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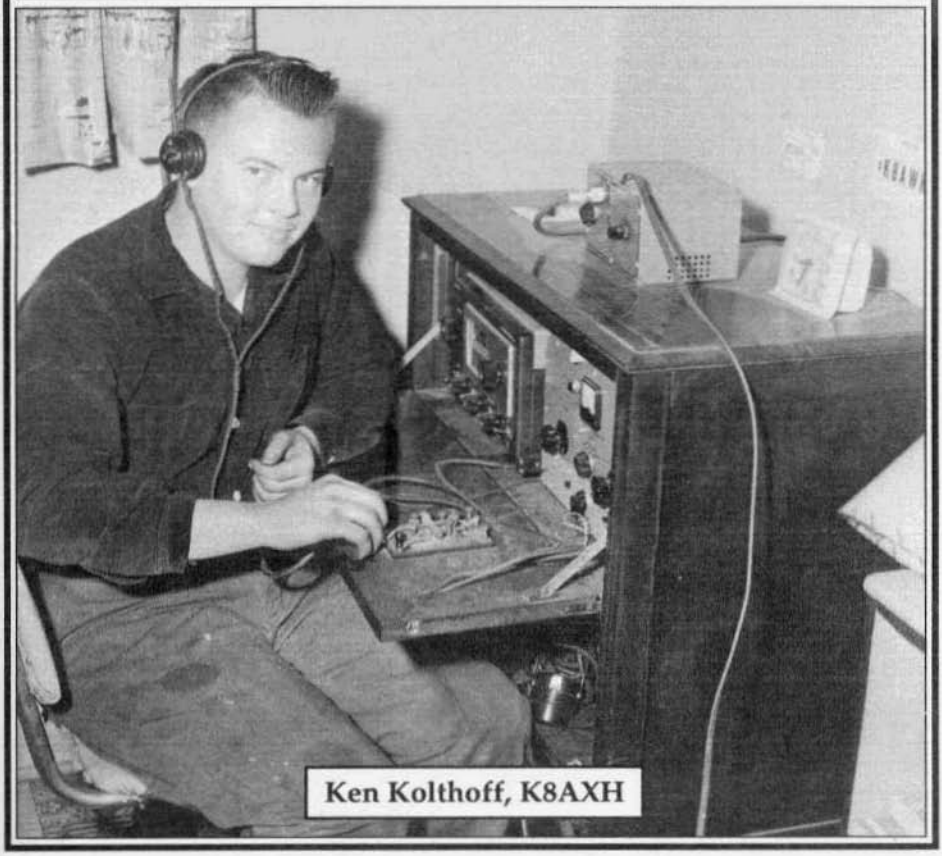
ELECTRIC RADIO

celebrating a bygone era

Number 116 December 1998



Ken Kolthoff, K8AXH

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

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

Regular contributors include:

Walt Hutchens, KJ4KV; Bill Kleronomos, KDØHG; Ray Osterwald, NØDMS; Dave Ishmael, WA6VVL; Jim Hanlon, W8KGI; Chuck Penson, WA7ZZE; Dennis Petrich, KØEOO; Bob Dennison, W2HBE; Dale Gagnon, KW1I; Rob Brownstein, K6RB; Don Meadows, N6DM; Lew McCoy, W1ICP; Kurt Miska, N8WGW; Warren Bruene, W5OLY; Brian Harris, WA5UEK; Thomas Bonomo, K6AD and others.

Editor's Comments

A reminder to all the 160M AM ops: Don't miss the Annual Electric Radio/N2KSZ Memorial 160M AM Contest. This year it will be held on the weekend of December 26/27. As has been the case for the last 9 years, the contest will start at 9 PM Pacific (Midnight EST) and end 24 hours later on Sunday. The rules have not changed: one point for each contact and an extra point for each AMI member worked. Logs should arrive at ER no later than January 30. They should contain the following information: name, callsign, city, state, time, signal reports, transmitter, receiver, antenna and AMI number. I'll have a full report with 1st, 2nd and 3rd place winners in the February issue. I'll provide award certificates and a copy of our new book, "Hiram Percy Maxim" by Alice Schumacher for the winners.

For newcomers to ER and to AM I should explain that N2KSZ, David Smith was the most enthusiastic participant in the ER 160-Meter contests. He won first prize in 7th and 8th contests and second back in the 6th. He was also an outstanding AM operator and a highly respected individual. When he tragically became a Silent Key last year it seemed very fitting to make the contest a memorial to him.

Out here in Colorado, the Colorado Morning Group held their annual Thanksgiving Day bash. Event organizer 'OJ' (Orlin Jenkins), KØOJ described the band conditions as being poor that day but there 40 checkins. Another Colorado AM'er, Ed Nesselroad, NØAUB, and his group the "Dummyloaders" are planning a 75M (3875) get together on New Years Day. He says they will start about 7 AM.

And so another year is coming to an end. As we get older they seem to just fly by. I'd like to take this opportunity to thank all of our subscribers for their support over the last year and Shirley and I send our very best holiday wishes to everyone. N6CSW

TABLE OF CONTENTS

Cover: Ken Kolthoff, K8AXH, as a novice (KN8AXH) back in 1956, operating his station which consisted of a Heathkit AT-1 transmitter and a Hallicrafters S-53 receiver.

Looking Back

by Lew McCoy, W1ICP
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It seems the Mighty Midget receiver of mine that was in QST so many years ago has again become popular. I was surprised and delighted to learn that a number of vintage oriented hams have built the unit recently. Barry, our editor, has asked if I might comment on the unit and why or how I came about to build and describe it.

First off, when I took the job of Novice Editor for QST, I was informed by George Grammer, our Technical Director, that I had to write an article every month rain or shine! For the most part I had complete freedom to pick my subjects but in several cases I was guided in what I should write about. For example, the FCC was concerned that the Novices were getting into too much trouble with both low frequency harmonics (an example was their second harmonic from 80 meters that interfered with some Canadian commercial services). So I wrote a lot of antenna coupler articles and filter articles to satisfy the FCC.

I had a fleeting interest in QRP so I decided to build a rig that would be essentially QRP and thus designed the Mighty Midget transmitter. The article ran in the February, 1966 QST. The rig consisted of a single dual tube, a 6GW8, using the triode section as a grid/plate oscillator driving the second section, a pentode that used a pi-network.

The transmitter would generate 10 watts input if properly tuned. To popularize the rig, I offered an award to any Novice who built the rig and worked at least 10 ARRL sections. As I recall, there were quite a few takers. I used the original during a sweepstakes and worked over 40 sections. I was not overwhelmed by QRP but I will admit that I had a lot of fun.

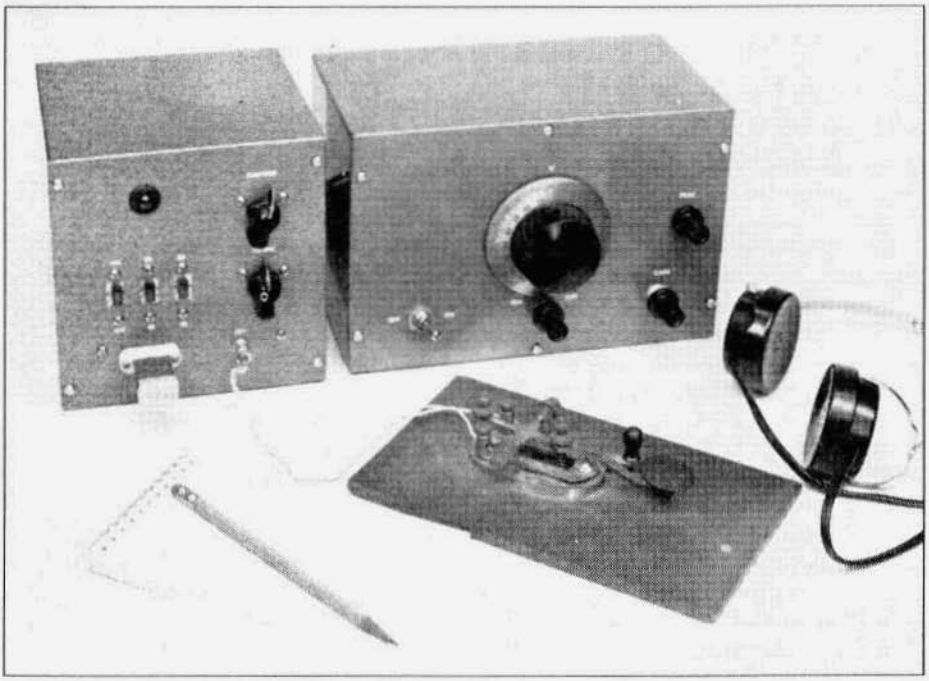
This rig led in turn to a receiver, the "Might Midget", which appeared in the April 1966 QST. It was described very well in the last issue of ER, November, 1998, # 115, "Midget in a Lunchbox" by Ron Meara, N2CQR. As a result of that article I received a considerable number of e-mails and letters. In order to respond to the questions I had to revisit the original article.

The Mighty Midget receiver was a superhet, using three 6U8s (triode/pentode combinations), one pentode section as the RF amplifier, the pentode section as a mixer, etc. It was and is a delightful little receiver but I suppose by modern solid state equipment standards it would be woefully lacking. But, like I say, it was fun, and that was the name of the game.

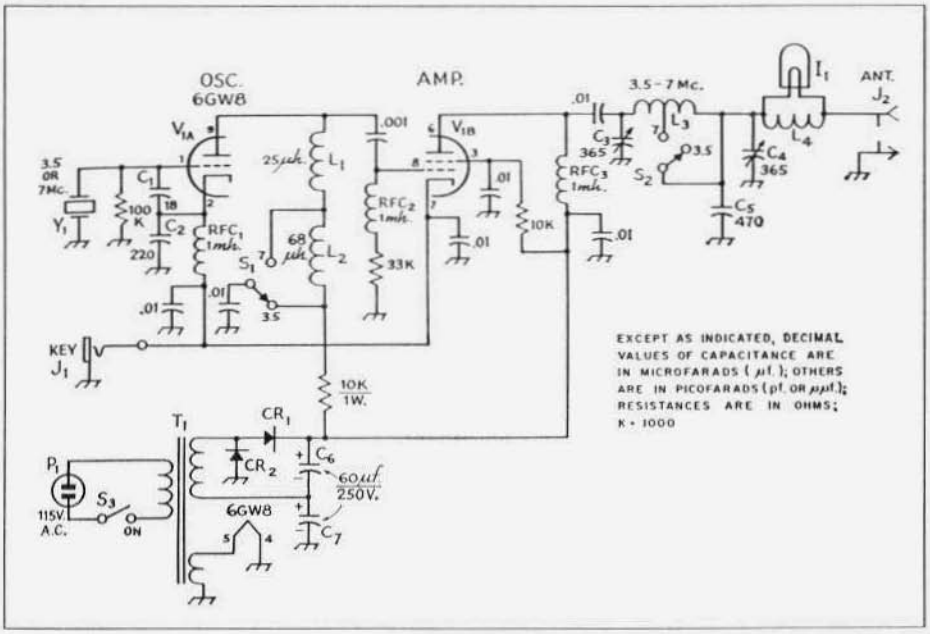
I used the Mighty Midget receiver and transmitter combination quite a bit but being essentially a power nut, and DX chaser, I finally put the rig on a shelf. Barry asked me the other day where the rigs are now. I have no idea, I probably gave them to one of my many students who I helped become hams. In any event, the Mighty Midget receiver as you have seen in the pages of this magazine has become a popular modern day (?) item.

I need to add here that my way of life is going through a drastic change. As you know, my wife Martha passed away and I was going bonkers sitting in Silver City, N.M. staring at walls. I have bought a place in a retirement community called Monte Vista here in Mesa, Arizona. They do allow ham radio but not beam antennas. I am going to put up a screwdriver vertical so I will be on most of the bands.

I like it here as this place has more activities than one can count. If any of you readers get down into east Mesa, my house is space 714. Please drop by and visit. W1ICP



The Mighty Midget transmitter and receiver. This photo is from the April 1966 QST.



Schematic diagram for the Mighty Midget transmitter. This is from the February, 1966 QST.

The Heathkit VTVMs

by Chuck Penson, WA7ZZE
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You probably remember when you got your first VTVM. Events like that are the kinds of landmarks people like you and me use to gauge the passage of time. I got my Heath IM-13 when I was 12. I remember somewhere I heard or read that leaving it on all the time would ensure greater accuracy. And so it ran 24 hours a day--its neon pilot light glowing in the darkness of my shack. Of course back then I wasn't paying the electric bill.

Over the years Heath designed and sold 25 versions of the venerable VTVM. This isn't surprising, I suppose, when you consider the broad market appeal of this essential piece of test gear. We all had one (or two) (or three) of them, and there were a lot of us. So it stands to reason that Heath would take the VTVM seriously.

Beginning in 1947 with the unbridled success of its O-1 oscilloscope, Heath set a course for the test equipment market. Not yet flush enough to hire full-time engineers, the company outsourced the designs of most of its early test equipment products, going to RCA for a VTVM. RCA, which cranked out its VTVMs on an assembly line, at first didn't quite "get it" with respect to designing for a kit-form product and came back with a much-too-complicated piece. Undaunted, Heath gave them another shot at it and soon RCA had got it right. Howard Anthony, Heath's latter day founder, probably wrote the directions (there were no manuals then as we have come to know them) himself, and soon Heath had another very successful product, the V-1 VTVM, going out the door. Before it was all over some forty years later, Heath had designed twenty five models. Table 1 is a list of all the VTVMs the company produced. The list does not include some model numbers which were merely factory wired versions of existing kit models. Also not included is the 1954 AW-1 Audio Wattmeter. Strictly speaking it is a VTVM, but I have chosen to leave it out of the list because of its specialized purpose. Unless otherwise noted, these are "regular" DC volts/ohms type units.

Table 1

Model #	Description	First year
V-1	First production unit	47
V-2		48?
V-3	Battery powered	49
V-4	First larger meter	50
V-4A		50
V-5	First "modern" design	51
V-5A		51
AV-1	AC type	51
V-6		52
AV-2	AC type	52
V-7	First PC board	55
V-7A		55
AV-3	AC type	57
IM-10	Extra big meter	60
IM-21	AC type	61
IM-11		61
IM-32	Extra big meter	62
IM-13	Horizontal format	63
EUW-24	Green cabinet	63*
IM-18		68
IM-28	Horizontal format	68
IM-38	AC type	68
IM-5238	AC type	76
IM-5218		77
IM-5228	Horizontal format	77

*Part of the Malmstadt-Enke Instrumentation Lab. Factory wired only.

An advertisement for the first Heathkit VTVM, from their November, 1947 flyer.

How come so many?

Although there were a lot of models, there were not a lot of changes. Model number changes were driven mostly by the bill of materials. As Heath used up its stock of surplus parts and/or went shopping for new vendors, new parts forced changes in the bill of materials, which forced a change in the model number. The basic circuit never changed very much (there are only so many ways to make a VTVM), only the shape and size of the parts. Of course model changes also were influenced by incremental improvements in the basic technology. Better tubes, more stable resistors, a tweak here and a change there, all lead to a fundamentally better product. Not all the changes were technology-driven, however. Some model changes were purely cosmetic--a new paint job sometimes went a long way.

