cabinet. Robert Schroeder, 5913 Stardust Dr., Watauga, TX 76148. (817) 485-5573

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**WANTED:** Manuals or copies for Stoddart NM 10 A, NM 22 and AN/USM 81 digital multimeter. Thanks. A. Guiriec-Hopital de Concarneau-29900, Concarneau, France

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**FOR SALE:** Swan 500CX, with ps/spkr; Swan 100MX mobile - $250 each. **WANTED:** SL-500; manual for ITT McKay 3010; manual for Stoner PRO 80-10 xcvr. Smitty, AD6V, (209) 255-1177

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**ELECTRON TUBES** FREE 1993 Catalog, over 2,000 types in stock. **Electron Tube Enterprises,** Box 311, Essex, VT 05451. (802) 879-0611, FAX (802) 879-7764

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**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

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

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**FOR SALE:** Repair! All makes and models, homebrew, maximum labor per unit - $96. Dan Rupe, W7HBF, Telo Technology, 1302 S. Uplands, Camano, WA 98292. (206) 387-3558

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**WANTED:** Information on commercially built and kit transmitters 1930-1980 for new book along lines of "Communications Receivers". Ideas and comments welcome. Ray Moore, c/o RSM Communications, POB 1046, Key Largo, FL 33037-1046. (305) 853-0184

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**FOR SALE:** Collins KWM-1, w/pwr sply; National NCX-3; Galaxy V, w/pwr sply and spkr; Heath AR-3. Joel Levine, WB2BMH, 67 Derby Ave., Greenlawn, NY 11740.

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**FOR SALE:** Clean R1051B, w/maint. manual, in perfect shape electrically and mechanically - $550 plus UPS. Walter M. Chambers, POB 241371, Memphis, TN 38124-1371. (901) 761-9381

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**WANTED:** Collins 302C-1, SM-3, SC101, 312A-1, 312A-2, crystal plug-in unit for KWM-1. Butch, KØBS, 5361 St. Mary Dr., Rochester, MN 55901. (501) 288-0044

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**WANTED:** Hallicrafters SX-25, only in very good cond. to be shipped to an address in the states. Jose Cangas, EA4JL, Velazquez, 86 trdo.-Madrid-28006 (Spain) 34 (1) 5755496

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**WANTED:** Clean top cover, Mhz-scale drum and 100 kHz calibration xtal for 51J/R-388. Fredrick Sequin, 28 Commonwealth Ave., Boston, MA 02116. (617) 267-7887

**WANTED:** Very early Hallicrafters and Hallicrafters/Silver Marshall equipment including Skyriders with entire front panel dull aluminum color, S-30 radio compass, S-33 Skytrainer, S-35 panadaptor, wood console speakers - R-8 & R-12, HT-2, HT-3, BC-939 antenna tuner, parts, advertising signs, paper memorabilia of Hallicrafters. Also want RCA model AVR-11 airport tower receiver. Chuck Dachis, WD5EOC, "The Hallicrafters Collector", 4500 Russell Dr., Austin, TX 78745. (512) 443-5027

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**FOR SALE:** HQ-180 - $200; HQ-145X - $160; HQ-100 - $100; SX-101 - $175; Johnson Desk KW parts unit - call for details. All plus UPS. Teleype model 28 ASR - PU only. **WANTED:** Johnson 122 vfo. Gerry Parker, Box 520, Casselton, ND 58012. (701) 347-5345 (d), 347-5018 (eve. & wknd)



**FOR SALE:** New list of over 400 vintage radios and accessories; also list of 500 vintage manuals available. SASE please. Mike Horvat, KA7ASF, 112 E. Burnett St., Stayton, OR 97383.

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**FOR SALE:** Eico 803 geiger counter, good cond.; BC-453 (works); BC-453 (2) parts. Make offer or trade? M. Neidich, K2ENN, 145 E. 15-6A, NYC 10003. (212) 777-1332

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**FOR SALE:** B&K 650 tube tester, w/manual and charts, very good cond. - $50. WANTED: Triplet 3444A tube analyzer; Triplet 3444 for parts; 3444A roll chart #84-177A or later and applicable chart update booklets; late production HP 8601A sweep gen.; L3 input module for Tek 7L5 spectrum analyzer; manual for HP 8698A plug-in. Bill McCombs, WBØWNQ, 10532 Bartlett Ct., Wichita, KS 67212-1212. (316) 722-7669

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**WANTED:** Any information regarding Bendix TA-3 xmtr, schematic or manual. Charles Di Cecca, 501 Mystic Valley Pkwy, Medford, MA 02155. (617) 396-9354

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**FOR SALE:** Collins 32V-2 - $300; 75A-4 - $400; 75A-2 - $300; Heath SB-200 - $225. Ray Hounshell, KF8GF, 8903 Schaefer St., Mentor, OH 44060. (216) 255-4494

**Western Heritage Museum Omaha, Nebraska**
***"a magnificent home for your equipment"***

***Leo Meyerson, WØGFQ, (founder of WRL) in concert with QCWA, needs donations of gear and related materials for the amateur radio exhibit at Western Heritage Museum in Omaha, Nebr.***

***This permanent display is the only one of its kind in the country and is something that all hams can be proud of. We expect 50,000 visitors annually.***

***Your tax deductible donation will be permanently noted on a plaque that will be prominently displayed.***

***For more information contact Leo at (402) 392-1708, May-Nov.; 619) 321-1138, Nov.-May.***

**FOR SALE:** Heath Nostalgia - 124 page paperback covers Heath history in pictures and stories. $9.95 postpaid (plus tax in WA). Heath Nostalgia, 4320 - 196th SW., Suite B-111, Lynnwood, WA 98036.

