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ELECTRIC RADIO

celebrating a bygone era

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Don Buska, N9OO

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:
Bill Breshears, WC3K; Bob Dennison, W2HBE; Dale Gagnon, KWll; Bob Grinder, K7AK; Jim Hanlon, W8KGI; Brian Harris, WA5UEK; Tom Marcellino, W3BYM; Ray Osterwald, NØDMS; Chuck Teeters, W4MEW; Bruce Vaughan, NR5Q.

Editor's Comments

15 Meter Jamboree, May 4/5

It's time for another 15 meter AM Jamboree now that 10 meters is going into the summer doldrums. The weekend of May 4/5 seems to be free of other contests so lets all get started at the crack of dawn (wherever you are) and make this jamboree the most successful yet. The contest/jamboree will end when the band goes dead Sunday night. I describe the event as a contest/jamboree because some AM'ers like to see if they can make the most contacts. I'm kind of like that. Last contest I made 62 contacts over the weekend. I was rather proud of myself for having worked so many stations. This time I'm going to have prizes to the AM'ers that work the most stations (1st, 2nd and 3rd). The prizes will be ER T-shirts and a copy of the book *Hiram Percy Maxim* by Alice Clink Schumacher that we published a few years ago. As in all the other 15M Jamborees I suggest that we concentrate our operating between 21.400 and 21.450. This leaves a lot of band for the SSB'ers.

Vintage Field Day, June 8/9

Another reminder to get yourselves organized for this years VFD. And if you can't get on the weekend of 8/9 June let me pass on a suggestion I got from Dale Gagnon, KW1I. He says that we should make every (or any) weekend in June into a Vintage Field Day. I think that's a great idea. This way everyone will be able to find a way to get involved in VFD. And if you send in a report describing your 'personal' VFD I'll get it into ER along with the regular reports.

ER Goes Into 14th Year

It's really hard to believe that with this issue we finish up our 13th year. Shirley and I want to thank everyone for their help over the years. Without a totally dedicated readership and the many great contributors we have ER would never have lasted this long. On to the 14th year... N6CSW

TABLE OF CONTENTS

Cover: Founder and President of the James Millen Society, Don Buska, N9OO, operating a little CW with his personal James Millen equipment from the AWA Museum Annex a few days after the special event, using the W1HRX callsign. See the W1HRX article on page 36. ***Photo by Gary Carter, WA4IAM.***

West Coast SSB in 1933

by Jim Hanlon, W8KGI
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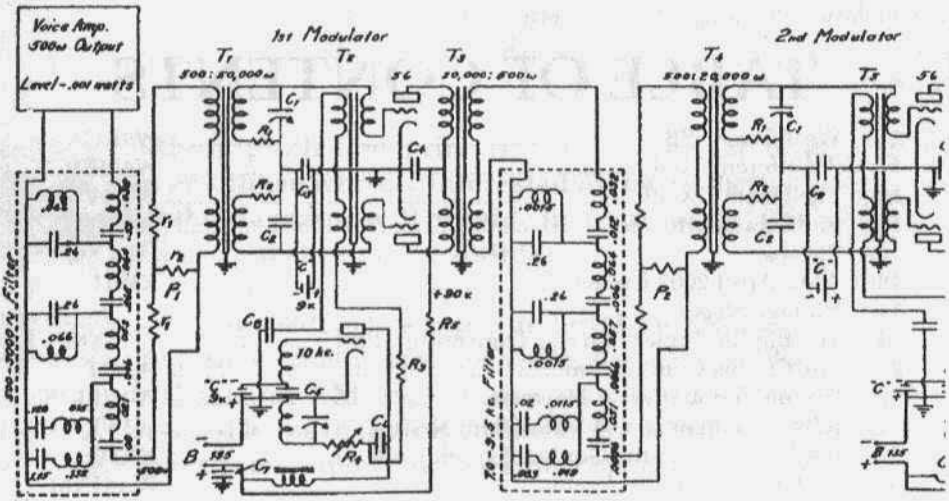
In an earlier ER article on "The Beginnings of Amateur Single Sideband[1]," I pointed out that although single sideband was invented by Western Electric and AT&T engineers in 1914, shortly after radiotelephone itself was developed, the current use of SSB by radio amateurs dates to much later, 1947, when Mike Villard put the first "direct frequency phasing" transmitter on the air from W6YX at Stanford University. I did mention that there was a group of "west coast amateurs" who were operating SSB around 1933, but I had not been able to find much out about them and it did not seem that the use of SSB had spread from their group to others as it did to all of ham radio beginning from Villard's work in 1948. Shortly after that article appeared in ER, Harry Hyder, W7IV, and Bill Fizette, W2DGB, were kind enough to send me copies of Robert M. Moore's articles from the September/October 1933, December 1933 and the first 1934 issues of *R/9 Magazine* spelling out the technical details of those early SSB transmitters. Moore was W6DEI and his address was 935 Palm Terrace, Pasadena, California, so he was undoubtedly one of those early west coast SSB hams. Then in ER for March 2002, Chuck Teeters[2] filled in yet another part



R_1—50,000 ohms
R_2—50,000 ohms
R_3—5000-100,000 ohms
R_4—5000-100,000 ohms (use maximum value possible)
R_5—10,000 ohms
R_6—5000 ohms

R_7—5000 ohms
R_8—10,000 ohms

C_1—250 μμfd.
C_2—200 μμfd.
C'—100 μμfd.
C''—75 μμfd.

of the early amateur SSB story with the news of Jim Lamb's report on SSB to the ARRL Board of Directors as published in truncated form in *QST*, October 1935.

So let's fill in the rest of the story by having a look at what kind of gear that "west coast" group built and put on the air.

You need to understand what amateur radio was like in 1933 to really appreciate what a feat it was for Moore and his companions to get on with SSB in those days. It was the depth of the Great Depression when only a handful of hams had the excess money needed to have a sophisticated station. According to Raymond S. Moore in his books, "Communications Receivers" and "Transmitters, Exciters and Power Amplifiers," most hams were using homemade regenerative receivers and one tube, self-excited transmitters in 1933. There were only a few, well off hams who had superhets, and those were mostly Hammarlund Comet Pros or National FB7s or FBXs. Indeed one can easily receive modern SSB signals on an FB7 and even on a regenerative SW-3 with a little finesse, but most of the 1933 era hams who were getting on phone were using a two or three stage rig with a 10 or a pair of them in the final and a modulator with a carbon mic, a couple of stages of audio, and a pair of 46 s running in Class B, newly developed in 1931. There were only a few tube types available to build with in those dear, departed days. My 1935 *ARRL Handbook* lists all of the transmitting tubes, triodes, tetrodes and pentodes, on a single page (38 tubes in all, many of them receiver audio output types). The listing of Standard Receiving Tubes takes up two pages and includes 55 types. This is a far cry from the 1060 listings of tubes on 37 pages in my 1948 handbook that were available to Mike Villard.

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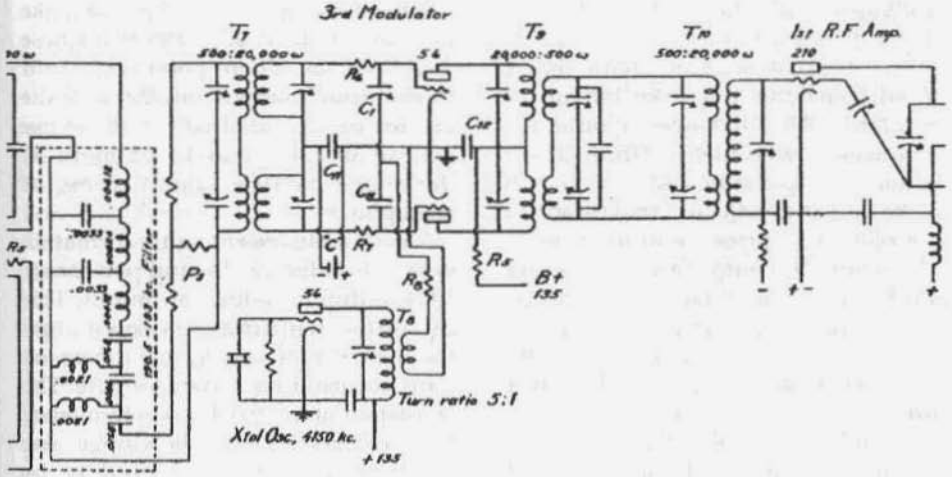

C_3—1 µfd.
C_4—2 µfd.
C_5—0.25 µfd.
C_6—0.1 µfd.
C_7—2 µfd.
C_8—0.25 µfd.

C_9—0.05 µfd.
C_{10}—0.1 µfd.
C_{11}—0.01 µfd.
C_{12}—0.02 µfd.

Ch_1—1.5 henry choke
Ch_2—0.07 henry choke

The SSB transmitter built by Robert Moore and described in *R/9* was far from a simple, three stage rig with a high level modulator, and it was a lot more complex than the on-frequency phasing transmitter that Villard pioneered in 1948. The entire schematic for his exciter was published in the first 1934 issue and I will send it along to Barry so that you can see it too. It is, as Moore acknowledged, an extension of Bell Telephone Laboratories developed, low frequency SSB "carrier" system technology that Ma Bell was using to stack multiple SSB signals onto the above-audio frequency range on long distance telephone lines.

Moore's transmitter starts out with a voice frequency amplifier with a 500-ohm output impedance and a 1-milliwatt output level. That amplifier feeds a 500 to 3000 cycle low pass filter made from iron core inductors and paper or mica capacitors and a T-pad resistive attenuator that adjust the audio drive level for the first balanced modulator stage to a lower level not really specified in the article. The filtered audio drives a twin triode (a pair of 227s or '56s) balanced modulator that is also driven by a triode 10 kc first carrier oscillator. This balanced modulator produces a lower sideband from 7 to 9.5 kc and an upper sideband from 10.5 to 13 kc and it is adjusted (balanced) to completely suppress the 10 kc carrier in its output. The output transformer on the balanced modulator converts its 20,000 ohm output impedance to 500 ohms and drives a second L/C bandpass filter that passes the 7 to 9.5 kc lower sideband and rejects the upper sideband. A T-pad resistive attenuator follows this filter that brings the signal level back down to original audio input level of the first balanced modulator. This lower sideband is then fed into a second balanced modulator, exactly like the first one except driven by a 200 kc second carrier oscillator. Its output is a lower sideband at 190.5 to 193 kc and an upper sideband at 207 to 209.5 kc and of course the 200 kc carrier is balanced out. Another output transformer converts the output of the second balanced mixer to 500 ohms where it is fed into another L/C bandpass filter that passes the 190.5 to 193 kc lower sideband and rejects the upper sideband. This output is fed through another T-pad into a third balanced modulator that is also driven by a crystal controlled 4150 kc carrier oscillator. The outputs of this modulator are a lower sideband from 3957 to 3959.5 and an upper sideband from 4340.5 to 4343 kc. The output of this balanced modulator is followed by a 75 meter tuned circuit, a 210 class A isolation amplifier, and several more tuned class B power amplifiers not shown on the diagram. The response of the several 75 meter tuned amplifiers is sufficient to reject the upper sideband and of course to pass the 3957 kc sideband. If you follow the conversion scheme through, you will find that the resulting 75 meter sideband is a "lower" sideband just like we conventionally use on the band these days. And as Moore points out, "our final output occupies only 2.5 kc of the precious 100 kc allotted for phone use instead of the 10 to 16 or more kc 'hogged' by the usual type of radiophone."

Moore includes enough information in his article for a well-equipped ham of 1934 to duplicate his transmitter. This includes winding his own low frequency interstage transformers on the cores of old audio transformers. The construction of the higher frequency transformers, T5 and following, is also covered in sufficient detail to be duplicated. In addition, the builder would need a Vacuum Tube Volt Meter with sufficient frequency response to measure the output of the various balanced modulators and oscillators.

It would be an interesting challenge

to recreate Moore's Single Sideband Transmitter and put it on 75 meters today. With a bit of scrounging one could surely come up with the parts, and the resulting signal should still be acceptable on 75. I can just hear the Yaecomwood guys when you tell them what kind of rig you are using. Maybe I'll have to try it in a couple of years when I have a little more time on my hands. ER

1. "The Beginnings of Amateur Single Sideband," Jim Hanlon, ER Number 112, page 20 & ff., August 1998.
2. "The Missing 1934 Single-Sideband Report," Chuck Teeters, ER Number 154, page 2 & ff., March 2002.

MRCG Seventh Annual Meet May 4, 2002

The seventh annual meeting of the Military Radio Collectors Group (MRCG) will be hosted by the Fort MacArthur Military Museum, San Pedro, Calif., on Friday and Saturday, 3 and 4 May 2002. This year's event will be designated as the KD6KWH Memorial Meeting in memory of the late Henry Engstrom. San Pedro is located on the south side of Los Angeles adjacent to the Los Angeles Harbor. The Museum is situated in Angles Gate Park near the ocean at Pt. Fermin. For driving instructions, maps and information on the Museum and the surrounding area please see the web sites listed below.

The theme of this year's meeting will be equipment operation, and to this end participants are encouraged to set up working displays and demonstrations. Friday will be devoted to equipment setup and display, operating events, and informal get-togethers on the Museum grounds. Special activities will include heliograph and signal light demonstrations and six meter fox hunts. One or more formal technical presentations may also be scheduled for this day. Saturday morning 0600 - 1000 has been set aside for those wishing to trade and sell parts and equipment and a BBQ lunch will be served 1100 - 1200.

For Saturday afternoon we plan to mount a field exercise involving a multimode base station at Ft. MacArthur, several outstations at selected locations in the surrounding area, remote participants (Bay area, etc.) and roving 'tactical' teams of 2 or more participants.

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Fort MacArthur Museum: http://www.ftmac.org/index.html
MRCG web site: http://www.syzen.com/milradio/
San Pedro (general): http://www.sanpedro.com/

Antique, Vintage Radio Show, Sale and Swap Meet
Sponsored by the Northwest Vintage Radio Society
Saturday, May 11, 9AM to 2PM
At the Salvation Army Rose Center for Seniors, corner N.E. Sandy Blvd. at N.E. 18th Ave., Portland, OR
Two floors of tables filled with vintage and antique radios, communication radios, tubes both NOS and used, many radio parts and radio literature. Everything is here for the vintage radio enthusiast.
For further info:
Wendy Johnson-Kent, Pres., 503-281-9335
Cliff Tuttle, Show Chair, 503-666-7005

A Different TR-4

by Chuck Teeters, W4MEW
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If you are up in years, when someone talks about a TR-4, you ask which one. The Drake TR-4 SSB transceiver from the sixties is what most hams think of, but the Abbott Instrument Company TR-4 Ultra Short Wave 2-1/2 meter transmitter/receiver came long before the Drake. Abbott started building their TR-4 in November, 1941. It was aimed at the civil defense communications market, which was developing as the US moved closer to involvement in the war in Europe. The Office of Civilian Defense, with the help of the ARRLs George Bailey, who was on the board for communications, was promoting the 2-1/2 meter UHF band for local CD nets. (Anything above 30 MHz was UHF or Ultra short wave and the 2 meter band was 2-1/2 meters, 112 to 116 MHz before 1946).

The Abbott Company located in New York, at the site where the World Trade Center sat, had just completed production on a Signal Corps contract for SCR-195/6 UHF sets. They knew there would be no further procurement. The Signal Corps Laboratory at Fort Monmouth had under development a light weight FM 40 to 48 MHz pack set. The Abbott built AM sets employed a super regenerative receiver, modulated oscillator transmitter, while the new FM set used a superhet receiver and a crystal stabilized transmitter. With the end of the government contract Abbott was looking for something to do. In the summer of 1939 Abbott produced a 2-1/2 meter ham transceiver called the Abbott DK-2. This was the SCR-196 reworked for 2-1/2 meters. The DK-2 sold for $16.50 less tubes, batteries, microphone, and headset.

The DK-2 was a typical 1939 ham 2-1/2 meter two tube transceiver with a 6J5 functioning as a self controlled oscillator on transmit producing under 1 watt output, and as a super regenerative detector on receive. The other tube, a 6G6, functioned as a modulator on transmit, and as an audio amplifier on receive. It used four 45 volt B batteries and two 3 volt A batteries. Like most modulated oscillator transmitters on 2-1/2 meters it was broad as a barn and wandered around in frequency. Super regen receivers had to oscillate on the receive frequency, and turn on and off at about 50 KHz. As a result the receiver transmitted a raspy sounding signal that was almost as strong as the transmitted signal. The super regen receiver also generated a loud noise in the headset with no signal. They were referred to as rush boxes because of the noise. The 4 MHz wide 2-1/2 meter band could accommodate only 4 or 5 QSOs with these type sets without interference.

Abbott followed up the DK-2 with the DK-3, which featured adjustable antenna coupling. This allowed optimizing the performance with different antennas and upped the output to 2 watts. The -3 was a much better performing radio but cost $19.20 less tubes, batteries, headphones and carbon mic. In July '41, Abbott came out with a mobile transmitter for 2-1/2 meters, the model MRT-3. This was a 20 watt high powered unit employing the brand new Hytron HY-75 UHF tube. This triode had both the grid and plate brought out the top of the envelope and improved the efficiency of ultra short wave oscillators.

