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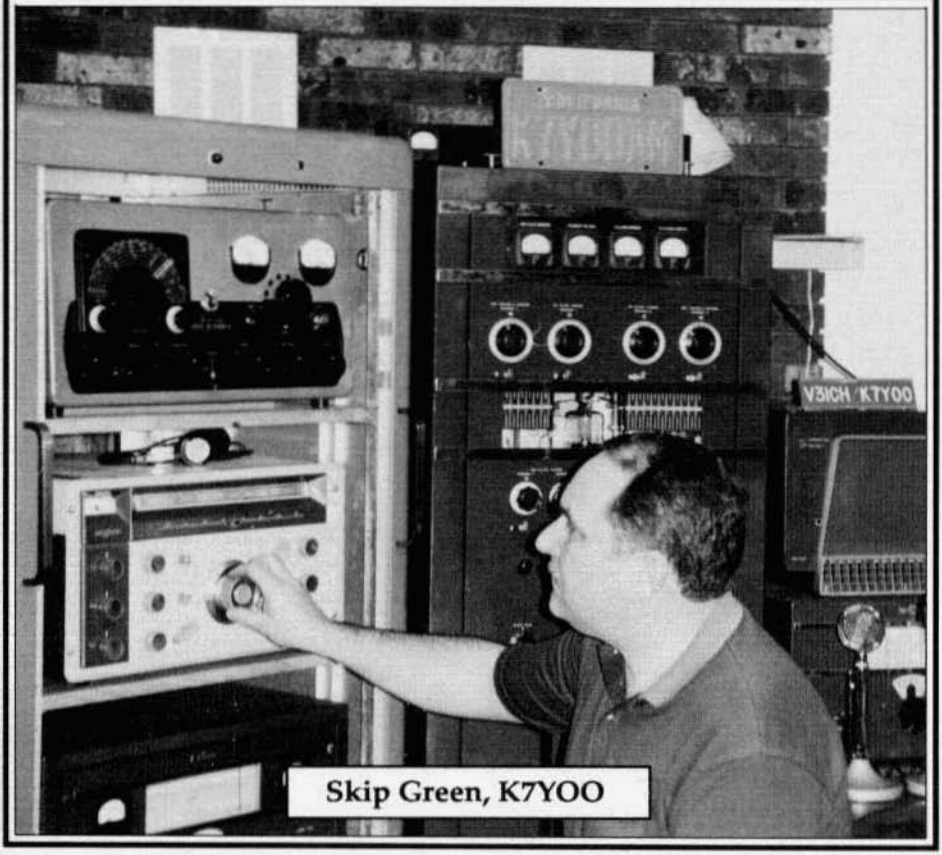
ELECTRIC RADIO

celebrating a bygone era

Number 36 April 1992



Skip Green, K7YOO

ELECTRIC RADIO

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WALT HUTCHENS,KJ4KV.....ELECTRIC RADIO IN UNIFORM
FRED HUNTLEY,W6RNC.....REFLECTIONS DOWN THE FEED-LINE
BILL KLERONOMOS, KDØHG.....VINTAGE PRODUCT REVIEWS
DALE GAGNON, KW1I..... AM REGULATION UPDATES

Electric Radio is published for amateur radio operators and others who appreciate the older tube type equipment. It is hoped that the magazine will stimulate the collecting of, and interest in, this type of equipment.The magazine will provide information regarding the modification,repair and building of equipment. We will also work to-wards a greater understanding of amplitude modulation and the problems this mode faces.

Electric Radio Solicits Material

We are constantly searching for good material for the magazine. We want articles on almost anything that pertains to the older amateur equipment or AM operation. From time to time we will also have articles and stories relevant to the CW operator and the SWL. Good photo's of ham shacks, home-brew equipment and AM operators (preferably in front of their equipment) are always needed. We also welcome suggestions for stories or information on unusual equipment. For additional information please write us or give us a call.

EDITOR'S COMMENTS Barry Wiseman, N6CSW/Ø

In this issue - another milestone (we've been around 3 years now) - we've put together an index of the first 36 issues of the magazine. By opening the staples this section can be removed from the magazine to be either copied or used separately. Every December from now on we'll update the index.

With this issue we've also expanded the magazine by 8 pages. This means that our printing and postage costs increased dramatically. To offset this cost - and the last postal rate increase - the new subscription rates will be as follows: Second class - $24; First Class - $34; Canada (Airmail only) - $35 and Foreign (to all countries Airmail) - $60. These rates will go into effect July 1. Up until that time new subscribers can subscribe at the present rates and all current subscribers can renew at the old rate, even if the renewal date is 11 months away. I hope these increased rates don't pose a hardship for anyone.

This may not be the best time to raise the rates - when the country is in a recession - but I don't see any alternative. I want to keep making ER better and that means bigger and that costs money. I'm hoping that everyone is going to be satisfied that they're getting more magazine for the extra money.

With 8 extra pages we have an opportunity to expand the magazine into new areas and print articles that may not be of such widespread interest. One example is the series we're starting this month on broadcast transmitters in the hambands. Another subject we've never touched on is vintage RTTY.

Going into our 4th year I feel very blessed to have made it this far. Thanks for your support.

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Cover: Skip Green, K7YOO, author of this month's article on the Johnson 500. The '500 is on the top shelf of the cabinet. Below it is a National NC-300. The rig behind Skip is a Collins 30K.

Reflections Down the Feedline

by Fred Huntley, W6RNC
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Nevada City, CA 95959

There used to be an abundance of free technical literature available on the counter-tops at the local ham stores, during the days when most hams were either building or modifying their own equipment. Practically every manufacturer published something about their products. It may have been only a sheet, but some went into brochures, booklets and occasionally catalogs.

Two of the outstanding pieces of manufacturer's literature were RCA "Ham Tips" and GE "Ham News". Both had similar formats. There were small booklets issued bi-monthly and contained fully illustrated construction articles on the latest in ham radio. Eimac published more lengthy technical treatises on vacuum tube operation. They also hired the renowned ham radio pioneer, John L. Reinartz, as a public relations representative. He wrote many down-to-earth technical articles for Eimac on improved ham radio techniques.

In QST magazine, both Hallicrafters and National Company had monthly full paid advertisement messages directed at informing hams about the highlights of their company's products and technical developments. Hallicrafters sometimes donated their full page to a "guest editorial" written by rank and file hams who had a noteworthy technical or operating topic to discuss.

The main tool in the average ham's technical arsenal was the large radio catalogs available from such mail order distributors as Allied Radio, Wholesale Radio Labs, Lafayette, Newark Radio, Burnstein-Applebee etc. These catalogs listed the full spectrum of available parts and many brands of manufactured equipment.

After WW II, surplus radio was king for several years and various companies published surplus radio catalogs. Those were the days when a 304TL cost 50 cents and an ARC-5 cost one dollar -- over the counter. Fair Radio outlasted all the other surplus outfits and still issues one of the most interesting catalogs available.

Around the mid 1960's when SSB was gaining acceptance, ham radio changed direction in favor of store-bought radio equipment. Home construction, parts availability and technical literature went into decline. There is still some of these things available but it amounts only to a ghost of the past.

To-day the technical and advertising literature, catalogs and brochures of yesteryear are worth preserving. They are a part of amateur radio's history and additionally are a valuable source of information in connection with repair and restoration of old tube-type equipment. **ER**

AM Forum At Dayton

Dale Gagnon, KW1I, has asked us to remind everyone that there will be an AM forum at Dayton on April 25, at 1:15 PM in room #7. There will be a country-wide panel discussion on AM and a pictorial review of a 'great California AM station', W6HDU.

AM'ers are also invited to stop by and visit the Southeast AM'ers in booths #3667 and #3668. Jim Taylor, W4PNM, one of the group, says that any and all AM'ers are welcome to use this booth as a meeting place and as temporary storage for purchases. **N6CSW/Ø**

LETTERS

Dear ER

With great sorrow I would like to inform the AM community of the death of our beloved friend, Don John, W4YDF, better known as "DJ" to thousands of ham operators across the country.

On February 29, DJ was found dead in his kitchen by his daughter Donna. It seems that he had a heart attack. He had open heart surgery in 1980 and had many health problems since that time.

DJ was very active in the AM community, promoting the traditions of AM. He was a Lifetime member of MARS and had given over 30 years of service to the MARS program. DJ was first licensed in 1952. His first transmitter was an 813 rig built in a kitchen cabinet.

My life is so much richer for having known DJ and I will never forget him.
Mike McCoy, AA4TW

Dear ER

The Japanese are masters of planned obsolescence with new and exciting (but hardly essential) bells and whistles. Who needs 200 memory channels in an HF rig?

In regard to the above: in my shack I have a coaxial switch that can select any one of six pieces or pairs of equipment. It has been very interesting to compare the performance of recent Japanese equipment with a 75A-4, R-388, SP-600, S-Line, etc. (which are all in good condition and correctly aligned).

I am not talking about comparing specific parameters but rather a "readability factor" i.e. digging out a weak 2x2 signal from under QRM/QRN and comparing the ability of the different receivers to deliver a readable signal to your ears. Which is really what it is all about.

You have to make allowances for warm-up stability, dial calibration and sometimes the lack of a noise blanker. However, I have never ceased to be amazed at how well most of the old equipment performs and sometimes outperforms the state of the art modern equipment, (no phase noise).

The 75A-4 mechanical pass band tuning works better than most of the modern veractor systems. The crystal filter on the SP-600 acts like a modern high performance crystal lattice bandpass filter rather than a forty year old "single signal" crystal filter. The S-Line is one of the quietest receivers ever manufactured.

Considering what modern equipment costs, you are not missing much by not buying the latest.
Roger Faulstick, KD4AS

Dear ER

Here in the Northeast, 6 meter AM activity has always been alive and well. Although many areas of the country have seen little or no AM activity on this band since the late '60's or early '70's, the Northeast has always had it's share of AM diehards and occasional users who will make it a point to check-in to their local net for a ragchew. However, with the recent love affair many of us are having with the restoration and collecting of vintage gear, 6 meter AM gear, which once sat on hamfest tables at giveaway prices, are now being snatched up by those with a discerning eye. In lieu of this situation, I thought that it might be appropriate to publish a listing of 6 meter AM nets in the Northeastern US. Actually, I would like to expand this 6 meter AM net listing for all active nets and informal ragchew frequencies for both the US and Canada.
Harry A. Schools, KA3B

Editor"s Note:

Harry sent along his listing of Northeastern 6 meter AM nets. Rather than print it now I thought it might be best to gather more information on 6 meter AM nets and print an expanded version sometime in the future. If you have any information that would be useful for the list, please send it in to ER.

ELECTRIC RADIO IN UNIFORM

by Walt Hutchens, KJ4KV
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Arlington, VA 22207

"The PRT-4 and PRR-9"

Part 1

Sometimes when you look at a military radio you can see right away how the design of the set fits its job. In other cases, there are more questions than answers and you find yourself wishing you could read its history or talk to someone who was there at the time to find out what the designers were thinking of -- but the stories are now decades old and the most you're likely to find is a paragraph in a corporate history telling how many were built and how wonderful they were.

This month our assignment is the one exception that I know of -- a truly strange little transmitter and receiver for which a careful, detailed and reasonably objective history was written when it was developed. This history is not a boring list of dates and names but a story, with twists and turns worthy of a novel.

Moreover, though the story follows the development of one radio, the problems it shows are those of all military radio development, in fact of all hardware development. Because the story is so interesting and the radios themselves are fairly simple, we'll spend more time than usual on the history.

Overview

The PRT-4 Transmitter and PRR-9 Receiver are separate pieces of equipment intended mainly to allow a squad leader to communicate with members of his squad. Both units are crystal controlled wideband (8 kcs deviation) FM voice units compatible with the PRC-25, PRC-77, VRC-12, and other ground sets of the 1960's and 70's. The transmitter can also send a tone to get the attention of receiver users. The transmitter operates on either of two preset channels and the receiver on a single channel in the frequency range 47 to 57 Mcs; the equipment was supplied with crystals for 50 channels at 200 kcs intervals.

The PRR-9 receiver is designed to clip to the edge of a helmet and use it (and the wearer) as a counterpoise for the 18" wire whip antenna. It has a built-in horn-type loudspeaker which points at the user's ear under the helmet edge and delivers ample volume for even a fairly noisy location; a miniature earphone may also be used. It is about 3-1/4" x 5-1/2" x 1-1/2" (H x W x D in operating position on the helmet) and weighs 9 ounces including battery and antenna. Carrier operated squelch is provided. The only control is an OFF-ON volume control; when fully advanced this knob turns off the squelch.

The PRT-4 transmitter is a hand-held unit which can be clipped to a suspender or pocket when not in use. Output is 1/2 watt on channel 1 and .05 watts on channel 2, giving a range from a few hundred feet in wet jungle to a mile in open terrain. It has a built-in mic, a channel switch, and a TONE-OFF-VOICE switch. The antenna is a 24" telescoping whip. The transmitter is 8" x 2-3/4" x 2" and weighs 23 ounces with the battery. Neither the transmitter nor the receiver can use other power supplies, control units, or antennas.

Left, PRT-4 Transmitter, Right, PRR-9 Receiver. TONE/VOICE switch keys the transmitter when pushed either way. Receiver is clipped to right side of helmet with side shown toward the head; Lanyard snap points to loudspeaker horn opening which is about an inch from user's ear.

Design

Both transmitter and receiver are fully transistorized. The PRT-4 transmitter is housed in a rugged die-cast aluminum case. By removing four screws you can take off the back cover; two more screws and the channel switch nut hold the fiberglass main circuit board in the case.

The electronic design is simple but interesting. A crystal controlled local oscillator operating 10.7 Mcs below the channel frequency is mixed with a Hartley oscillator on the channel frequency to give a 10.7 Mcs difference signal.

A 10.7 Mcs crystal oscillator, using a special circuit (so it isn't too tightly controlled by the crystal) is frequency modulated by a voltage variable capacitor to which the audio signal is applied, giving a 10.7 Mcs FM signal. The 10.7 Mcs FM signal is compared to the 10.7 Mcs difference signal; the error is used to control the frequency of the channel frequency Hartley oscillator. This stabilizes the channel oscillator while giving it the FM from the 10.7 Mcs oscillator.

This scheme sounds complicated but it lets a transmitter with five RF stages (remember, these are 1960's transistors) deliver 1/2 watt of power at 50 Mcs.

The PRR-9 Receiver was built in two models: the first production model, AN/PRR-9 which I will call the 'early model' and the PRR-9(XE-9) 'late model'. (The 'XE-9' tells you that it was experimental, developed at Ft. Monmouth and the 9th such set.)

The late receivers are about 5-1/2" long while early units are about an inch longer. In early sets the case is metal, late sets are of metalized fiberglass. The early sets use 14 discrete transistors while the late models use three integrated circuits.

The PRR-9 receiver is built on a single-sided fiberglass circuit board which slides into the case from the forward end. A pivoted, wire whip antenna is mounted on the rear end of the receiver; a small coax plug connects it to the chassis.

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Sticking out from one side of the receiver end-plate is a housing with a battery plug and an earphone jack. The battery looks like a long metal cased 'AA' cell and is held by a sturdy clip on the side of the receiver case. Early sets used a 5 volt battery with a two-pin plug (the large pin is positive); late sets use a 3.2 volt battery and have a single pin plug like a small phone plug (the plug tip is positive). The combination ON/OFF switch/volume control/squelch switch is mounted on the end plate.

The receiver loudspeaker consists of a flat, coiled horn with a driver unit at the center and delivers uncomfortably loud audio with only a few milliwatts of receiver output.

The circuit is a conventional double conversion superheterodyne (IF's of 10.7 Mcs and 455 kcs) with crystal controlled first and second local oscillators. Changing channels is the same for both transmitter and receiver: replace the local oscillator crystal (both are 10.7 Mcs below the channel frequency) and retune using channel alignment indicator ID-1189; the procedure would ordinarily be done by field maintenance personnel.

Early History

Most of the material in this section is from "History Of The Squad Radio", Research and Development Technical Report ECOM 4451, by Marvin W. Curtis, U.S. Army Electronics Command, Fort Monmouth, New Jersey, November 1976. This report is approved for public release (distribution unlimited) and should be available from the National Technical Information Service; Mil-Com Exchange Electronics, (904) 276-3568, has copies.

