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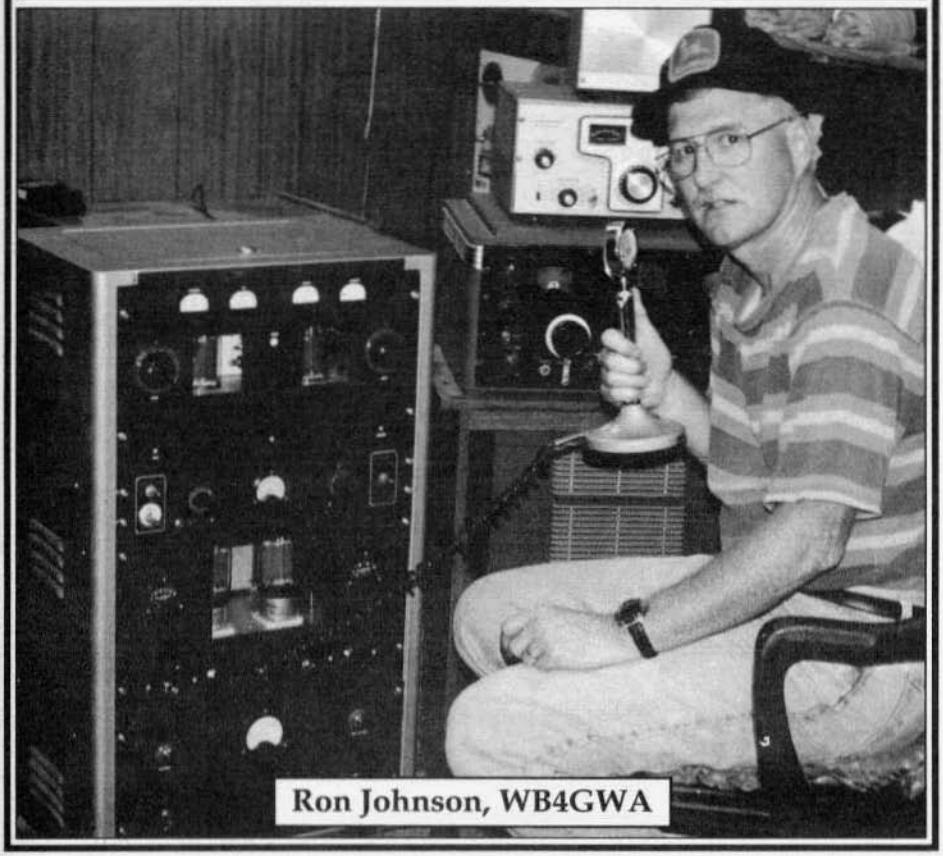
ELECTRIC RADIO

celebrating a bygone era

Number 110 June 1998



Ron Johnson, WB4GWA

ELECTRIC RADIO

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Editor - Barry R. Wiseman, N6CSW
Office Manager - Shirley A. Wiseman

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

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

Regular contributors include:

Walt Hutchens, KJ4KV; Bill Kleronomos, KDØHG; Ray Osterwald, NØDMS; Dave Ishmael, WA6VVL; Jim Hanlon, W8KGI; Chuck Penson, WA7ZZE; Dennis Petrich, KØEOO; Bob Dennison, W2HBE; Dale Gagnon, KW1I; Rob Brownstein, K6RB; Don Meadows, N6DM; Lew McCoy, W1ICP; Kurt Miska, N8WGW; Warren Bruene, W5OLY; Brian Harris, WA5UEK and others.

Editor's Comments

Recent events in Southwest Colorado

Our quiet life here in McElmo Canyon, west of Cortez, in southwest Colorado has been transformed. Shangri-la is gone and we're back in the real world now. Up until the events of last week, Shirley and I thought we were living in an area free of the crime and violence that plagues most of the rest of the country. We thought that we had finally found a safe, peaceful haven. We're not so sure now. A week ago three survivalists/militants/totally demented individuals burst into our small town of Cortez with their AK-47s blazing, murdering a local policeman and injuring two others. I'm sure most ER readers are aware of what's happened and is ongoing here from news reports. It has shocked, frightened, saddened, angered and bewildered our community. Shirley and I are in a state of disbelief. We expect things like this to happen in other, more populated parts of the country but never here. Presently, the largest manhunt in US history is going on in our area. Shirley and I don't feel that we are in any danger. We thank all those who called wondering how we were.

Barry Goldwater, K7UGA, Silent Key

We have always had a great admiration for Barry Goldwater, not only for his contributions to amateur radio, but for his contributions to the country as a politician. We had planned a short tribute to him in this issue, but it didn't come together. We'll have it in the July issue.

Problems With the USPS

Every month we get a few calls from subscribers who did not get their magazines or had received them very late. Most of these calls come from people who have subscribed second class. Last month however, starting about 10 days after we put the May issue in the mail (May 11), we got about 70 calls from first class subscribers who did not get their magazines. We immediately started sending out replacement copies. In most cases the original magazines did arrive, but after our replacement copies.

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Looking Back

by Lew McCoy, W1ICP
1500 Idaho St.
Silver City, NM 88061
mccoy@zianet.com

Bob Grinder, K7AK, who wrote the article last month in Electric Radio, about my original high-power modern amplifier has written to me asking me several questions. I have decided that his questions and my replies might make interesting reading for people who had built the amplifier or are interested in what happened in those days at ARRL.

The best way to approach this piece is to actually list Bob's questions and my replies.

What discussions at ARRL led you to take the leadership in developing the final?

That first question kind of drew me up short because one had to understand the personalities at ARRL HQ in those days. The two people that had most influence with me were George Grammer, the Technical Director, and Byron Goodman, W1DX. Leadership? That is really a wrong term as applied to me in those days. I was a "technical assistant" which is about one step higher than the guy who swept up the basement. However, like in any job, one had to be very devious if you wanted to do a project that you particularly wanted and—I'll be perfectly honest—I wanted a high power final for my home station. I have mentioned before that Grammer, who was the BOSS, did not care for high power nor beam antennas. By Goodman was the opposite and fortunately, he had charge of the Handbook. I convinced By that I would be doing him a favor by building a high power amplifier for the Handbook. The only encouragement I got from him was to get it built quickly.

What prompted you to select the Jennings UCS-300, National R-175A, B&W 850, and the Cardwell 8013? Did the ARRL have (or give) input into the development of these components.

That is easy to answer. I wanted a 'modern' amplifier, the B&W 850 was a natural for my purposes. I had personally acquired the Jennings vacuum variable and I knew that would be the type of capacitor for the future. The R175 was a horse of a different color. Grammer had built a new rig and included 15 meters, and he had used an ordinary 2.5 MH rf choke for the final tube. The doggone thing actually blew up on him. He set Vern Chambers, W1JEQ (he's been a SK for some time) to working on high power chokes, using the R175 as a basis. Vern must have wound and rewound about 15 of the R175s before he got one that showed a high impedance on all the then amateur bands. We informed the National Company and they immediately started making the 175A, which became the standard. As a matter of fact, I had wound several solenoid type chokes looking for one that was clean on all bands but finally gave up and used the R175A. The readers will have to understand that I got my job in the technical department because of TVI and lecturing on the causes and cures for interference.

This amplifier was "modern" in the sense that I used extensive shielding on it—and I believe that was the first high power amplifier to have such shielding. But I cannot take any credit for that; TVI was a problem and the design of the amplifier took that into consideration.

Did the ARRL staff interact significantly with Collins Radio in the design of the KW-1.

No, there were no contacts whatsoever. At least not on my part. Keep in

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The Spitfire Receiver

by Steven B. Johnston, WD8DAS
3350 Oakham Dr.
York, PA 17402

A Hamfest Tale

In the late 70s I was a teenage ham with a big appetite for cheap radio gear, including, of course, military surplus. At a northeastern Ohio hamfest one summer day I came upon something quite "different". It was a medium-sized black box with a few interesting knobs and cables sitting perfectly in a matching, felt-lined wooden transit case. The labels called out Receiver Type R.1147A with the British "A-crown-M" logo. To my young techie eyes, it was beautiful.

My interest was further aroused by a yellowed scrap of paper inside the case which identified the cable pinouts and referred to the unit as a "Spitfire Receiver". My blood began to pound in my veins—a radio from the famed Spitfire fighter plane? It couldn't be true! I asked the seller for the story of this radio, but he was selling it for someone else, didn't really know much, etc—you know the rap. Trying to conceal my excitement, I asked the price. My heart sank when he said 50 bucks. Not a lot of money, of course, but much more than I had in my jeans. But I HAD to have this radio! I opened my wallet, counted the bills again, cursed my earlier, more mundane purchases, and offered him all that I had: $18.

He hemmed and hawed, but at this point I laid it on the line. I *really* wanted that radio, I would give it a good home where it would be appreciated, and I was willing to give him every last dollar. I'm sure no Electric Radio reader has ever felt this sort of compulsion. The seller saw my enthusiasm, and with

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The author in his shack testing the R1147A.

a smile accepted my offer. He even returned three dollars of my money so I could buy some lunch! This unknown soul certainly earned my "Hamfest Hero" award.

Getting it Home

When I got it home, the faded note told me what voltages I needed, so I tapped them out of another receiver (if memory serves it was a Gonset G-66) and fired it up. A reassuring hiss sang out of the earphones, and as I tuned around with a cliplead on the antenna connector I heard TV video buzz. This, plus the funny-looking acorn tubes, told me it was a VHF receiver—probably tuning somewhere in the hi-VHF TV band.

My first efforts to research this receiver ran into dead ends, but when I wrote to the Royal Air Force Museum in London I hit paydirt. The museum was kind enough to send excerpts from the official war histories and photocopies of the declassified (yet still marked TOP SECRET - cool!) R.1147 manual. The manual, dated March, 1941, had markings from the Air Ministry in Whitehall and Radio Aids Navigation School on H.M.S. "Northney". I learned a lot from those few pages.

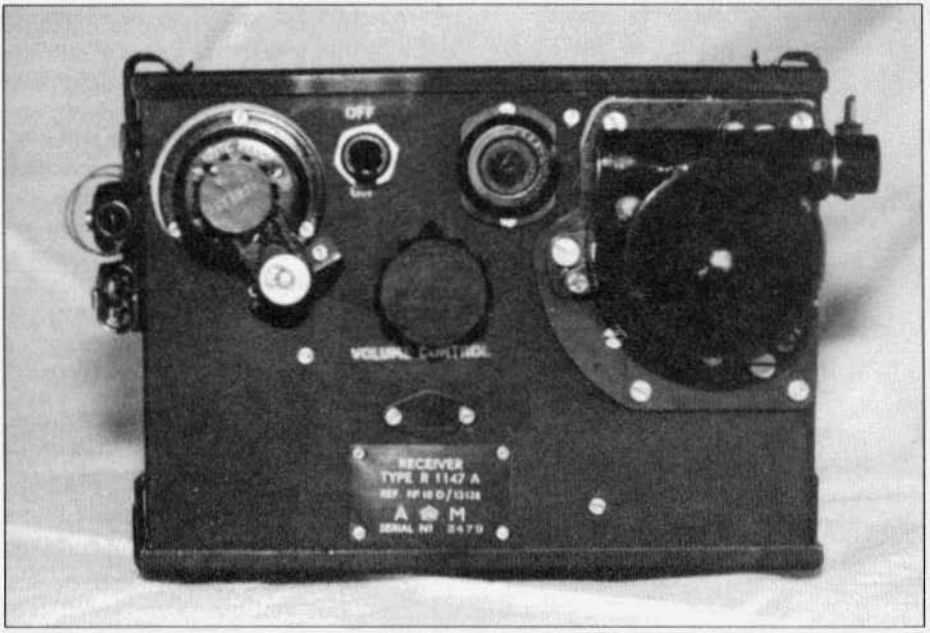
History Of The R.1147

Great Britain's struggles against German U-boats stimulated the development of a number of radio systems intended as airborne navigation aids. Two types of direction-finding equipment were considered: HF direction finding (HF-DF, also known as Huff-Duff) for tracking and locating enemy ships by eavesdropping on their routine communications, and VHF/UHF receivers homing on friendly beacons to on-land bases or aircraft carriers.

The possibility of leaving HF direction finding to escort vessels and relying on them to pass on the intelligence to Royal Navy Fleet Air Arm (F.A.A.) aircraft had been considered but generally rejected in February 1942. It was apparent from the start that development of suitable equipment would be challenging, but the urgency was great and any improvement to U-boat suppression by aircraft was considered worthwhile. Likewise, the difficulties faced by naval aircraft returning from long reconnaissance missions called for some form of homing system to reduce losses and improve efficiency.

Royal Air Force Photographic Reconnaissance Units (PRU) faced similar challenges, and sought similar relief. Standard VHF Radiotelephone systems were used for a sort of primitive "talk-in", but this was of limited effectiveness. Installation of more advanced homing equipment in PRU aircraft was first suggested in August 1940. PRU aircraft had a special need for a homing device in that the heights at which they operated added to the difficulties of accurate wind velocity forecasting. The existing Fighter Command VHF TR.1133 was initially found to be unacceptable to Headquarters Coastal Command (in charge of PRU), due to the size and weight of the equipment. A system called "Rebecca" (which I need to find more about) was suggested, but the Telecommunications Research Establishment (TRE) suggested as an alternative a simple beacon with a searchlight beam rotating clockwise, to be used with a stopwatch and simple receiver in the aircraft; Naval aircraft used the system as an aid for returning to carriers. The Royal Aircraft Establishment (R.A.E.) designed a basic homing receiver, the R.1110, then the more advanced R.1147, which was about to be produced for the Admiralty's Fleet Air Arm.

In March 1941 the Admiralty loaned two R.1147 receivers for tests in P.R.U. Spitfires. On 29 September 1941 installation of an R.1147 in a P.R.U. Spitfire had been completed by the R.A.E., ground and air tests of the equipment had been carried out, and the range and characteristics obtained were considered by the R.A.E. to be satisfactory for operational



Front panel view of the 'Spitfire' receiver.

use, particularly in adverse weather. Installation in other P.R.U. aircraft was recommended. However, the Officer Commanding No.1 P.R.U., at whose unit the trials had taken place, thought the recommendations were premature, as the installation was being tested.

A report on the results of further tests was made on 11 October. Successive homing bearings had varied by as much as 10 degrees and required considerable concentration by the pilot, which would not be possible when he was flying on instruments during actual operations. Considerable errors resulted from flying on an incorrect bearing for only a few minutes when letting down at a high ground speed. Results obtained by a navigator in a Fulmar aircraft were far more accurate, partly due to the slower speed, but primarily because of the increased concentration possible by the navigator/observer.

HQ Coastal Command considered that the main purpose of the equipment (to be an aid in adverse weather) had been overlooked in the later report, but in any case the significant problem remained: in adverse conditions it was impossible, or at least unwise, to concentrate on anything other than the normal flying instruments. Nevertheless, HQ Coastal Command recommended that development should continue and that receivers be installed in all P.R.U. aircraft. On 27 October it was confirmed that installation was required in all operational P.R.U. Spitfires, as well as on new production line aircraft.

Further trials of the R.1147 revealed additional weaknesses, and a test of the TR.1133 carried out in a P.R.U. Spitfire by unit personnel on 16 December 1941, Headquarters Coastal Command suspended provisioning of the R.1147 until further TR.1133 trials. They were carried out at Duxford in the same month, after which the Officer Commanding No.1 P.R.U. reported that installation of the larger TR.1133 was possible if the number of oxygen bottles carried was reduced from six to three. On 6 January 1942, installations of the R.1147 were canceled.

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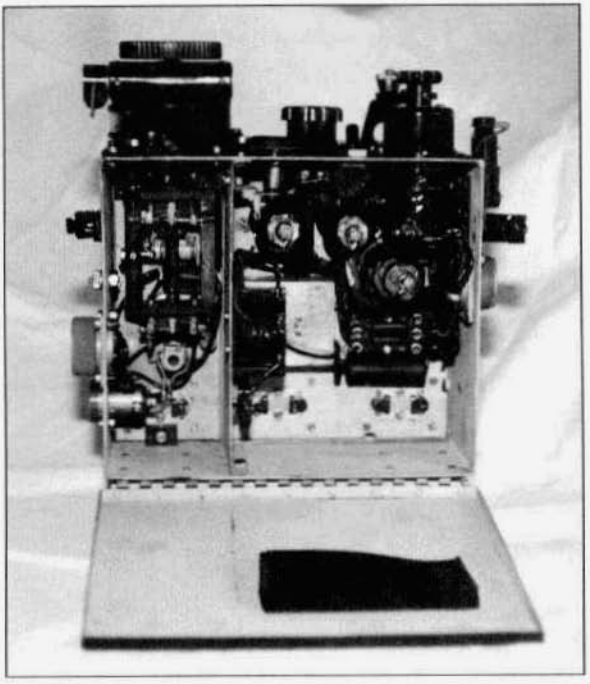

A view of the top of the chassis with cover opened.

Use of sector V.H.F. homing stations adjacent to photographic reconnaissance units was arranged with Headquarters Fighter Command and P.R.U. aircraft began to use the TR.113 3 installation in April 1942, eighteen months after the original requirement had been raised, during which time they had been operated with no radio installation of any kind.

The Fleet Air Arm continued use of the R.1147 and the more sensitive R.1147a in Seafires (Naval version of the Spitfire) as well as various reconnaissance aircraft.

Description Of The R.1147

The R.1147 was intended to supersede the R.1110 previously employed in aircraft for the reception of S.F. modulated (a type of modulation I am unfamiliar with) V.H.F. homing signals from rotating beacon transmitters. The frequency coverage is from 180 to 220 Mc/s, and the signal range up to 100 miles when the aircraft altitude permits a line-of-sight path. Provision is made for operation of the receiver either directly, or from one or two remote control positions. The remote control positions are equipped for power, volume, and tuning by spline shaft.

The receiver is a superhet, with seven tubes, namely a pentode (type VR95) mixer with a triode (type VR59) local oscillator, two pentode (type VR95) I.F. amplifiers operating at 25 Mc/s, a double-diode-triode (type VR55) acting as I.F. detector, heterodyne oscillator and A.F. detector, and two pentodes (type VR53 or 56) acting as separate S.F. and A.F. amplifiers.

The receiver was normally used with a quarter-wavelength fixed whip, though a previously installed type R.1110 system antenna could be used. Power was obtained from a separate 36 watt power unit operating off the 12- or 24-volt aircraft battery.

The dimensions of the receiver are approximately 11 in. by 10 in. by 6 in., and weighs 9 lb. The power unit weighs 13 lb. and its dimensions are the same as the receiver. The weight of the auxiliary equipment, including one or two remote control positions, is approximately 2 lb. or 4 lb. respectively.

A Mark 5B stopwatch was included in the system package for timing the beacon signals.

