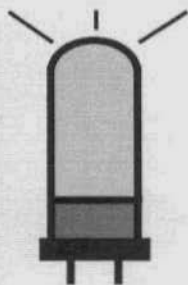


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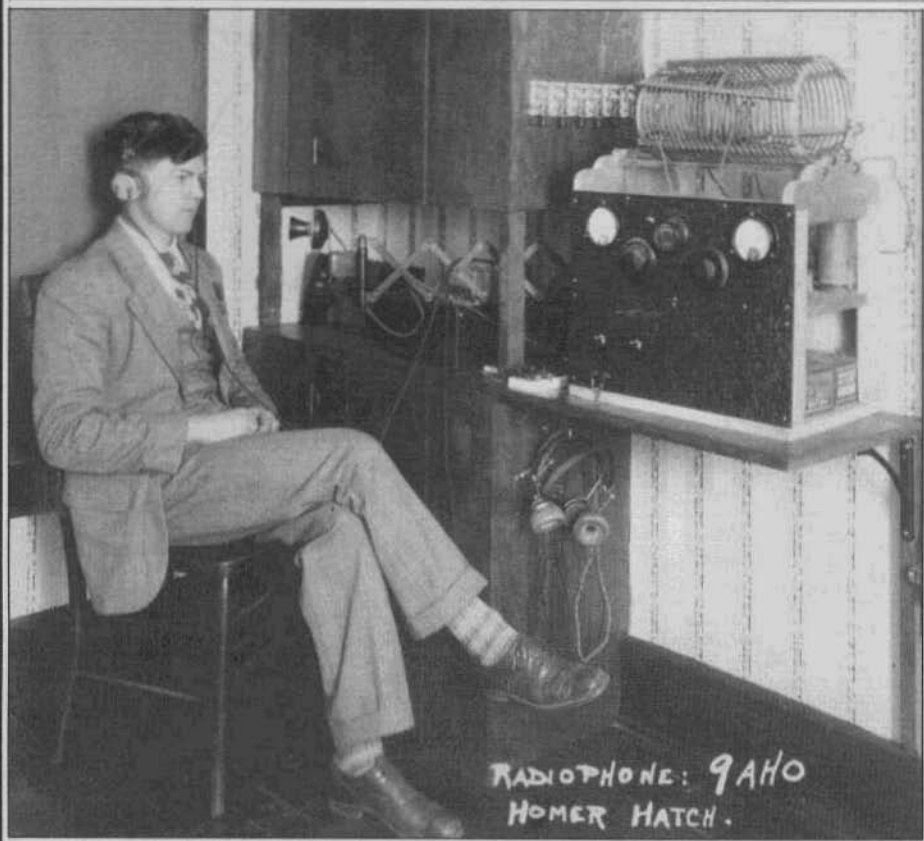


# ELECTRIC RADIO

celebrating a bygone era

Number 18

October 1990



RADIOPHONE: 9AHO  
HOMER HATCH.

# ELECTRIC RADIO

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DALE GAGNON, KW1I.....AM REGULATION UPDATES

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

## Electric Radio Solicits Material

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

# EDITOR'S COMMENTS

Barry Wiseman N6CSW/Ø

## Hard Times and Amateur Radio

It looks like this country is headed into another recession - maybe a bad one - and there are going to be some amateurs that are going to feel the squeeze. When their income is reduced or if they become unemployed the \$2000 Kenwoods may have to go in order to satisfy a higher priority; putting food on the table. But they shouldn't despair; despite what they've been told by the "experts" it is possible to have a vacuum tube/vintage station and be perfectly functional and happy.

For those amateurs licensed in the 50's or 60's going back to tube-type gear would not be any great ordeal; they've been there and understand the technology. But for the newer ham, raised on the 'glitzy' pages of our current ham magazines, it's going to be another story. I'm sure that for very many of them - particularly those who entered ham radio without an interest in radio or electronics - vintage gear is not a viable alternative. If they have to give up their expensive Japanese transceivers they will also give up amateur radio. But for the most part - necessity being the mother of invention - I think practically anyone (with a little help from their friends) could make a painless transition from appliance operator to whatever those of us who operate and maintain vintage gear might be called (real amateurs?)

continued on page 30

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Cover: Homer Hatch, 9AHO, Gridley, Kansas, 1930. I found this photo in one of Lee Faber's (W7EH) albums. I called Lee and asked him about the photo and what he could tell me about Homer. He said that he remembers Homer as a "real fine man" and that he had had many, many, QSO's with him in the late '20s and early '30s. The cabinet that extends up and out of the picture was for B battery storage. Does anyone have any additional information on Homer?

# HAMS ARE LASTING FRIENDS

by Charlie Vaughn, KD4AJ  
1968 Huntington Hall Court  
Atlanta, GA 30338

In the fall of 1940 Marvin Ollendorf of Atlanta, Georgia, acquired his ham license and became W4HAH. He remembers well the day the Postman delivered the eagerly awaited license from the FCC. As with most hams he could hardly wait to make his first on-the-air contact. He says that on his test he had a problem sending the 'H' and now here he was with two of them in his call. Nevertheless he got on 40 and nervously called CQ. The station that answered was Doug Snellgrove, W4GUP, in Opp, Alabama, himself a newly licensed ham. That was the beginning of a friendship that would last almost fifty years.

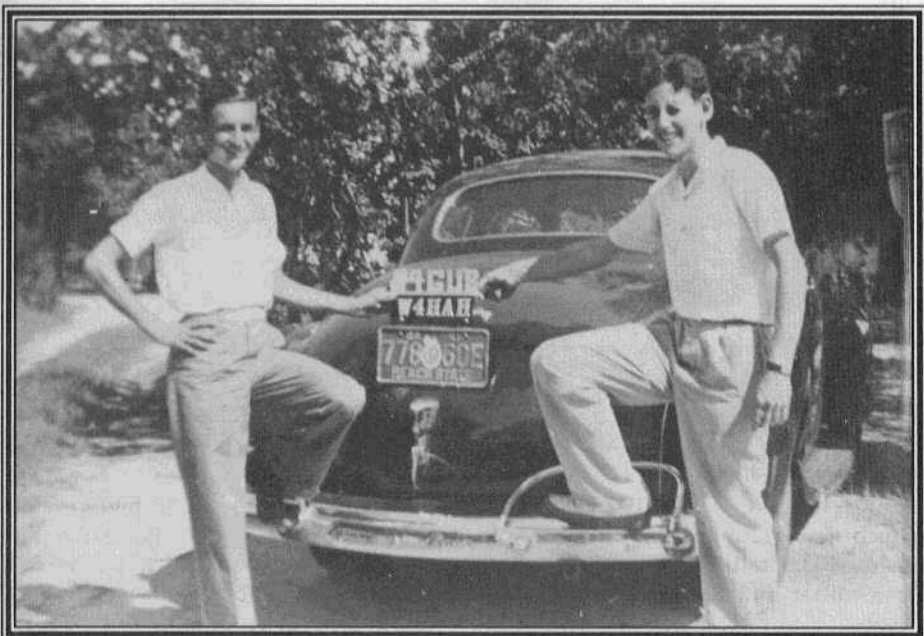
Our two new Hams made many contacts with each other on 40 meters through the fall of 1940 and into 1941. And as Doug recalls, "It was one of those afternoons when we were ragchewing that we finally decided to get together for our first eyeball QSO". Marvin traveled to Dothan, Alabama, where Doug was now living, for that first personal visit and the hams really did 'hit it off'. They agreed to continue their schedule on 40 meters on a weekly basis.

When the U.S. entered WW-II Doug enlisted in the Army and was sent to Ft. McPhearson, near Atlanta, for induction and training. Coincidentally, Marvin was now working at the same Army base as a civilian employee in the Signal Corp. Doug would later admit that it was a real morale booster for him to have a friend so far away from home.

Both men served their country well, both were in radio communication, and they said that they would renew their 40 meter schedule after the war. And they did. Each week they would meet on or about 7.05 Mhz to discuss everything from radio, to family life, to their dreams and goals, the thing that real good friends share with each other.

Their third 'eyeball' contact came on June 3, 1979. They had been friends now for 37 years. Doug (now K4DR) traveled to Atlanta and met with Marvin at his home. It was a real 'homecoming'. Marvin had the original transmitter that he used in their first contact. He demonstrated his modern Collins station to Doug. Doug commented, "We sure have come a long way since 1940, but it sure was fun to make contact on the old 10 watt CW rig in those days".

Their last meeting occurred in 1985. While on the way to Florida for vacation, Marvin and his wife Jesse visited Doug and his family and enjoyed dinner together. Again it was a great get together with plenty of reminiscing about their contacts over the last 45 years on the airwaves. Marvin and Doug would continue their 40 meter schedule each week for five more years. Sadly, Doug, K4DR, a good ham, Marvin's best friend, passed away September 7, 1990, one month away from a 50 year on-the-air friendship. Hams are lasting friends.



Doug, W4GUP (later K4DR), on the left and Marvin, W4HAH, in the summer of 1941. This was their first meeting and took place in Dothan, Alabama.



Marvin (on the left) and Doug together in Atlanta in 1979. Note the transmitter in Marvin's lap; it was the first one he used to contact Doug 37 years earlier.

# ELECTRIC RADIO IN UNIFORM



by Walt Hutchens, KJ4KV  
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## 'The RT-311/ARC-38'

Perhaps the milestone military radio of all time was the Collins ART-13 (E.R., November 1989); the next U.S. Navy liaison set, the ARC-2 (1944-1949) also broke much new ground, being, for example, the first U.S. military radio to tune both transmitter and receiver with a single knob.

The radio we will tour this month was also developed by Collins. Introduced in 1952, the ARC-38 contains two major innovations:

1. A stabilized master oscillator (SMO) with its output frequency controlled by reference to a crystal oscillator, and,
2. Low level stages of both receiver and transmitter which automatically track the SMO to minimize the number of coupling shafts, gears, etc.

In addition, important improvements recently applied to Army ground radios and UHF sets are applied here for the first time in an aircraft HF transceiver:

3. Fully automatic tuning of everything after the MO, including the antenna,
4. The mechanical filter for bandpass limiting,
5. Transmit audio clipping to increase effective power and eliminate overmodulation,
6. 'Black box' design with all operator controls on a control box, and,
7. Use of a silver tape which unwinds from a ceramic drum onto an aluminum one (and vice-versa) to achieve a very

wide range variable transmitting inductance without the spurious resonances which can occur with the usual roller inductance — this is in the antenna tuner used with the set.

Innovative sets can be undependable (the ARC-58, E.R., January 1990) or have features which don't work out (the PRC-25, E.R., September 1990) but the ARC-38 missed these pitfalls. But —oops! — there is one 'human factors' goof which should never have gotten out the door...

### Overview

The ARC-38 is an HF liaison transceiver which was installed in many types of naval aircraft requiring communication over longer ranges than available with UHF equipment. It covers 2 to 25 Mcs in 35,251 channels with .01% error or less; calibrated channel intervals are 500 cps up to 14 Mcs and 1 kc above.

The set is 8"x15"x20" (H x W x D, the standard '1-1/2 ATR' package) and weighs 67 pounds, not counting the rack, control unit(s), dynamotor power supply, etc. There are no operating controls on the front panel but a meter and switch allow checking important voltages and currents. Mike, key and phone jacks (for test purposes) as well as the transmitter output connector are on the right edge of the panel; the receiver antenna connector is on the left.

There are two control boxes; C-1398 is the 'local' box for use by the radio operator; it controls PHONE/CW, BFO FREQUENCY, channel frequency setup, etc.



RT-311/ARC-38 (right) and the CU-351/AR automatic antenna tuner used with it. This set came with a sticker on top of the transceiver case saying that it was overhauled by a contractor in October, 1966.

The optional remote box, C-1399, is for the pilot; it can only select a preset channel and adjust the volume.

The set is not calibrated directly in frequency. Instead, you look up the desired frequency in a small book stored in the 'local' control box and set a code found there on thumbwheels or a drum on the box. Once the frequency is selected, tune-up is automatic.

Rated transmitter output is 100 (CW or AM carrier) watts up to 14.25 Mcs and 90 watts above, from three 6159 (26-volt 6146) tubes in parallel. High level plate modulation is used and speech clipping of up to 15 db is provided.

Power input is 27.5 volts DC at 6.6 amps on receive, 26 amps on AM transmit, plus 115 volts 400 cps single phase at 1.6 amps. The set has 45 tubes, all miniature except for the PA and modulator. It uses solid state diodes but no transistors.

## History

I don't have a source for the history of the ARC-38, but the outlines are clear from the contract dates and nameplate information. It was introduced about 1952 and used into, at least, the early 1960's. At that time, many -38's were converted for SSB operation, becoming ARC-38A's; these sets were used, at least, into the 1970's and it would not surprise me to hear that there are still a few in operation today in the 'backwaters' of naval aviation and in foreign countries.

Total production might have been 10,000 sets. The price (not counting the CU-351 antenna tuner) was \$6240 per set; about two years pay for a young Navy pilot in the 50's.

## Design

One's image of a radio is most often of its front panel; the best are classics of industrial design.

Can anyone look at the front of an NC-2-40D, an ART-13, a command transmitter, or a BC-375 without a combination of respect, confidence and pleasure? The ARC-38's panel, however, shows the same triumph of function over form which occurred in the 50's in architecture and elsewhere.

In fact, the front panel controls were no longer needed. Once aircraft sets got so complicated that the operator could not make repairs, it made sense to move the radio to an out of the way place, keeping just the controls at the operating position. The ARC-38 was not the first 'black box' radio (that distinction probably goes to the ARC-19, a 1946 UHF transceiver much like the famous ARC-27) but it was the wave of the future — except for sets so small that the whole thing fits in the aircraft instrument panel, all later radios are 'black boxes'. One does not have to like everything which makes sense.

