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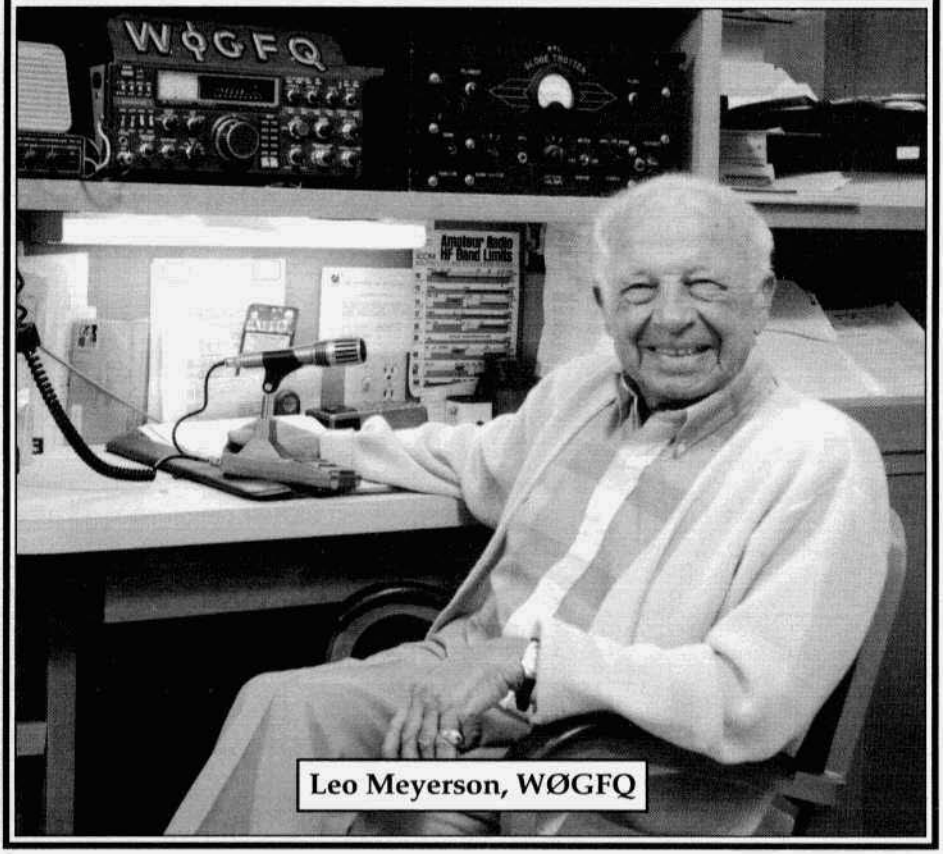
ELECTRIC RADIO

celebrating a bygone era

Number 83 March 1996



Leo Meyerson, WØGFQ

ELECTRIC RADIO

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

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

Regular contributors include:

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

EDITOR'S COMMENTS

When I started Electric Radio almost 7 years ago I made a rule that no one would ever be on the cover twice. I think that was a good rule but this month I decided to break it to celebrate Leo Meyerson's 85th birthday. Leo was also on the cover of ER #2 back in June of 1989. I think we should celebrate our radio pioneers and Leo certainly belongs in that category being the founder of WRL. Coincidentally in this issue we have an article on one of Leo's transmitters, the WRL Globe Champion.

I'm delighted to report that Leo - and his wife Helen - are in excellent health and enjoying life to the fullest. They spend summers in Omaha and winters in Cathedral City, California. Leo is still full of energy and leads a very active life. Last week when I talked with him he was just going out the door to play tennis. How about that!

Leo is also involved with author Jim Musgrove, K5BZH, who is producing a biography of his life. The book will also include a complete rundown on the amateur equipment Leo's companies produced. March 7 was Leo's birthday and we wish him many happy returns of the day.

Our parts directory is in trouble. When I wiped out our last data base we had 270 listings; so far on the new list we have only about 20. I'd like to make another appeal to everyone to put their parts units on the list; it's very important so that we have a source of parts available for restoration and repair. Until we get the list considerably larger, we're not going to charge for it; just remember to send an LSASE.

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Cover: Leo Meyerson, WØGFQ, at his operating position. On March 7 Leo turned 85. He enjoys excellent health - he still plays tennis - and he's as full of energy as he ever was. The rig above his head is a Globe Trotter transmitter; one of the first he manufactured.

Allied Radio Remembered

by Jeff Duntemann, KG7JF
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Back in the early '60's I was a junior high outcast tinkering with electronics, and every three or four weeks I would ask my dad for a check for three or four dollars to send away to Allied Radio for my next fix of electronics parts. The Allied catalog was the dream of all the young nerds in my neighborhood who had't yet discovered (or couldn't get) *Playboy*, and we dreamed endlessly after the Star Roamers and Span Masters that we were unlikely ever to afford until long after we no longer wanted them.

Ordering from Allied was as tricky as it was intoxicating. Each tube socket and ceramic cap had a certain shipping weight, which we were supposed to add up and then calculate postage from a chart according to the total weight of the goodies we wanted. I was always sure I had it figured dead-nuts, but out of a fear of not receiving my parts (and also of being dishonest -- what a concept!) I usually added a little extra. And sure enough, when the parts came, along with them came a little "payable-to-bearer" check for a dime or a quarter or 17 cents. We could deposit those refund checks in our bank accounts (those few of us who had bank accounts) or we could send them in with our next order. Wanna guess what most of us did?

Not long ago, Don Taylor, a friend of mine from Pouslbo, Washington, sent me one of those beautiful little checks that he had discovered among some back-of-the-shelf clutter in his attic closet. Apart from the inevitable staple holes (they were always stapled to the packing list) and what looks like a little splotch of cherry soda, it's completely mint, and I thought perhaps you'd all like to see it. It was printed on watermarked paper by the American Bank Note Company in black with maroon values and OCR figures. In the background in a very light gray is a picture of the main Allied Radio building somewhere on Western Avenue where (despite my living in Chicago all my life until I was 27) I never actually went. Once I have the refund check framed it will have on my wall as reminder that a dime did actually once mean something, and that young boys once cared for something better than mayhem and instantaneous gratification. **ER**

Amplitude Modulation International - March Update

by Dale Gagnon, KW1I, President

AMI Headquarters

Membership stands at over 870 as of the beginning of March. The original printing of 1000 membership certificates is almost exhausted. There is enough in the treasury to cover a reprinting. Many thanks to those who have sent in unsolicited donations.

Ed Sieb, VA3ES has proposed a Canadian AMI region and has volunteered to be its director. His proposal is supported by other Canadian amateurs. The proposal will be forwarded in March to the AMI Board of Directors for approval.

AMI Forum at the Dayton Hamvention

Confirmation has been received from the Hamvention administration that the AM Forum is scheduled at 12:15 PM in Meeting Room 2, on Saturday, May 18, 1996. This is the same larger room that we had last year, but it is one hour earlier. The Hamvention itself has been scheduled one month later this year. AM'ers should also plan to attend the annual pizza party early Saturday evening. Directions will be available at the forum.

The Dayton Amateur Radio Association operates a special event station, W8BI, in a van at the Hamvention. This year the theme of the station will be "Real Radios Glow in the Dark". It is reported that tube-type Collins radios will be in use and will be available for guest use. It seems everybody wants to get in on the classic radio act!

The AM QRP Net

AMI headquarters received a packet of information from Tom Cathay, K1JJ, on the new building and operating craze sweeping the Northeast AM community since January. An AM QRP net is scheduled to begin in the March time frame. These last two months before the first call up has given everyone the opportunity to build a qualifying rig to be ready to check in on the first net meeting. To become an official AM QRP station, one has to build a simple AM transmitter, either Class A running less that one watt or Class B running 1-10 watts. Then make 50 AM contacts with at least 10 of these being other Official QRP Stations (OQS). A review session with a "QRP Elmer" must be accomplished and then you must successfully check into the AM QRP Net using your QRP rig. There are rules that must be followed each time you put a new QRP rig on the air in order for it to be "net certified". A host of awards can be earned with various endorsements for AM QRP accomplishments.

If it sounds like a lot of rules and bureaucracy, it's all for fun and it's having its intended effect. New QRP rigs are coming on the air every day. Some are built on a brand new chassis and others are constructed on an inverted pie tin. The packet of information from Tom includes schematics of several tube based QRP rigs and all the other rules, regulations, awards and technical tips. If you are interested, write to Tom at 90 Windham Rd., Marlborough, CT 06447. Tom can also be reached at k1jj@aol.com

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

WRL Globe Champion Series 300, 300-A, 350

by Capt. Larry Rau, KF6WV
Box 1139
Occidental, CA 95465

Leo Meyerson deserves to be thought of as a living legend. After WW II he brought high quality modern radio parts together in solid, field serviceable designs for American hams hungry for new transmitting equipment.

Drawing on the conservative construction practices of the 1935-45 era WRL Globe gear featured steel cabinets and chassis and conservatively rated components.

During 1956 WRL transmitter styling and construction began to change rapidly under the competitive influence of E.F. Johnson and Heath. Comparing 1956 contemporaries, the robust Globe Scout 65 and the lightweight aluminum Heath DX-35 highlight the trend.

In 1956 the louvered round corner cabinet began to give way to the lighter more modern appearance of the one-piece perforated cabinet in hammertone grey in the same way the rack mount transmitter gave way to the table top unit.

By 1959 WRL cabinets had assumed the low profile "forward look" with polished aluminum panels and knobs.

It was during this 1956 transition period, when the Johnson Valiant and Heath DX-100 first came on the market, that the seldom seen Globe Champion 300 single unit table top transmitter was introduced.

Until that time, the 540 watt Globe King 500 had dominated the market for new high power AM transmitters. The 275 watt Champ was introduced to compete with the 200 watt Valiant, capitalizing on Globe's reputation of providing high power output and distinctive audio.

Costing as much as a new car, Collins and Johnson KW rigs weren't competition for the 650 dollar Globe King. Still all the 500 watt plus phone rigs were part of another world the average ham only saw in magazines but could never afford, much as they are today!

The Champ was designed by Sam Sidoni, designer of the Globe King and Ed Shulman, designer of the Globe Chief. Leo told them he wanted a radio with "low distortion and crisp intelligible response to voice frequencies".

In designing the more affordable 300, Meyerson's team borrowed heavily from the Globe King 500B/C. Whole sections of the design are lifted directly, as are many of the major components of the Champ.

The Audio Section

The entire audio section before the modulation transformer is essentially the same as that of a Globe King 500 B, but with 7 and 9 pin tubes replacing the older octal types. The lineup is the same: a pentode high gain mic amp with hi-Z input drives a triode speech amp working into a tetrode driver which drives push-pull triode modulators through an interstage transformer.

In the 300 the audio tube lineup is 6AU6, 12AX7, 6AQ5 and 809's (811-A's will work), while the 500B uses 6SG7, 6C5, 6L6, and 811-A's.

In both transmitters, audio bandpass is controlled by Centralab PC 81 and PC 91 couplets used as interstage coupling and bypass networks, while a low pass filter is inserted between the speech amp and driver in the Champ but not in the 500B. These couplets are commonly replaced by discrete resistors and ca-

Globe Champion 300

pacitors to modify the audio response. However, couplets with hi-fi characteristics were made, so if anyone finds a source of new couplets, please let me know!

The 6AL5 rectified audio compression feedback loop is identical in the Globe Champ and King.

The Globe Champion series uses push-pull 809 triode modulators, which obtain -8 volts of grid bias form a back-biased diode stack fed through the interstage transformer secondary winding centertap. The Globe King B runs push-pull 811-A's in classic zero bias operation, with the secondary centertap grounded.

Predictably the two radios sound pretty much the same without modification. Audio response rolls off sharply above 3500 cycles and below 200. Both deliver pleasant audio with low distortion tailored to amateur communication needs. As such, Globe audio stands in marked contrast to the two extremes of the 1950's - speech clipping and high fidelity.

The highly efficient but fatiguing speech clipping of the Valiant was derived from the low power AM mobiles of clever but impoverished post-war hams wanting the most talk power possible. AM DX'ers adopted speech clipping techniques quickly.

Hi-fi AM transmitters were (and are) hugely expensive and inefficient ego boxes, that devote much of their considerable power to beautiful bass, at the expense of intelligibility over the long haul. Still, nothing sounds better except wide-band (+ /- 5 kc) FM. Perhaps that is why so many of us impoverished hams embraced FM when $25 taxi radios became available. In the meantime $49.50 down and $22 a month bought you a Globe Champ 350, brand new.

The RF Section

Again the Globe King 500 and the Globe Champion 300 are very similar. The 6AU6 series tuned Clapp VFOs with OA2 voltage regulation are identical, as are the sequential 12AU7 keyers.

In both the VFO is followed by a

continued next page

for Peak Performance Power . . . the

NEW

BANDSWITCHING 10-160 METERS; 350W CW, 275W FONE, 450 W SSB (PEP), WITH 10W EXTERNAL EXCITER

Globe Champion 350

This handsome rig in an all-modern, newly designed cabinet features improved shielding for TVI-prevention and stability, eliminating RF feedback; also filtered and bypassed. High level class B modulation is sustained without usual clipping distortion through use of a commercial type compression circuit. Pi-Network output circuit matches low-SWR antennas, 52-300 ohms. Built-in VFO with improved circuitry for greater stability. Also built-in push-to-talk and antenna changeover relay. New filtered keying circuit virtually eliminates key clicks. Tailored for more "power punch" in the voice frequency range, the new 350 Champ covers most MARS and CAP frequencies. Adjustable bias control for sideband operation. Final tubes of 400 watt power handling capacity are fan air cooled. Single knob bandswitching. Entire unit self-contained in new-type ventilated cabinet. Power reduction to 75 watts makes transmitter available for novice use.

Wired/Tested

Only $49.50 Down

and $28.00 Per Mo.

TUBE LINE-UP FOR THE NEW GLOBE CHAMP 350

AU6 VFO; 6CL6 xtal osc/buffer; 2E26 driver; parallel AX9909 final amplifier tubes; 6AU6 mic. amp.; 6AQ5 driver; 6AL5 compression rectifier; push pull 809 modulators; two OA2 voltage regulators; 5U4GB low voltage rectifier; two 866A high voltage rectifiers.

3 MODE Operation WITH THE GLOBE ELECTRONICS Sidebander DSB-100

BANDSWITCHING 10-80 METERS

AM • CW • AND DOUBLE SIDEBAND

40 WATTS 50 WATTS 100 WATTS (PEP)

Wired & Tested: $149.95

In Kit Form: $119.95

This handsome new transmitter offers all three modes of operation: Sideband, AM and CW. Exclusive automatic balancing and floating grid circuit holds carrier suppression to 55 db or better. Continuous band coverage 3-30mc and 12-30mc, including all popular MARS, CAP and special emergency services. Use very simply with your present AM equipment for sideband, using standard crystals and regular VFO. If one sideband QRM'ed, receiving operator can switch to other. Will drive any of the popular commercial linears. Three stage RF section allows straight through operation for maximum efficiency. Internal tone generator facilitates tuning. Pi-Network output 52-200 ohms. Speech clipping and filtering assures powerful communication punch and minimum band width. 600V power supply has ample reserve for using external accessories (external VFO, VOX, etc. Socket provided on chassis rear apron.) Provisions for Antenna Relay Control. Forward Look Cabinet: 8x14x9". Shpg. wt.: 30 lbs.

KIT: Only $12.00 Down: $7.00 Per Mo.

W/T: Only $15.00 Down: $8.70 Per Mo.

TUBE LINE-UP

Two 6DQ6A Final Amplifiers
6CL6 Buffer Doubler
6CL6 Crystal Oscillator or VFO Doubler
2AX7 Audio Driver Amplifier
12AX7 Speech Amplifier and Driver
6AQ5 Modulator
6AL5 Diode Speech Clipper
5U4GB Rectifier

VOX Model 10

Specially designed for voice operated control of the Sidebander DSB-100 and similar transmitters. Has extra contacts for auxiliary circuits and manual or voice control switch. Simply plug into socket at rear of DSB Xmttr. Kit complete with assembly instructions.

Kit: $9.95 W/T: $29.95

QT-10

Anti-trip unit available as accessory for use with VOX-10. Plugs directly into VOX-10 unit.

Wired: $9.95

A page from the 1960 WRL catalog.

tetrode buffer/crystal oscillator and a pentode driver whose plate tank doubles as the grid tank of the final amplifier (PA)

The VFO operates on fundamental freqs of 1.8 and 7 Mc with multiplication occurring in the driver on 80, 20, 15 or 10 meters.

The RF tube lineup is 6CL6, 2E26, AX-9909/6083 in the Champ, and 6AG7, 6146, 4-250 (or 4-400) in the King.

While the VFOs are identical, the King's hateful 3 knob bandswitching has been ganged onto a single shaft in the 300 series, so that the coil taps of the PA, VFO and the osc/buffer/driver sections are all selected simultaneously.

In the Champ, 90-degree bevel gears drive the vertical shaft of the VFO's internal coil selector switch from the horizontal bandswitch shaft. This same arrangement shows up in the Johnson Ranger, and in modified form as a cog and cam arrangement in the Heath DX-100.

Who did it first?

Many major components are shared by the Champ and the B/C model Kings. The silver plated tank coil and the copper 10 meter tank coil in the Champ appear to be the same as those used in the King at twice the power.

The E.F. Johnson variable transmitting capacitor used as a plate loading cap in the 500 appear as the plate loading cap in the 300 where the B+ is 950V instead of 1850V, and the power level is 200 watts rather than 350.

A list of the parts used in the Globe Champ reads like a Who's Who's of the best American radio parts available: Sprague, E.F. Johnson, Centralab, Cornel Dubilier, Advance Relay, Potter & Brumfield, Allen Bradley, Amperex, etc.

Leo Meyerson ordered these parts in huge lots from the manufacturers. A typical order of 1000 4-250s made WRL Eimac's biggest civilian customer. Occassionally these standard parts were purchased as industrial surplus or manufacturing over-runs, to keep costs down.

While the choice of AX-9909 and V-70D finals in the Globe Champ 300 and Globe King 400 has made finding replacement finals famously difficult, those tubes represented the best available technology when the radios were made. Despite the rarity of these tubes today, or perhaps because of it, these radios are worthy of restoration, and when necessary, nondestructive modification.

The Power Supply

There are strong differences in the power supply arrangements, despite obvious similarities.

WRL achieved major savings by reducing the number of power supplies from 4 in the Globe King B to 2 in the Globe Champion series.

The 300's and 350's use a common 1000 volt high B + supply for both the final amplifier and the modulator. This is common practice in smaller transmitters, unlike the Globe King with its 1850V B+ supply for the PA, and a separate 100V plate supply just for the modulator.

In the Champ series, low B+ for audio, oscillator/driver, and PA screen voltages all come from a single winding in a common supply using a 5U4.

In the Globe King 500B, a 6X5 supplies power only to the buffer and keyer with a separate 400V winding and 5Y3 for the PA screen grid, while yet another supply provides 520 volts just for the 6146 driver! Low B+ and screen voltages are 300/250 in the Champ series and 500/300/400 in the King B.

In the 500B the modulator has its own power supply using 816 rectifiers and yet another power supply using a 5Y3 for the low level audio B+.

866's are used as the PA B+ rectifiers in both transmitter series. The Champ transmitters use dropping resistors to obtain PA screen voltage, while the screen modulation necessary to main-

continued next page

tain linearity in plate modulated tetrodes is provided through a high-Z choke in the screen line in both transmitters.

Model Changes

In the 300-A of 1958, the OA2/OB2 string regulating the PA screen voltage was replaced by a dropping resistor. Screen regulation was touted in the 300 manual as prolonging tube life and stability. No mention of this is made in subsequent manuals.

A .005 cap is connected to ground from a buffer tank coil, a key click or shaping filter consisting of two .1 mFd caps and a 47K resistor are added to the keying circuit, and a nicer wiring harness and relays supplant those used in the 300.

WRL had become Globe Electronics by September 1958, when my 300-A was made, and the panel has the revised Globe logo, but was still supplied with a WRL manual.

Transmitter input ratings of the A model are increased to 350 watts CW from 300, and to 500 PEP as a SSB linear from 300. The AM input rating remains at 275 watts (equivalent to about 1000 watts PEP!) Eugene Rippen in his tube-type transmitter guide lists the Globe Champ 350 as having ratings identical to the original 300, e.g. with SSB PEP ratings of only 300 watts input. I don't have the 350 manual to confirm this yet, but 350 ads list the SSB PEP input as 500 watts.

Operating The Globe Champ

In operation the Globe Champ 300 and 300-A are identical. They are straightforward and well-behaved when fed an adequate amount of electricity. This transmitter will draw 800 watts and requires a 15 amp circuit with little voltage drop if annoying carrier shift is to be avoided.

