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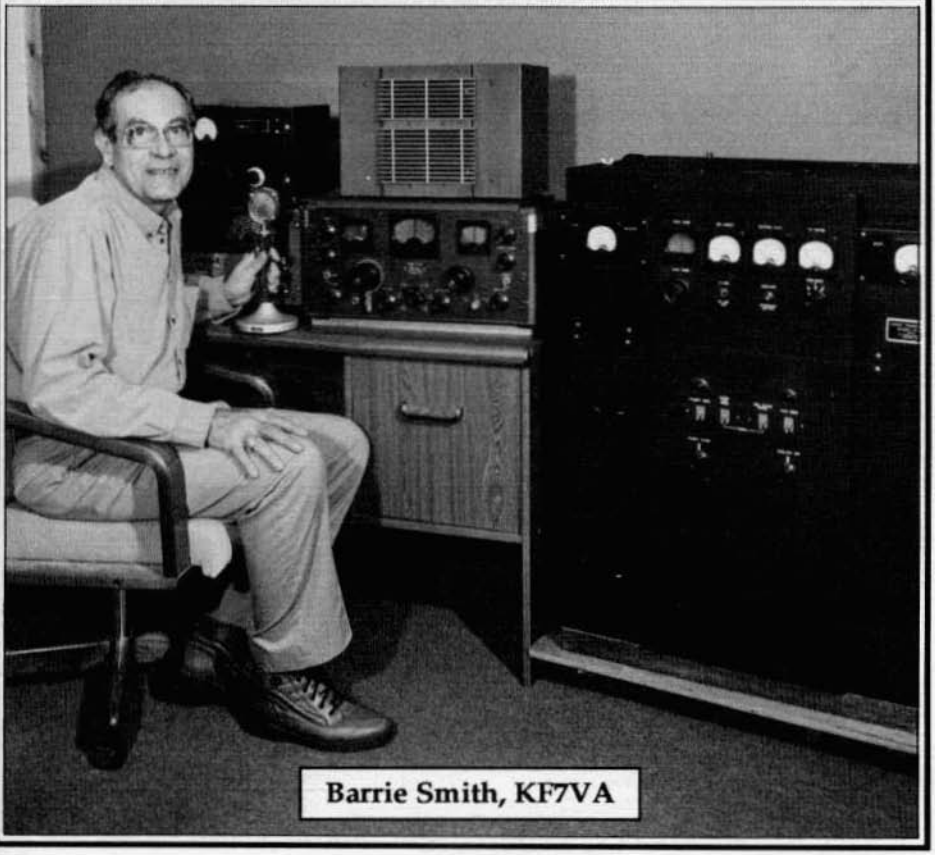
ELECTRIC RADIO

celebrating a bygone era

Number 43 November 1992



Barrie Smith, KF7VA

ELECTRIC RADIO

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REGULAR CONTRIBUTORS

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

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

Electric Radio Solicits Material

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

EDITOR'S COMMENTS Barry Wiseman, N6CSW/Ø

Now that it's winter most of us will be spending more time at our workbenches doing restoration and homebrewing. There's one problem we're all facing, and it's been getting worse as each year passes by: Where to get the parts? I have some ideas.

In the case of restoration, the ER Parts Unit Directory is one resource; and the best one. If you need a part for an XYZ transmitter, there's a chance someone has an XYZ on the list. Get the list ($2 and a LSASE with $.52 postage from ER) and check it out. And if you'd like to help your fellow hobbyist (and make a few bucks) put any junker parts rigs you might have on the list. You can do this by calling or writing ER.

For the boys that are homebrewing, parts acquisition is the toughest part of it all. There are commercial sources like Fair Radio, Antique Electronic Supply, Antique Audio, etc. that advertise in ER but they don't have all the parts that are needed; particularly authentic parts. What we can all do to help this situation is to put our surplus, the stuff we don't plan on ever using, into the classified pages of ER. We can all use our free ads to sell our surplus parts.

All of us have accumulations of what we call 'junk', knowing very well that most of it is not junk. All those switches, transformers, tube sockets, capacitors, that we all accumulate over the years could help those people who are trying to keep the building tradition alive in ham radio.

I suggest that if you have any parts you'd like to sell, make up a list and advertise the list in ER. I think it would even be acceptable to charge a buck for the list. Up until now most hams have thought that their junk box wasn't worth anything and nobody wanted anything out of it. Not true. From now on, and into the foreseeable future (maybe forever) parts - particularly authentic old time parts from the '30's, '40's and '50's - are going to be in great demand. So, if you have junker rigs or surplus parts, consider selling them back into circulation. It will be good for vintage amateur radio.

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Cover: Barrie Smith, KF7VA, with his Hallicrafters HT-4 and SX-28A. He operates 160-10-meters with a variety of vintage gear.

LETTERS

Dear ER

In regards to KJ4KV's article "Letter From Gaithersburg" that the Collins KWM-2A will be down to $150 a year from now. His prediction was based on the fact that the military had just recently dumped a large number of these units on the market.

It is true that the going price of a KWM-2A with power supply last year was in the neighborhood of 600 to 700 dollars. It's true that the military units are selling for around $250 to $400, if you can find one with a power supply. But, I have seen and worked on these military units, and believe me, you better buy at least 2 units in order to get one working unit. And you better have some knowledge in the proper cleaning and painting process before you will want to put it on your shelf.

Now, opinions are like backsides, everyone has one, so here's mine. In the long run, these units are going to help instead of hurt the market. It's going to give us parts that are much needed (hopefully they will stay in the United States), plus some of the people that buy these units and get them working are being exposed for the first time to REAL radios, which can't do anything but help our hobby in the long run. Thirdly, if you have several Collins 516 power supplies lying around you might want to wipe the dust off them, because I have seen several sell in the last couple of months in the $175 to $200 range. And most of these were going to KWM-2's in order to complete the set.

I am not in disagreement with KJ4KV over the prices he quoted in his article. It's just that our opinions differ in the direction that the old Collins gear is heading. Remember when buying used gear that the price will vary considerably between very poor condition and excellent condition.

In closing, it is nice to see so many people today having opinions and enjoying old radios. Keep up the good work!

Jim Bales, WDØGLF

Dear ER,

Dave Ishmael's "Regeneration Fever" article revives many memories of early "blooper" home brew one and two-tube regen sets and the amazing feats they could accomplish.

A typical sequence of events might start off with a visit to the local Kress "dime" store. Down in the basement in one corner sat a counter full of radio parts because then it was fashionable for men and boys, and even a few girls, to build their own sets.

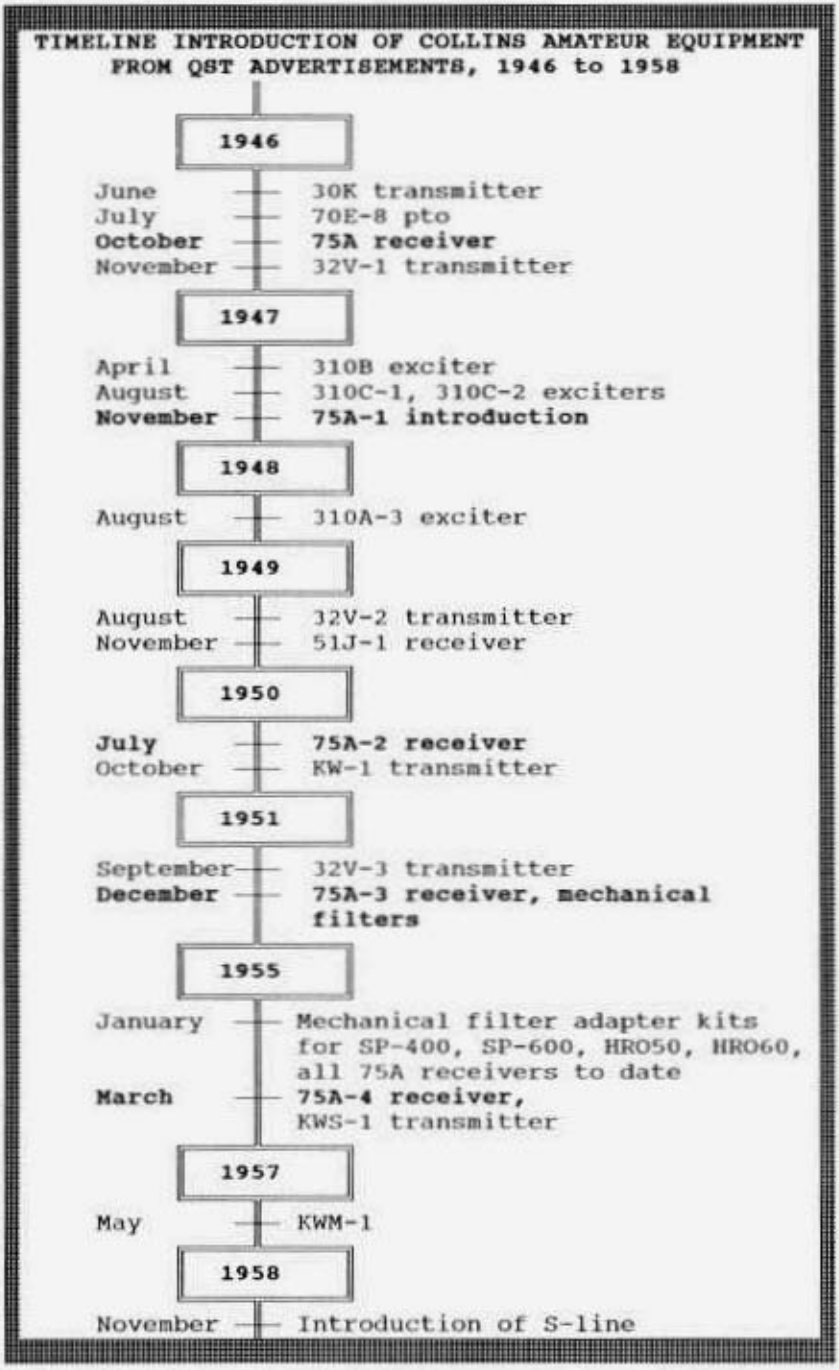
Let's start with a three-circuit tuner. The antenna primary coil and main tuning coil were wound with bright green silk insulated wire on a black bakelite form. But inside the form was a smaller coil mounted on a shaft so it could be turned parallel or less so to the main coil. This was called the "tickler". Then you would need a knob for this shaft, a baseboard to mount things on, and a bakelite front panel. A variable condenser for tuning with a "vernier" dial, a grid leak (sometimes adjustable), Cornell-Dubilier mica condensers, hook-up wire (often square cross-section tinned bus wire), and a pair of high-impedance Frost headphones, plus a UV-199 tube and socket, a dry cell to light the filament, a toggle switch to turn it on and off, and a 45-volt B battery would complete the necessities.

Then home for a few hours work on the kitchen table and a climb up on the roof to string up an antenna to the nearest power pole.

In those days there were many clear channel broadcast stations, which meant DX at night. One late night we tuned in WBT, Charlotte, North Carolina, all the way from Southern California, and they sent us a QSL card to confirm it.

If I can find a three-circuit tuner in some dusty attic I'm going to clear off the kitchen table once more and whip up another one of those regen wonders and try again to pick up WBT late some night.

Kenrick Ellis



Compiled by Ray Osterwald, NØDMS

ELECTRIC RADIO IN UNIFORM

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

'The May Transceiver'

No wait--don't put that handheld 220/440 MHz transceiver out of sight while reading about this vintage radio. This month we're on duty with its great-grandfather, a U.S. Marine Corps set which was probably the first UHF portable ever and you may want your modern handheld for comparison. Don't expect to see a strong family resemblance, however, for the MAY may be the largest set ever to be operable from a man's back.

Overview

The MAY is a backpack transceiver bought by the U.S. Navy mainly for USMC use beginning in 1944. Designed and built by Raytheon, it operates on four preset crystal controlled channels in the military UHF band, 225 to 390 Mcs. Transmitter output is about 1 watt AM or tone modulated; the receiver is a superheterodyne. Early sets got crystal kits for 100 channels; later ones were shipped with crystals for twenty channels with a set for the other channels being orderable.

The transceiver is 24" x 13" x 10" (H x W x D with the front panel up) and weighs about 43 pounds with internal battery and operator-carried accessories; an auxiliary battery pack is 5-1/4" x 12" x 20-5/8" and weighs 42 pounds with batteries and spares packed inside. The 13 tubes are a mixture of 7 and 9-pin miniature and subminiature types except for the 1007 octal HV rectifier.

Front panel controls are the channel switch, POWER, VOLUME, and a TONE KEY button. A meter shows battery voltage when you are on receive and RF output voltage on transmit. Jacks for two pairs of headphones and two microphones are provided. Retuning to change channel frequencies requires taking the set out of the watertight case.

Power is supplied by a 6-volt-40 amp-hour lead-acid battery in the bottom of the case to a vibrator pack in the set itself. Two spare batteries are carried in the auxiliary battery pack. Life is about four hours per battery from a full charge.

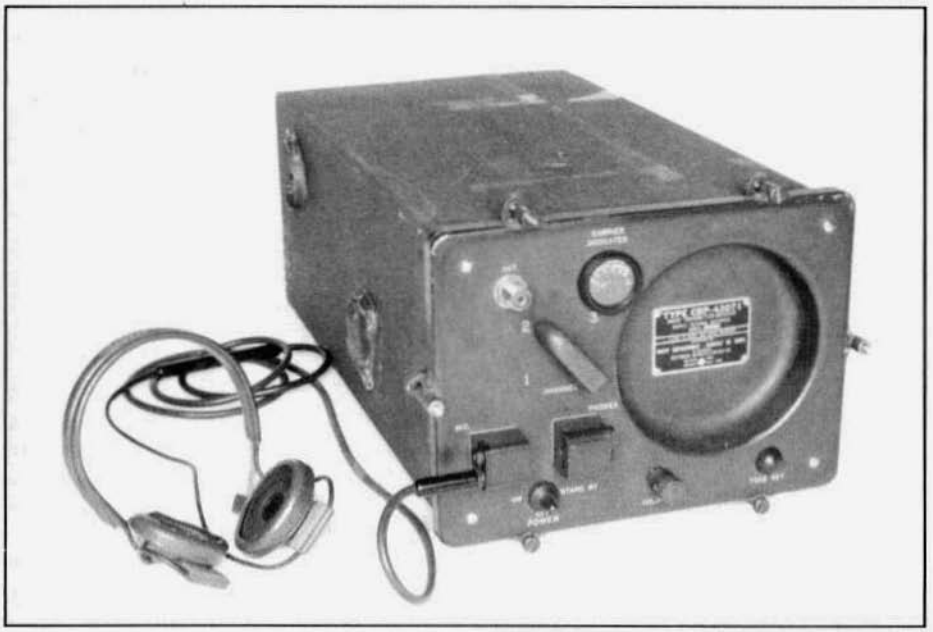
Both a short whip antenna for backpack use and a collapsing discone with coax feedline are provided with the set. There is no provision for remote control.

History

If you've watched Victory at Sea or any of the other WW II or later documentary films you've seen tactical air power in action: generally one or two planes make runs at an altitude as low as 100 feet to hit a bunker, armored vehicle, or other 'tough' ground target with napalm, rockets or gunfire. It looks easy, but from the air (at perhaps 150 MPH) a lot of things look alike and it is hard to find the right hill, let alone the target. A tactical air control team is part of the troop unit on the ground. Located where they can see the target, it is the team's job to make contact by radio with supporting aircraft and direct them to the target using landmarks or smoke or other markers.

To understand how the MAY came about let's review the path by which our forces arrived on UHF.

By the late 1930's U.S. Navy and Marine Corps short-range and tactical communications had moved from HF to the 60-80 Mcs range in order to get more



The MAY transceiver. Even the headphone and mic jacks are sealed. The round depression at the right of the panel is used to stow the phones and mic when the cover is on the set. The headphones shown are similar to those issued with the set; a lip microphone was also supplied but a handset or hand mic can be used.

channels and reduce the chance of over-the-horizon propagation which could be very helpful to an enemy. Ships used the 200+ pound RCA TBS transmitter and receiver; the Marines had the TBY portable to cover these frequencies.

Naval aircraft still used HF command sets such as the RU and GF and the ATA/ARA. Tactics in which surface ships would closely control defending aircraft would require more channels than HF could provide but these tactics had not yet come into use by U.S. forces. Surface ships had an assortment of HF gear to talk to planes; the Marines used the TBX backpack set and the transportable TBW/RBM combination.

