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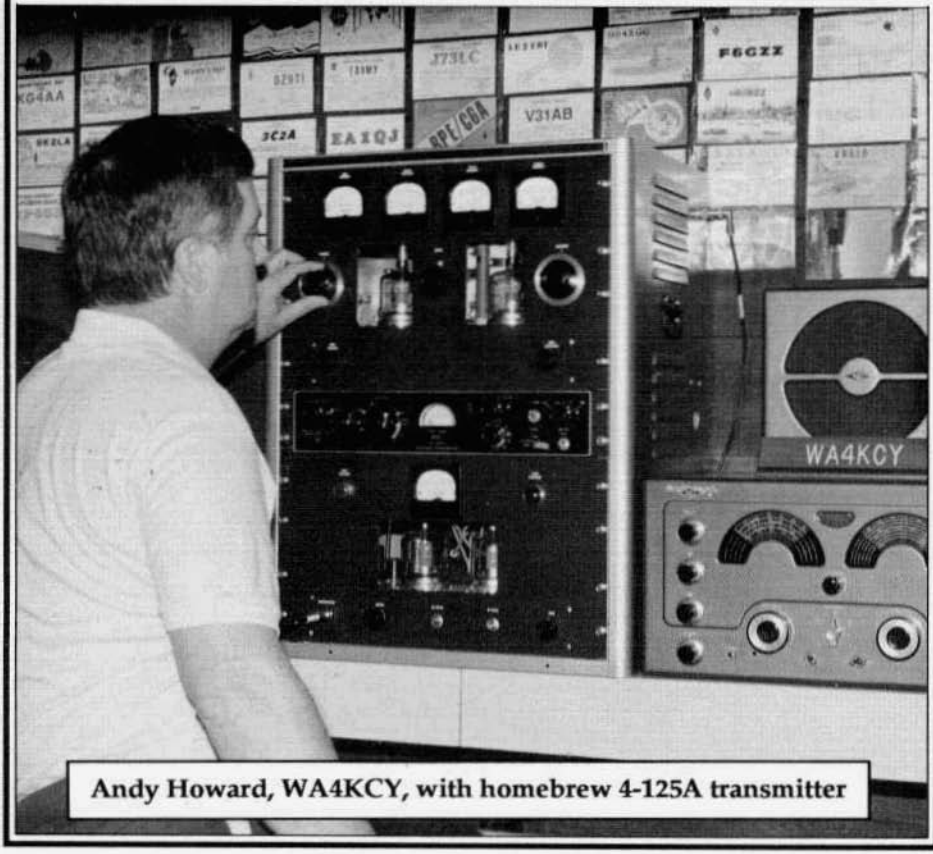
ELECTRIC RADIO

celebrating a bygone era

Number 29 **September 1991**



Andy Howard, WA4KCY, with homebrew 4-125A transmitter

ELECTRIC RADIO

published monthly by Barry R. Wiseman, N6CSW/Ø

at 4 Aspen Place, Durango, CO 81301

Second Class postage paid at Durango, CO. and additional offices

Authorization no. 004611

Postmaster send address changes to: Electric Radio
Box 57
Hesperus, CO 81326

REGULAR CONTRIBUTORS

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

A couple of issues ago I talked about my trying to contact Edward A. Neal, W7ARF, one of the Editors of GE Hams News. The other day I received this letter:

"Mr. Larry Soughan (WB3ELM), a subscriber to your publication and the Associate Pastor at our church, sent me a copy of your July 1991 issue.

" I am Jan Neal-Stein, the daughter of the late Edward A. Neal (W7ARF), who was the Editor of the GE Ham News from 1955 until the early 1960s. Even though I was quite young during the time my father was the Editor of the Ham News, I still have many fond memories of his work with this publication. I am very delighted that G.E. gave you permission to reprint the old issues and I know my father would have been pleased to hear you say it is a "first class" publication!

" As a personal note, my father passed away in July 1989 after a bout with liver cancer. This devastated our family, as he was never sick a day in his life and died just 10 weeks after the diagnosis was made. (I'm sure he and Michael Landon are comparing notes somewhere in the great beyond.) I am still sifting through many, many boxes and files of his, and if I come up with any material that might be of interest, I will be happy to pass it along to you.

"In closing, I just want to thank you for bringing back some very wonderful memories of my father"

I may have mentioned this before, but I really enjoy reading my mail. I get some very, very interesting letters. Now we know the "rest of the story".

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Reflections Down the Feedline

by Fred Huntley, W6RNC
POB 478
Nevada City, CA 95959

Like the song says,"Oh, How I Miss That Old Gang Of Mine!".... down at the radio club that is.

In 1934, at the Brooklyn (NY) Technical High School, when it was at Manhattan Bridge Plaza, the radio club was supervised by Mr. McArdle, a teacher in the Electrical Department. Of the members, I only recall W2IOP, who later on went to some fame.

The club transmitter was formerly that of WNYC, the city-owned AM broadcast station. It was a two deck breadboard outfit that sat on top of a table. The final had a pair of 852's.

After I got my ham ticket I attended some meetings of the Bay Bridge Radio Club -- a fine group of young fellows.

As I recall, there were no dues or formalities. The usual meeting was discussions of the principals of ham radio and issues of the day as covered in the latest QST magazine. What I clearly remember, is that after the meeting, some of us adjourned to a nearby tavern to continue the discussion over a beer or two. Occasionally a club member would hold open house and show his station to the group.

Two of the members - Smitty and Frank - were commercial 'ops' at RCA Communications. In 1936, I got a job with an export office, as a "runner" - delivering export documents to banks, consulates, steamship companies, railroads, U.S. Customs, etc. throughout the lower Manhattan (NYC) financial district.

Many times each week I used to pass by RCA Communications, which was located in a four-story brownstone building at the corner of Beaver and Broad streets. Equally frequently, I used to pass by the IT&T/Mackay/Postal headquarters a block away, also on Broad street. But, being too green, I never thought to check out what was going on inside these buildings where a lot of radio communication history was being made.

In later years, from what I have heard and read, in the RCA building, there was a room where a bunch of guys with perforators and glue pots, punched out CW message traffic on paper tape. The perforator was a mechanical keyboard. And the glue pot was used when a punching error was made. The error part of the tape was torn off, and a retyped corrected version was glued to the rest of the tape, with the mark/space holes in correct alignment.

During my travels around the financial district, I remember going through a large, cavernous room at the Erie Railroad offices in the Mercantile Bldg. at One Broadway. There were a lot of clickity-clacking sounds emanating from a long double-row of desk operating positions where about 20 men were engaged in Morse telegraph - handling train orders etc.

On one occasion, the radio club members paid a scheduled visit to the station of W2AYN, a leading radio amateur, and head of the N.Y. Fire Dept. radio. OM Borsody, dressed up in his best suit, showed the group around his radio shack. The highlight of his presentation, was when he demonstrated his 500 watt phone transmitter - an open rack job. He took a lead pencil and drew a nice fat 3 inch arc off the final tank. Then, with a small flourish he withdrew the pencil. The RF continued to sputter and sizzle by itself, and everyone watching was duly impressed.

About 12 years ago, a ham in NYC showed me an old "handshake certificate" that he received long ago from W2AYN,

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AM Power Issue Update

by Dale Gagnon, KW1I
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The FCC released an order on July 24, 1991, to deny the AM power petitions for re-consideration that had been submitted last November. These petitions requested review of the earlier denial of three petitions: RM-7402, 3, 4, which sought to amend the amateur power regulations to prevent the maximum power allowed AM to be reduced.

The FCC in its denials stated, " We disagree with the petitioners contention that popularity of a particular emission type within the amateur service community has any bearing on the maximum power that an amateur station should be authorized". This was the highlight of the denial. This quote was also printed in the ARRL's report on the order on page 61 of September QST. This was the commissions response to the petitioners' suggestions that they use the same reasoning today to allow the continuation of historic AM power that the commission used in their 1982 Notice of Proposed Rulemaking when they suggested a grandfather clause for the high power measurement because there was still some interest in the AM mode.

A copy of the denial order was sent to me at the end of July with a note from William Cross of the FCC stating that four Congressional Inquiries were received that week. The denial order was referenced in reply to them. It is gratifying to know that many AM'ers have continued to press Congress on behalf of the AM power issue.

At this point there appears to be several options to continue this fight. One is to challenge the FCC in the courts. Unfortunately, the Commission may have the authority to do what they have done. No legal issue has been discovered up to this time on which to base a case. Another option is legislation. The Amateur Radio Spectrum act is being investigated by AM'ers for the possibility of inclusion of amendments favorable to the historic AM power level. Another option is to continue to push for a review of this inept decision by one or more of the FCC commissioners. This can be attempted informally by those in the AM community that have contacts in government who will endeavor to put the facts of this miscarriage before the Commission.

If you have contacts in government who may be able to help in this way, please approach them as soon as possible. I would like to help you develop these contacts. I have a package of information I can send to you that is a simple letter explaining our plight in non-technical terms. It points out the deficiencies of the FCC handling of the AM power issue. The package also contains copies of the 1982 Notice of Proposed Rulemaking, 1983 Report and Order and copies of more recent petitions with AM paragraphs and other pertinent areas high-lighted. Although the odds have always been long, past and future efforts expended on this issue are not in vain. AM operation is enjoying a renewal of interest and the AM community is attracting serious notice for their vigilance and activism. •

ELECTRIC RADIO IN UNIFORM

by Walt Hutchens, KJ4KV
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"The MBF Transceiver"

How do you coordinate the maneuvers of Navy ships operating within a few miles of each other? Visual signals (flashing lights or signal flags) are often a good answer since these methods are almost impossible for an enemy to pick up. However, when the distances get very short -- 80 feet is common during refueling -- the speed of voice communication makes it invaluable and in any case visual signals are often unusable in bad weather.

The U.S. Navy used three different radio sets for this job during WW-II. The last to be designed was the MBF, built by Collins Radio Co.; you might not be surprised to learn that it has several interesting features...

Overview

The MBF is an AM voice transmitter and receiver in a single cabinet. It is 9-1/2" x 16" x 10" (H x W x D) and weighs 26 pounds not counting accessories. The transmitter and receiver are crystal controlled on a single pretuned channel from 60 to 80 Mcs. Rated transmitter output is three watts.

The receiver is a superhetrodyne with an audio output of one watt and has a panel-mounted loudspeaker; a handset may also be used. There is no provision for remote control.

The set operates on 115 volts AC or DC and requires 80 to 110 watts. It has 14 tubes, all 7-pin miniatures except for the final amplifier, modulators and rectifiers.

History

In the late 1920's, the Navy made a tentative decision to use VHF for short range communication in order to avoid having radio signals picked up at ranges far beyond the horizon. (The ducting and scatter propagation modes which make VHF ranges of thousands of miles possible today, probably could not be detected with the receivers of that time.) A first series of radios (the XP transmitter and XJ and XV receivers) was built by the Naval Research Laboratory and installed on battleships, cruisers and aircraft carriers; when these proved successful an operational set, the TBS transmitter-receiver, was built in quantity by RCA beginning in 1938. The mammoth TBS (about 250 pounds, including the MG set which furnishes high voltage) became the Navy's main tactical radio. It served through the war on all larger ships and many smaller ones, and was retired only when fleet tactical communication moved to UHF (225-400 Mcs) after 1948.

A second part of this VHF system was the TBY portable ('walky-talky') transceiver, reviewed in February, 1990.

In the prewar period, a set for permanent ship installations and a portable were all that was needed. Amphibious warfare, however demanded a whole new type of navy, including many craft which were large enough to be ocean-going over short distances yet too small for a permanent radio installation. Other applications could

The MBF transceiver with covers for the receiver and transmitter adjustments and MBF and TBS crystals. An accessory case which can be clamped to the top of the radio holds the handset, antenna and feedline, tuning meter, power cord, crystals for four channels (72.1, 72.9, 73.9 and 75.7 Mcs), and a few spare parts and service tools. Front covers for the radio and accessory case make them watertight.

have been aboard merchant ships sailing in convoy, as emergency sets on larger ships and at the hundreds of tiny Pacific islands providing recreation, boat engine repair and other support to the fleet.

The Navy probably had more than one application in mind; the manual shows a man carrying the MBF on his back and discusses mounting it by drilling holes in the deck of a ship. Whatever the role, in October 1944, Collins Radio got a contract to build what amounted to a 'miniature TBS'.

The manual has schematics for sets with serial numbers 1-479, 480-1536, and 1537-2126 but none 'over 2126'; this suggests that only 2126 sets were built. The MBF did not have a long service life. When the contract was signed, it was probably seen as part of getting ready for what would have been the largest amphibious operation in history - the invasion of Japan itself, planned for the winter of 1945-1946. But the invasion didn't get beyond planning because Japan surrendered in August of 1945. Vast numbers of TBS-compatible, simple radios were no longer needed and the contract was probably terminated immediately. The sets which were produced would have disappeared when the TBS did.

Overtone Crystals

Since the MBF is the earliest military rig we've studied to make use of overtone crystals (the XP and TBS were probably the Navy's first) we will take a quick look at the topic.

Quartz crystals are widely used for frequency control because quartz is a cheap and sturdy material which is piezoelectric that is, it changes shape in an electric field, and distorting a crystal produces a field. A varying electric field of the proper frequency can thus be used to set up vibrations in a piece of quartz and a vibrating crystal produces an AC field.

continued next page

The way in which a quartz plate changes shape depends on the direction of the electric field in relation to the way the plate was cut from the crystal. In the AT and BT-cut crystals most often used by hams and the RCA-developed V-cut used for the TBS and MBF, applying a voltage between the faces makes the faces move lengthwise relative to each other – called 'thickness shear'. The main advantages of crystals made this way is that they don't change frequency very much with temperature and are easily mounted since they can be clamped at the corners with little loss.

