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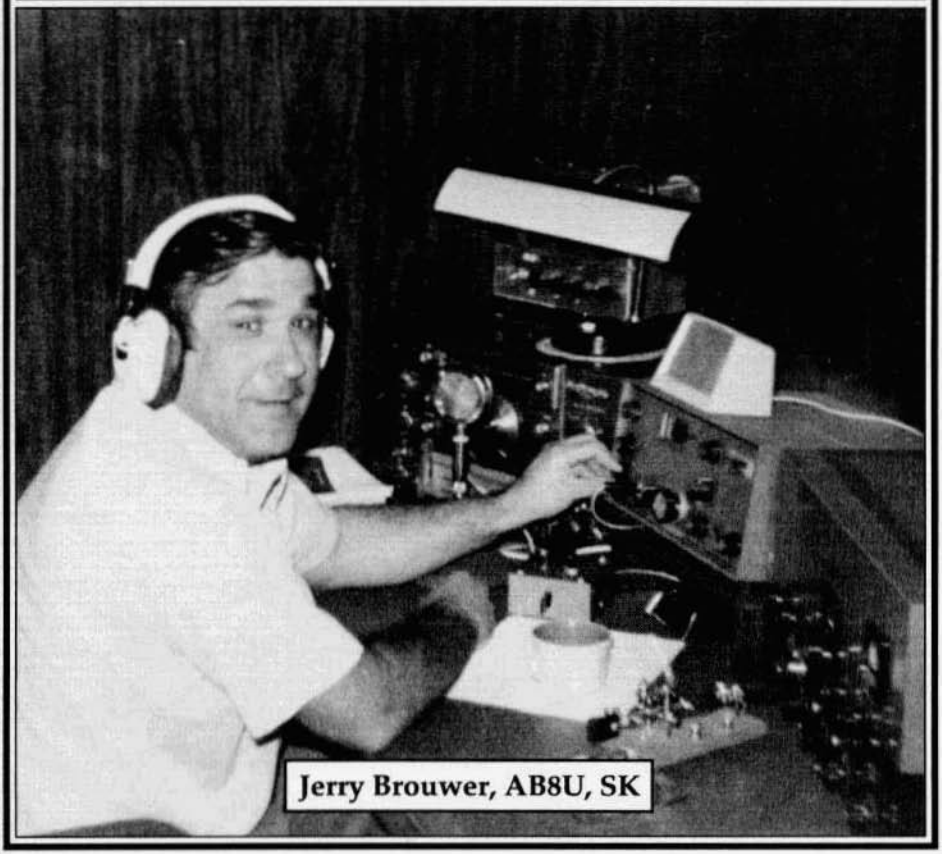
ELECTRIC RADIO

celebrating a bygone era

Number 74 June 1995



Jerry Brouwer, AB8U, SK

ELECTRIC RADIO

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

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

Regular contributors include:

Walt Hutchens, KJ4KV; Bill Kleronomos, KDØHG; Ray Osterwald, NØDMS; John Staples, W6BM; Dave Ishmael, WA6VVL; Jim Hanlon, W8KGI; Chuck Penson, WA7ZZE; Jim Musgrove, K5BZH; Dennis Petrich, KØEOO; Bob Dennison, W2HBE; Dale Gagnon, KW1I; Rob Brownstein, NS6V; Dick Houston, WØPK; Andy Howard, WA4KCY; Skip Green, K7YOO; Albert Roehm, W2OBJ; Steve Thomason, WB4IJN; Don Meadows, N6DM; Bob Sitterley, K7POF (photos) and others.

EDITOR'S COMMENTS

I'm having an awful lot of fun putting my first *QCWA Journal* together. My boss, Lew McCoy, W1ICP, President of QCWA, gave me a free hand to re-design the whole magazine and to put whatever I want into it. He's trusting that what I do will be acceptable to the general membership. I hope his trust has not been misplaced. I see this new job as both an opportunity and a tremendous challenge.

For this first issue of the *Journal* I went to some regular *ER* contributors for some of the articles. Rob Brownstein, NS6V, produced an article, " What Makes Vintage Ham Radio Buffs Tick". Don Meadows, N6DM, did a nostalgia type article on Sam's Surplus, a '50's surplus dealer in Los Angeles. This article would be of interest to *ER* readers but I think we've done things similar to this in *ER* in the past. Gerry Higgins, W9INP, contributed an article on putting an HBR-16 receiver together. A more detailed, technically oriented, version of this article will appear in a future issue of *ER*. Besides these articles there's a regular column on FCC happenings that I think is very well done; a DX column, a VHF/UHF/Satellite column and a column on QCWW (women in QCWA).

QCWA (Quarter Century Wireless Association) as the name implies is an organization of hams that have been licensed for at least 25 years. These are hams that all of us can identify with in one way or another. I've found the whole organization to be very positive and friendly. I invite ER readers to consider joining QCWA and for those who have not been licensed 25 years to subscribe to the *Journal*. The dues are reasonable, $15 per year for membership which

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Cover: Jerry Brouwer, AB8U, now a Silent Key. This photo was taken a number of years ago. It is the only one the family has of Jerry in his hamshack.

LETTERS

Dear ER

The arrival of Electric Radio takes precedence over all other matters. Your number 70 arrived here in the noon mail yesterday and I have only gone through it twice, saving future readings to replace any dull moments that I might experience, hi!

Purpose in this note: QSL Cards! Like 'homebrewing', 'QSL'ing' seems to have had better days! No wonder, twenty cents to send a card. I still go to the post office and ask for 'penny postcards' only to be looked at by the clerk as being some sort of weirdo.

As a youngster beginning ham radio in the early thirties a 'store bought' card seemed out of the question. I recall reading the QSL offerings by such old timers as W8DED in Holland, MI, I believe! So, the 'penny postcard' done by hand. Not too professional, but still indicating a contact. Receiving a QSL as acknowledgement of reception of my 'push-pull' type 45 tubes (a la George Grammer and *QST*) was quite a thrill. Often, the cards were tacked up on the wall, since the old farm house had wooden walls! And, when visitors came, my family would proudly point out those from distant cities.

Occasionally, I'll see an old call still listed in the current Call Book and I'll return the old QSL that has been sitting in a box for many a year! Usually in return I receive a note of speechless appreciation!

It's spring time out here in Louisiana and already a bit of QRN and soon the grass to be mowed. How nice it is after 81 years to still be a part of ham radio much less grass cutting!

Wes Chatellier, W5DPM

Dear ER,

I am troubled by Steven Fick's letter (*ER* May 1995) citing "design flaws" in Bob Dennison's "Electric Radio Pal" AC/DC set which appeared in the previous issue. In addition to being an accomplished design engineer, Bob has a rare talent for capturing the essence of early radio through his numerous construction articles, which have enabled countless old-timers to re-live joyous times of their youth, and permitted newcomers to savor, if only vicariously, those bittersweet years.

What disturbs me most about Fick's letter is that it is a foot in the door of vintage radio by one of many who feel a compulsion to protect us from ourselves. A simple warning from Fick to supplement caveats already enumerated by Bob in his article would have been sufficient; we didn't need his litany of complaints, dubious pronouncements on leakage current, and his questionable reference to a "safety-rated" (whatever that means) audio transformer. Yes, AC/DC radios pose a risk, but so do high voltage power supplies, antenna towers, and RF radiation and coping with potentially dangerous situations without unsolicited design reviews and gratuitous advice.

ER is a specialist publication written by and for a narrow segment of experienced, technically astute amateurs. Our enjoyment is derived from restoring or building communications equipment of a former era, incorporating old designs and components without "cleansing," as advocated by Mr. Fick. In that sense, the magazine and classic radio provide a haven isolated from the over-legislated daily life to which we have all succumbed. Let's keep it that way!

Robert G. Thomas, W3QZO

Dear ER

I read, with great interest, the article on plate modulation of CW transmitters. There is a cheaper and easier way

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SILENT KEYS

Dale Krolczyk, WB5IKH

It is with a feeling of loss that I inform "ER" and its readers of the passing of Dale Krolczyk, KB5IKH, my best friend, who spent many hours here in my workshop, working on the old "boat anchors", and also many hours on 3880 kHz QSOing with his many ham radio friends.

Dale and I had attended numerous fleamarkets together, and had made many trades back and forth. He was a very enthusiastic "AM" ham radio operator, and was talented in the repair of the old ham equipment. He had a photographic memory and could repeat in detail the statistics on all the old radio equipment.

Over the past two years, Dale had several mishaps which kept him off the air. Many inquires had been made about Dale because he and his laughter have been missed by all his radio friends.

Dale was involved in a car accident on the night of May 19, 1995, which took his life. He was 31 years old.

Dales parents, relatives and his many friends survive him. He will certainly be missed by everyone who has known him.

Cecil A. Palmer, W5NWX

Jerry Brouwer, AB8U

Jerry was "a real radioman" to borrow Leo Meyerson's expression. He was first licensed back in the '50's, he homebrewed his first rig, and his beginnings in ham radio led him on to a career as an EE. He was a ham of the old school believing that the traditions of amateur radio, like the code requirement and gentlemanly behavior were important.

I first met Jerry about the time I was getting ER off the ground. Together we had the Collins book, "The First 50 Years", reprinted. It was Jerry's energy (and money) that made it all happen. My role in the program was to sell the book. Jerry also reprinted all the Collins manuals (he was authorized by Collins) and produced the Compendiums of Collins Modifications that I now produce and sell. Collins' equipment was the center of his interest in vintage equipment. At the time of his death his collection was extensive.

I first met Jerry face to face at the '94 Dayton Hamvention. I remember him complaining of intestinal problems at that time. I had no idea that that illness was going to take him away.

This year he was in and out of several hospitals. At one point - after he was at the Mayo Clinic in Rochester -it sounded like he was in the clear but shortly after he returned home the symptoms of his illness returned. He fought a good fight but on May 10 he succumbed. He was 56. Jerry was a good friend and I will miss him.

N6CSW

On the Air With the Command Set Triplets

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

By far the most ubiquitous of all the WW II surplus gear suitable for amateur use are the Command Sets. Unfortunately, as my friend Stu, K8SJ, noted after using a BC-455B receiver in the January, 1991 Classic Exchange, they are broad as a barn door and they tune too quickly. As I was planning to add a BC-454 and a BC-455 to my on-the-air collection shortly thereafter, Stu's lament reminded me of an article by Rolf Schick, DL3AQ, in February, 1958 CQ, "The Command Twins". Rolf offers a way to get around those shortcomings of the high frequency Command Set receivers by adding a BC453 Q-5er as a second, selective IF. So, if you can round up the ingredients, here's a really practical way of making a couple of Command Sets into a triple conversion, narrow AM or SSB bandwidth receiver with a slow tuning rate and good calibration with respect to a center frequency.

The basic scheme is pretty simple. As most Command Set aficionados remember, the BC-453 tunes from 190 to 550 kHz and has an 85 kHz IF with a bandpass about 3 kHz wide when the IF transformers are loosely coupled. This receiver, known often as a "Q-5er," was tuned to 455 kHz and coupled to the last 455 kHz IF in a superhet needing more selectivity. The result was a double conversion receiver with a first IF at 455 kHz and a second, more selective IF in the Q-5er at 85 kHz.

It would be great to do the same thing to a high frequency Command Set, but unfortunately their IF frequencies are not within the tuning range of the BC-453. The 3 to 6 MHz BC-454 has its IF at 1415 kHz. And the 6 to 9.1 MHz BC-455 has its IF at 2830 kHz, and it has only three tuned circuits in the whole IF chain to boot. No wonder it is so broad! What Rolf did was to find a wonderfully simple way of converting the IF of the high frequency receivers down into the tuning range of the BC-453. It takes the addition of only two capacitors and a resistor to the high frequency set. Look at figure 1 to see what he (and I later) did.

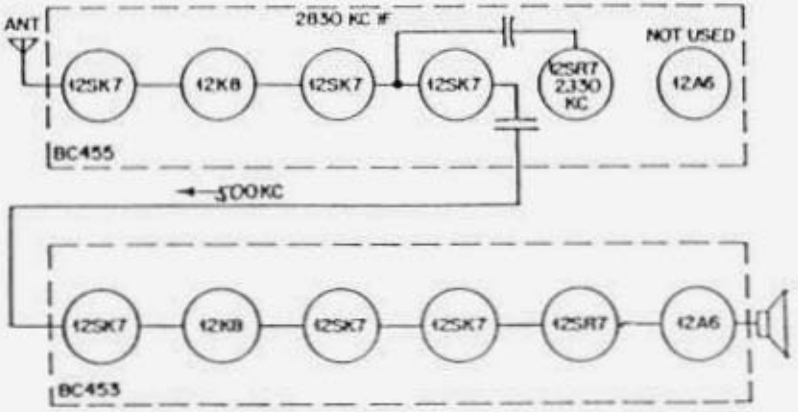
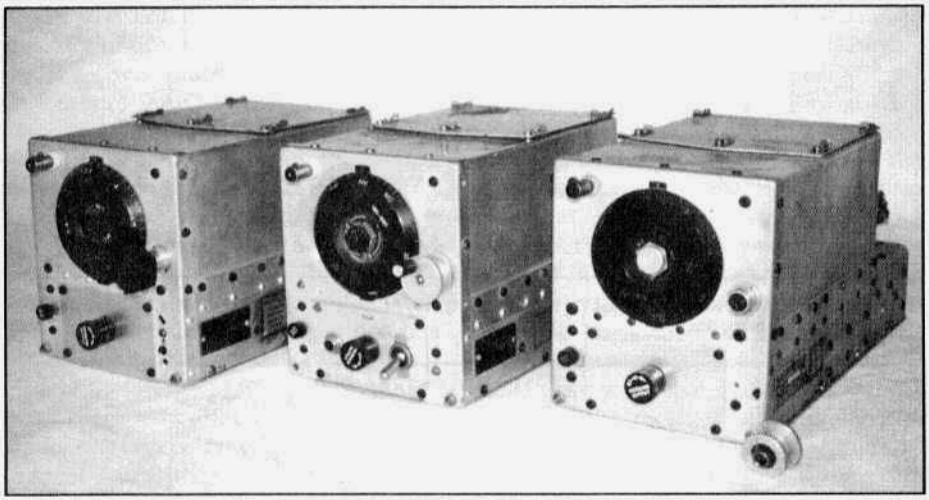


Figure 1. Block diagram of BC-455 with BC-453 second IF.



The Command Set Triplets. Left to right: BC-454, 3-6 Mc; BC-453, 190-550 kc "Q-5er"; BC-455 6-9.1 Mc. The BC-453 has a typical phone jack, gain control, BFO switch conversion installed in the front "drawer". The tuning drive knob sits beside the BC-455.

Figure 1 shows a block diagram of a BC-455 with its 2830 kHz IF. The triode section of the 12SR7 is the receiver's BFO, and it normally operates within one or two kHz of 2830 kHz. What we will do is to pull the BFO down several hundred kHz below the IF frequency by adding an additional capacitor to its tuned circuit and then inject it into the second IF amplifier along with the desired signal at such a level that the IF stage will act as a mixer. The output of this IF stage/mixer will then be within the range of the BC-453!

So if you're interested, here are the nuts and bolts details.

How To Do It

The first thing to do is to get each receiver running by itself, fix any bugs and do an alignment. In case you've forgotten, here's a quick rundown on how to "convert" a Command Receiver.

Figure 2 shows the connections available at the rear power socket, dynamotor plug (on top of the back shelf) and front panel plug. Most "full conversions" add a local gain control, BFO switch and headphone jack to the front panel of the receiver and bring power leads out either by soldering directly to the rear power socket or dynamotor plug or through a hole. Purists dislike all of these alternatives and prefer to use a receiver rack with a mating connector for the power plug. In my case, the choice was made for me by previous ham owners. One set had the rear connector already soldered, another had several holes drilled in the rear wall, and the third had the dynamotor shock mounts removed leaving several large holes.

Whatever method you choose, you'll need to supply around 250 volts at 40 mA (I use 200 volts and the receivers draw 35 mA each), filament power, and ground. The original filaments were wired in series-parallel and ran from 24 volts, 450 mA. Many hams changed them to full parallel wiring and ran them from 12 volts, 900 mA (or from a 5 volt rectifier winding and a 6.3 volt filament winding connected in series). If yours is a previously owned and converted receiver, check to see which way the filaments are wired, especially if

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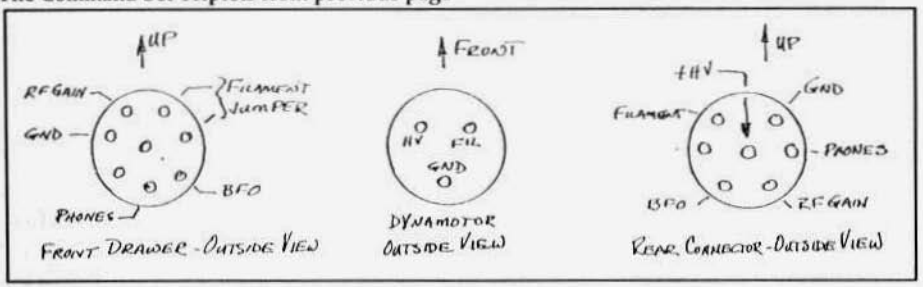

Figure 2. Connections at front panel drawer, dyanamotor plug and rear power socket of a Command Set receiver.

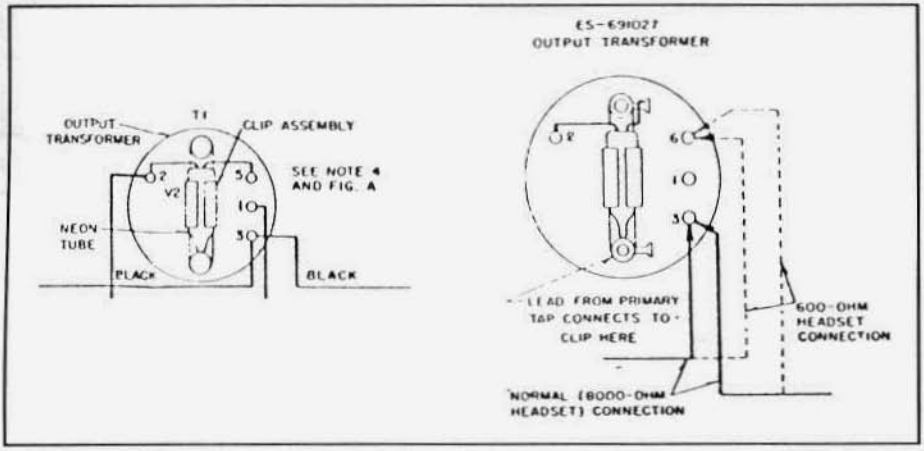

Figure 3. Audio output transformer connections for -A receivers on left and -B receivers on right.

you decide to run them from 24 volts! If you choose to supply +24 to the rear socket, there is a jumper on the front panel plug between pins 6 and 7 that goes between the wire connected to the +24 lead from the rear socket and the feed to the rest of the receiver. You will, of course, have to keep this jumper intact as you do further work up front.

While you are checking wiring, have a look at the audio output transformer. It's mounted on the sidewall in the far rear of the chassis just behind the BFO transformer, and it has a neon bulb on it. Figure 3 shows the physical diagram of the transformers used in the BC-45#-A and BC-45#-B versions of the receivers. If you have the -A version, there is only one way the transformer should be wired, as shown, and that is matched to an 8000 ohm headset load. If you have the -B version, the output leads may be connected to terminal 3 of the transformer (closest to the tip of the neon bulb) for 8000 ohm headsets or to terminal 6 (closest to the end of the bulb where the wire leads come out) for 600 ohm headsets. The choice is yours.

The front panel plug-in drawer area is where you will install an RF gain control for all the receivers and an additional phone jack and BFO switch for the BC-453. If you are lucky enough to have the plug-in drawer itself, drill out the two mounting studs on the right and left sides of the panel plate and enlarge the holes for a phone jack and a SPST switch. Drill out the knob in the

center and enlarge the hole for a 50K pot. If you don't have the drawer, just make a cover plate of the correct size and mount your controls on that. It's rather snug, but all three will fit. Wire one side of the pot to ground and the other to pin 1 on the front panel plug, which has two green leads attached to it, one of which goes to the 3 mFd capacitor mounted beside the drawer. Wire one side of the switch to ground and the other side to pin 5, which has one red lead attached to it. Wire the hot side of the phone plug to pin 4, which has a black lead attached. For the high frequency receivers, you will probably want to add a phone jack, at least temporarily while you check them out. This can be done conveniently by making connections at the rear power socket. It's not necessary to add a BFO switch to the high frequency receivers, since you turn the BFO off by turning the switch on. Omitting the switch will just let the BFO run all the time, which is acceptable for tune up and necessary for our final mode of operation.

Another item you will need is a knob to mate with the main tuning gear. If you are very lucky, you will be able to find some of the spinner knobs shown on my BC-453 and BC-455 in the photograph. Two of these turned up in the junk box of a friend. Both are marked "6743." Lacking these, you may be able to find one of the spline shafts used to tune the Command Receivers remotely. You can cut the ends off of these shafts and mount knobs on them. An alternative to butchering a shaft is to mold a piece of shrink tubing around a short piece of 1/4" shaft and around the end of the receiver tuning gear. I did this for my BC-454, but I had a little help with the gear side of the adaptor. I bought one of the BC-450 three receiver tuning boxes from Fair Radio, mainly for the pots, knobs and phone jacks it contributed to the project. I removed one of the tuning gear ends from this box; it's the same as the gear on the receiver. I used this as a form for my shrink tubing. I slipped the tubing over the gear and the 1/4" shaft and shrank it by rotating it over a candle flame. When it cooled, I removed the gear and slipped the formed adaptor over the receiver tuning gear. Another trick I've heard about but not tried personally is to get a piece of 1/4 inch thin walled copper tubing and drive it on to the gear with a hammer. It will form over the gear, and a dab of "super-glue" will keep it on.