The 1940 'Tizard Mission' technical exchange with Great Britain is best known for bringing us the cavity magnetron but knowledge of their well developed air war tactics and samples of the 100-156 Mcs command sets they were using were also of great importance. In the summer of 1942 the naval aircraft 'command' function moved to VHF, using the Western Electric type 233 transceiver which had been developed before the war for civil aviation use. (This set was later designated the ARC-4.) The surface Navy got the TDQ transmitter and RCK receiver while (probably in early 1944) the Marines got the MAW backpack set. I believe that Marine control of aircraft remained on HF until then. Ship-to-ship tactical communications continued to use 60-80 Mcs.

By about 1944, the need for even more channels was clear (early planning for the invasion of Japan probably did much to focus our thinking in this area!), propagation of hundreds of miles on frequencies of up to 200 Mcs was well known, and wartime technical advances were making small UHF radios a possiblity. A decision was made to move Navy surface tactical and aircraft command functions to UHF on frequencies of 225 to 390 Mcs.

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U.S. Army ground forces had adopted 20-40 Mcs FM for tactical use in 1942 and in the belief that these frequencies and FM were better for their purposes they declined to change; they use 30 to 80 Mcs FM even today. The Army Air Force had adopted VHF for the command function, using a copy of the British set which was designated SCR-522. When the armed forces were unified in 1947 it was decided that the now independent U.S. Air Force would move to the UHF band already chosen by the Navy; the move was to be completed by January 1, 1952. I believe it was at this time that the upper edge of the band was extended from 390 to 400 Mcs.

The Navy's first group of UHF sets included RCA's mammoth TDZ transmitter and RDZ receiver for surface ships, the Western Electric ARC-12 for aircraft, the RCA MAR for transportable applications, and the MAY for portable use, all contracted in 1944.

The TDZ is probably the all-time record holder for the number of Collins Autotune units in one set: when you change the channel, twelve dials start spinning. Without a doubt a set installed at the Naval Repair Facility at San Diego helped (in 1948) to inspire a certain nine-year old boy to write about military radios much later in life. Unfortunately the 760-pound TDZ would violate the rule of only writing about radios I can lift. The much smaller ARC-12 and MAR are both quite interesting and will eventually show up in these pages.

The MAY manual says the set was produced on two contracts, dated September 1944 and December 1948. A total of 860 sets were produced on the first contract. My set is serial no. 806 on the second contract. The battery box is serial A50 on a contract for a MAY-1 equipment. The '1' probably means that the set was changed somewhat from the MAY but I don't know what the changes were. With only one serial number for the MAY-1, total MAY production can only be guessed but 2500 sets seems reasonable.

In the spring of 1962, Ray Mote, W6RIC, was sent to the USMC two-week radio operator's school at Camp Horno, part of the Camp Pendleton complex in California. In addition to the GRC-9 and PRC-8, 9, and 10 he was taught to operate the MAY-1. When he reached Okinawa a few months later, however, his unit already had the PRC-41, a Collins built set less than half the size of the MAY providing 1750 synthesized channels 225 to 399.9 Mcs in 100 kcs steps.

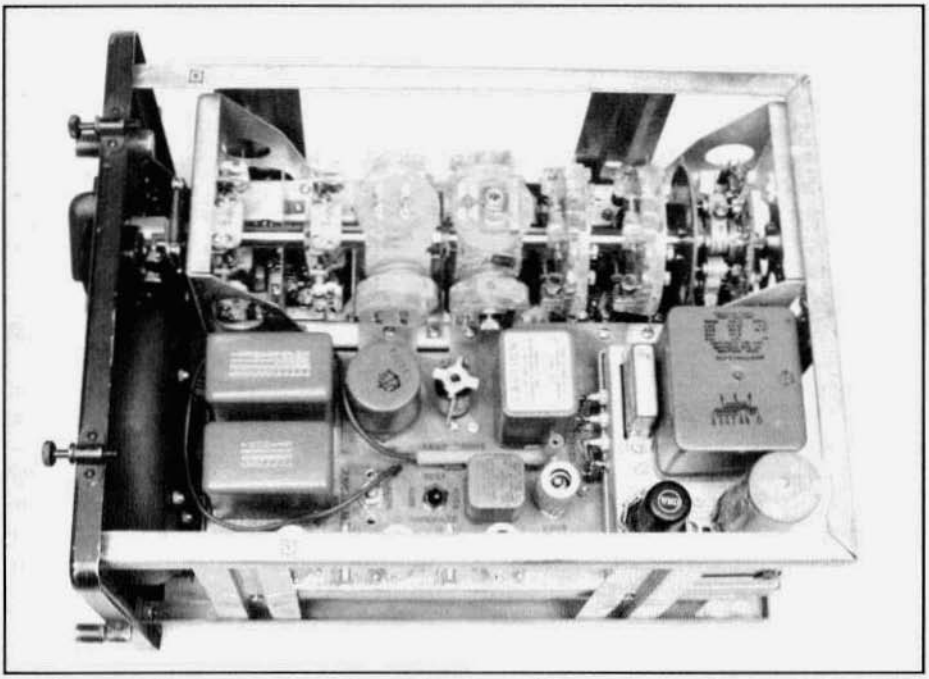
Design

The MAY is housed in a lightweight aluminum case. The radio goes in from the top and the spill-proof wet cell battery is installed through a cover in the bottom of the set. The radio connects to the battery housing by a pair of blade contacts. Both the top (front) and bottom panels are watertight and the set will float with the top panel upright – a definite convenience if your LCM landing craft grounds on a sand bar a hundred yards from shore and you have to wade through chest deep water with the radio on your back.

The radio is built of aluminum stampings in the form of a flat chassis in a frame. The RF stages are along one side with the IF, AF, and control circuits on the other. A vibrator power supply mounted on top of the chassis converts the 6 VDC from the battery to 150 and 228 VDC for the receiver and transmitter respectively.

The transmitter uses CR-9/U third or fifth overtone crystals in the 18.75 to 32.5 Mcs range. It consists of a 6AK5 electron coupled oscillator which doubles in its plate circuit. A 5656 9-pin twin tetrode with the sections operating in push-pull doubles again, feeding a second 5656 operating as a tripler. The 5656 final works straight through on 225-390 Mcs and another 5656 is used as a class-B modulator.

On receive a relay switches in a crystal 8.3 kcs higher in frequency (12 x 8.3 = 100 kcs) and the transmitter oscillator, doubler, and tripler are used to generate a local oscillator signal. A 6AK5 RF amplifier feeds a 5744 subminiature triode as a



Inside top of the MAY transceiver. The channel turret assembly runs left to right across the top of the photo. The large units near the center of the assembly are the tripler and PA plate lines, called 'helilines' because, to save space, they are wound on round plastic forms. The vibrator pack is at lower right.

mixer; the output from the mixer goes to three 6AK5 IF stages operating at 100 kcs. 100 kcs is a very low IF for these operating frequencies but the UHF band was relatively 'clean' in the mid-1940's and channels for sets of this generation were generally assigned at intervals of a multiple of 800 kcs so the considerable image response should not have been a problem.

Instead of the usual arrangement of IF transformers the MAY's IF passband is set by a lowpass filter at the IF input and highpass filter between the first and second stages; these give an IF which passes everything from about 50 to 175 kcs. The two filters are sealed assemblies: there is no way to align the IF. A 2E41 subminiature pentode-diode connected as a duodiode serves as a detector and AVC rectifier. A 6AK5 is used as an audio output stage; the rated output of 25 mw is plenty for headphone use.

Transmit-receive switching is always a problem in battery powered sets: do you use a complicated switch and make the operator do the work (as in the BC-611 handy-talky), duplicate most of the circuits so a low-power relay can be used, or just accept the fact that a lot of battery power will be eaten by the relay? The MAY's designers chose 'none of the above'! Instead, most circuits go through a relay with two coils. Going either from receive to transmit or the other way applies a pulse to one of the coils switching the unit to the other position where it latches and no longer draws power. The only other relays are a coaxial relay used for the antenna circuit and control of the latching unit and a small one used for crystal switching.

Antennas for radios covering a 2:1 range of frequencies are another problem. For backpack operation, the MAY uses a tele-

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scoping quarter wave; it is fully collapsed for frequencies at the top of the band and half or fully extended for mid or bottom-of-the-band operation. For transportable or mobile operation however, a much better answer was provided.

The 'discone' antenna consists of a cone which is about a quarter wave in height at the lowest frequency fed at the point against a disk about the same diameter as the base of the cone. With proper design it has a nearly constant 50-ohm feedpoint resistance over a very wide frequency range. This does not seem like a very portable antenna but the cone does not have to be solid; the AS-408/U discone used with the MAY has a detachable sheetmetal disk and a cone which collapses like the ribs of an umbrella. The disk fastens to the side of the set and the cone folds to slide into the tube which serves as a 'mast'; the tube can be stowed on the side of the auxiliary battery pack.

Channel switching for a UHF radio is always interesting because at these frequencies lead lengths and stray capacitance cannot be increased without ruining performance. On the MAY, a 1/2" shaft running from the channel switch knob on the panel to the rear of the set holds eight turret assemblies. From rear to front these hold an oscillator grid tuning cap, the two crystals, the oscillator and doubler plate coils, the tripler and PA plate lines and RF and mixer tuning caps for each of the four channels. The group nearest the chassis is connected by sliding contacts to the rest of the circuit; the tubes are mounted with the socket pins up. Rotating the channel switch rotates all the turrets to connect a complete set of crystals, coils, lines, and capacitors for the new channel. All the adjustments were done when the channel crystal was installed so changing channels on the beach requires only turning the switch.

The coils are slug tuned. The plate lines are wound on round polystyrene forms with a rotating clamp ring which carries a shorting bar.

When a channel frequency is to be changed, you install the new crystal pair. Four different oscillator and doubler plate coils are needed to cover the entire frequency range; the PA plate lines cover the range by the use of two different clamp rings which rotate to adjust the length of the lines.

These two rings may be a story in themselves. One has a short between the sliding contacts; the other has 3/16" loop of wire; since the lines they short are several inches long the tuning ranges mostly overlap. I seem to recall that the original plan was for the UHF band to be 225-360 Mcs; could the second ring have been a last-minute change to extend the tuning range?

Enough extra coils and clamp rings to set any channel to any frequency are provided in a case with the set. If changing oscillator and doubler coils is needed for the new frequency, you undo two captive screws to free the old coil and install the new one. To rotate a clamp ring you loosen two screws. Most of these parts are polystyrene (the best low-loss insulating material available in 1944) and they are easily broken.

With the new coils in place, you flip a switch on the chassis to use the panel meter as a multimeter, connect a probe stowed inside the set to various test points, and watch the meter while tuning up the oscillator and multiplier stages following instructions in the manual. Then you flip the switch back and tune the PA for maximum output on the meter. Receiver RF adjustment is done by using a probe to pick up vibrator hash from inside the power supply and tuning for maximum noise level.

Tools required to make these changes and do the tune up are small (insulated) straight and Phillips screwdrivers, a small wrench, and a jeweler's screwdriver, all provided in a kit with the equipment. As with most frequency multiplier strings some of the stages can be tuned to the wrong harmonic; the manual gives procedures for avoiding this. It also warns

At the left is the MAY coil box with the coils and clamp rings (called 'yokes' in the manual) which aren't needed for the channels now set up. There's another tray of coils under the one shown. At right, bottom to top, an extra coil and clamp ring, four CR-9/U crystals, spare 6AK5 and 5656 tubes, and a spare vibrator and rectifier tube. The spare tubes and vibrator stow in a block of foam rubber in the spare battery case.

you to work quickly when the stages are out-of-tune to avoid burning up tubes. Resetting a channel frequency on the MAY definitely is only for the skilled technician and it is not an on-the-beach operation.

Workmanship in the MAY is first rate. The wiring is cabled, ceramic feedthough caps are used by the handful, and most small parts are mounted on terminal boards. Transformers and chokes are hermetically sealed. The manual is well organized and complete; for example it notes that the set won't be watertight if the cover gasket takes a set -- and gives a procedure for replacing it.

On The Air With The MAY

My MAY came in very good condition from Ron Johnson, WA5RON, who writes that he found it at an Austin TX ARC flea market in 1975. One pair of ham band crystals had already been installed; he added another pair, making the set operable on 221.98 Mcs and 223.5 Mcs; the low band coil set easily tunes down to this range. He also built and installed a 120 VAC to 6 VDC power supply in the battery compartment. Ron used the set as a base and test station for some URC-4 and URC-11 emergency sets he was converting at the time.

Ron had carefully kept (and sent along) the coil box with all the extra coils and a spare vibrator and rectifier and four military crystals for the set. I already had the auxiliary battery pack, obtained a couple of years ago from collector Henry Engstrom.

Ron's work was so neatly done that I left it alone for purposes of testing the MAY. When I plugged in the power supply and threw the front panel switch, there were a few of the usual dirty contact problems and then the vibrator hummed

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

Part 3, the 75A-2 and the 1950's

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

In the summer of 1949, certain events were taking place at the Collins Radio Company. The engineers who were in charge of system planning were beginning to realize that the future of HF voice communications systems was probably going to be with the single sideband mode. However, the hardware necessary to build practical systems was still in a rather 'raw' state, and the few working systems required multiple racks of equipment space. The Engineering and Sales departments at Collins were determined to command a leading position in the radio field, and the Amateur Equipment department was no exception. They wanted to introduce equipment at the start of the new decade which had the highest possible quality. They also wanted the highest possible potential for spin-off, as many hams at that time were employed in radio at the professional level. These various factors meant that the new amateur equipment introductions would be high quality AM transmitters and receivers.

The legendary KW-1 AM transmitter had been prototyped, tested, and was scheduled for introduction some time in mid-1950. As part of a general new equipment sales drive, the 75A-1 was again turned over to engineer Lou Couillard for an upgrade, to be timed to coincide with the introduction of the high-power voice of the KW-1.

The 75A-2 product announcement occurred in July of 1950. Almost before the ink on the July copies of the ham magazines was dry, the Korean War broke out, June 25, 1950. There is no way that Collins could have foreseen that the nearly immediate commitment of UN forces to the battle over the 38th parallel would affect schedules in the entire product line. Collins Radio was one of the most essential defense contractors in the country.

In spite of the Controlled Materials Plan, and a very uncertain world situation, production of the new receiver began. It continued unsteadily throughout that summer and fall of 1950. By November, 1950, there were prototype 75A-2s ready for shipment to various dealers for new product evaluation. Finally, in February and March 1951, comments from the dealer samples had been incorporated into the design, and full production was initiated.

Due to the on-again, off-again nature of amateur equipment production in late '51 and early '52, rumors began to circulate that Collins was going to get out of the amateur equipment field altogether. It got loud enough that Mr. Collins was forced to devote the December, 1950 full-page QST ad to "rumor control", and officially state that he had no intention of quitting. (After all, the boss was a DX'er!)

There was some concern that we would again lose operating privileges as the Korean conflict escalated. The U.S. Army began to use portions of the 80-meter band while on maneuvers in South Carolina in August, 1951. We would have done our duty and become silent, but it fortunately turned out to not be necessary.

Finally, the dealers began to see a more consistent delivery schedule from Iowa. An ad in October, 1951 QST proudly announced that "your KW-1 is on the way!"

Figure 1, Collins 75A-2, from the station of O.J. Jenkins, KØOJ.

Circuit Design Of The 75A-2

In March of 1949, we unexpectedly regained partial use of our pre-war 160-meter band. So, Lou Couillard made sure his design for the 75A-2 included 160.

The 1947 International Radio Conference granted amateurs new bandwidth at 15 meters. Although use of 21 Mcs. was not permitted until May 1, 1952, both the 75A-1 and 75A-2 had full 15-meter coverage. This conference granted many new assignments at HF to the international services. Broadcasters, press wireless services, the military, and others had new allocations and higher power requirements, as HF was the prime international communications medium at the time. Amateurs gained 15-meter assignments, but we lost the 14.350 to 14.400 segment which was re-allocated to commercial services. What this meant to amateurs was a huge increase in the number of close-in, high-power transmitters.

The most noticeable cosmetic change to the new 75A-2 was the tuning dial. Gone was the slide-rule dial with its band-in-use illumination. In its place was the drum-type megacycle dial which characterized these receivers until discontinuation of the A-line equipment in 1959. Other changes included punching a chassis hole at the rear for an SO-239 coaxial antenna connector, as unbalanced coax feedline was beginning to win out over balanced feeders.

Nothing was radically changed in circuit design from the way Roy Olsen laid the 75A receiver out. There were design changes to the front end, the AVC circuitry, the crystal filter, and separate phone and CW noise limiters were added.