Heath's VTVMs evolved over the years and can be separated into a number of distinct groups. The V-1 through the V-3 are characterized by square boxes, small meters, and pointer style knobs. While the 1950 V-4 used the same box as its predecessors it incorporated a larger meter. The 1951 V-5, with its smaller box and rounded corners, was a turning point in design. A radical departure from earlier units, the V-5 reflected Heath's emerging interest in design and aesthetics. The V-5's form factor would set the pattern for all future models. While the V-7 was the first unit to use a printed circuit board, changes after the V-5 were largely cosmetic. Nevertheless, there were experiments with other styles. For example, the 1960 IM-10 incorporated an extra big meter and ultimately gave way in 1963 to the IM-13 which used the same meter but took on a horizontal format.

continued next page

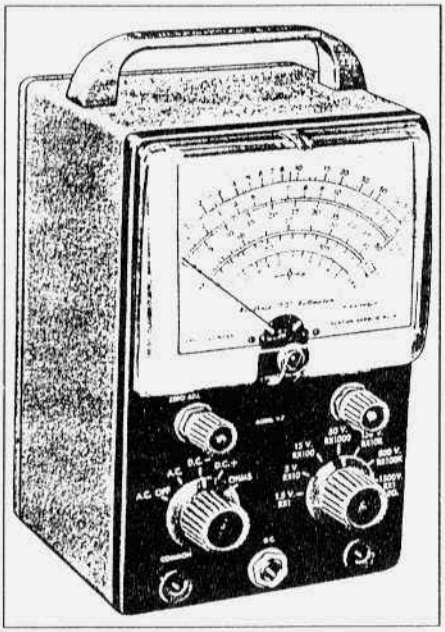
The rarest of all the Heathkit VTVMs, the V-3, a battery powered version of the V-2.

Because Heath sold so many VTVMs (gazillions, to be precise) most models are not rare. With a bit of patience and perseverance you can find almost any model you are looking for. Units as early as the V-4 turn up with some regularity, and post V-6 models are commonplace. Of course the very first units are not seen too often, and perhaps the rarest of all the Heath VTVMs is the V-3, a battery powered version of the V-2. The V-3 was apparently not very successful as it was listed only once--in the February 1949 flyer--after which it vanished without a trace.

Billions and billions. . .

The late Carl Sagen could have been describing Heath's sales figures. Although Heath's marketing was occasionally laughable (in its September 1948 flyer Heath called the V-2 "The most beautiful VTVM in the world"), marketing blurbs provide some of the few clues we have about the popularity of its products. In the August 1948 flyer Heath's ad copy noted that "many large universities and laboratories are now buying Heathkit VTVMs in lots of a dozen or more." And in 1960 Heath proclaimed the V-7A as "the world's largest selling VTVM." Attracted by the quality and modest prices, it would be no exaggeration to say that by the mid 50s there was not a college or and university in the entire country that didn't have loads of Heath equipment in their science, engineering, physics, and electronics departments. Government agencies were also buying lots of product, and businesses large and small bought Heath test equipment in vast quantities. And why not? Heath's test equipment may not have been HP quality, but it was perfect for the average user, and it was eminently affordable. Yet Heath would not give an inch on quality comparisons. In an ad for the V-2 Heath stated "one large electronics organization writes that they checked their Heathkit VTVMs against laboratory standards and Heathkits equaled in accuracy all their commercially built instruments."

There is no doubt that Heath sold a lot of VTVMs. While sales figures are, for all



The V-7 VTVM

The Heath IM-13 VTVM from their 1965 catalog.

practical purposes, impossible to find, we have two solid data points for VTVM sales. From the Fiebich Papers (see ER # 80). we have firm 1972 sales data for the IM-18 (11,983 units) and IM-28 (4,136 units). From these numbers we know the IM-18 outsold the IM-28 by a ratio of nearly 3 to 1 Using these data, and a firm number for the 1963 analog to the IM-28, the IM-13 (8,700 units), we can make a guess about sales of the IM-11, the 1963 analog to the IM-18. If we assume the same sales ratio in 1963 as in 1972, we get a number for the IM-11 that works out to a little more than 25,000 units, or a little more than 68 units a day, seven days a week. Though sales figures can not be confirmed, there is anecdotal information to suggest that by the release of the V-7 in 1955, Heath had sold a grand total of about 500,000 VTVMs. This works out to an average of 55,000 per year over the nine years involved--a very large number, but by no means impossible.

Changing times

By the decade of the 70s, technology had settled comfortably into the era of solid state, as reflected in Heath's catalogs of the time. By 1970, a variety of Heath VOMs had begun to show up, and Heath's first digital VOM appeared in 1972. Clearly, the days of the VTVM were numbered. The last iterations of the VTVM appeared in 1977. The IM-5218 and 5228--repainted version of earlier models--marked the end of VTVM product development for Heath.

In the end, forty two years after the introduction of V-1 VTVM, Heath closed the book on this remarkable series when the last model, the IM-5228, quietly vanished from the catalog late in 1989. What a pity. And what a sad and unceremonious end for the instrument that launched a zillion careers. But look on the bright side. You can still get and use a Heath VTVM. They are almost as easy to find today as when Heath sold them new. Dozens of them show up at hamfests everywhere. And because most users cherished their instruments, many of them show up in like-new condition. So for literally a few dollars you can have one of the all-time classic pieces of test gear. The piece without which no shop was complete. The piece without which you were just (trouble)shooting in the dark. The piece you saved your allowance for. Not just a VTVM--a Heathkit VTVM. ER

Chuck Penson still troubleshoots his all-Heath ham station with his original IM-13.

Painting and Touchup Techniques

by Thomas Bonomo, K6AD
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This is an article about the cosmetic, rather than the electrical restoration of old boatanchors. You will not need to apply any tube theory, read any circuit diagrams, or know anything about RF engineering in order to develop some new skills in this aspect of our hobby. This article is for those who like to keep their equipment in top physical condition, but have been hesitant to tackle a full cosmetic restoration. It is for those who have never given it a try because they did not know the techniques, were fearful of the results, thought it would be too expensive, or just thought it would be too much work. As you will see, it is much easier than you probably think.

Cosmetic restoration is a topic that often elicits a great deal of controversy. The purpose of this article is not to suggest that one way is better than another. Rather, its intent is to provide some useful information that will allow you to avoid making some of the basic mistakes I did when I was learning. I had no one to teach me the little tricks and techniques, so I had to learn the hard way—by trying things out and doing things over and over. The techniques I have developed will speed your learning curve and allow you to get the results you want without spending a lot of time and money.

When I acquire a vintage rig for the shack, I want it to look as good as I expect it to operate. Since it is rare to find new-in-the-box boatanchors these days, you usually have to settle for what can be found at your local swapmeet. Usually, they are in pretty sorry physical condition too. It is often difficult to believe the seller when he says *"yup... tried it the other night and it still puts out a good signal."* I usually have to hide my utter disbelief that the seller's dirty-old, scratched-up, bug-infested, and rusty rig could even light up, much less transmit or receive an RF signal. Even so, I would much rather buy a unit that is scratched and worn than one that has been badly butchered with a can of mismatched, glossy spray paint from a local hardware store.

I enjoy restoring my rigs to as close to new condition as possible. I want the results to be indistinguishable from a near mint-condition original unit. I am sure you have seen the kind of rig at swapmeets that screams *"I've just been repainted."* This is usually because the color does not match well or because the paint is too glossy. In addition, it often looks like the surface was not even cleaned well before the paint was applied! Yet with just a little bit more work, this unit could have looked just like it did out of the factory.

The fun and reward of taking the time to make an old boatanchor look exactly as it did when it was new is that you learn to become a craftsman (craftswoman, craftsperson, etc.) in the process. Once you learn a few simple techniques, it takes very little extra effort to produce a restoration that you will swear looks just like it came out of the factory. It will not scream *"I've just been repainted."* Instead, it will say *"I've hardly been used and I've been well stored since I was new."* You will derive a great deal of satisfaction from bringing an

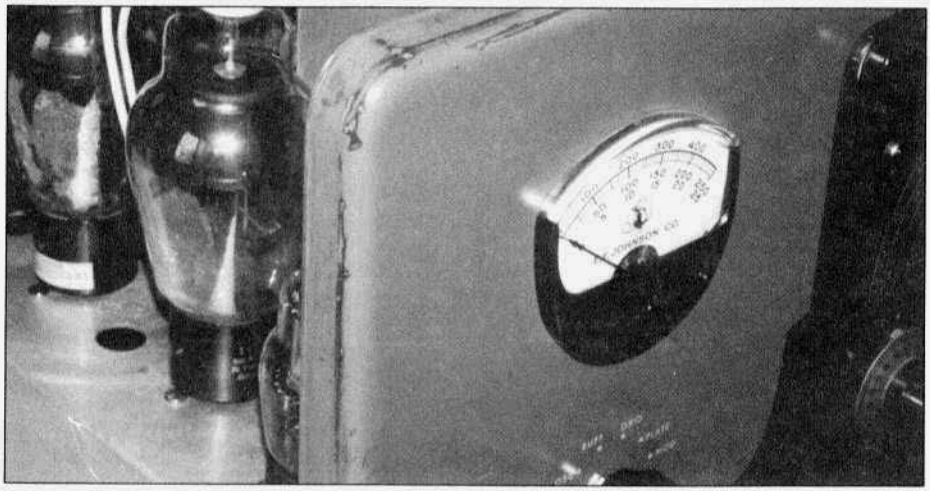


Figure 1. Typical trim ring on a Johnson Valiant shows poor care and handling.

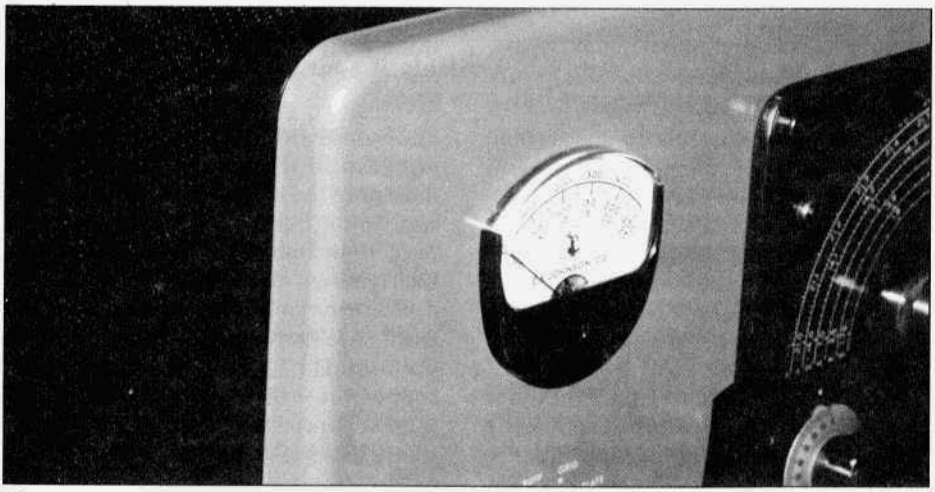


Figure 2. Same Valiant after restoration. Careful matching of paint and proper spray techniques yield a virtually undetectable paint job.

old rig from about a "6" in appearance back up to about a "9.5." It is especially satisfying when no one can tell that it has been restored, even if they look closely.

Whether you are restoring a front panel or painting an entire cabinet, three simple things will get you the results you want: 1) matching the color exactly; 2) matching the sheen exactly; and 3) knowing a few tips and techniques for spraying. Let's begin by first looking at some techniques to restore front panel edges like those found on the Johnson Valiant or Viking II. Then, we will move on to explore cabinet refinishing.

Restoring Front Panel Edges

You will often encounter vintage rigs in which the edges of the front panel have been badly scratched and worn. The Johnson Viking II, Valiant, Ranger

continued next page

Figure 3. An inexpensive airbrush, available at your local art supply or hobby shop, works well on small jobs like trim rings.

and 500 were particularly susceptible to this kind of damage. These are thought to be the toughest to restore, because there is no separate trim ring that can be removed and painted. On these types of units, the trim ring is a continuous part of the front panel. For this reason, most people never even try to restore these types of front panels. The truth is, however, that they are really not that difficult to restore. The before and after photographs of my Johnson Valiant in Figures 1 and 2 should give you some idea of how good you can make a front panel look, even when it is badly scratched.

Fortunately, you do not need anything more than an inexpensive airbrush to get excellent results. An airbrush is a very small, reusable paint gun, and its air supply is provided by a separate spray can of air, usually attached by a short length of hose. Inexpensive units like the one I used (shown in Figure 3) go for about $20, but there are much fancier units with more features. They are available at art supply and hobby shops. Even with the cheapest of airbrushes, if you do a good job of matching the color and the sheen, your refinishing job will be *virtually undetectable* and your front panel will look nearly new.

The trick to repainting the edge of a front panel can be seen in Figure 4. The paint must be applied from behind so that as the edge of the front panel begins to curve, less and less paint is applied, leaving a very smooth transition to the original paint. If any paint is applied from the front, there will be a paint line where the masking tape was removed. It is therefore important to remind yourself as you are spraying to always paint from behind and never towards the front panel. It is very easy to forget this and start painting from the front.

Figure 3 is a photograph of the same Valiant shown in Figure 1 after masking and then painting. If you look carefully at the photograph, you can see that no paint has been applied to the masking tape on the front panel. This

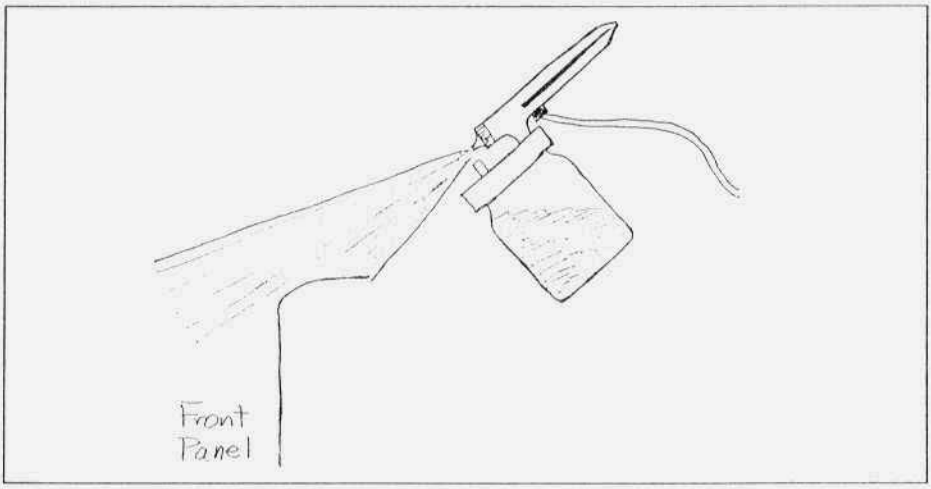


Figure 4. The trick to leaving no paint line is as simple as spraying from the right angle. Always spray from behind.

ensures that there will be no hard paint line when the masking tape is removed. The only purpose of the masking tape is to prevent paint dust and over-spray from getting on the knobs and meters.