Summary

The "Spitfire" R.1147 receiver is one of my treasured receivers. As one of the museum officials wrote, I have the honor of being probably the only "expert" on the R.1147 in the Western Hemisphere. That, and three bucks, will buy me lunch at McDonald's. **ER**

AM International Update - June

by Dale Gagnon, KW1I, President

Dayton Hamvention

I have been attending the Dayton Hamvention for over twenty years and this one was one of the best for weather. The forecast had been good for the weekend and the number of buyers and sellers seemed to be up. There was a lot of AM equipment for sale. I saw a complete BC-610 in great condition in the back of a pickup. I saw another partial BC-610 in the process of being purchased. At the same site were two very reasonably priced BC-614 speech amps. I spotted a DX-100, several Rangers, and many pricey Collins receivers, a few 32V family transmitters and many accessories. A few modulation transformers, many power transformers, chokes and all manner of tubes and transmitting components were available for the homebrewer. There was broadcast station equipment in the flea market. I saw a mixing board and a few high quality microphones. There were some nice military finds. An acquaintance purchased a complete BC-375 with tuning units. He also found an excellent condition BC-223 rig. The first one I had ever seen. I was fortunate to get the whip antenna and handcrank generator, with seat and legs, for the WWII era SCR-284. These accessories helped to complete my SCR-284 setup. (This is one of the problems of having too many radio sets. You can go broke buying accessories for the junk you already have lying around, not to mention buying a new rig once in a while!)

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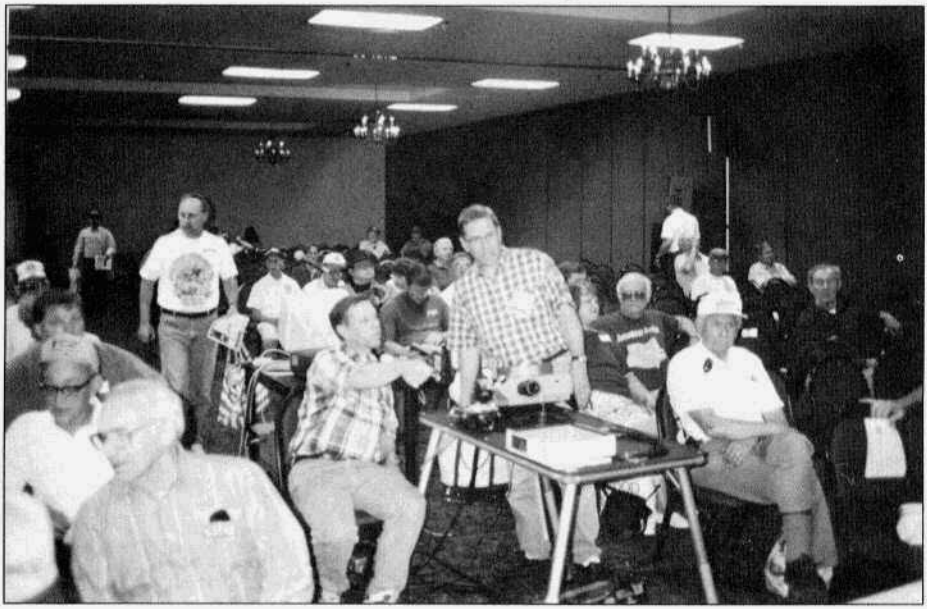
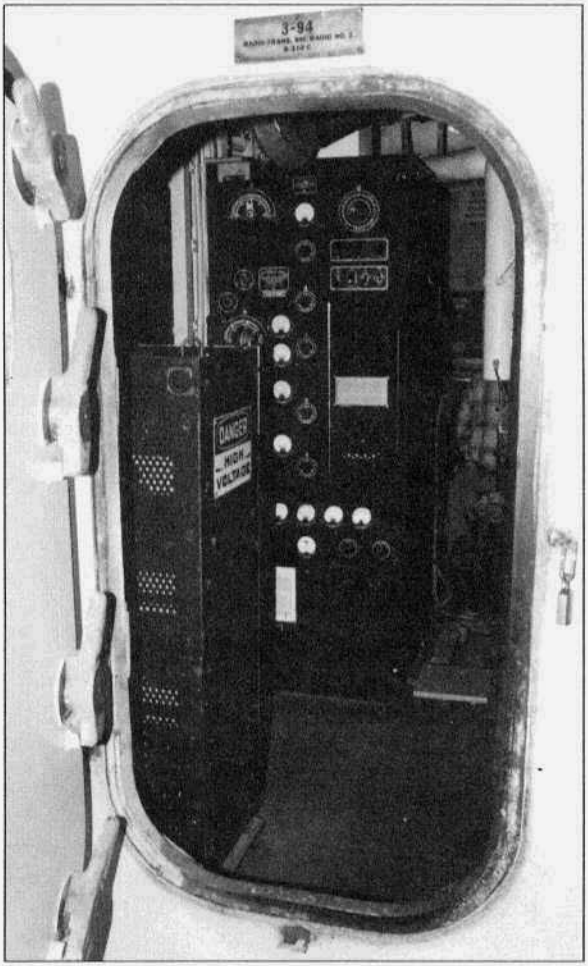


The AM Forum was a great success with about 85-90 people in attendance. *Photo by Dennis Petrich, KØEOO.*



A TAJ (low frequency) transmitter visible inside Radio 2 on the cruiser USS Salem.

The AM Forum at 11:00 am Saturday followed the "Amateur Radio and the Internet" Forum moderated by Mike, W1RC. Near the end of his program, to illustrate the availability of radio info on the Web, he brought up Steve, WB3HUZ's AM Window page with its AM operator pictures and sounds. Mike invited his very large audience to stay for the AM Forum. We ended up with a good group of 85-90. Our program included a brief update on AM International and then got into the main feature, a pictorial review of the radio equipment on the destroyer USS Cassin Young in Boston, the cruiser USS Salem in Quincy, MA, the submarine USS Lionfish and the battleship USS Massachusetts, both in Battleship Cove at Fall River, MA. For those of you who have been searching for a RBA, RBB or RBC receiver, your eyes would have bugged out. There must have been at least two or more dozen on display on theses vessels. Working transmitters included TAJ, TBA, TBK, TBL, TCK, TCS, TCZ and TDE. The presentation even included sound effects of one of the motor-generator sets starting up.

Special thanks to Brown, W1NZR for getting most of the gear in the photos working and actually checking in to our East Coast Military Net on AM using many of these transmitters on these ships over the last several years.

Saturday evening a dozen or more AM'ers and a number from the Collins Collector Association met for our annual pizza get together. We had our usual good time.

The accommodations for our forum were excellent and there is now room for 150 or more. We are tentatively planning to request another AM Forum at next year's Hamvention so think about marking your calendar now!

Naval Museum Ships Operating Event

From 1300 Z July 18 to 2100Z July 19 as many as two dozen ships will be operating this event. They will be calling CQ Special Event, CQ Museum Ships. Original Navy radio gear will be

used whenever possible. No specific frequencies have been designated, so listen for the special event CQ on the phone bands and the distinctive sounds of old transmitters in the CW bands. Participating ships will send their logs to the USS Salem Radio Club C/O W1QWT. Stations working two or more ships will receive a certificate, if an SASE is sent to Bob, W1QWT (good in call book). Some of the participating ships include:

Ship	Location	Call
USS Salem Cruiser	Quincy, MA	K1USN
USS Massachusetts Battleship	Fall River, MA	KN1EPL
USS Texas Battleship	TX	TBD
USS The Sullivans Destroyer	New York, NY	W2TU
USS Little Rock Cruiser	New York, NY	W2PE
USS Pampanito Submarine	San Franciso, CA	NJ6VT
USS Lexington Carrier	Corpus Christi, TX	W5LEX
USS Requin Submarine	Pittsburgh, PA	W3XX
USS Cod Submarine	OH	K8KRG
USS Batfish Submarine	OK	WØOOG/5
USS Drum Submarine	AL	W4IAX
USS Bowfin Submarine	Pearl Harbor, HI	K1ER/KH6
USS Torsk Submarine	Baltimore, MD	TBD
SS Jeremiah Obrien Liberty Ship	San Francisco, CA	K6TR
SS W.G. Mather Merchant Vessel	Great Lakes	KC8EXL
HMCS Haida Destroyer	Canada	VE3CGJ
MS Kraskin Ice Breaker	St. Petersburg, Russia	UE1ALK

Three smiling faces at Dayton. Left to right: Dennis Petrich, KØEOO; Dale Gagnon, KW1I and Brian Harris, WA5UEK. ***Photo by Dennis Petrich, KØEOO***

Danger Island, 1958, KH6MG/ZK1

by Bill Leahy, WØMP
9815 S. Parker Rd., #512
Parker, CO 80134-8815

I would like to take you back to a time of adventure and discovery. The time was August 13, 1958. The place was San Diego, California. At 0832 local time, the USS Point Defiance (LSD-31) pulled slowly out of the harbor, on its way to support the International Geophysical Year expedition to Danger Island, located in the Northern Cook Islands. On board was my uncle, Master Chief, F.R. Sanderlin, USN, who would be in charge of military personnel on the island and the military liaison with scientists from University of Wisconsin, California Academy of Sciences, National Bureau of Standards, Sacramento Peak Observatory, High Altitude Observatory and Cooper Development Corporation.

You see, there would be an event on October 12, 1958, that would help scientists explain disturbances in the ionosphere and lead the way for new discoveries in wave propagation. The event that would take place was the total eclipse of the sun. Danger Island was selected by the National Academy of Sciences because of "time and length of totality and the position of the sun during totality". Some of the tests were to be as follows:

"Measurement of Lyman alpha and X-radiation from rockets flown before, during, and after totality. Four rockets to be flown during partial phases to determine, if possible, something about the contribution to such radiation of active solar regions. Two rockets to be flown during totality will measure total Lyman alpha and X-radiation and will also attempt to determine the distribution of Lyman alpha around the sun.

"Operate a vertical-incidence ionospheric sounder to determine changes in ion density as a function of heights as the eclipse progresses". This test used a 10 KW transmitter, with an output pulse of 50 microseconds from 1 to 5 MHz. The antenna was a delta configuration, 400 feet transmitting and 300 feet receiving.

"Operate an interferometer of Fabry-Paret type to map by position angle and height, the intensity and line profiles of the coronal lines of the Fe XXV and Ca XV".

"Undertake measurement of the intensity of the white-light corona at large distances from the solar surface radius".

"Attempt rapid sequence photographs of the flash spectrum with high dispersion".

The USS Point Defiance proceeded north, up the coast of California to Seal Beach, to load the 8 NIKE-ASP sounding rockets that would be required for the tests. After the task was accomplished, the ship got underway, bound for Danger Island, with stops in Hawaii and Manihiki. It is the stop in Hawaii that would eventually lead to a new country for many Radio Amateurs throughout the world, because it would be the first time that the North Cook Islands were QRV on the amateur bands. The ship docked in Pearl Harbor at 1026 local time, August 19. The ship was to load field gear and a civilian passenger. That passenger was Leo Honea, chief engineer of WWVH and KH6MG (now WØGE). Leo would be on the expedition to support the radio transmitters and communications that would be used

One of the best photos from the expedition to Danger Island. Can't we all imagine ourselves operating from a location like this.

as part of the ionospheric tests. Along with his expedition duties, he would operate his own personal amateur radio station. The radio equipment he took with him consisted of a Viking Ranger transmitter, Collins 75A-2 and Hammarlund SP-600 receivers, and a homebrew antenna matchbox.

The ship proceeded on to Manihiki, to pick up a Cook Islands' administrator who would accompany the ship to the island. The Cook Islands' administration would provide valuable assistance to the expedition members as to what they could expect on Danger, Nassau and Suwarrow Islands. The following paragraphs have been taken from a letter to the California Academy of Sciences from the Fisheries Division, Cook Islands Administration.

"Nassau is a low island with typical atoll vegetation but has no lagoon and has a very bad landing for small boats. This island has practically no lee in bad weather. The sea breaks right around the reef and it is necessary to land over the reef in a shallow surf boat steered with a long sweep."

"You will find the climate pleasant and there are no special precautions necessary against any tropical disease. Pukapuka (Danger Island) and Nassau however have plenty of mosquitoes, which make some form of fly and mosquito screening essential by day and night. Flies are bad on most islands. There are no mosquitoes however on Suwarrow unless they possibly have started up from discarded water catchment areas. There is a water catchment area on Suwarrow which is not very permanent and may be subject to damage. A small iron roof and a water tank may take care of all the water a small expedition may need but this may be low if a native shell diving party is there."

"There are ample coconuts on all these islands and for anyone familiar with the subsistence food of atolls there is ample food to live on. However this is of course a relative term, and as you

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know many people are unable to live on the food. All three islands are badly overrun with rats. The rats are tame enough that they enter and feed in houses in daytime. I would suggest that your scientific equipment be well protected from possible rat damage. Cockroaches are common and do damage to all photographic gear."

"Australian white ant is common in Pukapuka and in Suwarrow. It should be remembered that the coconut trees on Suwarrow are generally riddled with this white ant, which renders them very dangerous in strong winds. When setting up a camp it would be well to remember that long tall trees often snap off with little warning when they are riddled with white ants."

"Like most of the Cook Islands, these three islands are in the Hurricane belt, which means in practice, that there is no local shipping between them from December until the beginning of April. Hurricanes are not frequent in these islands and the last one occurred in 1942. I was in Suwarrow at that time and had the misfortune to arrive there in a small cutter as the sea was rising, preceding a very violent hurricane. There is another island of Penrhyn, to the east of Suwarrow, which has a good entrance into the lagoon. There are two villages on Penrhyn and several small stores carrying limited supplies, a radio station in communication with Rarotonga, and this island is considered to be out of the Hurricane belt if you should intend to stay after December. During the hurricane in 1942, Suwarrow was completely swept by heavy seas which rose 23 feet above normal high water. We survived by being lashed into the tops of a group of Tamanu trees. Even after such a disastrous hurricane, it was still possible to live or rather exist from native subsistence foods. All fish and shellfish are safe to eat and are in ample supply."

"If your expedition has a marine biologist working on collecting fish, I doubt whether he could find a better island anywhere for studying fish. If no people are living on the atoll, fish are not hook shy and large tuna can be caught inside the lagoon. No classification of the Cook Islands has ever been made and I understand from the Smithsonian Institution that there are probably many varieties unknown to science in the area."

These are some of the conditions with which the expeditioneers had to contend with for the next two months.

The USS Point Defiance reached Danger Island August 26, 1958. The following is from the Navy log of F.R. Sanderlin.

"1st. day, 8/26/58 - Reconnoitered Danger Is. Group with LVT's and helicopter for possible landing and camp site. Found landing north side Motu Katava, possible camp site. LVT's cannot traverse living coral. No other surface presents problem within reason. Bogged down several times, but managed to proceed unassisted. Natives very helpful, friendly and speak English very well. Appear healthy and happy. Islands very beautiful. Heavy lush foliage coconut palms, pandanus. Reef and lagoon paradise of marine flora and fauna. Saw several small sharks, both outside and inside reef. One large Moray Eel. Beaches are pink to white coral limestone sands. Walking barefooted hazardous. Will attempt landing in morning."

Personnel landed the next day and started the long task of off loading field gear, test equipment, generators, food, water and explosives. After a few days the ship would leave and sail to Samoa, leaving 29 Navy/Marines and 15 scientists, including Leo Honea, to fend for themselves. The ship could not stay at the island as the lagoon had no entrance deep enough for the ship to enter and the ocean was too deep for anchoring. The ship would return at various times

to resupply the expeditioneers with food, water and other supplies during their stay on the island.

The Navy commenced blasting a 1200 foot long channel through the coral reef so the small landing craft could land and resupply the expedition members. This channel also was welcomed by the local natives of the atoll, as a safe passage from the lagoon to the open sea. The men suffered many coral cuts which do not heal very fast in the wet environment of the tropics. The blasting went on for quite a few days. Various types of explosives were used to penetrate the soft coral and then, using a drag, they moved the coral into the open sea with an amphibious tractor. During this time a Marine master sergeant was injured when a cable attached to the drag snapped. There were no doctors with the group and Leo Honea used his amateur radio station to call for assistance in San Francisco. The Navy doctors talked with the medical corpsman on the island regarding the first aid to be given until the ship could come and evacuate the Marine. The sergeant recovered and was back on the island in a few weeks.

The Navy launched two NIKE-ASP rockets for telemetry tests before the eclipse. These rockets set a new altitude record of a 158 miles. Immediately after launching the rockets, they were informed that a very large solar flare was in progress. The scientists were able to gather valuable, unexpected data from these test rockets.

Radio towers and antennas were erected by the Navy for communications and ionospheric testing. Two of these antennas were for amateur radio use. One antenna was a longwire, approximately 500 feet long erected over the lagoon, and a 10 meter, 3-element quad. Ten meters was very good for communications, as Solar Cycle 19 was just past its peak. Cycle 19 was the most active in the history of keeping records on sunspots. It peaked at 201 in February of 1958, and was at 184 for most of the time of the expedition.

Leo would operate as KH6MG/ZK1 during three weeks of the expedition. He operated CW, with some AM operation. SSB was only operated by the Navy for a worldwide solar flare alarm channel. The SSB mode of operation was in its infancy with amateur radio. Leo found that with his low power (50-75 watts), he had more contacts with CW. Leo contacted approximately 4000 radio amateurs throughout the world. One operating anecdote that Leo remembers is, he was listening one day to two radio amateurs talking on 10 meters. He overheard one say to the other that he wished he could work the ZK1 that was active and that he had not been able to make a contact yet. Leo broke in to the conversation and asked "Do you really want to work the North Cook Islands?" The ham said "Yes, I sure do!" and asked if he had a connection with the Danger Island expedition. To which Leo answered, "Yes, it's me, KH6MG/ZK1, you have just worked him!" The new one was in the bag and there was a very surprised and happy ham! After Leo returned to Hawaii, he did not wait for a QSL card from his contacts, he sent QSLs to EVERY contact!

During the two month stay on the island a visitor appeared with a group of video technicians. He was Lowell Thomas, of television fame. Thomas was there to do a story of the IGY expedition and of the eclipse of the sun for his television adventure and travel show, "Odyssey". The day came for the eclipse and the sky was overcast. Only a partial viewing was had by the expeditioneers, but most of the tests did not need the eclipse to be viewed. Thomas reported the tests as a failure, used file footage of other islands in the Pacific on the show and left the island. The tests were far from a failure. Scientific data was gathered which to this

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Third Annual Military Group Meet

by Hank Brown, W6DJX
4141 West L-2
Lancaster, CA 93536

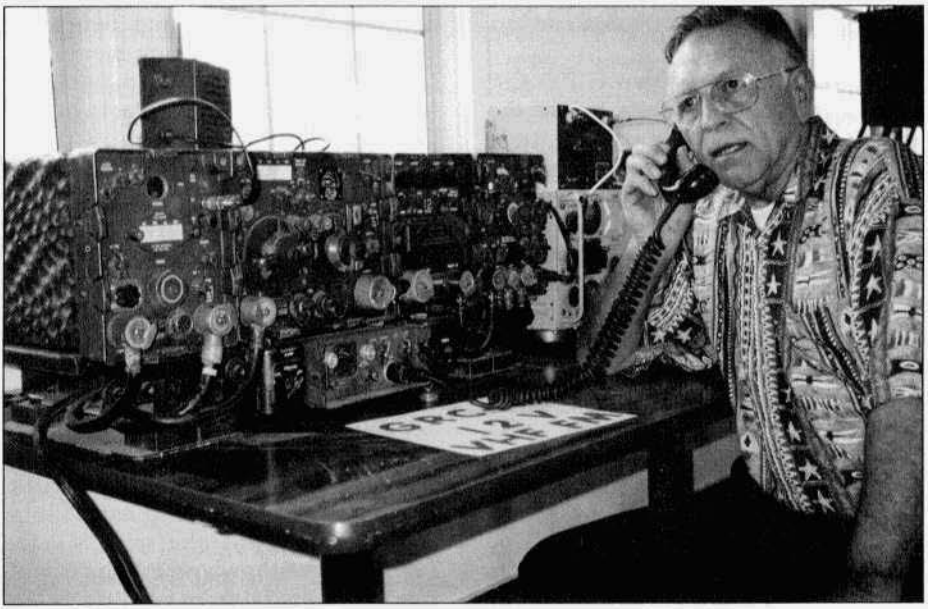
The Third Annual Military Radio Collectors Group meeting was held in the NCO Club, Camp San Luis, May 2nd and was a great success.