The "early series" 75A-2s had a front end which used a 6AK5 RF amplifier (as in the 75A-1), and 6BE6s for 1st and 2nd mixers. Seemingly overnight, there was an explosion of high-powered users adjacent to our bands. In addition, there was

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a substantial increase in the number of linear amplifiers and rotatable beam antennas on higher towers at amateur stations. This created the "new" technical problems of intermodulation distortion (especially 3rd order mixing), cross modulation, and receiver blocking. The situation grew steadily worse, finally becoming severe enough that the entire front end of the 75A-2 was re-designed in late 1951. These are known as the "late model" 75A-2s.

The late-model 75A-2s used 6BA7s for both mixers, with the fixed bias carefully adjusted so that the mixers spent as much time as possible in the linear region. These later A-2s also changed to an AGC-controlled 6CB6 RF amplifier. This tube was developed in the early fifties for TV service, being used in tuners and IF amplifiers. It has a transconductance of 8000 microhos and an equivalent noise resistance of just 1094 ohms, so it has high gain and is quiet. It has low interelectrode capacity, and is not subject to parasitic oscillation. It has a very sharp cut-off characteristic, however, requiring -4 volts or so to cut it off, which is nearly half of what is required to cut off the 6AK5. With this kind of characteristic, it is hard to understand how Mr. Couillard expected this tube to provide an improvement over the 6AK5 in reduction of distortion. In a July, 1955, QST article by Collins Engineers Ed Andrade (WØDAN) and Ernie Pappenfus (WØSYF), this conflict is alluded to. The authors recommend changing to a 6DC6 or a 6BZ6, which were recently developed to be resistant to blocking and distortion in the presence of strong signals. This article also advises a change to a 6BA7 mixer, as the 6BA7 is quieter by a factor of nearly three.

Looking on down the lineup, the next change to come was the elimination of the IF amplifier in the 1st variable IF. This was likely done to keep the gain ahead of the mixers as low as possible, so that they remain in the linear region as long as possible. Crystal filter effectiveness is greatly reduced when the filter is overloaded, and spurious responses can be introduced. Therefore, the main gain-producing stages in the A-2 occur after the selectivity is established.

To further improve overall stability, the crystal-controlled first oscillator was re-designed. It had been a 6AK5 pentode in a modified Colpitts electron-coupled oscillator, which is typically very stable when used in the fundamental or overtone modes. Couillard's new design used a 12AT7 in a modified Butler series-mode oscillator. This type of oscillator had been used in VHF equipment, and was noted for high stability and purity of output. Basically, a Butler oscillator is a grounded-grid class-C amplifier with controlled feedback. The plate and cathode currents are equal. A Butler oscillator can be used on a crystal fundamental, or any overtone. The use of this circuitry in an HF receiver was unusual, if not unique, and is a good example of Collins engineers using advanced circuitry to improve product performance.

The tuneable second oscillator (the PTO) was changed to an improved type 70E-12, tuning 1.955 to 2.955 Mc. This new injection frequency was required because the fixed IF was changed to 455 Kc. As before, the second harmonic of the PTO is selected when tuning in the 11 and 10-meter bands.

Directly following the second mixer is a slightly redesigned crystal filter. The phasing control capacitor is connected to the filter crystal in a balanced bridge arrangement, with resistors switch-selected in series with the phasing capacitor rotor to vary the total filter Q, and hence its bandwidth. Using this approach gives a filter with a phasing range down to 250 cycles or less, but with only a 6 dB gain reduction in its sharpest selectivity position. A special phasing capacitor is used which has an extra set of stator plates to avoid detuning the coupling transformer. Again, Collins provided enhanced performance by refining an established design.

A three-stage 6BA6 IF amplifier strip is

next. This is the main gain-producing stage in the receiver, but since the receiver selectivity has been already established by the crystal filter, the IF transformers need only provide interstage coupling. That's why there are 5 and 10 mmf mica condensers connecting the primary and secondary windings to increase gain. A procedure in the manual outlines removing these coupling components to narrow-band the receiver's IF.

A miniature 6AL5 double-diode is used as a conventional detector and AGC rectifier. A triode half of a 12AX7 is used as a DC amplifier for amplified AGC control. A positive bias is placed on the DC amplifier control grid for delayed AGC action. There is a degenerative R-C network in the AGC amplifier plate circuit to keep it from responding to audio frequencies. The 75A-2 "S" meter works in all modes, as it is connected in a bridging circuit between the last IF amplifier cathode and the screen supplies of the first two IF amplifiers.

New, dual noise limiters were built into the 75A-2. For phone operation, positive noise spikes were assumed to be automatically clipped by detector limiting, due to the heavy loading on the detector diode. Then, a series-type noise limiter (half of a 6AL5 double-diode) is used to limit the negative peaks, beginning at signals with 35% modulation. The limiting level is not adjustable from the front panel, but a limiter cut-out switch is provided. On CW, a dual shunt-type limiter shorts out noise pulses on both positive and negative peaks which exceed the operator's preset levels.

75A-2 Electrical Performance

The evaluation receiver in the photos was very nearly original, having had only two capacitors replaced in all its years of faithful service. In order to do the usual performance tests, I gave it a full alignment, checked the tubes, etc.

The receiver noise floor measured an astounding -141 dBm, and is probably due to the high-transconductance 6CB6 RF amplifier. This result was checked and repeated three times in succession. This equals a receiver input of .06 uV for a 10 dB signal-to-noise ratio.

Proceeding with the dynamic range tests, I discovered something rather unusual. The single-tone blocking dynamic range measured 56 dB at 20 Kc. signal separation. However, when the 1-dB gain reduction point is reached, any further increase in signal input power caused the receiver to completely block up and collapse into silence. This remained until all of the input signals were removed. Other owners of 75A-2s have reported no particular problem with blocking in high-signal environments. Since this was not my receiver, I could not start changing components, but voltage and resistance checks showed everything to be within 20%. I am at a loss to explain this behavior, and input from other owners is encouraged!

I went on to the 2-tone IMD tests, and found more "strangeness". The 3rd-order dynamic range measured 82 dB, 26 dB higher than the single-tone range. The tests were repeated three times, each time with the same result. I have never checked any receiver where the 2-tone dynamic range is higher than single-tone, commercial or amateur. I'm not sure that I even believe these results, but they were repeatable.

Conclusion

The 75A-2 was introduced in some rather challenging technical times. New requirements were testing the receiver designer's ingenuity faster than ever before. Advancements in tube design were depended upon to solve many of these problems. Collins balanced many engineering trade-offs in making design choices, and managed to adapt quicker than many other manufacturers. The 75A-3 was introduced in December 1951, giving the A-2 a rather short production run. Next month, we'll examine the 75A-3 and the reason for its introduction: the outstanding Collins mechanical filter. **ER**

G222-TR Geloso Transmitter

by Dennis Petrich, KØEOO
6419 Berwickshire Way
San Jose, CA 95120

Six months ago I was on 20 meters talking to IV3SUS and having a nice QRM-free QSO on SSB. As I recall, I was using my 32S-1, 75S-1, 312B-4 and 30L-1 S-Line. Savino and I were talking about vintage ham gear when I asked him if Italy had ever produced any AM/CW equipment back in the '50's. Savino said "yes", and began reminiscing about a company called "Geloso". Geloso, he said, manufactured everything from home appliances to TV's and ham gear, and made most of their components as well. Savino told me that these rigs were very popular in those days. He said the rig to have back then was an English-made Eddystone EA-12 receiver and an Italian-made Geloso transmitter.

Well, I quickly grabbed my "Buyers' Guide" covering the '50's and sure enough there was Geloso, showing one transmitter, one receiver and three VFO's. The transmitter was the G212-TR using an 807 in the final, and I later discovered the G222-TR using a 6146 in the final. The receiver was the G209-R. The receiver matched the transmitters in cabinet design and front panel layout, the most distinctive feature being the large radial dial. The Buyers Guide said about the Geloso transmitter: "Built conservatively like a battleship".

After the QSO with Savino I got all excited and thought about having one of these Geloso transmitters on AM here in the States, what a conversation piece I thought. I figured I would have to go over to Europe to find one though, never having heard of a Geloso in my 32 years on the air. If you look back into the DX section of CQ and QST's of the late '50's and early '60's you will see quite a few of these Geloso rigs pictured. I also found ads for "Geloso of America" in those same magazines. I never worked any DX on AM back then which probably explains my lack of familiarity with Geloso.

In any event, I was aware of them now and rather fired up to find one and see what made it tick. Skipping ahead, 2 to 3 months later I was down in the LA area visiting my brother-in-law, Steve, KG6XI. He showed me the local "shopper seller" which had a ham radio and CB section in it. There was an ad for an NC-303 with converters and speaker for a reasonable price. Well, Steve and I shot over to see what it looked like. We walked into the seller's ham shack and looked over the '303, it needed work and was dirty, but was restorable. As I straightened up and looked around his shack, I spied a rig on the floor that I had never seen before, but wait, I remembered seeing that large dial in the buyers guide several months earlier. It was a Geloso!

What do you know, I found one! It looked very clean too. I asked the owner if it worked and was it for sale? He said yes and the negotiations were on! A few minutes later the '303 and G222-TR were mine and being loaded into the car. Oh, by the way, he also had a Viking 500, but wouldn't part with it. Oh well, some other day. Anyway, talk about excited!

The manual was included, and in both Italian and English with a typed instruction sheet in German. It covered all of their products, two transmitters, the receiver and 3 of their VFO's; what a deal. The manual included alignment instructions as well.

As you can see from the pictures the G222-TR's front panel and workings were nicely laid out. During the inspection I found two resistors out of spec and one capacitor cracked. According to the documentation, a previous owner back in 1967 had replaced the electrolytics, which were

The Geloso G222-TR transmitter manufactured in Italy in the '50's.

still good. Everything else was just fine. I was impressed with the wiring layout. It was very professionally done, much like our military gear is. I turned the unit on and checked the voltages, which were all in spec. I couldn't go any further though, because the RF output jacks, receive and transmit, were a push-on Geloso brand, not anything I had ever seen before. Also, the mike jack was a large 3-prong type recessed into the front panel. The Geloso RF, receiver and transmit connectors fit into the same hole as our popular SO-239 so I replaced them. I kept the originals just in case I ever found the mates. I also couldn't find a mate for the mike connector so I found a standard 3 prong panel mount audio style jack popular today that also fit without any changes.

The G222-TR and G212-TR both use a manual TR switch in the upper right hand corner of the front panel. The switch controls B+ to the transmitter as well as the antenna changeover function. So, one nice thing is no changeover relay is required. A PTT replacement would not be easy to install, so I decided to be a vintage operator as well and use the switch provided.

One positive feature of this rig is it runs very cool. In receive the B+ is removed from the tubes so there is no heat dissipation except during transmit. The Gelosos use selenium rectifiers, which significantly lowers standby temperatures. The G222-TR runs much cooler than my Ranger for the same power output of 40-50 watts. The VFO was also more stable than the one in my Ranger over a 1-to-2 hour period. The G222-TR has no provisions for using crystals to set the frequency, the VFO is stable enough not to need them.

The solid/hollow state line up is: 8 tubes and 4 selenium rectifiers. RF: 6CL6 oscillator, buffer, doubler; 5763 driver; 6146 final. Modulation: 12AX7 speech amplifier; 12AU7 voltage amp, phase inverter; two 807's in push-pull. Power supply: 0A2 voltage regulator, 4 selenium rectifiers Size: 20.5" wide x 10.5: high x 10.25" deep and weight is 43 lb.

The Geloso transmitter covers 80 through 10 meters including 11 meters

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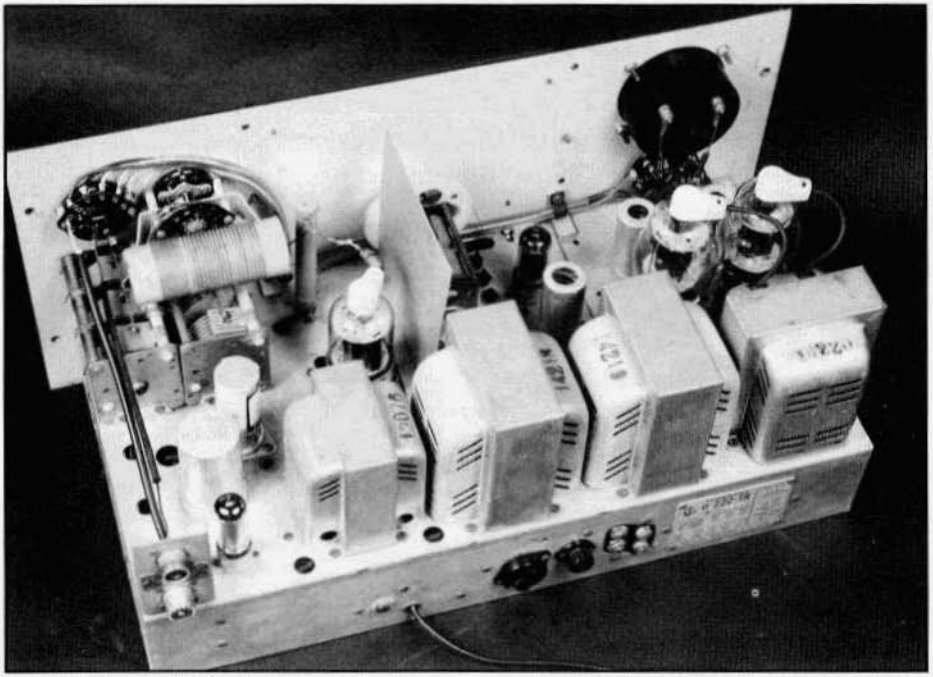


Top view of the chassis.

with 2 band switches, one for the VFO/ exciter and the other for the output tank circuit. The VFO uses 3 tuned circuits, one for 80 meters only, another for 40, 20 and 15 meters, and the last for 10 and 11 meters. The panel meter is switched and reads grid current, plate current and modulation percentage. The G222-TR had plenty of drive all the way up to 10 meters. The VFO was calibrated well and only needed minor correction when I did the alignment. In fact, on the air, the only problem I found with the rig was a slowly dropping grid current after one to two hours of operation. On a scope the driver output was stable so it turned out to be a gassy 6146. Once it was replaced I had no further problems.

The G222-TR is easy and quick to tune up, both for AM and CW. So far the feature I have been the most impressed with is the VFO stability and the coolness of operation. What I didn't like was the VFO spotting signal strength was too high with no external means to control it (close examination of the schematic showed a 2.2K/ 1W resistor connected to the "AM, VFO-Beat, CW" mode switch; adjusting this resistor will vary the VFO injection when spotting).

The output modulation transformer is driven by two 807's in push-pull with a 12AU7 as a phase inverter. The transformer not only drives the 6146 plate but also drives the 6146 screen grid. I had never seen a driven screen grid before. I have been getting excellent audio reports and on the scope the modulation looks clean. I found that an average reading of 50-60% on the modulation meter on the Geloso provided 100% modulation on envelope peaks shown on the scope.

The -3dB down input frequency response was quite broad. I measured 300 to 6000 Hz using an audio oscillator into the mike jack. I saw no peaks or unusual responses during the test. The G222-TR is advertised to have TVI suppression and no TVI has been observed to date. The Geloso rigs are truly international, with a

Front panel of the Geloso transmitter.

power plug provided on the rear to change primary transformer taps. 110-V, 125-V, 140-V, 160-V, 220-V and 280-V, 50-60 Hz AC operation is provided for from the rear apron. In fact when I got this rig it was plugged for 125-V and the VR tube wouldn't stay lit while tuning up to full power. Line voltage in San Jose is about 112-V, so changing the plug to 110-V solved the problem.

On the air the G222-TR has been great fun. As I suspected it has been a real conversation piece. The west coast group on 3870 thought it sounded good, and Bill, K7INK, remembered seeing an article in one of the old non-amateur electronic magazines from 1959 or 1960 that advertised "Geloso of America" as the only amateur equipment manufactured outside of the USA! How things have changed. On 75 meters, this summer, the only problem with the Geloso and the Ranger for that matter, was 50 watts isn't enough to beat the QRN unless it is sitting on top of a Desk Kilowatt. I am hopeful this winter will be better.

On the 40 meter SPAM net and on 10 meters the G222-TR did very well and performed with excellent audio reports. In fact, I think the highest praise of all came from Deborah Lockwood, Jim Lockwood's, KM6NK, wife. One night while Jim and I were talking on AM, Deborah shot into Jim's ham shack, looked around, and said, "where is Dennis? I just heard him talking and wondered how he got past me in the other room?" When she found out I wasn't there she laughed and said I sounded just like I was there. She has heard me on the air before and this was the first time this has happened.