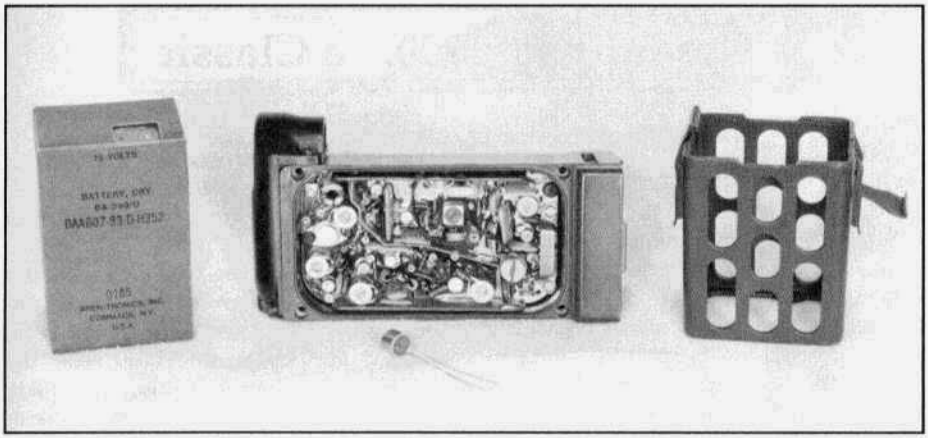
World War II produced two successful one-man radios: the BC-611 3.5 to 6 Mcs (AM) walky-talky (E.R., no. 24, April 1991) and the BC-1000, a backpack FM set with an output of 0.3 watts on 40-48 Mcs. Since the Army was converting to VHF FM, the BC-611 was of limited usefulness, while the BC-1000 was too large and heavy. At the end of the war, work started on a series of FM portables using the newly developed subminiature tubes. The result was the handheld PRC-6 and the small backpack sets PRC-8, 9 and 10. These were good radios but the Army thought that something even better might be possible.

Radios for Small Units

From ancient Greece to Napoleon, battles were fought between massed armies, each trying to concentrate enough men at a point to roll over the other. However, when the development of the explosive artillery shell, during the 19th century, made it possible to kill everyone within a radius of ten yards or more, tactics had to change. Soldiers were now dug in, spread out, or both, so that a single shot could not kill so many. But that created a problem of control, particularly at the level of the squad – nine to twelve men with a non-commissioned officer as leader. In massed attacks, these men would be within range of the squad leader's voice but when spread out or dug in, they might cover 100 yards. Telephones and runners could be used when dug in; for a squad on the move, hand signals became a partial answer. But only 'partial', because night, smoke, bad weather and terrain could make visual signals useless.

Why not give every man a radio? Until subminiature tubes were developed, the answer was obvious: radios were so bulky that a soldier equipped with one would have great difficulty using his weapon. Now, however, it was possible to think about 'personal' two-way radios; about 1947, the commercial development of a two way set the size of a king-size cigarette package raised Army hopes.

It was not yet to be. The development set was like most state-of-the-art designs, hard to make; it was also unstable, had a range of only 200 yards, and radiated a strong signal from its receiver. The Signal Corps Laboratory at Ft. Monmouth, New Jersey, turned to the development of radios for use between squad and platoon leaders and from platoon leaders to the company commander.



PRT-4 Transmitter back view with cover off and antenna removed. Transmitter battery at left, note open frame battery holder. Parts density is several times that of an early 60's commercial transistor radio.

This work eventually lead to the PRC-25, 1 to 2 watt backpack set which replaced the PRC-8, 9 and 10 and (when a 1/4 watt radio proved useless in the jungles of Vietnam) the PRC-6 as well.

The Squad Radio

The first transistors of military quality became available in 1953 and the Signal Corps Labs began work on a transceiver for use within the squad. Squad radios, however, posed a new set of problems. The individual squad member would not be a trained radio operator so the skill level had to be about that for use of a telephone. Neither could he put down other equipment in order to use the radio: the requirements document said that it had to be usable with the rifle in ready position. And for a set planned for use by a large fraction of the U.S. Army, cost would be a major factor.

Three approaches were tried. In the first, the set was built into the stock of the rifle – this proved awkward to use unless the rifle was in firing position and was quickly abandoned. Tests by the 101st Airborne Division at Ft. Campbell, Kentucky, in 1959 and 1960, evaluated two other approaches. In the first, (PRC-36), the radio was mounted on the user's belt; this equipment was considered unsatisfactory because the cables from the radio to the earpiece and to an antenna on top of the helmet became tangled in heavy brush. In the second, (PRC-34), the radio was built into a special fiberglass helmet; it had already been discovered that placing it in the top of the liner for a standard steel 'pot' made the helmet top heavy and likely to fall off, while other locations did not give enough clearance to the wearer's head.

The tests showed that although none of the equipment was suitable for general use as it was, the idea worked – giving squad members radios helped the transmission of orders, allowed greater initiative and made the squad more effective.

Finally – and very important to the future of the project – it was concluded that individual riflemen needed only a receiver. **ER**

Editor's Note: Part 2 will appear in the May issue.

The Johnson 500... a Classic

by Skip Green, K7YOO
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Vintage radio equipment is elevated to the classic status for a variety of reasons; rarity, uniqueness, function or engineering excellence being some of them. My personal preference is for radios that emphasize the two latter traits because they can be used on the air with relative ease and enjoyment rather than curios that are better viewed than operated. One radio that particularly stands out as a functional item even in the 90's is the Viking 500.

The Viking 500 was designed by John Foster [see ER #7] in the mid 50's when the AM market had peaked and SSB was becoming popular. The 500 stands out because many of the features that we take for granted, like tracking exciter stages and the ability to rapidly QSY from one band to the other, are incorporated in its design. Most radios in use at the time were real "knob twiddlers" delights and this included most of the E.F. Johnson units as well as other brands. Many of the characteristics of the KW-1 [see ER #23] which John also designed, are included in the Viking 500.

The basic circuitry of the 500 is fairly straight forward but what is outstanding is the manner in which a variety of off the shelf Johnson components are linked together to form a radio that was unique in the E.F. Johnson product line. The audio section consists of the typical low level preamp/clipper setup and 6B4G driving a pair of 811A's. At first glance this appears normal but what is interesting about this is the voltage being run on the 811A's, 2000 volts. There was some discussion about this because the maximum voltage listed for these tubes is 1500 V. John Foster told me that they conferred with the tube manufacturer (RCA) and were assured that if the correct bias was applied this would present no problem. This has indeed proven to be the case over the course of time.

The high level portion of the modulator and the power supply are mounted together on a separate chassis that is intended for placement remote from the operating position. This is very handy and makes it possible to readily repair or replace parts in this area (see photos). I consider this very important for the use of the '500 in the '90's when many times the original parts are not available and substitutions must be made. Different transformers, etc. can be substituted without harming the cosmetics of the RF deck. Some amateurs have even built complete new supply/modulator sections incorporating 'trick' audio schemes and heavy duty components without disturbing the integrity (or devaluing) the main RF deck. One bad feature of the power supply is that it is very top heavy and when hefting its 135 lbs by the sadistic little handles, it is easy to lose control of both your bladder and the supply. I have mine sitting on a small wheeled furniture dolly to avoid having to lift it and ease 'QSYing' around the shack.

The table top portion of the transmitter is housed in a cabinet which is the same as the Valiant and similar in size to the Thunderbolt. The vital difference is that it is much lighter than either of these units due to the power and high level audio components being mounted separately. This is great because it is easier to position on the operating desk or to work on. The RF deck houses the VFO, driver and amplifier stages as well as the low level audio circuits.

It is connected to the power supply by cables that interconnect the high voltage, control circuits and audio lines. This is a

VIKING "FIVE HUNDRED" TRANSMITTER

Rated 600 watts CW input...500 watts phone and SSB (P.E.P.) with auxiliary SSB exciter) -- instant bandswitching 80 through 10 meters! Compact RF unit designed for desk-top operation -- power supply modulator unit may be placed in any convenient location. All exciter stage ganged to VFO tuning. High gain push-to-talk audio system. Operates by crystal control or highly stable, built-in VFO. Class C 4-400A final amplifier provides plate circuit efficiencies in excess of 70% with unequalled broadcast-type high level amplitude modulation. Wide range pi-network output circuit with silver-plated final tank coil will load virtually any antenna system. Low level audio clipping -- effectively TVI suppressed and filtered. With tubes.

Cat No.	Amateur Net
240-500-1 ..... Kit	.....$749.50
240-500-2 ..... Wired	.....$949.50

real sore spot as far as I'm concerned because the high voltage connections are via small pin plugs and jacks that are marginal at best. I have seen specs on similar jacks in various catalogs including a recent E.F. Johnson components catalog showing these with a 600 volt rating. These are similar to the internal RF deck connections used in the Desk KW, which like those on the 500, have a tendency to arc over. I suggest replacing at least the high voltage connection with something more substantial like a high voltage BNC.

The RF deck itself is well engineered and performs admirably, having features that were unlike other EFJ products. The most radical departure from other Johnson designs is the fact that the exciter and VFO track, making a rapid QSY a pleasure. The VFO is lifted almost intact the Ranger as is the associated dial mechanism. Unfortunately, the 160 calibrations

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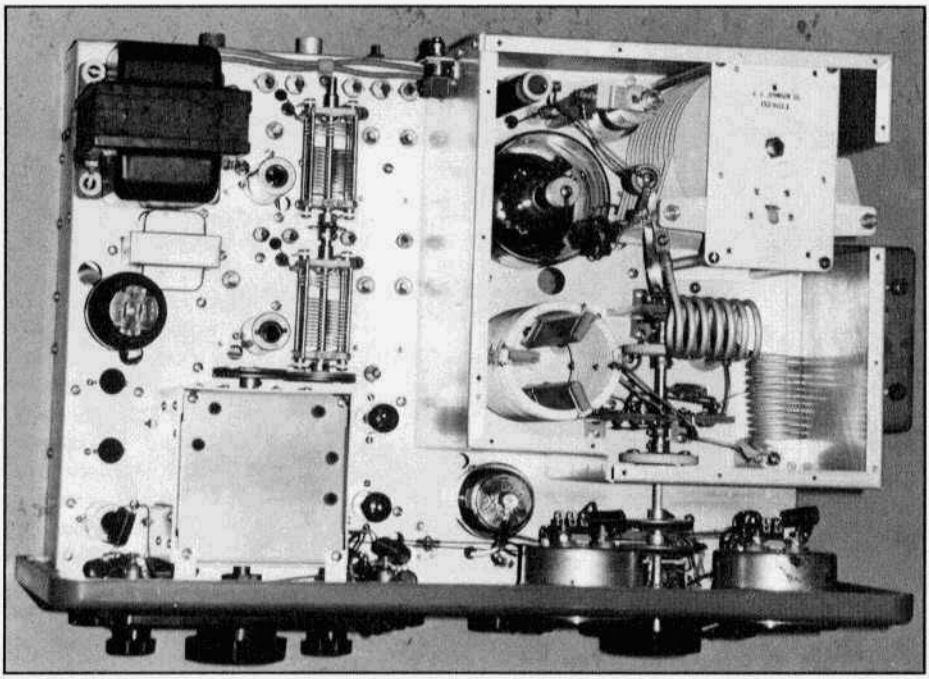


RF chassis. Note the vertical plate loading capacitor and other heavy duty components in the PA compartment.

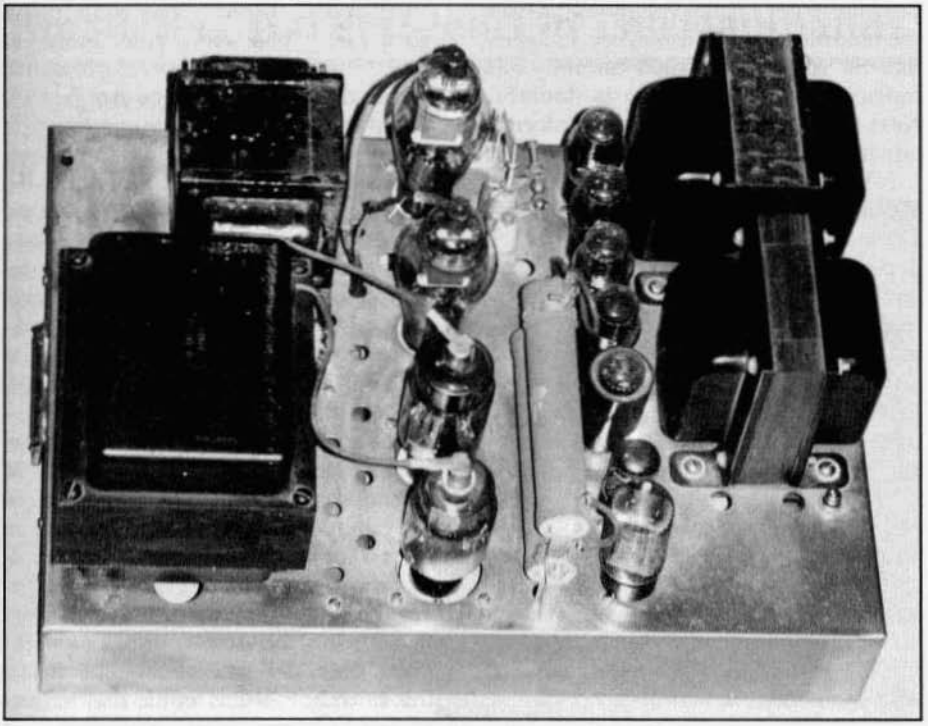
don't mean anything because the following stages don't include AM.

John tells me that during development, Al Pishitino, the chief engineer, took the 500 home for a smoke test and remarked that he "Called CQ on five bands, faster than ever before". This is one of the qualities it shares with the KW-1 and is a tremendous contrast to the Desk KW which takes considerable effort to change from one band to another.

Another KW-1 similarity is in the use of the PI-L tank circuit. This design is very efficient and I can detect little difference in output between 80 and 10 meters. This is certainly not the case with the Desk KW which has a real compromise tank circuit on 20 meters and above. Mechanically the tank circuit is really shoe-horned into a small compartment but the layout is well done.

The bandswitching layout was designed with the help of another Johnson engineer, Bud Bushell. The only bizarre feature is the vertically mounted plate tuning cap which is so large that a slot had to be cut into the side of the tank compartment for clearance. Apparently the cabinet provided enough extra shielding that this didn't create any problems. TVI prevention was a major concern with all manufacturers in the '50's and the PI-L circuit, along with the extensive bypassing in the 500, make it a very clean rig as far as spurious output is concerned.

I have already made mention of one problem (the cables) that exists on the 500 and there are a few more that bear mentioning. Many of the rigs suffered from failure of the plate transformers. I discussed this with John and it seems Johnson had quite a discussion with their transformer vendor about this problem. The first production runs were well underway when complaints about transformer failures began coming into the service department. The vendor contended that the problem was with the way the transform-



Power supply/modulator chassis. There's lots of room for substituting transformers if that should become necessary. The 866 mercury vapor rectifiers have been replaced with 3B28s as recommended by John Foster.

ers were being stored at the assembly area and they were picking up moisture. This didn't sit very well with the EFJ staff and the vendor was invited to see for himself. The vendor engineer showed up in Waseca and found that this premise was far from reality. They still were hesitant to admit that their transformer was at fault but mysteriously the next batch of transformers showed up with a revised lead arrangement for the high voltage windings. These replacement transformers have the high voltage leads routed out of the side and end of the upper bell and going directly to the rectifier plate caps. They can be further identified by the fact that they don't match the original mounting holes in the chassis. The power supply photos show such a transformer. It seems that the high voltage winding was routed or wound in such a manner on the original that arcing to the primary or ground would occur and then take the transformer out. Unfortunately, many units were in the field by this time and even though the company replaced many under warranty many units never received the new transformers. This gave rise to the bad reputation these rigs received for power supply problems.

Another problem that shows up is with the relays that key up the high voltage supply during PTT operation. When the relays are in good condition, few problems are encountered but as the relays become dirty the keyup/release sequence gets erratic causing arcing and resultant failure of various high voltage components. To add to this, the microphone circuit is still 'hot' when the rig is unkeyed (like the Ranger) and, depending on the switch arrangement in the mike, it is

continued next page

Johnson 500 from previous page
possible to get a nasty voltage spike from the modulator when unkeying. I suggest that the relays be cleaned carefully and replaced if their condition is doubtful. Next month ER will have some information from K7CMS regarding this problem.