If there are scratches that extend more than about halfway around the bend, do not try to paint these with the airbrush, because you will leave a paint line where the masking tape is removed. Instead, these should be touched up later by hand with a small artist's paintbrush. This is very important to remember, because if you leave a paint line, it will significantly reduce the quality of the final result.

Masking

A word of caution is in order about applying masking tape to the front panel. Do not use regular white masking tape. The original paint on our old boatanchors often does not adhere very well to the metal. White masking tape adheres too strongly and can easily take off some of the paint when it is removed (trust me, I've made this mistake). Using white masking tape can therefore be disastrous. Instead, purchase blue masking tape at your local hardware store. It is designed not to adhere as strongly as the white version.

Even when using blue masking tape, I find that it adheres strongly enough to pull off bits of paint. Here is a trick to reduce its stickiness: apply and remove it from a piece of cloth several times (I use the leg of my pants). Each time this is done, it picks up some fine lint from the fabric, making it slightly less sticky. The tape should be removed from the front panel several minutes after painting. The longer the tape is applied to the front panel, the more strongly it adheres, increasing the likelihood that small bits of the original paint will come off when it is removed. In the event this does happen, touch them up using a small artist's paintbrush.

Selecting Paint

Today there are two types of paint that you can use to restore old boatanchors. The most common type of paint is simple oil-based lacquer, available at most hardware stores. The other type is the more durable urethane paint, sold primarily by automotive paint suppliers.

You are probably already familiar with simple lacquer-based paints. Automotive paint, however, has become much more complex these days, thanks

continued next page

to better chemistry and stricter EPA regulations. Modern automotive paint is based on urethanes, and so comes in three parts: *paint*, *catalyst*, and *enhancer* (which speeds hardening time). While mixing these paints makes them inherently more complex to work with, you are rewarded for your extra effort with a significantly more durable finish. It will be much more resistant to chipping, scratching, oxidation and staining than oil-based lacquers. After the paint and catalyst are mixed, it will have about a two-hour pot life. This, of course, means you must have everything well prepared and ready to go before you mix.

You are probably wondering which type of paint to use. I use both types, depending upon the application. For restoring front panels like those on the Valiant, or when touching up a front panel, I almost always use lacquer. It is cheaper, easier to work with, and is ideal for mixing small quantities. It also has the distinct advantage that it contains more pigment than automotive paint, and so it is easy to get complete coverage with a thinner coat of paint. This is especially important when touching up a front panel or painting a trim ring without leaving a paint line.

When painting cabinets, I usually use automotive urethane paint, because it is so much more durable than lacquer. Lacquer will work, and it is certainly much easier to use, but I feel that it is worth the added effort and expense of using automotive paint since cabinets are subject to significant abuse.

Paint Matching

I use two different approaches to color matching, depending on the type of paint being used. In the case of touchups and front panels, where I always use lacquer, I mix my own paint so as to get an exact match. An exact match is a necessity to completely hide a touchup. To make mixing up a batch of paint easy, I keep a small pint can of each of the following colors in stock: gray, brown, black, white, yellow, red, green and blue. They only cost about $5 per can and with them you will be able to match virtually any color. I also keep a can of flattening agent and thinner on hand.

When using automotive paint for a cabinet, an exact match is not quite as critical. In this case, it is usually easiest to just let the automotive dealer match the paint for you. They have thousands of paint chip samples from which to choose. If you cannot find a close match from the chips, they can usually computer match your color for a slight additional charge. Even when you purchase a computer-matched paint, you will sometimes find that some final tweaking will be necessary. It really depends on how picky you want to be. Plan to purchase flattening agent and reducer separately.

When you are using catalyzed paints, make sure to ask for a small bottle of each color pigment used in the paint so that you can make any needed adjustments to the color when you get home. Also ask for some extra black and white pigment because these will allow you to lighten or darken the paint a bit. Yellow pigment will allow you to compensate for an original paint that has yellowed slightly over time. Just imagine the fun you will have mixing, matching, and getting it just right!

Matching Techniques

The final result you achieve will be directly proportional to how much time and care you put into matching the color and sheen of the finish. The following guidelines should help you get the results you want simply and easily.

First, thoroughly clean an area to be matched on the cabinet or front panel. Although it sounds rather obvious, the necessity to have a completely clean surface for color matching cannot be stated strongly enough. This is especially important if you are planning to

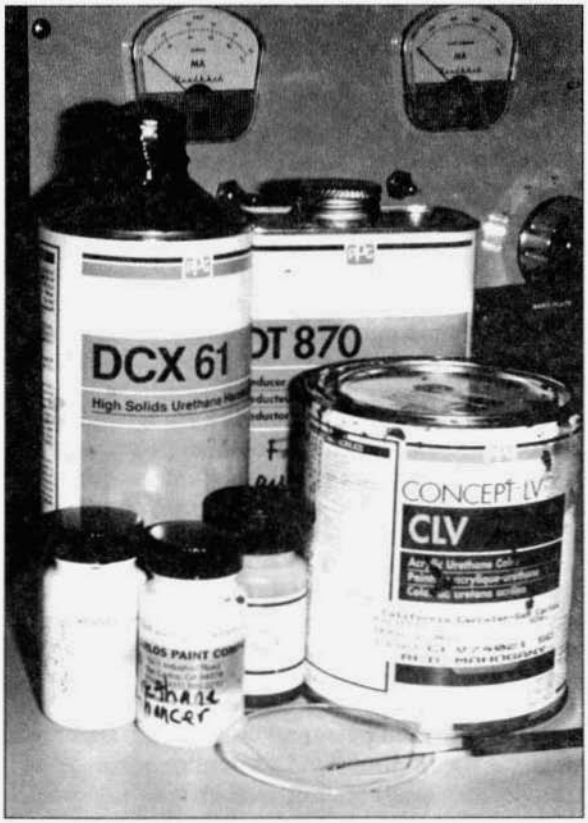


Figure 5. Automotive type paints (urethane) require mixing, but will produce a very tough finish which is excellent for cabinets.

paint or touch-up the front panel. It is disheartening to carefully match the paint color, touch-up the front panel, and then later discover that there was a layer of nicotine yellowing the paint you just matched. This problem will become apparent the next time you clean the front panel with a good cleaner. Your touch-ups will not match the newly cleaned panel and will stick out like a sore thumb. Yes, I have made this stupid mistake and yeah, I should have known better. Don't simply rely on the fact that the surface *looks* clean. It probably isn't.

Next, you are ready to test the surface being matched. To get the best match, it will be necessary to apply some test samples of mixed paint *directly* to the surface being matched. It will be much more difficult to get a good match if you merely apply test samples to something that is held *near* the surface being matched. Because of the need to apply the test paint samples directly to the surface being matched, it is important to make sure that they will not dissolve the original paint (they usually won't). The easiest way to do this is to test a hidden spot using a little lacquer thinner. This test will ensure that it will be safe to later remove the test paint samples without damaging the surface being matched.

Now you are ready to match the color. This is usually the most time-consuming part of the project if you strive for perfection. Start by transferring a small quantity of paint that is nearest in color to a separate container. Test the color by putting a small spot of paint on the area to be matched and then dry it for about 2 minutes with a hair dryer. Be careful to avoid overheating the surface being matched. You will notice that the paint will darken significantly as it dries. After it is dry, examine it very carefully under very bright light from several different angles. If possible, take it outside and look at the match under natural light. What direction does the color need to go for a good match? Does it need to be a bit lighter or darker? Does the shade need to be a bit yellower, browner, redder, greener, or bluer?

Add a bit of the needed color to your mix and repeat the process again. This

continued next page

is where you will need to spend some time experimenting. Plan to make lots of test iterations by making small corrections rather than big ones. If you do make a mistake while color matching by going too far in any one direction, you may need to add some of the original color to help reverse course. This is why it is important not to use all of the original color when you start. Keep repeating this testing and mixing process until you get the color just right. I find that I usually make about 10-15 iterations before I am happy. When you are done color matching, remove the color test samples using a little thinner on a rag.

The last step is to match the sheen. Unless the surface you are matching is high gloss, it will be necessary to match the sheen by adding some flattening agent. Proceed with this step only *after* the color is matched. It is this step that really helps separate the final look of excellent craftsmanship from a spray can job. Few radio cabinets were painted in high gloss, yet most spray paints are high gloss. A high gloss cabinet usually screams out *"I've just been repainted."* Matching the original sheen, on the other hand, will make the cabinet look original, avoiding that refinished look. It is very important to go slowly and not add too much flattening agent at one time. If you add too much, you will need to add more paint to increase the gloss, which may then necessitate repeating the color-matching step again. Yup, I've made this mistake too. Always start by adding less flattening agent than suggested by the manufacturer. Then add a little at a time.

If you are working with catalyzed paint, it is important to understand that you cannot test the sheen by just testing the paint alone. This is because the catalyst adds significant gloss to the final result. I did not understand this and once carefully matched the sheen, added catalyst, and then proceeded to paint. Instead of the satin finish I expected, I got a gloss finish, necessitating yet another trip back to the sandblaster. You must therefore test a small sample to which catalyst has been added. The easiest way to do this is to remove about 6 drops of color matched paint, add 3 drops of catalyst (the ratio is usually 2:1), apply to the surface being matched, and then dry as discussed above. If it is still too glossy, add a bit more flattening agent and then repeat the process until you have achieved the match you want. I use a small dish-shaped piece of glass like that shown in Figure 5 to test mix small quantities of paint.

If your local hardware store does not have flattening agent, it can be purchased at an automotive paint supply store. Lacquer and urethane paints each require a different flattening agent, so make sure you purchase the right type. They are not interchangeable. Likewise, make sure to purchase the right kind of thinner for the paint you are using. Catalyzed paint and lacquer each requires a different kind of thinner.

Sandblasting

Before painting a cabinet, it is important to remove all of the old paint. The original paint often adhered rather poorly, either because the paint was itself of poor quality, or because the metal was poorly prepared prior to painting. It is therefore highly recommended that you do not skip this step and just paint over the original finish. You'll be disappointed in the results.

The cheapest and easiest way to do this is to take the cabinet to someone who has a sandblaster. This is so much easier than trying to strip and sand the cabinet yourself. I grew to hate all the work of stripping and sanding, and it was a joy to discover how cheap sandblasting is. I usually pay about $10 for a cabinet the size of a Valiant. Your local powder coater or furniture re-finisher will usually be happy to do this for you. Before you deliver the cabinet to the

sandblaster, do not forget to first match the color! I almost made this mistake once too.

Strike up a friendly working relationship with them. Back when I was first learning, I occasionally made a few mistakes and needed to start over to get it right (my wife must have wondered why I kept going to the powder coater so often). I brought the cabinet of my *Heathkit Mohawk* back three times and they felt so sorry for me the third time around that they did not charge me anything! Finally, I got everything right and it looked absolutely beautiful.

Dents, Dings, and Priming

Once you have had the cabinet sandblasted, you can either prime it first, or just apply your color coat right to the bare cabinet. A primer coat will, of course, give better adhesion, but I have had acceptable results even when skipping this step. A simple spray can primer from your local hardware store is often the easiest way to apply a primer coat. You can go to the trouble of using two-part automotive epoxy primers and a spray gun, but this is not really necessary unless you just enjoy things first class.

A benefit of using a primer coat is that it can be lightly sanded before the topcoat is applied. This will help fill in any scratches or other surface imperfections. Use No. 400 or 600 "Wet-or-Dry" sandpaper and use a small amount of mineral spirits as a lubricant as you sand.

While a primer coat that has been sanded will hide many surface imperfections, the large, heavy dents and dings should be filled in prior to priming (the big dents are usually thanks to the careful handling UPS so regularly provides). Bondo or Devcon are both easy to apply and are readily available from your automotive paint supplier. They come in two parts and are mixed before applying to the surface. After they have cured, sand the surface level using a small piece of sandpaper on a small wood block. The primer coat will help hide any small imperfections in your repair.

A real time saving trick to fill smaller dents and dings is to use cyano-acrylate glue (most commonly called "super glue" or CA for short). For this application, you must use the heavy-bodied type available at hobby stores (the hardware store variety is too thin and runny). Just fill in the dent with CA and then hit it with a shot of "accelerant" spray (also available at hobby stores) and it will harden in a few seconds. Give it an hour or so to fully cure and then sand with very fine sandpaper (No. 400) to produce a smooth surface. Filling dents is a snap using this simple technique.

Spraying

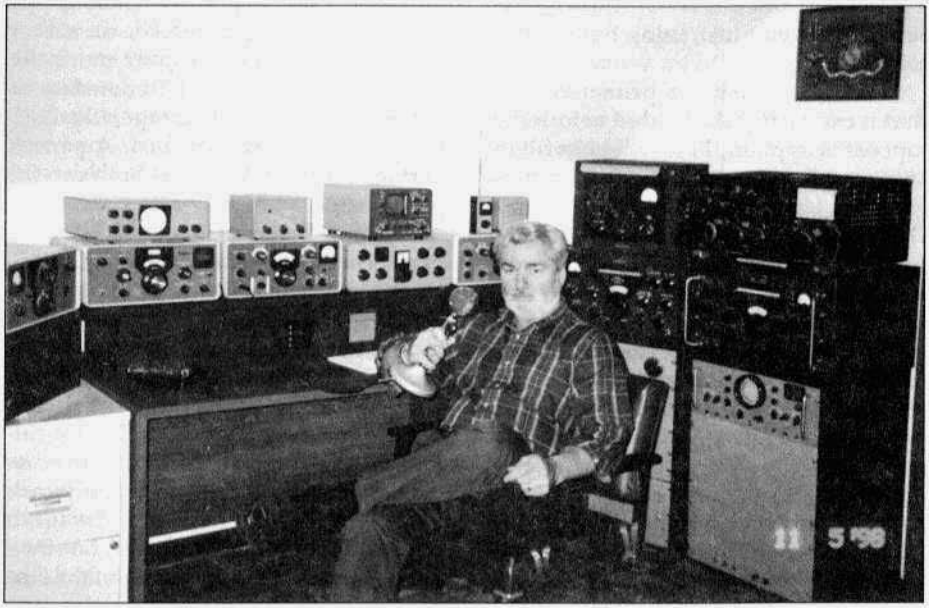
The most important step before you begin spraying is to make sure there is not any dust, hair, or lint on the cabinet. If lint or hair does show up in your new paint job, you can be sure it will be in the most obvious place possible (on my jobs it always appears front, dead center—never on the bottom where it will not be seen!). Compressed air, either from a compressor or a spray can, is the best way to assure a lint-free surface. If you spray in an open garage, like I do, this is also a source of dust. A perfect surface therefore requires both careful preparation and a bit of luck.

Spraying the paint is actually the easiest part. If you have access to an air compressor and a spray gun, you are in business. I planned to refinish quite a number of cabinets and so purchased a *Binks* HVLP (high volume low pressure) spray gun. If not, and you do not want to make the investment, you can still use an inexpensive airbrush, discussed earlier in this article. They work well on small jobs. I would not want to spray a six foot rack with one, but they are quite adequate for a cabinet the size of a Valiant.