I am impressed with this AM/CW rig. It works great (wouldn't be Italian if it didn't look great) and has a story to tell as well. For those of us who like to set the mood and atmosphere around our rigs, the G222-TR with the matching G209-R or Eddystone receiver coupled with some '50's European decorations would make a fine display. Maybe someone from across the pond will take this on and provide us with some future pictures.

If anyone has more information on Geloso or might know of someone who has, I would very much appreciate a call or letter. I would like to do a follow-up on this company and their products in the future.

Finally, you can thank Jim Lockwood, KM6NK, for the professional photographs. He is quite a photographer as well as a good friend. **ER**

Collecting/Repair/Restoration Tips

Changes to "Real Audio For The R-390A" in ER #42

1) The cathode bias resistor for the 6AH6 line amplifier should be 390 ohms in series with R-623 (47), not the 430 ohms indicated value. The total should be 437 ohms.

2) Referring to figure 2, the cathode bypass capacitor for the 6360 (C6) should be 100 uF/35-V, not 10 uF/25-V as shown. While the later value will work OK, there will be some degradation of bass response.

3) Also referring to fig. 2, the correct value for C7 (across primary of T1) is subjective. This capacitor was added to provide a high frequency rolloff at about 9 kc. The .003 value is correct for use with the UTC S-53X transformer. The PT-291, transformer has about 30% more primary inductance and I'd recommend a value of .002 if it's used.

Bill Kleronomos, KDØHG

Transformer Restoration

Duro Extend Rust Converter is a neat way to dress up a black transformer. It will turn the rust black and the epoxy base will even out the color.

Dr. Ed Richardson, WI5D

Radioactive Tubes

I recently came across information in TM-11-649 that warns of the radioactivity of some tubes we all use; OA2, OA2WA, 5651 and 5651WA. The warning states: "These tubes are potentially hazardous when broken; see qualified medical personnel and the Safety Director if you are exposed to or cut by broken tubes. Use extreme care in replacing these tubes and follow safety precautions in their handling, storage, and disposal. Never remove radioactive tubes from cartons until ready for use."

Considering the late date of this TM - 1963- this warning should probably be heeded. **Dave Metz**

Ordering TM's From NTIS

If you've been putting off ordering a TM for that old military set that you have from NTIS, I suggest that you not put it off any longer. In fact, it may already be too late. The last five manuals that I've ordered have arrived on microfiche, despite the fact that the accompanying paperwork described them as 'Paper Copies'. The publication date of the most recent manual was August, 1973. That's only nineteen years old! Apparently the U.S. Army Publications Center in St. Louis (where the Army manuals actually come from) is purging its files of originals. The quality of the copies on microfiche is also getting poorer. I'll repeat my offer of a free information sheet on dealing with the NTIS. Just drop me an LSASE.

Robert W. Downs, WA5CAB
2027 Mapleton Dr.
Houston, TX 77043

Magnetic Fasteners For Restoration

Many times when modifying or restoring a vintage rig it's necessary to mount a new relay, a small transformer, or other component. To do this without drilling holes I use a magnetic/adhesive product that's readily available in most department stores. It's sold for a variety of purposes, but is most generally used to mount cards or photographs to a refrigerator door. One side has a very strong adhesive applied to it and the other a very strong magnetic material. I've found this stuff to be very handy on my radio workbench. Some of it is strong enough to hold a fair sized tranformer in place. One manufacturer sells it in large sheets so it can be cut to whatever size is needed.

Barrie Smith, KF7VA

If you have a 'tip' that you think would be of interest to other collectors/restorers/builders/vintage operators, please send it in.

AM FREQUENCIES

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

From the Editor:

15-Meter Week Results

Martin Heiman, K7BDY, racked up the highest score: he worked a total of 154 stations using a DX-100B,HQ-160 and TA-33 3-element beam. In his letter he says," I think I schooled at least 50 guys on how to properly set their solid-state transceivers and all were very pleased to get on AM. It opened a new world for them."

Bill Brossmann, K9IUF, writes: "I wanted to send in my log for 15-meter week to let you know what a grand time I had. While I only made 13 contacts, each one was among the most enjoyable I have had. Conditions in Georgia were not very good. Other than my friend Andy, WA4KCY, who lives down the road, I did not hear a single station east of the Mississippi. I did learn that when the band appeared dead, a "CQ" would sometimes produce a return call from a station that was quite loud. In the past I have tuned across the band, heard nothing, and then moved to another band. Maybe we should all call "CQ" more often. I look forward to many more contacts on 15-meter AM." Bill was using a Johnson Ranger with a 75A-4 into an A-3 3-element tri-bander.

The next contest/jamboree will be on 10-meters some time after the first of the year. I'll have the particulars next issue. If anyone has any suggestion for improving our contests/jamborees please drop me a line.

Vintage CW Net Changes Time

Tracy Reese, WB6TMY, net control for the Vintage CW Net, asked me to advise everyone that the net has changed times for the winter. The net meets on 14.063 (plus or minus QRM), Saturdays at 4 PM Pacific, 7 PM Eastern. Tracy says the net could use some more check-ins as participation has fallen off to only four or five a session.

Radio Technique

Last month we erred when we gave the times for Howard Weinstein's (K3HM) radio program on WWCR. Here's the correct schedule: Sundays at 2300 UTC (6 PM EST) on 15.690 and Tuesday mornings at 0700 UTC or 2 AM EST on 7.435.

6AG7/6L6 25W CW Transmitter

30-30 Postscripts

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

As I was collecting parts for my 30-30 2-tube regenerative receiver, I was planning a matching 1-tube 80/40M crystal controlled CW transmitter. I already knew which one - the 1-tube 6AG7 xmtr described by Lewis McCoy/W1ICP in the November, 1953 issue of QST - the first xmtr that I built in 1959. This xmtr was featured in several of the later '50's ARRL Handbooks.

Well, so much for advanced planning! After several conversations with Barry/N6CSW, he persuaded me to use a 2-tube version, "in case I ever wanted to AM modulate it."I could then build a matching AM modulator!

I was still going to use the 6AG7 oscillator, but what "final" should I use? I considered the 1625 (I had a "box" full), a second 6AG7, an 807, a 2E26 or 6146, but I finally settled on the "classic" 6L6 - the original metal version released in 1936. As pointed out in Jim Musgrove/K5BZH's article "The Pioneering Novices" (ER#41), the 6AG7/6L6 crystal controlled xmtr was a favorite novice xmtr of the '50's. In addition, the 6AG7/6L6 combo can be found in many amateur handbooks from the 50's and 60's. There is no need to re-invent the "wheel" - just browse through your vintage library. I kept the design as simple as possible.

Like the 30-30 and its matching audio amplifier, the xmtr is built using 6" x 9" plexiglass for the base and front panel. Laying out the parts placement for the xmtr proved to be the toughest job! It took me four tries to get it "right" - a couple of nights work.

The following are some of the highlights of the xmtr's design:

* The 6AG7 crystal oscillator is of grid-plate configuration and is straight from the ARRL handbook. The plate circuit is untuned. Lewis McCoy/W1ICP pointed out in his January, 1953, QST article "A Novice 35-Watter" (1955/56 ARRL handbook) that the 6AG7's plate RF choke must be broadly resonant at 5 MHz to provide sufficient drive to the 6L6 on 80/40M. He recommended a 100 uH RF choke, a Millen 34300. I have not found that RFC yet and as a result, the 2.4 MH RFC that I used does NOT provide adequate drive to the 6L6! Result? 5W output!

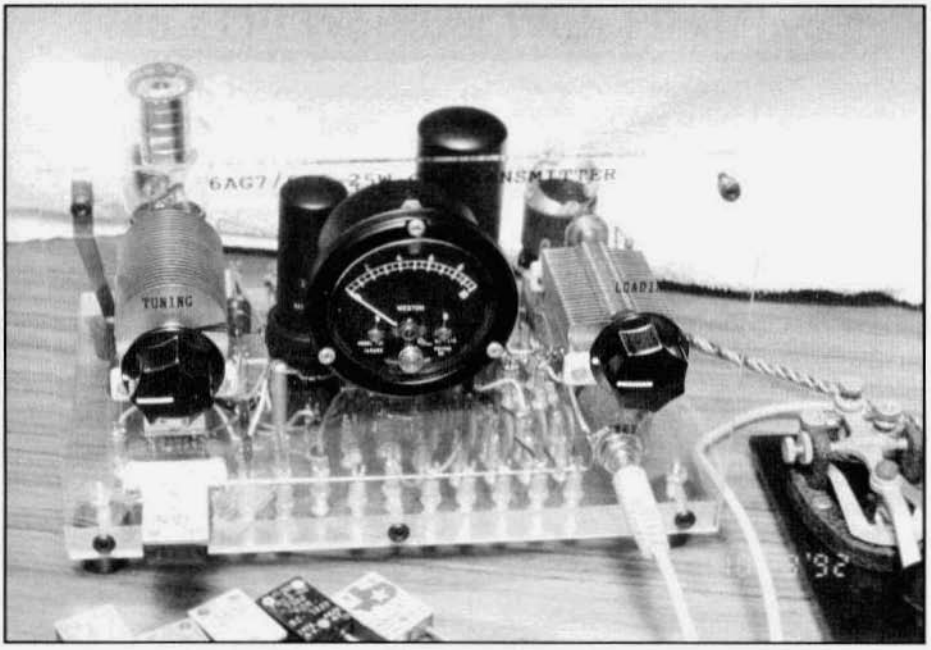
* The oscillator's plate and screen supply is regulated with an OD3/VR-150. The 6AG7's plate and screen current is approximately 9 mA.

* The 6L6's pi-network was designed using two 310 uufd variables. The 40M coil uses 15T of B&W 3016 miniductor stock (1" dia., 32TPI). The coil is mounted in an octal tube base. I have also been using this coil for 80M operation. A fixed capacitor can be installed from pins 2 to 3 of the octal coil form to optimize loading if the 310 uufd loading cap isn't adequate.

* The 6L6's plate current is monitored by a 0-100 mA 2 1/2" meter. A 0-1 mA movement is used with the appropriate scaling resistors. The scaling resistors were selected on the bench prior to assembly. A 0-150 mA meter might have been a better choice as the 6L6's plate current is 80 mA at 300 VDC.

* The cathode/key-click circuitry was "borrowed" intact from the 40M 6AG7/6L6 Novice Rig featured in "104 Ham Radio Projects for Novice & Technician" (Tab Book by Bert Simon/W2UUN - lots of "glow in the dark" circuitry).

* I kept the same front panel symmetry as the 30-30 and the audio amplifier.



Front view of the 6AG7/6L6 transmitter.

The power supply requirements are 1.6A @ 6.3 VAC and 105 mA @ 300 VDC (130 mA @ 350 VDC). I have been using a Heath IP-17 power supply for both testing and operation.

My first QSO with the 30-30 receiver and 6AG7/6L6 transmitter was on 40M with Bill Brannick/KC6SZE. This was my first QSO using a completely homebrew station. The xmtr worked fine but the 30-30 turned out to be marginal on 40M, even with the 20:1 National vernier, the tuning rate is just too "fast". The 40M novice band is only 0.8 divisions wide on the dial which corresponds to (just) 1.4 degrees of rotation of the tuning cap. Compare this to the 3.1 divisions/5.6 degrees of rotation for the 80M novice band using the same coil (yellow). Even the maligned BC-455 surplus command receiver covered the 40M novice band with 4.6 degrees of rotation !

My second 40M QSO with the 6AG7/6L6 was with Dave Mills/AJ7O. He gave me a 539 and reported that the xmtr's keying and tone were OK.

Needless to say, most of my activity with the 30-30 was on 80M. I "temporarily sacrificed" 40M capability with the yellow coil by adding a 10 uufd fixed capacitor at C2. This gave me complete 80M coverage. The 80M coverage now occupies 31 divisions - more than adequate.

The 140 uufd tuning cap used in the 30-30 is a pretty common value for these types of receivers. When used with the Alden plug-in coils, the frequency coverage is as follows:

Coil	Inductance	Frequency
Orange	412 uH	0.60 - 1.19 MHz
White	115 uH	1.15 - 2.30 MHz
Green	60.9 uH	1.56 - 3.16 MHz
Yellow	11.8 uH	3.60 - 7.22 MHz

The 140 uufd tuning cap should be used for a "general coverage" (SWL) receiver. However, it is too large a value for amateur-only coverage with the commercial Alden coils that I chose to use. After my (limited) experience with the 30-30, my next regen receiver will use a combination bandset/bandspread tuning scheme. much like the Ocean Hopper but

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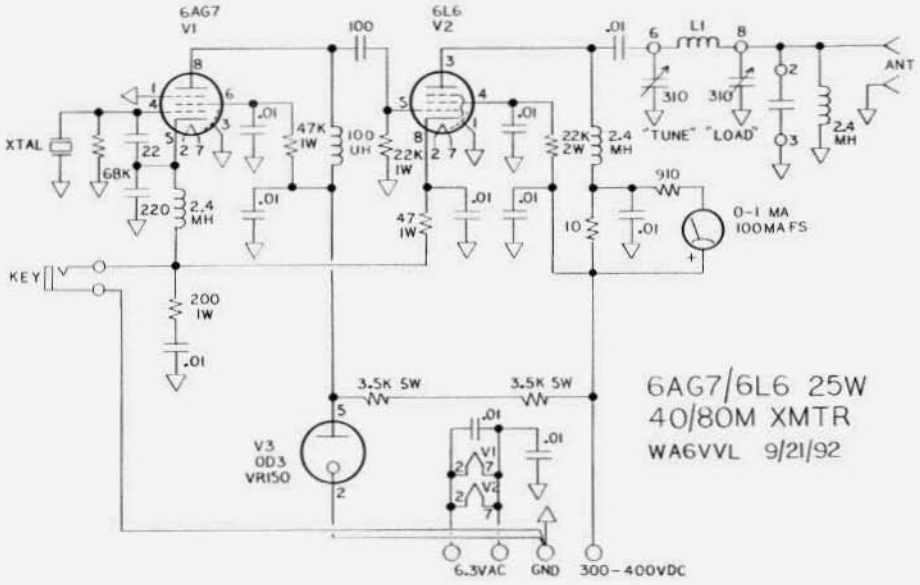


with vernier tuning on the bandspread cap. For example, the Alden yellow coil requires a tuning capacitance of 175 - 134 uufd to cover the 3.5 - 4.0 MHz 80M band. The bandset capacitor is set to (say) 130 uufd and a 50 uufd bandspread capacitor is used to tune the band. The bandset capacitor doesn't have to be panel mounted for amateur only operation - it can be chassis mounted - adjusted once and forgotten.

I have received several calls and letters requesting coil data for the 30-30. The Alden coil set is thoroughly covered in the "1934 Short Wave Radio Manual" but send me an SASE and I will send you Alden and Ocean Hopper coil data.

From my experience with the Alden coil set, you may want to wind your own coils to optimize the desired frequency coverage. If you do, you may want to consider the following:

* Start out using the same form factor as a commercial coil. The tickler/feedback winding spacing can be critical. Don't overlook the polarity of the tickler winding.

* The inductance of the coil can be calculated with a high degree of accuracy using the "tried and true" inductance formula in the ARRL handbook. Keep in mind that the calculating accuracy is only as good as your measurements.

* C2 represents the circuits stray capacitance and fixed capacitance. I underestimated the value of stray cap when I did my original calculations. The 30-30's stray cap is approximately 30 uufd. Added to C3's 12 uufd minimum capacitance, this value of 42 uufd will limit the maximum tuning range for a given coil's inductance. **ER**

Notes On Working With Plexiglass

1. The plexiglass' protective cover allows you to dimension and drill very accurately.

* Use a scribe to center-punch the holes instead of the larger automatic center punch.

* Use a small pilot drill (say #60) to pre-drill all the holes. Go up in steps to drill the larger 3/8" holes.

2. I have had the best success with relatively slow drill speeds, 690 and 1100 RPM have both work OK (the plexiglass manufacturer recommends a higher speed and modified drill bits).

* Drill slow enough not to melt the plastic. Drill bits will get very hot. If you are not sure, experiment on a piece of scrap plexiglass.

* I don't clamp the panels for 3/8" and smaller holes but I firmly hold onto the panels when I drill them. A drill that "catches" will ruin a front panel! If you're not sure, clamp it!

3. Tapping the 8-32 holes goes much quicker if WD-40 is used as a thread cutter/lubricant. Just coat the tap with a quick squirt before each hole is tapped.