Unless you have something wrong, each of the receivers should work at this point and should pull in signals off the air. After you've had a little fun admiring your handiwork, its time to do some alignment. Start by aligning the IF. You will need to couple a signal generator at the IF frequency to the top cap of the 12K8. Adjust each capacitor in the IF transformers for maximum audio output. If you have a modulated signal generator, you can adjust for maximum tone out. If you use a CW signal generator, turn the BFO on and adjust for maximum tone. I use my Simpson 260 on AC volts across the headphone leads, and also my ears, to measure the peak output. The Command Set maintenance instructions recommend starting at the second IF output and working back. Go through the sequence at least twice.

All of the receivers have B+ on the IF tuning capacitors associated with the plate circuits, #1 on the BC-453 and -454, so wrap some tape around your screwdriver or use a plastic tool. The BC-453 IF transformers have black fiber rods under the screw-off black caps. Pull these rods upward for the alignment, and leave them in that position if you want maximum selectivity for CW and SSB. Push the two end ones back down if you prefer broader selectivity for AM. The BC-455 has only one adjustment per IF transformer.

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Command Set Triplets from previous page

After you have aligned the IF in the BC-453, turn on its BFO and adjust it via the screw on the right side rear of the receiver, looking from the front, for zero beat with the signal generator. You may want to move it later, but this is a good start. We'll be pulling the BFO's in the other receivers down several hundred kHz.

To align the RF section, remove the top aluminum cover but not the shield over the tuning capacitor. Looking at the tuning capacitor shield from the front of the receiver, you will see capacitor C4D, the mixer padder, in the center; capacitor C9, the oscillator trimmer, on the far right; and capacitor C4E, the oscillator padder, in between these two. Attach the signal generator to the antenna input post, and align the above capacitors and the antenna trim capacitor, C2, as shown in table 1.

Table 1, RF Alignment Frequencies

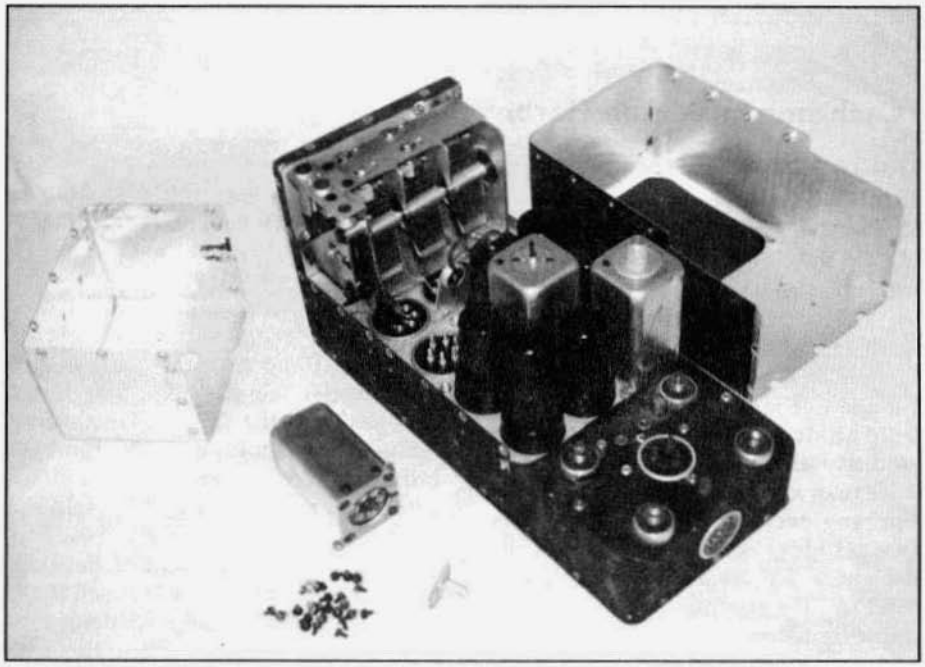
Receiver	Align C4D C4E, C2 at	Align C9 at
BC-453	520 kHz	210 kHz
BC-454	5.8 MHz	3.1 MHz
BC-455	8.9 MHz	6.1 MHz

If two different settings of C4E are found at which maximum output is obtained, be sure to use the setting corresponding to the higher capacitance.

Now you have to make a choice of the "second IF frequency" that you want to use as an input to the Q-5er. Rolf Schick chose 300 kHz. When I got my BC-453 running and tuned around, I found quite a few signals around 300 kHz, but things were relatively quiet around 500 kHz. So I chose to convert to the higher frequency. As it worked out, I can't hear any outside signals with the final setup anyway, so I could just as well have gone to the lower frequency. I found, with my 500 kHz IF, that I had to increase the injection of the BFO into the high frequency receiver's second IF tube in order to get adequate conversion gain. Rolf did not mention having to do this in his CQ article, so perhaps you wouldn't have to do this if you chose 300 kHz. But what's a conversion project without a little experimentation? At any rate, let me tell you what worked for me.

To pull the BFO frequency of the high frequency receiver down by 500 kHz (or by any other amount you choose), add capacitance between pin 6 of the 12SR7 (the BFO plate) and ground (conveniently found at pins 8 and 1). To increase the BFO injection, add capacitance between pin 8 of the 12SR7 and pin 4 of the second IF amplifier, the 12SK7 on the same side of the chassis as the tuning knob and in the middle row. For the BC-454, I added a total of 418 pF from the plate to ground and 51 pF to increase injection. For the BC-455, I added 43 pF from plate to ground and 51 pF to increase injection. If you have a frequency counter, you can couple it to the BFO plate through a capacitor to block the DC and adjust the BFO pitch screw on the outside of the chassis until the BFO is at the desired frequency, 1415-500 = 915 kHz for the BC-454 and 2830-500 = 2330 kHz for the BC-455. If you don't have a counter, listen to the BFO in a communications receiver.

You also need to go into the third IF transformer of the high frequency receivers, detach the tuned circuit connected to the second IF amplifier plate, and replace it with a 33K ohm resistor. The tube plate is pin 8, and there is a red wire running from it to pin 1 on the IF transformer. Pin 2 on the transformer is next to pin 1 in the counterclockwise direction as viewed from under the chassis, just the opposite way from the way pins are numbered on tube sockets. Pin 2 has two red wires connected to it, one of which goes up to the triple bypass capacitor on the side of the receiver just below the transformer socket. If you'd rather not mess with the transformer, just pull it out and connect the resistor directly across pins 1 and 2.



A CBY-46129, Navy version of the BC-453, with top cover, tuning capacitor cover, and first IF transformer removed. Note the fiber rod protuding from the top of the center IF transformer. Pull them up on all three transformers for narrow bandwidth.

Then capacity couple a convenient length of shielded lead or coax to pin 1 of the second IF tube and run it to the antenna post on the BC-453. I used a 0.003 mFd blocking capacitor, the value should not be critical.

At this point you should be ready to go. Tune the BC-453 to 500 kHz or your chosen frequency, put an antenna on the high frequency receiver and you should be able to pick up the high frequency signals on the BC-453. Because the high frequency receiver is fairly broadband, you will be able to set it on one center frequency and tune above and below that frequency with the BC-453. With the BC-454, I can go about 15 kHz either side, and with the BC-455 I can go about 30 kHz either side before signals drop very much. Because of the conversion scheme in effect, tuning the BC-453 higher will tune below the center frequency and vice versa. And if you are interested in SSB, put the BC-453 BFO on the high side of the IF passband to receive lower sideband.

After you are satisfied that everything is running, you may want to save a little B+ current by opening the cathode lead, pin 8, on the 12A6 audio output tube in each of the high frequency receivers. This cuts the drain from 35 mA to 24 mA in my installation.

I switch between the BC-454 and BC-455 with a DPDT toggle switch. One side switches B+, the other the IF to the BC-453.

That's about all there is to it. I can offer a few more hints. I like to cut the gain of my receiver back when I am transmitting (on CW) so that I can monitor my signal and my sending. To do that with this setup, I put a 10K fixed resistor in series with the ground lead to the high frequency receiver's RF gain control and a 50 K pot in series with the ground lead to

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The Heathkit Tenner, Sixer and Twoer

Lunchtime in Benton Harbor

by Chuck Penson, WA7ZZE
Box 2414
St. Paul MN 55102

When it came to new products, the amateur radio division was a wellspring of ideas. By 1958 new products were being released at an astonishing rate. In the span of less than a year the ham radio product line leaped from just two products (the AT-1 and the DX-100) to more than a dozen. Prolific as the amateur engineers were, however, new product ideas occasionally came from elsewhere. The creation of the Citizen's Band in 1958 provides an excellent example of just such an idea.

The Heath's General Products Division instantly recognized CB as a potential gold mine and quickly designed a simple, single-channel, CB transceiver to tap the market. The unit, called the CB-1, used a crystal controlled AM transmitter and a tunable regenerative receiver, and was built into an aluminum cabinet about the size and shape of a lunch box—complete with a handle.

The CB-1 proved extremely popular. Based on its success, the Amateur Radio division concluded that General Products was onto something and figured that a 10 meter version of the CB-1 would do as well. Someone then suggested that while they were redesigning it, perhaps a 6 meter version might be popular also.

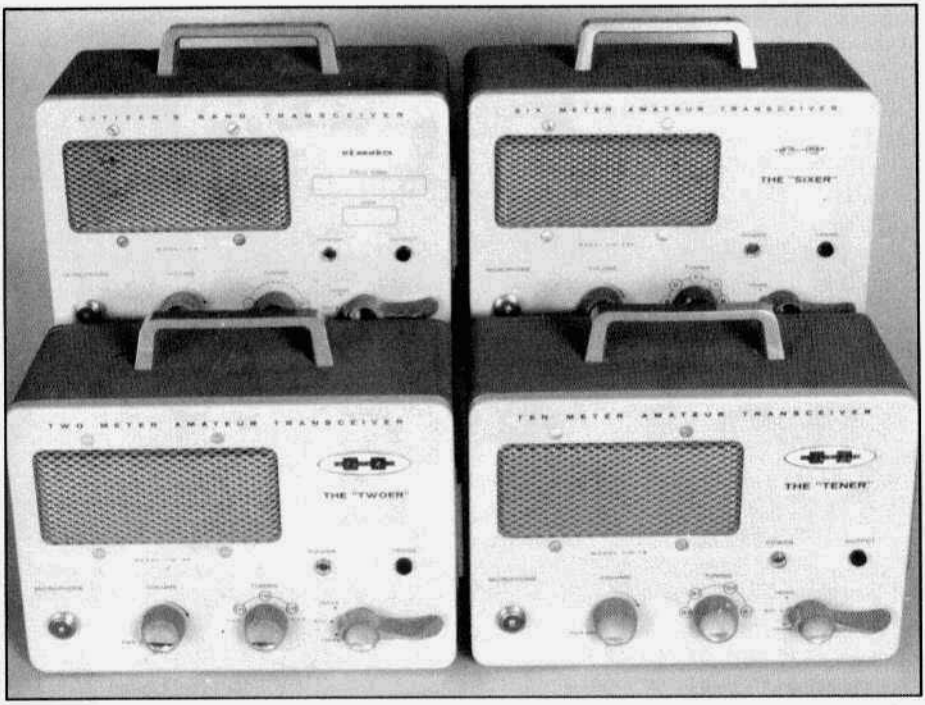
A Free Lunch

Redesigning the CB-1 for 10 meters would require almost no work at all. And it was just a hop, skip, and a jump to 6 meters. So from an engineering standpoint these were a couple of products pretty much free for the taking. Swell idea, eh?

Leaning on the "economies of scale" principle that had served Heath so well with other products, the new ham versions were designed to be identical in virtually every way to their CB cousin. Cosmetically the rigs were almost indistinguishable from each other, and electrically the units differed from each other only by a few coils and capacitors. Although officially designated the "Tenner" and the "Sixer," Heath nicknamed these little gems "Benton Harbor Lunch Boxes," and put them in the catalog early in 1960. They sold for $39.95.

At this period in Heath's development, there really was not much in the way of market research to determine the viability of any given product suggestion. Basically, if an engineer could convince the chief engineer that a product might sell, he was given the go-ahead to design and build a prototype. Once the prototype was working, the product would be fully developed and put into the catalog. This was a simple but precarious process. Although it had worked well for Heath, it might be more accurate to say that it was a process that Heath had simply gotten away with. Sooner or later though this "shoot from the hip" approach to product development was bound to go wrong. In the case of the Lunch Box series, Heath had incorrectly interpreted the success of the CB-1. The popularity of the CB-1 was based solely on the popularity of CB as an essentially license-free means of getting on the air—not on the "lunch box" concept itself. Hams, on the other hand, having many other means to work 10 meters, were not impressed with the Tenner, so while the CB-1 sailed to success, the Tenner floundered—badly—and was pulled from production in 1962.

While it was not a particularly expen-



The Heath family of Lunchbox transceivers: The Twoer, the Tener, the Sixer and the CB set.

sive mistake (these were not particularly expensive products), Heath had learned a valuable lesson in marketing, and one it would not forget.

Nevertheless, there was a silver lining here and Heath was about to succeed—almost in spite of itself. The Sixer was selling like fifty dollar 3-500s. The amateur community had discovered the Sixer as an inexpensive vehicle with which to explore VHF—in those days, the final frontier. Perhaps a 2-meter Lunch Box would be equally popular. And hey, it sure would be a great way to use all those boxes made up for the Tenner. Besides, it was another of those engineering freebies. Yes, indeed. A 2-meter Lunch Box was sounding like a great idea. Production began immediately, and the Twoer proved as popular as the Sixer. Both units sold extremely well. Indeed, VHF was the key to success for the Lunch Box transceivers.

Hey! There's no Thermos in Here.

The simplicity of these radios is reflected in their specifications. All versions in the series are 5-tube units using a superregenerative receiver "preceded by an RF amplifier stage" and a 5-watt input, plate modulated AM transmitter "automatically limited to less than 100 percent." The receiver is tunable while the transmitter is crystal controlled on a single frequency. Receiver sensitivity is "usable with signals as low as 1 uV at the antenna terminals." And boasting of the receiver's superb sensitivity, the receiver circuit description section in the manual notes that "3 uV will produce near full quieting." The specifications make no mention at all of selectivity.

The Lunch Boxes feature a built-in solid state power supply, an amplifier metering jack, and a "press-to-talk" lever switch on the front panel. This

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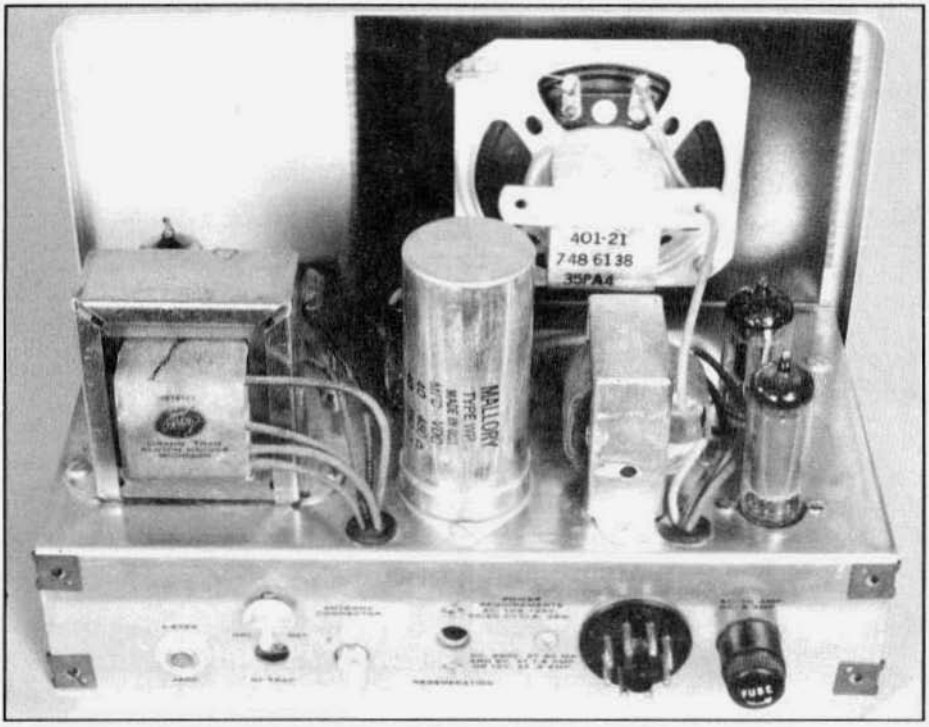
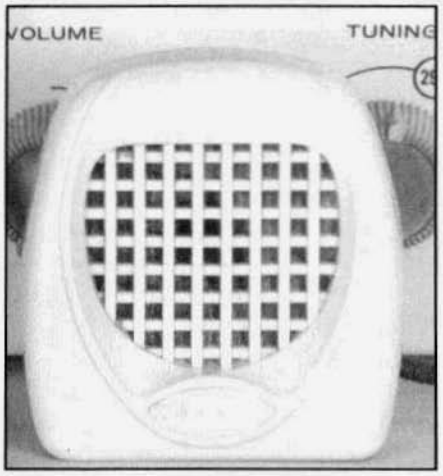


Rear view of Lunchbox with cabinet removed.

switch also has a transmit "hold" position—apparently designed for the long-winded operator. Other front panel controls include on/off volume and receiver tuning. Also on the front panel are a mic connector and two neon lamps—a power-on lamp (clear) and a transmit lamp (red). There is also a white and gold plastic Heathkit emblem on the front panel. Missing from these little rigs is any kind of squelch control—you have to listen to them roar between transmissions. On the rear apron is a regeneration control, a phono jack for a 50-75 ohm antenna, a fuse holder, a ground post, a quarter-inch jack for RF amp metering, and an octal plug for power input. On the right side of the cabinet is a hole through which the final amplifier's tank circuit tuning capacitor may be adjusted. The crystal socket is located inside the cabinet, and with the exception of the HW-29, all versions use rocks in the 8-to-9 MHz range. Some units have a holder on the right side of the cabinet—these are leftovers from the CB-1. This holder has a plastic face plate behind which one could slip the station license.

Almost immediately upon the release of the HW-29 Sixer in 1960, it was discovered that the unit had a couple of problems. The rig's regenerative receiver was radiating a respectable signal and getting into TV sets at a considerable distance. Additionally, the Sixer had been designed to use a 10 MHz fundamental crystal cut so that it would also oscillate at the fifth overtone (50 MHz). This scheme proved problematic for crystal activity and stability. Heath quickly redesigned the rig to solve the receiver problem and changed the transmitter oscillator section to include a multiplier stage to allow for the use of 8 MHz rocks. The new improved



Turner mic supplied as an accessory item with all Lunchboxes.

version was released as the HW-29A, and a modification kit was offered to owners of the original. It is likely that only a few hundred of the original units ever got out the door and as a result, finding one would be the ham radio equivalent of being dealt four of a kind.

Over the years of their production, dozens of mods were published for the Lunch Box series. These included everything from squelch circuits to S-meters and many—if not most—of these mods involved additional front panel controls. As a result, comparatively few units escaped the soldering irons and drills of well meaning ops. Not all the mods were undesirable or cosmetically devastating though. Many Lunch Boxes you will see have been modified with an SO-239 replacing the original RCA antenna connector.

The physical design of the Lunch Box is unique to the series. The paint style is a wrinkle finish brown cabinet and smooth finish light brown (advertised as "mocha") front panel. The knobs are unique as well. They are the same brown color as the cabinet and have gold-colored, inset faces. All versions came with a small desk/hand ceramic element microphone (made by Turner) and should not be considered complete without it. Two power cables were originally supplied—one for 120 VAC operation and one for use with a 6- or 12-VDC optional external vibrator power supply. The units can not be directly powered from 6 or 12 VDC.

Lunchtime is Over

By the late 60s, 6 and especially 2 meters had begun to define clear technologic directions for themselves. Channelization, band plans, repeaters, solid state, and especially the introduction and widespread use of FM began to take their toll on the Lunch Boxes series. With the passage of time, the Sixer and Twoer became increasingly anachronistic and sales of the Lunch Box series declined steadily through the '60's. By 1970 lunch time was pretty much over. Heath pulled the plug on both units late that same year and the Sixer and Twoer became another page in the history of ham radio and another chapter in the story of a most remarkable company.

Through the '70's, and for a short time in the early '80's, Lunch Boxes were a common sight at hamfests. As FM and repeaters established themselves as the way of the future, hams abandoned their old Lunch Boxes and for a time it was difficult to give them away. Then starting about 1985, a wave of nostalgia began to wash over amateur radio, and hams, as though weary of the endless 2-meter phone patches and 20-meter pileups, went looking for Lunch Boxes, and just about any other old boatanchors they could find (although it is difficult to think of the tiny Lunch Box as a boatanchor). Today the Lunch Box is an increasingly rare sight, and finding one that is not completely hammered, or that hasn't been modified beyond recognition is difficult. Among Lunch Boxes, the 6-meter (HW-29A) and 2-meter (HW-30) units are seen most often, and because of their short life span the original 6-meter (HW-29), 10-meter

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A "1937" Transmitter

by Bob Dennison, W2HBE
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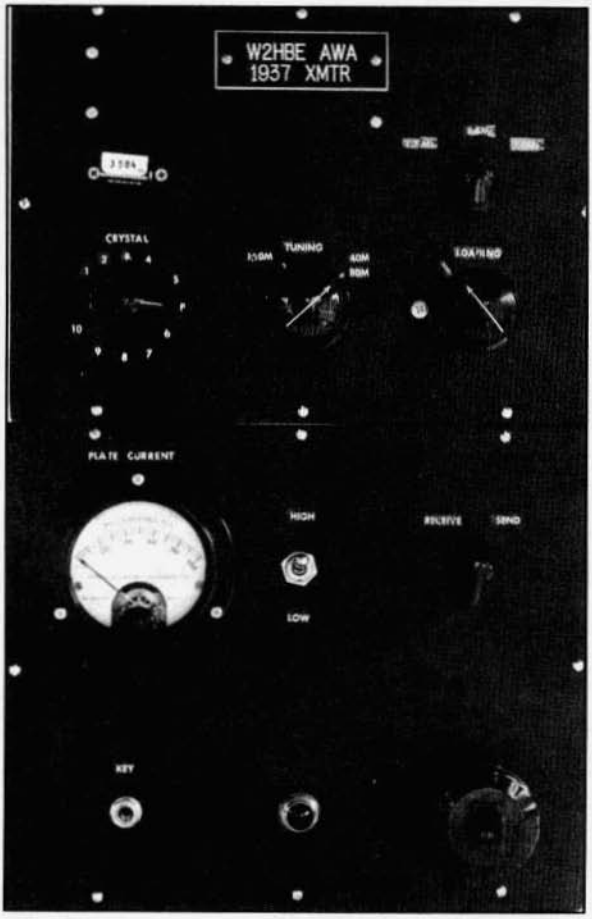
Every winter since 1973, The Antique Wireless Association (AWA) has conducted an Old Time CW contest in which members work each other using pre-1942 equipment. For example, KCØCW in Olathe, KS uses a homebrew 6L6-809 rig from May 1939 QST and receives on an HRO; W7KE in Montana has a 47 crystal oscillator pr. 46's and a 211 final running 100 watts. W2SN receives on an SW3. Some fellows, myself included, go all the way and use a homebrew receiver. The contest offers us a chance to relive the excitement of old time radio. This article describes the "1937 style" transmitter I used in eight of these contests.