I also suggest a bit of preventive maintenance for the various tuning circuits. These all use dial cords and as the rig ages, depending on its environment, the various components become stiff and hard to rotate. Don't wait until the dial cord breaks to lube the various conponents involved, or you will have the pleasure of a rather tedious restringing process and the job of trying to get the various stages to track again.

In discussing the design parameters set at the inception of the project, John told me that he was only given the power level and the modulator/PA lineup and the rest was up to him. He attempted to use as many stock components as possible (the VFO for example) and was pretty satisfied with the design with one exception, the power supply area. He said that if economy wasn't stressed so highly he would have preferred to have a separate screen supply and would have added one more choke to the HV supply. He also wanted to use oil-filled filter caps. The chief engineer was adamant about using the electrolytics so John went ahead and designed them into the rig. He did a proper job and used enough of them to give considerable safety margin. To my knowedge, they have never caused any difficulty other than from age-related failures.

The '500 proved to be such a flexible unit that the hams at Johnson even used it during field day, right after the rig was introduced. The field day site was on a farm about 4 miles west of Waseca and had a convenient windmill tower for antenna support. The crew strung up a 900 foot "V" beam as the main antenna. This combined with the firepower from a pair of '500s, had the operators working them as fast as they could log them. John Foster told me they were up to 50 QSOs an hour on 10 and 15 meters at one point (pretty good for an 'obsolete' mode!) Many stations called in just to comment on the tremendous signal coming out of Waseca. There was even one mobile operator who heard the commotion as he was traveling in western Wisconsin and drove out to the field day site just to get involved in the fun.

One other feature of the rig is the inclusion of an external input for low level drive (3-5 watts) to allow use of the rig as a linear amp. This makes it great for use with a Central Electronics 10A, 10B or 20A exciter.

The amateur fraternity was not alone in the enjoyment of Viking 500. As the AM era faded many of these rigs migrated into the hands of the 11 meter crowd where they were used as an amp or as a stand-alone unit. I questioned John as to whether any thought was given to the possibility of this during the design process and he said, "We never gave it a thought." While this is true, it seems ironic that in later years the Messenger series of 11 meter rigs displaced the amateur line. I know we all wince at this, but quite frankly the CB'ers are responsible for keeping a lot of these fine rigs in existence for us to scrounge up and enjoy today.

As can be seen, the Viking 500 is a worthwhile and viable addition to your vintage hamshack as well as being one of the true classics. Most of the problems with this rig are maintenance related and it suffers from few engineering faults (other than the lack of 160 meters!). I have always viewed it as a design that had a reasonable balance between quality, function and economy. If this rig was produced by 'a certain other manufacturer' it certainly would have had few compromises but the cost would have been so high that very few would be in existance for us to enjoy today. **ER**

Editor's Note: We'll have some mods for the '500 in next month's issue.

Broadcasts Transmitters On The Hambands

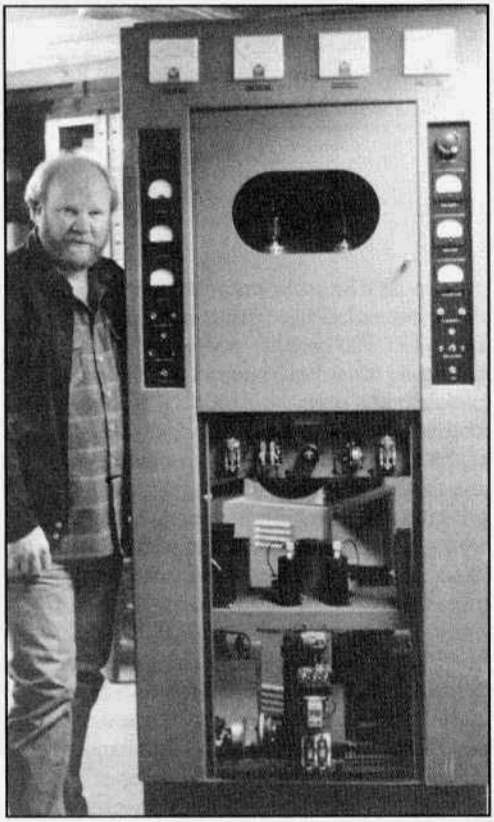
by Rod Sheffer, WA7AMI
16009 7th Ave., SW
Seattle, WA 98116

There appears to be an increasing interest amongst hams in old AM broadcast transmitters. These transmitters can be easily converted to operate in the 160 and 75 meter ham bands. While some hams are interested in operating broadcast transmitters, others are simply interested in restoring them and this can be enjoyable as well.

Broadcast stations, for reasons such as operating and maintainance costs, are replacing their existing transmitters with new solid-state units that will last forever and never break...(?). The typical station probably has a main transmitter and an older "back-up". With the new one, that makes three. In most owner/managers' minds that is at least one, maybe two, too many. So at least one goes up for sale or in some cases it might be free to anyone who will haul it away! I have had transmitters offered to me just that way and some I have hauled home.

The transmitters that I see being disposed of are anywhere from 25 to 60 years old. Some are in excellent condition and some are pretty sad looking. There are a large number of AM stations licensed for 1000 watts - that's 1000 watts output power not input power. In years past, some of these same stations were licensed for 250 or 500 watt operation. So there are a lot of old transmitters around in the 250 to 1000 watt range.

Some of the more popular manufacturers were Collins, Gates, RCA and Western Electric. There are many other good quality, lesser known, transmitter manufacturers so don't rule anything out until you look at it. These old transmitters weigh from 600 to 2000 lbs and are as large or larger than a refrigerator. Plan on some real excercise when you find one!



The author with one of his broadcast transmitters, a Bauer 1000V. It uses a pair of 4-400s in the final and a pair as modulators.

General Description Of An Older Broadcast Transmitter

RF Section

The transmitter starts out with a crystal oscillator; 535 to 1620 Kcs. This is followed by a buffer/driver stage (sometimes two) which drives a Class C RF amplifier. The RF amplifier is matched to the feedline - typically 50 ohm - with a 'PI' or 'PI-L' tuning network. Some older rigs have

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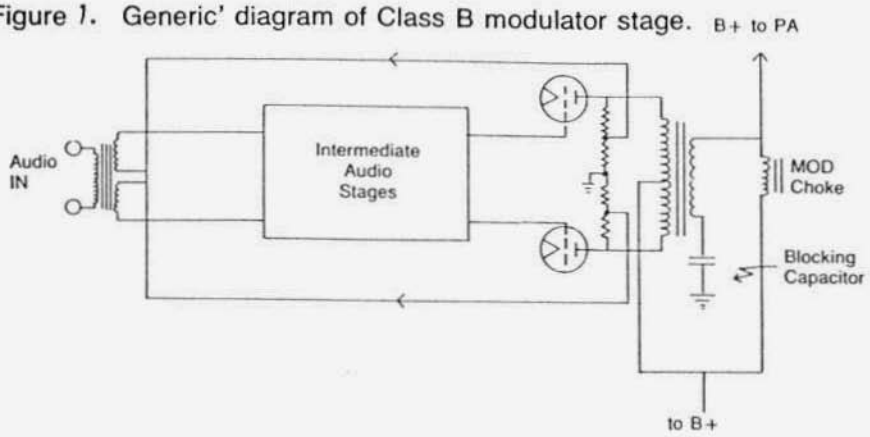
Figure 1. Generic' diagram of Class B modulator stage.



'push-pull' RF amplifiers and use link coupling instead. Power output levels are either 250, 500 or 1000 watts continuous. All these transmitters are very conservatively rated.

Audio/Modulator Section

This section is quite different in a broadcast transmitter as compared to a typical ham rig. The modulator starts with an input transformer that matches a balanced 600 ohm audio input impedance to the grids of push-pull audio tubes. [Refer to Figure 1] Depending on design, there could be a push-pull driver stage. This would be the case if the modulators were operating Class B. The modulator tubes are operated either Class AB or B. As you can see in Figure 1, this scheme is different from your typical ham rig. Broadcast transmitters were not designed to have a mic input.

Microphones, turntables, etc. are connected to a 'mixing' console where audio sources are mixed and amplified to what is called 'line level'. Line level is considered to be + or - Ø dBm or .775 volts of audio across a 600 ohm impedance.

The next part of the chain is usually some form of audio processing and finally a peak limiter which further amplifies the signal while limiting the input level to the transmitter to the amount required for 100% modulation. The audio input level required to 100% modulate most broadcast rigs is about + 10 dBm to + 15 dBm. This equates to about 3 volts of audio at the input transformer of the modulator. Not to worry! Any mic and pre-amp that can be transformer matched to a 600 ohm load and deliver around 3 volts of audio will get you going.

As mentioned, the modulators are 'push-pull' all the way through. The input is balanced - neither side grounded. Keep it that way and you will eliminate a bunch of potential problems like hum, noise, and RF pick-up in the audio system. This holds true of any audio/modulator set-up.

The modulators were designed to have wide frequency response - 50 - 10,000 CPS + or - 2 dB, distortion less than 3% at 95% modulation, noise at least - 60dB reference 100% modulation. These are typical specs on a 1000 watt RCA transmitter of 1950's vintage.

With some audio processing and equalization, excellent 'communications' audio can be acheived. [Referring again to figure 1] Negative feed-back is accomplished by taking audio off the modulator plates through a resistive divider network back to the input transformer secondary. Sometimes an R/C divider network is used to further flatten frequency response.

Note the secondary side of the modulation transformer (Figure 1). The mod.

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Monitor Your Signal

by John Staples, W6BM
732 Cragmont Ave.
Berkeley, CA 94708

One of the joys of AM is listening to the good audio quality of a well-adjusted AM transmitter. Unfortunately, some rigs are not up to snuff and the operators are unaware of the deficiencies. SSB rigs are particularly difficult to tune on AM without some monitoring equipment. A newcomer may be discouraged by bad audio reports and not know what to do to remedy the situation.

It is easy to build a simple and inexpensive monitor that will help you tune-up your audio chain by listening to the signal off the air. You can listen to hum, noise and distortion, and monitor your modulation percentage with fair accuracy with simple circuits described in this article.

One good way to monitor your signal is to just listen to it. Trying to do this with your own station receiver presents problems. The receiver front end will probably overload. Turning the audio down to prevent feedback doesn't let you listen to yourself very well. Instead of using your station receiver, try building a crystal set and listen through headphones.

An untuned crystal set can be built with a minimum number of components: an RF choke, a germanium diode, a small capacitor and a pair of headphones. Figure shows the circuit, which is about as simple as a radio can get. I prefer a germanium diode, such as a 1N56, but any silicon diode would probably work as well. I stole the phones from the Walkman, the ground goes to the chassis of the transmitter, and a few feet of wire for the antenna gives a loud signal in the phones. The audio compares well to a broadcast-quality modulation monitor which I normally use.

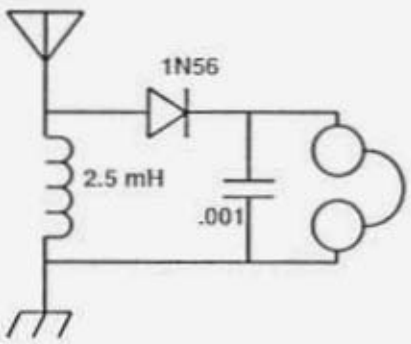

Figure 1

The crystal set allows you to monitor your audio quality but does not give a good indication of modulation depth, which is best monitored with an oscilloscope. Just about any scope will do, and if the scope has a vertical amplifier with limited frequency response, the RF can be applied directly to the vertical deflection plates. I have seen suitable scopes going for $5 at local flea markets. The two types of display usually used are an envelope presentation with the horizontal scan provided by a sawtooth or sine wave source, or a trapazoidal display, where the horizontal deflection is provided by attenuated audio taken from the secondary of the modulation transformer.

The envelope display presents the modulated RF waveform. The carrier amplitude doubles for 100% positive modulation and goes to zero for 100% negative modulation. Upward modulation approximately doubles unmodulated carrier voltage (quadruples the power), but asymmetry of the voice waveform may cause somewhat stronger modulation in one direction or the other. Downward modulation greater than 100% causes splatter and shows up as complete momentary disappearance of the carrier. As the voice waveform is quite asymmetric, the audio phase can be chosen to favor larger positive modulation peaks when

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Monitor Your Signal from previous page
the negative peaks hit 100% downward modulation. You can change the audio phase by reversing the connections to your microphone element, reversing the plate leads to the modulator tubes, or reversing the leads from the secondary of the modulation transformer.

The trapezoid pattern uses attenuated audio from the secondary of the modulation transformer to provide the horizontal deflection. During modulation the thin vertical line spreads out horizontally, forming a bright triangle on the screen. The triangle develops a 'tail' during overmodulation. Refer to my article in ER #11 or any old Radio Amateur's Handbook, for a discussion of trapazoidal modulation monitors.

Lacking a scope, a crude measurement of the modulation level and the carrier shift, which is the amount the average carrier level changes with modulation, can be obtained with another simple circuit, shown in Figure 2. Here, the RF on the feed-line is rectified by a vacuum tube diode such as a 6AL5 (or 6H6, 5V4, etc), filtered and read on a voltmeter. Don't try to use a solid-state diode; the 6AL5 will handle more than full legal power.

The 6AL5 is placed in the 50-ohm line between the low-pass filter and the antenna tuner. The circuit includes two resistors, two 600 volt capacitors, a switch and a high-impedance (20,000 ohms/volt) multimeter. This circuit, when used with a dummy load, can also give accurate power measurements.

Modulation depth can be roughly estimated with the switch in the 'Peak' position. The 0.02 microfarad capacitor charges up to the instantaneous peak value of the modulated RF voltage. Whistling into the microphone doubles the voltage at 100% positive peak modulation, and with the ballistic characteristic of the typical VOM, modulation peaks will kick the meter up around 50% of the unmodulated carrier voltage with average voice modulation.

Carrier shift, which is the variation of the carrier amplitude averaged over the modulation waveform, is measured with the switch in the 'Carr Shift' position. The meter should be steady during modulation and fluctuations indicate trouble. Downward carrier shift may signify a poorly regulated high voltage power supply in a plate modulated rig, inadequate grid drive, or a carrier level set too high in a SSB rig operated on AM. Upward carrier shift may indicate parasitic oscillation in the final or severe overmodulation.