Think of a V-cut crystal mounted horizontally. In the 'fundamental mode' the top of the plate might be going to your left while the bottom is going right; halfway between the top and bottom is an imaginary surface which isn't moving. The 'natural frequency' of this vibration is set by the stiffness and weight of the quartz – both constants – and the thickness of the plate. It is only slightly affected by the length and width of the plate, the clamping pressure and the size of the air gaps between the electrodes and the surface of the plate.

To produce thickness-shear crystals for higher frequencies, you grind the plate thinner. However, a plate for 7250 kcs is the thickness of three pages of this magazine; thinner plates are fragile and have all sorts of other problems.

If you have a half wave antenna you also have a three-half wave antenna for three times the frequency; the equivalent is true of a thickness shear crystal. Instead of a single half wave between top and bottom surfaces we can work with three half waves. When the top is going to the left, there will be a surface 1/6 of the way down which isn't moving, a region which is going right, a surface at the center which isn't moving, then a region going left, a surface 5/6 of the way which isn't moving, and finally the bottom, again going right.

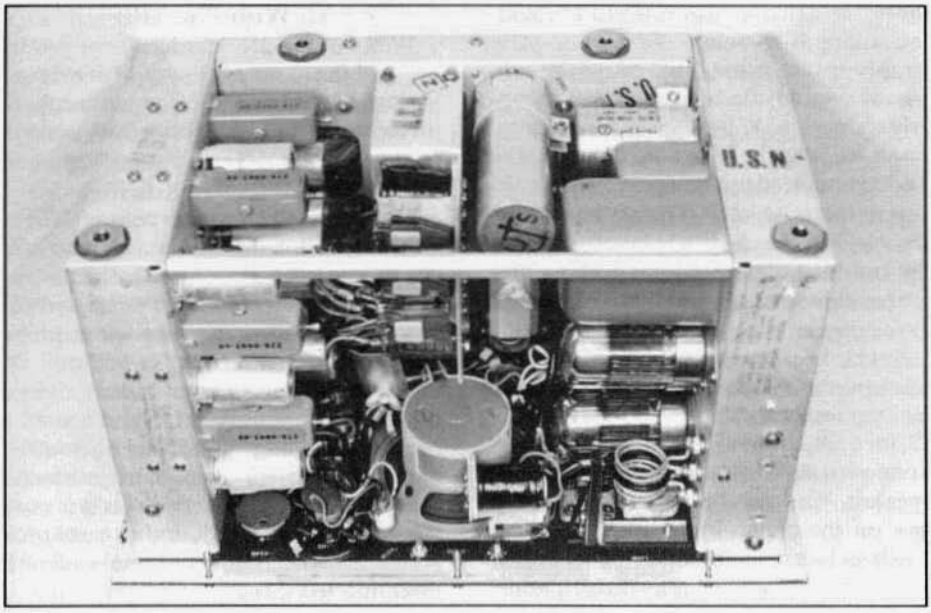
This 'third overtone' crystal vibrates at almost exactly three times the fundamental frequency. The disadvantages are that the shape of the plate must be more precisely controlled and the oscillator must supply more feedback and only at the desired frequency to force oscillation on the overtone.

If the oscillator has to be more complicated and the crystal is more expensive, why bother? Why not just use a frequency multiplier? "That's been done" the saying goes – and the military set which did it (the Navy's first UHF transmitter for surface ships, designated 'TDZ') was a disaster. To get to 225-400 Mcs, this set used crystals from 4.17 Mcs to 7.41 Mcs and multiplied by 54. Of course any multiplier produces all harmonics – the desired harmonic should be much the strongest, but they are all there. Suppose all the nearby 'spurs' were at least 30 db down from the thirty-watt carrier output. That means you have a thirty watt transmitter on (say) 277.8 Mcs together with a flock of several (up to thirty) milliwatt transmitters on frequencies which are multiples of 5.14 Mcs away from that channel. Since a task force only ten or twenty miles in diameter might guard a couple of dozen frequencies in the UHF band, you'd expect a real problem. Then consider that the RDZ receiver used roughly the same scheme for its local oscillator... 'disaster' is the right word.

The Navy never did it again. The TDZ and RDZ were replaced by much simpler and cheaper radios (TED and RED) which used third overtone crystals multiplied 12 times to reach UHF.

Design

The design of the MBF reminds you more of the sets in the VHF chapters of the 1950's Radio Amateur's Handbooks than it does of most military radios. The transmitter begins with a 6C4 third overtone crystal oscillator operating at 15 to 20 Mcs. The oscillator output is doubled by another 6C4 and then doubled again in another. The final is a 28D7 dual pentode with the sections in push-pull; it works straight through on 60 to 80 Mcs.



Top rear view of the MBF. The transmitter is on the left, the receiver is on the right, and the power supply is in the center. This 'H' chassis design is similar to that used in other Collins sets of the time, such at the ARR-15 and ARC-2.

The transmitter crystal socket is at the lower right corner of the front panel; all the stages are tuned by screwdriver adjusted 'APC' variable capacitors located along the right edge of the panel. A sliding link lets you adjust the antenna coupling.

The receiver uses a 6AK5 pentode RF amplifier, a 6AK5 mixer and three 6AK5 IF stages operating at 5.3 Mcs. The receiver local oscillator is a 6C4 overtone oscillator running at (channel freq. - 5.3)/4 and followed by a 6C4 quadrupler. Receiver tuning adjustments (similar to those of the transmitter) are located along the left edge of the panel.

The second detector is a diode-connected 6C4; it is followed by a series noise limiter, and AVC and carrier-operated squelch circuits.

The audio amplifier uses a 6AQ6 voltage amplifier, a 6C4 driver and push-pull parallel 28D7's operating class AB. It is switched to function as a modulator when transmitting.

The tune up controls on the panel are numbered 1-11. A plug-in meter, supplied with the set, goes through a screwdriver switch on the panel to measure a current related to the control being adjusted. Tune up is just as simple as it seems: plug in the receiver and transmitter crystals for the new channel and adjust the controls in numerical order for maximum (or sometimes minimum) reading on the meter with the switch set to the right position. Most receiver controls are adjusted for maximum noise. Tune up instructions are on the adjustment covers.

The circuits are ahead of commercial and amateur practice in the mid-40's only in using overtone crystals for frequency control but the real innovations are in the way the set is built and the features it provides.

The wide variety of vessels on which the MBF was to be used meant a variety of power sources; merchant ships, in particular, often had 115 volt DC power. The MBF, accordingly, was designed as an AC/DC set. This was done by connecting

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the tubes in two series strings and providing a circuit to select the proper plate supply arrangement. Two relays are connected through diodes to sense (and properly connect) a DC input of either polarity; on an AC line, the relays are open and the line is connected to a half-wave rectifier to supply plate voltage. The set has a 'hot' chassis, but the chassis is insulated from the front panel and case so nothing you can touch in normal operation is connected to the power line.

Special features fit the MBF to be a semi-portable and easy to install radio. Unlike most Navy shipboard sets (the SRR-13, for one), the MBF has internal muting, a one-watt audio output, and its own loudspeaker. You can connect a handset to a jack on the panel. In addition, there's a 'push to talk' switch on the panel which connects the loudspeaker as a microphone, just like on an intercom. The only other U. S. military radios to use a combination speaker/mic are the 'flight suit portable' emergency transceivers – URC-4, -11, -68, etc.

Antennas for shipboard radios are usually serious business, requiring at least a couple of days to run cable and weld the necessary clips, clamps and mounts. Though the MBF can be used with a permanent antenna, it comes with its own vertical and fifty feet of RG-8/U feed line. The upper end of the antenna has a ring and the lower end a snap; you just hook it to a signal halyard, run it up like a flag, and screw the 'N' connector to the front panel of the set.

The set uses only five types of tubes: 6C4's do all the oscillator and multiplier jobs and with the plate tied to the grid they serve as diodes for the detector, noise limiter and elsewhere. 6AK5's are used in all the RF and IF amp sockets; both RF and AF power amps are 28D7's, 6AQ6's are used where a high-mu triode was needed and the power rectifiers are 25Z6's. There's one spare of each type in an unwired socket inside the case.

On The Air With The MBF

Well not exactly – at least, not yet. In original form, the MBF won't tune down to the 6 meter band (too bad we lost the 5 meter band – 56 to 60 Mcs – after the war!) so it can't be used as a ham set without conversion.

I did, however, get a pair of MBF's working. Following the manual, I checked out the receivers first. One worked when I plugged it in – not bad, after 45+ years. The second had several cut wires, probably from a former owner's troubleshooting efforts. The DC input polarity select relays (which should not operate on AC) had an annoying buzz; since they measured substantially higher in resistance than those in the other two sets it is possible they didn't meet the inductance specs which are critical in this application. I disconnected this circuit temporarily.

There were a couple of 6AQ6's with heater-cathode leakage causing excessive hum and incorrect squelch operation. Neither showed any problem on the TV-7 tube checker but in a circuit which puts tens of volts of AC on the filament it doesn't take much. This was probably a frequent problem with these radios due to the 'series string' design. A few of the 6AK5's were weak, causing low sensitivity. And that was it – there were no problems with electrolytic capacitors or leaky coupling caps.

Both transmitters worked right away; with both sets connected to dummy loads, I was able to 'DX' from one set to the other across the radio room.

The MBF would have been an almost ideal ham set for use on local nets and in fact a conversion was published in the 'Surplus Radio Conversion Manual – Volume III'. It's not trivial – they tell you to rewind all the RF coils – but if time permits I may convert the not too good 'used' one of my working pair for the 50.4 AM frequency. Probably the only reason that the set wasn't more popular with hams is that so few were made.

Conclusions

We rarely tackle a radio for a 'new' requirement, let alone one by Collins, so surprises might be expected; the MBF certainly delivers.

To fully appreciate the MBF, one must recognize that the typical Navy shipboard transmitter of this period weighed hundreds of pounds and had lifting eyes in the top four corners. At 250 pounds, the TBS was a relative lightweight; the TDZ which replaced it was around 400 pounds. The 26 pound MBF represented a completely new approach.

It's portable in other ways than weight: with all accessories needed for operation it can be carried on a man's back and they even included the shoulder straps! You could have it working about five minutes after arriving and anyone who had used any of the Navy tactical radios would be able to operate this one with just a quick demonstration.

Allowing use of either AC or DC input makes the MBF quite flexible, though doing it automatically added a couple of relays which are one of the least reliable kinds of electronic parts. A more important price was the use of a series heater string which introduces new failure modes and complicates troubleshooting.

Another flexibility plus: the set accepts either the crystals supplied for it (FT-243 holders) or the FT-171-size TBS crystals. It was surely part of the plan that the frequency multiplication scheme and IF frequency for the two sets is the same so that the TBS crystal for a channel will put the MBF on that same channel.

Transmit audio is very muffled and 'bassy' when using the speaker as a mic; the speaker isn't correctly terminated and lacks a high-pass network to shape its response.

The 'hot chassis' design was a mistake. Life aboard ship is life with salt water and steel; in a combat zone you can add 'not enough sleep' to the equation. That's not the environment in which I'd want to work on a hot chassis. The manual says "be careful", but it doesn't mention using an isolation transformer. With a little more design effort it would probably have been possible to separate the RF and power grounds and eliminate this hazard.

This is a very nicely made radio, with sealed 'Chicago Standard' transformers and all RF parts silver plated. As the first Collins VHF set, it must have provided a valuable technique warm-up for the famous ARC-27 – probably the outstanding military UHF set of all time. Except for the 'hot chassis' design, no military radio I've seen shows more understanding of the way the set would be used. This is the way military radios ought to be built.

And Even More On The SRR-13

Thank goodness for letters from readers! In the July column I said that the IF stages in the SRR-13 and -13A used L-C filters. Todd Roberts, WD4NGG, wrote (very tactfully I thought) to ask why I didn't mention that the SRR-13A had mechanical filters.

The reason is that I didn't know. I did think about the possibility, but neither the four IF assemblies nor either of the two manuals I have says anything specific. I removed the cover from the one filter which was easy to get apart; it was full of coils and capacitors. The other units are of three other (different) designs -- none of them easy to disassemble. So, I assumed...

It appears that IF assemblies having Z-1003 (which looks like an IF transformer) have L-C filter assemblies; those lacking Z-1003 have mechanical filters. In general, the FRR sets and the SRR-11A, -12A, and -13A (from other info that Todd sent it appears that all three of these were built) should have mechanical filters but since the two types of IF assemblies can be exchanged, this rule isn't 100% dependable.

Several readers who have used SRR-13's and/or -13A's said that the calibration of their sets was off by a few kcs but okay for general use. Because of these comments, I repaired an unmodified spare oscillator assembly (containing all the parts

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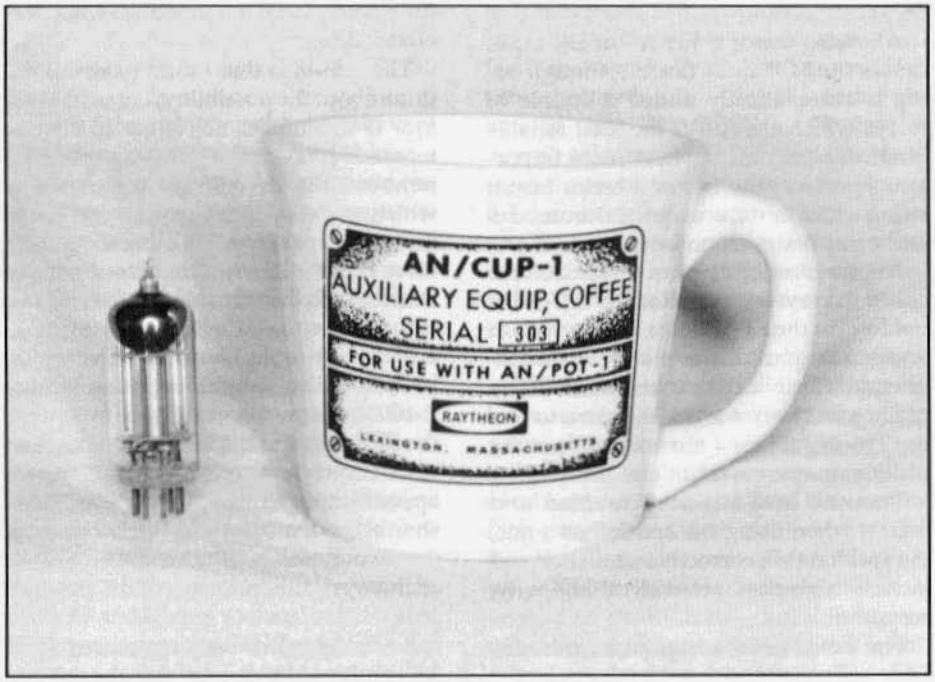
which affect the calibration) and ran tests with it in my set. It was better on 2-4 Mcs and about the same on other bands as the one I first tested. It is possible that the results reported in the July column were almost a 'worst case'.