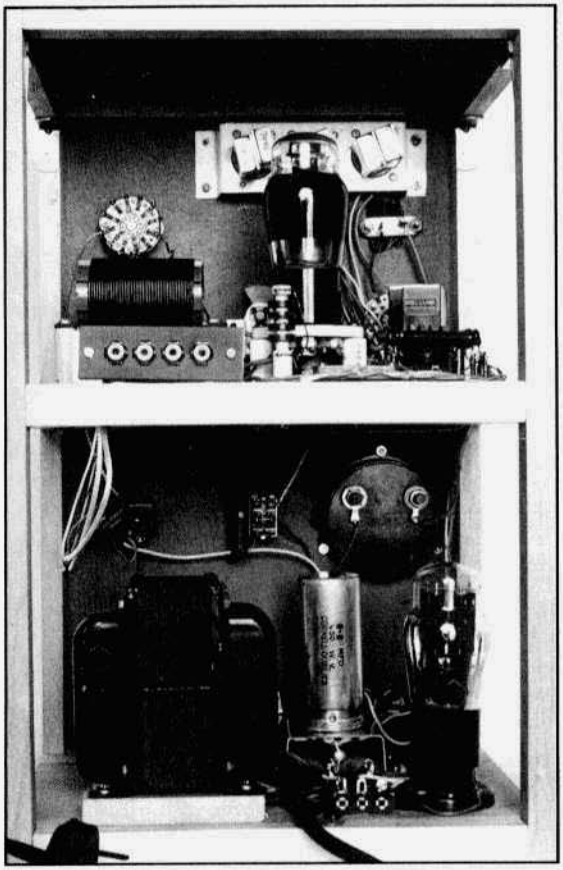


Front panel.

I wanted a simple transmitter that would be easy to build, permit quick frequency changes, work on 160, 80 and 40, require minimum adjustment when changing bands and it had to look like an old-time rig. My first attempt was a plain pentode crystal oscillator using a type 42 tube. This circuit suffered from high crystal current and chirped so badly that I received an OO notice. But I worked 62 stations and had lots of fun. After the contest, I did some research and study and found a wonderfully simple solution that required the addition of only two components - an RF choke and a small mica condenser. But, what a difference they made. Now the crystal current was much lower, the chirp was gone and previously inactive crystals worked just fine. The wiring diagram of the "1937" transmitter is shown in Figure 1.

The Jones Oscillator

The ARRL calls it the grid-plate oscillator because that's what Lamb called



Rear view.

it.(1) That certainly is not a good or descriptive name for such a breakthrough circuit. Frank Jones called it the Regenerative Pentode Oscillator or the Jones Multi-Band Oscillator in his 1937 Radio Handbook.(2) The success of the Jones circuit is due to regeneration caused by the small mica condenser (usually 100-125 pF) used in the cathode circuit. Prior to this invention, people tried increasing the grid-plate capacitance of the oscillator tube with an external condenser but this severely increased crystal current and often led to crystal fracture.

Jones claimed he could get 15 watts output from a 42 tube in his circuit. The RCA Transmitting Tube Manual TT-4 (p.85) says that a 6F6 (metal version of 42) can be operated with 400 volts on the plate, 275 screen volts, 50 mA plate current and that this yields 14 watts output. My voltages are slightly lower and I get 13 watts output on 80M. Modern day crystals are smaller than the old prewar crystals so the lower crystal current of the Jones oscillator is a real bonanza.

Construction Notes

To conserve table space, the rig is built vertically with the power supply at the bottom and the oscillator on a shelf above it. These shelves measure 8 x 10 x .75 inches. The corners are notched to receive the vertical struts which measure 15.75 x .75 x .5 inches. The panels are .125 Masonite painted black. These give the cabinet rigidity in the left-right plane while four angle brackets at the top are used to give rigidity in the front-back plane. Additional rigidity is imparted by the Masonite top cover.

Oscillator Notes.

The FT-243 crystals are plugged into octal tube sockets - two into each socket. Two of these sockets are located on the oscillator shelf just behind the crystal selector switch, S1, while the other three sockets are mounted on an aluminum bracket attached to the rear of the front panel near the top. Another crystal socket is mounted on the front panel above S1 to permit additional QSY options during contests. Normally, I operate with five crystals on 80 and five more on 40.

The panel socket is then used for 160 M. In passing, it may be noted that while this transmitter is basically a 1937 style, the FT-243 crystal was not available to amateurs until after WW II. I used them in spite of this since it would

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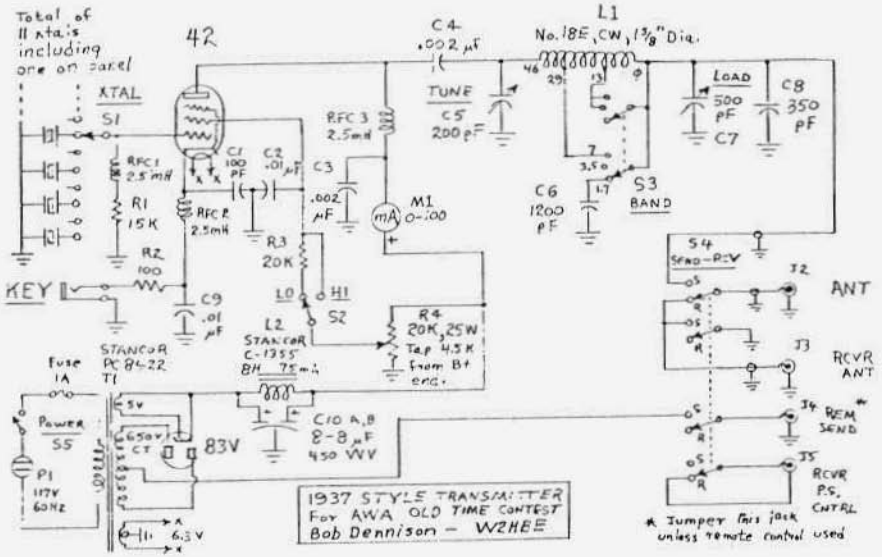

be virtually impossible to procure 11 pre-war crystals on the desired old-time contest frequencies. And the old crystals in their bigger holders would take up far too much space.

The oscillator coil form was made from a ribbed plug-in coil form from which each end was sawed off. A 3/8 inch wide strip of Bakelite was glued inside the coil form and projects 1/2 inch at each end to provide means for mounting on two ceramic stand-off pillars. The coil consists of 46 turns of No. 18E wire close-wound with taps at 13 and 29 turns from the load end. The diameter of the form over the ribs is 1-5/8 inches. I replaced the usual plate tank circuit and its old style link coupling with a Pi-network to facilitate rapid and smooth loading adjustments. The use of the Pi-net tank was known in 1936-37 and appears several times in the cited Jones Handbook. The Pi load condenser is a 2-gang broadcast variable with the OSC and ANT sections connected together. Maximum capacitance is about 500 pF. The HI-LO switch, S2, lowers the screen voltage during initial tune-up.

Power Supply

The power transformer is oversize for this transmitter but it helps give good voltage regulation and reduce chirping. The 83V rectifier was selected because it has fairly low voltage drop which also helps give good regulation. The old style electrolytic condenser had long ago dried out and lost all its capacitance so the can was opened and cleaned out and then two new tubular 8 uF condensers were installed in it. The main power switch is a handsome oldie found in a flea market. You never know when something will fail in a 1937 transmitter so I fused the primary just to be safe.

Tuning

During initial testing, connect a 50 or 75 ohm dummy load to J2. Select an 80 M crystal, put the bandswitch, S3, in 80 M position, jumper J4, put the HI-LO switch, S2, in LO and set C7 at maximum capacitance. Turn on power switch, S5, and allow the tubes to warm up. Turn S4 to SEND, depress the KEY and quickly tune C5 for minimum plate current. Flip S2 to HI position. Gradually reduce C7 while retuning C5 for

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Repair/Restoration Tips

Plug-in Coils From Old TV Sets

Old TV sets, especially tube type, use octal tube type bases as connectors for interstage connecting cables in the receiver. A friend of mine at the county recycling center saves the old TV's people throw out for me. I take the octal bases out of the old TV's and remove the wire from the pins with a desoldering tool. I then superglue the octal tube bases to a one inch diameter piece of PVC pipe two and half inches long.

I've used these homemade coils in both receivers and low power transmitters with excellent results.

Hope this suggestion helps someone who wants to use plug-in coils in their next project.

David L. Muse, KD4FEB

Info on Lacing Twine

I noticed the "String For Wiring Harness" letter from Ralph DiMuccio in the September issue, and offer the following suggestion.

Lacing twine, which is generally bee's wax impregnated linen, is still available. Mouser Electronics (800-346-6873) continues to provide the product in 500 yard spools for about $18. Hosfelt Electronics, Steubenville, OH, frequently lists the item in their catalogue. You can get the genuine article, so you don't need to settle for make shift replacements.

If you have a small project, and don't wish to purchase large quantities, send me a SASE and I'll provide your desired length.

Refer to the ARRL Handbook, any 1950-1960's vintage for proper lacing techniques and tying methods. As with anything else, there is a proper way to lace wires.

James R. Buchanan, K8WPI

Rust and Stain Remover

A great way of removing rust and other stains from vintage equipment comes from the back yard pool. A product called "Off The Wall" manufactured by Bio-Lab, Inc., Decatur, Georgia, under the BioGuard Label, is a non-toxic cleaner. It specifically is designed to removed rust and mineral scale from the walls and metal railings of swimming pools. It sells for from 16 to 20 dollars for a quart bottle. It will last almost forever. I've cleaned cabinets, panels, and plastic knobs with excellent results. (I've even cleaned the pool for six years and still have half the bottle.) Wipe it on with a damp sponge or towel and let sit for several minutes. "Rinse" off with another damp towel or scrubby sponge. Go lightly with the scrubby for stubborn stains and repeat if necessary. Once clean, I apply car wax or Armor-all for the final shine. Do be careful with Armor-all around soft plastic like clear dial faces. It can attack the plastic.

Dave Kuraner, K2DK

Glossary of (New) Terms

Dave Mills, AJ7O
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After 30 years of CW only operation I learned about the renewed interest in AM radio from Fred, W6RNC on 80 meters one evening. I found the AM guys polite and the conversations easy to understand and interesting.

I then started listening to the FM and SSB crowd that also are allowed to use the phone bands. Times have changed and along with the change in technology there seems to be a new set of technical and operating practices and terms in use. The following translations of actual terminology I've heard in use may be of some help to these of you who may be confused by the language in use today:

Term	New Meaning	Old Meaning
A "Ham"	A 2 meter rig	Amateur Radio operator
AM	Bad carrier rejection	Amplitude modulation
Analog	Voice modes	None
Antenna	Rubber duckie	Aerial made of wire
Bleeding	RFI or QRM	Blood from a cut
Courtesy	Huh?	Respect for others
CQ	Not on repeater	General call for chat
CW	Digital	Morse code
Drifting	Fading - QSB	Frequency shift
DX	A repeater 50 miles away	Long distance
Hambone	Amateur radio operator	Roast pig
HT	A "Ham Radio"	Walkie-talkie
Listening	CQ (2 mtrs)	Listening
QRP	Under 5 watts	Under 100 watts
QRZ?	Is the freq. clear?	Who is calling?
Radio	Any radio gear	A method of communication
Receiver	Radio	Listening device
Rig	Any radio gear	Transmitter
Round Table	Target freq.	Discussion group
S9 + 15	You're hitting me S15	S9 plus 15 dB
Technician	2 meter Op	Highly skilled person
Transmitter	Radio	Sending device
Tube	Obsolete - can't get	Warm, easy to use

VINTAGE NETS

Westcoast AM Net: Meets informally, nightly on 3870 at 9:30 PT. Wednesday at 9:00 PM PT they have their formal AM net which includes a swap session. Net control rotates.
California Early Bird Net: Wednesday nights at 8 PM PT on 3835.
Southeast Swap Net: Tuesday nights at 7:30 ET on 3885. Net control is Andy, WA4KCY. This same group also has a Sunday afternoon net on 3885 at 2 PM ET.
Eastern AM Swap Net: Thursday evenings on 3885 at 7:30 ET. This net is for the exchange of AM related equipment only.
Northwest AM Net: AM activity daily 4 PM - 5 PM on 3875. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT.
Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 5:00 PM PT, 7 days a week and usually goes for about 2 hours. Net control is Les, K6HQI.
Arizona AM Net: Meets Sundays at 3 PM MT on 3860. On 6 meters (50.4) this group meets at 8 PM MT Saturdays.
Colorado Morning Net: An informal group of AM'ers get together on 3875 Monday, Wednesday and Friday mornings at 7AM MT.
DX-60 Net: This net meets on 7290 at 2 PM ET, Sundays. Net control is Jim, N8LUV. This net is all about entry-level AM rigs like the Heath DX-60.
Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is usually Walt, KJ4KV, but sometimes it rotates to other ops. It starts at 5 AM ET Saturday mornings on 3885.
Westcoast Military Radio Collectors Net: Meets Sat. at 2300 local on 3885 and Sun. at 1600 local on 3885. Night net control is Andy, KD6TKX, and daytime net control is Tom, WA6OPE. AM is the mode used at present. It is not necessary to check in with military gear.
Grey Hair Net: The oldest (or one of the oldest) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8 PM in the winter and 9 PM ET in the summer.
Vintage CW Net: For CW ops who enjoy using vintage equipment.This is not a traffic net; speed is not important. The net meets on 14.050, Saturdays at 1 PM PT. Net control is Tracy, WB6TMY.
Vintage SSB Net: Net control is Chuck, N5SWO. The group meets on 14.293 at 1 PM CT, Sunday afternoons.
Collins Users Net: The oldest of the 'users nets'. It meets on 14.263 Sunday afternoons at 2 PM CT. The net control revolves. This group also gets together for an informal ragchew on 3805 Tuesday evenings at 7 PM CT.
Drake Users Net: Another relatively new net. This group gets together on 3865 Saturday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, WZ8O; Rob, KE3EE and Huey, KD3UI.
Heath Users Net: A new net started by Marty, WB2FOU/5. Net control is shared by Fred, AA5LW. It meets on 14.275 at 4 PM CT Sundays. Check in on either AM or SSB.
Swan Users Net: This group meets on 14.250 Sunday afternoons at 4 PM CT. The net control is usually Dean, WA9AZK.
Nostalgia/Hi-Fi Net: Meets on Fridays at 7 PM PT on 1930. This net has been meeting since 1978.
K1JCL 6-Meter AM Repeater: Located in Connecticut it operates on 50.4 in and 50.5 out.
JA AM Net: 14.190 at 0100 UTC, Saturdays and Sundays. Stan Tajima, JA1DNQ is net control.
Fort Wayne Area 6-Meter AM Net: Meets nightly at 7 PM ET on 50.58 MHz. This net has been meeting since the late '50's. Most members are using vintage or homebrew gear.
Southern California Sunday Night 6 Meter AM Net: 8 PM Sundays on 50.4. Net controls are Dan, KV6I and Scott, K6PYP. Informal, supports restoring old gear and using it on the air. Loan gear available for those wanting to join in.

Modifying the Knight T-60 Transmitter

by Donald F. Meadows, N6DM
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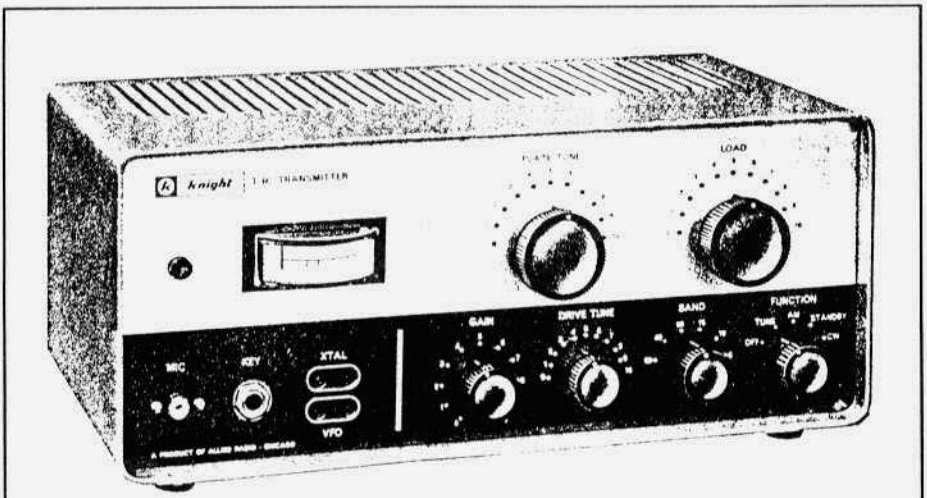
My first close acquaintance with Allied Radio kit transmitters was with their Knight 50-watt transmitter, identified on the manual's cover as the "T-50." This acquaintance was described in ER, #61 ("A Transmitter Story"). Some time around 1985, I acquired Allied Radio's successor to this kit, the Knight T-60. My T-60 was the novice transmitter of a close friend, now deceased, who had flirted briefly with ham radio before being diverted by the pressures of higher education and the acquisition of a wife. His T-60 transmitter, which he built from a kit in the early sixties, had been gathering dust for years and was finally aimed at the trash barrel until I expressed interest. Knowing I was a hard-bitten ham hung up on vacuum tubes, he was glad to steer his old T-60 novice transmitter in my direction.

At first, I saw it only as a parts source. Fortunately, he had also kept the manual. A close inspection of the wiring showed how beautifully he had followed the pictorial wiring diagrams. The quality of soldering appeared impeccable, a quality confirmed electrically. My friend's T-60 transmitter, I believe, could serve as a textbook model of an assembled kit transmitter. Once the dust and scum of time were removed, it proved to be physically unblemished in any way. It seemed uncouth to part it out. Violating its pristine condition would, in a sense, also have violated the memory of my late friend.

The Knight T-60 covered 80 through 6 meters (yes, 6 meters) with crystal control and also provided the option of screen-modulated AM phone. So far I have only used it on CW. Putting the T-60 on the air was easy. It worked okay on 80, 40 and 20 meters. With a 40-meter crystal, efficiency began to deteriorate on 15 meters; on 10 meters some RF still came out, but a glance through the cabinet's cooling vents showed the 6DQ6B final's plate running red. Not having the proper crystal, I never checked out the T-60 on six meters. With certain crystals, keying sometimes sounded strange-sort of mushy with a frequency shift actually too slow to be called chirp.

Reference to the schematic tells much about the T-60 transmitter. But its story would not be complete without reference to its detailed write-up in *QST* for May, 1962. This write-up is mostly descriptive, but it contains two segments which should be of immediate interest to modern T-60 buffs. In order to spare the reader a trip to dusty archives, I will quote these segments here.

"The amplifier is not neutralized, which is rather surprising since the 6DQ6B is not noted for low grid-plate capacitance. One might expect that it would "take off" in the absence of excitation from the buffer. And in fact it did, on 3.5 and 7 Mc, in the sample set we tried. It would not do so on 14 Mc and the higher bands. The 7 Mc oscillation was only observed when the amplifier was lightly loaded and the crystal was pulled out, but on 3.5 Mc the crystal had a hard job getting control under any condition of final-amplifier loading. However, stabilization was simple: a 22,000-ohm 1/2 watt resistor soldered across L2, and a 4700-ohm across L1 (these designations refer to the instruction book circuit) completely stopped self-oscillation. These resistors did not



T-60 60-WATT AM-CW TRANSMITTER

otherwise affect the operation of the set."

The above modifications improved stability. The following modifications improved keying - but let's let the source speak to us directly once again.

"All three RF stages in the transmitter are keyed. There is a small slow "yoop" in the keying which seems to be caused principally by the large change in oscillator plate voltage on closing the key, plus a little crystal heating." (Author's Note: this problem is also probably related to cathode emission of the 6HF8 oscillator tube. Substituting other 6HF8 tubes varied the degree of "yoop."). "This was cured by adding a 150-volt VR tube to the circuit to stabilize the oscillator voltage. The VR was connected across C4, the oscillator plate bypass, and a 6000-ohm, 5-watt resistor was inserted in the line from C4 to the junction of R4 and R5."

All these modifications were incorporated successfully in my late friend's Knight T-60 transmitter - but only after much soul searching. Given a pristine piece of vintage gear which is to be used on today's bands, how should one deal with problems in its basic design? Those who use original examples of yesteryear's radio technology must sooner or later make a value judgement which can be difficult. In dealing with a specific piece of pristine vintage equipment, the owner is sometimes faced with a variation of Hamlet's eternal, painful question - to modify or not to modify.