The program officially started Saturday morning but half a dozen participants gathered Friday afternoon to unload equipment for display and set up camp. Antenna masts and rigs were set up for operation in the overnight camp grounds just 100 yards from the NCO Club building.

Guests came from Washington, Virginia, Oregon, California and Oklahoma. Others heard of the meet on a local 2-meter channel and came by to join in.

A light on/off rain Saturday morning did not dampen the enthusiasm for the swap meet. All equipment, parts, books and other items were of military interest. The collection of items was probably one of the largest variety of military gear seen at a swap meet. Many were able to add that last item to complete a rig or system being worked on. Tables were cleared about 9AM so the general program could get underway.

Andy Miller, KD6TKX, put together an interesting program of speakers and subjects this year. Paul Bernhardt, KF4FOR, presented a slide program on the ever popular ART-13 transmitter. He provided handouts on conversion information articles and a list of manuals that were published for the ART-13. Slides shown were of the block diagram, mechanical tuning sequence, ART-13 accessories and



Hank Brown, W6DJX, operating a GRC-7. *Photo by Art Plummer, W6LR.*

Bjorn Forsberg, SM5UR, operating a Wireless Set No. 19. ***Photo by Art Plummer, W6LR***

photos of the rig. He also provided information on the design of a suitable power supply for the unit. The transmitter was used as late as 1959 by the Navy.

Bjorn Forsberg, SM5UR/6, was next with a dynamic presentation of the wireless set No. 19 "Russian Tank" set. The set came in the Mark 1, Mark 2, or Mark 3 versions and first appeared about 1935 in Canada. In 1942 about 100 sets per month were being produced. The equipment was retired from Canadian service about 1963. Bjorn worked another WS No. 19 in the parking lot on the small UHF set (220 mcs) and then demonstrated how a contact on the high end of 75 meters sounded. The set with original mics, headphones, junction boxes and antenna system was powered by a 12 VDC supply. Bjorn also stated the set was never in American tanks; only Canadian, British and European vehicles.

A short restoration tips session was held with information on vibrator repairs, contact cleaning and maintenance, adjustment of anti-back lash gear sets and the use of RTV in plugs and connectors.

Andy Miller took a few minutes to encourage stations to get on the air with their gear. The West Coast Military Net meets Saturday evenings 9:30 PM and Sunday mornings 9:30 AM on/about 3970 kcs. Any type of check-in is welcome. Listen for WA6OPE, NCS, on AM with a TBL-7.

Lunch was next. Dave Ragsdale, in addition to arranging for the facilities, also ran a delicious Santa Maria style BBQ of steak, chicken, salad, baked beans and hot bread.

Following the lunch Tom Horsfall, WA6OPE, presented a most interesting report on the restoration of a WW-2 fleet submarine in San Francisco. The USS Pampanito was active in WW-2 and sank 6 enemy vessels, damaged four others and rescued 73 allied POW survivors during the 1943-1945 period. Tom is responsible for radio and electronics equipment installation, restoration and operation on the sub. He reported the original radio receivers, transmitters, and a number of other systems are up and running as they were in the summer of 1945. He is presently working on the three radar sets on board, a Loran receiver and other related equipment.

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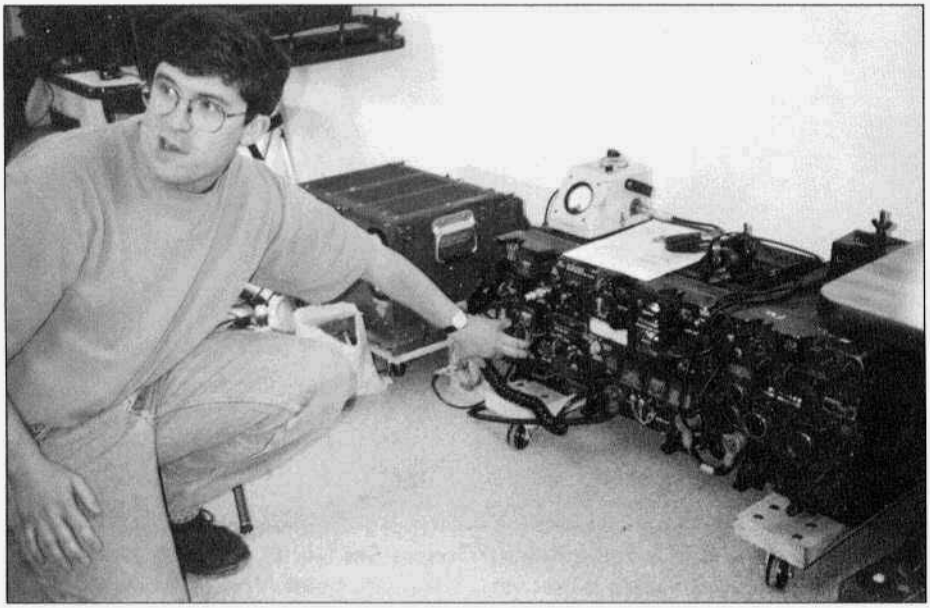
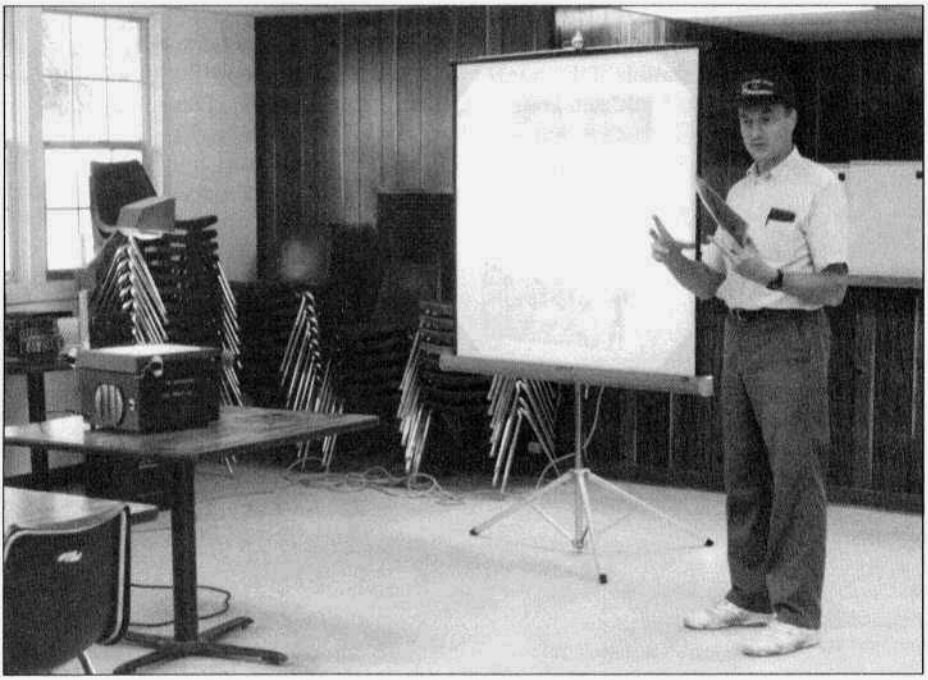


Mark Blair, KE6MYK, demonstrating the T-195, R-392 and GRC-19. *Photo by Art Plumer, W6LR.*



Paul Bernhardt, KF4FOR, giving a presentation on the ART-13. *Photo by Robert Heusser,K6TUY.*

Tom Horsfall, WA6OPE (right) at his swapmeet table. *Photo by Norm Hall, W6JOD.*

A display of military morale radios by Henry Engstrom, KD6KWH. *Photo by Norm Hall, W6JOD.*

Henry Engstrom brought along a part of his collection of military morale or entertainment radios. His presentation discussed radios such as the R-100, Tropic Master, Navy REO, REP and REH receivers. The last three had a red tag warning the units are not to be used aboard ship. Another surprise was the Navy RCN and RCM units—which were juke boxes. Also, his research turned up the fact that the navy REK system was a complete entertainment system aboard a hospital ship with a CR-88 receiver. The Hallicrafters S-29 was an R-62/ER while the S-39 was an R-80/ER.

Quite a few different units and com-

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A Solution to an S-Meter Problem

by Mike Brown "Brownie" W8DJY
6297 Brown's Run Rd.
Middletown, OH 45042

I recently purchased an SX-101A. Cosmetically the old Hallicrafters radio receiver was in very poor shape. I believe it had been stored in a barn because of its odor and the fact that I removed straw from the inside.

After a good cleaning, 1000 Q-tips later, and some simple tube replacements, I was able to bring this receiver back to life. I set my SX-28 aside for a few weeks and began using the NEW receiver daily. I have really enjoyed it. After a short time, I noticed that the strongest signals I was receiving never exceeded 30 dB over S-9. Well, the S-meter should read as high as 80 dB over S-9. Although I thought I had indeed checked V15 (6BA6) as good, I replaced it again with another one. Again, I thought I had solved the problem only to find that now the S-meter's maximum was 40 dB over S-9. I think I still have a problem with the S-meter amplifier circuit.

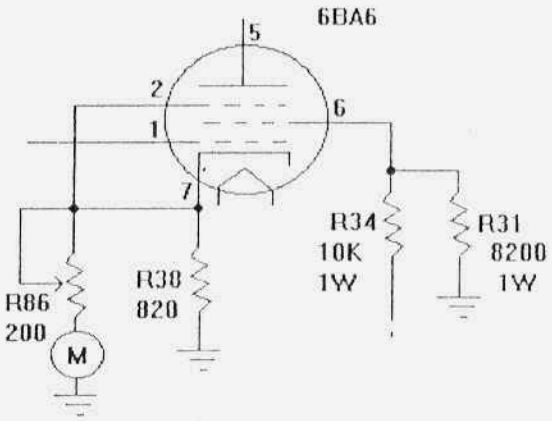
So I turned the receiver on its side and began checking resistor values. What a surprise to find that many had changed value. Below is the diagram of the S-meter circuit. I replaced three resistors, R31, and R34, that make up the voltage divider for the screen supply, and R38 in the cathode line of the 6BA6.

I then calibrated the S meter as suggested in the Hallicrafters instruction manual.

(1) Short receiver antenna input to ground
(2) Set sensitivity control to 10
(3) Set AM/SSB switch to upper or lower AM
(4) Set AVC switch ON

Then adjust the "S" meter adj control R86 on the rear of the receiver chassis until the meter pointer is in line with the right-hand index mark.

Over the last several weeks of using the repaired receiver, the S meter has risen to values of 50 dB over S-9 for some selected signals such as WA1HLR, W8VYZ, K4KYV, WB8BEM, WA1KNX, and W8ZR.



I realize that S-meter readings are not uniform over various brands and types of receivers. The Hallicrafters Company tried to establish that 50 µV of signal would be equivalent to S-9 and that each S unit would equal 6 dB. The SX-101A is one of the receivers that has an S-meter which reads out in S units and in microvolts. I really like this feature. The Hallicrafters manual clearly states that this S-meter indicates approximate micro-

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VINTAGE NETS

California Early Bird Net: Saturday mornings at 8 AM PST on 3870.
California Vintage SSB Net: Sunday mornings at 8 AM PST on 3835
Southeast Swap Net: Tuesday nights at 7:30 ET on 3885. Net control is Andy, WA4KCY. This same group also has a Sunday afternoon net on 3885 at 2 PM ET.
Eastern AM Swap Net: Thursday evenings on 3885 at 7:30 ET. This net is for the exchange of AM related equipment only.
Northwest AM Net: AM activity daily 3 PM - 5 PM on 3875. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT. The formal AM net and swap session is on 3875, Sundays at 3 PM.
K6HQI Memorial Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 3:00 PM PT, 7 days a week and usually goes for about 2 hours. Net control varies with propagation.
Arizona AM Net: Meets Sundays at 3 PM MT on 3855. On 6 meters (50.4) this group meets at 8 PM MT Saturdays.
Colorado Morning Net: An informal group of AM'ers get together on 3876 Monday, Wednesday Friday, Saturday and Sunday mornings at 7AM MT.
DX-60 Net: This net meets on 7290 at 2 PM ET, Sundays. Net control is Jim, N8LUV. This net is all about entry-level AM rigs like the Heath DX-60.
Eastcoast Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is Dennis, WA3YXN but sometimes it rotates to other ops. Saturday mornings on 1995 at 0500 ET. Will move to 3885 for summer.
Westcoast Military Radio Collectors Net: Meets Sunday mornings at 0930 local on 3975 + or - QRM, except the 1st Sunday of the month when the net meets at 2130 local. Net control is Tom, WA6OPE.
Gray Hair Net: The oldest (or one of the oldest - 44+ years) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8:00 PM EST & 8:30 EDT. URL: http://www.crompton.com/wa3dsp/grayhair.html
Vintage SSB Net: Net control is Andy, WB0SNF. The Net meets on 14.293 at 1900Z Sunday and is followed by the New Heathkit Net at about 2030Z on the same freq. Net control is Don, WB6LRG.
Collins Collectors Association Nets: Technical and swap session each Sunday, 14.263 MHz, 2000Z, is a long-established net run by call areas. Informal ragchew nets meet at 0100Z Tuesday nights on 3805 and on Thursday nights on 3875.
Collins Swap and Shop Net: Meets every Tuesday at 8PM EST on 3955. Net control is Ed, WA3AMJ.
Drake Users Net: Another relatively new net. This group gets together on 3865 Saturday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, WZ8O; Rob, KE3EE and Huey, KD3UI.
Swan Users Net: This group meets on 14.250 Sunday afternoons at 4 PM CT. The net control is usually Dean, WA9AZK.
Nostalgia/Hi-Fi Net: Meets on Fridays at 7 PM PT on 1930. This net was started in 1978.
K1JCL 6-Meter AM Repeater: Located in Connecticut it operates on 50.4 in and 50.5 out.
JA AM Net: 14.190 at 0100 UTC, Saturdays and Sundays. Stan Tajima, JA1DNQ is net control.
Fort Wayne Area 6-Meter AM Net: Meets nightly at 7 PM ET on 50.58 MHz. This net has been meeting since the late '50's. Most members are using vintage or homebrew gear.
Southern California Sunday Morning 6 Meter AM Net: 10 AM Sundays on 50.4. Net control is Will, AA6DD.
Old Buzzards Net: Meets daily at 10 AM Local time on 3945. This is an informal net in the New England area . Net hosts are George, W1GAC and Paul, W1ECO.
Canadian Boatanchor Net: Meets Saturday afternoons, 3:00 PM EST on 3745. For hams who enjoy using AM, restoring and operating
Midwest Classic Radio Net: Saturday mornings on 3885 at 8AM Central time. Only AM checkins allowed. Swap/sale, hamfest info and technical help are frequent topics.
Boatanchors CW Group: Meets nightly at 0200Z on 3579.5 Mhz (7050 alternate). Listen for stations calling "CQ BA" or signing "BA" after their callsigns.
Wireless Set No. 19 Net: Meets the first Sunday of every month on 14.165 at 1900Z and 3760 at 2000Z. Net control is Dave, VA3ORP.
Beer Town Traders Net: On 3885, 5:30 Central Daylight Time on Saturdays.

Nets that are underlined are new or have changed times or frequency since the last issue.

Homebrewing an 813 Transmitter

by Ron Johnson, WB4GWA
P.O. Box 306
Concord, GA 30206
Johnson_rw@Mercer.edu

The thing that makes vintage AM so appealing to a lot of us who remember, "the good old days" is the fine art of homebrewing. Last year I built a homebrew receiver and enjoyed getting it going. But when Andy, WA4KCY, showed me his windowed 4-125 transmitter the bug hit me hard. I decided I wanted to clone his transmitter but I did not want to use 4-125's due to the availability factor. Andy and I felt like the old 813 was a good tube to use since there were truckloads of them still around and since they are so rugged. Other than a few changes related to the 813's the design would follow Andy's transmitter.

I have often heard hams on the air talking about their homebrew transmitters and receivers and I had always said that one day I would have a station that was totally homebrew. I like the commercial stuff as well as anyone, and I like to take a vintage rig, go through it, and bring it back to life, but there is something magic about running a station that you designed and built yourself.

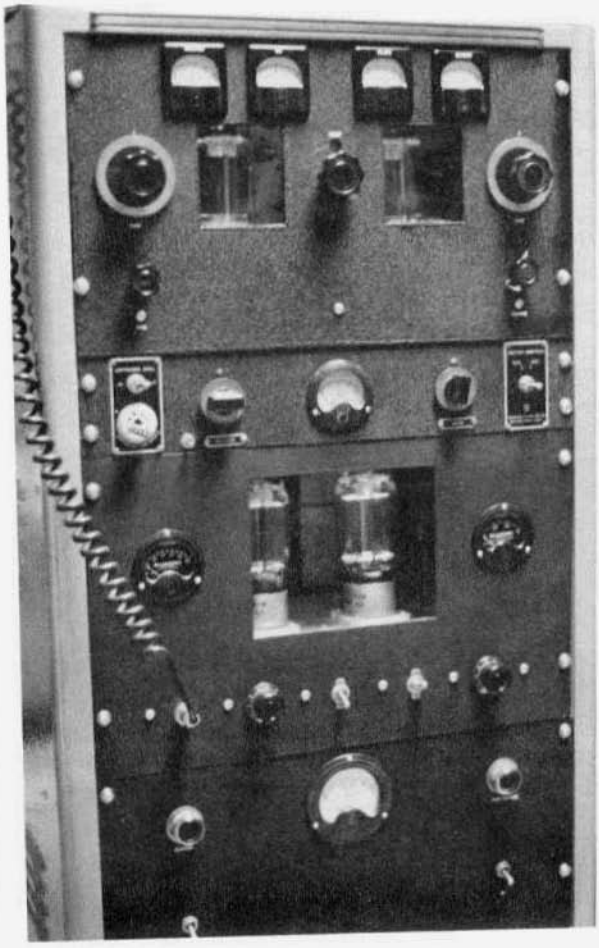
I took a few snapshots of Andy's transmitter and studied the article he wrote in Electric Radio [ER #29, September, 1991] and proceeded to get started. Part of the challenge these days is just getting the parts you need to build a project. But Andy was more than helpful and encouraging to me in this matter. He had several parts I needed and willingly let me purchase them from him. He knew that I was serious, so he didn't mind parting with his store of parts. Over a period of months, I gathered parts from every corner of my basement and scoured the hamfests I could get to in order to find others I needed. Sometimes it proved to be a very interesting process.

