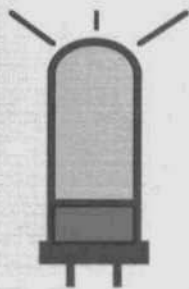


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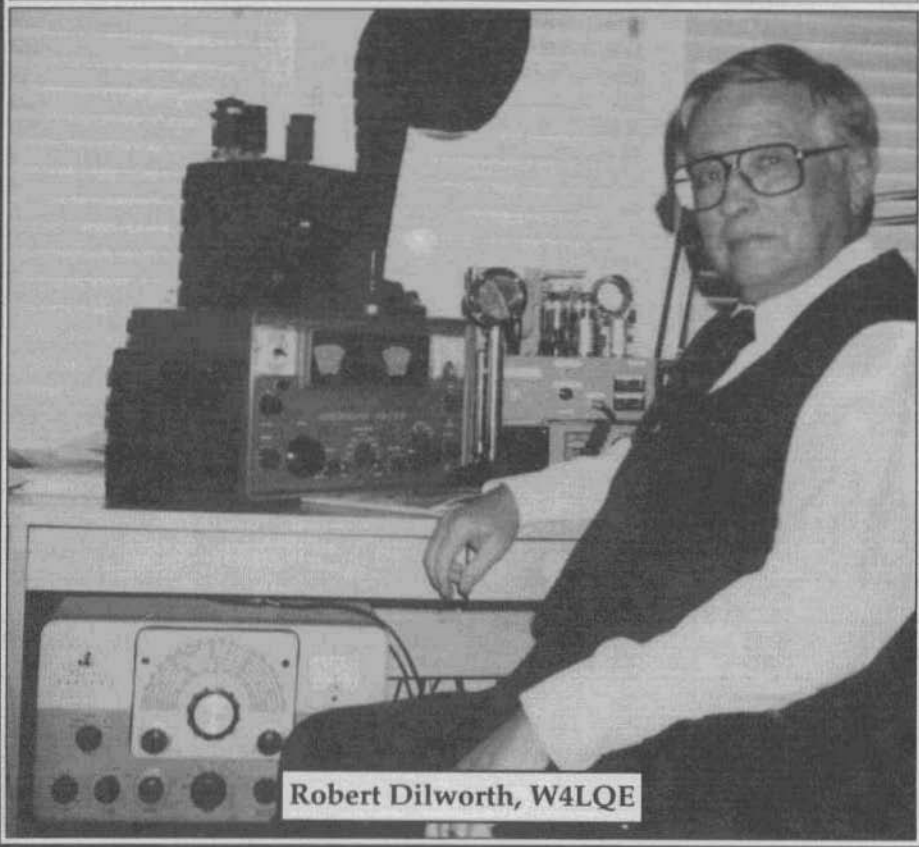


ELECTRIC RADIO

celebrating a bygone era

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Robert Dilworth, W4LQE

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

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

Regular contributors include:

Walt Hutchens, KJ4KV; Bill Kleronomos, KDØHG; Ray Osterwald, NØDMS; Dave Ishmael, WA6VVL; Jim Hanlon, W8KGI; Chuck Penson, WA7ZZE; Dennis Petrich, KØEEO; Bob Dennison, W2HBE; Dale Gagnon, KW1I; Rob Brownstein, K6RB; Don Meadows, N6DM; Lew McCoy, W1ICP; Kurt Miska, N8WGW; Warren Bruene, W5OLY; Brian Harris, WA5UEK; Thomas Bonomo, K6AD and others.

Editor's Comments

Shirley has asked me to thank everyone that called or sent cards wishing her well through her car accident ordeal. She was pleasantly surprised to learn that she had become so well-known to ER subscribers. Her recovery has gone very well (better than expected actually) and she'll be back to normal in a short while.

Last month I suggested tentative dates for the 3rd Annual ER Sponsored Vintage Field Day, the weekend of June 19/20. I asked for input from ER readers regarding the date and other details. Since I have not received very much input to the contrary, this year's VFD will be on the weekend of June 19/20. Those of you who plan to participate should mark your calendars.

The level of participation in VFD has been disappointing so far. I hope that this year, with improved propagation, we'll see an increased level of interest. I think that the idea of taking vintage gear into the field for a weekend in June should have a lot of appeal. It should also highlight AM operation and the operation of vintage tube-type equipment to the rest of the ham population. I hope that we can somehow get VFD established as a popular annual event. I'm still soliciting input from ER readers. I'd like to hear your ideas on what the event should be and how we can make it successful.

I think that part of the problem associated with VFD is the amount of advance planning that is necessary. I think that those who are planning to participate should started making plans now.

Next month and in the May issue I'll be talking more about VFD and possibly printing some letters from those that have provided their input. N6CSW

TABLE OF CONTENTS

2	Looking Back.....	WI1CP
3	Letters	
4	Spurious Emissions From Modified Rangers.....	W4LQE
6	The Gonset 100%R Modulation Monitor.....	W4MEW
8	The Hallicrafters SX-73.....	W8KGI
12	Winter Classic Radio Exchange Report.....	N5AIT
13	Military Radio Collectors Group 1999 Meeting	
14	K9 on 10KW.....	KE6VKJ
16	Photos	
18	Evaluating the Svetlana EL509/6KG6 Tube.....	Bob Henry
19	Vintage Nets	
20	The National Airways Ground Receiver (AGR) Series	Lawrence Ware
26	Our Future Lies in the Past.....	NR5Q
32	The AMECO AC-1.....	WA6VVL
36	Johnson Transmitter Potential Burn-out.....	WA9WFA
38	Homebrew Projects.....	W6JRY
42	Classifieds	

Cover: Robert Dilworth, W4LQE, in his present-day hamshack. See page 16 for a look at his 1947 setup.

Looking Back

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One question I get asked quite a bit is: What was it like working at ARRL back in those earlier days—exactly what was a working day like?

For one thing the reader must recognize that ARRL is the Headquarters organization of American Amateur Radio Operators—or more succinctly—Hams.

As one would imagine, making one's life work in your favorite hobby was much to be desired. In my time at the league, from 1949 up to 1979, salaries were very low by most standards. I was hired at \$3250 per year in 1948 and if I proved suitable, an increase would come in 90 days to \$3500. (That raise was conveniently forgotten for about six months until I finally had to ask for it!)

Any Monday, after a contest weekend, was always a "Brag" day—as to what each of us worked—for Sweepstakes it was a question of how many sections individuals worked and if a DX contest what we nailed that was new. Usually, on a Monday morning, very little actual work was accomplished. Just like any group of hams, we would gather around someone's desk or work bench and expound on how great we were as operators. Of course many of us were DX operators so the DX contests were thoroughly bragged about. In case you wondered, there were many hams working at ARRL who were what I call "professional" hams in that they didn't even have a station on the air. About the only time they got on the air was during field day and usually someone else built the working station.

I probably should elaborate on that word "professional". As far as I know,

everyone that worked at ARRL in my day either was either an active amateur or had been but there were those that didn't even keep a receiver. Don't misunderstand, these people I am writing about were dyed in the wool (maybe not wool) but they kept their interest in the hobby even if they didn't operate.

It is probably difficult for the average person to realize that working in your hobby can be a real joy. Every morning, when I got in my car, I was actually anxious to get to work. I am sure the other hams at ARRL felt the same way.

If one was qualified, it was possible to work one's way up the ladder. A second job for just about everyone at ARRL (except department heads) was the job of taking visitors around Headquarters and showing off the place. This wasn't a bad chore because we got to meet lots of interesting hams. My problem was where to get the time to do that second job. I was working in the technical department, writing an article every month and traveling all over the country lecturing on TVI. Because of the traveling and lecturing I became fairly well known. When a visitor would come, many would ask for me but I rarely complained.

I finally convinced the powers that be that we should have a working list of guides that would take turns in order and that system worked out fairly well.

There was a general rule in the technical department that if one built a piece of gear for QST or the Handbooks, the piece of gear must be torn down and the parts put back into stock. I don't think that I know of a single incident when that rule was ever followed. I remember talking By Goodman, W1DX, who was the Handbook Editor, into letting me build a kilowatt amplifier. (That was the pair of 4-250s described in the pages of ER about a year ago. I used that amplifier for years and I probably would have killed to keep it!).

Next month I will write more about working at the League. WIICP

LETTERS

Dear ER

What an excellent article for the CCA National Convention in the February ER!

My only complaint is that the members of the Dallas Posse who made it happen were not mentioned. The "deputies" who made it happen were: "Dirty Doug" Hickman, K4RIK Registration Deputy; "Maury the Mensch" Guzik, W5BGP, Food and Beverage Deputy; "Lean Gene" Robinson, N5LDX, Tour Deputy; "Glen the Kid" Kitto, N5OD, Program Deputy; "Mean Gene" Duprey, K1GD, Special Event Station Deputy; "Snake-Eye Jenks" Garrett, K5YNZ, Chuck Wagon Cook and Hashslinger; "Buffalo Bob" Peters, K1JNN, Swap, Sell and Display Deputy; J. B. "Jim Beam" Jenkins, W5EU and Mark "Tool Man" McCurley, KE4LPD.

Gentlemen and good friends all, their work should not be left unacknowledged.

Jay H. Miller, KK5IM

Editor:

And we should also set the record straight on a miscaptioned photo that appeared in the same article. The photo I am referring to is the top photo on page 14. The antenna tuner was built by James Monk, WØJL. It received the "Most Unusual Award" at the Convention.

We're very sorry for the error. N6CSW

Dear ER

It's high time that I send a few remarks and comments, which have been lingering in my mind. 'All good things are three' we say over here.

1. I hope your wife Shirley is well and recovering from the accident. Please send her my (and Regina's, DL4OCC) best wishes. Without knowing what ac-

tually happened—I always appreciate the US (west) driving style and speed limits. Don't you ever believe anyone telling you that 'free speed for free citizens' on German Autobahn is fun—it's not fun, it's murderous.

2. Great article by Randy, WA7CPA. I wouldn't have thought that I needed to read a US amateur radio magazine to find out about the German 'Unimog'. I knew some of the facts, but not that much detail.

3. Alice Schumacher deserves special thanks for her wonderful book on HPM. I knew a few of the stories from reading QST, but not that detail and certainly none of the other non-amateur related facts. At least the HAM stuff should be known by every licensed amateur, it's our heritage! Any guess where we would be without HPM?

Ernst Schroeder, DJ7HS

Dear ER

A non-ham friend of mine asked a question about an article in your January 1999 issue. The question was about your article, specifically the parts list found on page 23. The parts list refers to L5, L7 and L6, L8 as using No. 30 d.s.c. wire. So the question is this, what does the d.s.c. stand for?

I explained to my friend, that it was the abbreviation for "Double silk covered". (Two layers of silk, no enamel.) The next question my friend asked, Was where could I find that information? My answer to this was, there wasn't too many places where you could find this information.

I then remembered an old COYNE RADIOMANS HANDBOOK which I paid 50 cents for at a Flea Market. The Handbook included the information about the above wire in question.

From the COYNE RADIOMANS HANDBOOK,

Magnet Wire

Inductance coils wound with magnet wire, which is annealed copper wire

Spurious Emissions From Modified Rangers

by Robert H. Dilworth, W4LQE
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Few of us enjoy the luxury of a spectrum analyzer to verify the purity of our transmitter outputs. Recently I benefited from the next best thing—a skilled fellow ham in the person of my friend Lou Duncan, K4MNY, who from his Jackson, Georgia QTH was able to identify spurious carriers on 75 meters as originating from my modified Johnson Ranger II. Lou found fuzzy carriers 50 kHz above and below my 3885 kHz signal that came and went with my transmissions. I took the rig off the air and began an investigation.

The Ranger transmitters were designed at a time when limited audio frequency response was an accepted criterion. The limited low frequency response was obtained by using low values of interstage coupling capacitors, and limited high frequency response was obtained by adding capacitors from plates and grids to ground and across transformer windings. Like many other owners of Rangers and similar transmitters, I had broadened the audio response by increasing the coupling capacitors and removing or reducing the values of the roll-off capacitors. Lou mentioned that mine was not the only audio-modified Ranger he had encountered with spurious emissions.

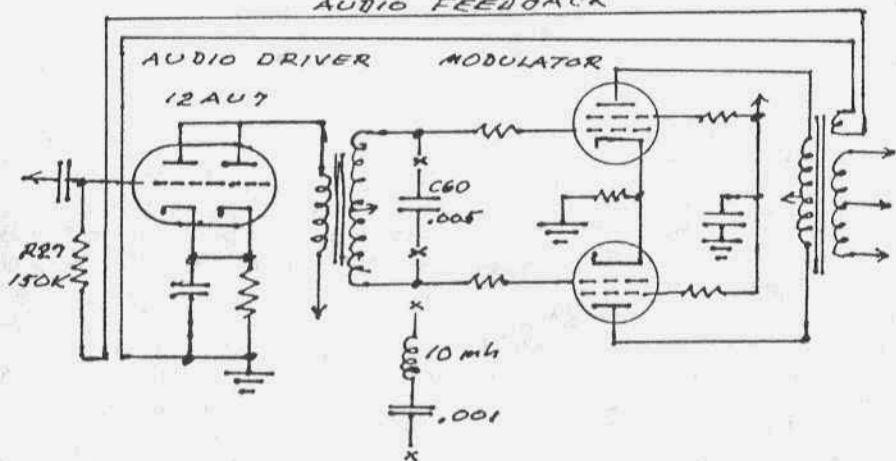
To begin work on this problem, I first set up to have a clear indication of the presence of the unwanted signals, so that diagnosis and cure would be unequivocal. Operating the Ranger into a dummy load allowed the signals to be heard on the station receiver. But to be sure of the suspected origin in the modulator, I removed the 9-pin jumpered plug from the rear of the chassis, which removes power from the RF circuits. I

placed a 5K 20 watt power resistor across pins 2 and 3 of that socket, which loads the modulation transformer secondary with approximately the same load as the 6146 final. On powering up the Ranger, my oscilloscope could clearly see the 50 kHz oscillation on the modulator tube grids. In addition, my TS-870 transceiver tunes down to 30 kHz, and by placing a clip lead between its antenna input and a location near the modulator tubes, I could easily tune in the 50 kHz oscillation. Having thus confirmed the origin of the problem as in the modulator, I set about to cure it.

The Rangers are unique among Johnson transmitters in having a tertiary winding in the modulation transformer, which provides inverse audio feedback to the grid of the 12AU7 driver stage. The purpose of this feedback is twofold. First, as in most hi-fi audio amplifiers, inverse feedback reduces distortion and flattens frequency response. Second, in the special case of the Ranger as used as the exciter and audio driver for the Johnson Desk Kilowatt, the feedback lowers the output impedance of the Ranger audio when used to drive the grids of class-B modulators in the Desk—a desirable technique for reducing distortion.

When audio amplifiers oscillate, feedback circuits are well known as likely causes. Therefore, I looked first at the Ranger feedback circuit as a possible cause of the problem. I had already noted that the audio gain control had no effect on the oscillation, which suggested that the 12AX7 speech amplifier stage was not involved. Next, I disabled the inverse feedback by returning the bottom of R27, the 12AU7 grid resis-

AUDIO FEEDBACK



Partial schematic of Ranger modulator

tor, to ground instead of the feedback winding. This stopped the oscillation, confirming the feedback circuit as the location of the oscillation. It now appeared that my audio modifications of decreasing the values of roll-off capacitors within the feedback loop had allowed the ultrasonic gain to rise, and this combined with phase shifts in the driver and modulation transformers at ultrasonic frequencies allowed the feedback to turn positive at these frequencies, with consequent oscillation.

I returned R27 to its original connection, restoring the oscillation, and set about to find a fix. I had changed the value of C60, across the driver transformer secondary, from the original .005 mFd to .001 mFd. Returning C60 to .005 mFd stopped the oscillation. I had also reduced the values of the RF bypass and coupling capacitors in the 6146 final, as well as the capacitor across the modulation transformer secondary, but these had only minor effects on the tendency to oscillate. The C60 roll-off thus emerged as the controlling factor in controlling the oscillation.

At this point, two obvious solutions to the oscillation problem were at hand.

You can eliminate the inverse feedback circuit entirely by grounding the bottom of R27 rather than its original connection to the tertiary winding. This costs a bit in distortion and flatness of response. A better solution is to leave C60 at its original value of .005 mFd, and tolerate the high-frequency roll-off.

Wanting to have most of my cake and eat it too, I looked for a simple way to reduce the gain inside the feedback loop at the oscillation frequency. Referring to the reactance chart in an old handbook, I noted that a 10 millihenry inductance would resonate with a .001 mFd capacitor at a frequency close to 50 kHz. Sure enough, an old 10 mH RF choke from my junk box connected in series with .001 mFd across the driver transformer secondary at the C60 location put a stop to the oscillation. The very low impedance of the series resonant L-C circuit kills the gain at the oscillation frequency. This is what I now have in my modified Ranger II.

I have the following advice for other Ranger owners who may want to broaden the audio response. Feel free to increase coupling capacitor values and

The Gonset 100%R Modulation Monitor

by Chuck Teeters, W4MEW
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Faust Gonset was an ingenious amateur who became famous for "niche" products the large ham manufacturers ignored. Gonsets' first products were for the 1937 "portable mobile" market. When the FCC first authorized amateur portable mobile operation, Gonset used the pages of *Radio Magazine* to showcase a 28 MHz mobile transmitter and receiving converter. You could buy the equipment as a kit or wired from the Radio Supply Company on South Broadway in Los Angeles.

World War II cut the amateur business short and Gonset got into war production. He changed the name of his manufacturing facility to Waterproof Electric to reflect the type of product he was building for the Navy. When the war was over he went back to building 10 meter converters. It was the same as prewar but with miniature tubes and packaged in left over Navy interphone cases. With thousands of war surplus receivers that would only tune to 18 MHz flooding the market, and lots of hams buying cars that hadn't been made during the war years, he sold plenty of 10 meter converters.