Most of the ARC-38 front panel is hidden by a cover (often called a 'bustle') which projects about 3-1/2", and conceals a blower and air filter, the meter and switch, and other parts requiring easy access. Behind the panel is a broad shallow chassis with receptacles for 12 plug-in modules. The blower forces air into the chassis (which is closed on the bottom by the case); holes of various sizes direct air to the modules according to need. There's a screened exhaust port at the top rear of the case.

The separate DY-118 power supply develops the plate voltage for for the receiver from the 115 VAC supply; that means that the power supply which is in constant use has indefinite life. Transmitter high voltage comes from a dynamotor which runs only when the transmitter is keyed or in 'CW XMSN' mode.

Like the ART-13, the ARC-38's electronics are both clever and refined. A PTO (permeability tuned oscillator) covers 1.75 to 3.5 Mcs. On transmit, this is

added to a 250 kcs crystal oscillator signal to give 2.000 to 3.75 Mcs; this signal is amplified to become the band 'A' carrier. On bands 'B', 'C' and 'D', the original oscillator signal is multiplied by 1, 3 and 7, respectively to give ranges of 1.75 to 3.5, 5.25 to 10.5 and 12.25 to 24.5 Mcs. When these signals are added to the 2 to 3.75 Mcs signal, they give output ranges of 3.75-7.25, 7.25-14.25, and 14.25 to 28.25 Mcs; band 'D' is cut off at 25.0 mcs.

On receive, the multiplied oscillator signal (as above) is mixed with the incoming signal to give a variable IF frequency of 2.0-3.75 Mcs. The output of the variable IF stage is mixed with the unmultiplied oscillator signal to give a fixed IF frequency of 250 kcs. This is passed through a mechanical filter, either an 8.5 kc wide unit for AM or CW, or a 2.5 kc one for 'CWS' — CW sharp. The filter output is amplified in three stages; a cathode follower drives conventional detector, self-adjusting noise limiter and AVC circuits. Because of the mechanical filters and cathode follower drive, the ARC-38 has the best noise limiting and AVC I have seen in a radio of this type. Audio quality is excellent for a liaison set.

The master oscillator is a PTO, but that's only chapter one of the story. Considering all types of errors (calibration, aging, temperature changes, etc.) the typical PTO will stay within 500 to 1000 cps of the correct frequency; when multiplied by 8 for band 'D', that means up to 8 kcs error. This may not be a problem for a manually operated set which can be calibrated near the channel frequency (the R-390 or T-368 for example) or for hams, since we usually 'tune around' for the desired signal. However, in military use, channel frequencies are published in an operation order and set up by maintenance personnel hours or days in advance. When needed (perhaps to report picking up a submarine on your airborne magnetic detection gear) you select the





The ARC-38 with the covers off. The tuner module is at the right front, the PA assembly at the rear. The SMO is out of the set, at the left.

channel, punch the mic button, and talk. There will rarely be time for either station to retune.

To get the necessary accuracy, a stabilization circuit was added to the ARC-38 PTO. The circuit begins by multiplying the PTO frequency by four, giving a range of 7.0-14.0 MCs. A 500 kcs crystal in a temperature controlled oven locks a 100 kcs multivibrator; tuned circuits driven by the frequency selection mechanism pick the 100 kcs harmonic which is between 1200 and 1300 kcs higher than the multiplied PTO frequency. The two signals are mixed, giving an output which goes from 1300 down to 1200 kcs repeatedly as the PTO goes up through each 25 kcs increment of its range. This signal is mixed with a 1000 kcs signal (doubled from the 500 kcs oscillator) to give 300 kcs to 200 kcs. This signal has four times the absolute error and roughly 40 times the percentage error of the original PTO output.

The 300-200 kcs signal goes to a discriminator circuit just like that found in an FM receiver — except that it is tuned to the 'right' value of the 300-200 kcs frequency by the selection circuits. If the 300-200 kcs frequency is correct, there will be no output, otherwise there is a DC voltage with sign and magnitude corresponding to the error.

How hard can it be? The DC error voltage drives a small air variable capacitor which is in parallel with the PTO tank circuit to correct the frequency.

This sounds like a good scheme, but it is even better than may be obvious. First, a control system of this type can (in theory) operate with a zero average error; the actual error depends on friction in the correcting motor and the accuracy of the discriminator itself. Second, the output to following stages is taken from the PTO, so if the correcting system dies you lose only stabilization — the set probably will still work as well as an earlier (un-stabilized) radio.

## Conclusions

I have neither 'user stories' nor written history for the ARC-38, so these comments are from my testing.

The one major problem is the system for setting frequencies. The book gives two codes for each frequency. One is used to set the 'manual' channel thumbwheel switches (for example B1-2-A-7 to set 3885 kcs) and the other to set pins on a 20 channel memory drum (for example B-FG-KL-PR-UWX for 3885 kcs). It's very easy to make mistakes; when I set up twelve 'AM window' frequencies on the drum of my set, I got two of them wrong.

With such an error-prone system, incorrectly set channel frequencies must have been frequent, though probably most were caught by pre-mission radio checks. With early 50's technology, it was not easy to build a synthesized HF set calibrated directly in frequency, but it was not impossible. The ARC-38 frequency setting scheme gets the second In Uniform "Turkey With Trimmings" award.

The biggest reliability problem is the switch contacts controlling the relays and autopositioners. Since these switch inductive loads, they get dirty rather quickly (after perhaps 50 channel operations) and the SMO or antenna tuner may then 'tune' for several cycles before stopping - or even run forever! The cure (already used on the bandswitch autopositioner) is a small neon bulb across each coil. It looks like a lightning storm when tuning up, but the contacts last indefinitely. Of course in military use, 50 channel operations might take months for some aircraft missions, so this weakness would not have been serious in all cases.

Each module has one or more male connectors on it's bottom. The pins are brass and not very strong; though they're guarded to some extent by guide pins and the hold down screws, they are still very easily broken if you drop a module

(the SMO weighs 14 pounds and is hard to get a good grip on) or set it down on a tool. Later sets (the ARC-58, for example) have much better protection.

The tuner centering circuits have what seems to be a design mistake. The table centers long before the SMO has reached the right frequency; at that time the centering circuit goes off and the output from the tuner discriminator takes over. This starts to drive the tuner table, but as soon as it leaves the center position, the centering circuit again kicks in and drives it back... "Ahhh runnnk! - ahhh runnnk! - ahhh runnnk! ..." 90% of the wear on the tuner gears must have come from this action; one more contact on one of the relays (to kill the discriminator output during SMO set up) would have prevented it.

The technical manual 'theory' sections are excellent, though sometimes so detailed that you can't find the forest. The troubleshooting info is weak, usually telling you the obvious (if a module doesn't work, check the tubes) but not the obscure but important (the meaning of symptoms like 'tunes forever' or various patterns of errors in frequency). One outstanding section - "Minimum Performance And Alignment Tests For The Experienced Technician" - actually presents a complete procedure covering everything likely to be required for sets in the field. It's especially noteworthy for telling you what procedures probably are not needed - important both for saving time and because unnecessary work done wrong is a leading cause of military radio failures. This section was written by FAETU (you say "fay-two", as I recall) - the Fleet Airborne Electronics Training Unit.

With over 35,000 channels of crystal controlled stability and accuracy and the adjacent channel rejection given by mechanical filters, the ARC-38 was a major advance over previous liaison sets. Except for dirty contact problems when the

## Audio Modifications For The Johnson Valiant

by "Doc" Metke, K6HLO  
7775 Sierra Dr.  
Roseville, CA 95661

1. Remove C-79 and replace with a .1 ufd @ 400 volts.
2. Remove V-13 and C-83 and C-84, also remove one end of L-45 and C-94 from pin 6 of V-14.
3. Install a .1 ufd @ 400 volts from pin 6 of V-12 to pin 6 of V-14.
4. Remove C-90 and install a .082 @ 400 volts.
5. Install a 10 ufd @ 35 volts from pin 8 of V-12 to ground.
6. Open secondary side of T-3 at pin 3 of J-8 and install (3) 1 amp. @ 1000 volt diodes in series, with the cathode end tied to pin 3 of J-8 and anode end to T-3. (Negative peak clipping)
7. Open primary connection of T-3 at pin 2 of J-8 and install (3) 1 amp @ 1000 volt diodes in series, with the cathode end tied to pin T-3 and the anode end tied to pin 2 of J-8. (Isolation)
8. Open the screen leads of V-5, V-6 and V-7 (finals) pin 3 and install a 50 ma. 10 hy choke in series of said lead.
9. In some cases it may be necessary to use a .05 coupling capacitor at C-83 (pin 6 of V-12 to pin 6 of V-14) due to low frequency oscillations in the audio circuit, this may be found by turning the audio level control up and down with the rig on the air and no microphone installed, while you have the meter switch in the modulation position and watching for undulating resting current.

**Editor's Note:** I think it is generally accepted among vintage radio enthusiasts that the Valiant is a good transmitter but that the audio from a stock rig leaves a lot to be desired. This modification really does make a Valiant sound good. Everyone agrees that Doc's Valiant sounds great. Others who have made this mod with good results include Woody, W6LHH and Roy, WB7NXX.

# Sure You Can Tune IT!

## 160 Meter Antenna Tuner

by George W. Watson, WØLOB  
13546 Omega Dr.  
Littleton, CO 80124

It seems that much of the fun of 'Hamming' has been gradually slipping from us in the past few years. How many hams have designed and built an oscillator or a filter or a product detector in the last year? How many care? Not many, it seems. To me that's where much of the enjoyment of amateur radio lies - in creating something you need for better operation and then utilizing it, improving it and going on to something different.

Getting back into AM operation has brought back some of the, pardon the expression, 'Spark' of hamming. Working on an AM rig is like raising the hood on a '65 Mustang - there is room to work, you have a pretty good idea of what each part is supposed to do, and you don't have qualms about repairing it.

I operate, sparingly, on 80 and 40 meters. Both bands are crowded and rather than add to the QRM on these bands and upset people with my "awful sidebands"

I decided to look at 160 meters where there is more unoccupied space. The only drawback is that my antenna space is limited, so I operate HF with about 100 feet of wire, center fed with a 450 ohm open wire line. This antenna works well down through 80 meters, but needs some help on 160. City lots have a way of antagonizing and challenging a person who wants to put up 250 feet of wire in a 150 foot space. I decided that the solution, at least initially, was not to buy a wire shrinker but to match what I have to the Viking II for 160 meter operation.

After looking at several designs, I selected the circuit of FIG. 1 for various reasons. 1) I prefer low pass design for it's additional harmonic rejection over the high pass, transmatch approach. 2) The components are reasonable in value and are obtainable. 3) I like to see a low VSWR even though it's not critical for good transmission, ala Mr. W. Maxwell.



4) An 'L' network is simpler but requires larger valued components. 5) I had the capacitors available and could easily fabricate the coil. The circuit is a basic 'T' network and could use an inductor in lieu of C1. The capacitor is easier to work with but electrically the circuits can be functionally identical.

To utilize the existing antenna on 160 the simplest approach seems to be to connect the two feedline points together and feed it against ground. My feedline drops about 15 feet from the antenna (30 ft. high) and from there is fed along the side of the house, under the roof overhang, down and into the basement. How much is vertical and how much is horizontal polarization on 160 is difficult to say. Anyway, it works!

The first step was to measure the antenna impedance on 160. The ends of the feedline were shorted together and the impedance measured against earth ground (copper water pipe with braid to the equipment). Using a GR 1001 generator and a GR 1606 A impedance bridge, the following average feedline impedance values were determined:

1.8 Mhz	.....	18.2 - J94 ohms
1.9	.....	22 - J66
2.0	.....	29 - J35

Next, The 'L' and 'C' values of the network at each frequency were calculated so as to determine the values needed to cover 1.8 to 2.0 Mhz. I looked at several approaches, all ending up with the same part values but each approach having its specific peculiarities.

Approach 1:

$$R_1 > R_2$$

$$B = R_2(Q^2 + 1)$$

$$A = \sqrt{\frac{B}{R_1} - 1}$$

$$X_L = QR_2$$

$$XC_2 = \frac{B}{Q - A}$$

$$XC_1 = AR_1$$

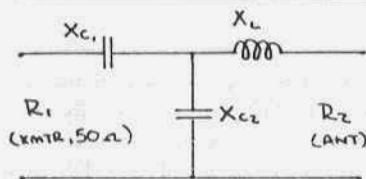


FIGURE 1

The technique used was to match 50 ohms (xmtr) to 18.2 ohms (ant. res. at 1.8 Mhz) and add enough  $X_L$  to the inductor to cancel the capacitive reactance of the antenna (-94 ohms at 1.8 Mhz).

The first requirement with Approach 1 is to select a Q. I chose Q=5 initially, but this changed to 7.6 based upon the second approach tried. I didn't want Q to be too high, but even with a Q of 7.6 the necessity for much re-tuning across the band did not occur.

1. Using Q=7.6, at 1.8 MHz  
 $B = 1069.4$

$$A = \sqrt{\frac{1069.4}{50} - 1} = 4.515$$

$XL = 138.3$ . To this is added J94 to cancel -J94 of the antenna.  
 $X_{L,TOT} = J138.3 + J94 = J232.3$ .  $L_{1.8} = 20.5 \mu H$

$XC_2 = 346.7$ ;  $C_2 = 255$  pf

$XC_1 = 225.75$ ;  $C_1 = 392$  pf

2. Using this same approach the 'L' and 'C' values can be calculated at 1.9 and 2.0 Mhz, using the appropriate antenna impedance values for each frequency.