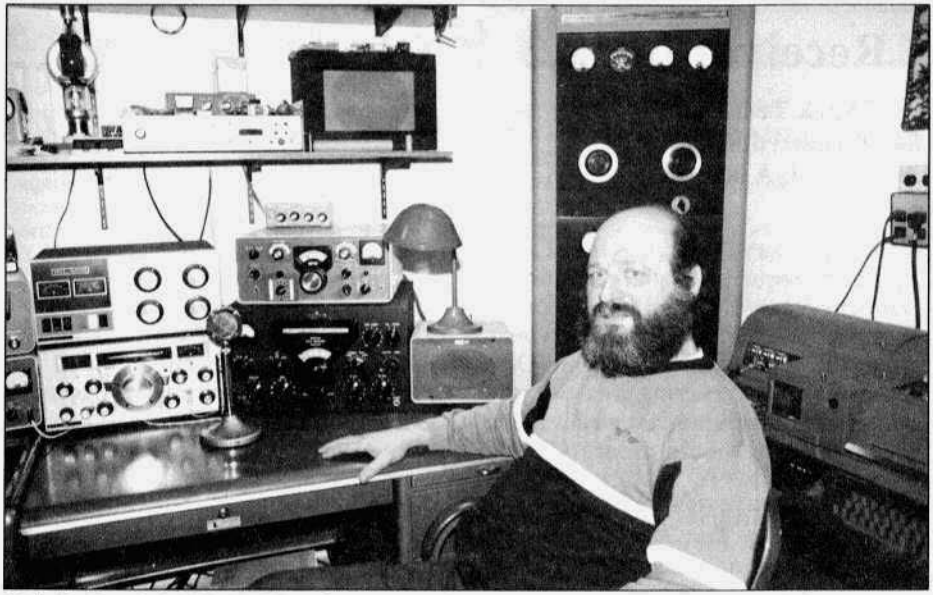
In order to avoid a stippled finish

continued on page 25

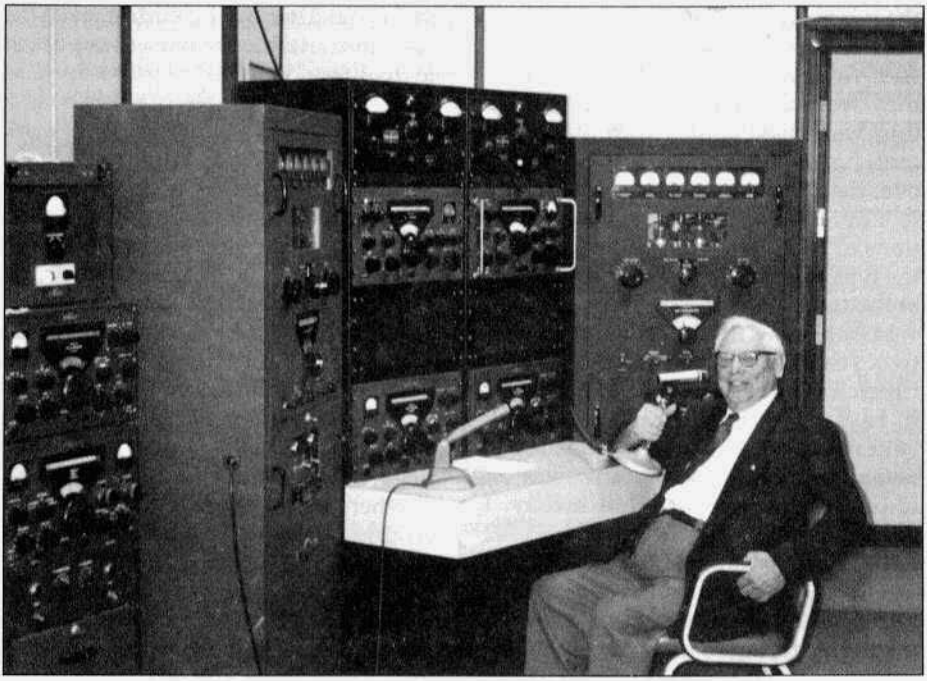
Kevin DiPeri, AA2CB. He wrote, "As I browsed through October's issue of ER I gasped when I came to Bob Login's article on the RBC receiver restoration. I acquired one of these a while ago but never knew anything about it or what to do with it. After reading Bob's article I now know the history of this fine radio. I am also almost finished restoring it as described in the article. I've been in contact with Bob and he has been most gracious in providing further details to help me."



Gary Cain, W8MFL, in his vintage hamshack that consists of Collins or HB gear.



Bob Zarkovich, KL7HDY, a frequent checkin on the K6HDY Memorial 20M AM Net, in his vintage hamshack.



Fred Hammond, VE3HC, at one of his operating positions. This photo was taken a few months back just before he suffered a stroke. Fred is still recovering. We send him our very best wishes. *Photo by Bill Gittere, K2LNU.*

Receiver Images

by Chuck Teeters, W4MEW
841 Wimbledon Drive
Augusta, GA 30909

This is not about 2 times the IF plus received frequency equals the image frequency, but is about my images of communications receivers. Maybe a better title would be "Confessions Of A Receiver Junkie". Having gone through more than 30 commercial and 3 home brew receivers should at least qualify me as a receiver addict. I got a Hallicrafters S-14 Sky Chief last year, which was my first store-bought receiver. The second time around I found the Sky Chief was not much of a receiver despite my memories, and started thinking about my receivers through the years.

Two things about the receivers I've had: first, I never bought a new one, they were always used, and second, they were used to ham with. Also, like most hams, my interests have changed over the years, from DX, to SSB, to VHF, to TTY, to AM. Therefore my expectations of receivers was slanted towards the type of operation I was interested in at the time.

I bought my first receiver in 1938, a two year old Hallicrafters S-14 Sky Chief. As I found out last year it left a lot to be desired, but I didn't know any better in '38. I had built a 2 tube regen before the S-14 so a superhet was an improvement, even on 160 meters. I added to my receiver inventory in 1942 with a Hammarlund Comet Pro. Its plug in coils allowed me to wind coils to tune to 200 kHz for carrier current. I spent a lot of time trying to work the xtal filter. I wanted narrower bandwidth to cut the power line noise, but never could. Connecting your receiver antenna terminals to the power line generates a lot of noise, but it was the only way we could communicate during the war.

When ham operation was restored in 1945 I used the Sky Chief with a 10 meter converter. I never used the Comet Pro for regular hamming. Between the Comet Pro and the Sky Chief I vowed never again to buy a receiver without calibrated bandspread and a noise limiter. Line noise on carrier current and ignition noise on 10 meters convinced me of that.

In 1947 I bought a Hallicrafters SX-24 from Vic, W8DMT. It had a noise limiter and calibrated bandspread. It also had a xtal filter but I couldn't make the rejection notch do what it was supposed to do. I found an SX-24 last year and as I remembered, found it really was a very good receiver, but I still can't work a crystal filter. When I got the 24 I was going to Kent State, which was almost next door. Then it was on to Ohio State, but the 24 was to heavy to carry, so I got an Echophone EC-3 from W8UKT. It was a light-weight AC/DC receiver made by Hallicrafters, similar to the 24 with one RF and two IF, calibrated bandspread, a noise limiter, and a crystal filter. It was a very nice receiver but it had a hot ballast tube inside and drifted quite a bit.

When I could afford a car to haul stuff around, I bought a Hallicrafters SX-43 from W9HLA at Allied Radio in Chicago. I was in school at Northwestern by then. It was a great BC receiver but not much of a ham receiver so I traded for an RME-84. It was nice but broad as a barn, no crystal filter, but I couldn't work them anyway. The RME was a well built, tough radio and like a Timex,

continued on page 39

VINTAGE NETS

California Early Bird Net: Saturday mornings at 8 AM PST on 3870.
California Vintage SSB Net: Sunday mornings at 8 AM PST on 3835
Southeast Swap Net: Tuesday nights at 7:30 ET on 3885. Net control is Andy, WA4KCY. This same group also has a Sunday afternoon net on 3885 at 2 PM ET.
Eastern AM Swap Net: Thursday evenings on 3885 at 7:30 ET. This net is for the exchange of AM related equipment only.
Northwest AM Net: AM activity daily 3 PM - 5 PM on 3875. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT. The formal AM net and swap session is on 3875, Sundays at 3 PM.
K6HQI Memorial Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 3:00 PM PT, 7 days a week and usually goes for about 2 hours. Net control varies with propagation.
Arizona AM Net: Meets Sundays at 3 PM MT on 3855. On 6 meters (50.4) this group meets at 8 PM MT Saturdays.
Colorado Morning Net: An informal group of AM'ers get together on 3876 Monday, Wednesday Friday, Saturday and Sunday mornings at 7AM MT.
DX-60 Net: This net meets on 3880 at 0800 AM, ET, Sundays. Net control is Jim, N8LUV, with alternates. This net is all about entry-level AM rigs like the Heath DX-60.
Eastcoast Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is Dennis, WA3YXN but sometimes it rotates to other ops. Saturday mornings on 1995 at 0500 ET. Will move to 3885 for summer.
Westcoast Military Radio Collectors Net: Meets Sunday mornings at 0930 local on 3975 + or - QRM, except the 1st Sunday of the month when the net meets at 2130 local. Net control is Tom, WA6OPE.
Gray Hair Net: The oldest (or one of the oldest - 44+ years) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8:00 PM EST & 8:30 EDT. URL: http://www.crompton.com/wa3dsp/grayhair.html
Vintage SSB Net: Net control is Andy, WBØSNF. The Net meets on 14.293 at 1900Z Sunday and is followed by the New Heathkit Net at about 2030Z on the same freq. Net control is Don, WB6LRG.
Collins Collectors Association Nets: Technical and swap session each Sunday, 14.263 MHz, 2000Z, is a long-established net run by call areas. Informal ragchew nets meet at 0100Z Tuesday nights on 3805 and on Thursday nights on 3875.
Collins Swap and Shop Net: Meets every Tuesday at 8PM EST on 3955. Net control is Ed, WA3AMJ.
Drake Users Net: Another relatively new net. This group gets together on 3865 Saturday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, WZ8O; Rob, KE3EE and Huey, KD3UI.
Swan Users Net: This group meets on 14.250 Sunday afternoons at 4 PM CT. The net control is usually Dean, WA9AZK.
Nostalgia/Hi-Fi Net: Meets on Fridays at 7 PM PT on 1930. This net was started in 1978.
K1JCL 6-Meter AM Repeater: Located in Connecticut it operates on 50.4 in and 50.5 out.
JA AM Net: 14.190 at 0100 UTC, Saturdays and Sundays. Stan Tajima, JA1DNQ is net control.
Fort Wayne Area 6-Meter AM Net: Meets nightly at 7 PM ET on 50.58 MHz. This net has been meeting since the late '50's. Most members are using vintage or homebrew gear.
Southern California Sunday Morning 6 Meter AM Net: 10 AM Sundays on 50.4. Net control is Will, AA6DD.
Old Buzzards Net: Meets daily at 10 AM Local time on 3945. This is an informal net in the New England area . Net hosts are George, W1GAC and Paul, W1ECO.
Canadian Boatanchor Net: Meets Saturday afternoons, 3:00 PM EST on 3745. For hams who enjoy using AM, restoring and operating.
Midwest Classic Radio Net: Saturday mornings on 3885 at 8AM Central time. Only AM checkins allowed. Swap/sale, hamfest info and technical help are frequent topics.
Boatanchors CW Group: Meets nightly at 0200Z on 3579.5 Mhz (7050 alternate). Listen for stations calling "CQ BA" or signing "BA" after their callsigns.
Wireless Set No. 19 Net: Meets the first Sunday of every month on 14.165 at 1900Z and 3760 at 2000Z. Net control is Dave, VA3ORP.
Beer Town Traders Net: On 3885, 5:30 Central Daylight Time on Saturdays.
Westcoast 40M AM Net: Sunday afternoons from 3-4 PM westcoast local time until 4-5 PM on 7160 +or- QRM.

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

A Cool KW

Part 2

by Bruce Vaughan, NR5Q
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Springdale, AR 72764

Power Supply...The first item we think of when someone mentions power supply is the transformer—right? Transformers suitable for KW linears are available at reasonable prices, though you may need to attend two or more hamfests to find one. Power supply circuits are flexible—we may start with a transformer whose secondary winding delivers voltages ranging from 500 VAC each side of center tap, up to 2200 VAC with no tap, and still arrive at the needed voltage. Full-wave, bridge, voltage doubling circuits, even voltage tripling circuits are practical considerations.

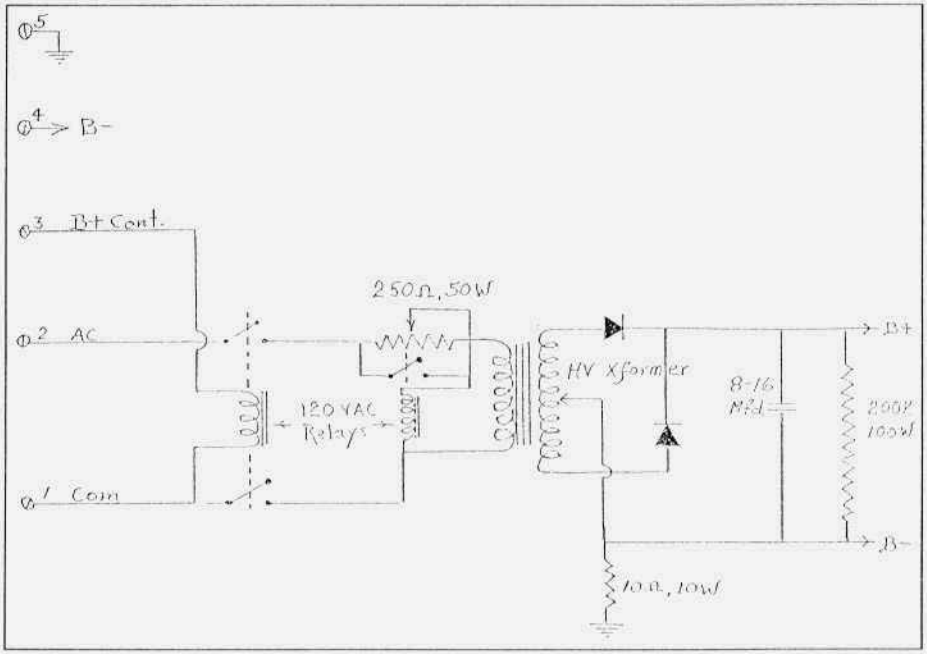
While my shack is wired for 240 VAC I prefer to build amplifiers that operate on 120 volts. Why? Well, at some time in the future all of my equipment will belong to someone else and many hams do not have 240 VAC available.

During the early years of TV many thousands of sets were delivered with transformers that will power a KW. Most of the transformers supplied secondary voltages in the 1000 volt range. By use of a voltage doubler you were close to the ideal voltage for an 813. What about the current rating? TV transformers were seldom, if ever, designed for 500 mA continuous duty. Remember that most ham usage—CW for example is intermittent duty. You can exceed the current rating on most transformers and get away with it. A very rough rule of thumb was employed by old timers to determine the current rating of unmarked transformers. Measure the thickness of the transformer core—one inch equals 100 mA.