The 10 meter converter was followed by a 3 to 30 MHz model. Then a whole line of HF mobile equipment followed with the name Gonset in place of Waterproof Electric Company. His most fortuitous product came in 1952. It was an 8 watt VHF AM transmitter, receiver, and power supply, in an 18 pound, one cubic foot case. Working from 6 volts DC or 115 AC, the "Gonset Communicator" hit the market just as the brand new Novice and Technician class licenses opened up a market for VHF

equipment. They were the only voice bands open to them back then. Thanks to the cold war, Civil Defense and RACES were right behind with an additional demand for two meter portable equipment. Gonset had gotten big enough that heavy competition moved in and things were down hill for Gonset after the Communicators.

The one product that Gonset put out in the forties that flopped was his AM modulation monitor, the 100%R. It was a great item, accepted by hams, useful, accurate, and cheap. But the widespread growth of television made it impossible to use his monitor. The 100%R was the best generator of TV interference a ham could connect to his transmitter. By 1950 ham dealers couldn't give Gonset 100%Rs away.

Gonset, like most hams, was probably fascinated by broadcast station monitors. The illuminated VU meter, and peak flasher of an RCA BW-66 or Gates MO-2639 AM modulation monitor is beautiful to watch. The Triplett Meter Company tried the ham market in 1940 with a modulation monitor, but it was expensive and didn't sell very well. After the war Sylvania came out with a modulation monitor. It measured modulation percentage with a meter and didn't have a peak flasher. Gonset saw an opening and moved in with his 100%R.

The Gonset 100%R used RF from the final tank coil of an AM transmitter to indicate 85% or 100% modulation by flashing a neon bulb. Gonset used a 6AL5 diode to rectify the RF and applied the resulting DC carrier voltage or audio modulation component through voltage dividers to the bulb. Switch settings al-



The 100% R was the best generator of TVI that a ham could connect to his transmitter.

lowed adjusting the carrier voltage, and selecting 85% or 100% of the carrier voltage to operate the neon flasher. Neat, cheap, accurate, and self powered except for the 6AL5 filament.

The neon bulb required about 70 volts to fire so the 100%R needed something over 80 volts RF input to give some adjustment range. The RF was picked up with a wire within a half inch or so of the final tank. This wire had to be at least 3 or 4 ft long to reach from the final to the 100%R. Three or four feet is a half wave antenna at TV frequencies. With a diode connected to one end and ham band RF flooding the other end, it's a great generator of TVI. It was the perfect example of television interference generated by an external nonlinear circuit. The diode was the generator, and the pick up wire was just the right length to radiate TV frequency harmonics.

There was no way to use the 100%R and stop TVI. To get along with your neighbors you didn't want harmonics. To drive the final stake into the heart of the 100%R, hams were buttoning up their transmitters in shielding to keep the harmonics inside. This made it difficult, if not impossible, to connect the 100%R. Most hams just put it in the junk box and forgot about it.

Maybe it was just as well. It was flirting with destiny to adjust the pickup wire near the final tank. If the pickup wire touched the final coil you could have HV on the 100%R. Holding a grounded mic in one hand and adjusting the 100%R with the other could set you up for the shock of your life. Maybe Faust Gonset was lucky after all with the 100%R. With all the law suits about product defects we see nowadays he would have been a sitting duck. **ER**

The Hallicrafters SX-73

by Jim Hanlon, W8KGI
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Despite his colorful use of the English language in his postings to the Boatanchors reflector, Marty Reynolds, AA4RM, is definitely a nice guy. He and I were part of the Radio Club gang at St. Xavier High in Cincinnati back in the 1950's. I lost track of him after I graduated, and I had no idea that he was Marty, AA4RM, from Atlanta who was one of the stalwarts of the Classic Exchange until we met face-to-face again at Stu Stephens' Dayton Hamvention booth one fine Saturday in the 1970's. He had grown at least a foot, but he still had the same friendly grin and the same swap-fest spirit that he exhibited in High School when he used to play "odd-man" with Hymie Lapirow over the occasional power transformer. I saw Marty at Dayton several times after that. One time, when his eyes were bigger than his suitcase, he bought a basket case Collins 310 exciter look-alike and then gave it to me after he realized there was no economical way he could get it home. Another time he really blew me away when he outright gave me the Hallicrafters SX-73 that is the subject of this tale. We had been keeping a schedule on 7290 AM for a while, and he just thought that my HT-20 needed that SX-73 as a companion receiver.

All I ever did for Marty in return was to give him a Lysco VFO. I think he's using it with his Stancor 69 now - it's at least partially responsible for that distinctive signal it puts out. I certainly did get much better than I gave!

The SX-73 is not something you see at every flea market. It was built by

Hallicrafters only from 1952 to 1953, and I've heard tell that only 1000 of them were made. Chuck Dachis says that it was probably the most expensive shortwave receiver Hallicrafters ever made, selling at the time for \$975. Although the development model that first appeared in the ads was prettied up, the production models were plain and functional. It was advertised in the amateur publications, but its primary target seems to have been the military market. Indeed, the government assigned it the same R-274 nomenclature that they gave to the Hammarlund SP-600, and Chuck Dachis says that they considered it to be an equivalent receiver. It is a contemporary and a pretty good match to the HT-20. They both are massive, AM/CW units that cover the entire HF range from 1.7 to 30 MHz. The SX-73 also throws in the AM broadcast band and the range up to 56 MHz, just like the Super Pro. But neither the SX-73 nor the HT-20 sold well, in the face of such competition as the T-195 and the SP-600.

A quick way to describe the SX-73 is to say that it is the Hallicrafters equivalent of the SP-600 Super Pro, but that would be selling it short. While it does have a similar electrical design, two RF's, double conversion above 7 MHz, a tunable HF local oscillator, 4 rather than 3 IF stages with 3 positions each of non crystal and crystal selectivity, its physical design and appearance are considerably different. Anyone who has ever serviced an SP-600 will have fond memories of all of those black, molded bypass capacitors and the impossible places Hammarlund hid them,



The SX-73, alias R-274D/FRR, s/n 1211, Order no 3464-PHILA-52.

like inside the IF transformer cans and underneath the selectivity switch where you could see it but there was no way short of un-wiring and removing the switch that you could get to. There is even one inside of the second conversion box that I finally got to only by unbolting and dropping the power supply sub chassis from the rest of the receiver. In marked contrast, almost all of the parts in the SX-73¹ are in quite accessible places. And to make it even better, Hallicrafters used a much better grade of capacitors. I have yet to replace the first tubular bypass capacitor in my SX-73!

As you can see by its picture, about the only front panel resemblances between the SX-73 and an SP-600 are the same 19 inch width and 10 1/2 inch height. The tuning dial window on the SX-73 is about the same size as that on the SP-600, and it offers switched mechanical pointers on each side to indicate the band in use, much as the SP-600 mechanically changes the center dial pointer to the scale in use. Both receivers offer a numeric logging scale, the

SX-73 form 00-000 to 52-100 in 52 Main Tuning knob turns and the SP-600 from 0-000 to 5-100 in 48 turns. Both receivers have provision for six crystal controlled frequency channels. The SX-73 has all of the same front panel controls and switches as found on an SP-600 plus an antenna trimmer which the Super Pro lacks. In one exception, the SX-73 does not have a provision to switch its S-meter to read audio output level while the SP-600 does. The smaller control knobs on the SX-73 are the same type as used on the SX-42 and SX-43. The main tuning knob has a bottom skirt which can be clamped in an adjacent dial lock. The tuning knob itself is not one found on any other Hallicrafters product, so don't lose it! The bandswitch has a rather common, commercial, fluted knob that again you do not see on other Hallicrafters gear.

When I first got my SX-73 from Marty, it was in pretty good condition. It played when I plugged it in, but the S-meter movement was completely nonfunctional. I am a much better scrounger

than a watchmaker, so instead of attempting surgery on the dead meter movement I simply found another meter of the same size, mechanical design and electrical sensitivity, and I transplanted that meter's movement into the SX-73's S-meter. The most delicate part of that job was transferring the S-meter dial plate to the new meter movement.

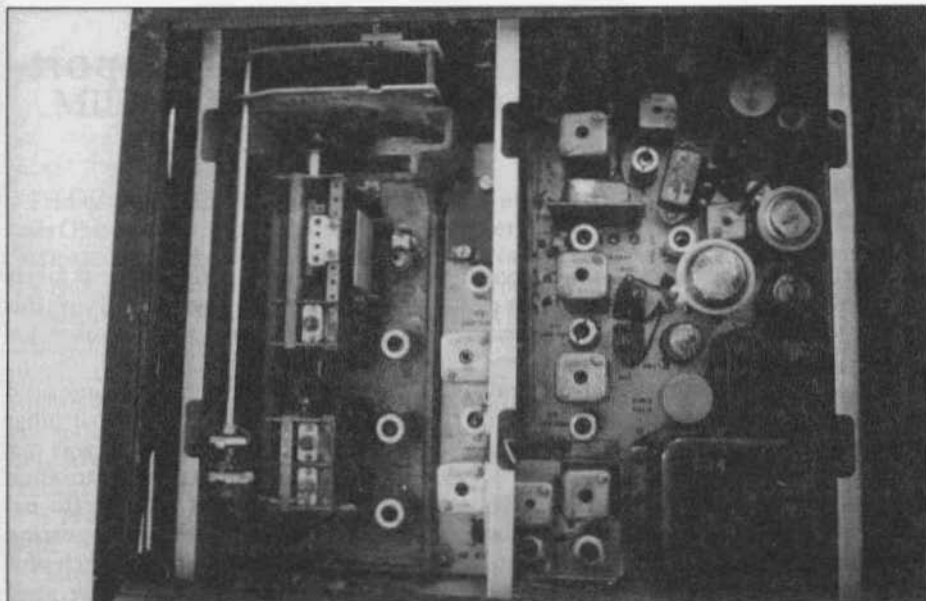
I had gotten the SX-73 up and running as part of my growing Classic Exchange collection several months before I had to pack up in Columbus and move to New Mexico back in 1989. So I was expecting, when I hauled it off the shelf and planted it on my workbench last summer, that a little dusting off and tweaking was all that would be necessary to get it in shape again. Was I ever wrong! A band of mice had moved in over the years, and every available nook and cranny was filled with mouse debris, including several pounds of dry dog food that the devils had pirated from my two faithful wolf-dogs who are supposed to keep the mice out of the garage but didn't. It took several weeks of masked and rubber-gloved vacuuming and scrubbing to clean the entire mess away. There was even dog food inside several of the coil sections that are mounted on the rotary turret. But once all of that was done, all that was needed was a bit of contact cleaner applied to the switches and pots and to the coil turret connections, and the SX-73 came back to its old self once again.

In the process of cleaning things up, I made a discovery about the coil assemblies that I really should pass along. The individual RF amplifier, local oscillator and mixer coil assemblies are each fastened into cavities in the bandswitch turret with two screws. At each screw location, there is a small, flat washer between the body of the coil assembly and the turret mounting surface. Leave that washer out, and the coil assembly studs will not mate properly with the turret contact fingers—and that band segment will not work. I figured that one out the

hard way after cleaning several coil sections and forgetting to install the washers on them. And it took a little while to realize what was wrong, too.

There is one oddity that the person aligning an SX-73 needs to know about. The IF transformers have tuning slug adjustments at the top and the bottom, both of which are reached from the top of the transformer. You need to use a nonmetallic tool to reach each one, since metal will detune the transformer. A sharpened wooden dowel works just fine for me.

The electrical layout of the SX-73 is pretty straightforward. It uses a 6AG5 first RF, 6BA6 second RF, 6BE6 first mixer and 6C4 tunable, high frequency local oscillator, 6AG5 fixed crystal oscillator, 6BA6 6 MHz IF and 6BE6 second mixer and 6BA6 crystal controlled 6.455 MHz oscillator (on bands above 7 MHz), three 6BA6 455 kHz IF's, 6BA6 IF output, 6AL5 detector and ANL, 6AL5 AVC, 6BA6 BFO, 6AT6 first audio, 6Y6 audio output, 5U4 rectifier and VR-105 voltage regulator. The VR tube is connected to the B+ line through two paralleled 7 watt, 110 volt (Christmas tree) bulbs which sit in the middle of the chassis and glow dimly in operation. The filament power to the first mixer and high frequency tunable local oscillator is regulated with a "ballast tube" that maintains a nearly constant current with line voltage fluctuations. The power transformer has taps to work between 95 and 260 volts, 50 to 60 cycles AC. The audio output transformer matches either a 600 or a 150 ohm load. The antenna input is available both on a screw terminal board and on a "twin-axial" connector. The receiver is designed to accommodate a 50 to 200 ohm balanced or single wire and ground antenna input. There are 6 selectivity settings available, three bandwidth variations achieved by different coupling levels in the IF transformers, and three crystal filter positions. The crystal filter circuit is placed between the second and third 455 kc IF stages in the



Down the hatch of the SX73, with the top inside cover removed. The front end, tuning capacitor, and 6 MHz IF are on one side; the second converter, 455 kHz IF, audio stages, and power supply on the other.

SX-73 a la Hallicrafters practice of the period also found in the SX-42 and SX-43. Hammarlund in the SP-600 and other manufactures as well followed more conventional wisdom by putting their selectivity up front between the mixer output and the input to the first IF. The BFO injection level is variable via a rear panel control.

Image rejection ratings for the SX-73 and the SP-600 are pretty comparable. The SX-73's worst image rejection rating is 80 dB at 7 mc and at 54 mc. At 30 mc, the image rejection is 100 dB. The minimum 6 mc IF rejection is 100 dB, so in all there are no noticeable spurious responses in the SX-73.

On the air, the SX-73 is a good general coverage receiver. Bandspread is adequate, and calibration is quite accurate once the receiver has been aligned. Neither the SX-73 nor its SP-600 cousin are favorites of mine for ham band operation compared to receivers specifically designed for amateur service. I'm

much more likely to play 40 CW in the background on my NC-303 or HQ-129X when I'm out at my workbench delving into the mysteries of a new find than I am to use either of the R-274's. But when it comes to listening to the BBC, to finding an out-of-band oscillator on some piece of equipment and especially to adding another near half century to my Classic Exchange age multiplier, the SX-73 is definitely a good choice.

Now where did I put those mouse-traps? **ER**

1 - Like the second conversion oscillator/mixer stage on the SP-600 which hangs like a wart on a dill pickle off the side of the tuning condenser shield in its own separate little box, the same stage in the SX-73 is mounted at the left rear of the chassis in its equally inaccessible little box. Dual conversion appears to have been a late addition to the design requirements of both receivers.

Winter Classic Radio Exchange Report

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With many returns still out, I have received logs and letters from about a dozen who participated in the recent "CX:" Classic Radio Exchange, the contest that encourages restoration and operation of older equipment. So far I have heard from many different regions of the country - including Hawaii.

This CX started less than auspiciously for me. Starting and finishing times got listed three different ways in three different publications (for future reference: we aim to go from 3 PM to midnight Eastern time - adjust accordingly for your time zone). My own operating was limited since I had to pick up my XYL from the airport one hour after CX started, and the airport is about 20 miles north, plus five miles across town. Add in the usual delays and I finally got to the shack four hours into CX.

I had one rig all warmed up and ready, a Viking II and Drake 2-B, still in place from the September CX. I worked some old friends from previous CX's, starting with Brian, K9VKY, in Pennsylvania. I don't know if he was on the USS Requin this time, but his 310B-3 was putting in a decent signal here. Third contact was with Jim, W8KGI, and I picked up two of his rigs before switching mine.

I HAD to put the Harvey-Wells TBS-50D "Bandmaster" on the air, so it went next. It has made an appearance in every CX since the very first (when I was in Austin, Texas, and CX was "NX" - Nostalgia Radio Exchange - a name we changed the second time around). I did work several of the CX "regulars," ending with Marty, AA4RM, for my third QSO with the Bandmaster and an SX-100. Since my

week had a been long one and I was falling asleep at the key, I closed with this QSO, having at least put in a token appearance with seven QSO's.

It is hard to believe that we have been doing "CX" since 1975 when brother Stu, K8SJ, got it all started. It was our intention to encourage the restoration and operation of the "classic" (to us) older equipment that was disappearing from the scene at that time, much of it just dumped, as the solid state stuff came in from abroad.

It certainly appears that "CX" has helped that recycling effort, considering the people who have been with us since the first, and those who have joined in as we have continued. I wonder how many rigs have been saved from the trash - including by me - just because of CX and looking for either a bigger age multiplier, or for that elusive odd radio (like Marty's Cosmophone).

As always I discovered what I need to fix: this time, antennas. The Windom was OK after I trimmed a few tree branches off it, but my horizontal V, open-wire fed, had one side of the feed line broken near the feed point, which explained why it would not load at all properly. Also in need of repair is my second Windom at the school where I teach and am the radio club sponsor (KF4LWA), running an HQ-170 and a Ranger (until I get the Apache repaired). I need to get those classic rigs back on the air and continue to "break in" the new kids the right way! Start 'em with REAL radio - all those knobs! Particularly impressive is the HQ-170 and Apache with SB-10 SSB adapter all in

Military Radio Collectors Group 1999 Meeting

Friday and Saturday, April 30 and May 1, are the dates for the MRCG Camp San Luis Obispo meeting. This fourth annual meet is the first two day event with Friday dedicated to field operations on all bands. We will also be setting up equipment in the NCO club which will be open all day Friday.

