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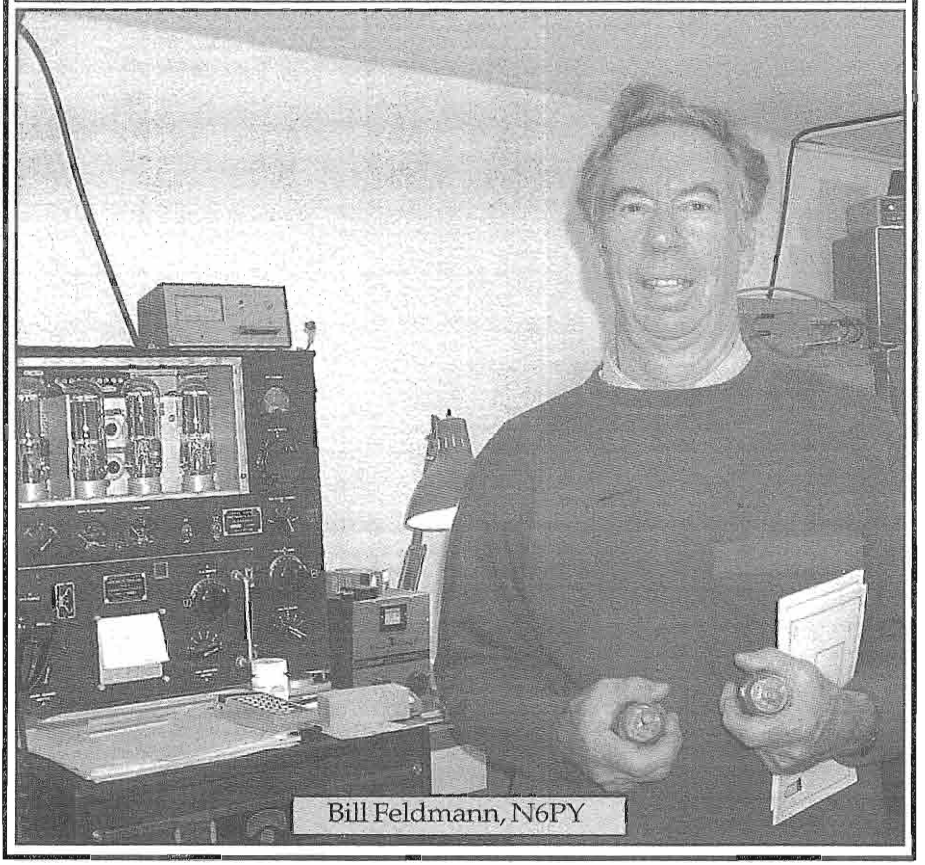
ELECTRIC RADIO

celebrating a bygone era

Number 164 January 2003



Bill Feldmann, N6PY

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Electric Radio was founded May 1989 by Barry Wiseman, N6CSW. The magazine continues publication 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 and operating with a primary 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:
Bob Dennison (W2HBE); Dale Gagnon (KWll); Chuck Teeters (W4MEW); Bruce Vaughan (NR5Q); Bob Grinder (K7AK); Jim Hanlon (W8KGI); Brian Harris (WA5UEK); Tom Marcellino (W3BYM); John Hruza (KBØOKU)

Editor's Comments

The 2002 Heavy Metal Rally is history. In spite of very poor band conditions, KDØHG has preliminary logs that indicate record participation in the event. Everyone had a great time, and the restored high-power rigs were really fun to work.

Many 10 Meter AM operators have noticed the slowly deteriorating band conditions. We are going to need 15 Meters to fill in for 10 in the near future due the decline in sunspot numbers. I'd like to run the Annual 15 Meter AM Exchange the first week of May 2003. I'll make an announcement in February Electric Radio, and the format will be the same as Barry used the last few years.

The first annual Electric Radio Dynamotor Night will be held the night of Saturday, March 1. Frequencies are 80 Meter CW on 3546 kc, 75 Meter phone on 3885. 160-meter phone will be on 1885 kc. The event is similar to the Heavy Metal Rally, with the winner of the exchange being whoever shows up in the most event logs. To enter, you need one piece of gear running a dynamotor supply, even if it's a Q-5'er! The exchanges should mention what equipment is dynamotor powered, and other relevant information. Send your logs to ER by mail or email, and we will announce the winner in a future issue and send participation certificates to everyone. I think this could become a fun event.

Many long-time AM operators would like to see the ARRL endorse the Worked All States operating award for AM. Due to the ever-increasing interest in AM and vintage radio, I would like to see this happen. If ER readers support this change, they need to contact their ARRL Division Director and express their views. The way it is supposed to work is that if enough interest in an AM endorsement is expressed; the matter will be referred to the ARRL Membership Services Committee for further action. Some question remains concerning what constitutes "enough interest".

Now is a good time for everyone to send in photos of your vintage shacks for ER to publish this year. I have had many requests for these photos, and everyone likes to see

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AM International January 2002 Update

by Dale Gagnon, KW1I
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AMI Headquarters News

Membership is now over 1400 with a dozen or so new memberships per month. Most new membership comes as a result of exposure to AMI through operating events and net activities. Happily, the organization enters the New Year with a small balance in the treasury. In 2003 I would like to request AMI membership help in making the AMI roster as accurate as possible. I would also like to add email addresses into the database. Please send changes of call sign, address, email, etc. to aminternational@earthlink.net.

2002 Thanksgiving AM Jamboree

The response headquarters received from this Jamboree was greater than any other recent AMI event. It may have been due to increased promotion including the "1000 Point Challenge". Jamboree activity in the Northeast was limited, but other parts of the country were very active. The logs sent covered a point range of 300 to 26,789. The later total was from Dave, W9AD who had 89 QSO's on 7 bands working 43 different transmitters. Dave, W6PSS was thankful for the opportunity to meet new people and renew old friendships. He noted the laid back nature of the operating event, he never heard any one call "CQ contest". Dennis, W7QHO in Glendale, CA sent in this report: "I got started on Friday with my ART-13 on 14286 KHz as soon as the sun went down and immediately heard Ashtabula Bill, W8VYZ, calling CQ on 14286 KHz. Gave him a call and he immediately came back giving me a 5-9 report. After a couple of overs, KE7KK broke in from Grand Forks ND, followed shortly by KW1I. Dale's KW-1 was 5-9 into Southern CA and I was surprised to receive a 5-7 from my 100 watts into a simple delta loop. Went QRT until 0630Z at which time I fired up the T368 and joined a group on 3885 KHz. The band was long but noisy and I made a dozen contacts including KG2CI in NY and W3PAW in MD before shutting down a couple of hours later. Saturday morning (1700Z) I put the ART-13 on 40M and joined the regular weekend 40M AM group that meets on 7293. Picked up 9 more contacts and several transmitter multipliers there before moving up to 10M at 2025. Put out a CQ on my AF-68 and immediately got a call from FG5FC. I worked this band until 2300 with a quick break in the middle down to 15 where I picked up W3DA and K0EOO. Took a break until late afternoon and went back to 3880 for a few contacts and then on to 1925 KHz to connect up with a West Coast group that regularly meets on that frequency. On Sunday, I joined the 40M AM group again and then went on to 10M for a short period, which concluded my operating activities for the weekend. Conditions on all bands were good throughout the weekend but a bit unsettled. On Saturday night, 75M went long early in the evening and I was unable to hear anybody on the West Coast Military Collector's Net at 8:00 PM PST. Participation levels were high, at least from this side. Following a relaxed operating schedule I made 49 total contacts on 6 bands. Also, a surprising number of

[Continued on p. 23...]

A Tribute to Maurice LaHue, W5KD, SK

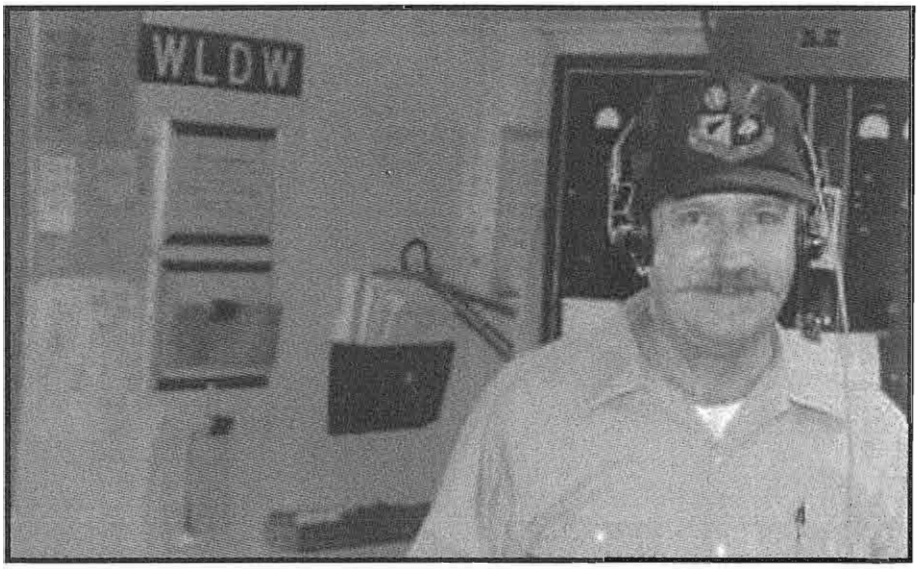
Distant Voices,
the Gift,
by Maurice LaHue W5KD

Across the wide ocean to where it began,
a dreamer of dreams conceived of a plan
To harness the power of matter so small,
transform it and cause it to loft from the soil.

Up through the heavens to fly in a flash,
bounce from the ether, return and to crash
So distant and far from the sender would seem,
as of a miracle... or maybe a dream.

Detected and routed through wire and through tube,
I scarce can believe the call of CQ
That trills from the speaker and out of my phones,
thank God and Marconi, for this.... Radio!

Dedicated to those romantic souls among us,
who yet delight in the turn of the dial and
the magic that was radio -



A Handy Experimenter's Power Supply

by Bob Dennison, W2HBE
82 Virginia Avenue
Westmont, NJ 08108

I enjoy building simple one, two and three tube radios. Most of these have employed a built-in power supply. That means I need to find or buy a power transformer each time I build another set. Then I had an idea -why not build a separate power supply that can be used with any one of a number of simple receivers? So, if you are in to building simple receivers, here's a low—cost power supply that should come in handy. See photo 1.

The wiring diagram of the power supply is shown in Fig. 1. For the power transformer, T1, I used a Thordarson 26R37 which I found in my junk box. This transformer has a 125 volt @ 15 mA secondary plus a 6.3 volt @ 0.6 Amp filament winding. If both windings are used, the total power is (125 x .9 x .015) + (6.3 x 0.6) which comes to approximately 5.5 watts. If we don't use the filament winding, we should be able to load the B+ supply to nearly 50 mA: 125 x 0.9 x 0.05 = 5.62 watts.

If you can't find the Thordarson transformer, there are two other transformers that will do as well - the Stancor P-8415 or the Antique Electronic Supply P-T442. Hammond Manufacturing offers several transformers that should do very well. Their No. 262B6 looks like a very good choice. The other transformer, T2, is an ordinary 6.3 volt @ 1.2 amp filament

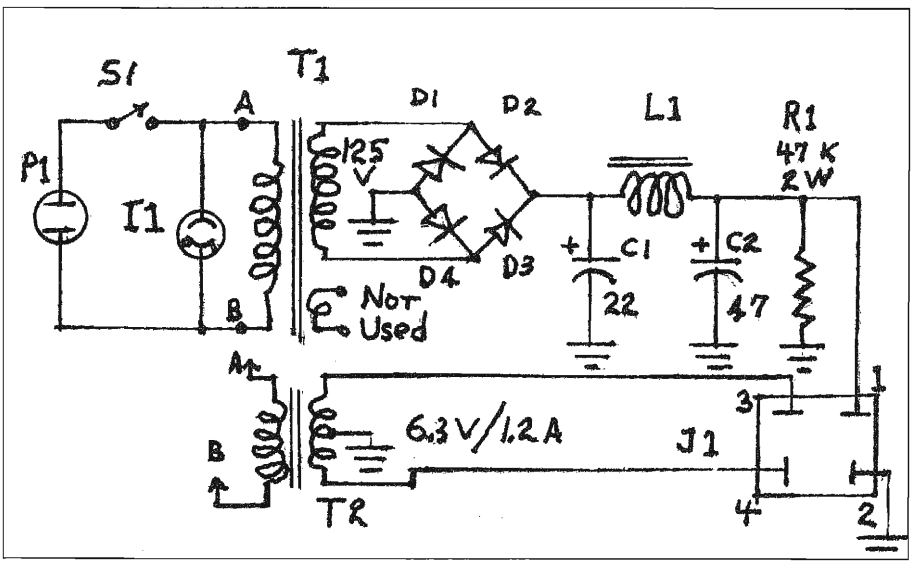


Figure 1: The complete wiring diagram of the experimenter's power supply as discussed in the text.

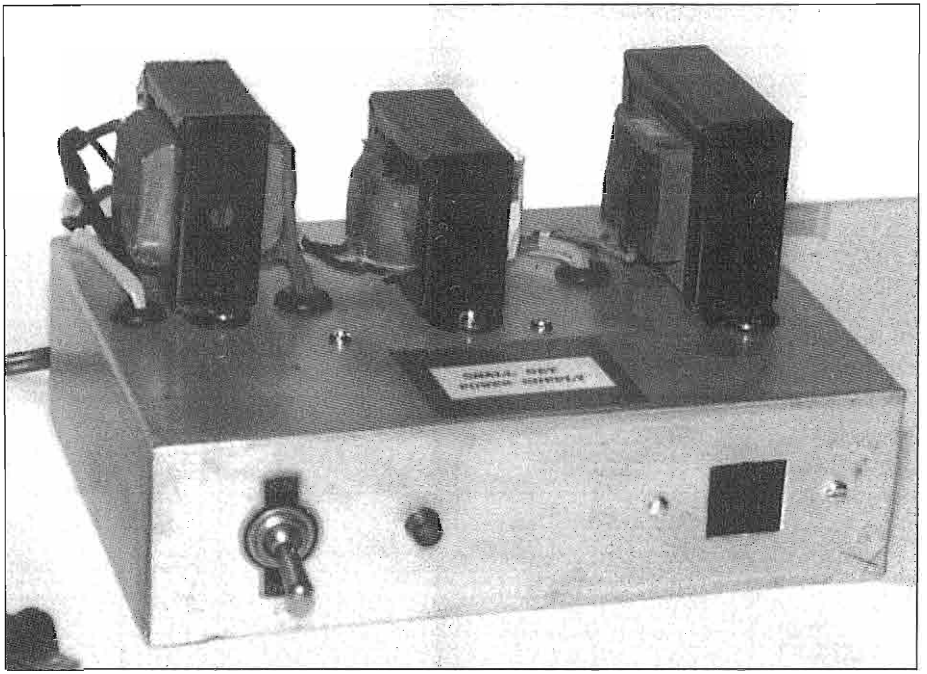


Photo 1: The completed power supply is waiting it's first project.

transformer.

I found a Stancor P-6134 in my junk box. There are "skads" of similar transformers so you should have no problem finding something equivalent. For the filter choke, L1, I used a UTC-R18 since I had one. Any choke rated at 5 to 10 henrys at 50 mA should be OK.

A bleeder resistor, R1, insures that C1 and C2 will be discharged soon after the power supply is turned off - even if it is not connected to a receiver. You don't want to pick up a power supply that you've been testing—get an unexpected shock and drop the supply on the floor. The bleeder is cheap insurance. Caution: It takes a few seconds to discharge the filter capacitors.

The power supply is built on a 5 x 7 x 2 steel chassis salvaged from a previous project. You will also need an a-c line cord with plug, a SPST switch, a green neon indicator lamp. a Cinch-Jones S-304-AB socket and some hook-up wire.

The voltage regulation curve for this supply is shown in Fig.2. At no load, the output voltage rises to 170 volts. I have used electrolytics rated at 250 volts rather than those 160 volt capacitors made for ac—dc radios. When this supply is used to power a simple regenerative receiver, I recommend using a zener diode to stabilize the screen voltage of the detector. If you don't need several watts of audio there are advantages in low power operation - there is less danger of electrical shock, less heat is generated and frequency drift due to temperature rise is reduced.

This is about as simple a project as you will ever find yet it could turn out to be one of the most useful. May you find many uses for it.