The Cabinet

If you are going to build a transmitter, you will, of course, need something to put it in. But finding cabinets is no easy matter either. Rex, K4JBJ and I were talking one day, and I mentioned to him that I needed a Bud type cabinet for my project. We went downstairs to his basement and found a Bud cabinet over in the corner that was in pretty sad shape. It had lots of surface rust but no holes in it. So, I managed to take it off his hands and brought it home. I sandblasted the cabinet until I was sure that all the surface rust was stripped away. Then I put a rust neutralizer on the spots that I had sandblasted. After many hours of surface preparation, I decided I wanted to paint it Hallicrafters blue. I managed to find a nice hammertone blue that roughly matched the color I wanted. Hammertone is a good paint to use because it will cover any blemishes in the finish. The results proved to be outstanding. The cabinet looked brand new. I also welded some nice three inch wheels on the bottom of the cabinet to make it easy to move around.

Building the Power Supply

Andy helped me out with the transformer and choke I needed that would provide a solid 2500 volts of DC for the modulator and final. I had oil-filled caps in my stock that would do nicely, but I



The author's 813 transmitter. The small deck between the RF deck and the modulator deck is a Millen 90800 exciter.

needed a diode stack that would handle the demands of the voltage. I did not have enough room in the cabinet to run rectifier tubes, so the diode stack was the answer. Andy and I visited Tom Hand's, W4WDC, shack one day to watch him wind transformers and I happened to mention to him that I needed a diode stack or some good way to mount a stack in my cabinet. Tom handed me a stack in a nice mounting that he had taken out of some other piece of equipment and asked if I thought it would work. It had 32 diodes in each leg, so I knew it would work. And it was just the right size to fit in the cabinet.

After getting the power supply placed in the cabinet where I wanted it, I was ready to test it. And sure enough, it was more than adequate. I had picked up a 100 watt 70k resistor at a hamfest for the bleeder, so I knew that the supply was stout enough to handle what I was going to need. I wound up with about 2600 volts (static) available to the project. The next thing I had to figure out was how to install shelves that would support the modulator and rf deck. I found some aluminum angle at Home Depot and chose to use plexiglass shelving so I could look down through the layers in case smoke leaked out from some unexpected source or in case I needed to check the routing of some wires.

The Speech Amp and Modulator

Since I was using Andy's transmitter as a model, and since he had worked most of the bugs out of his, I felt reasonably sure that the design could be counted on. So, I proceeded. I used a steel chassis from Antique Electronic Supply. Jim Taylor (SK), W4PNM, had designed the Class AB1 modulator so I knew it would be a good one. I substituted the 813's in place of the 4-125's and started to work.

The speech amp uses a 6SL7 as 1st and 2nd audio amp, a 6H6 limiter, and a 6J5 coupled to a 6SN7 with a single

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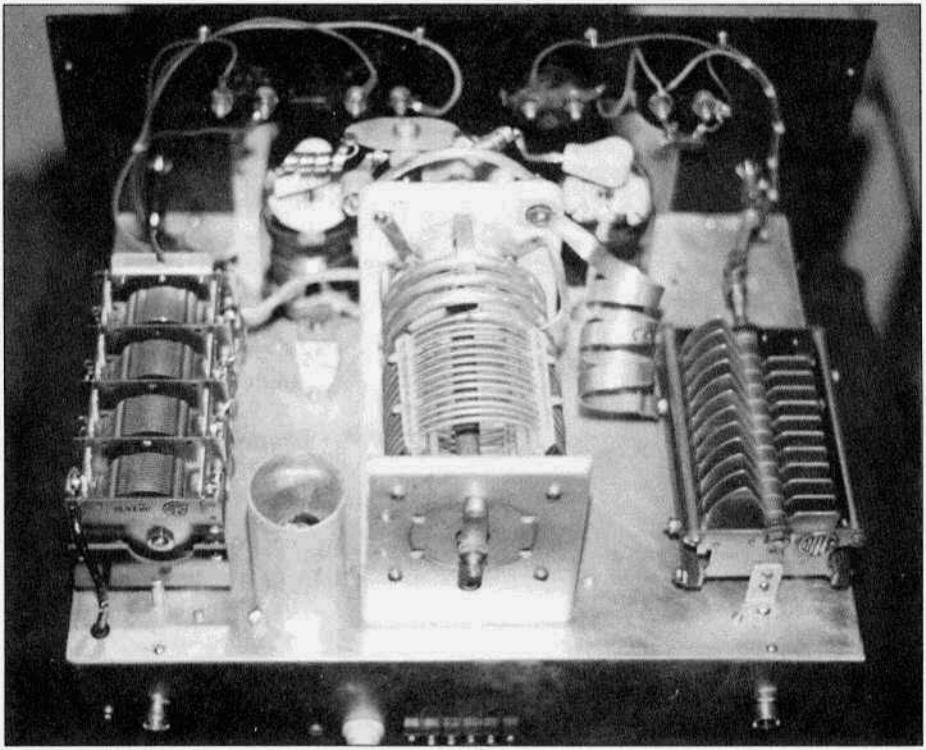
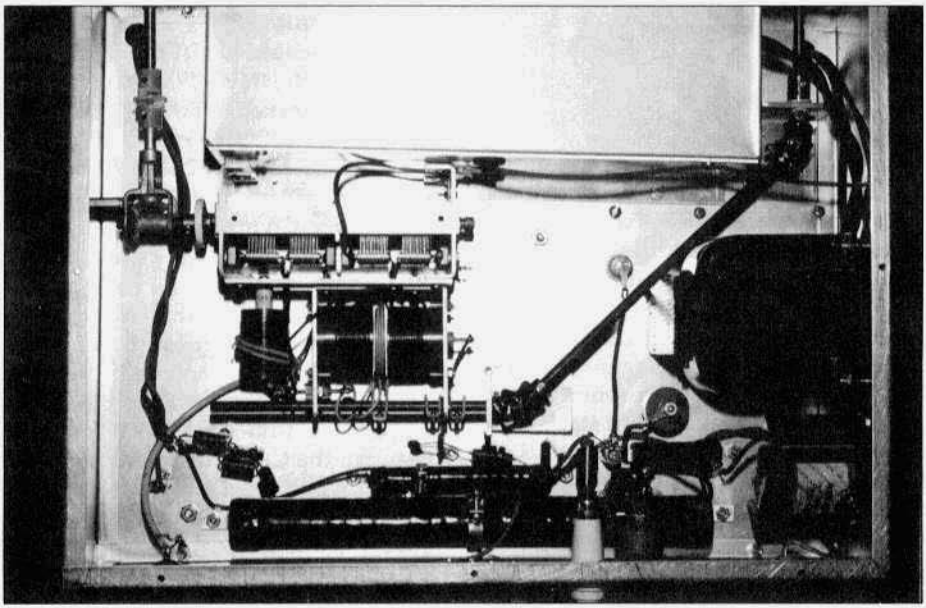


View of the RF deck from the top/rear.



Underchassis view of the RF deck.

plate to a push-pull grid interstage audio transformer with a 1:2 step up ratio. It operates as a straight voltage amplifier. All of the stages were coupled using .1 mylar caps. The 6SN7 plates are also coupled to the 813's using .1 caps. I found a transformer that would give me about 800 volts and filament voltage for the speech amp from an old military Collins junker and used a Radio Shack 6.3 volt transformer turned around to give me bias voltage. A bridge provided all the voltage I needed to develop the bias. I regulated it with a voltage divider network and a wirewound pot for adjustment. I use a D-104 mike and the audio is very natural sounding.

The Exciter

Andy had used a Millen 90801 exciter in his transmitter. It fit the cabinet nicely and I decided I would do the same. The only problem was that the 90801 is scarce. I looked all over the place for one but to no avail. So, the next best thing was to get something close. The Millen 90800 was just what I needed. I found one in California and bought it. When it came, I was a little shocked at its condition. It had been stored a long time, evidently. The dirt daubers had made nests in it and the cabinet was rusty. But, no problem, I had a sand blaster. I took the Millen completely apart and blasted the cabinet until I was sure it was clean. Some wrinkle paint and it looked new. Then I wired it back to original. I even ordered the cloth covered wire that was in the exciter and made sure it was as close to factory as possible.

The other road block I ran into was with the coils for the plate and oscillator circuit. The 90800 uses a 6L6 and an 807 and drops voltages with large resistors to obtain screen voltage. It required -45 volts of bias which was furnished by the supply I built for the exciter. The coils would be a challenge. I found a copy of the Handbook that had the Millen prototype in it and tried to wind the coils. But it was difficult to get them like I wanted them. A visit to the Internet yielded the name of a guy in the Northeast that apparently had bought out the Millen stock years ago. I called Ralph and he was very helpful. He had all the coils for the exciter available. I bought all the coils for 160 through 10 meters from him. Now the exciter was complete. It furnishes about 15 watts which is more than enough for the 813's. I dropped the plate voltage on the exciter so I could drive the 813's with about 10 watts.

The RF Deck

The Class C final using 813's is a good way to go because it doesn't need neutralization, especially when you mount the tubes below chassis level. I ran into another problem trying to find a B&W 850A. I did not have one and the hamfests proved to be of no help. I found one in my newly arrived issue of Electric Radio one month, but as soon as I called, the guy said it had already been sold. I was determined to have one, so I kept looking. I went to a hamfest in Marietta, Georgia and met a fellow who was tailgating. He had the usual assortment of parts and a B&W coil. I was looking at it when he tried to sell it to me. "You need that," he said. "Nope, what I really need is a B&W 850A", I told him. He said he had one at home in an old amp and that he would look for it.

About a week later, I got a call from him. He said he had found the B&W but that it was in bad condition. I told him I would take it anyway. He actually brought it by my office one day and gave it to me. I tried to pay him, but he didn't want anything for it. I immediately called Andy with the good news. The bad news was that it was a disaster. The plexiglass spacers were all brittle from heat over the years and it was as dirty as any I had ever seen. So, I took it home and started to restore it. After a

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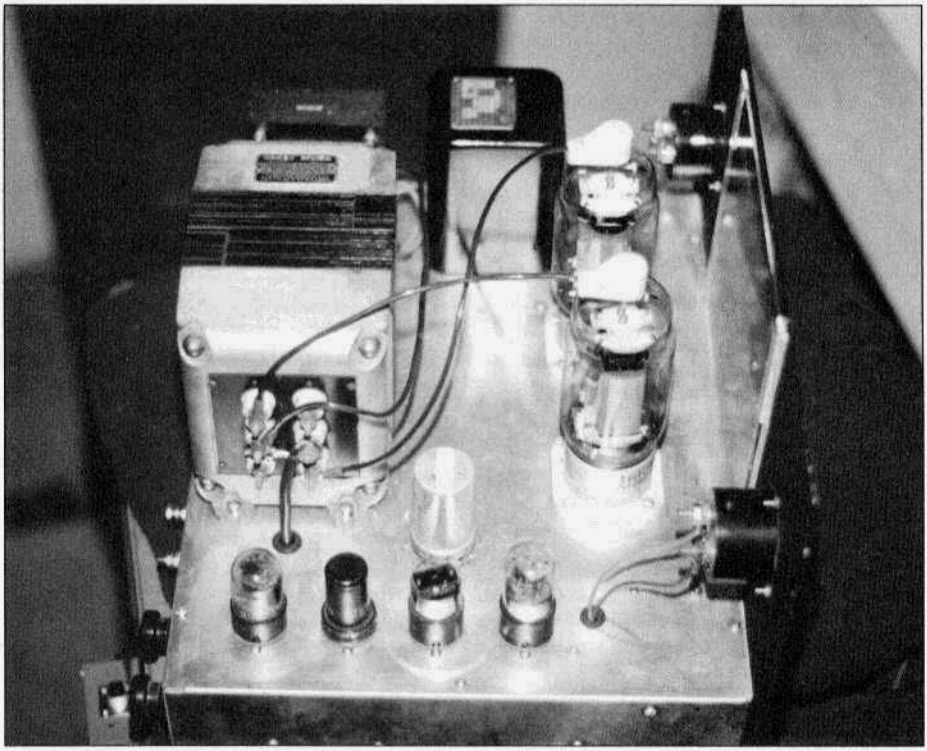
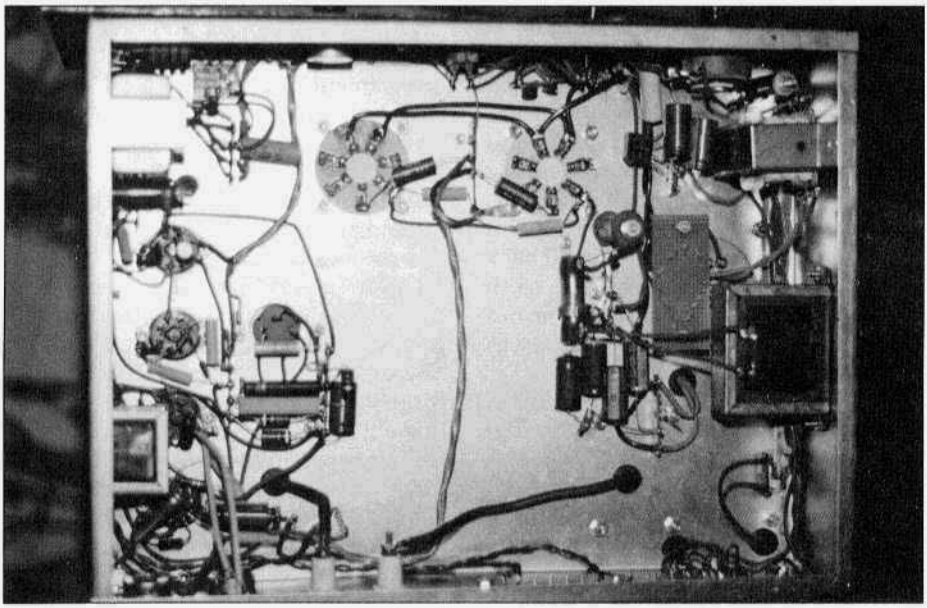


Sideview of the speech amplifier/modulator deck



Under the chassis of the speech amplifier/modulator deck.

week of work on it which included taking it all apart, re-silverplating the coil and making new spacers, it turned out as good as new. I was ready to move on.

The final uses a 150 mmf. tuning variable and a 2500 mmf. loading cap along with the 850A in a pi-network. The chassis is also steel, like the modulator, measuring 13"x17". The screens and filaments are by-passed and RF chokes are used in the plate and screen voltage inputs. The plate choke is a B&W that I got from a local parts house.

The grid circuit is a National MB-40. It is a broad-banded circuit probably manufactured around the '50s. It will tune 80 through 10 with a single turn of its tuning capacitor. It also has a swinging link that helps facilitate the exciter loading. Flexible shafts and universals connect everything to the front panel. The tubes are lowered into the chassis even with where the glass meets the metal tube base. This eliminates any need for neutralizing the tubes.

All the RF connections are made with 5/16" silver-plated copper strapping. Silver plating was done with a kit available from Antique Electronic Supply. The B&W 850A is turned around on the chassis so that the tuning, loading and inductor are very close to each other. The shaft that couples the B&W goes between the tubes. In keeping with Andy's design, I fashioned a 2" disk which is fastened to the band change shaft. It displays a 1/4" dry transfer number in the window to indicate band use.

Screen voltage is supplied to the final through a screen dropping resistor and it is controlled with a 6Y6 clamp tube. This eliminates the need for screen and bias supplies. I even asked Andy for a piece of shielding for the 6Y6 that was exactly like his. There are four meters that are across the front of the exciter that measure the grid current, screen current, plate current and plate voltage. And of course, my panel has windows in it to view the tubes just as in the modulator. All the panels were hand cut and finished in black wrinkle

Real World Tests

After four months of work the project was completed. A variac was used to bring it all up slowly. I am always fearful of just "throwing the switch" the first time. The glow of the tubes was a pretty sight. Into a dummy load the transmitter dumped about 530 watts through the Bird wattmeter. When I switched to the antenna and called my friend Lou, he came back with his usual reply, "Back the mike gain down!" I did and we made other adjustments until Lou thought it sounded right. But there was one thing that bothered me. Lou detected a slight a.c. hum on the signal. He lives so close that he can hear everything, so I knew it was probably not going to be heard by anyone else. But it bothered me enough to take the modulator out of the cabinet and look for it.

With the scope set on 50mv of sensitivity I started through the speech amp and checked every point. When I found the slightest sine wave on a DC line, I filtered it until the line was flat. I wanted to see only audio and no a.c. components. After a little extra filtering and placing all leads to the pots in shielded cable, no hum was detected. To quote Lou, "it is as clean as a hound's tooth."

Homebrewing has its rewards. It takes a lot of determination to look for scarce parts and to build from scratch. But anyone who is going to take on a major project needs at least three things to make it a success. 1. Patience--if you are going to build, you must be willing to walk away from the project for a time when you get disgusted or tired of it or when you reach an impasse. And you need to keep searching until you find what you need to complete the project. Don't compromise and make unnecessary shortcuts. They will hurt your work. 2. Vision--you need to be able to see the completed project and to keep a

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Viking II Modifications—Revisiting a Legend
Part 1

by Thomas Bonomo, K6AD
81 Lakewood Circle
San Mateo, CA 94402
bonomo@cpici.com

Last fall, I located an excellent condition Johnson Viking II with the matching 122 VFO and made the trip down to Los Angeles with N6OIP to pick it up. Since then, this underrated transmitter has become one of the favorites in my shack. There is just so much to admire about this great vintage rig. All switches are heavy-duty ceramic as are all of the tube sockets and coil forms. When was the last time you found a piece of amateur gear that was made entirely with heavy-duty ceramic parts? I'll bet its been awhile! The Viking II also features a high quality meter, heavy duty transformers, an oil-filled HV capacitor, extremely good TVI shielding, and it is housed in a very solid cabinet. Nothing cheap in this transmitter!

Its design is straightforward, reliable, and easy-to-troubleshoot. Simple but elegant. No wonder the earlier Viking I (which shared most of the same quality construction features) was the late Ozona Bob's favorite transmitter. Unfortunately, many Viking IIs have not been well cared for physically, so they often look pretty shabby when you see them at swap meets. However, if you put a bit of effort into cosmetic restoration, as I did, they can look really great.

Despite so many high quality features, this rig has never been as popular as the Valiant or the Ranger. This is probably because, at least in stock form, it just doesn't sound as good on either phone or CW. In addition, it requires an external VFO. The need to use an external VFO has never bothered me, though. After all, along with a rack full of crystals, this was just the way ham radio was for many years. You'll discover an added benefit of using an external, rather than an internal VFO as well. Because it is isolated from the heat generated by the transmitter, it is considerably more stable.

My Viking II was well built and had never been modified or restored. The original builder had even placed a drop of red paint on each solder joint after inspection. I began restoration by following the usual practice of replacing all the paper capacitors and electrolytics, and then checked and replaced those resistors which were severely out of tolerance (I felt guilty disturbing all those perfect original solder joints though). This doesn't take too much time, but it can really make a big difference to the final result you'll get.

Even after a full electrical restoration, my first on-the-air phone contacts confirmed the Viking II's reputation for thin, restricted-sounding audio (". . . . say, who's got you by the britches, anyway?"). I also received confirmation that my stock Viking II's CW signal wasn't very clean and that it sounded quite clicky.