Each station will use their own equipment and call sign with suggested frequencies being 3885, 3970, 7290 kHz AM and 51.1, 51.5 MHz FM. CW should be on lower frequencies. Late SSB military gear is expected to be operational on all bands from 80 thru 10 meters. Stations are requested to sign "MRCG" following call signs. Tom Horsfall, WA6OPE, has agreed to be our volunteer Frequency Coordinator. Preliminary indications are there will be quite a few different sets in operation and tactical antennas will be set up.

A 1942 Ford GPW Jeep with AN/GRC-9 and RT-70 sets will be running in the field.

Listen for battery sets, vibrators, dynamotors and gas engine generators running everything from Command Sets to SSB gear on AM, CW, FM and SSB.

A very large swap meet of military gear starts Saturday at dawn. Items expected are manuals (200 or more), receivers, transmitters, complete sets, power supplies, control boxes, cables, racks, test equipment and the ever present assortment of parts, connectors, hardware, meters, tubes and other small items.

Mr. Bart Lee, San Francisco, starts our interesting program with a presentation on WW II Radio Intercept and Spies. Mr. Dennis DuVall, W7QHO, follows with his description of east coast military collectors, equipment and on-the-air activities. Mr. Bjorn Forseberg, SMSUR/6, is next and will describe and demonstrate several working pre-World War II Trench Radios.

Active equipment will be operational inside the NCO club all day and includes RMCA R-203A/SR receiver, R-100 receiver, 2 TX-3 RX SCR-274-N, PRC-10A, C-131/ARC-5 Auto Tuning Unit, BC-610, GRC-109 set and late model 2-30 MHz SSB gear.

There will also be a number of inactive or passive displays which include ARR-2 Receiver and rare original signal generator, BC-640 TX, and BC-637 RX, R-808, URR-74V2, RS-6 Spy Set, BC-791 McElroy tape equipment, HT-1E Village Radio and USM-3A service kit.

Don't forget the big BBQ with chicken, tri-tip and all the extras about midday Saturday.

The day winds down with an open discussion period, business meeting for next years event and announcements of interest to all present.

Contact Hank Brown, W6DJX, (805) 943-2027, for more detailed information. Our E-mail contacts are: Don Jeffrey, boallan@aol.com; or Ed Zeranski, ezeran@cris.com. Use 146.52 simplex or 146.20/80 SLO repeater for local work while in the area.

K9 on 10KW

by Alex Samson, KE6VKJ
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Engineers who work for the broadcast industry often have a collection of tales. This is one of the best ones that I have.

It was 1986 and I had recently been given the task of managing the transmitter facilities of an AM and FM broadcast network in an overseas "third-world" tropical country. I will never forget my introduction to one of the network's 10 KW AM broadcast transmitter site in farm land at the outskirts of town.

This transmitter was housed in a normal house and has been in operation for at least 20 years. The house was all run down and shoddy and the entire yard was fenced off by a perimeter wall. The antenna was a 180 foot-high shortened quarter-wave vertical radiator located in the center of the yard. The station operated 19 hours a day and was continuously staffed by the locals who performed no other job than to keep the transmitter on the air (labor costs here were insignificant). There were always two techs on duty at this site. A 310 MHz "STL" transmitted the audio program from the AM studio located about 20 miles away, to an STL receiver in the transmitter site.

When I first got into the transmitter house, I was immediately impressed by the sheer size of the transmitter. It looked like a 100 KW transmitter! The front panel of the transmitter extended from one side of the room, nearly up to the other side, a distance of about 20 feet! All the techs gave me the customary "Good morning sir" and thereafter

everyone fell silent. Apparently, the guided tour ended as I stepped into the transmitter house and I was left to myself to conduct my own tour.

Upon closer inspection, I began to notice certain peculiarities. I noticed that virtually all the meters were inoperative. Only the PA plate current meter worked. There was an electric fan standing on a stool pointed towards a hole in the front cabinet. None of the front panel lights were lighted. In fact, it didn't seem that the transmitter was in operation at all! But one could hear the loud blowers that cooled the system somewhere at the back. I looked into the PA inspection window and there was a PA tube but no PA tank circuit and no back cover and in fact, I could clearly see straight onto the rear wall of the house!

I walked to the far end of the transmitter in order to take a look at the back and there I was met by a vicious K9 which was chained to the transmitter by the corner. She growled with severe determination towards my approaching presence. The techs became apologetic and immediately unhooked the K9 from her post and pulled her towards a space in the back of the house. The K9 reluctantly followed with her legs all stretched out, growling as she departed.

With the mongrel removed, I finally saw the rear of the transmitter which was a terrifying site. Being in the tropics, the operating environment can be severe beyond a doubt. Extremely high humidity, constant condensation, unreliable AC power with frequent outage and nasty spikes, and very hot sum-

mers are the norm. Being hit by lightning during a tropical thunderstorm is a normal occurrence and in some bad days, they get hit several times. After several decades of operation, this transmitter site had sustained so much repeated damage that the original transmitter is now just the PA tube sockets and cooling compartment. Everything else had eventually migrated away from the confines of the transmitter cabinet and now resided in the open by the ceiling, walls and floor areas of the space behind the original transmitter cabinets. The scheme was actually very practical because it made everything readily visible and accessible for easy and quick replacement or repairs. The 810 KHz tank coil was hanging from the ceiling by antenna end insulators. The massive 10 KW modulation transformer was simply standing on the floor right at the very spot where the shipping people dropped it off. Power supply and high voltage rectifiers were strung around on the wall. Exposed wiring crisscrossed all over the area. Everything was visible with one glance and the transmitter panel was actually just a Hollywood-style facade. Mind you, this station was outside of the FCC's jurisdiction so there was need for concern about "compliance". I suspect that the empty transmitter cabinets may be the remains of more than one transmitter that once saw service at this site.

The techs had a boring job. Very often, the transmitter would work without trouble for days (remarkably). Since the site was completely under the control of the techs, I suspect that they would even leave the system unattended at times while they wandered about conducting their personal affairs. To idle the time away while they were on duty, they always engaged in various forms of recreation. Sometimes, they would get their chickens and engage in cock fights. They actually had a chicken coop at the back of the transmitter house

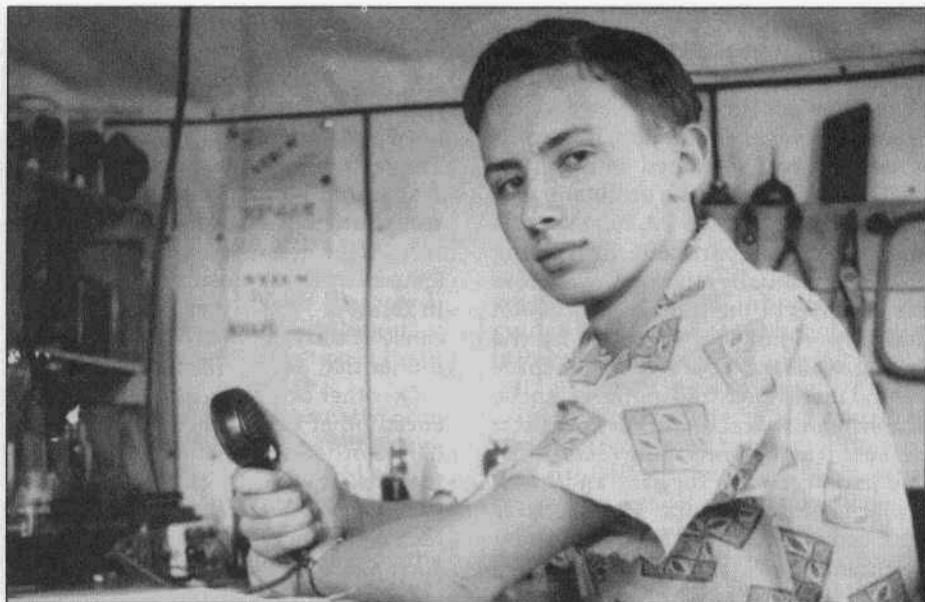
where they housed their pets. One day, as the techs were grooming their chickens while they were sitting idly by the transmitter, one of the cocks got irritated and jumped off the handlers arms. The tech jumped to grab the bird but that scared her away and she flew directly into the rear area of the transmitter. After the resulting downtime (caused by the explosion), the log books indicated "flashover, unexplained cause". I can imagine what they had for dinner that day.

On other occasions, they had experienced other downtimes caused by the neighborhood cats, and miscellaneous rodents. Thereupon came the explanation for the K9. What better way to lessen the incidence of downtime for such a minimal investment as an ugly big dog with a menacing look that scared all potential flashover victims away!

The electric fan on the stool also had a function. It blew a stream of air directly towards the 807 crystal oscillator. In its absence, the frequency would begin to drift and by so much that the next station on the spectrum had previously filed a complaint!

One of the tasks I undertook on this facility was to upgrade the audio driver with a more modern and reliable circuit that would hopefully improve the quality of the broadcast. The original audio amp was all class A tubes driving a transformer that was coupled to the grids of the push-pull 4CX5000 modulators in Class AB. I took an ordinary public address amp and a generic 40 watt push-pull output plate transformer with an 8-ohm secondary. I connected the plate leads to the 4CX5000 grids, CT to bias supply, and the public address amp drove the 8-ohm winding. It is quite possible that this system is still in operation today!

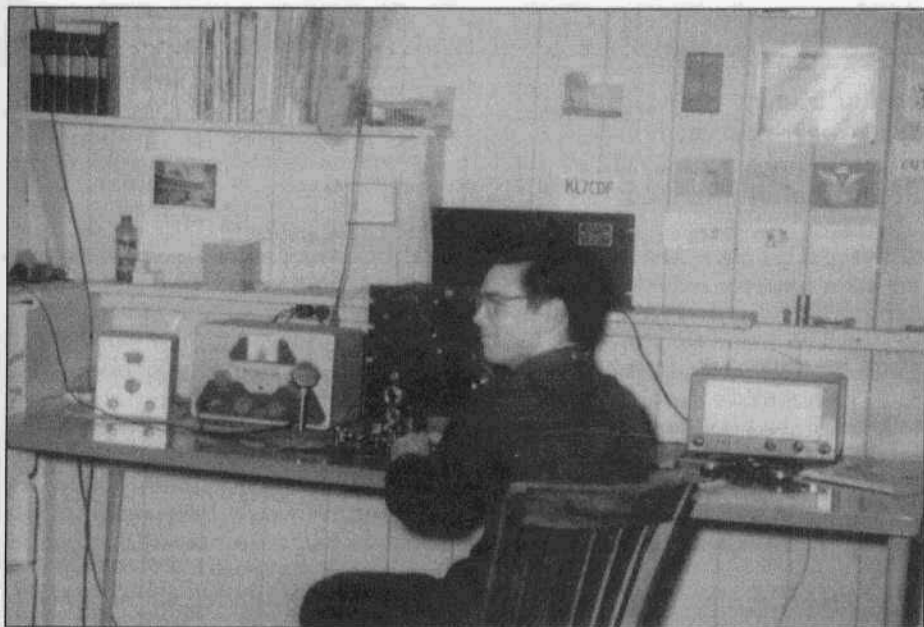
And about the homebrew affair at the back of the facade? I never laid a finger on it and who knows how it looks like today. If it works, why bother! ER



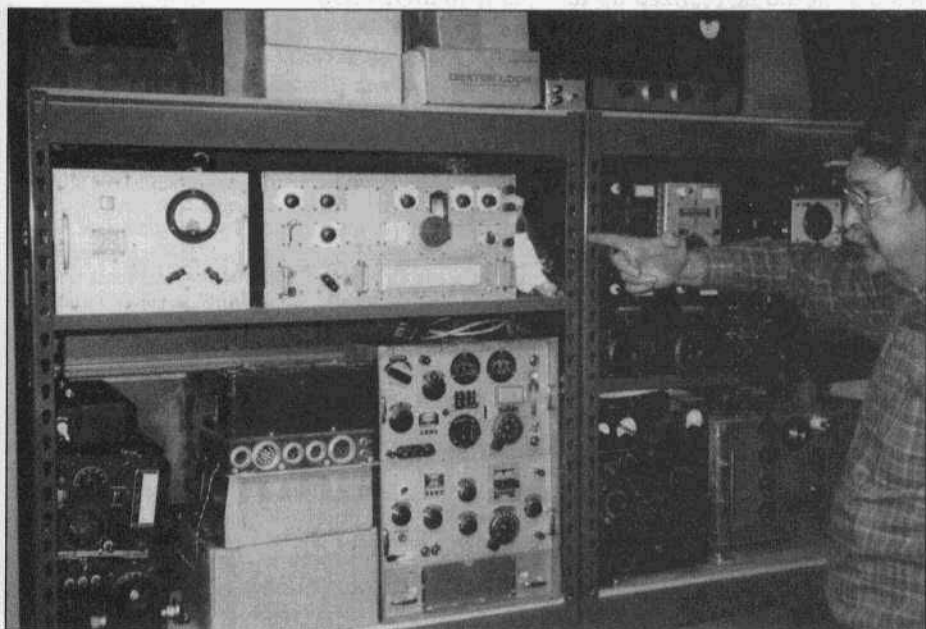
Bob Dilworth, W4LQE, back in 1947 when he was 16 years old [see cover for present-day photo]. The shack was exactly that—a little wooden coal storage shack that he cleaned out and lined with heavy white cardboard. The rig was a homebrew 807, 20 watts on 10 meters AM. The receiver was a Hallicrafters S-38 with a HB regenerative preselector.



Paul Johnston, W9PJ, winner of the 1998 N2K SZ Memorial 160-Meter Contest. A photo of him as a Novice, WN9OPD, was on the cover of Number 84, April, 1996.



Bob Gravel, K1BUB, in his ham shack circa 1959, when he was 17 years old. The gear consisted of a DX-40 transmitter, with VF-1 VFO and RAS-5 and S-38D receivers.



Ken Lakin, KD6B, author of several ER articles, with some of his vintage gear. Photo by Bill Hooper, KF6AR.

Evaluating the Svetlana EL509/6KG6 Tube

by Bob Henry

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Sweep tubes have been used quite extensively in linear amplifiers and RF outputs for many amateur radio transmitters. While these tubes yield a plentiful quantity of output power, they have not been considered to be as durable as other tubes for RF, such as the 6146. However, SVETLANA has produced a high performance 6KG6/EL509 that lends itself well in the applications of sweep tube RF output. The SVETLANA 6KG6 has an increased cathode emission, an extra heavy glass envelope, improved grid/screen alignment and a higher plate voltage capability. This sets it apart from the conventional type sweep tubes.

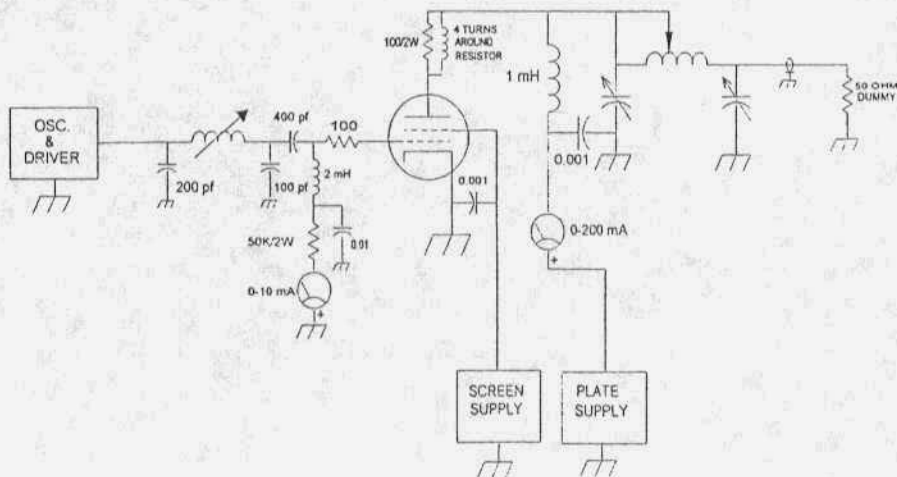
Up until recently, very little data about practical application has been done on the EL509/6KG6 tetrode. Perhaps, to some extent, it has found its usage primarily among the so-called Hi-End audio applications and some in linear RF amplification.

At this point, discussion will be given on the device as a class C RF amplifier. In this case, the EL509/6KG6 lends itself well in this application.

During testing, an output power of 83 watts into a 50 ohm dummy load was easily achieved with 720 plate volts, 150 plate milliamps and a plate efficiency of nearly 78%! The frequency for testing was 1.24 MHz, as this was readily available. Similar results should be realized up to around 10 MHz or so.

Some comparisons were made between a 6146B and the 6KG6 tube as to power

continued on page 37



Test Setup Used

VINTAGE NETS

California Early Bird Net: Saturday mornings at 8 AM PST on 3870.

California Vintage SSB Net: Sunday mornings at 8 AM PST on 3835

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

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

Northwest AM Net: AM activity daily 3 PM - 5 PM on 3875. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT. The formal AM net and swap session is on 3875, Sundays at 3 PM.

K6HQI Memorial Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 3:00 PM PT, 7 days a week and usually goes for about 2 hours. Net control varies with propagation.

Arizona AM Net: Meets Sundays at 3 PM MT on 3855. On 6 meters (50.4) this group meets at 8 PM MT Saturdays.

Colorado Morning Net: An informal group of AM'ers get together on 3876 Monday, Wednesday Friday, Saturday and Sunday mornings at 7AM MT.

DX-60 Net: This net meets on 3880 at 0800 AM, ET, Sundays. Net control is Jim, N8LUV, with alternates. This net is all about entry-level AM rigs like the Heath DX-60.

Eastcoast Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is Dennis, WA3YXN but sometimes it rotates to other ops. Saturday mornings on 1995 at 0500 ET. Will move to 3885 for summer.

Westcoast Military Radio Collectors Net: Meets Sunday mornings at 0930 local on 3975 + or - QRM, except the 1st Sunday of the month when the net meets at 2130 local. Net control is Tom, WA6OPE.