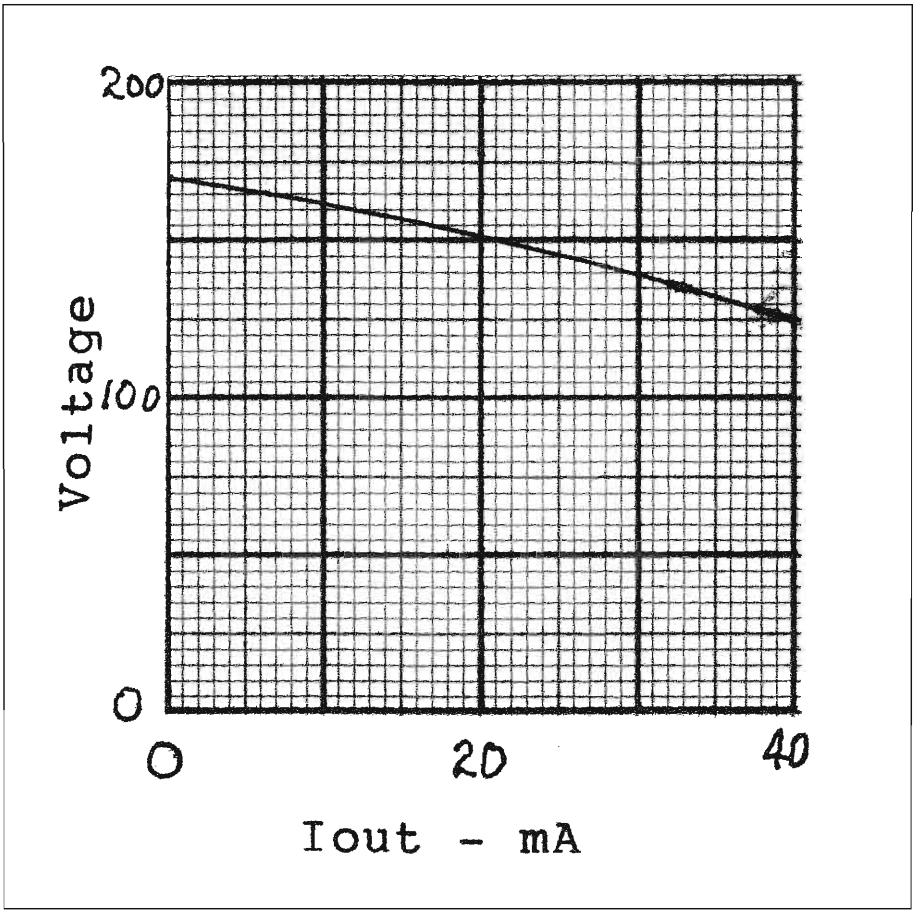


Figure 2: Here is a graph of output voltage versus load current for the W2HBE experimenter's power supply,

ER

The Restoration and Modification of My Collins 75A-1, Part 1

by Bill Feldmann, N6PY
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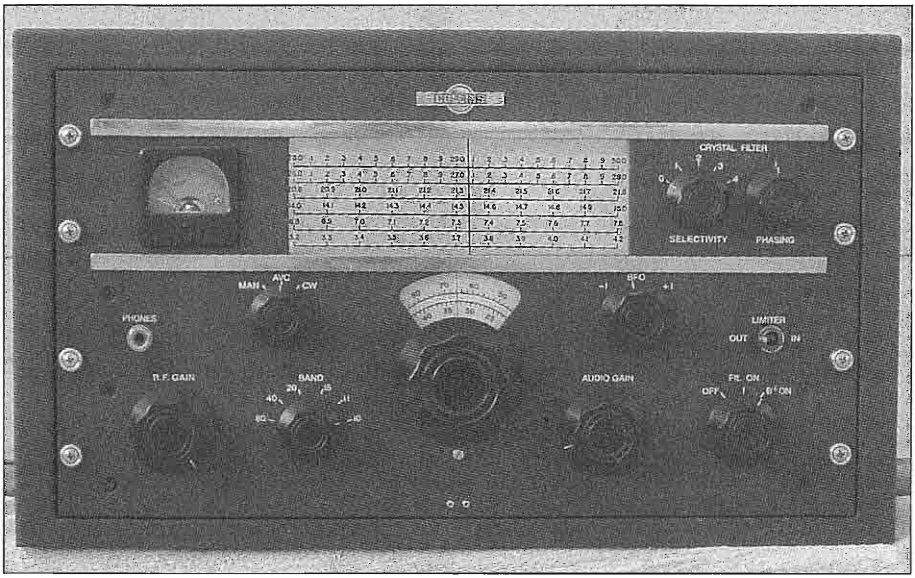
This is the first of a two-part article describing my experiences refurbishing a 75A1 receiver along with some modification I have found to be effective in obtaining excellent performance from this receiver. The first part covers troubleshooting, correcting problems resulting from the aging of components, and a description of an effective modification to improve ten-meter performance. The second part will describe other modifications that significantly improved performance and things I've learned working on this receiver.

Since obtaining a 32V3 transmitter I wanted the matching 75A1 receiver. After looking at many 75A1's, that were highly modified or in bad shape, a friend mentioned he had obtained two and was willing to part with one. The one I obtained was what I considered in restorable condition. Additionally, my friend had installed the popular Bill Orr modifications that I planed to keep in my receiver. Unfortunately, a previous owner had added a product detector in an attempt to make it a SSB receiver. Since I wanted to use it only for AM and the product detector was installation was poorly done, I removing this modification and restoring the original detector and AVC circuits. Fortunately the receiver's manual does a great job of documenting the circuit design and placement of parts, some of which had been removed.

The 75A1 receiver was a milestone being the first amateur receiver built by Collins. Art Collins told Roy Olson, who was the lead engineer on the project, "Build the best receiver at any cost". Roy's design started as the Model 75 receiver and just when Roy got the prototype working and took it home to try out, Art showed up at Roy's home and took it to evaluate before Roy had a chance to try it out. Art was so pleased that he ordered it into production ASAP. After a few design changes it was released as the model 75A, but problems occurred in the first units and the design was modified to the final 75A1 configuration.

For a 1946 receiver it was far ahead of its time and was the foundation for most receiver design up to the advent of modern frequency synthesized receivers. It featured double conversion with a Collins patented system using a crystal controlled local oscillator to obtain the first IF, which was tunable over 2.5mc to 1.5mc up to 15 meters then switched to 5.5mc to 3.5mc for 11 and 10 meters. It used the extremely stable PTO developed by Ted Hunter at Collins during WW2. The second IF was at 500kcs followed by a conventional diode detector with a BFO for CW use. It also featured advances in its noise limiter and AVC circuits. Its dial readings are accurate to one kc up to 11 and 10 meters where it's 2kc. After alignment, mine was within 300 cycles on each kc marker on 80 through 15 meters. No crystal calibrator was offered because it wasn't required. Its stability is outstand do to the careful design and assembly of its 70E-2 PTO, mine drifts less than 100 cycles from dead cold after a two hour warm up. It beats my KWM2 and S lines which all drift at least 300 cycles over the same time. It's a perfect cosmetic match to a 32V line transmitter featuring the same slide rule dial. Its



The Collins 75A-1 receiver was produced from 1946 to 1950. It was a revolutionary design whose basic principles were used until the arrival of advanced solid state work 40 years later.

only weakness is a lack of sensitivity on 15 through 10 meters, which is easy to correct with the modifications I'll describe in this article.

First lets talk a bit about working on and trouble shooting a 75A1, excuse me while I get up on my soapbox. Don't attempt working on one unless you have the necessary resources. You'll need a manual or a decent copy; my copy is from W7FG at 800-807-6146. Don't try to get by with just a schematic copy. You'll need the complete manual to locate parts on the chassis, align the receiver and order replacement parts. You'll need a good VTVM or DVM voltmeter with at least a one-megohm input to measure circuit voltages. Also you'll need access to a good tube tester. I've found that ones that only measure filament continuity and the cathode emission but don't measure transconductance are not satisfactory. You need good tubes for your 75A1 to work satisfactory. You should have good soldering equipment and know how to use it. If you don't have, or have access to, these basic basics tools, you're better off finding a good technician to do the work for you. A good source of those who work on this gear can be found at www.collinsradio.org on the Collins Store tab, which additionally has an excellent listing of part sources.

To properly align a 75A1 you should also have a stable and accurate RF signal generator. I use an old HP606B with an outboard digital frequency meter. You have to accurately know the frequency and level of the signals you are introducing during alignment. You can often find god used generators, like my HP606B, at a low price. Although it's not absolutely necessary, a scope good for at least 5mc is handy for finding oscillator or IF problems. These scopes can be found at low prices. If you don't have a scope, buy or build an RF probe using a circuit in the ARRL handbook to use with your voltmeter.

I'm going to first talk a little about trouble shooting a 75A1 because most of them I looked at had problems. This radio is not too difficult to work on, the circuit is basically a simple double con-

version receiver and the manual does an excellent job of describing its circuit. Most testing can easily be done once the radio is out of the cabinet. However, this isn't a solid state rig with only 12 volts, there are voltages up to 260 volts and you can get bit, or worse, so be very careful if it's plugged into a wall socket. The only difficult area to work on is the first IF filter section which I'll discuss below.

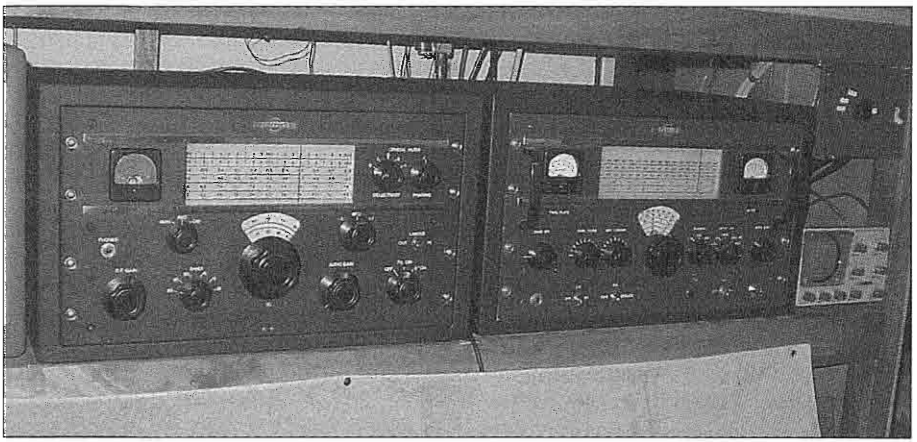
When I work on a receiver that has been not recently used, I bring up the power slowly using a VAIAC and check for smoke or unusual noise in the speaker. Even if it's working, I first check all the tubes, and replace any bad ones. I next go under the chassis with my DVM or a VTVM check the tube voltages using the chart in the manual. If I find the 6.3-volt filament voltages greater than 6.6VAC, I use a VARAC on the radio's power input to adjust them to 6.3VAC. The 75A1 was designed for 117VAC but my line power runs up to 125VAC. If I find tube voltages greater or less than + or – 10% of those in the manual, I start checking the values of resistors or for leaking caps in that tube's circuit.

If your receiver has excessive speaker hum, the most likely source is C84, the dual section B+ filter capacitor. I use DVM in the AC voltage mode and check the AC voltage between each terminal of C84 to ground. Mine checks less than ¼ VAC and I would replace C84 if it measures more than 1.5 VAC.

If your 75A1 is dead but has a B+ of at least 220 volts and all the tubes and their voltages are OK, start by checking from the speaker forward toward the antenna input. You can introduce a little hum into audio stages if you don't have an audio signal generator, by placing your finger or a length of wire on a tube's grid terminal, however be careful. If the audio stages are working, introduce a modulated signal using your RF signal generator at the grid of each IF and mixer tube moving forward in the receiver toward the antenna input. When you loose the modulation in the receiver's speaker, you have found the problem in the circuit between the last grid where you heard the modulation tone and the one with no tone. Check all voltages and visually look for fried or broken parts in the suspect circuit. High positive grid voltage readings often mean leaking coupling caps. Low screen or plate voltages can mean shorted bypass caps or bad resistors. You can check for an open coupling cap by connecting one of the same value in parallel with the suspect one and then see if the signal gets through. Also a dead mixer circuit can be caused by a failure in the oscillator feeding into it. You can test for an oscillator signal using a scope or RF probe on your voltmeter. LO crystals often fail in these older receivers.

The first problem I had with my 75A1 was no peak in response when I used the crystal filter in positions 3 or 4. I needed to fix this to properly align the second IF. Some of the 75A1's I had looked at also seemed to also have this problem. When I removing the cover from the filter circuit and inspecting it, everything looked fine. I then suspected the crystal was bad since I had the same problem with an old SX71 receiver that I fixed by replacing the filter's crystal. Unfortunately there isn't a lot of spare 500kc crystal floating around so I phoned Cal Crystal Labs. No luck, they didn't make ones below 2mc, but they recommended another source, that gave me a price of $95 and explained they are hard to make.

At that price I decided to see if I could do something with the one I had. I removed the crystal and carefully disassembled its holder, which is composed of two black plastic end pieces, and a white spacer held together by #2 screws and nuts. I found the crystal had an oily deposit on it. I carefully cleaned the crystal, the contact shoes in the end pieces, and white spacer using alcohol, followed by water and dish detergent. Then I rinsed the parts with distilled water. I kept the alcohol off the plastic parts and just used detergent and water to clean those. After allowing the parts to dry, I then reassembling the holder



Here is the station at N6PY that is referred to in the article. The 32V-3 is on the left, and the 75A-1 may be seen on the right. A monitor scope and an antenna panel complete this classic AM setup.

and installed the crystal holder in the circuit. Now the filter worked with a nice peak in positions 3 and 4 and a deep tunable notch, using the phasing control, in position 1. I could now align the second IF following the procedure in the manual. I suspect the oily deposit may have come from grease placed on the mating surfaces of the holder, as a sealing compound, that migrated onto the crystal. If you filter doesn't work, try cleaning its crystal.

I then started alignment of the RF and first IF sections. I was lucky because when I checked the trimmer caps I found none were stuck. Stuck trimmer caps are a common problem in these older radios and excessive torque can shear the screw loose from the rotating top of the cap. You then have the problem of replacing or repairing the broken trimmer. A good way to prevent this is to carefully heat any trimmers that show resistance to turning using a hair drier, and then the trimmer can usually be adjusted. If you are unlucky and break one or find one already broken, it can be repaired by the method suggested by Tom Bonomo, K6AD, in his excellent article in the Oct. 1999 issue of Electric Radio.

The next problem was when I tried to align the first IF by adjusting the trimmer caps and coils. This didn't seem to result in sharp peaks in signal strength. Additionally, the tracking of the second IF and RF circuits were poor, especially on ten meters. When I took the cover off the bottom of the first IF modules, I noticed some extra caps added to the IF filter modules indicating possible problems with the original silver mica capacitors. These domino shaped capacitor are known to change value, leak, or become resistive resulting in low circuit Q. I have heard of this problem in other 75A1 receivers.

I decided to replace them all since finding and repairing the bad ones involved the job of removing the IF modules. I ordered a set of dipped silver mica caps for the entire first IF and RF circuits from Mouser Electronics. Mouser stocks identical replacement values or ones so close in value they would still work. I ordered ones of equal or higher voltage ratings as the original ones. I had no problem replacing those in the RF section were there was room to work, but in the first IF section it looked like each module needed to be removed. I then discovered a short cut. After removing the radio's front panel, the front of the band switch, and the band switch shaft passing through each switch wafer, I

could remove the second and fourth modules, looking from the front of the radio. I first labeled and disconnected the wires going to the mixer tubes and adjacent modules then removed the three screws on the top of the chassis secure the second and fourth modules. After removing these two modules, I then have room to work on the first and third modules in the chassis saving a lot of additional work.

After carefully replacing all the silver mica caps in the RF and first IF, I reassembled the modules, band shaft and front panel. I checked my work since I didn't want to have to remove these modules again to fix any mistakes. Next I hooked up my signal generator, and aligned the RF and first IF as described in the manual. I couldn't believe the difference, these stages showed a considerable increase in gain compared to my first alignment attempt, the tracking was excellent, and each cap or coil adjustment resulted in sharp, high Q peaks. After alignment and adjusting the S meter for 100mv for a S9 reading at 29.0mc using my signal generator, I connected the radio to an antenna and signals on 10 meters were loud and clear, same excellent performance on 15, 20, 40 and 80 meters. Now I had a radio that worked like Art Collins and Roy Olson intended it to.

By 1951 many hams were unhappy with the sensitivity of their 75A1's on the higher bands. Bill Orr, W6SAI, decided to look into the problem. He found a large impedance mismatch between 50-ohm antennas and the tuned antenna coil. It became very severe on 10 and 15 meters. He also found the first mixer had excessive noise, and poor AVC response caused by low IF signal gain. He designed modifications to fix these problems, which were described in the Sept. 1951 issue of CQ magazine.

I'll briefly describe Bill Orr's changes below since most of you probably don't have a copy of his article. Many 75A1's have or partially have these changes installed so you may want to look at yours. I also included the voltages at the cathode (Vc), screen (Vs) and plate (Vp), after Bill's modifications of tube circuits that had component changes. They should be within 15% for your 75A1 depending on tube and component condition. These voltages were measured on my 75A1, on 80 meters, AVC off with the RF gain at full CW, no antenna signal, power line voltage of 115VAC, and a B+ of 237 volts. If you do Bill's modifications, do them one-step at a time not all at once in case you make a mistake. After each step check your work and test the receiver.

The Bill Orr Modifications

To improve the audio Bill added a 10uf, 50V cap across R51, on the cathode of V12 the audio output amp. Do not attach the cap to chassis ground but across R51 or it will blow when the receiver is in stand by. Next replace C83, a .002uf cap on the back of the audio gain control with a 500pf cap to improve the audio high frequency response.

He replaced the 6SK7 first IF tube, V3, with a 6SG7 to increase IF gain. This requires no component changes, only adjusting the S meter's zero pot.

He also replaced the 6SA7 first mixer tube, V2, with a 6SB7-Y for reduced mixer noise and increased conversion gain. To do this you must shunt R6, the cathode bias resistor, with a 220-ohm, ½ watt resistor and a .0003uf cap in parallel with R6. V2: Vc = 1.35V, Vs= 82.3V, and Vp= 2310V.

He increased the gain of the last 2nd IF amplifier tube, V7, by changing its cathode resistor, R30, to 330 ohm ½ watt, changing its screen resistor, R32, to 10K ohm 1 watt, and its plate resistor, R31, to 110K 1 watt. This resulted in better AVC and S meter response by providing a stronger signal to the AVC detector. V7: Vc= 1.56V, Vs= 80.7V, Vp= 206V.

The change that made the most improvement in ten-meter sensitivity corrects the antenna coil impedance mismatch. Disconnect the twisted pair of wires from the 12-turn antenna coil link

at the antenna terminals on the back of the chassis. Insulate the end of each wire so this link is floating and not used. Wind a new link consisting of three turns of insulated hook up wire over the RF ground end of the antenna coil, L6. Secure the link to L6 using a little coil dope. Twist the link wires and attach them to the antenna terminals like the original link was attached. My friend who had installed the link in my radio mentioned the position of the link could be adjusted on the coil to find a place that gives nearly equal S meter response on the 20 through 10-meter bands. He did a good job on mine because when I set my S meter at 100uv for a S9 meter reading on 10 meters, the calibration is the same down through 20 meters. On 40 meters the sensitivity drops to about 130uv and about 200uv for S9 on 75 meters where the decrease in sensitivity isn't a problem.

The last change Bill recommended does not improved performance but increases RF amp tube life. He replaced V1 with a 6AG5. Replace R2, the cathode resistor, with a 110 ohm, ½ watt one or parallel the existing resistor with 220 ohms, replace the screen resistor, R3, with a 47K ohm, 1 watt resistor, and replace the plate resistor, R4, with a 110 ohm, ½ watt resistor. Additionally, bypass pins 2, 7, and 6 of V1 directly to ground with .001uf disc capacitors. These caps should be added even if the RF tube is not changed for better performance on 10 meters. You will also have to use a higher tube shield. V1: (Vc= 1.15V, Vs= 109V, Vp= 230V)

While we are talking about changes, it's unnecessary to change any of the .1uf bathtub bypass caps mounted to the chassis unless you know one is bad. These are of a very high quality and almost never fail. The only problem is the caps and their long wire leads are inductive at higher frequencies. That's why Bill added the .001uf disc caps to V1.

In my next article I'll describe some other modifications I found to be effective in improving the performance of my 75A1 along with some additional things I discovered working on my receiver. I suggest that you wait and read the second part of this article before starting to work on your 75A1.

ER

Here is another view of the 75A-1, this time shown with a Collins speaker. No danger of finding dark filaments at N6PY!