If carefully done, the RF detector can be used to measure transmitter power fairly accurately. A good dummy load is substituted for the antenna. All the components after the 0.02 microfarad capacitor are

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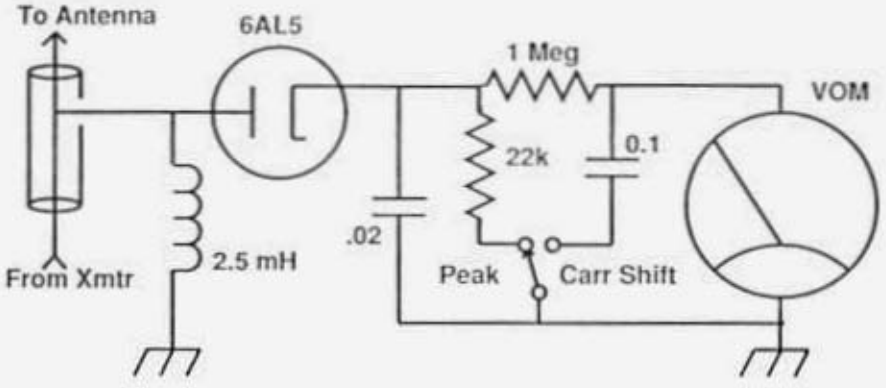


Figure 2

The Lazy Susan Approach

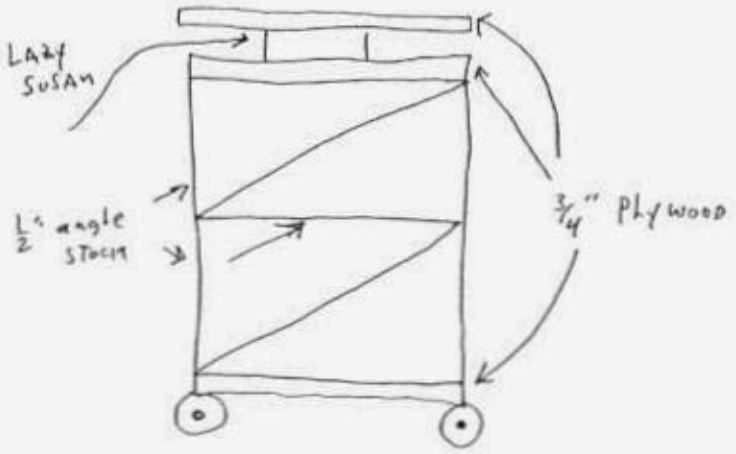
by Howard M. Mills, W3HM
Rt 3, Box 712
Harpers Ferry, WV 25425

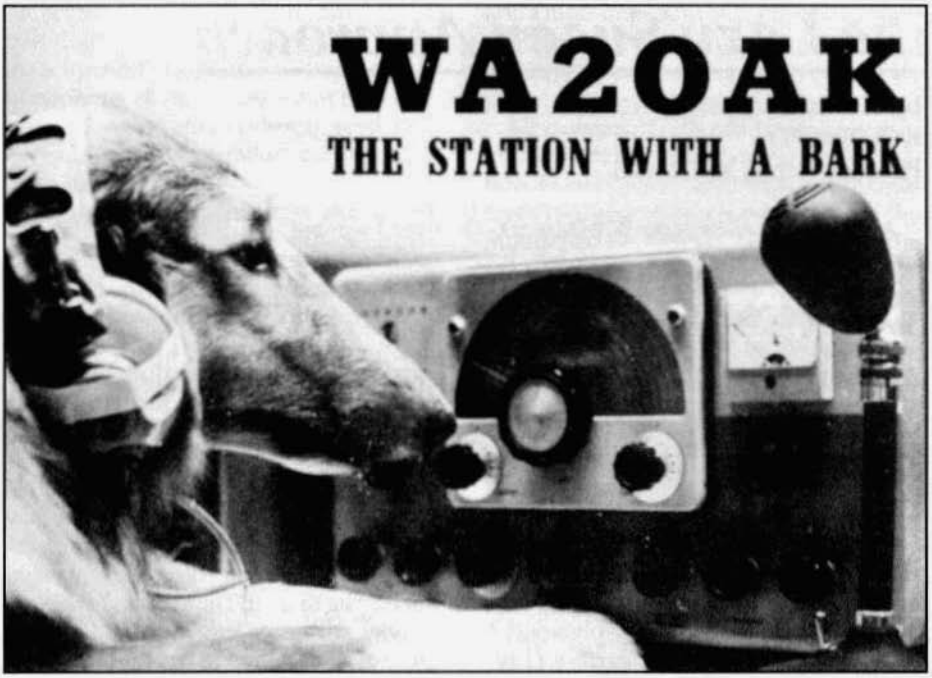
A constant problem at the W3HM workshop used to be a crowded work bench -- 2 or 3 big rigs on the bench and no room to maneuver. Occasionally, depending on the nature of the problem, the work would just set on the bench for days - even weeks - to the detriment of other smaller, easier jobs. Several years ago I found a solution to my problem.

To remove the clutter from the main work bench I decided to build a small portable work platform. I gathered up some 1/2" angle iron stock and basically made a 24" x 24" x 24" frame. The top and bottom were made from 3/4" plywood. I equipped the frame with 3" casters. I prefer to sit on a small backless stool while I work so the 2 feet 3 inch height was ideal for me. The bottom shelf is handy for tools, test equipment, parts containers, power supplies, etc. I now had a nice portable platform upon which I could place large pieces of gear (Johnson 500's, Valiants, 32V's etc.) and wheel them wherever I wanted -- outside in the driveway on those bright sunny days, into the radio shack, or to another part of the shop.

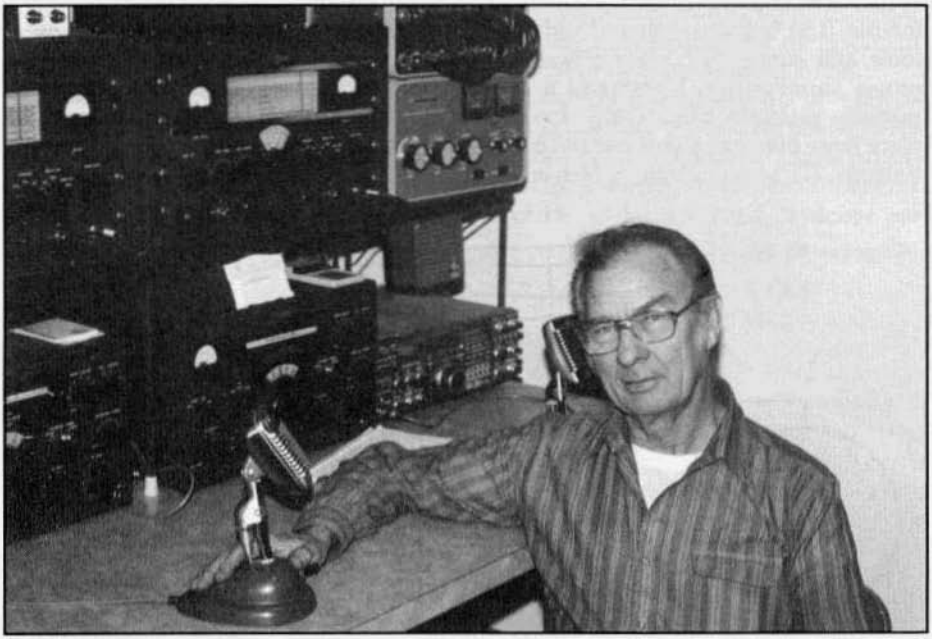
The real nifty part of the work platform was a lazy susan which I bolted onto the top. I purchased a heavy duty lazy susan device (the kind used in modern kitchen cabinets) from a building supply store. I bolted the 'susan' to the top of my moveable platform and bolted another 24"x24"x3/4" piece of plywood on to the top of the lazy susan. Now I can rotate whatever is on the platform to whatever position I want without having to lift it. These boat anchors get heavier with each passing year. I glued a piece of short napped carpet on to the plywood to protect whatever was placed on it.

Now, whenever the going gets tough and the work gets me down, I just wheel the platform into a corner and rotate the front of the work towards the wall so I don't have to look at it. You know, out of sight out of mind! **ER**

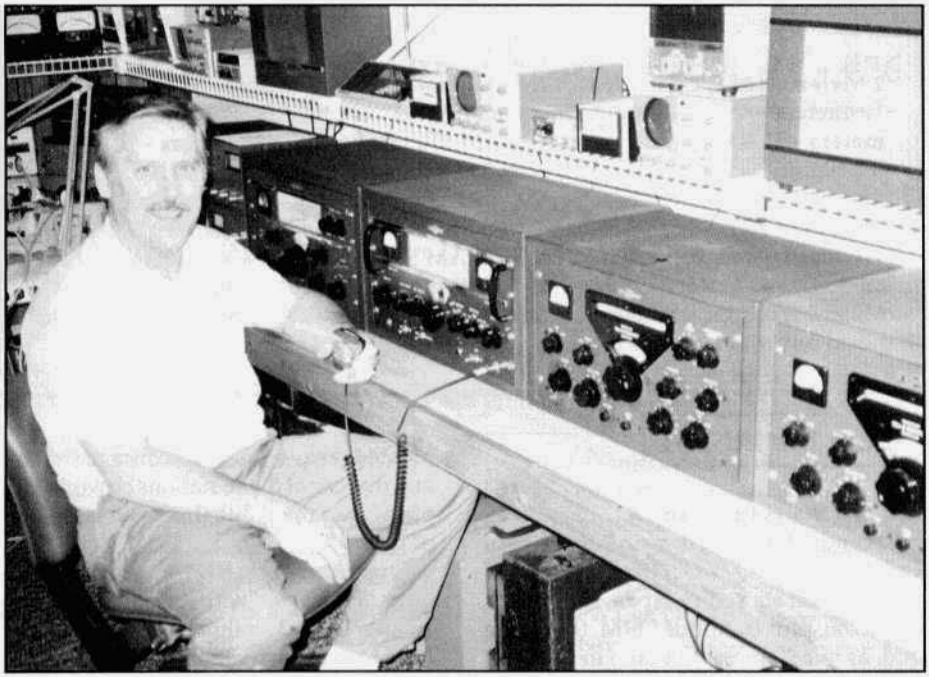




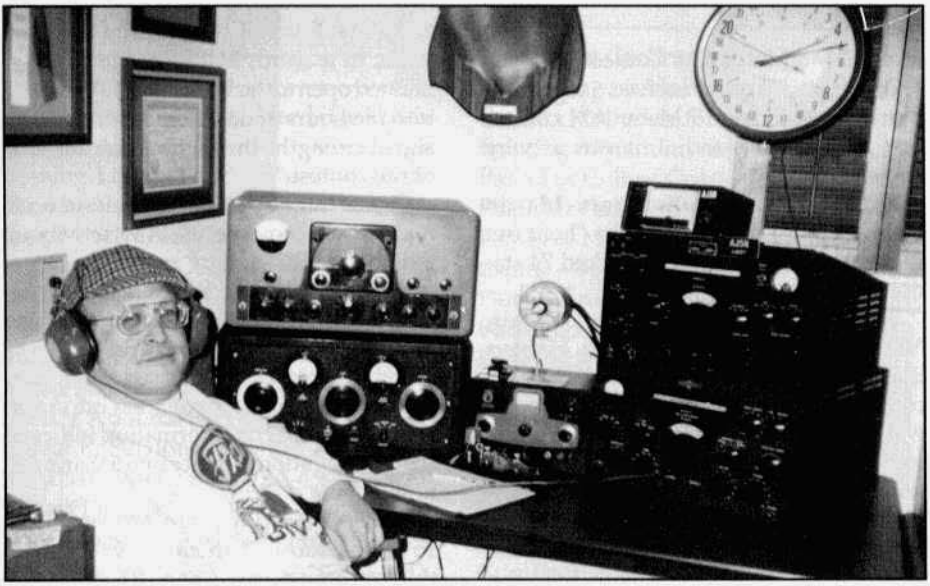
A QSL card from Arnold Goldman, WA2OAK.



Dewey Angerhofer, WØZUS, in part of his vintage station. In an upcoming issue we'll have more photo's of Dewey's station showing some of his other gear, which includes a Gates broadcast transmitter that he uses on 160 meters.



Rick Lutzinger, KD6ZR, with Collins receivers and transmitters. He says that he plans to get involved in the SSB net with a HT-32B/SX-101A station. He says it sounds like fun but "AM FOREVER".



Larry Cohen, AJ5N, a new convert to vintage/AM operation. The gear in the photo includes a 75A-4, 51J4, Viking Valiant, Viking Adventurer and a homebrew 30 meter rig with a pair of 807s in the final.

AM FREQUENCIES

2 Meters - 144.4, calling freq., activity in most cities; **6 meters** - 50.4 calling freq. **10 meters** - 29.0-29.2 operating window; **12 meters** - 24.985 calling freq.; **15 meters** - 21.400 - 21.450; **17 meters** - 18.150 calling freq.; **20 meters** - 14.286 for the nightly SPAM net starting at 5:00 CA time; **40 meters** - 7160, 7195, 7290 are the main freqs. Westcoast SPAM net every Sunday afternoon ,4:00 PM on 7160; **80 meters** - 3870, 3880 and 3885 are the main freqs. Westcoast SPAM net Wednesdays nights, 9:00 PM on 3870. AM Swap net Thursday nights, 7:30 PM on 3885; **160 meters** - Gray Hair net every Tuesday at 8:00 PM EST on 1945. Mostly sporadic summer-time activity but during the winter signals can be heard anywhere on this band.

From the Editor:

AM Net Starts In Japan

Recently I received word from Stan Tajima, JA1DNQ/KD2HB, that an AM net has been started in Japan. It operates on 14.286, plus or minus QRM, (the same freq. as our 20 meter net here in the U.S.) on Saturdays and Sundays at 0100 UTC. Stan says that "tube AM" is preferred but solid-state is ok too. He invites all of us to check-in.

March 1, 15 Meter AM Contest Results

Although we only received 6 logs from participants in the 15 Meter AM contest that took place March 1, it was a very successful event.

The high score came from Martin Heiman, K7BDY, who says he "held out till the band gave up". He worked 74 stations.

Second place goes to Tom Addair, N8IYV, with 25 stations worked. He says that he had a "terrific time" and that "every contact was an enjoyable QSO". "The band was in great shape as I could work a station out west, then work a Florida station and then right back out west".

Bill Skidmore, VE3AUI, and Steven Berkule, NW2F, tied for third place. No comments were enclosed with Bill's log other than that he was using a Valiant II transmitter, GPR-90 receiver and a horizontal loop antenna. Steven, NW2F, commented that he worked 5 Chicago stations and that out of the 16 stations he worked, "5 ops were named Bill, (has to be some kind of record)".

Roger Faulstick, KD4AS, worked 9 stations. He says, "with the average QSO lasting 15 to 30 minutes, it was kind of hard to rack up a high score.. There were just too many interesting amateurs to talk to."

Eddy Swynar, VE3CUI, (another ragchewer), reports that he worked 8 stations. Says Eddy, "Conditions on 15-meters were, in a word, SUPERB: the band remained open to the West/South-West well into the hours of darkness, with excellent signal strengths throughout the duration of the contest."

One of our hopes is that 'contests' on 15 meters will increase the AM activity on that band. Recently, I received a letter from Dean Manley, KH6B. He says that time is running out for us on 10 meters and that we need more activity on 15. Along with the letter, Dean enclosed a computer study comparing propagation on 15 versus 10 meters. His information indicates that propagation is better on 15 than on 10 now.

I've been hearing more AM signals on 15 lately; most of them above 21.400. I think as time goes by - and 10 continues to deteriorate - we will see 15 meters become a very popular band amongst AM'ers. **N6CSW/Ø**

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Military

Note: Unless stated otherwise, all ER inUniform articles are by Walt Hutchens, KJ4KV.

Miscellaneous - General

Modifications

Receivers

Regulations

Restoration

Single Sideband

Transmitters And Amplifiers

Photographs of Hams

compiled by John Seginski, N7NV

District #1

K1BH - #26, W1DGH - #21, N1FYX - #25, AJ1G - #32, K1GWT - #27, WA1HLR - #26, KW1I - #10/23, W1JEL - #16, K1JKJ - #34, KU1R - #26, KA1RZF - #10, W1YG - #26, KA1YKG - #27.

District #2

W2AN - #19, N2BAU - #31, N2DXO - #15, K2EJX - #2, WB2FOU - #6, N2GBY - #28 - KD2HB - #25, W2IHBE - #3/16, W2ICE - #19, N2INR - #31, W2IQ - #16/31, KB2IRH - #33, K2LXW - #30, W2LYH - #12, W2MJH - #31, WA2NFF - #26, WA2RIH - #28, WB2UID - #32, W2XC - #31.

District #3

W3BJZ - #31, W3BPZ - #4, NO3E - #31, K3EWZ - #32, WB3FAU - #32, WB3FRY - #31, N3GWE - #31, N3HFB - #31, W3HHC - #12, W3HM - #17, WB3HUZ - #25, N3IYP - #31, WA3JJT - #31, KO3L - #31, K3NFS - #31, W3NFY - #31, K3USC - #31, WA3VJB - #26/31, W3ZIF - #29.

District #4

KD4AJ - #16, W4CJL - #2/17, K4DR - #18, W4EGK - #32, W4HAH - #18, WA4KCY - #5/29, KJ4KV - #4, KY4KV - #17 W4KYL - #4, K4KYV - #21, W4PNM #16/17, N4QAS - #31, AA4RM - #16, KQ4S - #16, WA4UGR - #21, K4UJZ - #21, N4VHK - #22, N4VMV - #35, WB4VVI - #17, KB4YST - #14.