While TV transformers may well do the job I prefer to use a heavy duty transformer. With the decline of building many nice transformers were placed on a back shelf in ham shacks throughout the country. If you do not find one at your nearest hamfest, try an ad in Electric Radio or QST. Do I have a personal preference? You bet I do! I like a nice heavy transformer delivering about 2 to 2.5 KV across the secondary, a full wave rectifier circuit, 6 to 8 mFd of filter and a 200K, 100 watt bleeder. When available I like to use a choke input. Overkill—yeah I suppose so but it's hard to go against the teachings of my old Elmers.

This brings us to rectifiers... It is commonplace to find KW amps that use a string of low-priced rectifiers in series. This may prove to be the most inexpensive way to arrive at HV rectification. Is there a better way? I think so. K2AW's "Silicone Alley" sells nice high-current/high-voltage rectifiers at reasonable prices. It is so much easier to use two rectifiers in a full wave circuit—or four in a bridge—and put this worry behind you. The initial cost may be a few bucks more than a string of 'cheapie' rectifiers but I call it an investment in peace of mind.

What about filter capacitors? This opens up a lot more choices. Good HV capacitors have all but disappeared from the marketplace. When available the cost is usually high. The practice of stringing a double handful of low voltage capacitors in series has become a popular and effective solution. This idea has a lot going for it—low initial cost, low replacement cost, plus easy avail-



Power supply schematic

ability. For the past few years a surplus new capacitor has appeared at 90% of the hamfests I've attended. This capacitor is rated at 16 mFd, at 350 volts, and is usually sold for twenty-five cents each—cheaper by the hundred. Don't laugh. One hundred of these little capacitors disappear rather quickly if you do much building.

You will sometimes find a fifty year old oil filled capacitor that may be just what you need. Amazingly, I have not had one fail in use. I was lucky enough to find an 8 mFd, 4 KV capacitor for twenty bucks at a local hamfest. It was still going strong and kicking heck out of a pair of 500Zs when I sold the amp.

Fifty year old oil filled capacitors may be a safe bet but there is no way I'd go for old paper capacitors—I've had too many of them fail. If you have not heard a filter let go in a HV circuit you have missed one of life's most thrilling experiences. The sound is not unlike firing a 45 caliber pistol about four inches from your ear.

What is that extra relay and resistance in the primary supply lead? Those two components form an 'inrush' circuit. As you all know, when voltage is applied to a fully discharged capacitor for the first few milliseconds the capacitors represent a load almost equal to a dead short. As the capacitor charges its resistance becomes higher very quickly—still there may be enough current drawn during the charging time to take out one of your rectifiers. By installing an 'inrush' circuit you lower the voltage considerably during this charging process and offer a high degree of protection to both transformer and rectifier. Though the choice is yours, I recommend that such a circuit be incorporated in your HV supply. I bought my 50-watt variable resistances from Fair Radio.

Bleeder resistors serve two useful purposes—the most important of which might be saving your life. Even with the power turned off a filter can retain a charge for quite some time--unless some

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method is used to 'bleed' off the stored energy. It is important that the bleeder have resistance low enough to discharge the capacitor within seconds, and high enough in resistance that it does not draw excessive current. Why then, you might ask, not make the resistance quite high, say in the vicinity of one meg-ohm? Even though a one meg resistor will discharge a capacitor slowly, a reasonable load on your power supply is desirable because it improves voltage regulation.

What then is a reasonable value? I prefer a 100-watt bleeder of around 200K. I've used this value in a number of HV power supplies and am pleased with the end result.

Bleeders are not always available when we need them. I have made up bleeders using smaller resistors in series—for example 10 or 20-watt ratings. It is better to apply overkill here and use a combination that results in a rating in excess of 100 watts. It is natural for a bleeder to run hot. Radiated heat is more easily controlled when using one large resistor. By placing a large resistor in the clear where air can circulate around it heat is dissipated quickly. However, when soldering up a bunch of resistors on a perf board, or some other supporting material, it is much more difficult to achieve rapid dissipation of heat.

Metering grid and plate current is a must—the days of a tail light bulb and a loop of wire are gone. This is especially true with QRO equipment. Only a rank beginner, or someone with a death wish, is going to hold a neon bulb, or bulb and loop, near the tank circuit when the power is on.

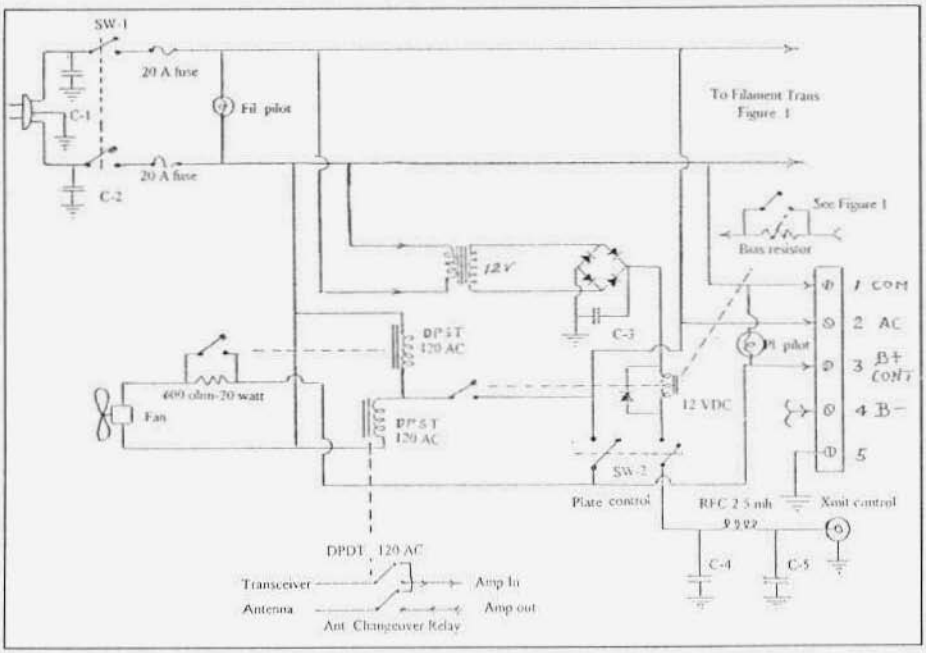
The first three-tube amplifier I constructed looked so nice as the project neared completion that I decided it was worthy of a brand new pair of those fancy square meters. I called my local supply house and placed an order for two meters in the forty dollar range. I assumed—wrongly it turned out—that $40 should buy a workable meter.

The meters arrived and were installed. Care was taken to see that the meters were carefully shielded. All metering is done in the negative lead of this amplifier—B minus floats above ground by about five ohms.

I could not get the amplifier to tune up. Try after try resulted in some of the wildest readings ever imagined. The plate capacitor seemed to have little effect as it was tuned through 180 degrees. In desperation, I resorted to 100-watt light bulb for a dummy load. It burned out when the plate capacitor was adjusted—I knew RF was being generated.

After two days or so of head scratching, I 'outboarded' two old Weston meters. Bingo! The amp behaved perfectly. I used the amp a few days with the meters resting on top of the cabinet. Everything worked so well I removed the fancy meters and replaced them with NOS surplus meters. The meters are still in the amp ten years later and working perfectly.

You old timers will find this hard to believe. Those fancy square meters that cost me $80 total were cheap magnetic vane meters. There was enough RF running around loose inside the cage to magnetize the meters—even though they were well shielded. I have no idea how little RF it took to render the meters useless. I called the manufacturer and asked to talk to engineering. I was told by their 'engineer' that since the meters were installed in home-built equipment they were not guaranteed and that my equipment was obviously at fault. That may well be, but it is good enough for Weston, Triplett, and a few other old meters left over from the war. My wholesale supplier told me that it took a lot more than forty bucks to buy a good meter. They recommended a meter that cost over $100. I passed them up. My advice—buy used or surplus meters made years ago.



Control circuit schematic.

Now that you have decided to build an amp one of the first things to think about is the chassis and cabinet. I am a great believer in using what you have if at all possible. However, if you really want to go first class buy a cab-chassis from K3IWK. This is the greatest thing I've found for building an amplifier. They are not cheap—but then they are quality all the way. In the long run they are no more expensive than buying a chassis, a used cabinet, and a new panel.

K3IWK's cab-chassis comes knocked down—and undrilled. Don't let this scare you. I've built two amps using his cab-chassis and I'll never build any other way. Here's why. You can place the chassis tray at any height needed. Say you need to mount a component under the chassis that requires a little over four inches clearance. With a standard chassis this may present a problem. Not so with the cab chassis—just place it to clear all your components before drilling any holes.

Once construction is under way the cab-chassis is a pure joy. Turn it upside down, right side up, on its side, on its back—all your components are accessible and well protected. EASY. Wiring is a snap using a cab-chassis.

Two hints... first assemble the cabinet and hold it together with duct tape before drilling holes. Second, make sure the chassis pan is positioned to accommodate your components. Hold it in place with duct tape. Check for square. Check again. Now, use a marking pencil to mark the position of corner screws. I use #6, 5/8 inch pan head (some dealers call this an oval head) sheet metal screws for cabinet assembly. Once the corner screws are in place, check for square again. Now, divide the distance between screws equally and mark the other screw holes. I recommend screws no more than four inches apart for the top and bottom—closer is better.

Second hint... it takes a lot of hardware—sheet metal screws, machine screws, nuts, and locking washers—to build an amp... a lot more than you

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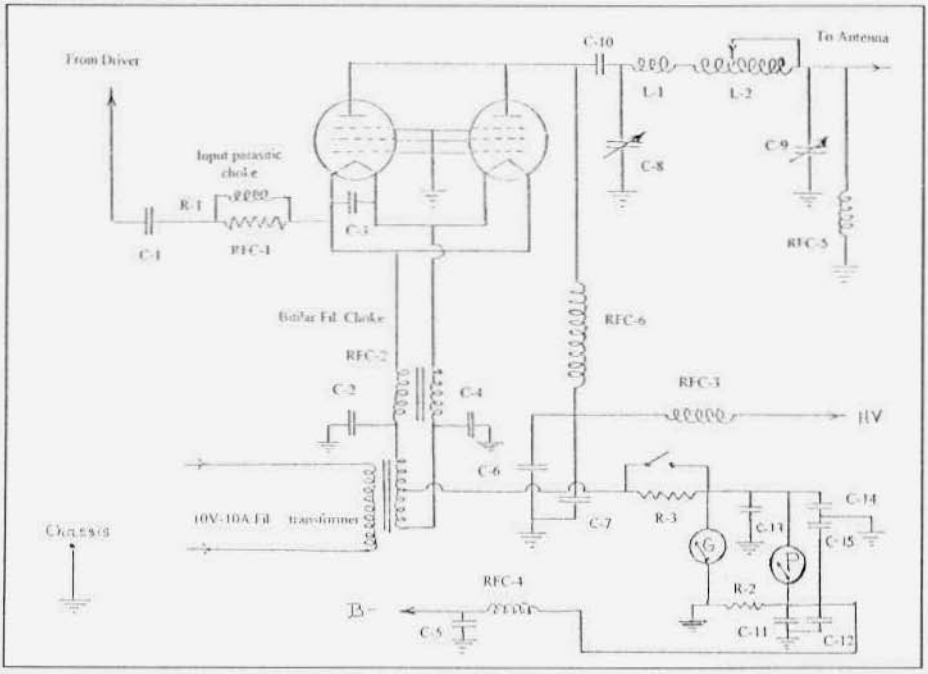

813 linear amplifier schematic.

would believe. Don't buy your hardware in those little blister packs. Go to a professional nut and screw store. For six to eight bucks you can buy all the hardware needed. If bought in blister packs it would cost ten times as much. One thing to remember, most of the professional stores do not like to sell in small lots so even if you only need a dozen of a certain size screw, go ahead and get 100. One hundred at a nut and screw store will cost less than a dozen at a home supply store.

Conclusion

I am never satisfied with any of my construction articles. If you go into great detail you bore old timers. If you do not go into detail you may leave some newcomers with unanswered questions. If you drop in some ideas that depart from precise engineering practice you are a lid. If you leave out such experiences you may cost a builder big bucks—like the meter story above. What to do? I tell it like it is. The ideas I have presented have worked for me for many years. I hope some of them are of value to you.

At the beginning of this article I promised to list a few safety rules near the end. These are rules I have practiced since my big jolt back in 1947. Even so, I have been close to becoming a silent key more than once since then. Just when you think you have the answer, electricity has a bad habit of finding another route through your body.

1. **NEVER** trust any component to work properly. Keep in mind that bleeders can open up, switches fail to turn off or on, transformer windings can short to ground. Perhaps a better way of saying it is: **DO NOT** assume anything.
2. When working on equipment first **UNPLUG** the item under test. Now think... how many cords and plugs do you have running all over the place. Make sure, then double check, that the plug you removed from the wall is the one supplying power to the gear under test.

Here is my method. Tie or tape a 24 inch strip of red ribbon to the power plug. When you pull the plug from the wall tie the plug to something at eye level above your workbench. Make sure you see the plug tied up before reaching inside.

Keep **TWO** good heavy jumper wires handy. When the cover is removed from your gear clip one end of a jumper to the chassis. Connect the other end to a good earth ground. Now, connect one end of jumper number two to the chassis, and strike the other end of the jumper to the HV supply. If no sparks fly, connect the jumper to the HV supply line.

It is now safe to proceed.

3. When operating, all gear should be well grounded...at all times.

4. If you must shoot trouble with the power on keep one hand in your pocket when making voltage measurements. Do not give the juice a direct path across your heart.

5. Expect the unexpected.

I could list a lot more rules but if you follow these few you stand a good chance of being around for the next cycle.

If you have questions my E-mail address is NR5Q@AOL.COM. Those requesting help or making comments by snail mail please enclose SASE. **ER**

Touchup Techniques from page 15

(similar to "orange-peel") it is usually necessary to thin the paint much more than recommended by the manufacturer. I have spoken to automotive refinishers, and they also confirm the need for additional thinning. I will bet the EPA does not allow the manufacturers to recommend additional thinning because of its effect on the environment. I usually add somewhere between 25 and 50% thinner just before spraying. Do not forget to use the right kind of thinner for the paint you are using.

Spray several light coats so that the paint will not run. I am always tempted to rush things along and put on too much at once, or put on another coat too soon (yeah, guess I'm a type A personality). Go slowly! It is really depressing when you see the paint start to sag on one side of your otherwise great looking cabinet. Then it is back to the sandblaster to start all over again (remember my Mohawk cabinet?). Spray with long even strokes which reach all the way across the cabinet. Do not spray in a circular or haphazard direction.

Avoid rubbing the final finish unless it is high gloss. If there are foreign objects like lint in your paint job, don't be tempted to try to rub these out with rubbing compound. This only works well on a reasonably glossy surface. Satin finishes cannot be salvaged except by light sanding with No. 600 wet-or-dry sandpaper and then repainting the entire surface. I have ruined an otherwise great satin finish trying to eliminate one small bit of lint in the paint by rubbing it out with rubbing compound. Unless there is a lot of foreign matter in the finish, it is best to just leave it alone.