Thoughts On Boatanchor Repair and Restoration

by Carl Constanten, W6UO
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Think you're good at boatanchor repair and restoration? Would you like to be better at it? There are many challenges in it, but repairing and restoring boatanchors can be a labor of love. I think all of us that have ever attempted to do this thing will understand. Is there satisfaction in it? Certainly. But is there money in it? Is there a living in it? Is there an economic or national imperative in it? Not any more. Then why do people do it on other guys' radios in exchange for money? Certainly, those of us who come to own gear that isn't working correctly want to make it right. This is obviously understandable; if we can repair those pieces of our gear ourselves to make them perform and look as we wish them to, we are lucky indeed. But just how may we do this ourselves, and what if we can't? Some people are known as repair and restoration sources for our gear – they may be good assets to us for those situations where we either have not the expertise or time to do things ourselves. How do we know what to do here, whether to take things on ourselves or not, and to whom to entrust our treasures to when our courage flags? And how might we become better at doing it ourselves? What follows are some of my own personal observations related to this unique activity.

What does it take to be good at this kind of work? I mean to really be an ace at this? After some years of observation, I conclude that there are essentially four factors at work here. First is Experience. I believe there is no substitute for experience. I have had the opportunity to undertake the restoration of maybe two dozen pieces of equipment, all my own personal items and all different. This does not qualify as real experience. In each case, I learned a lot between the first stages of troubleshooting and the final dusting off. Really, a great deal. If I had occasion to do a second or a third job on the same piece of gear, I know I would learn more each time. By the 25th, I might be able to do it in my sleep. There is just no substitute for the knowledge about what commonly fails, which components to suspect first, how to get that inscrutable assembly apart without TNT, what tricks there are to alignment. Going along with this experience is the accumulation of the commonly needed repair parts, supplies and tools. After some time everything will be close at hand. Tracking down that needed part, that odd tool will be a matter of going to the bench stock instead of a worldwide quest. There is truly no substitute for experience. Those who have worked in the original factories and who continue to perform their magic on our radios and those others who have gained the experience working on hundreds of our precious equipments over the years are a real treasure and should be honored for what they are and the experience that they have. For the rest of us, the only course is to keep at it. We can take the opportunity to work on gear whenever we can. The experience will always pay.

The second factor is the Technical Background to really understand what is going on inside the works of the radios. These are the analytical skills one acquires in the university or elsewhere that enable one to really understand what is

or should be happening within the circuitry. I had an old professor once that used to say that one could only really understand what was happening in any physical situation when one could do the math and write and solve the relevant equations involved. I thought this was only a ploy to get me to study my lessons at the time, but with the passing of years it is clear to me that this is really true. But it's not enough. It is only a means to the end. There exists a level of understanding beyond the mathematics. People who really understand radios, some of whom have written for this magazine, have progressed beyond the math and have come to have an intuitive sense for what will happen within a given circuit and circumstance. Some of the more talented of them even skipped the math part and moved directly to the intuition part. This is a little hard to explain, but think of it this way – radio designers sometimes think their role is to find a way to make the RF do what they want it to do. But the truly brilliant designers understand that the RF will always do what it wants to do. The trick is to gain an intuitive understanding of what that is going to be and to take advantage of it for your purposes. As an example I can, without any prior consultation or detail, pretty much guarantee that the Collins two-stage RF feedback neutralization circuit could not have been achieved without this level of intuitive understanding. Does one need this level of insight to successfully repair our treasures? No (fortunately), but it helps. Particularly when things have really gone wrong. When an unknown problem appears, when the manuals are of no help, when you are looking at multiple failures, one may always go back to basics. Few have this ability, and only after long study and experience. But all of us can always continue to learn and aspire to it. Our efforts will always be better for it. This factor is another each of us can improve upon if we have the desire.

Thirdly is a factor which is perhaps the most elusive to describe and to acquire. It is the Mechanical and Electrical Aptitude to have a "feel" for the work. All of us know people who never strip screws because they have a "feel" for it, who never botch solder joints because they have the knack, who never get runs in their paint jobs, and so on. People whom for whatever reasons have the gift for the work. Even when doing something for the first time. It's really quite infuriating for the rest of us. These people often have their tools in immaculate, neatly arranged arrays, each in its place in well-thought-out workshops and above all always clean and in perfect condition. It's most difficult to analyze this factor because it seems to be such a magical thing. This factor doesn't show up so much in the electrical repair of equipment as in the restoration phase. There is a true art in getting a piece of equipment into the sort of cosmetic shape all of us want to see. I'm not sure this can be taught. It is something that one just might be able to acquire through the combination of repair experience and artistic aptitude, I guess. Or maybe it's just genetic.

Lastly comes the easiest factor to describe – the Love of the Radios. All of us understand this one. Otherwise, it is unlikely we'd be reading this magazine. The desire to participate in history, to play with toys we only dreamed about as youngsters, to bring a piece of decrepit junk that was once our nation's finest example of the state of the communications art back to its pristine state – all of us identify with at least a facet of this. This factor cannot be taught, either, but it is the one that we all share. Some of the "professional" restoration people have this and some, well, don't. I put quotation marks around the term "professional" in this case because the term implies an activity which one pursues to earn one's living, which is frankly incompatible with the concept of loving the radios. Guys who look at each radio

they are sent to restore as a labor of love will probably end up earning something a bit less than they could flipping hamburgers. These guys are out there, and they all have long waiting lists for new work. I do not denigrate the efforts of the true professionals at this – these are people who will do a stated job to stated specifications for minimum cost and at market prices. No difference between this and the mechanic that services one's car. Reliable, known quality, reasonable cost, on time as promised. When you need a repair job done competently, the professionals will come through every time. But the "professionals" (note the quotes) will take the extra time to do things the way you would if you had the time or ability. You have to wait for the result. An important note here – just as it is the case with classic automobiles, the strategy of buying a radio that needs a lot of work with the intention of paying someone else to restore it is almost always far more costly than buying the same radio in excellent condition. It just doesn't pay. Of course, sometimes a particular radio is so rare that one has no choice, other than to wait possibly years for the right example to turn up.

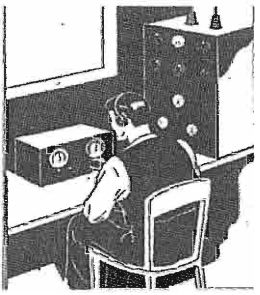
So what's the message here? Each of us can try to improve our skills within our own personal limits, each can be the best at doing this work that we can be. We can work to gain experience, work to try to improve our mastery of the theory, hope we have the genes that give us the aptitude, and enjoy loving the radios. There are few greater satisfactions than making a beautiful-looking, perfectly operating radio out of that hamfest junker. Someone once told me, when I was a young lad intently engaged in trying my hand at repairing anything that had died: "You can do something no doctor can do – you can take something that's dead and bring it back to life". Well, OK, it was my mother who said this, and she may have been a little biased. But there's no denying there is a special magic in it. If we look for compensated help from others, we can make our own assessment about their individual standing in each of these four factors to get an idea of what to expect. I personally know only one or two individuals that rank highly in all four. Many of the pros would rank highly in at least two, including some of the best known. After the basics of business ethics and honesty, which are above discussion, maybe the most important factor to us when looking for someone to help us is the last – look for the guys who love the radios.

ER

[...Editor's comments from page 1]

the changes we make in our equipment. If anyone has historic photos of amateur stations from the 1930's and 1940's that they would like to share with ER readers, I would appreciate receiving them.

I hope everyone has a happy and prosperous 2003, and keep those filaments lit!



A Really Big Transmitter for a Really Big Antenna
The Western Electric LD-T2

by Mark Richardson, W7HPW
System Engineer
Mountain States Networking
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Salt Lake City, Utah 84121

This Western Electric LD-T2 came to life on the second floor of the then-new Utah Valley Technical School in 1964. It was lowered unassembled through an access opening in the roof, by crane. During the following months Leonard "Woody" Woodward (W7KOP), Don James, and Robert Fair (AA7B) assembled and installed it. It was shipped brand new in the original crates! It was built in the early 50's and bears the serial number of 11.

Woody was a professor at Brigham Young University, a ham first licensed in 1920. Don James worked for the technical school as Director of the electronics

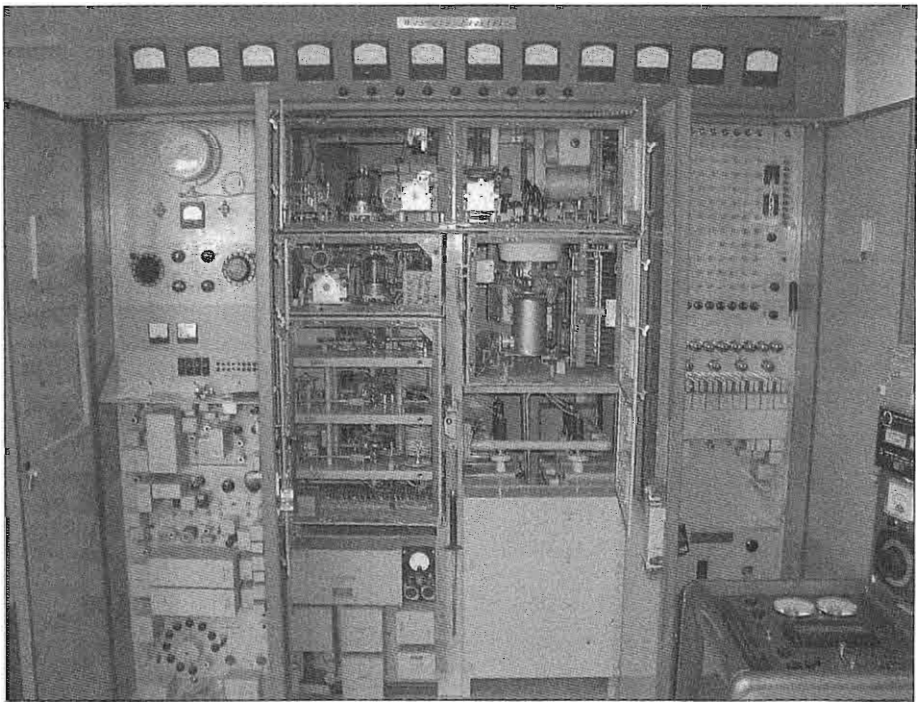
This transmitter is one of the few remaining examples of the Western Electric LD-T2, shown here at W7HPW. This was original equipment used with TAHA, the HF horn antenna described in ER #162 by Chuck Teeters (W4MEW).

programs. Robert Fair was one of the instructors.

Robert used the transmitter as a teaching tool and a ham transmitter off and on during next 2 decades. Many of the AA7B QSL cards still hang on the wall of the club radio room. When Robert left the school in the mid 70's the transmitter saw no use.

During the early 80's the school was bought by the State of Utah and turned into a community college. Renamed UVCC, or Utah Valley Community College, its curriculum was changed to that of a 2-year college.

That's when I entered the picture. I was attending the community college in 1985 when Dale L. Muhlestein (WE7Y), one of my instructors and advisor to the school ham club, talked me into joining them. I remember going into to radio room for the first time and saying "What is the club doing with an AM broadcast transmitter!" Dale told me that it was a short wave transmitter but that he didn't know anything about it. He also said that the school was looking for someone to scrap it. As I looked through the door windows and saw the dual 4-400's and thought to myself that I could build a nice amp with some of these parts. So, I volunteered my services to remove the transmitter. Dale forwarded my request to school officials and the word came down that they couldn't give the equipment away. Being state property it had to



With the doors open, the four main sections of the transmitter are visible. Left to right, the meter switching equipment is on the top, with power supplies for control circuits on the bottom. The next compartment holds the PA and the driver components. The bottom is a line regulator. The third compartment has the grid and plate tuning components. The compartment on the far right holds the servo controls that enable returning to any pre-set frequency in 28 seconds.

be destroyed or sold to the highest bidder.

A sealed bid auction was arranged, I submitted a bid, and crossed my fingers. You can imagine my surprise when I was awarded the bid. As a student of very little means, $100 was a lot of money to me.

It was then that I was able to really look over my purchase. I found an original Western Electric manual in the back closet, and a box that had 2 complete sets of blueprints printed in 1953. As I reviewed the manual it was then when I discovered what I had. For a hundred dollars I had acquired a complete USB, LSB, ISB, AM transmitter, which was capable of running continuously 4 KW PEP output from 4-24 MHz using a single 3X2500F3 final, driven by the 4-400's. The elapsed time indicator showed just 1411 hours on the filaments. That was when I decided I was not going to break it up for parts.

During the next 6 months I very carefully disconnected the wiring harness from the individual chassis, putting a tag on every wire. When the frame was empty I used an air hammer and chisel to remove the welds holding the frame together.

It was put into a storage unit for 4 months, then moved one piece at a time to a machine shop where I was working nights. I welded the frame back together and reassembled the electronics. Then came time for smoke test, 230 volt, 3-phase primary power was connected and I sweated throwing the main AC switch. Everything worked! No wiring errors, no problems, I left it on about 3 hours that first time. I used the transmitter as my communication class project, and got an A.

The transmitter was loaded on a trailer to be stored in a warehouse; I paid $15 a month for the floor space at the Bekins warehouse until 1993.

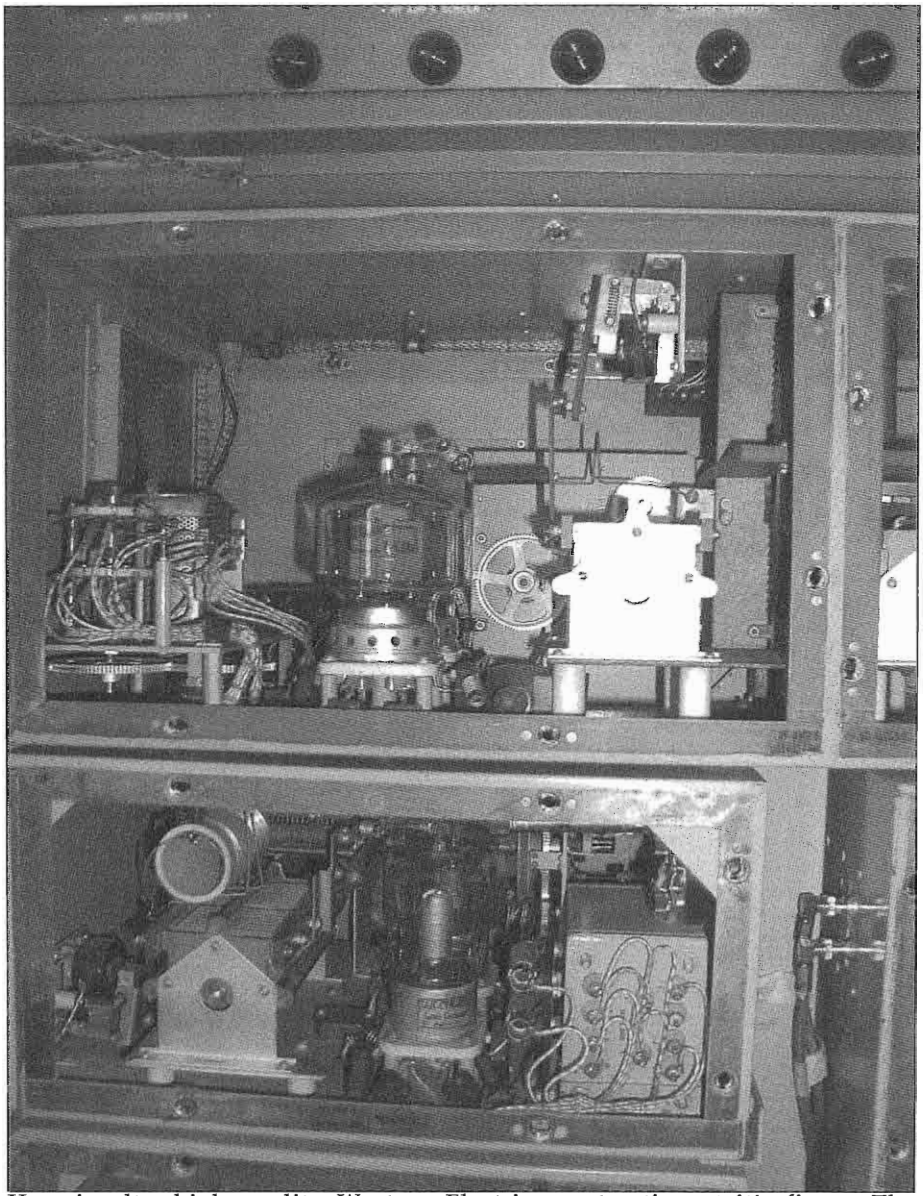
It was moved into our new home's garage where I disassemble it again and reassembled it in a room in the basement. Checkout and restoration took until October 10, 1997 with everything checked out, necessary repairs made, the antennas connected, and everything tuned up. I called CQ and KC8LL returned, time was 23:15 Z. I discovered that the transmitter would tune from 3.6 to 31 MHz making no modifications necessary.

In 1998 American Fork City started pressuring me about antennas so we sold the house and built a new home in Payson. The transmitter was disassembled again and stored until the new house was ready. We moved in June 2000, I had the transmitter running in Oct 1999 and had just enough time to finish a Millennium DXCC award working my 100th country on Dec31.