District #5

K5BAI - #3, WB5BMD - #7, K5BZH - #17/31, K5CF - #31, WA5EHS - #3, N5EIF - #24, KA5FGS - #3, K5FZ - #1/3/10/23/31, KB5IWX - #3, N5JBT - #13, K5LLK - #3, WA5MOE - #3, AJ5N- #36, W5OLY - #27, W5PYT - #3/8, K5SWK - #5/27, W5TOP - #20, K5UPX - #6, WA5VGO - #3/10/23, WA5VLZ - #7/33, KA5WOT - #21, WB5YLQ - #10, WB5ZPQ - #11.

District #6

W6AD - #26/34, W6ATC - #26, N6AW - #32, W6BM - #11/15, W6CC - #25, WC6D - #14, KE6DN - #35, KP6EA - #25, K6EOB - #28, WD6EWE - #25, W6HDU - #11, WA6HDY - #9, K6HLO - #11, K6HQI - #7, K6HV - #4/6/26, WA6IPD - #2, N6OMW - #28, K6PKO - #20, W6PKW - #16, W6PSS - #25/26, W6RNC - #3, WA6THD - #7, N6TPU - #28, N6UXW - #25, WA6VVL - #34, WA6ZJC - #9/25, KD6ZR - #36

District #7

W7RA - #28, WA7AMI - #2/16/36, K7BDY - #30, N7BEG - #22, K7CMS - #28, K7GCO - #16, W7GZ - #28, N7IOK - #27/28, W7ISJ - #28, W7JKY - #2/14/16, KB7JZQ - #28, W7KCK - #24, W7LR - #35, N7MHI - #2, K7MJ - #16, N7NV - #25, AJ7O - #20, WC7O - #28, K7OBB - #28, W7OUI - #2, K7POF - #3/25, KV7S - #18, KA7TSH - #28, WK7U - #13, K7VZP - #15/28, WA7WOQ - #10, AI7Y - #16, WA7YBS - #27, K7YIR - #2/16, K7YOO - #4/36.

District #8

W8AHB - #28, W8CAE - #33, W8DFV - #16, WD8DWR - #28, KB8FJ - #24, W8GNV - #15, W3HHC - #12, KY8I - #33, N8IAH - #28, KF8IK - #28, K8IOV - #28, K8IRC - #33, WB8JBT - #28, N8JRJ - #28, W8KGI - #4, WA8LXJ - #13, W8PRQ - #12, K8PSV - #35, KB8QF - #28, W8RHZ - #9, W8RXP - #31, KA8UKO - #28, W8VYZ #9/31, WA8ZNX - #28.

District #9

WA9ASZ - #7, K9BBA - #3, KF9BP - #28, W9CN - #31, W9CNI - #4, W9CVU - #26, W9DYV - #32, K9FCM - #15, WB9GKZ - #19, N9INW - #22, N9IPQ - #22, N9IQM - #22, N9IRD - #22, N9ISH - #22, WA9IXP - #18, N9IYC - #22, N9JBF - #22, W9WZE - #11, NG9X - #35, WA9ZOR - #19.

District #Ø

WDØALN - #7, KØAQO - #7, KØBS - #31, WØBUN - #19, WØCXX - #7, KØDEW #6/23, WØDOZ - #7, KØECC - #30, WAØFBQ - #7, WØGFQ - #1/8/18, KØGPX - #34, KDØHG - #2/8, KFØIE - #32, WØIWV - #24, WØJOL - #29, WØLHS - #35, KØLZW - #19, KØOCC - #16, WØOGH - #28, KØOJ - #6, WØRN - #22/34, WRØS - #13, WBØSUJ - #7, WØVT - #3/23/10, WØYDX - #7, WAØYSG - #35.

Other Districts

JA1DNQ - #25, KH6CC - #13, KL7GKY - #22, VE3CBK - #22, VE3GRO - #20, VE3HC - #34, VE4BX - #5, VE6GYJ - #16, VE7FY - #14/16.

Collecting/Repair/Restoration...Tips

SM-3 Replacement Switch

For those owners of the Collins SM-3 microphones that have a defective or intermittent push to talk (PTT) switch, the original switch is still available from Newark Electronics and other distributors. The switch is a type 30-3, manufactured by Grayhill. The decorative nut used to secure the switch to the mounting plate is a Grayhill type 30C1023-1. The price listed in the Newark catalog for both parts is $2.38.

Jerry Brouwer, AB8U

Removing Military ID Stickers

No doubt some of you have obtained ex-MARS, or other military gear with those metalized military ID stickers affixed to the front panel. They really look lousy, and can be removed with little hassle. If you peel them off cold they often leave a gummy rubberized residue that is really difficult to remove, especially on a textured panel like the KWM and S-Line series Collins equipment. Get your wife's hair dryer and apply a lot of heat to those labels and they will easily peel off leaving little, if any, rubber goopy residue. If there is any goop stuck to the panel, heat it up again, and rub lightly with a coarse towel soaked with pure mineral spirits. The rubber goop will ball up and come right off.

Pete Brown, KH6IRT

Hole and Scratch Removal

Small holes, dents and deep scratches can easily be filled or patched with 'Squadron Green Putty' available at most model shops. Application is easy and the hardened material can be sanded prior to painting.

Joe Sloss, K7MKS

Testing V-R Tubes

Question: Can a V-R tube that has passed excessive current and still glows be defective? In fact, can a V-R tube become defective? If so, how can one tell whether a V-R tube is good?

Answer: A V-R tube can be defective, even though it is not leaking air. If a tube does not maintain a specified voltage drop when the specified maximum and minimum values of current are caused to pass through it, then it is a defective tube. This is the normal symptom of a worked-out V-R tube. Excessive current can aggravate this condition and cause shorter life. Glow tubes (V-R tubes) may be tested by applying a DC voltage through a variable resistor, adjusting the resistor so that the two limits of current can be obtained, and then reading the voltage across the glow tube with a high-impedance voltmeter. For example, the voltage across a GL-OC3/VR-105 should not vary more than one volt when the current is changed from 5 to 30 milliamperes.

Lighthouse Larry, GE Ham News

WHERE DID YOU GET THE BEAUTIFUL FABRIC YOU USED FOR THE SPEAKER GRILLE RESTORATION?

SX-88: Hallicrafters' Highwater Mark

by Mike O'Brien, NØNLQ
1031 E. University St.
Springfield, MO 65807

The mid-1950s saw American radio manufacturers achieve the pinnacle of tube-type receiver development: the Collins 75A-4 and R-390A, National HRO-60 and NC-300, Hammarlund SP-600 and HQ-170, RME 4350, Drake 1-A, etc.

Any such list must include Hallicrafters, of course. In 1954, the Chicago-based company produced what a fortunate few owners consider on of the finest communications receivers ever made, the Hallicrafters SX-88.

The SX-88 was short-lived, disappearing from the market after only one year. Yet its mystique survives to this day. A recent ad in Electric Radio sought an SX-88 for a fellow who declared he was willing to pay "four figures" – far more money than the other above-mentioned radios command today.

What makes the SX-88 so special? For one thing, not many were built, probably few than 1,000. However, the SX-88's value doesn't derive solely from its scarcity. It remains an outstanding performer for a 38-year-old vacuum-tube rig, offering sensitivity and selectivity to rival many more modern radios.

The SX-88 grew out of two or three receivers that preceded it earlier in the decade. And it set a pattern for a succession of Hallicrafters receivers that continued for another two decades.

In 1950, dual-conversion was the newest rage among HF receiver manufacturers, and Hallicrafters weighed in with two distinct units. The SX-71 was a 13-tube general coverage (plus 6 meters) receiver that introduced the twin main/bandspread dials and central S-meter that were to become a familiar Hallicrafters front panel layout. The 11-tube S-76 was less popular commercially but was more significant electrically because it departed from the traditional 455-Khz intermediate frequency and pioneered the 50-Khz IF that became a Hallicrafters circuit hallmark.

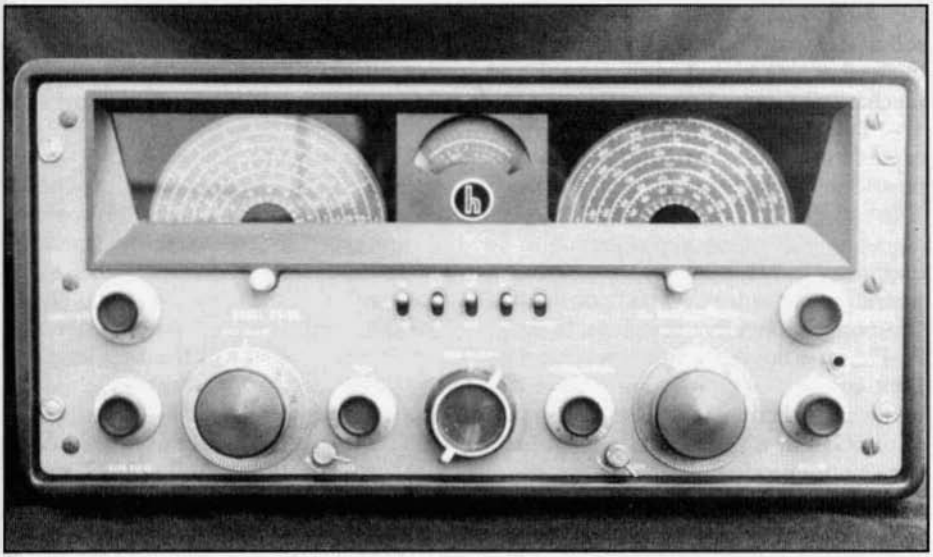
In the early '50s Hallicrafters also developed a top-quality military receiver, the R-274, available to civilians as the SX-73. This 20-tube behemoth explored the use of dual tuned RF stages on all bands to heighten sensitivity, and also addressed stability problems that long had plagued Hallicrafters receivers.

In December 1953, Hallicrafters sprang the SX-88 upon an unsuspecting ham community via an unprecedented six-page advertising spread in QST. "Twenty years of precision shortwave experience to reach this peak of perfection!" the headline crowed. A printed message from company president Bill Halligan proclaimed the SX-88 "the finest amateur receiver we have ever built... a ham's dream receiver... the biggest communications news of the year."

The SX-88 incorporated bits and pieces of the S-76, SX-71 and SX-73 designs, but went several steps further in a bold attempt to satisfy the various needs of hams and serious shortwave listeners.

The specs are impressive, beginning with physical dimensions: 20 inches wide (the thick steel front panel is 19, allowing rack-mounting without the cabinet), 11 inches high and almost 19 inches deep. Weight is a whopping 80-plus pounds.

Under the perforated hinged cover lurks 20 tubes, counting a 5U4G rectifier, OD3 voltage regulator and a 4H4 current regulator. Two separate four-section tuning capacitors are housed within a heavily shielded compartment atop the chassis.



The SX-88 covers 535 Khz to 33 Mhz, with bandspread calibrated for the circa-1954 HF ham bands. A six-position Selectivity switch varies bandwidth from 250 cycles to 10 Khz. The SX-88 was the first Hallicrafters receiver to formally acknowledge SSB. The leftmost toggle switch in the row at the center of the front panel has three positions: AM, CW and SSB (but no provision to choose between upper and lower sideband).

The gangs are turned by precision geartrains requiring 24 revolutions of the front-panel tuning knobs to go lock-to-lock.

The SX-88 covers 535 Khz to 33.3 Mhz in six bands, with bandspread dial calibrated for the 160-through-10 meter ham bands. While the main and bandspread dials on the SX-71 were rectangular, the SX-88 introduced the twin half-circle displays that became so familiar in later Hallicrafters receivers. The S-meter is calibrated both in S units and microvolts.

A closer look at the controls reveals a couple of innovations sure to intrigue hams in 1954:

– A three-position toggle switch selects AM, CW or SSB reception, making the SX-88 the first commercial ham receiver with "SSB" marked on its front panel (the 75A-4 and NC-300 were more than a year away). The SSB position kicks the SX-88 into an "exhalted" beat frequency oscillator mode, decreasing cathode bias resistance on the BFO buffer amplifier tube (6BA6) to boost BFO output. Although crude compared to later sophisticated detection circuitry, in 1954 the "exhalted BFO" seemed a real breakthrough to hams still struggling to copy SSB signals on receivers designed for CW. Also, the SX-88's automatic volume control circuit is isolated and amplified, obtaining its input signal ahead of the BFO, thus allowing the AVC to function effectively on SSB.

– A six-position bandwidth control offers selectivity choices that are remarkable even today: as wide as 10 Khz and as narrow as 250 cycles, with intermediate stops at 5, 2.5, 1.25 Khz and 500 cycles. Even more amazing is the method by which this selectivity is obtained: a three-stage 50-Khz second IF strip with eight tuned circuits employing special coils tuned by ferrite slugs and surrounded by ferrite sleeves. This coil design, which does away with the usual metal screw, yields Q as high as 185 at 50 Khz, almost double the Q of earlier Hallicrafters IF coils. Threading the brittle ferrite was no small manu-

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SX-88 from previous page
facturing feat, but the result is super-sharp selectivity with non of the annoying "ringing" often associated with crystal and mechanical filters of the day.

– Two knobs hint at unusual audio capabilities. There actually is a seventh position on the band width control, marked "Phono" which disables most receiver circuits and allows the audio section to be used to amplify input from a phonograph cartridge or tape deck. And a knob marked "Response" offers five positions: Normal, Hi-Fid, Bass Boost, Comm 1 and Comm 2. Both controls acknowledge the SX-88's hefty audio section, which employs a pair of 6V6GTs in a push-pull, inverse feedback circuit producing 10 honest watts of output. The Normal position on the Response control accentuates low and middle audio frequencies. Comm 1 and Comm 2 attenuate both low and high frequencies to enhance listening with sharp selectivity switched in. Hi-Fid provides an essentially flat response throughout the audio range from 20 to 20,000 cycles for AM broadcast listening and for playing records and tapes. Bass Boost does just what it says, again for high-fidelity reproduction. Connections for 3.2-, 8- and 500-ohm speakers are included.

Other front-panel controls perform more familiar functions. The meaty main tuning and bandspread knobs connect solidly to the anti-backlash gear-train, with operation additionally smoothed by hefty flywheels mounted behind the front panel. On/off toggle switches activate a diode-type noise-limiter, AVC, 100-Khz crystal calibrator and receive/standby modes. The Sensitivity knob varies gain of both RF amplifier stages and three IF amplifier stages. Other knobs control audio gain, BFO pitch and antenna coil trim. Two small knurled knobs adjust the frequency readout pointers in the half-circle dial windows, and two others activate lock mechanisms to freeze the main and bandspread tuning shafts at desired settings.

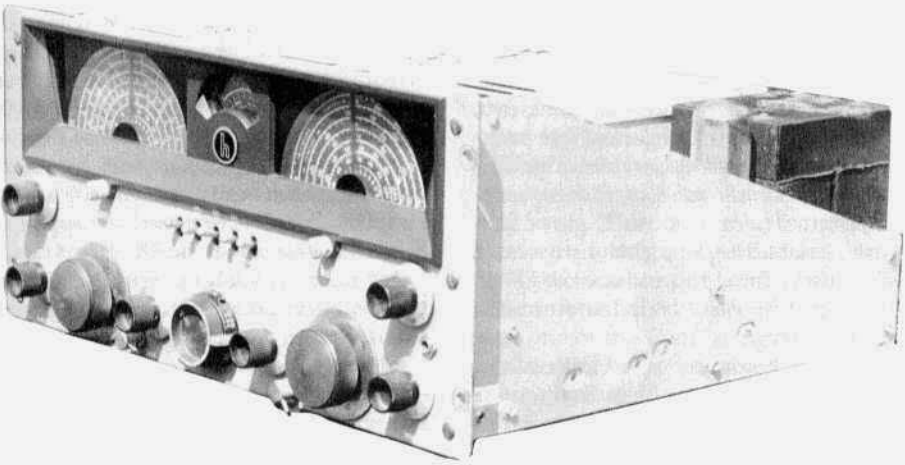
In addition to speaker connections and coax and wire antenna terminals, the SX-88's back panel offers a jack with 50-Khz IF output for RTTY or an oscilloscope, a photo input jack, S-meter adjustment and 115-volt accessory receptacle. An eight-pin socket can supply 300 volts DC and 6.3 volts AC for accessories, or can be configured to allow the receiver to be operated from a vibrator power supply or batteries.