Give It A Try

I hope this article will inspire you to give boatanchor refinishing a try. It is really a lot of fun and does not require any special technical expertise. You will be surprised how good you will be able to make some of your old rigs look. Best of all, by carefully preserving the original look of the rig, you will be helping to preserve a bit of radio history. You will also own some rigs that you can be extra proud of because you did the work yourself. **ER**

The Hallicrafters SX-43

Part 2

by Jim Hanlon, W8KGI
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Finally, after two half days of unsuccessful poking around, I had to put down my toys and go to a wedding. While the bride and groom were exchanging their "I do's," it suddenly hit me. The bands where the local oscillator was dead were the same ones where the rear section of the bandspread capacitor is connected directly in parallel with the main tuning cap. On the AM broadcast band it is disconnected. On the FM broadcast band the other section of the bandspread capacitor is switched in and all other capacitor sections are disconnected. And on the 3a band, a padder capacitor is placed in series with that bandspread cap. So... look for a short in the local oscillator bandspread cap or in the switch associated with it!

Voila, the bandspread cap itself read 1.6 ohms to ground!

There was nothing immediately obvious that might be causing the problem. So out with the Big Bath again and wash the whole darned capacitor section down. The short went away! Now it reads more than 30 megohms on my DVM. I'm pretty sure it was due to accumulated California gunk on the upper stator insulator. That wouldn't happen to a New Mexico receiver. Our dust is too dry to be conductive. But most importantly, the SX-43 is back to playing sweet music again on 40 CW and such.

So much for the joys of restoration. Now let's go on to a few things about the design of the SX-43 and how it works compared to several of its 1947 competitors. One of the reasons I've been happy to finally re-acquire an SX-43 is that I now have completed my goal of gathering all four of the late 1940's, mid price range communications receivers together. As a young ham in the 50's, I got to be very good friends with that HQ-129-X[2] at my high school radio club, I ran an NC-173[3] that anchored my brother's station at our fraternity house room at Ohio State, and of course I later had my own SX-43 and Elmac AF-67 there too. The only one of the four that I didn't meet up close and personal until recently was the RME-45[4]. Now that I have them all together again, I can make a side by side comparison.

Unlike Hammarlund and RME who just rolled out post war cosmetic updates of their 1941 designs, Hallicrafters broke new ground with the SX-43 and with its SX-42 big brother. Both receivers have IF transformers with dual tuned circuits in series, one resonant at 455 kc and the other at 10.7 mc. For AM/CW reception on the four ranges between 550 kc and 44 mc, the SX-43 circuit is that of an ordinary, single conversion superhet with a tuned local oscillator. The only unusual thing is that its 455 kc crystal filter is between the first and second IF stages rather than being between the mixer and the first IF as in its contemporaries. Perhaps it is there because of the relatively low gain of the 7F8 triode mixer. In any event, this crystal filter is adequately sharp and suitable for CW reception, and it has a functional phasing notch. On band 5, 45 to 55 mc, and band 6, 86 to 109 mc, the first IF frequency shifts to 10.7 mc. FM signals on these two bands are piped out of

Text continued on page 28

THE Model SX-43 is designed for the discriminating amateur who demands excellent performance and wide frequency range at a medium price. This new member of the Hallicrafters line offers continuous coverage from 540 kilocycles to 55 megacycles and has an additional band from 88 to 108 megacycles. AM reception is provided on all bands except band 6, CW on the 4 lower bands and FM on frequencies above 44 Mc. In the band of 44 to 55 Mc., wide band FM or narrow band AM just right for narrow band FM reception is provided.

One stage of high gain tuned RF and a type 7F8 dual triode converter assure an exceptionally good signal-to-noise ratio. Image ratio on the AM channel on band 5 (44 to 55 Mc.) is excellent as the receiver is used as a double superheterodyne on this band. The new Hallicrafters dual IF transformers provide a 455 kilocycle IF channel for operating frequencies below 44 megacycles and a 10.7 megacycle IF channel for the VHF bands. Two IF stages are used on the 4 lower bands and a third stage is added above 44 megacycles. Switching of IF frequencies is automatic. The separate electrical bandspread dial is calibrated for the amateur 3.5, 7, 14, and 28 megacycle bands and in addition is used to tune the 44 to 55 and 88 to 108 Mc. VHF bands, the main tuning gang being disconnected on these frequencies.

Every important feature for excellent communications receiver performance is included in the SX-43. The crystal filter and expanding IF channel provide four variations of selectivity on the lower frequency bands. Temperature compensation for freedom from drift, series type noise limiter, permeability-adjusted "microset" inductances in the RF circuits, separate RF and AF gain controls, color coding for simplified operation by the entire family, beautiful styling, all destine this new Hallicrafters receiver for top place in the moderate price field.

From the 1947 ARRL Handbook

the second IF and into a 10.7 mc ratio detector. AM reception on band 5 is accomplished by turning the 6J5, 455 kc BFO into an 11.115 mc second conversion local oscillator and by mixing that signal with the 10.7 mc IF signal in the 6SH7 second IF stage to produce a resulting signal at 455 kc for injection into the 6H6 AM detector. So, for about the same price as an RME-45, HQ-129X or NC-173, the SX-43 gives you AM/CW reception on all bands through 10 meters, AM and wideband FM (but not CW) reception on 6 meters, and FM on the "new" 88 to 108 mc FM broadcast band. What's more, to make it "family friendly," all you have to do to receive the AM broadcast band is to set all of the controls to the red marks on the panel and tune with the main tuning knob. To receive on the FM broadcast band, you set things to the green marks and tune with the bandspread knob. Really pretty clever, and a lot of function squeezed out of only eleven tubes, and good looking on top of it all! Speaking of tubes, the SX-43 was also a step ahead of the crowd incorporating a miniature 6BA6 as its RF amplifier tube and a low loss, low noise loctal double triode 7F8 as its mixer and local oscillator. That was much less noisy than the 6SS7/6K8 front-end combination used in the HQ-129X. Unfortunately, Hallicrafters didn't include an "antenna trimmer" to peak the tuning of the RF stage.

But while the engineers at Hallicrafters came through with some nice circuit improvements and wrapped them in a pretty package, they cut a few other corners that may have been responsible for the SX-43 not selling to hams as well as its Hammarlund, RME and National competition. As I mentioned earlier in this tale, the SX-43 is mechanically flimsy. The top of my workbench is a sturdy, two-inch thick slab of plywood. Yet when I put the SX-43 on the bench and slapped the underside with my hand, a signal on 40 CW bounced well outside of the crystal filter peak. The tuning mechanism in the SX-43 is a string drive, quite adequate for a BC band set but a little too "loosey goosey" for serious amateur work. Eventually, as in my receiver, the string will polish the shaft so smooth that it begins to slip, and then the user has to wrap a piece of paper or cloth friction tape around the shaft to recover friction. Also, the bandspread tuning on the SX-43 is quite skimpy. All of 40 meters, for example, is covered in just 4 1/4 turns of the 1-1/2 inch diameter bandspread knob, resulting in 20 inches of bandspread on this band. In contrast, the NC-173 offers 34-1/2 inches of bandspread, the HQ-129X, 44-1/4 inches, and the RME-45 with its two speed "cal-o-matic" vernier dial a fantastic 95-3/4 inches. Even the BC-348 with its geared down general coverage tuning gives 46-3/4 inches of 40-meter bandspread. So the SX-43 has, in general, the worst bandspread by far compared to all of its competitors.

I've also noticed that this SX-43, like its buddy back at St. Xavier High, blocks up on strong CW signals. The CW note squawks and goes to zero beat as if the bfo was being pulled to the frequency of the incoming signal. In this respect, the SX-43 behaves a lot like an overloaded regenerative receiver. My particular receiver also tends to wander around in frequency a bit. Whereas its 1947 cousins drift monotonically for a while and then settle down, the SX-43 continues to move around a bit on its own after the normal thermal drift has stopped. My guess is that fifty year old lightweight construction just isn't as electrically stable any more as the more sturdily built competition. In the middle 50's, dealers like WRL and Henry Radio who made a regular market for reconditioned, used receivers sold the SX-43 for $99 to $129.

Judging from the numbers of receiv-

ers that show up at hamfests these days, the HQ-129X was definitely the most popular, best selling of the bunch. Built from 1946 through 1953, it was the longest runner of them all. It offered the best bandspread of the group, covering the BC band to 30 mc in 6 coil ranges and employing triple-section bandspread and general tuning capacitors to optimize ham band coverage. Its tuning mechanism is coupled via solid, anti-backlash loaded gears. It is mechanically sound, has low warm-up drift and sufficient BFO injection so that it doesn't choke up on strong CW or SSB signals. Its three IF stages, properly aligned, offer the best skirt selectivity for AM reception, and its crystal filter is the sharpest of the group with an excellent phasing notch. On the minus side, it came with chintzy tuning knobs, which almost everyone replaced—where did all the originals go? Its noise limiter works well on phone but not at all on CW, and its S-meter tops out at S-9 with no room for "dB over 9." Its 6SS7/6K8 front end is probably the most noisy, least sensitive of the bunch, although its "antenna trimmer" compensates somewhat by peaking the RF stage tuning on the operating frequency. In the mid 50's used equipment ads it was consistently the most expensive, selling for $159 to $169 against its original purchase price range of $129 to $239. My HQ-129X is one of my two favorites from the group.

My other personal, on-the-air favorite from the group is the National NC-173. Like the HQ-129X, it is also mechanically solid, has low drift and good BFO injection. Its skirt selectivity is typical of the other two-IF receivers, and its crystal filter is sharp and has a very effective phasing notch. It covers the broadcast band through 10 meters in five coil ranges and 6 meters in a sixth range. Its bandspread is more than adequate, and its mechanical tuning mechanism is solid. Its outstanding noise limiter is the same circuit found in the NC-183 and the HRO-7, 50 and 60. It clips both positive and negative peaks, the clipping threshold is set by a front panel control, and it is highly effective on both CW and phone. It has an RF derived AVC circuit that is not influenced by the BFO and that can be used on CW as well as on phone. A little modification to give it a fast attack, slow decay characteristic would make it ideal for SSB. Its 6SG7 RF amplifier with an antenna trimmer and its 6SA7 mixer combine to make a fairly sensitive front end. It has a tone control and a phono input to the audio amplifier. Its S-meter is calibrated to 40 dB over S9 at full scale. Its sculpted cabinet and chrome skirted knobs make it the best looking of the bunch in my opinion. On the negative side, the long decay time constant of its RF gain control line—inherent to its AVC circuit—makes it incompatible with my favorite CW QSK control circuit. In the used equipment ads, the NC-173 generally sold for $125 to $149.

The RME-45 generally brought up the bargain basement in the used equipment market, going for $89 to $99. While it is a respectable, mechanically stable receiver, its loctal tube front end is reasonable sensitive, and it does have a tone control, it comes up short against the competition in most other areas. It has no antenna trimmer for peaking the front end. The crystal filter on my receiver has little or no phasing notch. Low BFO injection leaves very little dynamic range from a weak signal to a blocking signal on CW, and SSB is difficult to copy. The noise limiter is useless on CW. My receiver has considerable warm-up drift. While that would only be an annoyance on the other, bandset/bandspread receivers in this group, where I can simply reset the bandset capacitor slightly to make the ham band calibration accurate, it's more of a problem with the RME-45 since it has only

continued on page 38

Rebirth of a 1929 Transmitter

by Richard Oliver, KC9GQ
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My part in this story began one day in 1961 with my father, Jim Oliver, W9RDW, in the garage of our new house. I was twelve and had been enthralled with radio as long as I could remember. Wonderful radios, antennas, components, and things I couldn't identify had come out of storage and now filled the shelves lining the garage.

My eye fell on a wooden construction perched high in one corner. It looked like a small chair, though it was too small for a child and too big for a doll. It was very angular; if it was a chair it was a most peculiar one.

"Dad, what's that little chair?"

He looked puzzled, then followed my gaze and smiled "Well, that's my first transmitter." He went on to explain that it had used a pair of 201's and that he was planning to restore it.

Time went by, I graduated from Purdue and moved to Arizona. We lost my mother in 1986, and then in 1989 the call came from Dad's doctor. It had been a massive heart attack.

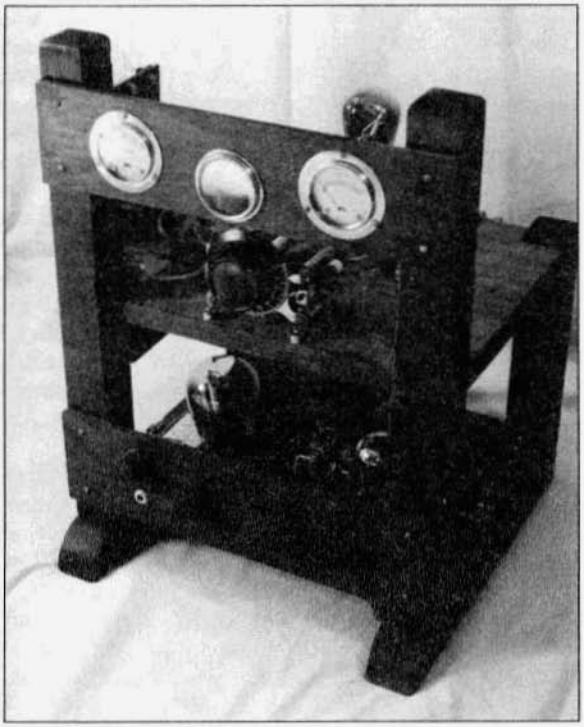
My wife and I returned to Indiana for the funeral and the onerous task of closing the estate. Dad had never begun the restoration of his transmitter so the job would fall to me, and my first close inspection showed that the job would be a big one. All that remained was the wooden frame with one Fahnstock clip and a small jumble of bus wire with a couple of resistors. A single bolt held the jumble to the frame, so I removed it and packed it in a box with other radio artifacts for safety. The frame had been water-damaged and was covered with layers of dirt and worse, and the steel screws had rusted badly leaving the joints loose. Most of the circuitry was simply missing. I put the frame in the "Arizona" pile and planned to sort it out later.

Murphy is no stranger here and this time he played a particularly nasty trick. The box with the jumble of wire was the only one that failed to reach Flagstaff. The surviving circuitry was now meager indeed—one Fahnstock clip resolutely clinging to the corner of the frame.

I set about examining all the remaining clues. There was Dad's first logbook, most of his early QSL cards, and the frame itself. I also had my memory of the few conversations with Dad about the transmitter. He had told me that it used a pair of 201's—at least I think he said 201's—and he had definitely said a pair. Was it a push-pull circuit? I photographed the frame, then disassembled it and cleaned off the grime. Several pencil marks emerged suggesting which holes might be related to one another.

Dad's old QSL cards caught my attention next because I thought they had been lost with the missing box. In fact it appeared that I had most of them. They are fascinating in their own right and tell of the equipment used by the hams Dad worked, but they tell nothing about Dad's gear. That "dope" would have been on the outgoing cards. Did any survive? I put a note in *"Strays"* asking to get in touch with anyone with such a card and then went to work on the logbook.