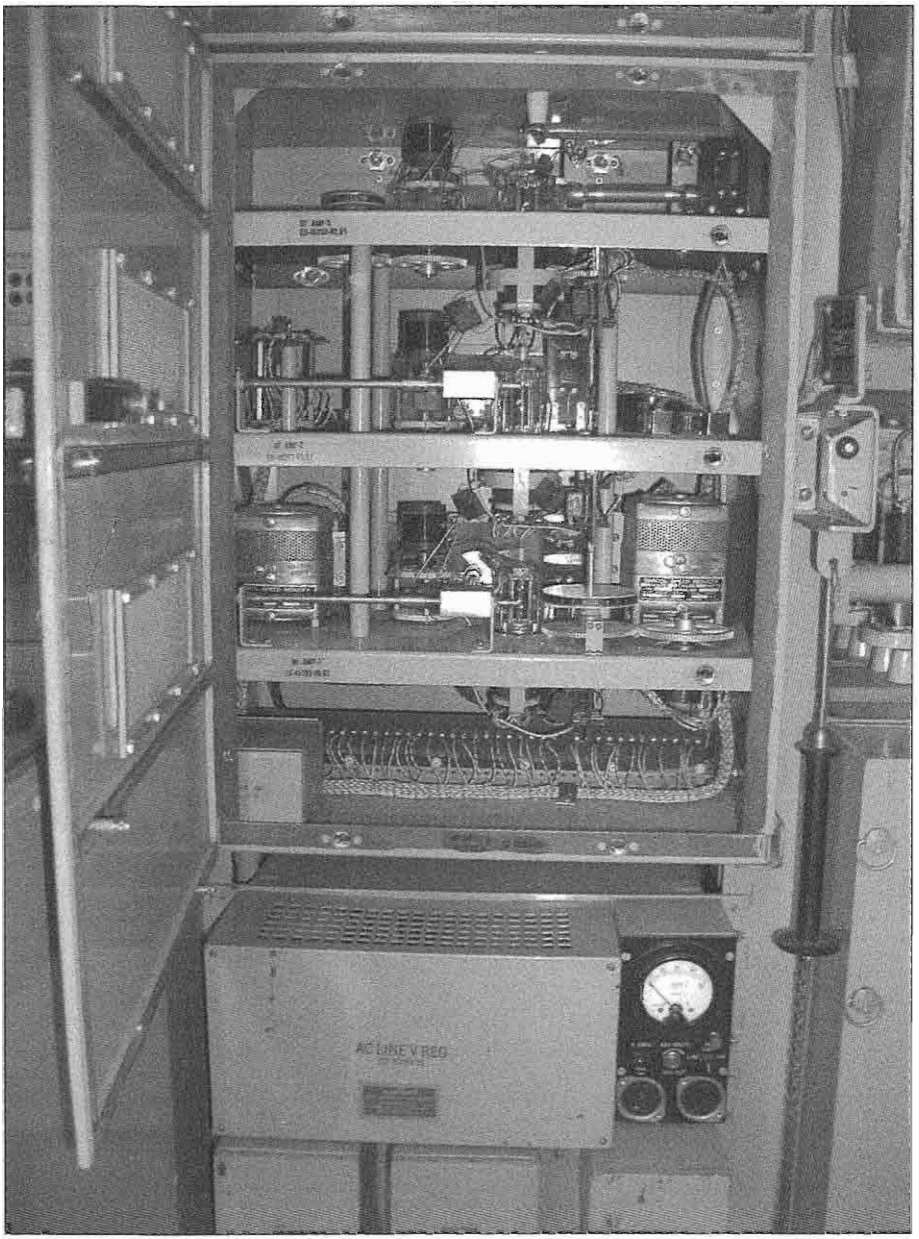
I have put 400 hours on the transmitter since 1997, working flawlessly. I used it for the Utah Amateur Radio Club Olympic special event station, K7O. Logging 2165 QSO's on all bands from 80-10 in 48 hours of operation, also used by the club for our clubs 75th anniversary special event station, W7SP.

In all it started me on a path of heavy iron, at 4500 lbs this one I call my ship anchor!

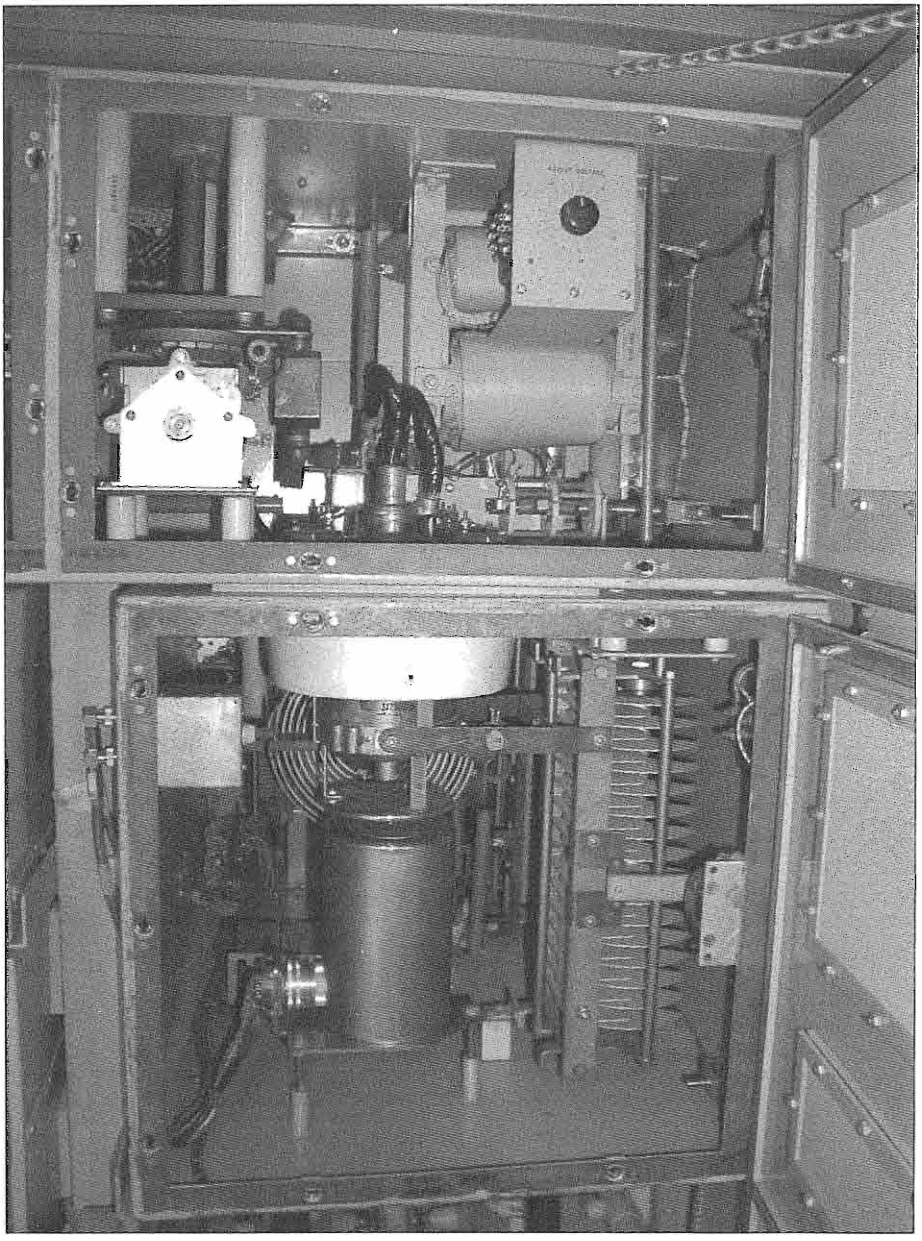
[Editor's note: This transmitter was also known to the Armed Forces as the T-265/FRC-10. There was an associated receiver, the R-369/FRC-10, which is rather rare. If several LD-T2's were used in multi-channel multiplex carrier terminal stations it was known as AN/FRC-108. One bay on this terminal was equipped with distortion measuring equipment. The multiplex terminal was capable of composite transmissions of RTTY, voice, FAX, or double-sideband AM, and would run 4KW PEP, or continuous 1KW AM. For multi-channel voice operation, it was capable of four speech channels over 12 kc of occupied bandwidth.]



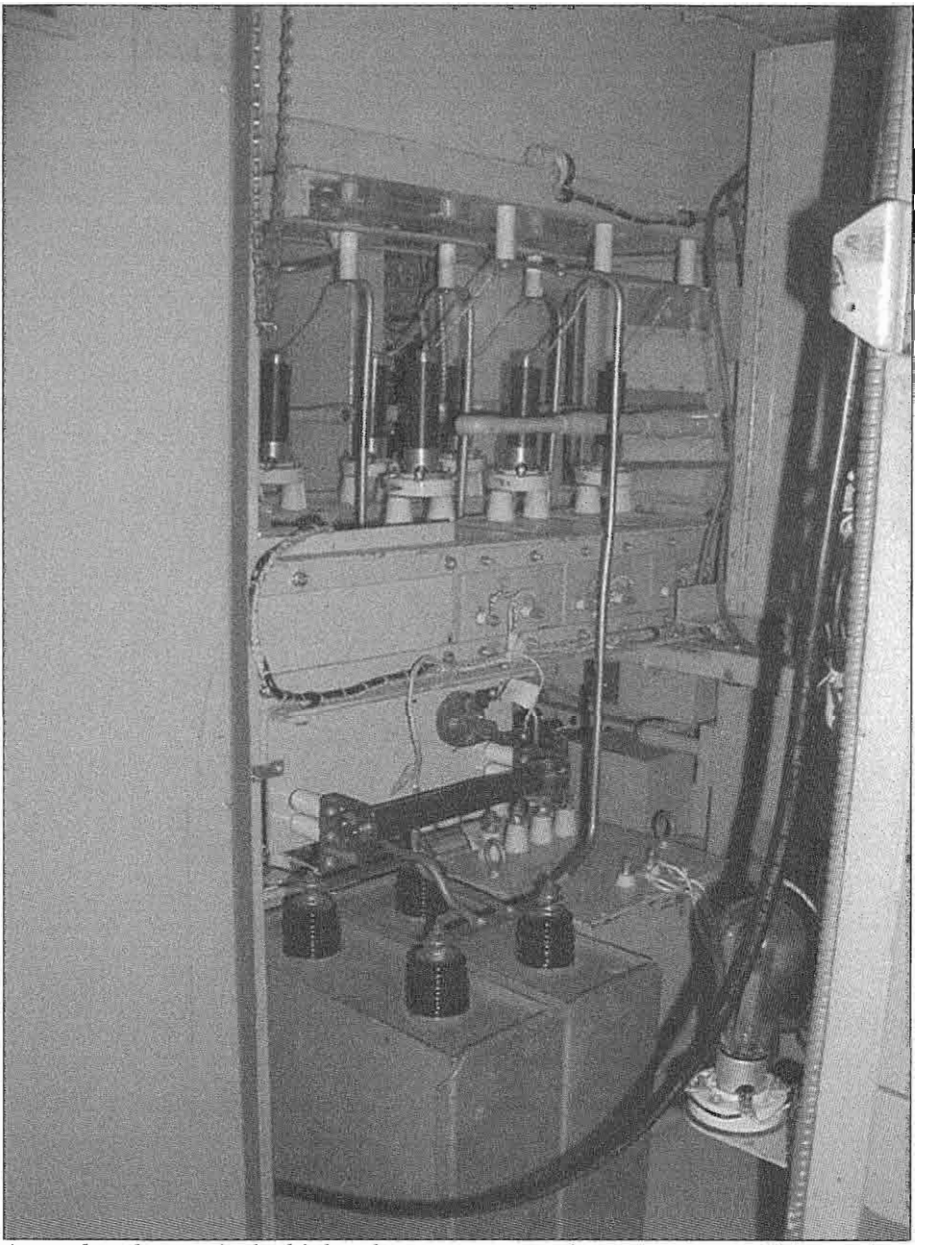
Here is ultra-high quality Western Electric construction at it's finest. The component selection and parts layout in this rig is the envy of every homebrew transmitter builder today. The 4-400's are shown in the top compartment in this view, with HF amplifier tuning circuity on the bottom. Notice the gears and tuning motors around the tuning components. These are driven by servo controls mounted in additional compartments at the rear of the main transmitter cabinet. Each compartment has safety interlocking circuits, seperate access panels, and an outside door. Sadly, so much of this type equipment has been scrapped and is no longer in existence.



This close-up of the center compartment that shows tuning and neutralizing components for 3 HF amps. At the bottom is the AC line requlator and it's metering circuitry. Not shown here are special control circuits that will utilize the full PEP output on the selected channel in the absense of modulation on the other channels. There is also a SSB demodulator for monitoring purposes.



A look inside the third compartment from the left shows the HF amplifier grid circuit in the top, and the plate tuning circuit on the bottom. The servo-tuning provisions are visible in this photo, as is the abundance of ceramics. Any output carrier frequency is held stable within .003 percent, regulated by three precision quartz oscillators, two of which are temperature compensated. They are fully adjustable to compensate for aging and long term errors similar to frequency standard equipment.



Around to the rear is the high voltage power supply compartment. This requires a power source of 230 VAC, 3-phase, 60 cycle, 10 kva capacity. The transmitter runs at 5.8 kw during no-carrier conditions. Under two-tone test signals, it will run 9 kw. When on standby it runs 2.6 kw, which is more than most ham 1 kw transmitters will require key down. For standby AM it runs 8 kw, however. Metered circuits include rectifier output voltage, line voltage, filament hours, plate current of important stages, and various RF sample points. ER

[...AMI Update from page 2]

different transmitters turned up, 31 including 6 home brew stations."

AMI Southeastern Region Report

Andy, WA4KCY reports the Annual Winter Get-Together of Southeastern AM Radio Club was held on Saturday, December 28 at the Andy's QTH: "This has been a regular affair since Tom Koch, W4UOC started it some years ago. It was originally held for AM and also RTTY operators. Three years ago Tom was unable to host the affair and it was moved to Andy's home in Clem, Georgia. Since I no longer operated RTTY that aspect of the meeting was deleted. We always host the affair in my basement. My office with computer and another larger room serves as radio shack. Everyone seems to enjoy meeting and fellowshipping in the basement since that is where all my homebrew equipment was built. They also get the chance to operate some of the really big transmitters like the 4-1000A modulated by a pair of 4-1000A's. This year we mostly operated the Gates broadcast transmitter on 75 meters. Several of the attendees made contacts on this and other stations. The affair started at 8:00 with coffee and donuts. About 9:00 my wife Sally, N4RFQ brought down a basket of homemade strawberry muffins. With cold temperatures outside and a fire in my wood burning heater things were really cozy and all enjoyed good fellowship. One of the features of our get-together consists of gifts brought by everyone. It has to be something boatanchor related and be in a sack or box with the call sign of the one who brought it. At 10:30 the person who came the longest distance gets to select the gift of his choice. The person whose call sign was on that gift gets to select next and so on until all gifts are distributed. There are always some really neat gifts like pairs of new 6146 tubes. After this is finished we go across town to Ryan's Steakhouse and enjoy a really fine dinner. The Southeastern AM Radio Club now has 129 members. We hold a weekly AM swap net on Tuesday nights at 7:30 PM Eastern time using the club call sign W4AMI. On an average night there will be between 30 and 40 check-ins. Lots of good conversation and swap items are there for all to enjoy. We also have an Internet Reflector for all members with access to the Internet. An offshoot from the Southeastern Club is the Gulf Coast Mullet Society net, which is held on Thursday nights at 7:30 PM. Most of the participants live along the Gulf coast in Florida, Alabama and Mississippi. The Southeast continues to have a very active AM group. AM is growing here and in other parts of the country as well. Anyone interested in the SAMRC is encouraged to visit our website at www.w4ami.com or my personal website at www.wa4kcy.com. I can be contacted at andy@wa4kcy.com .

AMI West Coast Region Report

By Bill Feldman, N6PY

I'm writing this just after the Electric Radio sponsored Heavy Metal Night. Here on the West Coast many outstanding AM signals were heard from converted broadcast, homebrew, and large amateur AM rigs early that evening. On 160 meters there were two groups, one at 3885 kc and the second at 1925 kc. Both groups were mostly working six and seven call district stations so the skip was short on 160. On 75 meters there were two large groups working cross-country. Tom, K1JJ, headed one group on 3883 kc with an outstanding signal here on the west coast. The second group headed by Chuck, WA0ZHH, was on 3890 kcs. Chuck did a great job of keeping things moving and directing traffic for lots of contacts.

Unfortunately later in the evening propagation became poor on 75 meters

[continued on page 38...]

Radio's Golden Age-Episode 20

by Bruce Vaughan, NR5Q
504 Maple Drive,
Springdale, AR 72764

Merchants I've known

To help readers better understand the everyday operation of my Radio and TV service business I believe it is necessary to explain something about the place in which the business was located. I am sure I could better understand the radio business firms that once flourished along 'Radio Row' in NYC, if I first understood the venue in which those firms operated. What were the streets like, what about the people, and more importantly what was their day-to-day living like in that particular part of the city? Let's take a look backward at my hometown as it existed when I first entered the business world.

Those of us growing up during the years of the Great Depression received far different training from our first employer than those entering the business world today. Some lessons we learned should be forgotten.

My first full time job was working in a large hardware store. The owner gave a whole new meaning to the words 'tight fisted.' I have known few men who worshiped the dollar more. I went to work there in 1939, and delivered feed, fertilizer, wire fencing, stoves, and other large items in a Federal Knight truck with solid tires. I am not sure of the year model but it was built before I was born. The owner was not about to abandon a perfectly good truck. Between deliveries I kept busy repairing and installing radios. The store was a Zenith and Philco dealer but it seemed most of my time was spent re-furbishing and repairing trade-ins.

Perhaps this story will illustrate my point. In the early 30's the Maytag Company brought to market a machine needed, and desired by practically every rural housewife in America. I refer to the gasoline powered Maytag washing machine.

The hardware merchant, I will not mention his name, was quick to see a chance to increase his wealth. He wrote the Maytag Company, and expressed interest in their machines. They sent a factory representative to call, and explain the terms of their franchise. Today the word franchise has little meaning, but in the first half of the last century a franchise gave a merchant, especially those in smaller towns, the exclusive rights to sell certain lines of merchandise. In return for such a franchise, dealers were expected, indeed required, to fulfill certain obligations.

Those obligations, though reasonable, quite often required a sizeable cash investment. Merchants with a low line of credit were quite often unable to meet the requirements. For example, as a Magnavox dealer I had to stock a full line of merchandise—at least one of every model, with adequate backup stock of all popular selling items. I was required to devote a sizeable amount of floor space to the display of the Magnavox line, maintain a fully staffed, and stocked, service facility, send technicians to company training schools, and attend all Magnavox sales meetings, even though they were sometimes several hundred miles away. You can see that a merchant wanting to add a line such as Maytag, or Magnavox, was looking at an investment

of probably no less than twenty thousand dollars. This was real money fifty years ago.

Back to my story, the Maytag Company had one unusual requirement—the dealer was required to employ a Maytag trained 'outside' salesman. At the time top pay in the hardware store was less than $20.00 per week. Most of the dozen or so workers received far less. My salary was $7.50 per week.

Well, when the factory rep told the stingy old merchant that he had to hire a factory salesman, it appeared the negotiations might end. "N-n-now hold on a minute Son," said the old skinflint. "Just what kind of money are we talking about? You know times are hard, and we can't afford to pay a big salary for some 'Fancy-Dan' to drive around the country trying to sell a washing machine. Every man in this store works. If my help is not with a customer they are unloading merchandise, putting stoves together, arranging the warehouse, and keeping the place clean."

"Let me explain," said the Maytag rep. "Our man will furnish his own car, pay for his own gas, and all you pay him is $10.00 for every machine he sells. Our most popular model sells for about $100.00. You get a markup of approximately 40% on all Maytag merchandise. So if the salesman sells two machines a month, you pay him $20.00, and you 'pocket' $60.00 profit on the two machines. Sound fair enough?"

