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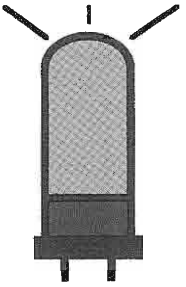
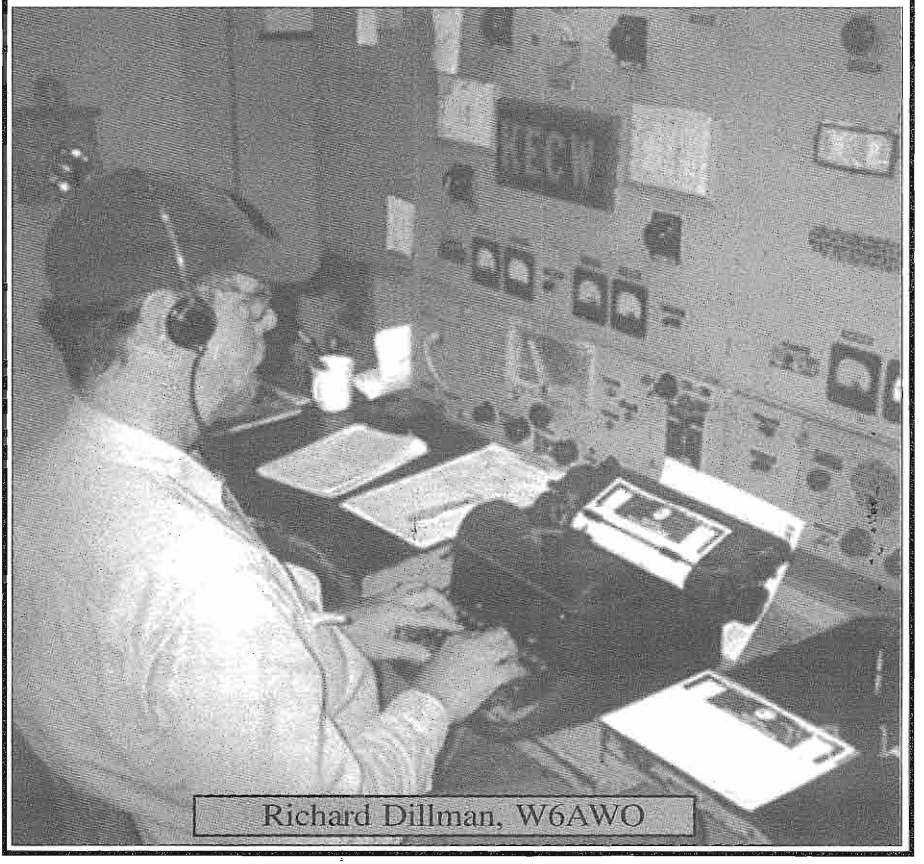


ELECTRIC RADIO

celebrating a bygone era

Number 161 October 2002



Richard Dillman, W6AWO

ELECTRIC RADIO

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Barry R. Wiseman, N6CSW

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 .

Editor's Comments

After reading Barry's column for all these years, I must say I find it a little strange to be the one who is doing the writing. Before anything else, I would like to thank Barry for starting Electric Radio Magazine and having the perseverance to keep it going. Like everyone else, I could hardly wait for the middle of the month to roll around when a new ER issue would be waiting in my mailbox. Finding it was like a breath of fresh air on a new morning. I doubt that many readers realize the personal sacrifices Barry and Shirley made in order to start the magazine. As your new Editor, I consider myself to be a caretaker of Electric Radio, and I intend to work hard every day to bring you the best in vintage ham radio and radio history. I am totally committed to the AM community, I am a member of AMI, and I expect ER to continue reporting on vital regulatory issues having to do with AM and the operation of vintage equipment. I also support CW operators and shortwave listeners. Hopefully, ER will outlive us all and will be enjoyed by a whole new generation.

I am 52 years old, and I have had my ticket since 1981. I came into ham radio from the SWL ranks. That's where I began to learn electronics by building accessories for my Hallicrafters out of the ARRL handbook from scrounged vacuum tubes. My Father was a geologist, and through his work I was able to meet electronics engineers who inspired me in engineering. There is no ham radio tradition in my family; I'm the only one. When I was a kid, I was fortunate to have a cranky old Elmer from whom I first learned of the rich history of radio and the contributions of telegraphy. He "insisted" that I spend a few years on the railroad after high school graduation, which I did. It wasn't until much later that I realized what good advice that was. My location now is in the Platte Mountains near Bailey Colorado, which is about 40 miles southwest of Denver, or about 300 miles northeast of Barry's house. I've spent 19 years working in telecommunications engineering for a utility company in Colorado, where I was responsible for radio system design

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Electric Radio Lives!

Farewell to its Progenitor and Fair Thee Well, Mr. New Editor

by David Olsen, W6PSS
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Ramona, CA 92065
W6pss@aol.com

From its humble beginning in a farmhouse over a decade ago, Electric Radio magazine has become a preeminent publication to a vast readership of radio lovers and hobbyists.

To would-be entrepreneurs, ER is living proof that one can make it too if he has a dream with that frontier spirit and passion that made America great.

Barry Wiseman and wife Shirley possessed such wonderful qualities. Perhaps some were innate and others learned. Barry confides that first few lean years were plagued with thoughts of giving up – "Just chucking the whole thing and trying something else." After all, they had a family to grow. But they persisted.

Oh, how happy they made us!

About the dream: Barry contacted a handful of amateur friends that included Leo Meyerson. They all shared his dream. His late night call asked: "What do you think about a radio magazine that talks about old radios that glow in the dark – one where people who lived then can share their recollections using this magazine as their forum?" Such a magazine too would cater to radio lovers, radio hams and hobbyists.

Subsequent phone calls asked: "Do you think ELECTRIC RADIO sounds corny as the title? How about a brief mission statement like, "Celebrating a Bygone Era? Will that fly? And, how 'bout a logo that resembles a UX199 giving off a glow?"

These were some of the thoughts that fueled Barry's dream and brought a World Class magazine into fruition. These ideas have indeed made ER the unique and prestigious publication that it has become.

"Celebrating a Bygone Era," has become the mantra of all who proclaim the essence of this magazine. Perhaps here lies the appeal to the many readers. Don't most of us each identify and celebrate our own personal bygone era? How many times have you thought about the boy or girl you used to be? Many times Barry has transported us back with cover pictures of very young amateurs beaming idealism.

Included were several of our dear senior amateur friends – some of whom have passed on.

Listening across the ham radio bands, one often hears, "Barry this and Barry that", as if they were personal friends of his. Some might be but that Ed's personal touch each month helps fortify the feeling. Indeed, many of us feel part of a vast network of "Radio Bugs" all requiring our monthly diet of ER.

We are grateful for the gift of Electric Radio. Thank you Barry! Thank you Shirley! God speed your continued good health, happiness, leisure and above average grandchildren. We are looking forward to your on-air presence in coming years. Thanks too for providing Ray your kind assistance in maintaining necessary continuity.

...._.-_ **[continued on page 35]**

A Vintage Communication Weekend on the S.S. Lane Victory

by Dennis DuVall, W7QHO
1524 Princes Dr.
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w7qho@aol.com

and Richard Dillman, W6AWO
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San Francisco, CA 94110
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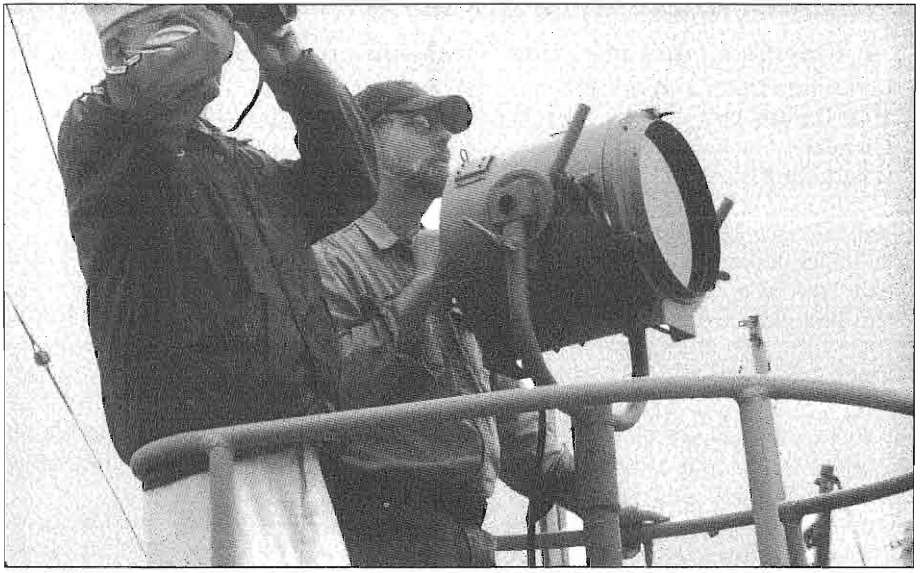
The S.S. Lane Victory, berthed in San Pedro, CA, is the world's last operating Victory Ship (see ER # 127). One of the more interesting activities undertaken by the ship and her crew is a summer excursion program involving six one-day cruses, two each in July, August and September. The ship leaves the dock in San Pedro between 0830 and 0900, steams across the San Pedro Channel to Santa Catalina Island, skirts the North coast of the island and returns to San Pedro typically arriving by 1600. During the cruse, up to 800 passengers and guests enjoy tours of the ship, a live band, and a mock air attack by "Nazi" bombers and other activities.

The ship is required to have a licensed Radio Officer (RO) on board during cruses and we usually sail with a second RO if a volunteer is available. The Lane Victory Amateur Radio Club also operates the club station as W6LV/MM during these sailings and is typically covered by two members who

Dennis DuVall (W7QHO) on the BC-441 at Fort McArthur



Mr. Bigelow, a uniformed Armed Guard and WW2 Navy veteran, with Richard Dillman operate the port signal light.

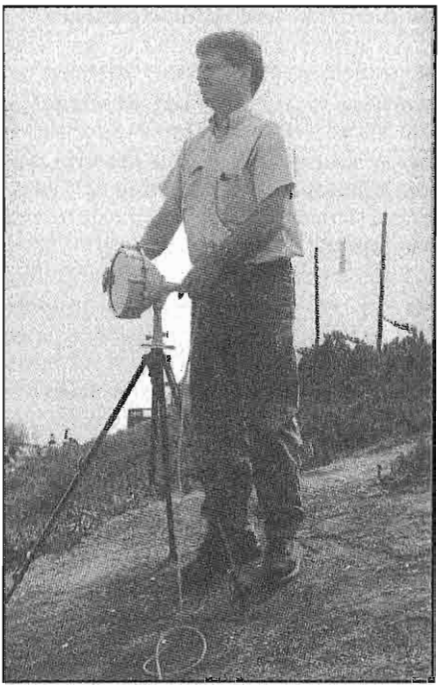
also travel as part of the ship's official crew. This year's August outings took place over the weekend of the 14th and 15th and communication activities were focused on the operation of vintage equipment and modes of operation.

Equipment

The Lane Victory's original WW2 radio system, an RCA Radiomarine 4-U, is completely functional and the ships marine license is still current, even though neither the MF or HF frequencies covered are in current operational use in the Western hemisphere. In recent years operation has been limited to occasional special event contacts with KPH, the former RCA coast station north of San Francisco. KPH is now restored and operated by the Maritime Radio Historical Society as part of the Point Reyes National Seashore. We also use the 4-U on the 80, 40 and 20-meter ham bands on occasion. CW output is 250 watts.

We also had Ft. MacArthur's BC-441 on board again, to replay the fort-to-ship communications exercise mounted two years ago (see ER #127). This rig is essentially a Hallicrafters HT-12 marine radiotelephone from the late1930s which the Army drafted at the start of WW-2. It was used for communication between Ft. MacArthur and vessels operating in the San Pedro Channel. This equipment was also installed in shore stations on Santa Catalina Island and elsewhere along the coast. The BC-441 was operated from the ham shack this time around on 1950 kHz using the ship's original 150-ft. "emergency" antenna. The antenna was end-fed through a modern SGC automatic antenna tuner.

We included a Heathkit Apache paired with a Hammerlund HQ-180 operating out of the ham shack for the first time. This setup was tuned up on 40M and running into a trap dipole strung between a pair of the Ship's masts. This rig was included primarily to check in with a CA/AZ AM group



On shore, Bart Rowlette (WB6HQK) calls the Lane Victory on his authentic portable signal light

on 7293 kHz, meeting on Saturday and Sunday mornings.

Finally, the ship's original port and starboard signal lights are in good working order and we wanted to give them a try. We have successfully used them at night from the dock, but a daytime ship-to-shore attempt during a previous cruse had been unsuccessful.

Operations

Over the weekend the ship was fortunate to have Richard Dillman (W6AWO) come down from San Francisco to sail as our second RO (see above). Richard, a member of the Marine Radio Historical Society (MRHS), played a pivotal role in the restoration of a Radiomarine 4-U which is now a featured attraction at the San Francisco Maritime Museum. More recently, Richard has been heavily involved in the KPH restoration effort.

Activities began Friday evening with Richard and Bart Rowlette (WB6HQK) reviewing signal light procedures and protocols. This was followed by a practice session with Richard on the ship's light and Bart at the other end of the shoreside parking lot with his portable signal equipment. Next, Richard and Jay Flynn (WB9AWX) fired up the ship's original Mackay direction finder and spent some time taking and plotting bearings on the few remaining beacons in the area. The above deck RDF loop antenna on this equipment is pointed from down inside the chart room with a control the size of a steering wheel.

Saturday

The Ship starts loading passengers at 0700 and leaves the dock at approximately 0830. In Richard's words:

"Things began early on Saturday with the passengers coming aboard and breakfast being served. The food throughout the cruise was excellent. Soon the harbor tugs came alongside and we were on our way out of the LA/Long Beach harbor and into the open sea. As I took my position in the radio room I thought I could feel just a small part of what it must have been like in the late 40s when this ship was part of the great Allied fleet. Departures then probably did not have the carefree air of this voyage. The men aboard then had no guarantee they would ever return but all of them did what was *expected of them and more despite the danger.*"

Tom Grove, K6LQI, was the primary operator in the ham shack on Saturday. He checked in with the 40M AM group with the Apache on Saturday morning, just as the ship was clearing the harbor. Stations worked included W1ZD, W6BCN, KO6SM and myself (W7QHO)

operating portable from Ft. MacArthur on a GRC-19. The equipment worked well except for a bad speaker on the HQ-180. W6LV/MM received good reports. Unfortunately, near the conclusion of the gathering, Tom received a report he was getting into one of the ship's PA systems, a reoccurring problem the club has encountered over the years.