The biggest problem with transceivers however was the change in frequency between transmit and receive. Using the same tube and tuned circuit for both send and receive, with different grid and plate voltages, send and receive frequencies were different. It required

retuning with every transmission. As a result if you started on 112.5 MHz by the time you had 3 or 4 transmissions you were on 115 MHz. The ARRL had recognized this problem and recommended using separate tubes and tuned circuits in UHF transmitters and receivers.

An Abbott competitor, Radio Transceiver Labs, also in New York City, at Richmond Hills built a 5 meter transmitter receiver following the ARRL recommendations, their type TR-8 in 1939. Sales were poor and the company gave up Ultra High Frequency sets. The company run by Frank Jacobs, W2BSL, was building a 30-38 MHz 15 watt AM transmitter for police service, and they offered it to amateurs in kit form. The T-150 sold for $22. In the fall of 1939 they added the HFM transmitter to their line. It was a 160 through 10 meter 30 watt mobile/fixed transmitter that sold for $57.60.

With Radio Transceiver Labs giving up on the 2-1/2 meter market the only

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competition left in the New York area for Abbott was a small operation on West 42nd Street called Radio Control Headquarters. Run by Don Vinik, W2DVD, they built 5 meter transmitters and receivers for radio controlled model airplane enthusiasts and a model RCH 2211, 2-1/2 meter AM voice transceiver for $37.50. Don closed down after December 7, 1941, but continued to build the 2211 out of his Deal, NJ home for civil defense organizations.

In November 1941 Abbott took the plunge and announced the TR-4 2-1/2 meter transmitter receiver. With a separate HY-75 transmitter and an HY-615, a low power version of the -75, in the receiver, and two stages of audio and built-in speaker it incorporated the features necessary to be a top line 2-1/2 meter set. With an advertising splash touting the special design to meet advanced needs for both government and commercial service as well as amateur, the $65 price seemed insignificant. Apparently Abbott moved a little to fast with the first TR-4 as they modified the design a month later. They added a mechanically linked section to the T-R switch to allow the use of the same antenna for both send and receive, and they moved the regeneration control to the front panel. It was the only change in the TR-4 in a 5 year production run.

Most of the TR-4 success was due to timing. In the November issue of *QST* the ARRL recommended all hams equip themselves with a 2-1/2 meter rig to support the civilian defense program. The day after the December 7th 1941 Pearl Harbor attack the FCC shut down all amateurs. Ham communications related to civil defense was expected to continue with special authorization. Sitting there ready to take up the challenge was the Abbott TR-4. However not much was happening, as the Office of Civil Defense had no approved communications plan. The ARRL was pushing to get them going but government red tape was in the way.

Russell Abbott took things into his own hands in January '42. He knew the FCC had allocated 116-117 MHz for police experimental use and would issue "X" licenses. On February 16th 1942 with Abbotts help, the Providence RI Police Department was licensed as W1XVI to use 116.150 MHz, a frequency easily reached by the 112-116 MHz TR-4. (In 1942 ham type calls with the "X" were issued to experimental stations, FM broadcast, TV, police, etc.) The license authorized eight fixed and fifty fixed-movable stations. Forty-five radio amateurs volunteered and were sworn in as policemen, assigned to such radio duties as the Police Chief should direct. Each signed a waiver of rights to compensation as a member of the department. Abbott supplied TR-4s under a buy back agreement to Providence. With the publicity the Providence civil defense organization received, both local and national the TR-4 was established as the "CD radio".

It was August '42 before OCD came up with a War Emergency Radio Service plan. Immediately many cities followed the Providence lead and bought TR-4s for their control stations. Look at any *QST* picture of a WERS station in 1942-'45 and there will be a TR-4. In my case in Buffalo, WERS used TR-4s in the main and sector headquarters, and ham built transceivers for the warden and observation posts. Mine used 57, 58, and 2A5 tubes with the base removed from the 57 to get it up to 2-1/2 meters.

The TR-4s were the Cadillacs of our WERS nets and to be allowed to operate one was a supreme privilege. As a new teenage ham with less than a years experience I never got to operate one. Over the years I saw a few TR-4 rust buckets, but when one in almost perfect shape showed up in ER I couldn't resist it. I can't operate it as 112 to 116 MHz

now belongs to aircraft navigation and not a ham band since 1946. But with a dummy load, and only a very low plate voltage, on a 500 miles in every direction VFR day, I was going to see what it sounded like anyway.

The TR-4 weighs 11 pounds in an 8 by 9 by 4-1/2 inch heavy steel case that could have withstood the London blitz. It uses an HY-75 ultra audion oscillator, and an HY-615 self-quenched super regenerative detector. The audio section, which functions as a modulator on transmit and the audio amplifier on receive uses a 7F7 speech amp and a 6V6 or 6L6 power amp. The use of the loctal 7F7 is interesting. The more common 6 series metal tubes were in short supply, but the loctals were not, as few defense contractors were using them. The 7F7 twin triode was also cheap. Abbott connected the two sections in parallel, so he had a cheap readily available audio triode. The rear cover is hinged to allow access to the tubes. Power is supplied through a six pin socket on the rear. Power required is 6 volts AC or DC for the filaments, 3 volts DC for 7F7 bias and the carbon mic, and 300 volts DC for plates.

Mechanically the TR-4 reflects the Abbott military contact experience with lock washers, rivets and every thing tied down, with all under chassis wiring in a cable harness. All RF wiring is above the chassis and is solid wire point to point with Lucite insulation holding the coils rigidly in place. Circuit wise the TR-4 transmitter uses the HY-75 with a tapped LC tank, a grid resistor, grid capacitor, two RF chokes and nothing more. The receiver is equally as simple using the HY-615 and the same number of parts as the transmitter. The audio is the 7F7 triode voltage amplifier RC coupled to the 6L6 audio power amplifier. The input to the speech amp is through a transformer with two primary windings, one hi-Z for the receiver and one low-Z for the carbon mic. The secondary connects to the 7F7 grid. This was called a transceiver transformer back then. The output from the 6L6 is into a transformer with both a hi-Z winding to modulate the plate of the HY-75 and a low-Z winding to feed the speaker.

A check with the multimeter showed no shorts, so the filaments were lit, 3 volts of bias applied and 300 volts DC was connected. Sounded like Niagara Falls. Running the grid dip meter across 113 MHz dropped the noise to practically nothing. A tap on the side of the grid dip meter could be heard in the speaker, so the receiver was working. The TR-4 has a balanced antenna connection so I made a coax balun for 113 MHz and connected a Bird watt meter and dummy load. Flipping the switch to transmit, I had 5 watts showing. With my HT I could tune from 112.9 to 113.7 and hear distorted but readable audio. Switching the TR-4 back to receive I could tune the HT from 112.1 to 114 and hear the raspy buzz coming from the receiver. The receiver transmitted signal peaked up at S 8 on the HT while the transmitter signal peaked up at S 9+. I cut the power, three minutes was enough of a test and besides I didn't want to check the speed and accuracy of FAA DF facilities.

So my TR4 works fine, with reasonable power output and a receiver that certainly can hear several microvolts. The TR-4 receiver could not hear anything when I transmitted FM with the HT, but the HT could receive the TR-4 in both the FM and AM modes. Obviously the modulated oscillator of the TR-4 produces just about the same amount of FM as AM. The receiver radiation would certainly be disliked in these days of high band occupancy, and the loud no station noise level of the super regen receiver would drive an operator nuts. My TR-4 is fun to look at, and reminisce about, but thank goodness for our narrow band synthesized squelched FM receivers. ER

The Heathkit DX-40

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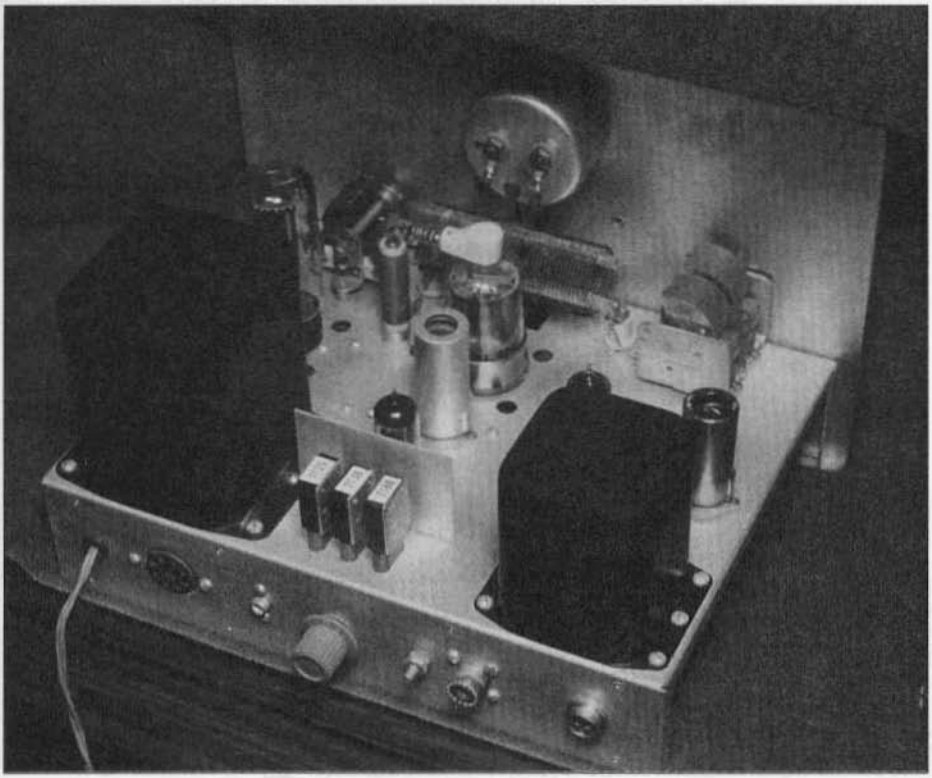
The Heath DX-40 was, as Marty Drift, WB2FOU might say, the last of the Heath "gray gear". A 2nd-generation DX-35, the DX-40 was first advertised in January '58, and lasted slightly less than three years when it was replaced by the DX-60 in Nov.'60. The DX-40 sold for $64.95 when it was introduced.

The DX-40 is a 75W CW, 60W AM, crystal-controlled, CW/AM transmitter with single-knob bandswitching on 80-10M. The pi-network will accommodate output impedances in the range of 50-1000 ohms. The tube lineup consists of a 5U4GB full-wave rectifier, 6CL6 Colpitts crystal oscillator (serves as a buffer when an external VFO is used), 6CL6 buffer, 6146 final, 12AX7 speech amplifier, and a 6DE7 controlled-carrier modulator (the older DX-35 used 12BY7s for the oscillator and buffer and a 12AU7 for the modulator).

The power supply uses a 7 Hy choke-input filter that delivers >580 VDC key-down @ 125 mA. The output filter capacitors are two 40uF 450 VDC electrolytics in series. The two 20K 10W equalizing/bleeder resistors for the filter caps are mounted on top of the chassis, keeping their heat away from the filter caps. An accessory socket is available for powering the Heath VF-1 (or similar) remote VFO (although you may have to decrease the 15K 10W resistor in series with pin 4 of the accessory socket for your particular VFO). An LC line-filter is connected in series with the power transformers primary.

A dual-scale (0-6 mA and 0-150 mA), fully damped, D'Arsonal movement 2-1/2" meter indicates 6146 grid or plate current. A 2-pole 4-position switch on the rear chassis selects between three



crystals or an external VFO. Crystals can be accessed through a "trapdoor" at the rear of the cabinet. The DX-40's point-to-point wiring is very clean and straight forward and I suspect that it would have been a good kit to build.

The DX-40 is housed in a 13"W x 8-1/2"H x 9"D aluminum gray-wrinkle cabinet and weighs in at about 25 lbs. (shpg weight).

The DX-40 pictured has a long history. I traded it for a DX-60 at the local TRW swapmeet in '85. I fully intended to completely rebuild it but dragged my feet until I found another "parts unit" in '91 at the long gone General Dynamics swapmeet. As it turned out, the "parts unit" was in very good shape inside, was assembled and wired well, and included three 40M crystals. I stripped the knobs, meters, panels, and tubes from both units and made a composite DX-40 from the "parts unit" using the best parts. The front panel was given several coats of Meguiar's Car Cleaner/Wax to bring out the original finish. The meter's plastic face was cleaned/polished with Novus Plastic Polish No. 2. All the front panel hardware was replaced with new hardware. The two 40 uF 450 VDC filter capacitors were replaced with new CDE 40 uF 450 VDC units—the originals were judged to be just too leaky. Both the filter choke and power transformer's mounting hardware was removed from the chassis and both were spray-painted glossy black in place.

I have used this transmitter many times on CW and prefer it over the DX-20 and DX-35 only because of the damped D'Arsonal movement meter—tune-up is so much faster than using the DX-20's and DX-35's iron-vane meter

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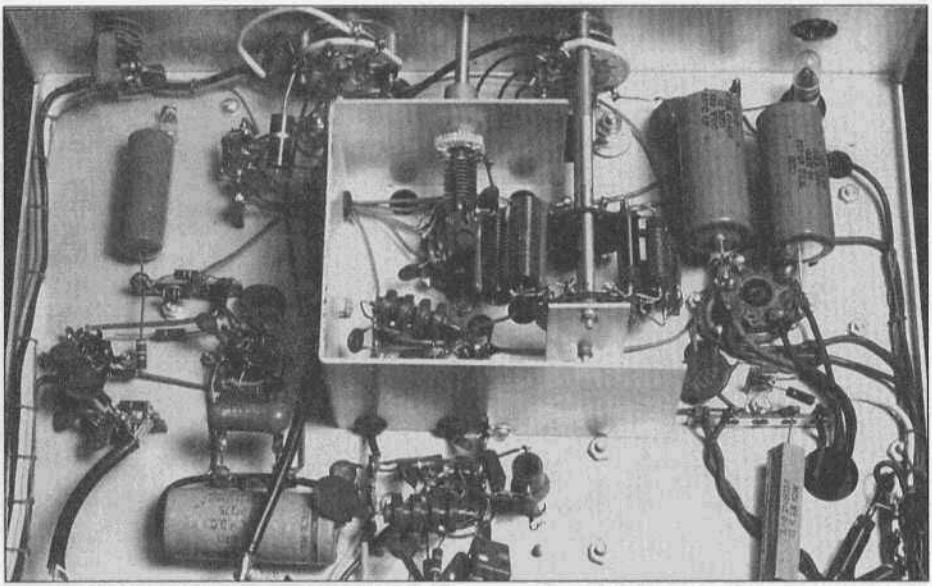


movement that bangs around stop-to-stop. The DX-40's "TUNE" position between "OFF" and "STANDBY" is also a welcome addition from the DX-35. A minor criticism of both the DX-35 and the DX-40 is the location of the crystals. I still prefer crystal control for my novice-type transmitters and have several dozen crystals to choose from. Changing crystals from the rear, three at a time, and then trying to remember the position of the rear-mounted crystal switch (or trying to get to it) is a major pain. The DX-40 was designed primarily for VFO operation. The 3-position crystal switch allowed novices to use the DX-40 until they upgraded and started using a VFO. Because of the mechanical design, I believe that crystal control was supposed to be a "temporary" operating mode.

I received good AM signal reports using an amplified base D-104 mic so I did not modify the speech amp. The DX-40 does not have a gain control in the speech amp so the D-104's gain was adjusted for maximum undistorted output. I replaced the Amphenol mic connector with a standard 4-pin mic connector (Radio Shack P/N 274-002) which necessitated enlarging the hole to 5/8".

All-in-all, the DX-40 is a very sound, serviceable, 75W CW, 60W AM transmitter. ER

For additional reading, try Donald L. Stoner'/W6TNS's DX-40 review in the Mar.'58 CQ, pgs. 68-70. Send me a LSASE or email me and I will send you the schematic. A schematic and partial manual is available on-line at http://bama.sbc.edu/

Selected References:

1. Heathkit, A Guide to the Amateur Radio Products, by Chuck Penson, WA7ZZE, 1995, DX-40, pg. 55.
2. Compendium of Heathkit Radios - Compilation of Heathkit Advertisements for the Radio Amateur, by Marty Drift, WB2FOU, 1995, DX-40, pg. 23.

Clatternet: 850 shift RTTY roundtable, on 10137 kcs USB Saturday, starts 0930-1000 Pacific time.

Radio Etiquette

Ed. Thanks to Larry Robison, W9MDX for allowing me to reprint "Radio Etiquette" from his website.

Ham radio is a nice hobby! It's always great to get on the air and talk with your "radio friends" about a particular project or a new piece of equipment or just the weather. Occasionally you will be chatting and someone will break in, right out of left field, and the QSO goes down the drain. It stops being fun. Why?

Many times it's just plain common sense. Here is a list of suggestions compiled by several operators with many years of combined ham radio experience.

It is always nice if a breaking station has something to add to the conversation and therefore he should be courteous enough to listen for at least one round to be sure to catch the "jist" of the conversation before breaking in. Having a pencil and piece of paper handy to write down the calls and names is a real good idea.

Breakers should know who is in the roundtable and certainly know who to turn it to. You should never be caught saying "Gee, I don't know who to turn it to!" It means that you are not paying attention to the roundtable order and probably not even the topic of conversation.

Old Buzzard transmissions are OK but there are two conditions which rule old buzzards. You should make your transmissions conform to the size of the group. If the group is large, keep you transmissions short so everyone gets a turn. Also if you are running low power keep your transmissions short. Many a nice clear frequency has been lost because someone with "low" power has made an old buzzard.