A big smile crossed the old man's face. Boy, here was a real deal. Either that salesman makes me money, or he doesn't get paid a nickel he thought. "You have yourself a deal, son, let's sign the contract so I can get back to work. How soon can I expect my first shipment of washing machines, and when will your man go to work?"

The factory rep smiled, and said, "The machines will be here in about ten days. You have your employees unpack the machines and put them on display. Many of the machines our salesmen sell are drop shipped directly from the factory to the customer. All you have to do is go out, unpack it, and instruct the owner in its operation. This keeps you from having to stock so much merchandise, and assures us that all Maytag's are properly displayed in your store at all times. The salesman will check in with you before the first of the month. As soon as your merchandise arrives, he will start to work."

A few days later a young man parked a 33 Chevrolet Coupe in front of the store, came in, asked for the owner, and introduced himself. "I am your new Maytag salesman. I will be selling machines for you starting Monday morning," he said. "Come out to my car and let me show you my demonstration unit." The young man was clean and neat, but not dressed in the usual suit and tie most outside salesmen wore. He proudly showed us his modified coupe. The deck lid had been removed, and the trunk floored with wood decking. On top of this wood platform was one of the latest gasoline powered washing machines. It was equipped with quick 'tie downs' so that the machine could be removed and placed on the ground. Beside the machine were compartments for sales literature, washing detergent, a gasoline can, and other washday items.

As I remember, the salesman's plan was simple, and well developed. He drove around the countryside until he came to a prosperous looking farm. After knocking on the door, he introduced himself—being sure to mention the name of the well-known hardware merchant. He then told the housewife that he would like to do a weeks washing for her absolutely free, and with no obligation on her part. He suggested she save up her washing for several days—then made an appointment to return a few days later and do the wash. Most farmwives jumped at the chance to get a whole weeks washing done absolutely free.

At the time agreed upon the salesman drove into the yard of the farmhouse, unloaded his washing machine with the help of only one other person. Then, after a short visit with the family he proceeded to do a weeks wash in record time, and with very little effort. It was not unusual to have quite an audience for this demonstration—the entire farm family plus a few curious neighbors. The amount of gasoline required for doing the entire wash cost only pennies. When the wash was finished, the clothes hung on the line, and the machine loaded back on it's platform, the young man would politely ask, "May I have a few more minutes of your time to show you how easy it is to own one of these Maytag's?" More often than not, he left with a signed order.

Nothing was said to the storeowner about payment until the Maytag salesman had been working almost six weeks. Then one day he walked into the office and said, "I think it is time we settled up. I have all the order slips here for the sales I've made." With that, he handed the stack of sales slips to the merchant.

Mr. Blank, the owner, studied the slips for several minutes. "How much money do you feel like I owe you for the last months work?" He asked.

"It is right there on the top of those sales slips," replied the young man. I waited until I sold 50 machines to settle up. You owe me exactly $500.00.

Mr. Blank turned white as a ghost. "Why, son, there is no way in God's world that I am going to pay you $500.00 for a months work. Al Nichols has been with me for over 30 years and he makes $67.50 a month. Why do you think I'd pay you an outrageous salary like that?"

"Well, one reason why you are going to pay me $500.00 is because we have a contract. If I make $500.00, you make $1500.00. You have no choice but to pay what the contract calls for. If you want to remain a Maytag dealer you will pay me $10.00 for every machine I sell in the future or lose the franchise. The storeowner finally paid the salesman, but he surrendered the profitable franchise rather than to continue paying a commission. He was simply so close with a dollar that he could not bring himself to pay a decent salary.

Today, the traveling salesman is almost extinct thanks to the retailers like Wal-Mart, Target, Best Buy, Circuit City, and others. When I opened my little one-man radio shop I had at least one dozen salesmen who called on me on a regular basis. They would come to town, check into a motel, and if all went well call on four to six shops that day—then move on to another town. A parts and tubes order of $200.00 was considered a big order. Most of the time orders ran much less.

Later, when I first began selling radios, small appliances, and TV sets, if I placed an order for six large units, and ten smaller items like irons and mixers, I felt I had placed a sizeable order. Today, with mass merchandisers having 2000 to 4000 stores to stock, a salesman can very well sell a major retailer many times more items in one call than I purchased the entire time I was in business.

I live near the Wal-Mart headquarters. Their growth is largely responsible for the tremendous growth of our area. Vendors today have suites of offices near the Wal-Mart headquarters. Recently I read in a local paper that one vendor, a company that manufactures household bleach, have sixty people in their Bentonville office just to serve Wal-Mart. With sales like this up for grabs there is little wonder that small merchants have trouble getting a company to do business with them. As a consequence the cost per item for major retailers is far different than that for independent business firms. As the wholesale cost differential increases, the big boys get bigger, and small merchants go broke. Walk through any mall or shopping center today, write down the names of the small stores, wait

six months, and walk through again. You will notice that many have gone out of business.

However, 'the traveling salesman period' was great while it lasted. I can think of so many stories—I had a nice old gentleman that owned a wholesale radio parts store in an adjoining state. He would go on the road for a week, and then go home and fill orders. He occasionally hired one man to help out, but it was mostly a one-man operation.

One cold winter day it had been snowing intermittently, but with no accumulation. I was standing in the front window watching the snowflakes fall when the old fellow parked his pre-war Ford in front of my store, and got out carrying two auto antenna boxes, and his large radio parts catalog.

We visited a few minutes discussing road conditions before we got down to business. "I want to show you some very nice automobile antennas," he said. "They are not inexpensive, but they are very well built. Some customers want to buy the very best, and I think you could sell some of these."

The antenna looked great. It was similar to the 'Eight Ball' antenna that was popular at the time, but seemed much better built. It also cost about four bucks more. I placed an order for six of the antennas.

I sold one of the antennas to a local businessman that had purchased a '48 Oldsmobile without a radio. He had someone install a Motorola radio in the Olds, and now, a year or so later, the antenna had developed a short to ground. I determined the problem was not in the lead-in. The low cost of auto antennas made it more practical to replace than to repair. Within a week the customer was back. He said the radio was so noisy since I had installed the antenna that he could not listen to it. Sure enough, when I gave the antenna a pull and let it loose there was chatter in the radio until all movement of the antenna stopped. Without any argument, I quickly replaced the antenna with another from stock. This time the customer was back within two days. It had the same trouble as before—apparently there was a poor connection between the antenna and lead. The leads on the antenna were not replaceable—they were soldered to the antenna. This time I replaced the antenna with a 'Ward Eight Ball,' gave the customer a $4.00 refund, and hoped for the best. This seemed to cure the problem.

I was still not convinced that all the antennas were faulty so I sold one more. It failed almost immediately. I gave up on the antennas, replaced them in the original boxes, and waited for the salesman to return. By letting the salesman pick up the antennas I could save shipping charges. Meanwhile I received my monthly statement with the antenna charges on it. I paid the bill but deducted the charges for the antennas.

The salesman and the owner of the radio wholesale supply where I purchased the antennas came by on his regular monthly call. I immediately mentioned the antennas and asked him to place the antennas in the trunk of his car, and to please see that my account was credited when he got back to his store. He inspected the boxes carefully, and said, "I'm sorry, I can't take these antennas back as I never sold them. I am completely unfamiliar with the brand. I have no idea where you bought them."

Needless to say, I found his attitude irritating and unreasonable. I explained when and why I bought them—even to reminding him of the snowy day in which he brought the samples into my store. He absolutely refused to admit that he sold me the antennas.

I went to my office and returned with the invoice. I said, "You are either senile or a crook. You have charged me with six of these antennas right here on your current invoice. I find it difficult to believe you are a man who charges customers for merchandise that he doesn't even

stock. If you never heard of this antenna, if you don't stock this antenna, how did you know the part number of the antenna to charge me with? You can either take back the antennas or leave them here—it makes no difference to me. I am paid in full for everything but these antennas, and as you don't sell them I don't see how you are going to collect for them."

The gentleman's face turned red, and without another word he stormed out the front door, got in his car, and left in a hurry. He never called on me again.

In the early 50's we had quite a flood in Springdale. As might be expected, some merchants 'made the most of it.' The town stream branch runs thru a large storm sewer under Emma Avenue, our main business district. This was the primary cause of our 'so-called' flood.

In my lifetime, the stream has been referred to by many names: Spring Creek, the Town Branch, "that d___ drainage ditch," and a few names I would hesitate to commit to paper.

The small gently curving brook is delightful in the spring when wild flowers cover its banks, and large oaks arc gracefully over the rippling stream shading its crystal clear water. Picnickers find its attractions irresistible.

During our dry, hot summer months, the small creek dwindles to a mere trickle. In the winter, when its grassy sloping banks are snow-covered, it has an enchanting beauty, becoming, in fact, the "winter wonderland" extolled by countless writers of flowery prose.

And in the fall, when trees achieved their peak colors of red, gold, and yellow, the stream assumes all the beauty of an old master's painting. But when it rains-and rains hard (I mean one of those toad-strangling gully-washers)—watch out! The small stream very quickly becomes a raging torrent of muddy water rushing northward, carrying with it tons of accumulated debris tossed in the creek by some of our less environmentally conscious residents.

This small gentle stream, in my opinion, is the catalyst that changed downtown Springdale forever. Future historians will determine whether or not the change was for better or worse. After the flood our little town was quick to seek help from the Federal Government. Help came in the form of 'Urban Renewal.' When they finished with our downtown area it was no longer ideal for use by retail stores. Within a short time those businesses not bankrupt had moved to urban shopping centers and Malls. For the present, let's just say that the change was inevitable. Some stories persist that Divine Intervention was a factor. Whether or not such stories are true is a matter of conjecture. If there is a master plan to our universe, as most of us believe, I see no logical reason why the plan should not include downtown Springdale.

How did it happen that a town was built in a location where flooding could occur? It was never planned that way, it just worked out that way.

Business firms migrated to Emma Avenue well before the turn of the century making it our primary, indeed our only, retail thoroughfare. The reasons why business firms chose this particular part of our city are many and complex. The settlement was not laid out that way originally.

For the purpose of this story, let it suffice to say that it happened. Gradually business buildings appeared along the dirt street. Spring Creek bisected Emma Avenue, presenting a rather annoying problem near the center of our budding metropolis. Let's be candid—at times the center of town became a giant mud hole.

It became evident that a bridge across the creek was badly needed. A by-product of such an improvement was the additional building spaces a bridge provided in the downtown area. What better place to locate a store than over the little creek? When the bridge was com-

pleted, most shoppers would not realize the stream existed.

Then, as now, plans for the abatement of immediate problems seldom included the future. A passageway for the stream under our shopping district, thought adequate at the time, remained constant in size, while the water flow increased yearly. As new homes were built, and more streets paved, the runoff increased tremendously. Springdale's growth was on a collision course with nature or, if you prefer, with the Almighty. And as is common in many disasters, small insignificant things sometimes contribute in a very significant manner.

A man of the cloth, residing south of Emma Avenue, was the pastor of a small church near Springdale. He took great pride in his calling, his home, his family, and the vegetable garden behind his modest home. The rows in his garden were straight, his plants evenly spaced, and not a weed could be found anywhere. There was one thing that annoyed him: at the back of his garden, tilted at a precarious angle, stood a long unused outhouse, an unsightly tribute to years gone by. This unpainted structure presented a potential hazard; it could, with the aid of a strong south wind, fall into his tomato patch.

This dilapidated privy was a constant reminder of his lean years of the thirties. Now, entering the nineteen fifties, he had indoor plumbing. The Lord had seen fit to deliver his family from those unforgotten, extremely unpleasant, trips to that picturesque little out house similar to those that once graced the back yards of every home in America.

With the advent of modern plumbing, we gained comfort and convenience, but lost a valuable part of childhood training, especially our reflexes. Absolutely nothing in this world will increase your sense of alertness, and speed of reaction, more than hearing the rattle of a snake less than two feet below your bare posterior. Some may argue that the sting of a red wasp is equally effective.

I digress... Our good citizen, overflowing with civic pride, decided to improve the appearance of his property. The old outhouse was pushed over and demolished. As the outhouse fell it reminded him of Halloweens past—a time when he was a carefree country boy. The remains of the structure were deposited in a heap at the back of his lot near the Frisco tracks. There they remained until the fateful night of May 29, 1950.

On West Emma Avenue, in front of the new Apollo Theater, patrons sat in their cars watching the approaching storm while waiting for the ticket window to open. Those arriving before show time could enjoy up to thirty minutes of music played on the mighty pipe organ.

In the well-appointed Theater lobby, a marble statue of the Greek God Apollo, unmindful of his lack of attire, welcomed the public to our finest movie house. In mythology, Apollo, the God of Music, Poetry, and Prophecy; also represented Youth and Beauty. The story of Apollo's journey from a smoke-filled northern city to the lobby of a small theater in Arkansas is intriguing.

Bill Sonneman, owned most of the theaters in Northwest Arkansas. When he began construction of his third Springdale Theater (I believe the year was 1948), he wanted it to be the flagship of his movie theater fleet. His new motion picture house would be second to none.

Construction was almost completed, yet the new theater was without a name. One day Max Cox, his general manager, mentioned to his boss that a certain antique and Art Gallery in town had a beautiful statue of Apollo in the store. Bill rushed out and struck a deal for its purchase. In one day, he acquired an artistic center of attraction for the lobby, plus a name befitting his latest palace of imagination. Springdale citizens eagerly awaited the Apollo opening. I feel fortunate to have been in attendance on open-

ing night. The theater, still standing, was built over a drainage ditch that converged with the town branch.

About 9:00 PM Max walked upstairs to the Apollo projection room. He glanced at the movie reels, estimating how much longer the feature would run. He was relieved to see it was almost over. He decided to cancel the second feature. As usual, when cancellation of the second feature was necessary, he would have the projectionist run the newsreel, the comedy, and previews of coming attractions again for the convenience of those who arrived late.

His back was hurting. He wanted to get home, take a couple of aspirin, and go to bed. Max had suffered chronic back problems ever since he was hurt on a construction job some fifteen years ago.

He said goodnight to the projectionist, checked all exits, pulled the big switch, and locked the front door behind him. The first trickle of water was already forming a small puddle on the concrete floor under the organ console.

Near 11:30 PM (a calculated estimate), debris lodges in the drainage ditch under the Apollo. Sometime after midnight the organ console is lifted from the floor by rising water. Electrical wires snap, air hoses break, and the organ console floats free.

Early next morning, when the falling waters deposit the once beautiful console on the soggy carpet near the stage, the mighty organ is little more than junk. Cost of restoration is prohibitive. Most Springdale citizens will never again hear the sound of a pipe organ in a movie house. The motion picture business is changing. An era, once thought of as eternal, ended that stormy night. The world will never see its like again—and such a pity...

It is now nearing midnight and the rainfall continues, sometimes quite heavy. Drainage ditches are beginning to reach flood stage. Run-off from the south is steadily increasing. Behind the neat home of our good preacher, his garden is now under water. The surging water tugs at a board from his old outhouse. Suddenly it breaks free, tumbling and turning in the roiling waters as it gains momentum. Another board succumbs to the raging current. Before the first board passes behind the old Dr. Christian house, the entire outhouse is afloat, headed for the Meadow Street Bridge.

Floating boards from the privy, joined by other debris, soon become a large mass of potential trouble. Unfortunately, in its mad rush downstream, the oversize pile of trash becomes lodged under the bridge. Water starts rising; more trash is picked up and carried to the narrow passage. Rapidly rising water reaches the Pioneer Lumber Company. Dimension lumber floats from the lumberyard outward to Emma Avenue. Larger pieces of floating lumber break through plate-glass windows of several buildings.

Autry Wilson was one of the first merchants to take advantage of the downtown flood. I suspect he acted more by necessity than by planning. As employees started carrying soggy merchandise upstairs from the basement they had trouble finding any place to put it. Someone thought of putting tables in front of the store on the sidewalk. A quickly-lettered "FLOOD SALE" sign appeared on Wilson's windows.

By good daylight the following morning, Emma Avenue was filled with anxious merchants, and curious residents, eager for a first-hand look at the widespread damage. They were attracted to the tables in front of Wilson's like flies to a picnic. Several clerks kept busy selling water-soaked clothing at prices only a little below full retail price. Everyone caught the bargain hunter fever. I bought a pair of rubber boots for which I had absolutely no use. The only BS I had to wade was around the coffee drinkers' tables in Penrod's. To the best of my memory, I saved fifty cents on the pur-

chase and never wore the boots once—but I had bought a bargain.

Wilson's sold out of merchandise they had long ago written off as unsaleable. It seemed as though an invisible force overcame us wiping out our compassion and judgment, and creating within us a panic to buy wet clothing—and all simply because so many people, myself included, wanted to profit by a friend's loss.

The week following the flood, a story making the rounds among coffee drinkers at Penrod's concerned a well-known Emma merchant whose store was on slightly higher ground. He arrived downtown before daylight that unfortunate morning. He was pleased to find his store had escaped with practically no damage. For this he was thankful, but as he stood in front of Penrod's watching Autry Wilson selling twenty-year-old long drawers and overalls, he realized he was missing a golden opportunity.

He watched with a twinge of envy, as the mad scramble around Wilson's outdoor tables continued. Happy buyers left the rickety wooden tables carrying load after load of soggy clothing. He pondered his dilemma-then sprang into action.

Quickly he returned to his store. "Put two of these old tables out front on the sidewalk, and put this one in the alley," he said. "Be quick about it! We are going to have a sale!"

Grabbing his sign-making kit, he wrote the words, "FLOOD SALE," on an eight-foot length of white wrapping paper.

Turning to his help, he said, "Carry all these overalls out back. Put them on the table, and don't ask questions. Wait for my word before putting that sign up."

Our enterprising merchant then hooked up his window-washing hose in the alley and proceeded to wet down his first table of "flood-damaged clothing."

Very soon he had both tables out front full of dripping goods. Then the sign went up, and the crowds arrived. One person kept busy wetting down clothing, as another carried the dripping loads through the store to the tables on the sidewalk. Sure, it was messy-but there's supposed to be water on the floor after a flood.

Oh yes, I was lucky, the water never reached the door of my shop.

Note...some parts of the above article appeared in a book I wrote for our local museum, "The Shiloh Museum of Ozark History." The book was for the Museum only and never sold outside the Museum.

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VINTAGE NETS

Nets that are underlined are either new, or have changed times or frequencies since the last issue.

AMI West Coast Net meets on or about 3870 kc, Wed at 8 PM Pacific (winter sked). Net control rotates between K6YKZ Skip, K6RCL "DJ", W6BCN Don, N6PY Bill, & KF6RIP Vic.