AN/CUP-1

Every once in a while a reader sends me a piece of equipment I have never heard of.

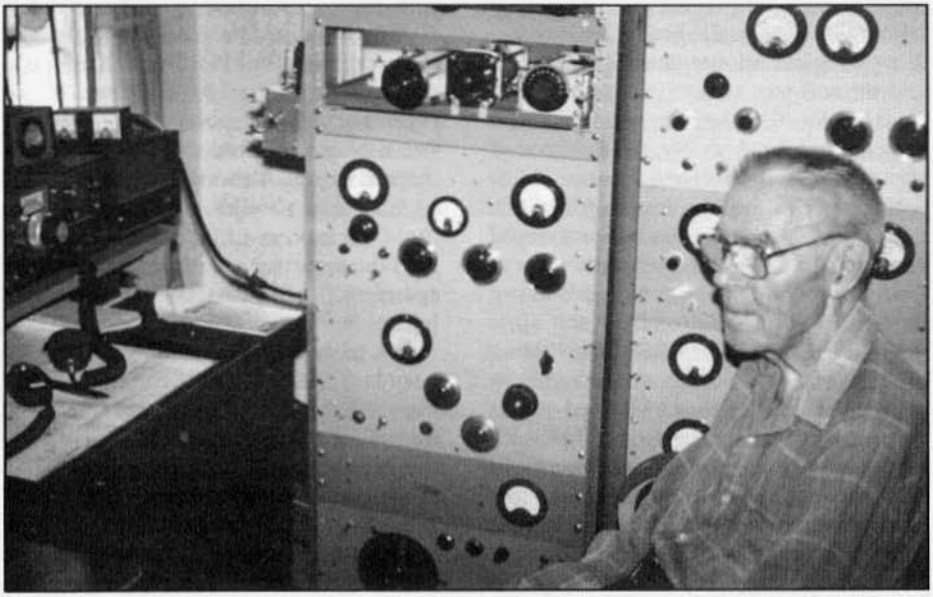
This unit -- for which many thanks to Paul Mathieu -- appears to be designed for a general purpose military function and might be useful in a ham shack, but since I lack both the technical manual and the POT-1 system, I am unable to test it properly. I have heard from others that it can also be used with something called 'INSTANT' (probably a code name, since it isn't in AN-nomenclature form) however I don't have info on that, either. •

I'D GUESS A PAIR OF 4-1000's ---- JUST IN THE BUFFER STAGE!!



AN/CUP-1. Note simple controls and ease of access for critical maintenance. The miniature tube is shown for size comparison.

Royal Kramer, W3ZIF, Allentown, Penn. in his hamshack.



Harry Glawe, WØJOL, Dana, Iowa, in his hamshack. Harry was first licensed in 1931 and says building has been his main interest in amatuer radio. Amongst the rack mounted gear shown in the photo are 2 amplifiers - one with 833A's and one with 6 837's - and a couple of antenna tuners. We may have more on Harry in a future issue.

A Desktop 500 Watter Using 4-125A Tetrodes

by Andrew Howard Sr., WA4KCY
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Carrollton, GA 30117

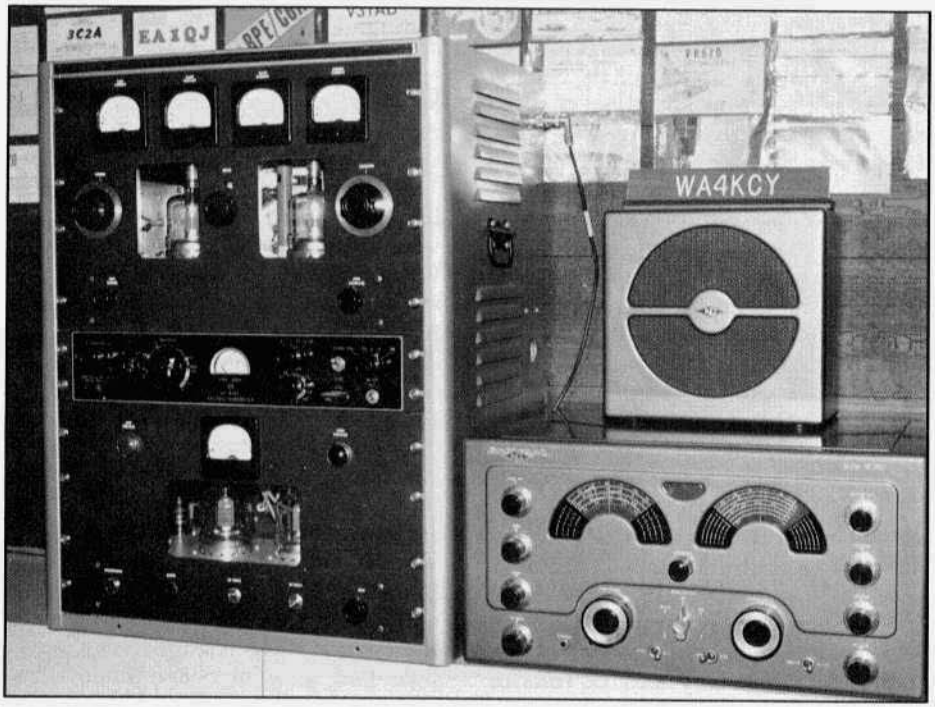
About a year ago the old junkbox started to fill with parts again. When this happens I always begin to think of putting them all together in a transmitter of some sort. I suppose what you end up deciding to build is directly related to the parts and tubes you happen to have on hand. A couple of years ago I had acquired a number of 4-125A's in a trade and had always wanted to give them a try in an AM transmitter. Once I had actually decided to build the rig I spent several more months under flea market tables attempting to locate the rest of the parts needed.

I have long admired the older tube type AM rigs that had the final and modulator tubes displayed in windows for viewing. I think that we can all agree there is something magical about glowing filaments and the soft red color of plates in the big glass bottles. Yes, the tubes would have to be in a window. Actually, the final ended up with two windows and the modulator with one window (the reason for which will be explained later). And since it would be a desktop rig with the power supply on the floor it would be nice to be able to run the final and modulators from the same supply. This would be in keeping with my practice of using the same tubes in both decks. The cabinet that I planned to use would be just tall enough to house the RF deck, exciter and modulator. This would be quite a change from the five and a half foot rack housing the 813 rig I built a couple of years ago [ER #5, September 1989] and used on 75 meters.

4-125A, 4D21, 6155

Sounds confusing doesn't it? Three different identifiers for the same tube does seem like they couldn't decide what to call it. I am not completely sure about the reason for this. I have seen military tubes labeled JAN 4D21. I have one made by Penta Labs (the old Penta Labs of California and not the recent Chinese copy of the Penta name) and it has only the 4D21 designation. Several other companies also made the tubes. I have them made by Eimac, RCA, Lewis and Kaufman, General Electric, Sylvania and Amperex. The tubes were manufactured in Europe by Amperex using the number 6155. The tubes seem to be the same except for the fact that they don't have the metal skirt around the bottom like their American-made counterparts. Since it is common practice to ground the metal skirt on the 4-series of tubes, I have only used them in the modulator but I am sure that would do equally well in the RF deck. These tubes are still available at hamfests and flea markets for around $5 to $20 in unopened boxes. Although not as plentiful as 813's they should be available for the remainder of my lifetime. I have long held the view that you should not have to spend $400 or $500 to retube an AM transmitter.

One of the advantages of this tube is the very low inter-electrode capacitance between the plate and grid (.05 mmf). This makes for a very stable tube considering the high gain. RCA in their spec sheet claim stability without neutralization to 100 Mcs if the input and output circuits are kept well isolated. Also, they require very low driving power when used as RF finals and can be operated AB1 in modulator service which means that they draw no grid current and can be driven with a voltage amplifier type speech amp.



The RF Deck

The Class C final uses a pair of 4-125's in parallel with a B&W 850A inductor, a 150 mmf. tuning variable and a 2,000 mmf for loading in a pi-network output. All chassis are 13" x 17" and were supplied by Sound Values of Ohio for about a third of the cost usually associated with aluminum chassis. Eimac air sockets are used for the tubes and the chassis is pressurized using a muffin fan. Screens and filaments are by-passed in the normal manner and RF chokes are used in the plate and screen voltage inputs. A B&W 800 plate choke and a 1,000 mmf. ceramic doorknob complete the plate circuit.

The grid circuit consists of a National MC-40SL. This is a broad-banded circuit manufactured in the mid '50's and available at flea markets. It will tune 80 thru 10 meters with a single turn of its tuning capacitor. It also has a swinging link that facilitates loading of the exciter. The link is connected to the front panel with a flexible shaft and the capacitor uses a right-hand drive and 1/4" shaft. Neutralization of the final is obtained with a 220 mmf. mica connected between the bias input of the grid circuit to ground and a Cardwell 10 mmf. neutralizing condenser is connected from the same bias input point to the plates of the 4-125S's.

All RF connections are made with 5/16" silver plated copper strapping. I am not sure how important the skin effect would be on 40 meters but the silver plating sure looks good. The 4-125A's were spaced so as to leave 2 1/2" space between the windows of the panel to accommodate the band change knob and band display. The 850A inductor is turned with the connections facing the front. This puts the tuning, loading and inductor very close to each other and allows for short connections. The shaft for the bandswitch actually goes between the tubes. The RF choke is set slightly to one side of this shaft and close to the inductor. Short pieces of strapping complete all connections. In order to make the knob arrangement symmetrical,

continued next page

universal couplings were used on all shafts. A 1/2" window is located just above the band change knob. Behind the panel is located a 2" disk which is fastened to the band change shaft. It displays a 1/4" white dry-transfer number in the 1/2" window to indicate the band in use.

Screen voltage is supplied to the final through a screen dropping resistor and controlled with a 6Y6 clamp tube. This eliminates the need for both screen and bias supplies. Four meters across the top of the panel measure grid current, screen current, plate current and plate voltage. Controls for the grid network are located at the bottom of the panel.

The Speech Amplifier and Modulator

One of the advantages of running high gain tetrodes in class AB_1 is that they will almost drive with an amplified D-104 mic. They draw no current in AB_1 and are easily driven with a simple voltage amplifier. I had originally planned for AB_2 operation and would only need 350 volts for the screens. This would be readily available from the speech amp supply. When drive from the speech amp proved slightly insufficient and it appeared that I would have to run the tubes in AB_1, I was faced with the need for 600 volts for the screens. A quick calculation indicated that I could get 530 volts from the supply by using capacitor input. This eventually proved to be adequate since 100% modulation is very easy to accomplish.

Since space would be a problem, I would also put the controls for the remote control of the power supply, press-to-talk, etc. on the front of the modulator panel. I did not think that this would present a problem if the circuits were kept properly isolated. I was careful however to keep all power and audio transformers as separated as possible and at right angles to each other.

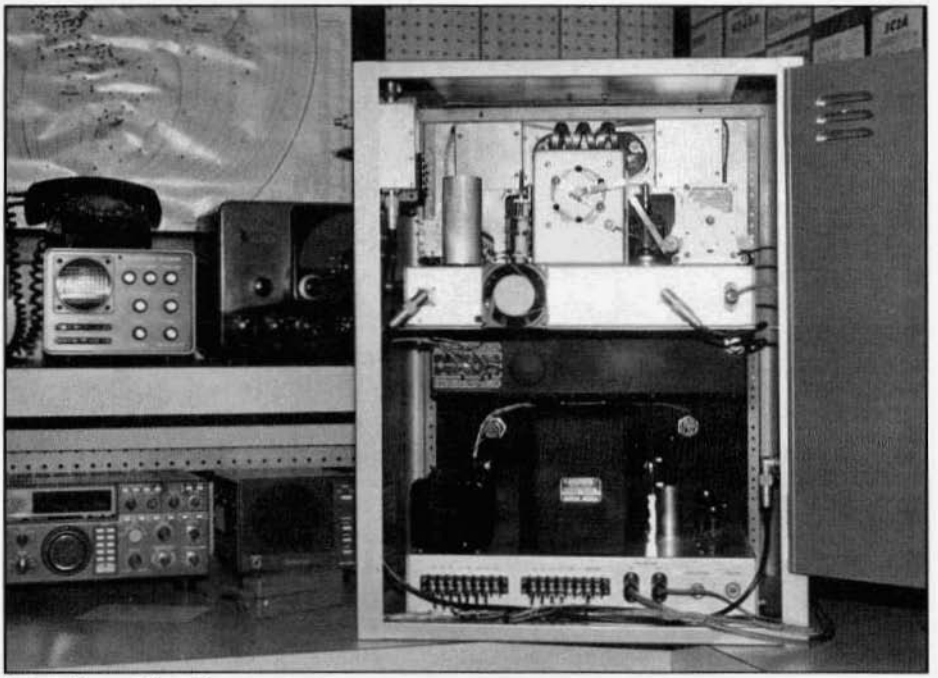
The modulation transformer is a Thordarson CHT Multi-Match rated at 300 watts. This is a commercial grade transformer and proved to be a good choice. The one limitation is the maximum plate-to-plate impedance. It is 16K ohms. A pair of 4-125A's at 2,500 volts have an impedance of just over 22K. I lowered the voltage on the plates to get a perfect match and also to reduce any problems with the modulation transformer insulation since this transformer is probably 40 years old. The impedance match did not change the audio at all but I feel better with the 2,000 volts. After all I only wanted to build a 500 watter!