Tuning controls are smooth in a well maintained radio. Drive, dip and modulator currents will be as described in the manual, and tune-up is uneventful. Pay attention to the position of the driver knob, to avoid unwanted doubling. Everything is rugged and overrated at this power level, and even a ham-handed operator will have trouble doing any damage, especially in the tune mode.

The transmitter will load the wide range of impedances typical of a Pi network: 50-600 ohms on 80-10 and 300-600 ohms on 160. Any decent tuner will provide a match at least that good on 160, and the short length of coax between your rig and tuner will be too stupid to complain as long as the antenna accepts power.

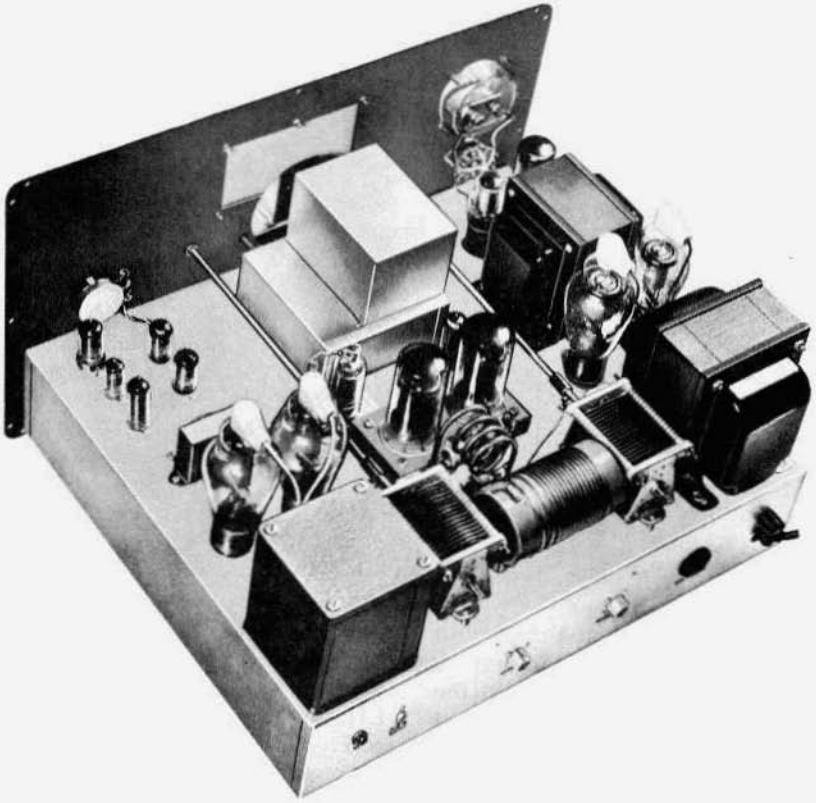
At resonance, plate current should be 275-290 mA indicated. This is an input of (950X.275) 261 watts. With 70% efficiency output is 182 watts. Nothing is working very hard at this level.

The modulator is capable of much more than 100% modulation, so there should be adequate headroom to obtain some really nice audio at modest gain settings, especially using 811A's or Svetlana SV 572s for you Hi-Fi buffs.

VFO temperature stability is better than my Ranger II after a half hour warm-up, and mechanical stability and microphonics are far better than with my DX-100.

Amperex did not rate the AX-9909/6083 for linear service in its tube data sheets. However in SSB linear operation, the Champ manual's tune-up procedure calls for a peak plate current of 300 mA with single tone mod or about 300 watts input. This is only 75% of the maximum plate current allowed in class C CW, in continuous commercial service!

However, under voice-modulated conditions, and given meter ballistics, 300 mA indicated peaks probably corresponds to an instantaneous peak envelope power closer to 1000 watts input than 500. If you choose to use the Champ in SSB mode, as a grid driven linear amplifier, be careful!



Inside top view of chassis (RF shield removed for full view)

Restoring The Champ 300-A

After a thorough cleaning with detergent and warm water, rinsing and drying, then recleaning the chassis with rubbing alcohol, the piece was thoroughly dried under a lamp. Switches, tube pins and sockets, relay contacts, and pots were all cleaned with De-oxit D5. Shaft bezels and gears were lightly lubricated, and gear alignment optimized.

Every paper and electrolytic capacitor was replaced. Micas, ceramic discs and oil filled caps were left alone unless damaged; none was. Audio plate load resistors were replaced with hand-picked units. Tubes were tested, and modulator tubes closely matched.

The transmitter was "run" in standby mode for several hours (no B+). This throughly dries any trapped moisture from storage, especially in transformers. Low B+ was applied and after a general smoke check, drive was adjusted, VFO tracking and calibration set, low B+, modulator bias and screen voltage were checked (I'm not brave.)

Do not key the Champ with the 866's removed! Doing so will blow the screens out of your AX-9909's!

Filament voltage and low B+ were measured and recorded. No hot transformers, chokes or resistors were found.

With dummy load, monitor scope and wattmeter connected, low-power tune-up was accomplished without incident.

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A 1927 Hartley Oscillator

Part 2. The Transmitter and Power Supply

Bob Dennison, W2HBE
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Westmont, NJ 08108

Synopsis

Part 1 of this article told about the AWA's 1929 QSO Party, its rules, the types of self-excited oscillators employed and the results you can expect if you enter this exciting and fun-filled contest. What follows is a description of the 1927 Hartley oscillator I used in last November's 1929 QSO Party.

The '27 is a 1927 Tube

In 1984 I built a Hartley oscillator using a type 10 tube. It worked well and was used in nine of the AWA contests. In October 1985, I began to think about building a new rig which might induce some of the ER gang to get into the AWA's 1929 QSO Party. After several false starts, I hit on the idea of using a type 27 tube. It is a 1927 tube, widely available at low cost. But would it be able to handle the job? A breadboard version quickly proved that it would indeed do a fine job.

The '27 Hartley

The complete circuit of the '27 Hartley transmitter is shown in Figure 1. In the standard Hartley circuit, the filament (or cathode) is at ground RF potential making it necessary to insulate the rotor of the tuning condenser. But here I have shifted the ground connection so that the rotors of the tuning condensers (C1, C2, C3) can be grounded directly to the chassis. This required the addition of RFC1. I used a 50 uH choke that was in my junkbox. This choke must be able to carry the 1.75 amp filament current without dropping the filament voltage more than about 0.1 volt. A good choice is the Miller No. 5248 hash choke (68 uH, .054 ohms) available from Mouser Electronics as their 542-5248.

I chose the tank circuit constants so that the dial would read directly in kHz. The Kurz Kasch dial reads 0-100 and this corresponds to 3500-3600 kHz. The Hammarlund band-spread tuning condenser, C2, has a capacitance range of 5-20 pF. This then calls for an inductance of 7.55 uH - see ER #65, Sept. 1994, pg. 29, for the formula. My junk box provided an old B&W 40 JEL 75-watt transmitting coil. The base and link were discarded. When cut down to 15-1/4 turns, this coil measured 7.55 uH. Coil L1 is mounted on a lucite plate as shown in Figure 2. A 3-1/2 turn link, L2, is arranged so that a 180° turn of the 'LOAD' control knob varies the coupling from zero to maximum. Band-set condenser C1 is set once and can then be forgotten. At first, I put a shaft lock on C1 but tightening it produced a small change in frequency so the locking device was removed. A small condenser, C3, permits quick and easy recalibration if this becomes necessary due to changes in antenna loading.

The adjustable link, L2, is shown in Figure 2. The end of the fiber shaft, to which the link coil assembly is attached, is cut at a 45° angle. Thus a 180° rotation of the shaft varies coupling from zero to maximum. If this is a little difficult to visualize, cut the end of a short piece of 1/4" dowel rod at 45° and glue a 1-1/4" disc of paper to this angled end. Hold this above Figure 2 and observe what happens as you rotate the shaft.

Front view of the '27 Hartley

The loading coil shaft is supported by a bracket on which a piece of spring wire provides friction to hold the proper adjustment when found. Not shown on Figure 2 is the panel bearing through which the shaft passes, two washers placed on the shaft between the bearing and the LOAD knob and a hub or collar with setscrew next to the back side of the panel bearing. These serve to prevent axial movement of the shaft. The output leads connecting to L2 are made from an old Radio Shack clip lead consisting of eight strands of untinned No. 37 wire, equivalent to No. 28 but much more flexible.

Normally, the loading is set to give three-watt output as indicated on the SWR/PWR meter in my Kenwood AT-200 antenna tuner. Once this setting is found, it needs no further adjustment. Thus, if the builder desires, he could use a simpler coupling system. For example, the coupling link could be made of stiff wire which, when correctly positioned, will remain in the desired position. NOTE: A change in loading will usually affect the frequency so final adjustment of C1 should be made after the desired loading is obtained.

Spotting

Spotting is controlled by switch S1. Section A connects the oscillator to a 50 ohm dummy load, section B turns on the power supply and section C reduces the power to make exact zero beating easier. As shown in Figure 1, it is still necessary to depress the key to turn the oscillator on. Alternatively, one could use a 4 pole-2 position switch at S1 with section D used to short the key jack, J1.

If your antenna coupler is properly adjusted (SWR=1) so that the Hartley oscillator 'sees' a true resistive 50-ohm load, then the zeroed frequency will be very nearly equal to the SEND fre-

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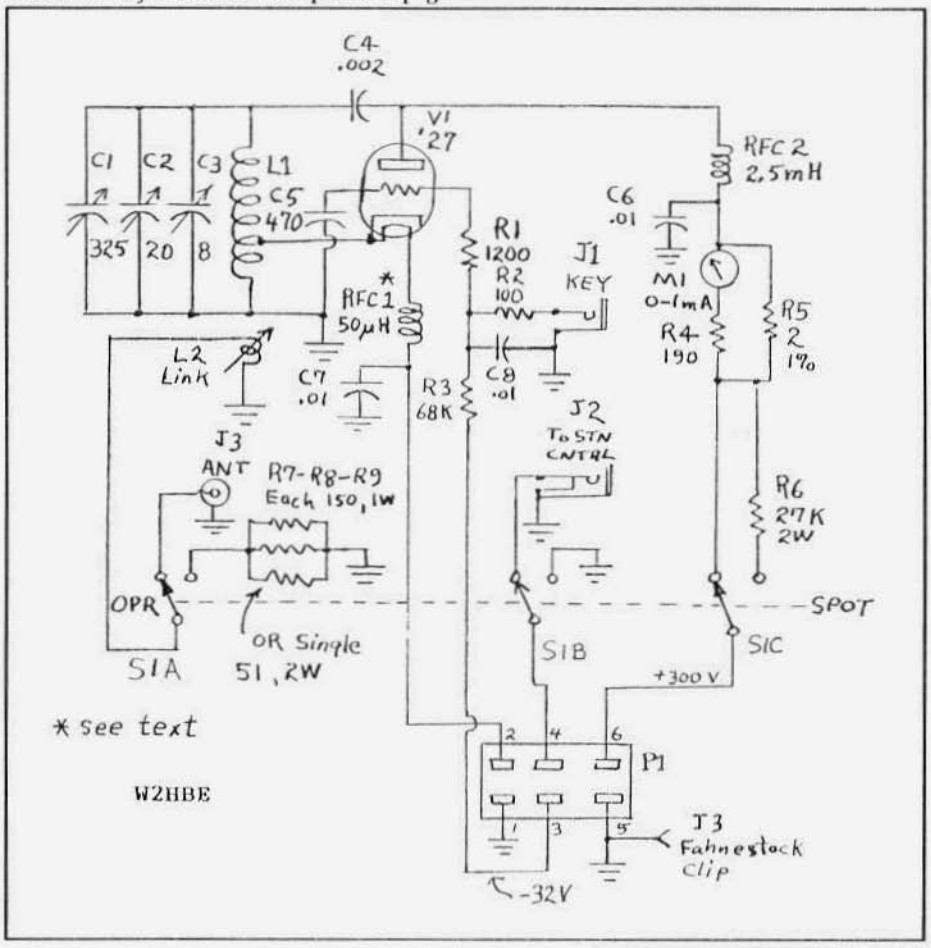


Figure 1. Wiring diagram of the 1927 Hartley oscillator.

quency. If you don't achieve such a match, these frequencies could be several kHz apart. Another point to keep in mind is that lowering the plate voltage by means of R6 can also affect the 'zero' frequency so be sure to check this out.

Since C1 is rather large, it is difficult to set it precisely at the right value; e.g., to make 3585 kHz occur exactly at 85 on the dial. This is where C3 comes in handy. It eases the final, exact calibration. Now, if you hear a CQ (actually he will be sending CQ AWA or simply 'AWA') at 3589 kHz, you can quickly set your Hartley to this frequency (dial at 89) thus increasing the likelihood of his hearing you.

Power Supply

Almost any power supply that will give about 300 volts will suffice. In addition, you will need 30 to 45 volts bias if you use blocked-grid keying and, of course, 2.5 volts for the filament of the '27 tube. A schematic of my power supply is shown in Figure 3. To reduce the possibility of keying chirps, the power supply should have good voltage regulation. For this reason, I used silicon diodes rather than a vacuum tube rectifier. A type 80 would be a good 1927 tube but it would waste power and impair regulation. An oversize choke at L1 and a 15K bleeder, R1, also help to

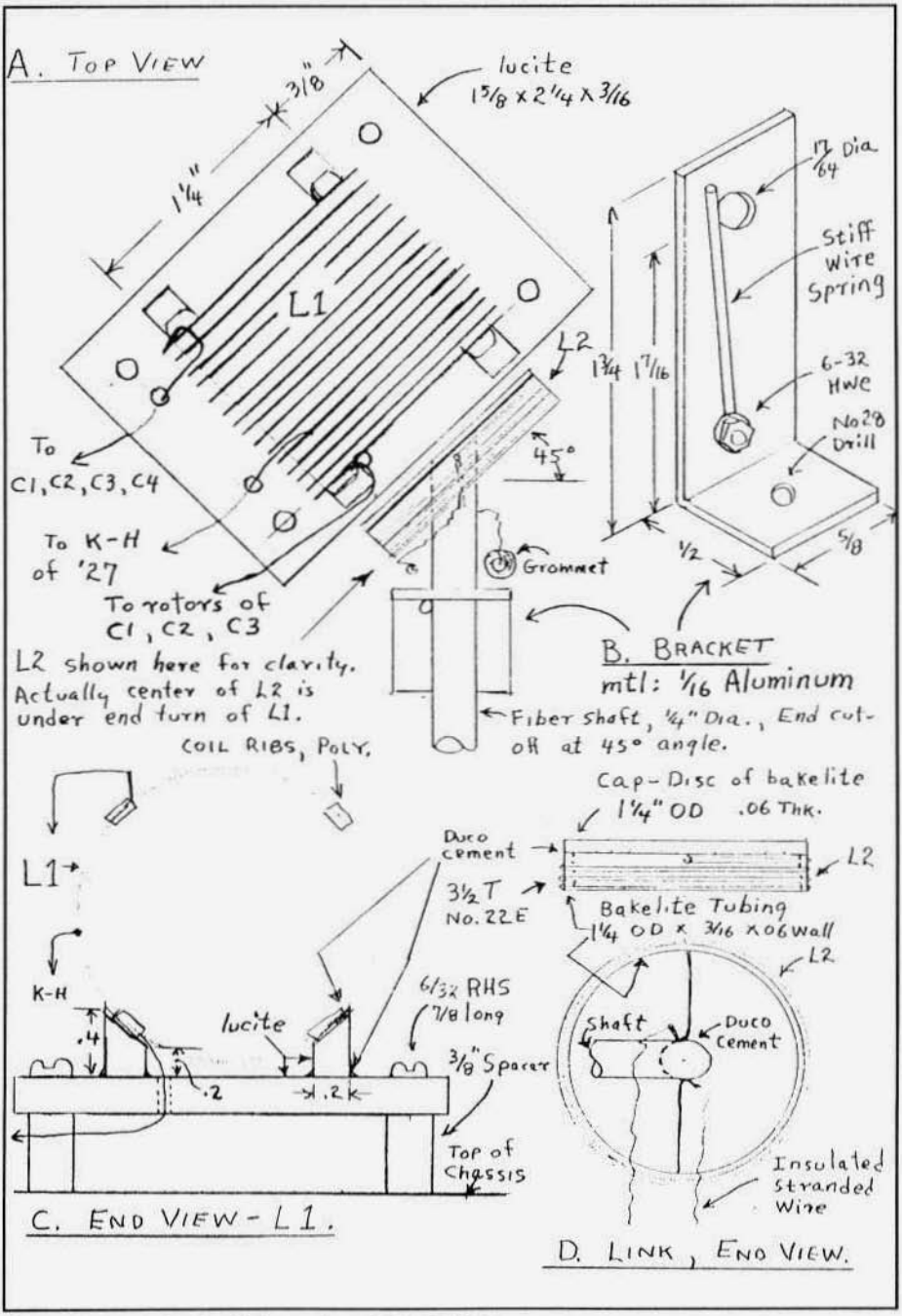


Figure 2. Details of coil L2 and variable link L2.

continued next page

A 1927 Hartley Oscillator from previous page

Rear view of the '27 Hartley

improve regulation. With the filtering provided by L1-C1, most signal reports have been T7. Remember, in this contest, a T9 signal marks you as a sissy!

The unused 5V and 6.3V windings are connected in series-aiding and applied to a voltage doubler to secure the blocking bias of approximately -33 volts.

Switch S3, labeled REMOTE CONTROL, allows the B+ to be turned on by a remote SEND-RECEIVE switch. At my station, this switch also turns on the receiver B+ ON or OFF and connects the antenna to either the receiver or the transmitter. Note that the switch S1-B on the Hartley can turn on the power supply B+ in SPOT mode even when the Station Control switch is in the receive position.

The power supply was built on a 5x7x3 aluminum chassis. Parts used in the bias rectifier were mounted on a piece of perfboard. Two nylon tip jacks are provided to allow checking the B+ and bias voltages. Switch S3 and Jack J1 are located on the rear chassis apron.

Operation and Results

I increase loading until plate current is about 31 mA. At this load, the power supply voltage drops to 290 volts (300 volts at no load) so power input is about nine watts. Power output is 3 watts. Efficiency is 33%, which could be improved a little bit by using a higher Q tank.

In the 1995 QSO Party, I worked 27 stations in 11 states including IN, OH, MA, NC and GA. Propagation and radio conditions were bad but even so I received good RST reports most of the

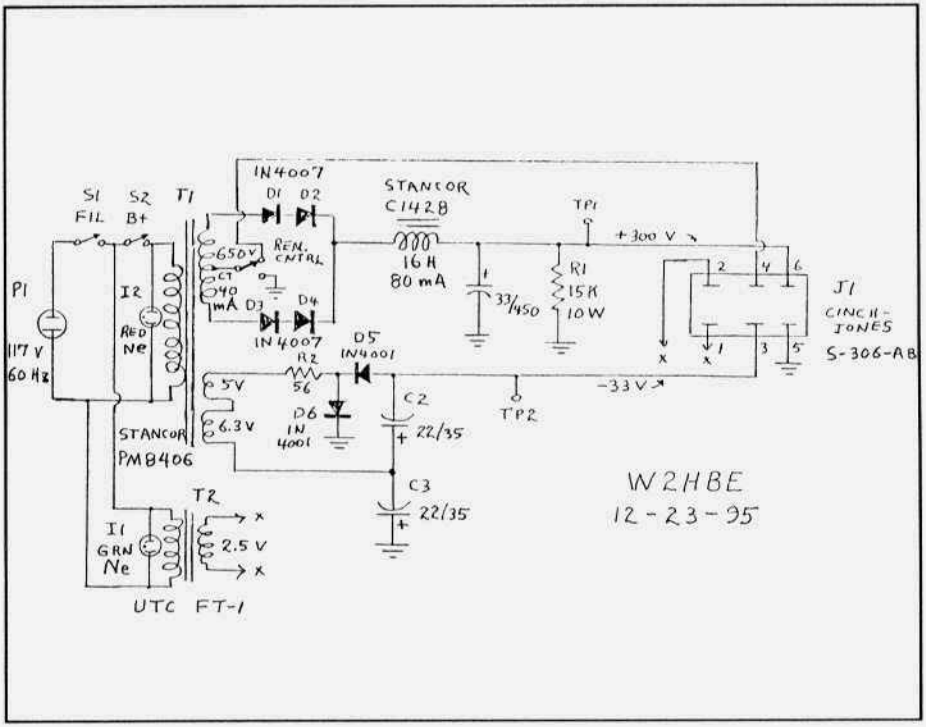


Figure 3. Power supply used with the '27 Hartley oscillator.

time. What it boils down to is this, you can work a lot of stations in this contest, even with low power, because all the other contestants want to work you - they want the points!