"Four No More" That sounded silly the first time I heard it but it really does make sense. If you are listening to a roundtable and it has at least four participants, maybe waiting a bit to join in would be wise. If you've ever played poker, it is sometimes only possible to join a game if someone gets up. That's reasonable for roundtables too!

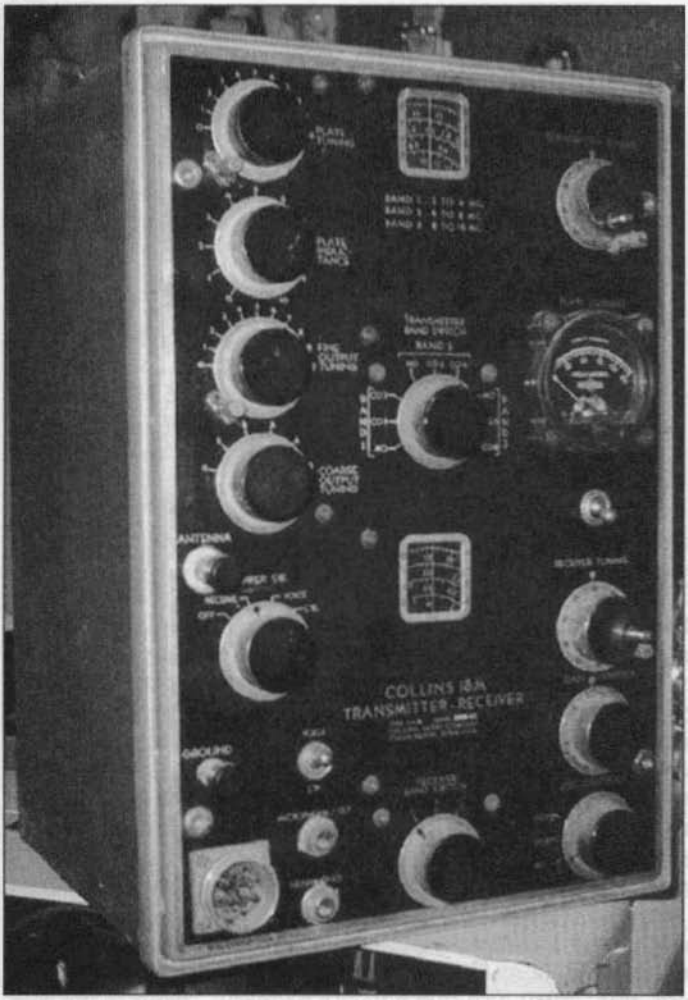
Mobile stations need to be given priority and whatever help necessary to get their message through.

Telephone calls ... we all recognize that the phone is an important instrument and you may receive phone calls while on the air but please, be courteous enough to excuse yourself and stop transmitting so that you can properly attend to the call.

Another thing to watch is language. Many guys have families with little ears hanging around and some times it gets pretty raw. Most of the time it's really not necessary either. Even though you may be an adult and can handle the shock of a potty mouth, ham radio is better without it.

And for heavens sake I am shocked at the number of hams that belch on the air! Imagine for a minute a poor guy gets a beautiful AM receiver all set up and the first guy he tunes into gives out with one of the big old belches. There has to be a cartoon somewhere with goo oozing out of the cone of the speaker ... and even though there can be a claim that it's a genetic problem because somebodies mother or father burped frequently, it ain't cool!

Here is a list of operators that have contributed suggestions to this list. Please consider that they are suggestions, not hard and fast rules, that are meant to make it enjoyable for everyone. If you have a suggestion please send me, or any one of them, an email. Larry, W9MDX; Tom, W3BYM; Jay, N3WWL or Marty, W3MTG.



The Collins TCH
A Very Interesting Old Radio

by Richard Beckett, WØBVT
R3 113 Norma Lane
Ashland,MO 65010
BeckettR@missouri.edu

Contract Date: 7/20/1940
Contract NR. 75324
Ser, NR, 8306-33

The story begins in October of last year when the XYL and I visited some old friends in St. Joseph, MO. My friend Charlie, who collects mostly old broadcast radios, was proudly showing me some of his latest finds, and that is when I spotted the TCH. My first and most obvious thought was how similar to the Collins TCS it looked. I have a very personal interest in the TCS; I operated one many years ago while serving in the US Navy. Time only permitted my taking one picture, however in the following weeks I began asking other hams and friends about the TCH, only to discover no one had any knowledge of it. After the usual web searches, and to no avail, I sent Barry the picture in hopes some of the ER readers might be of help. Then Barry suggested I gather as much information about the TCH as I could so I called Charlie for some help. He gladly removed the radio from the cabinet and we took a look inside. The upper chassis is the RF section, which houses 5 tubes; a VR-150 regulator, three 6V6's and a single 807 RF output. A quick look at the Collins TCS may offer some clues.

The TCS Legend

The TCS series of radio equipment is one of those success stories stemming from WW II that has few rivals, and no equals. The story begins in 1939 and the first contracts let with Collins by the US Navy. Interestingly, the first ART-13 (A through Z's) also from Collins, and TBX from GE, were ordered this same year. The Navy knew something the rest of our countries military didn't! The TCS was used in every war time capacity we can think of, including: armored vehicles, Jeeps, aircraft, landing craft, fixed and semi-fixed shore & field stations, and ships both large and small of every description.

The engineers at Collins designed the TCS with a great deal of redundancy, for example: Why two 1625's in the RF PA for CW, but only one is used for AM? Its class B modulator with two 1625's could easily modulate a pair of 1625 finals. The reason is quite simple; if you lose a PA while in the AM phone mode just substitute the other PA. If you loose a modulator tube, simply substitute the unused PA. In the CW mode you have both modulator tubes that can be substituted. It also used a separate 12A6 for the MO, and another for the crystal oscillator, with the third as a buffer driver to the 1625's. So, in either MO, or XTAL modes, you have a spare 12A6.

Let's return to the TCH for the moment: The lower chassis of the TCH is the receiver section, with a complement of 5 tubes: 2-12SK7's, 1-12SA7, 1-12SQ7, and 1-12A6. A rather conventional tube line up, but again, let's compare with the TCS which uses a 12SK7 1st RF, 12SA7 1st converter, 12SK7 1st IF, 12SK7 2nd IF, 12SQ7 det. AF driver, 12A6 AF output, and a 12A6 BFO. The frequency range of the TCH is from 2 to 16 mc. The TCS operates from 1.5 to 12 mc.

In hopes someone will offer a diagram and a lot more information about the little radio, I have decided not to speculate as to how the TCH might have accomplished its function as a low power AM & CW transceiver, but instead, will leave it to the imagination of ER readers. Given the complement of tubes outlined, keep in mind that all the electronics are housed inside one cabinet with the TCH. Where as the TCS used two separate cabinets for the R/T.

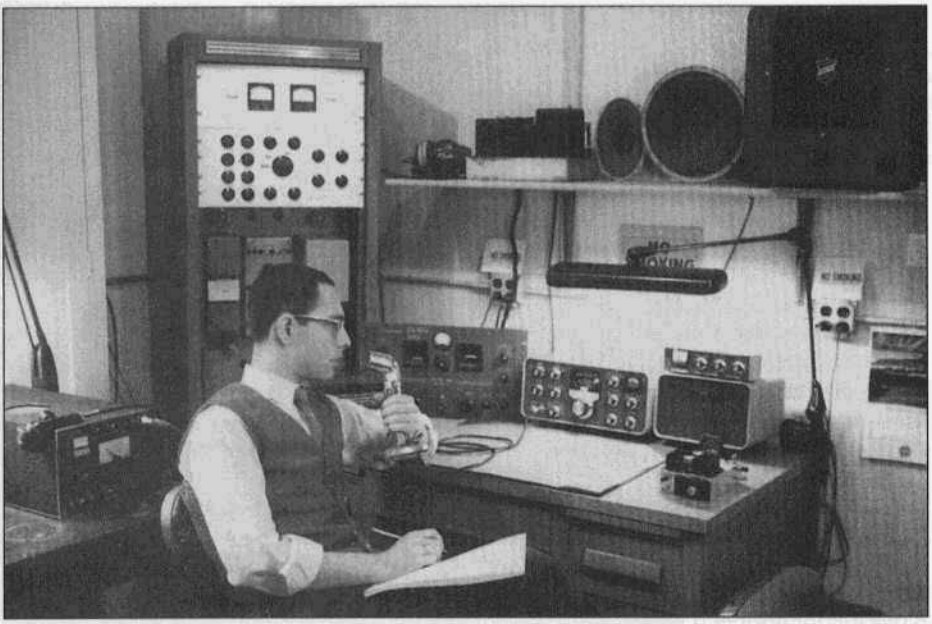
One might speculate that the TCH preceded the TCS and fell to disfavor for any number of reasons, e.g. lower performance, less redundancy, etc. It is also possible, because the TCH is much smaller and lighter, that it was never in competition with the TCS, and found limited use due to similar equipment already available.

My friend Dennis Starks, military historian and collector et al provided some of the information about the Collins TCS. Ref. *Poor Boy's Collins, The TCS;* by Dennis Starks. *TCS & Others,* by Ed Zeranski. ER

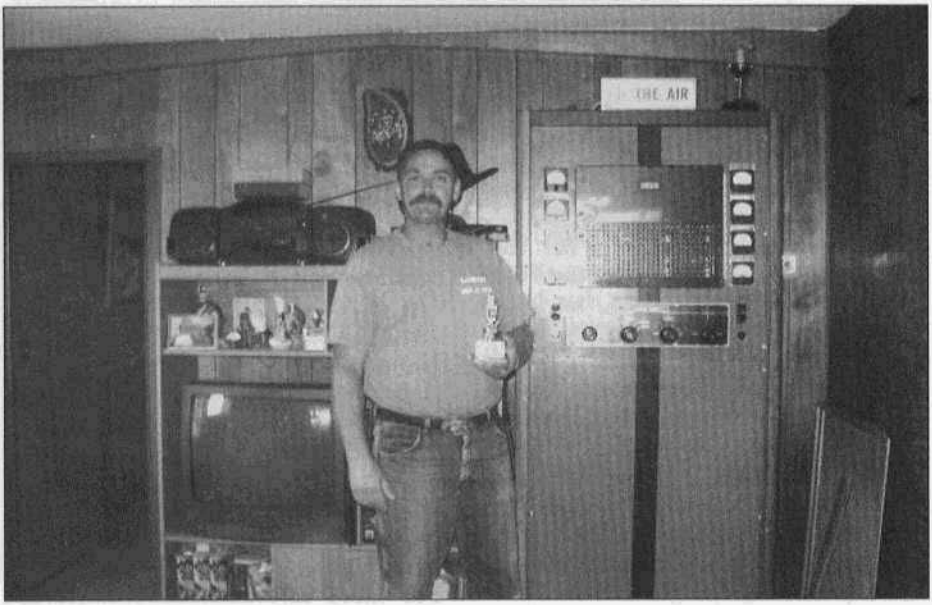
ARRL Missouri State Convention
Lebanon Amateur Radio Club
Lebanon, Missouri
May 4, 2002

*46,000 sq. ft. of flea market
*tables are $10 each, additional tables will be $1 each if reserved in advance
*Setup time is Friday, May 3 from 3PM to 9PM and Saturday 6AM to 8AM
*Admission tickets are $5 each
*ARRL VE testing by KOYS
*ARRL, DX, QRP, Sky Warn with the National Weather Service, Forum and Activities Antique Equipment, DXCC and WAZ card checking are planned.
*Special forum conducted by well-known QST and ER author, Mike O'Brien, KØMYW, on collecting, restoring and using all types of older equipment.

For more information: Contact Bill Wheeler, KØDEW at the Cowan Civic Center, 500 East Elm St., Lebanon, MO 65536. 417-532-4642, keccc@llion.org



Skip Tullen, K2PXQ, operating the Teachers College, Columbia University amateur radio station, WB2ZIJ in 1966. This station was put together to establish a link with Professor Jay Erickson who was on an educational mission to Kabul, Afghanistan. Ironically, they never did succeed in contacting professor Erickson.



Mike McElhinny, WN3B, voted to have the best audio during this year's (and last year's) Heavy Metal Rally. He's holding the trophy provided for by the even'ts organizer, Bill Kleronomos, KDØHG. The BC transmitter is a Gates 250-C.

Dennis DuVall, W7QHO, and Bob Heusser, K6TUY, at the 2001 MRCG meet. The rig in the middle is W6GER's AN/GRC-14.

Don Grantham, W6BCN, visiting K6CJA's shack in Hesperia, Calif. *Photo by W7QHO.*

AM International - April 2002 Update

by Dale Gagnon, KW1I, President

Dayton Hamvention - The AM Forum will be Friday May 17, 2002 from 10:45 to 12:15 pm in Meeting Room #4. The moderator will be Don Chester, K4KYV. Don will give an update on AM International and a segment on AM Operating Issues. The feature program will be "A 4-1000A Homebrew AM Transmitter " presented by Andy Howard, WA4KCY. Andy's pictorial presentation will give even more detail than his January 2002 ER article (Issue #152). As usual, AM'ers will gather at Marion's Pizza Restaurant (Off Exit 57 I-75, Wagoner Ford Road) on Saturday evening, May 18 at 7:30 pm. Bring photos of your shack to pass around. This year the Hamvention notified outdoor exhibitors that they were discontinuing the 120 VAC power equipped tent spaces. The past two years we used one of these spaces for an AM special event station that brought AM some high visibility and provided a fun contact for more than a hundred stations over each three day operating period. This year we will evaluate the situation to determine if future AM special event operations will be possible from the Hamvention.

Transatlantic15 Meter AM - John Petters, G3YPZ has been regularly calling CQ at 1200, 1300, 1800 and recently 2200Z on 21.425 +/- QRM. John has recruited several other UK and European stations to join the frequency at these times as well. He uses an IC-706 and a classic British boatanchor, a KW Vanguard, with various antennas. He is usually on daily. Propagation throughout March has been very favorable and he can be heard in the Northeast US at all four schedule times. John is making this effort to encourage the use of 15 meters by AM ops. This is good timing because the good 10 meter propagation we have been enjoying may cease sometime in April. It would be great if we reconfigured our 10 meter operating positions on 15 meters rather than turn them off until the 10 meter band opens reliably again in the fall. John is very active on AM on other frequencies. He has been worked in North America on 10, 17 and 20 meters. He is active on 75 and 160 meters in the UK.

Transcontinental 75 Meter AM - AM operators staying up late this month have been treated to some exciting coast to coast contacts. Steve, KL7OF in Tumtum, WA has been an "anchor station" on the West Coast and Tom, K1JJ has been one of the "clear channel" stations in the East. 10-20 stations participate on a typical evening. Attesting to the good conditions a recent coast to coast AM event was monitored by John, W3JN/CO2 in Cuba. Some AM ops have QSY'ed to 160 meters and have enjoyed equivalent signals. Steve, WB3HUZ's "The AM Window" website Bulletin Board has been helpful in following this activity - http://www.amwindow.org/wwwboard/wwwboard.html ER

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

VINTAGE NETS

Arizona AM Nets: Sat & Sun, 160M 1885 kHz at sunrise,75M 3855 kHz at 6 AM MST, 40M 7293 kHz 10 AM MST; 6M 50.4 MHz on Sat. at 8 PM MST; 2M 144.45 MHz, on Tue. at 7:30 PM MST.
West Coast AM Net meets Wednesdays 9PM Pacific on or about 3870kc. Net control alternates between John, W6MIT and Ken, K6CJA.
California Early Bird Net: Saturday mornings at 8 AM PST on 3870.
California Vintage SSB Net: Sunday mornings at 8 AM PST on 3860 +/-
Southeast Swap Net: Tuesday nights at 7:30 ET on 3885. Net controls are Andy, WA4KCY and Sam, KF4TXQ. 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.
Colorado Morning Net: An informal group of AM'ers get together on 3875 Monday, Wednesday Friday, Saturday and Sunday mornings at 7AM MT.
DX-60 Net: This net meets on 3880 at 0800 AM, ET, Sundays. Net control is Jim, N8LUV, with alternates. This net is all about entry-level AM rigs like the Heath DX-60.
Eastcoast Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is Ted, W3PWW. Saturday mornings at 0500 ET on 3885 + or - QRM.
Westcoast Military Radio Collectors Net: Meets Saturday evenings at 2130 (PT) on 3980 + or - QRM. Net control is Dennis, W7QHO.
Gray Hair Net: The oldest (or one of the oldest - 44+ years) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8:00 PM EST & 8:30 EDT. www.hamelectronics.com/ghn
Vintage SSB Net: Net control is Andy, WBØSNF. The Net meets on 14.293 at 1900Z Sunday and is followed by the New Heathkit Net at about 2030Z on the same freq. Net control is Don, WB6LRG.
Collins Collectors Association Nets: Technical and swap session each Sunday, 14.263 MHz, 2000Z, is a long-established net run by call areas. Informal ragchew nets meet on Tues nights on 3805 at 2100 Eastern and on Thur nights on 3875. West Coast 75M net that takes place on 3895 at 2000 Pacific
Collins Collector Association Monthly AM Night: The first Wed. of each month on 3880 kHz starting at 2000 CST (0200 UTC). All AM stations are welcome.
Drake Users Net: This group gets together on 3865 Tuesday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, W8NS; Rob, KE3EE and Huey, KD3UI.
Drake Technical Net: Sunday's on 7238 at 4PM Eastern time hosted by John, KB9AT; Gary, KG4D; Jeff, WA8SAJ and Evan, K8SQG.
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.
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 Calif. Sunday Morning 6 Meter AM Net: 10 AM Sundays on 50.4. NC is Will, AA6DD.
Old Buzzards Net: Meets daily at 10 AM Local time on 3945. This is an informal net in the New England area . Net hosts are George, W1GAC and Paul, W1ECO.
Canadian Boatanchor Net: Meets Saturday afternoons, 3:00 PM EST on 3745.
Midwest Classic Radio Net: Sat. mornings on 3885 at 7:30AM Central time. Only AM checkins allowed. Swap/sale, hamfest info and technical help are frequent topics. NC is Rob, WA9ZTY.
Boatanchors CW Group: 3546.5, 7050, 7147, 10120, 14050. 80 on winter nights, 40 on summer nights, 30 and 20 meters daytime. Nightly "net" usually around 0200-0400 GMT. Listen for stations calling CQ BA, CQ GB.
Wireless Set No. 19 Net: Meets the second Sunday of every month on 7.270 +/- 25 kHz at 1800Z (3760 +/- 25 kHz alternate). Net control is Dave, VA3ORP.
Hallicrafters Collectors Assoc. Net: Sundays, 1730-1845 UTC on 14.293. Net control varies. Midwest net on Sat. on 7280 at 1700 UTC. Net control Jim, WB8DML. Pacific Northwest net on Sundays at 22.00 UTC on 7220. Net control is Dennis, VE7DH
Mighty Multi-Elmac 75 meter AM net. Every Tues eve at 8 PM EST. NCS is Mike, N8ECR
Nets that are underlined are new or have changed times or frequency since the last issue.