A voltage divider was used to lower the 530 volts for use in the amp to 310 volts. The bias supply uses a 6 volt filament transformer, reversed and fed from the filament line to the speech amp. Four diodes (a small concession to solid state), two caps and a voltage divider with a 1 K ohm wirewound pot complete the bias supply. 4-125A's draw 50 ma of no-signal current in class AB_1.

The speech amp consists of a 6SL7, a 6H6 limiter, and a 6J5 transformer connected to a 6SN7 with a single plate to push-pull grid interstage audio transformer with a 1:2 step up ratio and operated as a straight voltage amplifier. All stages are coupled using .1 mylar capacitors. The 6SN7 plates are coupled to the 4-125A grids also using .1 caps. I use a crystal D-104 and have gotten excellent audio reports.

The Exciter

I had long wondered what to do with the Millen 90801 exciter that I had picked up in a trade a few years back. As the plans for the 4-125A rig began to take shape it became apparent that I would need an exciter about 3-1/2" high and the 90801 fit that requirement exactly. The 90801 is a broadbanded exciter using a 5763 crystal oscillator-buffer and a 6146 final amplifier. It is designed to fit into a standard 19" rack. The fact that it is crystal controlled did not present a problem since I grind my own crystals. Actually crystal control on AM has it's advantages when using old receivers since it tends to keep everyone on the same frequency instead of having a group spread out over 6 to 8 kcs of the band. This seems to be one of the main



Rear view of interior.

complaints from SSB operators and is justified on some occasions. With 400 volts on the plate of the 6146 and 160 volts on the screen it is easy to get the drive low enough for the 4-125A's. They require about 12 watts to develop 20 ma. of grid current. The exciter is easy to tune when changing bands and the addition of a small toggle switch in place of the regular keying jack makes spotting and tuneup simple. A switch disables the crystal oscillator if one desires to use a VFO with the exciter.

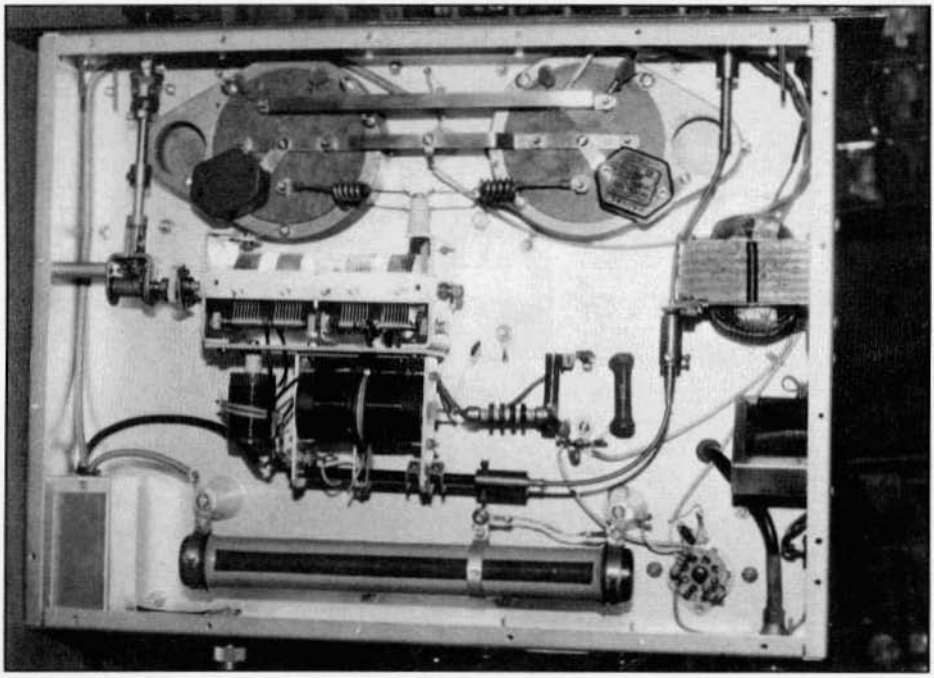
The Power Supply

The power supply consists of a completely reworked T-368 power supply minus all the delay and other safety circuits that the army uses in order for anyone to use the equipment and not kill themselves. It was completely rewired and includes a sub-chassis for the exciter supply. With an auto-transformer in series with the plate transformer the plate voltage is variable up to over 3,000 volts at 550 ma. This is more than enough current to run the transmitter since the plate transformer is rated for continuous duty. The power supply is enclosed for safety reasons and has heavy-duty casters for mobility. A ten foot cable makes it easy to get the power supply out of the way and under the table on the floor. The high voltage cable is rated at 40 KV and is encased in a piece of poly tubing as an additional safety precaution. The power supply is choke input and delivers very smooth voltage to the RF deck and modulator.

The Cabinet and Painting

The cabinet appears to be of Globe King size and vintage. I recommend a trip to a tombstone maker to get any cabinet worthy of restoration sand blasted. They use a sandblaster to cut the letters in the marble and have a very fine grade of sand that leaves a smooth finish on the metal. After sandblasting a coat of primer was applied and water sanded. Another coat of primer was applied and sanded before the final coat of 1983 General Motors silver acrylic lacquer was applied. The front panels

continued next page



Underside of the RF deck showing grid circuit in center.

were finished with black wrinkle finish and after baking were lettered using white dry-transfer lettering. There is absolutely nothing that will contribute to the look of professional construction like a good lettering job (straight and properly spaced) with dry-transfer lettering. I always pull a very fine piece of string across the panel to act as a guide in keeping the letters straight. I also like to label everything on the back with black lettering (controls and connections).

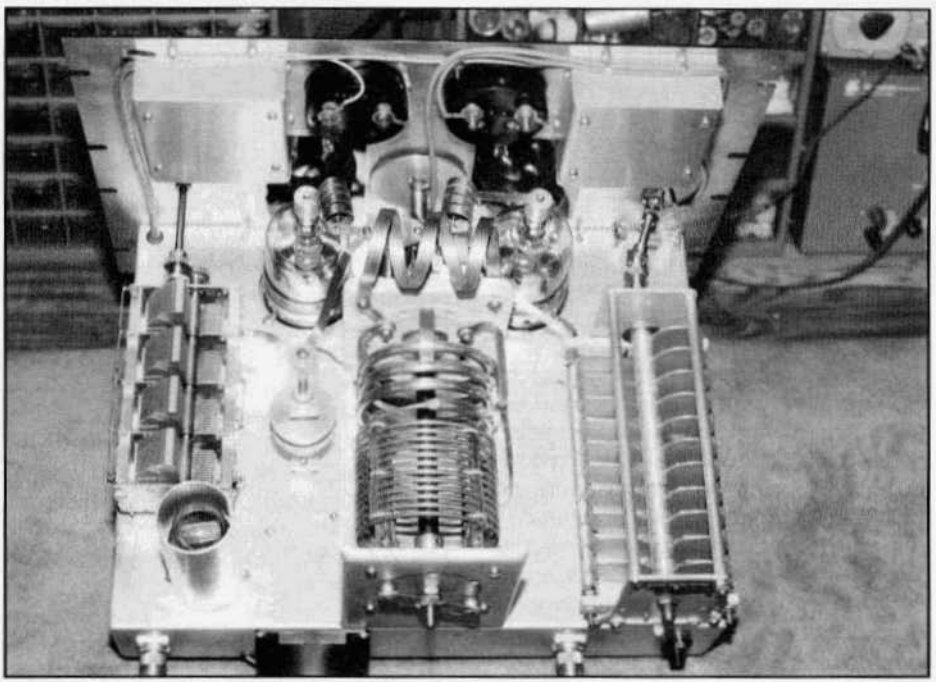
A Final Word

It should be apparent to those who know me personally and others that have read this and my previous article on the 813 transmitter, that I love to build. To me building is the greatest joy in ham radio. This is not meant as criticism to those who choose not to build however. Rather, it is a personal observation of my own likes and dislikes. I know many Am'ers who choose not to build although their knowledge of radio and electronics far exceeds my own. Since I do love to build (and also tell about it) I was delighted when Barry (N6CSW) asked me to do this article. I did not include schematics because of its size and space limitations but have them drawn and available for anyone who might want them. I do ask that you send a large (#10) SASE. Also, I would be happy to answer any questions concerning this project.

I was at Huntsville, Alabama, at a hamfest in August and came into possession of a 110 lb. modulation transformer built for Collins by Thordarson. I also got the Multi-Match CHT driver transformer and plate transformer. The modulation transformer is 15,000 ohms primary and 7,500 secondary. Great for a pair of 4-400's modulating another pair of 4-400's. Should have left it all there! Looks like another transmitter needs to be constructed. Here we go again..... •

Editor's Note: Presently Andy's working on another article for ER. This one will describe his construction techniques.

Rear view of modulator showing modulation transformer in middle, speech amp on right and power supply on left.



RF deck shown from above and behind.

Collecting/Repair/Restoration...Tips

Stabilant 22A

I want to pass along my discovery of the absolute best product I've encountered for the repair and restoration of electronic equipment in one long time.

One of the major, if not THE major problem in electronics is bad, intermittent or noisy contacts, connectors and switches. Over the years many products have been devised to help out with problems in this area, mostly cleaners and lubricants. Both of these have limitations-cleaners only help if the contact problem is caused by dirt or grease; lubricants do nothing and often cause more problems than they solve. After all, a film of spray silicone is non-conductive, why put it on a switch? If the contact is corroded, oxidized or worn, little can be done to make it operable again.

A Canadian company has recently developed a product called Stabilant 22A to solve this problem. It is a clear, colorless, slippery, liquid with the consistency of light silicone oil and is sold diluted with isopropyl alcohol as a carrier. It has the property that under certain conditions, that is, only when in an extremely thin film within an electric field, it becomes electrically conductive; otherwise it's totally inert and non-conductive. When applied to cruddy or poor contacts the manufacturer claims the contact becomes as good as one that is soldered. Sounds hard to believe? This stuff really works!

I have applied the stuff on very scratchy and intermittent rotary switches and the noise almost completely disappears when the switch is operated. I have put a drop on the bearings of intermittent meters and the meter suddenly works. If applied to tube pins in a noisy socket the noise goes away. It has worked wonders for me at work when applied to edge connectors of computer boards; BYTE magazine made it their product of the year as mysterious computer crashes often go away.

The stuff is expensive, a 15 ml bottle is $24, but it is applied a drop at a time with the applicator, a Q-tip or a small syringe. Very, very little is needed. Just apply a drop, work the switch or contact and apply one more drop on the contact for good measure. The alcohol will evaporate and leave the film. You must use a syringe when working in tight areas such as a multideck rotary switch, for example.

Stabilant 22A has limitations. It won't do much good on an utterly shot contact, there needs to be a reasonable limit here! It can't be used on power switching relay or switch contacts as the spark will burn the stuff off. It can't be used on plastic pots or anything else that isopropyl alcohol can attack. It will, however, save many relays and works somewhat in older carbon pots that are very noisy that a shot of 'cleaner' doesn't help. It is a must for older equipment where worn switches and contacts are virtually irreplaceable. Due to low vapor pressure, the manufacturer claims it'll last a decade or more-it won't go away.

For more info or to place an order contact: D.W. Electrochemicals,Ltd., 9005 Leslie St., Unit 106, Richmond Hill, Ontario L4B 1G7 (416) 889-1522

Bill Kleronomos, KDØHG

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. Northeast SPAM 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.

"Noticeably Drifty"

Last month I made a comment here that has generated a few letters and calls. One of the letters was from David Ishmael, WA6VVL:

"First of all I'd like to echo the comments that Dave Mills, AJ7O, made on the passing of Bill Webster, K6EOB. I met Bill about two years ago and he slowly got me hooked on vintage radio. In those two years, Bill had become a very good friend and mentor. I will miss his friendship and he will be in my thoughts for a very long time.

"The reason for this letter is page 19 of the August issue. I think (hope) that you will open 'Pandora's Box' with...**it's my impression that the only real stable vintage rigs were made by Collins and that most of the other gear is noticeablydrifty on CW.** I wonder what 'noticeably drifty' would equate to in drift specs?

"I have been licensed off and on since 1960 and use CW probably 99% of the time. I am not a contester or DX'er so my CW requirements are not as critical as (say) Dave Mills, AJ7O, who works a lot of CW DX. I was very happy as a novice using a converted BC-454 7 Mhz receiver with xtal controlled homebrew xmtrs when I didn't know any better. My first commercial receiver, an HQ-170C, was great. After using a BC-454, I thought I had 'died and gone to heaven'. Speaking for myself, I think there is (probably) a large difference between 'perceived' stability and the actual drift specs and this difference depends on one's CW operating requirements. I'm pretty easy to please when it comes to CW. I still occasionally use a BC-454 to copy CW on 40 M. In addition, I rarely use the narrow filter during my QSOs....

"I have an example of 'perceived stability' . I traded Bill/K6EOB, an avid AM'er one of my BC-348's for his pristine HQ-129X. He was absolutely satisfied with the -129's stability as we made some side-by-side comparisons between the -129 and the -348. So far, the -129 is the 'driftiest' receiver I have tested.

"I have access to several VFO's and receivers and will do some drift measurements/comparisons with them as time permits.

"Thanks again for Electric Radio. Hope your 'noticably drifty' gets the attention it deserves."

Vintage CW Net

Don't forget the Vintage CW net. It's on 14.062 (plus or minus) every Saturday evening at 9:00 PM Eastern Time, 6:00 PM Pacific. Net controls are Tracy Reese, WB6TMY and Ray Osterwald, NØDMS.