Gray Hair Net: The oldest (or one of the oldest - 44+ years) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8:00 PM EST & 8:30 EDT. URL: <http://www.crompton.com/wa3dsp/grayhair.html>

Vintage SSB Net: Net control is Andy, WB0SNF. The Net meets on 14.293 at 1900Z Sunday and is followed by the New Heathkit Net at about 2030Z on the same freq. Net control is Don, WB6LRG. **Collins Collectors Association Nets:** Technical and swap session each Sunday, 14.263 MHz, 2000Z, is a long-established net run by call areas. Informal ragchew nets meet at 0100Z Tuesday nights on 3805 and on Thursday nights on 3875.

Collins Swap and Shop Net: Meets every Tuesday at 8PM EST on 3955. Net control is Ed, WA3AMJ.

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

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

Nostalgia/Hi-Fi Net: Meets on Fridays at 7 PM PT on 1930. This net was started in 1978.

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

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

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

Southern California Sunday Morning 6 Meter AM Net: 10 AM Sundays on 50.4. Net control is Will, AA6DD.

Old Buzzards Net: Meets daily at 10 AM Local time on 3945. This is an informal net in the New England area. Net hosts are George, W1GAC and Paul, W1ECO.

Canadian Boatanchor Net: Meets Saturday afternoons, 3:00 PM EST on 3745. For hams who enjoy using AM, restoring and operating

Midwest Classic Radio Net: Saturday mornings on 3885 at 8AM Central time. Only AM checkins allowed. Swap/sale, hamfest info and technical help are frequent topics.

Boatanchors CW Group: Meets nightly at 0200Z on 3579.5 Mhz (7050 alternate). Listen for stations calling "CQ BA" or signing "BA" after their call signs.

Wireless Set No. 19 Net: Meets the first Sunday of every month on 14.165 at 1900Z and 3760 at 2000Z. Net control is Dave, VA3ORP.

Beer Town Traders Net: On 3885, 5:30 Central Daylight Time on Saturdays.

Westcoast 40M AM Net: Sunday afternoons from 3-4 PM westcoast local time until 4-5 PM on 7160 +or- QRM.

Nets that are underlined are new or have changed times or frequency since the last issue.

The National "Airways Ground Receiver" (AGR) Series

by Lawrence R. Ware
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Winter Park, FL 32792

Some History

In 1932, the General Electric Co. received a contract from the Civil Aeronautics Authority (CAA). (Now the FAA.) Because GE didn't have a receiver to go with their transmitter at the time, they asked James Millen of the National Company Inc. to design and build them a suitable radio for the contract. The result was the National AGS (Aeronautical Ground Station.)

This was one of the first superheterodyne high performance receivers National designed and built. With a companion regenerative LF receiver called the SW-58C for the 200-400 kHz band, quite a few AGS systems were installed. (Exact numbers are impossible to come by, but these radios are considered very collectable today.)

With AGS systems appearing at airports across the land, the airline industry began to recognize a good thing when they saw one. (Reliable radio communication for aircraft was still in its infancy back then.)

The airlines, lead by Herbert Hoover Jr. of Western Airlines (now TWA), gave James Millen and National a set of requirements. These requirements closely matched the amateur community's wish list for a "best" all round amateur radio receiver. Result: The famous "HRO" was born. First announced in October 1934, the HRO was to become one of National's defining moments in history. Yet, like anything else, the HRO could not be all things to all people. While an extremely sophisticated design for its time, it suffered from one major problem: You still had to switch coil sets to change bands.

Coil Catacomb Radios

In 1935 National announced a new receiver design, the NC-100. The NC-100 introduced an innovative sliding coil catacomb design of wonderfully elegant mechanical engineering. Designed by James Millen and Dana Bacon, this was the first of the "coil catacomb" radios. The new design avoided the problems inherent in the coil set switching of the HRO's, and still retained the performance advantages over the competition (many of whom were using very simple band switching circuits, prone to stray resonances and thus dead spots in tuning.)

From 1936 until at least 1949 variations on this design were still being produced at National. The NC-2-40D is considered the last of the National coil catacomb designs.

James Millen (with his own company the "James Millen Manufacturing Co." since 1939) continued development of the sliding coil catacomb concept after WW II with his commercially unsuccessful DPF-210 and DPF-501 radios before eventually also abandoning the concept because of manufacturing costs.

The AGR (Airways Ground Receiver)

While the private airlines purchased quite a few HRO's, the government (CAA) went for the slightly less expensive and more versatile NC-100 design. The CAA NC-100 variants are known by a series of model codes: All have three letters (RCD, RCE, RCK, RCL, RCP, etc.) and reflect both changes incorporated into the basic design and the government subcontractor associated with the design changes.

All of these radios started out life as

National NC-100's. National was well known as a primary supplier of components and subassemblies to many other radio companies. It would only have been a small step for them to move into supplying complete radios to other government contractors. Perhaps the unconverted radios already belonged to the CAA? I have been unable to locate any records that could shed light on this part of the AGR's history.

Another still unresolved question about the NC-100 based "Airways Ground Receiver(s)" is: How many were originally built and sold to the CAA by National, and how many NC-100 radios were modified by other contractors? The chart below contains the information I have collected so far.

As you can see, I am still missing quite a bit of information. I have manufacturers' manuals for types: RCF, RCL, RCP and RCQ. At least some information, (schematics, etc.) on several of the others, and of course Moore's 3rd & 4th to refer to. A number of current owners have sent me data plate information for my records.

The earliest known contract for "Airways Ground Receivers" seems to be from 1937, not long after the NC-100 started coming off the National production lines. This radio, the RCD, was built by National without a subcontractor also being involved. The RCD is the only model I'm aware of with Push-Pull audio outputs (2 6V6's). It is also the only model I know of with a tuning eye

tube, (6E5) and a crystal filter.

Later modifications

Modifications that seem to have been made to all of the later CAA radios include: An "Interchannel Noise Suppression" (INS) or "Carrier Operated Noise Suppression" (CONS) system. This was an interesting early squelch system controlled by a relay in one of the tube plate circuits (Usually a 6F8.).

All of the later series radios seem to have been modified for fixed frequency operation by allowing the high frequency local oscillator to operate crystal controlled. 3,025, 3105, and 6120 kHz seem to be typical "channel" frequencies for crystal control.

Later versions started out life as type RCE, RCF, RCK and RCL radios and were then modified into type RCP and RCQ radios under multiple "retrofit" contracts.

Both my type RCP's started out life as type RCK radios, all the I.F. transformers are ink stamped "RCK." All of these radios bear strong resemblance to their NC-100 "Father." All have the National sliding coil catacomb design with the white marker flag which shows band setting by which hole on the front panel you can see it through. All have the famous PW type dial, geared tuning drive and National three section main tuning capacitor. There are several extra controls related to fixed frequency operation and the CONS system on the front panels of most the CAA variations. Many also have a "dial lock" stud

Some version information:

Known variants:

TYPE:	Contract/Order codes:	Contract/Order date:	High S/N reported:
RCD	Order # 37-7383	?	101
RCE	Order # 38-2832	?	478
RCE	Order # 38-2833	October 1st, 1937	187
RCF	Order # 39-2748	June 30th, 1939	118
RCK	?	June 30th, 1939	235
RCL	?	?	?
RCP	CCA-24653 Order # 46-1467	October 30th, 1945	747
RCQ	CCA-26227	February 5th, 1948	404

located next to the PW dial. Some earlier versions have a sharp/broad control on the front panel for changing the IF band pass characteristics.

Typical specifications:

5 Bands

200 - 400 kHz

1.3 - 2.8 MHz

2.7 - 6.4 MHz

5.9 - 14.4 MHz

13.5 - 30.0 MHz

455, or 457 kHz IF transformers with variable bandwidth modification.

Unusual tone control circuit, (steep audio rolloff below 100 Hz and above 2 kHz.)

Fixed frequency operation option, and INS or CONS system.

No S-meter or crystal filters, seem to have been used. This would tend to lend support to the reported as common, "remote" use of the radios.

A "typical" tube line up in these radios, (this one is for the type RCL):

6K7 RF amplifier

6J7 Mixer

6J5 High Frequency Oscillator

6K7 1st IF amplifier

6K7 2nd IF amplifier

6C5 Detector

6F8 1st audio amplifier and squelch

6J7 Beat Frequency Oscillator

6J7 AVC Amplifier

6J7 CONS amplifier

6V6 Audio output

80 Rectifier

Variable bandwidth I.F. Transformers:

Most of these radios were built with unusual modified National IF transformers. Besides the normal primary and secondary windings these also have a third (tertiary) winding used to affect the coupling coefficient of the transformer. This allowed two different bandwidths (sharp or broad) depending on if a switch connected one end of the tertiary winding to ground. (See diagram) Later models of these radios (RCP, RCQ) had this feature (switchable bandwidth) removed and the trans-

formers hard wired either sharp or broad.

Looking at Figure 1.

Notice how the tertiary winding on T3 has both ends connected to ground, but the winding on T-4 has only one end connected. Closing the tertiary winding produces a broader bandwidth, thus T-3 is set "broad," and T-4 "sharp." The tertiary windings on these are one turn above the uppermost winding in the IF can, and one turn below the lower winding in the can, connected to the shield can (ground) at one end and either an external wire or a spring contact on the other. The more experimental among us can change these from one mode to the other without removing the transformer in all the later AGR radios.

Series Noise Limiter Modification:

In the type RCQ the 6C5 was replaced with a 6H6, with the second diode in the 6H6 used for National's "Series Noise Limiter" system. Some RCP's also received this modification.

Both my personal RCP's have lower serial numbers and do not have the 6H6 replacing the 6C5.

I have a set of field change sheets, which describe the modification of type RCP radios to use the 6H6 dual diode tube and noise limiter circuits. This was a CAA ordered field retrofit for RCP radios currently in service. The modification order and instructions (CAA Communications Engineering Division Circular # 41) was issued on August 17, 1948.

Looking at Figure 2.

Later models went through a number of small changes as problems with the interaction of IF bandwidth, RF gain, and CONS set points were addressed. All of the 1948 contract RCQ incorporated National's "Series Noise Limiter" design which first appeared in the NC-100A in about 1942.

The primary use of these radios seems to have been in a fixed frequency mode.

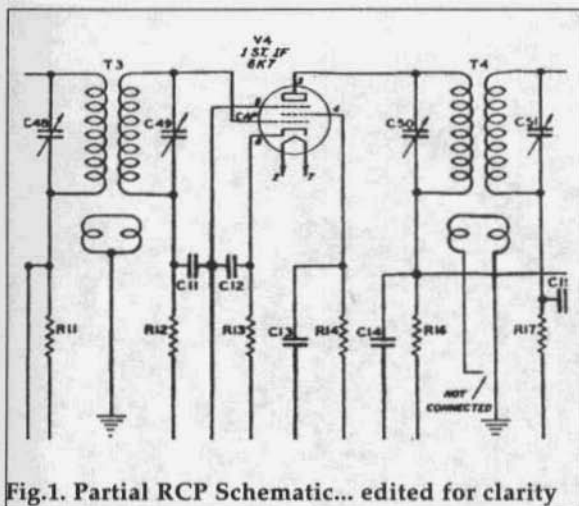


Fig. 1. Partial RCP Schematic... edited for clarity

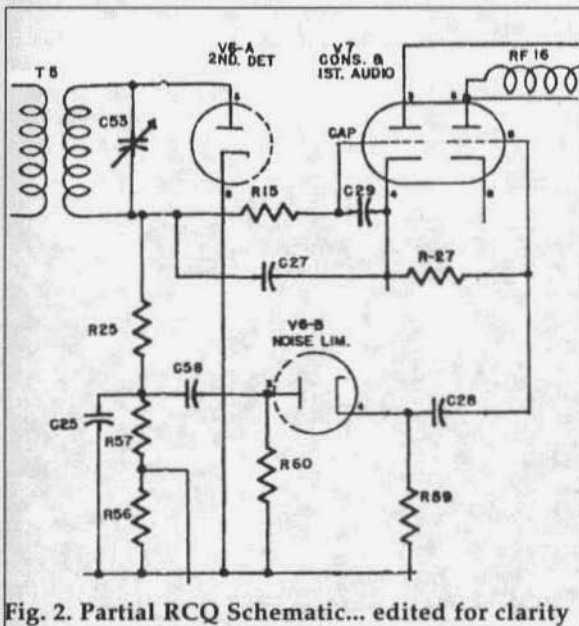


Fig. 2. Partial RCQ Schematic... edited for clarity

Perhaps the main airport "call up" frequency for the tower? Close examination of the design shows extra effort made to ensure receiver stability. Temperature coefficients of components in the local oscillator, IF chain and RF front end were selected and specified with frequency stability clearly in mind. The early CONS squelch system, coupled

with the unusual audio filter in the radio clearly point to clarity and reliability of voice communications as the design priority.

CONS allowed the radio to effectively ignore random background noise, yet produce a high level signal out when an approaching air crew called.

Excerpts from several manuals:

"... designed for use at Civil Aeronautics Administration Airway Communications Stations."

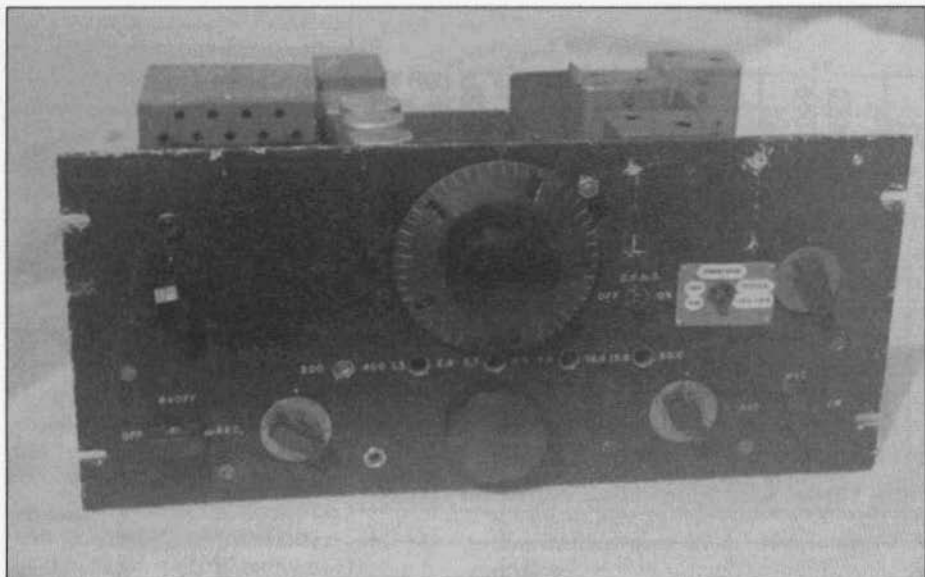
"... The high frequency oscillator has been modified so that it may be made either crystal controlled or tunable by means of a switch on the front panel."

"... to facilitate the AVC and CONS circuit... the second detector circuit has been changed, using the 6C5 second detector tube V6 as a diode, by connecting the grid to the plate, instead of as a triode."

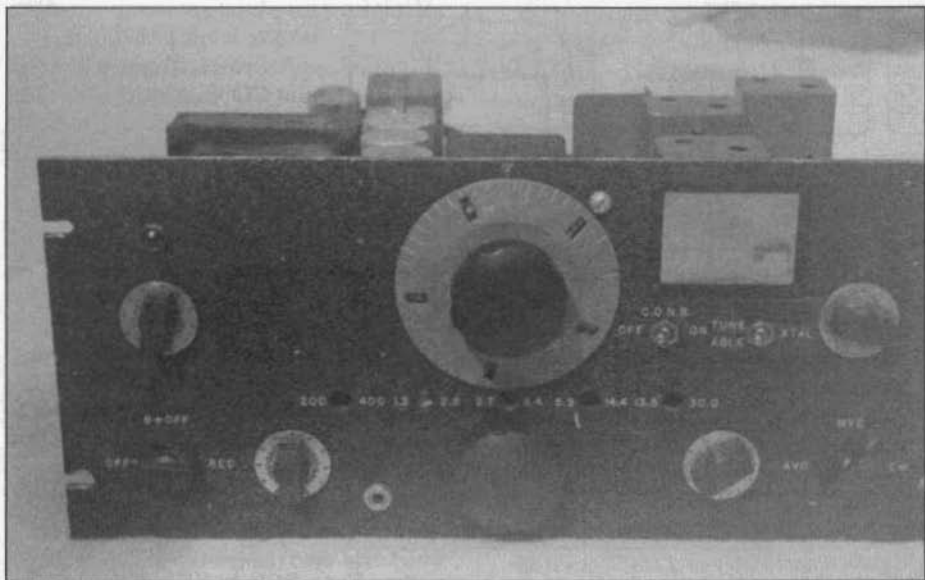
"... The audio amplifier circuits of the receiver have been redesigned to give a frequency characteristic which is fairly flat from 100 to 2000 cycles and falls off slowly to give a response of more than 15 dB down at 5000 cycles."

"... This receiver was originally a Type RCK or RCL receiver. The type designation was changed to RCQ at the time these modifications were made to distinguish it from its original type."