Often, common sense dictates the correct answer to this question. If the radio's basic design is sound, then one leaves it alone. One does not "modify" a Michelangelo fresco or a Rembrandt portrait. One may remove the scum of time but goes no further. If a radio's basic design is flawed or weak, then its later improvement may be justified if handled with finesse. But the radio will no longer be original. A crucial value judgement now enters the picture. The modification should disrupt an absolute minimum of the original circuit and mechanical parameters. Ideally, it should be reversible. It should be justified only after carefully weighing its basic necessity. Weighing the modification's pros and cons can thus rapidly approach, at the risk here of

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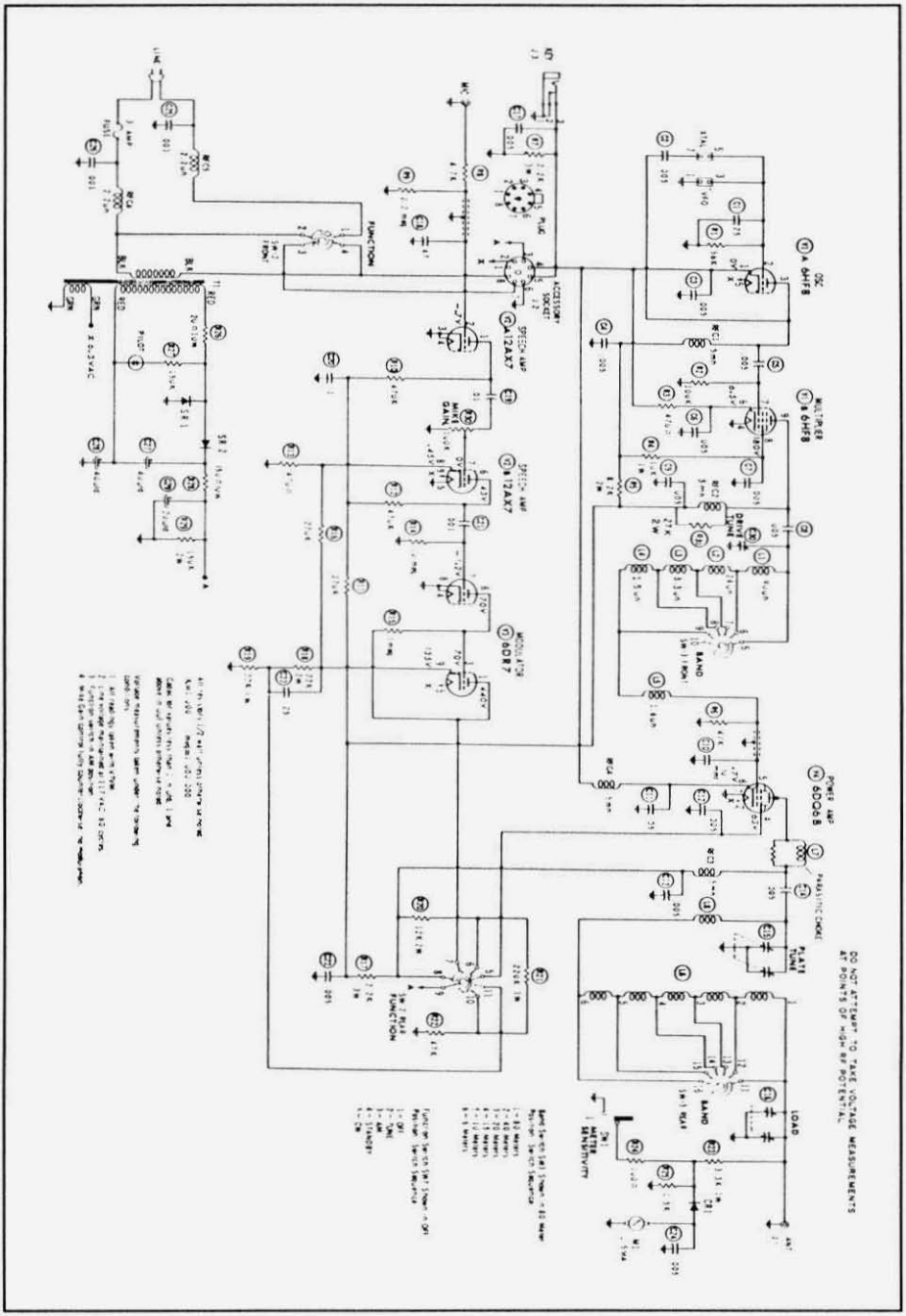

T-60 schematic

Modifying the T-60 Transmitter from page21

overstatement, a philosophical crisis. Even if the modification is successful, the owner may still suffer pangs of conscience. Modification of collectable vintage equipment should therefore follow some reasonable objective guidelines.

Fortunately, this modification dilemma has already been brilliantly addressed. In the article "Modified Antique Radios," published in *The Old Timer's Bulletin* (February, 1993, pg. 23), the author, D.K. Ownes, produced a breakthrough. This excellent publication, by the way, is the official journal of the Antique Wireless Association, Inc. All radio nostalgists who might consider modifying their vintage equipment should first read this article. Its important message deserves a summary here.

D.K. Owens recognizes three categories of modifications. The Type-1 modification represents "ignorant tinkering" and is quickly dismissed. One wishes the author had said a bit more about this. Perhaps D.K. Owens had in mind the painting over of a Catalin receiver cabinet to match the user's bedroom decor. Perhaps the Type-1 category would include modifying a radio's cathedral cabinet into a flattop box that supports coffee cups and other containers of liquids. Perhaps the radio's original control knobs were replaced with larger ones more responsive to the owner's palsied fingers. Inside the radio, "ignorant tinkering" suggests trial-and-error efforts to restore life to a dead set, like replacing a dead tube with another of the same shape which would fit in the socket. The different current and voltage demands of the renegade tube probably blew out other components, if not the tube itself. At any rate, the set probably remained dead. Walt Hutchens expands this concept of "ignorant tinkering" with humor and insight in his article "It's in Mint Condition," *ER* #65.

D.K. Owens' Type-2 modification is best defined by the power of Owens' own words. "Type-2 is a modification done by a skilled craftsman with a definite purpose - usually to correct a basic design defect. These modifications were made shortly after the set was purchased, using contemporary parts. These changes improved the set's performance and could have been used in the original design, had the maker wanted to." The article makes clear that D.K. Owens considers only Type-2 modifications as legitimate from the viewpoint of both a collector and user of vintage radios.

D.K. Owens also includes a Type-3 modification, such as requiring a vintage set to use modern tubes. This modification "does not correct a design defect and is not contemporary. It could not have been done in the original design and construction because the parts were not available at the time. This sort of modification may require great skill and may improve set performance, but I think it spoils the collector value of the set." Although some vintage radio users don't care about collector value, other nostalgists will breathe a quiet "Amen."

We are presented here with a usable, common-sense approach to an abstract problem. Henceforth, in working with vintage radio equipment, we now have a defined standard for evaluating modifications. The modifications I did on my late friend's Knight T-60 transmitter were all clearly Owens Type-2. The mods were published in *QST* (here the Owens-defined "skilled craftsman") shortly after the set appeared on the market. They were done to correct a basic design defect and they use contemporary parts. The modifications improve the set's performance. I'm sure my late friend would have approved of them. **ER**

AM Operating Techniques and Tactics in the Real World

by Jack C. Shutt, N9GT
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Fort Wayne, IN 46815

First of all let me preface these remarks with a statement that I am not a "SSB hating", old line, hard-nosed AM advocate who is still fighting the AM vs SSB wars of the '50's and early '60's! As a matter of fact, I have pursued AM, SSB, CW, contesting, VHF/UHF FM and repeaters, DXing, etc at one time or another over my 35+ years of hamming and I continue to enjoy them all. I have also always enjoyed building and tinkering with equipment and antennas. It is with this rather wide interest in many aspects of the hobby and appreciation for ham radio as a worthwhile endeavor that I offer the following comments.

It is quite interesting to observe the microcosm containing a few members of our greater amateur fraternity who consider AM to be a threat to humanity. Anyone who has operated AM for more than a day or two has observed this subculture. These few are generally heard on SSB complaining about "those lids on AM" while spouting diatribes about how we are too wide and we are violating their "right" to full and unencumbered access to the spectrum.

I have observed these apparently mentally challenged individuals making such disparaging remarks while they, themselves, are splattering over 20-30 kHz or more on each side of the center of their carefully placed signal. They are typically zero beat on 3885, 7290 kHz or 7295 kHz and intend to "QRM those @#*%!^&%$# AM'ers" off the band.

The really neat AM haters, however, are much more (or less?) sophisticated. Most of us have heard the famous laughter machine that regularly appears in the AM window and who could forget the "swisher". This dolt runs his VFO up and down across AM QSOs to generate the maximum amount of disruption possible and certainly must receive great satisfaction from his Sunday afternoon exploits. Sometimes when he gets really frustrated he adds the wideband jamming effect by placing what sounds like a running power tool or other appliance against the side of the VFO while swishing.

One of the most heartrending incidents I ever heard occurred when a seasoned AM'er was trying to demonstrate his station to some of his grandkids who were thrilled at the prospect of talking on the radio. I was shocked and disappointed to hear him being harassed by some moron spewing forth profanity and anti-AM remarks.

Unfortunately, we as avid fans of AM sometimes contribute greatly to the problem! I have often heard AM'ers reacting to obvious intentional QRM by expounding in great detail on the air how bad the QRM is and how those "idiots" should get out of the AM window. What the well meaning AM'ers do not seem to realize is that they are only encouraging the perpetrators by recognizing them and acknowledging the disruption of AM QSOs.

I am not suggesting that we put our heads in the sand but perhaps there is a more effective way to deal with malicious QRM than what we have most often heard. Maybe it would be more effective to IGNORE IT!

I know what I am suggesting might

seem like a radical concept. DO NOTHING! How could that possibly solve the problem? Well, it seems that if QRM'ers do not get the attention and the reaction that they crave they generally will move on.

RULE #1- KEEP YOUR COMMENTS ABOUT INTENTIONAL QRM OFF OF THE AIR! YOU ARE ONLY ENCOURAGING THE QRM'er TO CONTINUE HIS DIRTY DEEDS!

The interference to AM operation is certainly not the only activity the QRM artists seem to enjoy. If you have ever tried to work a particularly rare DX station who is operating split-frequency to handle a pile-up, you know what I'm talking about. I have listened to some of this tripe in utter amazement and almost total disbelief that some sickies get so much pleasure from irritating others. I have taken notice of the profanity and downright obscene remarks as well as the always present self-appointed kilocycle cops who react to the garbage by generating some of their own in their righteous (?) attempts to battle the offenders.

What has happened to amateur radio? I don't remember ever before hearing such total disregard for propriety and decency demonstrated on the air. It seemed in the "good old days" everyone was far too concerned about being caught by the FCC to engage in such conduct.

I guess I could proceed to theorize about the ills of society and how we are all going down the tubes. I believe, however, that there have always been a few individuals who attempt to spoil things for everyone else. If we dwell on the existence of these "problems," we tend to forget all of the good things about our hobby.

QRM'ers are the graffiti artists of the air waves. Do not give them the audience and the recognition that they crave!

There have been a number of articles written responding to these problems on our bands. One excellent editor appeared in *QST* a few years ago after a really terrible display of craziness had plagued a major DXpedition. The essence of this article was that a far more effective way to combat the madness is to ignore it and not to recognize it on the air! It has been demonstrated repeatedly that the problem generally goes away if it is ignored. Admittedly, this sometimes takes a large measure of patience and restraint.

This policy generally is successful when dealing with the unidentified interference generator. What then do you do about the obnoxious SSB'er who gives his call and appears to insist that he is doing nothing wrong by operating in the AM window and exercising his God-given right to the frequency?

How about actually talking to him rather than just talking about him? So many times these turf battles result in nothing more than two opposing groups bad-mouthing each other. The more the two groups antagonize each other, the worse the problem becomes. Why don't we invite the intruder(s) into the conversation?

I have been amazed that many times the SSB'er does not really understand what is going on and why his actions are offensive to AM'ers who are on or near his frequency. After all, he might not even hear them if his receiver is in the typical SSB narrow bandwidth mode. How about at least attempting to educate these guys and explain the AM window concept to them in a non-confrontational manner?

Sometimes, the only way you can successfully get the SSBer's attention is by calling him on SSB and politely explaining the situation. Perhaps this individual is not familiar with AM/classic radio and the existence of the AM window. This practice, of course assumes that you also have an SSB rig that

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can be fired up immediately. Also assumed is that you are dealing with a reasonable individual, which may not always be the case. At least, by making the effort, you are taking the high road by conducting yourself as a responsible operator and the ball is in his court.

I have found that most amateurs, when approached in this manner will either join in the conversation in a friendly manner or will move. Either of these options is certainly preferable to being QRM'ed.

RULE #2-DO NOT AUTOMATICALLY ASSUME THAT EVERY SSB STATION WHO IS GENERATING QRM TO AM OPERATION IS DOING SO INTENTIONALLY OR MALICIOUSLY.

By the way, don't bother threatening offenders with reporting their activities to the FCC. Empty threats will not work and actual reports to the Commission may not achieve the expected results. Generally, unless the offense involves endangerment to life and property, the FCC expects us to clean our own house. Amateur radio is considered to be largely self-policing and if we complain too much to the Commission, we may receive more than we bargained for and perhaps over reaction in the form of unnecessary regulation.

I realize that there are some people out there who will never be convinced, but you can at least try to educate them. You should, however, avoid on the air debates over the value of AM or its place in amateur radio unless you are prepared to be lambasted and ridiculed.

It would seem that sometimes we assume too much. That is, that everyone else understands our passion in operating old gear in what is perceived by some as an archaic mode. I have been truly surprised on several occasions to hear that the offending SSB station had no idea that he was creating QRM and also that he was very interested to hear about my vintage station and expressed a desire to maybe try some AM himself!

RULE #3-BE ASSERTIVE BUT NOT BELLIGERENT. CONTINUE TO EDUCATE OTHERS ABOUT THE EXISTENCE OF THE AM WINDOW AND OF THE GENTLEMEN'S AGREEMENT UPON WHICH IT IS BASED.

One very effective way for AM'ers to achieve some measure of recognition and respect is to just be active and get a respectable signal on the band. It is amazing just how much things seem to clear up when two or three fellows running 300 watt rigs get on one of the AM frequencies! A few of these "anchor stations" can really make a difference on the band. Unfortunately, this is only a short term solution and it is certainly not possible or necessarily desirable for everyone to run high power. It could be argued, however, that the higher power is necessary for effective communications under difficult conditions. This would certainly satisfy the spirit of Part 97 of the Rules and Regs.

I am an advocate of those who wish to run low power and entry level equipment. I enjoy this mode myself. Unfortunately, it is not a perfect world out there and if you choose this type of operation, you can expect to be clobbered a lot! QRP AM is not for the faint of heart!

Another solution may be for us to expand the AM window. Try operating above or below the popular calling frequencies. You might try using 7285 kHz on 40 meters for example and spread out a little when activity or QRM makes it necessary. I have heard a number of stations doing this and it works! After all, we still have legal access to the entire phone band.

RULE #4- BE POSITIVE! REPRESENT OUR NICHE OF THE HOBBY IN A POSITIVE WAY! SET AN EXAMPLE BY USING GOOD OPERATING PRACTICE.

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AM International Update

by Dale Gagnon, KW1I, President

AMI Headquarters News

AMI membership hits 750 this month. It's a real pleasure to read the encouraging letters that accompany membership requests. Many list and describe their AM equipment and a surprising number of new members have just dusted off their old rigs or acquired classic radios to again operate AM. I appreciate each word of encouragement and radio anecdote.

There is a delay in producing certificates for those who mailed in for membership during May. A change of office location produced a change in available printers. All certificates will be produced on a high quality laser printer and will be mailed before the end of June. Thanks for your patience.

The AMI treasury is at approximately $325.

Armed Forces Day

Have not received any reports yet. AMI would like to recognize your participation. Please send in a newsy letter so we can pass along your highlights.

AMI Discovery Weekend

There will be no AMI update in July, so this is a reminder to have your equipment ready to go for the September 9 & 10 AMI Discovery Weekend operating event. This is an opportunity for the AM community to demonstrate its vitality on the air. This helps keep us visible to the rest of the amateur fraternity and helps some of them to discover the enjoyment of AM radio! August *ER* will have more details. **ER**

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

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to get on AM. I have been using it for years and get very good audio reports. I am using this with an ARC5 military surplus transmitter. The ARC5s have a pair of 1625s (807s) tubes in the final. I run mine at 800 volts at about 200 mA. This is pushing them hard. I get about 100 watts out on a good day, normally about 80 watts.

I modulate them with an old tube amp. It has four 6L6s in the output stage. The amp is a public address amp and has 4, 8 and 16 ohm taps on the output transformer. The amp is capable of 50 watts RMS into a four ohm load. I could have changed the output transformer to match the 807s. It would need about a 4K secondary impedance. But instead I use a 12.6 volt 4 amp filament transformer with a 220 volt primary. I run the transformer backwards. The 12.6 volt secondary is connected as a primary. It is connected to the output of the PA amp. The 220 volt transformer primary is connected as a secondary. It is in series with the B+ to the 807 finals. This transformer has a turns ratio of 20 to 1 or an impedance ratio of 400 to 1. My 4000-ohm load looks like 10 ohms. This is a pretty close match to the output of the PA amp. I used the 12 volt to 220 volt transformer because I had one and I liked the 220 volt rating for the primary.

I am running this transformer much above its voltage rating and was concerned about insulation breakdown. I mounted the transformer isolated from ground to avoid arc over problems. It has been running for years this way. I think a 6.3 volt transformer with 117 volt primary would work as well. Try one with a power rating equal to your modulation requirements. For example a transformer of 6.3 volt times 8 amps = 50 watts. This is good for a 100 watt rig. I have tried some transistor Hi-Fi amps and they work well but be careful about there ratings. They lie a lot. You will be pushing the amp very hard so use a big one.

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The Conar 400 Revisited

by Dave Ishmael, WA6VVL
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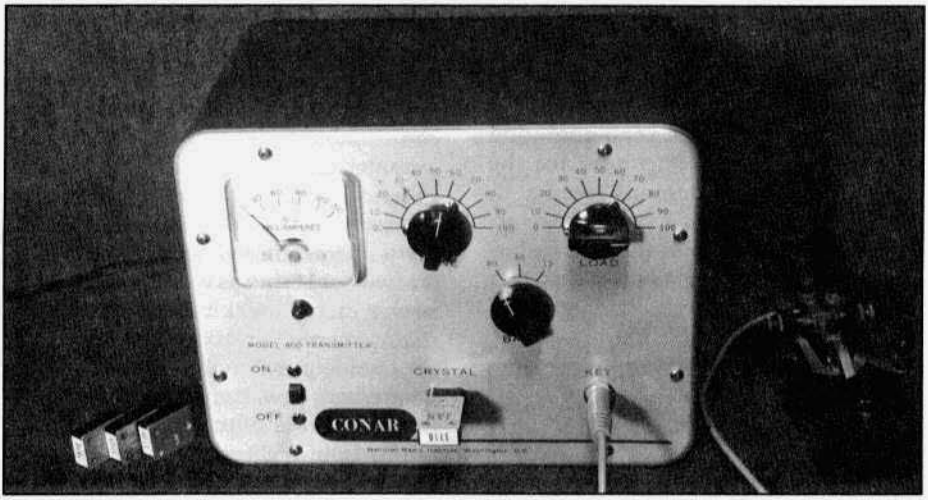
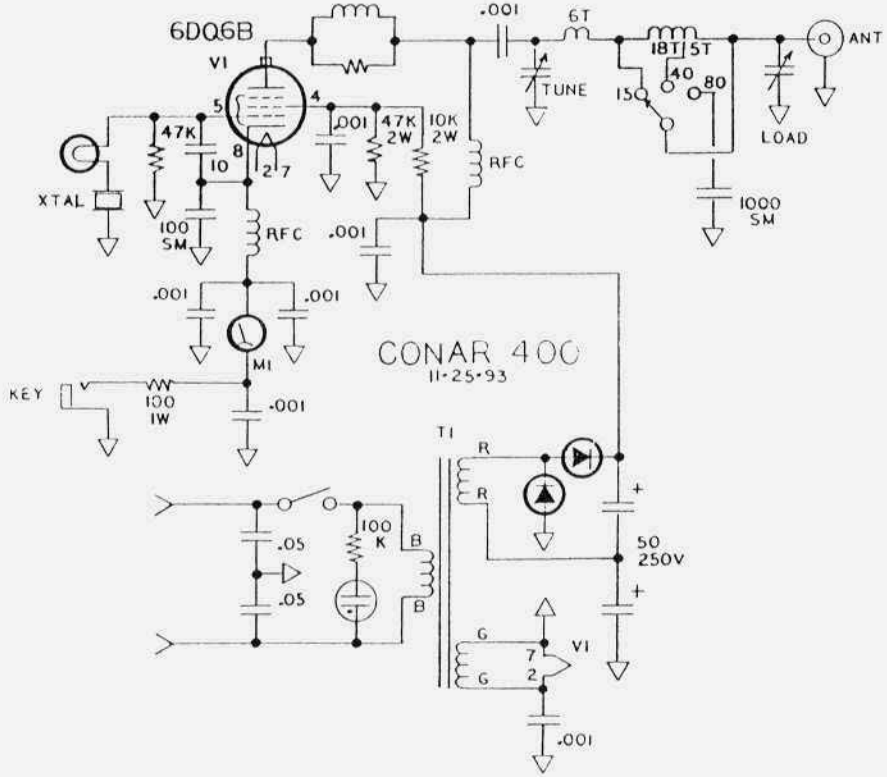
There have been many articles in the pages of *ER* that have made me curious about equipment that I otherwise wouldn't have thought twice about. Jim Hanlon, W8KGI's article, "The Conar Twins", in *ER* #45, is no exception. I have seen a few of the Conar 400 transmitters at local swapmeets but I can't recall ever seeing the Conar 500 receiver. I recently bought a nice Conar 400 transmitter from an *ER* reader, Jim Jorgensen, K9RJ, and it turned out to be a real surprise.