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**FOR SALE:** Collins kHz dials for 75A-1, 75A-2, 75A-3, 32V-1, 32V-2, 32V-3, KW-1, KWS-1 - $30 per dial or $35 exchange. Butch, KØBS, (507) 288-0044

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**WANTED:** General coverage used Hammarlund, Collins, Drake equipment in exc. cond. Levy, 8 Waterloo, Morris Plains, NJ 07950. (201) 285-0235

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**FOR SALE:** Heathkit HR-10B - $60; DX-60B - $60; HG-10B - $45; SB-303 - $150; SB-400 - $150. All exc., w/manuals. Cliff Fleury, AI7Y, 64174 Tumalo Rim Dr., Bend, OR 97701. (503) 382-9162

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**WANTED:** 51J-4 and 32V-3. Will pick up within 500 miles of Denver, Colo. Want working radios for active AM use; also want 51J-4 parts radio or mech. filter parts. Ed Cole, WBØSUT, 6060 4 Mile Canyon Dr., Boulder, CO 80302. (303) 444-7296

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**WANTED:** Power xfmr for Collins 30L-1 amp and cabinet for 32S3 xmtr. Jim Henderson, K6JAD, 3136 Ronald St., Riverside, CA 92506. (909) 682-8935

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**WANTED:** Hallicrafters SX-9; orig. manual for National NC-98; 1930's and '40's radio premiums; RCA 1847 camera tube. Bill Ross, KY9M, 875 Gordon Terrace, Winnetka, IL 60093. (800) 621-0687 days

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

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**FOR SALE:** Vintage parts. Send stamp and request "Vintage Flyer". USA only. Copies of some obsolete Readrite/Triplett equipment manuals. Bigelow Electronics, P.O. Box 125, Bluffton, OH 45817.

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**WANTED:** Coil sets A,B,C,D (bandspread) for HRO-5, buy or trade against same coils for HRO-7. HB9AQS, POB 209, CH-3780 Gstaad, Switzerland.

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**WANTED:** Collins 51J-4 rcvr, w/case, spkr and manual. Barry Nadel, Box 29303, San Francisco, CA 94129. (415) 346-3825

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**FOR SALE:** Central Electronics 20A, w/458 vfo - BO, U-ship; Mackay Marine 2013, two 811A modultors, two 813 finals. John Van Meter, WD9JIM, 69 - 19th St., Clintonville, WI 54929. (715) 823-2381

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**WANTED:** Drake 2-NB noise blanker and 2-AC xtal calibrator (for Drake 2-C rcvr). A. McGinnis, WA2DTQ, 55 Patton St., Iselin, NJ 08830.

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**FOR SALE:** Hallicrafters S-40B - $75; NC-300 - $250; Narco VTR2A w/mod - $35; Narco ADF29 - $35; King KX150 - $25; Genave - RT 563 - $100. Ed Cole, WBØSUT, 6060 4 Mile Canyon Dr., Boulder, CO 80302. (303) 444-7296

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

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**FOR SALE:** SC101, 312A-1 chrome lamp shades - $40 shpd. Repair and restoration of Collins and Johnson. **WANTED:** Someone near Moscow, PA to deliver equipment to Dayton hamfest. Butch Schartau, KØBS, 5361 St. Mary Dr., Rochester, MN 55901. (507) 288-0044

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**WANTED:** I'm still looking for McIntosh tube amplifiers. Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53228-0803. (414) 545-5237

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**FOR SALE or TRADE:** WW II rcvrs, Scott SLR-F, National R116. **WANTED:** Schematics for above and Harris RF 530A; also R392 plug. Tom Mackie, WB2ILA, 807A Bristol Ferry Rd., Portsmouth, RI 02871. (401) 683-9504

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**WANTED:** Urgently need schematic for German WW II field rcvr "Torn. E. b." Thanks. Bill Seaby, 9727 Britinay Lane, Baltimore, MD 21234-1863. (410) 661-5734

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**FOR SALE:** Hallicrafters S22R, w/manual; Echophone EC-1; speakers - Hallicrafters PM-23, Hammarlund AC 200. All working. Dusty Rhodes, W8MOW, 1324 N. Dorset Rd., Troy, OH 45373. (513) 339-1546

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**FOR SALE:** Globe King 500B xmtr, w/manual and spare final, good to VG condx. - $475. PU only. Michael H. Wilke, WB4AQL, 215 Dale St., Rossville, GA 30741. (706) 861-3070

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**FOR SALE:** First user friendly circuit on early BC-348's, most needed component values on 2 sheets 8 x 14, reads left to right. Send $2 plus (2) 29 cent stamps. Ray Larson, 12241-1/2 Gorham Ave., W. Los Angeles, CA 90049-5214.