Certainly with all the basic goodness built into this transmitter, you'd expected better performance. So, I began exploring why it didn't offer better performance, which ultimately led me to develop some mods to improve the audio quality as well as its CW keying. I hadn't originally intended for this to

The Viking II features band coverage from 160-10 meters and its construction is nearly bulletproof.

turn into another article project, but I spent so much time developing good solutions to these problems that I thought there might be a few other Viking II owners who would enjoy giving their rigs a new lease on life. If you make all of the suggested mods, you will own perhaps one of the best-performing vintage transmitters available today for both phone and CW and it will sound much better than a stock Valiant or Ranger on both phone and CW.

Now I should warn collectors who want to keep their rigs exactly the way they were delivered from the factory that this article probably won't please them. Instead, it is oriented to those collectors who want their Viking IIs to *operate* well, and there is just no way to make this an outstanding transmitter without making a few modifications. On the other hand, I find that it is usually possible to correct poor performance without changing out tube sockets and drilling lots of new holes. I believe that it is preferable to keep the rig as close to original as possible and this is always a primary design goal of any modifications I make. This helps explain my preference for using solid state components "under the hood," rather than adding or changing out tubes if possible. I guess I'm just basically a "no new holes" kind of guy. And anyway, if it is possible to get the same engineering result while maintaining the original chassis and tube lineup by using a few additional solid state devices where they can't be seen, why not? There's nothing wrong with doing it the other way, it's just that my design philosophy reflects the desire to keep the chassis as close to original as possible while bringing performance up to more modern day standards.

Performance measurements revealed that there are three separate problems with the audio which need to be addressed in order for the Viking II to achieve "broadcast quality" sound: 1) distortion becomes severe when attempting to modulate beyond about 75-80%; 2) extremely poor low frequency

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response; 3) limited high frequency response.

A review of Electric Radio, QST, and the Internet produced a wealth of suggested modifications for the Viking II. The audio driver stages have long been known to be a culprit in the Viking II, and so most of the proposed modifications I reviewed involved adding new tubes, or at least changing existing ones, in an attempt to get more drive and reduce distortion. I prototyped each and every published modification I could find and then retested the transmitter for distortion and frequency response. I tried the 6AQ5 driver mod, the 12AX7 front-end mod, the 6AH6 front-end mod, etc. etc. etc. While each yielded some improvement in performance, none of them produced the near-broadcast quality standard of performance I wanted.

The problem is that each mod tried to fix the audio problems by focusing on just one stage in the transmitter. Yet I quickly discovered that the problems with the audio in this transmitter were distributed throughout the transmitter. So, to make it sound really good, it is necessary to take a systems engineering approach to the problem. Merely addressing the problems contributed by one stage just won't do the trick. After all, improving the performance of your car's engine may help, but if the transmission continues to slip and the muffler continues to drag on the ground, your car will nevertheless drive poorly.

Before proceeding with the modifications, a bit of background information will prove useful in understanding why the Viking II didn't live up to its real potential and understanding how to unleash what lies just under its hood.

Class AB_1 Vs AB_2 Operation

Let's first review the modulator section itself, in order to clearly understand drive requirements. Johnson claims the modulator section of the Viking II operates class AB_2, which means that the grids of the 807 modulator tubes must be driven positive (and begin to rectify) during the peak of each audio cycle. Conversely, class AB_1 operation never drives the grids positive, so only voltage drive is required. A class AB_2 amplifier presents a special problem to the driver circuit because it must withstand the variable load presented by the grids during the entire audio cycle without distorting. On the other hand, a class AB_1 amplifier works into a constant load and so drive requirements are considerably relaxed because no drive power is consumed by the grids.

Measurements taken on several stock Viking IIs confirm that the modulator simply cannot operate class AB_2 without creating *extremely severe* distortion. The crossover point from class AB_1 to class AB_2 operation in the Viking II occurs at about 80% modulation. Take a look at Figure 1 which shows the original Viking II audio and modulator sections. As you can see, the audio chain is very simple, with two stages of audio gain preceding the push pull modulator section. The problem is that the 6AU6 driver tube (V2) and driver transformer (T3) are simply incapable of providing sufficient drive when the 807 grids begin to conduct. However, as soon as the modulator is backed off to operate class AB_1, distortion is reduced to reasonably low levels. Of course, most operators expect 100% modulation, and so push the inadequate driver stage to operate class AB_2, at the expense of severely muddying their audio quality. Thus, a stock Viking II just never sounded very good on the air.

It is difficult to see how Johnson could have claimed the Viking II had a class AB_2 modulator unless they just put their head in the sand while thinking *"well, it does operate AB_2 provided you ignore the muddy-sounding 35% distortion level."* If you operate this rig keeping the distortion to reasonable levels, it is important to operate it class AB_1. The problem is,

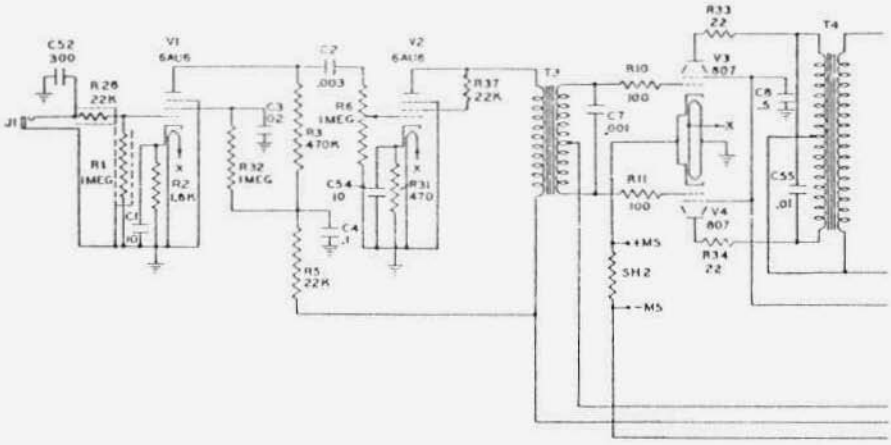

Figure 1. Stock audio chain.

this won't get you much more than about 80% modulation if you tune the rig up as recommended by Johnson. The Viking I was rated at an output of 115W CW, but the new Viking II was rated at 130W CW. Curiously, both units were only rated at an output of 100W phone. Perhaps Johnson recognized that its modulator section was barely adequate for the Viking I and certainly didn't have enough juice to fully modulate the Viking II at a higher power level and so kept the phone rating the same. We probably won't ever know what Johnson's engineers were thinking, but it sure looks like they simply decided to cut a few corners by keeping the same modulator section while going to a slightly higher RF power level when they introduced the Viking II.

Keep these thoughts on class AB_1 vs. AB_2 operation in mind because we shall return to them later when we begin making some mods. But first, let's take a look at the Viking II's frequency response.

Frequency Response

The frequency response of a stock Viking II is absolutely abysmal. As originally designed, it is probably one of the most restricted sounding transmitters you'll ever hear. An old carbon telephone from the 20s sounds better. Take a look at the frequency response curve in Figure 2 plotted for a stock unit. It is flat (±3 dB) from about 1.2 KHz to 2.7 KHz. No wonder reports said the audio sounded "thin." Now I'm sure you couldn't help but notice the other response graph on this chart. This is how your Viking II will perform when you are done making the audio modifications. Incentive enough to keep reading, I hope.

Of course, design criteria were different back when this transmitter was designed. Engineers wanted to produce a transmitter which put most of its modulation power into a very narrow set of mid-range frequencies, because these frequencies were the ones that were most important to intelligibility under difficult signal conditions. But today, AM operators are more concerned about signal quality. They want good frequency response and low distortion. "Effectiveness" just isn't as much of a consideration. But how much frequency response do you really need?

For an interesting perspective, I suggest reading the article by Bill Kleronomos, KDØHG [ER #11, March 1990 "Audio Response, How Much Do

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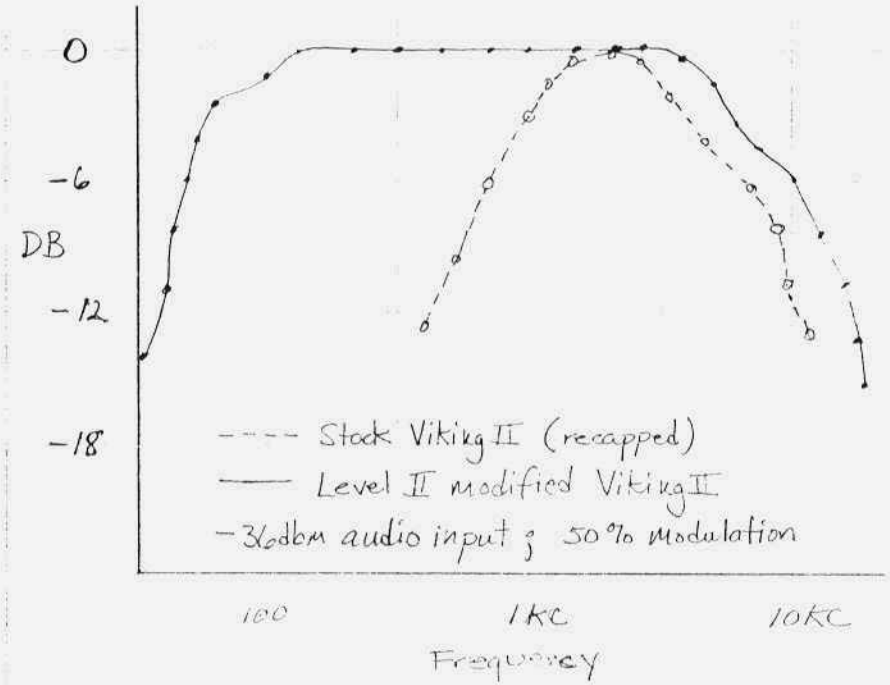

Figure 2. Frequency response graph before and after modifications.

You Really Need?"]. Increasing the frequency response increases intelligibility, but frequencies below 500 Hz also consume a great deal of transmitter power without a corresponding increase in "loudness." So, engineers intentionally used smaller values of coupling capacitors in order to attenuate the low frequencies, increasing the "effectiveness" of the transmitter.

Today, however, most AM operators are more concerned with sound quality than transmitter "effectiveness." Along with low distortion, there are two components to consider when seeking broadcast quality audio. First, increasing the overall frequency response of the transmitter will make your sound "richer" and less restricted (better low frequency response) and more sibilant (better high frequency response). Second, it is important that the transmitter's response be relatively flat.

There is a whole lot of interaction going on between the microphone and transmitter's response curves and this sometimes yields results that can lead to the wrong conclusions. It is possible to actually sound "better" using a transmitter that provides a peaky response, if that peaky response just happens to compensate for the response curve deficiencies of the particular microphone you are using. Conversely, you may sound worse if a peaky transmitter's response curve further accentuates an already bad microphone response curve. The final result is often a matter of luck which depends on how the response curves add up. It is important to keep this in mind when judging how well the mods you make work, because it is sometimes easy to jump to the wrong conclusion. If a peaky response is desired, it is preferable to provide this externally using outboard processing equipment, where you have direct control over its parameters. Good flat frequency response is therefore a very important design objective.

Two Levels Of Phone Mods

This article will present two levels of audio modifications. It depends on how much time and effort you want to invest in performance improvements. You will realize a huge improvement with just the first set of "no new holes" modifications which I've grouped together under *Level I Audio Mods*. When you are finished with these mods, your transmitter will have excellent frequency response. Gone will be the restricted audio of the stock unit. However, the driver will still only be capable of driving the modulator class AB_1, so distortion will increase dramatically beyond about 80% modulation where the modulator must run class AB_2. Fortunately, there is a tuning procedure which will allow you to operate at a slightly reduced power level that will help mitigate this problem.

Moving up to *Level II Audio Mods* builds on the work you've already done in *Level I* and also provides another huge leap in performance. These mods will allow your modulator to operate class AB_2, squeezing about 15% more power out of the modulator section at low distortion levels. When you are finished with *Level II*, you'll have a near broadcast quality transmitter. I decided to present improvements in this manner for two reasons. First, everyone may not want to go to the trouble of adding the extra components required by *Level II*. Second, since the *Level II* mods build on the work you've done in *Level I*, it gives you a good stopping point to compare results and actually see and measure the improvements obtained when stepping up from class AB_1 to class AB_2 operation.

Before you begin modifying your Viking II, take the time to replace all of the paper capacitors, old electrolytics, and out-of-tolerance resistors. Paper capacitors become leaky with age and can really degrade performance. Check the frequency response of your transmitter at about 50% modulation using an audio oscillator fed into the microphone input. Carefully tune up and make a few measurements to see how much modulation your rig will put out without any visible signs of distortion at 1 KHz. This will give you a good starting point for comparison purposes and will help convince you of the effectiveness of the mods.

Carefully compare your unit to the original schematic. It is not unusual to find undocumented modifications and often these will only interfere with the proper operation of the rig unless you know exactly how they might interact with a new set of modifications. An uncaught modification mixed in with the mods presented in this article could, at the least, degrade performance, or worse, render the circuit inoperative. In one of my Viking IIs, I found audio feedback, changed tubes, etc. etc. I even found a Viking II that looked like it had never been modified, and yet upon closer inspection found small differences between this unit and the original schematic. You'll just have to use your best judgment if you run into these cases.

There are three areas which together comprise the *Level I Mods*. First, we'll make some relatively painless modifications to the audio chain. Second, we'll add regulation to the modulator screens and grids. Lastly, we'll use a modified tune-up procedure that can be used when we are constraining ourselves to keep the modulator operating class AB_1.

Level I - Audio Mods

In virtually every modification article I examined, the 6AU6 audio stages were usually replaced with other tube types. No one seemed to like the 6AU6 in these audio stages, yet I found that proper design of the audio front-end using the original tube lineup in combination with replacement of the driver transformer yielded excellent results. The two 6AU6 stages have earned an

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unjustly bad reputation, probably because the driver transformer was itself so bad. If you are willing to limit the modulator to class AB_1 operation, they will perform very well indeed. Trying to operate class AB_2 will, however, just add lots of distortion.

The modified audio front-end using the original 6AU6s is presented in Figure 3. Let's take a look at each stage separately. V1's screen bypass capacitor, C3, was originally .02 uf. This value has too high a reactance at low audio frequencies, decreasing the gain of the first audio stage (V1) as frequency decreases. This is changed to .33 uf to improve low frequency response. An examination of the frequency response at the plate of V1 revealed that it was now flat from 25 Hz to nearly 40 KHz.

Signal handling tests revealed, however, that V1 could not handle the full output of most microphones without producing significant distortion. It was easy to see the clipping of voice peaks at V1's plate on an oscilloscope. There were two separate reasons for this. First, as originally biased, the plate voltage was only 60 volts and negative-going audio began clipping long before positive-going audio did, resulting in an asymmetrically distorted waveform. The maximum undistorted output of V1 was about 50 V_{pp}. Rebiasing the stage by increasing the cathode resistor allowed it to handle much larger signals without producing distortion. A value of about 3.3K increased the plate voltage to +108 and the stage would now produce a significantly larger 140 V_{pp} signal without distortion.

Rebiasing, however, only solved part of the problem. The other part of the problem is that this stage still had too much gain for a high output microphone like a D-104. If you close-talk a D-104, you will probably be surprised to discover that it will produce a whopping 1.2 V_{pp} signal (averaging about 600 mV_{pp}). As originally designed, the gain of V1 is approximately 200. Since the output voltage of even a properly biased V1 cannot exceed 140 V_{pp}, any input signal which exceeds 700 mV_{pp} (140 V_{pp} /200) will cause this stage to distort. *Oops!* So much for producing clean audio with a D-104 whose peaks well exceed 700 mV_{pp}. The cathode circuit of V1 shown in Figure 3 lowers this stage's gain from 200 down to about 110, producing clean audio for a high output microphone like the D-104. Incidentally, there is one published mod which replaces V1 with a 6AH6 in an effort to get more gain in this stage. You can now appreciate that this is exactly the opposite of what is required for good operation of this stage. OK, so now that V1 has good frequency response with low distortion, let's move on to the next stage, V2.

V2 is wired in a triode configuration in a stock Viking II, with the screen tied through a dropping resistor to the plate. In the modified modulator, V2 is rewired to produce a pentode configuration, with the screen resistor tied to B+. A 1 uf screen bypass capacitor has been added to improve linearity and increase the gain of this stage, which more than makes up for the reduced gain of V1. Low frequency response is improved by increasing the size of the cathode bypass capacitor C54 and the coupling capacitor C2. Low frequency response is further improved (especially when using a crystal microphone like a D-104) by changing R1 on the grid of V1 from 1 M to 3.9 M. It should not be higher than this to prevent thermal runaway of V1.

The audio driver transformer, T3, is a major villain in the Viking II, robbing it of any chance of having good audio. It has very poor frequency response and easily saturates on large audio signals because it must also carry the DC plate current of the 6AU6 driver. Fortunately, Antique Electronics (602-820-5411) offers an excellent replacement trans-

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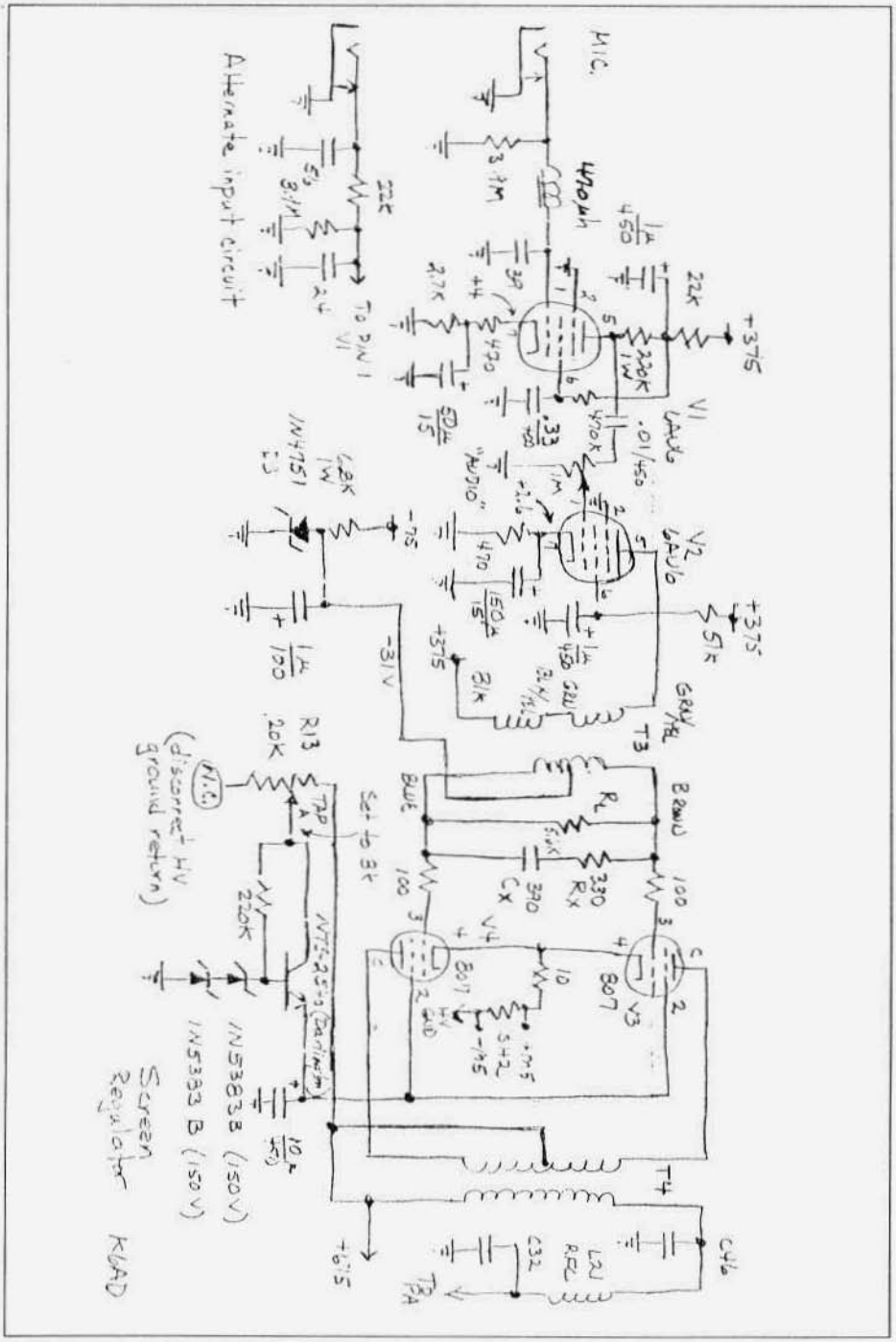


Figure 3. Level I audio chain and screen regulator.

former for about $24 - the Thordarson # 20A14. This transformer is extremely versatile, and contains quite a bit more iron which will reduce distortion and improve frequency response dramatically. It is a bit larger, but you'll have little difficulty mounting it in the same area. Now you might wonder if replacing this transformer alone will improve the ability to drive the modulator to class AB_2 operation. Unfortunately, the answer is no. As soon as you try to push the modulators to operate AB_2, what you get is mostly distortion.