* If you choose NOT to use WD-40, run the tap slow enough so that heat build-up doesn't melt the plexiglass. You will be able to see the material "flow" if you run the tap too fast - and the quality of the tapped hole will suffer. Best solution is to use the WD-40!

* Don't use the recommended tap drill. The recommended drill for an 8-32 tap is #29. The #29 did not provide adequate threads so I used a 1/8" drill. You may want to experiment on a piece of scrap plexiglass before making a final decision.

4. I used a circle cutter to cut the 4.2" hole for the speaker and the 2.2" hole for the meter. I have never gotten over my "fear" of using these things so I am always very careful.

* Use a drill press. Do NOT use a hand drill! The circle cutter I use specifies a maximum safe speed of 500 RPM.

* Use a sharp cutting bit.

* Clamp the panel with at least two C-clamps. Make sure that the circle cutter clears the C-clamps all the way down.

* I cut the panel from both sides to make sure that the backside doesn't chip or crack.

5. I use a T-handle reamer to enlarge the 3/8" hole to 15/32" for the toggle switches. I take my time and just take easy cuts with the reamer -- it just seems a tad "safer" than using a 15/32" drill bit.

6. Annealing plexiglass at elevated temperatures reduces the internal stresses created during the fabrication process. Since most of us will not anneal the finished panel, it is very important NOT to expose the finished panel to solvents (e.g., cleaners, thinners, paints, or.....) or immediate crazing/cracking will result.

Dave Ishmael, WA6VVI.

The National Company Alumni Dinner

by George Maier, KU1R
64 Shadow Oak Dr.
Sudbury, MA 01776

The group arrived around noon on a not-so-warm Sunday late in the waning summer days of September. To the casual observer at this popular restaurant along U.S. Route 1, it was just another luncheon function, one of many that take place during the course of a year. In reality, it was anything but routine. Former employees of the National Company were getting together, as they have for many years, for their annual reunion.

In its present form, this Alumni Dinner has been held since 1954. According to Vincent Messina, W1HRW, who organizes these events, it began in the mid 1930's as a go-out-to-lunch lab Christmas party. In the early years, the organizational responsibility for the party was passed around among a number of people; Vin Messina was one, as was Marty Oxman, W1NYU, and Pat Swain, who still shares in the work of organizing this annual get-together. Pat was a WW II military inspector who married Don Swain, a production manager at National who evenually became the technical service manager.

According to several sources, there were some raucous in-house parties in the beginning, but several factors combined to cause a shift to off-site locations. Evidently, the in-house parties were really super, but had a tendency towards becoming a bit too festive. Then the war came along, and there were worries over security as National was quite involved in building military communications hardware. That was the final straw in forcing the parties to be moved outside forever after. Oh! to have been there in those days; clearly they were one helluva bunch of partyers.

Around 1953, National went through a series of dramatic events that changed the company forever. The events and the people behind them are really a separate story, but to summarize, and not necessarily in order: the production shop became unionized, there was a proxy fight that left Louis C. Lerner of Lerner & Co. in control of National and its board of directors, and company president William Ready was forced out after nearly 40 years of service.

After all of the management changes, National became a very different place, in reality, it was the beginning of a long and gradual demise. While a fair number of people lost their jobs in lay-offs, many of the old timers simply left because the new management didn't suit them, and good jobs in electronics were fairly easy to find. People that had been there from the beginning were suddenly on the outside looking in. These events were responsible for the annual lab Christmas party becoming a company-wide reunion that was attended by both former and current employees.

Vin Messina was asked by a number of people to make a list of attendees at the 1953 party, which he did. Problem was, no one wanted to take the list, so he's been "stuck" with running the party ever since! In talking to Vin, there's no doubt that it's a labor of love. He still speaks very fondly of his days at National,and does a great job in keeping this group together.

As many of the former employees have said, there was a feeling of teamwork at National, a family-like atmosphere that was unique and unlike any they have found since. One of the real keys may

Vin Messina, W1HRW

have been the way in which William Ready managed the company. He knew all of the employees by name, and was often seen walking through the factory to chat with workers on the job. Even today, he's often referred to by former employees as Mr. Ready; it's the ultimate form of respect for a man that passed away over 35 years ago.

As a testament to the strength of the old company spirit, and the camaraderie that existed at National, in 1991, 57 people attended the reunion; this year, 54 showed up out of about 75 that were notified directly. Remember, it's over twenty years since the National Company ceased to exist as we knew it. Of course, there are many more National alumni around, but the numbers mentioned are those from the list of regular annual attendees.

In every circle of conversation that took place before, during, and after the meal, great stories could be heard as the people that were involved relived them. Much of this will be the subject of future writing projects, but here's a sample: did you know that:

* In many cases, the NC number of a radio was derived from the expected retail selling prices; the NC-300 is one good example.

* Both the Germans and the Japanese were reported to have duplicated the HRO during WW II from captured samples.

Left to right: Henry Cross, W1OOP, Arthur Orenburg, Walter Schreuer, K1YZW, Ed Harrington, W1JEL

Left to right: Walter Hart; Frank Bartlett, W1EU; Fred Cox; Marty Oxman, W1NYU.

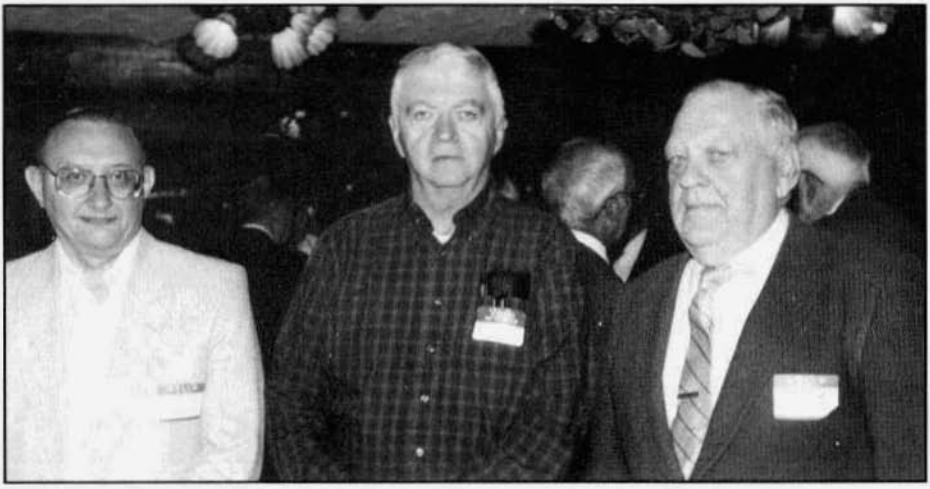
Imagine having one of each for your collection!

* For many years , radios were built by comparing two production samples, prints were almost never used.

Certainly it is difficult to talk to everyone at such a gathering. It's like being in a room full of celebrities, each with an interesting tale to tell, but not having enough time to hear them all; it's both wonderful and frustrating at the same time. However, with the aid of my trusty camera, I managed to capture a few interesting groups for posterity. In the pictures that accompany this you'll meet:

Vincent Messina - W1HRW, who went to work in the test lab for National in the mid-1930's. Vin knew all of the radios very well, and in fact taught many of the newcomers how to perform the various test functions required.

Henry Cross - W1OOP, a graduate of MIT engineering school, and a well known VHF/UHF ham enthusiast, Hank worked primarily in the military and commercial areas.



Left to right: Wayne Ledder, W1EWL; Phil Guinan; Don Poulin, W1MXC.

Left to right: Tom Potts, W1NRY; Conrad Espinola; Max Fuchs, WA1NJG

Arthur Orenburg - worked on National's Atomichron project, the first commercially available atomic time standard.

Walter Schreuer, K1YZW - a long-time avid DX'er. Walt was the head of non-amateur development at National, but did not contribute substantially to the amateur radio period. His own home-made SSB power amplifier made such an impression on the amateur engineers that it became the model for the NCL-2000.

Ed Harrington,W1JEL - also an avid DX'er, and, by the way, the principal designer of the NC-300 and HRO-60.

Tom Potts, W1NRY - project manager for the SR-19, which for years was the only HF military receiver that was EMP hardened. It received data, without drop-outs, through the infamous H-bomb tests in the Pacific.

Conrad Espinola - worked in the test group for both commercial and amateur equipment. Conrad continued to service a number of the ham products on his own after the company got out of the amateur market.

Max Fuchs,WA1NJG - was in military marketing. Max bought all of the NCL-2000 parts from National Radio and continues to sell them, as well as tech manuals for that product. Max claims to be the first to have operated a ham transceiver (an NCX-5) under the control of a Cesium Atomic Frequency Standard; talk about your high stability option !

Jack Ivers, W1HSV replaced engineering manager Dana Bacon after his untimely death in the late 1930's. Bacon had been the engineering manager during the James Millen years at National. Jack was credited with the management success of many radio designs through 1953, when he left for greener pastures.

Walter Hart - a mechanical design engineer who worked on the HRO series, as well as the SW-54, NC-120, NC-240, and others.

Frank Bartlett, W1EU - worked in the test lab and at one time or other probably aligned everything National made through the early 1950's.

Fred Cox - a production engineer for the government radio product line.

Marty Oxman, W1NYU - an engineer assigned to military projects, and one of

continued on next page

the original lab party organizers.

Wayne Ledder, W1EWL - primarily involved in the military group, Wayne was the project engineer for the HRO-600.

Phil Guinan - worked in the test lab group and was involved in final tuning of the HRO product line prior to shipment.

Don Poulin, W1MXC - another member of the original test department that had worked with the HRO line, as well as many of the WW II military radios.

Harry May, WB2EDS - (ex W1QPQ) - worked in the receiver test lab from the mid-'40's to 1952. Harry spent a lot of time inside HRO-50's, HRO-60's, and NC-183(D)'s.

Ralph Hawkins, W1EOX - involved in the military products, expecially the Naval AN/FRR triple diversity shore stations, which when built to the max, took up three six foot racks.

Bob Williams, W1JOX - primarily involved in test and inspection during his 20 years at National. Bob was hired by Dana Bacon in the 1930's for 50 cents an hour.

Dick Thurston, W1MFZ - an engineer that was involved with National TV's and HI-Fi's (you read right) in the early 1950's, as well as the AN/FRR receiver.

Bill Bartell, W1PIJ - worked his way up from the test group to become equipment sales manager by the time he left in 1953. Bill says the HRO was the world standard for sensitivity in the 1940's.

If you look back to the December issues of QST or CQ somewhere in the mid-'50's, you will see the National Christmas ads, with a tree full of pictures of employees with ham licenses. Look carefully, and you will see a handful of the same faces and calls.

On a personal level, this is the third reunion that I've had the pleasure of attending, and to say that they were enjoyable experiences just doesn't go far enough. Even though I never worked at National, my interest in writing about these people has been very warmly received. It's as though I've been given an honorary member status within the group, and believe

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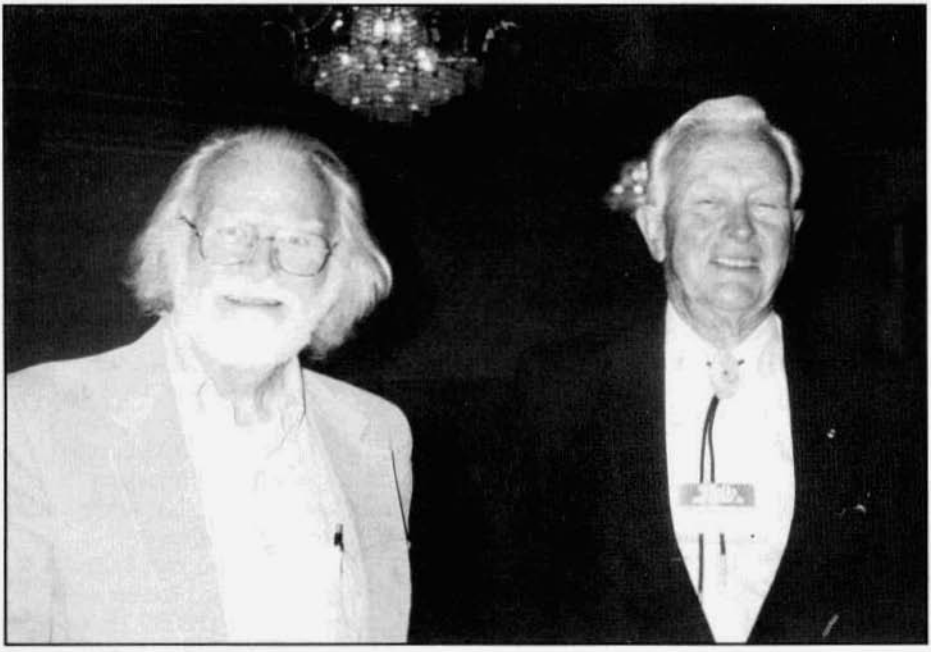
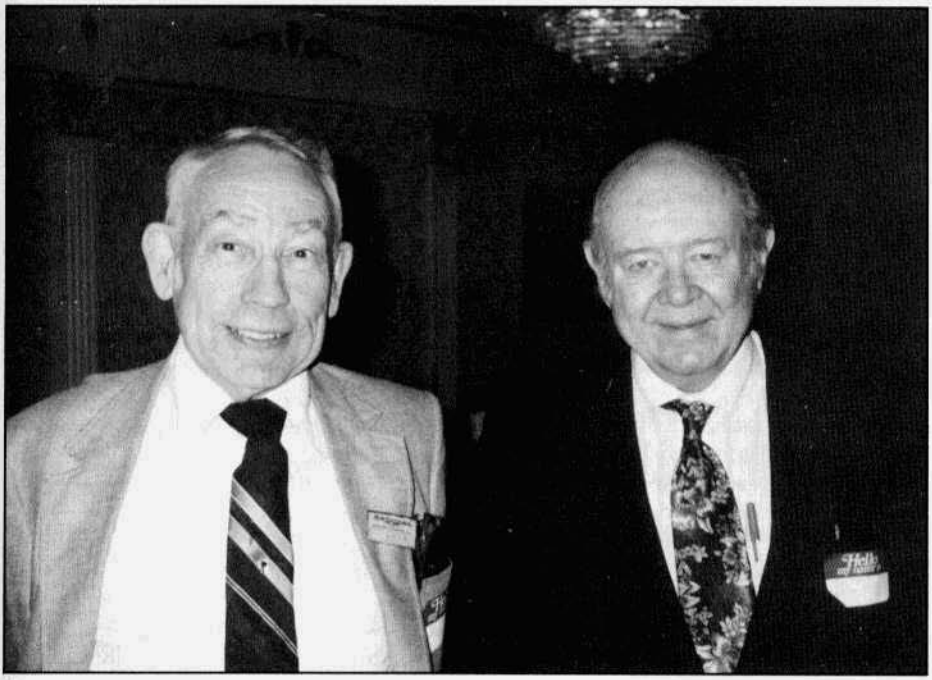
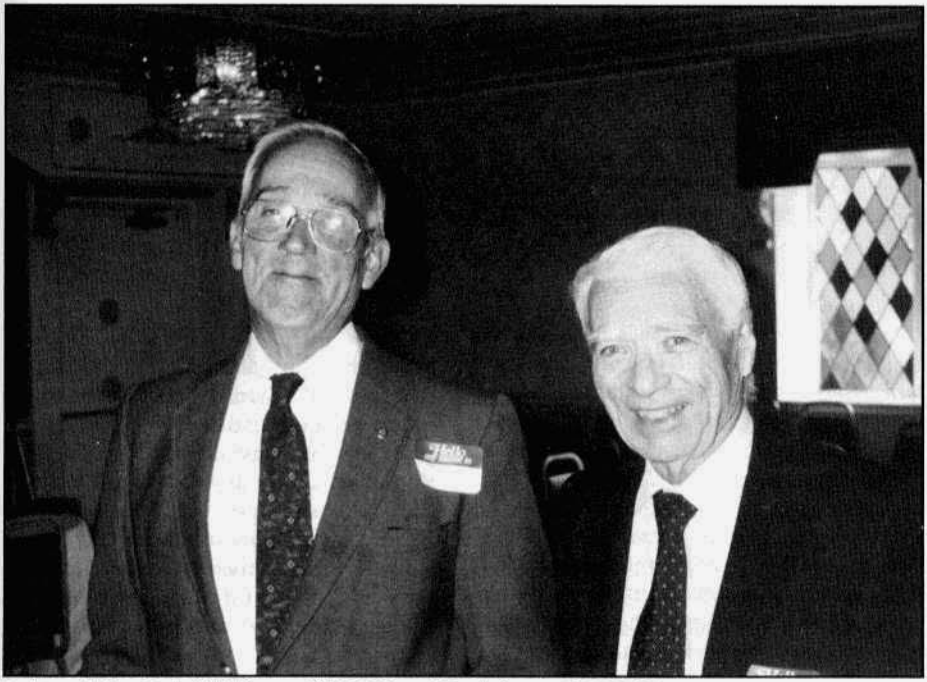


Left to right: Dick Thurston, W1MFZ and Bill Bartell, W1PIJ.