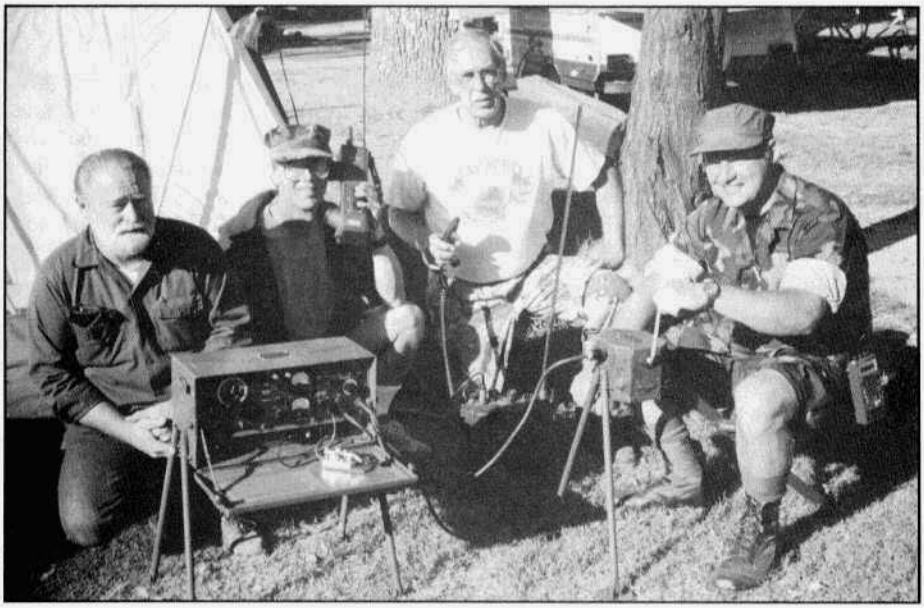
So if you want to see what great fun the old timers enjoyed, build a self-excited oscillator and join AWA. I hope to work you in the next AWA contest! ER

NOTE: If you want to join AWA, write to Joyce Peckham, Box E, Breesport, NY 14816. Dues are $15 per year.

WE WERE "BROWSING" IN THE RADIO STORE NEXT DOOR WHEN WE DECIDED OUR BUDGET IS MORE SUITED TO DIAMOND RINGS!

Colorado AM Morning Net members at the recent Loveland, Colo. hamfest. Front Row L to R: OJ, KØOJ; Fred, KFØOW; Walt, KØTSI; one of Marty's boys; Scott, KGØMR. Back Row L to R: Horst, WAØNUH; George, WØLOB; George, K7DU; Hank, WØAEE; Larry, KGØPJ; John, NØGII; Marty, KGØKO; Mike, WAØZOZ

Paul Vandenberg, K5HMN, in his hamshack. He is the most active AM'er in New Mexico. He operates mainly on 160 and 80 Meters.



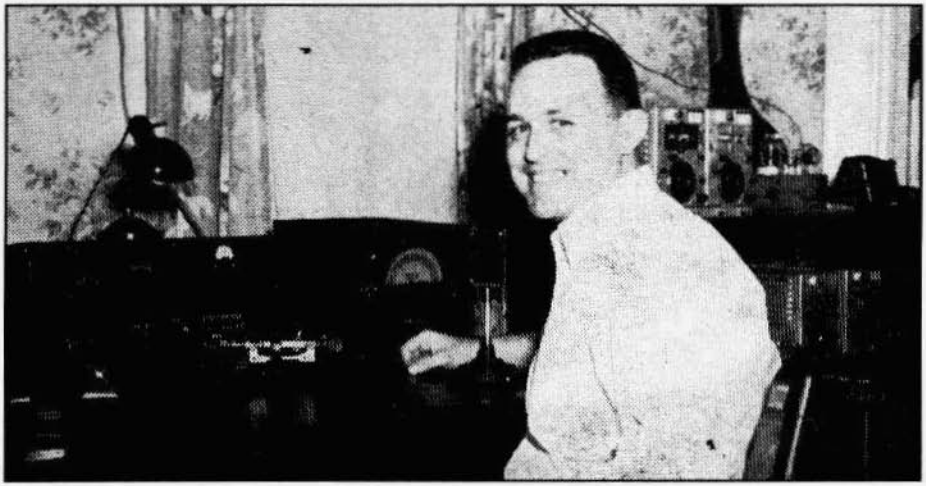
California Military Vehicle Collectors meet, Wooden Bridge Resort, Calif., September 1995. L to R: Tom Horsfall, WA6OPE; Richard Mollberg, KD6KWH; Henry Engstrom, KD6KWH and Vern Haik, KJ6OG The set pictured is Henry Engstrom's SCR-288 (BC-474) WW II field set, complete and operating.

Jerry Fuller, W6JRY, at his AM operating position; Desk KW, HQ-129X and Viking II.

VHF AM - Alive and Well in Tucson Area

Bill Braden, WC7O, well-known Arizona AM'er, reports that VHF AM is alive and well in the Tucson/Phoenix areas. In Phoenix the VHF AM'ers have a regular net Thursday evenings at 8 o'clock. A 6-meter net was established in the Tucson area several years ago; it's on Saturday nights at 8 o'clock There are usually 8 or sometimes 10 or more checkins. Sometimes when the band is open AM'ers from other states will check in. Bill has a sure-fire indicator of good conditions on 6 meters. When Rosie obersves skip on Channel 2 she tells Bill (he never watches TV) and he knows it's a good time to get on 6 and call CQ.

Bill Braden, WC7O, and XYL Rosie, KC7NL, in his present-day hamshack.



From the June, 1949, edition of *CQ* - "Organizer of the Oklahoma 50-mc net, Bill Braden, W5LEI of Tulsa. Bill uses an 829B."

VINTAGE NETS

Westcoast AM Net: Meets informally, nightly on 3870 at 9:30 PT. Wednesday at 9:00 PM PT they have their formal AM net which includes a swap session. Net control rotates.
California Early Bird Net: Wednesday nights at 8 PM PT on 3835.
Southeast Swap Net: Tuesday nights at 7:30 ET on 3885. Net control is Andy, WA4KCY. This same group also has a Sunday afternoon net on 3885 at 2 PM ET.
Eastern AM Swap Net: Thursday evenings on 3885 at 7:30 ET. This net is for the exchange of AM related equipment only.
Northwest AM Net: AM activity daily 3 PM - 5 PM on 3875. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT. The formal AM net and swap session is on 3875, Sundays at 3 PM.
K6HQI Memorial Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 5:00 PM PT, 7 days a week and usually goes for about 2 hours. Net control varies with propagation.
Arizona AM Net: Meets Sundays at 3 PM MT on 3855. On 6 meters (50.4) this group meets at 8 PM MT Saturdays.
Colorado Morning Net: An informal group of AM'ers get together on 3808 Monday, Wednesday and Friday mornings at 7AM MT.
DX-60 Net: This net meets on 7290 at 2 PM ET, Sundays. Net control is Jim, N8LUV. This net is all about entry-level AM rigs like the Heath DX-60.
Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is usually Walt, KJ4KV, but sometimes it rotates to other ops. It starts at 5 AM ET Saturday mornings on 3885.
Westcoast Military Radio Collectors Net: Meets Fri. at 2200 local on 3990 and Sat. at 0800 local on 3990 + or - QRM. Net control is Tom, WA6OPE or Andy, KD6TKX.
Grey Hair Net: The oldest (or one of the oldest) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8 PM in the winter and 9 PM ET in the summer.
Vintage CW Net: For CW ops who enjoy using vintage equipment. This is not a traffic net; speed is not important. The net meets on 14.050, Saturdays at 1 PM PT. Net control is Tracy, WB6TMY.
Vintage SSB Net: Net control is Chuck, N5SWO. The group meets on 14.293 at 1 PM CT, Sunday afternoons.
Collins Collectors Association Nets: Technical and swap session each Sunday, 14.263 MHz, 2000Z, is a long-established net run by call areas. Informal ragchew nets meet at 0100Z Tuesday nights on 3875 and on Thursday nights on 3805.
Drake Users Net: Another relatively new net. This group gets together on 3865 Saturday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, WZ8O; Rob, KE3EE and Huey, KD3UI.
Heath Users Net: A new net started by Marty, WB2FOU/5. Net control is shared by Fred, AA5LW. It meets on 14.275 at 4 PM CT Sundays. Check in on either AM or SSB.
Swan Users Net: This group meets on 14.250 Sunday afternoons at 4 PM CT. The net control is usually Dean, WA9AZK.
Nostalgia/Hi-Fi Net: Meets on Fridays at 7 PM PT on 1930. This net was started in 1978.
K1JCL 6-Meter AM Repeater: Located in Connecticut it operates on 50.4 in and 50.5 out.
JA AM Net: 14.190 at 0100 UTC, Saturdays and Sundays. Stan Tajima, JA1DNQ is net control.
Fort Wayne Area 6-Meter AM Net: Meets nightly at 7 PM ET on 50.58 MHz. This net has been meeting since the late '50's. Most members are using vintage or homebrew gear.
Southern California Sunday Night 6 Meter AM Net: 8 PM Sundays on 50.4. Net controls are Dan, KV6I and Scott, K6PYP. Informal, supports restoring old gear and using it on the air. Loan gear available for those wanting to join in.
Westcoast 40-Meter Sunday Net: Net control varies. The group meets on 7160 starting at 4PM PT.
Collins Swap and Shop Net: Meets every Tuesday at 8PM EST on 3955. Net control is Ed, WA3AMJ.

Military Gets AM Advice From Hams

by Paul S. Courson, WA3VJB
P.O. Box 73
West Friendship, MD 21794

Tactical Broadcast Station Tested

(Ft. Meade, Maryland) - Some dreams became reality for a group of vintage radio hams in Maryland who were invited to help the U.S. Army prepare a portable broadcast station for deployment to Bosnia.

The 5 kW station was temporarily established on 1670 kHz, which is a frequency in the new part of the AM broadcast band that now extends to 1710 kHz.

Transmissions from the station were part of an Army effort to predict the likely coverage area when the station is set up soon on 1143 kHz in the Bosnian city of Tuzla for the entertainment of American troops.

Prominent AM-ers Fred Cresce, KC4MOP; Steve Ickes, WB3HUZ; and your author, Paul Courson, WA3VJB, brought their expertise from running hi-fi AM on 160 and 75 to help the Army accomplish its mission.

Combining Work and Play

The group found it easy to accept the chore of running for a few hours an experimental 5000 watt hi-fidelity AM station parked on an unoccupied frequency where thousands of people might be listening.

Indeed, it was also easy to take on the additional mandates of playing music, taking telephoned listener reception reports, and delivering a careful analysis of the station systems.

So on the air went the "Fred Flintstone" show with his trusty sidekick Steve "The Huz Man."

Opening The Door

It wasn't as if the Army posted a "Help Wanted" ad to draw some volunteers. Instead, a combination of luck, timing and background credentials opened the door to this rare opportunity for civilian outsiders.

Paul "discovered" the station and alerted the group one afternoon as he casually tuned for the sole known occupant of the expanded band - a station that went on the air this past November as WJDM on 1660 kHz from New Jersey.

But he also found a strapping, unfamiliar station on 1670 kHz and thought it was a bootleg operator - especially knowing that pirate stations have appeared just above the traditional top of the AM broadcast band.

A call to the phone number announced by the station confirmed that it was a legitimate, experimental broadcast. Station manager, Don Brown, explained the mission. He then heard about our group's use of AM on the short-wave ham bands.

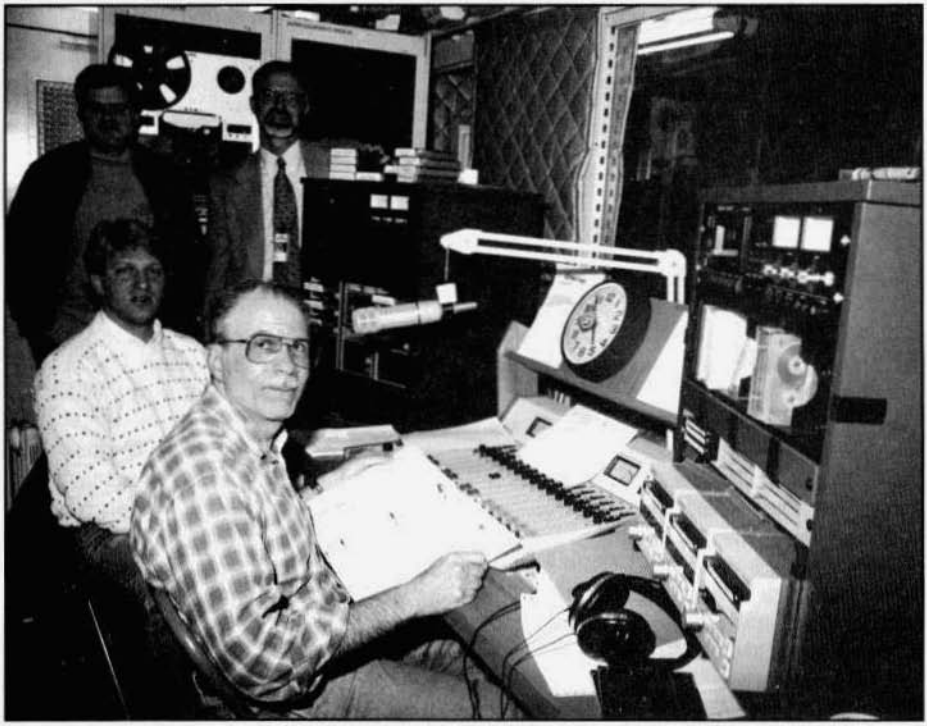
From that it made sense to all concerned that there was common ground and interest in joining forces for the Army's project.

Instant Feedback: Reception Reports

Steve manned the phones and Fred did an "air shift" as a ham-turned deejay. Callers seemed to really enjoy the exotic, if unpolished station they too had discovered.

About 40 calls came in during their stint, from points as far away as California and as noteworthy as four FCC monitoring stations!

In the four days the station was on the air, listeners in most states and a few foreign countries would report having heard the experimental broadcast.



AM'ers invade the Army: Foregroud Fred Cresce, KC4MOP; sitting next to him Steve Ickes, WB3HUZ; in the rear Ken Moffatt, N3EAR on the left and the author Paul Courson, WA3VJB.

Identity Crisis

The station first went on the air using the logo "K-Truck: Kilo Tango Romeo Kilo!" which conveyed the idea of a portable, truck-mounted radio station.

But it turns out a television station in Houston has the official call letters KTRK, so it was quickly decided to instead use the handle "ABS Army Radio."

Some callers openly questioned the authority of the station - perhaps because nothing quite like this had ever been heard before. Many suspected, as Paul did, that it was a pirate.

Don Brown, the station manager, acknowledged this was the first such experiment of its kind. It was not widely publicized in advance. And, as with the KTRK issue, not everything went as planned.

Spreading the Word

A variety of electronic bulletin boards alerted broadcast band enthusiasts, short-wave buffs and mainstream amateurs that the station was on the air promising to verify reception reports.

The ARRL bulletin station W1AW put out a special broadcast naming Steve and Fred as among the people manning the Army's experimental transmitter.

And Paul interviewed and tape recorded a segment with Don Brown explaining "K-Truck", which aired for the AM Community on both 75 and 160 meters.

Mission Accomplished

The Army's project offered the best of a "Field Day" mentality combined with the vintage radio specialty using AM.

A historical point: Steve and Paul were among the organizers of the 1993

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Radiotelephony *Before* Vacuum Tubes

by John Staples, W6BM
732 Cragmont
Berkeley, CA 94708

You are a Naval radio operator on watch Christmas Eve, 1906 just off the coast of Boston. Listening to the crackle of the spark transmitter in your headphones, suddenly you hear a violin in your headphones, and then a phonograph recording of Handel's Largo. You've just heard the first public demonstration of AM broadcasting, from Brant Rock, Massachusetts, conducted by R.A. Fessenden with an Alexanderson alternator running about 50 watts output at 76 kc. Three years later, Charles "Doc" Herrold begins regularly scheduled musical broadcasting from Herrold's School of Radio every Wednesday evening in San Jose, California with an arc-based radiotelephone transmitter. Radiotelephony, or just plain AM radio was demonstrated as early as 1900, before the invention of the vacuum tube. How did they do it?

The convergence of three developments opened the era of AM radio communications: the generation of the steady carrier, the ability to modulate the carrier and the availability of a suitable detector at the receiver. All this preceded De Forest's first demonstration of the vacuum tube triode in 1906, and it took ten years after that to develop circuits to generate RF energy with vacuum tubes.

The first development towards AM transmission was the development of a suitable source of a steady carrier.

Spark transmitters, used from before the turn of the century for CW transmission, evolved from simple spark gaps with a raspy sound to more sophisticated rotary gaps which produced a musical tone in the receiver. Each spark discharge produced a rapidly decaying pulse of RF whose frequency was determined by the resonance of the antenna, or by tuned circuits in the transmitter. The bandwidth of the transmissions was governed by the speed of the decay of the spark (the decrement): the faster the decrement, the wider the signal. Your lamp dimmer produces a similar signal which usually blankets most of the ham bands. Imagine trying to amplitude modulate that signal with audio!

The arc transmitter overcomes the limitation of the spark transmitter and generates a steady carrier. The steady arc discharge exhibits a "negative resistance" characteristic: as the current through the arc increases, the voltage across the arc decreases to the point where the arc saturates. This negative resistance characteristic is the reason your fluorescent lamp needs a ballast to limit the current, and can be used to produce oscillations in a tuned circuit the same way a modern tunnel diode does, which also exhibits a negative resistance characteristic. Elihu Thompson first noticed in 1892 that an arc could be made to generate persistent oscillations if it were immersed in a magnetic field. Later, in 1900, William Duddel noticed that the addition of a tuned circuit would make the arc "sing" in the audio range, Vlademar Poulsen found that instead of discharging the arc in air, a hydrogen or a hydrocarbon atmosphere significantly increased both the frequency and power of the output of the arc.

Figure 1 shows the circuit of a basic arc transmitter. Current from a DC generator first goes through the windings of the electromagnet that contains the

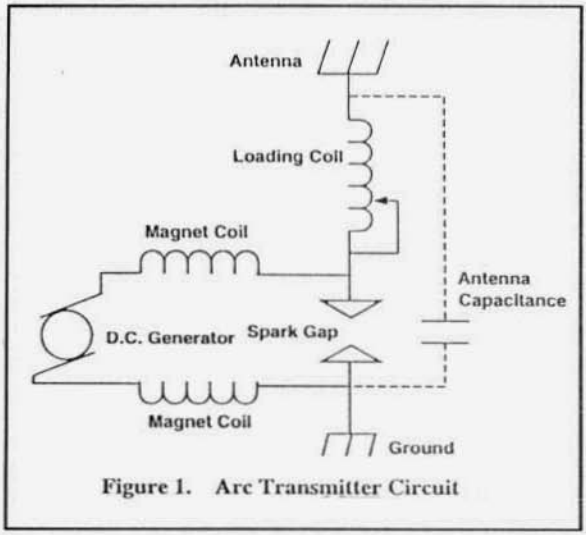

Figure 1. Arc Transmitter Circuit

arc, and which also acts as an RF choke, isolating the RF from the DC generator. The tuned circuit across the arc determines its oscillation frequency, which can range from tens of kilocycles to up to about a megacycle. The arc cannot be keyed on-and-off like a spark transmitter, so frequency-shift keying is used for telegraphy, with the key connected across a few turns of the resonating coil.

Arc transmitter powers range from 2 up to a maximum of 1000 KW. Cyril Elwell commercialized Poulsen's invention in the United States in a company that eventually became the Federal Telegraph Corporation. (Later, as business dwindled, one of the large arc converter magnets became part of E.O. Lawrence's newly-invented cyclotron, which brought him the Nobel prize.)

A high-frequency rotating-pole AC generator, or alternator can also generate a steady carrier. High frequency generators were not new. Frequencies higher than 60 cycles/second were already in use for house lighting circuits. Thompson in 1889 and Tesla in 1890 had already constructed generators generating AC above 15 kc to move the buzz of arc lights to above audibility.

Reginald Fessenden, after inventing the heterodyne receiver in 1901 that used a small arc transmitter as the local oscillator, turned his attention to development of a high-frequency generator. Encouraged by Charles Steinmetz at General Electric, Fessenden, largely with his own money, fostered the high-frequency, high-powered alternator. Ernest Alexanderson, a young engineer at GE, 12 years Fessenden's junior, was assigned the job of engineering the high-frequency alternator to Fessenden's specifications. Aiming at a frequency of 100 kc, an early model, used at the Brant Rock demonstration in 1906, fell short of that goal, operating at 76 kc with an output power of 50 watts. The low-efficiency antenna radiated only 12 watts, which seems to have been received at Machrihanish, Scotland.

The Alexanderson alternator has a stationary armature with coils biased with a DC field. The disk-like rotating element has a thin rim and a much thicker hub to withstand the considerable centrifugal forces caused by the high rotational speeds of up to 20,000 RPM. The rotating disk is provided with narrow slots around its periphery which interrupt the magnetic circuit up to 100,000 times a second. Lower frequency machines were produced that generated up to 200 KW of power 15 to 20 kc. The rotor would occasionally explode at these high speeds, so the alternators would sometimes be surrounded by sandbags. An operator would have to adjust the gap spacing with the generator at full speed, an unwelcome assignment!