The tube lineup includes 6CB6s as the first RF amplifier and AVC amplifier; 6BA6s as the second RF amplifier, second mixer, all three 50-Khz IF amplifiers, BFO amplifier and crystal calibrator; 6U8 as the first converter oscillator-mixer; 12AT7 as the second converter oscillator; 6AL5 for the detector and ANL; 12AU7 for the AVC rectifier and 50-Khz cathode follower; 12AX7 as audio amplifier and phase inverter; 6C4 for the BFO; and the pair of 6V6GTs for audio output.

The 50-Khz IF scheme is utilized throughout the coverage range. Two other IFs are employed: 1550 Khz for 1.7 to 3 Mhz, and 2075 Khz for all other bands. Image rejection is rated at not less than 80 dB below 20 Mhz and not less than 60 dB on higher frequencies. Sensitivity is claimed to be 1 uV for a half-watt output or 1 uV for 10 dB signal/noise.

Sensitivity led to the SX-88's most celebrated test, the historic DXpedition to Clipperton Island in the spring of 1954. A Newton, Iowa, DX hound, Bob Denniston, then WØNWX, recruited two other local hams, Gene O'Leary, WØVDQ, and Leo Olney, WØNUC, along with two energetic non-hams from the Denniston family lumber business, to undertake the journey to Clipperton, a dot of coral in the Pacific 600 miles off the coast of Mexico. Denniston was an admirer of Hallicrafters receivers, so he approached the company for the loan of some gear. Hallicrafters officials responded with two new SX-88s, a pair of HT-20 AM/CW transmitters and HT-18 VFOs.

"The SX-88 was the best receiver by far back then for hearing weak signals," recalls Denniston. "The 75A-4 was a noise



The SX-88 is a heavyweight, almost matchings its model number on the scales. Construction design allows removal from the cabinet and mounting in a standard 19-inch wide rack, if desired.

generator compared to the SX-88. The A-4 was better on stability, I'll admit – but it wasn't as good for low noise."

At age 73, Denniston today holds the appropriate call WØDX stateside. However, he does most of his operating as VP2VI from the Virgin Islands, where he and his wife operated an inn, Smuggler's Cove, for more than 20 years. Although he uses a solid-state Ten-Tec transceiver, Denniston still owns four SX-88s, keeping two on the island and two back in Iowa.

Fellow Clipperton adventurer, O'Leary, today lives near Dallas and is national service manager for a firm that offers extended warranties on automobiles and appliances. He remembers the SX-88 as "a terrific receiver with great selectivity. For its vintage, it did an amazing job." O'Leary was 20 years old in 1954 and served as the DXpedition's maintenance chief. He says the only problem encountered with the SX-88s was some salt-induced corrosion that fouled electrical contacts between bronze wipers and aluminum rotors on the tuning capacitors. "We had to clean them on a regular basis to keep the noise down," O'Leary notes.

The man who arranged for the SX-88s and other gear to be provided to the Clipperton gang was Fritz Franke, who joined Hallicrafters in 1939 and became the company's chief engineer and Bill Halligan's top aide over the next quarter-century. Franke still lives in a Chicago suburb. Although he regularly tinkers in his basement lab, Franke says details of specific Hallicrafters models are difficult to recall at age 85. "There were so darn many things going on back then, all at the same time," he explains apologetically. The SX-88 was "our top-of-the-line receiver," Franke confirms, and he guesses "only a few hundred" were made.

(Author's note: Although generally acknowledged as one of the premier ham radio design engineers of the era, Franke stubbornly refused to get an amateur license because he didn't want to spend time mastering Morse code. In recent months, however, after chiding from a group of Chicago hams with whom he

continued next page

SX-88 from previous page
lunches every Thursday, Franke has been thinking about obtaining a no-code Technician ticket. "After all these years," he admits with a chuckle, "I guess it's about time I got on the air myself.")

Among present-day SX-88 owners scattered around the country is Tom Rousseau, K7PJT, in Hillsboro, Oregon, whose background as a ham radio service technician and more recently as an oscilloscope design engineer for Tektronix, gives him some probable insight into how Hallicrafters came to produce the SX-88 and why it so quickly faded from the scene.

" With a company like Hallicrafters must've been back then, every so often the engineers will try to push the state of the art pretty hard. The SX-88 really tested the limit of the 50-Khz IF, and to me it's the ultimate in that generation of receivers. It has good sensitivity, and its sharpest selectivity is very sharp even by today's standards.

"But with that many high-Q stages with variable selectivity, there had to be a lot of production line tweaking. Problems like that are inevitable when engineers drive a company. Lessons can be learned from them. But those problems affect profits. So eventually the accountants usually get control away from the engineers for a while. From looking at the receivers Hallicrafters put out in that period, I think that's what happened there."

Indeed, production costs seem to have mounted, adding to the SX-88's already-sky-high price tag. When first introduced, the receiver's "amateur net" price was $499.95, only $30 less than the 75A-3 and HRO-60. During the next 12 months, the SX-88 price jumped to $595, and then to $675 -- a budget-busting figure beyond the reach of most hams.

In December 1954, exactly one year after the spectacular unveiling of the SX-88, the SX-96 was announced by Hallicrafters. The SX-96 offered the SX-88's same frequency coverage plus selectable sideband -- but half the tubes, half the high-Q tuned IF circuits, half the tuned RF stages, half the weight and, at $250, less than half the price. The 50-Khz second IF was retained, but selectivity options were trimmed, spanning 500 cycles to 5 Khz.

The SX-96, in turn, lasted only about one year, succeeded in 1956 by the SX-100, which enjoyed great commercial success over the next half-dozen years. Cosmetically and electrically, the SX-100 was a simplified SX-88. However, one apparent SX-100 advance over the SX-88 was the T-notch filter, which became a key ingredient in other famous Hallicrafters receivers that followed, including the SX-101 and SX-115.

Hallicrafters officially introduced the T-notch filter with the SX-100, but the circuit may actually have made an unofficial debut a couple of years earlier with the SX-88, according to Bob Forman, W9RJH, of Monmouth, Illinois. Forman took his SX-88 to Chicago in the 1950s and early '60s for tweaking at the factory, where he became friends with Fritz Franke, the late Cy Reed, W9AA, and other Hallicrafters honchos.

"Most of the hams who worked there would share anything they knew with you -- provided they knew you weren't working for Hammarlund or Collins!" recounts Forman. The new T-notch filter came up during one visit, says Forman: "Fritz told me it was a good filter and they had considered putting it on the SX-88 -- maybe even did it on a few of the last 88 production run, or maybe some of the factory boys installed it on their personal 88s. At any rate, I know Fritz gave me the schematic for the circuit and told me how to order the parts. But I never did get around to putting it on my 88."

Forman defends the SX-88's stability. Hallicrafters went to great lengths to minimize drift, including ceramic coil forms in the oscillator section, voltage and current regulation in the first conversion oscillator and a crystal-controlled second conversion oscillator. The effort paid off, Forman says: "I remember once I stopped

in to see Merrill Swan, W6AEE, in Arcadia, California. He had an SX-88 and he said it was as stable as a Collins. We fired it up from cold and worked RTTY for about a half hour with Ray Morrison in Chicago without ever touching up the tuning on the 88."

No production records seem to have survived the sale of Hallicrafters to Northop in the 1960s and the once-proud company's subsequent slide into oblivion. Interviews with a dozen SX-88 owners reveal serial numbers ranging from 111 to 565, with some chassis marked "Run 1" and some "Run 2". Even if serial numbers weren't consecutive across the two production runs, it seems unlikely from available information that the factory turned out many more than 1,000 SX-88s, and perhaps hundreds less.

Most owners contacted have endeavored to keep their SX-88s in original condition. One costly challenge is the 4H4 ballast tube, which nowadays carries a retail price of more than $100 when it can be found at all. An all-but-impossible part to locate is the special rubber-toothed drive belt used in the band-switching mechanism. Repair expert Tom Rousseau has used piano wire successfully in replacing the belt.

Rousseau has the luxury of having two SX-88s in his shack; he's kept one "stock" but has added selectable sideband and a few other modifications to the other "just to see how good an 88 could be made taking 1950s technology to the limit." He's wound up with "a wonderful sideband receiver," he says.

A couple of other owners report finding home-grown product detectors installed in their SX-88s after purchasing the radios used. Milton C. Smith, W6GMC, wrote articles in West Coast ham publications detailing how a product detector could be added along with other modifications to improve the SX-88. He advocated swapping out the 6BA6s in favor of 6BD6s in the IF stages and second RF amplifier; replacing the 6BA6 second mixer and BFO amplifier tubes with 6BH6s; and putting a 6DC6 in place of the 6CB6 in the first RF amplifier stage.

Purist decry such modifications as detrimental to the value of the radio on the collector market. Which reminds me of the question: Just what is an SX-88 worth today, anyway?

The fellow who offered to pay "four figures" is Bob Olsen, KE6OY, of Chico, California. "The first ham station I remember seeing when I first got interested in the hobby back in the late '50s had an SX-88," Olsen notes in explaining his quest. "It was one of the Cadillac receivers of that era. But, to be honest about it, nostalgia more than anything led me to look for one to buy now that I can afford it."

Olsen's ad got him a nice SX-88 from a ham in the state of Washington who needed cash to nail down a mint Johnson Desk Kilowatt that was coming up for sale. The actual price was only three figures -- $800-- but still hundreds of dollars more than other ham receivers from 1954 are bringing.

All but one of the other owners who've purchased their SX-88s within the past five years report paying from $125 to $450. The exception is Gerry Parker, KØGPX, who found an SX-88 at a garage sale in Fargo, North Dakota, a few years ago. Price: $20!

"It was in pretty good physical shape but had been butchered some over the years," Parker recalls. He replaced the audio output transformer and fixed some other electrical problems. "But I don't even like to think about, let alone talk about, what eventually happened to my SX-88," he moans. "I sold it to a guy in Texas. It took up so much room, and I have other receivers (for instance, three SX-101s) that I was really using. So I let it go. Since then, as I've learned a little more about the 88, I've wished a hundred time that I had it back."

By the way, Parker did recoup his $20 investment.... **ER**

Broadcast Transmitters from page 14
choke passes DC from the power supply to the PA amplifier but blocks audio from being fed into the power supply. The blocking capacitor will not pass power supply DC voltage but acts as an audio signal return path to ground for the modulation transformer. The plan here is to keep RF amplifier plate current from flowing through the modulation transformer. This current would cause the transformer to saturate, increasing distortion and reducing frequency response. Also this greatly reduces heating in the modulation transformer.

Power Supplies

Power supplies are arranged similar to ham rigs. You will find separate bias, low voltage and high voltage supplies. In addition a control voltage is present to operate relays and contactors. This voltage is usually 115 VAC but sometimes 24 VDC. Most high voltage supplies are full wave center tap types with (2) 872 or 8008 mercury vapor rectifiers. 866s are used in the lower power rigs. The supplies are well filtered and in the case of 1000 watt rigs, will supply 2500-3000 VDC at 1 amp continuously.

The transmitters are controlled via front panel switches and most can be controlled remotely with the internal relays. Metering is quite good in that any parameter that is important usually has a separate meter. There is a switchable multimeter to take all other readings. Supply voltage is typically 230 VAC, single phase, the same as the larger ham rigs.

Tube Types

Many of the tubes in broadcast transmitters are the same tubes found in ham transmitters of the same vintage. Typical types are: 6SJ7, 6SN7, 6AG7, 6L6, 6146, 807, 810, 813, 845, 4-125, 4-400, etc. One exception is the RCA 833A tube which is an excellent big triode that is used as a modulator and RF amplifier in many broadcast transmitters. Western Electric transmitters use W.E. tubes like 247A, 350B, 212E, 242A, 270A, 251A. These tubes are NOT available at "Fred's Radio/TV Repair" and are very hard to find and expensive.

In future articles I will discuss specific transmitters and how to convert them to ham band operation. If anyone has questions regarding a broadcast transmitter I am willing to help. I can be reached at (206) 244-4059 evenings.

Editor's Note:

We'd like to have input from others who operate broadcast transmitters in the ham bands. A note describing your transmitter with a photo would be greatly appreciated.

Monitor Your Signal from page 16
eliminated and an accurate high-impedance voltmeter is connected directly to the cathode of the 6AL5.

The power is given by the formula P= V2/2R, where V is the voltage measured at the rectifier cathode and R is the resistance of the dummy load, usually 50 ohms. The factor of 2 appearing in the formula converts peak voltage to rms voltage, needed for the calculation of rms (thermal) power.

You may notice that with RF off a small voltage is still delivered by the diode. This is due to electrons driven off the hot cathode to the plate. This effect is reduced by lowering the filament voltage to about 5 volts so accurate low power measurements may be made.

If your transmitter has a low harmonic content, if the dummy load is accurate, and you have been careful about the circuit construction, this measurement should be quite accurate over the entire HF ham bands.

I have shown several ways to check your signal with inexpensive equipment. Many AM stations employ inadequate monitoring and it frequently is all too apparent from the sound of their signal. Do yourself and your listeners a favor by trying some of these techniques. ER

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FOR SALE: Repair and restoration on all vintage equipment; 35 years experience. Barney Wooters,W5KSO, 8303 E. Mansfield Ave., Denver, CO 80237. (303) 770-5314

FOR SALE: FET multimeter AN/USM-223 (ME-297/v). Ranges - AC/DC 20k ohms/V, 10K ohms/V, (measures up to 5K volts, 10 amps DC), ohms x 10,000. Completely overhauled, calibrated, fresh batteries, test leads, adapters,instructionsheets and schematic.Ideal for RF applications, military's finest multimeter. - $49.95; calibration and overhaul service available for above meters; radio rcvr R-509/ARC (R15), 105-135 Mhz, new unused, orig. box w/TM ARC type 12 manual - $49.95; Radio Sonde set AN/AMT-4 1680 Mhz, adjustable plus or minus 12, tube type, AM modulated, shpg wt. 6 lbs - $15; military tech manual listings, largest stock in the world, over 50k - $5 refundable with first order. SASE for inquiries. Lee Frank, POB 10776, Harrisburg, PA 17105-0776.

FOR SALE: James Millen grid dip meter, 1.7 - 300 Mcs, model 90651 - $95; Jennings vac. type UCS 302 to 9 cap., unused - $85; National NC (CRU-F) 2" oscilloscope for rack or desk - $45. W6CAS, (916) 731-8261

FOR SALE: Hallicrafters SR46A 6 meter xcvr w/external vfo, mint, orig. box - $100; Hammarlund HQ-145 - $75; R-105a/ARR-15 - $50; Heath HX-10 - $125; SB-600 spkr - $20; ARRL Handbooks, good cond., 1959, '57, '55, '50, '48 - $15 ea.; very good cond., 1952, '49, '48, '47 - $17 ea.; Radiotron Designers Handbook 4th ed., 1500 pgs, excell. cond. - $18; send SASE for list of old radio books/magazines. Mark Hovda, NØJWI, P.O. Box 10091, Cedar Rapids, IA 52410. (319) 364-4048

WANTED: Johnson Ranger. Al Gross, (602) 899-6000 ext. 1372 (days), 933-3499 (nights).

FOR SALE: Navy RBM-4 rcvr w/original AC ps and manual - $60. Geoff Fors, WB6NVH, POB 342, Monterey, CA 93942.

FOR SALE: Harvey-Wells TBS50A w/photocopy manual, no supply, good shape - $50 plus UPS. Cash or trade. Roland Matson, K1OKO, RFD #1, Box 2943, Kennebunk, ME 04043. (207) 985-3751

FOR SALE: HB 813 xmtr - $250; Allied rcvr, AM/FM model 333 - $150; RT-68 w/115ps - $150. Mike, 10010 W 59th Pl., #4, Arvada, CO 80004. (303) 431-7298

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FOR SALE: Used technical books - radio, electronics, military, test equipment, catalogs, etc. List- $1 (stamps ok). Softwave, Dept. ER, 1515 Sashabaw, Ortonville, MI 48462.

FOR SALE: "Voices From The Past" on cassette tapes: "Who's on First", Abbott & Costello; Amos & Andy; others - $4 ea. del.Bob Sloan, KK4GO, 2340 S. Pucketts Mill Rd., Dacula, GA 30211. (404) 945-8642.

FOR SALE: 300 rigs, SASE for list; vintage manuals. Mike Horvat, POB 73, Stayton, OR 97383.