"... The AVC circuit has been completely changed to correct several conditions. Before modification, the AVC action was proportional to the peak sig-



Type RCP

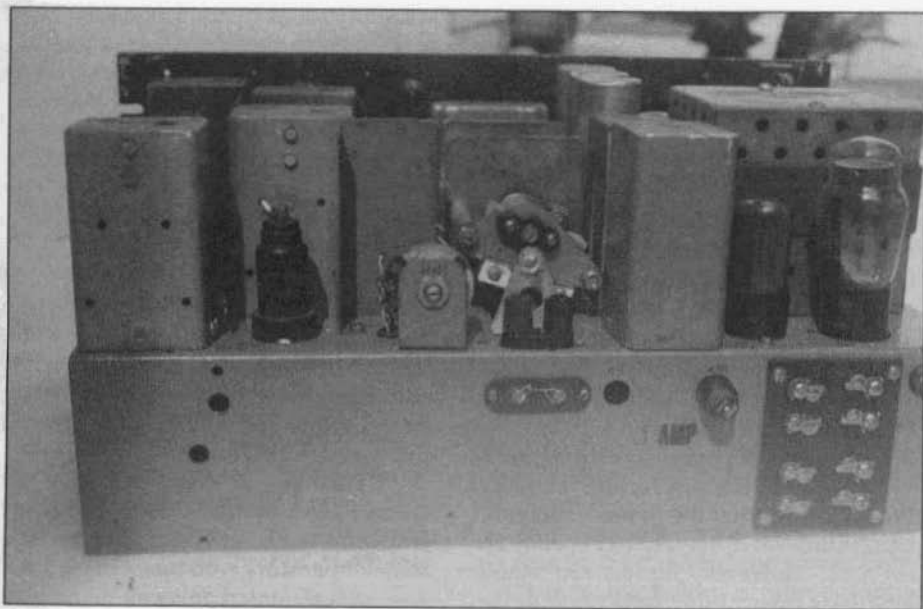


Type RCQ

nal input and thus was unduly affected by static crashes and modulation peaks. This feature was considered undesirable, therefore the AVC circuit was changed so that it responds to the average carrier input."

"... The CONS circuit has been

changed.... This modification has been made because the CONS control was so badly interlocked electrically with the RF gain control that it had to be reset each time the RF gain control was changed."



Rear view type RCP

Unusual output panels:

All of the later units have an unusual terminal board output connector panel on the rear. This is one of the easiest ways to quickly identify one of the AGR series radios at a hamfest or swapmeet.

Labeled outputs include: "monitor" and "600 ohm" output terminal screws, as well as speaker terminals. This would allow the audio to be easily piped into a local audio system for output on monitor speakers throughout the building or tower.

Most of the CAA radios also have single ended 6V6 audio outputs. (This was common in military versions of the NC-100 and NC-100A, but the civilian and amateur versions usually had push-pull output circuits.)

As you can see, these radios contain some interesting engineering changes from the standard NC-100.

My contract notes point to production runs from 1937 to 1948. I believe that as aircraft communication systems moved towards the VHF spectrum, these HF receivers were left behind.

Still production contracts over an 11 year span tells us that they filled a real need in the pre and post WWII aviation arena.

These radios show up from time to time at hamfests in the \$50-150 price range. With good performance, and a ton of interesting history attached to each one, I rate them as a definite "buy" for any National collector willing to reverse the numerous homebrew "improvements" found in most. Even the badly butchered ones can be fun, the experimenter can have a ball playing with the many changes and modifications these radios received over their service life.

One item to watch out for: Two of the four I've purchased have bad main power transformers, apparently a common failure.

If you have one of these radios, I would appreciate hearing from you with the data plate information.

I would also be more than happy to trade manual photocopies in order to complete my set. ER

Our Future Lies in the Past...

by Bruce Vaughan, NR5Q
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I don't expect this column to meet with much approval, or make me many new friends. Be that as it may, I feel someone must tell it like it is. All I ask is that you think carefully about the things of which I write.

In all of life we only have three times—the present, the future, and the past. We all know what the present offers in ham radio—and maybe that is enough for you. However, for all too many amateurs present day ham radio operating is neither exciting or challenging enough to sustain interest over a period of time. As proof I offer in evidence a declining ham population, negative growth in ARRL memberships, a shrinking and often dull QST, rude operators, crude language on the air, and the rapid demise of radio suppliers and manufacturers of ham radio equipment. All this, even with the temporary boost from the long debated no-code ticket, plus no sweat, no travel, super convenient ham exams. It was not always thus.

Today, those wanting exams often become irate when sessions are not arranged to their total convenience. It seems the easier it becomes to get a ticket, the less value the individual places on that little piece of paper. My ticket represents overnight trips to Little Rock, Kansas City, and Tulsa. Those trips took the better part of two days each and cost well over \$100 each. Yet, I consider my ham license the best investment I ever made.

What exactly is ham radio like today? Well, we have a lot of contests. Color it anyway you want, realistically a contest is a game bored ham operators play

with their radios. We still have a lot of nets and as such they provide many hams with a social outlet—and a few serve useful purposes. Far too many nets serve only as a means of letting people know your radio is working and that you are still alive.

We still have DX-ing—one of the few forms of real ham radio left, but many enthusiastic DX-ers have quit because of sick operators who block the DX station, self appointed policemen, and poor operating practices of those too lazy to learn DX procedure. Add DX clusters to the picture, and quite suddenly DX begins to lose its glamour. A once proud facet of our hobby is reduced to a simple formula—buy the gear, listen to the cluster, throw in your call, and there's your new one. Big deal!

We have two meter FM ... the domain of many former CB-ers, and those who have ham radio aspirations but are unwilling to put out the effort to become a real ham. I think of it as an expensive cell phone.

Then there's digital communication in all its many forms. In the final analysis digital ham communications is little more than an expensive, rather unreliable form of the internet. Oh yes, it does require a permit to operate.

The time when hams made most of the improvements to the art is long gone—through no fault of hams themselves. Radio has progressed to the point to where it is beyond the capability of all but a few hams. Let's face it... how much money would it take to build a transceiver equal to those offered today for a cost so low they actually represent only

a few hours work -- even unskilled work.

Like it or not, electronic equipment to is no longer a project for home constructors. Modern, complex, state of the art gear is the end result of teams of engineers working in immaculate, well equipped laboratories.

QRP operators may be among those most closely related to real ham radio—today QRP hams can still build their own gear. Even with commercially available QRP rigs a certain challenge remains—that of working stations with low power and a lot of skill.

Please—I'm not knocking DX-ing, Contesting, Nets, 2 meter FM, Pactor, Hector, or Whatfor—I'm trying to say that when we back off and take a hard look at ham radio it's easy to understand the declining interest and population.

Traffic handling, once a very important part of ham radio, is no longer a needed service. There are other ways messages can be sent that are more accurate and much faster. True, a few old timers still pass a message now and then, but in reality their operating is nothing more than an excuse to operate—a means of justifying their investment in equipment, and an opportunity to hone their skill as an operator.

Our most important contribution to society, and the main justification for the FCC allowing us to occupy valuable slices of the RF spectrum, is Radio Emergency services. A number of hams really enjoy emergency drills, field day, and use of radio to provide communications for public events sponsored by worthwhile organizations. The same group is naturally attracted to weather nets and tornado spotting service.

But let us be truthful—how many of you reading this became interested in ham radio so you could provide emergency communications? Not very many, I assure you. Most of us got into ham radio because we thought it would be fun. We wanted, and received pleasure

and enjoyment from the hobby.

So what of the future? Radio will continue to become more efficient, more compact, and totally impossible for a home builder to duplicate or repair. DX will lose the last of its fading luster due to the ease with which stations can be worked. Remove the challenge, remove the skill, remove the mystery, and you also remove the pleasure.

Like television receivers, cameras, and electrical appliances, transceivers will very soon become a disposable item. Repair of such equipment will become so difficult that it will be cheaper to replace than repair. Buy it, use it 'till it breaks, then trash it. Much the same as computers are today.

Ham radio, like many other hobbies, is a victim of too much progress. Compare it to the hobby of photography. Years ago there were active camera clubs all over the world. Every city of any size sponsored International Exhibitions of Photography. Amateur photographers belonged to photographic societies both here and abroad. They could be spotted everywhere. Thousands of photographers spent countless hours searching for a prize winning picture. It was a common sight from 1900 through the 1950's—amateur photographers lugging their heavy cameras and tripods about, carrying gadget bags on their shoulders full of expensive photographic gear. International Exhibition rules plainly stated—**all work must be done by the photographer**. In order to develop and print their pictures, almost every photographer had a darkroom; more than a few such darkrooms were better equipped than those of their professional counterparts.

And then it happened! First came Kodachrome color film—a film practically impossible to process without hundreds of thousands of dollars worth of equipment. Kodachrome was replaced by film that was easier to develop but the die was cast. Exhibitions

had struck out the requirement that "all work must be done by the photographer." They now accepted commercially processed film. Sound familiar—take a look at the 'No-Code' license.

Then camera companies began making automatic cameras. Exposure was no longer a big mystery—a monkey could get a properly exposed picture. This was followed by automatic focus, automatic film loading, one hour processing, and ultimately digital imaging.

Today, amateur photography struggles on—a dim shadow of its once glorious past. Is the hobby completely dead? No, not really. The number of serious photographers has dropped dramatically but those remaining are doing great things. Some are sensitizing their own plates and film. The beauty of platinum and gold toned prints can now be enjoyed again. Others find a challenge in doing good work with a 'Pin Hole' camera. (Compare to QRP operating) Other photographers continue to do great work for their own enjoyment. Many photographers have returned to cameras made long ago—and their price has gone out the ceiling. (Collins and National gear)

Look at other hobbies—flying for example. Jets are fast, and prop driven aircraft are disappearing from our skies. Still, more amateur pilots fly hang gliders, hot air balloons, ultra-lites, and experimental aircraft than fly supersonic jets—and they are having a ball doing it. The base of many hobbies lies in the past—not the future. This is especially true for hi-tech hobbies.

Ham radio as it was years ago does not exist today. The hobby has evolved—progressed if you will—into a dwindling, confused group looking for excitement and challenge where none exists.

The true believers, the hard core of ham radio will continue on. Some will experiment with ideas as yet unheard

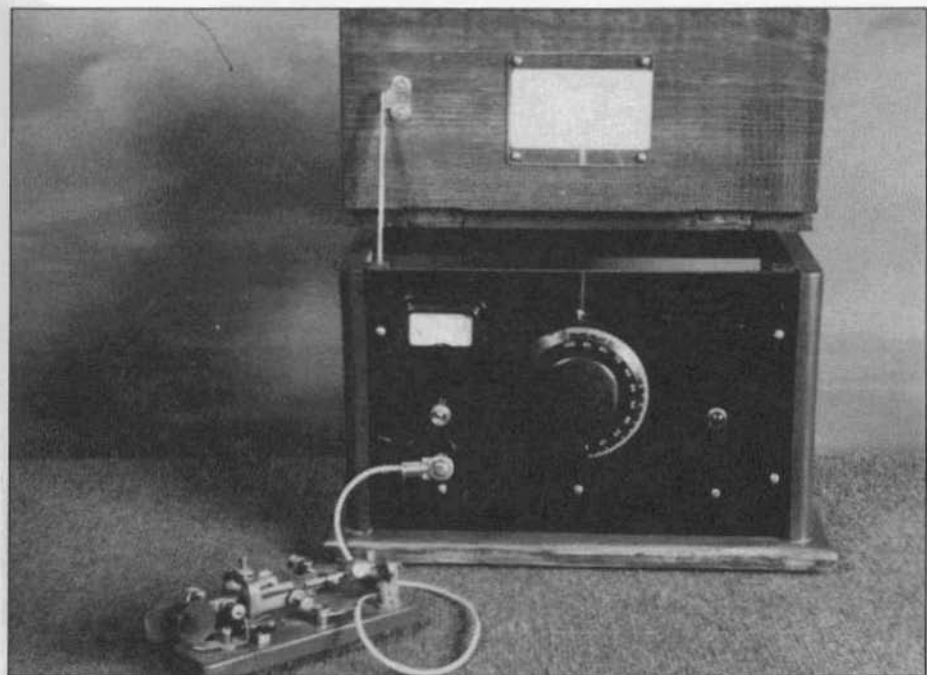
of—and a few will be successful—contributing something worthwhile to radio. Others will return to the basics: building, QRP operating, collecting, restoring, trying different modes and antennas, and using gear they can repair. A good many will continue to operate CW because of the pleasure and pride they derive from learning and using the code, a mode termed obsolete by many. Today, a good number are returning to AM where they once again communicate with stations that sound great—as good or better than the old AM broadcast stations.

Mourn not for the days that once were—they are gone forever. However, the history of those wonderful days may very well hold the key to the future. What was once fun can be fun again. When we cease to think of owning the very latest gadget and start thinking of challenges instead, then we are on the right track. Here are a few challenges—don't use any gear you can't repair yourself. Don't use any help when working DX. Work AM once again and hear the voice as it was meant to be heard. Increase your code speed by five WPM. Work 'separates' again—put your transceiver on the shelf. Build a QRP transmitter. Build a receiver that works—even if it's a crystal set. See if you can get on the air for less than \$100. Help a youngster build a radio.

Ham radio, like any other hobby, must offer those involved a sense of accomplishment. Without challenges, without effort, without knowledge, the hobby becomes lifeless. The hobby I envision may not appeal to millions but those who remain will be the cream of the crop.

Build a Classic...

I suppose among those who have read this far a few are thinking, "Well, that's all well and good, but I came into ham radio after the 'building' age. When I received my ticket almost all hams



The 25-watt 6L6 transmitter is contained in a wooden cabinet.

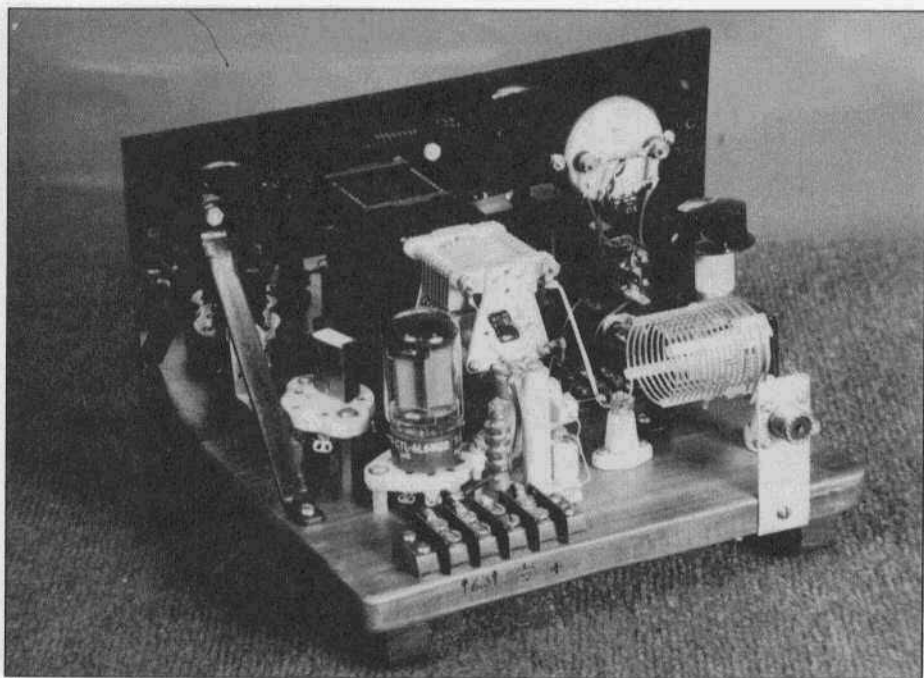
bought both their receiver and transmitter. To be perfectly candid, all I've built is antennas—how would I get started?"

That's a great question! Let me offer a project that is easy to build, uses parts available at almost every hamfest, looks great, works damn well, and is a blast to use on the air. Furthermore, this project should come in at less than twenty bucks with any luck at all. I refer to the old reliable 6L6 rig that was the first rig of thousands of hams during the thirties and even in the forties.

Way back in February 1938, I was a young squirt whose name was yet to appear in the Call book. The February issue of QST that wonderful year featured an article by Fred Sutter, W8QBW-W8QDK, that was to become a classic: **The "QSL Forty."** The article was so popular it was followed by a series of articles on the little transmitter. You will notice that there is a close resemblance between my transmitter and the

one described in the QST article. To be perfectly honest there are not too many different ways you can wire up a 6L6 crystal oscillator. All transmitters of the '6L6 Xtal Osc.' variety are closely related.

Oh, Oh, we are getting into tube type gear. Here is a good place to insert a warning. If you cut your ham teeth on solid state equipment you might have a tendency to poke around in a rig with the power switch in the 'on' position. Don't do that with tube type equipment! Even low power rigs like this can carry a terrific jolt—enough to cause serious injury, or even death under certain conditions. Follow the basic rules of safety. If you have had the rig 'powered up' and decide you must get your hands into the circuit, turn the AC switch off, unplug the power supply, allow a few seconds for the bleeder to discharge the filter capacitors, then short the HV to ground with an insulated handle screwdriver. Before pro-



Rear view of the 6L6 transmitter.

ceeding further clip a jumper from HV to ground and leave it there until you are finished troubleshooting.

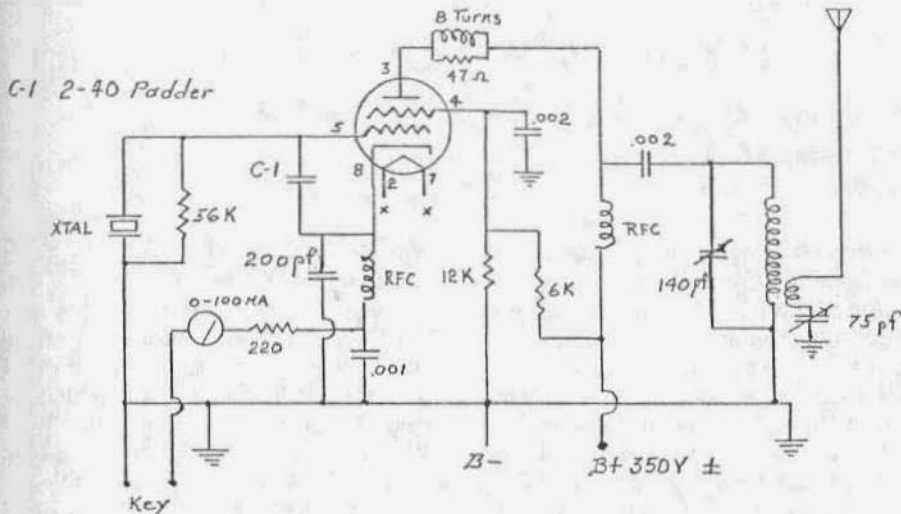
When it becomes necessary to make voltage measurements, or perform checks that require the rig to be in the power on position, be sure your test lead is well insulated, and keep one hand in a pocket during tests. Don't run the risk of setting up a closed circuit with the voltage running up one arm, across your chest, and down your other arm to ground.