3. The network values are:

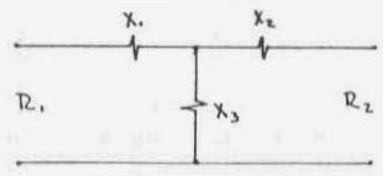
1.8 Mhz.....	C <sub>2</sub> 255pf.....	L20 .5 uh.....	C <sub>1</sub> 392pf.....	Xa 18.2 - J94
1.9 Mhz.....	220 .....	16.3 .....	439 .....	22 - J66
2.0 Mhz.....	182 .....	11.2 .....	591 .....	29 - J35

The values were checked against the following equations (Approach 2) and here one must assume a phase shift across the network. Various values for 'B' (phase shift) were tried and a low value of 5 degrees was selected so as to yield reasonable values for the parts. The phase shift isn't critical since I'm not transmitting with an array. From these values 'Q' was determined (X<sub>1</sub>/R), this value being used in the calculations of Approach 1.

Approach 2:

$$X_1 = -J \left( \frac{R_1 \cos B - \sqrt{R_1 R_2}}{\sin B} \right)$$

$$X_2 = -J \left( \frac{R_2 \cos B - \sqrt{R_1 R_2}}{\sin B} \right)$$

$$X_3 = -J \left( \frac{\sqrt{R_1 R_2}}{\sin B} \right)$$


Other approaches necessitate the selection first of one of the three components. The shunt element (Z<sub>3</sub>) could typically be selected from an on-hand variable capacitor and the other two elements then calculated. Some 'juggling' of the value for Z<sub>3</sub> may be necessary if the values of the other two elements become unwieldy.

Approach 3:

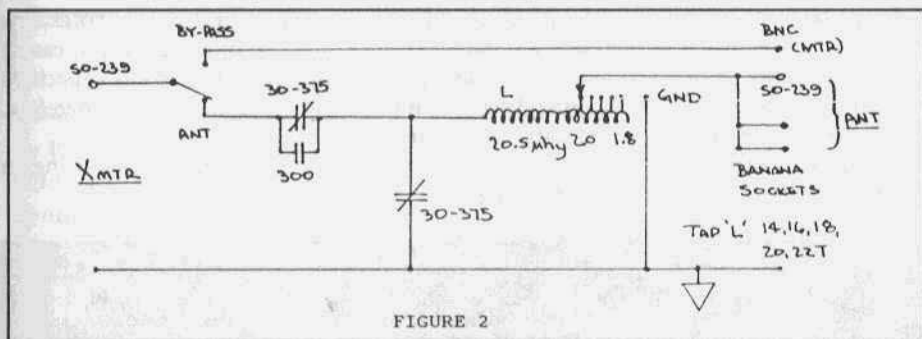
1. Select X<sub>3</sub>

$$X_2 = X_3 \pm \sqrt{X_3^2 \cdot \frac{R_1}{R_2} - R_1^2}$$

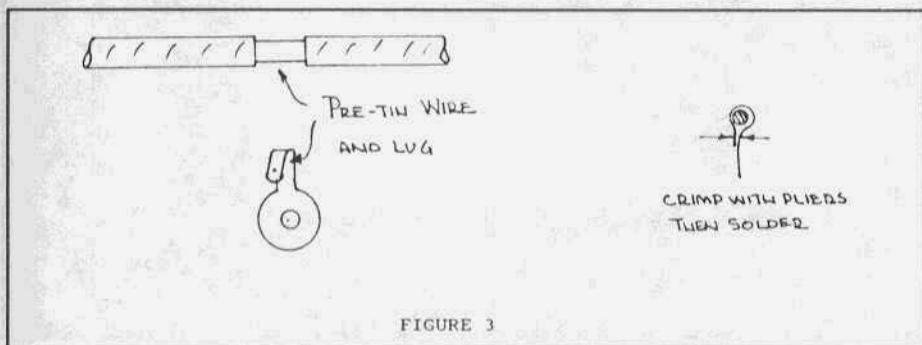
$$X_1 = X_3 \pm \frac{R_2}{R_1} \sqrt{X_3^2 \cdot \frac{R_1}{R_2} - R_1^2}$$

Use X<sub>1</sub> and X<sub>2</sub> both + or both -, the choice depending upon which sign yields the most practical values.

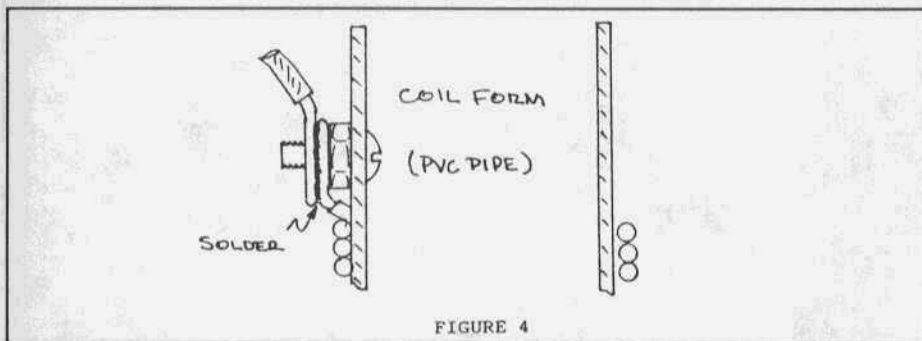
In Figure 1, Capacitor C<sub>1</sub> (xmtr side) must be isolated from ground and thus requires an insulating shoulder washer or other means of keeping both sides of the capacitor off ground. C<sub>1</sub> is a 30 - 375pf variable cap shunted with a transmitting mica cap of 300 pf. I also added a feature that is not necessary but very handy, and that is the 'bypass' position that permits tuning the transmitter into a 50 ohm load/meter (no QRM) and then switching the 'ant' position and tuning for minimum VSWR. An antenna ground position was added for convenience and safety reasons.



The coil was wound on a 2 inch by 5 inch PVC pipe (2.5 inch OD, winding) using #14 house wire (PVC insulation with a clear nylon outer jacket). This wire turned out to yield 9T/inch (2.5 in total length of winding). I used solder lugs for the taps - bent and soldered to the coil wire.



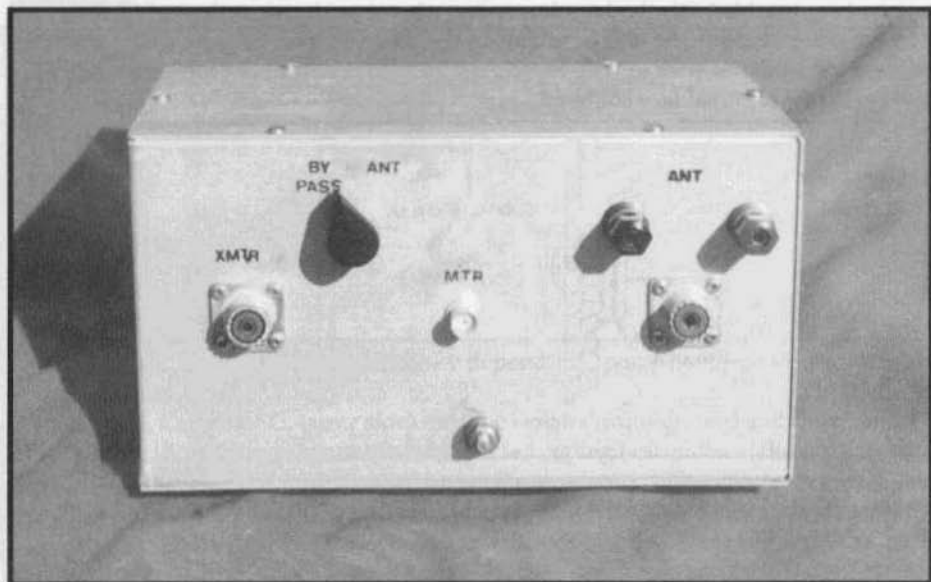
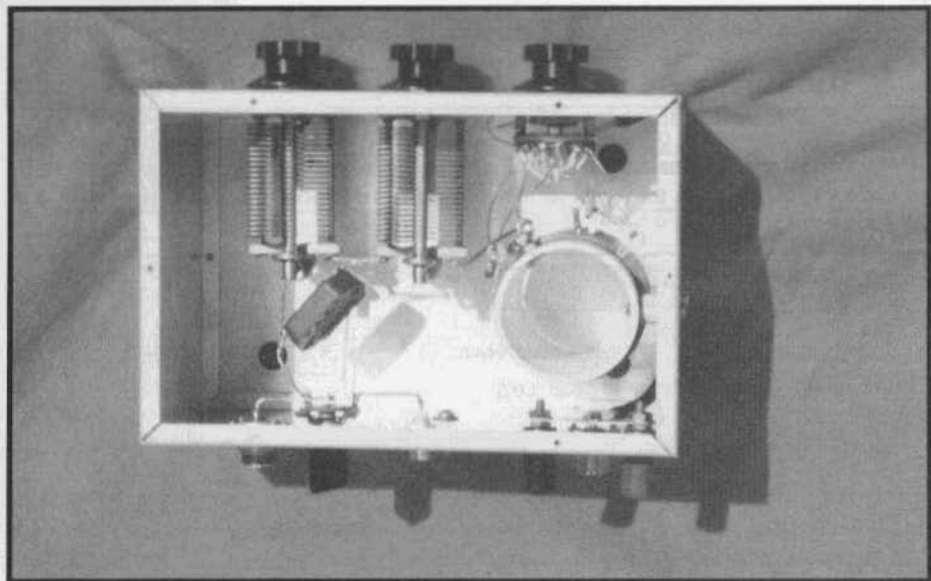
I had no trouble with the lugs loosening when I soldered to them. 1/2 inch 8x32 screws were used for the end terminals of the coil. I looped the coil wire around the screws but soldered wire to wire for the circuit connections, not worrying whether or not the screw terminal was soldered.



I used a dual 6-position ceramic wafer switch paralleling the two sides for current sharing through the contacts. Tuning is easy and straight forward. This approach can be used for different antennas, the first criterion being that of determining the antenna impedance and calculating network values accordingly.

**Editor's Note:** 1) L can be looked at as two inductors in series combined into one. One inductor is part of the impedance matching network, and the other is used to cancel the capacitive reactance of the antenna (the inductive reactance is = to the capacitive reactance of the antenna at the operating frequency). The actual value of L, therefore, is the sum of these two required inductive reactances.

2) One can also calculate the resistive value of an antenna's feedpoint by using an RF ammeter and a known amount of RF power.

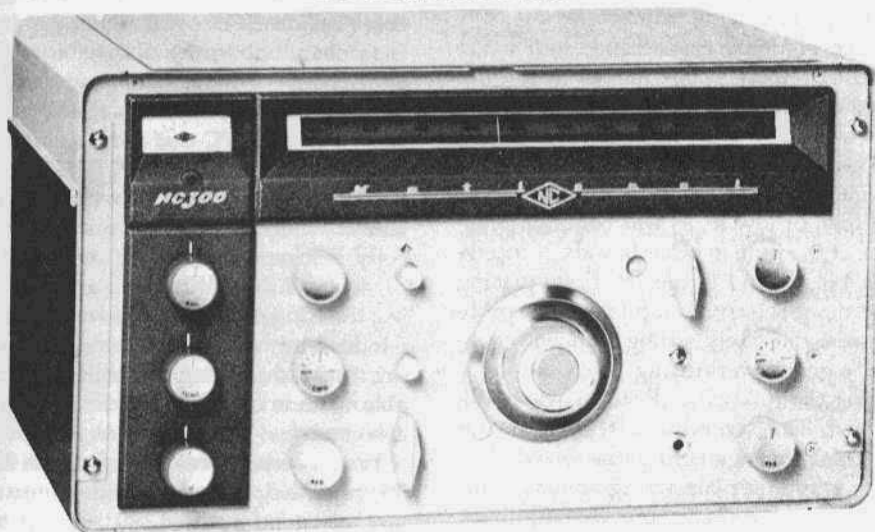




## VINTAGE PRODUCT REVIEW

by Bill Kleronomos, KDØHG  
POB 1456  
Lyons, CO 80540

### National NC-300



The National NC-300, first introduced by a high-powered publicity campaign in the pages of *QST* for 1955, was intended to be National's answer to the Collins 75A series receivers, and since the 75A-4 hadn't been introduced yet, the NC-300 was to be the first amateur receiver specifically designed for that new voice mode, single sideband. According to the advertisements, National had actively solicited comments from the amateur community as to what they wanted to see in quality communications receiver, and the result was the NC-300. This approach pre-dated Lee Iacocca's motto for Chrysler, "Satisfy the Customer", by some three decades and, by and large, National's entry into the premium receiver field accomplished this goal. The NC-300 received nothing but rave reviews after it's introduction. This receiver really gives it's contemporaries

from Cedar Rapids a run for the money in almost every respect. In fact, I am mystified as to wide price disparity between the NC-300 and the 75A-1, 2 and 3 on the used market today for there is little difference in performance.

The NC-300 is a thirteen tube dual conversion receiver with IF frequencies at 2215 Kcs and 80 Kcs. Coverage is ham-band only, from 160 through 10 meters. Additionally, dial scales are provided for the 6, 2 and 220 Mhz bands. When these bands are selected, the NC-300 tunes a range of from 30 to 35 Mhz so that the dial reads correctly on these bands if VHF converters are used as an accessory. The National model numbers for the VHF converters are NC-300C6, NC-300C2 and NC-300C1 for the 6, 2, and 220 Mhz models. A converter cabinet was an option accessory as was a crystal calibrator and a matching speaker.