Arizona AM Nets: Sat & Sun: 160M 1885 Kc at sunrise. 75M 3855 Kc at 6 AM MST. 40M 7293 Kc 10AM MST. 6M 50.4 Mc Sat. at 8 PM MST. Tuesday: 2M 144.45 7:30 PM MST.

Boatanchors CW Group: 3546.5, 7050, 7147, 10120, 14050 Kc. Check 80 on winter nights, 40 on summer nights, 20 and 30 meters daytime. Nightly informal net usually meets around 0200-0400 UTC. Listen for stations calling "CQ BA" or "CQ GB".

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

California Vintage SSB Net: Sunday mornings at 8AM PST on 3860 +/-

Colorado Morning Net: An informal group of AM'ers get together on 3875 Kc Monday, Wednesday, Friday, Saturday, and Sunday at 7 AM MT.

Canadian Boatanchor Net: Meets Saturday afternoon on 3745 Kc at 3:00 PM EST.

Collins Collectors Association Nets: Technical/swap sessions meet every Sunday on 14.263 Mc at 2000Z. A long-established net run by call areas. Informal ragchew nets meet Tuesday evening on 3805 Kc at 2100 Eastern time, and Thursday on 3875 Kc. West Coast 75 M net is on 3895 at 2000 Pacific time.

Collins Collector Association Monthly AM Night: Meets the first Wednesday of each month on 3880 Kc starting at 2000 CST, or 0200 UTC. All AM stations are welcome.

Collins Radio Association's Collins Nets: Mon and Wed at 8PM EST or 0100 GMT on 3805 Kc, Sat at 12 Noon EST or 1700 GMT on 14.250 Mc.

Drake Technical Net: Meets Sundays on 7238 Kc, 2000z. Hosted by John (KB9AT), Jeff (WA8SAJ) and Mark (WB0IQK).

Drake Users Net: This group gets together on 3865 Kc, Tuesday nights at 8 PM Eastern Time. Net controls are Gary (KG4D), Don (W8NS), and Dan (WA4SDE).

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

Eastern AM Swap Net: Thursday evenings on 3885 Kc at 7:30 PM Eastern Time. Net is for exchange of AM related equipment only.

Eastcoast Military Net: Check Saturday mornings on 3885 Kc +/- QRM. Net control station is W3PWW, Ted. It isn't necessary to check in with military gear, but that is what this net is all about.

Fort Wayne Area 6-Meter AM net: Meets nightly at 7 PM Eastern Time on 50.58 Mc. This is another long-time net, meeting since the late '50s. Most members use vintage or homebrew gear.

Gray Hair Net: The oldest (or at least one of the oldest at 44+ years) 160 meter AM nets. Net time is Tuesday evening on 1945 Kc at 8:00 PM EST and 8:30 EDT. Also check www.hamelectronics.com/ghn

Hallicrafters Collectors Association Net: Sunday on 14.293 Mc, 1730-1845 UTC. Control op varies. Midwest net Sat. 7280 Kc 1700Z. Control op Jim (WB8DML). Pacific Northwest net Sunday 7220 Kc at 2200Z. Control op Dennis (VE7DH).

K1JCL 6-meter AM repeater: Operates 50.4 Mc in, 50.4 Mc out. Repeater QTH is Connecticut.

K6HQI Memorial Twenty Meter Net: This flagship 20 meter net on 14.286 Mc has been in continuous operation for at least 20 years. It starts at 5:00 PM Pacific Time and goes for about 2 hours.

Midwest Classic Radio Net: Meeting Saturday morning on 3885 Kc at 7:30 AM, Central Time. Only AM checkins are allowed. Swap and sale, hamfest info, and technical help are frequent topics. Control op is Rob (WA9ZTY).

Northwest AM Net: AM activity is daily 3 PM to 5 PM on 3875 Kc. The same group meets on 6 meters at 50.4 Mc. Times are Sundays and Wednesdays at 8:00 PM. 2 Meters Tues. and Thurs. at 8:00 PM on 144.4 Mc. The formal AM net and swap session is on 3875 Kc, Sundays at 3 PM.

Nostalgia/Hi-Fi Net: Started in 1978, this net meets Friday at 7 PM Pacific Time on 1930 Kc.

Old Buzzards Net: Daily at 10 AM local time on 3945 Kc in the New England area. Listen for net hosts George (W1GAC) and Paul (W1ECO).

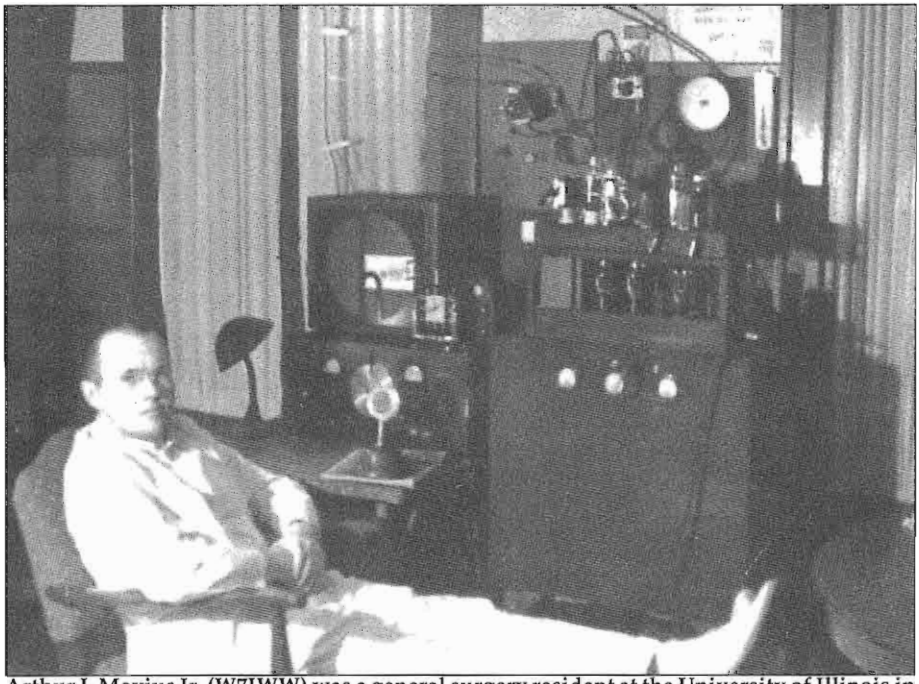
Southeast Swap Net: Tuesday at 7:30 PM Eastern Time on 3885 Kc. Net controls are Andy (WA4KCY) and Sam (KF4TXQ). Group also meets Sunday on 3885 Kc at 2 PM Eastern Time.

Southern Calif. Sunday Morning 6 Meter AM Net: 10 AM on 50.4 Mc. Net control op is Will (AA6DD).

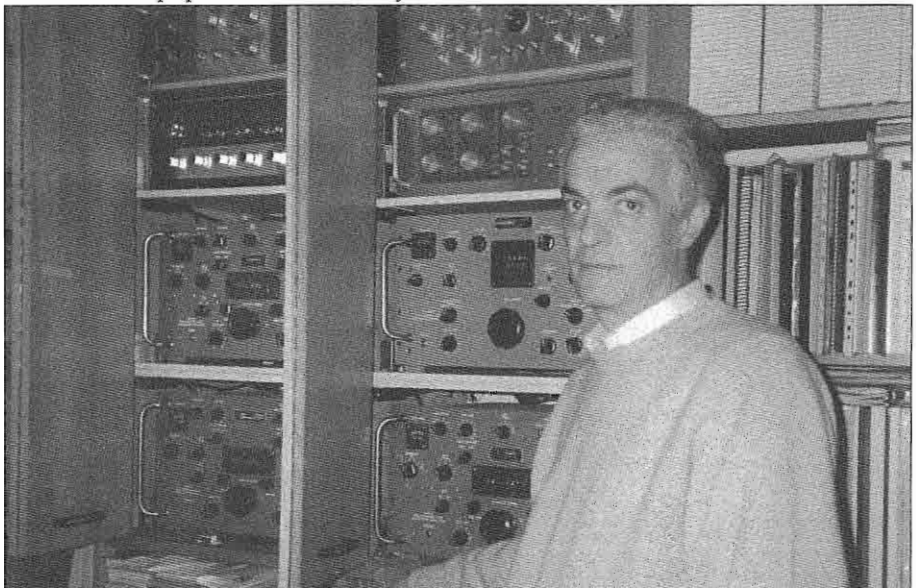
Swan Nets: User's Group meets Sunday at 4 PM Central Time on 14.250 Mc. Net control op is usually Dean (WA9AZK). Tech net neets Saturday at 1900z on 7235 kc. Net control is Stu (K4BOV).

Westcoast Military Radio Collectors Net: Meets Saturday at 2130 Pacific Time on 3980 Kc +/- QRM. Net control op is Dennis (W7QHO).

Wireless Set No. 19 Net: Meets the second Sunday of every month on 7270 Kc (+/- 25 Kc) at 1800Z. Alternate frequency is 3760 Kc, +/- 25 Kc. Net control op is Dave (VA3ORP).



Arthur J. Movius Jr. (W7IWW) was a general surgery resident at the University of Illinois in the 1930's and kept his homebrew phone rig installed at the hospital. This was in an age with very few electronic devices in the medical profession. Today, operating a station such as this near medical equipment would be risky.



Paolo Viappiani is a long-time ER reader, and is the author of the R390 handbook, printed in Italy. He is a professional audio engineer, and has 40 years of SWL experience with vintage equipment.

Eico Test Equipment

by John Hruza, KBØOKU
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photos by Cora E Cobb, KBØLPZ

Semiconductors took over from vacuum tubes for several reasons. The products using them were smaller, lighter (!), cheaper, used less power and, perhaps most importantly, were much more reliable. The few repair shops in existence today get very few transistor radio jobs.

One of the main reasons many of us still work with boatanchors is that we enjoy the challenge of keeping vintage electronics working. Some troubles can be resolved without test equipment. We can substitute known good tubes until the radio works (or still doesn't). But for most jobs we need a test bench. At a minimum, the bench consists of a multimeter, also known as a volt-ohmmeter (VOM). Many jobs can be handled with that one instrument.

Figure 1 shows, from the left, the Eico first generation 536 and second-generation 536A pocket multimeters, the 540 Readi-Tester and the full-size 566 VOM, one of four similar types. The 555 and 565 were 20K ohms/volt; the 556 and 566 were 1K. The 555 and 556 used 1% resistors while the 565 and 566 used 5%. To the rear is the box the 566K VOM kit arrived in. Plenty of choice in models! On the right is the 612 Filament Continuity Checker. It was a very poor substitute for a tube tester that came in a pocket multimeter case.

For serious work, however, there are five more basic test instruments needed. First, since many of the circuits we want to observe can easily be overloaded by a VOM, we need an amplified meter that has little effect on the circuit: a vacuum

Figure 1, First and second generation EICO VOM equipment, with the type 612 filament checker shown on the far right.

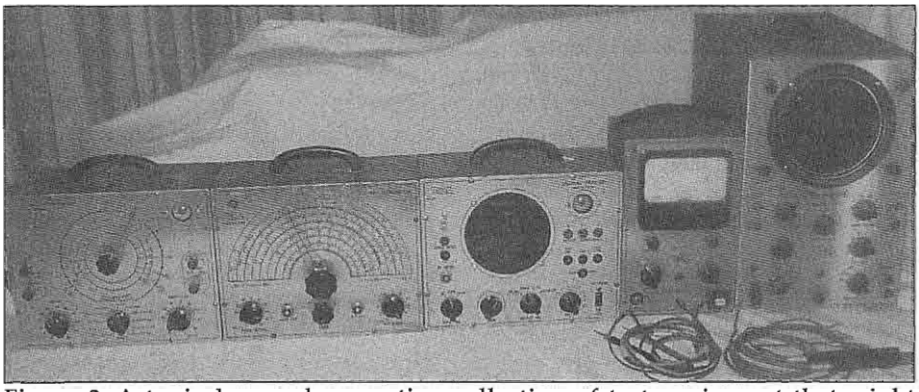

Figure 2: A typical second-generation collection of test equipment that might have been found in any of the thousands of independent service shops once so common in the United States during the 1950's.

tube voltmeter (VTVM). Next, we need a means of injecting proper known signals into various stages of the equipment we are working on. A signal generator provides this function. A signal tracer makes following the signals through the radio much easier. A component tester, such as a comparator bridge, can tell us if we have a bad part. Finally, it is often useful to actually see the signal's waveform. For this we need an oscilloscope.

Of course, there are many more instruments available to help us with our work. Several manufacturers provided a quite wide range of equipment, both ready to use and in kit form. One company that offered both forms was Electronic Instrument Co (Eico), based in the New York area. Harry R. Ashley founded Eico in 1945. Their first product, offered in 1946, was the model 113 Electron Tracer, a signal tracer with a built-in VTVM. Next came a conventional VTVM and a signal generator. In 1948 they offered their first kit, a version of the 221 VTVM, which they had previously sold in ready to use form only. By 1950 a full line of test equipment was available in both forms.

A typical 1950s test bench assembled from second generation Eico equipment is shown in Figure 2. From the left are

Figure 3 shows a typical third-generation test bench. Now, FM alignments are necessary, and made possible by the Type 369 shown fourth from the left. The 369 was an excellent piece that is still used by many technicians.

the 950B Resistance-Capacitance Comparator Bridge, 320 Signal Generator, 147A Signal Tracer, 221 VTVM and 460 5" Oscilloscope. The scope owns both the PLC low-capacitance and PSD demodulator probes. Their total cost would have been about $300, or about $200 if you built the equipment yourself from kits.

You could have saved another $50 (wired or kit) by buying the 425 scope instead of the 460 but even though both use a 5" tube the latter is more useful because it is dc-coupled and wideband. So, at that time, you could have been in the radio repair business for as little as $150. And this is at a time when a simple RCA WV-95A VTVM cost $153 by itself.

If you were setting up a similar bench a decade later, it might have the third generation gear shown in Figure 3. Again from the left is the 1064 6/12v Battery Eliminator/Charger, 955 In-Circuit Capacitor Tester, 330 Signal Generator, 369 TV Sweep/Marker Generator, 235 VTVM and 261 AC Voltmeter/Wattmeter. The 235 wears the famous Uni-Probe which was issued with all the later Eico VTVMs. We would still be using the 460 scope, or if we had first bought the 425, we would by now have had to replace it with the 460. Even if we already had the latter, we've just spent $450 to upgrade our test bench, or $300 if we built the kits.

We have added the 1064 so we can work on car radios and amateur mobile equipment on the bench, which is much easier than under the dashboard. The 369 is needed for TV and FM alignment and the 261 helps with high fidelity and stereo work.

Figure 4 is a comparison of VTVMs. The big 214 on the left represents what I call Eico's first generation test equipment, with a blue panel. This style of gear lasted into the early 1950s. Next are early and late second generation 221 and 232 (peak reading) VTVMs with silver panels. I have never seen an advertisement for the later versions with the clear meter bodies. I guess Eico just kept using the old pictures! Last are the 235 and 261 (ac) third generation units from Figure 3.

A similar comparison of signal generators is shown in Figure 5. The 377 is an audio sine-square wave generator. The second generation 320, 324, and large 315 are RF signal generators as is the third generation 330, which is solid state like most of that styling.

Finally, Figure 6 shows a few of the other second-generation instruments available from Eico. The 625 tube tester's cover was optional at $3.95 extra cost. The HVP-2 30KV High Voltage Probe could be used with any VTVM or 20K ohms/volt VOM. The 1171 is a Capacitance Decade Box and the 1180 is a Resistance Decade Box. The 488 Electronic Switch allows a dual trace display on the scope.

It is interesting to note that, unlike Heathkit, Eico didn't change the model number when they made cosmetic changes in the units, and units of all three generations were available side by side on the same catalog page for years at a time. After all, they had a production line going - why stop building an old model that was still selling just because they came out with a new one?

Eico was formed at about the same time as Heath began making test equipment kits. For many years Eico was Heath's closest competitor, offering at least some equipment in all the same areas, including test equipment, amateur radio, high fidelity and other consumer electronics. By the end of 1956 they were advertising that they had sold over one million units. After 1970 they sold only kits until they left the market later in the 1970s. They always sold their products through distributors, never di-

[continued on p. 38...]

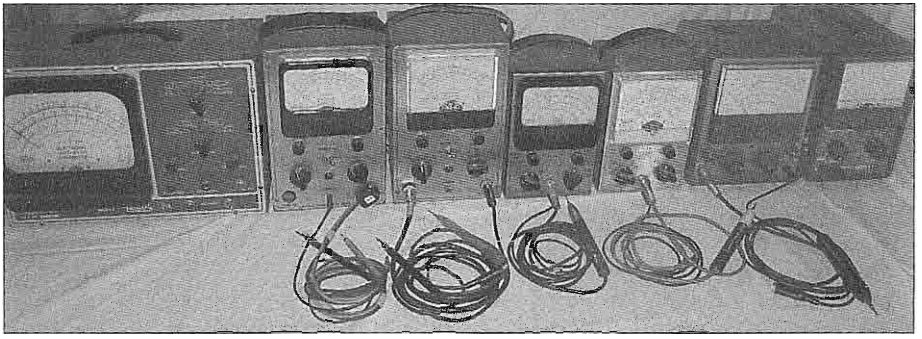

Figure 4: A comparison of VTVM's made over the years by EICO.

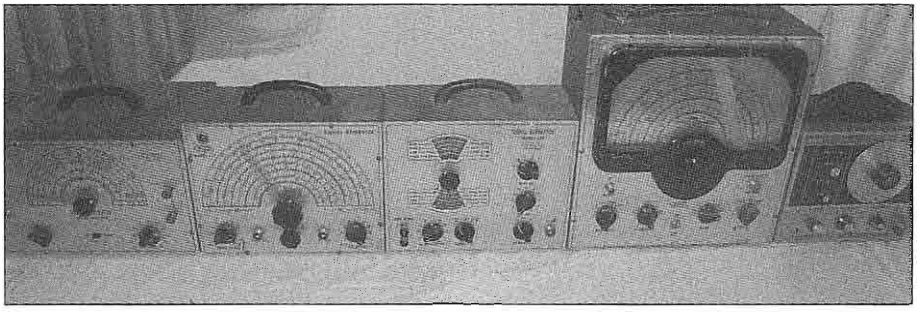

Figure 5: Here is shown a comparison of signal generators, similar to figure four.