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**FOR SALE:** TM Repros, excess from collection purchases, IB BC-312-J, BC-342-J 1942, TO 08I-10-139 BC-375-E 1943 - $5; SB 11-17 Tube to Equipment Cross-reference 1945 - $20; NA-08-5Q-4 ATA/ARA 1942 - $15; NA-08-5Q-137 RAT/RAT-1 1939 - $10. Plus $3 shpg. Robert W. Downs, WA5CAB, 2027 Mapleton, Houston, TX 77043. (713) 467-5614

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**FOR SALE:** TMC GPR-90 rcvr, late model w/calibrator, orig. spkr and orig. manual, one owner, bought new in 1960, exc. cond., aligned by prof. shop in December. **WANTED:** WRR-2; WRR-3; FRR-59A; 51J-3; 51J-4; R-392 (made by EAC). Craig, KØAZB, 1202 9th Ave., East, Menomonie, WI 54751. (715) 235-6046

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**FOR SALE:** Heathkit SB-620 panadaptor, 455 kHz input, extra coils - $75; HP 410B VTVM - $60; C-82/ART-13 control box, new - $20. Joe Orgnero, VE6RST, Box 32, Site 7, SS 1, Calgary AB, T2M 4N3, Canada. (403) 239-0489

## WANTED

***Collins promotional literature, catalogs and manuals for the period 1933-1983. Jim Stitzinger, WA3CEX, 23800 Via Irana, Valencia, CA 91355. (805) 259-2011. FAX (805) 259-3830***

**FOR SALE:** Collins 75A-4 filters: 6 pole ceramic for high quality AM. 3 bandwidths available: 4, 6, or 9 Khz - $83.50 ea.; single pole CW crystal filters - $88 ea. 10% discount for two filters. Money back guarantee. Calif. residents please add sales tax. Vector Control Systems, 1655 No. Mountain, Ste. 104-45, Upland, CA 91786. (714) 985-6250

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**FOR SALE:** R-390A squelch modication: small external add-on module, super sensitive, works great on AM and SSB, 15 minute installation, instructions included - $25. Rick Mish, (419) 726-2249

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**FOR SALE:** New 1993 catalog now ready. Send $2 for the Add-A-Page, color, plastic protected, illustrated catalog. Laboratory and Hobby test equipment, tubes, plug-in coil forms, reprint books and literature. Antique Radio Labs., R 1, Cutler, IN 46920.

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**WANTED:** Hammarlund HC-10 or SPC-10 SSB converter; Central Electronics Sideband Slicer; Collins 353B-31 or -12 plug in; Tech. Material Corp. model SBC-1 sideband converter; antenna coupler model CU-872. Please state cond. and asking price. Shaun P. Merrigan, 14203-72 St., Edmonton, AB Canada T5C 0R4

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**FOR SALE:** KWS-1 and 75A-4, w/extras - $500 PU only. Mike, WB3DDJ, Lawrenceville, PA 16929. (717) 827-3580

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**WANTED:** GRC-109 radio sets and accessories. Fred Weymouth, 13471 Hensley Rd., Midlothian, VA 23112. (804) 739-2471

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**WANTED:** Heath HO-13, will pay top $ for clean one; also want Drake 2NT xmtr. Billy, K4NJS, 998 N. Church St., Spartanburg, SC 29303. (803) 585-2810

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**FOR SALE:** QST magazines 1923 to 1949 and 1960 to present, single issues or quantities; CQ magazine Volume 1, numbers 1,2,&3; Collins bug; Collins R390A. SASE for list. Don Merz, 47 Hazel Dr., Pittsburgh, PA 15228. (412) 344-0956 (7 PM - 10 PM EST)

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**FOR SALE:** Transmitting/Receiving tubes, new and used. LSASE for list. I also collect old and unique tubes of any type. Looking for Taylor and Heintz-Kaufman types and large tubes and sockets from the old Eimac line; 250T through 2000T for display. Maybe you have something to trade? John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455

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**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.

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**FOR SALE:** Collins 'meatball' logo lapel pins. Stamped metal, baked enamel finish. A nice replica of the Collins round insignia. May be used to replace a missing logo on the S-line, KWM-2, etc. - $5.95 plus $.75 S&H. George Pugsley, 1362 Via Rancho Prky, Escondido, CA 92029.

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**WANTED:** Manuals for National HFS rcvr and Gonset 6-meter G-50 xcvr. Clem Duval, 33727 Brownlea, Sterling Heights, MI 48312. (313) 795-4670

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**FOR SALE:** TRC-136 Collins 1 KW HF radio set in walk-in shelter. Late '60s vintage autotune URG-1 series equipment. Uses 60 Hz power, can run full-duplex four sideband mode, has telephone and teletype hookups & modems, air conditioner, etc. - $1800 each. Dave, (408) 984-1929

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**FOR SALE:** Johnson Ranger, exc. shape - $140 U.S. U-ship. (306) 425-2057 eves.