The Goldschmidt alternator presents another approach of generating steady carriers with rotating machinery and

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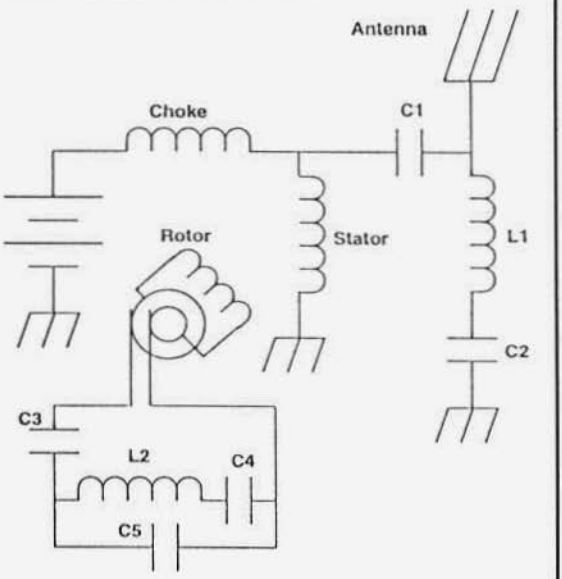


Figure 2. Goldschmidt Generator

operates at a lower revolution frequency. Here, the high frequency is generated by an interplay between rotating armature coils, tuned to a subharmonic of the generated frequency, and a fixed stator. The stator is provided with a DC bias, which induces a voltage on the rotating coils in the secondary. The secondary is coupled, via slip rings, to a tuned circuit which produces a relatively higher frequency of oscillation in the secondary circuit. This high frequency oscillation, coupled with the physical rotation of the rotor, induces a still higher frequency of oscillation in the fixed stator circuit, which is coupled to a second tuned circuit, as shown in Figure 2. A complex set of tuned circuits generates the frequencies f, 2f, 3f and 4f. Only the fourth harmonic, 4f, is present at the output terminals, the power at the other frequencies cancelling itself at the output. Goldschmidt generators have produced power to 150 KW at frequencies to 45 to 60 kc while spinning at only 3100 RPM for the 150 KW unit to 8000 RPM for smaller, higher-frequency units.

Increasing the transmitted frequency can also be accomplished with saturable-reactor frequency doublers or triplers, similar to varactor-based UHF frequency multipliers used today. The multipliers use the nonlinear saturation of an iron core to induce harmonics of the input frequency. When an iron core is subjected to a large magnetizing field, a combination of RF and a DC bias, the RF wave form is distorted, generating harmonics. Numerous circuits were devised to maximize the efficiency of second and third harmonic generation of the output of Alexanderson and Goldschmidt alternators.

Spark transmitters were not left completely out in the cold for experiments in generating steady carriers. Marconi arranged a series of rotary gaps on a common axle, each offset from the next, that would produce a damped spark wave form. When the damped signals were combined, the next would start in phase with the last one, which was starting to decay. With careful timing, the RF oscillations would add coherently, producing a reasonably steady carrier. No record exists whether this generator was actually used for AM transmissions.

The Goldschmidt alternator at the gigantic CW station at Nauen, Germany generated 1200 amperes at 450 volts (over half a megawatt) at 6 kc while rotating at 1500 RPM. Two frequency doublers delivered 24 kc to the antennas with an overall power plug-to-antenna efficiency of a remarkable 66 percent. The frequency stability during keying was kept to 0.01 percent. The

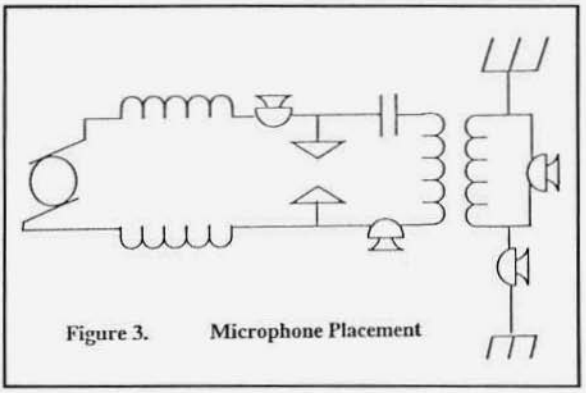


Figure 3. Microphone Placement

Port Jefferson, Long Island station used two 200 KW Alexanderson alternators operating at 15 and 19 kc.

The alternator efficiency was greater than that of arcs, usually 50-60 percent versus 40 percent. Arcs also had more incidental modulation and a considerable amount of harmonics. The arc had to be cleaned more often and usually permitted a CW speed of 60 WPM, where the alternators were capable of more than 100 WPM. Both were used for AM transmissions.

The second development toward telephony was the development of the ability to modulate the carrier wave with audio information. The carbon microphone had already been developed for the wired telephone service. The carbon microphone is a variable resistance element that can be inserted in series with either the DC feed or in series or in shunt of the RF output circuit of an RF generator. Figure 3 shows four different positions that a microphone can be placed in in an arc transmitter. However, a carbon microphone can take no more than a few watts before it will overheat and burn out. A number of ingenious arrangements were used to overcome this.

Large numbers of carbon microphones were connected to a common mouthpiece, and the carbon elements connected electrically in series or parallel to the RF generator, usually in series with the antenna or across the output of the RF generator. Alternatively, a number of microphones were arranged in a lazy-susan fashion, each microphone used for a few seconds and then quickly replaced with the next one. Water-cooled microphones were invented that dissipated several hundred watts.

Microphone "relays", or mechanical amplifiers had also been developed for wired telephony, in which a telephone receiver is mechanically coupled to another microphone, providing power gain. Cascades of microphone relays permitted higher-powered transmitters to be modulated. One type of relay modulated a stream of flowing conductive fluid or streaming conductive powder passing between two contacts to modulate the high-power RF carrier.

Another form of modulation was provided by a capacitor microphone, which changed the frequency of the tuned antenna circuit which was coupled to a fixed frequency Alexanderson alternator. This changed the antenna efficiency, effectively amplitude-modulating the RF signal.

Still another approach, used primarily with higher-powered alternators, was to modulate the RF output with saturable reactors. Magnetic amplifiers, like frequency doublers, make use of the saturation of an iron core. The feeble microphone current, along with a DC bias which takes the core to near saturation, can modulate the permeability of the iron. The iron core is included as part of the resonant circuit between the generator and the antenna. The magnetizing effect of the DC bias determines its inductance and therefore the tune of the circuit. As the bias is modulated by the audio current form a microphone, the resonant frequency of the circuit

continued on page 38

The 1625 Tube

by Berk Berkemeyer, WØREP
402 Kingridge Dr.
Ballwin, MO 63011-2729

When the 807 tube was announced during the middle 30's, it became an instant success among the ham population. It could handle more power than the 6L6 and was relatively cheap. Many, many ham transmitters, both homebrew and commercial, were designed to use this tube, probably the second most used ham tube (next to its successor, the 1646) in history.

With the war in Europe looming, designers of military communications equipment were gearing up new designs, especially in the relatively new field of military aviation. I'm sure that they looked at the 807 and saw in it the answer to their needs, with one exception. Most military mobile equipment used either 12 volt or 26 volt direct current power systems. The 807 was usable in pairs on the 12 volt system, but 26 volts was a real problem. Another, minor worry was vibration and shock: the 5 pin based 807 had a tendency to work its way out of the socket under physical stress. I don't know the actual sequence of events, but the result was the 1625, introduced about 1940 or 1941. It is not listed in the 1941 ARRL Handbook, or the 1941 Walter Ashe catalog, but is in the 1942 handbook and various 1942 catalogs.

The 1625 is an 807 with a 12 volt filament and a seven pin base, thus solving both the aforementioned problems. It was used in the ART-13, BC-610 and of course the Command set transmitters, this last application being the one most affecting the post-war ham community. How many billions of clicks, thumps and chirps appeared on the ham bands over the years as a result of the many thousands of command transmitters sold for peanuts to the rapidly expanding ham population? Almost every ham publication had articles on 'how to clean up the Command rig signal' and some of the fixes worked. The culprit was usually RF on the filament lines, and we choked and bypassed those lines, replaced them with shielded wire, powered them with DC and many other and more exotic fixes and were often rewarded with a decent signal. The external power supplies were also made up in many weird and wonderful ways so as to increase the power output. I can remember working a number of hams in the early 50's who said they were running 1000 (or more) volts at 300 mils. The

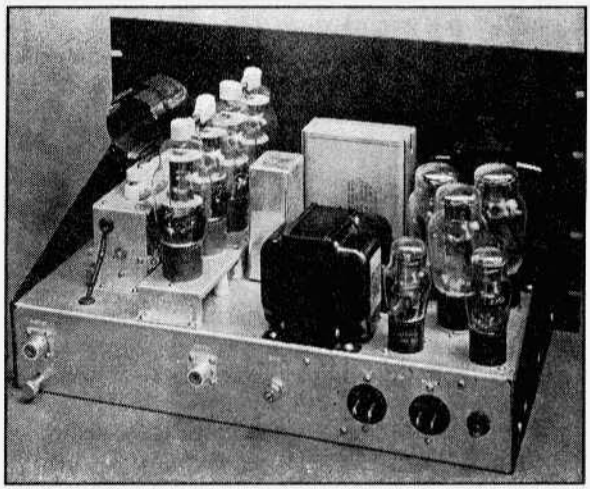


Figure 1. A linear amplifier with 4 1625 tubes.

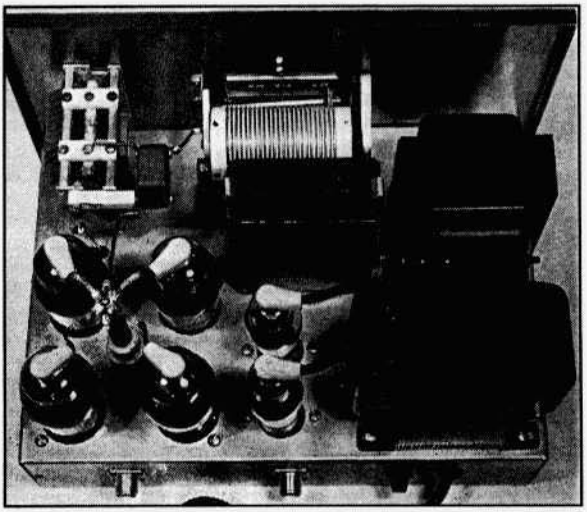


Figure 2. A simple 200W grounded grid linear using 1625s.

tubes were cheap, and so what if they only lasted a few hours, we got out with them.

It was this ability to take rough treatment (translate, 'overload')and the onset of single sideband suppressed carrier exciters that resulted in the next large consumption to the 1625 tube, still available in the early 50's for under a buck. In the April 1954 *QST*, George Grammer, W1DF, wrote an article describing a linear amplifier (Fig. 1) using four 1625 tubes in class AB1 push-pull parallel for SSB work. It worked well, but was quite complicated and required plate and bias voltages as well as a well regulated screen supply. This unit also appeared in the ARRL Handbook.

Then in the June 1955 *QST* came an article by E.L. Hoover, W9SAR, and R.L. Peck, W9MOW, describing a simple 200 watt amplifier (Fig. 2 & 3) and grounded grid 'linear' amplifiers became the rage. The problem of the beam forming plates being tied internally to the cathode and thus caused all sorts of unwanted things to happen was solved. The authors (and undoubtedly others) found that many

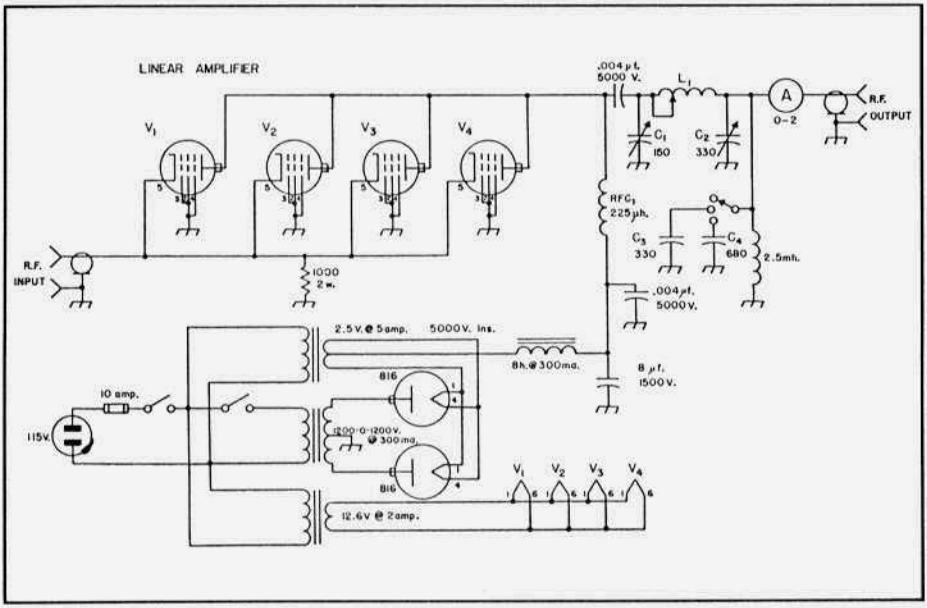


Figure 3.

continued on next page

Figure 4.

tube manufacturers brought the lead for the beam forming plates through the bulb separately, and soldered them into the cathode base pin. All that was necessary was to take off the base, move the beam forming plate lead to the grid or screen pin and either reinstall the original base, or install a new 6 pin base. Then the only problem was to resolder the pins and recement the base to the bulb. Since the bakelite cement was not available, this caused another problem. One of the solutions was to use stove flue cement, but this wasn't entirely satisfactory. An alternative fix was to leave the base on the tube and cut a slot in it so that the beam forming plate wire could be fished out and moved to a grid pin. The authors formed P & H Electronics and initially made the modified tubes and the base cement available.

In the February 1956 *QST*, an ad appeared advertising the P & H linear amplifier (Fig. 4), running about 400 watts input using 1200 volts on the plates at around 400 mils plate current. They were relatively cheap, worked well and replacement tubes were readily available. Several years later, P & H offered a similar amplifier, still using four 1625 tubes but now rated at 800 watts PEP input. I'll bet that ran hot! They also offered the 400 watt unit with 837 tubes, which didn't have to be modified. They continued to offer amplifiers into the 60's.

This form of amplifier must have been popular with the home brewers as there were a number of schemes offered in the November 1957 *QST* Hints and Kinks column for modifying the 1625 tubes. 1625s are still available at hamfests at a dollar or so. A little scrounging for the tank and power supply components and four tubes and you can still build a simple, inexpensive medium-power linear amplifier. One word of warning though, steer clear of RCA tubes. They connect beam forming plates to the cathode internally and thus cannot be modified without impairing the vacuum. So, off to the next hamfest or the nearest junkbox and have fun! **ER**

Jay Miller, KK5IM and "The Signal"

Jay Miller, KK5IM,in his mostly Collins, vintage hamshack. He has become the interim editor for the new Collins Collectors Association's quarterly newletter "The Signal'. Issue Number One arrived here recently and just like Jay's book "The Pocket Guide to Collins Amateur Radio Equipment", this 4-page, large-format newsletter is first class throughout. Congratulations Jay and congratulations to the Collins Collectors Association. A press release from the Collins Collectors Association follows:

A reorganized Collins Collectors Association recently published the first issue of its own quarterly newsletter, "The Signal." From a loose existence since 1988, the group now sponsors one of the most active vintage radio nets on the ham bands and sponsors an annual dinner for Collins enthusiasts at the Dayton Hamvention.

The mission of the Association is to preserve the history and lore of Collins radio equipment, promote its care and use and provide an archive of information about the equipment and the people who built and used it.

Members of the Association will receive four issues of the Signal and a serial-numbered membership certificate. Dues are $15 a year ($18 outside USA and Canada). For additional information and membership application, please send a SSAE to the Collins Collectors Association, P.O. Box 840924, Pembroke Pines, FL 33084.

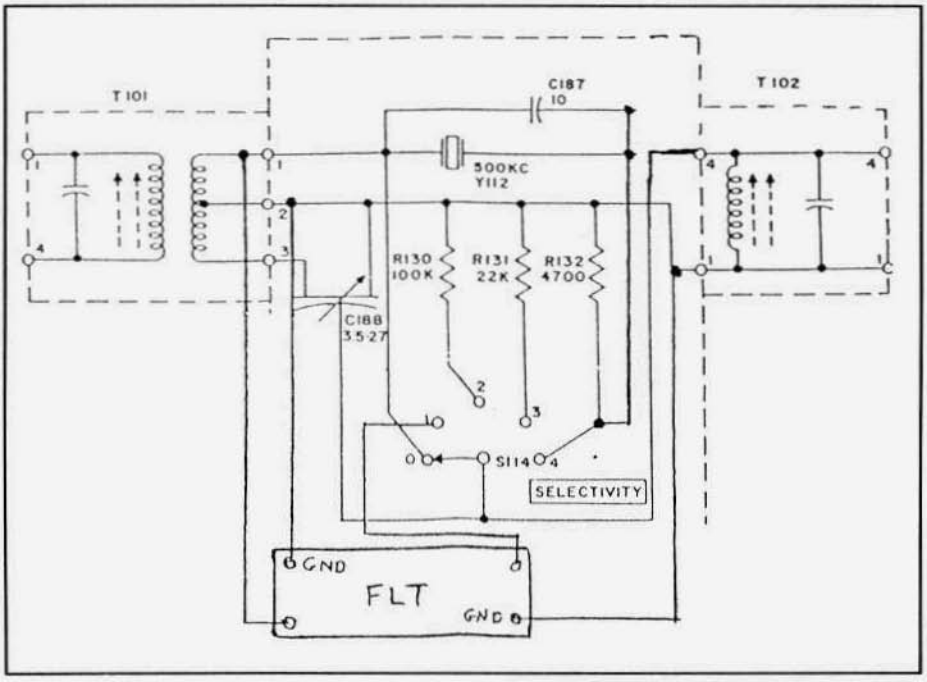
A Mechanical Filter for the R-388 and 75A-1

Chuck Teeters, W4MEW
841 Wimbledon Dr.
Augusta, GA 30909

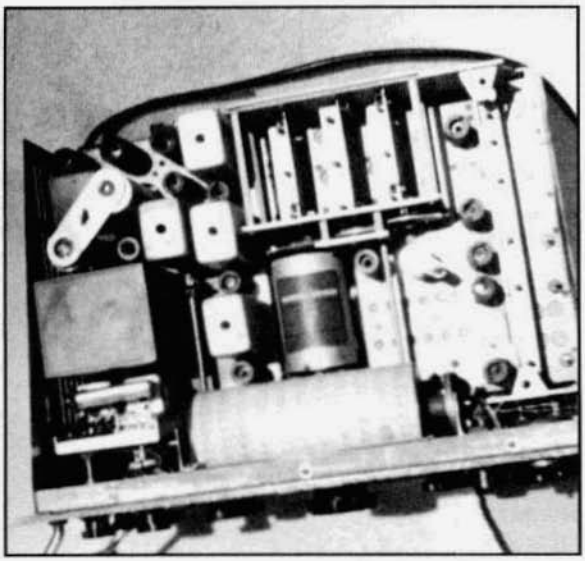
Being an afficianado of the R-388, Collins 51J-3, means my ears perk up when I see 500 kHz. The R-388 and 75A-1 get their selectivity from a 500 kHz IF. Almost every other receiver in the world uses 455 kHz and all the surplus filters are for 455. Finding filters for 500 kHz is almost impossible.

I was surprised when reading the Fair Radio Catalog to find a 500 kHz IF receiver module with a Collins mechanical filter. The filter is listed as 3.5 kHz wide centered on 501.5 kHz and the module price is $35. I called Lima and ordered one and it was exactly as advertised. The mechanical filter is in a case similar to a type E, except about 3/4 the size. It was easy to remove from the PC board, and it checked out perfect, 3.5 kHz bandwidth and a loss of less than 6 dB at 501 kHz. It looked just right for my IF, wide enough to work on AM interference and sharp enough for SSB.

I put the filter in the receiver without drilling holes or any non-reversible changes. The crystal filter compartment provided space and switching for the mechanical filter without major changes. I had to go under the receiver to remove one nut on the bottom of the crystal filter cover. All the rest was done



Schematic showing installation of mechanical filter in Collins R-388.



Looking down into R-388. The filter is on top of T-101 and T-102, just to the front of the power transformer.

on top, inside the crystal filter box. The mechanical filter is light enough to mount by its leads, so there was no mechanical work involved in adding it to the receiver. The selectivity switch puts the mechanical filter in the circuit in position 1, while the 0 position bypasses both the mechanical and crystal filters. Positions 2, 3, and 4 switch in the crystal as normal.