Dad's logbook contains a wealth of information. He was licensed as W8CPW on March 1, 1930, and his first log entry was a March 8 QSO with Ken Hanifan, W8CLH. Ken was the other ham in Dad's hometown of Waterville, Ohio. Dad had told me many times



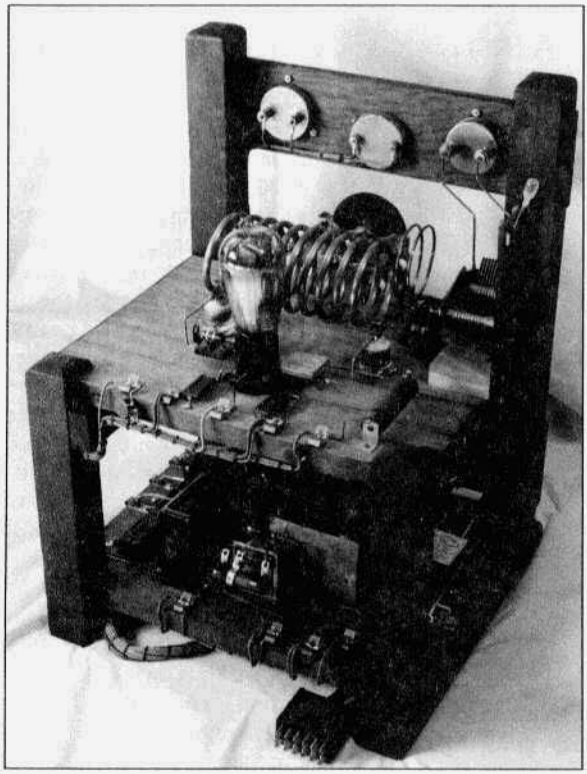
Front view of the restored 1929 transmitter.

about Ken's shack, his Windom antenna, and his marvelous gear. Ken had a profound influence on my father—was his "Elmer" in modern parlance—and it was no accident that Dad's first QSO was with him. The logbook continues to list 56 QSOs, the last on February 2, 1931. The first 44 QSOs were with 7.5 watts on 80M CW, the last 12 were with 2 watts on 80M and 40M, CW and phone. The two groups of QSOs are separated by a gap of five weeks with the notation "built new transmitter and receiver during this time." Was this the transmitter I hoped to restore? If so and Dad considered it his first, what was he using before? I was finding a few answers but more questions.

Armed with the logbook and a 1991 Callbook I set about looking up the stations Dad had worked. Most were absent from the Callbook but about a dozen were there and I sent a letter to each. Most replied that they had received their calls later and wished me luck. Three were the same hams Dad had worked in 1930 and 1931, still active with the same calls more than six decades later. Two of these sent me copies of Dad's QSL card with the information I sought. The first QSL was to W8AYJ on September 21, 1930 and it lists a UX-245 Hartley transmitter. The second on February 2, 1931 (after the "new transmitter" notation) was to W8AQB and lists a CX-301-A running 2.5 watts. The CX-301-A could easily be the "201" Dad told me about, but it is a single tube, not a pair. Once again I had a few answers and more questions.

My next stop was QST since it seemed likely that Dad would have used it for his transmitter project. My QST collection goes back to 1926 and I worked my way through it looking for anything Dad might have used. I learned a lot about Hartleys and modulated oscillators and even found a few transmitters with frames that resembled Dad's, but none of them matched the little I knew about the old rig.

In 1992 I learned about the computer-based national telephone listing and used it to track down several old friends. Then it hit me, what about Ken Hanifan? I found him in Fort Wayne, Indiana, just an hour up the road from my hometown of Wabash. I called and yes, it was the same Ken, now operating as W9GGQ. Through letters, phone calls and visits I have come to know Ken, at least a little bit. He is an accomplished artist, a voracious reader, and an enthusiastic ham and homebrewer. He may



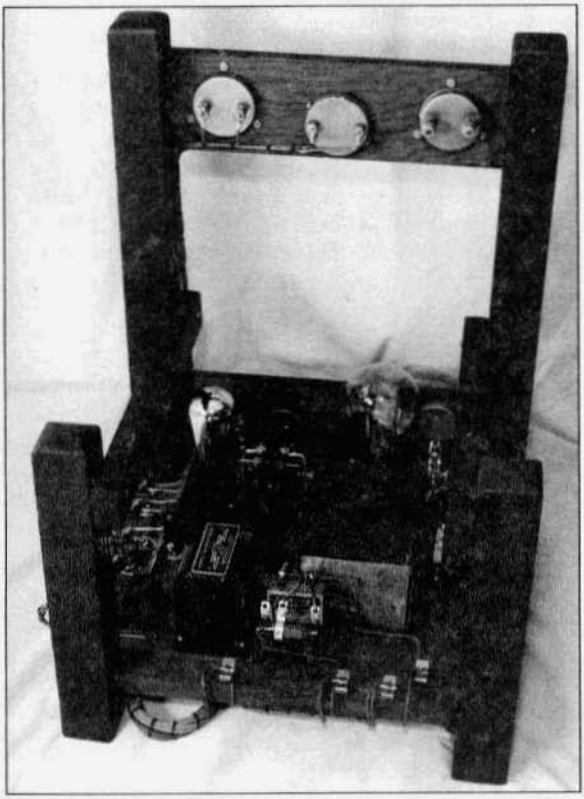
Rear view of the 1929 transmitter. RF deck is on top, modulator deck is below.

have started with spark but he has stayed abreast of technology; when I first visited Ken was just finishing up a homebrew spectrum analyzer! Ken was able to give me invaluable details about the old transmitter; it had an upper deck, it used Heising modulation with an RCA dual choke, and it used Readrite meters. I also learned that the hardwood for the two decks came from the remains of an old mill outside Waterville. That mill must have been built when the canals were new; it is sobering to think that part of the transmitter is over 150 years old!

After my first talk with Ken I inspected the frame for evidence of an upper deck. I found faint scrape marks in one corner where it had been a tight fit; Ken knew what he was talking about. I had missed it because there were no screws securing it in place. The choke had been sitting there in the garage, but I had not recognized it for what it was and had not saved it. Ken had bought the original choke through an ad in QST and with his help I would find another. I found the ad, Ken verified it, and I obtained another choke through an ad in Antique Radio Classified.

The transmitter has an upper front panel with three meter holes, but what meters belonged there had been a mystery. Ken's recollection of Readrite meters sent me digging through the junk boxes. What I eventually found was a 30-mA plate milliammeter in a homebrew transmitter built around a type 42 tube, probably in the late 1930's. I suspected that it had come from the older transmitter and close inspection showed that it fit the center hole. It is held in place by a metal band that is clamped around the body of the meter, then secured by two bolts through the panel. Two faint indentations in the back of the plywood panel match these bolts precisely. I had my plate milliammeter—the second original component.

At about this time I recognized a serious error in my investigation. The QST's I had checked were from my own collection, but what if Dad had made notes in whatever article might have inspired the transmitter? I had never known Dad to mark up a book or magazine in any way, but I was coming to understand that this transmitter was not built by the man I knew as my father. It was built by a sixteen-year-old high school



Rear view with RF deck removed. The large brown choke behind the UX-250 modulation tube is the Heising modulation choke. It was from a Radiola 17.

kid with boundless enthusiasm and a shoestring budget. I quickly dug out Dad's QSTs and started the search anew.

My hunch was soon rewarded in the April 1929 QST. There on page 12 in a Ross Hull article on radiotelephony, Dad had carefully pencilled in a ground return on a schematic. The circuit was a choke (Heising) modulated Hartley with a UX-210 oscillator, a UX-250 modulator, and a UX-201 speech amp. Besides the discrepancy in tube types and number the circuit looked right. Conformation soon appeared in the same issue in the form of scraps of paper with the schematic and a list of parts. More such notes turned up in the October 1930 QST, the month the transmitter was built. The pieces were clicking into place. Dad probably could not afford the 210 and the 250, but he had plenty of good '01's discarded by the local radio repair shop. He may have intended to upgrade to the bigger tubes later but it never happened.

It was time to consider what I would do with this transmitter when the restoration was complete. The high-C Hartley RF deck is a good start, but the Heising modulator is inefficient, prone to distortion, and when used with a self-excited oscillator it produces FM as well as AM. Ross Hull considered it woefully inadequate by the standards of the day and included it in the article as an example of how 'phone should not be done. Dad may have come to agree with Mr. Hull. After five weeks of construction the transmitter was used for just two months for a total of twelve contacts.

None of this really mattered though, so long as all I had was a meter, a choke, and a Fahnstock clip. It was time for a comprehensive search for original components that might have escaped my attention. October 4, 1993 is circled on my calendar because on that day I found one final unopened box from Dad's garage, and inside it treasure! I recognized immediately the mostly intact RF deck of the transmitter. There was the tube socket, the plate choke wound on a wooden dowel, the plate blocking capacitor, the grid capacitor with clips for a grid leak, filament resistors and capacitors, Fahnstock clips, filament clip, and one coil support. Also in that box I

Text continued on page 35

1929: A Critical Year For Ham Radio

You may have seen references to a "1929 transmitter" or a "1929 signal," or perhaps you've noticed that the Antique Wireless Association sponsors the "1929 QSO Party." The choice of the year 1929 is not arbitrary; the terms originated in 1928 in response to the greatest crisis ever to confront Amateur Radio. In late 1927 the International Radiotelegraph Conference met in Washington, D.C. to work out treaties to control the various radio services and make new rules. The United States, Canada, Australia, and New Zealand saw amateurs as an asset and worked to protect their interests, but that view was not shared by the other 48 participating countries.

Things did not go well for Amateur Radio at the Conference and the full alarm was sounded in an editorial in the December 1927 QST:

" ...Our chances for decent privileges are mighty slim and we wanted to tell you about it now, so that you can get ready for a jolt that will blow everything in sight."

" ...If we can succeed in carrying home from this conference as much as 40% of the frequency widths we now enjoy in this country, we will regard ourselves as the most smiled-upon children of Fortune. Five percent is a much better guess at what we'll get."

" ...It seems inevitable that we will get cheated out of a lot that we have thought ours, a lot that we have regarded as essential. But whatever we get, we can find a way to carry on with it, somehow. It may alter the game entirely, it may require new methods and a new order of cooperation amongst ourselves. But it may prove to be exactly what we need to inject vim into a game that threatens to stagnate... We've positively flourished under difficulties before. Perhaps what we need is a fresh lot of difficulties so we can do some more flourishing." [1]

If that last comment sounds insincere, perhaps it was. Hams were accustomed to using a full 4 megacycles of the radio spectrum below 16 megacycles, plus 8 megacycles in the 5M band. Now the pessimists were predicting that in 1929 it would shrink to a total 600 kilocycles or less. [2] Things would have to change if Amateur Radio was to survive.

From a technical standpoint Amateur Radio was not prepared for the impending crunch. Crystal oscillators and MOPA circuits had recently been adopted by commercial operators and a few hams, but the great majority continued to use rigs that were just one step beyond spark. These were self-excited oscillators in the Hartley, Colpitts, and tuned-grid, tuned-plate configurations. Power supply filtering was often inadequate or missing, and proper transmitter adjustment was the exception. The resulting array of buzzing, rasping, chirping and drifting signals in and near the ham bands was quite a cacophony, according to contemporary reports. Clearly something would have to be done to clean up those signals if they were to fit into the much-reduced bandwidth to be available in 1929.

QST continued to report the unfolding story of the Washington Conference as the League did what it could to deal with the situation. Operational changes were proposed to preserve both long-haul and short-haul communication, [3] the importance of station monitors was stressed, and the League announced the formation of the Technical Development Program to see what could be done with the hardware. [4]

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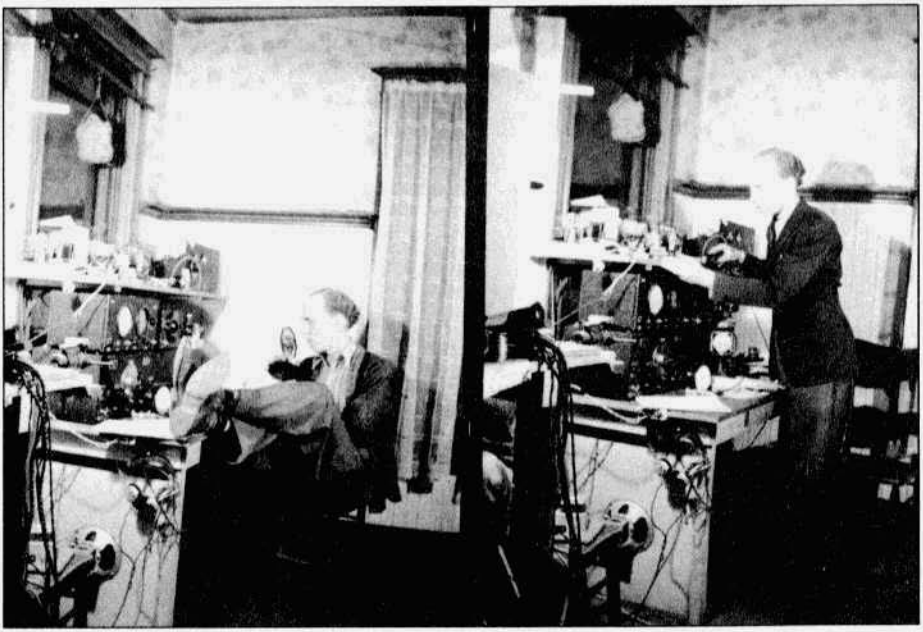

W8CPW shack, 1937. Note the Hallicrafters 5-T and SX-15, the cannonball 'Dixie' headphones and straight key. All other gear is homebrew. *Photo by James Oliver, W8CPW.*

found a Readrite meter which had been modified as a hot-wire ammeter and calibrated optimistically in RF amps. It fits the left-hand meter hole and sits adjacent to a small, Bakelite panel that supported the feedline connections, antenna coil, and loading capacitor. I remembered packing it all up but at the time I didn't guess that it was part of this transmitter; it was just too interesting to leave behind.

The mounting holes for the tuning capacitor made it easy to recognize and I found it with a quick search. It still had the mounting brackets, knob, and fiducial pointer attached, and there were copper straps attached that fit exactly to the coil supports. It is a General Instrument "NOLOSS" unit of about 400 pF capacity—perfect for a high-C Hartley. The capacitor had been supported by standoffs that eventually surfaced among some old hardware, recognizable by the marks they had left on the wood deck. The tank coil was gone so I built several following Ross Hull's instructions.

The coil support caught my attention next. It had been fashioned from the glass body and porcelain insert of a screw-type fuse and was held upside-down against the wooden deck with screws. A bolt protruded from the top to secure the coil and the whole affair was held together with Burgundy pitch. I cannot think of a finer example of Depression-era homebrewing than this. The broken pitch was replaced and a second support was fashioned from a matching antique fuse. (I'm trying to abbreviate this account; locating the pitch and a matching Sterling fuse actually took years.)

The bus wire connecting the works is a mixture of round and square and it has been clipped in several places next to solder joints. The transmitter was being cannibalized for parts, not disas-

continued next page

sembled for repair. This was done to the RF choke and it took me some time to realize that there was another story here. The severed bus wires did not match up with the remaining pieces on the deck. I finally realized that they would match up if the choke were removed and turned around, yet it could not be turned around because the mounting brackets would only fit one way. The choke had been clipped out of the circuit and removed from the board, disassembled, reassembled backwards, and screwed back to the board. Had Dad begun the restoration after all?