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**WANTED:** Broadcast equipment catalogs and transmitter brochures from 1930-1955. Magazines wanted: "Broadcast News" (RCA), "Pick-ups" and "Oscillator" (Western Electric). Sam, W6HDU, 1031 San Antonio Ave., Alameda, CA 94501. (510) 521-1429

## ELECTRIC RADIO PARTS UNIT DIRECTORY

**If you need a part for a vintage restoration send $2 and an SASE (.52 postage) for a 6 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:** Ranger I in good condition - $125. Plus UPS. R. Haworth, W2PUA, 112 Tilford Road, Somerdale, NJ 08083. (609) 7834175

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**FOR SALE or TRADE:** Hallicrafters Sky Champion, rough; SX-42, fair. **WANTED:** Tech. info on RME-45 and BC-669D radios. M. Runyan, KK7F, S. 1117 Fiske, Spokane, WA 99202. (509) 535-5548

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**FOR SALE:** Repair & refurbishment of older tube-type amateur equipment. Fully FCC licensed; 35 years experience. Chuck Banta, N6FX, Claremont, Calif. (LA area) (714) 593-1861

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**FOR SALE:** 1 high voltage oil xmtr filter caps - (2) 6 mfd, 3000-V - $10 ea.; (2) 10 mfd, 600-V - $7 ea. Bill Riley, 863 W. 38th Ave., Eugene, OR 97405.

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**FOR SALE:** Heathkit amateur radio repair by RTO Electronics, 4166 Maple St., Berrien Springs, MI 49103. (616) 473-3201

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**WANTED:** Loop antenna used on JU-88 bomber or equivalent; radio rack mounts used on ME-110 fighter. W5RXN, 2105 NW 30, Oklahoma City, OK 73112. (405) 525-3376

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**FOR SALE:** HRO-500, needs to be tuned up - $400. UPS brown paid. Jack, 1024 Main St., Boise, ID 83702.

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**WANTED:** Drake items - 34PNB, RV-4C, 7075 mic, SPR-4. Jim Leathem, K7BTB, (602) 635-2117

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**FOR SALE or TRADE:** BC-610F, w/coils and TUs, 160 thru 10 meters; Philmore SW/BC radio, model # 7001-CR; B&W Matchmaster model # 650. Call anytime. Joe Perratto, 1341 SW Evergreen Lane, Palm City, FL 34990. (407) 220-2189

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**WANTED:** Manuals for Hunter Bandit 2000B and Hunter station control, Heathkit Warrior HA-10, Collins 51J-3. Originals preferred, copies OK. Jerry Kethcart, WB9YMT, 16620 Robinhood Dr., Orlando Park, IL 60462. (708) 532-9245

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**WANTED:** National NC-200 receiver. State condition. James T. Schliestett, W4IMQ, POB 93, Cedartown, GA 30125. Tel/Fax (404) 748-5968

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**FOR SALE:** RIT for KWM-2 and S-Line. No modifications for KWM-2; 75S- needs one wire - $59.95. SASE for info. John Webb, W1ETC, Box 747, Amherst, NH 03031.

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**FOR SALE:** HRO-500 - $750; Collins 75S-3B, 32S3, w/pwr sply and DL1 - $750; HRO-W, w/pwr sply and coils - $250; HRO-50T, w/coils - $350; NCX-3, w/pwr sply, in boxes - $300; Drake T4XB, R4B, MS4, 2NT - $550; HQ-129X - $165; CE 20A/458 vfo - $200. All very nice, w/manuals. U-ship. Jerry, WB0HHK, Rt 1, Box 370-5, Pleasent Hope, MO 65725. (417) 742-3105

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**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

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**FOR SALE:** BC-779 military Super-Pro, w/AC sply - $160; radar units MS24APRI, TN1B, 2B, 3B, APRI. Bud Santoro, 3715 Bower Rd., Roanoke, VA 24018. (703) 774-9153

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**WANTED:** Thordarson spark xfmrs; round style ham xtals; Hammarlund plug-in coils; pre-WW II homebrew ham rcvrs and xmtrs. George Flanagan, W2KRM, 42 Cygnet Dr., Smithtown, NY 11787. (516) 360-9011

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**FOR SALE:** Four NIB Halldorson chokes, 30H, 1 K ohm DC, 150 mA - $7 apc. plus shpg. John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455

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**WANTED:** Harvey-Wells R9 rcvr; APS-90 pwr sply; Eico 720 vfo; SSB adapter and spkr for RME 4350 rcvr. Bob Nickels, 1444 S. Rotzler, Freeport, IL 61032. (815) 232-7142

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**FOR SALE:** Restoration of vintage radios; 25 years experience. Phil Goodman, K4FXB, 4112 Commodore Dr., Atlanta, GA 30341. (404) 457-4195