Left to right: Harry May, WB2EDS (ex W1QPQ) and Ralph Hawkins, W1OEX.



Left to right: Bob Williams, W1JOX and Jack Ivers, W1HSV.

The Story of Ray Morrow and Morrow Radio

by Bruce Adlard, WA7YTW
485 SW 6th
Canby, OR 97013

For years I have heard older hams talk about Ray Morrow, W7AWE, and Morrow Radio Company. Recently I decided to do an article for ER about Ray and Morrow Radio Company of Salem, Oregon.

Ray's interest in radio started at age eleven. When he was in high school he worked for a radio repair shop in the afternoons. At the age of 18, after graduating from high school in the early '30's, Ray worked at an electrical shop wiring houses and working in the shop on electrical items. Finally, after working at several shops, Ray started his own business. Due to a motorcycle accident and a broken leg, the business only lasted a week.

When the war broke out, Ray was asked to teach radio mechanics for the army reserve at a local Salem high school. Later, he went on to teach for a year for the reserve at Snohomish, WA. After his year of teaching Ray returned to Salem to start his own radio repair shop.

For the remainder of the war, Ray was busy fixing broadcast sets in his repair shop. At times he was as much as 200 sets behind. Ray built his own test equipment for his shop because at that time decent test equipment was hard to come by.

One day in the early '50's Ray was in United Radio Supply in Porland, Oregon buying some radio parts, when he saw a Gonset converter for sale. After looking it over in the store Ray decided to buy it and bring it home with him. After trying it out, when he got home, he decided to make a converter for himself that would outperform the one he recently purchased. After making his converter and showing it to several ham friends, they asked Ray to make them for them. This was the start of the Morrow Radio Company and the famous Morrow Converter.

The first converters covered 80, 20 and 10 meters with output on the high end of the broadcast band. Later models would have all the amateur HF bands except for 160 meters. The converter was mainly intended for automobile use and required 6-or 12-volt filament supply and a DC supply of 150 volts. Ray then felt he could improve the converters' performance by improving the quality of the broadcast receiver the converter worked into. The result was a combination of a converter and IF amplifier followed by an audio stage. The result was the MB-6 receiver.

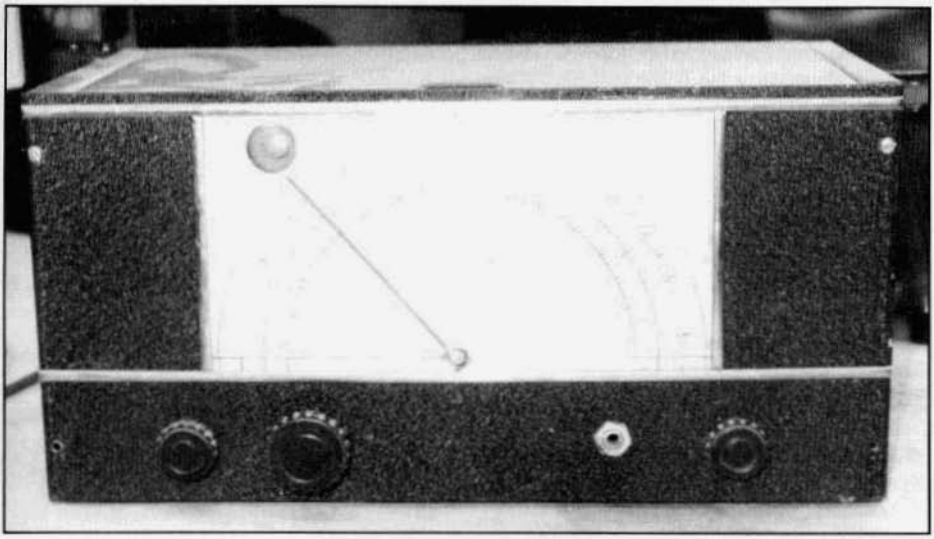
Ray then started to work on a companion transmitter for his newly designed receiver. The transmitter, when it was finished, was known as the MB-565. The Morrow Twins were then born.

Ray always felt that when he built and designed something, it had to be perfect. For this reason, Morrow Radio manufactured in-house most of its transformers, coils, knobs and at one time, even its variable capacitors. Chassis were punched and silkscreened in house. Ray handled all aspects of running the company, from designing the equipment to keeping the business end of things going. Most of the time he would put in at least twelve hours a day, seven days a week.

I asked Ray to elaborate more on the Morrow Twins. I asked if he had any problems manufacturing them. He stated that the Twins had the 6146 in the transmitter in the horizontal position, as opposed to the conventional vertical position. Many hams at the time didn't think the 6146 would perform properly in the horizontal position. But Ray felt it wouldn't make any difference in the performance of the tube and didn't change the position of the tube in the transmitter.

I then asked Ray why the Twins did not have 160 meters. The answer was simple: in the '50's, 160 meters wasn't used very

Ray Morrow, W7AWE.



Ray 'homebrewed' this receiver in 1932.

much due to navigational Loran.

Ray did try his hand at making a single sideband receiver, but due to expensive start up costs the project was dropped.

In the late '50's, Morrow Radio entered into the manufacturing of CB sets, and is credited with coming out with the first hand-held set that would fit in a shirt pocket easily. Each one of the hand-held sets would be tested by talking to another person a mile away with the same kind of set.

In 1962, due to unforseen circumstances, Morrow Radio was forced to close. Ray went to work for Konel where he was head of the radiotelephone section. In the early '70's Ray's two sons started Morrow Electronics in Salem. Ray worked at the company as an engineer until his retirement in 1975. The company manufactured navigational Loran and depth finders for fishing. Ray now enjoys working with his computer and talking with friends on SSB and SSTV. ER

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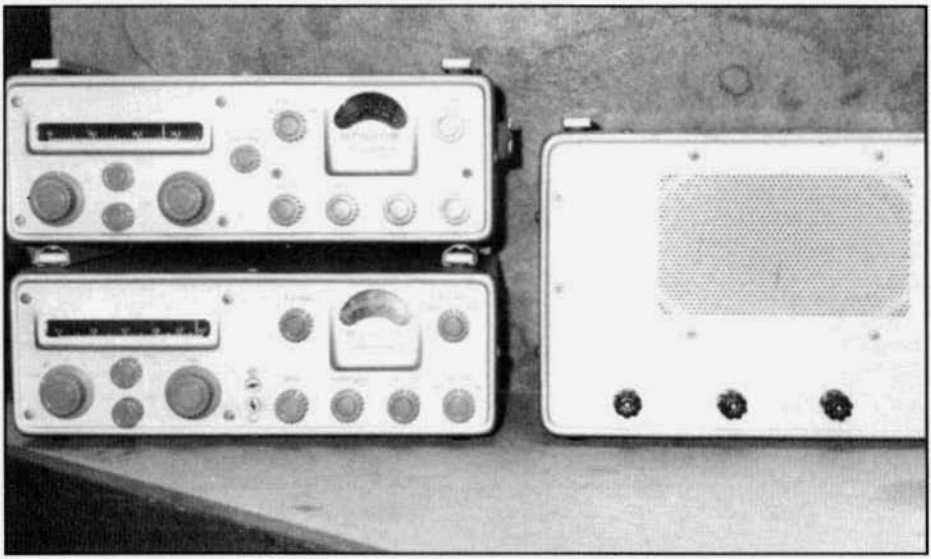


The Morrow Twins, MBR-5 receiver and MB-560 transmitter.

The Morrow Products List

Converters

1BR covered one band and was available for the 6-10-20-40 and 80-meter band.
2BR covered 40 and 75-meters and was the first converter Morrow produced. The dial was originally round and then was changed to rectangular.
3BR covered 10, 20 and 75-meters.
5BR covered 10-80 meters.
5BR2 was produced in the late '50's and was a modern looking version of the Morrow 5BR.

Receivers

In late 1953 the Morrow FTR mobile receiver was produced. It was designed to tune the output of the Morrow converters and to be used for mobile use.
In the mid '50's the Morrow 5BRF was produced. It covered 80-10 meters.
About 1956 the Morrow MBR-5 was released. It covered 80-10 meters and could be used for mobile or fixed station use. It came with a 100 kc crystal calibrator and a built-in noise limiter for mobile use.
In the late '50's the Morrow MB-6 receiver was produced. It was dual conversion and covered 80-10-meters.
In 1957 the Morrow Falcon was produced. It covered 75-10-meters and was dual conversion. It was intended mainly for mobile use.

Transmitters

In 1956 the Morrow MB-560A transmitter was brought into production. It covered 80-10-meters AM or CW with an output rating of 50 watts on 80 meters. It had a built-in VFO and used high-level Class-B modulation.

Accessories

MLV-50 motor-driven variable inductor for matching a mobile whip tunable 80-10-meters.
In the late '50's Morrow was the first to manufacture Conelrad alarms for amateur use. The models were the CM1 and CM3. The CM1 was tunable to Conelrad frequencies and had a visual signal level meter and a built-in alarm. The CM3 tuned the Conelrad frequencies and also had a built in alarm but was minus the visual meter for signal levels.

ER In Uniform from page 9
and the set came to life. It doesn't get any easier than that.

As noted before, the Washington, DC area seems to be a dead zone for AM VHF and UHF activity, but I was able to pick up the tone-modulated signal from my PRM-10 grid dip oscillator. Plugging in a T-17 carbon mic I was able to key the transmitter and talking made my URM-13 light bulb dummy load brighten slightly. When I switched the GDO to 'diode', coupled it to the PA plate lines and spoke into the mic, I could hear the voice signal in headphones connected to the GDO.

I'm still looking for a crystal set, tool kit, and discone and whip antennas for the MAY. And if another military VHF/UHF enthusiast ever lands within a 10 mile radius, I'll take the MAY testing further.

Conclusions

The MAY is probably the first communications set to have 9-pin miniature and subminiature tubes. The discone antenna may not be a first: it probably appeared on Navy ships as an ECM (Electronic Countermeasures) antenna at about the same time.

The 5656 also deserves honorable mention. With two tetrodes having almost exactly the characteristics of the 6AK5 symmetrically arranged in a single envelope and a shared screen grid with a built-in bypass capacitor it is almost an ideal low power UHF amplifier; other companies were still designing sets using either 6J6 dual triodes or pairs of 6AK5's. An output of over a watt at 390 Mcs with only four tubes isn't bad, in fact the tube ratings say it will deliver 4.6 watts at 225 Mcs! I don't recall ever seeing this tube in a ham design; perhaps it was too expensive compared to the 6AK5 and the various dual triodes.

The MAY's overall quality and ease of operation are noteworthy.

On the other side of the coin, this may be the largest radio ever designed for operation from a man's back; among men who carried sets of this scale (the SCR-300 FM set was another) it was a black joke to wonder if you were in greater danger from enemy fire or from hitting the ground to escape it.

Spillproof lead-acid batteries nearly always leak a bit; one could usually identify the guy who carried the radio by the acid holes in his fatigues. It gives you a really bad feeling to find that a combat radio has a jeweler's screwdriver in the packed-with-the-set tool kit. Changing a channel frequency is a much more delicate operation than one would like.

There are definitely things to dislike about the MAY. But a cup of coffee costs a nickel, at least it did when this set was built. A combat radio that worked on 390 Mcs was nothing if not state-of-the-art in 1944. The delicacy, size and weight were unavoidable for a set with such performance at the time. Overall, the MAY is a fine military radio and a more than respectable great granddad for your handheld. **ER**

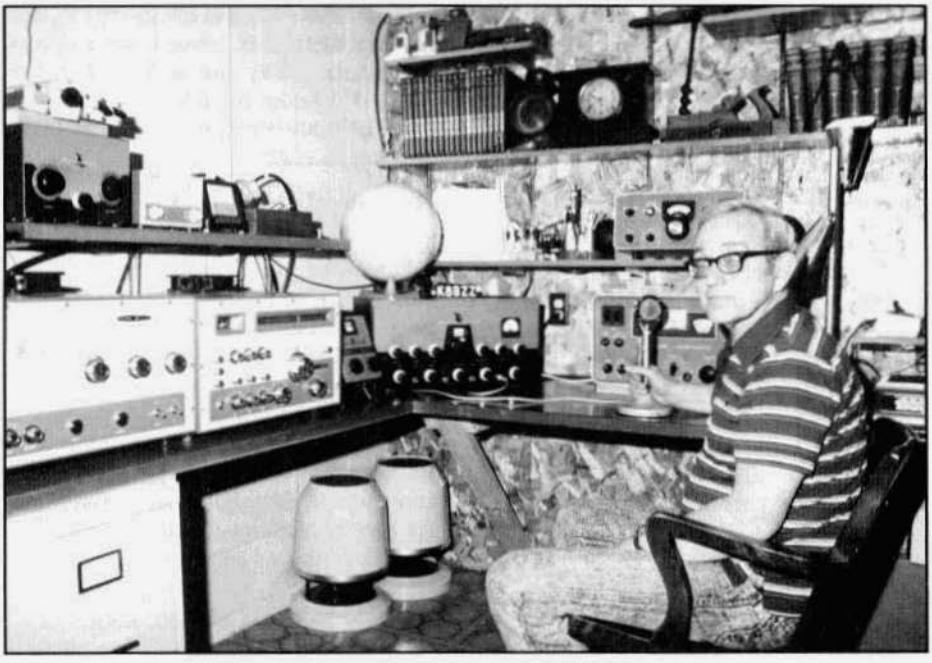
(The following sets mentioned in this column have been covered in previous issues: the TBY, November 1989, the ATA/ARA command sets, March and April 1990, and the GRC-9, October, 1989.

The National Alumni Dinner from page 28
me, it's a privilege that I value very much.

For all of you that are interested in more of the history of the National Company, a series of personal profiles is already under way to highlight individuals that were part of it, so stay tuned, it promises to be fun.

Many thanks to Ed Harrington and Vin Messina who both have been friends and mentors in this effort, and to all of the former National Company folks that have contributed to this ongoing effort. **ER**

David Bertman, AB7B, in his vintage hamshack. Dave's main interests are CW, QRP and DX but he says he also enjoys listening to the AM guys.



Ned Winter, K8BZZ, a regular on the 20-meter SPAM AM net.

Richard Shields, WA2AXT, with his vintage gear, in New Burn, North Carolina.

Bill Nickle, AF7D, with some nice AM gear. He lives in Arlington, Texas.

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DEADLINE FOR THE DEC. ISSUE: DEC. 3

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

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

FOR SALE: Hallicrafters SX-15, S-20R; Hammarlund HQ-120; National NC-46; RAS-5; Millen xmtr. Joel Levine, WB2BMH, 67 Derby Ave., Greenlawn, NY 11740. (516) 757-7641

FOR SALE: Working 1940 RCA AR77 rcvr, restorable w/book, will deliver within 100 miles; old xmtg tubes, LSASE for list. Plimpton, Rd 6, Box 264, Wellsboro, PA 16901.

WANTED: For NC-303, the calibrator - 10 mc WWV converter; also pwr xfmr for Globe 755 vfo. Sam Ash, N4VIB, (706) 695-5658 eves.

WANTED: Manuals or copies for a National NC-155 and a Hammarlund HQ-110A. Bill, AF7D, 1025 Hunter Ridge Dr., Arlington, TX 76013. (817) 274-5071

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

FOR SALE or TRADE: Viking Valiant; URM-25F sig. gen.; RBL-5 (National); GRC-9 (new/unused). **WANTED:** ART-13 LF oscillator or cover panel. Tom Brent, Box 1552, Sumas, WA 98295. (604) 826-4051

WANTED: Double button microphone, Western Electric 387 or Continental 10 in exc. wkg cond.; also need (2) .001 mFd and (2) .0005 mFd 6,000 V tubular caps to repair a Hallicrafters T-54 TV. K. Ellis, 500 E. Montecito Ave., Sierra Madre, CA 91024.