The Big Rig Project, an 813 Transmitter

(final comments and circuits)

by Tom Marcellino, W3BYM
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Rockville, MD 20853
W3BYM@arrl.net

Part Three

Judging by the amount of e-mail and surface mail received about this project, it seems I've stirred up some renewed interest in home brewing. This is one objective that both the Editor and I were hoping would be met. There's been messages from ER readers who are non-hams and just enjoy building. Several have commented on specific sections of Part 1 such as the treatment of meters and now have some insight in that area. One reader sent me several samples of wire that he had trouble tinning. This stemmed from the section on wires in Part 1. I look forward to other messages from ER readers and will answer them promptly.

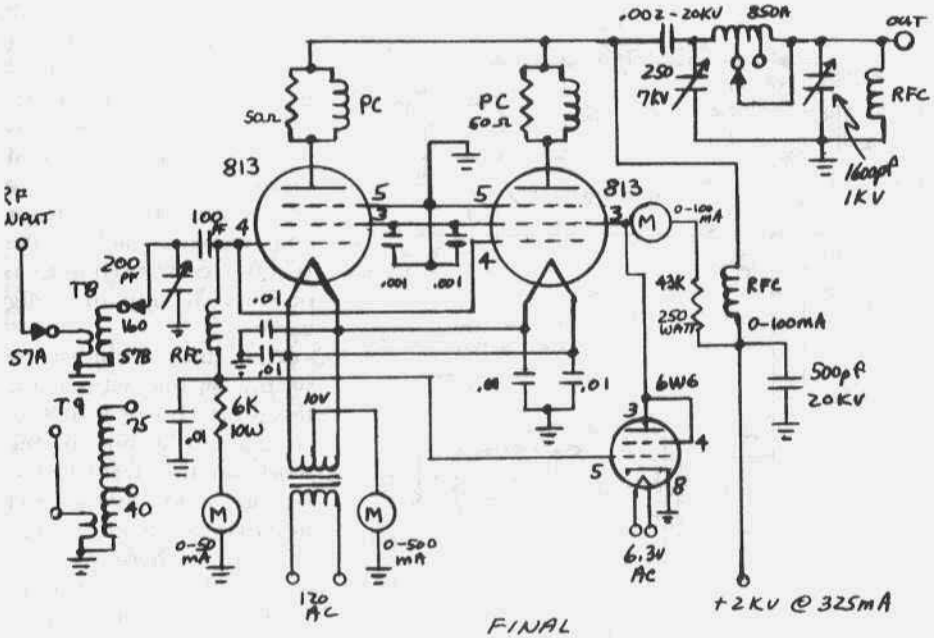
This part contains some final comments and the circuits for all the decks. In the beginning it was planned not to include the circuits because no new information would be presented. Most of the e-mail received has stated they (readers) were looking forward to seeing the circuits in future parts.

If the speech amp is used as shown with just a mic driving the input, there will not be enough gain in the system for 100% modulation. In this case, the speech amp will require one additional stage of gain. In fact my deck still has the socket that was wired for a 6C5 preamp ahead of the 6SL7. Since adding some external audio gear, it was no longer needed and therefore disconnected. The mic transformer circuit was not detailed because the chances of finding this exact transformer are slim.

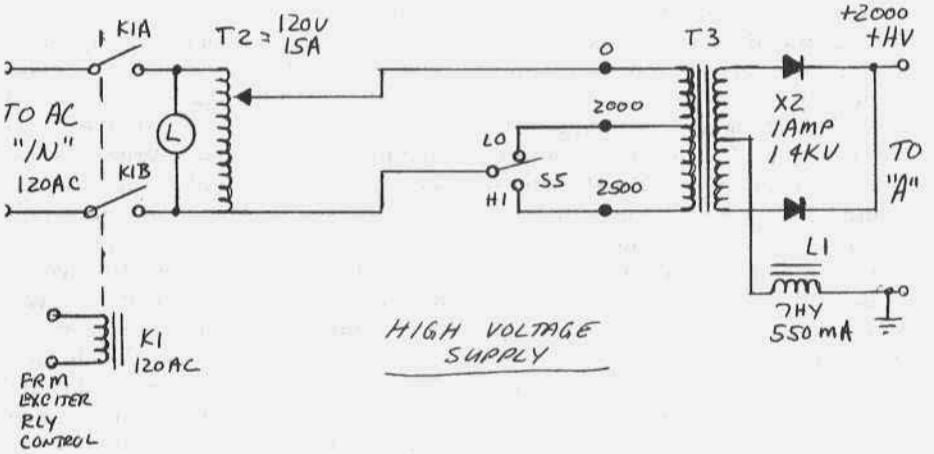
The audio transformer in the 807 cathodes has its CT grounded. In normal audio use this is the B+ connection. The speech amp drawing shows only the 10 K feedback resistor for simplicity. My actual deck uses a 10 K pot with a switch on its shaft. The switch is in series with the 10 K. Also very important is the phasing switch that isn't on the drawing. Again it was omitted to minimize the drawing clutter. To install this switch just lift the left hand side of the two 47 ohm grid resistors. Route the two cathode connections to the wipers of a DPDT switch. Then cross wire the outside contacts and connect the resistors to the contacts. Of course this audio phasing switch can be connected in several other places in the speech amp.

The PA deck shows a single 0.002uF at 20 KV coupling capacitor in the output tank. In my deck I use two 0.001uF units in parallel. The thing to remember here is you want a capacitor(s) that will handle large amounts of RF current. The 6W6 clamp tube is cut off as long as grid drive is present. In the absence of grid drive pin 5 of the 6W6 will go to zero which turns on this tube. As a result its plate pulls the screens of the 813s down to 60 VDC. At this time the 813 cathode current is 75 mA. These are very safe values to protect the pair of 813s. If more protection is wanted, i.e., near zero cathode current, then I refer you to the 1964 *ARRL Handbook*, page 154.

The B&W 850 tank was altered for 160 meter operation by the addition of 19 turns having a diameter of 2.5 inches. A



FINAL AMPLIFIER



HIGH VOLTAGE SUPPLY

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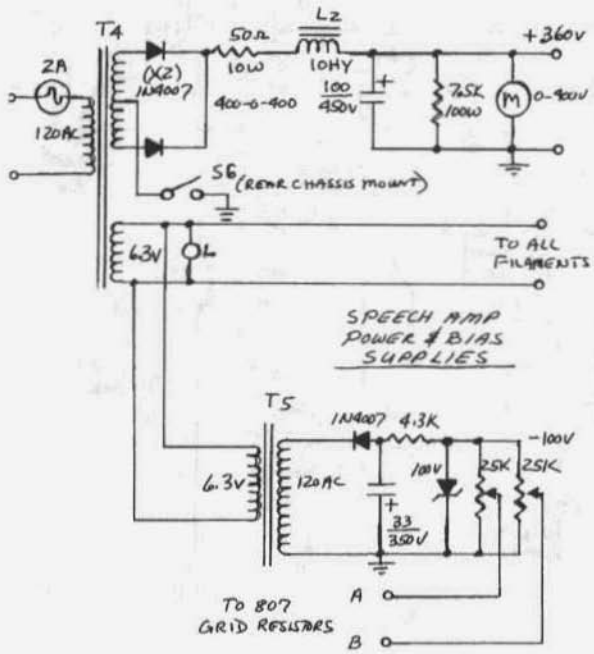


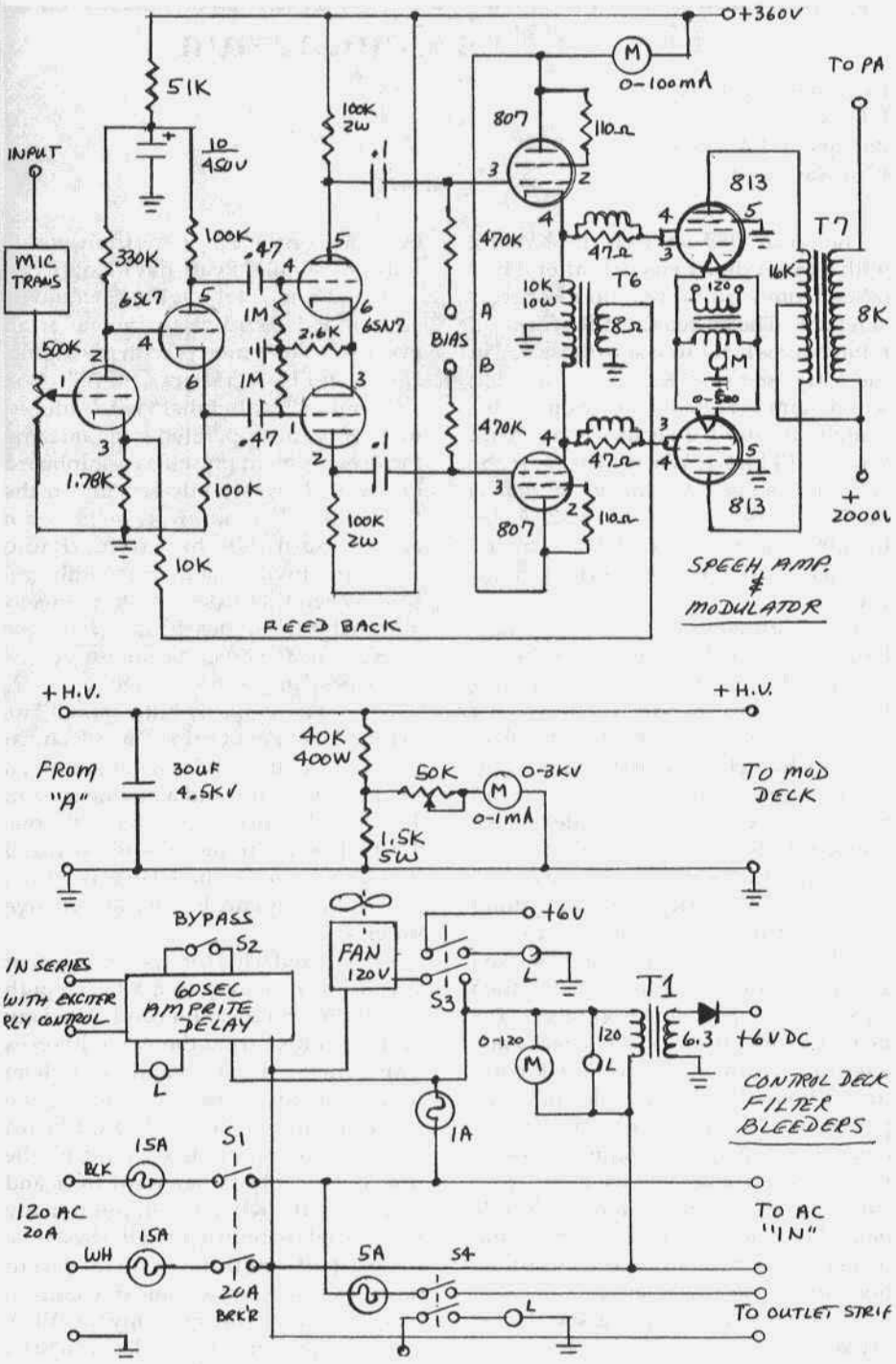
piece of B&W 3031 works well. The PA input grid tuned circuits are as follows: The primaries have two turns wound around the secondary coils on the bottom end. These were wound with # 22 insulated solid wire. The secondary for the 160 meter coil is 35 uHy. Wind this on a 1.25 inch form using 52 turns of #24 enamel coated wire. The 75 and 40 meter secondaries are wound on a 1.0 inch form using #22 wire. The total coil has 41 turns and is tapped at 15 turns up from the bottom for 40 meters.

Also included but not shown on the PA diagram is the parasitic chokes in the grid and screen leads. These chokes consist of 4 turns of #20 wire wound on 50 ohm 2 watt carbon resistors and mounted right at the socket pins. The plate circuit parasitic chokes were fabricated to the same specs. The input and output RFCs are 2.5 mHy units.

At this writing it is the beginning of March, 2002. The rig has now been on the air for about 6 weeks nearly every week day. The performance remains reliable and consistent with good audio reports. Tuning is trouble free and since I mostly operate on 40 meters, the rig is stable enough as settings never need changing. Several have commented that it has a characteristic clack on the receive end during turn on—a real sign of a big carrier.

Well this concludes the writing of the last part for this project but by no means concludes the end of the work on this transmitter. While I now have a good performing high power transmitter, there are many other ideas I want to investigate. The transmitter will now serve as a test bed for these ideas.

Some of these ideas include: Modifying the 60 second warm up timer. The large tubes are not up to good operating temperature after the 60 second delay. A time more like 4 to 5 minutes would be better. Perhaps a solid state timer design would be appropriate here. While the HV voltage regulation is good I think it can be made better. By simply reducing the value of the bleeder and have more bleeder current this can be accomplished. Doing this of course will call for a new value of HV detection resistance on the bottom of the bleeder string. The use of a separate screen supply for the 813s should be investigated and evaluated. Maybe this will be a better method of suppling this voltage. I've always wanted to gain more knowledge in the use of toroidal inductors. Perhaps the input grid circuit would be an excellent area to gain this experience. These are some new things I will get to in the future and who knows you may once again see the results published in ER. **ER**



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The Collins Conundrum

by Lloyd Roach, W3QT
P.O. Box 152
Pocopson, PA 19366
w3qt@aol.com

The ad in *QST* showed the KWM-2 with a major dent in its side after it had fallen from a building onto a concrete sidewalk. The ad read, "Still Works." I remember when I first saw those ads in the early 'sixties, it seemed to me that sort of ham gear had to be designed for somebody other than just some ham. Little did I know! When I first saw the "S" Line series of Collins gear such as the 75S-1, 32S-1, 312B-4, KWM-2/A and the 30S-1, I realized that this was the serious stuff that only serious hams used.

In the summer of 1961, I was a new Novice (KN3QNT) with an even newer Heathkit DX-20 under my arm, visiting my Elmer, "Tex" Hendricks, W3AK. Tex lived in nearby Malvern, PA, and had the only homebrew metal lattice tower I have ever seen. He was an accomplished ham. As I entered the house into his den, I noticed a brand new beautiful "S" line on his desk. Tex explained, "With this stuff, you don't even need to call CQ; they just come back to you. My son has already worked 20 countries with 100 watts!" We then entered the basement shop where Tex went to work on my DX-20. I had made a wiring error when I built the kit and didn't know how to trouble shoot the problem. I asked Tex about the equipment upstairs. I wanted to know how it could work so well, being so small. "Well it's mostly the single side band," he said. "There's no carrier and it doesn't squeal when there's more than one guy on your frequency.

"But that's nothing; you should see my mobile rig, the KWM-1. It's really small and I talk to Europe on 20 meters every day on the way home from work!" Europe? Mobile? Every day? Holy Cow!

"Good grief," I thought. "I would be ecstatic if I could raise anyone at all every day on 40 meters with my dipole, DX-20 and Hallicrafters S-40-B!"

About a year after that visit, I enlisted in the Navy and operated some amazing radio equipment myself as a shipboard operator. It was while serving in the Pacific that I became aware of the depth and breadth of the Collins Radio Company involvement in the military. It was then that I decided that when I got back on the beach, my rigs were going to be Collins. I began my search in earnest in the back pages of *QST*, which came regularly but a month late via the Fleet Post Office. Then I saw it: a KWM-1 with an AC power supply, a DC power supply and a mobile mount. The one advertised was just like the one Tex had. As I examined the ad, I realized it WAS the one Tex had. He was selling his KWM-1 and my home was only five miles away!

Tex wanted $400 for everything; that was a lot of money to a $97 a month sailor. But I bit the bullet and called my parents collect from the Armed Forces YMCA in Pearl Harbor and asked them to loan me the money and pick up the rig. In a letter from my folks, I heard Tex was pleased that I would be the new owner. My father went over and picked up the KWM-1 and put it in my room. That rig represented the first time I ever had anything with a decent receiver, much less a stable transmitter, and—would you believe—my first VFO!