Improve And Maintain That ART-13

by Bill Kleronomos, KDØHG
POB 1456
Lyons, CO 80540

In the last issue of ER I described some modifications to improve the performance and utility of the ART-1 when used as a CW rig. This month I want to cover some tips on this fine rig in three areas: maintenance, common problem troubleshooting and changes to provide improved TVI suppression and expanded 160 meter coverage.

Other than the usual electrical alignment as described in the service manual (available from Fair Radio and other sources) the single most crucial area to give some TLC to is the autotune mechanism. This mechanism is precisely and ruggedly built and is quite complex. Unless you have a stomach for rebuilding and repairing complicated mechanical gizmos the best thing to do is prevent problems to start with. I suggest that the autotune mechanism be given a thorough cleaning and lubrication once a year. The procedure is not difficult but it is not covered in the Fair Radio manual. Let's go over the procedure as described in NAVAER 16-30ART13-501, a training manual that's not commonly available.

The cleaning procedure is strictly common sense. After removing the front apron to gain access to the mechanism, use compressed air for dust removal and a spray can of trichlor (contact cleaner) with a small brush as required to degunk everything. Have ventilation when using trichlor or any other solvent; you will continue to need your liver. Keep the solvent out of the ball bearings, if possible.

Once the thing is clean, its time to lubricate the mechanism. I recommend having the following lubricants and tools on hand before commencing: "Superlube", a teflon based silicone grease available from Radio Shack and other sources, used for sliding surfaces; some ATF (automatic trans. fluid), a great non-gumming and corrosion preventing lubricant, or, in it's place, MOBIL 15W-30 synthetic motor oil (same properties); a common drinking straw and a syringe with needle (call a veterinarian or ask someone with diabetes, perhaps) to use as a precision oiler.

The lubrication procedure is simple but it's important not to miss any critical points, so consult figure 1. If your unit has the lubricating wicks still present, remove and toss them out if they are severely worn rather than risk chunks of felt floating around in the works. Where the drawing calls for B, Vacuum grease, use the Superlube. Where A or C "instrument oil" is called for, use the ATF or motor oil. If you plan to use your rig in an unheated aircraft at 35,000 feet, use the ATF as it won' t get too thick at -30 degrees.....

In addition to the syringe, the drinking straw has great utility in reaching hard to reach spots. Just dip it an inch or so into the oil, cap the end with your finger and release your finger when the end is in the crevice you want to lube.

Here's two areas that need lubrication not shown in the drawing. The first are the worm gears on the autotune mainshaft that sit directly behind each autotune unit. These need a good coating of Superlube and perhaps also a drop of motor oil for good measure. Without proper lubrication these gears will grind their associated brass ring gears into powder, ruining all five autotune units. The last area of major consideration is the cams that drive the switches that comprise S-113, coarse antenna tuning (control C). Without lubrication these cams will wear and cause the mechanism to jam during a tune cycle. Use a long screwdriver or the straw and lay a thin bead of Superlube in the edges of the phenolic cams. Don't use too much, and

don't use any common oil which might attack and de-laminate the phenolic. Put a drop of oil on each roller's bearing and on the main switch pivot arm bearing (obvious when you look at the mechanism). While you're in there, try to get a few drops of oil in the front bearing of the large variable capacitor.

This completes the lubrication procedure. Before buttoning up the front cover, you need to attend to a few other maintenance items. Just to the right of the B autotune unit (fine frequency tuning) are bolted the two autotune limit switches S-111 and S-112 that are operated by a phenolic cam driven by a lead screw. Make sure to put a few drops of oil on the lead screw. Next, carefully clean the contacts of these two switches with a folded piece of #600 or finer grit sandpaper following up with a wash of trichlor or contact solvent. Note that S-111, the rear limit switch, is a SPDT type with two contacts to clean. These switches are a trouble area that I'll mention more on later.

If you are fastidiously minded it might be worth considering applying some silicone spray to the entire auto tune mechanism as both a rust preventative and to lube any place that might have been missed.

COMMON PROBLEMS

In spite of Murphy's law, the ART-13 is very well made of high quality parts and even a 50 year old one can be extremely trouble free. While anything can go wrong there are a few weak points that can cause common problems. Let's cover these areas.

If the symptom is the failure of the transmitter to key and the red indicator light doesn't come on after an autotune cycle suspect S-111, the rear limit switch attached to the side of the B autotune unit. This is an open type snap action switch operated by a coil spring under pressure. It appears that this spring loses its tension after a few decades (what do you want? WW II wasn't supposed to last until 1991) and the lever arm loses its "snap" when closing-the switch operates, but not well. If a switch is on the way out, you can restore it by a careful and competent cleaning but the results might not last more than a few months.

It may be possible to remove the spring and stretch it a bit for more tension but I wouldn't want to try it unless I had a spare. Apparently this switch problem was known to the armed forces and the manufacturer because sometime in the early '50's a new and improved switch was introduced as a repair depot spare. This improved switch is recognizable as the coil spring is replaced by a C shaped phosphor bronze flat spring that works much, much better. This improved switch is part of the B drive autotune units that were sold by Fair Radio as new spares last year; I was fortunate to get one. Don't bother writing Fair for one, they're all sold out. I'd sure like to know who bought a slug of new multiturn autotune units for ART-13s; they couldn't be that hot of an item!

As a last resort, a persistently bad switch can be simply replaced by another of the same type that works, or by adapting a modern microswitch.

Symptom: Loss of PA grid drive on one or two bands, not on all. This one can be a real bear to find. It seems that the ceramic trimmer capacitors that are stacked under the multiplier chassis are prone to breakdown if they've been cracked or manhandled during adjustment. This erratic problem caused at least one ham I know, weeks of hair pulling. The solution is to replace the capacitor which might be a tough job, or add a small replacement ceramic or mica trimcap underneath as a replacement for the one defective section.

This is a good place for a reminder that these ceramic trimmers are brittle and will break or crack without much provocation. Unfortunately, they are often frozen by age and tough to turn for an alignment.

I found that the frozen ones can be freed by application of heat from a hair dryer and then placing the tip of a screwdriver at right angles to one of the metal adjusters, carefully and gently rap the handle end of

continued next page

ART-13 from previous page
the screwdriver. Sometimes, tho, you're gonna break one so keep the above tip in mind.

Problem: No operation or poor frequency on every other band (as selected by the A knob). This is caused by the other well known switch problem in the ART-13, the failure of S-101. This switch alternately switches in and out a fixed padding capacitor in the PTO which changes its fundamental operating frequency-every other band. The solution is easy, just clean the switch contacts as described above with very fine sandpaper followed by a wash of solvent. Getting at S-101 is a bit tough. It's accessible by removing the side cover of the PTO compartment and its located on the divider between the left wall of this compartment and the multiplier section. It's operated by a cam attached to the A knob. Cleaning this switch is best done by grasping a folded strip of sandpaper in a curved type hemostat or similar tool.

Anything can fail, and most problems can be found by astute troubleshooting techniques and the tips in the manual. The problems I just mentioned appear to be rather common ones and as such bear mentioning. If you've got your rig all apart anyway, it might be worthwhile doing a preventative maintenance cleaning of these switches that are prone to trouble.

One last repair tip. Don't attempt to run the autotune motor for any length of time if the mechanism is jammed or turns extremely slow. The motor will most quickly overheat and be prone to burnout. Turn the chain by hand as required to resolve the problem.

IMPROVEMENTS

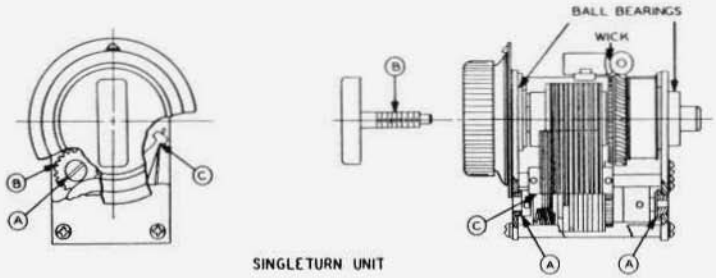
Ahha-here's the best part of this article! What ham can resist modifying and improving on his classic boat anchor! Improving the already excellent frequency stability was covered last month. This month I want to concentrate on expanded coverage of 160 meters.

In stock form, the bottom end coverage of most ART-13s goes down to about 1985 Khz or so, and it's possible to easily expand the coverage down to 1900 Khz. All you need in the way of parts is a small toggle switch-a miniature job from Radio Shack is perfect, a solder lug, some 9" of small insulated wire-the tougher the insulation, the better, and small mica capacitors in the 100 to 200 pf range.

Remove the 837 oscillator tube from its socket and wrap a few turns of wire around the grid pin, pin #4. Tack soldering the wire wouldn't hurt and as the tube is a tight fit inside the socket retainer you might have to bend out the side of the retainer a bit to allow the re-insertion of the tube without pinching off the wire. Mount the switch in one of the rig's ventilation holes near the 837 and do the same with the ground lug but use a large star washer to insure it's well grounded through the paint. Connect the capacitor from the lug to one switch terminal, and connect the free end of the wire going to the 837 to the other terminal. Use a marking pen and label the switch positions. Open is NORMAL and closed is LOW. That's basically it. Tune the rig up as usual as low as it will go in frequency on 160 then throw the switch over to LOW. The transmit frequency will shift down about 75 Khz or so depending on the capacitor value. Note that you will lose some grid drive as the tracking of the multiplier and driver stages is off when the VFO frequency is shifted in this manner, and this limits how far you can take this modification. With good tubes you leave the marked grid area of the meter at about 1920 Khz. Don't forget to throw the switch back to NORMAL for usual operation or you're going to wonder why your rig won't work!

I didn't notice any decrease in my rigs stability after I made this modification, but some common sense is in order. Don't make the added wire so long that it flops around or vibrates. •

Editor's Note: Next month Bill has more on the ART-13; TVI suppression and other operational notes.


BALL BEARINGS
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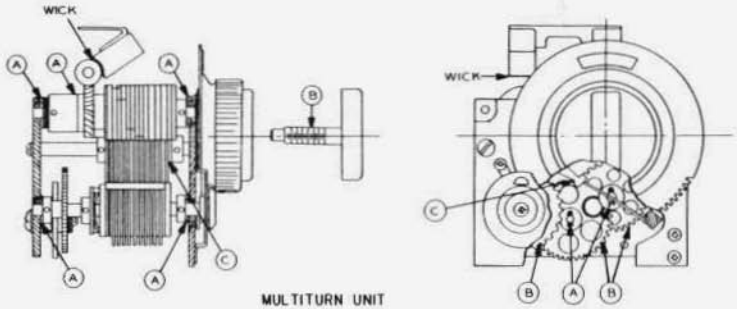
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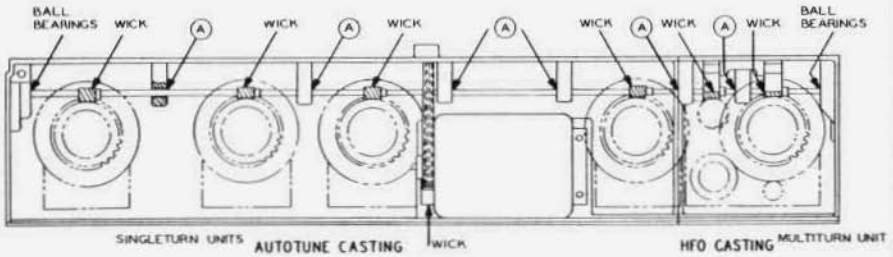
BALL BEARINGS
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BALL BEARINGS
SINGLETURN UNITS
AUTOTUNE CASTING
WICK
HFO CASTING
MULTITURN UNIT

Figure 1

Vintage Product Review

Collins 30K series

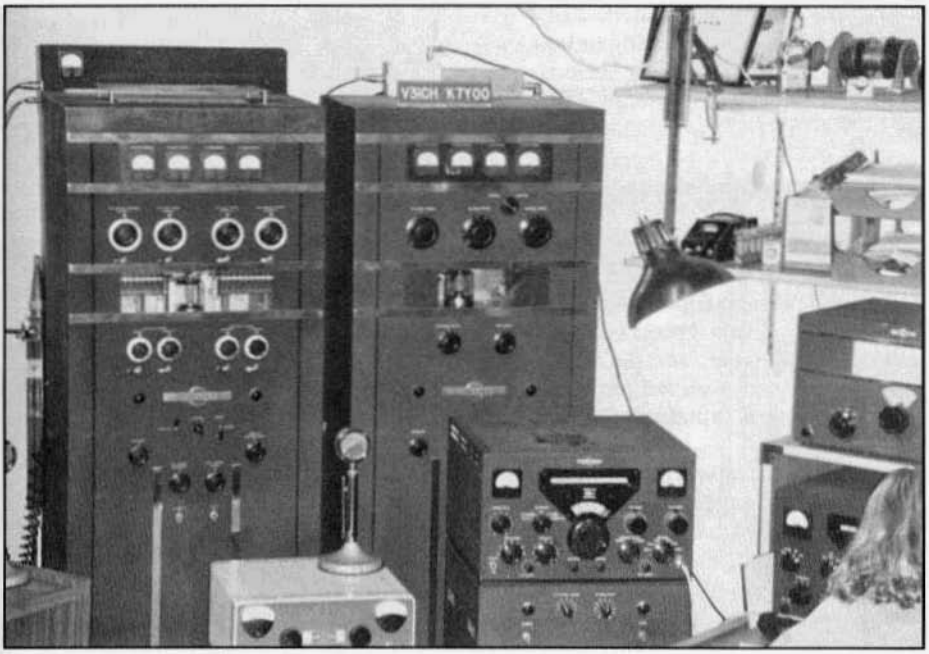
by Skip Green, K7YOO
P.O. Box 595
Winona, MN 55987

One of the first amateur transmitters introduced by Collins after WW II was the 30K1. According to Warren Bruene W5OLY, designer of the unit, engineering and production of the 30K1 preceded the 32V by a few months which places the transmitter in production sometime in 1946. The 30K is very similar in appearance and layout to the prewar 30J. The main differences being that the tube lineup was updated, bandswitching was incorporated and a companion VFO exciter (310A) was offered with the unit. The sales literature does not indicate that the 310A was optional and no provisions were made for crystal control of the transmitter. This is probably the single greatest departure from previous designs. The transmitter/exciter package was designed to operate on all ham bands on 80 through 10 meters and made a very tidy 500 watt input station.