Notice in Figure 3 that the transformer is wired in a *step-down* configuration. This makes it possible to use a much lower value of R_L which helps swamp out the variations in load impedance caused by the grids as they begin operating class AB_2, thus helping to reduce distortion. This is logical since the grids only need about 60 V_{p-p} of drive for AB_1 operation and a 300 V_{p-p} swing on the plate of V2 is quite reasonable. Lower values of R_L also improve frequency response. Tests confirmed that wiring the transformer in a step-up configuration did not perform as well.

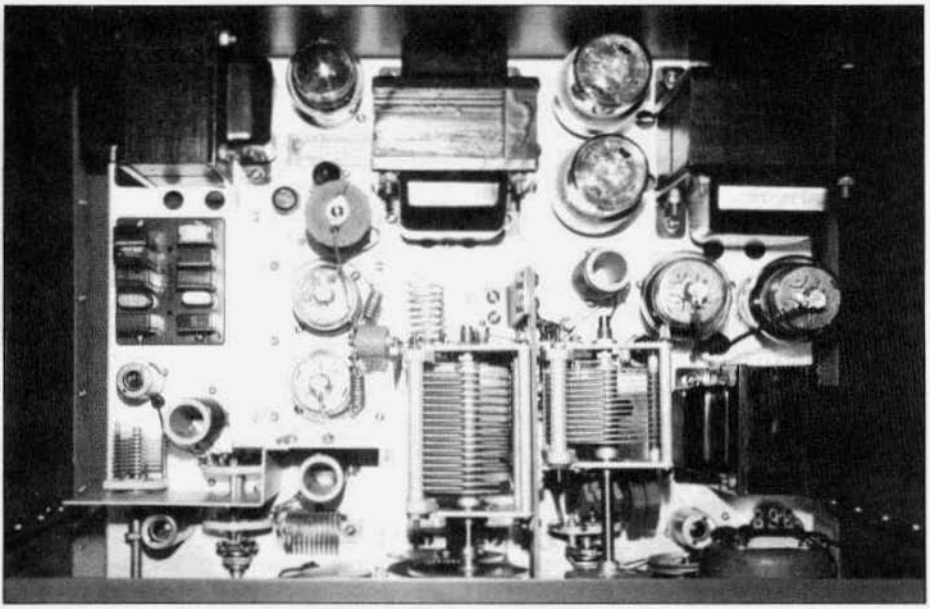
The load impedance seen by the driver transformer plays a large role in determining the frequency response of the overall driver stage. As R_L is reduced, the bandwidth of this stage is increased. However, this value can only be reduced in accordance with the ability of V2 to provide adequate drive. A value of 5.6K is an excellent compromise. R_x and C_x across the driver transformer secondary serve to limit the high-end frequency response of the driver stage well outside the audio passband.

The modified audio section of your Viking II will have a flat frequency response of about 75-12 KHz (±3 dB) to the grids of the 807 modulator tubes. Tests, however, showed that the response of the entire transmitter is still only 100-2.7 KHz (±3 dB). Hmmmmm ..... the low end is greatly improved, but we still haven't made any improvement in the overall transmitter's high frequency response, despite the fact that the response of the audio front-end and driver stages has been considerably improved. Take a look at Figure 3 and you'll see that this is because the high frequency response of the transmitter is ultimately limited by the splatter filter which is composed of C46, L21, and C32. This pi filter has a low pass characteristic and serves to intentionally limit the bandwidth of the transmitter to keep splatter to a minimum. The high frequency rolloff point can be increased by decreasing C46 and C32 using the following table as a guide:

C32 & C46	Rolloff Freq.	Bandwidth Consumed
.01	2.7 kc	5.4 kc (stock unit)
.0068	4.5 kc	9.0 kc
.0047	5.8 kc	11.6 kc (recomnd)
.0039	6.5 kc	13.0 kc
.0033	7.4 kc	14.8 kc

The frequency response you choose to select is a matter of personal choice. I have seen suggestions that C46 and C32 should be changed from .01 to as small as .001 uf. However, I believe that this is unwise and inconsiderate of other operators as any overmodulation will create splatter over a wide range of frequencies. Is there any bandwidth limitation? Not according to the new FCC rules, except for the general requirement of "good engineering practice" [97.101(a)]. But consuming too much bandwidth *will* get you in trouble with your fellow hams. In the interest of being a good neighbor while at the same time improving my Viking's audio, I chose to limit the frequency response of my Viking II to 5.8 KHz. Most operators don't use receivers with enough bandwidth to discern improvements beyond this point anyway.

The low-end frequency response of the Viking II is ultimately limited by



The chassis is heavy duty and all tube sockets, switches and coil forms are ceramic.

the modulation transformer itself. Distortion of a low frequency sine wave becomes visibly apparent on a scope at frequencies below about 200 Hz. There's just not enough iron in the existing modulation transformer to provide low distortion at frequencies below about 200 Hz (without adding audio feedback). Nevertheless, the stock modulation transformer will give good results unless you are *really* a purist. I chose to stick with the stock modulation transformer (and as you'll see in Part 2 of this article, audio feedback significantly improves distortion at low frequencies).

Level I - Modulator Regulation

Distortion can be reduced by regulating the screen and grid voltages of the modulator tubes. Johnson recommends adjusting the divider tap on R13, which sets the screen voltage, for a modulator current of 60-80 ma. On my units, adjusting the divider tap to produce 60 ma of modulator current resulted in a screen voltage of +390 volts. This was well in excess of the 807's maximum recommended screen voltage of +300. Another result of using a resistive divider to generate the modulator screen voltage is that R13 dissipates nearly 23 watts of useless heat on the bottomside of the chassis and it doesn't generate a well regulated screen voltage either - it drops nearly 60-70 volts on voice modulation peaks. This is because there is a large variation in modulator screen current - from 2.5 ma while quiescent, to more than 20 ma on voice peaks. With a screen current variation of over 18 ma, and a Thevenin equivalent resistance in the divider resistor of say 4 K ohms (assuming the tap set to slightly off its center point), using V=IR results in an expected voltage drop of 72 volts (4,000 X .018 = 72), just about what was actually measured. The problem is that when the screen voltage falls on voice peaks, it reduces the modulator's output, causing distortion of the audio waveform. High quality audio therefore demands well regulated screen voltage.

It is understandable that Johnson

didn't regulate the modulator's screen voltage, because this would have added two more tubes to the chassis. Fortunately, solid state components make this job much easier today. I tried a simple zener diode regulator approach, using several 5W zener diodes in the screen circuit, but found that this only gave mediocre results. The reason this worked poorly is that the screen voltage must be derived from the +675 volt supply which is on only while actually transmitting. If the current in the zeners is set high enough to keep them from falling out of regulation on voice peaks, they will need to dissipate several watts of heat. This heat causes them to drift nearly 25 volts in the first 90 seconds of each transmission. While the regulation on voice peaks is certainly much better than that afforded by the original resistive divider, I still didn't feel that the combination of the short-term regulation and drift was adequate. This led me to add a Darlington pass transistor, so that heat generated in the zeners, and therefore drift, could be held to a minimum.

Take a look at the screen regulator circuit in Figure 3. You'll notice that only 5 regulator components are required. Not only will the screen voltage be well regulated, but R13 no longer generates 23 watts of useless heat, so your Viking II will run much cooler. Set the tap of R13 to 8K ohms and don't forget to disconnect the ground return from R13. Be careful of the fine wires on R13 when adjusting it, as these are easily damaged. Incidentally, using R13 in this circuit isn't entirely necessary but since it was there I used it to reduce the heat generated by the pass transistor. The screens in your unit should operate rock steady at about +300 volts (a drop of only 2 volts on voice peaks). High voltage zener diodes are not carried by as many distributors as they used to be. Fortunately, they are still available from Allied Electronics at 800-433-5700. Get 'em while you still can.

Incidentally, I've seen mods which suggest tying the screens to the +375 volt supply to avoid the need for a regulator. This is a bad idea for several reasons: 1) it exceeds the 807's maximum screen voltage rating; and 2) the modulator screens will draw about 20 ma even when the transmitter is not active and, without plate voltage present, this amount of screen current exceeds the tube's maximum rating for screen dissipation. It would be possible to use the unused section of the CW/Phone switch to select the screen voltage for each mode, but when it is in the Phone position the screens will still draw current when not transmitting - with the same objection as before. Since this mod provides no other improvement in performance that can't be just as easily be obtained using just a handful of inexpensive components, you are better off doing it right to begin with. Two thumbs down on this mod.

With the screen voltage well regulated, the modulator current should be set by adjusting the grid bias voltage. This can be done by adjusting the value of the zener diode. The more negative the grid bias becomes, the less quiescent current will flow. The modulator quiescent current is not too critical, and anything within 30 to 60 ma will work well. Take a look at the negative voltage supply in Figure 3 and note that the original resistive divider is no longer used. Instead, the buffer stage has its own resistive divider (see Part 3 of this article) and the modulator grids are regulated using a zener diode. A 31 volt zener diode (1N4751) produced a quiescent modulator current of about 50 ma in my unit.

Level I - Modified Tune-up Procedure

With all of the *Level I* mods in place, you'll be able to produce a much cleaner signal with excellent frequency response. However, you will still be limited to achieving about 80% modula-

tion, unless you are willing to suffer significant amounts of distortion as you push the modulator to operate class AB_2. Fortunately, there is a convenient solution which will help alleviate this problem. Since modulator power is about 15-20% less than it would be if it were operating AB_2, an improvement is realized by cutting back the RF power to match the power available from the modulator. As you can see from the table below, the penalty for operating AB_1 is not too large. Johnson recommends loading the PA to 230 ma. As you can see, this produces voltage swings on the modulation transformer which will not produce 100% modulation. However, if you load the PA with less coupling to say, 205 ma, you'll achieve about 95% modulation but with much less distortion. This will reduce your carrier level from 95 watts to about 82 watts, a small price to pay for a cleaner signal (note: power levels measured at 115 VAC input).

Plate Current	Peak Mod. Voltage@T4	Approx. Mod %	Carrier Level
245 ma	+300 to +1000V	75%	105 W
230 ma	*+150 to +1150V*	*80%*	95 W
205 ma	+ 25 to +1200V	95%	82 W
185 ma	- 25 to + 1275 V	100%	+71 W

Changing the loading on the PA changes the modulation impedance that T4 must work into. As the plate current is reduced, the modulation impedance rises and the voltage across the modulation transformer increases. The modulation impedance at the recommended 230 ma loading is:

Modulation Impedance = Plate Voltage ÷ Plate Current or 675 V ÷ 230 mA = 2.93 K ohms.

Reducing the plate current to 200 ma increases the modulation impedance to 3.38 K ohms.

Meter Calibration

One thing I found with the two Viking II units on my bench was that the meter calibration should be considered highly suspect. This problem has also been seen in the Johnson Valiant [ER # 46, 2/93, "On The Trail of the Valiant Low-Output Problem"]. Johnson measures current by metering the drop across a small value resistor, which in the case of plate current is a small piece of nichrome wire. Both of my units were off by nearly 20 ma which can make a very big difference when loading.

In units of this age, I'd recommend measuring the current flowing in the shunt (M4) and then make adjustments as necessary. The job is a bit tricky because you must lift the high side of SH1 (marked M4-) along with the lead which feeds the meter. There are a lot of wires which come together at this junction which make it a real pain to deal with. Lifting the ground side may seem easier, but the resistance of the meter you insert will add to the resistance of SH1, causing the front panel meter to read incorrectly.

Shorten SH1 if the front panel meter reads too high, but don't actually cut the nichrome wire - just solder it with a short piece left hanging out so you can reverse the process if needed. If the meter reads too low, then you need more resistance and SH1 must be lengthened. If your unit was built with enough nichrome wire wrapped around the solder lug you may be in luck. Otherwise, you may need to find a longer piece of nichrome wire, or measure its resistance and substitute an appropriate low value resistor.

Part 2 Next Month

On-air contacts with the *Level I* improvements in place report a huge improvement over a stock Viking II. Since the transmitter's frequency response is now flat, your sound will depend entirely on your choice of microphone. An outboard equalizer can be used to

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Leroy Sparks, W6SYC (left) and Mort Jones, W6KLG dealing at the recent Military Collectors meet in San Luis Obispo, Calif.

Also at the Military Collectors meet from left to right: Henry Engstrom, KD6KW; Paul Bernhardt, KF4FOR and John Field.

W5FAO, Silent AMer

I am saddened to report the passing of a fellow ham and a best friend to me here in Waco, Texas.

The Rev. Noel V. Guice, W5FAO, a retired Baptist minister and an ardent AMer passed away at a local hospital May 1 and was buried in Waco. He was 93 years old.

His ham radio equipment was his main source of enjoyment and communications with the outside world for a number of years. He made many friends this way. His health conditions had prevented him from being active on the ham bands for the past several years.

I'm sure that many amateurs will remember the jolly, interesting QSOs with him in the years that have gone by.

He is surely missed by me and all those who knew him.

Best friend, Cecil Palmer, W5NWX

Military Group Meet from page 17

plete systems were on display with some working and some passive. On one table was TBX-5, WW-1 BC-15A spark transmitter and a Bendix RA-1B aircraft receiver. A Canadian VHF AN/UTA-68 along with a good looking SCR-300 and BC-474A were displayed next to a TBY-1 rig. A pair of BC-611 handi-talkies in cases drew attention while a complete GRC-109 with the GRA-71 keyer generated interest. A working T-195 and R-392 in the rack with all accessories was running on 28 VDC as was a complete GRC-7 VHF FM set on 6 meters. Also up and running was a complete light grey TCS-8 with remote control and dynamotor supply, a complete AN/ARC-5 VHF set with crystals for 2 meters and an SCR-284 (BC-654) with 12 VDC PE-103.

This group is composed of people interested in military radio and all work is by volunteers. Costs are shared by passing the hat. There is no charter, elections, officers, dues or other type of official organization. Therefore, a short business meeting resulted in Hank Brown, W6DJX, responsible for next years meeting and program. The next meeting date was set for the first weekend in May, 1999. It was also noted this would be the last meeting of this century!

Bob Heusser, K6TUY, video taped the entire meeting. The tapes will be transferred to VHS tapes and made available for $10, postage paid. Don Jeffrey, WB6DFV, duplicates the tape and Hank Brown handles the sales and mailing chores. At this time we have tapes from the 1996 and 1997 meets available. The 1998 tapes should be ready shortly.

Late in the afternoon the meeting was closed out with a round of wants and haves from the audience. Everyone left with a positive attitude and the feeling of having had a great time at the MRCG. Plans are under way for the next one and it looks like it will be even bigger and better.

Contact Hank Brown, W6DJX, 4141 W. L-2, Lancaster, CA 93536, (805) 943-2027 if you would like to join in, give suggestions or request more information.

Don Jeffrey, WB6DFV, has agreed to be our e-mail contact and will be in contact with Hank on a regular basis. Don can be reached at bollan@aol.com.

Ed Zeranski is our e-mail and mailing list contact at ejz@marlin.nosc.mil.

Also, drop in on the group website at http://www.milradio.net. ER

Danger Island from page 13

day helps us to understand the ionosphere and propagation. After all the preparation and work, the expedition was a success.

The USS Point Defiance left with the expeditioneers on board after 58 days on the atoll, October 18, 1958, to sail back to the United States via Pearl Harbor, with a job well done.

Leo Honea went on to have a successful career with the government as Chief Engineer of WWVH and WWV. F.R. Sanderlin went on to a 33 year distinguished career with the United States Navy and retired as a Commander.

I would like to thank CMDR F.R. Sanderlin USN (ret), KB6RQO; Leo Honea, WØGE; J. Sherwood Charlton, Ph.D., K5GOE; Frank Schottke, W2UE/7; Phil Finkle, K6EID; Tom Harrell, K8XP, without whose help and assistance this story would not be possible.

I was ten years old in 1958, and remember very clearly my uncle leaving on this unique adventure. I remember talking with him after he returned from the expedition, about the adventure and of the radio operation from the island. This helped me kindle a wonder of how radio worked, which has directly led to my 33 year involvement with amateur radio and communications. The next time you work someone in some remote part of the world, remember what that person had to endure, to give you that 'new one'. Thanks for the DX! ER

S-Meter Problem From page 18

volts of signal strength as developed at the antenna input terminals when terminated in a 50-70 ohm load, at 14.3 MHz. The indicated microvolt readings at other frequencies will vary approximately from that of 14.3 MHz. Also, all readings 50 microvolts or less will be more accurate and correlate more closely than those higher. WOW! What a Great Receiver! ER

813 Transmitter from page 25

sharp eye on the details that will bring it to completion. When parts are hard to come by and when you meet a roadblock, vision for the completed project will keep you going and keep you excited about getting it done. 3. Friends--I could not have completed this project without the support of friends. Don't be afraid to talk to people who have built major projects. They can give you hints that will save a lot of time and prevent problems.