The circuit diagram shows the modified crystal/mechanical filter switching. There are only four connections to make and two to move. The common ground terminals of the mechanical filter are connected to the wire between T 101 terminal 2 and T 102 terminal 1. Use heavy wire and keep the leads short and they will support the filter. The output from the filter is connected to switch S 114 terminal 1, and the input to T 101 terminal 1. One end of the crystal and C 187, a 10 pFd cap, are disconnected from T 102 terminal 4 and connected to switch terminal 4. The photo shows the filter on top of T 101 and T 102, just to the front of the power transformer. The wiring is exactly the same in the 75A-1 but the part numbers may vary; follow your schematic.

After completing the installation, touch up the tuning of T 101 and T 102. With the selectivity switch in position 1 touch up the slugs to eliminate the dip in the middle of the filter pass band. You will have to go back and forth to optimize these adjustments. After everything is working properly, replace the filter compartment cover, making sure that the filter case does not touch the cover.

And there you have it, a normal receiver, a 3.5 kHz passband when the going gets rough on AM, and the crystal for CW. The mechanical filter is just right to tune AM on either sideband and get good fidelity. It's the best and easiest addition you could ever make to a R-388 or 75A-1 for $35. ER

FOR THIS THING YOU CALL "WIRELESS", YOU SURE HAVE TO BUY A LOT OF WIRE!

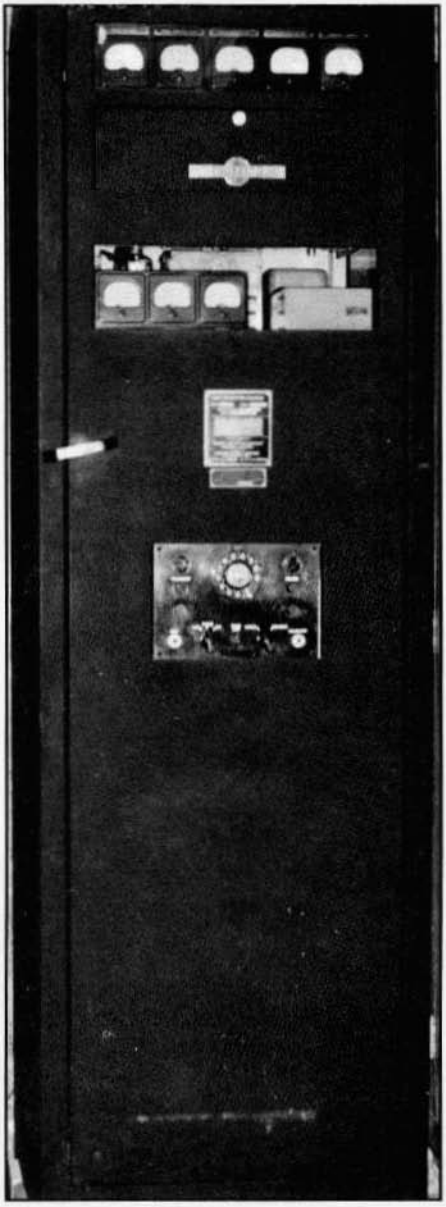
The Collins TCB-1 Navy Auto-Tune Transmitter

by Tom Smith, N5AMA
13034 Elmington Dr.
Cypress, TX 77429-2062

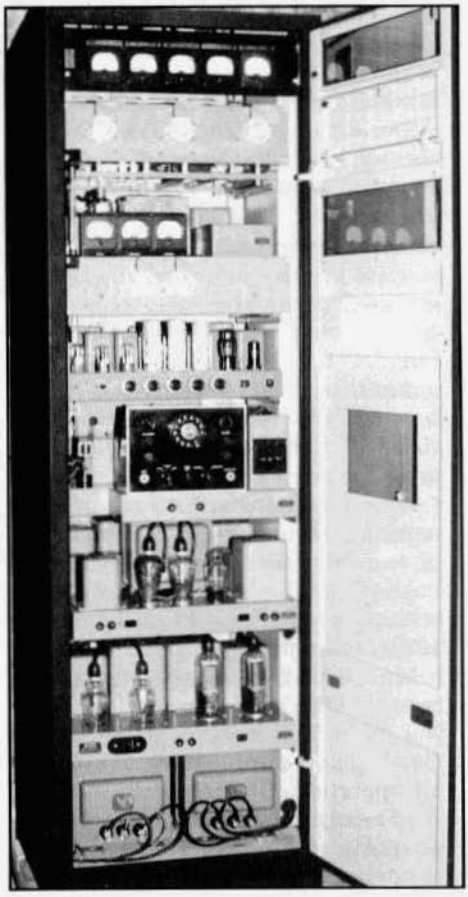
Several months of communication with a third party through a friend resulted in my acquiring a WW II vintage Collins transmitter. The old Collins transmitter was apparently purchased from the government thirty years ago and put into storage until recently when I obtained it through a trade. The rig was traded sight unseen with my friend having recalled that it was large and in good shape. The only thing actually known about the transmitter was that it was Collins, low power and AM.

My friend made a unscheduled trip to San Antonio and called me on his mobile phone on the way into town one Saturday afternoon saying that he had truck load of radio for me. He understated the size but knowing he has a tendency to do this, I brought a trailer with my pickup truck. What I found was a beautiful Collins transmitter weighing 950 lbs., a box of tubes in the original cartons and the original Collins manual.

The radio was complete except for 4 relays, 2 panel lamps, the auto-tune motor, a blower motor cage, and some of the large 3-pin crystals. The relays and Dialco lamps were probably removed for use on other ham gear but were easy items to replace. The auto-tune motor would be more difficult to replace. The Bodine motor has standard voltage requirements but is smaller than normal and is reversible. Another motor could be adapted by fabricating a mount and a coupler, but it's always nice to have the original. I felt very fortunate when the original owner located the original motor with the bracket and connector. The box and spun glass



Front view of the TCB-1 transmitter.



Front door open.

filter of the blower were easy to fabricate from marine plywood, with the extra benefit of fabricating the box to fit standard size A/C filters. The 177-G operator's control unit (remote control unit) is also missing.

The condition of the cabinet was excellent with just a few small areas requiring paint touch up. Standard black wrinkle paint was used on the exterior. A zinc chromate primer and semigloss grey wereused on the inside. Collins had an unusual practice of screwing their winged emblem tags on all major components like transformers, chokes and individual cabinet parts.There are 20 tags on the cabinets and doors, with an individual serial number and part number for each part. I'm not sure if this was a government requirement or just pride in the construction of Collins equipment.

Conceptually the transmitter is very straightforward. It uses 10 crystals that are selected by dialing a number on the telephone type rotary dial located on the cabinet front panel. Note the dial has 11 positions including the letter "A" after the "0". This activates a series of relays to select the proper crystal frequency, the proper mode of operation (CW or AM phone) and tunes the exciter and final tank and matching circuit. The transmitter can also be turned on and off via the dial and can be remotely operated from a control unit that has an old style telephone with handset for phone operations. FSK is also a mode option. The transmitter operates from 1500 kHz to 12 MHz. It is functional below and well above this frequency range at the rated output.

The power requirements are 110 VAC, 60 cycles at 650 watts for CW and 900 watts for A2-A3 operation. I power the rig through a General Radio 50-amp variac to reduce my 122V line voltage. There are 14 transformers and 7 rectifiers in the transmitter providing filament and plate voltage. The supplies and modulator section are mounted in the lower sections of the cabinet with the RF and matching units in the upper cabinet. All six units are mounted in the cabinet on slides and coupled via fixed multi-pin connectors at the rear of the cabinet (early modular construction). Front doors and rear removable panels allow access to all units. Despite the fact that this transmitter was made for the Navy, it's obvious that this transmitter was designed for a fixed station and never intended for shipboard operation. The 75 pound plate and modulation transformers are not bolted down but mounted on pins. Nothing in the transmitter is shock mounted or pro-

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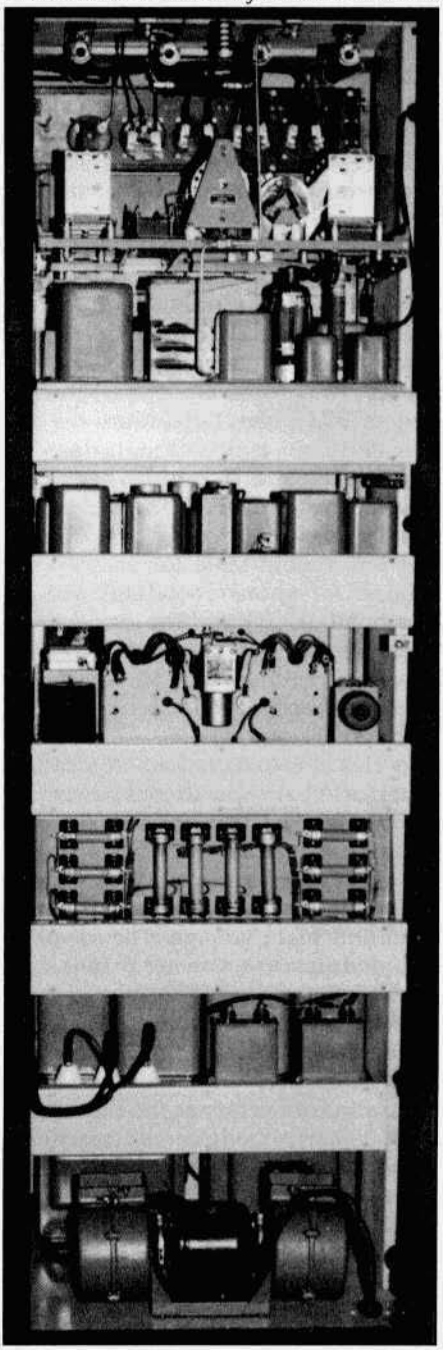

Rear view, panels removed.

tected from vibration - very important when firing large guns.

The crystal oscillator is oven stabilized and uses an 837 with an 807 multiplier driving a single 813 final. The autotune matching network works into an unbalanced antenna or transmission line with an impedance of 30 to 1200 ohms resistive and up to 1000 ohms reactive. It takes the autotune about 4 seconds to complete the tuning process. Not very fast by today's standards, but in 1941 not too shabby. The transmitter is rated at 75 watts. This should be a candidate for one of those commercials with a brick on the key for a month or a year or so.

Interstage transformers are used extensively throughout the FSK, microphone amplifier and driver stages. Push-pull 805 modulators are driven with a pair of 6F6-Gs to easily provide 100% modulation.

My father (W5GEF) related a story to me about the TCB-1 that occurred during WW II. He was stationed on Guadalcanal during the height of the air operation. Guadalcanal was being used as an air for the Allied Island hopping offensive. A request for equipment to communicate with aircraft resulted in the installation of a Collins TCB-1. The transmitter was installed and put on line only to be immediately shut down by one very angry communications officer. It seems the 75 watts output was far more power than needed for local communications with the aircraft and it was felt that the TCB-1 was also being received by the enemy giving advance notice of Allied air strikes. A transmitter of much lower power was installed to provide short range communications.

My transmitter has no installation date. The manual indicated a contract date of February 10, 1941. This may mean that this TCB-1 was never installed or perhaps not returned to service after it was overhauled at the Mare Island

continued to page 38

WRL Globe Champion from page 9
The transmitter was then run key down at tune power level for several minutes. Next, I switched to CW and tuned up to full power. No problems. Next I set up for AM, ran it key down for a while, then cracked the mic gain, and gave it some audio.

Voila!!

Naturally, it worked fine on the air for a week, then a screen grid blew in one tube. Is this easy to spot? Not when a single good AX-9909 can easily deliver 150 watts and the bad one still pumps 30 watts, yielding normal plate current at resonance, and normal unmodulated output!

So, I tore apart the modulator, measured a million voltages, and still couldn't figure out why my modulation was negative above 75 watts! I read many engineering texts and tube manuals, changed antenna tuners, but still my plate current "wobbled" and the scope pattern stank. My ratty old 300 had worked better than this pretty 300-A! I changed perfectly good tubes, then capacitors. Nada. Had I forgotten or over looked something fundamental? Yes!!

Finally in desperation, with no other way to test them and with no spares for substitution, I put my precious AX-9909's one at a time in the damn transmitter and fired it up. The finals are in parallel, I reasoned, and ought to work alone. Bingo! The bad tube could not hide any longer.

Did I order 2 new tubes at $90 each? Nope, that would be too easy! Instead I researched and designed a brilliant, wholly hole-less, replacement scheme using 4X-150's, (subject of another article), scrounged the parts, but didn't build it.

Finally, I realized finishing the new 8' x 20' addition to my shop was more important than buying a sheet metal brake and a set of chassis punches in order to make a single 4 x 6 inch replacement sub-chassis for the RF deck.

Eventually, I just ordered the tubes. Naturally, they are now $120 each. So I ordered 2 tubes that cost me five times what the transmitter did. Still I have a rare, mint, and original vintage transmitter for about the cost of a decent Valiant. Before you do the same, you may want to read my article on conversion to 4X-150-A's. It will keep your Globe Champ on the air affordably, and without drilling any holes in it! Either way, it's easy to make the Globe Kings little brother work like a Champ!

Epilogue

By 1960, Globe Electronics had been acquired by Textron who later owned Heathkit and GC Electronics. Under Textron ownership the Globe Champion 300-A became the 350, and got a re-styled paint job on the front panel, with the Globe logo removed. Textron later moved production facilities to Rockford, Illinois, presumably leaving most of Globe's highly skilled female production crew behind in Iowa. Leo Meyerson blames Globe's demise on Textron's poor quality control.

In the early 60's Globe Electronics entered the CB market with a beautiful low profile radio that borrowed much of its modular mechanical design (but none of its electronics) from the excellent Morrow MB series. Capable of only about 70% modulation, and with a barn door IF, its poor performance killed Globe in the CB market.

Textron, without Leo Meyerson's roots in the radio business, failed to develop new transmitters as SSB emerged as the dominant mode in ham radio. Textron's short-sighted management style meant the end of the road for Globe.

My thanks to: Leo Meyerson, WØGFQ and Jim Musgrove K5BZH for information and photographs; Ozzie, WB6ICM for my 1st Globe 300; Frank, W7CQF, for my 300-A (+ manual); Mike, KA7ASF for 300 manual; Bill, K7INK for 500-B manual and many patient signal reports!; John, W6BM for AX-9909 data sheets. ER

The Lazarus Project - Restoring a DX-100

by Alex Persichino, WA2BMB
15 Wayside Ln.
Lebanon, NJ 08833

I located a DX-100 while at a hamfest at the Sussex County Fairgrounds last August '95, and was able to purchase it for $20. I know what you're thinking, and you're right. Although it was in rough shape, I knew I could bring it back to life. When found, the radio was sitting on the ground, without a cabinet. All the knobs were gone, except for the VFO/xtal and drive control knobs.

The previous owner had two "High Voltage" warning signs on the front panel, and the gray paint was worn away around the control, indicating long term use. The chassis was oxidized and extremely dirty. All the transformers were in place, and the only missing tube was a 5R4 high-voltage rectifier. The frequency dial was spinning freely due to the control shaft coupling being loose.

The only problem noticed under the chassis was a modification of some sort, consisting of a few resistors, capacitors and a diode mounted on a single terminal strip. The modification was located beneath the VFO compartment.

The first thing done in the refurbishing was to replace the A/C line cord with the three-conductor variety. I modified the cord by using in-line fuse holders, installing 4-amp fuses in both the neutral and positive wires of the cord.

The missing 5R4 high-voltage rectifier tube was replaced, along with both the bias and high-voltage filter capacitors. The power and plate switches were checked, and it was found that the plate switch was shorted, placing the transmitter in the transmit mode continuously.

All the switches were cleaned with Tarn-X and De-Oxit.

After a new plate switch was installed, it was time for a smoke test. The tubes lit and no arching or sparking occurred. I switched to CW, and turned the crystal/VFO control to VFO position. I observed no grid drive at all. I then inserted an crystal, but still only able to see a slight amount of grid drive.

The grid drive potentiometer was cleaned and lubricated. The set screws were missing from the coupler. The coupler links the control knob shaft to the potentiometer. The grid drive was restored by installing new set screws, allowing the potentiometer to be controlled by the driver control.

The next problem to be addressed was the VFO. The case was removed and the VFO section of the band switch was thoroughly cleaned and lubricated. An open RF choke in the cathode circuit of the 6AU6 VFO tube was replaced. I also found a broken wire on the 160 meter VFO coil that I had to resolder. The modification discovered earlier was removed and the cathode keying line was wired back to the CW phone switch. This restored the normal operation of the VFO.

I reattached the frequency indicator dial and recalibrated the VFO. The transmitter was loaded into a dummy load, to full output. The plate current meter, however, only read 40 mA. After the meter shunt was replaced, the plate current meter was reading accurately.

I modified the audio section for better frequency response, using standard methods outlined in many articles, among which is Electric Radio, #49, pg. 30, by Bill Beatty, K7CMS.

I also regulated the 1625 modulator tubes screen grid voltage with two OA2 voltage regulator tubes. The modulator bias was also regulated by a 39V 1 watt Zener diode. I then mounted the modulation transformer on insulating stand offs. It was noticed that the plate of the 12BY7 crystal oscillator-buffer was glowing red. Upon checking the voltage, I found it to be +400 VDC. (This value is way over the tube rating!)

A review of an article I had read by J.D. Mitchell, W9JDS, in CQ Anthology II (Cat. No. 102-2) 1952-1959, pg. 8, had reported this problem along with a method to resolve it. He had made the exciter power supply a "choke-input" circuit.

"Locate the black wire from the filter choke and connect it directly to pin 8 of the 5V4. The jumper between 5V4 pin 8 and the input section of the filter capacitor is cut out. And all three sections of the filter capacitor are paralleled."

This dropped the voltage to limits within the normal operating parameters of the tubes. While the transmitter was operating, there was a distinct buzzing sound. It was suggestive of a mechanical cause, and subsequent tightening of all transformer mounting bolts eliminated the problem.

I had some knobs in my junk box, and used them to replace the missing ones. The high-voltage warning signs were removed from the front panel, improving the appearance immediately.

A second modification, suggested by W9JDS, was the installation of a momentary "ON" push-button switch on the front panel, for the purpose of providing a frequency-spotting feature. The switch grounds the VFO keying line, allowing the operator to zero beat an incoming signal in both CW or phone modes.

I've been using the DX-100, and the on-air comments about its audio quality have been very good. A Turner Plus 2 microphone turned down to about level 4, has more than enough audio to drive the transmitter.

The small price of a less-than-perfect radio ($20) and the few components needed to restore it to its former self was nothing compared to the fun and the new understanding I experienced in doing the work myself. The challenge was not to do the work, which was simple, but to ascertain the needed information. The fun was finding it, then implementing the restorations, with the successful outcome of using it on the air.

I'd like to thank my friend, John Proskura, WA2MOL, for his help in carrying and transporting numerous "boat anchors" over the years. His friendship and our shared interests over the years have bolstered me in my never ending quest to find and restore the "less-than-perfect."

I thank my wife/editor for her forbearance and understanding. Without her patience, and tolerance for this part of my life, I would not have enjoyed the past years and the challenges of vintage radio restoration. **ER**

HEY ERNIE - REMEMBER THAT TRAP YOU SAID YOU NEEDED? I THINK I FOUND ONE, UNLESS THIS GUY'S SHOTGUN IS LOADED!

Radiotelephony from page 25

changes, modulating the RF signal.

Finally, the receiver required a detector that could demodulate voice signals. The first detectors of RF energy were the coherer and the magnetic detector. In the coherer, metal filings are placed between brass plugs in a glass tube and the resistance decreases in the presence of radio frequency energy. Between CW characters, the coherer is returned to a high-resistance state by tapping it. This limits the response to much below audio frequencies. The magnetic detector, which operates by drawing a magnetized wire through a loop with RF in it and listening to the magnetic domains switch their direction through a second pickup coil, was also limited to very slowly varying signals.

The electrolytic detector, a type of rectifier, appeared in 1904, and was followed two years later by the first crystal detectors, all of which could demodulate an AM signal. Silicon and carborundum detectors, which required a bias battery, came first, followed by the more sensitive but less robust galena detector. These detectors functioned well on spark signals, and allowed the operators off Brant Rock to hear Fessenden's first musical broadcasts.

Soon afterward, vacuum tubes replaced Fessenden's alternator and Doc Herrold's arc transmitter as AM transmitters. De Forest made an audion oscillate in 1912 and by 1920 Frank Conrad was transmitting with six 50-watt triodes at 8XK, which became KDKA in November, 1920. Herrold's station in San Jose evolved into KQW, finally to become KCBS in San Francisco in 1946. High-powered arc transmitters were used as late as World War II, and an Alexanderson alternator in Sweden is still spun up once a year as a testament to the rich 100-year history of radio. **ER**

Advice From Hams from page 21

Dobbins Island AM Expedition similar to the self-contained, portable station the Army plans to airlift and drop in Bosnia.