WANTED: Military radios and electronic equipment, collections, components, cables and manuals; freq. standard for GRC-109; GP-7; TU's; NIB 811A's. Charles Di Cecca, KA1GON, 501 Mystic Valley Pkwy, Medford, MA 02155. (617) 396-9354

FOR SALE: Antenna insulators - 14 7/16" long, 3/8" x 3/8" x 9/16", made of Cycolac plastic. D. Charles Keller, 6785 St., Rt 7, S, Andover, OH 44003.

FOR SALE: Weston 15" lab std. meter - $38; WE audio generator - $42; WW II xmtr 604DM - $42; RV-13B military VHF rcvr - $68; C130 aircraft intercom - $10. Ed, W15D, 1040 Cleveland, Stephenville, TX 76401. (817) 968-3365

WANTED: Military radio equipment for my collection. Special needs: BC-191/375 tube compartment cover, roller inductor, ammeter, mounting rack. Chris Bowne, AJ1G, 3 Carnot Court, Pawcatuck, CT 06379. (203) 599-5262.

FOR SALE: 75A-4 s/n 2149 w/.5, 3.1 filters - $425; R-1051B rcvr - $600; S-38B rcvr - $40. All excellent condition. Bill, K6DUY, 2199 Granite Dr., Alamo, CA 94507. (510) 820-6966.

WANTED: HRO-50T-1 C and D coils; xtal calibrator and NBFM adaptor. Phil Jaque, KD6CKS, 1908 Ruhland Ave., Redondo Beach, CA 90278. (310) 374-1746.

WANTED: For Viking Valiant II, #754 choke (L 11 p/n 102-754-2) or Valiant II and Ranger II for parts; mint SX-28A Super Skyrider. McCollum, W8VBQ, 6078 Price Rd., Loveland, OH 45140.

WANTED: Millen Vari-Arm vfo, type 90700, 90701 or 90711. Also looking for a Millen ceramic jack-bar type, 5 pin coil socket #41205 and air coils #43022 and #43042 for a 90800 exciter. Interested in Millen equipment and any information on James Millen's life and company for a future article. Thanks to all who have helped so far. Henry Rogers, WA7YBS, POB 501, Minden, NV 89423. (702) 267-2725

WANTED: HRO-60 coils type G/H/J/AA/AB. Barry Nadel, Box 29303, San Francisco, CA 94129. (415) 346-3825

FOR SALE: Lafayette radio operating and service manuals, schematics etc. If I don't have it,they never printed it. Pete Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964

WANTED: US military keys, everything but especially Navy SE series and low-number Signal Corps J series. Tom French, W1IMQ, 120 Great Rd., Maynard, MA 01754. (508) 897-2226

FOR SALE: Globe King 400B, good shape w/ extra 5514s and V-70-Ds - $750; Pierson KE-93 rcvr, no ps - $40; CRV-46151 aircraft rcvr - $60. Mike, KFØVM, 10010 W. 59th Pl, #4, Arvada, CO 80004. (303) 431-7298

WANTED: 1951-'54 QST and 73 back issues. Don't have to be consecutive or complete. Tom Schlechte, 1021 Hunt Dr., Lakeland, FL 33801. (813) 687-3721

WANTED: Clean 75A-4 spkr. Please consider selling me your unused or spare unit. San, K5YY, (903) 832-3344

FOR SALE: AN/SRT-502 kilowatt RF amp. stages - $200; TT-4A teleprinter - $40. **WANTED:** Manual for R-388A/51J4. Tom Brent, Box 1552, Sumas, WA 98295. (604) 826-4051

WANTED: ITT Mackay marine rcvrs; TCS equip.; 1940's Ham/military/AM xmtrs; Hallicrafters HT-9, HT-20. Shane Ward, N1DMX, 14 Pond St., Amesbury, MA 01913. (508) 388-9716

CLASSIFIEDS

WANTED: Manual for HP600B; 3TF7 tubes; meters for R390A; TEK 465 or 475 scope, must be in very good cond. Clark Hatch, WØBT, 2546 SE Peck Rd., Topeka, KS 66605. (913) 235-2721

FOR SALE: BC-1031 panadaptor - $50; PDR-27F radiation detector - $40; more, long list - $.75 (coins). **WANTED:** Collins SM-1/2 or 3 microphones. J. Orgnero, VE6RST, Box 32, Site 7 SS 1, Calgary, AB T2M 4N3. Canada (403) 239-0489

WANTED: Buy and sell all types of electron tubes. Harold Bramstedt, C&N Electronics, 6104 Egg Lake Rd., Hugo, MN 55038. (800) 421-9397, (612) 429-9397, FAX (612)-429-0292

FOR SALE: Heathkit MP-10 power converter. 6 or 12 volt DC input, 175 watt continuous 117 VAC output, w/manual - $30. Ken Greenberg, 4858 Lee, Skokie, IL 60077. (708) 679-8641

WANTED: 75TH tubes; HT-20 cabinet; original manual for Western Electric 451A-1 250 watt broadcast xmtr. Sam, W6HDU, 1031 San Antonio Ave., Alameda, CA 94501. (510) 521-1429

FOR SALE: TMC GPR-90 w/3.1 Collins mech. filter - $295; Hammarlund 160, clean and nice - $160. Bud, W7IYG, 16306 Midland, Nampa, ID 83687.

WANTED: Plate coils for 310B-3; cabinet for R-390 or junker w/same; Millen #37001 HV connectors; B&W 375 coax switch; EV 664 mic. Lloyd, AA6T, (408) 722-4349

WANTED: Knightkit T-175 linear; Knightkit R-195 rcvr; companion vfo for Knightkit T60; NOS face plate for same T60 xmtr. Question: where can I obtain the correct gray paint used for Knightknit metal xmtr cabinets? I'm restoring a T60. Dave Mantor, W9OCM, 2308 S. Fairlawn Way, Anderson, IN 46011. (317) 642-1103

WANTED: Excellent to mint Hallicrafters SX-101A and National NC-303. James Geer, WB5LXZ, 604 King Dr., Bedford, TX 76022-7124. (817) 268-1985

ELECTRON TUBES FREE 1992 Catalog, over 2,000 types in stock. **Electron Tube Enterprises,** Box 311, Essex, VT 05451. (802) 879-0611, FAX (802) 879-7764

WANTED: Radar equipment, units or complete systems. Also early WW II aircraft TV cameras. Allan H. Weiner, 14 Prospect Dr., Yonkers, NY 10705. (914) 423-6638

WANTED: WW II military sets, racks, etc. Finders fee paid on non-owned sets purchased. Sam Hevener, "The Signal Corps", W8KBF, 3583 Everett Rd., Richfield, OH 44286. (216) 659-3244

FOR SALE: Radio tubes; repair and restoration of all vintage amateur and commercial radios, 25 years experience. Herbert Stark, 321 N. Thompson St., Hemet, CA 92543. (714) 658-3444

FOR SALE: Johnson Challenger; WRL Globescout 680; Knight T-50; Heathkit AT-1; Gonset 'Super 6' converter; RME preselector; National NC-125 (a beauty); ARC-2 xcvrs w/racks and heads; ART-13 xmtrs w/ps and heads; Collins mech. filter F455-0.5; 2 ea BC-348Rs w/dynamotors, unmodified. Larry, (602) 892-4618 eves.

WANTED: Bullet type microphones - Shure, Astatic EV, etc. Chas. Collins, 1977 S. 74th St., West Allis, WI 53219. (414) 327-4141

WANTED: Spkr and converters for NC-300 rcvr. F.W. Nicholas, (602) 864-9987

FOR SALE: Collins 312B4 - $125; Hallicrafters HT-18 - $39; National NC-155 - $55. Plus shpg. H. Mohr, 1005 Wyoming, Allentown, PA 18103. (215) 435-3276

WANTED: Mint cond. Heath SB-610 monitor scope w/manual. WB8KMJ, P.O. Box 534, Sunbury, OH 43074.

WANTED: Eldico TR75 to complete my childhood station. Thanks. Jim Beeson, K6PGV, (800) 783-3131 9:00 - 5:30 PST

CLASSIFIEDS

FOR SALE or TRADE: Harvey-Wells TBS-50D Bandmaster Deluxe w/vfo, base, excellent cond. Sam Hevener 'The Signal Corps', 3583 Everett Rd., Richfield, OH 44286. (216) 659-3244 5-8 PM ET

WANTED: Module repair manual Navships 95700 or equiv. for R-1051/URR rcvr. Mike Student, KB7TH, 6585 Canoe Hill Dr., Sparks, NV 89436. (702) 673-2046

WANTED: Will pay good buck for Thordarson rcvr "All Star" or "All Star Senior". H.K. Fredrickson, VE5HF, 218 Skeena Cres., Saskatoon, Sask., S7K 4G8 Canada. (306) 242-9275

FOR SALE: Very nice Collins 75S-1, 32S-1 w/ matching ps/spkr, all manuals and cables - $425 plus shpg. Bill, AB4SJ, 736 Spring Valley Rd., Montgomery, AL 36116. (205) 281-0970

WANTED: Any books on surplus radio conversion; magazines, books on amateur radio; books on radio repair; courses on radio & communications repair. Allan Mark, POB 372, Pembroke, MA 02359.

FOR SALE: Skyrider 5-10, very early Hallicrafters VHF super, works - $95; Meissner DeLuxe Signal Shifter, clean - $65; Hallicrafters S-120, clean, works. Plus UPS. Paul C. Crum, 6272 N. Cicero Ave., Chicago, IL 60646. (312) 282-3033

FOR SALE: Collins, National and Johnson sale. 22 xmtrs and rcvrs plus some other modern items. Legal size SASE. Tye, KB8FJ, 777 Brightridge Dr., Bridgeport, WV 26330.

WANTED: Multi-Elmac ATR-4 and Multi-Elmac S-meters. Lea, KN4JW, 310 So. Park Dr., Spartanburg, SC 29302. (803) 582-8237

CLASSIFIEDS

FOR SALE: Drake TR4CW (RIT), no scratches, non-smoker, one owner, little use, all factory options, no mods, w/MS4 and AC4 - $650; Drake SW4-A, panel factor marked 'Custom Made Unit' special orig. factory mods, as new - $175. Former Drake Collector, (601) 729-2024

WANTED: T-368 xmtr. Jeff Main, N9IMW, (414) 962-6383

WANTED: Capstan and pressure roller for Roberts 770X 4 track tape deck or 4 track capstan and pressure roller. Paul Zapotocky, K1JKJ, RR 1, Box 7735, Underhill, VT 05489. (802) 899-2051

FOR SALE: (7) Simpson '300' series meters; (4) B&W xmtr coils; (20) Trumbell porc. knife switches; (10) Ohmite 200 W resistors; (4) filament xfmrs; (7) xmtr Hi-V var. caps; porc. insulators; 2 sets headphones; (6) panel meters; Hi-V fixed caps and more - all for $240 plus UPS. Tom Waters, 3703 Bonview Ave., Baltimore, MD 21213. (410) 488-5356

WANTED: Old books, magazines, handbooks, Whites Radio Log, First Call Books, old writings on early radio, issues of Radio Magazine. Call, write or fax. I pay shpg. Please do not throw them away. Donald R. Boland, N1FYX, 28 Faulkner St., Malden, MA 02148. Tel. (617) 324-5362, FAX 322-8412

WANTED: Swan MB-40A. Larry Howe, KBØHIB, (417) 882-1682

FOR SALE: 100 NOS boxed miniature tubes - $65; 150 mixed, used, unboxed tubes - $40; used tested 25L6, 35L6, 50L6, 6SK7, 12SK7, 6SJ7, 12SJ7, 6SN7, 6J5, 12J5, 6H6, 12H6, 6AC7, 6V6, 5Y3 - $1 each; Jackson 103 tube tester - $20; Heath FM3 FM tuner - $20; ARB rcvr tuning head - $12; noise blanker for Heath SB-104 rcvr - $17. Plus shpg. NOS, used, coils, chokes, xfmrs, yokes, flybacks, var caps, service manuals, books, magazines, equipment SASE/list. WANTED: Lower front panel for SX-100 and front panel for S-85 rcvr. Robert Morrison, 231 Perkins St., Havelock, NC 28532. (919) 444-1660

WANTED: Cabinet for Collins 32V xmtr. W3HM, Rt 3, Box 712, Harpers Ferry, WV 25425. (304) 876-6483

FOR SALE: Howard 435 - $80; RAO-5 Wells-Gardner - $70. Dan Mason, 1325 N. Lima St., Burbank, CA 91505. (818) 848-9474

WANTED: Any condition: units, modules or parts for R-390, R-390A, R-392, ARR-41, PRC-47, PRC-74. Buy quantities of receiving tubes. WA5THJ, 1920 Maxwell, Alvin, TX 77551. (713) 331-2854

WANTED: Johnson Viking I or II, 122 VFO, Ranger II, 500; Heath Apache, Warrior, DX-100; Globe King 500 (all vg to mint, please). Also want DX-100 knobs (all) or non-wrkg DX-100. Todd Zelasko, KA8GEF, 9401 Grand Division, Cleveland, OH 44125. (216) 883-5134

CLASSIFIEDS

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

FOR SALE: Knight Ocean Hopper with all coils - $125; Heath Mohican GC-1A w/AC/DC supplies, manual - $125. All excellent cond. S.T. Carter II, W4NHC, POB 033177, Indialantic, FL 32903-0177. (407) 727-3015

WANTED: Hallicrafters S-76; RCA 44BX microphone. Terry Knapp, KG7ZD, 1937 Valley Dr., Las Vegas, NV 89108.

WANTED: Collins 32S1/3; Heath DX-100; manuals for Heath GD 1250 dipper. Ken Poling, N8EIU, 4707 Martin Dr., N. Olmsted, OH 44070. (216) 777-8785

FOR SALE or TRADE: 3TF4 tubes. **WANTED:** Late Collins 75A-4; KW-1; 30S-1; Ranger II; Johnson Desk KW. W3VL, (215) 295-6331

WANTED: Copy of schematic or manual for BC-611 HF walkie-talkie. Possibly looking to buy one. David Childers, POB 191213, Kodiak, AK 99619.

FOR SALE: New Collins parts: 30L-1 blower motors - $35; 51S-1 PTO osc., 70K-7, P/N 522-2918-000 - $200; silver plated 30S-1 tank coils - $7. Dennis Brothers, WAØCBK, HC 84, Box 1, Potter, NE 69156. (308) 879-4552

FOR SALE: Harvey-Wells "complete amateur station in only one cubic foot", T90, R9A - $275. Charles Lukas, W1DOH, 24 Durkee Lane, RFD 1, Acton, MA 01720. (508) 263-3743

WANTED: Whatever happened to all the SCR-268 radio sets (radar). Also need VT-127A tube. T. North, 3161 W. Calle Cisne, Tucson, AZ 85746.

FOR SALE: Basketcase NC-100, FAA model rcvr, good for parts, possible rebuilding; also swap SW-3 80 m GC coils for 20 m set, BS or GC. SASE for details. Bill Plimpton, W2DXH, Rd 6, Box 264, Wellsboro, PA 16901.

FOR SALE: KWS-1 S/N 1297 - BO by April 30; BC-224, fair - $25; parting Viking II; 51S1 WE, rack mounted - BO over $495. Joe Sloss, K7MKS, (206) 747-5349

WANTED: NC-300TS matching spkr cabinet for NC-300 rcvr. Tom Jurgens, KY8I, 3920 Jim Dr., Bridgeport, MI 48722. (517) 777-2257

CLASSIFIEDS

WANTED: Collins KW-1, KWS-1, KWM-1, R389, R390a, 75A-4 with 3 filters; SX-115. F.H. Werry, DJ3OE, Saturnweg 18, D-4056 Schwalmtal, Germany. phone: 01149-2163-20528, FAX: 20552. 24 hrs., will call back.