The NC-300 is one solidly built receiver, inside and out. It is clearly evident that National made no attempt to cut corners or compromise it's flagship receiver for 1955. In the case of the NC-300, the words 'solid' and 'stable' are not synonymous with heavy. It is not as heavy, at some 50 pounds, as the SP-600, for example.

The National engineering staff made two extremely smart moves in the design of this receiver which were new to the state of the art in mid '50s amateur receiver design. The first was the placement of the IF crystal filter not at the second, or low IF, as was common practice at the time in other brands of receivers, but instead in the 1st IF. By placing the sharp selectivity 'up front', the problem of extremely strong adjacent channel signals overloading or cross-modulating the following IF stages was minimized. The second smart move out of the Malden engineering staff was the use of a very low plate voltage of 150 volts. This makes for very quiet RF amplifiers. The net result of both of these tricks, as well as the rest of the receiver design is a receiver quite capable of digging out an extremely weak signal in the midst of heavy QRM.

National took great pains to design stability good enough for SSB into this receiver, and was quite successful at doing so. The 1st oscillator coils are wound on ceramic forms and air, not mica trimmers, are used for calibration. Not only is the oscillator B+ regulated, but also the heater of the first oscillator tube. The previously mentioned low B+ voltage enhances stability. The main tuning is just super-silky smooth and the weighted flywheel on the main tuning enhances this feeling of stability. The tuning rate is plenty slow for sideband, being a minimum of fifteen turns of the dial to cover a ham band. This is the same number of tuning turns a Collins S-Line receiver uses to cover the 20 meter band,

for comparison. There is absolutely no tuning backlash evident when tuning CW or SSB.

As I mentioned, the NC-300 was specifically designed for use with SSB so it has several features that set it apart from it's mid-'50s contemporaries. It has a real product detector that uses a 6BE6 as a combination BFO oscillator and mixer. In sideband mode, the IF signal is routed to this tube which then produces the audio difference between the two signals. And, yes, an AVC that works with SSB was provided for!

It must have been quite a thrill for the hams of that era, used to having to try to copy sideband by turning on the BFO, turning off the AVC and manually riding the RF gain in order to receive sideband on an unstable receiver with tuning backlash, perhaps, suddenly being able to tune and listen to SSB on a receiver as easily as listening to AM!

I ran a series of tests on a sample NC-300 provided to me for evaluation to see just how good it was.

#### SENSITIVITY

As with my previous product reviews, AM sensitivity was measured by the 10 db S+N/N method, which takes into account the internal receiver noise. The measured AM sensitivity at 29 Mhz was 2.0 microvolts, and at 3.8 Mhz it checked in at 1.5 uV. CW and SSB sensitivity measured better than .15 uV on all bands, a respectable figure.

#### STABILITY

In my opinion, this is where the NC-300 really stands out among it's contemporaries. Thermal stability was checked after a 20 minute warm-up from a cold start. Drift on 20 meters measured less than 10 Hz after another 20 minutes. You'd be hard pressed to actually be aware of any drift whatsoever, tune it to a SSB QSO and leave it. It won't move, but the guys you're listening to might drift more instead! This figure is outstanding.

While tuned to a SSB QSO on 20 meters, I gave the cabinet a series of goodly thumps. There was definitely a change in pitch, but the receiver came right back dead on frequency. I had to physically lift the front of the receiver and let it drop a couple of inches before it was necessary to retune a received signal. Mechanical stability is excellent. There was no sign of oscillator instability or 'pulling' when a test signal was varied from 10 to 1000 uV, or the RF gain was varied.

### SELECTIVITY

This is provided by one of the more unusual features I've ever seen on a communications receiver. There are TWO selectivity switches; one on the high IF, which works in conjunction with the crystal filter, and another on the low IF. While highly effective, this combination of dual selectivity adjustments takes some time to get used to and a reasonable amount of experience and expertise to use properly. The simplest way for me to describe the use of these two switches is that one sets the desired degree of selectivity and the 2nd IF switch, then one can use the selectivity options and the associated crystal filter tuning in the 1st IF as a form of bandpass tuning on QRM, or to notch out an interfering heterodyne or interfering close in CW signal. The second IF selectivity bandwidths are 8, 3.5 and .5 KHz.

### IMAGE REJECTION

This checked in better than 90 db, the limitation of my test equipment. There appeared to be a considerable amount of signal leakage into the receiver from the outside world via the power cord or speaker leads. This in itself was of no major consequence except if one were to use one of the associated VHF converters. Strong signals present in the 30 Mhz range would then appear as spurious responses on the VHF band of interest.

### DIAL CALIBRATION

The dial markings range from 1 Kc / divisions on 160 to / 10 Kc divisions on 10 meters. Since the slide rule dial is almost 11" long, one can set the dial fairly closely.

### AUDIO DISTORTION

At 1 Kc distortion measured 2% at 100 mw, 5% at 500 mw and 7% at 1 watt. Not bad, but not quite up to the receivers with PP 6V6 audio finals.

### OVERVIEW

I can find a lot to praise in the NC-300, and only a few things to complain about. Let's discuss the complaints first. I am not totally thrilled with the dual IF selectivity adjustments. There was a time in my life when I was much more intrigued with knob twiddling than I am now, but it can take a considerable amount of time to tweak in a weak signal by optimizing the tuning. Rest assured however, that you will indeed be able to get it right eventually. Those blood relatives of Marconi out there will undoubtedly like this versatility. I cannot understand why the adjustable noise limiter, which works superbly on AM is switched out and rendered inoperative in SSB mode. Too bad.

I don't know what it is in a receiver that elevates it to the level of excellence. Those of you who adore the Collins 75A series would probably not be impressed by the HROs, and yet, the HROs are held in awe by many. Many love the Hallicrafters series for their own reasons. I truly feel that the NC-300 deserves far more consideration as a truly excellent '50s era communications receiver that it has gotten to date.

By every standard that many of use to judge the performance of communications receivers, the NC-300 is a consistent winner. For even the most demanding of amateur applications, the NC-300 provides more than adequate selectivity, sensitivity and unexcelled stability for a product conceived during the heyday of American electronics manufacturing.

Excerpts from a recent bulletin from the United States Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Research Laboratories, Boulder, Colorado.

We are now in month 48 of solar cycle 22. Average activity levels and solar indices made a substantial increase in August. Daily values for 10 cm flux, sunspot number, and sunspot area reached some of the highest values observed yet this year. In particular, the 10 cm flux value of 315 observed 26 August was the highest since the 321 observed on 16 June 1989 and the sunspot number of 18 August (394 observed at Boulder) was the highest value since the 395 observed on 10 September 1989. The increases of these indices was sufficient to produce a slight increase in the smoothed values for February 1990. In response to this increase in the smoothed RI, the prediction model has risen a little for the next few months, however not enough to result in a new cycle maximum being predicted. The sharp rise in average RI over the last two months gives a definite impression that the possibility indeed exists for the solar cycle to rise past its July 1989 mark of 158.1. Although to do so it would require several more months of activity equal to that of August's levels.

The increase in activity observed in August may be the beginning of the peak that has been anticipated for several months and is expected to occur in September or October. In any case, this increase in activity lends credence to the belief that solar cycle 22 will have an extended maximum with numerous periods of both high and low activity through 1992.

**Editor's note:** I read this as good news for those of us who enjoy 10 meter activity.

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## AM From the Wilderness

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

In late August, Sam, W6HDU, and I camped out for three days in Yosemite National Park but didn't leave AM behind. Thanks to the magic of radio, we managed to participate in the nightly west coast AM net with the help of Bill, K7INK, and the Turlock Amateur Radio Club repeaters.

Sam brought along a venerable NC-57B receiver and we strung up a 20 foot antenna in our housekeeping cabin in Yosemite valley to monitor the bands. A complex radio link was set up for transmitting, starting with a 70 cm hand-held which relayed to the Yosemite repeater on 147.00 Mhz. That linked to the Turlock repeater on 147.03 to Bill's shack in Denair where we retransmitted the audio on 3870 Khz with his Johnson Viking Desk Kilowatt. The coupling to the Viking Desk was acoustical, but the audio reports were surprisingly good.

The first night, 27 August, we heard many 20 meter AM signals, including K6HQI, VE4BX, W3HM and W4PNM. Later that evening on 75, K6EOB, W9FGJ/7, KL7GKY and WB7NXX were worked. The second night WE5L was heard on 20, and W6PKW was added to the worked stations on 75. The received signals were very readable: just as good as at home.

The only interference was a hairdryer in the next cabin being used to dry out a camera that had fallen into the river. We were surrounded by hams in the housekeeping campground, with NN6A and WB6DZT on one side of us, and two more hams on the other with two HF SSB rigs and several verticals. The next time we go, we will bring a Viking Ranger and see how well we get out.

## AM FREQUENCIES

2 Meters - 144.4, calling freq., activity in most cities; 6 meters - 50.4 calling freq. 10 meters - 29.0-29.2 operating window; 12 meters - 24.985 calling freq.; 15 meters - 21.385 calling freq.; 17 meters - 18.150 calling freq.; 20 meters - 14.286 for the nightly SPAM net starting at 5:00 CA time; 40 meters - 7160, 7195, 7290 are the main freqs. Westcoast SPAM net every Sunday afternoon 4:00 PM on 7160; 80 meters - 3825, 3850, 3870 and 3890 are the main freqs. Westcoast SPAM net Wednesdays nights, 9:00 PM on 3870. Northeast SPAM net Thursday nights, 7:30 PM on 3885; 160 meters - sporadic summer-time activity but during the winter signals can be heard anywhere on this band.



Don Andersen, KV7S, relaxing after the 15 meter contest

### 15 Meter Contest Results

The first place winner in the Electric Radio sponsored "Weekender" on 15 meters was John Barcroft, WA6ZJC, with a total of 161 points. John worked 6 DX stations. Second place goes to Don Andersen, KV7S, with a total of 148 points. He worked 4 DX stations. Last month I reported that Don worked 148 stations. I erred when I just glanced through his log. Third place winner is Martin Heiman with 106 points. He worked 2 DX stations. Congratulations to John, Don and Martin. Certificates will be sent along in the near future.

### 10 Meter Contest The Week-end of Nov. 3 and 4th.

This 'contest' should be really something if the band holds up the way it is presently. There are some rule changes. Instead of a definite starting and finishing time, let's just start when the band opens and finish when it closes for both days Saturday and Sunday. And there will be no extra points for DX; just 1 point for each station worked. But let's remember that the stations you work for points do have to be on AM, at least for the contact. CU on 10, Barry, N6CSW/Ø

# LETTERS

Dear ER

Just thought I'd write you in answer to the letter written to ER by Ed English on the Arcturus #27 Coronet tube. After the release of the metal tube by RCA in the mid thirties some of the independent tube manufacturers like Ken-Rad and Sylvania also got on the bandwagon to produce metal tubes. Some of the small independents like Arcturus and Triad didn't want to plunk down the initial money for startup costs to produce the metal tubes like RCA so they produced a cheaper 'hybrid' type metal tube. This consisted of a smaller type glass bulb inside a metal container attached to the standard octal base. Arcturus called these the "Coronet" series and they were usually labeled 6C5MG, 6K7MG, etc. which stood for metal-glass. In addition to these octal based 6 volt types, Arcturus also produced some of the earlier 2.5 volt types with an octal base. These came with an adapter to convert from the octal base to a five-pin socket. The #27 tube that Ed has is one of these. These oddballs were only produced for a couple of years at the very most which explains why Ed had probably never seen one before. By the end of the thirties most manufacturers had gone from the production of metal tubes to the "GT" style. The "MG" octal based types are usually obtainable by going through junkboxes at hamfests or meets. The 2.5 volt types with the adapters are a bit harder to find but persistence in digging will usually turn some up in the same manner. These "MG" types are just one of the many oddball styles one can find in the interesting area of vacuum tube collecting.

John H. Walker Jr.

Dear ER

Did you see the article in the October, QST, page 54, "Why So Many Hams Carry a Torch for 10"? Pretty good article but there was no mention of the considerable AM activity at 29.0.

Also, the article indicates that I better not try to operate vintage equipment on 10 "...older equipment, especially with vacuum tubes, may dodder a little on it's highest frequency band", and the new solid-state rigs "...have fewer moving parts and no vacuum tubes to weaken or die.

What do you suppose happens to solid-state rigs near thunderstorms without expensive input and line protection? Transistors didn't get the reputation, "three legged fuse", for nothing. How many hams can fix their solid-state synthesized rigs when things go wrong? And even if you have the ability and equipment to do the repairs you may have to tear up the rig to replace the faulty component.

There's a big controversy going on about a "code free license". Seems to me they should keep the code and drop the theory requirement. All you've got to do now is open up the box and plug the appliance cord in the wall socket and connect the antenna. Ohms law? Who needs it?

Ken Morgan, KC5DW

To Bill Kleronomos, KDØHG

I enjoyed your article in Electric Radio [#17] of your visit in Lima to "The Fair", as we locals refer to it. It is really nice when I need a part, to be able to stop by The Fair on the way home from work. The urge to 'buy out' the candy store fades away when you feel like it is always available.

You might appreciate knowing we still make tanks here. We build the M1A1 Abrams tank, which I believe is the best tank in the world. We are ready for Mr. Hussein.

Steven Putman, N8ZR

Dear ER

Hi, I'm one of your cover to cover ER fans and daftly enjoy the little book. Albeit I am just a sporadic AMer, amer alsoer a CWer and occasional SSBer. (or is that BSer!!)