Take a look at coverage in *Electric Radio* #54 (Oct. 93) and you'll see the same strategy of using a generator-powered, AM station faithful to the "broadcast quality" mentality of ham stations in the 1950s. It was transported by boat and dropped on an uninhabited island in the Chesapeake Bay.

Meantime, the Army was given a few suggestions as to how to improve the audio quality of their station, how to coach listeners to give a technical analysis of their reception, and how propagation issues are likely to play out.

Of course, for us, this was just a routine walk in the park. Now if only we could run 5000 watts, play music every so often, and openly solicit listener reception reports and take requests for songs.....**ER**

NOTE: Reception reports with QSL requests should go to: Army Broadcast Service, Att'n: Maj. Roy Messersmith, 601 N. Fairfax St., Alexandria, VA 22314

Collins TCB-1 from page 34

Shipyard. By the way, I believe the Mare Island facility has succumbed to a recent round of military closures. Few of these old transmitters survived the scrap yard after the war. Many were barged offshore and dumped into the Pacific. Many of those that wound up in amateurs hands were probably stripped for parts. The remaining transmitters of this vintage should be restored to help preserve this important part of our history.

I would greatly appreciate hearing from anyone who knows of the location of a remote unit for the TBC-1 or has any comments concerning its use. **ER**

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FOR SALE: "Introduction to Key Collecting", 64 page softcover illustrated guide - $11.95 ppd USA. Start now in this fascinating hobby. Artifax Books, Box 88-E, Maynard, MA 01754.

FOR SALE: New Ranger I, Valiant I & Navigator plastic dials, 160-10, freq. numbers in green, w/all holes, like orig. - $17.50 ppd. Bruce Kyder, 4003 Lauarawood La., Franklin, TN 37064. (615) 794-9692

FOR SALE: Service bench DC sply, output - 6V/7A and 12/3.5A, isolated and metered - $25 + shpg. H. Mohr, W3NCX, 1005 W. Wyoming, Allentown, PA 18103.

FOR SALE: BC-1306, exc., w/orig. TM 11-230 - $200, photos available; list of other equip., etc - LSASE. Patrick Marineau, K9HF, 5055-1/2 Lakewood Ave., St. Louis, MO 63123. (314) 752-3611

FOR SALE: Fascinating 1994 Radio Bygones hard cover British book "Wires, Wheels and Wings" - a wireless mechanics (RAF) diary - $18 ppd. Ken Greenberg, 4858 Lee, Skokie, IL 60077. (847) 679-8641

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: Many radio tubes. **WANTED:** telegraph keys. Premium paid for "bugs" & rare, unusual, or unique straight keys or related telegraph items. Vince, K5VT, 3410 N. 4th Ave., Phoenix, AZ 85013. (800) 840-KEYS

FOR SALE: HP 606A sig. gen., exc. - $125; TSI counter model 351, nixie tubes, 2.5 MHz - $20. **WANTED:** Electric Radio issues #1 - #65. Dave, W1DWZ, (508) 378-3619

FOR SALE: National NC-183D, w/xtal calibrator - $185; Drake 2A - $125. Both nice condx. Millen grid dip meter mod. 90651, like new - $80. Larry, WA7MAL,HCR 2, Box 261, Coulee City, WA 99115. (509) 632-5603

FOR SALE: Mod xfmr Thordarson T14-M49 in orig. wooden box - $100 + shpg; fil xfmr for 3B28s, 2.5V, 15A - $20 + shpg. Joe, NM1V, (508) 658-6186 before 7PM EST.

FOR SALE: HRO-60 w/sprk & 6 coils, good condx - $400 OBO + shpg; many tubes - call. Stan, WD6GGK, CA, (408) 728-3480

FOR SALE: Lab test equipment, old and new, clean and working. Write needs - SASE. S.T. Carter, II, W4NHC, POB 033177, Indialantic, FL 32903-0177. (407) 727-3015

WANTED: Old meters & any aircraft stuff. Chris Cross, Box 94, McConnell, Il 61050.

WANTED: BC-969 rcvr, manual for same; Squires-Sanders SS1BS. Weber, 4845 W. 107th St., Oak Lawn, IL 60453-5252.

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

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

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

WANTED: Pwr xfmr for the Heath HO-10 or HO-13 monitor scope; manual for HO-10 (copy OK). John Keil, 4618 Norwalk St., Union City, CA 94587. (510) 471-4838.

WANTED: Still collecting early WW II radar equip. & manuals, what have you. Allan H. Weiner, 97 High St., Kennebunk, ME 04043. (207) 985-7547.

WANTED: The bandswitch mechanism for SB-34 or parts unit. Skip Marsh, W6TFQ, 2593 W. San Madele, Fresno, CA 93711. (209) 431-1547.

WANTED: IF cans (5) for HQ110 rcvr. Jim, W8HPL, OH, (614) 927-2592.

WANTED: RT-136/GRC-13 military xcvr, made by RCA. Leroy E. Sparks, W6SYC, 924 W. McFadden Ave., Santa Ana, CA 92707-1114. (714) 540-8123.

WANTED: NC-300 parts; RF gain pot & switch, front mounting bars, T2 audio output, 4H4-C tube. Tom, W3BYM, 13806 Parkland Dr., Rockville, MD 20853. (301) 871-7463.

WANTED: Vacuum tubes, new & used, any brand. I pay: used 2A3 single plate - $50; manufacturers name is molded in base & metal plate is rectangular. Used Cardon 585 - $100; KT88 new - $120; 845 new - $100; 245, 345, 210, 310, 50, 250, 801, VT52, others also wanted. Tim Metz, 221 Wheatland, Fairview, OK 73737. (405) 227-2456.

WANTED: Any new or used Western Electric vacuum tubes & tube sockets. I pay these prices for new: 274B - $150; 205F - $80; 350B - $110; 301A - $100; 252A - $400; VT25 - $40; VT52 - $70; 310A - $12; 348A - $40; 349A - $35; 404A - $6. Used: 262A - $40; 104D - $100; 205D - $140; 274A Globe - $150; 100M socket - $30. All others wanted. Tim Metz, 221 Wheatland, Fairview, OK 73737. (405) 227-2456.

WANTED: NC303 in top condx; small scope like RCA WO-33A; Simpson 466. G. Liccione, W2TPZ, 118 Hiawatha Trail, Liverpool, NY 13088. (315) 457-7928.

Vintage Manuals Available
Your only stop for the finest quality vintage, amateur, audio, Lafayette and many radio-related manuals. Get catalog #5, two $.32 stamps. Pete Markavage, **The Manual Man**, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964.

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

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

WANTED: I buy ham rcvr's not working but worth saving. Ron, 10701 W. 54th St., Shawnee, KS 66203.

WANTED: Old ham desktop microphones, any condx.; separate mic heads & stands. Rick, KF5NU, 9031 Troulon Dr., Houston, TX 77036. (713) 774-5102.

WANTED: WW II navy shipboard xmtrs & accessories, any condx. Steve Finelli, N3NNC, 37 Stonecroft Dr., Easton, PA 18045. (610) 252-8211.

WANTED: Vintage AM equipment for personal use, must be collector quality or mint. Prefer Collins, will consider others. Bob Tapper, NØIMH, Box 61538, Denver, CO 80206. (303) 740-2272, FAX 777-6491.

WANTED: Drake 1A. Mike, KE6HD, 310 Houston Ct., Danville, CA 94526. (510) 831-105, FAX: 831-1220.

WANTED: Elmac AF67 xmtr for parts; SBE 34 for parts; Globe King 500B; modulator deck or parts. Herb Resch, KØUBK, MN, (612) 455-7898.

WANTED: Sideband Handbook by CQ writer, Don Stoner, Institute Radio Engineers publication on VLF, published, June 1957. Weber, 4845 W. 107th St., Oak Lawn, IL 60453-5252.

WANTED: Heath xtal sets; early ham & shortwave equip., literature, accessories, broken or parts units; any Heath amateur gear. WA5THJ, Rt 9 Box 163, Alvin, TX 77511. (713) 331-2956.

WANTED: Early Bell Labs or Western Electric point contact or junction transistors. Robert K. Wallace, 8007 Red Lion Rd., Springboro, OH 45066. (513) 748-0657.

WANTED: "Pretty" HQ129X front panel; GDO, VTVM, coax relay, xtal mic. Bob, AZ, (602) 816-0660.

WANTED: National NC-400 rcvr, Hallicrafters s-76 rcvr. Cash or interesting trades available. Jim Jorgensen, K9RJ, 1709 Oxnard, Downers Grove, IL 60516. (708) 852-4704.

FOR SALE: T-Shirts w/Johnson Viking logo - $15, state size. Viking Radio Amateur Radio Society, POB 3, Waseca, MN 56093.

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

FOR SALE: HRO50T, A-D, cal., spkr, manual; 51J-4 CW filter F500B14; Eimac 4-400s, tested. Dean, KO6IJ, (714) 643-7930, deanbers@ix.netcom.com

FOR SALE: Heath: VF-1 VFO - $50; HW-7 QRP xcvr - $95; SBA 300-4 6M converter - $30; SBA 300-3 2M converter - $20; QF-1 Q-Mult. - $35; SB600 spkr - $35; HS1611 spkr - $45; SB301/SB401 combo - $225; early Heath spkr in painted wood cabinet - $40. Hallicrafters: PS-150 - 12 P/S - $40; R-48A spkr - $35. Lafayette: 99-2536 6&2M VFO - $30; HE-89 6&2M VFO - $35; HE-40 gen. cov. rcvr - $50. Gonset: 2M Comm. (looks new) - $100; G-76 DC P/S - $40. Drake: TR4, RV4, P/S, spkr - $300; DC-4 P/S, NIB - $50; National SW-3 w/6 sets of H/B coils - $300. Yeasu: FT-101B w/hand mic - $275; YD-844 desk mic - $50. Waters: Model 349 Channelator - $65; model 3001 hybrid coupler - $55. Collins 351D-2 mobile mount plus MP-1 P/S, look new, in orig. boxes - $100; Eldico P-101 P/S - $25; Mosley CM-1 rcvr - BO; Knight model V-107 6&2M VFO - $35. Parker Heinemann, W1YG, 87 Cove Rd., Lyme, CT 06371. (203) 434-7783

FOR SALE: Dual reg. pwr sply, 0-500V, 0-500 mA - $50. Joe, W7ISJ, 10332 Camino De La Placita, Tucson, AZ 85748. (520) 886-3087.

FOR SALE: Johnson 250W Matchbox - $90; Johnson SWR bridge - $30; Hammarlund SP-600-JX, needs work - $175; Millen grid dipper - $75; BC-348, nice - $150; BC-348 mount - $20; Heath Commanche/Cheyenne - $150; BC-610 speech amp - $125; BC-610 tuning chart set - $15; BC-1206 - $25; Hallicrafters S-76 - $75; Hammarlund S200 spkr - $60; Heath Laboratory RF gen. - $20; Bird 500W continuous Termaline w/Collins label - $50; Radiotron Designers Handbook, 3rd edition - $25; NOS tubes - 813 - $25; 4-65 - $30; 250TL - $75; 203A - $40; 807 - $8; 866A - $8. Used tubes - 2A3 - $15; 250TH - $75; 810 - $40; 100TH - $25. Mark Hovda, NØJWI, POB 10091, Cedar Rapids, IA 52410. (319) 364-4048, 7-9 PM CDT.

FOR SALE: Hallicrafters S-76, exc. - $195; SX-71, exc. - $225; SX-101 MK II, VG - $225; Johnson Matchbox, 275W, w/meter, exc. - $145; Knight T-60, good - $60; Electrovoice V-2A velocity mic, VGC - $350; National HRO-60, w/spkr, works, needs TLC - $375; Conar 400 xmtr - $50; other equip., manuals - free list, call or write. Richard Prester, 131 Ridge Rd., West Milford, NJ 07480. (201) 728-2454

FOR SALE: KW-1, very nice condx - $13,000. Don, KV7S, AZ, (520) 743-9711

FOR SALE: (3) #5C22 xmtg tubes; (1) #CIK-6014; (2) #5608A; (1) #PL-4-400A; (1) Eimac #327A. George Jones, 1943 Palm Dr., Fernandina Beach, FL 32034. (904) 261-6533

FOR SALE: HRO-5TA1, coils, ps. **WANTED:** National type 5897 ps; Zenith Transoceanic; Drake 2AQ. Carter Elliott, WD4AYS, 1460 Pinedale Rd., Charlottesville, VA 22901. (804) 979-7383

FOR SALE: Band new, most still in the box! 1943 Bendix Radio Compass MN-26Y, 12 tube rcvr, tunes 150-695 kc and 3.4-7.0 mc in 3 bands. Includes MN-28 remote control & cable, MN-40D azimuth indicator & manual - $125 OBO, U-ship. Bob Bakinowski, 1524 Saint Tropaz, Tucson, AZ 85713. (520) 624-8029

FOR SALE: SCR-274N/ARC knobs for rcvrs, new, 6 total - $5 each as a lot, I ship. John Snow, 4539 N. Bartlett Ave., Shorewood, WI 53211. (414) 964-0194

FOR SALE/TRADE: Collins 32V1 - $300; R388 - $195; Gonset III 2M, CD - $75; Globe Chief - $60; Hallicrafter SX-42 - $160; S118 - $50; Navy audio amp CFT50107A, YA2 - $40; aircraft RCA AVT112A, unused - $150; NIB coils military 99A xmtr. **WANTED:** Turner VT73, 25X, 22X, 33X; Collins spkr, manual for 75A-1; National Select-O-Ject; NC-183 dark; NC-173 rack; NC-183D rack, spkrs, manuals; Johnson Viking I; 75M Master Mobile; Gonset 1V 2M; 15 pin Jones female. Sam Champie, KD7XX, 105 W. McKenzie, Hermiston, OR 97838. (541) 567-2879

FOR SALE: Hallicrafters S-38E, very good - $35; Zenith Transoceanic, R-600, complete w/wavemagnet nd unused log, exc. - $100; Realistic DX-150A com. rcvr, w/manual, exc. - $85; Heath xtal set CR-1 w/manual, mint - $100; Sencore picture tube tester/rejuvinator, complete w/all sockets, extensions and setup manuals - $75. All items plus shpg. Roger Snowdall, 8405 Everett, Raytown, MO 64138. (816) 356-0396

FOR SALE: Tektronix catalogs, 10 from '66 to '91, Hewlett-Packard, 5 from '81 to '92, all - $125. Dave, W1DWZ, (508) 378-3619

FOR SALE/TRADE: Hallicrafters SR-150 xcvr, nice, book, AC pwr sply, DC transistor pwr sply. Fred Clinger, OH, (419) 468-6117 after 6 PM Eastern

FOR SALE: Tube ham gear; tube hi-fi gear; sweep tubes; Sherical Audion; send wants. V. Vogt, 2311 Pimmit Dr. #114E, Falls Church, VA 22043.

FOR SALE: Radio parts, old & new, tubes, galena crystals, etc., very low prices. L. Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150. (716) 873-0447

FOR SALE: Hallicrafters SX-96, orig. book, no spkr; CE-100V & 600L; Wandel Goltermann, 4 piece, sig. gen. & scope. Del, K9FCM, FL, (407) 336-1455

FOR SALE: Vocaline xcvr, mic orig. line cord never used, orig. manual. Dusty Rhodes, W8MOW, 1324 N. Dorset Rd., Troy, OH 45373. (513) 339-1546

FOR SALE: Manuals: ART-13 maintenance - $25; TCK, RAK-7, SCR-508 & 608 - $20, all orig. Steve Finelli, 37 Stonecroft Dr., Easton, PA 18045. (610) 252-8211

FOR SALE: Solid-state SSB/CW model HR-1680, 10-80, very clean - $95 + shpg. B&K model 606 Dyna-Jet tube tester - $20 + shpg. Jack Busk, W9FQK, AZ, (520) 634-2028

FOR SALE: Viking Ranger I - $195; Hammarlund HXL-1 - $295; Drake TR4C/AC-4 - $350; 34PNB - $99. Ron, K1BW, MA, (413) 538-7861.

FOR SALE: TS-509/UR field strength meter - $10; Knight T-60 xmtr - $40. Colin Collier, N4TUA, GA, (912) 988-1276.

FOR SALE: Valiant II, SB301/401, HW16/HG10, NC183, Heath Q-mult. Joe Perratto, K2QPR, FL, (407) 220-7362, anytime.

FOR SALE: Repair! Radio repair, tube or solid state, reasonable rates. Jim Rupe, AB7DR, Western Amateur Radio Repair Co., (WARRC), POB 697, Grayland, WA 98547. (360) 267-4011

FOR SALE: Compactron adapters - set of (2) adapters which allow 9-pin & 12-pin compactron sweep tubes to be tested on TV-7 type tube testers. This lets popular tubes such as 6JB6, 6JE6, 6JF6, 6JM6, 6JS6, 6JU6, 6JZ6, 6KD6, 6KM6, 6KN6, 6LB6, 6LF6, 6LQ6, 6LR6, 6LX6, 6ME6, 6MJ6, 12BJ6, 20LF6, 21JS6, 23JS6, 24JE6, 27LF6, 30KD6, 40KD6, 8950, 7868 be tested on TV-7 testers which do not have compactron sockets. Tube test setup & test data are supplied for the TV-7 tester series only. This includes switch settings & bias values as well as minimum & 'as new' test values. (2) adapters as well as tube test info & pin-out conversion data are supplied. Please send $25 to: Daniel Nelson, 1025 E. Desert Ln., Phoenix, AZ 85040. (602) 243-7421 eves. E-mail: djn@indirect.com

FOR SALE: Hallicrafter rec S-108 exc - $80; Yaesu rec FRDX400 - $125; GC both w/manuals, + shpg. **WANTED:** Crystal phasing assembly from National rec NC-2-40-D or HRO-7. May buy parts unit. Burt Ostby, 2424 F-30, Mikado, MI, 48745. (517) 736-8020

FOR SALE: New JAN 2A3 tubes - $20 each; new JAN 35TG tubes - $20 each; 1962 ARRL Handbook - $15; BC-1206 rcvr, like new - $20. Wayne LeTourneau, WB0CTE, POB 62, Wannaska, MN 56761. (218) 425-7826

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, WD5EOG, "The Hallicrafters Collector", 4500 Russell Dr., Austin, TX 78745. (512) 443-5027

WANTED: Info on the old Allied Radio in Chicago. I'm researching the company for an article in ER. Need anectodes, stories, history, etc. Kurt H. Miska, N8WGW, 3488 Wagner Woods Ct., Ann Arbor, MI 48103. (810) 641-0044 wk. FAX (810) 641-1718. 76247,1422@compuserve.com

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

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

WANTED: Nems Clarke VHF rcvrs: 1302, 1306, 1509, 1511, 1906/7; need manuals for above sets & also 1301A, 2801A, 1501A, other Nems paperwork & manuals for research. Joe Roberts, N4WQC, Box 180562, Austin, TX 78718. (512) 339-6229 voice/fax

WANTED: Clegg 66'er w/Squires-Sanders on the dial; PJ-068 plug. Bob, KI4MB, 6608 N. 18th St., Arlington, VA 22205-1802. (703) 533-0650

WANTED: WW II radar. Will pay top dollar for APS-4 orig. manual; APS-4A orig. manual; & C-300 control box APS-4; also looking for 1970 ICS-UHP-481, 1973 vintage used in USM-341 DVM, made by NLS Systems. Steve Bartkowski, 4923 W. 28 St., Cicero, IL 60650. (708) 863-3090

WANTED: Johnson Viking 500 w/pwr sply. Robert Braza, N1PRS, 23 Harvard St., Pawtucket, RI 02860. (401) 723-1603

WANTED: Bathtub key as used by RAF & RCAF in WW II. I'm not a collector. Was WAG on Lancaster in WW II es would like to have that key for old times sake. Ed English, W6WYQ, 1841 Pinecone Dr., San Luis Obispo, CA 93405. (805) 543-0543, eenglish@slonet.org

WANTED: Schematic for oscilloscope type 32A by Telequipment Ltd & has Motorola model T-1014B. W7SC, 3932 S. Mesa View Ln., Boise, ID 83706-6052.

WANTED: Ameco VFO 621 w/manual; spkr for HQ-170A. Fred Hoofer, WØBMT, 201 E. 4th St., Neligh, NE 68756. (402) 887-5201

WANTED: Gonset G-50 schematic or manual copy, will pay top dollar. Jim Riff, K9JSC, 81 N. Ela Rd., Barrington, IL 60010. (847) 575-7832

WANTED: Hallicrafters HT-1, HT-4, HT-9 xmtrs & SX-17, HQ-180 rcvrs; ARRL Handbooks 1930-1951. Ken Seymour, KA7OSM, 9115 SW 176th Ave., Beaverton, OR 97007. (503) 306-7439. ken.seymour@attws.com

WANTED: RA-88 rectifier, long rectangular aircraft style by Western Electric. Jeary Vogt, 3 Brampton Rd., Malvern, PA 19355. (610) 296-2162. jeary@aol.com

WANTED: For the Central Electronics 100V xmtr; a copy of the manual & the limiter plug-in module. Skipp Tullen, K2PXQ, NJ. (201) 539-8120.