Enough already. I've been tinkering with rigs all my life, and while I've had my share of electric shocks, I'm still here. The thing that really bugs me is that after all these years, and many, many hard electric jolts, I should have learned something. Still, every now and then I pull a really bonehead trick and get knocked on my rear again. The moral of my story is: Never become complacent, do not take a casual attitude about HV. It's like a copperhead snake, and

almost as deadly—it hits when unexpected, and without warning.

Now that we have scared all newcomers out of the idea of ever building anything—including a crystal radio—we can proceed with the project at hand. The little rig shown here is capable of working DX as well as local ragchewing. While not nearly as convenient and easy to operate as a modern transceiver, in those years before WW II, this was one of the most popular rigs around. I pulled a stack of old 1939 and 1940 QSL's from my file—about 25% of the stations worked were using a version of this rig.

Let's discuss the power supply first. Any power supply that can supply 350 to 500 volts, at 150 mA will be OK. A look at the handbook shows 500 volts is more than the recommended voltage for a 6L6. When this rig was popular back in the 30's a 6L6G sold for less than two bucks, and did not receive the TLC they do today. Actually, the big reason we operated



Schematic of 6L6 transmitter.

our 6L6 rigs at reasonable power was the always present danger of cracking a crystal. In those days before millions of surplus crystals, a crystal and crystal holder represented quite an investment. Few beginning hams owned more than one frequency. If your power supply puts out a full 500 volts I would recommend a voltage divider and pulling off around 400 for the transmitter. You will not be loading the rig to 150 mils of plate current—I hope. The reason I recommended a power supply that would handle 150 mils is to minimize voltage drop when keying. The one big bugaboo of running a keyed oscillator is chirp. In all probability if you build the rig as described, use a power supply as described, and load the rig for maximum power output, you will put out a signal any canary would envy. The easy answer is to de-tune the rig—ever so slightly—and back off a bit with your coupling. Only experience, gained by operating your particular rig, will drive the chirps away and leave you with a T9 signal.

Aw, come on now—is an honest T9 signal possible with a rig such as this? Yes, it certainly is. What you must do is remember your basic radio theory. Dou-

bling your power does not double your signal. Typically these little 6L6 rigs will put out from 10 to 25 watts. Despite the QST article referred to earlier, I would never try and get forty watts input to this rig. OK, let's say that you hit resonance, load the antenna, and the rig is drawing 80 mA. We know our supply voltage is 400 volts... 32 watts in. I would expect an efficiency of around 55-60 percent. So, we should be putting about 16 to 18 watts into the antenna. Let's say the rig is chirpy. By slightly retuning the plate capacitor and loosening the coupling the chirp disappears. If we measure our power it probably has lost less than 5 watts—mine drops more like three watts. It would take a better pair of ears than mine to tell the difference between 15 and 18 watts—or whatever.

Actual Construction...

This rig can be built from almost any ham's junk box. Little is to be gained by specifying exact specifications for the few parts involved. Notice that I have followed 1930's style construction practice and built on a breadboard. Breadboards were used for several reasons back in those depression years. The only

The AMECO AC-1

by Dave Ishmael, WA6VVL
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After the Novice license came into existence in July 1951 (read "The Pioneering Novices" by Jim Musgrove, K5BZH, September 1992 ER, pgs. 4-9, 32), several entry-level Novice two- and three-tube CW transmitters became available. These transmitters were relatively inexpensive and were designed using open chassis construction. Among the more popular were: WRL CW-7 - 7W 70L7/50L6 (\$19.95); Walter Ashe WAT-25 - 80/40M 25W 6AG7/6L6 (\$17.31), with matching WAP-25 power supply (\$14.23); Meissner 2-CW - 80-20M 25W 6V6/5U4 (\$24.95); Philmore NT-200 - 80/40/15M 25W 6V6/6L6/5Y3 with the power supply built on a separate chassis (\$29.40); AMECO AC-1 - 80/40M 15W 6V6/6X5 (\$16.95).

As a fifteen year old Novice in 1960, I don't recall ever seeing any of these transmitters at my ham friend's QTHs. Everyone I knew was into homebrewing transmitters with 6AG7s, 6V6s, 6L6s, 6DQ6s, 807s, 1625s, and 6146s, or building the more popular Heath, Knight, EICO... kits. Of the transmitters listed above, I clearly remember the Philmore NT-200 and AMECO AC-1 ads. I started out homebrewing transmitters even before I got my Novice license, so I suspect that I never considered buying either one. It wasn't until I read Randy Barthel, KF8TV's article in the July 1993 QST, An "Ocean Hopper" Reunion, that I started looking into acquiring an AMECO AC-1. I was curious about how well it worked and thought it might make a good collectable next to my own Ocean Hopper (ER#42).

The AMECO AC-1 was first (?) advertised in the 1957 ARRL Handbook

which means it was probably first available in late 1956. The February 1957 CQ, pg. 66, discussed building the "new Model AC-1 Novice transmitter" in about three hours. In 1957, the AC-1 sold for \$16.95 in kit form which included a coil kit for one band, 40 or 80M. Tubes and crystals were extra. An extra coil kit, CK-1, was available for \$0.50. A set of 6V6GT and 6XSGT tubes was \$2.13. By 1962, the price had increased to \$19.95 and included the tubes (model AC-1T). AC-1 ads in QST for December 1969 and March 1970 were \$23.95 and \$24.95 with tubes. The extra CK-1 coil had increased to \$0.75, \$1 and \$1.10 respectively.

Richard Mintz, the president of the AMECO Corporation, was very helpful in researching the AMECO "archives" for AC-1 information. He sent me copies of the instruction sheets for three different versions of the AC-1:

*The AC-1 pictured in this article is the original version. The PLATE TUNING and ANT. LOADING capacitors are both 365 uF. The AC-1 pictured in KF8TV's article in QST is also an original version.

*The 2nd version moved the 6X5 closer to the power transformer, more in-line with the 6V6. The coil socket was moved to the rear to make room for a larger 2-section 900 uF ANT. LOADING capacitor. The 2-screw terminal strip (TB1) for the antenna was rotated 90 degrees to the right side of the chassis. The front panel silkscreen was not changed to correspond with TB1's new location and the GND and ANT labels were now meaningless. The 8 Hy filter choke was eliminated and the 2-section filter cap was changed to a single 20 uF 450V input filter capacitor.



Front view of the AMECO AC-1 with 40M coil installed. This is the original version of the AC-1.

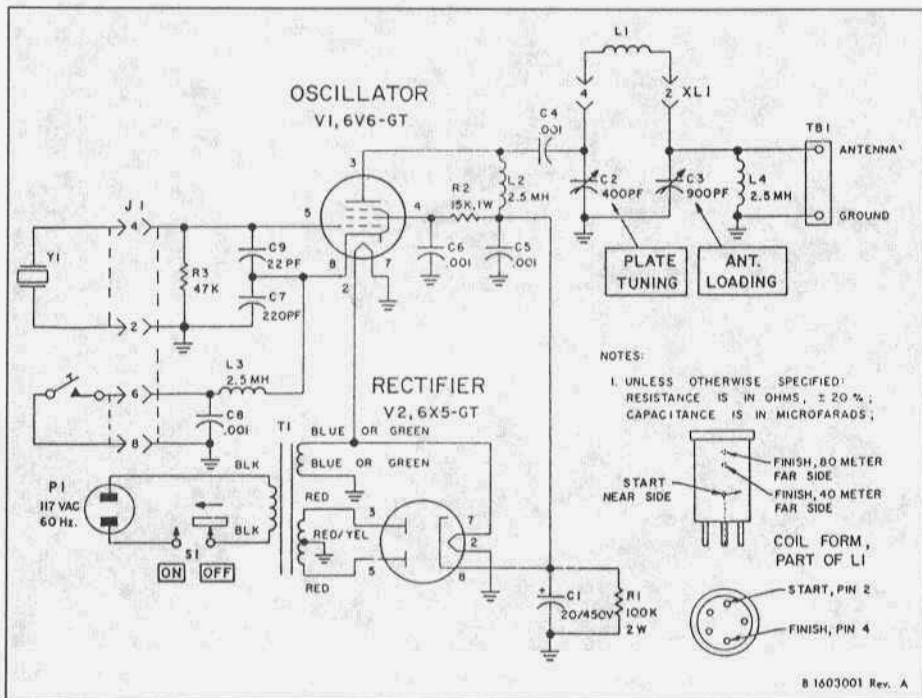
* The 3rd version changed the plug-in coil to a fixed coil and used a slide-switch for 80/40M bandswitching. The fixed coil and slideswitch were installed using a bracket in place of and over the original 5-pin coil socket. The front panel silkscreen was still the same as the original.

The instruction sheets were not dated so it's not clear when these major revisions occurred. The AC-1 ads in QST for December 1969 and March 1970 still advertised the extra CK-1 coil. It appears that the fixed-coil version was available after 1970 (?).

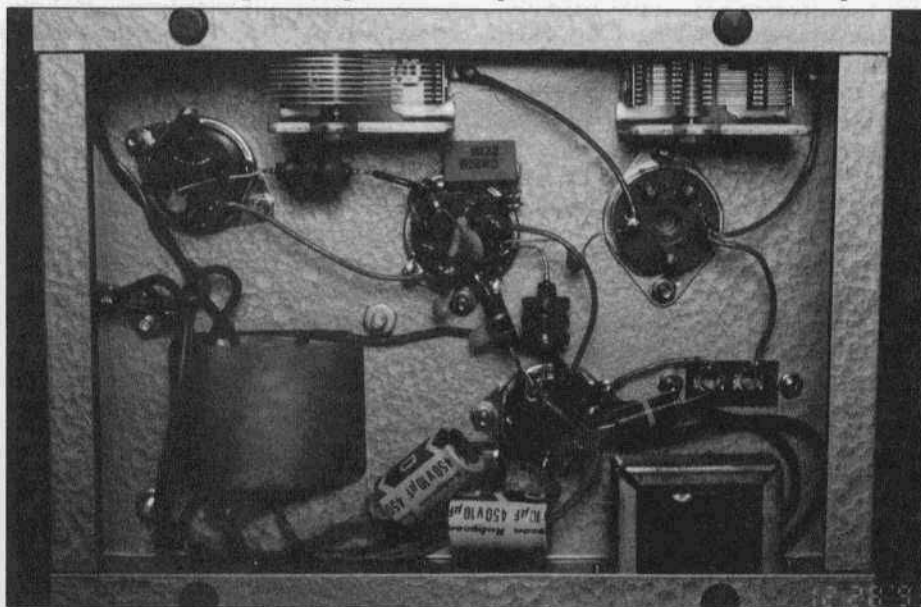
My original AMECO AC-1 is a Novice class, two-tube, 15W input, crystal controlled, single-band 40 or 80M, CW transmitter. A pi-network matches "any random length of antenna". The coil-form included with the kit could be wound for either 80 or 40M. An extra coil kit (CK-1) could be purchased to cover the other band. The coils are wound on standard

clear phenolic 5-pin 1-1/4" dia. coil forms. The 80M winding has 32-1/2 turns and is 1" long (28uH) and the 40M winding has 15-1/2 turns and is 1/2" long (10uH). A 6V6GT operates as a grid-plate crystal oscillator. The power supply uses a 6X5GT as a full-wave rectifier with a capacitor input filter and a 8 Hy filter choke that delivers >330V key down. The key-up voltage is 425V @ 120 VAC line. The input and output filter capacitor is a dual-section 8 uF 450V. The power transformer is relatively small, the core measuring only 2-1/2" x 3" x 1". The transmitter runs comfortably warm after several hours of operation.

The AC-1 is built on a 8" X 6" x 2-1/2" gray hammertone finish chassis with white silkscreened lettering. An octal tube socket on the top of the chassis serves as the crystal socket and key jack. The PLATE TUNING and ANT. LOADING knobs are maroon. A 2-screw terminal strip (TB1) connects the antenna.



AC-1 Schematic Diagram. Reprinted with permission from AMECO Corp.



Under chassis view. The 2nd version of the AC-1 moved the coil socket to the rear and used a 2-section variable for ANT. LOADING. The original single-section apparently didn't match "any random length of antenna".

NEW AMECO TRANSMITTER



in kit form **\$16.95***
only

- Pi-network Output circuit
- Includes Heavy-duty AC power supply
- 6V6 Oscillator and 6X5 Rectifier
- 15 watts input
- For 40 and 80 meters CW
- Crystal controlled
- Attractive grey ham-mertone finish with white lettering and red knobs
- Simple and Educational building instructions

The new AMECO transmitter kit is an ideal unit for the beginner or novice who requires a reliable transmitter. It is a high quality rig containing a heavy-duty transformer-choke power supply. It has a Pi-section output circuit to work into any random length of antenna wire. NO ANTENNA TUNER IS NECESSARY. Keying is clean and chirp-free. TVI suppression features have been included in unit. Kit is low in cost, simple to build, and easy to operate. Units are complete with punched chassis, hardware and instructions.

* Model AC-1 with coil kit for any 1 band, less tubes and crystal..... \$16.95

Extra coil kit CK-1..... .50
Set of tubes for above (6V6 & 6X5)..... 2.13

1957 ARRL Handbook ad

I bought my AC-1 from an ER reader who answered my ER#55 ad. The AC-1 was his first transmitter and he purchased it as a kit around Christmas of 1969. Judging by the date code on the original 2-section filter cap (820-63) and the original AMECO 6X5 tube (416), this kit may have been packed as early as mid 1964. The condition of this AC-1 is really mint. It came with both 80/40M coils with original AMECO boxes, an extra set of tubes with original boxes, cable for the key, and the original instructions. All this AND expertly packaged to survive UPS!

Tuning up is pretty straightforward with the exception that there is NO tune up indicator—you have to use an external relative power indicator or a 0-100 mA DC meter in series with the key. Output power measured 7-8W with my Kenwood AT-230 on the 20W range. The transmitter puts out about the same

power as my Heath AT-1 on 80/40M, but using a much smaller footprint/simpler design.

There was very little chirp using 80M crystals but my 40M crystals were a different story. Some of my 40M crystals were quite chirpy, very tuning critical. After PLATE TUNING was adjusted for dip, it was further adjusted for minimal chirp and best keyed waveform on my Kenwood SM-220 monitor scope. My first QSO with the AC-1 was with Dave Hills, AJ7O on 80M. He gave me a 579 RST with just a hint of chirp. Dave reported no key clicks.

Over the years, I have heard some pretty disparaging remarks about the AMECO AC-1. Bottom line? 40M crystals are less forgiving/potentially more chirpy than using a 6AG7, but careful tuning can minimize the chirp. The power supply is more than adequate. I think the AC-1

is a pretty classic 6V6 transmitter and probably works as well as any 6V6 crystal oscillator transmitter can.

Send me a LSASE and I will send you a copy of the instruction manual. Please indicate what version you are interested in. If you don't indicate which one you want, I will send the original manual. ER

Selected References:

1. "New Equipment for the Novice", Novice column, Walt Burdine, W8ZCV, CQ Magazine, Feb. '57, pg. 66.
2. "An Ocean Hopper Reunion", Randy W. Barthel, KF8TV, QST, July '93, pgs. 54-55.

To Join AMI send \$2 to:
AMI
Box 1500
Merrimack, NH 03054

Johnson Transmitter Potential VFO Burnout

by Scott Freeberg WA9WFA
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White Bear Lake MN 55110
scott.freeberg@guidant.com

After experiencing a VFO burnout in my Johnson Viking Valiant, I thought I would share the problem and the solution with those that are running Johnson transmitters. Your VFO may be burning up at this moment. Johnson used the same VFO design in several transmitters including the Ranger, Valiant, Navigator and the 500, so the same problem is common across several models.

Since I got my Valiant, I have been experiencing an occasional blowout of the 300 volt low voltage fuse. I looked around each time but I could not find anything wrong. I figured that possibly some capacitor was probably starting to leak, but which one? Nothing was hot. I'd replace the fuse and run for another few weeks. I know, shame, shame, plus I never opened the VFO compartment to snoop around or I might have found the problem. One day the transmitter blew the fuse and did not come back to life when the new fuse was installed.

This time there was plenty to find wrong. The transmitter was experiencing excessive low voltage supply current draw. I finally opened up the vfo compartment... I found a burned out resistor and several damaged tubes. To start with, there is an 18K ohm resistor (R3) in series with the 300 volt supply, being used as a current limit for the 150 volt OA2 VFO voltage regulator. The resistor's power rating was not adequate for this application, plus it is located in the unventilated VFO compartment. The resistor burned up and ruptured, which changed its resistance from 18k to 150 ohms. This in turn re-

sulted in excessive current to the OA2 voltage regulator tube, burning it out. This excessive current draw then exceeded the 5V4 current rating, burning it out. Upon OA2 burnout, 300 volts was being directly applied to the grid of the 6AU6 VFO oscillator tube, damaging it.

Looking back on this whole thing, the resistor was probably burning out slowly, reducing the resistance value over time, resulting in more current and heat, causing the resistance to go even lower until the failure was catastrophic.