Circuit description

The basic transmitter uses a single 4-125 in the final modulated by a pair of 75TH triodes. The audio driver is a very straightforward design with a lineup consisting of 6SJ7 preamp, 6SN7/6H6 clipper and 6B4 driver. Audio filtering is employed to limit the bandwidth to 4 khz. This is a bit wider than many later rigs that started the rolloff at 3 khz. The audio on these transmitters is very clean and on the air reports I have received are generally better than received on my stock KW-1. Mechanical layout is a typical Collins setup with the plate transformer in the bottom of the cabinet, and plate supply components on a separate chassis at the next level. The next chassis contains the low voltage and bias supplies and above this is the modulator and audio section. The modulation transformer is a fairly specialized unit that has an auxiliary winding for modulating the screen of the 4-125. This would in part account for the abundance of audio available in this transmitter. The top chassis is an open unit which is a platform for the RF components. No type of shielding is employed and the bandswitch and separate tank coils for each band are mounted on a plate that is bolted to the front panel. The links on these tank coils are mechanically coupled together for ease of tuning. An antenna tuning unit is included in the output circuit that allows the transmitter to be connected to a variety of balanced and unbalanced loads. Two separate plug-in coils are provided for the tuner. One covers 80 and 40 meters and the other covers the rest of the bands. This tuner and output tank arrangement is very similar to the 310 B-2 exciter. The lack of shielding and tank circuit arrangement most likely accounted for a lot of the TVI problems reported with the 30K1. Many of the units in existence today have been subjected to various forms of butchery in attempts to solve this inherent weakness. It is ironic that the 32V1, which came on the market at approximately the same time as the 30K, was an entirely new design and utilized Warren Bruene's Pi-L tank circuit designs.

The 310A exciter portion of the 30K1 was a little more revolutionary in that it is totally bandswitching and tracked throughout the ham bands with no tuning. The tuned circuits are set to track with the PTO, so only frequency adjustments are necessary. The PTO itself was an innovation in that the linearity, stability and



30K4 on the left, 30K1 on the right at K7YOO's station

calibration accuracy are adequate for use even to this day! The buffer, driver and output stages all utilize rugged 807 tubes providing plenty of drive for the 4-125 PA. The power supply is self contained and the controls on the 310A provide spotting and keying functions for the main transmitter. Many of the 30K1 transmitters around today are minus the 310A which indicates many of the transmitters were removed from service while the exciter went on to perform other duties.

Using the 30K1 in the '90s

I enjoy operating vintage equipment and not being a museum curator tend to make subtle modifications to enhance or allow operation of my rigs. The following section will list some of my recommendations and observations on the 30K1/310A.

1. The 310A has an overabundance of drive on the lower bands. The manual recommends de-tuning the grid circuit of the 30K1 to reduce the grid drive, a practice that makes me wince because harmonic attenuation is seriously reduced. I highly recommend the addition of a pot to adjust the screen voltage on the 310A final and lower the output as required to keep grid drive at the proper level. I did this by removing the key jack and mounting a pot in the existing hole. If CW operation is desired an in-line type jack can be brought out the back via a cable.

2. It is not necessary to modify the basic audio on this transmitter to have nice audio. The most radical mod I have made is to adjust the clipper control to eliminate any speech clipping action.

3. The scarcity of 75TH modulator tubes often necessitates the substitution if 100TH tubes. This requires that the grid bias voltage divider be re-wired to give the proper idling current on the 100TH's. Otherwise this is a "plug in" modification. Another tube that works extremely well and plugs into the same socket is the 572B tube. An additional filament transformer will have to be added to provide the 6.3 volt filament voltage for this tube.

continued next page

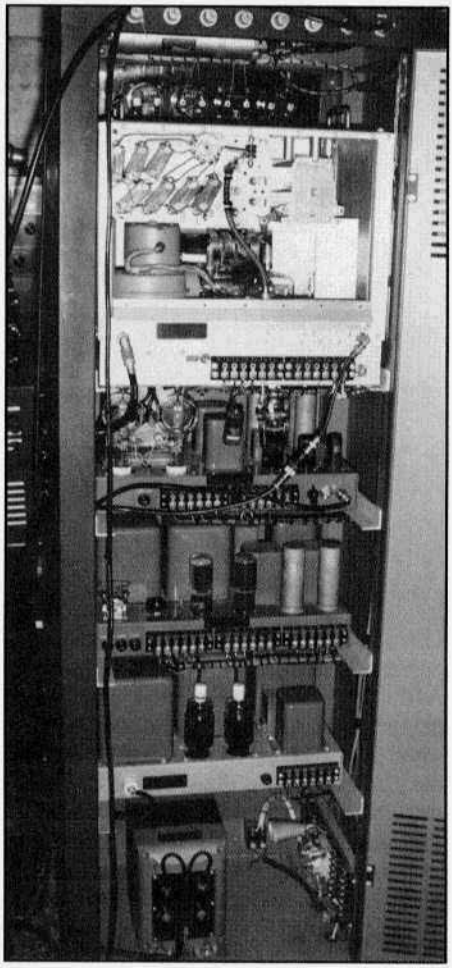
30K Series from previous page

4. The RF deck is somewhat of a dilemma because any shielding or tank circuit modifications require serious mechanical alterations. If you are fortunate enough to live in an area where TVI is of little concern it can be operated as is , otherwise, operating hours will have to be chosen carefully.

I was 'fortunate' in that my 30K1 was missing most of the final tank circuit components when I got it but was otherwise in very good condition. I proceeded to build a shielded cabinet around the existing RF deck chassis and installed new tank circuit components utilizing a pi network design.

What I ended up with was a very clean "mini KW-1" package that performs nicely. The only sacrifice is on 10 meters where optimum design Q is very hard to obtain because of the very high plate load impedance in this high voltage/low plate current design. The stray capacitance in the circuit nearly exceeds what is required to resonate the tank circuit on 10 meters. One way around this is to increase the power output of the transmitter by substituting a 4-250 or 4-400 in the final and raise the screen voltage by eliminating the screen dropping resistor. The resultant higher current draw results in a lower plate load impedance, easing tank circuit design. At least 3 other 30K owners that I know of have transmitters in operation with the larger tubes at the higher power level. I was originally sceptical about this because of the increased loading on the plate, filament , and modulation transformers but I have received no negative reports of failures caused by the higher power levels. I do feel that it would be worthwhile to substitute a little beefier modulation transformer such as one from a T368 or BC 610 I because of the possibility of core saturation when drawing 300 ma through the original transformer, but this is only speculation.

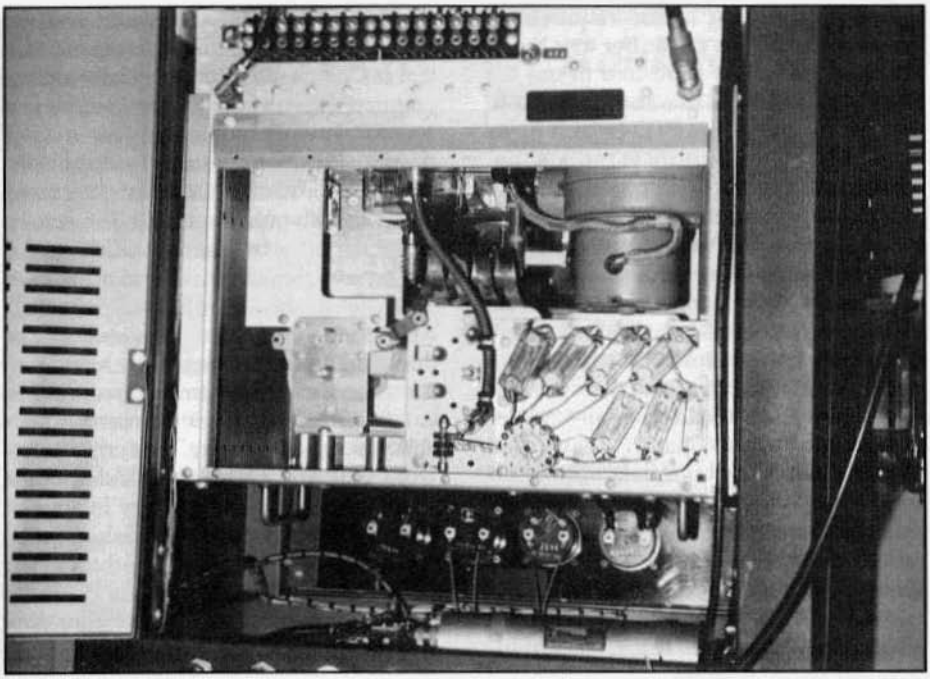
Sam Thompson, W6HDU has a beautiful 30K1 (looks like a Collins prototype) with a B&W 850 tank assembly, and a 4-400 in the final that appears to have the original transformers, so apparently the original "iron" is adequate.



30K1 interior, rear view, note 500 watt (4-400) RF deck; W6HDU's rig.

30K4, 30K5

The 30K4/5 commercial transmitters are very similar to the 30K1 and were apparently marketed even after it was dropped from production. These units are dual channel crystal controlled transmitters that utilize a similar design and tube lineup. Cosmetically they share the same cabinet and general appearance but the electrical differences are significant . These



Close-up of 30K RF deck showing B&W tank coil assembly in center;W6HDU's rig.

transmitters have 2 complete sets of tuned circuits, one for each channel and the final tank circuits are Pi Networks. The frequency range is also greater in that they cover 2-30 Mhz rather than just the 80 -10 meter amateur bands. All tuned circuits are set up using plug-in coils which are adjusted along with the associated tuning capacitors for maximum output on the crystal controlled channel. Channel switching and mode changes are accomplished with relays that can be front panel controlled or remotely activated via an external control. The remote is designed so that a telephone control line can be utilized. The audio section of these transmitters is identical to the 30K1 except that the modulation transformer is mounted in the bottom of the cabinet, rather than on the audio deck. The main differences I can detect between the 30K4 and 30K5 is that the 30K5 uses a 6AG7 rather than a 6V6 crystal oscillator and has neutralizing capacitors added in the driver and final circuits.

Using the 30K4/5

1. Since most of us prefer VFO control to being "rock bound" it is suggested that the crystal oscillator stage be modified to function as a buffer. Any of the older handbooks offer circuits suitable for this application. In my 30K4, I changed the oscillator to a 6AG7 and re-wired it as a buffer. This allows the use of a variety of different VFO units. The 310C Collins unit is ideal for this application because it is a cosmetic match and is quite stable. If the plug in coils for the intermediate stages are not available it is possible to drive the grid of the 807 buffer or the 4-125 directly using a 310B or similar exciter. I prefer to use the original stages of the 30K4 because less modification of the original circuitry and functions are required.

2. These transmitters perform quite well on 160 meters with little modification. The original low frequency final tank coil at the maximum inductance setting will resonate on 160 by adding some additional fixed capacity to the tuning and loading

continued next page

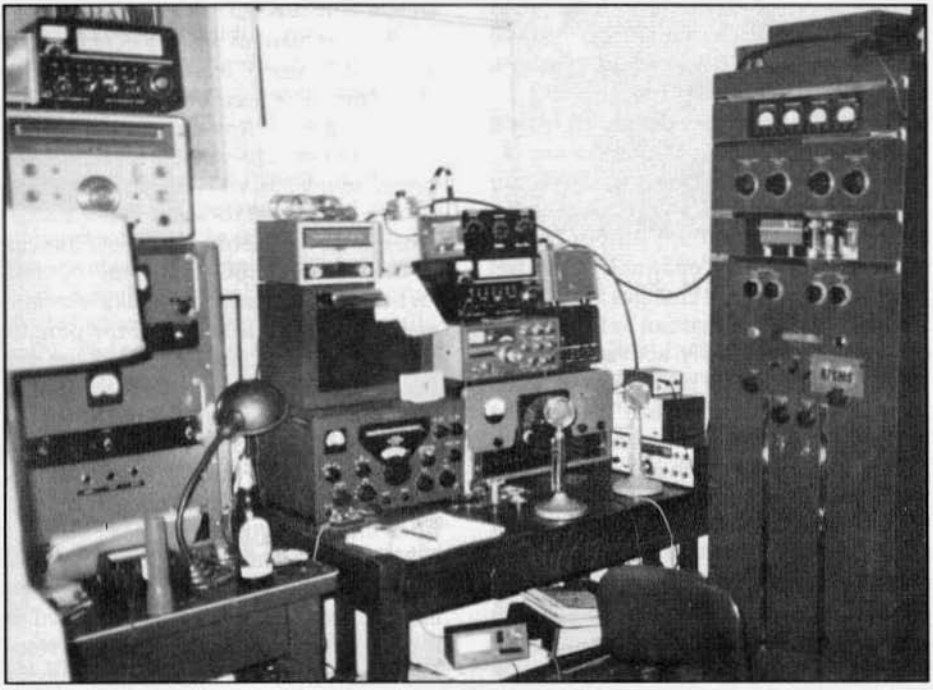
30K Series from previous page

capacitors. Padding is also required on the plug in coils for the buffer (osc.) and driver sections. If it is desired to use the 310C VFO on 160 all that is required is to feed the output of the PTO (which tunes from 1.6-2.0 Mhz) directly to the 30K, bypassing the doubler built into the 310C. I did this by mounting a small ceramic switch in the 310C so 160 or 80 meter output could be selected. I took this one step further by making a new dial scale with 1.6-2.0 Mhz calibrations so I didn't have to do any arithmetic on those late night 160 QSO's. (If anyone wants one of these dial scales I would be happy to laser print one for you as I have the layout on computer disc).