WANTED: XCU-303 or XCU-300 xtal calibrator for NC-303 rcvr; Heath DF-2 Navigator rcvr; VLF eqpt. Al Kaiser, W2ZVR, 713 Marlowe Rd., Cherry Hill, NJ 08003-1551. (609) 424-5387

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

WANTED: SP400, EH Scott rcvrs, only in very good condx. Jose Congas, EA4JL. Contact in the States, Kurt Keller, CT, (203) 431-6850.

WANTED: 5 meter for Hallicrafters S-40 or S-40A. Lloyd Mallory, VE9LRM, POB 270, Cocagne, NB Canada. (506) 576-7758

WANTED: Meters for RT-834/GRC-106, AM-3349/GRC-106 & MD-522A/GRC, part of AN/GRC-142-C hut. Edward J. White, WA3BZT, 809 Seymour Rd., Bear, DE 19701-1121. (302) 322-1313

WANTED: Dynaco PAS-3 stereo pre-amp for Dynaco ST-70 pwr amp. Brian, NY, (315) 788-2866.

WANTED: Mics-Shure 545S, 54PE/D, 588, 533VC-Hi/dual Imp.; Turner BX/D, CX/D, VT-73, EV641, 638, 619, 605-Hi Imp. Ready buyer. Tom Ellis, Box 140093, Dallas, TX 75214. (214) 328-3225. Fax, 328-4217

WANTED: Military TV-2 or TV-7 tube tester. John, W7KPA, 2445 S. Hillsdale Dr., Springfield, MO 65804. (417) 889-0233

WANTED: 75S3B/C, RE. John Miller, AK, (907) 337-9157.

WANTED: Clean KWM-1 at reasonable price for my personnel station. Michael Crestohl, KH6KD/W1, 263 Nahant Rd., Nahant, MA 01908. (617) 581-5479

WANTED: Harvey Wells R-9 rcvr, Z-match, AC sply for T-90, (2) 6KD6 tubes. John, KF7OM, NV, (702) 727-8171.

WANTED: Collins mechanical filter adapters 353A-60 & 353B-60. Butch, KØBS, MN, (507) 288-0044.

FOR SALE: Announcing "Radio by Hallicrafters", the definitive book on the Hallicrafters Company & it's products, by Chuck Dachis 'The Hallicrafer Collector'. More than 200 pgs, over 600 photos & 10 years in the making. Available late March 1996, at $29.95 + S&H from Schiffer Publishing Ltd, 77 Lower Valley Rd., Atglen, PA 19310.

FOR SALE: Hallicrafters HT40 - $75; PM23 - $55; S38C-$65; number 19 spare tube caddy - $55; Heath IT5283 signal tracer - $35; IPA5280 pwr sply - $20; GE S22, no handle, works - $175; Lafayette D257, Bakelite, left wrap around horizontal grill bars, works, nice - $85; Philco PT2, nice - $45. **WANTED:** Collins 310B; Radiola 61-8 parts set. G. Steveres, WØATA, Box 704, Longmont, CO 80502. (303) 776-9036. SYWW90A@PRODIGY.COM

FOR SALE: HRO items: rare coils, spkr, xtal filter, knobs; Palomar VLF-1 converter; P-310-X preselector. Jim, K7BTB, Box 50355, Parks, AZ 86018. (520) 635-2117

FOR SALE: 1932-1992 QST in QST & Walter Ash binders - $1500, OBO; various ARRL books 50-60s; NRI radio course basic & advanced in three binders 1937 - BO. Jeff, KEØMT, CO, (303) 455-5658.

FOR SALE/TRADE: Drake 2NT xmtr & 2C rcvr - $225/pair; Millen NOS 90801 TX, Millen 90881 amp. **WANTED:** Millen 90711 variarm VFO, Stancor 10P. Tom Smith, N5AMA, 13034 Elmington Dr., Cypress, TX 77429-2062. (713) 376-3436 h, 957-6420 w

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

FOR SALE: Heathkit, RCA, Regency, parts, manuals, much more. SASE for list. John Hruza, KBØOKU, 2521 S. Holly St., Denver, CO 80222. (303) 758-4377

FOR SALE: AN/USM-338 oscilloscopes 75 Mc dual trace, government rebuilt w/all new accessories - $375 ea. Shawn Daniels, MO, (314) 343-5263.

FOR SALE: S-line (WE), NC300, SX100, TS430, Tristao 7' tower. Jim, MO, (816) 524-1541.

FOR SALE: Collins 75S3 (WE), exc. - $295; 312B3 (WE), exc. - $195; Drake R4A, exc. - $150; FS4, exc. - $250; RME VHF152, VG - $55; DB22A, VG - $50; DB23, G - $35; CME50063 (DB20) - $30; Hammarlund S200, exc. - $80; Nat'l SW54, VG - $45; Wells Gardner BC 348J, G - $75; Heath V1 - $25, 07 - $25; IT11 - $25. **WANTED:** F & G coil for HRO7; cabinet & rack handles for R388 (or 51J). Doug, WA, (206) 472-3478

FOR SALE: Heath HO-5404 station monitor scope, all manuals, looks new - $75, U shp. Joe, AB5LL, AR, (501) 257-2567

FOR SALE: Orig. manuals: SCR-522 - $22; USM-24 - $12; RM-27A - $8, ppd in USA. Geoff Fors, WB6NVH, POB 342, Monterey, CA 93942.

WANTED

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

WANTED: McIntosh and Thordarson amplifiers any condx. Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53228-0803. (414) 297-9310

WANTED: Help Vibroplex build its Company collection of Vibroplex bugs, keys and memorabilia. Call Mitch, WA4CSR, at The Vibroplex Co., (800) 478-8873.

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

WANTED: Collecting: Pre-1950 commercially built amateur gear; xmtrs, rcvrs & accessories. Dean Showalter, WA6PJR, 72 Buckboard Rd., Tijeras, NM 87059. (505) 286-1370

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

WANTED: Old microphones, w/w-out stands, in any condx. Rick, KF5NU, 9831 Troulon Dr., Houston, TX 77036. (713) 774-5102

WANTED: Coils for Hallicrafters HT-6; Delco 5300, PRC-64 or RS-6 dead or alive. Gary Cain, W8MFL, POB 521, Shakopee, MN 55379.

WANTED: Wells-Gardner BC-348N, J or Q parts rcvr. Pete Hamerstna, WB2JWU, 87 Philip Ave., Elmwood Park, NJ 07407.

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

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

WANTED: Interesting Navy stuff, xmtrs, rcvrs, radar, etc. Bigger is better! Surprise me! William Donzelli, 304 S. Chester, Park Ridge, IL 60068. (708) 825-2630 integra@aol.com

WANTED: Information from the following WRL catalogs: '37, '38, '39, '46, '47, '48, '50 & '63. If you can help call - Leo Meyerson, WØGFQ, CA, (619) 321-1138.

WANTED: Hallicrafters S-40, 52, 77, 5R30A, S-72L. Radio should be orig. & in exc. condx. Takashi Doi, 1-21-4, Minamidai, Seyaku, Yokohama, Japan. FAX: 011-8145-301-8069

WANTED: Knight kit Ocean Hopper regen rcvr, state condx & price. I have coils. David R. Mazza, KB9EL, 366 S. McKinley, Kankakee, IL 60901. (815) 933-8824

WANTED: Bandswitch & volume knobs for Hallicrafters S-53A & spkr mounting bolts for Hallicrafters S-19R rcvrs. Alan Johnson, N4LUS, 2490 Sharon Way, Reno, NV 89509. (702) 826-8167

WANTED: Drake 1A; Viking Adventurer TX, TBS-50, CE 100V. Fred, W6YKM, CA. (209) 296-5990.

WANTED: R24/ARC-5 (.52-1.5 Mc) military air navigation rcvr. Mike, AC5P, POB 33, Bartlesville, OK 74005. (918) 333-2795

WANTED: Manual &/or schematic for Flesher TU-300 tuning unit, copy OK. Jay Budzowski, N3DQU, 109 S. Northview Ave., New Castle, PA 16102.

WANTED: Globe HG-602, HG-303, VFO Deluxe; Hallicrafters SR-46A; Ameco TX 86. Al Bernard, POB 690098, Orlando, FL 32869-0098. (407) 351-5536

WANTED: ATA xmtr CBY 52211, 7-9 MHz (looks like ARC-5). Ken Kolthoff, K8AXH, 5753 David Pl., Fairfield, OH 45014-3507. (513) 858-2161

WANTED: Hallicrafters spkr model R46 or 46A for SX100. Please advise. Daniel Seidler, 3721 W. 80 St., Chicago, IL 60652. (312) 284-8221

WANTED: RCA AVR5A, AR60, Western Electric or equipment marked Civil Aeronautics pre-WW II. James Treherne, 11909 Chapel Rd., Clifton, VA 22024. (703) 830-6272

WANTED: S-meter for 75A4 (or A3). John Casale, WA2FHL, 3 Pickering Ln., Troy, NY 12180. (518) 272-3631

WANTED: Single gang 365 pF variable caps; Allied Radio Circuits Handbook; small HB AM/CW xmtr. Dave Dameron, KG6BP, 819 Boundary Pl., Manhattan Beach, CA 90266-6621. (310) 318-5311

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

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

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

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

WANTED: WW II Japanese xmtrs & rcvrs (and parts) for restoration and ER articles, information on T1083 30's vintage British aircraft xmtr. Ken Lakin, KD6B, POB 310, 701 SE Salmon Ave., Redmond, OR 97756. (503) 923-1013, e-mail klakin@aol.com

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

WANTED: Globe King 500, A, B, or C xmtrs, any condx., reasonably priced. Terry Collins, KB9AUP, 18 N. Tomahawk Ave., Tomahawk, WI 54487. (715) 453-3707 d, 453-4633 eves

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

WANTED: Function switch (rotary) for Hallicrafters HT-40, p/n 060002260. Chuck Brumley, KB2SWI, 32 Glenwood, Saranac Lake, NY 12983. (518) 891-5704

WANTED: Hallicrafters SX-62; Hammarlund HQ-180; Gonset Commander. Clean equipment only, please. Rich, MA, (508) 473-3513.

WANTED: Schematic for Bendix RDF type RA-1B. Tom, KE6RYE, 176 E. 229 St., Carson, CA 90745. (310) 834-7558

WANTED: Signal generator HP model 606A; tube tester. John, N7ZMG, WA, (206) 775-5043.

WANTED: Hallicrafters TW500 & 1000 parts sets; military ARB rcvr; Philco model 118 escutcheon. Robert Haworth, W2PUA, 112 Tilford Rd., Somerdale, NJ 08083. (609) 783-4175

FOR SALE: Surplus radio publications, good to exc: Surplus Radio Conversion manual, Evenson & Beach, Vol. 1 (1948) - $25; Vol. 2 (1948) - $25; Radio Surplus A LA 73, 73 magazine (March 1970) - $15; 73 magazine, special surplus catalog issues, (June 1963, June 1964, June 1966, June 1968) - $15 ea; CQ Anthology "The Best of CQ 1945-1952 (1958) - $15; Command Sets, editors of CQ magazine (1957) - $35; tuning unit, B&W oscillator-multi. assembly model 15000A (T-368 xmtrs) - $85; BC-455-B rcvr, 6-9.1 Mc, bright aluminum, unmodified, w/o dynamotor, w/spinner knob - $75; BC-459-A xmtr, 7-9.1 Mc, bright aluminum, unmodified - $75. Derek, KI6O, 5191 Rimwood Dr., Fair Oaks, CA 95628. (916) 965-4904

FOR SALE: Last four, Collins PM-2 pwr splys (for KWM-2's), average - $50; remaining PM-2's, complete but need work such as clean-up, cabinet repaint, fuse holder/pwr cord replacement, etc., (xmfr/choke/output plug guaranteed good), new pwr cord/fuse holders included where needed, great for back-up splys where less-than-perfect will suffice, and you are willing to do some refurbishing - $35; four for $120, call for info; NIB dial assemblies for KWM-2/S-line - $50; used 4D32 tubes - $25; NIB RCA 807's - $7; Collins directional couplers w/3" sq. RF wattmeter meter, like in SC-101 console and early Collins wattmeters, used coupler/new meter - $50; Linear Systems model 250-AC solid state pwr sply for S-line/KWM-2, etc. - $150; three first class stamps w/label for ten page parts/equipment list. Derek, KI6O, 5191 Rimwood Dr., Fair Oaks, CA 95628. (916) 965-4904

FOR SALE: Repair of TV-7 tube testers w/ calibration. I will fix & then verify calibration of your TV-7 tube tester for $45 + all shpg or return at no charge. Daniel Nelson, 1025 E. Desert Ln., Phoenix, AZ 85040. (602) 243-7421 eves. dpn@indirect.com

FOR SALE: National NCX-1000, factory incomplete unit, w/meter, hardware, RF components, etc. - $35 shpd. George, K1ANX, MA, (413) 527-4304.

FOR SALE: Homebrewers, custom chassis & panel fabrication, 15 years prototype tech experience, vacuum tube literate. Brian, KA9EGW, IL, (708) 487-5359/FAX 487-5424.

FOR SALE: Unassembled Heathkits: ID-5001, IDA-5001-1, IDA-5001-2, IDA-5001-3, IDA-5001-4, IDA-5001-5 weather computer/accessories - $750 + shpg or BO. WB8IPG, MI, (810) 362-2656, FAX, 362-2706.

FOR SALE: SX28, VG - $225; SX99, VG - $95; SX140, panel like new, works good, cabinet needs refinish, manual - $65; SX71, nice panel, works good, copy of manual - $95; SB310 w/SB600 spkr, like new, manual - $120; DX40, works well, panel needs TLC - $40. U-shp. Dick Dixon, W7QZO, 16032 Lost Coyote Ln., Mitchell, OR 97750. (541) 462-3078

FOR SALE: Collins 30L-1 (WE). **WANTED:** Repairable Johnson & Hammarlund gear. Larry, N4QY, 170 Heritage Ln., Salisbury, NC 28147. (704) 633-3881

FOR SALE: Tube list, new & used, wide variety audio, ham. Recently expanded. SASE 52¢. Bill McCombs, WB0WNQ, 10532 Bartlett Ct., Wichita, KS 67212-1212.

FOR SALE: 118C-610 tuning units, TU-47 through TU-53, various condx., SASE for list. Jim Miccolis, N2EY, 126 Summit Ave., Upper Darby, PA 19082. (610) 352-5247.

FOR SALE: Gonset G-66B & #3069 AC & DC pwr sply, G-77 & #3117 modulator-DC pwr sply w/ cables, plugs, brackets & manuals - $200; Gonset Super 12 converter & manual - $25; Gonset 11-10 meter converter - $12; Jackson 637 tube tester - $40; Millen 92101 preamp & 10 meter coil - $30; Hallicrafter R-51 spkr w/clock - $65; R-274/URR (SX-73) manuals NOS 100 pgs - $13 mailed. Dan Mason, R.R.1 Box 204F, Santa Fe, NM 87501. (505) 455-3416.

FOR SALE: RME-6900, VGC+ - $200; Swan VFO210, VFO-508 - $150 ea; Collins CF-1 - $130, misc xtals - $8 ea; Drake AC-4 - $95; D-104 - $30. WA1APX/8, MI, PH/FAX (810) 781-9717.

FOR SALE: HQ180C, VG, orig. manual - $250; SX122A, VG - $150; SX110, VG - $125; Howard 435, G - $95; RME DB20 preselector, matching RME 69 G - $75; Allied AX190, G - $75; Allied R100A, F, needs restoration - $50. **WANTED:** Pre-war National items, particulary AGS, FB7 coils. Cash or PU prefered or plus shpg. Larry, CA, (310) 860-3131, after 7 PM PST weekdays.

FOR SALE: Bakelite panels cut to order, please send size required for price. Parker Heinemann, W1YG, 87 Cove Rd., Lyme, CT 06371.

FOR SALE: Eico 666 tube checker, good - $75; Eico 667 tube checker, exc - $100. Bill Riley, W7EXB, 863 W 38th Ave., Eugene, OR 97405. (541) 345-2169.

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

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

FOR SALE: "Teletype" T-shirts. The Teletype Corporation's "T" symbol in black on a yellow (what else?) Hanes shirt - $15 ppd. Sizes L or XL only. Jack, WA2HWJ, NJ (201) 927-7784.

FOR SALE: Hallicrafter manuals. Most photocopies - $5 + $1 shpg; Johnson, Heath, WRL, others. SASE for list. DSM Diversified, 909 Walnut St., Erie, PA 16502.

FOR SALE: New orig. PJ-068 mic plugs for Collins S-line/KWM-2A/HF-380 shp'd in USA - $8 ea. Clint Hancock, KM6UJ, 6567 Ashfield Ct., San Jose, CA 95120-4502.

FOR SALE: HP-606A RF signal generator, stable, verbose specs in last ad - $115; HP-606B, dittos - $145; AN/URM-25D military RF signal generator, 0.01 through 50 MHz - $75; TEK 7000 series scope plug-in extenders: rigid - $140, flexible - $150, very good condx; TEK 6013 high voltage scope probe/case, 1000X, 12 kv, approx. 80 MHz - $70; TEK TM503 3 bay cabinet, hold 3 each 500 series plug-ins - $60; TEK FG501 function generator - $85; Fluke: 8000A 3.5 digit multimeter - $45, 8600 4.5 digit multimeter - $55, both powered by AC & nicad, as is; 538 rcvr - $15, Hickock Cardmatic 1188 (tester only) - $50, Cardmatic 121 w/cards - $45; Heath HR-10 rcvr - $15, HP-200CD - $20, HP-3400A rms voltmeter - $35, + UPS for all items. **HELP:** Need manual copy/schematic for Krohn-Hite pwr sply UHR-240 & DC-500 kHz tube amp RCA-50. **WANTED:** HP-4800 vector impedance meter; extender cable set (Service kit HP-11592A) for HP 141S/855X/8552B spectrum analyzer; TEK P6009 100X scope probe; two 7STH tubes. Stan Krumme, KO6YB, 16432 Lakemont Ln., Huntington Beach, CA 92647. (714) 841-5866.

FOR SALE: Drake 1A - $300. **WANTED:** McMurdo-Silver rcvr. John Hurst, KU6X, 2512 Euclid Crescent E, Upland, CA 91784.

FOR SALE: Broadcast xmtr Raytheon RA-1000 1 kw, uses two 833A finals driven by a pair of 813's, modulators are a pair of 833A's, size 7 ft tall, 4 ft wide, 3 ft deep and heavy, single phase, cosmetically it could use a little paint but electrically everything is intact, have copy of manual. I need this thing out of my garage. PU only - $750. Bill Lambert, AK4H, 8917 NC 50 N., Benson, NC 27504. (919) 894-4659 d, 894-3352 eves.

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

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

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

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

FOR SALE: Legends of Amateur Radio, a 42 minute video featuring W6HX, K6OJ and W6EA. "Tall Tales and Big Antennas", produced by the Southern California DX club "...enjoyed running it" - Hugh Cassidy, WA6AUD - $10 + $3 shpg. Please send check and make payable to: Harvey Laidman, N6HL, 4923 Encino Terrace, Encino, CA 91316.

FOR SALE: Forest Service c1940 SPF, HF pack radio - $125; xfmrs: 1100VCT, 800 mA - $45; 1230VCT, 500 mA - $45; 1290VCT, 400(?) mA - $35; 1510VCT, 200(?) mA - $35; 14500VCT, 200(?) mA - $35; 30V, 50 amps - $55; capacitor, 17.0 mFd, 5000VDC - $20; metal T-17 mic - $18; T-32 carbon desk mic - $25; Avionics: Nova54ar "Aerosear" - $20; Narco "Superhomer" - $20; TCS rcvr/xmtr, parts units - $15 ea. U-shp. WA7HDL, ID, (208) 756-4147 after 1730 MDT.

FOR SALE: Johnson KW matchbox/meter/manual, VGC - $225; Ameco TX-62 - offer. Dan Greeson, KH6P, 98-1145 Kahapili St., Aiea, HI 96701. (808) 486-8879.

FOR TRADE: National FB-7 w/80/40/20 coils; FT-154 shockmount for BC-348; Heath HD-1410 keyer. Tom Brent, Box 1552, Sumas, WA 98295. (604) 826-4051.

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

FOR SALE: Radio tubes; repair and restoration of all vintage amateur and commercial radios, 25 years experience. Herbert Stark, 321 N. Thompson St., Hemet, CA 92543. (909) 658-3444.