Later that year, while on leave in Bryn Mawr, PA, I got the KWM-1 on the air

The author with some of his beloved Collins gear.

and almost immediately worked Tony Alonzo, KH6SP at the Pearl Harbor sub base, which I had seen only a few days before. The first thing I noticed on my new "M-1" was that the dial tuned backwards. 'Must be wound wrong, I thought; later I learned they were all that way. I figured Art Collins must have had a good reason for this minor flaw. However, in reading Fred Johnson's wonderful Collins articles in Electric Radio years later, I learned that it was a matter of expediency.

E.F. Johnson made the Desktop KW and the Johnson Matchbox; what could be better than that? Or how about B&W's prolific assortment of transmitters, coil stock and other accessories? Everyone wanted one of those huge WRL 500-C transmitters... Didn't they? Something else drove my interest in Collins Radios.

I think the Collins Conundrum is something different. Unlike Viking, Hammarlund, Drake, Heathkit, National, or any other major brand of the era, Collins stood out as the supplier for the military. To a young ham born in the middle of World War II, that was about as high a credential as you could get.

Kids my age had spent their childhood watching every WW II movie available. Our parents' own military service, along with John Wayne and a host of other Hollywood actors portraying national heroism, showed us how America fought to become victorious over evil and a colossus on the planet Earth by using the best American-made bulletproof equipment like Collins. Airplanes had Collins gear. Ships had Collins gear. Now as a ham I could have Collins gear. Gonset, Hallicrafters, Eldico or Heathkits usually did not survive a trip off a building!

To this day, when I am operating my KWM-2/A and 30L-1, many of my contacts tell me that they can "tell" that I'm using Collins gear by the sound of it. I also find it rather astonishing that a transmitter/receiver combination such as the 32S-3 and 75S-3B is still regarded by many who write technical articles for this magazine as some of the finest HF single sideband equipment ever produced. The noise floor of a 75S-3B receiver is legendary. KWM-2/A's were recalled for service in Operation Desert Storm and now they're being examined by FEMA for point-to-point circuits for homeland security!

continued on page 42

On the Elimination of Haywire

by Tom Clinton, W4ULL
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The following describes a method of interconnecting boatanchors and the various associated appurtenances with the idea of eliminating some of the inevitable haywire. At least it keeps most of the haywire in the back of the operating position. The scheme is embarrassingly simple, but perhaps it will stimulate some thought among those whose shacks, like mine, seem to be covered in RG-58 Kudzu. Like most boatanchor aficionados, my operating position is more or less always in a state of flux, as I acquire a "new" piece of equipment, or simply "rotate the crops". I like to make comparisons between, for instance, two transmitters, two receivers, two antenna tuners, etc. This usually involves unscrewing a lot of coax cable fittings or having a bunch of coax switches. Coax switches can be rather pricey, not to mention ugly when brought out front so you can change them from the operator's chair.

I decided a while back to "neaten" my shack by building a control unit, using a bunch of relays controlled by a row of switches on its front panel, to do all the various configuration changes that I wished to do. I realized after many hours of construction that I had actually increased the volume of haywire by 253.6% by having to run all the coax to this centralized unit. After disassembling the unit, returning the components back to the respective junk boxes, and nursing my wounded pride, I hooked the station back to normal (100% haywire). This is the time in my cycle of failed projects when I usually receive my monthly copy of *Electric Radio*, with positively brilliant articles from the likes of Chuck Teeters, et al, that make me feel even more like an incompetent boob.

Well to get down to business, it finally dawned on me to use a modular approach. The junk box had a bunch of aluminum boxes about the size of a small brick. I decided to put a couple of relays in a box with their coils connected to phone jacks on the box and their contacts connected to chassis mounted coax connectors, also on the box. Each relay then became a SPDT coax switch (see Photo 1 and Fig. 1). The coax connectors for each relay's contacts (C = Common, or wiper; NO = Normally Open; NC = Normally Closed) are on the top. One SPDT coax switch can be used to select one of two transmitters, one of two receivers, etc. Also mounted on the boxes is a toggle switch that can be used to connect the relay coils in parallel, so the box becomes a DPDT coax switch without running another control wire. Having a DPDT coax switch is handy for inserting and removing something like a B&W Matchmaster. For those who may not be familiar with the Matchmaster, it's a dummy load which has a switched mode wherein a small percentage of the signal is transferred to the antenna for checking SWR with its built-in meter. Its a great device but, annoyingly, it has no switch position for a straight through connection to the antenna when you are through tuning and want to actually transmit. As you can see from Fig. 2, a short piece of coax between the normally closed contacts of each relay within the box allows direct connection from the transmitter to the antenna tuner when the relay is de-energized. When the relay is energized, the transmitter is

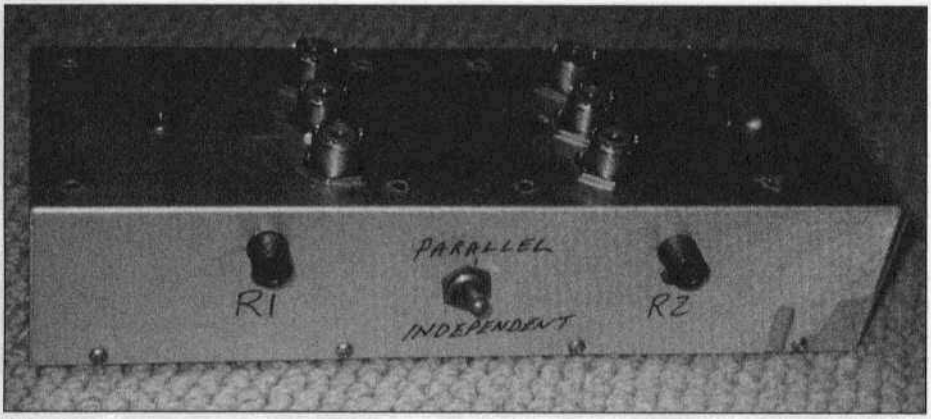

Photo 1

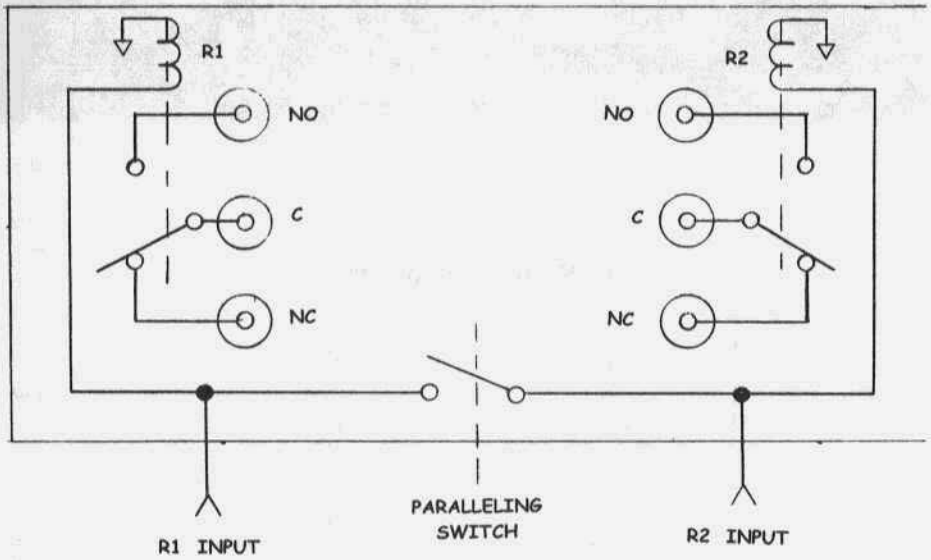

Figure 1. Relay Box

connected to the input of the Matchmaster and the antenna tuner is connected to the output of the Matchmaster.

Someone who seemed to be very knowledgeable about such matters wrote an article a while back to the effect that, for frequencies up through the 10 meter band, no noticeable mismatch was introduced by using common relays as coax switches. Good enough for me, and I don't notice any different settings of the antenna tuner when using relays or not. The relay boxes have no dangling wires of their own and can be easily stored when not in use. Since they are out of sight in the back of the station, labeling was done simply by magic marker.

In order to control the relay boxes, a separate control console (Photo 2 - under the Collins 75A-4) was built using a "chassis" of 2x4's (yes, wood), covered with sheet metal from a parted-out Tektronix scope. The console was made of a size and construction such that

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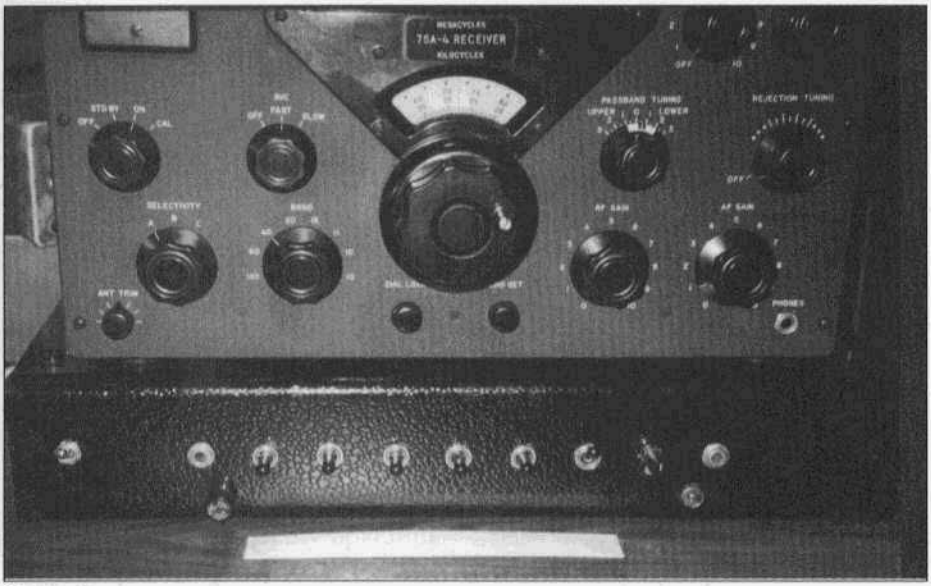

Photo 2

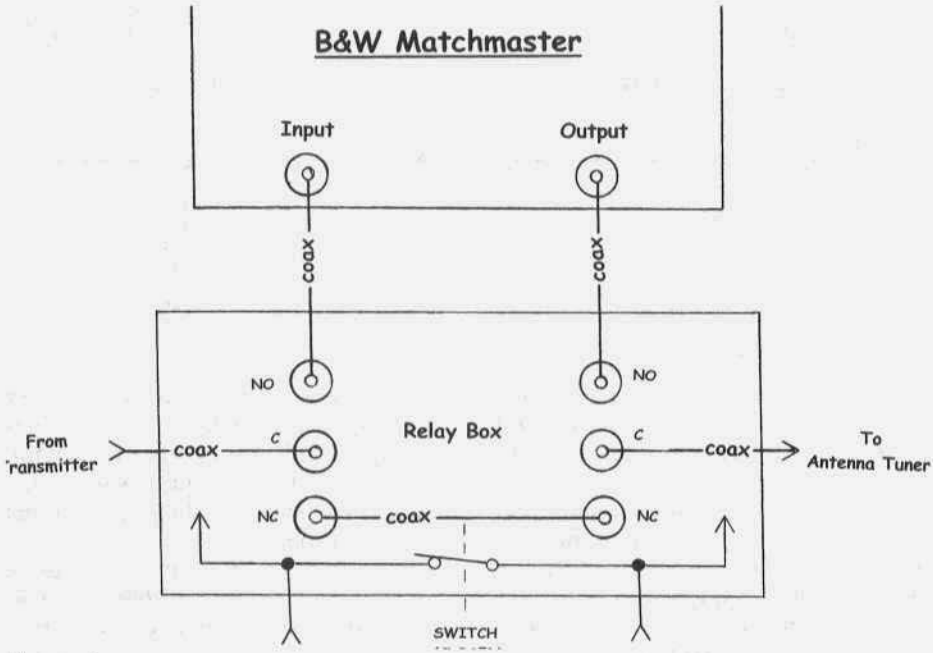

Figure 2.

considerable "tonnage" of boatanchor gear could be stacked on top. I like the "leather" texture of the Tek scope sides and, when spray painted black, the metal makes a reasonably agreeable blend with various boatanchors. The basic function of the control console is just to support a bunch of switches, as well as phone and key jacks (all obtained from "J. Box & Company") and to hide the wires from these devices as they connect to screw-type terminal strips on the rear of the console (see Fig. 3). Its easy and convenient to hook "patch" cords from these terminal strips to the various relay boxes, or to phone or key connections of boatanchors. These "patch" cords, including the coax signal lines, are now all behind the equipment and generally out of sight. The console, like the relay boxes has no dangling wires of its own.

I have a fondness for the toggle switches that are used on the console. I call them telephone switches because I have seen them on old telephone exchanges. They are silent, soft touch DPDT, center-off, switches that have large plastic covered bat handles. Manipulating these switches gives me a sort of "Walter Mitty" feeling that I'm actually controlling the studios of Voice Of America, or the NBC Blue Network; something more grandiose than my motley collection of boatanchors. Six of them entered the inventory of J. Box & Co. at the cost of 25 cents each from a salvage company in Oklahoma City, and I wish I had purchased many more.

Whatever the power requirements for the relay coils (they don't all have to be the same), the power supply(s) can be located in the control console with output going to the terminal strips in the back. By using jumpers, any switch can pick up the required voltage and route it to any relay. The power supply shown in Fig. 3 is a simple DC supply with its output connected to Terminal 3 on the back of the console. A short wire from Terminal 3 to Terminal 8 would allow Switch (x) to control a relay connected to either Terminal 9 or 10. Some switches are used without relays to switch a headphone, speaker, or telegraph key. With your favorite bug plugged into the key jack, a wire from Terminal 4 to 5 would allow Switch 1 to transfer keying from one transmitter to another. For more than two selections, rotary selector switches rather than toggles can be used. The whole idea here is not a specific design, but simply to push the idea of modular construction, which can be changed at will. The terminal strips on the back of the control console should be labeled or a "key" should be kept detailing what switch contact, phone jack, or power supply terminal belongs to what. Usual safety precautions as to grounding, etc., should be followed, especially if relay voltage is high. The relays in my system have 120VAC coils. The choice of these relays was made after a comprehensive engineering study that was somewhat skewed by J. Box's then current inventory of a dozen brand new Guardian's, picked up at a hamfest for 50 cents each. With 120VAC running around, there are no exposed terminals, and each relay box has a ground lug attached to the station ground bus.

Dangling wires are somewhat inevitable, but at least all wiring is now concentrated at the back of the operating table. By proper location of the relay boxes, the length of coax cables to the various rigs can be minimized, and the control wires running to the terminal strips on the back of the console can also be as short as possible. Only the "patch" cords that are actually in use need clutter the table. A supply of spare cords, both coax and zip cord with spade lugs, makes changing the layout of the station easy and quick.

The switch at the far left of the console is a master 120VAC switch, which energizes power strips in the back of

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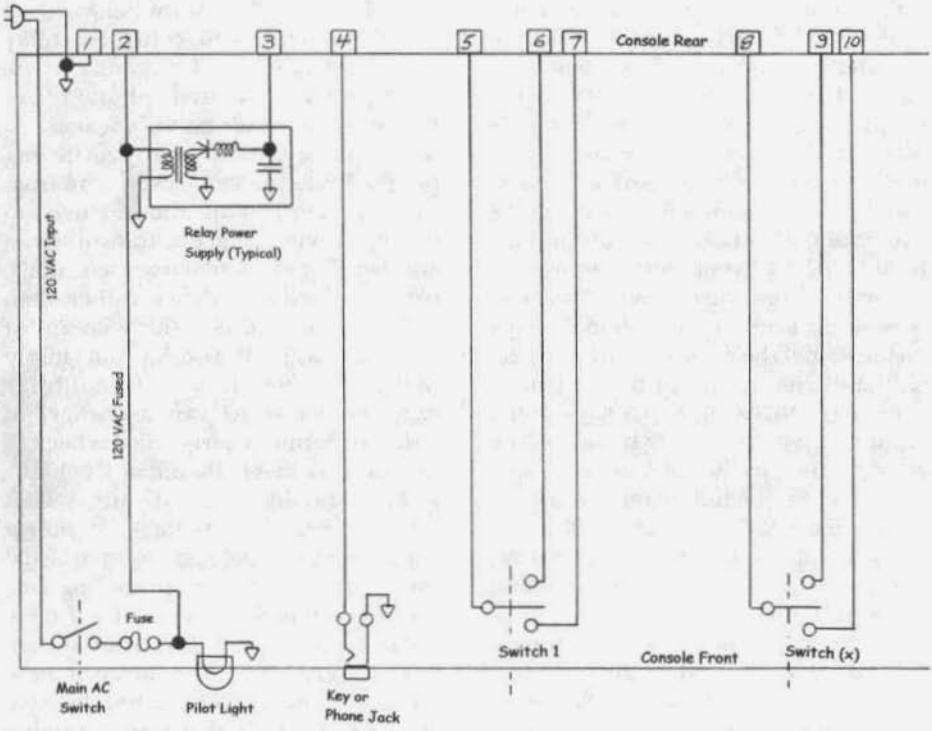

Figure 3. Control Console.

the station, and is the power source for relay operation. I like having one switch energize the rigs and accessories that I use the most, and figure it saves wear and tear on the rigs' power switches, which are left in the "on" position. Also included on the console is a fuse and pilot light for the main 120VAC. I first planned to use stick-on labels for the switches since their function is subject to occasion change. Rather than clutter up the front of the console, I decided to use a paper "key" for switch function descriptions which is taped to the table just below the switches themselves. This "key" can be prepared on a computer word processor or spreadsheet, and changed at will as the configuration of the station changes.