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**FOR SALE:** RCA SRR13A rcvr - $195; Heath DX-60B (AM/CW 80-10 xmtr), HR-10B (80-10 rcvr), HR-10 (80-10 rcvr - $60 ea; Orion CV-157 SSB demodulator for Collins R-390A - $245; Hallicrafters TW-1000 portable shortwave - $75; Hallicrafters S-19R Sky Buddy, rusty case, untested - $20. SASE for list. Don Merz, 47 Hazel Dr., Pittsburgh, PA 15228. (412) 344-0956 (7 - 10 PM EST)

**FOR SALE:** SAMS Photofacts and parts for collectors. Electrolytics, high voltage capacitors, power resistors, plugs, switches and more. Free catalog. A.G. Tannenbaum, WA2BTB, POB 110, East Rockaway, NY 11518. (516) 887-0057, FAX 599-6523

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**FOR SALE:** Collins 75S3B, exc. - $330; Hallicrafters P-500 pwr sply/spkr - $90; Collins 32S3, VG - $250; Gonset Super 12 converter, VG - $23; 5 new orig. cables for the BC-610/BC-614; RF ammeters - $5 each. Larry, WØOGH, (602) 892-4618

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**FOR SALE:** Military monitoring antennas: broadband VHF/UHF discones, biconical types, 30 - 1000 Mcs, shipboard construction, 'N' connectors, preamps, antenna multi-couplers, cables and accessories. Rick Mish, (419) 726-2249

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**FOR SALE:** (2) Johnson Ranger switches, NIB, PN H 22, 992. **WANTED:** Johnson directional coupler indicator, PN 250-38. Jim Tolbert, K5GHS, Rt 4, Box 537, Forest, MS 39074. (601) 625-8541

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**Message:** Collect Keys? Subscribe to the Vail Correspondent, your quarterly journal. Informative articles, free ads. USA, $10/yr. Sample $2. TVC, Box 88-E, Maynard, MA 01754.

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

**FOR SALE:** Choke, 2.5 Hy, 280 mA, 43 ohm, upright open frame, 3C317-22, NOSB - $2.50, 5/$10; DY-17A/ART-13, NOSB - $45. Plus UPS. **WANTED:** Aluminum CS-48's, buy or trade steel ones; rectifier RA-34; power unit PE-49; BC-191/375 tuning units, prefer -A version. Robert W. Downs, WA5CAB, 2027 Mapleton, Houston, TX 77043. (713) 467-5614

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**FOR SALE:** LS-166/U spkr, H-33*/PT handset - $15; M-29*/U mic - $10; for PRC-6, 8, 9, 10, 47, RT-66, 67, 68, 70, R-392, T-195, R-808, T-631, GRC-10, others. M-80*/U mic - $10. For PRC-25, 77, VRC-12 family. Plus UPS. Condition good, checked. I have several plus other related accessories. Need to thin my collection. **WANTED:** Cast mounting brackets for LS-7A, 166, 203 or 454. Early LS-7, T-17, T-45, LG-2, LG-3, GN-45. No -Fr or -Gy please. Will buy junkers for parts. Robert W. Downs, WA5CAB, 2027 Mapleton, Houston, TX 77043. (713) 467-5614

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**WANTED:** CE 100-V for parts or restoration. Gary Burrows, N2INR, (315) 487-9410

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**FOR SALE:** Moving, cleaning shack. National NC-300, nice - $150. SASE for list. Chris Huntley, KXØY, 132 Waterford St., Edinboro, PA 16412

**FOR SALE:** Mixture of 10 command rcvrs and xmtrs, lot only - $190; ARR-41 w/mount and pwr connector - $150; BC-348 mount - $65; ARC-12 rcvr & xmtr - $15 each; ART-13 mount - $65; CU-32 ant. tuner and mount for ART-13 - $65; CU 26 ant tuner for ART-13 - $125; ARR-2 rec 3 - $35; ART-13 dynamotor - $45; BC-430 aluminum/vri good - $35. Larry, WØOGH, (602) 892-4618

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**WANTED:** Military sets. MAY-1; PPN-1; PPN-2; BC-966; British military radios; Bell Laboratories "Record" magazine, 1920's & 30's. Leroy E. Sparks, W6SYC, 924 W. McFadden Ave., Santa Ana, CA 92707.

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**WANTED:** Need more room in your home? Cramped? Crowded? I will clean out your attic or basement or whatever of all unwanted radio parts, old projects, dead gear, etc. free of charge. Will travel reasonable distances. I have my own truck. If you need more room, please call. Donald R. Boland, N1FYX, 28 Faulkner St., Malden, MA 02148. (617) 324-5362

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**FOR SALE:** 32S1/75S1, w/spkr, manual & cables; RME-4350, w/spkr & manual; RME VHF 152A; Johnson Matchbox; TBS-50A; Harvey-Wells T-90; R9A pwr sply; Z-Match; Gonset G-76, w/pwr sply and manual; Elmac PMR-7, w/pwr sply; Globe Champ 300 w/ manual. Gene, W7MXM, 508 S. Ammon Rd., Idaho Falls, ID 83406. (208) 522-5854

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**FOR SALE:** HRO-500, w/manual & orig. brochure, mint - $850; Drake MSR/FM-P marine version DSR-2, mint - $700. **WANTED:** Marconi 1950's marine shore station rcvr. K3ES, (412) 621-3977