At mid morning Richard fired up the 4-U to keep a schedule with KPH:

"I prepared to put the ship's original 4U console on the air by throwing the switch that activated the big motor-generator in the base of the console. This unit runs on 120VDC ship's power and supplies the high voltage and filament voltage for the HF and main (MF) transmitters. We had arranged for KPH to be on operation and I worked Denice (DA) at KPH on 4 and 6Mc and on MF. I sent DA the traditional QTO report and signed the message with a 73/88. Denice was the first female operator hired at KPH. Later we exchanged DH messages of greetings with DA rocking along on her chrome Vibroplex and me copying on the mill. One of the messages was addressed to the captain. I brought it to the bridge (on a correct RCA message form of course). He initialed it to indicate receipt and gave me a message in return which I filed with KPH. It was almost like the old days!"

At 1400 we called W6LV/MM from Ft. MacArthur on the museum's BC-669 and Tom responded immediately with the BC-441 from just off the northern coast of Santa Catalina. We were both operating with big antennas this time around, and at a distance of only 18 miles over salt water, full quieting was experienced on both ends of the link. The ensuing interchange was played to interested visitor audiences on both sides. Several young people were given the opportunity to talk over the circuit and appeared to be excited by their first live radio experience.

At approximately 1530 as we were approaching the harbor, Richard attempted to contact Bart Rowlette on the shore with the ship's port signal light. Unfortunately this attempt was unsuccessful, primarily due to a misunderstanding on Bart's location and the landmarks involved.

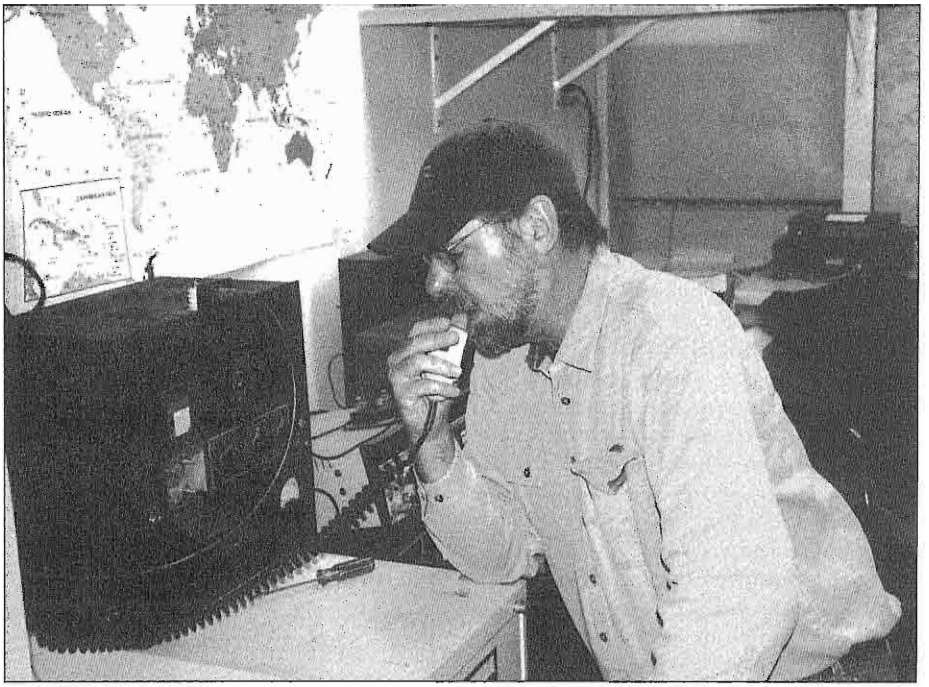
Later on that evening, Richard fired the 4-U up again in an effort to work KPH on MF. Contact was established with the ship on 480kc using A2 emission and KPH answering on 426kc.

Sunday Operations

I was riding in the ham shack on Sunday and my first activity was to check out the interference problem experienced the day before with the Apache. Sure enough, I was coming in loud and clear on the band's sound system. Grounding their amplifier chassis, which had helped with other equipment in the past, resulted in no improvement so I reluctantly shut the Apache down and used the club's TS-940S in the AM mode instead. At a power level of only 30W (vs. 120 for the Apache) no further complaints were received. At 0900 I checked in with the 40M-morning group again, but participation was down that day and the round table broke up fairly quickly.

At 1400 we repeated the Ship to Ft. MacArthur connection on 1950 kHz, with good audience participation again. Bart (WB6HQK) was manning the BC-669 on the shore end this time around. Bart and Richard also used this link to coordinate another signal light try which took place an hour later as we approached the breakwater at the entrance to the harbor. Again, in Richard's words:

"Up on the flying bridge I used the blinker lights to communicate with a shore station Bart Rowlette, WB6HQK, set up at the LA/Long Beach Marine Exchange. My first message was AIR



Richard Dillman operates the Fort McArthur BC-441

RAID PEARL HARBOR THIS IS NO DRILL. Not something I would send by radio of course but I figured the blinker light had a low probability of intercept! A high point of my blinker light experience was meeting Mr. Bigelow, a genuine WWII signalman and member of the Armed Guard (see picture). I think he enjoyed the fact that a "youngster" such as myself was so *enthusiastic about using this arcane mode of communication."*

Richard also made several 40M contacts with the 4-U during the cruse using a 7010 crystal operating "straight through." This provided specified grid drive to the transmitter's 813 PA tubes at rated output. Subsequent SWL reports from W6DJX and others indicated superior keying characteristics and CW note when the rig was operating in the marine bands (see above). The transmitter is specified to operate 1900 to 24,000 kHz using crystals in the 1500 to 3000 kHz range. This is multiplied by a factor of as much as 8X to reach the highest output frequencies. All the 4 and 6 MHz marine contacts were made with a 20xx kHz crystal and we will try to use the older, thicker "rocks" exclusively in the future.

All in all it was a great weekend. To let Richard sum it up:

"This was all great fun but it made me think of the real purpose of the restoration projects of the MRHS and aboard the Lane Victory. That purpose is historic preservation. Our aim at the MRHS is to restore and preserve the artifacts of our great maritime radio heritage and in the process honor the men and women who dedicated their working lives to maritime radio and made it an honorable *profession."*

ER

The W3F Story

by Paul Courson, WA3VJB
Box 73
West Friendship, Md, 21794

WEST FRIENDSHIP, Md.) - The direct descendant of the famous GaithersburgHamfest in Maryland was inaugurated in fine style in September with an AM Festival Station featuring a classic receiver and a formidable vacuum-tube homebrew transmitter.

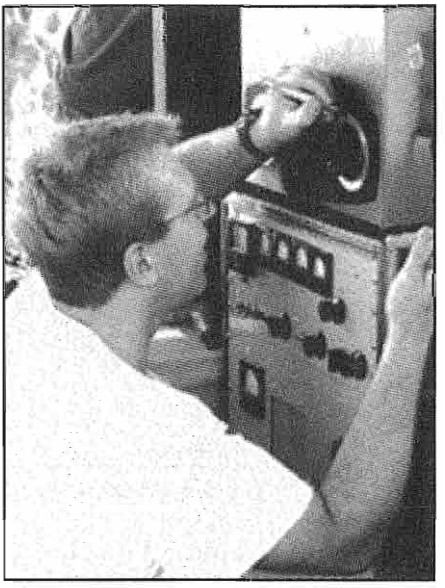
Operating with the special event call sign W3F at a new location for the "Fall Fest" co-sponsored by the Foundation for Amateur Radio, those gathered continued a tradition dating back to 1994, when the hamfest organizers invited the AM community to establish a station to demonstrate classic radio at a major regional hamfest held for nearly 50 years at the Montgomery County Fairgrounds.

Each year since then, an AM Festival Station has been a showcased part of this hamfest, including now its move to the Howard County Fairgrounds. Passers-by, hearing the warm and inviting sound of high-quality audio, stopped and reminisced about, or in some cases, got their first introduction to the specialty of using Amplitude Modulation on the shortwave ham bands.

Logistics Planning

Over the years, a system of careful equipment planning and advance site surveys has helped guarantee the on-air success of the AM Festival Stations With a new location this time, such preparation was all the more essential. A few days ahead of the hamfest, several of us went out to the site to reconnoiter and determine the best location for a station.

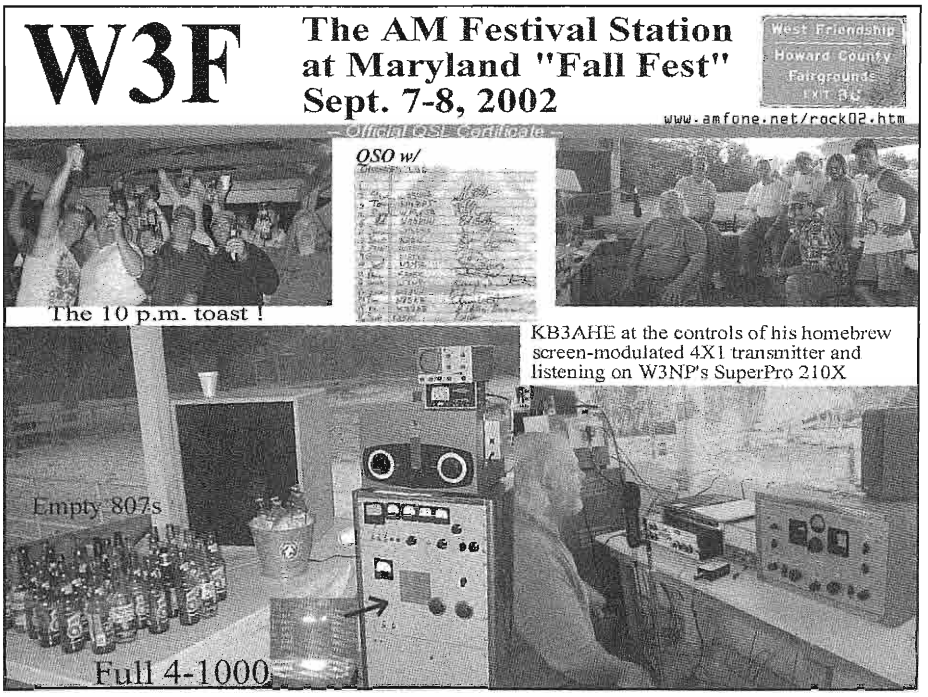
We quickly settled on an area that presented the best electrical power and



Steve (WB3HUZ) carefully marks the best settings on the Johnson Kilowatt Matchbox

the best trees for antennas. But, it turns out the location may not have been available to us, as we learned the fairgrounds proprietor had also rented the site to a second group - a dog show - whose participants may also be interested in the trees and grass.

Our second choice was an area quickly dubbed "The AM Corral." The features include a small judging hut on stilts overlooking a dirt ring where horses and livestock are shown during agricultural events. The hut was judged substantial enough to hold a transmitter, receiver, audio gear and the AM crowd likely to congregate at the scene. The structure was open on the sides, but a roof promised some shelter if it



The Official W3F QSL cards which was sent to AM'ers lucky enough to work the station

were to rain.

It should be noted that the "corral" concept actually dates back at least 30 years to gatherings of AMers at the famous Deerfield hamfest in New Hampshire, sponsored by Hoss Traders. It was at that location that an existing campsite area was dubbed "The AM Corral" and became known as the place to look for people from the strong AM contingent populating northeastern states.

Pacing off the corral, we determined that the trees bordering the fenced area were about 100 feet apart, or just about the right distance for an open-wire fed doublet we planned to hoist aloft, tuned with a Johnson KW matchbox for the intended 40 and 75 meter operation. With bow-and-arrow, it took only three shots to place two ropes about 50 feet in the air on each side. The light weight of the antenna and feedline ensured we would get good overall height when the ropes were pulled taut.

We were skeptical about the quality of electrical service to the hut, but saw easy ways to run our own AC bus from a service box if need be. As it turned out, the supply was adequate.

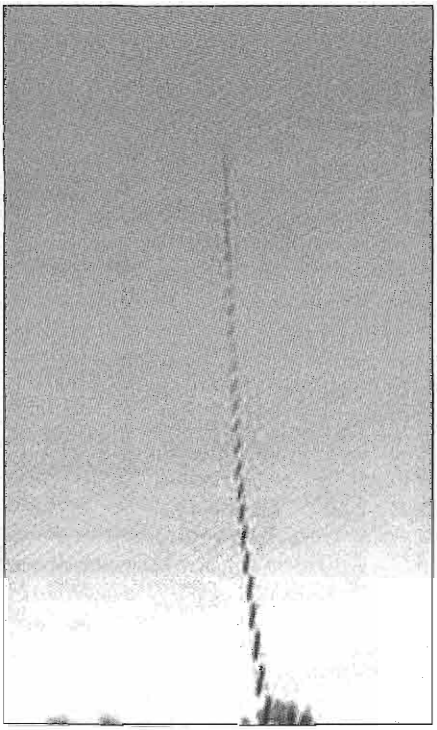
Fire it up !

Frank, KB3AHE brought to the site from Baltimore his homebrew 4-1000 transmitter, screen modulated with a pair of 2E26. This transmitter is heard nightly from his home on the north side of Baltimore, and always draws good comments. He has brought it the past couple of years to this particular hamfest during a temporary re-location at a baseball field in Bowie, Maryland.

Elaborate audio processing and a hi-fi condenser microphone open up the "sound" of this rig to convey the natural, full-sounding qualities of the human voice. This philosophy worked

well with the variety of voices serving as "guest ops" on Frank's rig, all of whom remained recognizable because the audio was enhanced instead of constrained as with communications-grade audio.

The receiver came from Dave, W3NP, who traveled from his home in Ft. Ashby, West Virginia to join us in the advance planning as well as for the hamfest weekend. The Hammarlund Super Pro 210-X was an excellent performer, both in fidelity and in ease-of-tuning. The receiver output was fed into a Bogen audio amplifier, which in turn drove an Altec loudspeaker used in commercial sound reinforcement. Al Brown, KZ3AB, a hamfest official and AMer, had the great idea of using this speaker to shoot toward the hamfest promenade, so that it could serve as an audio billboard promoting the station and inviting folks to stop by. During overnight activity, the receiver's 6V6 output was plenty to power a couple of high-fidelity home stereo speakers at the radio hut.



The W3F 120-foot flattop Skyhook

After nailing down the open wire feedline and putting up a few safety ribbons to keep people from walking into it above ground level, we flipped the switches and found good reception and a good transmit match. We were ON THE AIR!

The AM Community

I've been licensed for 30 years and I never have seen in "mainstream" amateur radio the high level of social exchange and long-term friendship seen among AMers. The stations established at hamfests have included overnight on-air activity that really seems to leverage this sense of community.

About ten years ago I hosted a small gathering of AMers at my home near Annapolis. I wired and placed a mixing console in the family room, with remote control to the radio room so that my guests could operate my station during this little party. One of us, Gary (N2INR) came up with the idea of a 10PM "toast" of our friendship, and the proceeding became known as "Rolling Rock Hour" to slightly honor the favored brew, but mostly to lend pomp and circumstance to the festivities. The clinking of the bottles, as delivered in hi-fi, was heard and appreciated by those on the airwaves during the QSO.