One nice thing about the center-off toggles, when used for speaker switching (I just use one speaker), is that you don't have to use the headphone jack as a speaker switch. My shack has only vintage headphones, and there is the ever-present danger of damaging fragile headphone cords when plugging and unplugging them. Most of my receivers have phone terminals (screws) on the back as well as a jack in front. The headphone jack on the control console can be connected (through one of the console switches) to these terminals and the speaker is not muted when using phones. By proper console switch positions, one receiver can be monitored through the phones, while another is monitored on the speaker. As clever as this seems, I can find absolutely no worthwhile purpose in so doing. One of the nicest things about my shack now is how quickly I can change transmitters during a QSO. While listening to the other station, I

continued on page 42

John F. Williamson, W3GC, ex-3GC, Silent Key

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Jack Williamson, cofounder of Barker and Williamson Company, died suddenly on March 19, 2002. He was 95. Licensed as 3GC in 1921, Jack grew up with spark but enthusiastically embraced early tube technology. He worked part time at the family hardware store in Ardmore, PA while attending Haverford School. Encouraged by his mother, he arranged window and counter displays with radio parts and equipment. Jack's knowledge of radio and his freely-given advice attracted workers from the Autocar truck manufacturing plant, located across the street from the store, who came during lunch breaks and shift changes for his counsel—and to buy parts for their radios! The young fellow soon acquired a widespread reputation for his abilities, to the extent that none less than Atwater Kent and his engineers made several visits to solicit Jack's technical advice on AK products during their design and pre-production stages.

Jack studied electrical engineering at Drexel Institute for three years but was forced to withdraw at the onset of the depression. Meanwhile, Barrie Barker (W3DGP) had to relinquish his job as a machinist at his family's textile mill due to drastic loss of business. Jack and Barrie had been friends for years so, with no employment prospects, and in spite of the dismal economic climate of 1934, they launched a new business to manufacture RF coils for amateurs. Their first products were made in an unused corner of the Barker mill, where they had a lathe for making air-wound coils using processes devised by Barrie. Jack went on the road with samples and product displays to radio stores and any gathering of hams where there was a prospect of attracting customers. As the product line expanded and became widely accepted by the ham fraternity, Barker and Williamson Co. garnered name recognition throughout the emerging communications industry. Thus, just before Pearl Harbor, B&W was approached by Hallicrafters engineers who had been frustrated in their attempts to design an antenna tuner for the BC-610 that could match short antennas to Signal Corps specifications. Within one week, Jack and Barrie completed the design and construction of a prototype tuner for presentation to Army engineers at Ft. Monmouth. The model was accepted and, after refinement to accommodate extreme environmental conditions, a production contract was awarded to B&W for the tuner to be known as BC-939.

The fledgling company grew rapidly following that initial military contract, moving on to contracts of ever-increasing complexity. Furthermore, the reputation for excellence established by B&W in prewar days followed them into military circles, where the company was frequently sought out for critical jobs. B&W made a successful transition in the postwar era with new business from both military and ham radio sectors. Notable in the amateur line were their venerable coils and transmitter variable capacitor products, Model 5100 self-contained all-band transmitter and companion Model 51SB SSB adapter, a variety of auxiliary equipment, and the Model 6100 crystal-synthesized SSB transmitter. These and other original B&W amateur radio products are still avidly sought by collectors of vintage ham radio gear. Barrie's health began to fail in the early 'sixties, forcing him to retire, but Jack continued operating the firm until its sale in 1964. In later

continued on page 41

Radio Service in the Golden Age
1930's through the 50's

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Episode 11

Color Convertible Television! Yeah, Sure.

Athens, Texas, in 1965 was a small, clean, progressive southern city. The C-M plant, one of the areas major industries, was built originally for the production of wood furniture. If my memory is correct we were told that the factory once manufactured a line of high-end bedroom furniture.

When the original company decided to sell the plant, the C-M organization realized they had a great opportunity to expand their growing TV and radio manufacturing facilities. Curtis Mathes purchased the sprawling plant, and converted it to the production of radio, radio phonograph, and television receivers. It was everything the Benton plant was not—a really beautiful manufacturing facility. Actually, the electronics-radio and TV chassis's assembly, occupied a very small amount of their total floor space. At least 90% of the plants square footage was used for cabinet manufacturing, offices, and warehousing of the finished product.

Outside the huge main building were several sheds where lumber for the cabinets was 'seasoned.' I am unsure of the processes involved, but the green lumber had to be dried and stabilized before it went to the big building to be turned into furniture. I found the cabinet manufacturing part of the plant more interesting than the electronics.

I will not go into detail of each operation in the building of a nice console TV cabinet, but I will tell you that it only takes minutes to build, uses an incredibly small amount of costly wood, and involves very few man hours. At this time, roughly the period between 1955 and 1970, Curtis Mathes had a reputation for fine cabinetry. In reality, CM TV cabinets in my opinion were of average quality, but had the look of expensive furniture.

Wood scraps glued together with a fast drying bonding agent made up the cabinet tops. Many smaller wood pieces were bonded together, and sanded smooth with a counterbalanced belt sander suspended by a steel cable over the gluing table. When you looked at the bottom side of a TV cabinet top, you might count six or more odd shaped pieces of wood. After sanding smooth and flat—an operation that took probably two minutes—a coat of glue was applied and a sheet of veneer cut to an approximate size was tossed on the sanded top.

The veneered top was then put in a press where considerable pressure was used to assure a good bond between the veneer and the scrap wood base. Cabinet tops then went through an oven and emerged minutes later ready for cutting down to the exact size. The edges were then given a decorative edge with a router—the shape of the cut depended upon the cabinet style for which the top was intended. Popular styles among buyers in the 60's were Early American with a maple finish, Mediterranean, which was finished in a dark walnut color, Fruitwood, which was Early American spattered with black paint,

and Danish modern, usually finished in a medium walnut. The period of 'Blonde' furniture was in the past, and no longer a factor in the market—a tribute to the evolving good taste of the buying public. When completed, a C-M wood cabinet was heavy to lift, had a nice smooth finish, and had all the appearances of a fine piece of furniture. I would say their cabinetry compared very well with upper end furniture built today.

While the C-M plant covered several acres, the area where TV and radio chassis's were assembled and wired was not much larger than a basketball court. After a chassis was punched and drilled—a quick process with the equipment designed for this step, it was placed on a padded cradle and passed down an assembly line where workers installed transformers, tube sockets, filter capacitors, terminal strips, controls, and pre-assembled units such as the 'front end' tuner. This assembly line was rather short—perhaps 60 feet in total length. As the chassis in its wood cradle was pushed down the line it stopped in front of a worker, one of many, who installed only a few components. For example, one worker might install the tuner, the next person on the line installed the power transformer and filter capacitors, and the next worker might install a volume control and a terminal strip. It did not take a chassis very long to travel the length of the line, but when its trip down the table was completed every part on the chassis was mounted. The chassis was then moved to the wiring line.

In front of each worker on the wiring line was a large pictorial diagram. The diagram might, for example, show two miniature tube sockets, a terminal strip, and a potentiometer. The drawing would show two resistors and a .01 capacitor. These three parts, the two resistors and the capacitor, were in a bold color different from the rest of the drawing. These three parts were all the worker at this assembly line station was taught to install. After a short instruction session showing a new worker how to make a mechanical connection first, then apply a small amount of solder, they were ready to take their place on the primitive assembly line. As each simple step was completed, the worker pushed the chassis cradle to the next worker on the line. Another chassis was in place waiting for the worker to again repeat his previous operation. In chassis, after chassis, the same parts were installed and soldered by the same worker. There was little chance for error.

When a chassis reached the end of the line it was carried to a small screened-in room. Radio chassis' were connected to a speaker, and underwent final alignment. TV's were of course connected to a picture tube, yoke, convergence board, speaker, and other outboard components. Here both picture and sound were given a final alignment.

Meanwhile, completed wood cabinets moved slowly along their line on a conveyor belt. As a cabinet passed through one of four spray booths the appropriate finish was applied. Workers stood by in each booth waiting to apply the appropriate finish when a TV cabinet appeared. One booth was for walnut finish, one for maple, one for the darker 'Mediterranean' finish, and one for the 'Fruitwood' finish. The painters knew from the cabinet styles what finish to apply. Each booth was perhaps 16 feet wide. When a set to be finished in maple appeared a worker walked alongside the cabinet giving it a coat of maple tinted lacquer spray. The TV cabinet never paused in its slow travel through the spray booth. The painter walked alongside the set spraying it from every angle. It took a cabinet about 60 seconds to travel through a spray booth.

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As cabinets came off the paint line, waiting employees begin installing such things as speaker grills and speakers, picture tubes, yokes, and convergence boards.

Another worker installed the chassis and connected up all components. The set then went to a final checkout and test bench. No difficult problems were corrected here. If the set was found to be inoperative, or had a defect, it went directly to a screened-in service area where technicians tracked down the problem.

Alignment of audio and video that might normally take a service shop two hours or more to perform could be done in minutes as all necessary equipment was in place and waiting. Seldom was an inoperative TV or radio in the service room over ten minutes. From the service area the sets were placed back on a conveyor platform leading to the packing and shipping room.

Perhaps the high point of out visit was a two-hour talk by Curtis Mathes. The talk ran a little over six hours.

Mr. Mathes told us a story about his youth when he was working in a grocery store. Over a period of time he made friends with a wealthy rancher who shopped at the store where he worked. One day the rancher invited him out to his ranch for supper. In Texas, as well as other states throughout the south, dinner is what you eat at noon—you eat supper after the day's work is finished. He said the rancher told him that after supper he would tell him how to become a wealthy man—maybe even a millionaire. The young man eagerly accepted the invitation.

When he arrived at the ranch he was surprised to find the ranchers wife busy preparing the evening meal. No servants were in evidence. After a delicious meal that included such staples as hot biscuits and gravy, the elder gentleman said, "Curtis, why don't you and I go out on the front porch, and I'll tell you my secret of becoming rich. Pick up that glass of iced tea and bring it along with you."

Mr. Mathes said he was ready for a long lesson on making money. The old timer and the young man sat down in wood rocking chairs, and sipped their cold drinks. Curtis waited for the old rancher to speak. At last he shattered the silence—"Here is the way to become wealthy" he said. "Keep it simple, and deal for cash."

Curtis waited for more. The rancher spoke again, "That is all there is to becoming a millionaire. If you get involved in complicated business deals you are likely to get hurt. If you sell on credit many will pay you, but a lot will not. Why get involved in complicated, unsecured deals. Remember my six words—"Keep it simple, deal for cash."

Mr. Mathes told us he had always tried to keep his operation simple, and be very watchful of his borrowing, as well as his accounts receivable.

Mr. Mathes told us how he started in the radio business back in the early 1930's. At the time he was bucking well-established dealers selling wellknown brands of radios such as Atwater-Kent, Majestic, and Crosley. He did not have an easy time earning a living from the sale and repair of radios alone. It was clear he needed an additional source of income. The extremely hot Texas summers provided the opportunity he was seeking. He would build and market a line of window fans.

He faced two problems—how do you find the money for a metal working plant, and if you had such a plant, where in rural Texas could you find trained personnel. The answer was amazingly simple—build the fans from wood. Experienced wood workers can be found throughout the south in almost every community, and wood working equipment in those prewar years was relatively inexpensive compared to metal fabricating equipment.

Fan blades, pulleys, bearings, belts, and switches were purchases in bulk from independent vendors. The Mathes Company built simple but attractive wood framed window fan boxes and installed the components. It was a simple operation. Curtis Mathes was practicing the first part of his 'key to wealth.'

The fans were attractive and cooled just as well as those made of metal. In reality, most housewives preferred the attractive wood frame to a painted metal contraption. The fans sold well according to Mr. Mathes. All looked rosy indeed for the new manufacturing plant—until the fan's electric switches started burning out. Suddenly calls came in from dealers all over the trade area. Mr. Mathes said at first he was discouraged, but as he rethought the situation he decided to apply the old adage, "If you have lemons, make lemonade."

He hired extra help, showed them how to change the switches on the window fans, and put them on the road immediately. They were instructed to call on every dealer who had purchased fans, and to install new, and hopefully a much better, switches in every fan his dealers had in their inventory. From the dealers files they secured names and addresses of customers who had purchased fans, them made calls to the customers homes to replace switches, even if the switch had not yet failed. He explained to us that this was a golden opportunity to build a base of loyal dealers who knew they were dealing with a company that 'stood behind their product.' It also made the name Curtis Mathes a respected name throughout his trade territory. His idea paid off. Later, when the Mathes Corporation introduced a line of room air conditioners housed in wood cabinets, dealers bought them even though the idea seemed wildly impractical.

Not many years ago I was in an antique store in Mountain View, Arkansas. There on the floor was a Curtis Mathes window fan in a nice walnut finished wood frame. I asked the owner to plug it in. The fan worked as well as a new one, and the cabinet still was attractive in spite of a few scratches.

I would like to say that the Mathes Company continued to 'Keep it simple' but sometimes they forgot. I think their most impractical innovation during the years I was a TV dealer was introduced at that meeting in Athens. Perhaps we should take a quick look at the TV market as it existed at the time before going into this latest Mathes revolutionary idea for selling TV sets.

Color TV was just beginning to capture the attention of the buying public. The pictures on all color sets at the time were, to be quite honest—terrible. No other words can describe the color pictures we endured during the fifties and into the early sixties. Gradually the picture quality improved, but not before a lot of people invested a vast sum of money on sets of doubtful practical use. The first color set I purchased was a 16-inch RCA in a BIG plywood table model cabinet. My wholesale cost was $542.10. I remember it well. The set delivered a color picture of sorts. Perhaps the most annoying feature of those old sets was the impossibility of ever achieving perfect convergence of the three-color images. People appeared to have either a red, or green, or blue outline—sometimes a mix of all three. If you liked rainbows around every image then the old sets were OK. If you wanted realistic color you were in for a disappointment.

Nearby lightning strikes, running an electric sweeper near the TV, or sometimes it seemed, for no good reason at all TV sets would become 'magnetized.' The result was really wild colors—something like I imagine people see after smoking those little white

continued on page 43

W1HRX on the Air Again

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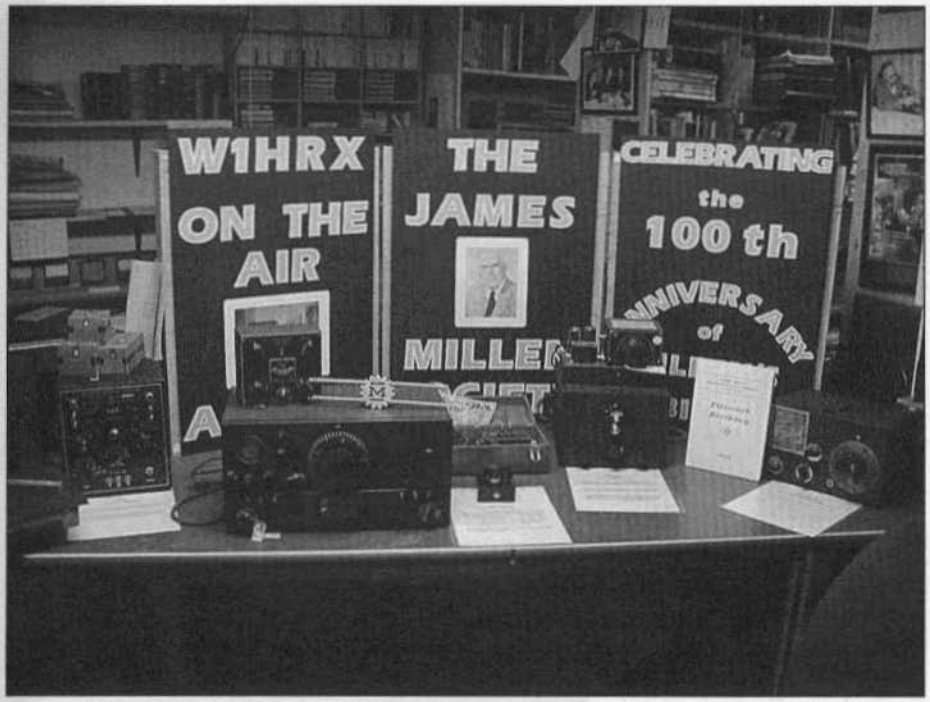
There are many individuals in this diverse hobby known as Amateur Radio who love to maintain and use transmitting and receiving equipment of a bygone era, who thrill at operating their own personal 'time machines' on the air. The glow of tubes, the clatter of heavy duty T/R relays, it all brings back to life the memories of the first seventy years of ham radio. Yet, as scarce as this experience may be in these days of 'software defined radios', it is even rarer to have the opportunity to operate a piece of living radio history on the air. On the afternoon and evening of Wednesday, September 5th 2001, a handful of lucky ham radio operators did just that.