The real test came one day when I was ready for Andy to check it out. I called him on the phone and told him I was ready for his appraisal. Lou, Andy and I got on 3885 in the middle of the day and heated up the ether. Andy said it sounded like I was in the room with him, the audio was that good. "It sounds just like you," he said. Subsequent tests with a Hewlett Packard Spectrum Analyzer proved that the signal was clean and that it was within specs. But even with sophisticated equipment on hand to check it out, I felt if it could pass Lou and Andy, it was truly a success. And in the words of Jackie Gleason, "How sweet it is..." ER

Viking II Modifications from page 37

compensate for microphone deficiencies, giving you the control you need to achieve broadcast-quality audio.

Next month we'll realize another big leap in performance as we add the *Level II* audio mods. These mods will add a push pull driver capable of handling the variable load presented by the grids of the 807 modulator tubes, allowing class AB_2 operation at very low distortion levels. We'll also add a negative peak modulation limiter to protect the modulation transformer. Part 3 the following month will be devoted entirely to CW operators as we improve the CW performance of the Viking II. ER

Looking Back from page 2

mind that Grammer didn't exactly get hot and bothered about pi network design. He was an advocate of push-pull types. And I really believe that he believed that the pi was not as efficient as the push-pull type design. However, necessity, and in this case TVI, can make some very strange bedfellows. Plug in coils for big finals quickly became a thing of the past. George may not have liked my going to a pi network

But he was one man who knew and appreciated what the members wanted. (And he taught all of us to do the same.)

What was the reaction of the membership to my final?

I can say that I got lots of mail and what was unusual, nearly all were complimentary. I have to be honest, I have some pride and I was proud of that particular amplifier.

How often did you actually use the amplifier. What was your favorite mode of operation?

I installed the amplifier at my home in Granby, Conn. My shack was in the attic and I had two by fours on a couple of gables. I reset the two by fours so that they were 19 inches apart and then mounted the amplifier on the two by fours. I had a pole pig in my power supply and I remember talking Vic Clark into divulging how he tuned the power supply in primary keying to put a slight modulation on his note. For those of you who have come along lately, Vic Clark, W4KFC, (now a Silent Key) was probably the finest contest operator in the world. He was one of the finest of the fine, and I admired him very much.

Bob White, another famous ham used to come to my station and we worked multi-op in contests. Of course I worked primarily phone, both AM and SSB.

What was the eventual disposition of the amplifier?

My son-in-law was W1YNP, later W1RT, Bob De Bragga. I am not sure but I believe he finally got the amplifier but here my memory is vague and Bob is a silent key so I can't ask him. I have no idea where the amplifier is or if it was junked.

A good friend of mine sent me a chassis and cabinet and if I can get my butt into gear, I may build a desktop amplifier. I have got all the parts including either a 4CX10,000 or a 4CX5000—but I think those would be a little too big!

As an aside, and in conclusion, I did have permission from FCC to run some very high power for TVI tests and I did.

And not matter what anyone tells you-power does get you quick answers. W1ICP

Editor's Comments from page 1

The post office people said that the problem occurred because of new automation equipment at the Denver distribution center. Apparently (all this is hard for us to understand) the equipment diverted some of the magazines to the wrong part of the country and they were returned to Denver. This equipment also 'ate up' a large number of our magazines. The post office people say this is because the magazine is not in an envelope or tabbed shut. This has never been a big problem in the past although every month we do replace a couple of copies that have been damaged in the mail.

To alleviate some of the problems we're going to TRY to tab all the 1st class magazines from now on. And as of now we're offering an option to our 1st class subscribers. For an extra $4 per year we'll put your magazine in an envelope. Later we may extend this same option to second class subscribers. We're told that if we use envelopes subscribers will get their magazines faster and of course in pristine condition. Those of you who are interested in the envelope option can send us 34 cents for each issue remaining on your subscription. When you renew please add $4 to the price of the subscription. N6CSW

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Subscribers receive 1 free - 20 word- ad per month. **Extra words are .20.** Here's how to count the words in your ad: the heading - For Sale, Wanted, etc count as **1 word**. Your name, call, address and telephone number count as **6 words**. Hyphenated words count as **2 words**. **Please count the words in your ad and if you're over 20 words send payment for the extra words.**

Non-subscribers: $3 minimum for each ad (up to 20 words). Each additional word is .25. **Please call or write for display rates.**

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DEADLINE for the JULY Issue: JULY 1

FOR SALE: Repair and restoration on all vintage equipment; 45 years experience. Barney Wooters,W5KSO, 8303 E. Mansfield Ave., Denver, CO 80237. (303) 770-5314

FOR SALE: "AM FOREVER" quality Haynes T-shirts, grey, blue, green & red. Sizes M, L, XL - $15 shpd. Rick, K8MLV/Ø, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

FOR SALE: R-390A Orig. Maint. Manual,TM11-5820-358-35,189 pgs - $28 incl. Dom Priority Mail. Aben, POB 4118, Jersey City, NJ 07304. avidov@aol.com

FOR SALE: Radio books, magazines, catalogs, manuals (copies), radios, hifi, parts. Send 2 stamp LSASE. David Crowell, KA1EDP, 40 Briarwood Rd., North Scituate, RI 02857-2805. aq253@osfn.org

FOR SALE: Tubes, Penta Labs 811A - $20; 572B - $55; 3-500Z, matched pr - $300; US NOS 811A - $35. Many other US NOS. VISA/MC. Dee, W4PNT VA (800) 755-2365, soundnmind@rica.net

FOR SALE: Collins 353C-14, 1.4 khz plug-in mechanical filter adapter for 75A-1 - $150 shpd. Robert Nickels, 1444 S. Rotzler Ave. Freeport IL 61032.

FOR SALE: SX-62 - $175; SX-62A - $200; Radiola 17 - $30; AK 42 - $40; Zenith 6G601 - $40. Carter Elliott, 1460 Pinedale Rd. , Charlottesville,VA 22901. (804) 979-7383

FOR SALE: Collins S-Line aluminum knob inlays: small (exciter/PA tuning) - $1; 30L-1 - $2; spinner/plain (main tuning) - $3. Charlie, K3ICH, 13192 Pinnacle Lane, Leesburg, VA 20176. (540) 822-5643

FOR SALE: Hallicrafters, RME, Gonset, other. Also power supplies, test equipment,VHF/RF amps, more. LASE. Don Jeffrey, POB 1164, Monrovia, CA 91017.

FOR SALE: Collins 312B-4, 2 ea; Gonset Commander HF xmtr. SASE for list. Marvin, 2957 Gaffney Rd., Richmond,VA 23237. (804) 275-1252, wa4tqi@juno.com

FOR SALE: National MB-150 mult-band tank - $40; Johnson 500 manual - $20; SAMS CB Photofact #5 ,#6 ,#79, #91 - $40 set; Triplett 630APL VOM - $35. **WANTED:** Heath HW32 manual. Dave W1DWZ, MA, (508) 378-3619, w1dwz@juno.com

FOR SALE: New Hammarlund rcvg tubes, S-meter - $25. **WANTED:** Coil set for Millen 90651 dipper. Norm, W1CIX, POB 402, West Bridgewater, MA 02379. (508) 583-8349

FOR SALE: HRO-60 w/spkr, 7 coil sets in box - $600; NC-303 w/spkr - $350. Both in exc condx. Chuck, KØRFQ, MO, (417) 863-7415.

FOR SALE: Galena xtal radios, very sensitive & selective. L. Gardner, 458 Two Mile Crk Rd., Tonawanda, NY, 14150. (716) 873-0447

Vintage Manuals Available
Step way up to the finest replicated and original vintage manuals available. Get new Catalog 7, three $.32 stamps. Pete Markavage, **The Manual Man**, 27 Walling St., Sayreville, NJ 08872. (732) 238-8964, manualman@juno.com

WANTED: 1963 WRL catalog; will trade 1957 WRL or 1963 Allied catalog. N4IQ, POB 690098, Orlando, FL 32869-0098. (407) 351-5536

WANTED: QST, CQ, Radio Craft & Radio News magazines, 30s, 40s, 50s. Advise price + shpg. Beni Fernandez, KP4DN, 1674 Atlas St., Summit Hills, PR 00920.

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

WANTED: Howard radios of any type. Andy Howard, WA4KCY, 105 Sweet Bay Ln, Carrollton, GA 30116. wa4kcy@usa.net

WANTED: E. F. Johnson Co. HAMALOGs, unusual photos and information 1923-70. Bruce Hering, 41120 State Highway 13, Waseca, MN 56093. (507) 835-5619. bhering@efjohnson.com

WANTED: RADIO Handbook, First Edition, published May 1935. Lynn Stolz, N8AJ, OH, (614)885-5428

WANTED: Homebrew xmtrs and rcvrs or parts, working or not. George, NT1NQ, (401) 724-5516

WANTED: Top dollar paid for Winchester Radios and Winchester related items. Donald Daggett, 122 Hall Rd., Grahamsville, NY 12740. (914) 985-7249, wc2e@webtv.com

WANTED: Heath SB-Series circular dial (KHz), entire dial assembly, or cheap junker with it. K8NGV, 3170 Kennesa View, Marietta, GA 30064. hoitenga@atl.bellsouth.net

WANTED: Knobs for SX-101; especially pitch, selectivity and main tune. Rich, (508) 473-3513, k1etp@sprynet.com

WANTED: Have 4 Harvey-Wells TBS-50D xmtrs and need VFO & AC pwr sply. George Shute, W4BDG, 2910 Virginia St., NE, Albuquerque, NM 87110. (505) 298-7347

WANTED: Temco 75GA or Supreme AF100 xmtr; Elmac AF67 xmtr. Robert Perlstein, W1IV, POB 642, Old Orchard Beach, ME 04064. Perls@Compuserve.com

WANTED: Service manual, copy, or the loan of a manual to make a copy for RCA Carfone 450 base station, model number CSU15B2. Paul Thompson WOOD, 6355 So. Dudley Way, Littleton, CO 80123-3317. (303)973-8483, snowshoe@dimensional.com

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

WANTED: Vintage AM equipment for personal use, must be collector quality or mint. Prefer Collins, will consider others. Bob Tapper, K1YJK, 5 Polo Club Dr., Denver, CO 80209-3309. (303) 740-2272, FAX 777-6491

WANTED: Collins 310A-1 &/or 310A-3, any condx; 30J, 30K-(any); 302C-1, 312A-1. **FOR SALE:** SC-101 lamp hoods & grills. Butch, K0BS, MN, (507) 282-2141

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

WANTED: Noise Blanker PCB for KWM-380/HF-380 (Only PCB not assembled). T. Haruyama, JA1OZZ, t_haruyama@atg.mitsumi.co.jp

WANTED: James Millen 90201 low voltage power supply and 90902 oscilloscope. Doc, W9VVN, (218) 586-2952.

WANTED: TMC GPT-750 xmtr. Top dollar price paid for unit in first class condx. Alan Gray, W3BV, 1361 Sylvan Rd., Perkasie, PA 18944. (215) 705-0943, agray@voicenet.com

WANTED: Transmitter BC129, amplifier BC116, dynamotor BD46; pre 1940 aircraft radios or parts. James Treherne, 11909 ChapelRd., Clifton, VA 20124. (703) 830-6272, treherne@erols.com

WANTED: Allied A2516 or Kenwood/Trio JR500S, any condx, or manual for either rcvr. David, WD6AF, maggihouse@aol.com

WANTED: Power xfmr for HQ170, HQ170 for parts; also Heath Lunchbox mics. Bob, K6GKU, AZ, (602) 816-0660, photobob@prodigy.net

WANTED: Original Valiant and Viking 500 manuals. Tom Bonomo, K6AD, CA, (650) 578-1897.

WANTED: Books by Thomas Adams published by Howard W. Sams in the Basic Electronic Series, circa 1961. Dan Langston, KO4RA, (912) 453-9066, danman@accucomm.net

WANTED: Historical info on development of 12AT7, 12AU7 and 12AX7. Which of these was first, when, production info, etc. Tech info not needed. Kurt Miska, 3488 Wagner Woods Ct., Ann Arbor, MI 48103. (248) 641-0044 (w). Fax 641-1718, khm@tir.com

WANTED: AN/GRC-9 (Angry-9), must be complete. Lee, TX, (702-575-6705), ltb@birdhouse.fernley.nv.us

WANTED: Variometers. Steve Gross, W9OJI, 602 W. First St., Mt. Morris, IL 61054. (815) 734-4255

FOR SALE: Genuine new surplus: Unused R-390A cabinets #CY-979A/URR w/shock supports and misc hardware package - $305; top and bottom cover sets - $75. Mac McCullough, TX, (214) 324-4849, Fax - 324-4844

FOR SALE: Hallicrafter's manuals, copies starting at $5, some Johnson, WRL, others. SASE for list. DSM Diversified, 909 Walnut St., Erie, PA 16502.

FOR SALE: Vintage radio owners, retire the variac, new solid state SofStart available SASE. Rick Paradise, KE4OCO, 515 Wood Forest Ct. NE, Marietta, GA 30066-3519.

FOR SALE: Collins radio parts. Send SASE for list. Bill Mills, 188 Ellis Mill Rd. NE, Milledgeville, GA 31061-9020.

FOR SALE: Vintage ham gear: Mint ERCO 753 xcvr w/ 751 pwr sply, works and looks great and includes manual - $185; Mint ERCO 723 CW xmtr w/manual, this unit looks almost brandnew - $125; Swan 700CX with 117 ps and manual in exc condx - $275; Lafayette HE 45A 6M xcvr in good condx w/manual - $75. Tom Bonomo, K6AD, CA, (650) 578-1897.

FOR SALE: ART-13 mod xfmr - $15. **WANTED:** Command set rcvrs, 190-550 kHz, mint, good, bad, parts; HW32 manual. Dave, W1DWZ, MA (508) 378-3619

FOR SALE: NIB J-45 code keys-$24; NIB 6DC6-$2.75; 6AZ8-$3. Lowell, K6KC, POB 15026, Fresno CA 93702. (209) 227-1605, k6kc@lightspeed.net

FOR SALE: Collins 75S3 and 32S3, CCA exc. w/ orig. boxes and manuals - $700 each. Fred, W6YM, (209) 296-5990.

FOR SALE: (1) small 6 meter rig, 12AT7 & 2E26, no mod, Japanese made; (1) 6-9 mc Command rcvr, fils converted to 12 VAC front panel, vol. cont., phone jack & AM & CW switch; (1) 508/ARC/60 118 to 148 MHz rcvr, continuously tuned. All good condx, + UPS. James P. Barton, WØKNJ, POB 417, Burke, SD 57523.

NOTICE: In Hope, AZ, in September, they are having a celebration of the old Army proving ground that was there. Includes an air show, last year they had a B-17 and a German bomber. I wonder if there are any military radio collectors in the vicinity who would like to get together and show off their stuff. Jim Haynes, W6JVE, 1535 W. Cleveland, Fayetteville, AR 72701. (501) 443-9339, haynes@cats.ucsc.edu

FOR SALE: Millen 90661 grid-dip meter, all 7 coils, metal case, near mint condx - $64. Mervyn Ellsworth, 2309 N. 25th, Boise, ID 83702. (208) 345-6878.

FOR SALE: Drake TR4C, AC4, MS4 & 7075 mic, w/extra set of finals, all gear in first class condx & working - $350. Cliff, W3LVC, MD, (410) 796-1070.

FOR SALE: WACO-5NWX telephone filters. Just plug in. 1/$13.95, 2/$25, 3/$34. Money back. Cecil Palmer, 4500 Timbercrest Ln., Waco, TX 76705. (817) 799-5931, w5nwx@juno.com

FOR SALE: Eimac 4-250A NOS stored never used - $85 ea., $160 pair. Dan Keman, K3XR, 218 Balthaser Rd., Sinking Spring, PA 19608. (610) 670-2980 K3XR@JUNO.COM

FOR SALE: T-368C, spare mod and pwr supply, tuner, and manuals, S-Line, 30L-1. **WANTED:** T-195/C plus cables and mobile mount. Will trade. Randy, WA7CPA, AZ, (602) 266-2256, rbest@primnet.com

FOR SALE: Drake R4, T4X, MS4spkr/PS, books, receipts and cables - $275. Bob, W7XS, (509) 395-2103, rosburn@gorge.net

FOR SALE/TRADE: TMC/AC-6 multicoupler - $225; Knight/R-100A - $175; Drake/TR-4C - $450; Hammarlund/HQ-205(TR) - $225; WWII/RU-17 $125. Sam Timberlake, KF4TXQ, POB 161, Dadeville, AL 36853. (256) 825-7305 stimber@lakemartin.net

FOR SALE: Rcvr, 75A4, filter 3.1, ser #056, VGC - $750; xmtr-Viking Ranger, VGC - $200; xmtr-Viking Valiant, VGC - $350. Bill, K6DUY, CA, (510) 820-6966 - hinterland@juno.com

FOR SALE: Hallicrafters SX-43 rcvr, works, nice condx; Hallicrafters SX-22, good condx & works. Fred Clinger, OH, (419) 468-6117 after 6 PM EST.

FOR SALE: Heath Chippewa amplifier & sply, not pretty but restorable - $250; Valiant, VG - $275; Viking I, VG- $175; Johnson 250 matchbox, near mint - $100; SB-610 monitor scope - $95; Hallicrafters R-42 spkr - $100; J-47 knee key, NOS - $45; ARRL handbooks & other stuff. LSASE for list. WA7IHN, POB 442, Aumsville, OR 97325. wa7ihn@aol.com

FOR SALE: Western Electric Telegraph Sounder, 20 ohm, NIB - make offer. Allan Lurie, W9KCB, 605 E. Armstrong Ave., Peoria, IL 61603. (309) 682-1674

FOR SALE: Johnson Viking matchbox - $125; Heath VF-1 VFO - $65, old Vibroplex key - offer; Heath HM-2102 Hallicrafters S-40B - $80; Lafayette KT-200 - $65; tube CB sets. Gerald Perkins, RFD#2 Box 34, Milo, ME 04463-9605. (207) 943-8742

FOR TRADE: Two good RCA 833As for one Taylor 833A; also looking for Taylor 803, 813, 875A. John H. Walker, Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455, jh.walker@alliedsignal.com

FOR SALE: Hammarlund HQ-110C - $120; Gonset G-63 - $125 + shpg. Chuck Klawitter, W9VZR, WI, (414) 962-9366.

FOR SALE: Join SPAM, the society for the promotion of AM. Lifetime certificate $1, SASE. W4CJL, 202 Baker Dr., Florence, AL 35630.

ELECTRON TUBES FREE Catalog, over 2,000 types in stock. **Electron Tube Enterprises,** Box 8311, Essex, VT 05451. (802) 879-1844, FAX (802) 879-7764

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

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

FOR SALE: Strong, steatite antenna insulators. Lengths from two to fifteen inches. SASE for list. John Etter, W2ER, 16 Fairline Dr., East Quogue, NY 11942. (516) 653-5350.

FOR SALE: Dial/clock covers. Send bezel, old or drawing, make/model, guaranteed satisfaction - $10 ppd. William P. Turner, WA0ABI, 1117 Pike St., St. Charles, MO 63301. (314) 949-2210.

FOR SALE: Free info on many topics related to vintage amateur radio equipment & operations at http://www.mnsinc.com/bry/hamlynx.htm Everyone welcome. Brian Carling, G3XLQ/AF4K.

FOR SALE: New Ranger I, Valiant I & Navigator plaster dials, 160-10 freq no's in green, w/all holes like orig - $17.50 ppd. Bruce Kryder, 4003 Lautawood Ln., Franklin, TN 37067. (615) 794-9692.