Bruce (KG2IC) responsible for helping organize several hamfest vintage AM stations at Dayton and at Rochester New York, came up with the name "AM Festival Station" to distinguish our type of operating from the mundane, SSB-oriented "special event station." Combining this concept with the celebration of a 10PM toast has since become recognized as a "Rock Event,"

The W3F operators, L-R: Frank (KB3AHE), Paul (WA3VJB), Steve (WB3HUZ), Dave (K3ZRF) standing, Gary (W2INR) sitting, Gary (AA3WH), and Fred (K2DX). Well over 100 stations on 75 and 40 meters were worked in less than 24 hours of the special operations.

as declared by the organizing participants from time to time.

So it was with great anticipation both on the air and at the hamfest site that we operated Saturday afternoon and on into the night.

Lighting up the Aether

Frank's rig is powerful, but we all were surprised to see that the skies were lighting up at night with a dull red and green glow to the north and northwest. It turns out aurora borealis, and not Frank's transmitter, chose this particular night to ignite the upper layers, ruining radio reception for a while but creating a great show. During this flare up, the station was informally put on stand-by and we moved back to the camping area where Joe (N2YR) cooked us a delicious garnish of homegrown hot peppers for a combination of Koni Dogs (an upstate NY specialty brought by W2INR of Syracuse), hamburgers and other dinner fare cooked on a charcoal Weber Kettle I brought in the enormous trunk of a 1964 Buick Electra that my grandfather bought brand new. It's the best possible car to carry big old radios, too.

We had operated on 40 meters most of the day Saturday, holding down a frequency around 7285 kc for hours and hours as people up and down the East Coast and toward the Midwest checked in to work AM Festival Station W3F. Some folks we spoke with expressed regret they couldn't be with us, but we said it was just as good that there were still some people at the other end to talk with!

The station received consistently strong signal reports throughout the region.

We credit the height of the antenna and the tuned open-wire line, plus an orientation placing the broadside lobes right into the most populous AM territories of the country. With that kind of

height we suffered no RF problems with our audio chain on transmit or receive; moreover, there was no interference with the public address system at the fairgrounds.

In the past we tried coax-fed doublets, but these proved problematic for two main reasons - limitation to a single band, and a loss of height caused by the weight of the type of coax needed for a high power station. Consequently, for the past few year we have exclusively used open wire line with great success.

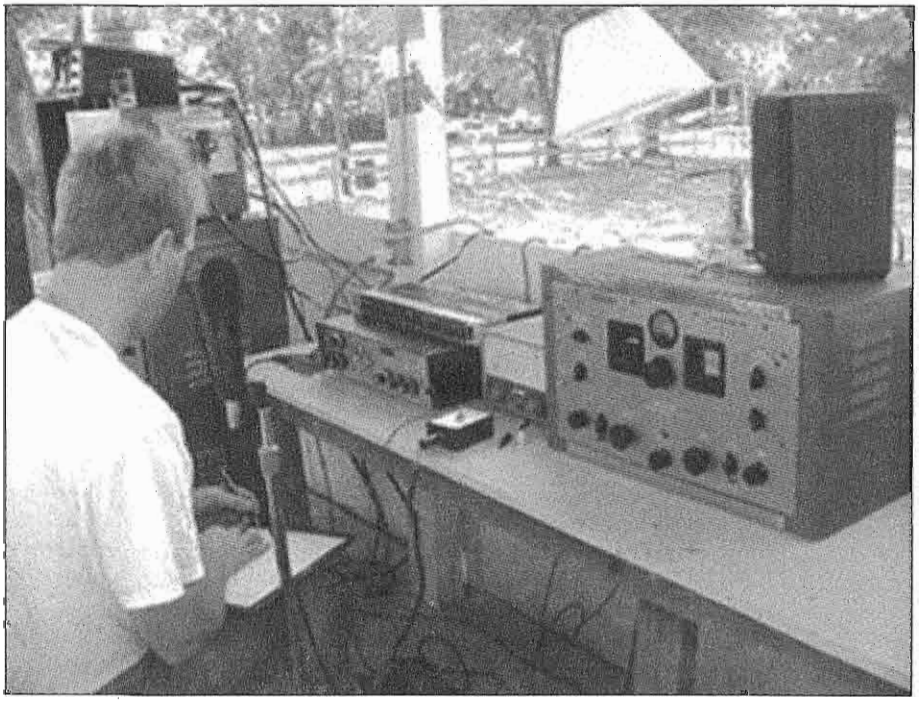
Promotion & QSL

The internet has proven to be an excellent way to draw attention to proposed AM Festival Stations.

From AM "reflectors" to bulletin boards to direct email, people are recruited to take part on the air and show up at the hamfest itself.

Some of the locals were able to do both - working the station daytime, then coming to the hamfest site Saturday night to hang out with us. The website address you see at the top of this story contains a multitude of pictures and sound files to fully document W3F as an AM Festival Station. A souvenir verification certificate provides some wallpaper for people to enjoy.

ER



Another view of the operating position showing the classic Hammarlund Super-Pro 210-X

Other AM'ers who stopped by included L-R: Howard (W3HM), Dave (K3ZRF), Charlie (K3YA), Joe (N2YR). and Gary (W2INR)

Last but not least, the swapmeet goodies!

Radio Service in the Golden Age 1930's through the 1950's

by Bruce Vaughan, NR5Q
504 Maple Drive
Springdale, AR 72764
NR5Q@AOL.COM

Episode No. 17

"Frank and Norman"

My number one problem in running a radio and TV repair business was finding good 'bench men.' While there was never a shortage of those who applied for a job as a radio and TV repairman, the truth was that not one out of twenty could do the job. My standard pay for repairmen was either an hourly wage of about twice the minimum wage, plus 20% of their total labor charges, or a flat commission of 60% of their total labor charges. Most choose the first because they could not repair enough sets in a week to earn grocery money.

I received a call from a local employment agency about 1:30 PM. "Mr. Vaughan, this is the 'Acme' Employment Agency. We have an experienced television repairman who wants to relocate to this area. If you are in need of skilled help I could have him drop by at your convenience."

I told the caller that I was, indeed, in need of skilled servicemen, but that my experience with applicants who had to resort to employment agencies for assistance in getting work had not been very good. I assured her that I meant no offense to her, or her agency, but that we were a busy shop with a good reputation, and that we did not need repairmen who could not deliver.

"Is there any way you would consider interviewing this young man this afternoon," she asked. Apparently my words of discouragement did not work on this young lady.

"Sure," I replied, "send the fellow on up. I'll be available all afternoon."

"Would 4:00 PM be convenient? If so I'll have him at your shop at promptly at four this afternoon."

Good enough," I replied, "just tell him to ask for Bruce."

Promptly at 4:00 o'clock I watched as a nice looking young man about 28 years old, stepped from a battered old Chevrolet sedan and enter my front door. I decided to intercept him before one of the floor salesmen got to him. After the usual introductions I suggested that we go next door to the 'Dairy Delight' store and discuss our business over a cup of coffee. I was never one to miss a chance to take a break from work.

Frank ordered a glass of orange juice—I had my usual black coffee. As we sat visiting and getting acquainted I was sizing up my prospective employee. He had on a pair of jeans, and a snow white, starched and ironed, white dress shirt. He seemed well educated, and his gold-rimmed glasses seemed just right for his slightly 'chubby' build. He told me of places he had worked, but I did note that he offered no written recommendations of any kind.

Frank told me he had gone through a rather messy divorce, and that while

he had custody of his little girl he was actually doing his best to evade his former wife. He felt she was going to try to regain custody of his child—legally or illegally. His home was in the northern part of the country, and he had moved south to a place he though would be difficult for her to find. He also told me he was an active member of a religious order that did not drink coffee, or any drinks that contained caffeine.

At this point I had mixed emotions. He seemed to come across well. His personality was good. He seemed truthful. However, there was the possibility his ex-wife might cause trouble at any time. Also I was somewhat concerned that he might border on being a religious fanatic. I had to make a decision based on nothing but a brief conversation over a cup of coffee.

"Frank," I said, "Please understand my problem here. I really know nothing of your ability, other than what you have told me. You do have some problems that might cause both of us trouble at any time. That is the down side—here is the positive side. I do need a good bench man. We have more work that we can possibly do. I like your appearance and your personality. I am prepared to make you the following offer. I will pay you $2.50 per hour, time and a half for overtime. No limit as to the overtime you can put in. I will also give you 20% of all your labor charges. I will pay weekly. If you put in a few hours overtime and can do as well on the bench as I can, you can make about $250.00 per week. If you can't produce, you will make much less. (Please keep in mind that the minimum wage at this time was $1.65 per hour)

Frank accepted the job. "I'll be at work when you open in the morning," he said. "What are your shop hours?"

"We open at 7:00 AM and close at 6:00 PM. We use a time clock in the shop, and most of the repairmen check in around 8:00 AM—but that is entirely up to you."

"I'll be here at 8:00 AM in the morning. I am staying with friends—they live about 20 miles from here. I think if I left any earlier it might be inconvenient for the family."

When Frank arrived the following morning I had a bench all cleared off for him. We had plenty of test equipment. Each bench had a RCA dot and bar generator, a VTVM, tube tester, and signal generator. Two scopes were available as well as numerous gadgets needed for service at the time. After introducing Frank to all the boys in the shop I assigned Dennis, my 'Ozark Mountain Man' repairman to help Frank become familiar with the shop, then I returned to my duties in the office, and on the sales floor.

I noticed that Frank went to work immediately organizing equipment and tools in a manner convenient to him.

Our shop was far different from the efficient repair shops of today. It grew from a one-man shop where visitors were always welcome, and we were never too busy to visit with friends. Our coffee pot was always warm, and usually there was some donuts or cookies on the coffee table. The floor was concrete and spilled coffee just added a nice brown color to the usually messy floor. Somehow, we never learned to run a clean-cut, no nonsense, play by our rules business. Customers were allowed in the shop, and welcome to pull up a stool and watch us work on their equipment. I know this sounds weird today but that is the way we operated. As far as 'down-home' business establishments went, we wrote the book. Frank took to this type of environment like a duck to water.

Shortly after he arrived that first day I heard a customer enter the shop through our back door. "I have a TV that needs fixin', he said. "Is there any

chance I can get it before the weekend?"

Such a question was generally answered with pessimisms, and negative answers. I heard Frank say, "My name is Frank. My bench is all cleaned off and ready to go. Why don't I help you get the set in the shop, and I'll see if I can't get you fixed up right away."

I watched from what I hoped was a concealed vantage point as Frank and the middle aged gentleman carried a 21-inch RCA table model TV into the shop. After filling out a work order Frank went right to work and never stopped visiting with the customer. "Mr. Spears, how long have you owned this TV," Frank inquired.

"I bought it back in 53 or 54 I think," replied the customer. I could tell he was pleased with the polite conversation that Frank kept going as he checked out the sets operation. It was not a simple tube replacement job—the set had to come out of the cabinet. Some thirty minutes later I noticed Frank was making the final test of the sets operation. When he was satisfied the set was working correctly, he grabbed a polish cloth and some furniture polish and carefully rubbed down the Mahogany cabinet. Then he filled out the job ticket and brought it and Mr. Spears check to the office.

The customer seemed happy to pay the $44.00 repair bill, and I noticed he shook hands with Frank before he got in his pickup truck to leave.

By the days end Frank had completed a total of six repair jobs, at least two of which would have took any man in my shop several hours to trouble shoot and repair.

I went into the shop area and asked Frank to check with me before he checked out for the day. He came in the office about 5:15 and said, "You want to see me Bruce?"

"Yes, Frank, I seem to have made a mistake when I hired you. You never know what kind of ability a man has until you see him at work. Forget our arrangement we made yesterday. Your starting salary will be double what I quoted. If you can produce consistently the way you did today there will be another raise at the end of the month."

Frank did produce. He made friends quickly, and was by far the best repairman I ever had in my shop. Frank continued to get wage increases until he was making roughly double what my other repairmen were earning. If one of them happened to question the difference in salary I just pulled out the previous months job receipts and told them to compare what Frank was doing with what they were doing. If you want more money, learn more about trouble-shooting, and turn out more work. They all understood though some were envious of Frank's ability.

At this time I considered the repair shop a necessary evil. Our money was made in sales. I had to maintain a service shop to sell electronics. This was long before the days of discount houses, and dependable electronics. I would estimate that at least 20% of all new sets we unpacked required some service before the unit was ready to be sold. Once sold, we considered ourselves lucky if we made less than three calls under the standard warranty period. Our profit margin on TV sets was around 28%—more on top end merchandise, and less on 'leaders.' Without a shop we would have gone broke very quickly. A good year, profit-wise, was one in which the shop broke even.

With Frank in the shop things started running smoothly, and the shop turned a tidy profit. At the same time, Frank was pulling down quite a paycheck—more than I ever paid a repairman before or since. About 18 months after going to work in the shop Frank told me he was quitting. I was very unhappy to hear the news. I made him an offer that I never dreamed I'd make to

anyone else.

"Frank, the shops books are kept separate from the rest of the store. Take over the shop, manage it anyway you want, and keep ALL the profit. All I want is to have a shop to do my service on merchandise we sell. You can bill me out just as you do any other customer. You will have full control over the shop, and pay me nothing for the use of equipment. We will figure out a reasonable rent for the space and reasonable lease on the three service trucks."

"Sorry Bruce," replied Frank, "My ex is getting too close for comfort. I'm moving to the coast but I can't tell you where exactly. I have to keep moving."

Of course I had to fill the vacancy. Losing Frank was like losing two top mechanics. I placed ads in the local papers, the Tulsa World, and the Wichita Kansas paper. I received a number of applications. One was from a repairman in Dodge City, Kansas. I was so desperate that I called him and told him I'd drive up to Dodge for a personal interview. Now, this is no short hop from Springdale—it is not very short of 500 miles. I loaded up the family in the motor home and headed for Dodge. My prospective employee was working as a repairman for Western Auto in Dodge. When I arrived at the store I found he was the only repairman in their one-man shop. I introduced myself and he never stopped trying to converge a 21-inch color console. I was a little disappointed that he never bothered to give me five minutes after the 500-mile drive, but I was really in need of skilled mechanics.

His first question was, "How much do you pay?" My reply was, "How good a repairman are you?"

He seemed a little upset at the question. "I have a lot more business than we can do. You will never run out work. My last repairman was making over 500.00 a week when he quit. If you can do as well as him, you will make the same. If you do less, you will make less. If you can do more I'll pay more, but you have to be good to earn that much."

I explained that most of our labor charges were in the $20.00 to $30.00 range and that if you could repair five sets a day you would probably make the $500.00. I explained that this was not based on shoddy workmanship or half completed repairs—we expected no more than a normal number of complaints or 'kick-backs.'

I asked if I could look at his job tickets for the past week...he refused. He also turned down my job.

My next applicant was Norman, a man from Joplin, Missouri. Norman was in his early forties, married, with two children. He assured me he could hold down a job as a bench man. I was very frank with him and told him he would be wise to work at least two weeks before moving his family. "You might not like me or my shop," I told him. "Also, there is the possibility that you are not capable of doing the work—only you know what your true ability is."