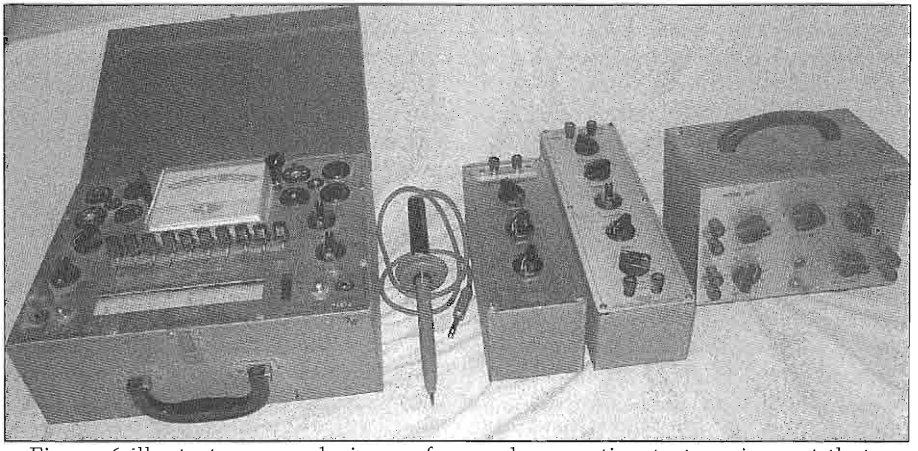

Figure 6 illustrates several pieces of second-generation test equipment that no service shop could expect to do without. Generally, EICO could be depended on to get the job done, within certain expected limits. The most important piece of test equipment was located between a good technician's ears!

rectly as did Heath, so they were somewhat at the mercy of dealers who often (e.g. WRL, Allied, Lafayette and Radio Shack) also sold their own competing items. Eico's founder Harry Ashley died in 1995. As mentioned in the "Editor's Comments" in last month's ER, the company still exists at this moment, although it is expected to complete liquidation by the time this article is published.

As Eico is no longer in the test equipment business, the only way we can get their equipment is at hamfests, estate sales, auctions and similar markets. The prices today are low compared to other manufacturers' units. But their quality was reasonably good to start with and they are mostly easy to repair. If you need to set up a test bench today, you should consider equipping it with Eico gear.

 ER

[...AMI update from page 23]

both for long and short skip. About 11:00pm PST I went up to 40 meters but copied no signal there that band was in such poor condition and even the broadcast stations were weak. Even with the poor band conditions the Heavy Metal Night was lots of fun for me to work and listen to because AM events exchange real information, not your standard "you are 5-9, hello and goodbye" like most current ham contests.

During December the skip at night on 75 meters has continued to be long most evenings making for great cross country QSO's, but hard on local nets. Unfortunately, intentional QRM has also been a problem on some of our Wednesday evening AMI nets. It seems there are individuals that can't stand to hear others having a good time doing something they aren't familiar with and just have to disrupt them. This is not only a problem for those of us using AM, also but for hams using other modes. The Collins Collectors Association side band nets have had this problem. Additionally, a friend of mine that has been on many DXpeditions says he is about ready to give them up because of intentional QRM.

However, if a QSO is in progress on the frequency we want to use for a net or schedule, we should always try to negotiate a solution with the stations using that frequency. If someone is there first they have the frequency. In just about every case I have informed stations of a net scheduled on their frequency, the operators are glad to help by moving. In a few cases they have even joined the net.

However, the interference problems with the Wednesday AMI net are different. They show up after the net starts or when AM stations are on frequency preparing for the net. The same guys even have moved up the band to interfere with an in-progress CCA AM net last summer.

Fortunately the FCC is now starting to crack down on these types of operators, but it takes time and hard evidence. If we hear individuals boasting on the air about causing intentional QRM to our AM nets, document this evidence by making a recording and sending the evidence to the FCC. In the short term, the best policy is to never confront or argue with them on the air. Also, never mention that they are causing a problem while you are on the air. When they hear they are causing a problem, they know they have been successful and will just get worse. If we don't respond they will often just give up and go look for trouble somewhere else.

On a more pleasant note, I'm looking forward to more fun during the coming year restoring and modifying old radios along with many interesting AM QSO's and would like to wish all the same for 2003.

 ER

ER Article Updates and Corrections

Command Set (ER 161) and Galaxy COMM-2 (ER 160) Updates

By John Hruza, KBØOKU
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My thanks to all the readers who have contacted me regarding the articles I have been writing for ER, especially to those who offer corrections and additions to the information in those articles.

The Command Set Reference article that appeared in the October issue brought a particularly large mailbag. Two readers, Bill, N9TT and Carl, W3CL, reminded me that 1625s have 12v, not 28v, filaments. In command transmitters the two filaments are in series across the 28v aircraft power source. Sorry guys, I'll try to phrase things more carefully in the future.

Bill further states that the 62207 junction box was not part of the command set series but instead was used with the Navy RU series of receivers. He included in his letter a huge amount of additional information about the equipment covered in the article. I'll try to summarize it here.

First, some interesting comments on the AN/ARR-1 homing adapter: The Navy ARB communications receiver has mounting studs on top to fit the bottom of the ARR-1. The tube compartment cover of the RU receivers mounts on the same arrangement of studs. As the bottom of the ARR-1 is covered by felt like the bottom or the tube compartment cover, Bill suggests that the ARR-1 was designed to attach to, and work with, either the RU or ARB receivers. He points out that the 62036 command set power adapter was used on the 500-1500kc receivers and matches that on the panel of the ARB and some of the later versions of the RU series. It would supply power to the ARR-1 or, less commonly, an LM type frequency meter.

Bill confirms that the ARR-1 was originally called the ZB and adds that the ARR-2 was earlier called the ZBX. The test sets used for pre-flight setup were the TS-1/ARR-1 or 60013, and the TS-24/ARR-2, respectively. Both used a 955-acorn tube oscillator working in the 234-258 mc range. Additionally, the TS-1 has a preset 450-830 kc oscillator that modulates the RF oscillator. The TS-24 has six of these AF oscillators. The TS-24A also has six as well as a another tone oscillator that modulates them, providing the double modulation scheme described by Walt Hutchens way back in ER issue #14.

Update to Table 6 – AN/ARR-1 Beacon Receiver in the original article –

ZB	AN/ARR-1	Equipment
69076		R-1 receiver (trf amplifier/detector)
29173		RE-1 (?) antenna switching relay
23214		pilot's control box

Bill also added information on the ARC-60, noting that the manual is TM 11-522 and that much of the equipment carries Aircraft Radio Corp numbers instead of the military ones. Both numbers are shown, where known, in the following update to Table 10. The original table mentioned a transmitter in the ARC-60 system; there is none in the aircraft. The transverter contains the complete transmitter as well as the converter for the receiver. I still don't know which transmitter was used on the aircraft carrier.

AN/ARC-60 Aircraft Radio Equipment
R-508
R-19 118-148mc receiver
PP-2792 (?)28v > 260 vdc 100ma power supply
MC-215 (?) flex tuning spline
C-1917/AR C-52 receiver control box
O-423 K-13 1kc oscillator/relay, R-508 tuning aid
MT-1677/AR (?) oscillator/relay mounting
AT-701/AR A-16 inverted-L antenna
CV-431 TV-10 228-256 mc ½-watt transverter, from-and-to 118-148 mc
(?) J-13 junction box
MT-1140/ARC M-12A receiver and transverter mounting
RE-275/AR K-18 relay unit
J-502/ARC J-10 jack box
DY-86/ARN-30 (?) dynamotor on the R-508

I will quote Bill's final paragraph exactly, as it gives the flavor of someone who has actually used this gear and knows it very well. "The homing transmitter [on the carrier] used with the ARR-1 and -2 was the YE. Since you had to know two radio frequencies to get the audio it provided some tactical security. For homing, the antenna was rotated at some slow speed with an omni directional reference tone allowing a stopwatch to roughly judge what angle you were from the carrier. The reference tone could be at any preplanned angle for security, and the audio could be transmitted omni directionally with other navigation information at periodic intervals. Kind of like the old 200-400 kc beacons with [added] omni directional capability and a small measure of tactical security."

Table 11 should also be updated to include information from Ray, N0DMS, ER editor, found elsewhere in the October issue. Here is the more complete version:

AN/ARN-59 Equipment

R-836 190-1750 kc ADF receiver
C-2275 R-836 receiver control box
R-508 118-148 mc receiver
PP-2792 28v > 260 vdc 100ma power supply
DY-150/ARN Dynamotor
MT-1912/ARN Mounting base
MT-1913/ARN Mounting base
AT-780/ARN Antenna
ARC-19050 Loop housing
ID-637/ARN Azimuth indicator
ARC-17984 Cable assembly
ARC-18637 Cable Assembly

Chuck, KB2E, sent me a book that should be a major addition to the bibliography at the end of the article. This is the Surplus Conversion Handbook by Tom Kneitel, K3FLL/WB2AAI, published by Cowen in 1964 as their catalog number 122, part of the CQ Magazine Technical Series. This covers not just the command sets but also many other military radios of the same vintage. Thanks, Chuck, that was very generous of you.

Finally, I received an anonymous contribution, mailed from Chicago without a return address or signature. I was really happy to get this – it's a photocopy of an undated advertising data sheet for the Galaxy R-530 communications receiver. Among other equipment shown is the COMM-2, the subject of an article in the September issue of ER. The description states: "Single sideband Transceiver designed for Commercial and Military applications. 2-channels, will operate on lower or upper sideband. 2 to 20 MHz frequency range. Operates on +/- 12 VDC. 117/230 VAC available." The manufacturer is shown as: "galaxy electronics, division of Hy-Gain Electronics Corporation, R.R.3, Lincoln, Nebraska, 68505, telephone: (402) 434-9151, Telex: 48-6424".

Thanks again to everyone who responded to these articles. It's really great to know that someone is actually reading them! I'm sure that, with these updates included, they will be more useful to other readers.

[Editor's note: Additional information

obtained by Electric Radio indicates the ARC-60 UHF Command Radio was used in the H-13, H-23 and others and was replaced by AN/ARC-45.

The ARC-59 LF direction finder was used in C-2, C-130, RF-101, F-105, UH-1, HH-3, SH/UH-3H, OH-6A, H-34, H-43, H-46, CH-47, CH-53D, O-1, OV-1, S-2, T-37, T-38, U-1, HU-16, X-19 and was replaced by AN/ARN-89.

ARC-5 equipment was typically used in B-17, B-24, C-47, C-119, C-121, P-2, P-5, P-38, S-2, T-28, H-13, H-19, F4U, F6F, HO3S-1, HO5S-1, HRS-1, PBM-5S, PBY-6A, R6D-1, SB2C-5, TBM-3S.

Readers probably know of other aircraft the equipment was used in, and this is by no means intended to be a complete list.]

A WW2 Navy CW Rig Speaks (ER 162)
by Bob Login, AA8A

The captions in figures 2, are wrong. The rig is a TBD, not TDB.

Thermal AM (ER 159)

Since the "Thermal AM" article in ER #159 was published, ER has received additional information about ionospheric cross-modulation. It was described by B.D.H. Tellegen in 1933 when he observed the effect on a Swiss station at 650 kc that had been modulated by Luxembourg on 262 kc. Later, Radio Luxembourg on 230 kc was noticed to be modulated by Radio Paris on 182 kc. Two Aurtralian physicists, Bailey and Martyn, offered a solution and described it in Experimental Wireless and Engineering, March 1935, vol 12, page 122. They offered an explanation of the physics of the modulation that differs from George Mather's conclusion which I described in my article (from Electronics Magazine, September 1950). Bailey and Martyn attributed the effect to the motion of electrons not following a linear law when under the influence of powerful electric fields. Here are some additional references which readers have kindly provided:

Nature, B.D.H. Tellegen, Vol 131, p. 840, 1933

Admiralty Handbook of Wirless Telegraphy, Vol2, 1938 Ed. p. 18-19

Radio Ray Propagation in the Ionosphere, Kelso, McGraw-Hill, 1964

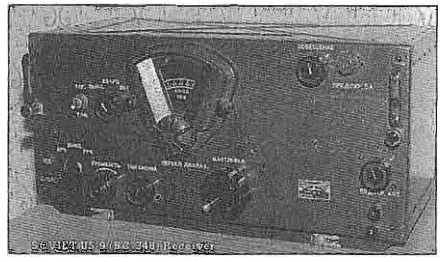
The Magneto-Ionospheric Theory, Ratcliffe, Campridge University Press, 1959

Perhaps a large library in a major city area would have these reference materials.

Thanks to Chuck Teeters (W4MEW), Joel Ekstrom (W1UGX), and Richard Wieschhoff for this information.

A Letter From Geoff Fors (ER 161)

The Photo on page 30 is a Chinese BC-348 clone, not a Russian version. The Russian BC-348 copy was called the US-9 and is shown below:



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FOR SALE: NOS military tubes: Radar APS4. 3B24, 2K25, 1B22, KS5998 dynamotor brushes. VT100A, 106, 136, 866JR, 4CX250B, EC8010, 5204, 6130, 7815. Bill Coolahan, 1450 Miami Dr. NE, Cedar Rapids Iowa, 52402-2933. 1-319-393-8075

FOR SALE: Hallicrafters HT-32A $275.00, Heath Mohawk $225.00, FT-101E $175.00. With manuals & Great condx. Bob Braza, W1RMB, MA, 508-261-8231

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FOR SALE: Johnson manuals: Ranger II, VFO; Viking II originals $20.00 ea.; Ranger II repro $15.00; Ranger II schematic $5.00. Prices shipped. John, W8VBQ, 513-575-5561

FOR SALE: Wireless Set No. 19, Radio & dynamotor $150.00 Pick Up only please. SW225 triple knife switch for ART-13 $10.00. Shock mount for LM freq meter $15.00. Shock mount for BC-348 $50.00. Mike 510-732-0932

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FOR SALE: Collins "S" Line 75S-3, 32S-1 312B-4, 516F-2 good to exc condx, $1,400.00, Cliff Fleury, AI7Y, 509-493-8203

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FOR SALE: First user friendly circuit for early BC-348's! Send $4.00 + .37 US stamp + business envelope. Ray Larson, 12241 ½ Gorham Ave., W. Los Angeles CA 90049-5214

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Publications, ham & test gear. K4AFW, 104 Glenwood Dr., Williamsburg, VA 23185

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

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NOTICE: T-368 Registry. For info w2zr@aol.com Subscribe to the T-368 & BC-610 reflector at http://groups.yahoo.com/group/T-368_BC-610

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FOR SALE: VM parts, new-boxed electron tubes, new Heathkit parts, and new panel meters. Norm, 1440 Milton St., Benton Harbor, MI 49022

FOR SALE: Build your own "Midget" bug replication by K0YQX, ca 1918, featured by K4TWJ in CQ Magazine, May '98. 10 detailed blueprints. FAX: 507- 345-8626 or e-mail bugs@mnic.net

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

FOR SALE: New and used early radio and collector tubes. See www.fathauer.com for lists or email tubes@qwest.net. George H. Fathauer & Assoc., 688 W. First St. Ste 4, Tempe, AZ 85281, 480-968-7686. Toll Free 877-307-1414

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FOR SALE: Convert any wattmeter to read PEP! Perfect for AM/SSB-$19.95 ppd for complete kit! HI_RES, 8232 Woodview, Clarkston MI 48348, 248-391-6666, hires@rust.net

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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, KD0ZS, Felton Electronic Design, Box 187, Wheatland, WY 82201. 307-322-5858 feltoned@coffey.com www.feltondesign.com

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FOR SALE: WACO-5NWX telephone filters. Just plug in. 1 /$13.95, 2/$25, 3/$34. Money back. Cecil Palmer, 4500 Timbercrest Ln., Waco, TX 76705. 254-799-5931 w5nwx@hotmail.com

FOR SALE: 51J-4 filter replacements, direct plug in—6.0 kc Collins mech. filter, 3.3 xtal lattice, 2.3 kc xtal lattice, 500 cycle xtal lattice -$245 each; R390A 16kHz flat phase filter, for Hi-If AM-$245. Inquire about free AM xmtr parts, PU only, or S&H charge otherwise. Chuck Felton, KD0ZS, WY, 307-322-5858, feltoned@coffey.com, www.feltondesign.com

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

FOR SALE: Treasures from the closet! Go to www.cjpworld.com/micromart to find some unique items many Hams would lust for! (360)699.0038 or gus@wa-net.com

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

FOR SALE: PANEL AND CABINET REFINISHING; Johnson, Hammarlund 180(a), R390(A), & others total restoration & sales; My updated web site: http://w4pnt.8k.com Patty & Dee's Marina; Dee Almquist, 534W. Main St., Waynesboro, VA 22980. 540-249-3161 Cell: 540-480-7179, FAX 540-249-5064

FOR SALE: RIT for Collins KWM-2/2A; No modifications needed. $79.95 SASE for details. John Webb, W1ETC, Box 747, Amherst NH 03031 bigspndr@bit-net.com

FOR SALE: 2 ¼" dia XP53 plug-in coils; 3 ea. 5 pin, 1 ea. 4 pin, All 4 $6.00 + shipping. Henry Mohr, W3NCX, 1005 Wyoming, Allentown, PA 18103-3131

FOR SALE: Aluminum heat dissipating plate and grid connectors for all 3, 4 and T series Eimac including 3-500Z, 4-1000, 304T's and 1000T's, W1ETC, Box 747, Amherst, NH 03031 etc. Alan Price fixr7526@cs.com

FOR SALE: QST full years '51, '53, '56 $12.00. '43, '46 $16.00 each. Shipped USA. Tom Berry, W5LTR, 1617 West Highland, Chicago IL, 60660, 773-262-5360

FOR SALE: Hammarlund SP-600-JX-17, good condx w/ specific (correct) manual $450.00 shipped. ABe (W3DA) in Delaware 302-349-5389 before 10 PM please.

FOR SALE: Many parts for radio builders, please call to discuss needs. Joe Battyany, W6CAS, 1501 Sherwood Ave., Sacremento CA 916-731-8261

FOR SALE: Sam's Photofact numbers 1-1300. $5.00/radio ppd in USA. Don Kuhn, W8KPD, POB 686, Marion OH, 43301-0686. 740-383-5744

FOR SALE: Ships radio room clock repros, boatanchor mugs and t-shirts, more. http://www.cafeshops.com/amradio,amradio2

FOR SALE: Yaesu FRG-7- $170, SP-101, SP-901 speakers- $ 40 each, FV-101 VFO-$115. Carter, 434 979 7383, CElliott14@aol.com.