Several BA folks told me that this is a common enough occurrence and if it hasn't happened yet, it will. They recommended a two step solution to the problem. First replace the resistor with at least a 5 watt part. In my case, I used two 36K ohm 3 watt resistors in parallel to yield 18K ohms at 6 watts. Another suggestion was to completely move the resistor out of the VFO compartment and mount it under the chassis. The VFO compartment is already very hot from the OA2, this resistor, and the 6AU6 VFO tube. I soldered the new resistors to a new three lug terminal strip mounted to one of the VFO compartment mounting screws directly underneath the VFO. There is a grommet nearby which conveniently passes wires directly into the VFO compartment. I ran two wires from the new resistors through the grommet into the vfo compartment and soldered them to the old resistor connections.

I then replaced the 6AU6 VFO tube, the OA2 voltage regulator tube, and the

Restoration Tip

For some time I have been using a product that I don't think a lot of people are aware of. In an automotive supply store or a Home Depot you can get DURO's Extend. This product is around by several makes. I suspect it was a NASA development and is free for anyone to use. This stuff comes out looking like thin milk. You take a rusty surface, brush off the loose flakes, but leave the hard core rust. Then paint this stuff on. In a short time it will turn black. It reacts chemically with the rust forming a hard finish. They suggest that you use it as a primer and then paint it. It looks good and I seldom get to the painting stage. I've used it on my car, which was the main intent, I did an antique cannon that had been rusting since 1850 and I just used it on a Stancor power transformer that had gotten rust spots on it. It is just another tool in the arsenal of the restorer.

Van Field, W2OQI

5V4 regulator tube. It was very interesting to note that the 6AU6 checked out good on the tube tester but the vfo did not function with it, probably due to grid damage. I replaced the tube and the transmitter worked properly.

One really odd thing about that burnt up resistor was that the orange color band, which signifies thousands of ohms changed color from orange to yellow as the part burned out. When I read the color code, it read 180K ohms which confused me.

So if you are experiencing VFO anomalies, it flat out stopped working, or you happen to be poking around in the VFO compartment, you may want to consider replacing that OA2 current limit resistor before it finally burns out.

My thanks to my friends on the BoatAnchor list for their help. ER

Editor: Long-time ER readers will be quick to remind me that we have dealt with this problem in earlier issues. I think that for the benefit of new subscribers/new vintage enthusiasts the revisit is worthwhile.

Evaluating the Svetlana EL509/6KG6 Tube from page 18

output and efficiency. The 6146B was chosen, as it is a familiar device for this application. The following data reflects these comparisons:

	6146	6KG6
PLATE VOLTS	650	695
PLATE CURRENT (mA).....	110	150
SCREEN VOLTS.....	210	155
CONTROL GRID (mA).....	4	5
POWER OUTPUT (WATTS)....	51	81
PLATE Efficiency (%),.....	71	77.5

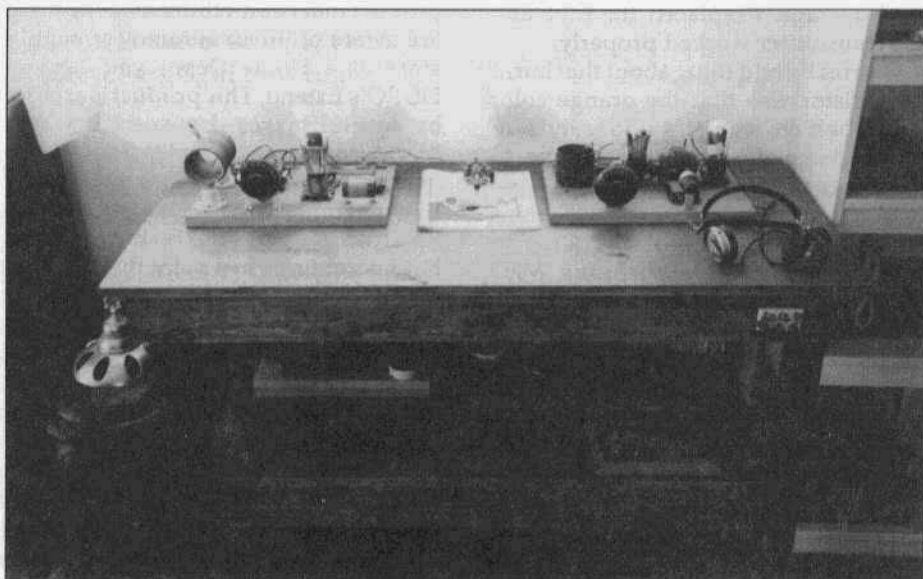
Even though the output capabilities were different for each of the tubes, the comparisons were basically showing what each could produce within its own parameters. Notice that the plate efficiency is substantially greater for the 6KG6 in comparison to the 6146B.

In one test of the 6KG6, 100 watts output was achieved with a plate efficiency of 72%! This would probably be the power limit for this tube.

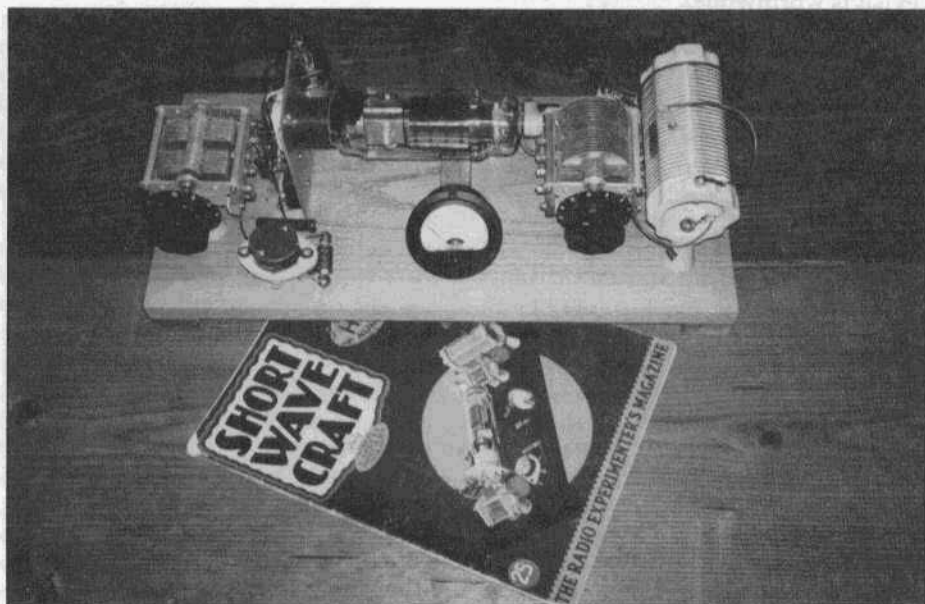
The 6KG6 is a well suited device for Class C service. This is a robust tube that is easy to drive with plenty of output power. ER

Homebrew Projects

Photos of homebrew gear built by Jerry Fuller, W6JRY



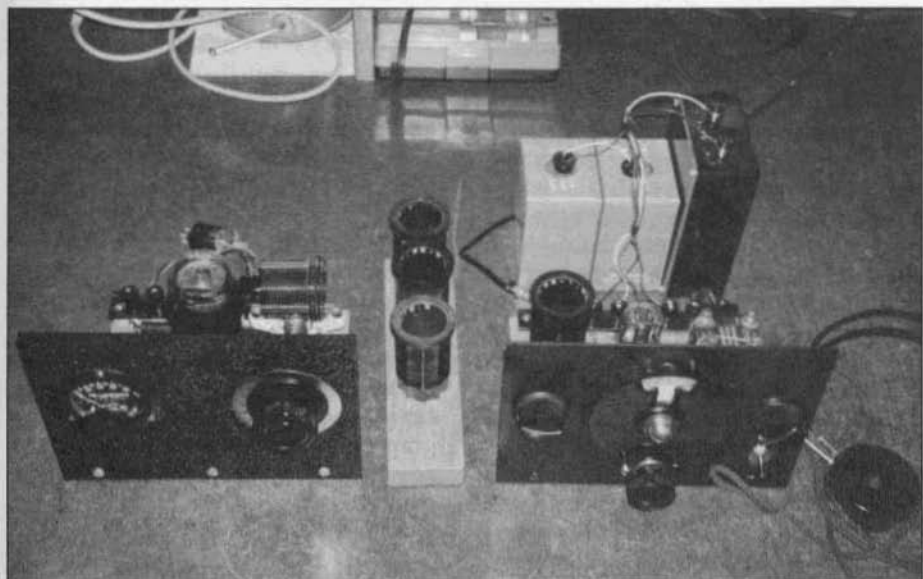
Table, transmitter, receiver and power supply. From ARRL "How to Become a Radio Amateur", 1930.



804 power oscillator. From "Shortwave Craft", July 1936.



On the right W6JRY's version of the Bob Dennison (W2HBE) 1937 transmitter. From ER, June 1995, page 14. Receiver on the left, the W6JRY version of the SW-3 from QST, Sept. 1931, page 9.



On the left is my version of a transmitter that Niel Wiegand, WA5VLZ, built and then described in an article ("A 6L6 Classic") in ER #62, June, 1994. He built the transmitter from plans he found in the "Stancor Hamannual". On the right my version of Bob Dennison's (W2HBE) IG6 Simplex Shortwave Radio.

Our Future Lies in the Past. from page 31
tools actually required for building were a soldering iron and solder, a hand saw of some sort, a screwdriver, pliers, and a little hand powered drill. Luxury items like electric drills, diagonal pliers (side cutters) needle nose pliers, hole saws, hole punches, metal breaks, and drill presses were not available to many hams.

Cost was the primary factor in building before the war. "What's cheaper," was a question asked more often than "What's better." To go with breadboard construction, panels were made from any material at hand including Bakelite salvaged from old BC radios, plywood, hardboard, and sometimes aluminum. Whatever was available cheap, meaning free, became the material of choice.

My panel is a piece of 'imitation' bakelite, a plastic panel material sold by Antique Radio in Mesa, Arizona. The breadboard is a scrap of soft pine that measures about 8 by 10 inches. I sanded the base and gave it a coat of stain. This was followed by two coats of satin finish varnish. More coats would have been applied but I was in a hurry to get to my actual construction.

I wanted to keep the rig with an authentic look so a 'cheapie' meter was used. I had to make several hamfests to find the 'Readrite' meter. Before the war they sold for about 79 cents from Allied Radio. Now, due to so much surplus still floating around, it is far easier to find a nice Weston meter than one of the economy meters.

The tank coil is not all that critical—neither is the plate capacitor. Any capacitor from 100 pF to 150 pF will be fine. The rig in the illustration shown is designed for forty meters. I was lucky enough to find a hunk of old B&W coil stock for the tank itself—the link was homebrewed.

About here someone is sure to ask about coil winding data. Try this... multiply the frequency in meters of the band you wish to work by a factor of .4

(point four). This works well for me when winding coils on a 1-1/2 to 2-1/2 inch form—not very scientific but close enough for a good starting place. Example, the rig pictured is built for 40 meters. $40 \times .4 = 16$. It just happens that the coil in use has 16 turns and works great. As you approach higher frequencies like ten meters you may have some stray capacitance floating around because of long leads and this formula may not hold. It seems to work great for 15 thru 80. Of course wire size, spacing, coil diameter, humidity, temperature, and the closing DOW Jones averages may figure into precision calculations, but I don't like to spend all day figuring out something simple like coil winding. Chances are I'd goof up and get it wrong anyway.

Hey, you are using link coupling to the antenna. Would a pi output not be a better choice? Sure, go for the pi output if you wish. I used link coupling because that was about 'the only ball game' when I was first starting out. Again, I wanted my 6L6 rig to be typical of the prewar years construction.

Why ceramic sockets for the crystal and tube? Because I had 'em and because the old-timers liked them. They offer no advantage here except they look pretty. Hams of the thirties went overboard on 'low loss' construction due to some very clever advertising by National, Hammarlund, and other parts manufacturers.

I would like to offer a page or two of detailed instructions but they are so simple they only occupy one short paragraph. Find a board for the base, find something for a panel, mount parts, connect parts, put on the air. That is about all I can tell you.

Happy building. Let me know how your 6L6 rig works out. All E-mail is answered promptly, snail mail may take me a few days or weeks depending upon my work load. ER

Spurious Emissions from page 5

to decrease roll-off capacitor values in the 12AX7 stage. Reduce values of the modulation transformer secondary shunt and the RF bypass capacitors with some care, checking for modulator oscillation. But take great care if you reduce the value of C60, the driver transformer secondary shunt. Use the solutions mentioned above, but be aware that different production runs of Rangers may have had different sources of the driver and modulation transformers, with different ultrasonic frequency response and phase shifts. The cause and cure for your particular Ranger may differ a bit from mine. Always check for ultrasonic modulator oscillation. You may not have a friend like K4MNY to warn you of problems.

I feel obligated to add this admonition, since I have suggested making tests on Ranger circuits with the cabinet removed and power on. Rangers, Valiants, Vikings, DX-100s, 32Vs, 5100s, and many other such rigs use high voltages of 300 to 700 volts. This is in the most dangerous range, where accidental shock can induce cardiac fibrillation. Heed the old but good advice of working with one hand in your pocket. Shock from a D-104 in one hand to 600 volts at the other is lethal. BE CAREFUL. ER

Letters from page 3

having various kinds of insulation which suit it for this purpose. The specific kinds of insulated wire may be specified by the abbreviations listed.

1. Plain enamel covered. P.E. (or sometimes EC)
2. Single cotton enameled. S.C.E. (One layer of cotton over enamel.)
3. Single cotton covered. S.C.C. (One layer of cotton, no enamel.)
4. Double cotton covered. D.C.C. (Two layers of cotton, no enamel.)
5. Single silk enameled. S.S.E. (One layer of silk over enamel.)
6. Single silk covered. S.S.C. (One

layer of silk, no enamel.)

7. Double silk covered. D.S.C. (Two layers of silk, no enamel.)

Coils which are to withstand high temperatures or moisture sometimes have insulation of fiber glass consisting of fine strands of glass applied as a yarn.

Barry, I hope this helps some of your readers,

Bob Rosenhahn, KE6LNI

Classic Exchange Report from page 12
place (with Matchbox and separate SWR bridge, of course). It LOOKS like radio -- or a bit like Dr. Frankenstein's laboratory.

I still think we should have a "weight" multiplier for scoring, added in with age: I like the idea of multiplying the total weight of all equipment used times an age factor, such as AGE divided by 100. That way, as age increases the weight factor comes more into play. For example, using my age: weight factor would be $58/100 \times (\text{total weight})$. Maybe weight should include only everything you use AND have to lift to put in place to operate CX, so all those BC-610s permanently in place out there don't really count. OK, OK - it's just a thought. One I have every time I am moving that Apache, or the Viking II.

Hope you all had a great CX. Remember to continue to put out the word and to bring in the "new kids" also, who represent the life of our activity. Remember too that ANYTHING can be used in CX. The next one is on the last Sunday in September at 3 PM Eastern (Daylight?). We all have time to get everything working again, right up to when we throw the switch for next CX, and the next smoke will escape! Thanks to all for keeping 'em going! ER

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<http://www.qsl.net/n900>

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FOR SALE: Repair and restoration on all vintage equipment; 45 years' experience. Barney Wooters, WSKSO, 8303 E. Mansfield Ave., Denver, CO 80237. (303) 770-5314

FOR SALE: Radio books, magazines, catalogs, manuals (copies), radios, hifi, parts. Send 2 stamp LSASE. David Crowell, KA1EDP, 40 Briarwood Rd., North Scituate, RI 02857-2805. aq253@osfn.org

FOR SALE: KWM-2 fan bracket - \$12 ppd. Dave Ishmael, WA6VVL, 2222 Sycamore Ave., Tustin CA 92780. (714) 573-0901.

FOR SALE: Small parts, transformers for projects and repairs of tube gear. Let me know your needs. Van Field, W2OQI, 17 Inwood Rd. Center, Moriches, NY 11934. (516) 878-1591 or wreck_and_rescue@juno.com

FOR SALE: Hickok KS-15750-L1 transconductance tube tester. Rugged steel carrying case w/many accessory socket adaptors & manual (copy of model 1575). Rick, K8MLV/G, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

FOR SALE: NOS, UTC # F-7101 matching (600-8 ohms) xfms (2 W) - \$13 ppd/dom./USA. ABEN, POB 4118, Jersey City, NJ 07304-0118, Avidov@aol.com

FOR SALE: Hallicrafters HA-1 keyer, nice; S-41-G rcvr, good condx. Fred Clinger, OH, (419) 468-6117 after 6 PM.

FOR SALE: Collins S-Line aluminum knob inlays: small (exciter/PA tuning) - \$1; 30L-1 - \$2; spinner/plain (main tuning) - \$3. Charlie, K3ICH, 13192 Pinnacle Lane, Leesburg, VA 20176. (540) 822-5643

FOR SALE: Hallicrafters, RME, Gonset, others. Also some military, test equipment, VHF/RF amps, more. LASE, Don Jeffrey, POB 1164, Monrovia, CA 91017.