He assured me that he could handle the job and agreed to come to work the following Monday. To his credit, he did show up for work on time. I had a small 17" black and white portable waiting for repair. It seemed to me to be a very easy job. The complaint was simply "no picture—no sound—no light on the screen." Every repairman knows this is normally the easiest repair job there is. An absence of power, whether it be the AC supply, or in the DC power supply circuit, is a job that should take no more than one hour at most. Norman started on the set shortly after 8:00 AM on Monday. I decided to leave him alone and see how long it took him to run down the problem. Wednesday afternoon (I am telling it like it is) he was still probing the in-

sides of the little TV with his voltmeter. The one thing he was doing correctly was probing with the red probe instead of the black one.

I stood it as long as I could. "Norman, you seem to be in deep trouble," I said. "What can be wrong with this set to take almost three days to repair?"

We had a 40-mfd filter capacitor with test leads attached hanging on the wall over the test bench. I picked it up and went around the power supply filters. The second one I tired did the work. The set came on with a rush.

"Norman," I said, "This was a 30 minute job. We cannot possibly charge the customer more than $20.00 labor, and about $4.50 for the capacitor. You have been on this set three days. Do you realize that it would have been cheaper for me to give the customer a brand new 17" TV, and throw his old one in the trash? Based on your performance so far, if I pay you $10.00 a week I am going in the hole. How in the world do you expect to support a wife and children as a repairman if you cannot repair a simple TV problem? My advice to you is get a lot more training and experience in electronics, or go into another trade." Harsh words, but some people just refuse to face reality.

Of all the headaches in running a business I found dealing with employees the most difficult. You will find this hard to believe, but the State Employment Bureau once sent me a repairman to interview who was legally blind. I was tipped off when he tried to enter our store, and had to feel his way to the door. I asked how he got to my store from his home in Fayetteville. He said he had his daughter drive him. Now, I certainly sympathize with the blind—losing one's eyesight is a terrible thing. My mother was blind in her later years, and my eyesight is becoming more and more a problem. However, I still do not understand how the gentleman or the employment agency, thought a blind man could hold down a job repairing TV and radio sets. You tell me.


ER

[Editors comments continued from page 1:]

and installation. After 6 years of corporate outsourcing, three major restructurings that cost hundreds of jobs, and finally big layoffs that included me, I decided I'd had enough and that I should look for a career change. Electric Radio Magazine is that change! Although I haven't been able to be very active on the bands while working at my former employment, I am looking forward to meeting many of you on the bands this winter. I would like to thank the many readers who have taken the time to call or write and express their encouragement. It really is true that vintage radio people are the greatest!

The ER photo book is going to be Barry's continuing project. I'm going to be asking everyone to send in their photos and a short biography. I've seen what Barry has in mind, and I think it is a great idea. Some of the material that is coming in is excellent, but there just isn't enough of it to make the project work. Don't worry about not being a writer because we can help you. Barry is committed to a nice book, so please don't let him down.

The ER parts directory is in need of revision. If you have listed anything with Barry, please see if it is still available, and if not, let me know and I will take it off the list. Better yet, consider adding some more parts rigs to it!


ER

VINTAGE NETS

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

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.

Drake Technical Net: Meets Sundays on 7238 Kc, 4 PM Eastern time. Hosted by John (KB9AT), Gary (KG4D), Jeff (WA8SAJ) and Evan (K8SQG).

Drake Users Net: This group gets together on 3865 Kc, Tuesday nights at 8 PM Eastern Time. Net controls are Criss (KB8IZX), Don (W8NS), Rob (KE3EE) and Huey (KD3UI).

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 Users Net: Group meets Sunday at 4 PM Central Time on 14.250 Mc. Net control op is usually Dean (WA9AZK).

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).

Command Set Reference

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Electric Radio has published several articles over the years dealing with the famous World War II aircraft command set radios (see Further Reading below). These have described very well the specifications and operation of the radios they have covered. There remains a need for an overview and cross-reference of the many types of command set equipment. Here are the radios we will discuss in this article:

ARA/ATA, SCR-274-N & AN/ARC-5 - HF command sets and related navigation receivers
AN/ARC-5 & SCR-274-N - VHF command sets
SCR-522 & SCR-542 - VHF command sets
AN/ARC-1 - VHF command set
AN/ARR-1 - VHF navigation receiver
AN/ARR-2 - VHF navigation receiver
ARC Type 12 & AN/ARC-60 - VHF command sets and related navigation receivers
ARC Type 15, AN/ARN-30 & AN/ARN-59 - VHF navigation receivers

By 1935 Naval aviation had advanced to the point where not just single aircraft but complete formations of aircraft were flying from carriers. The Navy saw the need for crews of aircraft flying in formation to communicate by radio. Because much of this communication would consist of orders from the formation commander, the proposed radios were called "command sets". However, there was also the need to communicate with the carrier or other landing fields. And because Naval aircraft fly over water, often out of sight of landmarks, navigation functions also had to be included. Some Naval aircraft, especially long-range land-based machines, had the additional need to communicate over long distances, usually with their bases. Radios for the last function were called "liaison sets" and will not be covered here.

A small company called the Aircraft Radio Corporation, located in Boonton, New Jersey, had been building air-to-ground radios for commercial aircraft. In 1936 the Navy asked them to design equipment that would meet their command and navigation needs. The design was completed a year later, and initially proposed a modular system with two types of receivers. Two RAT command receivers would cover 13.5-27.0 mc and eight RAV receivers would add the navigation function, covering 190kc-27.0 mc. I am not aware of any transmitting equipment in this first series of command sets, which went into production in 1939.

At the same time, Aircraft Radio developed a similar system for the Navy that did include transmitters. This second command series consisted of three RBD receivers covering 1.5-9.1 mc and four GT transmitters covering 3.0-9.1 mc. By the time production started in 1940, the RDB receivers had been redesignated ARA and two more were developed, extending coverage to 190-1500 kc for navigation. GT transmitters were redesignated ATA and were joined by one more, covering 2.1-3.0 mc. The ARA/ATA series established the basic design for aircraft command and navigation radios of which 1.45 million units would be built through the early 1950s and which would serve throughout World War II and the Korean "Police Action".

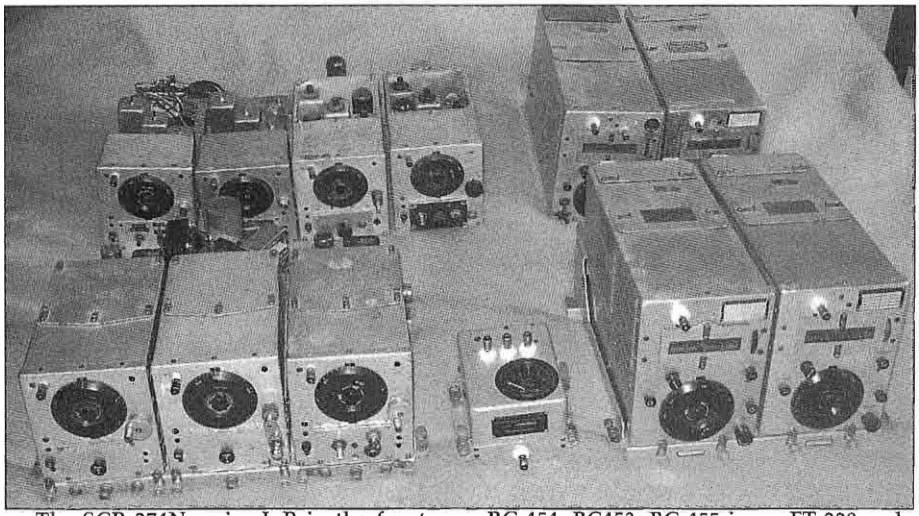
Meanwhile, the Army Air Corps discovered that it had radio communica-

tion needs similar to those of the Navy. They asked the Army Signal Corps to develop a system to give them this functionality. The Signal Corps had been watching the work being done by Aircraft Radio and suggested that the Air Corps could use the same radios. A commission was set up to work out what changes would be needed in the Navy radios to make them suitable for Air Corps use. The result was the third series of command radios, the SCR-274-N. The only significant change from the Navy version is the weight saving gained by not painting the aluminum cabinets black! I hope the cost of the commission to the American taxpayer wasn't too great, considering the magnitude of this decision.

In 1943, the principle of using a common nomenclature system for all the military services resulted in the redefinition of the SCR-274-N as the AN/ARC-5 that also incorporated some technical improvements. At the same time, additional receivers and transmitters supplied the final extensions of coverage. Units were now available to receive on 190 kc-9.1 mc and transmit on 500 kc-9.1 mc. All command sets still operated mainly on am but cw capability was present, if rarely used. Just think of a fighter pilot trying to fly his aircraft, work his guns and rockets and adjust his radio while meanwhile pounding out code on his J-37 knee key. Can you imagine him copying code while watching his instruments, his six and everything else in the sky and below it? I imagine it was a very rare occurrence when the key was even issued.

Receivers are conventional 6-tube superhetrodynes measuring 5" wide, 11" deep and 5-1/2" high. They use 250 vdc at 40 ma and 28 vdc at 450 ma (or 12 vdc at 900 ma). The 250 volts is supplied by a D-10A (or DM-32) or D-10 dynamotor mounted on the rear deck of the receiver.

Transmitters are MOPA (master oscillator/power amplifier) designs with a 1626 oscillator driving a parallel pair of 1625s (807s with 28v filaments and 7-pin bases) in the final. Power output is about 90 watts on cw and about half that on am. The units use a 1629 eye tube as a tuning aid and a crystal-con-



The SCR-274N series L-R in the front row: BC-454, BC453, BC-455 in an FT-220 rack. Next is the BC-442 antenna relay, then transmitters BC-696, BC-459 in their FT-226 rack. In back are parts units, 4 receivers and 2 transmtters.

Table 1 - HF Command Set Units -

ARA/ATA	SCR-274-N	AN/ARC-5	Equipment
46129	BC-453	R-23, -148	90-550 kc (85 kc IF) receiver
46145	BC-946	R-24	520-1500 kc (239 kc IF) rcvr
46104	-	R-25	1.5-3 mc (705 kc IF) receiver
46105	BC-454	R-26	3-6 mc (1415 kc IF) receiver
46106	BC-455	R-27	6-9.1 mc (2830 kc IF) rcvr
23261	BC-473	C-42	single receiver control box
23155	BC-496 -		double receiver control box
23251	BC-450 -		triple receiver control box
-	D-10	DY-1	12v > 250v 60 ma rx dynamotor
21531	D-10A, DM-32, DY-2		24v > 250v 60 ma rx dynamotor
-	-	MX-19	receiver audio adapter
62036	FT-310	MX-20	rx aux pwr adapter (for ILS)
49107	FT-230	MX-21	receiver remote control adapter
-	FT-260 C-24		receiver local control adapter
RC-54A RC-54A	RC-54A		receiver test set w/I-84A meter
-	-	C-25	remote ant/loop switch
-	-	C-26, -744	tunable control box
-	-	C-27	lock-tuned control box
-	-	O-4A	lock-tuned rcvr tuning oscillator
-	-	T-15, 52302	500-800 kc transmitter
-	-	T-16, 52303	800-1300 kc transmitter
-	-	T-17, 52304	1.3-2.1 mc transmitter
52232	-	T-18, 52305	2.1-3 mc transmitter
52208	BC-696 T-19, 52306		3-4 mc tx w/3500 kc crystal
52209	BC-457 T-20, 52307		4-5.3 mc tx w/4600 kc crystal
52210	BC-458 T-21, 52308		5.3-7 mc tx w/6200 kccrystal
52211	BC-459 T-22, 52309		7-9.1mc tx w/8000 kc crystal
23243	BC-451 C-29		transmitter control box
21626	DM-33	DY-8	24v > 575v 160ma modulator/ transmitter dynamotor
29125	BC-442 RE-2		antenna relay
50083	BC-456 MD-7, 50141		modulator
62207	-	J-17	junction box

trolled marker generator. Transmitters are 5-1/2" wide, 12" deep and 7" high. They use 560 vdc at 75 ma and 28 vdc at 700 ma (or 12 vdc at 1.3a). High voltage for the transmitters and modulator comes from a DM-33 (or DY-8) dynamometer mounted on the modulator.

There are a few significant differences among the units in Table 1. Most importantly, because of different modulation schemes, 50083/BC-456 modulators must be used with ATA/SCR-274-N transmitters and 50141/MD-7 modulators with ARC-5 transmitters. The earlier designs used screen modulation and the later ARC-5 used a fairly high-level plate/screen technique. Although ARA/SCR-274-N receivers are interchangeable with ARC-5 units, the latter have AVC and much better selectivity. While this is not an actual incompatibility, it may require slightly different operating practices.

The original designs and many of their derivatives discussed below came from Aircraft Radio that also manufactured many of the sets. However, due to their limited production capacity and the need to build many sets quickly, several other companies joined the list of suppliers. Other manufacturers include Stromberg-Carlson, which made many of the ARA/ATA and some of the ARC-5 sets, and Western Electric that made most of the SCR-274-N units.

A whole family of accessories was developed to allow the modular com-

Table 2 - Command Set Accessories -

ARA/ATA	SCR-274N AN/ARC-5			Equipment
-	FT-233	MT-7		single receiver rack
-	FT-231	MT-5		FT-233/MT-7 mount
46110	FT-277	MT-63		double receiver rack
46085	FT-279	MT-62		FT-277/MT-63 mount
46149	FT-220	MT-65		triple receiver rack
46150	FT-221	MT-64		FT-220/MT-65 mount
-	FT-264	MT-67		quad receiver rack
-	FT-278	MT-66		FT-264/MT-67 mount
-	FT-234	MT-69		single transmitter rack
-	FT-232	MT-68		FT-234/MT-69 mount
52212	FT-226	MT-71		double transmitter rack
52213	FT-227	MT-70		FT-226/MT-71 mount
-	FT-276	MT-73		triple transmitter rack
-	FT-262	MT-72		FT-276/MT-73 mount
-	FT-332	MT-75		quad transmitter rack
-	FT-331	MT-74		FT-332/MT-75 mount
no number	FT-235	-		BC-473 single rcvr ctrl box mount
no number		FT-240	-	BC-496 double rcvr ctrl box mount
no number		FT-222	-	BC-450 triple rcvr ctrl box mount
no number		FT-228	-	BC-451 single xmtr ctrl box mount
no number		MC-215	no number	remote rcvr tuning shaft kit
-	MC-211	MX-22		remote tuning shaft right angle adapter
-	MC-237, -236		no number	local rcvr tuning knob
-	-		MT-4	C-26 rcvr control box mount
50084	FT-225	MT-76		BC-456/MD-7 modulator mount
29126	FT-229	MT-77		BC-442 antenna relay mount
-	-		MT-78	C-27 rcvr ctrl box, J-16 jct. box mount
-	-		MT-80	C-29, C-30 xmtr ctrl box, etc mount
-	-		MT-84	J-17 junction box mount
-	-		MT-98	combination ctrl box mount
-	-		MT-159	TN-6 antenna tuner mount
-	-		CW-2	SO-151 6-pin socket cover

mand set units to be mixed-and-matched for many different applications. Most of these are listed here.