The Conar twins were available from Conar, a Division of National Radio Institute (NRI), in kit form or assembled. They were also available from NRI as part of their amateur radio home study course. The twins were first advertised (?) in the '65 *ARRL Handbook* so they were probably available in late '64. The twins were advertised as "new" in both the '65 *ARRL Handbook* and the '73 ARRL "How To Become a Radio Amateur". NRI ads in *QST* suggest that the twins may have been available through 1980 as part of NRI's Basic Amateur Radio home study course.

The Conar 400 is a novice-class one-tube 6DQ6A 25W, crystal controlled, CW transmitter with single-knob bandswitching on 80, 40, and 15M. A pi-network matches the antenna. The 6DQ6A operates as a grid-plate crystal oscillator. The power supply uses a solid-state voltage doubler that provides >300V key-down @100 mA. The power transformer is relatively small, the core measuring only 2-1/2" x 3" x7/8". The output of the voltage doubler uses two 50 uF 250V electrolytics. The Hoyt 2-1/4", 0-150 mA undamped meter is in the 6DQ6A's cathode circuit. The transmitter is well bypassed. There is a small light bulb in series with the crystal (Conar refers to this as a "special



Conar 400 transmitter with xtals and key; ready to go on the air.



variable-impedance current-limiter" that "protects your valuable crystals").

There was very little chirp using 80M crystals but my 40M crystals were a different story. Some 40M crystals were quite chirpy, very tuning critical. After TUNE was adjusted for dip, it was further adjusted for minimal chirp, best keyed waveform on my Kenwood SM-220 monitor scope, minimal crystal currents. At some settings of TUNE, crystal currents were quite high as evidenced by the brilliance of the crystal lamp and crystal heating. It's too bad that the crystal lamp isn't mounted on the front panel because it's a very useful tuning indicator.

The pi-network is made from two lengths of 1-1/4" dia. 8TPI 16AWG miniductor stock (similar to B&W 3018) mounted at right angles to each other. The 15M band uses a separate coil with 6 turns. The 15M coil is in series with the 80/40M coil that has a total of 23 turns. An additional 1000 pF SM cap is switched across the LOAD cap on 80M. The TUNE and LOAD caps are standard 2-section "broadcast variables" - the TUNE cap using only one of the sections.

The Conar 400 easily tuned to 25-30W input power with 13-16W output. The transmitter puts out more power than the Heath AT-1 but using a smaller footprint/simpler design. The transmitter is housed in a 9-7/8"W x 7-1/2"H x 6-3/8" dark-blue hammertone steel cabinet. The front panel is thin gauge brushed-steel with bright red silkscreened lettering.

The Conar 400 turned out to be a real "time machine". As Jim, W8KGI, pointed

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WW II Nomenclature Systems

Part one of two parts

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1. Introduction

Like many of you, I have struggled for years to gain a minimal understanding of the multiple nomenclature systems in use during World War Two. The "alphabet soup" on equipment data plates was incomprehensible without some sort of guide. With the help of information pieces of the puzzle from friends like Robert Downs, Fred Chesson, Fred Raper, August Link, and many others, I was able to put together a fair approximation of such a guide.

2. Overview

Any militarily significant system usually has a number of component parts, each of which must be easily identifiable by a simple reference during both training and operations. The number of military systems in use makes a similar referencing scheme necessary at the system level as well. Further, it is desirable to have a nomenclature system which inherently makes it easy to distinguish between systems and components of those systems.

Three separate and independent nomenclature systems were in common use at the beginning of the war: the Army nomenclature system, the Navy model letter/type number system, and the Navy Mark/Mod system. These were joined in late 1942 by the new Joint Army-Navy (or "AN") System of nomenclature.

The Army system featured the familiar SCR, SCM, SCS designators for systems, and BC, FT, HS, etc. for system components. The Navy used a series of two and three-letter designators for systems, while using a 5-digit type number for each system component. Both of these systems appear to have been in use since World War One or earlier. A second Navy system used Mark and Mod numbers for various ordnance items such as guns and shipboard fire control radars. In that system, there appears to have been no significant attempt to distinguish systems from components. Since so little of the Mark/Mod system applies to the material we encounter in collecting, it will not be discussed further. The Joint Army-Navy Nomenclature System was implemented to cope with systems intended for multiservice use or with potential for such use, thereby ending the confusion that resulted from a single system having two radically different nomenclatures assigned by the Army and Navy (such as the IFF system the Army called the SCR-515, also known as the Navy Model ABA). Of these four systems, only the AN system and the Navy Mark/Mod system have survived.

3. Army Nomenclature System

This system was developed for Signal Corps use at least as far back as World War I. Three-letter designators beginning with "SC" were used to denote complete systems, while one and two-letter designators were used for components. Only a few system designators were used:

SCM	Set, Complete, Meteorological
SCR	Set, Complete, Radio
SCS	Set, Complete, System

The SCS designator was applied to groups of SCR-numbered sets comprising an extensive system, such as multiple radio sets employed in a ground-based fighter direction/control center. The SCR designator could be a single transmitting or receiving set, or a full set of both transmitting and receiving equipment. An additional designator, "RC" was used for subsystems or groups of accessories. This ranged from the RC-198 (the old familiar FL-8-A audio filter) to IFF systems which were intended to be used with ground or airborne radar sets carrying their own SCR designator. Each of these could have a suffix (as in the "SCR-274-N"). Some early systems, such as the SCR-183 or 283 systems, carried a variant identifier between "SCR" and the number, such as "SCR-AL-183", "SCR-AN-183", etc. The designators for equipment components were:

A Phantom Antennas
AL Aerial Communication
AN Antenna Aerials
AP Panel Sets
AR Lightning Arrestors
BA Primary Batteries
BC Basic Component (Rcvrs, Xmtrs, Control Boxes, etc.)
BD Switchboards, Power Boards, etc.
BE Cabinets, Starting Boxes, etc.
BG Bags, Cases, Fabrics, Covers, etc.
BK Circuit Breakers, Relays
BX Boxes
BZ Buzzers
C Induction Coils, etc.
CA Capacitors
CC Electrical Connecting Cords
CD Electrical Cords with Plugs
CE Animal Pack Equipment
CF Telephone (carrier)
CH Chest
CO Electrical Extension Cords
CP Cables (counterpoise)
CS Carry Case
DC Crystals & Crystal Units
DM Dynamotors
DR Wire Reel
EE Telephone, Telegraph & Signal Lamp Sets
F Fairleads
FL Filters
FM Supporting Frames
FT Fittings, Mounting, Clamps, etc.
GA Spark Gap
GC Hand Crank
GE Gasoline Engines
GN Generators
GP Ground Rods
GR Sound and Flash Ranging Set
GY Guys & Stakes
HO Shelters
HS Headsets
I Ammeters, Voltmeters, Clocks, etc.
IE Instrument Equipment
IN Insulator
IS Electrical Instruments
J Transmitting Keys
JB Jack Boxes
JK Jacks, Receptacles
K Carts, Trucks, Trailers, etc.
KE SCS Equipment (Vehicular)
LC Telephone Line Construction Tools & Apparatus
LG Legs
LM Illuminating Lamps & Bulbs
LP Loops
LS Loudspeakers
M Miscellaneous
MA Radio Mast, less Antenna
MC Miscellaneous Components
ME Maintenance Equipment
MG Motor Generator
ML Meteorological Apparatus
MO Motors
MP Mast Bases, Brackets, Clamp
MS Mast Section
P Headsets
PA Public Address Equipment
PE Power Units
PH Photographic Articles
PL Plugs
PN Mounting Panels
R Telephone Receivers
RA Rectifiers
RL Reel Mechanisms

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WW II Nomenclature Systems from previous page

RM Remote Control Units
RS Resistors
RU Water Cooler
SE Signal Sets
SG Shafts & Gears
SO Sockets, etc. (Connectors)
ST Carrying Straps, etc.
SW Switches
T Telephone Transmitters and Microphones
TC Central Office Sets (wire)
TD Chest Sets
TE Tool Equipment
TF Power Transformers
TG Telegraph Instruments
TL Tools
TM Terminals, Connectors, etc.
TP Telephones (desk sets, etc.)
TR Towers
TS Handsets (wire)
TU Transmitter Tuning Units
VB Vibrators
VO Oscillators
VT Vacuum Tubes
W Wire
WC Cables

4. Navy Nomenclature System

The Bureau of Steam Engineering, created in 1910, was initially given responsibility for Navy radio equipment. This continued after they were renamed as the Bureau of Engineering and lasted until they merged with the Bureau of Construction and Repair in July of 1940, emerging as the new Bureau of Ships (BUSHIPS or NAVSHIPS). Radio systems were assigned a two-letter model designation, with the first letter indicating the type of system and the second letter indicating the specific model. ("Model RA" would have been the first receiver). Separate components of a system were assigned type designators containing a two-letter prefix for the manufacturer and a four-digit type number. The prefix "SE" was used for Navy-built equipment, and commercial designs were assigned a two-letter manufacturer designator. The first two digits of the type number indicated the component type (46 - receiver, 52 - transmitter, etc.).

Rapid growth during the period between wars soon made the old model letter and type number scheme obsolete. Lack of adequate detail obscures this process, but it appears that the new three-letter model designators and the five-digit type numbers were not implemented at the same time. As each equipment category reached the end of the available two-letter model series, they began using three-letter model designators for complete systems.

Nomenclature for both the RU-1 and RAC receivers was assigned in December of 1931, with components of both units assigned five-digit type numbers. Unfortunately, with only a single letter available to indicate the model in the most heavily-used categories such as airborne receivers and transmitters, this system was also doomed.

On the second contract for a specific model, the model designator was suffixed with "-1" (a second contract for the RAK would be designated as "RAK-1", a third contract as "RAK-2",etc.). Authorized modifications of the system by the Navy after delivery would result in addition of a lower-case letter suffix (such as RAK-1a, RAK-1b, etc.). Experimental equipment was assigned model letters beginning with "X" if manufactured by the Navy (XA, XB, etc.), or with "CX" if commercially manufactured (CXA, CXB, CXAA, CXAB, etc.). Preliminary models of equipments, intended to become the property of the Navy under the terms of a contract, were given an "X" prefix letter, separated from the basic designation by a dash. The preliminary (test) model of "Model TBU" was therefore designated "Model X-TBU".

The new type number had a prefix for the manufacturer and five or six digits ("CRV-46151" for the Model ARB receiver). The list of manufacturers had

long since outgrown the two-letter set and was rapidly using up the available three-letter designations.

It was to grow well into the four-letter series by the end of the war. Five-digit type numbers were used for major pieces of a system (transmitters, receivers, control boxes, power supplies, etc.) and six digits for subassemblies and smaller parts. The first two digits were the "class" or general type of item, and the remaining digits indicated the specific component model. A modification to the basic design would result in addition of a hyphen and upper-case letter suffix ("COL-46159-A", etc.).

Experimental components had an "X" added before the five digits ("X47101", etc.).

Wartime developments forced a modification to the type number system. Classified equipment (radar, IFF, etc.) was assigned a type number with the usual two-digit class identifier and a three-letter suffix. Any component with an alphabetic suffix in the type number was instantly recognizable as classified equipment, and should have been more easily protected.

Modified component type numbers were indicated with a numeric suffix ("CAY-50AEY-1", etc.)

One further note: Generations of postwar typists unfamiliar with either the equipment or the model/type assignment principles have thoroughly fouled up the equipment lists they retyped.

Navy Model Letter Assignment

Model **Type of Equipment**

- **A** Airborne Radio and Radar Equipment
  - **AB** Airborne IFF
  - **AI** Airborne Radar Intercept
  - **AM** Airborne Radio Transmitting and Receiving
  - **AR** Airborne Radio Receiving
  - **AT** Airborne Radio Transmitting
  - **AY** Airborne Radar Altimeters
- **B** Ship-Shore IFF Equipment
- **C** CX All Commercial Experimental Equipment
- **D** Ship-Shore Radio and Radar Direction Finding Equipment
  - **DX** Assembled Direction Finder Equipments (DF assemblies which when used with a standard receiver form a completeDF equipment.)
- **E** Emergency Power Equipment (Gasoline or Diesel engine generator sets)
- **F** Radar Fire Control Equipment ("F" series superseded by the BuOrd Radar Mark/Mod series)
  - — Subseries of "F" series in use for other than fire control radar, as follows:
  - **FP** Facsimile Recording Equipment.
  - **FQ** Facsimile Scanning Equipment.
  - **FR** Frequency Shift Receiver Converter Equipment.
  - **FS** Frequency Shift Keying Equipment.
- **G** Airborne Radio Transmitting Equipment (Classification cancelled - Reassigned "AT" series.)
- **H** Hoist Train Mechanism (Cancelled - hoist train mechanism considered as part of an equipment.)
- **I** Intercept Radar.
- **J** Sonar-Sound Listening (Receiving).
- **L** Precision Calibrating Equipment.
- **M** Radio Transmitting and Receiving Equipment. Radar Mark & Mod: Radar Fire Control Equipment.
- **N** Sonar Echo Sounding.
  - **NA** Sonar Beacon.
  - **NG** Echo Sounding (Rochelle Salt).
  - **NJ** Lightweight Echo Sounding Recording.
  - **NK** Portable Echo Sounding Recording.
  - **NM** Echo Sounding (Magnetostriction).
- **O** Measuring, Test, and Operator

continued next page

Trainer Equipments for Models OA to OCZ inclusive.
For Models after OCZ, the subseries breakdown is as follows:

- **OE** Xmtr and/or Rcvr Analyzers, Vacuum-Tube Voltmeters, Volt-Ohm-Milliammeter,Multimeters.
- **OF** Echo Boxes, Wavemeters, Frequency Meters (non-precision).
- **OG** Signal Generators (non-precision), Test Oscillators
- **OK** Sonar Computers.
- **OM** Test Monitor Equipment.
- **OP** Signal and Sound Wave Measuring Equipment, Noise Meters.
- **OS** Oscilloscopes.
- **OT** Radar Operator Trainers.
- **OV** Vacuum Tube Analyzers or Testers.
- **OW** Sonar Test Equipment.
- **OZ** Impedance Measuring Equipment.

P Automatic Transmitting and Receiving Equipment Coding Equipment.

Q Sonar Echo-Ranging-Listening Equipments:

- **QA** E/R/L (Quartz).
- **QB** E/R/L (Rochelle Salt).
- **QC** E/R (Magnetostriction) with L (Rochelle Salt).
- **QD** Depth Determining Equipment.
- **QF** Teacher and Training Equipment.
- **QG** Console Version of "QC" Series.
- **QJ** Console Version of "QB" Series.
- **QK** Scanning Sonar-Crystal.
- **QL** Frequency Modulated Sonar.
- **QX** Auxiliary Equipments to Echo Ranging Sonar.

R Radio Receiving Equipment (Panoramic radio adapters were included in this class up through Model REZ).

- **RP** Panoramic Radio Adapters.

S Search Radar Equipment.

T Radio Transmitting Equipment.

TP Power Amplifiers.

U Remote Control:

- **UX** Mobile Remote Control.

V Visual - PPI Repeaters.

W Sonar - Combined Ranging and Sounding:

- **WA** Combined Sounding-Ranging (Magnetostriction).
- **WB** Combined Sounding-Ranging (Rochelle Salt).
- **WC** Combined Sounding-Ranging (R/S Sounding) (M/S & R/S Ranging & Listening).
- **WD** Combined Sounding-Ranging (R/S Sounding) (M/S & R/S Ranging & Listening).
- **WE** Combined Lightweight M/S Echo Ranging with sounding feature removed.
- **WF** Combined Ranging-Sounding-Listening (Sonic & supersonic listening using ADP crystals).

X Experimental (Navy-designed).

Y Navigation and Landing Equipment: (other than direction finders), (beacons).

Z Airborne Navigation and Landing. (Classification can celled - re assigned "AY" series).

Navy Type Number Assignment

Class **Material**

10 Miscellaneous: To be used when a definite class is not available.

14 Special RF Devices (Not covered by any other classification). (Electronic switching, etc.)

18 Prime Movers and Accessories: All types except electrical.

19 Batteries: All types; parts and accessories.

20 Rectifier Power Units - Voltage Regulators - Copper Oxide Rectifiers: All types. A20 is crystal detectors.

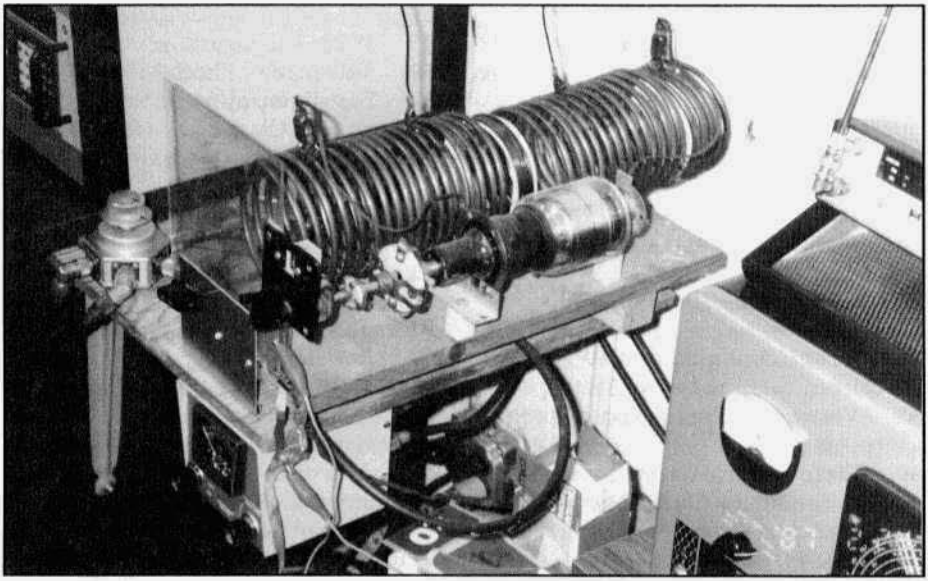
21 Motors - Generators - Dynamotors -Motor Generators - Rotary Converters, etc. Motor controllers.

22 Instruments - Electrical Indicating and Recording.

23 Control Panels and Control Units. (Except motor controllers.)

24 Switches: Manually operated.
25 Shields and Shielding Material: Finishes.
26 Keys - Telegraph: Manually operated.
28 Protective Devices: Static types.
29 Electromagnetic Contact Devices: All types.
30 Transformers and Reactors: Power and audio.
35 Oscillators - Complete Units (Audio or RF).
36 Ranging Equipment - Radio (Localizer, rotating beacons, etc.)
38 Vacuum Tubes - Photo-electric Cells: All types.
40 Piezo-Electric Crystals and Holders - Thermometers and Thermostats.
41 Compensators - Underwater Sound.
43 Transmitter-Receiver Units (Combined): Equipment in which the transmitter and receiver are not separable as units.
46 Receiver Units and Converters (RF to IF, etc.) - Radio and Sound.
47 RF Transformers - Inductors - Chokes.
48 Capacitors: All types.
49 Head Telephones - Telephone Cords - Patch Cords - Loudspeakers - Plugs - Jacks - Sockets - Receptacles: All types.
50 Amplifier, Modulator, and Coupler Units - Electronic Converters - Mixing Panels: All types. (Complete diplex and duplex units.) See 14 for electronic switching.
51 Microphones - Hydrophones - Underwater Sound Electrical Pickup Devices - Combination Handsets: All types.
52 Radio Transmitter Units: Includes RF drivers for underwater sound equipment, etc.
53 Filter Units: All electrical types.
54 Sound Receiving Devices - Acoustical.
55 Indicators and Recorders: Radio, radar, and underwater sound. (Indicating instruments under Class 22.)
56 Wave Propagation
59 Television - Photo - Radio
60 Test Equipment (Integral instruments under Class 22.) A60 is Training Equipment (Operator trainers and instruction devices.)
61 Insulators and Insulating Material: Phenolic and Ceramic.
62 Wires and Conductors - Junction Boxes. A62 is RF transmission lines and RF cables, etc.
63 Resistors: All types.
64 Static Recorders and Eliminators.
65 Remote Control Systems by Wire: Repeater systems, etc.
66 Antennas - Antenna Assemblies. (Dummy and phantom antennas.)
67 Automatic Systems, Facsimile, Tele-Automatic: Automatic keyers and recorders.
68 Secrecy Systems: Sending and receiving. (Speech scrambling)
69 Direction Finding Equipment: Radio.
70 Distance Finding: A70 is radio altimeters.
72 Portable Equipment - Field Sets.
73 Combined Gas Engine Generator Sets.
74 Precision Calibration and Measuring Equipment.
75 Standards: (Including standardization notices, etc.)
78 HF Underwater Sound Projector (above 10 kc) and supporting parts.
79 LF Underwater Sound Projector (10 kc or below).
83 Frequency Control Systems.
84 Control by Radio.
85 Interference Reduction.
87 Experimental Superfrequency Equipment.
88 Instrument Landing Equipments.
89 Radio Recognition and Identification Devices.
90 Visual Signalling Apparatus (This classification for type number assignments only). **ER**

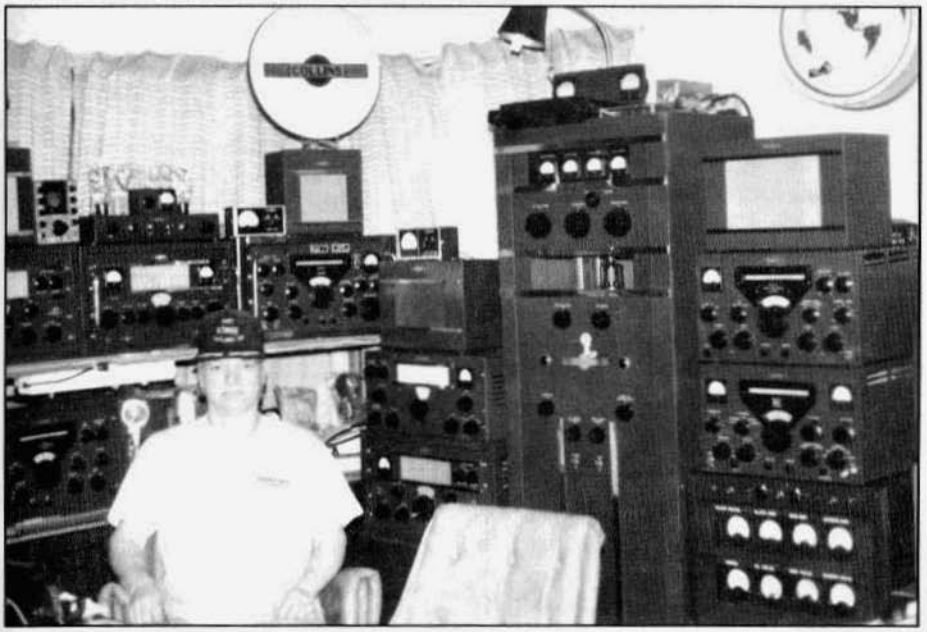
Next month part two.