FOR TRADE: Two good RCA 833A's for one Taylor 833A; also looking for Taylor 204A, 813, TR4OM. John H. Walker Jr., 13406W. 128th Terr., Overland Park, KS 66213. (913) 782-6455, jhwalker@prodigy.net

WANTED: Front panel milliammeter for the Harvey-Wells T-90 Tx'er. Richard N. Pann, W1SUJ, 2447 Yates Drive, Augusta GA, 30906, 706-798-7279. rpann2@comcast.net

WANTED: Relays from Johnson Matchbox KW and 275 watt. Raymond Fisher, WA8JLT, 937-692-8550 call collect.

WANTED: 5AP4, 5BP4 or 1805-P4 CRT for my 1939 Andrea TV set. Arch Doty, W7ACD, 503-554-9142 archd@aol.com

WANTED: Nameplate for BC-342 rcvr. Also 4X4X2 aluminum metal utility cabinet, removable front, back, covers. Louis L. D'Antuono, 8802 Ridge Blvd, Brooklyn NY 11209. 718-748-9612

WANTED: Lafayette HB-400 or HB-333 or Olson Tube Type CB set for conversion to 10M AM. Will pay your price working or not. Bill Smitherman, KD4AF, 9401 Hwy 67, East Bend NC, 27018. 336-699-8699

WANTED: Power supply and connecting cable for a Harvey Wells T-90 Bandmaster Tx. Ed, WA7DAX, 1649 East Stratford Ave., Salt Lake City UT, 801-484-5853

WANTED: CINCH-JONES plug P310-CCT. This is a 10-contact plug with 5/32 inch wide contact blades, and with cable clamp in cap. Vernon Yeich, 1700 White Hall Rd., White Hall MD, 21161, phone 410-357-5112

WANTED: Looking for 2 anode connectors for 4CX250 tubes, and a main tuning knob for the KWS-1. John Munro, G3GBB, tel. 01379-783657. jmunro2@ukonline.co.uk

WANTED:: The two red jewel lights on the front of Johnson Ranger. RbrtKJ6CA@aol.com

WANTED: BC-610 transmitter within driving distance of the Twin Cities MN, Email me with information at w0ir@attbi.com

WANTED: Manual or schematic for National VP4050A counter and Realistic Signal Generator A11IM. Will pay for copies. Roger K1TG

rwkuchera@snet.net

WANTED: HELP: I need information on a E.M. Sargent Co. Model 205A 5-band radio circa late 30's (?). David Miller, 307 754-4351 or K7ALR@arrl.net.

WANTED: Pwr Xfmr for Browning Golden Eagle MK IV. 110V pri/sec 32.4, 280, 9, 6.3 VAC. Bob K8MGC, 330-879-5250 Bobludy@sssnet.com

WANTED: Cabinet only for Heath AT-1. Rough OK. Dick Bixler 503-690-2557

WANTED: HELP: Your grand-son build a successful and simple vacuum tube regenerative receiver. Reprints of Gernsback 1930's plans for sale. Free List. Bob Ryan, 1000 S. Gilbert St., Apt 132, Hemet CA 92543-7065

WANTED: T-368, GC, will PU locally, also 75A-4 filter clamp. KC9VF@arrl.net

WANTED: SBT-1K TMC PS-4 pwr sply need manual or schematic. Bernard Drew, Bernard@quidnunc.net

WANTED: (Badly) Harvey Radio Labs Model FT-30, 1935 Xmtr. See E. Rippon guide p.57 or FOS p.257. This was my rig back in 1941 when my call was W1NLL. In needed, I will send you a picture copy. I will pay $1000.00 plus shipping for one in almost any condition. Robert Enemark, W1EC, PO Box 1607, Duxbury MA, 02331. 781-585-6233

WANTED: Wanted: Manuals for Collins Antenna Tuners 180-Y and 180-V Mike Kincaid - W7FKF, 248 Justin Road, Murphy, TX 75094, 972-578-1120

WANTED: Schematics only for Heathkit 180-Y and 180-V SS-9000. Have all other info. Marvin, 770-290-314, mmoss@mindspring.com

WANTED: TCS Army-Navy rcvr 1.5 to 20 Mc, and good manual to rework Globe King 275. W0BEI, 800-500-8055. Dave.

WANTED: Collins 51J-4 complete, reasonable price paid for a nice clean one. Art Plummer, 650-359-1858, w6lr@arrl.net

WANTED: GRC-9 microphone, Headset, speaker. Lee, N2UDF 315-656-9578,or Lcarroll@post.com.

WANTED: Coil sets for HRO-50. Casey, W8FDE MI 231-755-1579 FAX 231-737-3101

WANTED: Panel meter M-100 for Johnson Desk KW. 50-500 MA DC grid-modulator current. Face marked two scales. Bottom 0-50, Top 100, 200, 300, 400. Also bottom of face #796, FS=5MA, 20 ohms 100 mv. Or does anyone know how to modify the circuits for maybe two separate meters? Bob, WA6ICL, 14463 Astoria St., Sylmar CA, 818-362-7404

WANTED: Hallicrafters SX100 general coverage rcvr (mark 2 preferred): excellent operating condx (others considered). J.I. Lillie, PO Box 128, Onondaga MI 49264. 517-628-3531

WANTED: SB-104 main tuning knob. Ed Cuevas, Ft. Worth, 817-222-5355, ecuevas@juno.com

WANTED: Cakepanion 2 tube regen rcvr. Prefer w/ all coils. Doug Reeves, WB6RKY, PO Box 278135, Sacramento CA 95827. wb6rky@hotmail.com

WANTED: Coil "C" for HRO-60. Gerald Park W8QS, 517-351-5106, park@msu.edu

WANTED: Galaxy (WRL or HyGain) LA-550 Linear, RF-550 Wattmeter, CAL-250 calibrator. All answered! Kelley, W8GFG, 9010 Marquette St., St. John IN, 46373; 219-365-4730

WANTED: Tech help to modify xtal controlled transistor CB rig for ham bands. Rex, PO Box 4518, Jeffersonville IN, 47131, 812-282-4824

WANTED: Any TMC Equipment or Manuals, what have you? Will buy or trade. Brent Bailey, 109 Belcourt Dr., Greenwood, S.C. 29649 864-227-6292 brent@emeraldis.com

WANTED: AN/WRR3-R1134 VLF receiver. Jack Holzer 913-791 5141, days

WANTED: KNOBS and front panel meters for the GRC-19 set, T-195 and R-392. Please contact Gary W5UUO, 450 Cunningham Road, Celina, TN 38551 931-243-5323 w5uuo@info-ed.com

WANTED: James Millen plug-in coils p/n 42080, 42040, 42015, 43015. Bretting 14 manual. Gary Carter, WA4IAM, 1405 Sherwood Drive, Reidsville, NC 27320. Phone: 336-349-1991. Email: gcarter01@triad.rr.com.

WANTED: Westinghouse MW-2 and MW-3 transmitters and parts. Also HP Model 1727A Oscilloscope manual. Gary, WA4ODY, Seabrook TX 77586, 281-244-7695, myctpab@earthlink.net

WANTED: Manual for General Radio Co. Unit Oscillator Type 1211-C (.5-50 Mc.) Jim Eberwine, W4APV, 8118-37th Ave. North, St. Petersburg FL. 727-347-0942

WANTED: Empire PA210 Panadaptor, URM-25 Sig Gen, URM-26 Sig Gen, URM-7 Rec SBT. Dean, 6725 Portland Ave South, Richfield, MN 55423

WANTED: Manual and schematic diagram for LAPP Power Supply Model 73. 0-18v, 0-36v, 30 Amps (?). Alan Lurie, W9KCB, 605 East Armstrong Ave., Peoria, IL, 61603. 309-682-1674

WANTED: Schematic diagram for Freq Meter CRR 74028 (part of LM-13). Frank Hill WA6SYI 1313 Milton Ave., Walnut Creek CA, 94596 fdhill@attglobal.net

WANTED: Hallicrafters HA-20 VFO Line Sampler, or schematic and parts to homebrew. H.I. Stark, K9UBL, 3215 S. Meridian Street, Indianapolis IN 45217-3231

WANTED: Radios Master catalogs, pre vol #12th ed, all before 1947. R.V. Matson, W1CSO, FOB 956, Lake Panasoffkee, FL 33538. (352) 568-1629

WANTED: BC-639 VHF RX and RA-42 power supply. Northern CA pickup preferred. Ian Abbott, KC6UPT, ian@wildblueaviation.com (209) 747-3639

WANTED: TBX radio and/or accessories required by military radio collector. Ray, VK2ILV, ROBINSON@SHLRC.MQ.EDU.AU

WANTED: Older rigs & accessories. Brian Carling, AF4K, 117 Sterling Pine St., Sanford, FL 32773. http://come.to/AF4K/

WANTED: Fully functional w/manuals: Johnson AN/FRT-505 xmtr, Swan F51 and FC76. Contact Ric at C6ANI@ARRL.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: National Co. emblems, escutcheons, and logos from equipment, also National AN/WRR2 in working order. Don Barsema, 1458 Byron SE, Grand Rapids, MI 46606. (616) 451-9874. dbarsema@prodigy.net

WANTED: Still looking for manual, schematics, trouble-shooting, RCAF Rx by TMC R-5007A/FRR502. David Boardman, VA2DVD, 418-877-1316 radioman@dbtubes.com

WANTED: BC-348 () rcvr w/following suffix: B,C, H, J, K, M, N, P, S, for collection. Ken Kolthoff, K8AXH, POB 215, Craig, MO 64437. 660-683-5353

WANTED: B&W plug-in coils 80MEL, 800ES, 80BVL, 80JVL, 80TVL. Jim Jorgensen, K9RJ, 1709 Oxnard Dr., Downers Grove, IL 60516. 630-852-4704 k9rj@attbi.com

WANTED: Racal rcvrs; manuals for RA6790/GM/ELF/VLF; Plessey IMR5000 manual; Plessey radios. Allan, Norco CA, (310) 812-0188, alan.royce@trw.com

WANTED: ARC-5 rcvrs, racks, dynamotors. Jim Hebert, 1572 Newman Ave. Lakewood, 0H 44107.

WANTED: Top prices paid for globe shape radio tubes, new or used. Send for buy list or send your list for offers. Write or email: tubes@qwest.net George H. Fathauer & Assoc., 688W. First St. Ste 4, Tempe, AZ 85281. 480-968-7686, Toll free 877-307-1414

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: Collins 70K-2 PTOs working or not; 1N82A diodes; Bretting 14/14AX manual. Clark, WØBT, KS, (785) 286-2132

WANTED: Seeking unbuilt Heathkits, Knight kits. Gene Peroni, POB 7164, St. Davids, PA 19087. 610-293-2421

WANTED: WESTERN ELECTRIC horns, speakers, amps, and mics. Barry Nadel, POB 29303, San Francisco, CA 94129. museumofsound@earthlink.net

WANTED: Manuals, manuals, and 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: Stancor/Chicago PCC200, PCO/PSO150, 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: 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: 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: Collins 310B3, basket case OK - welcomed; & Chicago 500W CMS-2, high-level modulation xfmr; Taylor T21. Jerry, W8EGD, CO, 303-979-2323

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: 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: Searching for RME CT-100 or 3R9 xmtrs and info about them. David Edsall, W1TDD, 156 Sunset Ave., Amherst, MA 01002. 413-549-0349, dedsall@crocker.com

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

WANTED: Orig Heath manuals for ham & test equip. Please state condx & price. Warren, K1BOX, NC, (828) 688-1922, k1box@arrl.net

WANTED: RCA 140,141, AVR5A. GE K80, K8OX, K85. Any condx. James Treherne, 11909 Chapel Rd., Clifton, VA 20124. treheme@erols.com

WANTED: ARC-2, ARR-7 and ARR-15 racks; BC1387 for BC-611; whip antenna for PRC-124. Joseph Pinner, KC5IJD, 818 Hill St., Kingston, TN 37763. kc5ijd@bellsouth.net

WANTED: WW II German, Japanese, Italian, French equipment, tubes, manuals and parts. Bob Graham, 2105 NW3Oth, 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, billrobb@net-link.net

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

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

WANTED: Tektronix memorabilia & promotional literature or catalogs from 1946-1980. James True, N5ARW, POB 820, Hot Springs, AR 71902. 501-318-1844, Fax 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: DC ammeters, aircraft instruments, panel meters; meter books & gauge catalogs; photos of meters & control panels. Chris Cross, POB 94, McConnell, IL 61050.

WANTED: Service manuals, originals, and copies for copy of HP 3330B, HP 3582A, and HP 11710A. Will pay ALL exp. and more! Reinhard Wieschhoff, 7 rue du Debuche, F-78120 Rambouillet, France. Tel/

The Collins Video Library

The Collins KWM-2 Video (4 hours, $89.95) Highly detailed video on operation, rebuilding, alignment, troubleshooting, and neutralization of this classic! A must for anyone who owns and operates a KWM-2 or 2A. Printed documentation included.

The Collins 75S-3 and 32S-3 Video (3.5 hours, $74.95) An excellent in-depth examination of the most popular version of the S-Line equipment. Operation, modification, alignment, neutralization are covered and more! Much of this information applies to all versions of the S-Line!

The Collins 30L-1 video (1 hour, $74.95) This is a complete guide to the 30L-1 amplifier. Topics covered are operation and safety, updates, and a discussion of the classic 811A triode. Learn the secrets to greater performance.

The Collins 30S-1 video (1 hour, $39.95) Finally, here is the one everybody has wanted! This extraordinary video describes operation and user safety, maintenance and modifications of this classic Collins powerhouse amplifier. Very informative--truly a must for all 30S-1 owners. Complete with printed documentation.

The Collins Amateur Radio Radio Eqipment Video Spotter's Guide (1 hour and 40 minutes, $24.95) Close to 90 individual pieces of Collins Radio equipment are shown in the video. Examples of some of the gear covered are: KW-1, KWS-1, 30K-1, 20V-3, 75A-4, KWM-2, S-Line, KWM-1, 30S-1, 30L-1, KWM-380 and much more. Study up before that next hamfest!

The Collins KWS-1 Video (2 hours, $39.95) This video is the perfect companion to the 75A-4 video for owners of the "Gold Dust Twins"! Butch Schartau (K0BS) shows you how to operate, maintain and repair your KWS-1. Watch as Butch goes theough the entire alignment and neutralization process, as well as showing you how to properly operate this famous transmitter.

The Collins 75A-4 Video (4 hours, $89.95) This video is four hours of great information on how to repair, maintain and restore this classic receiver. Butch Schartau (K0BS) guides you through all aspects of keeping your 75A-4 running like a top.

R-390A Video (7 hours, $109.95) At last it's available! Long awaited by serious "boatanchor" enthusiasts this is a great video all about the ultimate receiver. Now you will have the ultimate video to go along with it. R-390A expert Chuck Rippel (WA4HHG) covers an absolutely incredible array of information in this "heavy duty" video. This video looks at operation, the receiver modules, complete circuit description, front and rear panel details, complete mechanical and electrical alignment, PTO details, and performance evaluation, modifications, troubleshooting, and restoration. There is nothing like this video available today, at any price!

R390A Addendum Video ($49.95) Another 3 hours and 40 miutes of R-390A information from Chuck Rippel (WA4HHG).

SP-600JX Video (4 hours, $89.95) In this video, Chuck Rippel takes us through all aspects of SP-600-JX servicing including repairs, restoration and modifications. This video is a must for any new owner needing to work on the SP-600.

All videos are now available in PAL versions!
Purchase three or more videos and get 10% off of the retail price!
Add $5.95 each for the first two videos for shipping and handling in the USA, additional videos are shipped free.

Produced by Floyd Soo, W8RO (ex-KF8AT)

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RCA HB-3 Tube Handbook - $75.
RCA Radiotron Handbook, 4th Edition - $62
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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

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Fax: 00331304111 02

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. McFadden 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 antennas AT1O1, AT1O2, GRC-9; Bendix ATD tuning unit Type CRR 47211, 9050 to 15800 kcs; Gas engine generator UPG-12 (GRC-109) KA1ZQR, 348 N. Main St., Stonington, CT 06378.

WANTED: Gonset G-76, Valiant II, Yaesu FTdx400, Hammarlund HX50A, Phillips 777 Automotive Short Wave Radio. KB0W, 916-635-994, frankdellechaie@sprintmail.com.

WANTED: National SW-3 model, version 3. Uses

32-32 30 tubes. Dean Showalter, W5PJR, 72 Buckboard Rd., Tijeras, NM 87059. 505-286-1370

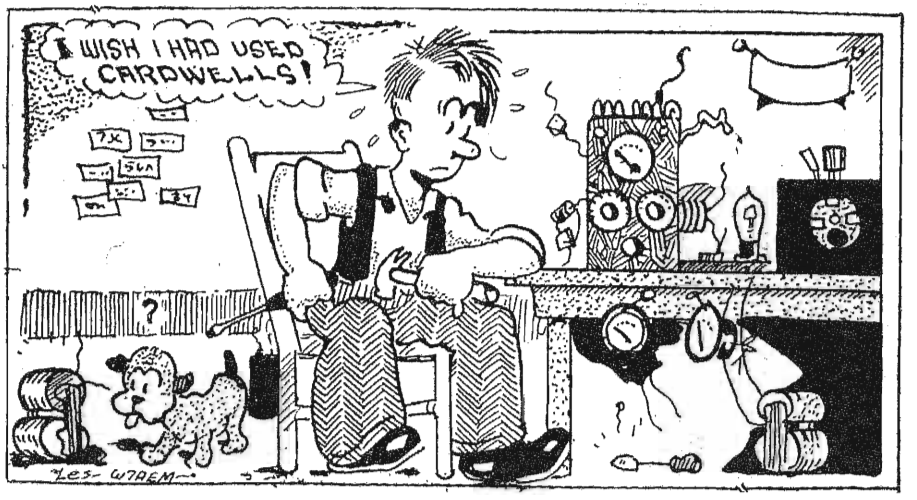
WANTED: Collins 32V& Collins 75A series; Globe Scout; National SW54. KBØW, CA, 916-635-4994. frankdellechaie@sprintmail.com

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

WANTED: SB 110/ps (Heath 6 meter transceiver) Bob Speckhals 1-507-331-5103 WBØDMC

WANTED: Parts to complete AN/ARC-59 RDF system for ER avionics article: Need MT-1913/ARN mount base; cable assy ARC-17984 or ARC-18637. Please call or email Ray, NØDMS at ER: 720-924-0171, ER@OfficeOnWeb.net Thanks to all who have responded!

For Sale: Knight "Star Roamer" SW Receiver, $40; Knight R-55A Receiver, $75; Realistic DX-120 Receiver, $55. Mike Grimes, K5MLG; 3805 Appomattox Cir; Plano, Texas, 75023, (972) 867-6373.Email:grimesm@flash.net



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