In addition to the hf-band command sets, the AN/ARC-5 series included a set of vhf radios. These became necessary because air-ground communications moved from the 1.5-9.1 mc band to 100-156mc. After WW-II, this band was limited to 108-136 mc. A few early vhf receivers and transmitters were built under the old SCR-274-N BC-xxx numbers but most carry the AN/ARC-5 nomenclature.

The advantage of modular design allowed the R-28 and T-23 to plug directly into the standard command set racks, but they are actually radically different from the hf units. For one thing, they operate on am only; there is no provision for cw.

The R-28 is a conventional 10-tube superhetrodyne with a 6.9 mc IF, 5" wide, 14" deep and 7-3/8" high, weighing 14-1/2 pounds. These dimensions, of course, mean that it overhangs the front of the mounting rack by about 2". An unusual feature is the use of 717A tubes in the front end. The receiver is crystal controlled on four channels that are selected by a new remote control box.

The T-23 is 5-1/2" wide, 15-1/4" deep and 8-1/2" high. It also overhangs the front of the mounting rack. The transmitter uses two 1625s as crystal oscillator and multiplier, an 832 uhf dual tetrode as multiplier/driver and a sec-

ond 832 as a push-pull final amplifier. The 4-channel crystal selection mechanism is a motor-driven switch. The same switch selects the appropriate prealigned tuned circuits for each frequency. Of course, these differences mean that a new transmitter control box was also required.

The AN/ARC-5 vhf radios were actually not our first 100-156 mc command equipment. A major reason the American military went to that band was the need for compatibility with existing British equipment. In fact, our first mass-produced units were copies of the British TR.5043 transceiver consisting of the T.5017 transmitter and R.5019 receiver mounted in the 5009 rack. Bendix built our version in 1942 as the SCR-522 (28 vdc) or SCR-542 (14 vdc). It includes a CS-80 case, which holds an FT-244 rack that, in turn, holds the BC-624 receiver and BC-625 transmitter. The case for the equipment is 12-1/2" wide, 12-3/4" deep, 6-1/2" high and weighs 37 pounds.

The transmitter uses a 6G6 crystal oscillator into a 12A6 multiplier, a push-pull 832 multiplier/driver and a push-pull 832 final with an output power of 7.5-10 watts depending on frequency. The finals are plate modulated by push-pull 12A6s that, in turn, are driven by a 6SS7. Output frequency is in the 100-156 mc band and is 18 times that of the crystal.

The receiver is a superhetrodyne also covering 100-156 mc and using a 9003 broadband rf amplifier, a crystal-controlled oscillator followed by multipliers, a 9003 mixer and three 12 mc IF amplifiers. Received frequency is 18 times the crystal frequency plus 12 mc. The audio section is squelched and doubles as an automatic crew intercom amplifier.

The rack contains, in addition to wiring and connectors, the channel selection motor and linkages. Thus the BC-624 and BC-625 can't easily be used alone. Some form of custom mechanical switching would have to be installed.

There are no operating controls on the transmitter-receiver. The control box only allows selection of one of four preset channels and receive/transmit switching. All setup and tuning for these channels must be done in the radio unit itself by a radio technician before take-off.

The first fully American 100-156 mc command set was the AN/ARC-1 (surprise!) 10 channel, 28-tube transceiver put into service about 1944. The radio includes 3 Collins Autotune units, one each for receiver, transmitter and antenna tuning. The radio, of course, has to have crystals inserted and the Autotune units must be set up before the equipment can be used. A separate receiver front-end guards the 140.58 mc emergency channel.

The receiver portion is a superhetrodyne similar to the BC-624 in that the output of a crystal oscillator is multiplied by 18, then used as the local oscillator signal into the mixer which drives a 9.72 mc IF chain. The transmitter mixes the same local oscillator signal with that from a 9.72 mc crystal oscillator to generate its output frequency in a pair of 6AK5s. This is then passed to an 832 driver and thence to the 8-watt push-pull 832 final. A push-pull pair of 6V6s that is driven by a 6C4 phase inverter modulates the final. An on-board dynamotor provides high voltage.

Just as air-ground communications moved from the 1.5-9.1mc band, navigation beacons moved from lf to high vhf. The first response to the band change was the Navy ZB, later renamed AN/ARR-1, a homing receiver. Perhaps "converter" would be a better word, but the unit falls between the usual definitions. The ARR-1 is actually a receiver front end, a 4-tube 234-258 mc trf amplifier with a detector. It

Table 5 - AN/ARC-1 Command Radio -	
ARC-1	transceiver
DY-9	28 vdc dynamotor
C-45	control box
TS-80	tuning meter

must be used with another receiver, which also supplies its power, capable of tuning its 540-830 kc output. The ARR-1 is 4" wide, 10" deep and 3" high, weighs about 4 pounds and was in use from about 1938 to 1943 when the ARR-2 began to replace it.

I have no further details on the ARR-1 equipment. IF anyone can help fill in this blank, please let me know and I will write a follow-up for ER. Or write the article yourself and send it to Ray.

To cover the new band, the R-23 and similar navigation receivers had to be replaced. Again, the modularity of the original Aircraft Radio design showed its advantages. The R-4 receiver was developed as a plug-in replacement. The R-4 is an 11-tube vhf receiver, 5" wide and 11" deep to fit the standard receiver rack, 6" high and weighs 9 pounds.

At the same time, the C-2 and C-15 control boxes were developed for the R-4, as was the C-38, which can control two hf and one vhf receivers in addition to one R-4. The C-2 works like an ordinary single-receiver control box through an MC-215 flexible cable, but the C-15 works through wiring to an electrical tuning motor mounted on the R-4.

Because many beacons remained on the 190-550 kc band, flyers found it desirable to operate the R-4 as a stand-alone unit while retaining the R-23 in existing systems. A separate package including the R-4 was developed - the AN/ARR-2.

I know very little of the history of the ARC (Aircraft Radio Corporation) Types 12 and 15 command/navigation radios. The most important thing to note is that the ARC Type 12 is NOT the same as the AN/ARC-12. My best understanding at this point is that the Type 12 and Type 15 were built by ARC for civilian use and were commandeered by the military to supplement the standard nomenclature units discussed above. Be careful reading material that refers to these units, as confusion is rampant.

Type 12 receivers and the CV-10 transverter will mount physically in the ARC-5 racks, but the units have no rear connectors to mate with those built into the racks. Type 15 receivers will also fit and will plug into the ARC-5 racks but the pin assignments are different. Check the schematics and/or carefully trace the wiring, then make appropriate changes before applying power.

Finally, there are two modernized radio sets of which I have only very limited knowledge. The AN/ARC-60 is derived from the ARC Type-12 com-

Table 6 - AN/ARR-1 Beacon Receiver -	
R-?	234-258 mc homing trf amplifier/detector
?	Automatic antenna switching relay

mand set from the AN/ARN-59 from the ARC Type-15 and AN/ARN-30 navigation radios. I would appreciate hearing from anyone who has more detailed knowledge of these types.

Or perhaps you could write to ER with the information, or write an article so we all can learn more about these radios and especially how they fit into the overall command set picture.

[continued page 28]

Editors's note: The AN/ARN-59 was a more modern design using 14 subminiature tubes and was released around 1957. The receiver was produced in a package about 4X4X10 inches, similar to others in the series. It was an airborne radio compass system designed to automatically provide a visual indication of the direction of any RF signal that had been tuned in. It also had the ability to function as a single ADF system for homing and position fixing. The receiver

Table 7 - AN/ARR-2 Beacon Receiver -

R-4	234-258 mc homing receiver
C-2	R-4 control box
C-38	4-receiver control box, 1 of which is an R-4
D-10, DY-1	12v > 250 vdc 60 ma dynamotor
D-10A, DY-2	24v > 250 vdc 60 ma dynamotor
MC-215	remote receiver tuning shaft kit
MT-7	single receiver rack
MT-5	MT-7 mount
MX-22	remote tuning shaft right angle adapter

Table 8 - ARC Type-12 Command and Navigation Sets -

R-10	550-1500 kc receiver
R-11	190-550 kc receiver
R-15	108-136 mc receiver
R-19	118-148 mc receiver
R-20	75mc fixed-tuned marker beacon receiver
R-22	550-1500 kc receiver (later model of R-10)
D-10A	24v > 250 vdc 60 ma receiver dynamotor
TV-10	228-258 mc transverter, from-and-to 118-148 mc
T-11	116-132 mc 2w transmitter
T-13	132-148 mc 2w transmitter
A-12	108-148 mc antenna, 3-section rod
L-10, AT-382	9"dia loop antenna
C-16	R-11 receiver control box
C-17	R-15 receiver control box
C-18	AT-382 RDF antenna control box
M-11	transmitter mount
M-12	receiver mount
M-18	C-16, -17, and18 control box mount

was spline-tuned over three bands, from 190 kc to 1750 kc, and it featured very high image rejection of at least 70 dB. The components of the AN/ARN59 included the following:

MT-1912/ARN Mounting base
MT-1913/ARN Mounting base
AT-780/ARN Antenna
ID-637/ARN Azimuth Indicator
DY-150/ARN Dynamotor
R-836/ARN Radio Receiver
C-2275/ARN Receiver Control

Table 9 - ARC Type-15 & AN/ARN-30 Navigation
(Including VOR/ILS) Receivers -

ARC Type-15	AN/ARN-30	
R-13	R-445/ARN-30	108-136 mc receiver
R-34	R-1021/ARN-30D	108-126.9 mc xtal-controlled rcvr
	DM-32, D-10A	24v > 250 vdc 60 ma dynamotor
	CV-265/ARN-30	VOR/ILS converter
C-81		R-34 control box
C-88		R-34 control box
	C-3436A/ARN-30	R-1021/ARN-30D control box
	MT-1175/ARN-30	equipment rack

Table 10 - AN/ARC-60 Command Set -

R-508	118-148 mc receiver
PP-2792	28v > 260 vdc 100 ma power supply
MC-215	flex tuning spline
C-?	Receiver control box
O-423	1kc oscillator/relay, R-508 tuning aid
T-?	Transmitter
AT-701	Inverted-L antenna
CV-431	228-256 mc transverter, from-and-to 118-148 mc

Table 11 - AN/ARN-59 Navigation Receivers -

R-836	190-1750 kc ADF receiver
R-508	118-148 mc receiver
C-2275	receiver control box
PP-2792	28v > 260 vdc 100ma power supply

If anyone has corrections or additions regarding any of the radios in this article, please let me know. I would welcome any updates that would fill in some of the remaining blanks and/or correct my mistakes. I would like to express my appreciation to all the Electric Radio contributors who have written about the command sets. Much of the information summarized here came from their articles.

Further Reading:

Electric Radio articles -

Command Sets, Walt Hutchens, #11 & #12

ARC-1 aircraft command transceiver, Walt Hutchens, #14

Command Set Triplets on the air, Jim Hanlon, #74

Command Set Transmitters on the air, Jim Hanlon, #75

Command Set Transceiver, Larsen E. Rapp Jr., #84

ARC-5 command receiver improvements, Norman Chipps, #122

ARC-5 command receiver improvements, Hank Brown, #124

AN/ARC-5 power supply/speaker, Frank Van Zant, #140

Other articles -

Converting the SCR-274-N, CQ 5/46

Command Twins BC-454 & -455, CQ 2/57, 1/58 & 2/58

Classic Exchange 1/91

Various late-1940s and early-1950s issues of QST and ARRL Handbooks

Various Editors & Engineers Radio Handbooks

Official manuals -

ATA & ARA radio equipment, Aircraft Radio 6/40

ATA/ARA radio equipment, AAF undated

SCR-274N radio set, TO08-10-50 2/43

AN/ARC-5 radio equipment test & alignment, NavWeps 16-30ARC5-501 12/49

ARC Type-12 radio set, AN16-45-122 10/52

Other manuals -

Surplus Radio Conversion Manual, Vol.1, 2 & 3, Editors & Engineers 1948

Command Sets SCR-274/ARC-5 Conversion Data, CQ 1957

User's Guide to ARC Receivers & Transmitters, unknown

Complete Guide to WWII Military Communications Equipment, Hevener 1999

Schematics, various sources -

ARC-5 Unit Interconnection

ARC-5VHF Transmitter

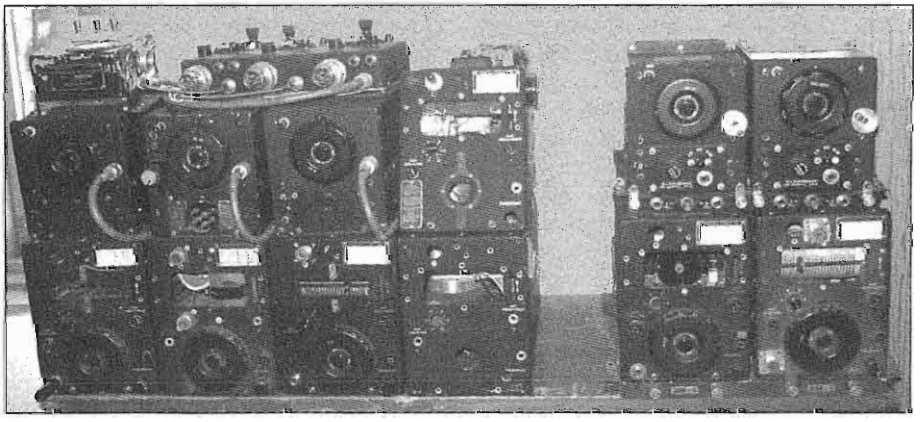
R-4/ARR-2 Radio Receiver

Page 29, top to bottom:

Top photo: The ARA/ATA system partially assembled with tuning cables connecting the triple control box to the 3 receivers. In the center is an antenna relay and junction box. To the rear is the dynamotor and modulator. On the left are 3 transmitters, and 2 parts rigs shown in back.

Center photo: ARC-5 station that has 2 receivers in an MT-63 rack and 2 transmitters in a double transmitter rack. Sometimes the racks and accessories are harder to find than any of the transmitters or receivers.