The event that day commemorated the 100th anniversary of the birth of James Millen, ham radio legend in his own right and the man behind the famous HRO series of receivers produced by the National Radio Company. Two years before his death in 1987, Millen had donated his personal 1 KW transmitter and HRO receiver that he had used in the mid 1930's to the Antique Wireless Association. Since that time, both the transmitter and the receiver had been lovingly restored to full operating condition by some of the local AWA members. The transmitter had been on the air occasionally since coming home to the AWA museum annex using the organization's club callsign, W2AN. However, on the evening of September 5th, the station was to operate using James Millen's original callsign, W1HRX , for the first time in 64 years!

The idea for the special event came from Don Buska, N9OO, a cofounder of The James Millen Society in 1999 to promote the research, collection and, most importantly, the actual use of James Millen equipment. (Millen left National in the late 30's and had his own manufacturing company from 1939 through the late 70's.) Don knew that the AWA had the Millen transmitter in their museum and, in 1999, started communicating with various people at the AWA to drum up support for the 100th birthday anniversary special event idea. The AWA was very enthusiastic about the idea, especially Ed Gable, K2MP, curator of the AWA museum. The stage for the special event operation was set.

My involvement in the project began in June, 2001, when I had begun picking up James Millen transmitting equipment and constructing my own vintage ham station. I met Don Buska, President of the James Millen Society, when I joined the society and we struck up an e-mail correspondence. Upon discovering that I was a long-standing AWA member who frequented the Rochester conferences, Don filled me in on the plans for the W1HRX special event station and informed me that the Society had acquired the W1HRX callsign from a ham club in California (which had never used it on the air.) I was instantly hooked. There could only be one anniversary celebration like this, and I wanted to be a part of it!

The special event was actually going to be in two parts. The first part would consist of the main operation of the big Millen transmitter at the AWA museum annex, in conjunction with a display of



A display put together by members of the JMS of equipment designed or influenced by James Millen, including one of the extremely rare Millen DFP-201 prototype receivers.

various pieces of equipment produced, designed or influenced by James Millen. The second part would take place on the last morning of the conference that Saturday. Don had brought his own personal Millen transmitting equipment and HRO receiver to make contacts using the W1HRX callsign.

His transmitter rack consisted of the following Millen items: model 90801 50 watt exciter, the rare 90831 modulator*, 90281 high voltage power supply, 90903 oscilloscope (not working), and model 90711 VFO. A vintage Lambda power supply would supply the low voltages for the transmitter.

*A note about the 90831 modulator Don used: he had recently acquired the unit from Ralph Jannini, KA1FAA, who runs James Millen Electronics, one of the units left after the split up of the original James Millen Manufacturing Company. The problem was that Ralph only had the complete sub-chassis of the modulator. It was missing the modulator transformer and had no cabinet! In the months leading up to the conference, Don took some sheet metal to a HVAC company and had them bend it into a cabinet. Then, he slapped a modulator transformer on it from his Johnson Ranger transmitter. This left him with the problem of the faceplate for the modulator, which he created on his computer, printing the final result out on laser printer contact transparencies multiple times to get the black of the faceplate 'really black', then sticking it on the metal faceplate! He did such a wonderful job on it, I dare you to find it in the photograph!

I arrived in Rochester the Sunday before Labor Day, three days before the beginning of the conference. There were

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The author, WA4IAM, enjoying a few contacts. Clive Oakes, VE3YB, logging in the foreground. ***Photo by Robert Lozier, KD4HSH.***

to be only three Millen Society members participating in the operation: myself, Don and Canadian member Clive Oakes, VE3YB. Don and Clive arrived at the Red Roof Inn where I was staying on Labor Day afternoon. We linked up and went across the street to Wendy's to grab a bite to eat and have a 'get acquainted' meeting. We also planned the next day's schedule, which included meeting at the AWA museum annex to setup the Millen display and learning how to work the big Millen transmitter. Don wanted to be out at the annex, which is actually in East Bloomfield, NY, about 30 miles from Rochester, at 8 am. Since the operative word for me every year at this conference is 'vacation', I told him I would be there at 9 am.

On Tuesday morning, I made my way towards East Bloomfield. I called Don on a prearranged repeater frequency, expecting him to already be at the annex. When he answered, he said he was still looking for the place (not surprising if you've never been there before, since the annex is a bit tricky to spot.) I gave him directions and we soon linked up there. I seem to remember Clive getting lost too, but soon all three of us were there setting up the display backdrop created by Don's wife, Bonnie, W9MSC.

Ed Gable, the museum curator, and his many volunteers were also there in force getting the whole annex ready for the throngs of visitors that would be showing up the following day from all over the world. We broke for lunch at noon and, on our way back, Ed took us to the main AWA museum just a mile down the road from the annex. I had been there many times before, but this was Don's first visit. Seeing the look on his face while he examined all the

John Bauer, W4AWM, at the height of the 100 carrier pileup!

Marconi equipment, the early wireless gear and the early mechanical television equipment, was one of the high points of the day.

Later that afternoon, we returned to the hotel conference site where the attendees were already starting to pour in. I began roaming around the parking lot where the conference flea market was to start the following day, looking for the two men who were going to be absolutely vital to the success of the special event operation.

Bob Raide, W2ZM, and his son, Mike, W2ZE, are both professional broadcast engineers, and they both know the in's and out's of the big Millen transmitter better than anyone alive. Don and I found them in short order and proceeded to pick their brains. Don told Bob that the AWA had a crystal for 3882 kHz to use on the transmitter.

Don explained that the Wednesday night which we had planned to operate W1HRX just happened to be the very night that the Collins AM Night Net was to meet on 3880 kHz, and that the net control stations had requested that we get as close to their frequency as possible because of the intense interest of their members to work our special event.

At this point Bob said, "Well, I'll tell ya, fellas. That transmitter requires a really active crystal in order for it to transmit. If it's not a good, active crystal you can forget it!" I quietly started praying to the radio gods, hoping that the AWA had a VERY active crystal!

On Wednesday morning, hundreds of buyers and sellers were in the flea market dealing in everything from early wireless equipment to genuine German Enigma code machines to early transistor radios. We were so busy looking at all the goodies in the flea market that, before we knew it, it was 3 pm and we needed to start making our way to the museum annex.

Our first operation time, which was scheduled for 4 pm, would give the ham operators at the conference a chance to work W1HRX from the flea market parking lot. Tim Walker, W1GIG, had strung up an 80 meter dipole between two lampposts in the parking lot and had it hooked up to a Multi-Elmac transmitter. Don, Clive and myself arrived at the museum annex at about 3:40 pm. Mike, W2ZE, was there to tune the transmitter and get us started. Bob, W2ZM, had to return to

continued next page

Mike Raide, W2ZE, starting the whole thing off, with AWA Museum curator Ed Gable, K2MP, keeping the log

his home in Syracuse, NY, earlier in the day to take care of some business but, by 3:50 pm, he appeared on our start frequency of 3837 kHz from his home QTH to give us a signal report and to make sure the transmitter sounded OK.

We ended our first session at 6 pm, having worked about thirty different ham calls at the flea market 30 miles away. We went a short distance down the road from the annex to grab a bite to eat before the start of the main session at 7 pm.

We returned at about 6:50 pm to get ready for round two. Mike pulled out the 3837 kHz crystal and popped in the 3882 kHz crystal. He keyed the transmitter and... nothing.

Our hearts sank. Calmly, Mike said, "Don't panic!", pulled the crystal out of the socket and slammed it on the table. He inserted the crystal back into the socket, and the transmitter came to life! As luck would have it, our transmit frequency ended up almost exactly on 3880 kHz, the frequency of the Collins AM Night net.

Mike started us off at 7 pm. A few of his AM buddies were there waiting for him, so he knocked off contacts with them in short order. After about half an hour, he turned the mic over to Don, who made a few quick contacts but wanted to mingle with the conference attendees who were starting to show up in small car loads. I believe Ed Gable made a few contacts after that, with Clive manning the logbook.

The band was just starting to open up a bit when the mic was turned over to me. That's when the big pileup started. In all my years in ham radio, I've never heard anything like it. After calling "QRZ W1HRX", instead of hearing a dozen or so carriers trying to break through to make a contact, there were 50, 100, and after the band opened up a bit more, 200 carriers all trying to make contact! "Mayhem" is perhaps not as adequate a description of the sound as "RF carnage" is!

Sometime around 8:10 pm, the bus chock full of conference attendees pulled up to the annex. At this point John Bauer, W4AWM, took over the mic duties and I relieved Clive at the logbook. John made a great run, knocking off contact after contact. A couple of other visiting hams also took the mic to make a few QSO's but, before I knew it, the mic was back in my hand. After about 15 minutes at the helm, I happened to look up and out at the rest of the room. There must have been 25 to 35 people in that room, all looking at

the transmitter with their mouths hanging open! I think they were just as amazed as we were at the pileups we were getting! I thought, AOK, let's give 'em a show!' So I dug in my heels and doubled the pace. Someone told me later that they were astounded at how fast I was knocking off contacts. I told them, that's what comes from working CQ World Wide with the W4WS Contest Group!

The time was approaching 9 pm, our scheduled shutdown time. I called the midwest net control station for the Collins AM Night Net, thanked him for the use of the frequency, and Don came to the mic to add his thanks as well. The NCS came back saying, "Don't stop! We've gotta bunch of guys in the Rockies and the west coast that want to try to work W1HRX!" So, by popular demand, we kept on going! John, W4AWM, took the mic duties at this point, which freed me up for a much needed stretch.

John, Mike and I ended up running the pileup until 11 pm ET. By that time we were all worn out, and most of the stations at the other end had called it a night. We never made it out to the west coast. The furthest west we managed to get were two or three stations in Colorado. My hotel bed felt mighty good later that evening!

Three days later, I was back out at the annex watching Don make contacts on his Millen setup using the W1HRX callsign. He was joined by Ron, WA2TT, who managed to make a couple of AM contacts on 40 meters, and another Ron, W2FUI, who started working stations on 40 meter CW. Out of all the QSO's they made that morning, only one of those stations had worked W1HRX during the Wednesday night session. Don completed the operation on 40 meter CW. A total of nine QSO's were made before it was time to pack up the equipment and get ready for the journey home.

The W1HRX special event had been a great success. The final QSO total stood at 158 contacts, with only three or four of those being made with SSB stations. Everyone involved agreed that it was a truly wonderful operation that none would soon forget! **ER**

Postscript

For those of you who are interested, here are the stats on the James Millen transmitter as sent to me by Mike Raide, W2ZE.

Xtal Osc. : 57
Buffer: Pair of RK-20's
Final: Pair of 204A=s
Millen audio driver
Modulator: Pair of 851's

Finals and mods running 1700 volts
Plate current: 250 mA
Input power around 370 watts, push pull class C is about 70% efficient.
204A has about 250 watts plate dissipation and the 851's 1000 watts of plate dissipation a piece.

W3GC, Silent Key **from page 31**

years Jack concerned himself primarily with contract matters, but he remained influential in the amateur product line and he was never above helping out in the shipping department. He was an active ham throughout his involvement with the company and continued to operate on local VHF nets until recently.

Jack Williamson was a successful, dedicated entrepreneur in the field he loved. A man with an imposing physical frame, outstanding social grace and absolute devotion to family, W3GC was never without his friendly, outgoing charm—always eager to discuss current events or spin a yarn from his rich career. **ER**

Ed: W3NE is working on a longer and more complete biography/history of Jack Williamson and the B&W company that will appear in a future issue of ER.

Collins Conundrum from page 25

However, there's a little more to it than fond affection for classic equipment, such as one would assign their '62 Vette, '58 T-Bird or '66 Monza. Like it or not, they actually do make better cars today. So... I have come to the conclusion that, with the possible exception of digital signal processing, a well aligned and adjusted Collins rig may be as good or better on HF single sideband than anything ever made. Period!

Another piece of the Collins Conundrum can be explained this way. Fred Johnson pointed out in his articles that Collins gear had a good "feel" to it largely because it was designed so well mechanically. We've all seen and operated cheezy equipment, much of it produced off shore. If you don't believe me, try taking your $100 hand-held dual-bander downtown to a major city and see if you can hear anything through the intermod. I think that if the Collins Radio Company existed today and made a two-meter or 440 rig, the front end would be like a brick wall and things would probably be pretty quiet, even in front of your town's comm center or City Hall. There really isn't a company out there now which represents the standard. I am in the middle of reading a wonderful series of books called *Triumph I, II* and *III* which traces the history of the Pennsylvania Railroad. Talk about a standard: if these guys couldn't build a railroad track around a mountain, they bought the mountain and bored a hole through it! I think this is what Collins Radio and Collins equipment means to many of us.

It's a pretty extraordinary feat that today, we can turn on a 40-year-old rig and still get compliments from folks operating three thousand dollar microprocessor-controlled radios. I have never left the fold, despite some flirtations in the 1980's with some Pacific Rim solid-state gear. (I went to confession later.)

Today I maintain a station which includes my "S" Line, a KWM-2/A, a 51S-1 receiver, 30L-1 amplifier and a floor mounted Henry 2K-X, with 4,000 volts on the plates, which I believe is a distant cousin to Collins when it comes to performance and quality. H'mmm. I wonder what would happen to an FT-1000 MP Mark V if you tossed it out the window! ER

Elimination of Haywire from page 30

can zero beat a second rig (using the "tune" or "calibration" mode). Then, by flipping two switches (key and coax relay), I can switch transmitters in a heartbeat for a comparison of signal strength, keying characteristics, etc. The station bug does not have to be moved and remains plugged into the same jack. I realize in reading this over that since I'm CW only, I didn't mention microphones. Of course, everything said about key jacks, etc., would apply equally well to microphones.

I guess if you come away with anything from this article, it's that it is pretty handy to have some miscellaneous controls, in easy reach of a station's operator, which can be conveniently wired into various pieces of gear from terminals at the back of the station. I'm already planning the next version of a control console, which will have even more switches, jacks, potentiometers, etc. The National NC300/303 series of receivers has provision for an external RF gain control. What better place for that control, than on the console. A large array of switches, knobs, pots and jacks is guaranteed to impress any casual visitor to the shack, even though at any given time they may not be hooked to anything!

Now turn the page for some real boatanchor articles! ER

Radio Service from page 35
crystals in their pipe. The cure was a service call by a TV technician. The serviceman arrived at the house carrying a gadget that resembled a miniature 'hula hoop' well wrapped with black plastic electrical tape, to which was attached a 20 foot electrical cord.

The repairman first turned on the TV, then plugged the degaussing coil into the nearest electrical outlet. The coil was switched on, and then passed all around, over, under, and in front of the picture tube—more or less like a magician does when levitating a young lady in midair. As a degaussing coil is moved about the front of a TV the picture does all sorts of weird things—colors change, people distort, and the customer looks on with amazement. Here is where the smart repairman uses a little showmanship. When all the demons are driven from the set and the spirits are at peace with Milton Berle, the hoop is rotated until the plane of the loop is vertical to the TV screen, and slowly backed several feet away from the TV. Then the loop is switched off. If the exorcism was successful the happy customer might, later that same night, watch a magenta complexioned Roy Rogers ride his bilious colored horse across a cyan landscape. Each and every figure, in all probability, would be surrounded by a red or green outline—maybe both.

It was understandable that many potential TV customers were reluctant to invest money in either a monochrome, or color TV. They were afraid that any day now color TV would be vastly improved—a correct assumption, and that they should postpone purchase of a TV set until that time. A sizeable number of customers owned old 12, 14, and 16 inch monochrome TV's that were badly in need of replacement. This was the buying climate when Curtis Mathes announced to the small group of dealers that he had solved the problem.

His answer to this dilemma was the introduction of a truly color convertible TV. If potential customers were offered a monochrome TV that could be converted to the latest color model at a later date—and for a guaranteed fixed price for the conversion—all the objections to buying a new TV today would be put to rest. How was this to be accomplished? His answer was amazingly simple. Build all monochrome, and color TV chassis the same size and with the same control placement. While the color TV might require a few more controls, monochrome TV sets would have the same number even though they might be of little practical use. Example, a treble boost control, and a phono input switch on the monochrome might be replaced with horizontal and vertical hold controls.

When a customer wanted to upgrade his CM monochrome receiver to the latest color model, the dealer simply ordered out a color set which arrived in a cheap, plain black metal cabinet. He then slid out the monochrome chassis, and replaced it with the new color chassis. The old monochrome chassis was now installed in the black metal box and put on the floor as a 'rebuilt' monochrome TV. The customers cost was moderate—the wholesale cost of the color set. The dealer's profit was a 'rebuilt' set in a new metal cabinet that should sell for about $100. Everybody won—or so it seemed. Unfortunately there must have been a few details that needed further attention. That was the first and only time I heard of the revolutionary 'Color Convertible' TV sets. ER

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FOR SALE: Parts, tubes, books, ect. Send two stamp SASE or email for list. Wayne LeTourneau, POB 62, Wannaska, MN 56761. wb0cte@arrl.net

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FOR SALE: Military and commercial communications items: http://www.maxpages.com/murphyjunk. Murphy's Surplus, 401 N. Johnson Ave., El Cajon, CA 92020. (619) 444-7717

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FOR SALE: Tubes, 7 or 9 pin, used - 50¢ ea; tested OK, others; Galena xtal radios, or parts. L. Gardner, 458 Two Mile Creek Rd., Tanawanda, NY 14150. radiolen@aol.com

FOR SALE: Convert any wattmeter to read PEP! Perfect for AM/SSB - $19.99 ppd for complete kit! HI-RES, 8232 Woodview, Clarkston, MI 48348. (248) 391-6660, hires@rust.net

FOR SALE: Complete hardware set to connect Collins PM2 to KWM2 - $19.95 ppd. Warren Hall, KØZQD, POB 282, Ash Grove, MO 65604.