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**FOR SALE:** We have a large selection of HV capacitors for tube circuits. Check out our Mike-Mate preamp kit, just $8.75. 100 mF 450-V axial electrolytic, new $3.99. Massive 2000 pF 10KV disc, $.79. 1500 pF 5KV tubular film, $.45. 600V .47 tubular film, $.69. Much more, S&H extra. Visa/MC. $1 brings catalog and coupon. USA/Canada only. Two Fox Electrix Co., POB 721, Pawling, NY 12564. (914) 855-1829

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**FOR SALE:** S-38C - $23; pr. of good used 1614's - $12; 6N2 converter - $17; RME-6900 - BO; TCX xmtr shockmount - $12; parting NC-57 & TCS xmtr; KWS-1 - BO. Joe Sloss, K7MKS, (206) 747-5349

**FOR SALE:** Collins R-392 audio modules, NOS, sealed boxes, w/tubes - $25 shpd. Send SASE for Collins equipment and misc. keys books, etc. Bob WB2FOF, 129 Marly Dr., Syracuse, NY 13219. (315) 468-2691

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**FOR SALE:** Manuals: TM-11-281, SCR-399A/SCR-499A; TM-11-855 (copy) w/schematic pack, R-389; TM-11-274, AN/GRC-19; 32MS-1B, Collins SSB ship/shore; TM-11-856, R-390, w/schematics - $20 each. TM-11-235, BC-611; RBB/RBC (copy) - $15 each; TM-11-662; TM-11-690 - $10 each. Postage xtra. WA7HDL, (208) 756-4147

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**WANTED:** Suitable replacement for K1504 RF amp FET (MOS P-channel) in Davco DR-30 rcvr. Al Bernard, NI4Q, POB 690098, Orlando, FL 32869-0098. (407) 351-5536

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**FOR SALE:** HRO-50T, w/spkr and coils; Drake TR-3, w/AC sply; Heath Senica VHF-1; Hallicrafters HT-44, w/sply; Collins 312B-4; Heath MP-10 12-V inverter; unbuilt Heath Conelrad CA-1 kit, still in box; Heath spkr HS-1661; Heath Q multiplier QF1; Ameco 2-meter converter. Marty Drift, WB2FOU/5, (817) 497-6023

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**WANTED:** Johnson accessories, code keys, SWR bridge, station monitor, etc. Even good clean rigs. Bob Kemp, POB 470, Lake City, MN 55041. (612) 345-5345 days

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**FOR SALE:** Johnson Navigator - $85; Gonset GC-105 2-M AM Communicator - $30. **WANTED:** Globe King; Viking 500; T-368, etc; GPR-90 cabinet. Bill, (701) 772-6531

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**WANTED:** SX-62A aluminum front dial cover; 7" working TV; SX-133. Steve Sauer, WA9ASZ, R3, Box 413, Bloomfield, IN 47424. (812) 863-2088 after 7 PM EST

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**FOR SALE:** Heath AR3, Globe 6-2 VFO, National 6N2 VFO - $35 each. Plus shpg. H. Mohr, W3NCX, 1005 Wyoming, Allentown, PA 18103. (215) 435-3276

**WANTED: Any condition, Hallicrafters Sky Master and EP-132 as shown. Also want SX-46, S-48 and S-49. Chuck Dachis, 'The Hallicrafter Collector', 4500 Russell Dr., Austin, Texas 78745. (512) 443-5027**

**WANTED:** Original manuals for BC-348, BC-610, AN/URC11, SCR245. Glantzmann, 22bis avenue gros-malhon, Rennes, 35000, France.

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**FOR SALE:** Very clean SX-101A, w/R-48 spkr and copy of manual - $150 PU only. Fred Clinger, 417 Beechwood Dr., Galion, OH 44833. (419) 468-6117 after 6 PM

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**WANTED:** For Viking I - L2 and R25; for NC-303 - NTS-2 and XCU-303; for SX-28A - T-7. J. Dennis Bohrofen, KØRAV, 2472 'X' Ave., Grimes, IA 50111

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**FOR SALE:** BC-348 - $200; BC-779A Super-Pro - $50 PU; Valiant front panel, w/meter - $50. Al Sziriski, AI4U, 6251 Fox Hunt Tr., Orlando, FL 32808. (407) 222-0007 (d), 298-3493 (n)

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**WANTED:** 0-10 VAC meter for my BC-610I. Need 1.5-2.0 Mc TU and coil for BC-610; pair of 2A3 tubes; (4) type 10 tubes; coils for GF/RU units. Larry, WØOGH, (602) 892-4618

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**FOR SALE:** Tektronix model 575 transistor curve tracer with model 122C, manual and adapters, exc. cond. - $500. Don, W7KCK, (503) 289-2326

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**WANTED:** Early Hallicrafters - any condx. Also SX-88; Blue Racer; JT-30 and Breting #9. Tom Lucht, 9317 Jaynes, Omaha, NE 68134. (402) 571-0688