Bottom Photo: Stacked to the left is a triple control box that is cabled via 3 MC-215 spline shafts to 3 ARA receivers in a triple rack, an antenna relay, and a CBY-62207A junction box. This group includes a rare 62036 auxillary power adapter. Also shown isa homebrew AC power supply mounted on an old dynamotor base, which is in the CBY-46129 receiver in the middle. Next to these are 5 ATA transmitters, CBY-52232, CCT-52208, CBY-52209, CBY-32848, and CBY-52211 covering 2.1/9.1 mc. ER



A Russian BC-348 Clone

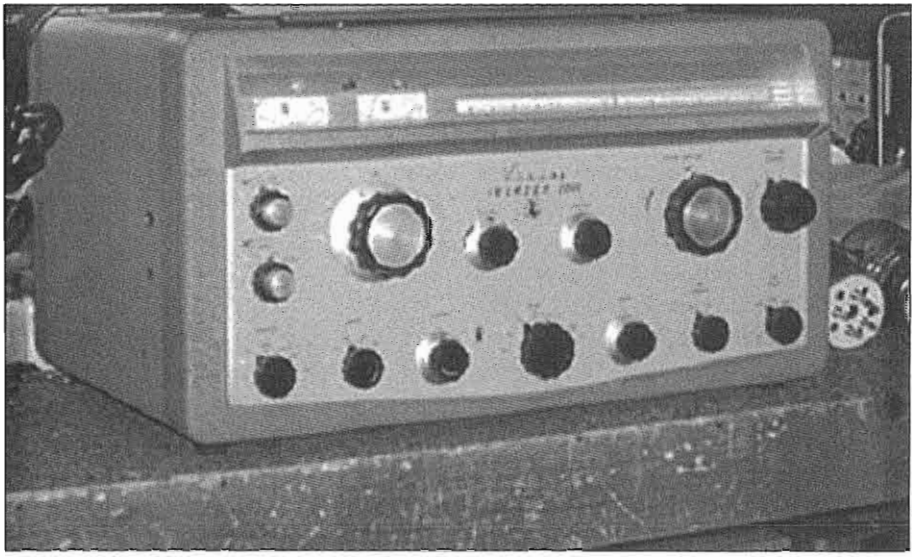
A letter from Geoff Fors, WB6NVH:

"The Russian BC-348 clone was called the US-9. Later ones had transistor inverters. As near as we can figure, they made them from about 1949-79. The quality is quite high but wiring errors seem to abound. Early ones did not have a vernier tuning knob. They even copied the metal octal tubes. I thought I would find RCA tubes in the one I inspected, but instead they had Cyrilic characters stamped on them. I couldn't do a destructive test, but I was suspicious that the metal octal tubes made by the Soviets were really just glass octals with a metal cover, like an OZ4. They were fond of short-cuts. Evidently the Polish also built a BC-348 clone, probably just a Russian subcontract job like the SCR-522 VHF clones they put into Mig fighters through the 1970's. I was told by a Russian that the radios had no definite color scheme, just whatever paint was available. Some were yellow, blue, gray, or whatever. The ones I saw were all a shabby black. As far as I know, the Chinese never cloned the BC-342 or 348 with the exactitude that the Soviets did. Relations between China and Russia soured in the late 1950's and never recovered, so the Chinese went off on their own on radio designs. The Russians evidently didn't copy the ART-13, but instead loosely copied the German FuG-10 transmitter, a strange modular thing involving many interconnected pieces, like a Command Set. I guess the autotune mechanism and the PTO were too much for them".

Geoff also visited Shanghai and found ...."the little radio shop had a small workbench upon which the proprietor was trying to fix a 5 tube American ac-dc set. His only tools were a rusty screwdriver and a soldering iron. I didn't even see a VOM. He was busy tapping away on the poor thing in some vain hope of finding the trouble; I could see wax pouring out of the paper capacitors in it. I powered up a bunch of his wares from the display window and all of them came to life with a horrendous 100 cycle hum blasting from the speaker. Obviously the filter caps were all dried up and he didn't know what the trouble was. Maybe I could get a job there fixing radios in the summer".

ER

Your new editor got a telephone call from a friend this summer who said "Call this guy about a transmitter that either gets hauled away or it goes in the dumpster." I called the owner, and went to get it that same weekend. The rig turned out to be a Johnson Viking Invader 2000! Not only was it a rig that has always been on my "wish list", but it has no serial number and has a hand-lettered dial scale. This is likely a prototype unit, but its past history is not known--yet. I'll be doing a full story in a future issue of ER when the restoration is completed.



Lake Erie Boatanchors Group Summer Meeting

by Jeff Covelli WA8SAJ
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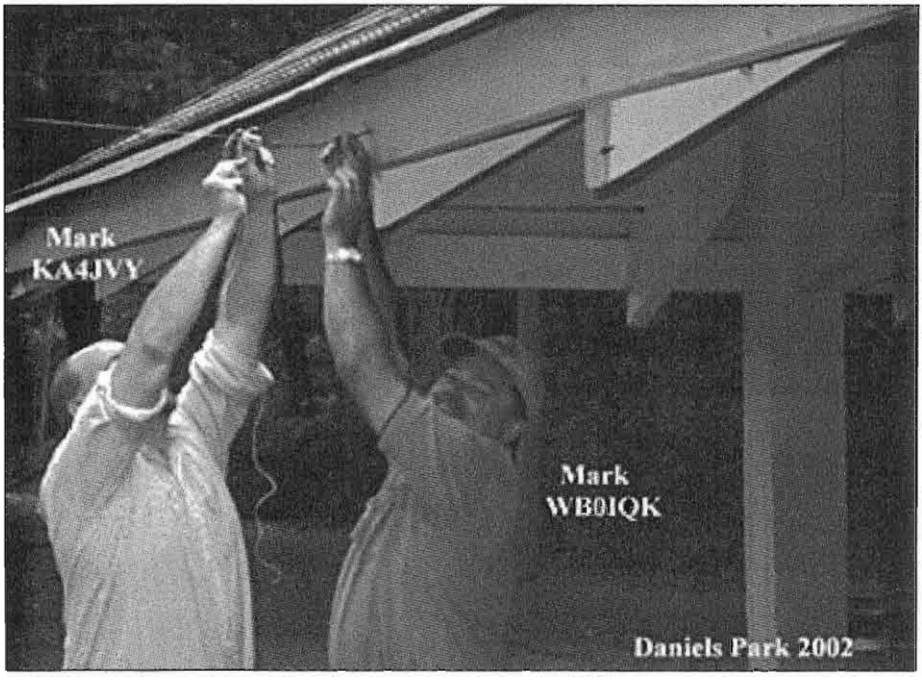
(440) 951-6406
wa8saj@ncweb.com

The Lake Erie Boatanchors Group had another informal get-together at "Daniels-Park" in Willoughby, Ohio on Saturday September 14th, 2002. I had a Hallicrafters SX-115 receiver set up for listening to 40 meters, with a measuring tape for a long wire. The guys all talked about old tube gear, antennas, and A.M. operation around the Great Lakes region. Mark, A4JVY, brought another military set-up. There was a long wire antenna for 40 meters tied into the TCS set-up.

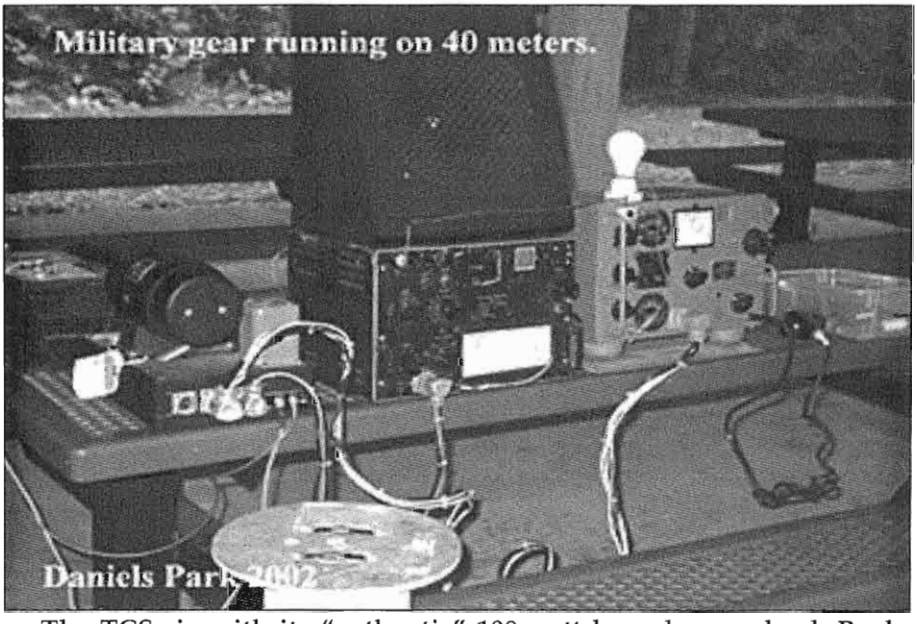
The location was picked for easy access from the I-90 freeway East of Cleveland, Ohio and it sure came in handy. The thunderstorms were very active in the morning, but we all stayed dry thanks to the cover of the large pavilion. My wife Lucy, who kept the refreshments going, put all the coffee, donuts and cookies together. Ed-AA8TV finally got a Knight Kit T-150, although not the exact one he was looking for, but one to put on the air soon. Ron, W8KYD swapped a NC-300 for a Johnson Ranger II from Larry, W9MDX. Larry also has the pictures I took of the event on his web site at w9mdx.com. Mark, WB0IQK showed off his D-104 microphone on a boom he put together, which drew a large crowd around it. The total number of folks attending was 21. Here are the attendees:

1) W8ATH, BOB
2) WB8BPA, DON
3) N3BRY, DENNY
4) K8DBN, BILL
5) KC8DDH, ROB, traveled thefarthest, about 200 miles from Warren, Michigan
6) N8ETQ, DAN
7) WB3FAU, RUSS
8) NI8G, TOM
9) K8GVH, JOHN
10) WB0IQK, MARK
11) KF8IS, BRUCE
12) KA4JVY, MARK
13) W8KYD, RON
14) W9MDX, LARRY
15) K8NXF, BOB
16) KC8QGJ, TOM
17) WA8SAJ, JEFF
18) AA8TV, ED
19) KA8WTK, BILL
20) WB8ZEJ, BILL
21) K8RMR, RICK

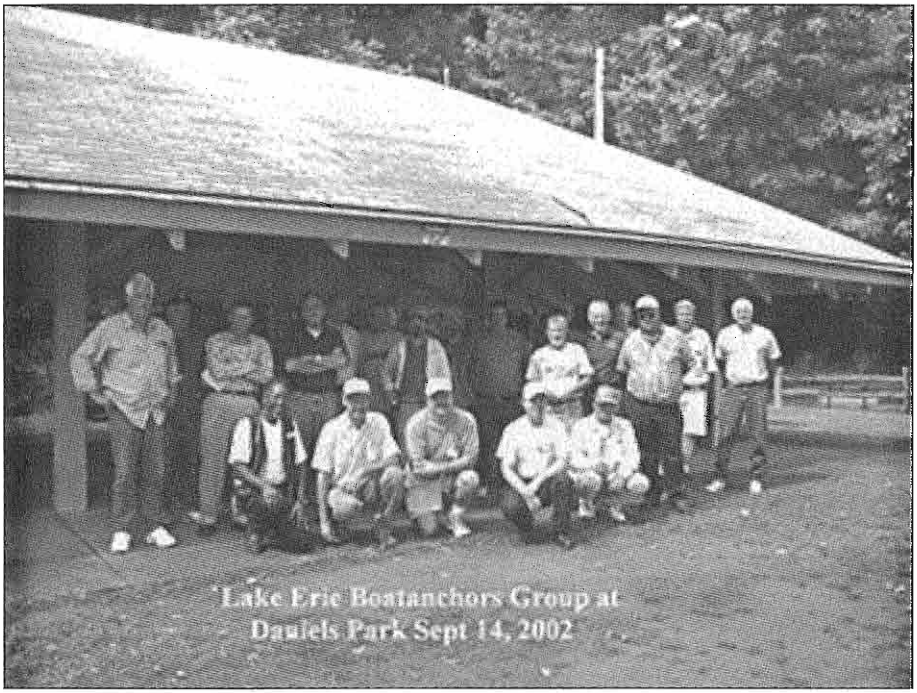
Thanks to Ron, W8KYD and Bill, K8DBN for the mailing invitations to around 75 folks. The next get together should be in January, and I'm sure it will not be outside, since the snowballs will be flying around!

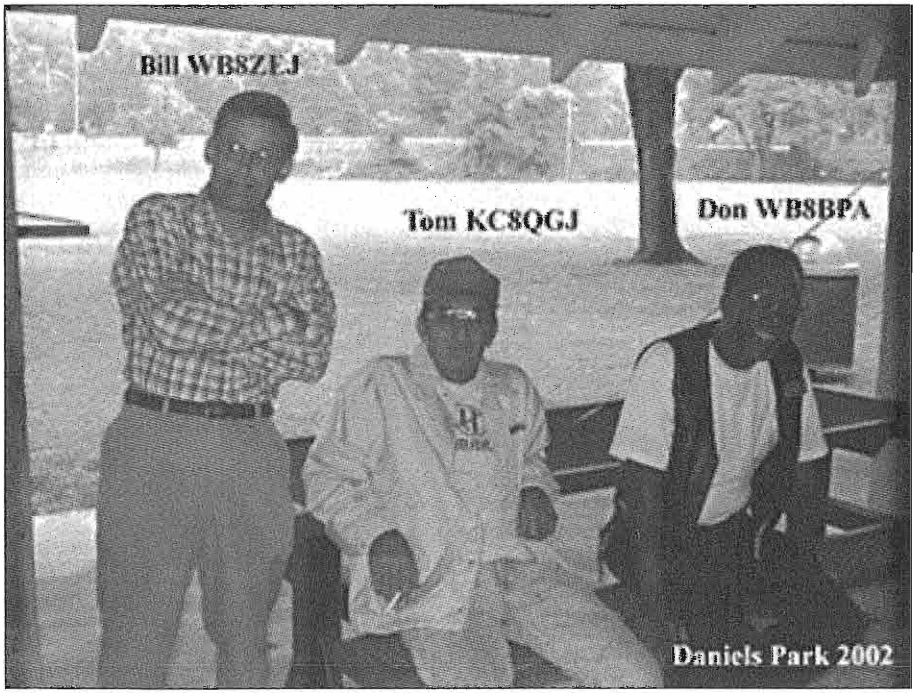


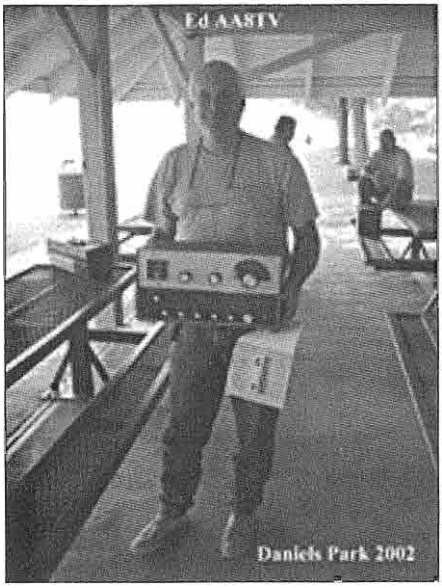
The antenna crew at work



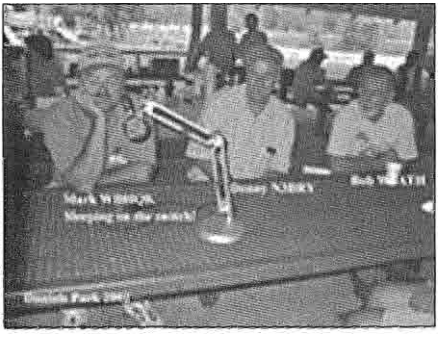
The TCS rig with its "authentic" 100-watt ham dummy load. Real radios have motors!