Anyway, I'd like to see you shift on your stool a little bit and cease once in a while showing these neat and tidy shacks and racks of old gear. It's too stereotypical of all Radio magazines, even though we readers enjoy it. But why not show the truth once in a while. You owe it to at least the AM fraternity to put in a picture of the worst, crappiest, most junked up table with just so-so working old radio gear on it. Lets be honest, most of us work and tinker in a clutter of parts, paper, gizmos and balderdash that only the owner knows what goes where and wherefor! Hey, the junky look makes us feel comfortable, in case we get tired of listening to how many micro or mega volts our 4-Z-one billions put out we can string paper clips, mix 807s or take apart our straight key. Most of our radio space is in a state of constant flux anyway. One day it's operate, the next it's repair, the next it's covered with fishing gear, the next a dumped parts box, the next a Pizza feast. So own up and publish the truth, as those very neat and clean Homebrew or revitalized rigs don't belong to us all.

Here is also an idea for an award specifically designed for MOST of us AM'ers. Call it WASS, for "Worked A Single State." One only need verification of one US state to attain the award, although it has to be on AM. With just 49 endorsement stickers if they want to try for more. Who ever works all 50 states on AM, ER springs for a permanent tattoo that says "AM-50" on the operators forehead. Who'll be first? Gotta run, I smell something burning in the radio room....

Frank Tapley, WB7NZI

**Editor's Note:** Next month a photo of Frank's hamshack; 'gizmos', 'balderdash', pizza and all. Right Frank?

Dear ER

Many of the memories of becoming a novice class licensee 22 years ago were rekindled looking at the pictures in ER and reading about equipment that I thought was 'old' back then. Within 2 weeks of getting the magazine, I saw a Heathkit HR-10B - my first receiver- for sale at a yard sale. I bought it for \$4. Now if I come across a DX-20, I'll be back in business.

I noticed that many of the individuals that place classified ads are looking for schematic diagrams and/or operating manuals. Here in the Washington D.C. area we have a club, "The Mid-Atlantic Antique Radio Club", that claims to have copies of every schematic for every piece of radio equipment that has been built since Maxwell was figuring out equations and Van Allen was trying on belts! According to one semi-reliable source - my boss - the club was given 2 school buses (yes, school buses) full of manuals. They cataloged the manuals on a (non-antique) computer and can provide copies.

**William T. Cross**

Write to the Librarian, Michael Prossie, 3658 Daisy Road, Daisy, MD 21797 or call (301) 854-6205 for information. The MAARC Newsletter says schematics are \$3.

Dear ER

As you are no doubt aware, we have a very extensive array of vacuum tube equipment, much of it recently acquired, though most has been a part of our family for at least 30 years. I have found the advertisers in ER (those to whom I have responded) to be absolutely circumspect and honest in description and reasonable in pricing of equipment. ER obviously attracts some very nice people. I think it's because ER is not a 'glitzy' publication and there is no sign of hysteria in it.

**Roy Luxemburg, N5QQM**

# The Swapfest Animal Does Shelby

by Marcus Frisch, WA9IXP  
Box 28803  
Greenfield, WI 53220

When QST arrives in my mailbox, the first thing I do is scan the Hamfest Calendar. People say that I always seem to find the best deals; hence the name, "Swapfest Animal". Even if I were a millionaire, I'd still attend the various fests in my area. The trouble with local fests though, is that all too soon they tend to become 'inbred'. You see the same faces, the same obsolete computer junk and the same old dented and rusty S-40B on 'Ralph Gumoutski's' table.

Desperately needing a break from two jobs and going to school full-time, the ad for the Shelby, North Carolina, fest looked pretty good. I contacted a fellow vintage hi-fi enthusiast friend of mine, Jim Godwin, of Roswell, Georgia. After he had 30 seconds to consider my latest brainstorm, he agreed to put me up for the duration.

Whenever I plan to attend a new fest, especially one where I will spend the evening, I make my reservations in advance. This includes lodging, my fest ticket and, if I'm selling, at least a four by eight foot table. If you don't know where to stay in that strange town that you are going to, call the local police department of the city nearest the fest. Use the non-emergency number if they have one. You will find that there are many nice privately owned motels that will outclass 'Tom Bodett', "leaving the light on for ya". I've used this method for years, and I've never been disappointed with a police department recommendation.

After a pleasant day and a half with Jim in his home in Roswell, discussing life and vacuum tube hi-fi gear (REAL

hi-fi glows in the dark too!), he too came down with that deadly virus, SWAPFEST FEVER. Soon we were on our way up I-85 to Shelby. We arrived in Shelby at 1700 hours Friday night. The swapfest was being held in the Cleveland County Fairgrounds, which is on the east side of Shelby, off of business US highway 74. The swapfest fleamarket area rivaled Dayton in size and layout. There were motorhomes and campers everywhere. I'm not into digital appliance rigs, so at this fest and any other, you'll have to ask someone else how big the new commercial section was. After about an hour of cursory shopping, it was obvious the big dealers were all waiting for Saturday. The prices had those 'Middle East Crisis' specifications: high and no dickering. Some of the dealers had rolled in there Wednesday night! Deciding that nothing was going to shake loose until morning, we went to get a bite to eat. Being that I'm from Milwaukee, Friday night is 'Fish Fry Friday'. We found a place in Shelby called, "The Fish Camp". The fish was excellent, the prices reasonable, and, if you pardon the expression, the atmosphere was bare bones.

Room service promised a wake-up call at 0330. I always have a wind-up alarm clock as a back-up in the event of a power failure, or a brain failure at the front desk. That happened to me once when I was attending a fest in Missouri and I haven't stayed at that motel since. The moon was still high in the clear North Carolina sky when we began the serious Shelby swapfest shopping Saturday morning. Parking had been a snap and the entire area was well lighted.



At 0610, I made my first major purchase of the day; a real nice Johnson kit Valiant, early style, for fifty dollars. The original manual came with it and the guy said that it has some high voltage problems. By this time, ALL old gear does. He was honest (something I'll comment about later), and I'd rather fix something myself, instead of undoing someone else's 'golden screwdriver'. Besides, I have plenty of spare Valiant parts.

At 0614, and not twenty feet from the Valiant purchase, I bought an excellent Hammarlund SP-600 JX-21 in the original cabinet with all the trimmings etc., for one hundred and fifty dollars. This one has a very neat engraved plaque on the front panel that says, "Reconditioned by the US Navy-Boston Naval Shipyard-April 1966". I think I would have bought it just for the plaque!

After these two adrenalin pumping purchases, I didn't buy anything else in the highly desirable boat anchor class. But that doesn't mean that it wasn't there! Walking around, I saw a very high quantity of nice vintage gear at reasonable prices. Maybe it was there because of the 'renewed interest' of some hams or that this "interest" hasn't hit the South yet. Either way, here is a sampling of the

things I saw: A very clean Heath DX100B sold for \$75, lots of Johnson Rangers starting at \$75 and to \$175, plenty of Collins A-Line and both winged and round S-Line. One guy had six pieces of Clegg gear and another had a complete Harvey Wells set-up; the Bandmaster Senior, the VFO, both power supplies (one with a dynamotor) and Z-match for \$200.

Drake had a big showing here, with greatly varying prices. I picked up a very nice 2-CS speaker for my SW4-A, for \$15. This, for me, was a real find. I've looked for a loose MS-4 or 2-CS at many fests. They are hard to find.

Heath gear, especially the Collins clone SB series, was in greater numbers here than any fest I've ever attended in the last twenty years. There was at least four complete 'Greifkit' stations, complete with the RF amp. All of it was at giveaway prices, and most

of it went home with the sellers.

In Hammarlund, I saw several HQ-100s at \$75 to \$125, an HQ-110 for \$60, an HQ-170 at \$150 and a PRO-310 at \$250. The SP-600 that I bought was the only one I saw there, but of course, there might have been others.

The National line let several NC-300s surface, in various conditions, and they



started at around \$50. I saw a real clean NC-303 sell for \$150 and a perfect NC-400 with the matching speaker sell for \$300.

W9AC [Bill Halligan, founder of Hallicrafters] would have been very proud at Shelby. There was lots of Hallicrafters equipment; I saw several SX-100s starting at \$100, a couple of SX-101s at \$150 and a nice SX-28 at \$150. An SX-73, in beautiful condition, with the correct matching speaker, sat there most of the day for \$200. Lots of the S-120 class general coverage stuff appeared also.

There wasn't much military equipment at this fest. I saw only one real nice Motorola R-390A at \$250 and a very clean stock BC-314 for \$45.

One of the most unusual things I saw in vintage gear was the number of orphan matching speakers. There was at least six S-100 and S-200 Hammarlund speakers. I saw a lighted Collins A-Line speaker sell for \$150. The most common speaker line of all was Hallicrafters; the "Big H's" were everywhere! Early ones, late ones, and even that style that Marty, AA4RM, says look right at home in a 1939 Trailways bus station. Shelby, was definitely the one stop matching speaker shop.

My friend Jim went along with me to Shelby to look for some test equipment. He is a big fan of Tektronix, and he wasn't disappointed. Lots of the dealers lined the walking rows with TONS of it. According to Jim, he got a super deal on a couple of plug-ins and a cart for his scope. The guy started at \$250 for the one plug-in, but Jim waited him out and talked him down to \$170 for all three pieces. I've known Jim for years, and I think that Shelby was like Christmas for him. Don't let his laid back Southern style fool you; I predict that he will be a li-

censed vintage equipment operator soon!

Tubes, the receiving type, generally went for between fifty cents to a dollar. They were very plentiful, and there was lots of the mil-spec white boxes. The QRO tubes were there also, although not as many as I've seen at other fests. 4-400s started at around \$50 for a guaranteed pullout, and I didn't see anything exotic like an 833. There were quite a few of the modern Eimac ceramic type, standing out proudly in their big yellow boxes.

The real difference I noticed about Shelby, as compared to the fests I attended in the mid-west, was how polite and honest everyone was. Without exception, every time I purchased something heavy, there was an offer to help carry it to my car. And, the address of the seller was given up front, not something I had to ask for, and be reluctantly given. Southern hospitality is alive and well. Despite the beautiful weather, many of the 'good ol' boys' wanted me to sit in the shade and talk AM. It was "yessuh-nosuh" all the time. Speaking with a drawl became second nature. Some people even knew who I was by the WA9IXP name tag I had on, and remembered the ads looking for McIntosh hi-fi gear over the last fifteen years.

It was a swell fest! I'll be there next year for sure! In a later article I'll reveal some of my cleaning techniques that I use to recondition equipment. I plan to use the Valiant I picked up at Shelby. As far as my hamfest horsetrading secrets, I guess that you'll just have to learn those on your own!

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# The Return of the Shortwave Mobile Receiver

by Bill Kleronomos, KDØHG

POB 1456

Lyons, CO 80540

**We all have solid state AM/FM/ cassette decks in our cars, why not add shortwave capability?**

As far as I know, there hasn't been an automotive receiver capable of shortwave reception marketed since the era of the Gonset/Elmac in the '50s or '60s. It was my pleasant surprise, therefore, to see literature for the new Phillips DC 777 "Car Audio Combination" at a Denver stereo equipment store.

Lets get the 'trivial' observations over with first. The DC 777 is a first rate AM/FM cassette deck providing a rated 50 watts RMS audio power (2x25 W). Now, on to the nitty gritty for us hams and SWLs. The DC 777 also covers the Longwave (144-288 Khz) and HF (3170-21910 Khz) frequency bands with some of the most clever and innovative features I've seen in any receiver.

Frequency entry is accomplished via a little keypad which retracts into the face of this dash mount unit when not in use. Hit 3885, Enter, and you're listening to the evening SPAM net. There is scanning capability over the HF spectrum in 5 Kz steps, or manual entry or fine tuning can be done in 1 Khz steps. A little plug-in remote control is available as an accessory. There are 20 memory frequencies available for shortwave which can be preset - a joy while occupied with driving. Philips also has cleverly provided a triple timer that can be used in conjunction with the memories. For example, many international SW broadcasters are on different frequencies at different times of the day and night. All one needs is to enter a station's times for given frequencies - then let the DC 777 do the thinking. For example, program one multi-level memory under 'BBC'. Then, when

you want to hear the latest from London, the receiver notes the time and automatically selects the appropriate frequency used by the BBC at that hour. This receiver can be programmed with up to five such frequencies per SWBC station. The timer can also be used to cancel whatever station you're listening to and shift the unit to any frequency at any time you select, so one doesn't miss a sked or newscast, for instance.

Other features include an IF bandwidth that is automatically adjusted depending on signal strength and/or the setting of the treble control. Cutting the treble automatically narrows the IF bandpass for best S/N and interference rejection. Same with weaker signals. An 'auto store' circuit automatically notes the five strongest AM and FM stations in a given locale for fast station selection while travelling in unfamiliar areas. There is a multi-function LCD display and a 'beep' tone for tactile feedback as you push buttons. Alas, the DC 777 has no product detector; one is limited to the reception of AM signals on HF.....

For all these features, and many more, the DC 777 has a list price of about \$400. It can be found at discount stereo stores in the \$300 range. But, think of the entertainment value with one of these in the dashboard and an ART-13 in the trunk with the remote control box bolted under the dash!

For more information, write to Philips Car Stereo, 32605 W. 12 mile Road, Suite 308, Farmington Hills, MI 48334

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## TINY 160 METER AM RIG

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

Before WW-II many hams built low-power AM rigs so they could chat with their home-town buddies. The band of choice in most cases was 160 meters. A few watts input was generally found adequate. One rig, described in QST (Jan. 1937) by W3CHO (Walter van B. Roberts of RCA) used a 76 crystal oscillator driving a 43 final. Another 76 was employed as a speech amplifier driving a second 43 as modulator. The 43s were connected in series (cathode modulation) so no modulation transformer was required. A 25Z5 connected as a voltage doubler provided the plate supply. QSOs were R9 at 10-20 miles and R7 at 70 miles - all daytime.