FOR SALE: Tubes, Penta Labs, 811A- \$20.; 572B- \$55.; 3-500Z- \$170.; ZG also avail. (these are Amer. made); NOS 811A- \$35. Many other US NOS. VISA/MC. Dee, W4PNT, VA (540) 249-3161, soundmind@rica.net

FOR SALE: Hallicrafters, Drake, Heathkit, Military, etc. Send e-mail request or SASE for list #2. Fenton Wood, 109 Shoreline Dr., Star Harbor, Malakoff, TX 75148. fenton@tvec.net

FOR SALE: Tube sockets, ceramic, octal to flanged Johnson 50 watters. SASE for list. Bill Riley, W7EXB, 863 W. 38th Ave., Eugene, OR 97405-2375. (541) 345-2169

FOR SALE: Swan SS15; Tempo 2020; Tempo one; Swan 350; test equip Heath 101. Dan Rupe, WA, (360) 267-4011. w7ddf@yahoo.com

FOR SALE: BC-604 xtal box w/some xtals - \$30. Ken Kolthoff, 8967 Scott Dr., Desoto, KS 66018. (913) 585-1196. kolthoff@gvi.net

FOR SALE: NCX-3 w/pwr sply, exc condx - \$195; HT-37, very good - \$175; SX-99, good - \$165. Cliff Fleury, A17Y, POB 1233, Goldendale, WA 98620. (509) 493-8203

FOR SALE: Johnson Viking II w/122 VFO & manual, very nice - \$250; Millen 92200 xmatch w/manual, like new - \$200; Technical Materiel Corp. AN/URA-27 antenna tuning system, complete w/manual, like new - \$150; other TMC items available. John P. Tiedeck, WA2SDE, 212 Grandview Rd., Media, PA 19063. (610) 566-8049

FOR SALE: Table AM-FM radios, RCA RLC 20-512; RHC 17N Panasonic RE7129, RE7273, RE6451, Magnavox 1FM062 - \$10 ea; Americana 2220 stereo dual spkrs - \$12; Precision E-400 sweep signal generator - \$40; Heath 0-6 5" oscilloscope - \$50. All above + UPS. Onerio I. Sabetto, 1717 Burgess Rd., Cleveland, OH 44112. (216) 481-1036

FOR SALE: 1st issue, 3 print, 1927 Handbook; 500 Watt 813 xmtr w/811 mods. **WANTED:** BC-610 w/speech amp. George, RI, (401) 724-5516.

FOR SALE: National NC57 - \$59; Heath CPOs & Q multipliers - \$17.50 ea. All + shpg. H. Mohr, 1005 W. Wyoming, Allentown, PA 18103.

FOR SALE: Heath Mohawk & AK-5 spkr, collector quality - \$250 + shpg. Ron, AB5WG, 115 First St., Sugar Land, TX 77478. (281) 491-7823

FOR SALE: Rare, black HRO 50R1, 7 coils, xtal cal, NBFM adapt, manual - \$450. Jim, K7BTB, POB 50355, Parks, AZ 86018. (520) 635-2117

FOR SALE: Drake L7 2KW wide range linear w/ spare pair of new, boxed Eimac 3-500Z. Absolute collector quality. I believe this to be the cleanest that can be found anywhere - \$995; MN2700 2KW matching network - \$225; WH7 2KW wattmeter - \$65; CW75 electronic keyer - \$75; R7 general coverage rcvr updated by Drake to R7A w/NB7A noiseblanker, 5 filters, MS7 external spkr, operating manual plus separate service/maintenance manual in Drake vinyl binder - \$695; R4B rcvr, exceptionally clean, near mint w/complete set of new, boxed tubes but does need work - \$100. I pay UPS/insurance. Please, no personal checks. Jeffrey Hopkins, WA2DPK, 1360 Jean Ave, Redlands, CA 92374-2749. (909) 798-7914

FOR SALE: Collins 75A-4, ser. #877, in good, working condx w/spinner knob, 1.5 kc, 3 kc, W7FG manual, ER modification compendium - \$750 firm. Omar de la Rosa, KQ6IG, 485 E. Julian St., San Jose, CA 95112. (408) 287-5775 day, 292-2738 eves.

FOR SALE: HQ-129, HQ-150, SB-220, SX-111, HT-37, SP-600-JX, HQ-180, B&W 5100, DX60, Rascal 17, Johnson 500. Bill, CO, (303) 841-6201.

FOR SALE: USM 24C navy o'scope w/manual - \$60; BC348P w/AC - \$145; pair EB8 phones - \$40. All + shpg. Robert Martin, 111 Bancroft, Rochester, NY 14616. (716) 663-4182

FOR SALE: A-27 Phantom antenna - \$50; AR-41 w/military manuals - \$250; S-40 rcvr - \$50; Trio-2200 2M portable - \$75; Lettine-240 w/extral coils & spare TX - \$250; Conset G-66B & DC pwr pack - \$100; Micro-match SWR meter - \$50; H/P automatic attenuator model 50B - \$50; H/P scope model 130 - \$100; Heath scope 10-4555 - \$100; Heath audio gen. 1G-1272 - \$75. Ron, K6LLQ, CA, (925) 682-2838.

FOR SALE: GR 916A RF impedance bridge, 0.5-60 MHz, w/cables, case, nice condx - \$200. Chase Hearn, 104 Glenwood Dr., Williamsburg, VA 23185. (757) 229-7263

FOR SALE: McMurdo Silver VTVM, new - \$50; AN/AFS-4 Airborne torpedo shaped carrier plane radar, one of the first, w/inst book - \$2500. Harry, W6ATC, CA, (310) 478-3561

FOR SALE: 1939 Japanese 0-200 mA meter - \$200; Federal telegraph 128AY marine regen rcvr - \$250. Gary, WA9IFY, 169 N. Ridge Rd., Versailles, IN 47042.

FOR TRADE: Transformer 117 VAC/2260 VAC 270 mA, no CT for xfmr to give 1500 VDC 200 mA. Bob Lackey, W4QBE, 1252 Worley Creek Rd., Lakemont, GA 30552. (706) 782-3670

FOR TRADE: My Collins 32V3 for Johnson Viking 500. **WANTED:** T-368-F maint & field manual. Jeff Wilder, W8XQ, 2730 McKinley Ave., Kalamazoo, MI 49004. (616) 381-3807

FOR SALE: Repair! Radio repair, tube or solid state. Reasonable charges. J. Dan Rupe, W7DDF, 998 Whipple, POB 697, Grayland, WA 98547. (360) 267-4011, w7ddf@yahoo.com

FOR SALE: One BC-610 P/S deck, late model, can be put on 220 sply, PU only; one BC-610 speech amp; one T-368 TX modulator deck, has complete P/S for T-368 exciter, spare set 4-125A tubes, PU only; one T-368 exciter, has output tube. **WANTED:** To buy: 1 to 8 new 6146 tubes; 1 to 4 new 12BY7 tubes; 1 to 2 4-1000A good tubes; 1 to 2 4-1000A tube sockets; 1 to 2 chimneys for 4-1000A tubes. Joe Davis, W5EL, AR, (870) 257-2839.

FOR SALE: I have a quantity of old QST mags. A few 1920s; many 1930s; a few 1940s (WW2 yrs); drop me a card for complete list. **WANTED:** To buy, Johnson KW matchbox ant. tuner for use w/my Invader 2000, any condx, wkg or not, incomplete unit OK. Please help me get another old rig on the air. Joe Davis, W5EL, 64 Chief White Eagle Ln, Cherokee Vlg., AR 72529. (870) 257-2839

FOR SALE: Hallicrafters SX-28 rack mount - \$300; EICO modulator, mint - \$125; HQ-180 parts unit - \$45; Johnson Viking, needs face lift - \$50. Marty, NJ, (609) 466-4519.

FOR SALE: HQ-120X - \$135; BC-610 pwr sply, PU only - \$300. **WANTED:** PE-73-C dynamotor & connectors. W7RBF, AZ, (602) 864-9987.

WANTED: Johnson Adventurer, Challenger or Navigator, must look & work good. Ralph, KW8G, 4200 Bently Lake Rd., Howell, MI 48843. (517) 545-4200 after 5 EST

WANTED: Collins - Amateur catalogs, sales literature, manuals, promotional items & Signals. Richard Coyne, POB 2000-200, Mission Viejo, CA 92690.

WANTED: Howard radios of any type. Andy Howard, WA4KCY, 105 Sweet Bay Ln, Carrollton, GA 30116. wa4kcy@usa.net

WANTED: E. F. Johnson Co. HAMALOGs, unusual photos and information 1923-70. Bruce Hering, 41120 State Highway 13, Waseca, MN 56093. (507) 835-5619. bhering@efjohnson.com

WANTED: Top dollar paid for Winchester Radios and Winchester related items. Donald Daggett, 122 Hall Rd., Grahamsville, NY 12740. (914) 985-7249, wc2e@webtv.com

WANTED: Owners of the John Leary, W9WHM, re-engineered Hammarlund SP-600 rcvr, seeking info and serial number of rcvr. Bill Mills, KC4AA, (912) 452-2957, wmills@gmc.cc.ga.us.

WANTED: Galaxy V accessories (F-3, DAC-35, SC-1, RV-1, etc); cabinet for 600L. Tom Hoitenga, K8NGV, GA, (770) 426-8682, hoitenga@bellsouth.net

WANTED: SW-3 Coils any band. Pre 1935 ham, pre 1925 broadcast, wireless equip. Mike Bald WD5GLW, (918) 492-7361, radiomb@aol.com

WANTED: Collins KWS-1 in very good condx. Prefer PNW area for PU. k7jb@ptld.uswest.net

WANTED: Drake SPR-4 rcvr in exc condx. Wels, Steinstr.12, D-48465 Schuettorf, Germany. Fax +49.5923.5761

WANTED: Swan 330 general coverage converter for model 600 rcvr. Jim, KØYLW, (785) 364-3989.

WANTED: Collins 310C series exciter. Jack Shutt, N9GT, 1820 Dawn Ave., Fort Wayne, IN 46815. (219) 493-3901

WANTED: Hallicrafters SX-101. Will pick up reasonable drive from Reading, PA. Dan, (610) 670 2980, k3xr@juno.com

WANTED: Orig. R392 tech. manual; Tubes: 26FZ6, 26A6, 26C6, 26D6. Peter, VE3URO, (416) 694-4652, ve3uro@qsl.net. Thanks.

WANTED: Gonset G-50 pwr xfmr / parts rig. VG+ Heathkit SB-303 front panel. Emil, KA8GEF, OH, (216) 883-5134, EZela57383@aol.com.

WANTED: Modulator / pwr sply for Gonset G-77 mobile xmtr. Jay Procenko, NY6L, 10745 Tabor St., Los Angeles, CA 90034. (310) 779-7311.

WANTED: Mint Yaesu FT-2FB & PS FP-2. Bob, K34MB, 6608 N. 18th St., Arlington, VA 22205-1802. (703) 533-0650

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

WANTED: Collins 310A-1 &/or 310A-3, any condx; 30J, 30K (any); 302C-1, 312A-1. **FOR SALE:** SC-101 lamp hoods & grills. Butch, KØBS, MN, (507) 282-2141

WANTED: Heath Gear, unassembled kits, catalogs and manuals. Bill Robbins, 5339 Chickadee Dr., Kalamazoo, MI 49009. (616) 375-7978, billrob@net-link.net

WANTED: I wish to correspond with owners of National FB7 / FBXA / AGS coil sets. Jim, KE4DSP, 108 Bayfield Dr., Brandon, FL 33511. j.c.clifford@juno.com

WANTED: Military radios, USR-550 / ARR-40 rcvr; Soviet xcvrs R-112, R-173. Leroy Sparks, W6SYC, 924 W. McFadden Ave, Santa Ana CA 92707-1114. (714) 540-8123

WANTED: Control head for Collins Airborne 618M and any other VHF airborne rx or trx; control head manual basemount and any acc. Shigaki/JA6IBX, shigaki@mse.biglobe.ne.jp fax-Japan-(0)96-329-4601

WANTED: Plug-in coils, circuit, documentation, for regenerative Canadian Marconi Marine Receiver 3V-SW8. David Boardman, 10 Lemaistre, Sainte-Foy, Québec G2G 1B4, Can. (418) 877-1316, davidboardman@sprint.ca

WANTED: 1920s, 1930s Navy equipment. DP, GK, RAA, RAB, RAG, RAH, TAV. Any condx. William Donzelli, 15 Gen. MacArthur Dr., Carmel, NY 10512, (914) 225-2547, william@ans.net

WANTED: Geanshift for Teletype Model 28, or complete machine with one. Ivan, WA6SWA, POB 248, Reno, NV 89504. (702) 329-7738, idh@cs.unr.edu

WANTED: Presentable T1154 or HT20 xmtr. John Gibson, 1075 Sterling Ave., Berkeley, CA 94708. (510) 849-1051, gibsonj@mindspring.com

WANTED: National SW-3, w/wo coils. Not working OK, prefer complete. State condx, price. Thanks! Matt Kastigar, NØXEU, (314) 962-1418, kastigar@swbell.net

WANTED: Clean, working Elmac AF-67 and AC supply. Andy, WAØGAG, 3091 Pinyon PL, Grand Junction, CO 81504. (970) 434-8492

WANTED: Manual and accessories for AN/PRC-14; TBX-2 canvas pieces. Joseph W. Pinner, KC5JJD, 201 Ruthwood Dr., Lafayette, LA 70503. kc5jjd@sprintmail.com

WANTED: Book - Radio Receiver Design by Sturley; Bliley round amateur stak; Robert Perlstein W1IV, POB 642, Old Orchard Beach, ME 04064. (207) 934-9206, perl@compuserve.com

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FOR SALE: Genuine new surplus: Unused R-390A cabinets #CY-979A/URR w/shock supports and misc hardware package - \$305; top and bottom cover sets - \$75. Mac McCullough, TX, (214) 324-4849, Fax - 324-4844

FOR SALE: Hallicrafter's manuals, copies starting at \$5, some Johnson, WRL, others. SASE for list. DSM Diversified, 909 Walnut St., Erie, PA 16502.

FOR SALE: Vintage radio owners, retire the variac, new solid state SoftStart available SASE. Rick Paradise, KE4OCO, 515 Wood Forest Ct. NE, Marietta, GA 30066-3519.

FOR SALE: Tube type kits for CW/AM. Vintage Radio Kit Co, 427 North Main St., Sharon, MA 02067, email us at CPCW-5@aol.com or visit our web site at: <http://www.mnsinc.com/bry/vintage.htm>

FREE: Please, visit my Vintage Radio site, loaded with BA pictures and information. [http://www.geocities.com/SiliconValley/6992/JOSEV.GAVILA\(EB5AGV/EC5AAU\)<eb5agv@amsat.org>](http://www.geocities.com/SiliconValley/6992/JOSEV.GAVILA(EB5AGV/EC5AAU)<eb5agv@amsat.org>)

FOR SALE: Vintage radios on display, bought, sold, traded and repaired. Webpage - <http://www.tiac.net/users/hobfact>. Rick Galardi, WIDEJ, Boston, MA, (781) 485-1414, Fax 289-1717, hobfact@tiac.net

FOR SALE: Zenith G500 Transoceanic - \$140; Conar 400 xmt - \$75; Heath Q-Mult - \$30, REL wavemeter - \$20; BC906 freq meter - \$25. **TRADE:** Hallicrafter's R46B spkr for R46; Heath DX100 cabinet for Parmetal R390 cabinet. Carter, VA, (804) 979-7383.

FOR SALE: Ameco TX-62 w/VFO, 6-meter AM/CW xmt, very clean - \$150 shpd. Jeff, WA8SAJ, 5368 Melody Ln, Willoughby, OH44094, (440) 951-6406, wa8saj@mcweb.com

FOR SALE: BUD freq calibrator FCC 90 - \$10 +shpg. Dennis Baker, KE0QM, (913) 782-9092, wbfm@sound.net

FOR SALE: Adventurer, fair - \$35; TR3, MS4 PS, man, exc - \$175, u-ship. NZSM, Chuck, (806) 798-1452

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FOR SALE: Heath Nostalgia, 124 pg book contains history, pictures, many stories by longtime Heath employees. (See BOOKS inside back cover.) Terry Perdue, 18617 65th Ct., NE, Kenmore, WA 98028.

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WANTED: Collins KWM-1 emission switch, early 5 pos. type, part no. 259 0862 00. Geoff Fors, WB6NVH, POB 342, Monterey, CA 93942-0342. (831) 373-7636

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WANTED: WW-2 Japanese military radio of any kind; Hammarlund PRO-310. Takashi Doi, 1-21-4, Minamidai, Seyaku, Yokohama, 246 Japan. Fax 011-8145-301-8069. taka-doi@a2.ctktv.ne.jp

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WANTED: Vibroplex bug w/3 inch base; B&W type JEL baby coils McElroy bug, Brian Roberts, K9VKY, 130 Tara Dr., Fombell, PA 16123. (724) 758-2688

WANTED: Kleinschmidt teleprinter models: 311, 321, (AN/FGC-40, AN/GGC-16, AN/UGC-39...) Tom Kleinschmidt, 506 N. Maple St., Prospect Hts., IL 60070-1321. (847) 255-8128

WANTED: Old tube amps & xfmr's by Western Electric, UTC, Acro, Peerless, Thordarson; Jensen, JBL, EV, Altec, WE spkr's. Mike Somers, 2432 W. Frago, Chicago, IL 60645. (312) 338-0153

WANTED: Military survival communications equip: radios, beacons, manuals, books, historical info/photos. Daniel Cahn, 3444 Greenwood Ave., Los Angeles, CA 90066. (310) 398-7159. danielc411@aol.com

WANTED: Any military entertainment radio (Morale rcvr), manuals, accessories, or data plates. Henry Engstrom, KD6KWH, POB 5846, Santa Rosa, CA 95402. ph/fx (707) 544-5179

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WANTED: Copy of MIL-T-27A spec, RCA, Gates, Langevin b'cast gear. R. Robinson, 868 S. Main St., Plantsville, CT 06479. (860) 276-8763. richmix@erols.com

WANTED: RCA 140, 141, AVRSA. GE K80, K80X, K85. Any condx. James Treherne, 11909 Chapel Rd., Clifton, VA 20124. treherne@erols.com

WANTED: Broadcast gear; tube or solid-state, compressors, limiters, equalizers, microphones, consoles, micpreamps, recorders. Mike States, Box 81485, Fairbanks, AK 99708. (907) 456-3419 ph/fax or mstates@polarnet.com

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WANTED: AM mechanical filter, F455J-60 for Collins 75A4. Myron, K4YA, OK, (918) 456-9573. cherry@intellix.com

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