A tuner for all seasons (and all power levels) by Hank Clark, W2IQ. He uses it on 160 thru 30 meters with a center fed doublet.

Dee Almquist, W4PNT (on the left) and Kim Herron, KE8NE, at their tent at the Dayton Hamvention. They had the nicest display of vintage equipment there.

An advertisement for our ER T-shirts at Dayton. From left to right: Bob Mann, W8LHP; Jim Jorgensen, K9RJ; Dennis Martin, AA8GG and Tom Lehnert, AE8O.



Gary Whitcher, K7MHE, in his hamshack which consists entirely of Collins gear. A beautiful display.

A 1937 Transmitter from page 16

minimum plate current. Continue until plate current is 50 to 55 mA. Power output should be about 13 watts. NOTE: If you have several 42s, try each of them so you can select the best one. It is a good idea to check your 83V rectifiers also.

On 80M, the RF crystal current is about 30 mA. On 40M, the crystal current may rise to 65 mA when the transmitter is tuned for maximum output. I found that if C5 is then turned slightly CCW (more capacitance), the RF power output will drop about 1 watt and the RF crystal current will drop to a safe level. Plate current will be about 52 mA. Plate voltage will be about 385 volts (key down). Power input will be about 20 watts and efficiency will be about 65% which is good for an oscillator.

Results

This little rig has been used in eight of the AWA Old Time contests. Using a 40 M Zepp antenna I have had 534 contest contacts, including 24 states, four Canadian provinces and Granada Island (J37XC). Best DX was W7KE - about 2500 miles on 80M. My only regret is that I didn't know all this back in 1937. **ER**

References:

1. A Practical Survey of Pentode and Beam Tube Crystal Oscillators for Fundamental and Second Harmonic Output. J.J. Lamb, QST, Apr. 1937.

2. The Frank C. Jones Radio Handbook, 1937 Ed., pp 207-209. Covers the 42 crystal oscillator, the 82V rectifier and the pi-net output circuit.

Letters from page 27

The efficiency is not great but you can not beat the price.

You can use a reactor to keep the DC out of the modulation transformer but it takes a big one and I do not have one. You may have to lower the screen voltage on the finals if your CW transmitter is running them hard.

You must use some sort of audio conditioning to restrict the bandwidth. I use an equalizer and the tone controls on the amp. Dig out that old Hi-Fi amp and join us on 3.885 MHz, its fun.
Peter Cavalla, N2SPJ

Editor's Comments from page 1

includes quarterly issues of the Journal. Non-member subscritions to the Journal are the same. For more information contact: QCWA Headquarters, 159 E. 16th Ave., Eugene, OR 97401-4017. Phone 503-683-0987

This year for Field Day, June 24-25, let's all get involved. We can do this by taking our gear into the field and running on emergency power or we can participate from our shacks. We can run our vintage SSB gear, operate CW or go AM. I'd like to promote more participation in Field Day by us vintage enthusiasts. Please send reports (and photos) if you were involved in Field Day this year. Next issue I'll print some of what I receive.

Lately I've been hearing more and more AM'ers and vintage SSB enthusiasts operating mobile. Although I've never had an HF rig in my vehicle I'm becoming very interested in trying it out. Maybe some of you mobile ops could send in some material for the rest of us. A description of your mobile station with photos would be very interesting.

A couple of well-known AM'ers are recovering from some health problems. We send our best wishes to Art Robinson, WØIWV and Pat Persons, K7YIR; speedy recovery guys.

Lastly, here's a plug for the Fort Tutthill hamfest at Flagstaff, Ariz. July 21-23. It's a great event. Of all the hamfests we've been to I think this one is our favorite. **N6CSW**

Command Set Triplets from page 9

the BC-453 RF gain control. I short these out on receive, either with a switch or a relay, but I drop them into the circuit on transmit. The extra pot on the BC-453 allows me to adjust the gain on transmit to a comfortable level.

85 kHz signal generators are not easy to find. Some audio oscillators go up that high. I have a Radio Shack integrated circuit, unfortunately no longer in their catalog, that with the addition of a few R's and C's and a couple of 9 volt batteries generates sine or triangular waves at any frequency I need up to 500 kHz. You could throw together a 555 oscillator at 85 kHz. It wouldn't be sinusoidal, but that would make the harmonics easy to find on your communications receiver for calibration purposes. If you can't find anything, just tune in a weak signal on the air with the BC-453, tune it to a convenient pitch with the BFO, and peak the IFs as above. It might not be exactly 85 kHz, but who cares?

Rolph Shick's article also contains information on coils for 20, 15 and 10 that you can plug in to the BC-455. I cannot vouch for how well they work, but you might be interested in trying them.

I'd be happy to supply any interested reader with a schematic, a "practical wiring diagram" and alignment instructions for the Command Set receivers as well as a copy of Rolf's article. Please send me a large, self addressed envelope with two stamps and a dollar to cover copying.

Good luck with your project. I hope you enjoy it as much as I have. **ER**

The Conar 400 Revisited from page 29

out in his original article, the 400 is very similar to the rig in the article by Lewis G. McCoy, W1ICP, "A Three-Band One Tube Novice Transmitter", in the December '57 *QST*, pgs. 34-37. This is the article that I used to build my early novice transmitters from '60-'62.

Unfortunately, not all of my transmitters worked very well. Oh they (kind of) worked, but they sure left a lot to be desired, especially in their keying characteristics. I spent hours building them, planning every screw hole, every part location, every.... Then came the "smoke test" and disappointment. I got so good at building good looking, mediocre, 6DQ6 transmitters that it got to be a joke between Alan Burgstahler, WA6AWD, Richard Morse, WA6KXK, and myself during high school. Alan would "throw together" a transmitter and it would work flawlessly (well, almost flawlessly). As a beginning novice, I "religiously" adjusted my transmitter for plate dip. If they didn't work too well after they were dipped and loaded, I didn't have the experience to troubleshoot them past wiring mistakes and the more obvious errors one makes in homebrewing transmitters. As a result I built many homebrew transmitters using the tried and true trial-and-error technique. I haven't built a one-tube 6DQ6 transmitter since high school so the Conar's tuning idiosyncrasies brought back a lot of memories and answered a lot of questions. In '60, I didn't have a bulb in series with the crystal, a large assortment of crystals, a monitor scope, an RF power meter, or much experience. What a difference 30 years makes.

I would have never guessed that an article in *Electric Radio* would have answered questions that were 30 years old. I think I will renew my subscription! **ER**

HE WAS TALKING ON THE MIC ON THE INHALE AS WELL AS THE EXHALE IN ORDER TO MAKE TWICE AS MANY CONTACTS

The Heathkit Lunchboxes from page 13

(HW-19), and 11-meter (CB-1) units are exceptionally rare in any condition. Indeed, in the ten years I have been collecting Heathkits, I have never seen an HW-29, and have seen only one HW-19. It now resides safely in my collection.

If you set out looking for a Lunch Box you need to keep a few things in mind. If you are just interested in playing around with one it doesn't much matter what physical condition the rig is in, only that it works. But if you are interested in collecting you will want to look for a Lunch Box in as near perfect condition as possible. No extra controls, no extra holes, and with the original paint, knobs, and handle. The handle is brown by the way, not black. Inspect the unit inside and out, and look for a crystal. Also check the controls for smooth operation, and ensure that the mic jack is original. Be sure to check for the power cords and the manual, and above all, make sure you get the original microphone. Depending on how long the unit has been idle, you may or may not want to plug it in and turn it on, as you could end up blowing a cap or two. And of course, it would be nice to have a pair.

To get a Lunch Box on the air requires nothing more than a simple quarter wave plugged directly into the back with a right angle adapter. A mobile mag-mount antenna works well too. Heck even a simple rubber duck with the right adapters will put out a signal. "Simple" is the operative word with the Lunch Box.

So the next time you're hungry for something different and fun, grab your Lunch Box and enjoy! ER

Editor's Note:

I've just finished reading the manuscript of Chuck Penson's new book on Heath's amateur radio products. For now I'll just say that the book is great. I'll talk more about it in a future issue. **N6CSW**

AM Operating Techniques from page 26

Two wrongs do not equal a right! Do not be suckered into on-the-air battles and exchanges of insults and QRM. We will never gain respect for AM/classic radio by such negative actions.

Sometimes, just being right is not enough. We have to suppress our instinct to react to our taunters and win them over or at least gain their respect.

Unfortunately, we also have among our ranks of AM enthusiasts a number of individuals who need to clean up their act. It is certainly not my place, nor my intent to proselytize, sit in judgement, or offend anyone. However, some of the operation by dyed-in-the-wool AM'ers that I have heard might make anyone cringe.

You guys know who you are! Some of the conversations heard on 75 meters would probably be questionable in the locker room, let alone on the air. These exchanges would probably fit into the category of pushing the envelope of propriety to the limit. Why is that stuff necessary on the radio? Is it a disregard for authority or some kind of anti-social statement?

I am certainly no prude, but is it too much to ask to keep the profanity, sexual inuendos and endless political and religious debates off the air? Let's face it, we are bombarded with enough of that stuff on broadcast TV every day. Maybe that is why some people feel they can get away with it on ham radio.

What it all boils down to is very simple. If we are not willing to observe good operating practice and ethics ourselves, we can hardly expect others to respect us and our operation! ER

CLASSIFIEDS

Advertising Information

Subscribers receive 1 free - 20 word- ad per month. **Extra words are .20.** Here's how to count the words in your ad: the heading - For Sale, Wanted, etc count as **1 word**. Your name, call, address and telephone number count as **6 words**. Hyphenated words count as **2 words**. **Please count the words in your ad and if you're over 20 words send payment for the extra words.**

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DEADLINE for the JULY Issue: JULY 3

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

FOR SALE: HS-30 headsets, GI dated 1944, brand new, in sealed, waxed, protective cartons. Extra earpieces, dessicant, instructions, cord, included. Used with virtually all WW II and many later combat and clandestine radios - $20. Gene, KD4YIZ, (800) 619-0900.

FOR SALE: 5 KVA voltage regulator, CN-514/GRC w/CY-2851 carrying case, 8-1/2" x 17" x 15" deep, input 95-135 VAC, 60 cps, output 115 VAC @ 42 amps, appears brand new - $225 OBO. Bob Bakinowski, 1524 Saint Tropaz, Tucson, AZ 85713. (520) 624-8029.

FOR SALE: Gonset G-76 w/o pwr sply, works fine - $125. Bill, KD0HG, POB 1456, Lyons, CO 80540. (303) 823-6438.

FOR SALE: Tek 575 transistor curve tracer, exc. condx. manual - $300; Hickok 539B/C scroll chart #3200-138 (Fall '67) fair w/rollers, shpg incld. - $25; two G.E. 575A, appear NOS, orig. boxes - $40 for both, includes continental UPS. Bill McCombs, WB0WNQ, 10532 Bartlett Ct., Wichita, KS 67212-1212. (316) 722-7669.

FOR SALE: Drake R4C SN24520 extra clean w/all Sherwood mods, filters, NB, xtals, MS4 just aligned; T4XC w/DX engineering processor; AL4 - all $800. Sound in Mind, Dee, W4PNT. VA (800) 755-2365

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

FOR SALE: Collins 30L-1 - $500; 75S3C (RE). **WANTED:** 516F-1 sply; old Collins gear. K2OA, NY, (914) 691-7957.

FOR SALE: Hallicrafters SX-100 - $175; Hammarlund SP-600-JX26 - $375; B&W 370 SSB receiving adapter - $125; Collins 312B-4 - $175. Manuals, all exc. W5SCT, TX, (915) 677-3675.

FOR SALE: Collins KWS-1 S#1011 complete w/Collins relay, nice condx; 75A-4 S#1767, good condx., will not separate, pick-up only - $2500. Blaine Puterbaugh, WB8SSO, 8732 Secor Rd., Lambertville, MI 48144. (313) 847-3367 eves.

FOR SALE: General Radio model 1392-A time delay generator w/PDM & PPM outputs. Ronald Dement, AA2QQ, 755 Quincy Ave., Bronx, NY 10465.

FOR SALE: 2 Johnson KW matchboxes, both in very good condx, 1 has factory swr/pwr meter, I want to sell only one. **WANTED:** Hallicrafter SX-28 or SX-28A rcvr. Joe, AB5LL, AR, (501) 257-2567.

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

WANTED: RME DM36 converter. Matches RME69 rcvr. Trade nice RME VHF152A converter or money. Bill, WC7O, 12405 Ranchette Dr., Tucson, AZ 85743. (602) 682-7285

WANTED: TV7-D tube tester in good working condx. Rich, WA2TUM, NJ, (908) 968-1452.

WANTED: Joy-stick var. freq. ant made by Partridge in England. Lou, W3HKL, NJ, (609) 494-1102.

WANTED: Coils for National 1-10/A & FB-7. LSASE for radio/book list. Wayne Childress, KC7KUE, 1903 Jerome Pl., #3, Helena, MT 59601. (406) 443-7255.

WANTED: Stancor xmtr's; 415 mic amp; Millen VFO. **FOR SALE:** TCS-13 xmtr, rcvr, cables & antenna coil unit w/matching serial numbers. Thanks! Tom Smith, N5AMA, 13034 Elmington Dr., Cypress, TX 77429-2062. (713) 376-3436 (h), 957-6420 (w)

WANTED: PS0-400 VDC, IP-17 or IP-2717; factory assembled SP-17 or SP-2717. Broken, working. Robert D. Milligan, KH6MB, 6608 N. 18th St., Arlington, VA 22205-1802. (703) 533-0650.

WANTED: HRO plug-in xtal for HRO variation two (only xtal). Tajima, JA1DNQ, c/o The Nakagawa's, 22942 Cedarspring, Lake Forest, CA 92630.

WANTED: Johnson Valiant II, will pay top dollar if exc. condx. Gary, AA5QT, TX, (713) 355-6153.

WANTED: Hot marking machine for labelling electrical wire for vintage aricraft restorations. Jeary Vogt, 3 Brampton Rd., Malvern, PA 19355. (610) 296-2162.

WANTED: Drake R4B, R4C or Collins 75S-3. Andy, KE6UF, 350 Camino Parque, Oceanside, CA 92057. (619) 722-7233.

WANTED: B&W sideband adapter w/built in pwr sply; Atlas 350 XL xcvr - not working. Bob Kemp, POB 470, Lake City, MN 55041. (612) 345-5345.

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

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

WANTED: Johnson gear, all models, any condition. Please state asking price. Wen Turner, AD7Z, Box 451, Cal-Nev-Ari, NV 89039-0402.

WANTED: Main tuning knob for Hallicrafters SX-101 series. No scratched or chipped please. Tom Jurgens, KY8I, 3920 Jim Dr., Bridgeport, MI 48722. (517) 777-2257.

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

WANTED: KWS-1; HF-380; 62S1; R-389 and SP-600JX. Need exc. condx. Mitsugu Shigaki, JA6IBX, 2825 -2. Jozan Kamidai Machi. Kumamoto. 860 Japan. FAX Japan-96-329-4601

WANTED: Brown Bros. twin lever/straight key combo; Hallicrafters R-8 or R-12 spkr. Charles Brumley, KB2SWI, 32 Glenwood, Saranac Lake, NY 12983. (518) 891-5704

WANTED: Meissner Signal Shifter, working condx. w/coils. Greg, N6PUO, 1607 Grandview Ave., Martinez, CA 94553-1863. (510) 228-9440, collect OK, 16:30-21:30 PDT

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

WANTED: Drake 1A rcvr; manual (copy) for DX Engineering IC-2-T4X speech processor. Makoto Takazawa, JA1XS, 20364 Vera Cruz Ln., Boca Raton, FL 33498. (407) 852-4327.

WANTED: Cabinet for E.H. Scott SLR-Marine; manual/copy for HQ-180A. Mark, POB 1077, Minden, NV 89423. (702) 782-3596.

WANTED: HI-FI spkr's & enclosure by Altec, Electrovoice, Jensen, JBL; tube components. Tim Phelan, 845 Lilybud, Ballwin, MO 63011. (314) 227-9264.

WANTED: Front panel LD. plate for BC-342N. Pete Hamersma, WB2JWU, 87 Philip Ave., Elmwood Park, NJ 07407.

WANTED: Hallicrafter HT-9 osc/ant coils & xtal's. Robert Braza, N1PRS, 23 Harvard St., Pawtucket, RI 02860. (401) 723-1603.

WANTED: Cardwell receivers (e.g. 54), manuals, advertising literature & technical bulletins. Newell, VE7AEC, in callbook. (604) 943-6033

WANTED: DM-28 & DM-24 dynamotors for BC-348 & BC-224 rcvr's. Ken, 19120-D Ave. of the Oaks, Newhall, CA 91321. (805) 298-9704.

WANTED: Heathkit, Eico, Fisher, Dynaco or similar tube audio amplifier in any condition or manuals for same. Mike Nowlen, WB4UKB, POB 1941, Herndon, VA 22070. (703) 716-1363

FOR SALE: Drake TV-1000 low pass filter (1KW) - $20; dynamotor (12-260V) - $10; Hudson-American Radio-Telephone (Corsair II)/brass cabinet/manual - $15; Pierce-Simpson ship-to-shore (Caribe 130A) radio - $5; Westinghouse RADA - $325; orig. Clapp Eastham HR-HZ (two boxes) - $675; Hammarlund HQ-120X/manual - $125; exc. Sky Buddy S-19R/manual copy - $140; Johnson KW Matchbox/meter/manual - $225; 390-A rcvr (professionally aligned) - $350; orig. HRO w/manuals, all coils p/s - $400; exc. National HFS/all coils/manual - $300; National SW-3/coils - $350; (2) National 1-110's w/coils - offers; National SW-5 (circa 1930)/coils - $300; Alan International rcvr (an AC, 4-tube SW-3 type circuit circa 1932)/six pairs coils - $350; AN/URM-25D RF sig. gen. (10 kHz-50 MHz) - $100; TU-75A (WW II xmtr tripler osc.) - $10 ppd.; Library of Military Conversion/Signal Corps info - offers; Sunday & Schultz brand wooden variometer - $50; 20 honeycomb coils and mounting hardware - offers; used/NOS transistors--200 for - $10 ppd; many antique meters; Kantronics Universal Terminal (RTTY, CW, AMTOR, ASCII)/manual - $20; MFJ-624/620 phone patch/instructions/VU meter - $20; "How to Make Radio-Phone Receiving Sets" circa 1923 - $10; "How to Build Doerle Short Wave Sets" circa 1935 - $10. Glen Fritz, N4WDX, 15321 San Pedro Ave., #102, San Antonio, TX 78232. (210) 497-5665, FAX 496-9750

FOR SALE: Globe King 500A, 2 VFOs, w/Globe 400 parts, radio exc - $800; Johnson Valiant I - $325 exc., pick-up Erie, PA. Brian, K3USC, PA, (814) 866-2585

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FOR SALE: National HRO-7, A, B, C, D coils, pwr sply, spkr, VGC - $300 + shpg. Greg Richardson, WA8JPC, POB 405, Gallipolis Ferry, WV 25515.

FOR SALE: New Collins PJ-068 mic plugs for S-line/KWM-2 - $8 each. Clint Hancock, KM6UJ, 6567 Ashfield Ct., San Jose, CA 95120-4502.

FOR SALE: Johnson Viking II w/122 VFO - $240; Johnson Challenger - $125; **WANTED:** Spkr for National HRO-60; clock & bezel from Heath SB-630 console. Gary, K7MHE, OR, (503) 257-6525.

FOR SALE/TRADE: 75S3B (RE) has SB & AM mech filters installed, nice condx. - $550 or trade for TS-830S. Smity, AD6V, CA, (209) 255-1177.

FOR SALE: Collins manuals (copies) - R-390, R-390A, R-391. **WANTED:** Tube CB's & accessories. N1FRX, ME, (207) 834-6273, eves & wknds

FOR SALE: Prefer local deal- Johnson Ranger R-390A product detector mod.; collector KWM2A. Darrel, WA5AAO, TX, (409) 968-3384.

FOR SALE: Johnson T-Bolt amp, exc condx. w/manual - $450 + shpg. Rich, WA2TUM, NJ (908) 968-1452.

Needed For a Restoration:

Any condition, early '30's, Hammarlund MLW-125 (shown) and MC-75-S brass variable caps. MLW-125 has 5 rotors, 6 stators, a cast metal frame and front panel screw mounting.

Brian Harris, WA5EUK
3521 Teakwood Ln.
Plano, TX 75075. (214) 596-2914

FOR SALE: Hallicrafters rcvr model S-40A, not working, some knobs missing, make offer. Mark Yawn, KD4LYJ, Centerville, GA, (912) 922-0309, 6 to 9 PM, serious inquiries only.

FOR SALE: TH-22/TG Terminal Telegraph 110 VAC NOS - $35 includes UPS. Alan Dale, W9ZPP, 2824 Forest Ave., Evansville, IN 47712. (812) 424-5208.

TRADE: My orig. Johnson Ranger brochure for orig. Valiant, 75A-?, 32V?, NC-303 brochure. Thanks! Joe Eide, 2623 Clare St., Eau Claire, WI 54703. (715) 834-4582.

TRADE: British Eddystone 830/7 rcvr, exc. w/ manual. **WANTED:** Hallicrafters SX-88 or ??? Sandy Blaize, W5TVW, 417 Ridgewood Dr., Metairie, LA 70001. (504) 836-2134.