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**FOR SALE:** RAL-6 rcvr. **WANTED:** Eddystone rcvr; XCU-300 xtal calibrator. F.W. Nicholas, (602) 864-9987

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**FOR SALE:** Rebuilt Ocean Hopper w/BC coil - $75; two NIB Penta 813 tubes, w/sockets and Stancor P-6458 10-V, 5-A xfmr - $60; VG Heath HR-10B, w/100 kHz calibrator - $50. **TRADE:** Rebuilt Ocean Hopper w/cabinet and coil set for Heath AT-1. **WANTED:** Millen 34300 100 uH RFC; 1957 Allied catalog. David W. Ishmael, WA6VVL, 1118 Paularino Ave., Costa Mesa, CA 92626. (714) 979-5858

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**WANTED:** Tower TR-24A, antenna AN-154A for RC-127A IFF set. Extra RC-127 for trade. Paul Thekan, N6FEG, 335 Rutherford Ave., Redwood City, CA 94061. (415) 367-1499

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**FOR SALE:** Galaxy GT-550 w/AC sply - $300; Yaesu FTdx560, w/Landliner & xtra spkr - $225; Drake TR-3, w/AC sply - $185; Swan 350D, w/pwr sply & spkr combo - $325; R-390A, w/manual (copy) - $200; SP-600-JX, exc. cond., w/manual (copy) - $250. All PU or U-ship. Parting out a Galaxy V, w/pwr sply. **WANTED:** Echophone, all models (1940-1950 only); AR-88; Johnson Valiant. David Kamlin, (714) 367-1013 (d), 495-3864 eves to 11 PM PST

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**WANTED:** Two plugins for Empire NF-105 rcvr, to 200 mHz; Harvey-Wells VFO; manual for Raycom 3135 selective voltmeter. Thanks. Jack Iverson, N9KYT, 11100 Old Mill Dr., Palatine, IL 60067.

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**WANTED:** Any of the following, complete or parts units - R-390, R-392, Heathkit SB-series, Mohawk, SB-500, SB-310, SB-313, single banders, etc. Byron, WA5THJ, 1920 Maxwell, Alvin, TX 77511. (713) 331-2854

**FOR SALE:** Viking II, w/VFO - $125; HT-37 - $100; Adventurer, w/matching screen modulator - $60; NC-300, w/2-meter converter - $100; HQ-170C, w/spkr - $125; CBS Audimax (2 units) & Volumax AM broadcast compressor and peak limiter - $125. All good condx w/ manuals. Pair of new 100TH's - $25. Tony Wheeler, K9BBA, RR1, Box 215, Carlock, IL 61725. (309) 376-7721

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**WANTED:** Two 304TL tubes. Coy McGinnis, 9361 U.S. Rt. 52, Stout, OH 45684. (614) 858-4672

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**FOR SALE:** Dial calibration is easy with our Tri-Mark crystal calibrator. Uses 9V battery or rectified filament voltage. Three outputs provide rock steady signals from broadcast to UHF. Great pocket signal source. Kit $17.95; assembled $24.95. $4 S&H, VISA/MC. USA/Canada only. $1 brings catalog and coupon. Two Fox Electrix, POB 721, Pawling, NY 12564. (914) 855-1829

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**FOR SALE:** Technical Materials Corporation GPR-92 rcvr, exc. condx, w/manual - BO. Ron, KC6WTG, POB 783, Santa Rosa, CA 95402. (707) 539-8319 noon to 9 PM Pacific

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**WANTED:** Knight T-60 xmtr. Bob Braeger, WA6KER, 6634 Navel Ct., Riverside, CA 92506. (909) 682-5084

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**AN-08-10-112** Handbook of Maintainance Instruction, Radio Receiver BC-348-J-N-Q (repro); also **TM-11-854** Radio Receiver R-388/URR (Repro). $15 each plus postage. Lee Frank, P.O. Box 60011, Harrisburg, PA 17106-0011

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**FOR SALE:** Real audio for your R-390A. Send me your audio chassis (no junkers please) and I'll ship you a ready-to-play chassis. If you're not happy (for any reason) return the chassis (within 30 days) for a full refund. Specs will equal or exceed those specified in ER #42 article - $119 shpg prepaid. Allow 30 days for delivery. Bill Kleronomos, KDØHG, DBA Longmont Labs, 224 Main St., POB 1456, Lyons, CO 80540. (303) 823-6438

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**FOR SALE:** Collins 32V-3, less cabinet, w/ book, clean & working; Heathkit QF1 Q-multiplier, vg; octal tube GM car radio. Gus Enquist, VE3MAL, RR 1, Redbridge, Ont. P0H 2A0, Canada. (705) 663-2387

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**WANTED:** Swan 600 custom twins; 508 VFO; 300B Cygnet; VX-2 VOX unit; Hallicrafters SX-100; Kenwood 599D twins. Exc. to mint. James B. Geer, WB5LXZ, 604 King Dr., Bedford, TX 76022-7124. (817) 268-1985

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**FOR SALE:** R-392/GRC-19; R-392, w/vehicle mounting base; Eldico SSB-100F; Collins R-390; Kennedy 220; IP501A; Grebe CR8; Leutz 'C'. Can bring to Dayton. Larry Wright, (708) 658-7328