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

FOR SALE: Large stock new vaccum tubes, all tested in boxes, sell as unit to highest bidder. SASE for list. Bill Riley, 863 W. 38th Ave., Eugene, OR 97405-2375. (541) 345-2169.

FOR SALE: T-17D mic, NIB - $25; J-38 key, VG - $20; Sale list - $1. **WANTED:** 62S-1 converter. Joe Orgnero, VE6RST, Box 32 Site 7 SS 1, Calgary, AB T2M 4N3 Canada. (403) 239-0489.

FOR SALE: Have a lge box of Japanese WW-2 radio panel meters & field test equip. Call or send a SASE for list. Albert Lopez, 12700 Yorba Linda SE, Albuquerque, NM 87123. (505) 293-1209.

FOR SALE: HT-32; HQ120X; RAL-6 rcvr; Heath HX10. **WANTED:** Viking II manual, 122 VFO. W7RBF, AZ, (602) 864-9987.

FOR SALE: Eico 720 - $125; Eico 730 - $125; Johnson mobile xmtr - $125; Howard 490 rcvr - $200. **WANTED:** PE-73 dynamotor; xtal Lattice filter for SR-150 xcvr. Greg Richardson, WA8JPC, POB 405, Gallipolis Ferry, WV 25515.

FOR SALE: Magazines, manuals, surplus books, some surplus xfmrs, & other parts. Call your needs. Vic Edmondson, W4MYF, RT 1 Box 2599, Lee, FL, 32059. (904) 971-5580.

FOR SALE: Collins 516F-2 bias mod, parts/instr - $12, ppd/US. Cory, N2AQS, 1000 E 14th/178, Plano, TX 75074-6249. hinec@ccgate.dl.nec.com

NEW RELEASE: Flyer 198. For details send 2-stamp LSASE to: Olde Tyme Radio Company, 2445 Lyttonsville Rd. Suite 317, Silver Spring, MD 20910.

FOR SALE/TRADE: Turner 95D, 90D-5, Shure 737A, S22-D, 55S. Ray, MO, (314) 961-9088.

FOR SALE: HT32 xfmr, plate fils, etc - $70. Joe, W6CAS, CA, (916) 731-8261.

FOR SALE: Tektronix CRTS T533/P2 NIB - BO; 75K 1/4W 1% resisters - 1¢ ea. **WANTED:** RDO RDF RDJ APR-9, APR-13, ARR-22 stuff APA38. Dean, MN, (612) 869-9264.

FOR SALE: NIB Coto Pee Wee inductance type CS-640-E - $5 ppd; NIB Telco lightning arrestor, No.9242 - $3 ea; coaxial relay, no info - $5 + shpg; ceramic BeeHive insulatoes - $2.50 ea; headset adaptor for headset HS-33 or HS-38 - $3; BNC Tee box Pomona, mod 2390 - $5; Storm-king by Brach lightning arrestor, very old - $3; several glass & brown ceramic antenna insulators - $1 ea w/other purchase. James Fred, 5355 S. 275 W, Cutler, IN 46920.

FOR SALE: Sell/Buy/Wanted/Trade: Vintage equip at the "K8CX Ham Gallary." http://paradox2010.com/ham/ a free service.

FOR SALE: KWM-1 w/516F-1 pwr sply, replaced tuning knob, two small holes on right side of cabinet & larger hole for air vent tube on back, also pwr xfmr replaced w/a larger one so the pwr sply cover does not fit, front panel looks very good, copy of manual included - $750; Command sets, lge selection of rcvrs, xmtrs, & access, some NIB. Write, call, or E-mail your wants. Ron Hinze, 4201 Shirlee Ln. N, Shoreview, MN 55126. (612) 766-9154 tvcom1guy@aol.com

FOR SALE: Johnson Viking II xmtr w/manual, no mods, PU only - $225. Stuart T Carter II, W4NHC, 680 Fernwood Dr., Melbourne, FL 32904-1995. (407) 727-3015.

MESSAGE: Finally settling down now, sorry about the lost letters. Will catch up soon. William Donzelli, 15 Gen. MacArthur Dr., Carmel, NY 10512. (914) 225-2547, william@tars.net

FOR SALE: DX60 - $95; Telequipment 10 MHz scope - $50. **WANTED:** Select-o-ject. Don, W7KCK, OR, (503) 289-2326.

FOR SALE: 1974 Callbook - $22, includes priority mail. Pat Stewart, W7GVC, 1404 Ruth Ave., Walla Walla, WA 99362-3558. (509) 525-1699.

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FOR SALE: QST's, any issue 1930 to date - $6, ppd; Bakelite panels & straightened lengths of #10, 12 & 14 tinned wire - SASE for info. Parker, W1YG, 87 Cove Rd, Lyme, CT 06371.

FOR SALE: Knight T60 - $65; Signal corps test unit I-176A w/test lead - $22. Dave Mantor, W9OCM, POB 1, Fairmount, IN 46928-0001. (765) 948-3781

FOR SALE: Solar CE160 capacitor analyzer, like new condx - $35 + UPS. Ken Tountas, 2309 N. 51st St., Waco, TX 76710. (254) 772-7307

FOR SALE: BC348J radio for parts, no pwr sply - $35. Robert Martin, 111 Bancroft Dr., Rochester, NY 14616. (716) 663-4182

FOR SALE: BC-610-F, 70E-8A VFO + ps, for 160, homebrew speech amp & paperwork - $625; other items also available. Vern, WØVV, IA, (515) 767-5207.

FOR SALE: Knight T150 - $40; T368 exciter - $40; complete but need work. **WANTED:** SX101 parts. Bill, KE7KK, 6712 Lake Dr., Grand Forks, ND 58201. (701) 772-6531

FOR SALE: Repair! Radio repair, tube or solid state, reasonable rates. Jim Rupe, AB7DR, Western Amateur Radio Repair Co., (WARRC), 998 Whipple, Grayland, WA 98547-0697. (360) 267-4011

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FOR SALE: R-390A Repro nameplates - $9 shpd. N5OFF, 111 Destiny, Lafayette, LA 70506. trinit698@dt.net, (318) 989-3430

FOR SALE: Sylvania X-7018 modulation monitor - $55; Eddystone dial - $50; Central Electronics MM-2 monitor scope w/IF adapter - $150; MC Jones directional wattmeter 706-1 - $85; Heath: HA-14 & ps - $335; AR-3 - $35; HM-102 - $40; various coax relays & switches; call, big list - free. Richard Prester, 131 Ridge Rd., W. Milford, NJ 07480. (973) 728-2454

FOR SALE: Heath HG-10B - $70; Hammarlund HQ-100 - $100; Collins S-line & access's - $995; Drake MS-4 - $50. Ron, K1BW, MA, (413) 538-7861.

FOR SALE: Ranger I, exc - $250; Valiant I, exc - $350. PU only. Larry, K3LQB, 154 W. Putnam Ferry Rd., Woodstock, GA 30189. (770) 926-1441

FOR SALE: Hallicrafters SX28 w/manual, good condx - $250; National NC300 w/manual, good condx - $200. + shpg. John, NE6G, 7495 Gunter Rd., Pensacola, FL 32526. (904) 944-6563

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WANTED: WW II Japanese, German, Italian radios & communication equip for display in intelligence museum. LTC William L. Howard, 219 Harborview Ln., Largo, FL 33770. (813) 585-7756, wlhoward@gte.net

WANTED: Mics: EV605, 638, 641; Astatic UT-78; Shure 545S/54PE/54SD, CR80, CR41, 707A. Tom Ellis, Box 140093, Dallas, TX 75214. (214) 328-3225, fx 328-4217 tomsanics@flexcomp.com

WANTED: Collins 32V2 or 32V3, w/ manual in exc and unmodified condx. Richard J. Taylor, 11 N. Cypress Dr., Wichita, KS 67206. (316) 682-9151, rjtaylor@feist.com

WANTED: Copy of MIL-T-27A spec, RCA, Gates, Langevin B'cast gear. R. Robinson, 868 S. Main St., Plantsville, CT 06479. (860) 276-8763, richmix@erols.com

WANTED: TBY, complete set unmodified, or accessories; also BC-611. Roger Sewing, N6TNF, Novato, CA, (415) 898-4412, rsewing@cmc.net

WANTED: Command sets ART-13's; Collins radios & all accessories top $ paid; also most radios repaired reasonable. FCC licensed. WA1DEJ, MA, (781) 485-1414 eves, hobfact@tiac.net

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

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

WANTED: Valiant II; Swan 600R Custom; Hammarlund SP600-JX21A; TMC GPR-92. Ric, C6ANI, POB N4106, Nassau NP, Bahamas.

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

WANTED: Any military entertainment radio (Morale rcvr), manuals, accessories, or data plates. Henry Engstrom, KD6KWH, POB 5846, Santa Rosa, CA 95402. ph/fx (707) 544-5179

WANTED: For Collins AN/URC32, interconnecting cables, mine missing & cut; for AN/URC 32, AM2064URC, H169U, CX1046A, C2091 URC, CM 126/UR, 172J1, mod xfmr for T-368. Pete, Box 250, Ottsville, PA 18942-0250. (610) 847-2214 eves

WANTED: Swan model 117-XC pwr sply; Hallicrafters model P-150 AC pwr sply. John B. Keil, 4618 Norwalk St., Union City, CA 94587. (510) 471-4838

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FOR SALE: Mic for Heath lunchbox - $20; 4" Simpson 200 mA meter - $20. Les Mathews, WB2DQV, 421 Carvin St., Clayton, NJ 08312.

FOR SALE: QST magazines complete 1930 to 1997, all in binders - Make offer. RJ Eastwick, N2AWC, 224 Chestnut St., Haddonfield, NJ 08033. (609) 429-2477

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FOR SALE: Hundreds of books: ARRL; Rad; Lab; RCA, Receiver Design, 2-stamp SASE for list. Charles Brett, 5980 Old Ranch Rd., Colorado Springs, CO 80908. (719) 495-8660

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FOR SALE: Harris-Gates HFL 1000 xmtr w/SG70 exciter, manual, cables - $1500. V. Vogt, 330 SW 43rd St. #247, Renton, WA 98055. (540) 856-8277

FOR SALE: Stancor ST-204A, 69TX, DC-3 TX & 203 TX. Tom Berry, K9ZVE, 1617 W. Highland Ave, Chicago, IL 60660. (773) 262-5360

FOR SALE: R390As, working w/meters - $225; working, no meters - $150; not checked w/meters - $150; no meters, not checked - $100. Pete, PA, (610) 847-2214 eves.

FOR SALE/TRADE: Collins 75A2 xtal calibrator, one mech filter - $350; 32V - $250; R-388 - $175; 32S-1 - $325; R-390 - $225; 65151 - $650. Pete, PA. (610) 847-2214 eves.

WANTED: Anything related to Tecraft & Ameco, cheap stuff only; Tecraft pwr sply & manuals. Bud Fritz, N3SFE, 104 2nd St., Montgomery, PA 17752.

WANTED: Collins R389, 30K-, 310-, 399C-1, KW-1, HF80 i.e. HF8014, 8515-1, Hallicrafters SX-115. Richard, WAØAKG, NE, (402) 464-8682.

WANTED: Test equipment & tube audio amplifiers. Mike Nowlen, WB4UKB, 2212 Burgee Ct., Reston, VA 20191. mike@3dnet.com

WANTED: McKay Dymek radio literature & info. Gene Peroni, KA6NNR, POB 58033, Philadelphia, PA 19102. (215) 665-6182

WANTED: S -meter for NC300. Ozzie, (530) 468-2116, W6ICM@SESQTEL.NET

WANTED: TBY-2 manual. Navships 94200.1 "Directory of Communication Equipment". Joseph W. Pinner, KC5IJD, 201 Ruthwood Dr., Lafayette, LA 70503. kc5ijd@sprintmail.com

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WANTED: Keys - keys - keys - keys - keys - keys - keys - keys - Jim, KØYLW, KS, (785) 364-3989

WANTED: E.H. Scott Radios only in very good condition. EA4JL, contact in the States, Kurt Keller, CT, (203) 431-6850.

WANTED: Cash for Collins: SM-1, 2, 3; 55G-1; 62S-1; 399C-1, 515-1; 75S-3A, C 32S-3A; any Collins equip. Leo, KJ6HI, CA, ph/fx (310) 670-6969, radioleo@earthlink.net

WANTED: National SW-3 first model, 2 volt version; S-101 xfmrs; NC600 condensors; Browning preselector. Dean Showalter, W5PJR, 72 Buckboard Rd., Tijeras, NM 87059. (505) 286-1370

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WANTED: Watkins-Johnson or Communications Electronics Inc. info, catalogs, manuals or equipment. Terry O'Laughlin, WB9GVB, P.O. Box 3461, Madison, WI, 53704-0461, 608-244-3135

WANTED: Hallicrafters HT-1, HT-9, HT-31, S-T, SX-11, SX-17, SX-25; Howard rcvrs; Harvey xmtrs. Ken Seymour, KA7OSM, 9115 SW 176th Ave., Beaverton, OR 97007. (503) 306-7439 24 hrs. ken.seymour@attws.com

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

WANTED: Broadcast gear, compressors, limiters, old mics, consoles, EQ, tube recorders, thanks! Mike States, Box 81485, Fairbanks, AK 99708. (907) 456-3419 ph/fax

WANTED: Navy xmtrs: MQ, TCA, TCE, TCN, TCX, TDE; rcvrs: RAW, RAX, RBD, RBJ. Steve Finelli, 37 Stonecroft Dr., Easton, PA 18045. (610) 252-8211. navrad@enter.net

WANTED: Squires-Sanders SS-1R, SS-1T, SS-1V, SS-1S, see my web page tulsa.oklahoma.net/~wd5jfr. Hank, WD5JFR, OK, (800) 364-4265

WANTED: Sargent info, have acquired a Sargent model 11 UA. Are there any others out there? Need a manual copy & would like to talk/correspond w/any other owners of this or similar sets. Dean Showalter, W5PJR, 72 Buckboard Rd., Tijeras, NM 87059. (505) 286-1370

WANTED: The front bezel and freq pointer for the E. H. Scott Navy RBO-2 rcvr. Keith, KK5FE, 31 Claudia Dr., Covington, LA 70435. (504) 892-4538, kk5fe@communique.net

WANTED: Hallicrafters HT-9 parts - side fins, osc/plate coils, serial plate, ant. post. Carl H. Nord, WA1KPD, 16 Saddlebrook Dr., Killingworth, CT 06419. (860) 663-3676, cnord@snet.net

WANTED: KWS-1 exciter back panel. Dick Bean,, K1HC, 422 Everett St., Westwood, MA 02090-2218. (781) 461-0101, K1HC@AOL.COM

WANTED: S-Meter for SX-24 or -25. George, W2KRM, NY, (516) 360-9011, george2f@aol.com

WANTED: Info/schematic on military AN/URT27 Radio Set, beacon (parachute) unit is designed to operate on 243.0 MHz. Len, WA6ELK, (619) 689-2854; lcastro@qualcomm.com.

WANTED: Information-WW2 TCS Radio System: Design, Manufacturing & Operation for article. Any help appreciated. Thanks. Greg Greenwood, WB6FZH, POB 1325, Weaverville, CA 96093. (707) 523-9122 (message) gregfdzh@aol.com

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FOR SALE: New orig. PJ-068 mic plugs for Collins S-line/KWM-2A/HF-380 shp'd in USA - $8 ea. Clint Hancock, KD6H, 6567 Ashfield Ct., San Jose, CA 95120-4502.

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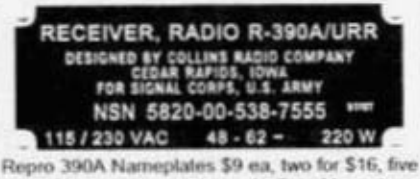

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WANTED: Xmtg tube sockets, 813s, etc. Send SASE for list 4 tubes & socket extenders. Typetronics, POB 8873, Ft. Lauderdale, FL 33310-8873. (954) 583-1340, fax 583-0777

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WANTED: ATLAS 350XL junker parts radio; 350 pwr sply; schematic for National 100A. Don, CA, Ph/Fx (818) 368-7374.

WANTED: National coils, dog house pwr splys & NIB parts. I love National. Sylvia K. Thompson, N1WVJ, 33 Lawton-Foster Rd., Hopkinton, RI 02833. (401) 377-4912

WANTED: Broadcast xmtr, 500 to 1000 watts. Merle Crowley, W1GZS, POB 476, Sumterville, FL 33585. (352) 568-1676, lal@sum.net

WANTED: Johnson Navigator xmtr. Donald Kelly, 27973 Bush Ln., Scappoose, OR 97056-2010. (903) 654-7130

WANTED: Manual for Clegg 22'er Mark two, two meter AM xcvr. Al Norton, K7IEY, 1008 Liberty St., Lynden, WA 98264. (306) 354-4622

WANTED: VFO knobs for Ranger II or Valiant II; modulation xfmr for B&W 5100, need not be orig. Andy, KA9SDT, 201 Moore Dr., LaCrescent, MN 55947. (507) 895-8926

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

WANTED: Transformer T-14 (balanced modulator xfmr) for Drake TR-4, badly needed to revive comatose patient! Richard Pann, W1SUJ, 2447 Yates Dr., Augusta, GA 30906. (706) 798-7279

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WANTED: SX42, SX88, SX117, AGS, NC-400 & PRO-310. Taka, CA, (650) 697-6719. chi_taka@earthlink.net

WANTED: Hallicrafters SX-25, 88, 100; Hammarlund HQ-100, 145, 160, 180, PRO-310; Howard 437-A; National NC-46, 190, 400; rcvr should be in exc condx, orig, no mods & working. Takashi Doi, 1-21-4. Minamidai, Seyaku, Yokohama, 246 Japan. Fax 011-8145-301-8069, taka-doi@kk.iij4u.or.jp

WANTED: Schematic for Morrow MBR-5 radio. Harold Spaulding, 1567 Lilac Way, Upland, CA 91786.

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WANTED: 250TH tubes; Jennings vac var cap 1/4 inch shaft; roller inductor that will cover 160 w/ turns counter or a seperate turns counter; high pwr plate choke that will cover 160 or 80; bandswitching grid input assembly; NC-300 xtal calibrator. Dave Johnston, K9HDQ, IN, (765) 354-2884.

WANTED: Manual schematic, antenna coupler CU-286/FRR-33. Weber, 4845 W. 107th St., Oak Lawn, IL 60453-5252.

WANTED: Mosley CM-1 rcvr & spkr. Doug, KC8JT, 1539 North Rd., Troy, OH 45373-1101. (937) 335-1300

WANTED: Driver xfmr part No. 121A7 for Elmac AF-67. Bill, WA2TDR, NJ, (973) 744-3164.

WANTED: SM-57 ext S meter for NC-57 rcvr; S-53 or S-53A for parts. Bill Bowes, N7MOB, WA, (253) 839-8591.

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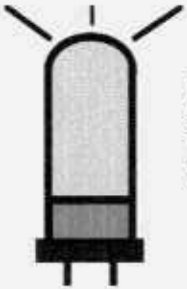

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