FOR SALE: Lakeshore Phase Master II exciter, mint cond. w/Bandhopper vfo & orig. books - $125. Fred Clinger, WA8KJJ, 417 Beechwood Dr., Galion, OH 44833. (419) 468-6117

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

FOR SALE: Used technical books - radio, electronics, military, test equipment, catalogs, etc. List- $1 (stamps ok). Software, Dept. ER, 1515 Sashabaw, Ortonville, MI 48462

WANTED: HRO-60 coils type AA/AB and pre-1950 ARRL Handbooks. B. Nadel, Box 29303, San Francisco, CA 94129. (415) 346-3825

FOR SALE: Millen vfo #90711; Gonset Communicator III; Harvey-Wells TBS-50. Roland Matson, K1OKO, RFD #1, Box 2943, Kennebunk, ME 04043. (207) 985-3751

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

FOR SALE or TRADE: Collins R-388 (with QST product detector modification and literature), extremely clean, plays great, in black cabinet, manual copy - $250 OBO. **WANTED:** R-389 VLF rcvr. Gene, (800) 872-9680 (Atlanta, GA).

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

WANTED: C7 and C35 for Ranger II; Globe King 500; Eico 751 AC supply; Johnson low-pass filter; Heath Cantenna; Johnson 10-watt audio amplifier; Johnson swamping attenuator; Johnson power reducer; Johnson Desk KW; Johnson 500; Ranger II; Viking II and Bird wattmeter. Mack Fairley, AB4ZF, 506 Tallyrand Ave., Monroe, NC 28112. (704) 283-5146

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

FOR SALE: Multi-Elmac AF-68A w/commercial ps, near perfect cond. - $135; Drake R4A, near perfect cond. - $135. Cliff Fleury, AI7Y, 64174 Tumalo Rim Dr., Bend, OR 97701. (503) 382-9162

FOR SALE: U.S. Navy flameproof keys NOS, 1955 sealed packages - $60 shpd. Telegraph items, etc., 7 page illustrated list - $1 plus SASE. J.H. Jacobs, 60 Seaview Terrace, Northport, NY 11768

WANTED: Mint condition Collins 51S-1 and 51J-1; Hammarlund - HQ-180; Drake R-4C. Priced right, please. M. Neidich, K2ENN, 145 E. 15th St.,-6A, New York, NY 10003. (212) 777-1332

WANTED: Clean, unaltered and operational Collins 310B-1; RME-69 and RME-99, w/ manuals. Martin Piepenburg, W9OLD, RR 1, Box 568, Monterey, IN 46960. (219) 542-2591

FOR SALE: BC-191 and two tuning units. Best written offer by 1 Jan. 93. Pick up preferred. Brian Roberts, 3068 Evergreen Rd., Pittsburgh, PA 15237.

FOR SALE: Heathkit DX-60, exc. - $50; Swan 500CX SS-16 Special, w/spkr/pwr sply, exc. - $260; Hammarlund HQ-110 - $75. All plus shpg. Richard Lucchesi, WA2RQY, 941 N. Park Ave., N. Massapequa, NY 11758. (516) 798-1230

FOR SALE: Radio tubes, capacitors, etc. 16-page illustrated catalog - $2 (foreign $3). Don Diers, 4276 North 50 St., #L2, Milwaukee, WI 53216-1313

FOR SALE: 500-watt modulator deck to fit 19" rack, wrinkle black finish, w/0-500 mA plate meter, also 3 ps chokes and 7 filter caps - $150 PU only; Heath Apache and SB-10, both units completely rebuilt, both are real clean and have manuals - $225 PU only. Vic Gregowski, WD8DWR, 3635 Orvall Dr., Fort Gratiot, MI 48059. (313) 385-9479

WANTED: Manual for HP600B; 3TF7 tubes; meters for R390A; TEK 465 or 475 scope, must be in very good cond. Clark Hatch, WØBT, 2546 SE Peck Rd., Topeka, KS 66605. (913) 235-2721

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

FOR SALE: AN/GRR-5 with headphones, AC cord and repro tech manual, 8.5 on 1-10 scale (BFO weak), 1.5-18 mHz - BO over $100 plus shpg. (approx. 60#). Jay Harmon, 11724 Mollylea Dr., Baton Rouge, LA 70815. (504) 272-7657

WANTED: Early National rcvrs - SW-2, 3, 4, 5, FB-7, ACS, HRO and coils. Steve Barnes, K6PFW, 848 N. Silverwood, Upland, CA 91786.

FOR SALE: Heath DX-35, AR3, - $35 ea; Mohawk rcvr - $95; SWR AM2 & Laf. HA52A - $15 ea. Shpg xtra. H. Mohr, 1005 Wyoming, Allentown, PA 18103. (215) 435-3276

WANTED: 120 V pwr sply for SR-150; Shure 51 or 55 mic. Terry Knapp, KG7ZD, 1937 Valley Dr., Las Vegas, NV 89108. (702) 647-5729

FOR SALE: National RAO-2 rcvr - $75, PU only. **WANTED:** Schematic and pwr unit for Navy TCO-2 radiotelephone. Mike Tara, 4657 Eastview Dr., Stockton, CA 95212. (209) 931-6059.

WANTED: Pre-WW II National VHF Super Regen rcvrs, SRR or I-10. I have miniature telegraph key to trade. Niel Wiegand, WA5VLZ, 12105 Mustang Chase, Austin, TX 78727.

ELECTRON TUBES FREE 1992 Catalog, over 2,000 types in stock. **Electron Tube Enterprises,** Box 311, Essex, VT 05451. (802) 879-0611, FAX (802) 879-7764

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

FOR SALE: B&W 5100B xmtr in VG cond., w/manual - $250; Viking I in VG cond. w/manual copy - $150; Meissner Signal Shifter for above in good cond. - $45; HG-10B vfo in exc. cond., w/manual - $70; Johnson MN 250-23 Matchbox in exc. cond., w/manual - $95; National NC-300 in VG cond., w/manual - $250; Hammarlund HQ-180 in VG cond., w/manual and spkr - $275. Please ask for lists of goodies. Clyde Sakir, N7IOK, 4243 E. First St., Tucson, AZ 85711. (602) 323-1120

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

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

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

FOR SALE: National NCX-3 xcvr, NCX-1 pwr sply, spkr console, manuals - $175; Hallicrafters HT-40 xmtr, manual - $90. Franklin S.H. Young, KH6CDO, 2816 Poelua St., Honolulu, HI 96822. (808) 988-7474

WANTED: WRL Globe Scout 65A in good condition. Tracy, WB6TMY, Box 4694, Santa Rosa, CA 95402.

FOR SALE: CV-591A/URR SSB converter, exc. working cond. - BO. KI1W, (617) 227-5228 eves.

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

FOR SALE or TRADE: Navy shipboard xmtr AN/SRT-14, 0.3 - 26 Mcs, AM and CW, 4-400A in final, 120 AC pwr sply, w/manuals, many spares and accessories. PU only. Ted Bracco, Quincy College, 1800 College Ave., Quincy, IL 62301. (217) 228-5213

FOR SALE: Russian mech. filters, 600 Hz bandwidth at 500 khz, for rcvrs like 75A-1, 51J, etc. - $62 ppd. Joel Thurtell, 11803 Priscilla, Plymouth, MI 48170. (313) 453-8303

FOR SALE: Swan 500CX xcvr w/117XC pwr sply/spkr and orig. manual. Exc. cond. - $250. Dan Radcliffe, KF9BP, (414) 255-9165

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

WANTED: Globe King any model; homebrew rack mounted AM tx; National NC-183DTS; Uniden Tempo 2020; broadcast tx's; broadcast mics, ext. vfo for Ameco TX-62; Marconi KTW63; Drake model 4-NB; Harvey UHX-10 xmtr; also parting out a Galaxy III and a Johnson Ranger. Donald R. Boland, 28 Faulkner St., Malden, MA 02148.

FOR SALE or TRADE: Drake R-7, MS-7, R-4B, filters, manuals. Levy, 8 Waterloo, Morris Plains, NJ 07950. (201) 285-0233

WANTED: Junkers for parts: Edgecom 2000A and SB-34. Will pay shipping. Marvin Moss, W4UXJ, Box 28601, Atlanta, GA 30358.

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

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

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

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

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

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

WANTED: RCA AR-88, VLF or ELF rcvr; tube CB's; SB-301; SB-401; SB-110; SB-200; SB-101; SB-310; Harvey-Wells; Sonar; Lettine; Gonset; Lampkin; Philco; Arrow; B&W; Bendix;Swan;Hunter; Davco Stancor ST202A; SB-220. Donald R. Boland, 28 Faulkner St., Malden, MA 02148.

WANTED: Good cond. Collins 516F-1 (pay $100-$150); 516F2 (pay $100-$120); SM-3 mic (up to $150) and 515-1. Mimi, 2212 Rockefeller Ln., Redondo Beach, CA 90278. (310) 379-6052 or FAX 379-5543

WANTED: E.F. Johnson Viking accessories with the Viking emblem (black or grey microphones & external spkrs). Promotional literature & information on the Johnson "Avenger". Sumter Hickman, KB5QHD, 1008 W. 10th St., Plainview, TX 79072. (806) 293-5809

FOR SALE: Test set I-199-A (dynamotors and handcrank generators) NOS, with manual copy - $95 plus UPS. Robert W. Downs, WA5CAB, 2027 Mapleton Dr., Houston, TX 77043. (713) 467-5614

WANTED: Crank/spin local control knob for command set rcvr. Trades? Cash? Have some command set parts for trade. Bill Kleronomos, KDØHG, POB 1456, Lyons, CO 80540. (303) 823-6438

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

FOR SALE: B&W 5100 - $140; Collins 32V-1, no cabinet - $120; R-388/51J-3, rack mounted - $175; 75S-3, no CW filter - $200; National NC-300 - $100; Gonset GSB-100, perfect appearance and bad pwr sply - $100; Telex Ham-II rotor - $150; Hallicrafters Skyrider 5-10, no cabinet - BO; BC-683 - BO; General Electric H-51-C, 1930's AM console - $120. No shpg beyond 70# UPS limit. **WANTED:** Lafayette HE-10 (KT-200) rcvr. Jim Jorgensen, K9RJ, 1709 Oxnard, Downers Grove, IL 60516. (708) 852-4704

FOR SALE: APR-4Y rcvr w/CV-253 tuning head, wrks - $200 OBO; Heath HW-12A, 75-M SSB xcvr, w/AC & DC sply - $100 OBO; Bogen PA amp w/pr of 6L6's - $75 OBO. **WANTED:** Hal ST-5 or ST-6 TU. Steve Davis, KD2NX, 705 13th Ave., Belmar, NJ 07719. (908) 280-9760

WANTED: Gonset 2-M Communicator manual and/or schematic. Also need Gates 39B or Collins 26 U-1 broadcast limiter. Tom Smith, N5AMA, 13034 Elmington Dr., Cypress, TX 77429-2062

FOR SALE: Webster Bandspanner antenna w/ spring base, data - $50; equipment, parts, books, manuals, long list - $1. **WANTED:** Collins literature. U. Joe Orgnero, VE6RST, Box 32, Site 7, SS 1, Calgary, AB T2M 4N3 (403) 239-0489

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

FOR SALE: National NCX-5 xcvr, w/pwr sply/spkr, exc. cond. - $185. Jerry Andrews, WB3BDM, 1813 Rocky Glen Dr., Frederick, MD 21702. (301) 696-1934

FOR SALE: Military favorites: R-390As, R-388s, SP-600s, R-1051s, WRR3s and other HF and LF rcvrs, modules and parts available. LSASE for new list. APS-E, 107 Fayton Ave., Norfolk, VA 23505.

WANTED: A WRL-70 transmitter. Leo Meyerson, WØGFQ, 69911 Via Del Sur, Cathedral City, CA 92234. (619) 321-1138

WANTED: Top lid for KWS-1, will trade 75A-4 lid; face plate for Heath HX-20; meter for Heath AT-1. Marty, (817) 497-6023

WANTED: Knight Kit Ocean Hopper and coils, any condition, working or not; National Velvet Vernier B dial; Millen 34300 100 mH RFC; clean to mint orig. ID plate and/or front panel for a BC-348 restoration, any model; minto to VG SX-100, AT-1. Dave Ishmael, WA6VVL, 1118 Paularino Ave., Costa Mesa, CA 92626. (714) 979-5858

FOR SALE: New Collins parts: 30L-1 blower motors - $35; 51S-1 PTO osc., 70K-7, P/N 522-2918-000 - $200; silver plated 30S-1 tank coils - $7. Dennis Brothers, WAØCBK, HC 84, Box 1, Potter, NE 69156. (308) 879-4552

FOR SALE: Collins 4A amateur xmtr, circa 1933 - $3200; set of 3 unused mech. filter adapters (353C-14, 353C-31, 353C-60) for 75A-1 rcvr - $400; KWM-380 service manual - $40; National LF-10 LF preselector for HRO-500 - $275; NC-183D - $250; DX-100, superb cond. - $150; Zenith Trans-Oceanic H-500 - $125; Drake 2NT, w/3 xtals - $125; RME-6900 - $140; 4-1000 socket - $30. Mike Palmer, K5FZ, 16707 Creeksouth, Houston, TX 77068. (713) 893-7004

WANTED: BC-348 J, N or Q; tech manual for BC-221; R-392 tech. manuals; Radio magazines 1940 - 1950. Alan Mark, POB 372, Pembroke, MA 02359.

WANTED: Anyone who served at the 7TH RRPS (Radio Research Field Station) in Udorn, Thailand between 1968 - 1971. Bill Bogart, KA9CWK, POB 81, Covington, IN 47932.

WANTED: Copy of manual for Johnson SSB adapter; 75A-3. Mike Samarco, W1JZ, 111 Glen Ave., Upton, MA 01568. (508) 529-4427

FOR SALE: Collins KWM-2A, RE, w/PM-2 - $400. Ron Nott, K5YNR, 4001 La Plata Hwy., Farmington, NM 87401. (505) 327-5646

WANTED

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

FOR SALE: Johnson Desk KW, complete, needs paint - $875 PU only; Valiant I; B&W 5100; (2) ART-13 mod xfmrs - $10 each plus UPS. Jack Iverson, N9KYT, 1110 Old Mill Dr., Palatine, IL 60067. (708) 359-0941

WANTED: Gonset Communicator IV, 220 mHz xmtr/rcvr, good to exc.; manual/copy for National NC-240D rcvr. Roger Zaun, W9UVV, 4902 W. Parkview Dr., Mequon, WI 53092. (414) 242-4931.

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

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

FOR SALE: I have a limited number of Lord shock mounts suspending the 30S-1 blower. These aren't Collins parts, but physically fit perfectly. The rubber is stiffer, and should last forever (give or take). Set of 3 for $20 plus $2 postage USA. Peter R. Brown, KH6IRT, 5332 Puahia Place, Honolulu, HI 96821. (808) 373-2792

WANTED: Pre-1925 radio equipment; crystal and tube receivers; horn speakers and related items. Matt Erdahl, 6506 S. Dorsey Ln., Tempe, AZ 85283. (602) 730-0570

WANTED: SX-28 or SX-28A in very good or better condition. Will pay top dollar and more. Warren Debuke, K2SM, 303 Drake Dr., North Tonawanda, NY 14120. (716) 692-6641

WANTED: Globe King 500 B or C; 75A-4, must be exc. Gil Parsons, WA8JIW, POB 192, Ross, OH 45061. (513) 867-0820

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

FOR SALE: Thirty-six page catalog of WW II military radio equip. - $1 or postage stamps. Sam Hevener, W8KBF, "The Signal Corps", 3583 Everett Rd., Richfield, OH 44286.

WANTED: Johnson gear, all models, any condition. Also parts and literature. Please state condition and shipped price. Wen Turner, AD7Z, Box 451ER, Cal-Nev-Ari, NV 89039.

FOR SALE: Racal RA117E HF communications rcvr, good clean cond., all tube equipment, made for British gov't in late '60's, 19" rack mounting, bandwidth 100 Hz - 15 kHz in 6 ranges, uses Wadley loop for electronic band switching, very well made - $500. Nigel, KC4TLV, (404) 994-3900 (w), 949-1097 (h).

FOR SALE: Lafayette 2 & 6 meter vfo, model HE-89, w/manual - $15. Roy Kramer, W3ZIF, 740 S. Carldon St., Allentown, PA 18103. (215) 797-9406

WANTED: Hallicrafters SX-101 or SX-101A. Must be clean and in working cond. John B. Keil, 4618 Norwalk St., Union City, CA 94587. (510) 471-4838

FOR SALE: Misc. sizes IRC, Shall Cross and Sprague wire wound precision resistors, NOS, used for meters etc. - $20; (2) 6D54 nuvistors - $9; (1) 6AL5, (1) 12AU7, solid state, used in many Heath VTVM's, new - $17 for all; (1) 1942 GE LS-3 loudspkr w/cabinet, new - $45. Plus much more. Joe, W6CAS, (916) 731-8261

ELECTRIC RADIO PARTS UNIT DIRECTORY

At this point the directory has over 230 units in it. If you need a part for a vintage restoration send $2 and an SASE (.52 postage) for the list. If you have a parts unit, consider putting it on the list. Your dead unit can help bring others to life!