Lake Erie Boatanchors Group at
Daniels Park Sept 14, 2002


Bill WB8ZEJ
Tom KC8QGJ
Don WB8BPA
Daniels Park 2002



Ed with his Knight T-150--Another boatanchor united with a happy new owner.



Asleep at the mic

(continued from page 2)

Fair thee well Ray Osterwald, N0DMS.

As the new owner and editor of Electric Radio magazine, you bring along your dreams and experience that we look forward to reading about. We have been most impressed with your prolific writing in ER.

From the beginning, this publication has attracted writers who openly shared their dreams and experiences. Many improved their talents. One such example was the monthly series entitled, "Reflections Down The Feed Line" that shared radio highlights of a kid from New York who carried his passion for radio throughout his life. Like an old "Radio Soap" of those golden days, we all suffered a loss in that writers' passing.

ER has attracted and featured articles about many prominent amateurs, radio manufacturers, and radio pioneers including: Leo Meyerson (W0GFQ), E.F. Johnson, William Orr (W6SAI) to mention only a few.

Noteworthy was the scholarly series on Guglielmo Marconi.

As you know Ray, you are at the helm of a magazine as well as an institution. May you experience all the successes of the past and continued growth in the future! Long live Electric Radio magazine!

Fair winds and following seas Ray to you and your dear wife as you steer the good ship ER. ..._._

ER

ER

If You Build It, They Will Come

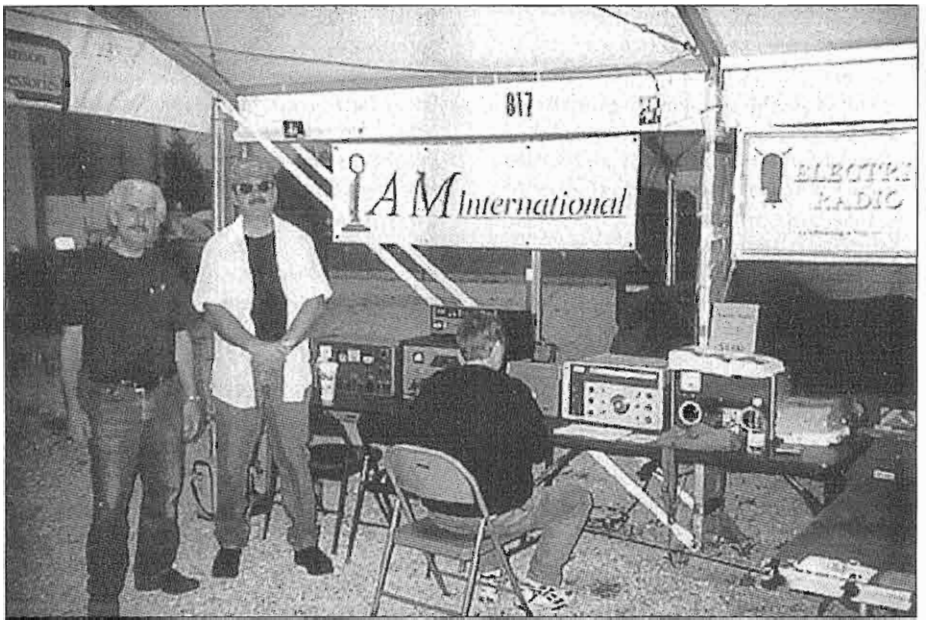
by Bruce Howes, W1UJR
29 Cushman St.
Portland ME 04102

This article was to about last May's AM Special Event in Portland, Maine, but with my recent move to the state, coupled with my search for a new business the writing was pushed to the back shelf. So when I contacted Barry a few weeks ago I offered a new twist. Rather than just tell you about all the fun we had with the station, I wanted to exhort you to set up your own AM Special Event station and in the process share some of my trials and tribulations on how to go about getting your station on the air.

The first question you might ask is "Why set up an AM Special Event Station in the first place?" After working on several of these events, from the Dayton Hamvention to the Buffalo Hamfest, I often ask myself "Why lug a couple hundred pounds of quite valuable gear out of your basement, wrangle with the hamfest committee over operation and placement, round up your contingent of operators, and spend less time operating than setting up the station?" Why indeed! The answer is rather simple, because it's worth it! Sure we can operate from the comfort of our hamshacks at any time, but if you do that you are missing fully half of the fun of this hobby. You see, ham radio isn't just about vacuum tubes, feedlines and SWR. Radio is also about people, their lives, hobbies, and passions. No mode portrays the richness of the human experience like AM. All right, I'm biased. I like Amplitude Modulation, in fact like may be too light of a word for it, I am in awe of AM. I have found that time and time again, that there is no finer mode to bring in listeners like the rich, full sound of AM. I see it again when we run one of these stations, where a small crowd will gather around the speaker, listening to our operator hold forth with another station. I can divide this group into two distinct subgroups; those new to the hobby, and those who once ran AM but left the mode decades ago.

Nothing prevents you from making your own special event by setting your station up for a local Boy Scout troop, a church group, or in the neighborhood shopping mall. In fact, as you would not be "preaching to the choir", it could be argued that these places might be even more effective than a hamfest. But for sake of argument let's assume you are now trying to justify your stations existence to a local hamfest committee.

The first step to getting a special event station off the ground is get approval from the club hosting the hamfest. The first objection to come up will almost invariably be the concern of RFI to the public address system. Also safety, too much power consumption or not enough space is usually next on the list. You can easily handle these objections by having a prepared station layout. Photos are ideal for this. Be sure to show antenna positions, power consumption, and RF output. I used to lug the T368 around to fests, but after suffering a hernia –really, I have found that DX-100 power, anything over 100 watts is more than enough to make excellent contacts if the bands are in good shape and the antenna efficient. Our station at Dayton in 2000 was only a DX-100 trans-



mitter and NC-300 receiver, coupled to a dipole fed with balanced line. The entire station, along with AMI and Electric Radio information, fit on a 24" x 36" folding table. While transmitting, we used well under 20 amps of current. It's hard to object to a station of that size using that moderate level of power. Try comparing it to a 150-watt light bulb! If you can, bring along a decent external speaker, because nothing will draw in spectators like a large public address speaker, at a moderate audio level, reproducing the rich fullness of the AM signal. Time and time again onlookers have been amazed at how good the audio can sound compared to the tinny-sounding 3" speaker in their solid-state rig.

Be sure to mention to your hamfest hosts the attention your station will bring to their event. Often the club officers are not aware of the significant following enjoyed by AM, too often dismissing it as an antique mode. Prepare ahead of time a ready listing of methods that you will use to promote the station and their hamfest. Free publicity, with the attendant rise in admission receipts, can work wonders for small fest. Be sure to follow up with postings on the AM Window and AM Fone websites. Don't forget to get the special event in QST. All of these items can make a real difference. Don't hesitate to let your local new media know about your "vintage station". A simple press release, faxed to newspapers, radio and TV can do wonders in a small town.

If you would like an example press release just email me at BHowes@Maine.rr.Com

Once you have the official "thumbs up" it is now time to inspect the facilities well before the operating day. All hamfests are not created equally and it is important to look for any "skyhooks" to use for antenna supports, dangerous power lines to be avoided, and a nice spot out of the sun for your station. Use common sense. Make a written list of extension cables, coax, antenna supports, and other gear you will need at the site. Such a list assures you a quick station set up on the hamfest morning

with a minimum of headaches.

Here is the easy part: Recruit your help! The effort to set up and operate a successful Special Event station can simple with the right help. I have been fortunate to always find a good number of volunteers who cheerfully chip in to set up and operate the station. Assign two teams, one for setup and breakdown, and another team to operate.I find that I am often too tired to do much operating after the night and early morning setup is finished. Most hamfests last 4-5 hours, so be sure to have at least 3-4 ops to keep the station on the air, allowing everyone to get his or her turn at the coffee, donuts and other hamfest goodies.

I won't enter into the debate of the "channel" AM operation, but it is important to operate near one of the key AM "windows". Allow yourself some space, maybe +/- 10kc, so as to not interfere with adjacent QSOs. I have found that during the hours of the typical hamfest the 75 and 40 meter bands are ideal. 3.875 and 7.280 mc are ideal frequencies for your station. They are close enough to the AM window to be found easily, but separated by enough space so as not to cause QRM to other band activities.

Plan for QRM, because like it or not, it does happen. Try to find someone with a high power station to act as the "Channel Master" or anchor station. They should keep the frequency open by frequent calling and announcing the special event call sign. It is a good plan to have your QRO station come on at least ½ hour before your station formally goes on the air.

As a courtesy, if possible, have some coffee and donuts waiting for your crew when they arrive to set up the station. Be sure to allow plenty of time for antenna and power supply issues. Once you get on the air, or as we say here in Maine, on the "ayah", log, log, log. Keep a written log of your contacts; make some notes on each QSO for later reference.

Be sure to invite the gathering crowd to actually operate the station. This often times taxes your persuasive powers, because they will be mic shy. If you find this the case, patiently offer a few questions for them to ask the op on the other end. If you are lucky enough to have a YL observing, be sure to invite her to operate. Nothing creates a pileup quicker than a female voice. Explain to how to tune the transmitter, how to zero beat the receiver. These terms are new concepts new to many of your observers, even if they hold a license!

I find it helpful to have handouts at the station. The AMI brochure (contact Dale KW1I for this) or WB3HUZ's explanation of how to properly run AM on a solid state rig is very good, as are the URLs of various AM and vintage gear websites. You might want to contact Ray to obtain some issues of Electric Radio to sell, and don't forget the ARRL. The League exists to promote ham radio, and is an excellent source of many free pamphlets regarding the radio hobby.

Set up a display of real radio parts such as old tubes, variable caps, and inductors, or old QSTs, which many of us have in abundance. Show the crowd what a vacuum tube really looks like. If you can, bring in a homebrew transmitter or receiver to show the crowd. People are fascinated when they can see and understand how a radio really works. Today's equipment, as compact and versatile as it may be, lacks the charisma and "soul" that a nice old tube set has. Open the top of the reviver and transmitter and let your observers see the inside of the radio, the glow of the vacuum tubes, and the purple glow of the 866s. I will wager you that the "ohh" and "ahh" factor will far exceed what you will receive from the stations solid-state cousins. If you can, have a small notebook where your crew and

spectators can sign in with their name, call and email address. Such a guestbook is very helpful for developing next year's operation, and provides the hamfest hosts of the station traffic.

(Editors note: For a real eye-popper, see if someone can bring in an operating ART-13 and run the Autotune a while!)

Keep in mind our three goals; the first is simply to have fun. Lets face it, as magnanimous as it is to want to introduce newcomers to the joys of vintage gear; you are never going to want to make the effort to set up the station again unless you and the other ops enjoy themselves. Our second goal, to borrow a phrase is to be an "AM Ambassador". This is something that we hopefully practice anytime we are on the air, but at no time is it more important that when operating a high profile Special Event station. Be courteous to those calling in, try to have short chats rather than just callsign exchanges, ask about their station, years licensed and then be sure to thank them for checking in. If you are able to get a roundtable QSO going so much the better, such dialogue really showcases the best of AM operation. Our last goal, and perhaps most important, is to introduce newcomers to the hobby, and to remind those older ops of the pleasures of operating vintage gear.

There is nothing like having an old timer sit down and explain his amazement that AM is still around and relate his experiences homebrewing in the 30s and 40s. Or the new ham, armed only with an HT, who is magically drawn to radios that glow in the dark. Get ready for converts and to hear many memorable stories.

Once your operation is done, the equipment packed away, be sure to thank your hamfest hosts for the space. Chances are they are going to be pleasantly surprised at the turnout and crowd that your small station drew. Just in case, be ready to address any concerns they might have while mentioning that you would like to meet soon to begin planning next year's station.

Next, take your crew of ops and any new AM converts out for lunch and some well deserved cold 807s. This is an excellent time to critique the operation, discuss next year's station, and initiate the newcomers into the world of glow in the dark radios.

Everyone loves to look at photos of the latest hamfest event, so be sure to bring along your camera. Digital cameras are excellent for the ease of putting these photos up on the web. Do your best to shoot a group photo in front of the station, and send off a copy to your crew, aside from reminding you how much fun you had, it will go a long way to rounding up help for next years event.

If you can, scan in your logbook and put it up on the web. Or if you manage to find some very patient and considerate soul, you could even design and mail out your own QSL cards for the event. I still have the very attractive Dayton QSL card that KW1I designed a few years back.

When all this is done, give yourself a good pat on the back. Setting up such a station is not an easy task, but take heart, it does get easier and more enjoyable each time. Know that while you are providing a fun morning diversion for you and your ham buddies, you are also doing a great service for the hobby. Your station can demonstrate the magic of radio to a prospective ham, enrich the radio experience for newcomers, provide an impetus to get back on the air for the inactive, trigger some fond memories in our older hams, and end up costing you no more than a few cold beers. I would say that is bargain indeed!


ER

New Filters for the Drake TR-4 CW Transceiver

By Jeff Covelli WA8SAJ
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Willoughby, Oh 44094
wa8saj@ncweb.com

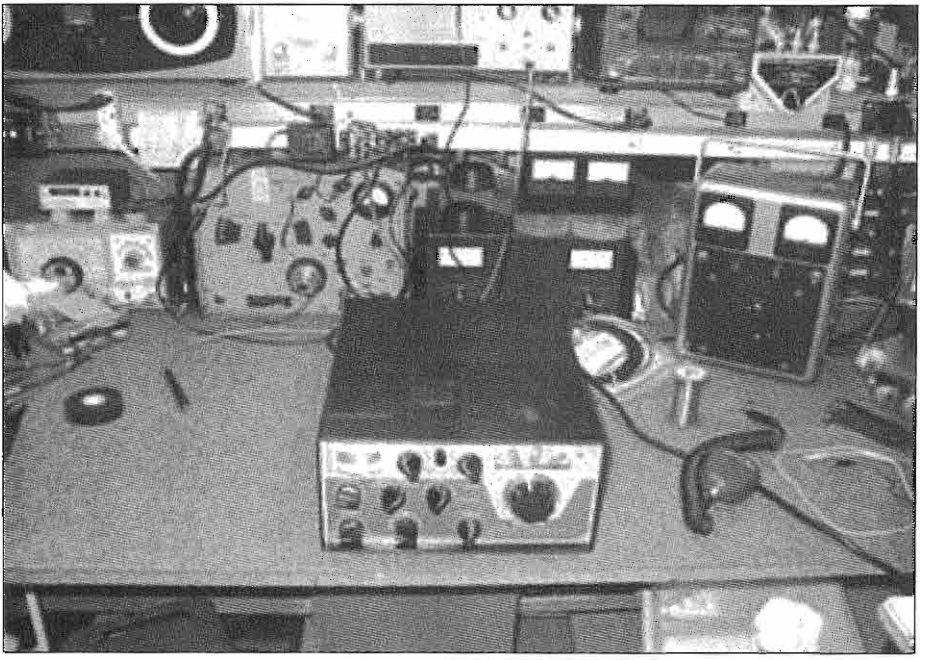
The Drake TR-4 series radios have been around since the mid 60's and they have been very good to the many folks owning them. Once in awhile, one of the two SSB filters decides to fall off frequency or just plain drop in signal level, and you are left with a radio that is virtually useless. It is great if there is single band on the TR-4 with the correct working sideband. The other bands probably won't be working right with a bad filter and here is why:

Let's review the Drake TR-4 Series filter scheme. The first IF uses a 9.0 MHZ system, very common in those days. There is one 9.0 MHZ carrier oscillator and two SSB filters marked "lower" and "upper", vs. two carrier oscillators and one SSB filter that are used in other rigs. The reason there are two filters is because there is no problem having to shift the VFO to compensate for the sideband change. When you change from lower to upper SSB, you always are centered in the passband. The TR-4 uses a VFO frequency of 5.0 to 5.5 MHZ. On 80 meters the mix is direct: VFO of 5.0 MHZ plus 4.0 MHZ = 9.0 MHZ IF, and the "lower" sideband is used like normal. However, on 20 meters the mix is 14.0 MHZ minus the VFO of 5.0 MHZ = 9.0 MHZ. Since the mix is reversed, the sideband filter has to be switched to allow the "upper" sideband to pass. This is why when going from band-to-band you see the sideband filter lights changing and the operator has to make sure that the correct sideband is selected for each band. It is confusing until you get used the picture of how the mixing is done and why the filters get switched around.