FOR SALE: Repair, upgrade, performance modification of tube communications & test equip. Accepting most military, all Collins & Drake designs, & the better efforts from others. Laboratory performance documentation on request. Work guaranteed. Chuck Felton, KDØZS, Felton Electronic Design, Box 187, Wheatland, WY 82201. (307) 322-5858, feltoned@coffey.com, www.feltondesign.com

FOR SALE: I am making aluminum plate and grid connectors for T series tubes. If interested contact Alan Price at fixr7526@cs.com

FOR SALE: Ur old QSL card? Search by call free, buy find at $3.50 ppd. Chuck, NZ5M, CRBCS1@prodigy.net

FOR SALE: Nems Clarke 2201 rcvr, 105-155 mHz AM, works, very nice (former NASA) - $55 plus shipping from 24401. Dave Metz, (540) 885 7914, 7-10PM eastern please

WANTED: ARC-5 rcvrs, racks, dynamotors. Jim Hebert, 1572 Newman Ave., Lakewood, OH 44107.

WANTED: Orig Heath manuals for ham & test equip. Please state condx & price. Warren, K1BOX, POB 1051, Spruce Pine, NC 28777. (828) 688-1922

WANTED: SCR602 components, BC-1083, BC-1084 displays, any APS-4 components. Carl Bloom, CA, (714) 639-1679 or 3778111@mcimail.com

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

WANTED: Bendix radio rcvr RA-1B; Belguim set RST-101. George Rancourt, K1ANX, MA, (413) 527-4304 or k1anx@mindspring.com

WANTED: Collins 70K-2 PTOs working or not; IN82A diodes; Bretting 14/14AX manual. Clark, WØBT, KS, (785) 286-2132

WANTED: Drake 1A rcvr; 399C1 Collins VFO; JRC 505 twins. K5YY, AR, (501) 756-5010. k5yy@arrl.net

WANTED: T-195 OR T-195B modules with emphasis on the LV sply and blower unit. Robert Heusser, CA, k6tuy@mindspring.com

WANTED: Stancor/Chicago PCC200, PCO/PS0150, RC8150; Triad A-9-J, A-10-J, A-11-J, A-12-J. **FOR SALE:** Books, send SASE. Richard Robinson, POB 1425, Wallingford, CT 06492. (203) 949-0871, richmix@erols.com

WANTED: R-390A rcvrs, parts rigs or restorable, will restore yours at reasonable prices. Walter Wilson, KK4DF, (706) 733-8323, wewilson@knology.net, www.knology.net/~wewilson

WANTED: WWII BC-610-E series or earlier xmtr; BC-739 interphone control box. BC-652 rcvr. Steve Finelli, N3NNG, 37 Stonecroft Dr., Easton, PA 18045. (610) 252-8211, navrad@enter.net

WANTED: 1950's Popular Electronics; 1961-65 Heathkit catalogs & Radio-TV Experimenter. John Curtis, WØCAR, 3146 S. Franklin St., Englewood, CO 80110. (303) 781-8027, wocar@arrl.net

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

WANTED: 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: Any Swan or Heath equipment or accessories, working or not. Julius Peitsch, WA8X, 110 Dawn Ave., Roscommon, MI 48653. oldradio@voyager.net

WANTED: Blower flanges for T-195/CRC-19 xmtr; "A" knob for ART-13; PE-110 pwr sply (for BC-669). K3HVG, (301) 831-6022, joepp@erols.com

WANTED: B&W type JEL coils; reasonably priced McElroy bug. Brian Roberts, K9VKY, 130 Tara Dr., Fombell, PA 16123. (724) 758-2688. k9vky@arrl.net

WANTED: Any info relating to ASB-8 Airborn Radar set. Pete Deierlein, KD2LN, 6257 Perryville Rd., Chittenango, NY 13037. (315) 687-5456, p.deierlein@worldnet.att.net

WANTED: National NTE CW xmtr in working condx. I love National. Sylvia Thompson, 33 Lawton Foster Rd., Hopkinton, RI 02833. (401) 377-4912. n1vj@arrl.net

WANTED: Knight Star Roamer; Hallicrafters S-38E; test equip; Johnson Viking II; Elmac AF-67. George Elliott, #AP-5528, 10745 Rt 18, Albion, PA 16475

WANTED: Info pin connections & values of UTCS21 & ART-13 mod xfmr's. Randy, K4RHH, rwc-radiocollector@worldnet.att.net

WANTED: Galaxy (Hygain) RF-550-A wattmeter; Elmac AS-1 mobile spkr; military LS-2 spkr; any Harvey-Wells spkrs, VFOs, aircraft units, TBS-50-B. All answered. Kelley, W8GFG, 9010 Marquette, St. John, IN 46373. (219) 365-4730

WANTED: HELP! Need picture of WWII SCR-270 radar antenna, like the unit that detected Japanese planes that bombed Pearl Harbor. Note: not the picture in the movie Tora, Tora, Tora. An engineer drawing detail from manual will be OK. Robert Enemark, W1EC, POB 1607, Duxbury, MA 02331. (781) 585-6233

WANTED: Western Electric horns, spkrs, amps, tubes, mics. Barry Nadel, POB 29303, San Francisco, CA 94129. museumofsound@earthlink.net, www.museumofsound.org

WANTED: Rcvr R174/URR snap in unit for "Gas Radio" command set. Bruce Beckeney, 5472 Timberway Dr., Presque Isle, MI 49777. (989) 595-6483

WANTED: 14 pin tube socket w/1-5/16" pin circle, pin diameter .040 (need 4). KA1FZS, POB 465, Branford, CT 06405.

WANTED: National SW-3 w/complete set of orig coils & pwr sply in near mint working condx. Gale Roberts, POB 152, Clyman, WI 53016.

WANTED: ART-13, trades avail, PU or meet half way. WA5AAO, POB 335, La Grange, TX 78945. (979) 968-3384

WANTED: Need tech info on Raytheon transistors type T-59077, T-59078. Steve Bartkowski, 4923 W 28th, Cicero, IL 60804. (708) 863-3090

WANTED: Hallicrafters HA20 VFO. H.I. Stark, K9UBL, 3215 S. Meridian St., Indianapolis, IN 46217. (317) 788-1210

WANTED: Top prices paid for globe shape radio tubes, new or used. Send for buy list or send your list for offers. E-mail tubes@qwest.net for list or catalog. George H. Fathauer & Assoc., 698 W First St. Ste 4, Tempe, AZ 85281. (480) 968-7686, www.fathauer.com

WANTED: Looking for a Knight T-150A that I modified in the '60s. I added a one-tube reactance modulator behind the VFO. It was enclosed in PC board material which was soldered together. Does anyone have this T-150A? Ed Santavicca, AA8TV, OH, (216) 521-6093. aa8tv@aol.com

WANTED: FT-243 xtals between 7.245 & 7.283 MHz. Bill Smitherman, 9401 Hwy 67, E. Bend, NC 27018. (336) 699-8699

WANTED: Manual or copy for Globe DSB100 and 6N2 xmtrs; 755A VFO specifically the A model. Mike KØAZ, k0az@sofnet.com

CDs From the ER Bookstore

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R390-R390A/URR Technical CD-ROM - $ 57.
RCA HB-3 Tube Handbook - $ 75.
RCA Radiotron Handbook, 4th Edition - $ 62
Radio Boys on CD-ROM - $ 39.
80 years of QST - $ 39.95 per set (generally 5 or 10 year set).
All 11 volumes - special package price - $ 373.
Collins Radios Technical CD-ROM series. Vol. 1 - Collins Receivers; Vol. 2 - Collins Transmitters & Amplifiers; Vol. 3 - Collins Transceivers; Vol. 4 - Accessories, Power Supplies, VFO's, etc. Each CD - $79, Complete Set - $279

By Hamanuals

Drake equipment operator and service manuals on a two CD set by Bill Turini, KA4GAV - $71.95

By August Johnson, KG7BZ

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970-564-9185, er@frontier.net

WANTED: Old Callbooks, especially those covering the years before 1930. Alan, W3BV, PA, (215) 795-0943 or W3BV@arrl.net

WANTED: Searching for RME CT-100 or 3B9 xmtrs and info about them. David Edsall, W1TDD, 156 Sunset Ave., Amherst, MA 01002. (413) 549-0349, dedsall@crocker.com

WANTED: New or used unmodified BC459A, BC696, T18/ARC/5, T19/ARC/5, CBY52232. Louis Lytch, K2DET, 117-33 230th St., Cambria Heights, Jamaica, NY 11411-1806. (718) 528-5065

WANTED: Manuals, manuals, manuals for radio-related equipment to buy or swap. Catalog available. Pete Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872. (732) 238-8964

WANTED: Collecting military electronics including radio, radar, RDF and test, manuals & literature. William Van Lennep, POB 211, Pepperell, MA 01463. (978) 433-6031

WANTED: Postcards of old wireless stations; QSL cards showing pre-WWII ham shacks/equip. George, W2KRM, NY, (631) 360-9011, w2krm@optonline.net

WANTED: RX R-77/ARC3 + connectors & control box; C-118/ARC-3. G. Orecchia, Corso Galliera, 14/26, 16142 Genova Italy. sp0220bon@tin.it

WANTED: WW-2 Japanese military radio and radar of any kind. Yokohama WW-2 Japanese Military Radio Museum, Takashi Doi, 1-21-4, Minamidai, Seyaku, Yokohama 246 Japan. Fax 011-8145-301-8069, takadoi@carrot.ocn.ne.jp

WANTED: High end tube CB's, General Radiotelephone, Utica, Polycomm, etc; Collins TDO manual. Shane Ward, 6 Pond St., 2nd Floor, Amesbury, MA 01913. (978) 815-4275 n1dmxradio@aol.com

WANTED or TRADE FOR: Squires-Sanders SS-1R, SS-1V, SS-1S, SS-1RS. Paul, W5NTQ, (713) 229-1343 or w5ntq@pdq.net

WANTED: Tektronix memorabilia & promotional literature or catalogs from 1946-1980. James True, N5ARW, POB 820, Hot Springs, AR 71902. (501) 318-1844, Fx 623-8783, james.true@ibm.net

WANTED: Collins promotional literature, catalogs and manuals for the period 1933-1993. Jim Stitzinger, WA3CEX, 23800 Via Irana, Valencia, CA 91355. (661) 259-2011. FAX (661) 259-3830

WANTED: WW II military remote control rcvrs #ARW/CRW, xmtrs, dynamotors PE186 PE126, joy sticks, Gyroscopes for the GB, Azon glide bombs. Maurice Schechter, NY, (516) 294-4416 or mauricsch@cs.com

WANTED: QSL cards from old/pre WW II Ham DX countries; old regen kits. Hajime Suzuki, Nishikuniyoshi 1644-24, Ichihara-Shi, Chiba-Ken, 290-0231 Japan

WANTED: WW II Japanese xmtrs & rcvrs (parts, plug-in coils) for restoration & ER articles. Ken Lakin, KD6B, 63140 Britta St., Ste. C106, Bend, OR 97701. (541) 923-1013. klakin@aol.com

WANTED: RCA 140, 141, AVR5A. GE K80, K80X, K85. Any condx. James Treherne, 11909 Chapel Rd., Clifton, VA 20124. treherne@erols.com

WANTED: Seeking unbuilt Heathkits, Knightkits. Gene Peroni, POB 7164, St. Davids, PA 19087. (610) 293-2421

WANTED: Collins 310B3, basket case OK - welcomed; & Chicago 500W CMS-2, high-level modulation xfmr; Taylor T21. Jerry, W8EGD, CO, (303) 979-2323

WANTED: Tektronix #366-1646-00 volts/division knob for T-912 storage oscilloscope or parts unit. Robert, (303) 988-2089, rgbdenver@att.net

WANTED: Info, schematics, trouble-shooting, RCA FSW receiver by TMC, rackmount R-5007A/FRR502 with RF drawers. David Boardman, VA2DVD, radioman@dbtubes.com or (418) 877-1316

WANTED: Scott Special Communications rcvr. EA4JL, please call, Kurt Keller, CT, (203) 431-9740, k2112@earthlink.net

WANTED: Russian 1.5-8 MHz military transceiver, type P(R)-131. Will pay well for a good one. Leroy Sparks, W6SYC, 924 W. Mc Fadden Ave., Santa Ana, CA 92707. (714) 540-8123, leroysparks@earthlink.net

WANTED: SW3 #33A and #35 coils. I will trade my extra coils SW3 coils. Hank Bredehorst, 2440 Adrian St., Newbury Park, CA 91320. (805) 498-8907

WANTED: Long wire ants AT101, AT102, GRC-9; DY88/105; PP327GRC9; counterpoise CP12 & 13 GRC9; BC348 pwr conn PLQ102/103. KA1ZQR, 348 N. Main St., Stonington, CT 06378.

WANTED: Globe King 500 B/C; Viking Valiant I/II; Viking 500; Heathkit Mohawk. Frank, (916) 635-4994, frankdellechaie@sprintmail.com

WANTED: National SW-3 model1, version 3. Uses 32-32 30 tubes. Dean Showalter, W5PJR, 72 Buckboard Rd., Tijeras, NM 87059. (505) 286-1370

WANTED: Collins 32V & Collins 75A series; Globe Scout; National SW54. KBØW, CA, (916) 635-4994. frankdellechaie@sprintmail.com

WANTED: Hallicrafters SX88 or SX115. Larry Redmond, 413 Bedfort Dr., Duluth, GA 30096. (770) 495-7196

WANTED: Clean fully functional w/manuals Swans FC76, FS1 and WM2000A. Contact C6ANI @ c6anirumcay@hotmail.com

WANTED: Crystal calibrator, like the Heath HD-30 or similar. Bob, Farricy, K2QZ, k2qzr@dreamscape.com

WANTED: BC-329 xmtr & T-5/FRC. Dave, WD4PLI, CA, (818) 846-0617

WANTED: Instruction Service manual w/ schematics for Nems-Clarke type 2801A UHF rcvr. Paolo Viappiani, Via G B Valle 7-19124 La Spezia, Italy. Fax: ++39-0187-21647, pviappiani@tin.it

WANTED: National Co., Inc nameplates, equip logos or other items w/the diamond NC on them; also WW II era tube model military rcvr covering 225-400 MHz. Don Barsema, 1458 Byron SE, Grand Rapids, MI 49506. (616) 451-9874, dbarsema@prodigy.net

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

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

WANTED: Parts for a TMC GPT-750 xmtr. I need the AM modulator deck and other parts to restore this unit. John, KF2JQ (716) 873-0524 jprusso@acsu.buffalo.edu

WANTED: Old military radar displays, scopes, antennae, receivers, manuals, etc. Even half ton items! William Donzelli, 15 MacArthur Dr., Carmel, NY 10512. (847)225-2547, aw288@osfn.org

WANTED: Info on xmtrs made by Clough-Brengle Co. Used by the CCC, in the mid to late 30's. Any help would be greatly appreciated. Ron Lawrence, KC4YOY, POB 3015, Matthews, NC 28106. (704) 289-1166 hm, kc4yoy@trellis.net

WANTED: Collins 30K1 xmtr; also need orig manuals & literature for 75A1, 32V1, 30K1. Paul Kluwe, W8ZO, POB 84, Manchester, MI 48158. (734) 428-2000

WANTED: RBB/RBC rcvrs, pwr splys, cables & RAK/RAL equip. Andy Miller, KD6TKX, CA, (831) 484-2389, amillertkx@aol.com

WANTED: Electric Radio; Antique Radio Classifieds; Old Timers Bulletin. Alan Mark, POB 372, Pembroke, MA 02359

WANTED: Collins R-389 VLF parts, units, PTOs, manuals, anecdotes, antidotes. Don Reaves, Box 241455, Little Rock, AR 72223. (501)258-6097 W5OR@comcast.net

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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

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FOR SALE: WW-2 ARC-5 xmtrs & rcvrs - $30 to $60; racks & boxes; big Navy A/C field strength meter - $75; misc stuff. Ed Hammond, WN1L, POB 390, Buckfield, ME 04220. (207)336-2858

FOR SALE: Radio Shack Transistor Tester 22-024 w/copy manual - $19.95 + $3UPS. R.J.Eastwick, W2RJE, 400 N. Haddon Ave. Unit 109, Haddonfield, NJ 08033. (856) 420-2477

FOR SALE: National NC-300 rcvr - $125; Realistic DX-160 - $85; Viking I - $100. Mike Grimes, K5MLG, 3805 Appomattox Cir., Plano, TX 75023. (972) 867-6373, grimesm@flash.net

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

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

T-SHIRTS

The front displays the logo from the cover of ER (the tube outline, Electric Radio, and 'celebrating a bygone era'). The back has "Real Radios Glow in the Dark" (used with the permission of Classic Radio).The T-shirts are U.S. made by Hanes and come in S-M-L-XL-XXL . The color is just a little lighter than the cover of ER - $15 del. ($16 for XXL)

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Please add $3 S&H for one book and $1 for each additional book.

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ER, 14643 County Road G, Cortez, CO 81321-9575

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