3.In using the 30K4, I noted that excessive grid drive was available on the lower bands requiring me to run the buffer and driver tuning off resonance to lower the grid drive to the 4-125. After studying the schematic, I noted a resistor voltage divider that could be tapped at various points to raise or lower the screen voltage to the 807 . While not mentioned in the manual, it was Collins intention that the installing engineer re-wire the connections to this resistor network by changing pin connections inside the plug-in coil assembly for the driver. This is discreetly mentioned only as a reference on the 30K5 schematic supplied to me by Mac,WA8ZNX.

These transmitters are a real pleasure to operate because of the "instant" bandswitching feature provided by the dual tank circuits. One merely has to pretune the transmitter to the two desired bands after plugging in the proper coils and you are all set. The "modern" Pi Network tank also seems to do a decent job keeping my neighbors happy in spite of the poor shielding the 30K4/5 shares with the 30K1. •

Editor's Note: Coming up in a future issue we'll have another vintage review by Skip; this one on the Johnson 500.



30K5 at WA8ZNX; note QSL from fellow AM'er, K7CMS, on front of rig.

Reflections from page 2

who as a humorous item, issued a home-made mimeographed certificate to his friends, certifying that they had shaken the hand that had shaken the hand of Edison and Marconi.

My closest encounter with a famous radio inventor was in Baltimore, Maryland, in 1938, when I attended a public lecture given at the Radio College one night by Edwin H. Armstrong, the inventor of regeneration and the superhet. With an audience of about 50 people, he lectured about his newest invention - frequency modulation - and gave a recorded audio demonstration of its superiority as to background noise, compared with broadcast AM.

Eight or ten years ago, while eavesdropping on a CW sked of a group of old USN buddies, I heard W6FB state a real truism, "Those were the good old days - but we didn't know it then."

So, everybody, keep your eyes open and your ears to the ground. Check out everything that is going on around you, because today is one of the good old days of the future and you will want to tell the next generation all about how things used to be. •

Editor's Comments from page 1

Over the weekend of August 17 and 18 we attended the Albuquerque New Mexico hamfest. We (my wife and I) had a wonderful time. It was great seeing all my friends down that way and meeting some people that I've QSOed with for the first time.

There was a good assortment of vintage gear there and the best of it sold within the first couple of hours. My observation is that interest in the old stuff is increasing dramatically. I met a number of people who are just getting involved in this aspect of amateur radio.

My best acquisition was a Knight Space Spanner in mint condition for $11. That's the rig I built in 1955 at the age of 13. What a flood of memories that brought back. I'll have to build something again...on to #30.

Book Review

Communications Receivers, The Vacuum Tube Era: 1932 - 1981 Second Edition by Raymond S. Moore

The first edition of Ray Moore's book "Communications Receivers" was probably the most indispensible book in my library. To my knowedge it was the only reference book on communications receivers around. However, it did have some shortcomings; it was incomplete - some of the more obscure receivers weren't there - and there were just too few photographs. I'm happy to report that those shortcomings do not exist in the Second Edition and there are other improvements.

First of all there are many, many additional sets described (they're probably all here now) and there's a photo of most every receiver; and the photo's are better. In addition Ray has expanded and/or revised his descriptions of many of the sets. The Second Edition is a tremendous improvement over the first.

Ray Moore starts off his book with a history of communications receivers. This is a wonderful, well written essay that gives the reader the whole story on the evolution of the communications receiver. And then throughout the book there are histories of the various companies. It's interesting to learn something about the companies that manufactured the gear that we appreciate so much.

As books go, "Communications Receivers" at $17.95 is probably the best bargain around. And I think it's probably one of the most useful books a collector/restorer/AM'er could have in his library. I recommend it highly and in fact will return your money if you don't like it. To order your copy send $17.95 plus $3 shipping and handling to: **Books From ER, Box 57, Hesperus, CO 81326. N6CSW/Ø**

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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

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WANTED: All items found in WW II Martin B-26 bomber forward radio position: chair, wall lamp, clock, vent, oxygen, etc.; complete 274N radios/wiring. I am building a display from plans and pictures. SASE for list/info. Greg Greenwood, WB6FZH, Box 1325 Weaverville, CA 96093. (916) 623-4520

FOR SALE: I'm accepting offers on a Knight T-150 xmtr; two HW-30's; National NC-57B; T-368 exciter; ART-13; Heath VTVM model IM-21; two Airline antique radios, Knight SWR meter. Thank you. Dave Mantor, W9OCM, 2308 S. Fairlawn Way, Anderson, IN 46011.

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WANTED: Collins 32V-3. Must be excellent. Will pickup within 400 miles of Joplin. Don Hilliard, WØPW, Rt 5, Box 219, Neosho, MO 64850. (417) 451-5892

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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

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FOR SALE: Over 150 military manuals of the 1940's and early 1950's. Large SASE w/$.52 postage for list. August J. Link, 2215 Faraday Ave., Suite A, Carlsbad, CA 92008. (619) 438-4420 days.

FOR SALE: Ham Radio (many ARRL Handbooks) and Radar/Microwave. Book lists now available. Send $.29 stamp for each. Rainy Day Books, POB 775, Fitzwilliam, NH 03447. (603) 585-3448

WANTED: Collins KW-1, KWS-1, KWM-1, R389, R390a, 75A-4 with 3 filters; Hallicrafters 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: HQ-180A w/matching spkr, clock, manual, stored for 20 years, near mint - $275; National FB-7X, velvet ps, six coils - $480; Drake 1A w/manual, mint - $275; Drake 2B/2BQ w/manual, mint - $175; Gonset G-66 rcvr w/ac supply - $65; Harvey Wells TBS-50 w/matching vfo and manual - $100; Collins 75S3B/w, near mint - $425; Drake R4C, late SN, w/.25 and .5 filters, NB, extra xtals, manual, mint - $325. Ron, WA6IUH, 1660 Castlehill Ct., Westlake Village, CA 91361. (805) 494-1712

FOR SALE or Trade: Altec Lansing compression amp., 0 - 30 dB compression; B&W sideband adaptor; tubes and misc. equipment. **WANTED:** KWM-2; SR-150 or? Russ Hunt, W9HZD, 14 Siros, Laguna Niguel, CA 92677. (714) 363-8119

FOR TRADE: Johnson 500 for T-368 or HB KW. **WANTED:** Manual for BC-614 speech amp; BC-610 tuning unit, TU-47, TU-54 and TU-53; BC-312, BC-342 or BC-348 rcvr; junction box and freq. shift exciter TRA-7. Mike McCoy, AA4TW, 1102 Virginia St., SW, Lenoir, NC 28645. (704) 758-4170

WANTED: Military Radios and Electronics Systems, collections and accessories: dynamotors, DF loops, control boxes, etc. Any vintage or nationality. Charles DiCecca, KA1GON, 501 Mystic Valley Pkwy, Medford, MA 02155. (617) 396-9354

WANTED: Very old or unusual Hallicrafters equipment, entire 1934 "H" and "Z" line of Silver Marshal, parts, memorabilia and manuals. Chuck Dachis, "The Hallicrafter Collector", WD5EOC, 4500 Russell Drive, Austin, TX 78745.

FOR SALE: Don C. Wallace, W6AM, Amateur Radio's Pioneer. By Jan D. Perkins, N6AW. This book describes the history of amateur radio, as experienced by Don. Hardbound, 320 pages and 200 photographs, 24 in color. $29.95 + S&H ($3 US, $5 overseas). CA residents add 7%. Wallace & Wallace, 11823 E. Slauson Ave., Suite 38, Santa Fe Springs, CA 90670.

WANTED: Speaker for Collins 75A1, 75A2 or 75A1 or 75A2 with speaker; 310 series exciter; D-104 mic. Greg, WB6FZH, Box 1325, Weaverville, CA 96093. (916) 623-4520

FOR SALE: Military SCR-694-C radio sets. Includes BC-1306, PE237 power unit 6-12-24V selector, GN-58 generator, 3 antennas, headset, mics, power cords, FT-82 mount, MP-50 antenna bracket spare tube box and TM-11-230C manual. Excellent to unused. Price - $575 each. Estimated shipping cost - $75. Vic Riley, Rt 3, Box 248, Bridgeport, WV 26330.

WANTED: Philco 57C w/o case; National B and BW dials. C. Schiotz, K2PGB, 15 Runyon Mill Rd., Ringoes, NJ 08551. (212) 272-8131 days.

FOR SALE: Many vintage Collins, Johnson, Hammarlund radios, plus tubes, parts, etc. SASE for Fall List. **WANTED:** Buncll sideswiper. Parker, W1YG, 87 Cove Rd., Lyme, CT 06371.

WANTED: Original military manuals TM 11-274 (GRC-19); TM 11-858 (R392); spares case CY 1298/URR (R392). Tom Mackie, WB2ILA, Rd #2, Harbor ViewRd., Oyster Bay, NY 11771. (516) 922-9553

FOR SALE: Johnson Viking Valiant - $255; Hammarlund HQ-100, as is - $35; R-4C noise blanker - $85. Shipping included. Don Bishop, NØEA, Box 4075, Overland Park, KS 66204-0075. (913) 541-6627

CLASSIFIEDS

FOR SALE: High voltage capacitors. Check out our growing inventory of new Doorknobs, Mica Transmitting Caps, Tubular Film, Orange Drops, Discs, Silver Mica. Plus many hard to find NOS and surplus parts. Just in: FT-243 crystals. Visa/MC. Call or write for our latest flyer. Large SASE appreciated. Steve, NW2F, Two Fox Electrix, POB 721, Pawling, NY 12564. (914) 855-1829

WANTED: Military electronic items, including Radar, RDF, communications and odd or unusual items; APS-10; APS-13; loop for DAG. William Van Lennep, POB 211, Pepperell, MA 01463. (508) 433-6031

FOR SALE: APR-4 rcvr w/CV-253 tuner - $125; URR-35 rcvr - $60; BC-1031 panadaptor - $50; equipment; parts; books; manuals. List - $.50. J. Orgnero, VE6RST, Box 32, Site 7, SS1, Calgary, AB T2M 4N3, Canada. (403) 239-0489

WANTED: Schematic/manual or info on National R-115 rcvr. Has anyone else heard of this rig? Bob Hopkins, (805) 485-6365

FOR SALE: Sonar ST-120 AM/CW xmtr w/ Johnson 122 vfo and ps - $120; Hallicrafters 6 M transverter. Prices plus packing and shpg. Send LSASE for list of other items of interest to hams and audio/radio experimenters. Henry Kuhn, W8ERC, 1397 Washington Cir., Forestville, OH 45255.

TRADE: Henry 2K linear amp. (console) complete - RF deck (no tubes), power supply, cabinet and original instruction book. Great restoration project, needs minor work. Prefer local pick-up. Want 51J4. Russ Hunt, W9HZD, 14 Siros, Laguna Niguel, CA 92677. (714) 363-8119

WANTED: Drake equipment: TC-6 transmit converter; AC4, MS4, PS4, SPR-4, R4 receive crystals, manual for SW4A. Hammarlund: HC-10 sideband converter. David Rogers, WA7ZYQ, (208) 245-2070

FOR SALE or TRADE: BC-375E; URM25D; RBS; TCS rcvr; R1052 (30 - 260 Mhz); APR-4 w/tuning units; BC-639. **WANTED:** Collins built R389, R390a, and R392. Tom Brent, Box 1552, Sumas, WA 98295. (604) 826-4051

WANTED: Near mint late SN 75A-4; exc. R-389 LF rcvr; exc. to mint T368. Mike Draa, KC8CU, RR 1, Box 1615, Brooks, ME 04921. (207) 525-4421

FOR SALE: Two Hallicrafters HT-6 xmtrs - $75 and $50; pre-WW II Super- Pro - $95; 4-1000A linear amp. w/spare - $375. All prices OBO. U-ship except amp. **WANTED:** 51J4; Kenwood R-1000; blank rack panels; old cotton covered hook-up wire; Simpson mod. 29 meters. Mike Carroll, NI4N, 108 Wessington Ct., Hendersonville, TN 37075. (615) 822-0082

CLASSIFIEDS

WANTED: Spy radios. Buying military radios beginning with "SS", (example SST-1,)! Also M-209 cipher machines! Trade items available! Keith Melton, POB 5755, Bossier City, LA 71171. (318) 747-9616

WANTED: 1937 Gross Radio CB55 amateur transmitter schematic/manual needed for restoration. Will pay/trade for any replication costs. Bob Mattson, KC2LK, 10 Janewood, Highland, NY 12528. (914) 691-6247

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: Collins 51J4; late 75A-4; Viking Navigator; 600 ohm spkr; inexpensive Vibroplex or Speed-X bug. **TRADE:** Heath AT-1; Hammarlund Four Twenty and modulator. **HELP:** Info, schematic or manual on SRR13 and WRR3B military rcvrs. Brian Roberts, K9VKY, 3068 Evergreen Rd., Pittsburgh, PA 15237. (412) 931-4646

WANTED: Johnson Valiant, Ranger or Viking xmtr in good condition. George Carroll, 301 New Jersey Ave., National Park, NJ 08063. (609) 848-6699

WANTED: Swan 508 vfo; Swan 117XC; spkr/ps in any condition; Johnson #250-39 TR switch. Bob Partridge, VE3SRD, 516 Park Cresent, Pickerin, Ont., L1W 2C9 Canada. (416) 839-7850

WANTED: Vibroplex Lightning or Champion bugs in good condition. Call days leave message if unavailable. Ron Bramhall, KQ5A, 7877 S. Magnolia Way, Englewood, CO 80112.

FOR SALE: Please send SASE for 5 page list of vintage gear for sale; xerox's available for over 200 vintage manuals - 10 cents per page. Mike Horvat, 112 E. Burnett, Stayton, OR 97383.