The 1937 edition of "Amateur Radiotelephony" by Frank Jones described a 5-10 watt rig using a 6L6-G oscillator, Heising modulated by another 6L6-G. The plate, but not the screen, was modulated so that the oscillator would continue to oscillate even at the trough of the modulation envelope. This rig used a motor-generator plate supply and was intended for emergency work.

In the Dec. 1921 QST, there is a description of a 1-tube AM rig using one of the old Western Electric tennis ball shaped vacuum tubes (probably a VT-2). This rig used absorption modulation (carbon mike) and operated on 375 meters (800 Kcs). Using 120 volts from a homemade battery, 5ZX of Houston, Texas, enjoyed contacts up to 97 miles!

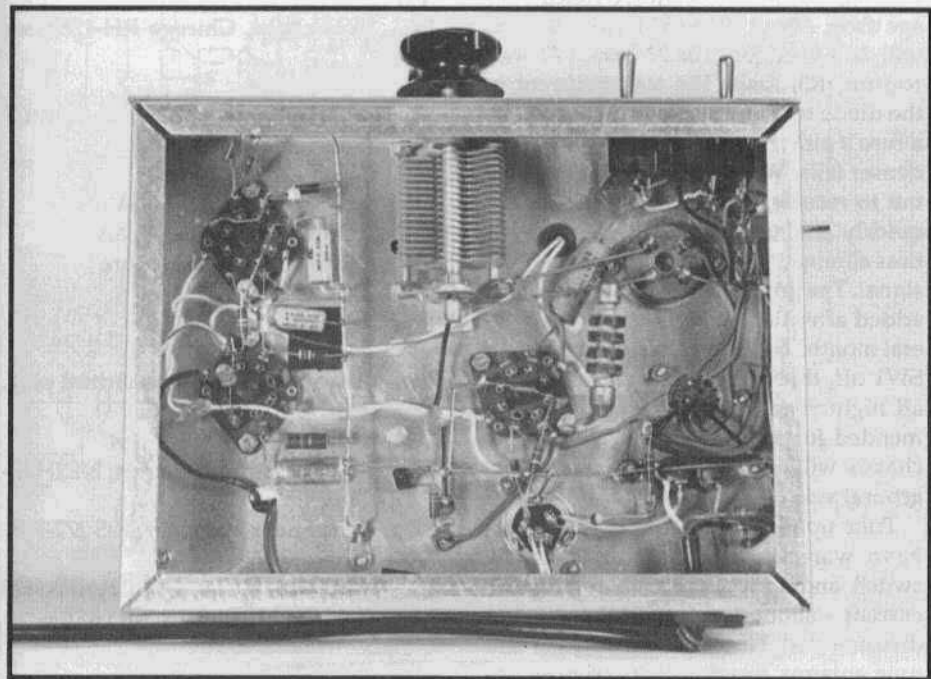
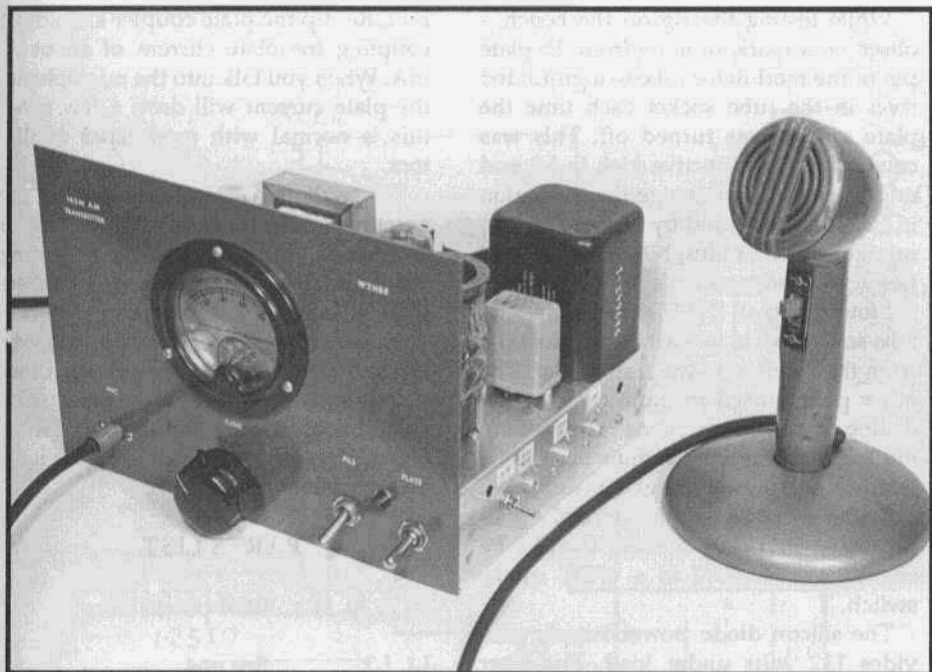
My rig, see Fig. 1, uses a 50L6-GT (V3) as a modulated oscillator. I copied Jones' idea of modulating the plate but not the screen so that the oscillator will continue to oscillate even at the trough of the

modulation cycle. This is further enhanced by using the Jones' regenerative oscillator circuit. Normally, it is not considered good engineering practice to amplitude modulate an oscillator because unwanted frequency modulation may occur. In my tests, the incidental FM was less than 30 hertz at 75% modulation and is considered acceptable in this application. Use a good, active crystal and if you have trouble, try a different value for C2. More capacitance gives less regeneration and less danger of non-crystal controlled oscillation.

The tank tuning condenser, C1, is a Hammarlund MC-250-S chosen because it would fit below the 2" deep chassis. It is insulated from the chassis by means of a pair of fiber washers - one having a shoulder to center it in the mounting hole.

The tank coil, L1, consists of 43 1/2 turns of No. 18E wire wound on 1 1/2" diameter 4-prong plug-in coil form. The antenna coil, L2, is 6 turns of No. 18E wire. Cover L1 with a single layer of clear plastic sealing tape. Wind L2 over the bottom end of L1 and use more tape to hold it in place. Depending on your antenna and antenna tuner, you may need more or fewer turns at L2.

The speech amplifier, V1, is a 12SJ7 high-gain pentode stage. I use a cheap crystal microphone found at a hamfest and the combination yields 10 to 12 volts peak-to-peak at the grid of the 50L6-GT modulator, V2. A gain control was not found necessary. The modulation choke, L3, is not critical. I used what I found in my junk box. It should be able to handle 85 mA. About 5H should be fine.



While testing the rig on the bench, I observed a spark jumping from the plate pin of the modulator tube to a grounded rivet in the tube socket each time the plate switch was turned off. This was caused by the inductive kick in L3 and might eventually damage the insulation in L3. This was cured by connecting two miniature neon bulbs, N1 and N2, in series across the modulation choke.

I found a small DPDT relay in my junk box so I used it to switch the antenna from the receiver to the transmitter. The other pole is used to mute the receiver during transmission. Some receivers are muted by grounding the mute bus - some by opening (ungrounding) it. Switch SW3 provides a choice of either mode. An alternative to using a relay would be change switch SW2 to a 4PDT rotary switch.

The silicon diode power supply provides 112 volts under load. The filter choke, L4, is not critical. Pick one that will carry 85 mA without too much voltage drop. About 10 to 15 H and 300 ohms will do a good job. The 27 ohm, 1/2 watt resistor, R3, limits the surge current in the diode to a safe value and also acts as a fuse if either the diode or the filter condenser fails. When switching from transmit to receive, the 100 ohm resistor, R2, quickly discharges the filter condenser thus eliminating any annoying hang-over signal. The green neon indicator, N3, was added after the rig had been in use several months because I often forgot to shut SW1 off, thus letting the filaments burn all night. The 3-wire ac cord is recommended for safety as it insures that the chassis will always be connected to the ground side of the ac line.

Tune up is simple. After the filaments have warmed up, turn on the plate switch and tune C1 for a dip in plate current - about 3 mA with the antenna disconnected. Now connect antenna and tune antenna coupler for maximum antenna current or an increase in plate cur-

rent. Re-dip the plate coupler and adjust coupling for plate current of about 27 mA. When you talk into the microphone, the plate current will drop a few mA - this is normal with modulated oscillators.

The (radiation + loss) resistance of my antenna is 12.5 ohms at 1.9 Mhz. I get 3 A antenna current so the rig is putting out about 1 watt. The Kenwood reflectometer says 2 watts but I suspect it is very generous. I've worked my friend Jack, WB2KMW, a couple dozen times (7 miles distant) and we've had solid QSOs except during bad thunderstorms. Signal strength and quality reports have been excellent.

## PARTS LIST

J1, J2, J3, J4.....RCA phono jacks

L1, L2..... See text

L3.... 2.3 H choke, Stancor C-2304, see text

L4.... 15 H choke, Chicago RH-1585, see text

K1....DPDT relay, 115 V ac coil, or 4PDT switch, see text

SW1.... SPST switch, 115V, 6A

SW2.... DPDT switch, 115 V, 6A

SW3.... SPDT switch, miniature

C1... See text

P1... 3-wire cord set with polarized plug. R-S 278-1258

N1,N2... 1/4 watt neon lamps, NE2H, R-S 272-1102

N3.... Green neon indicator, R-S 272-708

Y1... 160 meter crystal, CW Crystals, 570 N. Buffalo St., Marshfield, MO 65706

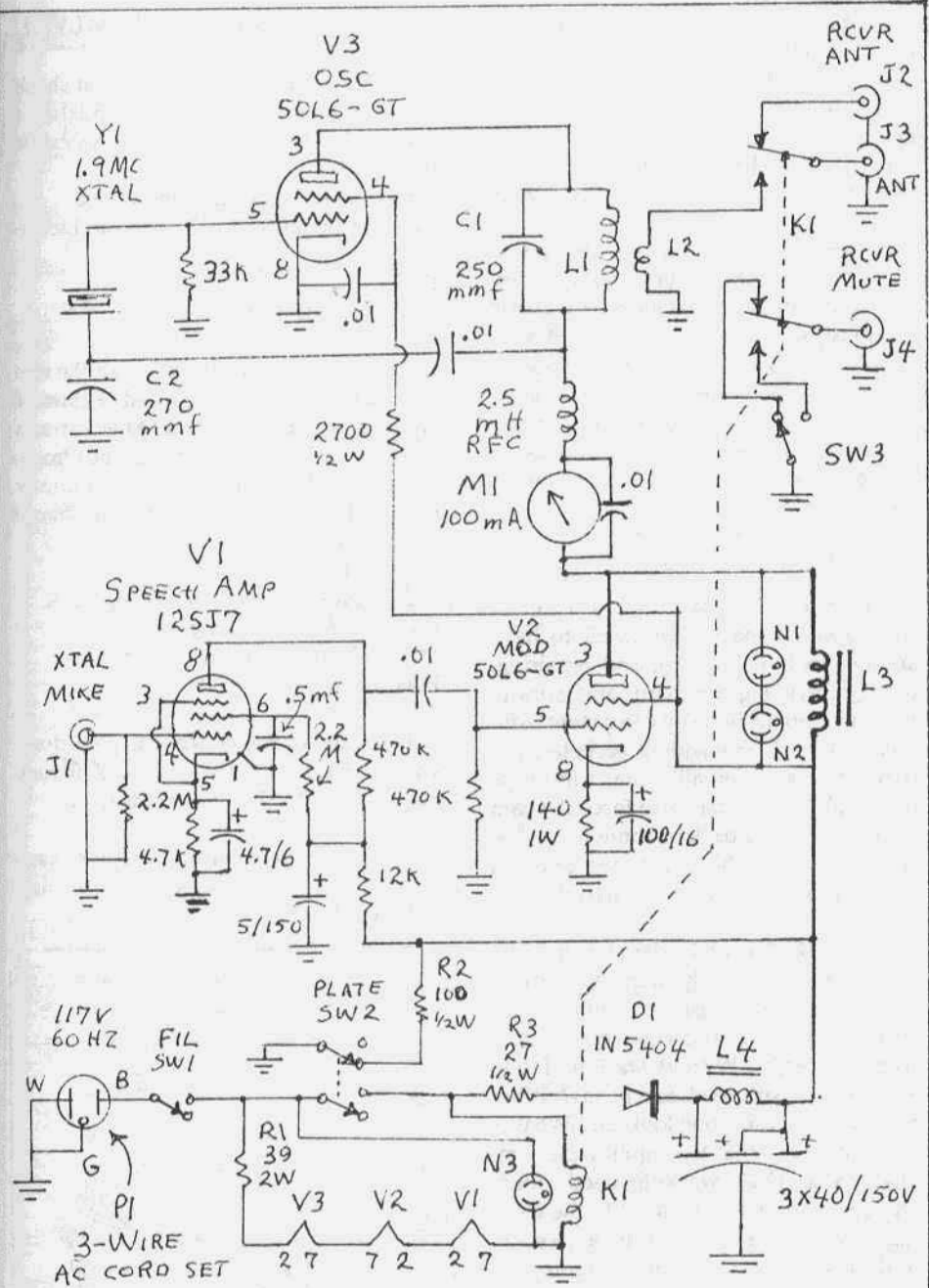


Fig. 1. The 3-Tube 160 Meter AM Rig.

### ER in Uniform from page 8

aircraft's mission required frequent channel changes, it was probably a reliable set as well. As the last AM liaison transmitter used by the Navy, it's a fine example of the AM radio art and if it had been calibrated directly in frequency it would be one of the finest military radios ever built.

Information on 400 cps power and on rebuilding the ARC-38 (and similar) crystal ovens will be in next month's column. If you want to put an ARC-38 on the air, drop me an SASE and I'll send you my notes on other problems and solutions.