FOR SALE: Knight R-100 w/calibrator & spkr - $100; Heath Apache - $200, both near perfect. Jim Jorgensen, K9RJ, 1709 Oxnard Dr., Downers Grove, IL 60516. (708) 852-4704.

FOR SALE: Tandy Science Fair, Globe Patrol regenative rcvr, VG condx., includes instruction manual & orig. shpg carton - $35 ppd. Al Kaiser, W2ZVR, 713 Marlowe Rd., Cherry Hill, NJ 08003-1551. (609) 424-5387.

FOR SALE: Collins 32V-3 - $650; Viking II - $200; Harvey Wells T-90 w/ps - $200; Z-match tuner - $100; TBS-50A - $100. **WANTED:** HT-32B. Joel Thurtell, 11803 Priscilla, Plymouth, MI 48170. Phone/FAX (313) 453-8303

FOR SALE: Repair! Radio repair, tube or solid state, reasonable rates. Jim Rupe, AI7DR, Western Amateur Radio Repair Co., (WARRC), POB 697, North Cove, WA 98547. (360) 267-4011

FOR SALE: ARC-5 VHF sets - $35; BC-442-A antenna relays - $20; ART-13 LF osc - $25; **WANTED:** type 805 tubes. James Owens, NWØO, 1363 Tipperary St., RR3, Boulder, CO 80303-1621. (303) 673-9019.

FOR SALE: Mic plugs: 3/16, 3 conductor - $4, 2 conductor for Heath - $6. $1 each shpg. PA add 6% tax. DSM Diversified, 909 Walnut St., Erie, PA 16502.

FOR SALE: BC-398R, no mods with dynamotor - $250, U-ship. Ken Kolthoff, K8AXH, 5753 David Pl., Fairfield, OH 45014. (513) 868-2161

Trade: Eico 460 scopes, repairable, good CRT's, manuals, for Lionel Train Catalogs, 1945-1960, local only. Louie, (718) 748-9612, NY, after 6 PM.

FOR SALE or TRADE: UTC S-18 modulation xfmr (new); B&K E200-D RF sig. gen. (like new w/ manual). Al Bernard, POB 690098, Orlando, FL 32869-0098. (407) 351-5536

FOR SALE: Gonset 2M-111, OK, parts or restore - $50; tuning knob, NOS for BC348-Q - $10. Joe, W6CAS, CA (916) 731-8261.

FOR SALE: Drake R4C SN24520 extra clean w/all Sherwood mods, filters, NB, xtals, MS4 just aligned; T4XC w/DX engineering processor; AL4 - all $800. Sound in Mind, Dee, W4PNT. VA (800) 755-2365

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

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

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

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

WANTED: Cabinet for Heathkit HG10B VFO; SB102, SB40, SB301 for parts, any condx is acceptable. Dick, W4NFN, WI. (715) 866-8704.

WANTED: Photographer is looking for collections of American ham gear made between 1930 & 1980 to illustrate book. I will travel to your location. Joe Veras, N4QB, POB 1041, Birmingham, AL 35201. (205) 328-2661 (d), 967-0639 eves/wkends.

WANTED: ARRL Hints & Kinks Vol. 11; manual for Ballantine 300H AC VTVM; Drake MS7 spkr. Lynn Stolz, N8AJ, 2461 Bean Oller Rd., Delaware, OH 43015. (614) 369-9777, call collect

WANTED: Old, scarce or unusual bugs. Also Mac keys, of course. Tom French, "The McElroy Collector", 151 Barton Rd., Stow, MA 01775. (508) 562-5573

WANTED: Info on Bendix Marine ADF100 auto direction finder. Also to buy RBA, RBB, RBC rcvrs. John Hartman, 11 Woodhenge Cir., Londonderry, NH 03053. (603) 437-2819

WANTED: Good to exc. EFJ Ranger II; 1975 World Radio-TV Handbook; Hammarlund XC-100P xtal calibrator. Brian, IL (800) 225-0256 x 14733

WANTED: BC-222; Drake 2B; trans-less communication rcvrs like Hallicrafters S-38, 41, 53, 72; National SW-54 and so on. Takashi Doi, 1-21-4 Minamidai, Seyaku, Yokohama, Japan. FAX: 011-8145-301-8069

WANTED: TBW xmtr, units intermediate freq. xmtr 350-1000 kcs; high freq. xmtr 3.0-18.1 Mcs ;rectifier unit. I will provide shpg containers or will PU. Paul Thekan, N6FEG, 335 Rutherford Ave., Redwood City, CA 94061-3514. (415) 367-1499

WANTED: R-390A rcvr in good condx.; mod xfmr, UTC/Stancor-CMS-3, or same as Johnson Desk Kilowatt type. P. Jay Spivack, 325 S. Washington Ave. #244, Kent, WA 98032. (203) 859-2680

WANTED: SRR-11-12-13 or FRR 21-22-23 rcvrs, manuals or schematics. Ray Blackford, WA1ZYE, Box 6591, Edison, NJ 08818. (908) 892-6537, 9-10 PM

WANTED: Hallicrafters HT-6 xmtr; Sky Chief rcvr; SX-24 rcvr; Gonset G-77 xmtr; Johnson mobile xmtr; other 50's mobile equipment. Pete, WB2BYQ, NJ. (201) 934-0321

WANTED: Monster Navy xmtrs, VLF thru UHF, any condx. Manuals, motor-gens, controllers too! William Donzelli, 304 S. Chester, Park Ridge, IL 60068. (708) 825-2630

WANTED: Johnson Challenger or other similar xmtr. Jim Lawrence, KC5GWU, NM (505) 334-8063 eves.

FOR SALE: Used technical books - radio, electronics, math, military, magazines, etc. List: $1 (stamps OK). Softwave, 2 Dept. ER, 1515 Sashabaw, Ortonville, MI 48462

FOR SALE: Wandel Gulterman at 463 spectrum analzer (selective level meter, 6 kHz-18.4 MHz) - $100; HP 3580A spectrum analyzer - offer; Daven VH795H attenuator, 75 ohm, 0-111 dB, binding post in/out - $50. **WANTED:** Collins 26U; Gates 39A/B; Sta-Level-Devil, etc.; Langevin Progar, any condx. OK. Richard P. Robinson, POB 5055, Woodbridge, CT 06525. (203) 397-5420, FAX 294-1745.

FOR SALE: Genrad 740 cap. bridge - $35; Eico 368 RF sweep gen. - $45; 944 flyback tester - $13; HP3200B 10-500 MHz RF gen. - $95; Hickok 288X, 110 kHz-160 MHz - $65; HP200CD 5 Hz-600 kHz audio osc, manual - $50; Heath IB-5281 RCL bridge, solidstate - $42; IG-72 10-100 kHz audio gen. - $28; IT-28 cap. tester - $35; IT-7400 IC tester - $35; Staco isolation xfmr/variac, metered output, NIB - $110; Much more, list-LSASE. Kirk Ellis, KK4YP, 203 Edgebrook Dr., Pikeville, NC 27863. (919) 242-6000 eves

FOR SALE: Red Army HF-xcvr British WW II, R-1155 bomber RX. **WANTED:** German WW II radios. Rag Otterstad, OZ8RO, Hosterkobvej 10, DK-3460 Birkerod, Denmark. FAX ++ 45-4468 1514

FOR SALE: Johnson panel refinishing: Ranger I, Ranger II, 500, Desk KW, Viking I, Viking II. Production runs this summer. Call or SASE for info. Ron, AB5WG, 115 First St., Sugar Land, TX 77478. (713) 491-7823 after 6PM CST

FOR SALE: New list -hundreds of manuals, schematics and service information. Send 2-stamp LSASE. David Crowell, KA1EDP, 40 Briarwood Rd., North Scituate, RI 02857-2805. (401) 934-1845

FOR SALE: Ultrasonic pulser w/four 4CX350A tubes, sockets, fan pwr sply, complete, schematics - $100. Dan Merz, 312 Sierra, Richland, WA 99352. (509) 375-1334

FOR SALE: Signal Corps CH219 xtal chest for BC-669 (100 xmt & 100 rcv xtals, 1.69-4.440 MHz) - offer; **WANTED:** Service manual & schematic for FT-101E. Vin Legare, KQ4DZ, 11 Bitterblue Rd., Archer, FL 32618. (904) 486-1249

FOR SALE: Hammarlund Super Pro SP-210LX, p/s, some mods, good appearance, untested - $165, prefer you PU; Drake 2B, clean, works lower bands - $125; Swan 500C ps/spkr, clean - $350; linear (2) 3-400z's, heavy duty ps - $395, prefer you PU. All + shpg. **WANTED:** Clean, working NC-183D. Gene Rippen, WB6SZS, 105 Donnington, Auburn, CA 95603. (916) 885-6147

FOR SALE: 160 M tank coils for BC-610 NIB - $100; Collins S-Line w/pwr sply, WE - $1100. Jim, MO (816) 524-1541

FOR SALE: W-4 - $65; PS-4 - $235; TR-4C - $225; PS-75 - $80; SBE-34 - $200; SB2LA amp - $250; SB-200 - $275; SW-250 (6 mtr) - $250 + UPS. WA1APX/8, MI, (810) 781-9717.

FOR SALE: Manuals: RME-45 - $12; Heath SB-220 - $12; Schematic SB-221 - $2; Trigger 1973 Catalog - $5. Harry Blesy, 95740 Clarendon Hills Rd., Hinsdale, IL 60521. (708) 789-1793

FOR SALE: Knight T-60 w/VFO - $100; Heath DX60B w/HG10 VFO - $110; Heath VF-1 - $35; HP23A - $45; U-ship. W9CN, FL (407) 452-7904

FOR SALE: Collins 32V-2 (spare PTO and 4D32); KWM2/516F-2/mobile mount + 2 MPI's; Gonset G-50; 30L-1, RE. All are 9's! Randy Best, WA7CPA, AZ, (602) 266-2256

FOR SALE: E.H. Scott RBO RX + parts unit - $50 pair. P.U. only. Mike, PA (717) 656-8746

FOR SALE: All Heath gear: HO-10 scope; Senica parting out; 2 meter converter for SB rcvr; DX-40 manual. Marty, WB2FOU, NJ (609) 466-4519, 8 AM to 12:30 PM EST

FOR SALE: 45 copies of Antique Radio 1989 to 1993 - BO. Les Mathews, 8908 Tar Hill Ln., Orlando, FL 32836.

FOR SALE: Unmodified BC-375-E w/shock mount, dynamotor & 7 seven tuning units, PU only. Ted Bracco, Quincy University, 1800 College Ave., Quincy, IL 62301. (217) 228-5213

FOR SALE: Hallicrafters SX-140K w/orig. manual, VGC - $75 + shpg. Bob, K8RNE, OH (216) 322-8722

FOR SALE: Collins 300G 250W broadcast xmtr - $1500. Evan Haydon, N0GMR, NE (402) 435-4083

FOR SALE: Soviet R105M xcvr w/all accessories - $225 PU only. Greg, WA2ORO, NY (516) 661-2846

FOR SALE: New Amperite 2-minute time-delay relays for the 30S-1 amp, part #115NO120 - $20; Collins Red Label plug-in mech filter, F-455-Q-6 - $50. Steve, WB4IJN, SC (803) 873-7847 x 200 (d), 821-6931 eves.

FOR SALE: Conar Twins, mint - $125; Johnson Adventurer - $50; DX-35 - $45; DX-20 - $40; HRO-7 w/5 coils - $175; TAC bug - $150; . Pete, WB2BYQ, NJ (201) 934-0321

FOR SALE: 864/WD-11 plug-in replacements - $20 ea. or 2 for $35 + $2 shpg; adapters any triode to WD-11 sockets - $5 ea. + $2 shpg; SW-3 replacement plug-in coil forms - $6.50 ea. + $3 per order shpg; Short-wave coil book - $4 + $2 shpg; SW-3 Story Book - $5 + $2 shpg; Restore Your Radiola III or III A or Bal. amp - $2 ppd. James Fred, RI, Cutler, IN 46920. (317) 268-2214

FOR SALE: Heath DX60A AM xmtr, clean - $75; Globe Chief 90 CW TX, restorable - $50. Sound in Mind, Dee, W4PNT, VA (800) 755-2365

WANTED

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

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

WANTED: Miniature APC type 150 pF tuning capacitors, prefer w/knob shaft. James Fred, R1, Cutler, IN 46920. (317) 268-2214

WANTED: Radar equipment, the bigger the better! Also early TV cameras. Allan H. Weiner, 507 Violet Ave., Hyde Park, NY 12538. (914) 471-9500

WANTED: Help Vibroplex build its Company collection of Vibroplex bugs, keys and memorabilia. Call Mitch, WA4OSR, at The Vibroplex Co., (800) 478-8873

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

WANTED: Collecting: Pre-1950 commercially built amateur gear; xmtrs, rcvrs & accessories. Dean Showalter, WA6PJR, 7816 Redberry St., NW, Albuquerque, NM 87120. (505) 899-9376

WANTED: Need to locate a PTO for a R-389. Will be used for restoraton and ER Historical article. Ray, N6JDMS, CO (303) 838-3665

WANTED: Early Collins Radio items; F455B08 mech filter; 75A-3 coil cover & kilocycle dial. Brian Roberts, K9VKY, 3068 Evergreen Rd., Pittsburgh, PA 15237. (412) 931-4646

WANTED: Old tube amps & xfmrs by Western Electric, UTC, Acro, Peerless, Thordarson; Jensen, JBL, EV, ALTEC, WE spkrs. Mike Somers, 2432 W. Fargo, Chicago, IL 60645. (312) 338-0153

WANTED: B&W coils; 40MEL (2), 400ES, 40BVL for my Globe Champion 175A. Don Hillard, WØPW, Rt 5, Box 219, Neosho, MO 64850. (417) 451-5892

WANTED: Collecting early Heath gear 1940's - 1960's; early Heath catalogs and literature; Heath mics, spkrs, supplies, access., any parts units. Byron, WA5THJ, 1215 Fresa Rd., Pasadena, TX 77502-5017. (713) 941-3631

WANTED: Kleinschmidt "Teletype" equipment, literature, 7/8" paper tape, Hallicrafters elevating base for SX-42. Tom Kleinschmidt, 506 N. Maple St., Prospect Heights, IL 60070. (708) 255-8128

WANTED: TMC GPR-92 HF Rcvr. Hank, W6SKC. (602) 281-1681 FAX: 281-1684

WANTED: Military radios RT-136/GRC-13, Soviet xcvr R-112, rcvr R-323. Leroy Sparks, W6SYC, 924 W. McFadden Ave., Santa Ana, CA 92707-1114. (714) 540-8123

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

WANTED: Orig. manual for Hallicrafters S-1 special (S-2); 1934 Allied catalog. Bill Rose, 875 Gordon Terrace, Winnetka, IL 60093. (708) 441-6462

WANTED: All round, mint, KWM-2A, 516F-2, 30L-1; S-line metal feet w/screw; KWM-380 service manual. Takashi Nakamura, JR7TEQ, 20-2 Midorigaoka Shiroisi Miyagi, 989-02 Japan. FAX 224-25-1727

WANTED: Military radios. Any manpack, walkie-talkie, survival. Prefer working/cosmetically clean, premium for NIB. Particulary PRC-17, 21, 28, 63, 64A, 93, 103, 126; CRC/7; URC-64 pwr sply AM-65; RT-66-67-68/GRC; crank generators including G8/GRC & G-76G; test sets URM-30, AN/PRM-32, TS 2530/UR, URM-172; TRC-77 battery box, 12V pwr cable & TM. Harness for PRC-75. Daniel Cahn, 3444 Greenwood Ave., Los Angeles, CA 90066. Msg (310) 398-3840, FAX 398-7159

WANTED: Radio Engineering Magazine, Jan. 1933 & Feb. 1932 issues. Geoff Fors, WB6NVH, POB 342, Monterey, CA 93942

WANTED: Allied AX-190 rcvr. Mint only. Dave, WB2TBB, 611 Burtis St., Brick, NJ 08723. (908) 920-9611

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

WANTED: Military radios, any URC/PRC, manpack, walkie-talkie, survival, particularly URC-4, 64, 68; PRC-63, 93, 68, 47; RT-10, 20, 60. Pref. working/repairable. Additional contacts appreciated. Daniel Cahn, 3444 Greenwood Ave., Los Angeles, CA 90066. Msg/FAX (310) 398-7159

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

WANTED: Collins 30J, 30FXB/C, other pre-1940 Collins amateur gear for my collection. John Firey, WB5HRI, 14818 Delbarton, Houston, TX 77083. (713) 5615-KW1

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

WANTED: Uniden CR-2021, (Hickok, etc.) mutual conductance tube tester; Kenwood T-599 xmtr; Radio Shack DX-400; SB-610 scope. Rick, K8MLV/Ø, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

WANTED: Plug in xtal for National HRO variation two. Stan Tajima, JA1DNQ, c/o Nakagawas, 22942 Cedarspring, Lake Forest, CA 92630. (714) 707-4675

WANTED: Paying immediate cash for old Fender and VOX guitar amplifiers. Frank Czaja, AI9T, 8968 W. Forest Home #4, Greenfield, WI 53228

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

WANTED: Early exciter such as National NTX30, Hallicrafters HT-6, RCA ACT 20; need ICPI CRT. John Zitzelberger, WB6JJE, 1673 Devonshire Ct., Thousand Oaks, CA 91361. (818) 991-8358

WANTED: Cabinet for GPR-90; SX-42. Only in very good condx. Jose Cangas, EA4JL. Contact in the States Kurt Keller, (203) 431-6850

WANTED: Cosmophone, or related info; Viking 500 ps/mod; B&W coils 2175-2179; Drake 1A vernier knob. Brian, TX, (214) 596-2914

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

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

WANTED: RBB SRR-12, SRR-22 or similar rcvr in repairable or better condx, cash or trade. Ray, WA2ZYE, Box 6591, Edison, NJ 08818. (908) 225-0909, bus. hrs EST

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FOR SALE: Hammarlund Super Pro BC779/SP210LX, very clean, aligned - $425. Sound in Mind, Dee W4PNT, VA (800) 755-2365

FOR SALE: Jennings VAC variable, USLS-465, 5 kv - $60 ea + shpg; Jack Dubbs, 44 Monk, Security, CO 80911. (719) 392-2043

FOR SALE: HRO-60 BC band dial scale - $12 + shpg; **WANTED:** Junker SX-62 & NC-125S meter. Ed Saurer, KC9SP, 787 N. Peterson Rd., Greenwood, IN 46142. (317) 881-1483

FOR SALE: 1994 Paperback, "Behind the Front Panel" by David Rutland, 158 pgs. - $10 ppd. Ken Greenberg, 4858 Lee, Skokie, IL 60077. (708) 679-8641

FOR SALE: RBS-1, RBM-5, w/ps & connecting cables - $250; RAL & RAK, pwr sply & connecting cables plus spare parts - $350; National NC-183D w/spkr & manual, nice - $450; Collins KWS-1, S/n 1342 - $1500; Collins 30S-1 - $1200; mine det set SCR-625 H in transit case - $250; AN/PSM-38 test set for F4E Phantom - $100; Collins 32S-1-75S-1/516L-2 - $500 OBO; Johnson 275W Matchbox w/swr - $80. George, K1ANX, MA (413) 527-4304

FOR SALE: NCX-1000 spares, pwr sply filter board (8) 80 mFD 450 VDC caps, same as NCL-2000 w/diode stock & resistors - $40; NCK-1000 tank coil - $4; antenna relay - $5; Blower - $20; RF choke - $5; NCX-1000 incomplete chassis - $75 shpd. George, K1ANX, MA (413) 527-4304

FOR SALE: Retired from Marine & 2-Way Radio business, cleaning out shop & shed, new & old gear. SASE. K6LLQ, Box 21608, Concord, CA 94521

FOR SALE: R-392 w/ps - $175; R-390 - $195; Forest Service 1940's SPF HF field radio w/pack box - $95, w/o box - $75; Collins TCS-12 xmtr - $95; TCS-13 rcvr, xmtr, cables, control box, vertical mount w/base, Navy AC supply & manual copy - $365; Perkin MTR-636-30 6 to 30 volt, 30 amp regulated supply - $85; LS-166 - $10; 872A tubes, new - $14, used - $7; 500 W mod xfmr, 1.33/37:1 ratio, w/37H 275 mA choke - $85; good R-388 dial drum - $25; HS-30 - $10; T-32 carbon desk mic - $30; Electrovoice MSA-3000 mic, NIB - $30; TM-11-5820-358, R-390A operators - $10; ME-352 multimeter - $15; Parting out: T-195, TS-382, TCS rec/xmtr. Trades? Offers. U-ship. WA7HDL, ID (208) 756-4147 after 1730 MDT

FOR SALE: Collins: 270G-3 spkr - $175; 312B-5 - $325; MM-1 - $90; CP-1 - $145; DX eng processor for KWM2 - $150; ACX1000A - $125. KO6U, CA (714) 643-7930

FOR SALE: New Collins 18051 antenna tuner - $295; 312B4 - $110; KWM2-A - $395; Collins parts. Ron Follmar, K5GIT, 332 Camino Real, Kerrville, TX 78028. (210) 896-8830

FOR SALE: Drake R7, all filters - $550; Clegg 22'er FM - $50; Swan 500CX, 230XC, DD-76 - $300; Swan 350, 117XC - $175; Swan spkr/patch - $40; T-4X only - $75; Hallicrafters SX-96, Signal Sentry - $100 U-shp. Richard Lucchesi, WA2RQY, 941 N. Park Ave., N. Massapegua, NY 11758. (516) 798-1230

ELECTRON TUBES: All types - transmitting, receiving, obsolete, military--Large inventory. **Daily Electronics Corp.,** 10914 NE 39th St., B-6, Vancouver, WA 98682. (800) 346-6667, (206) 896-8856, FAX (206) 896-5476

FOR SALE: Collins KW-1, S/N 129, exc. condx, a magnificent xmtr, as much a pleasure to look at as to operate, orig. & complete with nothing missing, nearly perfect but for a few small touched-up paint scrapes on cabinet sidewall and one small plug-buttoned switch hole on RF deck panel from Collins SSB mod (undone), operational & in perfect working condx., orig. manual, spare finals and modulators - $17,000. George Flanagan, W2KRM, 42 Cygnet Dr., Smithtown, NY 11787. (516) 360-9011, 7 to 9 PM ET

FOR SALE: Heath Ham Radio Collectors Guide, pictures, specs of all Heath ham gear ever made, also includes list of gear and some stories on the AT-1 and TX-1 - $20 includes shpg. Marty Drift, P.O. Box 21, Blawenburg, NJ 08504.