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

FOR SALE: Millen 2" rack scope - $125; Empire NF-105 field intensity meter w/TU's for .36-30 Mc, 20-200 Mc, 400-700 Mc - $150; R 1490/GRR-17 military rcvr - $250; AN/WRR-3A rcvr - $100; R 392 w/manual & ps - $150; HRO-50T-1 w/front panel, missing case and some coils - $150; Johnson HD rotator w/control box - $150 PU; Rohn BX 64 tower, tilt base - $200 PU. Pete, WØEWQ, (215) 849-5830

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

FOR SALE: Drake C-Line; NCX-3; R-390A. Carter Elliott, WD4AYS, 1460 Pinedale Rd., Charlottesville, VA 22901. (804) 980-7698 (d), 979-7383 (n)

FOR SALE: Working antique Hickok RF-AF generator - $65. **WANTED:** Sylvania 6JB6 tubes and working Ranger, preferably Ranger II. Rick, K8MLV/Ø, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

FOR SALE: B&W tank coil - $75 shpd. Mike Oxenreider, WB3CTC, 63 Hellers Church Rd., Leola, PA 17540. (717) 656-8746

WANTED: Ameco mod. CMA multi-band converter and Turner mic, 454-C (SSB) for collection. Will pay cost, shipping, expenses. Pse write E. Schlapfer, HB9LCI, Zwangi 7, Zurich 8038, Switzerland.

FOR SALE: Johnson Viking 6N2 Thunderbolt amplifier, w/relays & solid-state rectifiers - $875 PU only. **WANTED:** "N" type coax relays. Clem, W8VO, (313) 268-2467

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

WANTED: Manual for National FB7 or FBX, copy ok; National power supplies for FB7/X and HRO. Bill Strangfeld, WB8YUW, 254 Elm Ave., Cincinnati, OH 45215. (513) 948-1071

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

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

FOR SALE: Meissner Signal Shifter model EX - $50; Morrow MBR-5 - $30 as-is; Knight Space Spanner - $40; Clegg Thor - $65; DX-100 - $65; HRO 60 C,H,I, coils - $30 ea; 6N2 converter - $25; mint Electro-Voice speech clipper in orig. box - $30; LM-11, w/pwr sply - $20; Silver cap checker - $10 as-is; parting NC-57. Joe Sloss, K7MKS, (206) 747-5349

WANTED: Top dollar paid for Collins 30W, 32A, 32B, 30FX and 40B xmtrs. Paul Christensen, 11142 Raley Creek, S., Jacksonville, FL 32225. (904) 721-9111 9 AM - 5 PM

FOR SALE or TRADE: Collins St. James Grey collection: 32V-1, 32V-3, 75A-1, 75A-2, 75A-3, 75A-4, 2 spkrs + extras - $2K; WE 451-A1 BC xmtr - $3K; W.E. CGR-1 rcvr (1924); Sargent 12-D; 2-1/2 V HRO "Silver Dial" - offers. Gary, WA9MZU, 1751 Michon Dr., San Jose, CA 95124. (408) 266-2218

WANTED: Following for Navy RU rcvr, CW-46011 mount, CW-21454A dynamotor, CW-23096A switch box, CW-62018 junction box and instruction manual or schematic. Also looking for Navy GF xmtr, National ACS or ACS-X and FB-7 or FBX. Robert I. Hall, KEØJK, RR 01, Box 1401, Dunnegan, MO 65640. (417) 654-2577 after 5 CST

FOR SALE: SX-42, good cond., all bands work but needs alignment, Sam's Photofact plus service notes, no spkr - $160 plus UPS; HQ-100, needs alignment plus work, manual, no spkr - $70 plus UPS. Bill Becker, 453 Preakness Ave., #4, Paterson, NJ 07504

WANTED: Knobs and spkr for Radiola 17. Bud Santoro, 3715 Bower Rd., Roanoke, VA 24018. (703) 774-9153, collect OK

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

FOR SALE: SAMS for hams. Photofacts of vintage ham gear. We also buy used SAMS. A.G. Tannenbaum, WA2BTB, POB 110, East Rockaway, NY 11518. (516) 887-0057

FOR SALE: HP 628A sig. gen. - $150; T.S. 741, w/p.s. and case - $40; Variac 120, 20 amp - $35; 813's - $15; 805's- $20. Milton Levy, 115 N.W. Loop 410, Apt. #24B, San Antonio, TX 78216. (502) 366-3290 anytime

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

FOR SALE: Johnson Viking Ranger, exc., clean, good rubber - $160 U.S., U-ship. Syd Nelson, VE5JD, Box 306, La Ronge, Sask., S0J 1L0, Canada. (306) 425-2057

WANTED: Any information on Supreme model AF-100 ham xmtr, made by Supreme Transmitter Corp. late '40's? Don Winfield, 6080 Anahuac Ave., Fort Worth, TX 76114.

WANTED: Manual/schematic? B&K 445, Eico 330, Eico 379, Semcore RC115, TS-888. Marvin Moss, W4UXJ, Box 28601, Atlanta, GA 30358.

FOR SALE: Piggyback pwr sply for KWM2A; TBS-50A. **WANTED:** Heath SB-610 scope. Gene Clayton, W7MXM, 508 S. Ammon Rd., Idaho Falls, ID 83406.

MESSAGE: Sample issue no. 1 of the Vail Correspondent (quarterly journal for key collectors) still available, $2. Published by W1IMQ. TVC, Box 88, Maynard, MA 01754.

FOR SALE: PM 2 pwr sply, exc. cond., includes mounts - $120 plus shpg; Hallicrafters SX-101A - $150. Gary Elliott, 808 Clarice St., Delhi, LA 71232. (318) 878-8032

WANTED: Schematic or manual for RCA Radiomarine AR8516 communications rcvr; schematic for Dentron MLX-Mini 75-meter xcvr. John, KU6X, 2512 Euclid Crescent, E., Upland, CA 91786. (714) 981-6759

WANTED: Main tuning knob for Heathkit 401; original manual for Heath Apache, model TX-1; orig. manual for Hallicrafters model 28 Super Skyrider; orig. manual for Yaesu FRDX-400 w/ 6 and 2 meter converters. Please state price and condition. Jerry Sirois, VE3DIK, 12 Alton Acres, N., Orillia, Ont., L3V 5J5. Canada

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FOR SALE: Two Viking II's, one with vfo; Ranger and Apache, VGC, working, w/ manuals. PU only. Dusty Rhodes, W8MOW, (513) 339-1456

FOR SALE: Johnson: Ranger I - $125, Ranger II - $160, Viking I - $100, Viking II - $100, Valiant II - $275, Courier amplifier - $300, Pacemaker - $150, Valiant mod. xfmr, new - $40. Heathkit: DX-100 - $100, TX-1 (Apache) - $100, DX-35 - $40, VF-1 - $25, SB-10 SSB adapter - $80. Eico 720 w/modulator - $60; Hammarlund HQ-170 - $150; National NC-300 - $130; Galaxy III remote vfo - $25; 810 tubes - $25. **WANTED:** Meter for Valiant I; National NC-303 (mint). Gary, W7FG, (918) 333-7893

WANTED: Copy of "Service Modification Compendiums for S-Line and KWM 1/2/2A" or of parts thereof referring to KWM-2/2A and other publications on same subject. Hans Zimmermann, HB9AQS, POB 209, CH-3780 Gstaad/Switzerland

WANTED: Heathkit HRA-10-1 crystal calibrator for HW-32. D.W. Naylor, WAØCTE, 509 Brown Circle Dr., Osawatomie, KS 66064. (913) 755-4462

FOR SALE: Thousands of vintage radio parts, catalog #0692, 40 pages - $2. Gary B. Schneider, Play Things Of Past, 9511-23 Sunrise Blvd., North Royalton, OH 44133.

FOR SALE: 51J4, exc., (3.1 kHz filter) - $325; R-388, exc. - $225; Swan 500C, with AC/DC pwr sply, VOX, exc. - $210. John, KU6X, 2512 Euclid Crescent E., Upland, CA 91786. (714) 981-6759

FOR SALE: R648 - $100; R-390A - $175; R-1490/GRR 17, mint cond. but needs tuning belt - $375. No shpg. **WANTED:** R4C AM filters. Nick Oliviero, 8121 Manchester, #491, Playa Del Rey, CA 90293.

FOR SALE: SX-62; SX-100; SX-17; Knight R100A or trade for pre-war rcvrs. **WANTED:** 8R-1 Collins calibrator. Larry Tinkler, 18012 Pt. Conception, Cerritos, CA 90701. (310) 860-3131

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

WANTED: WW II airborne TV equipment - ATK, ATJ, etc.; also early radar equipment units or complete systems. Allan Weiner, 14 Prospect Dr., Yonkers, NY 10705. (914) 423-6638

WANTED: Good 51J or HRO-50 or 60. Must be mint or close to it. John File, POB 566, Tolono, IL 61880.

FOR SALE: Tektronix 575 transistor curve tracer, model 122C - $500. Don, W7KCK, (503) 289-2326

WANTED: Information on the history of commercial radio operator's licenses. Ron Thomas, W8QYR, POB 347115, Atlanta, GA 30334.

FOR SALE: Sorenson pwr sply, 50 v, 2.5 A DC - $25 + $10 shpg; HP model 3430A digital voltmeter, works - $25 + $10 shpg; Triumph model 3335 multimeter, has been restored - $25 + $5 shpg; 2 nice empty Knight-Kit test equipment cabinets - $15 ea. + $4 shpg; Seco model 510B CB power meter, like new - $25 + $5 shpg; GBC model CTC-3010 TV camera - $25 + $5 shpg. I am still making SW-3 replacement plug-in coil forms and have the winding data for the SW-3, write. James Fred, R1, Cutler, IN 46920. (317) 268-2214.

WANTED: Rider manuals #1, 20, 21, 22 & 23; pay for pictures of console for Colonial AC-31 floor model radio. Stephen Kalista, Sr., 9 Maple Dr., Jim Thorpe, PA 18229. (717) 325-4120

WANTED: To buy or pay for copy of operators manual for Geatsch signal generator SSG-1/AN/GRM-59. Aloha. Itsuo Yano, 80 Lehua St., Kahului, HI 96732.

WANTED: Heathkit 10 inch chartpaper and EV-205 recorder for parts; also Hallicrafters S-meter. Thanks. Robert Enemark, W1EC, Box 1607, Duxbury, MA 02331. (617) 934-5043

FOR SALE: Heathkit SA2060A Deluxe Antenna Tuner, still in kit - $219; Heathkit SA2040A antenna tuner - $169; Heathkit HA10 Warrior linear - $250; Tektronics 545 with 1A2 - $35; new tubes: 4-125A/4D21 - $45; 35T - $30; 6080 - $3; 2A3 - $22. Used, good, 813 - $10; 807 - $3; 45 - $14; 2A3 - $12. More tubes, write. Fifty-six different Heathkit manuals, write. **WANTED:** Collins 310B, 32S or 75S, any condition. G. Stevens, WØATA, P.O. Box 704, Longmont, CO 80502-0704. (303) 776-9036

WANTED: HT-32B or HT-32A; R-390 or R-390A; cabinet for 51S1. Ward Rehkopf, K8FD, 116 Fairway Dr., Belmond, IA 50421. (515) 444-4396

WANTED: Hallicrafters SX-100 and Drake 2B. Exc. to mint please. James B. Geer, 604 King Dr., Bedford, TX 76022-7124. (817) 268-1985

WANTED: Parker mod 525 0-1A meter as used in Henry Radio amp. Doug, K6PUN, 2215-A Faraday Ave., Carlsbad, CA 92008. (619) 438-4420 (days)

WANTED: A few 'missing pieces' of that great old military gear. A DM-43 or DY-96 dynamotor (24 volts, for BC-653 transmitter), a CRC-7 emergency transceiver, tuning units range 'D' and 'F' for the GP-7, a frequency standard module for the CRC-106, a CBY-23049 antenna relay box for RU/GF gear, and a CAY-20084 rectifier/modulator for Navy model TBW transmitter. A set of crystals for the PRT-4 and PRR-9, also one for the MAY. Still need cheap URC-68, PRC-90, and PRC-63 survival transceivers. A 'junker' R-442/VRC receiver or just a good front panel for one, and a good BC-923 receiver. Accessories for URC-87 (V) (Southcom SC-130 'Patrolfone') transceiver – battery box, whip antenna. Dynamotor DM-21 for BC-312 receiver – this has four (not three as I said last time) banana pins that stick out on the bottom and is rated at 28 VDC in, 166 volts out. Finally, many thanks to the folks who helped cut down the size of this list from the last time. Walt Hutchens, KJ4KV, 3123 N. Military Rd., Arlington, VA 22207. (703) 524-9794

WANTED: Manual for Navy RBB-2 or RCB-2 rcvr; old Galaxy V or 550 remote vfo's - junkers (need only cabinets). Have manual for Collins 356-1 limiter amp. Gary Reiss, Rt 1, Box 141, Wilcox, NE 68982. (308) 263-3231 (h), 995-5541 (w)

WANTED: Non working Collins equipment !!! Also other makes. Write with model and make.. Dan Rupe, W7HBF, 1302 S. Uplands Dr., Camano, WA 98292.

FOR SALE: NCL-2000 with spare finals - $500; NC-300/303 VHF converter set - $100; KW Electronics KW-107 Supermatch - $150; HQ-120 - $150. KØOCC, Atlanta, (404) 396-1312

WANTED: Knight Span-Master II or Olson RA-48. Have Span-Master, Ocean Hopper and others for trade. Al Bernard, NI4Q, P.O. Box 690098, Orlando, FL 32869-0098. (407) 351-5536

WANTED: Manuals or copies for Hammarlund HQ-110, HQ-120; Heath HR-10B, HW-12; BC-348Q; paint info for Ranger I & II. Al Norton, K7IEY, 1008 Liberty St., Lynden, WA 98264. (206) 354-4622

FOR SALE: 75A-4 filters - 6 kc - $150, 1.5 kc - $125, .8 kc - $125; Heath GR-81 regenerative SW rcvr - $45. John Orahood, 5819 Miller Valley, Houston, TX 77066. (713) 440-5598

WANTED: Nice HRO-60; tuning knob for SX-88; HR-2 and HR-3 heat dissipating connectors; two new, or known good 450TH or TL tubes; 40 or more mH, heavy duty, edge-wound rotary inductor; KW, multi-tap xfmr; interested in any GRO tubes, sockets, xfmrs, vacuum or air variables, RF and pwr sply parts. Barrie, KF7VA, 125 Ben Hogan Dr., Missoula, MT 59803. (406) 728-7637 wkdys, 549-1921 eves and wknds

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FOR SALE: NC-125 w/Select-O-Ject and matching spkr, all in good cond. - $145; B&W 5100-B in nearly new, operating cond. and very good appearance! - $250. Both together for $325. Would prefer PU but could ship. Manuals included. Clyde Sakir, N7IOK, 4243 E. First St., Tucson, AZ 85711. (602) 323-1120

FOR SALE: SBE-34 SSB xcvr, very good - $145; Drake MN-4, exc. - $85; 814 tube - $9; Johnson TR switch - $30. Bill, KE7KK, 6712 Lake Dr., Grand Forks, ND 58201. (701) 772-6531

WANTED: Manual and schematic for Galaxy V, MK II; also a .1 mFd @ 2500 volt cap. Bob Bricker, K4CSV, 821 S. 14th St., Fernandina Beach, FL 32034. (904) 277-7061

FOR SALE: Weston AC & DC wattmeter model 310 in carrying case - $75; (2) Synchro rcvrs, 115 V, 60 cycle, type 23TR6, new - $25. W6CAS, (916) 731-8261

WANTED: Teletype Model 28ASR equipped with the dual-headed LCXD tape reader (fixed and climbing head). Schematic for Harvey-Wells Bandmaster. Jack Hart, WA2HWJ, (201) 927-7784

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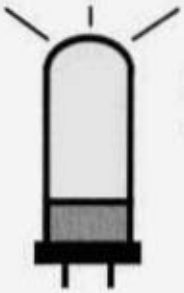

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