Next month we'll talk about some other ARC-38 design features and issues which come up when putting one on the air.

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### Editor's Comments from page 1

This recession may be good for amateur radio. It may force us all to have another look at building and repairing. It may force a great many amateurs to become more technically competent. And it may banish the widely accepted notion (once and for all) that tube type gear is all junk. It may also force the ham magazines to go back to some of the basics and forego the usual fare; antenna stories, product reviews, and contest results.

Bill, K0OHG, and I have had some conversations recently about the practical aspects of going back to vintage gear. How much would it cost to set up a working AM/CW/SSB station if one were really strapped for funds? What equipment should one look for? What is the best buy? What test equipment is really necessary? Do we really need expensive tuners and wattmeters? In the coming months we're going to explore some of these questions? For the newcomer to vintage radio this will be very helpful... to the oldtimer it'll be interesting. Stay Tuned. On to 19..

### Input for ER from Rick, K8MLV/Ø

A nice colored map for the ham shack of the area around the Hawaiian Islands is available free of charge on request. It is 23" by 31". Write to:

State of Hawaii Information Office  
Dept. of Business and Economic Development  
POB 2359  
Honolulu, Hawaii 96804

A very impressive book (about the size of a paperback novel) entitled "Tables of Frequency Allocations and Other Extracts From: Manual of Regulations and Procedures for Federal Radio Frequency Management" is available free of charge by request. Simply write to:

Executive Secretary, IRAC  
U.S. Department of Commerce, NTIA  
Room 1605, HCHB Bldg.  
14th and Constitution Ave., NW  
Washington, DC 20230

This winter 10 meter season, why don't you 20 meter buffs use ur 14.286 rock and operate 28.572?? Good idea, eh?

Has anyone noted on the weather channel that Harrison, Ark. on the radar map is denoted as HRO?





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## DEADLINE FOR THE Nov. ISSUE: Nov. 5

**WANTED:** Coils for AC model SW-3 receiver. Also need diagram or information on pre-war Harvey Radio Labs T-90 amateur transceiver. Leland Smith, W5KL, Jasper, AR 72641.

**WANTED:** 6 Kc filter for Collins 75A-4 receiver and meter for Johnson Valiant II transmitter. Dave Hunt, WA6GNZ, 38733 Stivers St., Fremont, CA 94536. (415) 797-3933

**FOR SALE:** Hammarlund HQ-160 receiver w/manual - \$75; HQ-110C w/manual - \$75. Both in good condition. Plus shipping. Burt Ostby, 2424 F-30, Mikado, MI 48745. (517) 736-8020

**WANTED:** Sam's transistor service manuals TSM-1 thru TSM-50. All numbers needed. James Weil, 15915 Armada Ctr. Rd., Romeo, MI 48065. (313) 784-9860

**WANTED:** Eldico TR-75-TV transmitter, complete unit or parts. All replies answered. Stanley Klick, W3YGC, 545 Antietam Dr., Hagerstown, MD 21740. (301) 733-8162

**WANTED:** Cabinet, bottom plate and copy of schematic for Hallicrafters SX-15 Sky Challenger receiver. Also need schematics for S-41G and National NC-88. Steve Johnston, WD8DAS, 2321 Calvin Ave., Norfolk, VA 23518. (804) 583-8525

**FOR SALE:** RME-45, matching speaker, plays/looks nice but tuning capacitor needs repair - \$75; SX-101 receiver, nice - \$125; HP 130-C oscilloscope - \$85; lots of WW-II military radio parts, pieces, accessories, components, connectors, aircraft, vehicle field sets, etc. SASE for list. Henry Engstrom, POB 5846, Santa Rosa, CA 95402. (707) 579-2070

**WANTED:** Transistor radios from the '50s and early '60s. Cash or trade. James Weil, 15915 Armada Ctr. Rd., Romeo, MI 48065. (313) 784-9860

**WANTED:** Manual or schematic on military (?) National NC-183D. Has rack mount, more tubes and front panel controls than stock NC-183D. Will pay copying costs. Mike Blazek, 16737 Monitor, Baton Rouge, LA 70817. (504) 753-7194

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**WANTED:** Help! I need a clean, unmodified Collins 516F-2 supply in perfect working condition. I have been frustrated for years by "clunker" 516F-2s. Please state condition and price. Thank you. Richard W. Parker, KB2DMD, 21 Blue Grass Dr., Trenton, NJ 08638. (609) 883-3255

**WANTED:** Collins filters: F455J-15, 1.5 KHz RTTY bandwidth; F455J-60, 6.0 KHz for AM and F455J-31, 3.1 KHz for SSB (ugh!). Postcard with price and availability will do or call Roy, N5QQM, 1336 Sherwood Forest Blvd., Baton Rouge, LA 70815-5330. (504) 272-2563; FAX: (504) 272-4913

**WANTED:** Manuals for Heathkit Mohawk receiver (RX-1) and SSB adapter (SB-10) for the Apache transmitter. Kevin Hogan, KAS5TE, 405 S. James, Monahans, TX 79756. (915) 943-9313

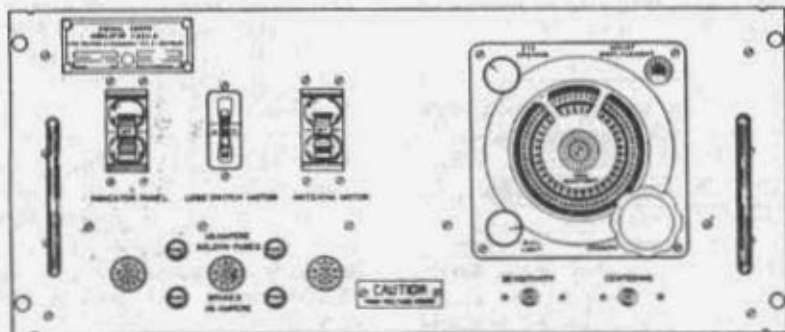
**FOR SALE:** RCA model WO33B oscilloscope, real nice - \$23; Heathkit audio oscillator Mdl AG7 - \$13; Hallicrafters S-108 general coverage receiver - \$55; National MB-40L tuner - \$11. Ward Becht, 625 Tufts Ave., Burbank, CA 91504. (818) 842-3444

**FOR SALE:** Do you need tubes, parts, schematics? Send SASE. Nick Marshal, 2207 Peachland Ave., Sebastopol, CA 95472.

**WANTED:** National NC-303 and Hallicrafters SX-115. Must be very clean to mint. Jim Geer, WB5LXZ, 604 King Dr., Bedford, TX 76022. (817) 268-1985

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**WANTED:** Gelson receiver, model G-250. D.H. Moore, POB 521, Palo Alto, CA 94302. (415) 322-272



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**WANTED:** R-220 receiver in good working shape; also rack mounting brackets for SRR-13 & R-1051. Edward J. White, WA3BZT, 809 Seymour Rd., Bear, DE 19701-1121. (302) 322-1313

**WANTED:** Machine shop work. Knobs, shafts, bushings etc. made to your sample or drawing. Reasonable. Jim Dill, Box 5044, Greeley, CO 80631. (303) 353-8561 even.

**WANTED:** Wierd tubes (duds ok) for display. Marcus Frisch, WA9DXP, Box 28803 Greenfield, WI 53220-0803.

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**FOR SALE:** Viking Valiant - \$250; R460/UR (HRO-50) - \$250; Heath DX-40 - \$75. Cliff Fleury, 64174 Tumalo Rim Dr., Bend, OR 97701.

**FOR SALE:** Collins: selling my collectors quality KWS-1, serial #1124. Absolutely mint, documentation, cables, 4CX250Bs, Collins relay, solid state recs., spare finals, original manuals and shipping crates - \$1200 firm, cashiers check or MO. Larry, W5VHP, (918) 333-2891

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**WANTED:** My first commercial receiver, a Hallicrafters Sky Buddy S-19-R. Thor Lyford, W0QIK, 1354 Arden View Drive, St. Paul, MN 55112. (612) 636-1857

**FOR SALE:** Miscellaneous odds and ends, antique radios and parts. LSASE for list. Hidyne Research, POB 3342, Williamsport, PA 17701. (717) 326-2148

**WANTED:** RCA AVT-15 transmitter; AVA-120 trailing wire antenna reel and related hardware; SCR-319 items. Ken Gillis, 27217 Garden Way, Franklin, MI 48025. (313) 390-6873 days.

**WANTED:** Globe Scout 680 (680A), Viking Ranger I/II or Viking Challenger. Prefer factory-wired. Must be excellent physical and working condition. Bernie, WA6HDY, 452 Oxford Dr., Arcadia, CA 91007. (818) 445-2891

**WANTED:** Johnson Ranger II tx or any identical AM tx in working condition; also Japanese WW-II Chi-ichi rx which is similar to HRO-5. Stan Tajima, JA1DNQ, c/o Toshiba, 701 Westchester Ave., White Plains, NY 10604. (914) 949-7750

**FOR SALE:** 450 military/commercial radio/radar manuals, 1938-1965. Many WW-II, Collins manuals plus military electronic handbooks. Send 25 cent stamp for list. Rainy Day Books, POB 775, Fitzwilliam, NH 03447. (603) 585-3448

**WANTED:** US amateur callbooks 1920 thru 1936 plus 1939-1940-1941-1945-1955. Bob, W4JNN, POB 166, Annandale, VA 22003. (703) 560-7161

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**FOR TRADE:** NIB (2-18-43) WW-II Navy BC-645 IFF set with aircraft mount. Was secret during WW-II. Trade for WW-II items. Sam Hevener, W8KBF, 3583 Everett Rd., Richfield, OH 44286. (216) 659-3244

**FOR SALE:** Good used 813s - \$15; 811As - \$10; 866As - \$5; 5763s - \$5; 6L6s (metal) - \$3; 810s - \$20. SASE for list. Gary Cain, 1775 Grand #302, St. Paul, MN 55105.

**FOR SALE:** BC-191 with tuning units; Heath monitor scope SB-610 - \$60; Johnson Adventurer - \$50; Heath HX-10 - \$40; Knight all band vfo - \$40; Radio Engineers Handbook, 8th edition - \$15; Johnson 10 meter vfo, new - \$20; Gonset mobile converter - \$15. Plus UPS. R. Olmsted, 608 W. Thompson Ln., Murfreesboro, TN 37129.

**WANTED:** Collins SC-101 Station Control; 312A-1 Control/Speaker units; 310A-series speaker/phone patches. Written offer or leads appreciated. Roy, N5QQM, 1336 Sherwood Forest Blvd., Baton Rouge, LA 70815-5330. (504) 272-2563; FAX (504) 272-4913

**WANTED:** QSTs before 1930; books, magazines about audio, radio, electronic tubes; Electric Radio #1(May, 1989). All this for my own collection. not for resale! Michel Charest, 9347 Lajeunesse, Montreal, Quebec, Canada H2M 1S5. (514) 389-8537

**FOR SALE:** 70 years accumulation. 1920's radios, tube testers, signal generators, meters, transmitter/receiver parts, Radio Master catalogs, flyers, books, manuals, linear amplifiers, 48 pages - \$1. F.H. Yonker, W2IBH, 7 Old Farms Rd., Saddle River, NJ 07458. (201) 825-1895

**FOR SALE:** Custom made plug-in coils, 4,5, and 6 pin, 1 1/4" dia. by 2 1/4" - \$3 each; Gonset 6 meter Communicator, receiver/transmitter, untested, looks ok - \$100 ppd; Simpson AC VTVM, maybe model 715, some printing rubbed off panel, works - \$25; CDE 8 mfd 1000 VDC capacitor - \$5 plus shpg; smallest variable voltage transformers, 10 to sell - \$15 each plus shpg; NIB Aerovox Hyvol 4 mfd 1000 VDC capacitor, 2 to sell - \$10 each plus shpg. James Fred, R1, Cutler, IN 46920. (317) 268-2214

**FOR SALE:** Zenith Transoceanic H 500, suitcase style radio, super condition - \$150. Frank Vardeman, N4SUJ, (813) 871-2134

**WANTED:** Collins 75A-4 receiver in good working condition and good appearance with speaker. Don Landes, WX4C, Rt 6, Box 177, Harrisonburg, VA 22801. (703) 434-5710

**WANTED:** Will trade 75A-4 with 6 kc AM filter for Johnson Viking 500. David Johnston, K9HDQ, RR #1, Box 108-C, Daleville, IN 47334. (317) 354-2884

**WANTED:** Johnson Courier in very good condition or better and a Johnson KW matchbox. Gil, N4QAS, 101 E. Holly Ave., Suite 3, Sterling, VA 22170. (703) 430-5555

**WANTED:** Collins exciter 310A; BC-191 transmitter; manual or circuit of Collins 30K-2 and 30K-3. Fenton Wood, 109 Shoreline Dr., S.H., Malakoff, TX 75148.

**FOR SALE:** Tubes, new in box. Please send \$1 for list of 300+ tubes. Refundable. Wilson Hauck. BTB. Inc. E.R., 6820 Stout Rd., Memphis, TN 38119

# CLASSIFIEDS

**FOR SALE:** HRO-60 with all coils, speaker, mint - \$300; BC-610E with BC-614 and manual - \$150 or trade for 75A-3 or Ranger. Chuck Graves, KØRFQ, (417) 869-6884

**WANTED:** Collins Radio 312B-4 console (winged emblem) and type 6000 electron tube. Bill Mills, KC5PF, 1740 Tonys Court, Amissville, VA 22002. Office: (703) 818-3955 Home: (703) 937-4090

**FOR SALE:** Johnson Thunderbolt, beautiful condition - \$450; Ranger I, nice - \$150. SASE for others. Parker, W1YG, 87 Cove Rd., Lyme, CT 06371. (203) 434-7783

**WANTED:** Top (ceramic) wafer for Harvey Wells Bandmaster Deluxe bandswitch. Chuck Graham, K6KDZ, 20335 Casa Loma Rd., Grass Valley, CA 95945. (916) 273-6847

**FOR SALE:** Webster Bandspanner - \$65; 3.1 Khz filter for 75A-3 - \$50; HRO-60 crystal calib. - \$30; parting out HRO-60, SX-42, Viking II, Valiant. Joe Sloss, K7MKS, 4732 119th SE, Bellevue, WA 98006.