FOR SALE: BC-659-A, WW II vehicular radio, part of SCR-609/610, transmits and receives 20-27.9 Mhz FM on 2 channels, nice condition - $30; GE Progress Line desktop base, 100 watts, all hollow state, beautiful condition, crystalled and operating on 29.6 Mhz FM - $40; Elmac A-54 transmitter and PMR-7 receiver combo, w/mic and 12 VDC power supplies, not pretty but work, transmitter has modulator mods and ultra-modulation and is loud - $75 for the pair; good, slightly used 4-1000A, no brown inside - $75 or trade for several new 813's. Bill Kleronomos, KDØHG, Box 1456, Lyons, CO 80540. (303) 823-6438

ER Parts Unit Directory

At this point the directory has 180 units in it. If you need a part for a vintage restoration send $1 and an SASE 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: Small universal 20 watt to 50 watt mod. xfmr, such as UTC S-19; Collins 10.5775 Mhz crystal. Hal Layer, KK6HY, POB 27676, San Francisco, CA 94127. (415) 661-6958

FOR SALE: HRO type RAS-3 speaker and power supply, good condition; QST's 1925 thru 1929. Charles Stinger, W8GFA, 404 Ross Ave., Hamilton, OH 45013

FOR SALE: Hallicrafters SX-25 - $70; matching spkr - $25; SX-100 - $150; HT-37 xmtr - $150; Gonset 2 M amp. - $90; Heathkit DX-60B - $50; BC-221 freq. meters - $35 each; Atlas 210B xcvr - $150. Milton Levy, W5QJT, 539 McCarty, Apt. #507, San Antonio, TX 78216. (512) 366-3290

FOR SALE: Collins 51S1 - BO; Millen Transmatch - $145; 6 new Millen Wavemeters - $35 each; VF-1 and 122 VFO, as is - $13 each; 75A-1 - $165. Joe Sloss, K7MKS, (206) 747-5349

WANTED: Navy RAX rcvr, CG-46115 and 814 tubes. Steve Davis, KD2NX, (new add.) 705 13th Ave., Belmar, NJ 07719. (908) 280-9760

FOR SALE: Transmitting/Receiving tubes, new and used. Some 304TL, 35T, 203A, 811A, 833A. 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? **WANTED:** 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: One 6 x 9 speaker, 4 or 8 ohm, must have magnet approx. 1" in dia. and 1" long. Evan Haydon, 4308 N. 15, Lincoln, NE 68521. (402) 435-4083

WANTED: BC-610; Help: anyone have any info on BC-188A? Manual or info appreciated. St. Peter's Old Radio, R-3, 5236 City Rd., Denmark, WI 54208.

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: 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: Reprints - Collins, National, etc. Manuals, modifications. Send for list. Pay less. Mint HT-37, also HT-4. Dave Knepper, Box 34, Sidman, PA 15955. (814) 487-7468

FOR SALE: After being burglarized 5 times, I still have some left. What do you need? Cdr. Glenn W. Ritchey, USN Ret., W7SAB, 219 Naval Ave., Bremerton, WA 98310. (206) 373-9631

WANTED: Hammarlund HQ-215 w/spkr; BCB crystals; HQ-180AC; Drake 2C. Levy, 8 Waterloo Dr., Morris Plains, NJ 02950. (201) 285-0233

FOR SALE: Eico 720/730 - $85; new 110v Dow Key Relay - $55; Navy CRV46148 & CRV46147 with AC - $150 pair; BC-348Q w/AC - $85. Steve Harmon, N9HGF, 4340 N. Congress Ave., Evansville, IN 47711. (812) 474-0842

BOOKS, MAGAZINES WANTED: Modern Electrics, Experimenter, Science Invention, Radio News, Radio Retailing, Radiocraft, M.I.T. Radiation Laboratory Books. **OTHER TECHNICAL BOOKS, MAGAZINES**, also **CRYSTAL SETS, MICROPHONES.** State lot price for resale. Delton Lee Johnson, WB6MNY, 14 McKevett Heights, Santa Paula, CA 93060. (805) 525-8955, evenings

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FOR SALE: Viking Valiant II, perfect - $400; HQ-129X, very good - $150; Viking Challenger - $75. Cliff Fleury, AI7Y, 64174 Tumalo Rim Dr., Bend, OR 97701. (503) 382-9162

WANTED: HRO-60, SX-73, SX-88, NC-400. Speakers wanted for NC-303 (NTS-2), HRO-50T1, NC-183D (NC-183DTS), 75A-4 (270C3). Manual wanted for HRO-60. Carter Elliott, 1460 Pinedale Rd., Charlottesville, VA 22901. (804) 979-7383 (H) 980-7698 (W)

WANTED: National NC-400 and NC-303. Will drive semi-unreasonable distance to pick up. Bruno Bitin, 3311 Calle La Veta, San Clemente, CA 92672. (714) 661-7893

WANTED: Manual or a copy of one for a NC-44 rcvr. Will cover cost. Donald Boland, NIFYX, 28 Faulkner St., Malden, MA 02148.

WANTED: 6 Khz mech. filter for 75A-4; tap data for UTC xfmrs VM-5, S-22, S-9 and PA-59AX. Please help! Jim Jorgensen, K9RJ, 1709 Oxnard, Downers Grove, IL 60516. (708) 852-4704

CLASSIFIEDS

NEW 75A4 FILTERS

AM filters with optimized response to eliminate the ringing and distortion caused by the steep skirted mechanical filters. Make your A4 sound like an A1, A2, HRO, etc.

Three models:

455A4-4 khz

Gives a smooth slightly narrower nose than the 6 kc Collins, ideal for crowded band conditions. Non-ringing design. Filter BW = 4 khz @ -6 dB, 16 khz @ -60 dB.

455A4-6 khz

Best for general AM use. Much smoother sounding than the 6 khz Collins. Filter BW = 6 khz @ -6 dB, 16 khz @ -60 dB.

455A4-9 khz

Great sounding audio when QRM is not a problem. Filter BW = 9 khz @ -6 dB, 21 khz @ -60 dB.

Note that above bandwidths are for the filters alone. Nose BW reduced slightly and -60 dB improved considerably when installed in receiver.

New design optimized for best tradeoff between skirt selectivity insertion loss (within 3dB of mechanical filter) and smooth audio quality. Exclusive circuit neutralizes input to output leakage capacitance.

Also available is a CW filter, model 455A4-CW1 to give similar response to the crystal filter in a 75A1 or A2. Single crystal backed up by a ceramic filter. Less insertion loss than 500 Hz Collins.

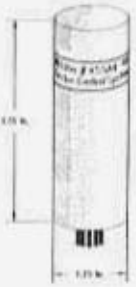
Prices: (money back guarantee)

455A4-4 khz, 455A4-6 khz, 455A4-9 khz ---- $83.50 ppd.

455A4-CW1 ---- $88 ppd.

(10% discount for 2 or more filters)

Calif. residents please add sales tax



VECTOR CONTROL SYSTEMS
1655 No. Mountain, Ste. 104-45
Upland, CA 91786
(714) 985-6250

Direct plug-in, no modifications necessary!

FOR SALE: KW-1 restoration. I bit the bullet and had new artwork and silkscreens made for all KW-1 panel markings including RF panel, vfo escutchen, power/speech amp. I have original Collins paint for complete panel restoration including silkscreening. Send me your panels, I'll return them factory fresh. Call for costs after 5:00 PM Hawaiian Standard time. Peter Brown, KH6IRT, 5332 Puahia Place, Honolulu, HI 96821. (808) 373-2792

WANTED: Globe King 500 in good condition. Micheal Ruggiero, W2NVR, 570 Monmouth Pl., West End, NJ 07740. (908) 222-6006

WANTED: KWS-1 for my collection. Must be very nice. Ed, (915) 833-3088 days, 581-3460 eves. Call collect.

FOR SALE: Plug-in coil forms, with proper pin spacing, for the SW-3 and other National rcvrs - $7.50 ea. plus $2 per order shpg; 20 pages of info on the SW-3, including complete coil winding data - $5 plus $1.50 shpg; plug-in replacements for WD-11 tubes - $17.50 ea. plus $2 per order shpg; adapters, any triode to WD-11 socket - $5 ea. ppd; also 1G4GT to WD-11 socket - $5 ppd. James Fred, R1, Cutler, IN 46920. (317) 268-2214

CLASSIFIEDS

GIANT HAMFEST AT K8MLV/Ø, EVERYTHING MUST GO! FB Johnson KW, less than 50 hrs use by me, late SN w/amenities - $950; FB Johnson T-Bolt RF amp. - $450; FB Johnson Matchbox - $250; Globe King 500 w/spare partial mod. & ps deck, needs work; Globe 350, wks FB on 75M, have wafer switch, parts needed for all band opr.; FB Johnson 6N2 xmtr, w/vfo and partially built ps - $75; other 6 and 2 m AM gear; FB Eico 730 mod/audio driver w/enclosure (nice for Johnson KW or Viking 6N2) -$50; Viking Ranger, wrks ok but needs filter caps - $50; Elmac AF-67 needs vfo wrk, plus spare AF-67 parts unit; Johnson Valiant xmtr, needs wrk; probably one of the best sounding DX-100's around - $150; D-104 mic w/stand - $30; P&H audio compressor; nice, clean, NC-183D w/spkr, fair cond. - $150; National NC 303 in fair cond. w/spkr, brand new spare 4H4C ballast tube and matching 3 band VHF converter pack (6,2,1 1/4 M) - $225; HRO Jr. w/ps. coil set, spkr; Superpro rcvr for parts; Hallicrafters S36A for parts; National NC 156, wrks but needs much TLC; FB Tapetone 6 M converter w/reg. ps; FB Globe vfo; FB Ameco 6 M converter & ps; FB Ameco preselector, tunable 1.8 - 54 Mcs; Northern Radio Co. variable master oscillator & freq shift keyer; beautiful 19" rack on castors, 6 1/2' high by 30" deep; steel tables; smaller 19" racks on castors, also 30" deep, w/white formica tops, nice, clean, handy, about the same size as a Johnson Desk KW; component collection: resistor assortment, capacitors all types - var., fixed, oiled filled etc.; inductors; variety of xfmrs - power, mic, line, interstage, modulation; chokes; mics; cables; connectors; pilot lites; switches; relays; numerous pieces of test equipment, FB Knight tubetester, FB Paco cap chkr, R/C ratio bridge model C-20, Millen GDO's w/Knight Ant. Z Bridge, Heath IM-13 VTVM's; Tektronix scopes models 551 & 553, not complete w/o ps; Hewlett Packard 202A low freq. function generator; HP200CD wide range (.005 - 600 kc) oscil. and more; Hy-gain 6 ch. "2M CB" HT; xtal assortment; much military surplus and misc incl. HF xmtr with Soviet markings; 829B PA; RCA ribbon mic, model 44-A w/line xfmr; coax cable; ladder line; ant. rotors w/ctrl boxes; meters; ant. tuners; numberous radio-electronic handbooks; reference & textbooks; vintage catalogs; radio masters; vintage QST, CQ, Radio, 73, Radio-Electronics etc; 1940's era Rider's Perpetual Troubleshooting Manuals, some over 4" thick. Most all equip. w/manuals. Extensive assortment of vacuum tubes, incl. brand new 4-1000A, (with this collection you'd practically be set up with tubes for life!) 872 and other sockets. Please help preserve the heritage of AM by buying this stuff, or it may wind up in the dump! Also, want 6JB6 tubes, buy or swap. Please call for appointment, anytime. Prefer pick-up but will ship smaller stuff. Rick Miczak, K8MLV/Ø, (719) 543-2459

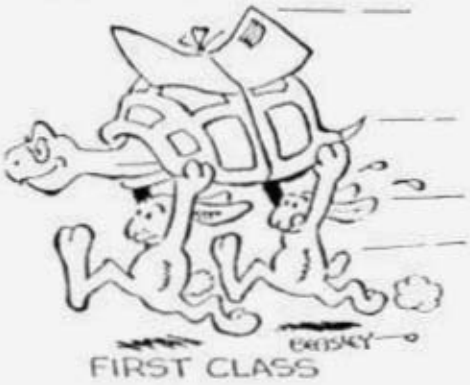
WANTED: Knight Ocean Hopper; manual for Heathkit DX-20. David Ishmael, WA6VVL, 1118 Paularino Ave., Costa Mesa, CA 92626. (714) 979-5858

WANTED: S5B adapter OSB-1 (or MSR-4/5) for TMC GPR 90RX rcvr. Albert Santangelo, VE3AJM, 252 Arnold Ave., Thornhill, Ontario, Canada L4J 1C2. (416) 731-7274

FOR SALE: Very clean DX-60B w/new 6146; Heath chrome knobs. WANTED: Dial scales for HRO-50T. Marty, WB2FOU/5, (817) 497-6023 after 6 p.m. CST

FOR SALE: Drake B-Line: R-4B, T4X-B, AC-4, MS-4, factory conditioned spring '91 - $375; Drake crystals, WARC, GC - $5. **WANTED:** FT-243 hamband crystals. Frank Vardeman, N4SUV, 4612 Eddy Dr., Tampa, FL 33603. (813) 871-2134

FOR SALE or TRADE: Surplus Conversion Manuals - $30 for both; First Fifty Years (Collins) - $30; NOS tubes: 7193/2C22 - $5; 6GH8A - $5 for 5. **WANTED:** R-648. J.L. Myers, 1010 Graybar, Nashville, TN 37204. (615) 297-5886



A directory of vintage parts unit rigs available to subscribers for $1 and a LSASE. Presently there are 170 units in the directory and it's growing daily. The list of units is by manufacturer in alphabetical order followed by the owners address and telephone number. If you have a parts unit please let us put it on the list.

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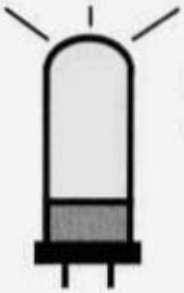

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