Previously, I'd asked George from International Radio Corporation (INRAD) if it was possible to make new SSB filters for the TR-4 series radios. He didn't have enough requests at the time to make new filters. Then, one day I finally sent him a couple of filters from an old TR-4 I had lying around. He swept them on his tracking generator and went to work on having some made. I was able to get started on replacing both filters in one of my TR-4CW's. I used the same radio for the A. M. filter since it was working so well. My conclusion is that the filters work very well. With that being said, everybody needs to save those prized TR-4's because there is now a way of reviving the rig like new!

The first thing I did was to sweep the original filters using an audio signal injected into the microphone jack while watching the pass-band as I moved the generator from 300 HZ to about 2100 HZ. There was a drop of about 3 DB on some of the frequencies on both sidebands across the spread. At 9 MHZ for sideband, it is very hard to make filters with a perfect ripple of plus or minus ½ DB, like a 455 KHZ mechanical filter as used in a Collins KWM-2. This goes for the 5.0 MHZ filter on a Drake T-4XC, etc.

So, I was not surprised to see this ripple. I also compared the receiver using a very strong signal from a generator and the calibrator; both showed that the original filters and new filters were about the same in selectivity. The



The author's well-equipped shop, with the TR-4CW ready for its INRAD filter installation

ripple up to 4 DB or so across the 300 to 2500 HZ range than the original filters, but the audio response does sound good on transmit and receive. Now for getting to work on replacing the filters:

REMOVE THE OLD FILTERS

1) First you will need to use long needle-nose pliers to get the nuts off of the filters on both sides of the chassis.

2) A couple of small straight-slot screwdrivers.

3) A soldering iron.

4) Some patience in doing this!

5) Start with the front panel facing you, bottom up!

6) I had to pull the CW/AM filter plate off of the bottom of the two SSB filters. Then I tied the filter plate out of the way for now.

7) The four nuts were taken off from the top and bottom of the filters. This is where you have to use a small screwdriver and needle nose, to get the nuts off of the filters.

8) Unsolder the four wires going to the filters on both sides of the chassis.

9) Gently pry the filter off of the mounting plate with a larger screwdriver and gently pull the "lower" SSB filter out first (right filter bottom up), through the "top" of the radio.

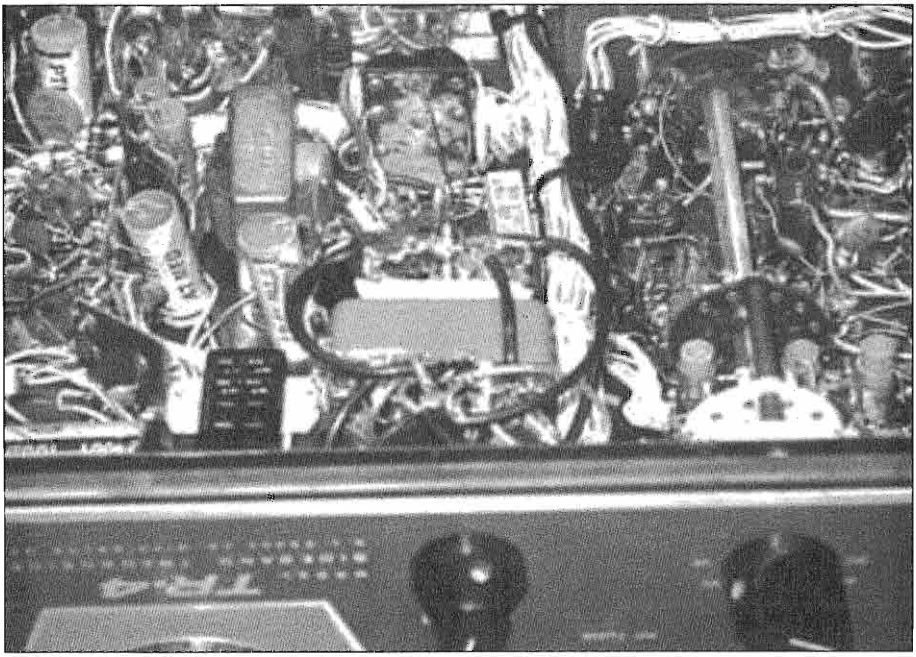
10) Now the "upper" SSB filter (left filter bottom up) comes out the same way.

INSTALL THE NEW FILTERS

Pre-tin the solder leads on the new SSB filters with just a little solder, so it will make soldering in the tight area much easier during installation.

1) Start with the "upper' sideband filter first (left filter bottom up), from the top of the radio.

2) Put on the nuts and use the small screwdriver and long needle-nose pliers to tighten the nuts up good, (do



A view of the Drake TR-4 with the bottom cover removed to show the filter location.

not tighten the bottom nuts yet). Solder the wires that were taken off before.

3) Install the "lower' sideband filter now the same way.

4) Re-install the CW/AM filter mounting plate; tighten the nuts on the bottom of the filters to hold the plate tight.

ALIGNMENT

You're all done with the installation, now I would go and align the 9 MHZ carrier oscillator (C-130), along with the filter matching transformers T-6 and T-13, null out the transmit carrier also on 80 meters in USB mode, as per the manual.

I have compared this TR-4CW with the other one I have on receive and transmit, although the audio on the INRAD radio does sound a bit more mellow, due to the fact these filters are 2500 HZ wide compared to 2100 HZ on the stock filters. I've had good audio reports using the INRAD filters, so I can say they work great!

INRAD FILTER INFORMATION

The INRAD model number of the filters are 1901 for upper sideband, and1902 for lower sideband. The 1992 costs of the filters are $110 each from INRAD. They can be reached by phone at 541-459-5623. On the internet, go to http://www.coulee.com/inrad/index.htm and look for the "Drake" link. Their e-mail is: inrad@rosenet.net. Let's keep the old TR-4's going!

73...Jeff Covelli/WA8SAJ

(Editor's Note: The INRAD web site has full performance specifications on these filters including response curves.)

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FOR SALE: Radio books, magazines, catalogs, manuals (copies), radios, hi-fi, parts. Send 2 stamp,LSASE.David Crowell,KA1EDP,40 Briarwood Rd., North Scituate, RI 02857. ka1edp@juno.com

FOR SALE: Gernsback's Radio-Craft and Short Wave Craft magazines from 1930s. Free list. Bob Ryan, 1000 S. Gilbert St., Apt. 132, Hemet CA 92543-7065

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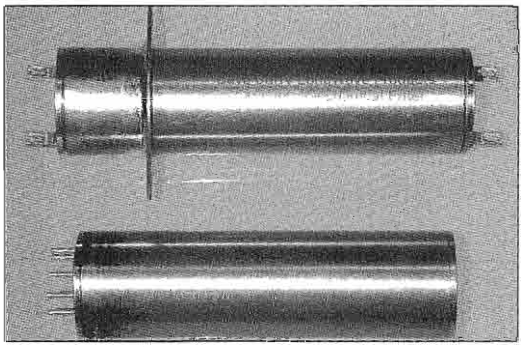

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PLEASE NOTE: The R390A filter has been discontinued and sales are subject to stock on-hand. The R390A 6Kc filter is sold out.

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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. 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: 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 refinishing: Johnson Ranger sets - $250; Valiant sets - $300; Johnson 500 sets -$300; Collins R390 (A), front side -$125, both sides -$225; Hammarlund HQ-180 series panel & bezel-$200, cab add $100. Dee Almquist, 534W. Main St., Waynesboro, VA 22980. 540-249-3161 Cell: 540-480-7179 http://w4pnt.8k.com.

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: Knight R100A, T150, $75.00 each; Johnson Ranger 1 parts unit $100.00. Richard Cohen, FL. 813-962-2460

FOR SALE: Tapered cathode bias RF pots, mil/spec, 2W/10K, $9.95 ppd. 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: Gr 11, EK2, Swan 250, Hallicrafters S-38A. **WANTED:** Heath SB 110/ps.Bob WB0DMC 507-331-5103

FOR SALE: Vintage Kenwood TS-520 HF radio, MC-50 Microphone, Spectronics DD-1K digital readout $300.00. Yeasu FT-101EE, needs repair $125.00.Drake MS-4 Speaker, $45.00. U-Ship. Dan Langston, KO4RA.danman@accucomm.net 478-453-9066

FOR SALE: TS-183 Battery, $40.00, I-208 sig gen $50.00, BC-439 NIB freq meter $50.00, BC-1000 NATO $125.00, BC-221 freq meter $50.00 **FOR TRADE:** BC-611 for FL-10-GN-44 Steve Bartkowski, 4923 W. 28th St, Cicero IL, 60804, 1-708-863-3090

FOR SALE: B&W 5100B Good Condx $100.00 51SB $85.00 Exc Condx. Delivery possible to SW. W5LTR, Tom Berry, 1617 W. Highland Chicago IL 60660, 773-262-5360

FOR SALE: BC-779 Super-Pro 200 in rare portable configuration, $440.00. SX-111 beautiful condx. $200.00. Ron, MI, 517-374-1107

FOR SALE: Heathkit DX-100B w/manual, no mods, excellent condx, Johnson KW Matchbox exc. w/manual. Raymond Fisher, 937-692-8550

FREE: Various 19 inch rack panels, aluminum and steel types. Central IN., P-U only. Dave K9HDQ 765-354-2884

WANTED: Hallicrafters SX-101A tuning knob with good 0-100 dial. Victor, WD8DWR@ARRL.Net

FOR SALE/TRADE: Johnson LoPass filter 250-20; Millen dial 10035 (NIB); Eddystone 898 dial (NIB). Bernard, NI4Q, PO Box 690098, Orlando, FL 32869-0098. 407-351-5536

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

FOR TRADE: RBL-5 Navy rcvr trade for PPN-1 ant or PPN-1 bag; BC-611 handie-talky, good condx trade FL-10-GN-44 PRC-25 nice shape trade for above & trade for PE-210 p.s. Steve Bartkowski, 4923 W. 28th St., Cicero IL, 60804, 1-708-863-3090

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

WANTED: Small open frame DPDT 110 VAC relays with 3/16 inch contacts, N.I.B., chassis mounting. L. D'Antuono, 8802 Ridge Blvd, Bklyn NY 11209, 718-748-9612

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: Schematic or copy for Leader Electronics scope LBO-505 and Hitachi V-1050-F. KenTountas, 2309 N. 51st St. Waco TX. 76710, 254-772-7307

WANTED: Johnson Thunderbolt amp, Johnson Viking xmtr. K9QPM 815-485-2025

WANTED: Main tuning knob or slow motion drive for 75A4. KWS-1 parts including internal wiring loom, transformers T502 and T504,capacitor C501,and other smaller parts. John Munro, G3GBB tel. 01379-783657, Email jmunro2@ukonline.co.uk.

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

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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: SCR-522, other WWII radio for flying aircraft restorations. NIB or exc condx. Ian Abbott, KC6UPT, 209-747-3639 ian@wildblueaviation.com

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: National radio pwr sply's for HRO, HRO-5 or SW-3. Bill Cabeen, KM6P, CA, (310) 829-7678, cabeen@ucla.edu

WANTED: Fully functional w/manuals: Johnson AN/FRT5O5 xmtr, Swan F51 and FC76. Contact Ric at C6ANI@ARRL.NET

WANTED: 70' or larger crank-up tower, prefer Tenn, KY, W8, W9, W0, W5, AZ location, others considered. Tom Berry, W5LTR, 1617W. Highland, Chicago, IL 60660. (773) 262-5360, 262-0016

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/FRR5O2. David Boardman, VA2DVD, 418-877-1316 radioman@dbtubes.com

WANTED: Heath SB series parts source; B&W 160,80,40 JEL coils; McElroy bug. Brian Roberts, K9VKY, 130 Tara Dr., Fombell, PA 16123.724-758-2688, k9vky@arrl.net

WANTED: Dynamotors from WW II & Korean wars, looking for real small sizes, clean & unused. Bob Ryan, 1000 S. Gilbert St. Apt. 132, Hemet, CA 92543

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

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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: Heath SB-220 project amp. Jim, AD5KD, Tulsa OK, (918) 747-3136, kd5gho@swbell.net

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: BC-610 pieces and parts of all kinds. John Schneider, K4HLM, 320 Woodchuck Ct., Roswell, GA 30076. 770-992-9668, tphase@mindspring.com

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

WANTED: Antique tubes. Paying $40 ea for good used type 201 tubes (not A). Buy list & new 2000-2001 catalog of collector tubes available. See www.fathauer.com. George H. Fathauer & Assoc., 688W. First St. Ste 4, Tempe, AZ 85281. 480-968-7686, tubes@qwest.net

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: Bendix radio rcvr RA-1B; Belgium set RST-101. George Rancourt, K1ANX, MA, 413-527-4304 or klanx@mindspring.com

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

WANTED: National HRO black wrinkle spkrs, oak coil boxes, coils; Western Electric horns, spkrs, amps, and mics. Barry Nadel, POB 29303, San Francisco, CA 94129. bnadel@ccnet.com

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/PSO15O, 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

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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

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

WANTED: Long wire ants AT1O1, AT1O2, GRC-9, DY88/105, PP327GRC9; counterpoise CP12 & 13 GRC9; BC348 pwr conn PLQ1O2/103. KA1ZQR, 348 N. Main St., Stonington, CT 06378.

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/ Fax: 00331304111 02

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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

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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

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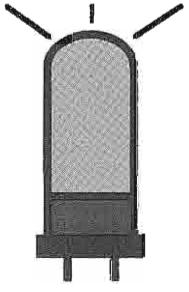

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