FOR SALE: Parting out Johnson Valiant. **WANTED:** Power xfmr for Gonset GSB-100. Dan Radcliffe, KP9BP, 8201 Plainview Pkwy, Sussex, WI 53089. (414) 255-9165

WANTED: Mint 32V-3 and loaded 75A-4 with high SN; SX-88 in good to excell. condition; 200 watt multi-tap mod. xfmr; ARRL or other handbooks from late '50's and early to mid '60's; multi-meter or movement for 6N2 T-Bolt. Barrie Smith, KF7VA, 125 Ben Hogan Dr., Missoula, MT 59803. (406) 549-1921

FOR SALE: Transmitting tubes: (4) 814s; (3) 810s; (1) 813; (1) 211, carbon plate; (1) 4-125A; (1) HY-75; (4) 866As. Bill Riley, W7EXB, 863 W. 38th Ave., Eugene, OR 97405. (503) 345-2169

WANTED: Small, cheap vfo CW xcvr. Paul C. Crum, 6272 N. Cicero Ave., Chicago, IL 60646. (312) 282-3033

WANTED: Manuals for the following equipment: SCR-274N, ART-13, ARC-5, BC-610 (including coils and tuning units); manual for SX-88; main tuning knob for SX-88; flight manuals for WW II aircraft; manuals on navigation; ARC-5/SCR-274N pieces and parts. Larry, WØOGH, (602) 892-4618, eves

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FOR SALE: High power roller inductor, square copper, w/counter - $60; Hallicrafters S-20R - $55; dual cap, 150 pf/section, 0.13 spacing - $20; tubes - Westinghouse CWL-861 - $30, CWL-860 - $15; F.T.C. F-102-A - $15; LM-18, LM-21, LP-5, RCA 158 scope - $25 ea.; Carter 420v/200ma genemotor, 6v/33amp or 12v/17amp input - $8. George, WA7HDL, (208) 756-4147

WANTED: Manual or copy for Collins 32V-1 xmtr; spkr for KWM-1 (312B-1 or -2); Hammarlund FM-5 or FM-1 VHF xcvrs and manuals for the same (to convert to 2 meters). Brian Harrison, KN4R, 420 Proctor St., Denver, NC 28037. (704) 483-5679

FOR SALE: Hammarlund HQ-170 w/manual, no clock, working, decent shape - $75 plus shpg; 1930's RCA 'Photophone' ps from historic Boulder theatre, 1 KW output - free plug shpg; W.E. 418A NIB - offer; W.E. 701A NIB - offer. Bill, KDØHG, (303) 823-6438

ELECTRIC RADIO PARTS UNIT DIRECTORY

At this point the directory has 200 units in it. If you need a part for a vintage restoration send $2 and an SASE (.52 postage) for the list. If you have a parts unit, consider putting it on the list. Your dead unit can help bring others to life!

CLASSIFIEDS

WANTED: Machine shop work. Knobs shafts bushings, etc. made to your sample or drawing. Reasonable. Jim Dill, Box 5044, Greeley, CO 80631. (303) 353-8561 evenings.

FOR SALE: Parts by mail since 1954. Vintage parts available. Send stamp and request "Vintage Flyer". USA only. Bigelow Electronics, Box 125, Bluffton, OH 45817

WANTED: Early TV camera equipment. Also buying and selling radar equipment. Allan H. Weiner, 14 Prospect Dr., Yonkers, NY 10705. (914) 423-6638

FOR SALE: HQ-170AC - $150; Collins WE 75S3B - $480; Collins 312B5 - $300; Valiant II - $325. Cliff Fleury, AI7Y, 64174 Tumalo Rim Dr., Bend, OR 97701. (503) 382-9162

WANTED: "E" coil for HRO-60 (900-2050 Khz) and dial scale; Collins 516F-2 ps without case. Butch, KØBS, (507) 288-0044

WANTED: Pinouts, operating data, sockets and circuits for RCA 8646 power tube. Jeff Duntemann, KG7JF, 8105 Paraise Dr., Scottsdale, AZ 85255. (602) 483-0192 days

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FOR SALE: Hallicrafters SX-62A w/manual, mint; Collins 75S-3C w/maual, mint. G. Stockwell, 1411 Memorial Dr., SE, Cedar Rapids, IA 52403. (319) 364-1718

WANTED: Qty of Johnson ceramic transmitting tube sockets, 4-pin bayonet type for tube display purposes. John H. Walker, Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455

WANTED: Radio Physics Course testbook; Ghirardi & Radio Engr. Handbook, F. Terman; NC-183D for good home. Mike, AC5P, POB 33, Bartlesville, OK 74005. (918) 333-2795

FOR SALE: Collins 310B exciter; SPR-4 fully crystaled w/cal.; Gonset Comm. III. Carter Elliott, WD4AYS, 1460 Pinedale Rd., Charlottesville, VA 22901. (804) 979-7383

WANTED: Tube socket and plate cap set (ceramic) for type 204, 849, 861 tubes, etc. Roland Matson, K1OKO, RFD#1, Box 2943, Kennebunk, ME 04043. (207) 985-3751

FOR SALE: Acme DA-3 mod xfmr, Pri res. 22 ohms each side of CT, sec. 4300 ohms - $10 + $3 shpg; beautifully restored Solar model CB cap-res bridge - $35 + $5 shpg; 3 tube homemade Hi-Fi tuner, less tubes - $15 + $4 shpg or $30 w/tubes; Eico model 145 multi-signal tracer - $25 + $5 shpg; Triplett model 1210, in poor cond., no papers - $10 + $5 shpg; B&K model 445 CRT tester, adapters included - $25 + $5 shpg; Carter dynamotor, 2 amp, AN/ATC-2, book and dynamotor, no tubes $20 + $5 shpg. James Fred, R1, Cutler, IN 46920. (317) 268-2214

FOR SALE: Collins 51S1, WE, good cond. - $500. WANTED: Original manual for BC-348R; ARC-5 rcvrs. James Owens, NWØO, 1363 Tipperary St., Boulder, CO 80303. (303) 673-9019

WANTED: Viking II, Valiant; DX-100 or ???. Basket cases considered. Have some items to trade. Fred Mikolajewski, KC9WW, 13255 103 St., West Allis, WI 53214. (414) 257-0189

WANTED: Pedestal base only for a Collins SM-2 mic. Jim, WØJJL, 2207 Madison Ave., Norfolk, NE 68701. (402) 371-3477

WANTED: Information, manuals, schematic, etc. for Navy CCQ430601/TBX-8 rcvr/xmtr. Charles J. Graham, 20335 Casa Loma Rd., Grass Valley, CA 95945. (916) 273-6847

FOR SALE or TRADE: SX-100; R46B; DX-100; 312-B4/W; Simpson 266 VTVM w/wooden case. + UPS. Ray, (314) 428-1963

WANTED: Schematic or unit: Western Electric radio BA80-40, two band novice band xcvr, advertised in Popular Electronics around 1958. Joe, K3YCA, 3628 Kimble Rd., Baltimore, MD 21218.

WANTED: Transmitting inductances as used in 1920's... made by REL (Radio Engineering Labs.); flat coils mounted on glass supports, various diameters. Roland Matson, K1OKO, RFD #1, Box 2943, Kennebunk, ME 04043. (207) 985-3751

Please remember to count the words in your ad. If you are over 25 words, please send 15 cents for each extra word.

CLASSIFIEDS

WANTED: 1950s regulated power supply designs, especially variable to zero volts; Kepco, Lambda handbooks, manuals, schematics of commercial models. Alan Douglas, Box 225, Pocasset, MA 02559.

FOR SALE: BC-610F, works, w/extras; DX-100, mint - $90; NC-303 - $250. Will trade any of the above for Valiant. Chuck Graves, KØRFQ, (417) 863-7415

WANTED: National SW-3 coils; un-paired bandspread coils or non-working ok; coil forms; S-101 audio xfmr; Hallicrafters HT-1, HT-2, HT-4; Drake 1-A tuning knob; NB-7 card; Meissner Deluxe Signal Shifter coils - 160M, 40M, 20M; #10 tubes. Rich Oliver, KC9GQ, Box 1872, Flagstaff, AZ 86002. (602) 774-7527

WANTED: Ranger II or Valiant II. Barrie Smith, KF7VA, (406) 549-1921 eves or wknds.

WANTED: For collection and restoration all models of Johnson gear, any condition. Also advertising, etc. Please state cond. and price. Wen Turner, AD7Z, Box 451, Cal-Nev-Ari, NV 89039.

FOR SALE: HQ-110C, mint, clock works, orig. manual - $125; HQ-170AC, excell., clock works - $225. Both collector material, sharp radios. K5YY, (903) 832-3344

WANTED: Receivers: Squires Sanders SS-1R; 51S-1; ARR 15; R-388/388A; G1 33. Mitsugu Shigaki, JA6IBX, Jozan Kamidai Machi 2825-2, Kumamoto, Japan 860.

WANTED: National spkr for HRO-60; manual for Navy RAO-2 (National NC-120X) rcvr; front panel for HQ-129X. Sheldon M. Rubin, 117 N. Ridge St., Rye Brook, NY 10573. (914) 937-2535

WANTED: Hallicrafters R46A/B spkr in reasonable cond. Tony, KØKCY, 9827 6th St., NE, Blaine, MN 55434. (612) 786-3842

WANTED: 1400 V CT/200 ma xfmr. R. Cohen, 11802 Willow Pt. Way, Tampa, FL 33624. (813) 962-2460

WANTED: Schematic for Morrow MBR-5 rcvr and ps; schematic and manual for HW-100 xcvr. Lee Frank, (717) 564-4529

FOR SALE: Manuals, copies of R4B, R-4C, R7, SRR-4, Collins 75S-3C, 51S1, 51J4. Levy, 8 Waterloo, Morris Plains, NJ 07950. (201) 285-0233

CLASSIFIEDS

FOR SALE: Active AM'er, KH6IRT's unsolicited comments about the Tri-Mark Receiver Marker; "What a little gem! Strictly first rate construction, and I am utterly delighted with it...I am telling as many Ham friends, both on the air and off, about your nifty products". Thanks Peter. Send a large SASE for our latest catalog of parts and kits. Visa/MC. Steve, NW2F, Two Fox Electrix, POB 721, Pawling, NY 12564. (914) 855-1829

WANTED: RME HF 10, 20 and VHF 2 &6 M converters; metal equip. cabinets with hinged tops for homebrew projects. Richard D. Cohen, 11802 Willow Pt. Way, Tampa FL 33624. (813) 962-2460

WANTED: 203A tube; BC-906B; Bendix LM13 (CRR 74028) freq. meter calibration charts; Hallicrafters SX-32 parts source. Brian Roberts, K9VKY, 3068 Evergreen Rd., Pittsburgh, PA 15237. (412) 931-4646

FOR SALE: Working Knight 600A tube tester w/manual - $45; HP-202A sig. gen., excell. cond. - $45. **WANTED:** Working Ranger, preferably Ranger II. Rick, (719) 543-2459

FOR SALE: SCS-2 and 3 technical manuals (BC-638, 639, 640, 686, EE-99, RC-81, 93 and RM-18, 25). SASE or call for list of these and over 100 other 1940's and early 1950's military technical manuals. August J. Link, 2215 Faraday Ave., Suite A, Carlsbad, CA 92008. (619) 438-4420 Mon-Sat.

WANTED: For HRO-7; spkr & enclosure, coil set E & F. Chick Dressell, W3BPZ, 1039 N. 21st St., Allentown, PA 18104. (215) 437-1608

WANTED: Philmore, Meissner, Ameco or Walter Ashe novice xmtr; G-76. C. Schiotz, K2PGB, 15 Runyon Mill Rd., Ringoes, NJ 08551. (212) 272-8131

FOR SALE: Collins 32V-2 - $250. Pick up only. Fred, W6RNC, POB 478, Nevada City, CA 95959.

FOR SALE: Transmitting/Receiving tubes, new and used. LSASE for list. I also collect old and unique tubes of any type. Looking for Taylor and Heintz-Kaufman types. Maybe you have something to trade? Large tubes and sockets from the old Eimac line; 450T through 2000T for display. John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455

WANTED: Old VHF antennas: Halo, Squalo Big Wheel and beams. Clem Duval, 33727 Brownlea, Sterling Heights, MI 48312. (313) 268-2467

WANTED: Hallicrafters SX-28, SX-111, SX-122, SM-40 S-meter. Bill Colligan, N1DJR, 35 Quail Run, Hampstead, NH 03841. (603) 329-7879

FOR SALE: Miscellaneous odds and ends, antique radios and parts. LSASE for list. Hidyne Research, POB 3342, Williamsport, PA 17701. (717) 326-2148

CLASSIFIEDS

FOR SALE: B&W RF clipper for Heath SB series, new - $75. **WANTED:** Sockets/mounting blocks for 204A/304A/849 type tube. Jim Jorgensen, K9RJ, 1709 Oxnard, Downers Grove, IL 60516. (708) 852-4704

FOR SALE: McMurdo Silver Micromatch SWR meter w/manual - $40; Signal Corp paper tape practice keyer MN TG-34-A circa 1943 w/manual, 8 tapes, in excell. cond. - $100; Millen antenna bridge MN 90672 w/10, 15 and 20 meter coils in near mint cond. - $95; 4CX250F/G, new - $50 ea. or $80 for both; 4X150A/7034, new - $45; Philco MN 66 Cathedral in excell. cond. - $250. **WANTED:** HQ-180. Clyde Sakir, N7IOK, 4243 E. First St., Tucson, AZ 85711. (602) 323-1120

WANTED: 3.1 Khz and 800 Hz (CW) mech. filters for 51J4 Collins rcvr; S-meter for HRO/5/T/W rcvr. Paul, WØFTN, 10930 Woody Lane, Coon Rapids, MN 55448. (612) 755-1825

FOR SALE or TRADE: DX-100, mint - $150; (3) Heath 'single-banders', need repair - $100 for all. Joel, K8PSV, 11803 Priscilla, Plymouth, MI 48170. (313) 453-8303

WANTED: Lambda MM2 modulation monitor, in working cond.; any Johnson AM xmtr. Tajima, KD2HB, c/o Shinagawa, 21555 Sterling Dr., El Toro, CA 92630.

WANTED: Espionage equipment. Historian purchases spy radios, code and cipher machines and any equipment, devises or manuals pertaining to the world's intelligence organizations. Keith Melton, Box 5755, Bossier City, LA 71171. (318) 747-9616

WANTED: WW-II military electronics; test equipment, radios, radar, odd-ball items, counter measures, APS-13; also manuals, books, articles pertaining to same. William Van Lennop, POB 211, Pepperill, MA 01463. (508) 433-6031

WANTED: Information on Hammarlund HQ-88 and HQX-300. Were they actually manufactured? Hammarlund advertised these rigs in several magazines in the 1971 time frame. Barry, N6CSW/Ø, Box 57, Hesperus, CO 81326. (303) 247-4935

HAMFESTS

HOSSTRADERS, Deerfield, NH, MAY 2

This may be the premier vintage swapfest in the country. Although it officially starts on Saturday, May 2, a lot of trading is done the previous evening.

For those camping out, spaces are available after 4 PM on Friday. The event is held at the Deerfield Fairgrounds.

AM Forum At Dayton

If you're going to be at Dayton this year don't forget to attend the AM forum. It will be held in Room #7, at 1:15 PM on April 25.

Two items on the agenda should be of great interest: a 'country-wide- panel discussion on AM and a pictorial review of W6HDU's station.

MARTA ELECTRONIC SERVICE

BUSINESS RADIO COMMUNICATIONS

Meet Max, W5GJ, licensed in 1935, electronics instructor in the Army Signal Corp and owner of Houston's MADISON ELECTRONICS SUPPLY. Since 1956 Madison has sold all types and brands of amateur equipment and parts. Through the years he evaluated that equipment; Collins remains his preference.

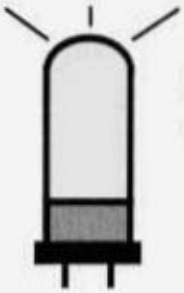
"I know the promise of the transistor and microprocessor has been fulfilled for amateur radio but my 75A-4, S-Line and Henry amp are all I need," says Max. "I know what's going on 'under the hood' on the these radios and could practically repair 'em on my lunch hour. Any tubes I need are in stock at Madison. These radios look good too."

And.... W5GJ is at the top of the DXCC Honor Roll with ALL current countries confirmed, all done with Collins equipment!

Max's Collins is not obsolete and neither is yours! Because of collectors and users like you and Max, Collins radios will be heard on the air into the next century.

Should you need repairs on your S-Line, let me restore its specifications.

Mike Palmer, K5FZ
16707 Creeksouth
Houston, TX 77068 (713) 893-7004



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