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**FOR SALE:** Valiant - $275; Valiant HV xfmr - $50; 866s - $10. **WANTED:** Adventurer; Viking 122 VFO; Eico 722 & 730. Rob Brownstein, NS6V, 3881 Winkle Ave., Santa Cruz, CA 95065. (408) 464-0505 wkdys

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**FOR SALE:** T-368 RF exciter, complete; modest quant. of AN type cannon plugs. WANTED: 1614 tubes. Mike WØBVA, 305 N. Keith St., Scammon, KS 66773. (316) 479-2756

**NOTICE:** Radio auction April 17 in Plymouth, PA to include wooden, bakelite, floor model, ham, military, transistor radios, tubes, parts. Consignments accepted. LSASE for info. **WANTED/TRADE:** Looking to buy or trade battery and crystal sets 1920's and before; tubes - 4X150A, 4X150G Eimac. Micheal Crain, RR1, Box 472, Harvey's Lake, PA 18618. (717) 639-2794

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**FOR SALE:** Valiant - $200; NC-300, w/spkr, calibrator & manual - $200; SX-101A - $125; HQ-170 - $145; BC-610 w/speech amp, xtra coils & xtra finals - $350; scope - $25; Eico sig. gen. - $15; Dentron MT-3000A tuner - $100. OBO on above items. Prefer PU. Chuck, KØRSQ, (417) 863-7415

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**WANTED:** AN/FRR-48 (XW-1) synchronous rcvr made by GE, National LF-10 low freq. preselector and TF spkr for HRO-500. Dan Mason, R.RT 1, Box 204F, Sante Fe, NM 87501. (505) 455-3416

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**WANTED/TRADE:** My SW-3 and $200 for your SW-4. Also exchange EC-2. Robert Enemark, Box 1607, Duxbury, MA 02331. (617) 934-5043

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**WANTED:** E.H. Scott military RBO, SLR-12A, REE, RCK, SLRM. Also need manuals/schematics. Thanks. Tom Smith, N5AMA, 13034 Elmington Dr., Cypress, TX 77429. (713) 260-5842 (d)

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**FOR SALE:** (2) 4X150A tubes, factory sealed - $35 each; (2) 4X250Bs, sealed - $35 each; (2) mil. plate caps for 4X150As - $10; Jennings vac (new) max 302, min 9, 10 KV - $65; 866 sockets - $1 each; 866 tubes - 4/$8; ohmite 15A tap sw, new - $10; ohmite 100 W, 25 M (plus other sizes), new - $3; Millen 3004 standoffs, quartz, NIB - $3; variable xfmr, new, 2 KVA - $50; mod xfmr, 807's, UTC - $20; Millen ceramic caps - $1; aluminum plate caps, new - $2; relays 2500 ohm, 10 mA, 28 VDC, new - $10; octal sockets, new - $.50, ceramic - $1.50; UTC chokes - BO. Joe, W6CAS, (916) 731-8261

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**WANTED:** Johnson Ranger I and a SX-28A and/or spkr. Mike Ferraro, K6ZSR, 743 Lilac Dr., Montecito, CA 93108. (805) 969-5095

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**FOR SALE:** Mallory 40 mFd, 300 WVDC electrolytics, new - $1.50; Lafayette catalog, 1974 - $5. **WANTED:** Knightkits. John Vercellino, WB9OVV, 6921 Springside Ave., Downers Grove, IL 60516-3114. (708) 964-3020

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**FOR SALE:** Military tech manual listings, largest stock in the world, over 50k - $5 refundable with first order. SASE for inquiries. Lee Frank, POB 60011, Harrisburg, PA 17106-0011.

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**FOR TRADE:** M-209 cipher machine, OSS/SOE "Spy" radios, and other espionage devises available for trade. Keith Melton, (318) 747-9616

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**FOR SALE:** Electronics suite from U.S. aircraft carrier. MF-UHF rcvrs, xmtrs, radars, PPI displays, RTTY cnvters, terminals. Much more. Bob Mantell, W6VQT, 3135 N. Ellington Dr., Los Angeles, CA 90068. (213) 851-2786

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**FOR SALE:** BC-174 freq. meter - $45; 813s - $15; 805s - $15; Galaxy 550, w/matching sply and manual, mint - $200; 116-V, 20-amp variac- $35. **WANTED:** Unique wire tuner and KWM-1 xcvr. Milton Levy, W5QJT, 115 NW Loop, 410, Apt. 248, San Antonio, TX 78216. (210) 366-3290

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**FOR SALE:** Collins 353B mech. filter plug-in adapters for Hammarlund SP-600, .8, 2.1, and 6 kHz. **WANTED:** RCK rcvr. Tom Brent, Box 1552, Sumas, WA 98295. (604) 826-4051

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8 A.M. UNTIL 3 P.M.

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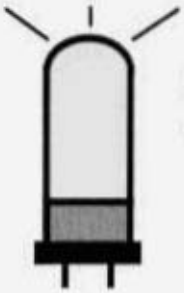

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