**WANTED:** Collins 75A-4 speaker, phone patch/wattmeter/spkr desirable; manuals for KWS-1 and 32V-3; National speaker for HRO50-T-1; panadaptors, Radiophone Co. model 44 "Band Scanner", Hallicrafters SP-44, Navy RBV-2, Panoramic model TCA-2, T-200, Panoramic PR-1; premium paid for Hallicrafters SX-88s and SX-42s in excellent to mint condition, also for SX-32. All inquiries will be answered. S.R. Luxemburg, N5QQM, 1336 Sherwood Forest Blvd., Baton Rouge, LA 70815-5330. (504) 272-2563; FAX (504) 272-4913

**WANTED:** Pre 1950 ARRL handbooks. WA7NNH, 1024 Main St., Boise, ID 83702.

**WANTED:** Very old or unusual Hallicrafters equipment, entire 1934 "H" and "Z" line of Silver Marshal, parts, memorabilia and manuals. Chuck Dachis, "The Hallicrafter Collector", WD5EOG, 4500 Russell Drive, Austin, TX 78745.

**WANTED:** USAF technical manual TO-31R2-183-3 (KWM-2A schematics), Collins 516E-1 or 516E-2 power supply manual. U. Joe Orgrero, Box 32 Site 7 SS-1, Calgary, AB, TEM 4N3 Canada

**FOR SALE:** Early Silver test equip. in good condition, \$25 each plus UPS or best offer: Model 906 FM/AM signal generator; Model 904 Condenser/Resistance tester; Model 905 "Spark" Signal Tracer; Vomag Universal VTVM. Wes Chatellier, W5DPM, 1950 Chevelle Dr., Baton Rouge, LA 70806.

**WANTED:** E.F. Johnson Viking Navigator; Speed-X bug; pre-war ham receiver; early CW wireless gear, books, keys etc; Western Electric 211-D. Brian Roberts, 3068 Evergreen Rd., Pittsburgh, PA 15237. (412) 931-4646

**WANTED:** For Viking Ranger II: crystal cover with knob and a 9 pin plug, Victor Gregowski, WD8DWR, 3635 Orvall Dr., Port Huron, MI 48060.

**FOR SALE:** Hallicrafters HT-32, not working but good transformer - \$75 OBO.  
**WANTED:** Collins 32S-1 or 3 for parts or a nice working one. G. Stevens, WØATA, Box 704, Longmont, CO 80502-0704. (303) 776-9036

**FOR SALE:** Hallicrafters SX-99 - \$70; BC-342 - \$65; BC-348 - \$65; 2 KW isolation xfmr, 115 to 115 volts - \$40; 813 and 805 tubes - \$20 each; beehive standoff insulators - \$1 each; KW linear amplifier with single 4-400A, precision built RF deck - \$200. Levy, 7600 Blanco Rd., # 6086, San Antonio, TX 78216. (512) 341-9549

**FOR SALE:** Used technical books: radio, electronics, math, military, magazines, etc. \$1 for large list. Stamps OK. Softwave Communications, Dept. ER, 1515 Sashabaw, Ortonville, MI 48462.

**WANTED:** Accessories for R4C: speaker; SW xtals and AM filters. Levy, 8 Waterloo, Morris Plains, NJ 07950. (201) 285-0233

# CLASSIFIEDS

## SKYPOINT HAM CENTER

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- \* Largest inventory of used gear on the East Coast
- \* Large inventory of vintage and nostalgia rigs
- \* Rig repairs, modest rates and quick turnaround
- \* Newrigs, station accessories, antennas -- no problem

**FOR SALE:** AX-9909s: have 4 good ones but not in boxes, prefer to sell in pairs - best offer; Hallicrafters SX-73 receiver, good condition with complete service manual - best offer. Steve Miller, WA3JTT, 909 Walnut St., Erie, PA 16502. (814) 454-8990

**WANTED:** Will provide loving home for your good quality HQ-145 or HQ-180. Ken Morgan, KC5DW, 9000 Trumbull Ave., SE, #76, Albuquerque, NM 87123. (505) 293-6196

**FOR SALE:** Four HK54s in original condition - make offer. **WANTED:** Heathkit VF-1 vfo, with manual, in near mint condition as possible. Willard Wallace, W8YJO, 2833 E. Shaffer Road, Midland, MI 48640. (517) 689-3512

**WANTED:** RT-58/ARC-12; BC-966; BC-652; BC-923 and R-252 or R-252A/ARN 14. Prefer unmodified. Leroy Sparks, W6SYC, 924 W. McFadden Ave., Santa Ana, CA 92707. (714) 540-8123

**WANTED:** Collins mechanical filter, part #F455Y-60 (526-9340-00). Bill Kleronomos, KDØHG, POB 1456, Lyons, CO 80540. (303) 823-6438

**WANTED:** 3-wide ARC-5 transmitter rack and shockmount; 3-wide ARC-5 or SCR-274 receiver rack and shockmount; T-15/ARC-5 transmitter; TN-6/ARC-5 loading coil and MT-159/ARC-5 mount; any other ARC-5 or SCR-274 accessories; PP-279/ARN-30 power supply. David Ross, 2502 Amethyst Drive, Santa Clara, CA 95051. (408) 984-1929

**WANTED:** Cabinet CY-917/URR or CY-979/URR or equivalent for R-390. J. Lucas, N1ZA (516) 589-1051 evenings.

**WANTED:** 4 Kc filters for R390A: F455N40. Ernie, KØOCC, 8240 Grogan Ferry Rd., Atlanta, GA 30350. (404) 396-1312

### ER Parts Unit Directory

At this point the directory has about 70 units in it and it's growing daily. If you need a part for a vintage restoration send \$1 and an SASE for the list. If you have a parts unit consider putting it on the list. Your dead unit can help bring others to life.

Electric Radio - the first year - all twelve issues delivered First Class in a padded envelope - \$25. Individual copies \$2.50 delivered. #1, #2, #5 and #11 are reproductions.



**WANTED:** Navy RAX CG-46115 LF receiver and BC-223 AX transmitter. Steve Davis, KD2NX, 2372 84th St., Brooklyn, NY 11214. (718) 265-2390

**WANTED:** National HRO-60T accessories: HRO-60TS speaker; SOJ-3 Select-O-Ject; Coils: F, AA, AB, AC. I will pay top \$ for any or all of the above. Frank DeCoito, Star Rt. #2, Box 242, La Honda, CA 94020. (415) 948-2045

**FOR TRADE:** NC-183D, matching speaker, original manual, good condition with a few scratches, good operational but probably could stand tweaking up. This is above average unit. **WANTED:** Good Ranger II in similar physical condition. Bill Shields, W4OWR, 516 College St., Madisonville, TN 37354. (615) 442-1318

**WANTED:** Riders Manuals Vol. 1, 2, 11, 12, 18, 20, 21, 22, and 23. Jim Barrows, 15121 41st Ave., SE, Bothell, WA 98012. (206) 337-4880

**FOR SALE:** The following collectible vacuum tubes, untested, but all have filament continuity and look new: Chatham Electronics, JAN 2050 and JAN 5R4WGA - \$5 each; GE 6550 - \$5; Amperex 5894 and 7377 - \$15 each; no name or number, seems to be UHF type - \$5; 2 Raytheon JAN CRP 3B 24W - \$5 each; Western Electric 505313 - \$10; NU 829 - \$20; 2 RCA 815, age hardening cracks in metal shell - \$25 each; RCA tube, number 624 scratched on base - \$5. Add \$2 shpg. for 1 tube or \$3 for 2 or more. James Fred, R 1, Box 41, Cutler, IN 46920.

**FOR SALE:** Transmitting/receiving tubes, new and used. Exa: OD3, 3B28, 4X150, 4X500, 4-65A, 4-125A, 6A3, 12A6, 45, 807, 809, 810, 811, 812, 815, 829, 832, 836, 872, 1619, 1625, 5894, 6130, 6146, 9003 plus others. LSASE for list. I also collect old and unique tubes of any type. Maybe you have something to trade? John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455

**WANTED:** A copy of the Collins Story, "The First Fifty Years". Larry, NE8V, (513) 981-2462 or callbook address.

**FOR SALE:** Bigelow Electronics has been in the electronic mail order business since 1954. Vintage parts and equipment available. Request free "Vintage Flyer". Bigelow Electronics, Box 125, Bluffton, OH 45817.

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

**FOR SALE:** Antique radios, parts, tubes, books, 150 panel meters, knobs, amateur, test equipment, transmitter crystals, etc. 13 lists. SASE + \$2 cash (no checks). Richard & Rose's Radio Mart, POB 691443, Tulsa, OK 74169.

**FOR SALE:** Collect keys? You'll enjoy WIMQ's illustrated references. "Introduction to key collecting", 64 pages - \$9.95, "Vibroplex Collectors Guide", 87 pages - \$14.95. Add \$2 s/h to total. See your dealer or order direct from: Artifax Books, Box 88-E, Maynard, MA 01754.

**FOR SALE:** UTC transformers, brand new in factory cartons, 100 different types: transmitting, filament, chokes and modulation transformers. Also audio interstage and outputs etc. Commercial, military and amateur grades. Send #10 SASE for catalog and inventory to: Len Crispino, POB 702, Hudson Falls, NY 12839. (518) 638-8199

**WANTED:** Still looking for Hallicrafters S-39 Sky Ranger and RE-1 Sky Courier, portable type receivers. R. Haworth, 112 Tilford Rd., Somerdale, NJ 08083. (609) 783-4175

Don't forget the 10 M contest Nov. 3 & 4

Please remember to count the words in your ad. If you are over 30 words please send 10 cents for each additional word.

**WANTED:** Brown case "Oceanic" type radios. Also want SR-500 and Electro-Voice 419 mike stand, mike or both. Edward Dep-tula, KA3OTT, POB 751, Havertown, PA 19083.

**FOR SALE:** Newly published instruction books, authorized by Rockwell International, are now available for the Rockwell/Collins S-Line. These instruction books are brand new and have been printed from the latest editions - complete in every detail, including the front and rear color covers. A money-back guarantee of the purchase price ensures your complete satisfaction. Instruction books for the following models are currently available. KWM-2/2A (\$35); 75S-3B/C (\$30); 32S-3A (\$30); 75S-3/3A (\$25); 32S-3 (\$25); 312B-4/5 (\$20); 516F-2 (\$15). For U.S. orders, include 7% of the purchase price for shipping and handling. (Canada and Mexico add 12%; all other international countries add 25%) Ohio residents add 6% sales tax. VISTA Technology Incorporated, 3041 Rising Springs, Bellbrook, OH 45305. (513) 426-6700

**FOR SALE OR TRADE:** Bendix type MN-26LB radio compass (mint condition), 3 bands; 200-410 kcs, 550-1200 kcs, 2.9-6 Mhz. 28VDC (with dynamotor). Trade for 432 Mhz gear or ? Lee Groff, WW5B, POB 460, Brookshire, TX 77423. (713) 934-4659

**FOR SALE:** New FT-243 crystals in metal box (120), 5675 Kcs - 8650 Kcs (25 Kcs apart) - \$45; (2) 304TL sockets, new - \$15. Also lots of (surplus new) caps, xformers and other parts. Jos. Battyany, W6CAS, 1501 Sherwood Ave., Sacramento, CA 95822. (916) 731-8261

**FOR SALE:** Collins digital frequency display for the KWM2 and 75S3, model DD-IC, w/manual - \$150. Charlie Vaughn, KD4AJ, 1968 Huntington Hall Court, Atlanta, GA 30338. (404) 396-0276

**WANTED:** Hammarlund SP-600JX; TMC GPR-90 (R-825/URR); GPR-90 RX (R-840/URR); SBT-350; Racal RA-17; RA-217; RA-6217; RA-6772. Al Roehm, W2OBJ, 22 Brookdale Rd., Cranford, NJ 07016. (201) 276-2997

# SPAM

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**WANTED:** National receivers: NC45, NC80, NC81, TV7; HRO-5 coils; E, F; HRO-7 coils; E, F; HRO-50 coils G, H, J, AA, AB; HRO-50 FM adapter, NFM-50; NC-183D xtal cal, XCU-83; HRO-7 main tuning knob (black); feet for the NC-2-40D and it's speaker. Also National Brochures, advertising items, displays, knobs, speakers, etc; Johnson 500 instruction manual (copy ok); Johnson Signal Sentry model 250-25; Johnson T/R switch 250-39; Ameco AC-1 40 meter coil; any tube kits complete but unbuilt: receivers, transmitters, audio equipment. Steve Sauer, WA9ASZ, 1274 Londonerry Ln., Greenwood, IN 46142. (317) 882-4598 eves. after 7:00 EST.

**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

**WANTED:** WW-II military electronics; test equipment, radios, radar, odd-ball items, counter measures, APS-13; also manuals, books, articles pertaining to same. William Van Lennop, POB 211, Pepperill, MA 01463. (508) 433-6031

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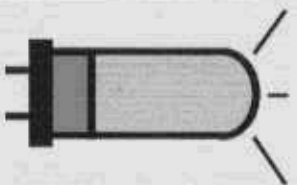
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