FOR SALE: Eico 950 RC Comparator/Bridge, VGC w/manual - $30; Eico 147A signal tracer, VGC w/manual - $30; Heath IT-11 cap checker, good w/manual - $30; Sencore TC-136 tube tester, good working condx w/1972 data - $60. Shpg extra. Bill McCombs, WBØWNQ, 10532 Bartlett Ct., Wichita, KS 67212-1212. (316) 722-7669.

FOR SALE: Hallicrafter R46B skr - $45; Collins T/R relay new #410-0134-00 - $40; Drake TR4C w/fan & AC4 - $225; 813 tube - $15; Eimac 250T tube - $25; 807 RCA new - $7; 137 handkey w/clamp - $15; ceramic antenna insulators 4" - 75¢ ea; National NCX3 for parts - $45. List available for SASE. **WANTED:** Meter for Yaesu FL-2100B. John Kakstys, 18 Hillcrest Ter., Linden, NJ 07036. (908) 486-6917.

FOR SALE: Xmtg & rcvg tubes; 118 NIB; 33 unboxed new or used; 826, 872A, 7360, 4X250F, 5, 6, 12 volt series, etc. - $350 + UPS. Bill Coolahan, 1450 Miami Dr. NE, Cedar Rapids, IA 52402-2933. (319) 393-8075.

FOR SALE: Ham Price Guide: over 2500 items priced - $9.95 US, $11.50 Canada, $14.95 other; Tube Type Xmtr Guide is still available, 550 pictured items described - $17.95 US, $19.95 Canada, $29.95 other. Californians add sale tax. Sound Values, POB 9, Auburn, CA 95604.

FOR SALE: R-390A/URR orig. Dec 1961 maintenance manual TM 11-5820-358-35, 189 pgs - $28 incl. priority mail. Aben, POB 4118, Jersey City, NJ 07304.

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FREE: Need antique radio/transmitter parts, tubes, schematics, repairs? For flyer send 2-stamp LSASE to Olde Tyme Radio Co., 2445 Lyttonsville Rd., Site 317, Silver Springs, MD 20910. Phone/Fax (301) 587-5280

FOR SALE: T-368; Ranger; Valiant; Invader 2000 rebuilder; partially built SB220 kit; Warrior; Apache; B&W 5100; T-150, T-60, DX35, VF1, HG10, AF68/PMR8; Eldico twins, SX25, SX110, SX101, R-100; Eico: 720, 723, 722 VFO, 730 modulator; Layfayette VFO; HR10B; Drake 2B; R390A; SP600; Galaxy 5MK2; GT550 stations; R530 rcvr; T-368 modulator deck & pwr sply deck - $175 ea. Dick, WØEX, MO, (417) 469-3347.

FOR SALE: Over 300 items never offered before. Hallicrafters; Breting; National; Sargent; Swan; Patterson; Hammarlund; Drake; & more. Send SASE & FAX # if any. No phone calls please regarding this list. WB6SZS, 105 Donnington, Auburn, CA 95603.

FOR SALE: 75A-4 MHz drum decals. Both old & new, buff color, install instructions - $8.50 ppd. W3HM, Rt 3, Box 712, Harpers Ferry, WV 25425.

FOR SALE: WW II radios, radars, bombsights, manuals, more, 50 page catalog - $2 US, $5 foreign. Sam Hevener, W8KBF, "The Signal Corps", 3583 Everett Rd., Richfield, OH 44286. (216) 659-3244

FOR SALE: Radio & electronics related books, 160 titles, call or write for list. Paul Washa, WØTOK, 4916 Three Points Blvd., Mound, MN 55364-1245. (612) 472-3389

FOR SALE: Drake SPR-4 front end parts, PTO w/ dial, osc mixer board, FL board, band switch w/23 xtals, T8, T9, T10, T11, T15, T16, T17, PBT xfmrs - $100 ppd. W3HM, Rt 3 Box 712, Harpers Ferry, WV 25425.

FOR SALE: HP audio amp; Vibrokeyer, MFJ keyer; 200 W resistors; Pickett slide rule; ER mags; ARC mags; RadioNews; QSTs; CQs; Ham Radio; 73; Allied catalog; Radio & Jones handbooks, How To Become a Radio Amateur; Golden Classics of Yesterday. Tom Waters, 3703 Bonview Ave., Baltimore, MD 21213. (410) 488-5356

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

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

FOR SALE: Gonset GSB101 linear, NC125, HW16, Heath Q-mult., HC10 slicer. John, W9CN, 420 Patrick Ave., Merritt Island, FL 32953. (407) 452-7904

FOR SALE: RME 45B general coverage rcvr; RME DB 22A preselector-RF amplifier; RME OEM spkr, includes orig. manuals for 45B & DB 22A. Rhett Downing, KJ7IM, 954 N. McCue #159, Laramie, WY 82070. (307) 721-3022

FOR SALE: HRO 60 w/11 plug-in modules - $400, PU only. E-mail via Prodigy ID ESDF04A Joe Goodof, W8YPW, FL, (941) 649-6301.

FOR SALE: Scott 388B rcvr - $300; Altec Valencia III ensemble - $375. **WANTED:** Heath Pawnee xcvr. Paul, WB7SWR, 3103 Arrow Pl., Las Vegas, NV 89108. (702) 646-9041

FOR SALE: Huge stock, new variable & fixed air capacitors, xfmrs at bargain prices. Send SASE for list; two Eico tube testers, one model 666, one 667, exc. condx. Bill Riley, W7EXB, 863 W. 38th Ave., Eugene, OR 97405.

FOR SALE: Very rare brown glazed 4 prong jumbo sockets. **WANTED:** KWM2/A wired vector socket for Magnum Six speech processor. Bob, KL7HDY, AK, (907) 346-1044.

FOR SALE: Radiola 18 w/100A spkr ,tubes - $150; Grebe Synchrohpase w/tubes - $200, both work. PU only at Milton-Freewater, Oregon, swap meet March 17th. Pat Stewart, W7GVC, 1404 Ruth Ave., Walla Walla, WA 99362-3558.

FOR SALE: Fan bracket for KWM-2/32S-? lowers the internal temp 20° C using two 60mm micro-bower fans (ER#71). Drop-in, no mods - $15; replica Ocean Hopper front panel - $20. All ppd. DWI Engineering, POB 3611, Costa Mesa, CA 92628-3611.

FOR SALE: Fiberglass rods, 5/8" dia., 13' long, UV resistant, good standoff insulators, twinlead spreaders, ten ppd - $10. Ron, K5YNR, NM, (505) 327-5646.

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

FOR SALE: Collins 32V-3 orig. manual, exc. appearance & working - $550 US. Don, VE6XF, Box 1004, Red Deer, AB, T4N 6S5, Canada. (403) 341-6071.

FOR SALE: RCA CR91/AR88 rcvr - $250; Geloso G209 - $200; Harvey-Wells TBS-50A - $85; Heathkits: HO10 scope - $40; Q-multi - $20; AM2 SWR bridge - $20; HD-19 patch - $30; assorted ARRL publications; misc books. Larry, VE3RF, Canada (519) 632-7921 eves.

FOR SALE: Collins 75S-1, WE, VF-exc Q multi notch - $300 + shpg. John, AK, (907) 337-9157.

FOR SALE: Collins embroidered grey baseball caps, winged or meatball - $15 ea or both for $27. Outside US enquire. Mail check to Ridinger's Enterprise, 3487 Bayberry Dr., Chino Hills, CA 91709-2817.

FOR SALE: Galena crystals & homemade galena crystal radios; & parts for same. L. Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150. (716) 873-0447.

FOR SALE/TRADE: WW II jeep radios model BC-620 & pwr splys, all in very good (operating) condx.; various handsets, headsets, mics, vibrators, tubes, antennas, compenents & adapters for both BC-620 & BC-659 radios. SASE or call for list. Ed Guzick, 916 Lenox Rd., Glen Ellyn, IL 60137. (708) 469-3183.

FOR SALE: Hammarlund HX-50 late serial - $200; HQ-170A/C w/spkr - $225. Each w/manuals & extra set of tubes, both exc. condx. Warren, WS5E, (TX) (214) 686-4414 h; 520-7799 w.

FOR SALE: Hammarlund HQ110, or trade for National general coverage rcvr. Hoover, SC, (803) 726-5762.

FOR SALE: T4XC, AC4, R4B, MS4, mint - $400 + shpg. Gary, N0SH, LA, (318) 878-8032.

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

WANTED: SP400; EH Scott rcvr; only in very good condx. Jose Cangas, EA4JL. Contact in States Kurt Keller, CT, (203) 431-6850.

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

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

WANTED: Audio xfmrs manufactured by UTC; LS-10, LS-10X, LS-47, LS-47X, LS-56. James Owens, NWØO, 1363 Tipperary St. RR 3, Boulder, CO 80303. (303) 673-9019

WANTED: Very good-mint EFJ Ranger II; CQ magazines- May & Sept, 1945; Hammarlund XC-100P xtal calibrator; 1975 WRTVH. 1-800-225-0256, ext 14733.

WANTED: Heath C3 manual copy; various knobs for SR400; GSB201; Valiant II; SM3 mic element. Bill, KE7KK, 6712 Lake Dr., Grand Forks, ND 58201. (701) 772-6531

WANTED: Heath DX-35 in good to exc condx. Please call or write w/condx & price. Richard D. Cohen, 11802 Willow Point Way, Tampa, FL 33624. (813) 962-2460

WANTED: Drake C line; TR4CW/RIT; 2B late production, very clean. K8OW, 11456 Forty-niner Cir., Gold River, CA 95670. (916) 635-4994

WANTED: Collins KWM/HF-380; AC-381 4.3 kHz filter. Koji Mitoshi, 456-33, Kamimobara, Mobara-City, Chiba 297, Japan. Tel/Fax 011-81475-24-9115

WANTED: Collins S-line filters: F455FA-05, #546-9494-00, &/or F455FA-08, #546-9446-00. B. Lee Cornwell, KD3KD, HCR 1, Box 95, Mt. Pocono, PA 18344. (717) 839-2710

WANTED: Reward for National SW-4, has 4 tubes but only one set of coils. Robert Enemark, POB 1607, Duxbury, MA 02331. (617) 934-5043

WANTED: Old tube amps, spkrs & xfmrs by Western Electric, Altec. Have Hallicrafters SX9 w/ cabinet to trade. Mike Somers, 2432 W. Fargo, Chicago, IL 60645. (312) 338-0153

WANTED: RCA AVR5A, AR60, Western Electric, or equipment marked Civil Aeronautics or any airline. James Treherne, 11909 Chapel Rd., Clifton, VA 22024. (703) 830-6272

WANTED: P's & parts for Heath/National: Heath HP-24 AC pwr sply for HA-14; National E & F coil for HRO-50; National A & AC coil for HRO-60. Taka, CA, (415) 697-6719.

WANTED: Wiring info on UTC modulation xmfr type VM1. K1EYY, 259 Walker Rd., Cabot, VT 05647.

WANTED: Conset model 3201 pwr sply & modulator; Eico model 722 external VFO. John Lewis, WB9NWO, 3526 N. Elmcroft Terr., Peoria, IL 61604. (309) 685-5865

WANTED: For restoration of WW II Taylor-Craft L2 or L2B, radios RCA AVR-20 & AVT20 or Learadio AMT-12 & AMR-12 w/AMG-12 pwr sply. Leads to any above equipment gratefully accepted. Richard N. Pann, 2447 Yates Dr., Augusta, GA 30906. (706) 798-7279

WANTED: TBY-7, BC-222, WW II Japanese, German military radio of any kind. Takashi Doi, 1-21-4, Minamidai, Seyaku, Yokohama, Japan. FAX: 011-8145-301-8069.

WANTED: Drake 2BQ spkr/Q-multiplier; manual or copy for HG-10B. Myron Cherry, WM4Z, Rt 2 Box 159, Tahlequah, OK 74464. (918) 456-9573

WANTED: Military surplus "Basketweave" wire mesh tube pullers. Ray Mote, W6RIC, CA, (805) 985-6048. rmote@train.org

WANTED: National SW-3 (or SW-?), gd-exc, w/ ps & coil sets. Jack, AL, phone/FAX (205) 881-6646.

WANTED

Vintage AM equipment for personal use. Must be collector quality or mint. Prefer Collins, will consider others. Bob Tapper, NØIMH, Box 61538, Denver, CO 80206. (303) 740-2272, FAX (303) 777-6491

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FOR SALE: BC-348 manual: orig. USAF T.O. for operation, installation, troubleshooting, maintenance, brand new (collector's item itself) - $32 ppd, bookrate. Military Marketing, Inc., Box 741, Norcross, GA 30091-0741.

FOR SALE: Scopes: HP1725A, 275 MHz - $750; TEK 7603 system - $350. Cory, N2AQS/AFA4TZ, 1000 E. 14th St., Bldg 178, Plano, TX 75074-6249. (214) 751-7535. hinec@ccgate.dl.nec.com

FOR SALE: B&W 380 T/R switch - $20; Drake RV3 - $65; DC4 - $65; HS7 headsets - $45; B&K 747 transconductance tubetester - $50; Autek QF1A - $40. Frank Scutch, WB4AYJ, 11780 NW 24th St., Plantation, FL 33323. (954) 472-9474

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TRADE: Orig. manuals NC-100ASD, RBL-2 & RCE-3 for other National manuals, catalogs, literature, etc. Hank, KD6TJQ, CA, (805) 498-8907 QuailHill6@aol.com

FOR SALE: T-368F (no tubes), PU only - $495; homebrew 810, 805 mod & ps - $250; R-392, LS-166, spkr & pwr con - $225; Hallicrafters HT44 & ps & SX117 - $400; BC-611F new in orig. box, SCR-625H mine detector in carrying case - $175; Boonton 260A Q meter - $200; Heath HR10-B w/HRA-10-1, DX6013 & HG-103 - $300; measurement model 59 UHF head - $100. George, K1ANX, MA, (413) 527-4304.

FOR SALE: Pristine Collins KWM-2 system, 312B5 VFO, 516F2, PM2, 516E1 pwr splys, 351D2 mobile mounting kit - $1800; Drake 2C, 2CQ & 2NT xmtr, re-painted covers, new tubes, alignment also in perfect condx. - $425; Drake C line, all filters, xtals, new tubes, panels knobs & repainted covers - $550; National NC183D fully restored to new condx. - $425. All shpg extra or PU in Ohio or Dayton Hamfest. Paul, OH, (513) 773-9550 after 6 PM.

FOR SALE: R390, R390A, R391 manuals (copies). **WANTED:** Tube CB's; RCA Theremin; Fisher Spacexpander reverb. Charles Zafonte, N1FRX, RR3, Box 2075, Fort Kent, ME 04743. (207) 834-6273

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FOR SALE: Hammarlund equip: complete station, HQ-170A w/24 hr clock, HX-50A xmtr (doesn't have 160), HXL-1 linear, mic, manuals & service bulletins & updates - $850; Hammarlund RGB-2 rcvr (military version of the HQ-129-X) - $275. All equip is exc. shape cosmetically & electrically. Shpg negotiable. Kim Herron, 16141 24th Ave., Coopersville, MI 49404. (616) 677-3706

FOR SALE: Patterson PR15 - $325; HRO500 - $1000, SB220, like brand new - $650; SP44, needs xfmr - $150; Hallicrafter S108 w/box - $225; S-85 - $125. All is VG to exc condx. Jim Weil, 824 Heather Lake Dr., Clarkston, MI 48348-3648. (810) 391-7687, voice/FAX

TRADE: Collins broadcast, rare 60H mixer w/212Y remote amp in singel case, orig. canvas bag. Trade toward good 75A-3/4. Dave, K4IST, FL, (904) 477-8500.

FOR SALE: 75A small skirted knobs, NOS - $1.50; RG-213/U coax, new, 150 ft rolls - $38. Lowell Thomas, AA6ZD, POB 15026, Fresno, CA 93702. (209) 227-1605

FOR SALE: Triplett model 630 (1948) volt-ohm-ammeter, book & box, looks new, in storage for years - $95 shpd. James B. Geer, WB5LXZ, 1013 Overhill, Bedford, TX 76022-7206. (817) 540-4331

FOR SALE: Collins 75A4, 4:1 tuning - $800; 75A2 - $350; Hallicrafters SX-42 - $75; R-42 spkr - $45; S-36, rough - $25; ARRL Handbooks: '46, '49, '51, '53, '54, '56, '57, '59 - $15. Mark Hovda, NØJWI, POB 10091, Cedar Rapids, IA 52410. (319) 364-4048, 7-9 PM CDT

FOR SALE: I have the following radios, please call for specific details: (3)HQ-129; National NC-300; SP-600 JX-13; BC-603. Joe, NY5Z, UT, (801) 393-6840.

FOR SALE: Ham Radio Magazine, 1980 thru June 1990, complete - $20 + shpg. Francis Waggoner, W2PTI, 268 Barben Ave., Watertown, NY 13601. (315) 788-1621

FOR SALE: Hallicrafters SX-110, exc - $100; S-108, exc - $85; S-85 & 86, VG - $60 ea; FPM-300, VG - $140; Drake R-2B w/2BQ, VG - $100. Don Jeffrey, POB 1164, Monrovia, CA 91017.

FOR SALE: Viking mobile, Cheyenne MT-1; PDR-275 radiation counter, URM-32 frequency meter, ARC-5, military radio misc/manuals. Henry, KD6KWH, POB 5846, Santa Rosa, CA 95402. (707) 544-5179

FOR SALE: Stancor 55C028 mod xfmr (for BC-610). **WANTED:** R/S DX-440, DX-60 manual/copy. Rick, K8MLV/Ø, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

FOR SALE: AN/USM-159A frequency meter - $50; military terminal (unused) Tadiran TER-100 - $300; military antenna coupler CU2351 (unused) - $600; Millen dip meter 90651 - $60; Astatic mic D104 w/T-UG9, NIB - $70; T-UG8 stand, NIB - $50; D104 w/T-UG8 - $40; Racal RA117E, British Navy version, mint w/case - $1300; Racal TA99 1 kW linear amp - $600; Creed 444 teleprinter, like new, in orig. box w/manual - $400. Nigel, AD4AG, 6735 Valley Court, Douglasville, GA 30135. (770) 949-1097 h, (404) 255-6790 x252 w

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

FOR SALE: National rcvrs NC-109, near mint w/orig. manual - $125; NC-140 exc w/manual (copy) - $150; Collins mech filters for R390A, 16 kc - $20; speed-X key w/Navy knob - $20; tubes: all NIB; 6AK5, 6AL5, 6AS6, 6AG5, 6AU6, 6AV6, 6U8A, 1X2, 0G3, 6K6GT, 6X5GT, 6K6GT, 6X4, 6088, any 10 for - $15; (2) 4X250B @ $20 ea; (1) 4CX250F @ $20 ea; (1) 2AP1 (CRT) - $15; 75TL - $25; 100TH - $35. All + UPS. Ron, KC6WTG, POB 783, Santa Rosa, CA 95402. (707) 539-8319

FOR SALE: 75A-4; 75A-2; R-388 w/PD; HQ-170; Drake 2-A w/2AQ; Valiant; GSB 100; Globe Scout 680-A w/VFO; Lafayette HA-225; Elmac AF-68; Knight T-60; Heath Sixer; Hallicrafters SX-43; SX-25; SX-100; 1949 Motorola TV; BC-610 plate xfmr. SASE for list. Joel Thurtell, 11803 Priscilla, Plymouth, MI 48170. (313) 454-1890 tele/FAX

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FOR SALE: Sampson CB circa 1960; R-101-A; T-110-A; M-10; Demco amp; Millen 90811 TX. WAØUKJ, MO, (314) 428-1963

FOR SALE: Philco tuner cams, have 3 - $8 ppd. R.J. Eastwick, N2AWC, 224 Chestnut St., Haddonfield, NJ 08033. (609) 429-2477

FOR SALE: Dow-Key TR switch, DKC-TRP - $45; Hallicrafters R-47 spkr - $40. U shp. Rob, NS6V, CA, (408) 464-0505, weekdays only.

FOR SALE: Johnson Pacemaker - $250; RCA AVT112A, AVA126, AVA120 - $150; signal gens: TS497B - $50; 1130 - $30. Mel, K2AOQ, 100 Stockton Ln., Rochester, NY 14625. (716) 671-0776

WANTED: HT32A or B xmtr, must be working & clean. Willing to trade cash, Viking Ranger, SX101A, SX100. Joseph K. Stern, W4LTT, 9313 NW 10th St., Plantation, FL 33322. (954) 472-7888

WANTED: Manual/schematic for Belmont REH, Crosley REO, REP; PRC-10 radio case, A model only; ARD remote; ARR-15 mount. Henry, KD6KWH, POB 5846, Santa Rosa, CA 95402. (707) 544-5179

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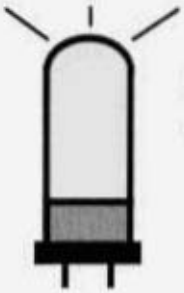

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