FOR SALE: Tubes NIB PT 8 model G triode directly heated socket, 4 pins, made by Philips for telephone service, years 1950/60, tubes are exc. for preamplifiers in HI-FI. Andrea Moretti, POB 8, 50040 Usella FI, Italy. tel/FAX 574 982123 anytime.

FOR SALE: Hallicrafters (April 1947) R-42 spkr for SX-42/SX-43 - $75 OBO. Don, K8POU, 11332 E. Indian Lake Dr., Vicksburg, MI 49097-9399. (616)649-4646

FOR SALE: B&W 51SB sideband generator for 5100TX, cosmetically OK - $125. Sound in Mind, Dee, W4PNT. VA (800) 755-2365

FOR SALE: Homemade galena crystal radios, detectors and galena crystals. $1 regular, $2 super. Radio parts. What do you need? L. Gardner, 458 Two Mile Creek Rd., Tanawanda, NY 14150.

Repair & refurbishment of older tube-type amateur equipment. Fully FCC licensed; 35 years experience. Chuck Banta, N6FX, Claremont, Calif. (LA area) (909) 593-1861

FOR SALE: Complete set of tubesters for Collins S-line - $100 or trade for National equipment; **WANTED:** Manual for National HRO 50T, articles on National Radio such as the HRO series. Ron, WB4OQL, 740 Brookdale Dr., Greer, SC 29651. (803) 879-3133

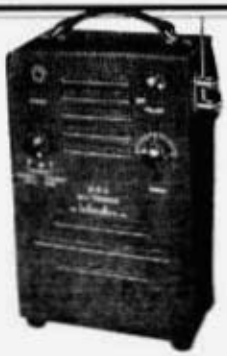
FOR SALE: Hammarlund HQ-125 w/Collins mech. filter, manual, mint - $325; Swan 700CX w/PSU-3 supply, manual, mint - $350. Bob Needleman, KD4ZN, 395 Meadowbrook Rd., North Wales, PA 19454. (215) 661-9283

FOR SALE: Collins WE 312B-4 - $125; W7FG manuals - 75A-1, -2, -3, -4 and Ranger I - $8 ea. ppd; ER collection #1 - #69, 62 issues - $75 or trade for VG/mint Hallicrafters rcvr. **WANTED:** Hallicrafters 100 kHz T-9D/E xtal with or w/o calib. from SX-100/101/111 or HA-7 calib. w/xtal; orig. SX-100/SX-117 manuals; Conar 500 schematic; VG/mint National NC-270 w/spkr and Hallicrafters R-47/48 spkr. Dave Ishmael, WA6VVL, 1118 Paularino Ave., Costa Mesa, CA 92626. (714) 979-5858

FOR SALE: NC-300. **WANTED:** Pwr xfmr for HT-32; B&W L-1000A, L-1001A amp. F.W. Nicholas, AZ, (602) 864-9987 after 5 PM MST.

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. (909) 658-3444

FOR SALE: IE-17. BC-611 test set including CH-299, I-135, CS-81 FT-282, A-82, manual, extras - $600. Sam Hevener, W8KBF, "The Signal Corps", 3583 Everett Rd., Richfield, OH 44286-9723. (216) 659-3244



WANTED: Any condition, Hallicrafters S-35 panoramic adaptor and S-33 Sky Trainer as shown. Chuck Dachis, 'The Hallicrafter Collector', 4500 Russell Dr., Austin, Texas 78745. (512) 443-5027

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

FOR SALE: R1051 rcvrs, exc. condx, cleaned, completely checked, various models to choose from. Shawn Daniels, (314) 343-5263.

FOR SALE: Harvey-Wells T-9; SX-28; B&W 5100B; Bendix RA-10 rec. & ctl. box; Thordarson 300W multi-match mod xfmr. Gary Sarra, POB 310783, Newington, CT 06131. (203) 665-6056.

FOR SALE: E.H. Scott RCH/czc 46209 Navy Rx clean - $175. Sound in Mind, Dee, W4PNT, VA (800) 755-2365.

FOR SALE: SASE for list of vintage ham-related equipment, parts, tubes & publications. Chase Hearn, KC4SJ, 104 Glenwood Dr., Williamsburg, VA 23185. (804) 229-7263.

FOR SALE: National NC66, VG - $75; Heath VX-1 voice control, VG - $30; Utica 650 6M & VFO, VG - $65; Hallicrafters HT-40, F - $50; Radio Handbooks 1940, 1941, 1942, 1959 - $35 ea; all above UPS paid. Pickup only - RCA AR-77, F - $100; Mackay type 128AV, G - $125; National Coast Guard rcvr type R115, F - $100; National RBL-5, G - $125; Pierson KP-81, G - $150; Heath HX10 Marauder, F - $50; Yaesu FL2100 amp w/10 m, VG - $300; Yaesu FTDX400 & FV400S VFO, VG - $300; Globe Chief 90, VG - $75. Howard H. Hood, 5670 SW 44th St., Port Orchard, WA 98366. (360) 674-2179.

FOR SALE: GR cap. analyzer 1611 - $95; AN-TXC 1 FAX - $25. UPU only. Many xfmrs & chokes for your junk box needs. Ted Stewart, W6NPB, 2157 Braemar Rd., Oakland, CA 94602. (510) 531-7042 or FAX 531-7072 anytime.

FOR SALE: Level meters for Collins R-392/URR rcvrs, new - $35, UPS prepaid. Dennis, WA0WAB, (316) 225-3737 (d), 225-2961 (n).

FOR SALE: Tubes, capacitors, sockets, NOS and reproduction parts for antique radios and TV's. Large SASE for tube list or $2 for 20 page catalog; refundable with 1st order. Vintage TV-Radio, 3498 West 105 St., Cleveland, OH 44111.

FOR SALE: Gates BC-500T broadcast xtmr - $1200 or BO; Heath DX-60A - $75; DX-60B - $75, Elmac PMR-6A - $75; Dynaco PAT-4 - $50. Steve, KA9QLF, 803 S. Church, Jacksonville, IL 62650.

FOR SALE/TRADE: Heath Q-mult; Fisher tube amp; S38B; NC-183; rare Mica-Mold 6AG7/6L6 TX; DB-20. **WANTED:** ARRL "How to Become Radio Amateur" circa 1953/54. Joe Perrato, FL, (407) 220-7362 anytime.

FOR SALE: R-390A/URR maintenance manual, TM 11-5820-358-35, Dec. 1961 issue, 189 pgs. - $25, domestic ppd. Aben, POB 4118, Jersey City, NJ 07304.

FOR SALE: Hammarlund HQ-110C w/manual & Hammarlund 24-hr clock, very nice condx - $110 + shpg. Merle, W1GZS, POB 476, Sumterville, FL 33585. (904) 568-1676 (d).

FOR SALE: Cheap price buys collection of vintage gear, military manuals & magazines, PU only. Dave Mantor, W9OCM, POB 1, Fairmount, IN 46928-0001. (317) 948-3014.

FOR SALE: Homemade galena crystal radios and parts. L. Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150. (716) 873-0447.

FOR SALE: National NC-300, matching spkr, xtal calibrator, correct ballast tube, VG condx - $200. John Peterman, AB9G, 4124 N. 89th St., Milwaukee, WI 53222. (414) 461-5444.

FOR SALE: Mint Collins KWM-1, 516 F-1, manual - $500; pristine 75S-1, 32S-1, 516F-2, manuals - $600. Greg Gore, 11528 Watermass Ln., Charlotte, NC 28262. (704) 549-4719.

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

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

FOR SALE: R-390A sales, service and parts. Sase for info. Miltronix, POB 3541, Toledo, OH 43608.

FOR SALE: Johnson Viking Mobile xmtr w/orig. manual. Gus Enquist, VE3MAL, RR 1, Redbridge, ONT P0H 2A0 Canada. (705) 663-2387

FOR SALE: NOS 3B28 - $15; 5894 - $27.50; **WANTED:** Tung-Sol tube manual. Joseph Pinner, KC5IJD, 201 Ruthwood Dr., Lafayette, LA 70503. (318) 981-7766, josephwp@aol.com.

FOR SALE: Power supply PRD Electronic, PP-962/U, 2 units rack mount, variable voltage, Klystron tube output. Ex-Army, orig. ops. manual, exc condx, also good for parts or trade. Call for details. Victor, CA (805) 581-5317

FOR SALE: National 1-10 VHF rcvr; BC-221 freq. meter, fine condx, both w/manuals; Signal generators: Boonton 78F; GR713-B, HP612-A; Hickok 180X; QST 1935-1965; IRE Proceedings, Electronics, Electronic Design, all from 1940's, '50's, '60's, all magazines in exc condx & complete years. Charles Moizeau, W2SH, 33 Old Forge Rd., Millington, NJ 07946. (908) 647-4950

FOR SALE: Central Electronics 200V and 600L - BO. Stan Hojnacki, 103 Wilson Ave., Blackwood, NJ 08012. (609) 435-8975

FOR SALE: Navy AN-URA-8 - $40; Collins 30L-1 & parts 30L-1 - $485; **WANTED:** RME 4301. Fred, CA (209) 296-5990

FOR SALE: Hammarlund HQ-110 - $75; National NC-109 - $90, both w/copy manual & working condx. John Keil, 4618 Norwalk St., Union City, CA 94587. (510) 471-4838

FOR SALE: Jennings vacuum var. USLA-465, 5KV - $70 each plus shpg. Jack Dubbs, 44 Monk, Security, CO 80911. (719) 392-2043

FOR SALE: Used tube list, good selection and quality, SASE. Bill McCombs, WB0WNQ, 10532 Bartlett Ct., Wichita, KS 67212-1212.

FOR SALE: Heath 2er, Q -Multiplier; HQ-180; FPM-300 MKII. Carter Elliott, VA, (804) 979-7383

FOR SALE: TM 11-668 FM xtmrs & rcvrs - $7 ppd. R.J. Eastwick, N2AWC, 224 Chestnut St., Haddonfield, NJ 08033. (609) 429-2477

FOR SALE: Heath AM filter - $85; CW filter - $50; SB-630 station control - $75; Conelrad Alert - $25; Gonset VFO 6/2/220 - $60; Drake 2B/2BQ - $215; 2-NT - $100. Other equipment/manuals- request lists. Richard Prester, 131 Ridge Rd., West Milford, NJ 07480. (201) 728-2454

FOR SALE: Repair of TV-7 tube testers and calibration: I will fix and then verify calibration of your TV-7 tube tester for $40 plus shpg or return it no charge. I now have meters to repair those units with. Daniel Nelson, 1025 E. Desert Lane, Phoenix, AZ 85040. (602) 243-7421 eves

FOR SALE: TCS AC pwr sply PP-380, new - $150; ARC-5 connectors. **WANTED:** Navy RAS rcvr components, coils, pwr sply, rack; TBW xmtr; manuals: RAA, RAB, RAD, RAS, RBJ, RCE, RCH, RCK, RCL, RDG, RDM, REE, TCE, TCZ. Steve Finelli, N3NNG, 37 Stonecroft Dr., Easton, PA 18045. (610) 252-8211.

FOR SALE: Tektronix scope, model 503, works fine. Make offer. Victor, CA (805) 581-5317

FOR SALE: ARRL Handbooks: '49, '50, '51, '54, '57, '59, fair condx - $14 ea. Mark Hovda, NØJWI, POB 10091, Cedar Rapids, IA 52410. (319) 364-4048, 7-9 PM CST

FOR SALE: Johnson front panels refinished and silk screened. Viking I - $75, 122 VFO - $40. Exchange prices. Turner Enterprises, POB 451, Cal-Nev-Ari, NV 89039-0402

FOR SALE: Heathkit lives on in historical anecdotes by employees. Quality 124-page illustrated book. $9.95 postpaid. Heath Nostalgia, 4320 196th S.W., Suite B-111, Lynnwood, WA 98036-6754

FOR SALE: Collins KWM-2 ,WE - $450; Sig. gen. Booton model 80 - $85; Coax relay - $40. Pat, K7YIR, WA, Tel/FAX (206) 487-1230

TRADE: Collins 353C-31 75A-1 mech. filter/adapter for 75A-4 4:1 reduction gear drive. Dave Mills, 1503-G Adelaide, Tucson, AZ 85719

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

FOR SALE: Thousands of Tested Tubes w/Warranty! Send for new list with improved discounts and monthly specials. Both xmit and rec. tubes.I have acquired many common tubes recently. Buy those spare tubes for your tube radio, audio, ham and electronics. Most tubes are used at about 33% of new, many are about $1. I have bunches of octal, older, 7 and 9 pin tubes. All tubes are tested on TV/7D/U tester and then boxed. I give a 30 day warranty. Send wants or SASE with two stamps for list. Daniel Nelson, 1025 E. Desert Ln., Phoenix, AZ 85040. (602) 243-7421 eves

TRADE: Two good RCA 833As for one Taylor 833A. Jon H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455

FOR SALE: Collins Radio repair/reconditioning, multiple levels of service available, 25 years experience,Collins only! Free UPS shpg; info available. Cory, N2AQS/AFA4TZ, 1000 E. 14th St., Bldg. 178, Plano, TX 75074-6249. (214) 751-7535, 24 hrs, hinec@cegate.dl.nec.com.

FOR SALE: Manuals (copies) Collins R390, R390A, R391; Heathkit GR84 rcvr - $60 ppd. **WANTED/ FOR SALE:** CBs. List-LSASE. Charlie Zafonte, N1FRX, (207) 834-6273 eves/weekends.

FOR SALE: Hallicrafter's manuals. Copies $5 for most models, shpg $1ea. Some Johnson, Heath, Hammarlund, others. SASE for list. DSM Diversified, 909 Walnut St., Erie, PA 16502.

FOR SALE: PRC-25 set, RT-505 exc. condx. w/ used long & short ant, handset, bag, pack - $260; as above but w/used (need paint) RT-505 - $225; RT-505 w/o acces. used - $200, used exc. - $225; VRM-1 test set for RT-246, -524, R-442, module go no-go, NOS - $50; PSM-13 batt. test set for PRC-6, -10, -25, other NOS - $25; RT-77/GRC-9 - $95; remote cont. for PRC/CRC equip, used C-433 remote - $15; C-434 local - $18, both - $30; R-442/VRC 30-80 MHz rec. 24 VDC used - $175; RT-246/VRC push bottom version of RT-524 30-80 FM set, used - $525; UCC 74A teletype w/cover, no cables, 100 lbs. used - $40; AT-1047 16 ft fiberglas whip in 4 sections w/ rigid base, 2 in. hole mount, NOS - $45. Add shpg. Tartan Electronics, Inc., POB 36841, Tucson, AZ 85740-6841. (520) 577-1022, FAX 293-7145.

FOR SALE: Gates BC-250G,Y - $600, PU only; BC-639 VHF rcvr - $35; National NC-57 - $75; RCA AR-77 - $60; TS-382 AF osc - $25. + shpg. Jim Feasel, OH (614) 927-2592.

FOR SALE: Orig. manuals: TM 11/630 (BC-652, -653) - $20; TM 11/4877F photo equipment - $25; Swan 120/ps/manual - $150; R-390A IF deck - $100. Mel, K2AOQ, NY, (716) 671-0776.

FOR SALE/TRADE: Galaxy Comm2 SSB xcvr/ case; Harvey-Wells Bandmaster Deluxe, matching p/s; Heath 20M Single Bander, DC p/s. **WANTED:** NC173; NC183. Berk, MO (314) 394-0441.

FOR SALE: Rare "radio phone" (xmits & rcves) type SP, built by Western Wireless, LTD, San Francisco, for US Forest Service. Designed by Harold Lawson. Historically important, first mobile equip. put in service in significant numbers. Used in early 1930's fire fighting campaigns. Equipment enabled FS to gain valuable experience in rough mobile communication including air to ground & ground to air. Consequently US Army, preparing for WW II, consulted extensively with the FS in establishing their communications technology and techniques. Equip. is chronicled in "Radio for the Fireline" by Gary Craven. Set of two, minimum offer $400. Craig Woods, 548 Simoron, Ogden, UT 84404. (801) 393-2192.

FOR SALE: Collins 75A-4 rcvr w/3.1 & .5 kc filters, vernier knob, orig. manual & sales receipt (1957), serial number 35XX - $750; Collins 32V-1 xmtr w/ orig. manual & spare 4D32 final - $450; EF Johnson Pacemaker, clean - $200; Hammarlund SP-600JX-26 rcvr w/top & bottom covers, near mint - $475; Hickok 539B tube tester w/orig. manual - $150; Hickok 800A tube/transistor tester - $50; TMC MCU-2 cross-needle 1 kw p/swr meter, w/cabinet - $200, all + UPS. Ron, KC6WTG, POB 783, Santa Rosa, CA 95402. (707) 539-8319.

FOR SALE: Mod xfmr, 1800W 12KCT to 4.5 K, 0.9A, 9 x 11 x 12, 100 lbs - $150 + shpg. Jim Feasel, OH (614) 927-2592.

WANTED: Squires-Sanders equipment, accessories, literature. Gene Peroni, KA6NNR, POB 58003, Philadephia, PA 19102. (215) 665-6182.

WANTED: Collins 51S-1 rcvr. Richard Valentine, N1SQJ, 69 Fern Hill Rd., Bristol, CT 06010. (203) 583-8251.

WANTED: BC-224 or BC-348 NIB or mint. Tom, N5OFF, LA, (318) 989-3430.

WANTED: Cosmophone; B&W coils 2175-2179; shortwave & TV laboratory 4-pin coil forms; Viking 500 ps/mod. Brian, WA5UEK, TX, (214) 596-2914.

THE
COLLINS COLLECTORS ASSOCIATION

Bill Wheeler, KØDEW, Chairman
Proudly extends this invitation to attend
The Second Annual CCA Convention and Social Dinner Event
at
Cedar Rapids, Iowa
August 12 And 13, 1995
Where:
The Long Branch Motor Inn
90 Twixt Town Road, N.E.
Cedar Rapids, Iowa 52402
Phone 319-337-6386

Room reservations must be made by July 11th as this is a very busy time for Cedar Rapids and reservations cannot be guaranteed at any later date.

To register for the convention please contact
Tom Vinson, NYØV at 319-393-8087
or
Rod Blocksome, KØDAS at 319-393-8022

Contact Motor Inn directly for rooms at 319-337-6386
if you wish to stay at The Long Branch.

ACTIVITIES

Tour of Collins Radio Museum, Comm. Central and the antenna farm. Displays of equipment from Collins (one of a kind items) such as a solid state amplifier for the KWM 380, and an HF 380A in olive drab color (one of only two) and many more items. This is a once in a lifetime opportunity to see Collins equipment that was never marketed. You will not want to miss this event as it may never happen again in our lifetime!

Also, a very interesting program at the dinner is being planned.

The convention starts at 10:00 AM on Saturday, August 12th, 1995. Dinner cost will be approximately $16 per person.

The Cedar Valley Amateur Radio Club annual hamfest will be held on Sunday August 13. Please plan to attend this fine hamfest!!

ELECTRIC RADIO STORE

BACK ISSUES

All back issues are available at $34 per year or $3.25 for individual copies. Buy the entire first 6 years (#1- 72) for $175 and save. This price includes delivery in the U.S. Foreign orders please inquire.

COMPENDIUMS

Collins 75A-4 Modification Compendium- all the factory modification bulletins from Collins Radio Co., all the articles printed in CQ, Ham Radio, QST and ER, 85 pages- $20 plus $3 S&H

Service Modification Compendium for the S-Line, KWM-1/2/2A series - 260 pages - $45 plus $4 S&H

Service Modification Compendium for the KWS-1, 32V and 75A series - 42 pages - $15 plus $3 S&H

HATS

Finest quality, U.S. made, tan in color, embroidered ER logo -$15 delivered.

T-SHIRTS

The front displays the logo from the cover of ER (the tube outline, Electric Radio, and 'celebrating a bygone era'). The back has "Real Radios Glow in the Dark" (used with the permission of Classic Radio). The T-shirts are U.S. made by Haynes and come in S-M-L-XL and XXL($1 extra).

The color is just a little lighter than the cover of ER - $15 delivered.

BOOKS

Vintage Anthology - Book 1 by Dave Ishmael, WA6VVL.....$14.95

The First Fifty Years: A History of the Collins Radio Company and the Collins Divisions of Rockwell International $49.95

Fixing Up Nice Old Radios by Ed Romney.....$25

Wireless Communication in the United States by Thorn L. Mayes.....$29.95

Communications Receivers, The Vacuum Tube Era: 1932-1981 by Raymond S. Moore.....3rd Edition $19.95

Don C. Wallace, W6AM, Amateur Radio's Pioneer by Jan D. Perkins....$29.95

Oscilloscopes, Selecting and Restoring a Classic by Stan Griffiths.....$19.95

The 1994 Amateur Radio Mail Order Catalog and Resource Directory.....$16.95

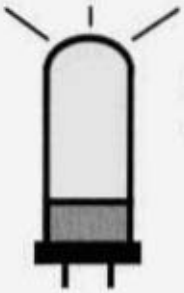
McElroy, world's champion radio telegrapher by Tom French $19.95

Please add $3 S&H for each book.

ER Parts Unit Directory

If you need a part for a vintage restoration send $2 and an LSASE (.55 postage) for a 7 page list of parts units. If you have a parts unit, consider putting it on the list. Your dead unit can help bring others to life!

ER, Box 57, Hesperus, CO 81326. (970) 247-4935



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