On a second visit Ken provided me with several photographs from 1930. None show the transmitter as I know it, but one snapshot does include a simpler, breadboard transmitter that Dad had built. I blew up the photo and carefully measured everything. There was the "NOLOSS" capacitor, the oscillator tube socket, the plate choke (before being cut short), the fuse-base coil supports and even the filament clip. It was an earlier incarnation of the rig I was restoring! Ken explained that parts were hard to come by so it was common to recast the same parts in different configurations. In the configuration shown in the photo the socket had held a UX-245. This is the rig Dad used to work W8AYJ. Now I understood how this could be his "first" transmitter. Beside it in the photo was a Hartley transmitter built by Ken on a wooden frame that clearly influenced the final form of Dad's transmitter.

The Bakelite panel that held the antenna coil and capacitor had been broken; I used it as a template to make a new one. A search for the antenna capacitor produced several with the right mounting holes, so I selected one that looked right and mounted it. That left the antenna coil, of which there is no trace. Apparently it mounted to the Bakelite panel and had to be bent for adjustment. I knew from the QSL card to W8AQB that the original had been used to feed a single wire with relatively high impedance. To use it in my shack I need a 50-ohm, unbalanced feed, so I built a second panel with larger loading capacitor and adjustable antenna coil for use on the air.

The RF deck was now ready to smoke test. As I brought up the B+ I was elated to see that the plate blocking capacitor was still up to the task, but the readings didn't look right and it was making a raspy, unstable note. A quick check revealed lots of unwanted spurious VHF oscillation. The usual cure for this is a small resistor or choke in series with the plate, but I was not willing to make such a change. That part of the circuit was original and complete and I didn't want to modify it. After much head scratching I took a small toroidal core and slipped it over the plate pin of the tube. The spurs disappeared.

On October 24, 1993 I made an attempt to use the old rig. I answered a CQ from KD6NI'A on 40M CW and he became the first ham to hear it on the air in over six decades. He reported a bad chirp but tuning was the real problem. I had to nudge the tuning until it landed in a good part of the band then wait for Chris to come along with his CQ. The rig wasn't ready yet.

The tuning capacitor is almost fully meshed on 40M and the entire band goes past in about 1/4 inch of motion at the dial skirt. Hand capacity also had a huge effect on the frequency. I had to stay at least two feet away to avoid detuning—a severe limitation on operating to say the least! In the end I applied a copper sheet to the bottom of the RF deck and tied it to RF ground. I also mounted a small vernier tuning capacitor on a removable bracket. Tuning is still a challenge but at least it is possible now that I can get close enough to touch the knobs.

Another quirk of the self-excited oscillator surfaced when I loaded it into the

The author's shack in 1997. The restored high-C Hartley transmitter is in front of the author. Note that the Hallicrafters 5-T and SX-15 are the same receivers that appear in the 1937 photo of W8CPW's shack.

antenna. As my dipole moved in the wind it detuned the tank circuit and caused the frequency to wander. After I tied the end of the antenna coil nearest to the tank coil to RF ground this effect diminished considerably. I still need calm weather to operate comfortably, though.

The modulator board was nothing less then a 3-D jigsaw puzzle with an unknown number of mostly unknown pieces to be assembled into an uncertain pattern. By use of deduction, induction, and lots of trial and error the surviving components were identified and took up their old positions on the modular board.

Few parts from the original power supply have survived but this is a mixed blessings. It allowed me to keep a clear conscience as I designed and built a modern supply with all eight (yes, eight) voltages properly filtered, regulated, and decoupled. Such a supply is critical in making the transmitter usable today.

At long last all the pieces were in place and on February 3, 1996 I contacted K7BDY in Show Low, AZ on 80M AM. Martin's comments left no doubt that the 1920's state of the art left plenty of room for improvement, but at least he could understand me. Because of this (and because I have only one '50) I reserve AM for special occasions.

The high-C Hartley rig is truly a 1929 transmitter (see sidebar on page 34) even though it was built in 1930 and uses a modulator designed in the mid-1920's. It lives in a place of honor—front and center on my operating desk. Above it is a remarkable footnote to the story. It is an SWL card from South Australia reporting an "R7, FB" signal from W8CPW on December 14, 1930 . At that time the rig was new and Dad was still trying to make the first contact with it. He would not succeed for another five weeks, but that afternoon his CQ with 2

continued next page

watts on 40M CW was definitely getting out! Ironically, he noted in the log "can't raise anyone—going back to 80 meters."

The restoration eventually returned the rig to about 75% to 80% original, the only nonreversible modification being extension of one shallow hole through the modulator deck. The ties to an important time in history and the special connection to my father's boyhood make it truly unique and a great joy to operate. I want to express my thanks to the many hams who helped with suggestions, encouragement, and offers of parts, and a very special thanks goes to W8AYJ and W8AQB who saved the QSL cards that gave me the clues I needed so badly. Most of all I am indebted to Ken Hanifan, without whose assistance the transmitter would never have made it on the air, either in 1930 or 1996.

Now, about that "built new... receiver" note. Hmmm. **ER**

The Hallicrafters SX-43 from page 29

mechanically geared down bandspread whose calibration I can't correct when the receiver drifts.

When it's all said and done, sometimes I still go out to my "summer shack" in the garage after it's dark and I've put the dogs into their kennel and turned the lights out, and I turn on the old SX-43 just to admire its glowing green dials just one more time. And I think of a time almost half a century ago when I saw another SX-43 and knew I wanted to become a radio ham. And I'm very thankful that it all happened. **ER**

References:

2) "The Hammarlund HQ-129-X," Electric Radio #66, October 1994, page 4.
3) "Radio Kon Tiki" (The NC-173), Electric Radio #78, October 1995, page 4.
4) "The RME-45," Electric Radio #87, July 1996, page 24.

1929: A Critical Year From page 34

Ross Hull, an Australian amateur and Technical Editor of QST, was put in charge of the program. It was a fortuitous choice. Mr. Hull's preliminary report appeared in the August 1928 QST, "Overhauling the Transmitter for 1929." [5]To the surprise of everyone including Mr. Hull, the elusive "1929 transmitter" turned out to be the familiar Hartley with two changes. First, the tank circuit was replaced with a coil wound from 1/4 inch copper tubing and a larger capacitor. Second, antenna coupling had to be reduced—a lot. So was born the "High-C Hartley" transmitter.

In the end the 160M, 40M, and 20M bands were slashed to an average of 28% of their former width, the new boundaries approximating those we know today. The 5M band was cut in half, but 80M survived intact and the new 10M band was created. Fortune had indeed smiled upon us. Hams reached a new level of technical advancement and the community had been galvanized by the common threat. Amateur Radio entered the turbulent 1930's stronger and more unified than would have been possible without the crisis of 1928-1929. **ER**

References:

1. QST, Dec 1927, P.9
2. "200 Meters and Down," DeSoto, 1936, P.183
3. QST, April 1928, P.7
4. QST, May 1928, P.7
5. QST, August 1929, P.9

Receiver Images from page 18
kept on ticking through lots of moves to temporary shacks. I used it on 40 CW mostly.

After school the RME and I arrived at work in New Jersey and I decided to build a receiver. QST had a home brew 8-tube receiver that looked nice so I built one, but could never get it working the way I wanted it to. I replaced the RME and homebrew with a $90 BC-348 from Steinbergs in Cincinnati. You can break your arm turning the bandswitch on the 348, and the tuning has more backlash than a model T transmission. The crystal filter knew less about filtering than I did, but it was an OK receiver otherwise.

It was time to move up and a surplus BC-1004, a Hammarlund Super Pro SP-200 was acquired. About the same time I built the SSB transmitter in the November 1950 QST. The Super Pro did an admirable job on SSB, however if you left it on for 40 days, it would drift for 40 days. One hand on the bandspread knob was the solution. The Hallicrafters SX-71 that followed was not the solution, while it got rid of images, and had a nice big bandspread dial, it could match the Super Pro cycle for cycle on drift. And don't break the dial cords, it will take 3 days to string new ones.

Next I picked up a Hammarlund HQ-129X that was a super good receiver. I think it was better than the Super Pro, and a lot easier to move around, but it still wanted to drift. W2KQJ traded me his HRO-5 for the -129, and I got a good receiver with a lot less drift, and a lot less calibration. It took me very little time to find out I still didn't like calibration charts. I used a Collins R-388, a military 51J-3 at work. It didn't know the meaning of the word drift so I bought a used 75A2 from Tom Howard, W1AFN. Then a used 75A-3 when the 75A-4 came out. When the 75S-1 came along I bought a 75A-4 from Ted Dames, W2KUW. Then my neighbor, W2BDS wanted to sell his 75S-1 so I got rid of my -A4. A mistake, so I bought my 75A-4 back, for a hundred bucks more than I sold it for. All Collins are good, but the -A4 is the cream of the crop.

I had a chance to get a surplus R-390, which is a super great receiver. But after the 75As and 51Js, the -390 tuning is like an automobile differential with a noisy pinion gear. When I told W2VQR his receiver was hard to tune, Lloyd gave me a -390A to use. No improvement, so I got an R-388 from W8RM when he shipped out. I still have the 388, complete with Dick's HR number on the front panel, and I still use it most every day. Of course I've kept the -390A just in case.

About 1960, Bob Dennison, W2HBE, had an article in QST on his home brew with Collins mechanical filters. I had several in my desk along with a super dial assembly by Eddystone. I started building a copy of Bob's receiver, but the 7360 beam switching mixer came along so I rebuilt the receiver before I finished it. Then the 12AD6 and 12EK6 low voltage anode tubes looked interesting, then nuvistors, etc. I still haven't finished the receiver, but I promised myself I will this year.

We had salvage sales at work so I bid on an AN/FRR-12. What I got was a pair of Hallicrafters SX-73s. I traded one to W2DVD for one of the pair of SP-600s that he got in the same sale. Real boat anchors, big, heavy, hot running, and impossible to get at a lot of the guts. They were real throwbacks to the stone age compared to the R-388s and -390s. We decided they weren't for us, so we sold them and some AN/URA-13s, a Collins R-390 type exciter we had bought at the same time to J.J. Glass, a surplus dealer. That was the only time I ever made any money on a receiver. Also I think they convinced me that smaller and lighter receivers were the way to go.

But I couldn't pass up a $25 Hallicrafters SX-99 at the South Jersey

continued next page

hamfest, but I should have. It was no better than the SX-71 from years before. I traded for a Drake 1A, which looked weird but worked great. Wish I had kept it but I needed something to use with a VHF converter so I found a National NC-125. It was a fair receiver, and the built-in Select-O-Ject, which I could work, was great, better than a xtal filter.

One of my boys worked at a gas station after school, next to Lafayette Radio on Rt 35. By some sort of a tire-radio trade he brought home a Lafayette HA-350. It was a great ham band receiver, a rice box copy of the 75S1. I used it for a few months, but couldn't bring myself to buy a Lafayette, just didn't seem right. W2IWY wanted to sell his HQ-170, so I got that instead. The -170 was usable, but the little -350 was a better radio, and a lot cheaper. About this time receivers started getting together with transmitters and I went through the usual assortment of transceivers. Swans, Nationals, Collins, Drakes, Hallicrafters, and even an EICO 753 passed through my shack at one time or another, but that's not for this story.

K2KLW was leaving Fort Monmouth, so I bought his Swan 600-R. I never could get used to the dial and tuning arrangement, although the receiver worked good. I had a chance to trade it for an Allied A-2516. It was a copy of the 75S1 made by Kenwood for Allied. I wish I still had it as it was a super receiver, but a little weird looking. Almost as high as it was wide, with a raised front panel, it looked like it was waiting to leap at you. I ended up with a Collins 75S-3 in a three way trade. The S-3 is a great receiver but a lot more money than the Allied. Then Coop, W2NIE, was updating his shack and offered me his Drake R-4C at a good price. It was a fine receiver and I used it for several years before selling it. If I didn't have the 75S-3 I certainly would still have the Drake as it was a keeper.

About 2 years ago, John, K2KLW, was reminiscing about his first receiver, a Hallicrafters S-38C. At our club swapfest I traded some old stuff to WA4EQG for 2 S-38s, an A and a C. A few tubes, caps and alignment, and they were working fine. I was surprised to find they were usable receivers, at least on 40 and 80 CW and AM as I always thought of them as toys. I gave the -38A to my son, and shipped the -38C to John in Scottsdale, AZ, addressed to KN2KLW naturally. I don't think it replaced his R-390A as the main station receiver, but he was pleasantly surprised.

About 6 months ago I found a real nice S-19R Sky Buddy that W4JLC had restored. I tried it on 80 and 40 and was really surprised at how good it was. Much better than the S-38s or my S-14 Sky Chief. You could use it with today's band conditions on CW and AM and survive. I shipped it to W8RM as it was his first receiver. I knew because at least 6 times a year Dick tells me how he brought his brand new S-19R home on the back of his bicycle in 1940. Some guys talk about walking 5 miles to school every day, but Dick peddled his first receiver 25 miles home to Piqua, Ohio.

So now I split my ham time between the R-388, SX-24, and 75S-3. The Sky Chief and -390A sit on the shelf, and the W2HBE home brew is still waiting to be finished. And I would get an -A4 in an instant if a cheap one showed up and I've been looking for 45 years for a KP-81 that Sam, W8UKS said was the best receiver made. So if I left out or insulted your favorite receiver, please excuse me, but that's the way I remember them. **ER**

Mark your calendars now for the ER/N2KSZ Memorial 160M contest. This year it will be on the weekend of Dec. 26/27.

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FOR SALE: Cleaning part of shack. SASE or email for equip & parts list. Earl, K6GPB, 5319 Sierra Vista Rd., Murphys, CA 95247. earlw@goldrush.com

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

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FOR SALE: Dial/clock covers. Send bezel, old or drawing, make/model, guaranteed satisfaction - $10 ppd. William P. Turner, WA0JAB, 1117 Pike St., St. Charles, MO 63301. (314) 949-2210

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

FOR SALE: New Ranger I, Valiant I & Navigator plaster dials, 160-10 frequency no's in green, with all holes like original - $17.50 ppd. Bruce Kryder, 336 Sliders Knob, Franklin, TN 37067. (615) 794-9692

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

WANTED: Crystal with fundamental between 8 and 8.222 MC, FT241 or FT243 case. Jim Clifford, KE4DSP, 108 Bayfield Dr., Brandon, FL 33511. (813) 654-7531, j.c.clifford@juno.com

WANTED: 803, RK20 tubes; Temco 75GA xmtr or Supreme AF100. Robert Perlstein, W1IV, POB 642, Old Orchard Beach, ME 04064. (207) 934-9206 perls@compuserve.com

WANTED: Navy equipment with SE-series datatags, any condx, any size. Also, manual for BC-365-A. William Donzelli, 15 Gen. MacArthur Dr., Carmel, NY 10512. (914) 225-2547, william@ans.net

WANTED: Collins USB mech filter, F500 Z4 (526 9377). Carl, W2YH (973) 827-7441 or cbanfield@juno.com

WANTED: Collins spkr for 75A4; harness or plug to connect between KWS-1 and 75A-4. Bob Smith, KC4WJO, 14779 Kogan Dr., Woodbridge, VA, 22193. bobsmith7@aol.com

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

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

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

FOR SALE: Repair, upgrade, performance modification of tube communications & test equip. Accepting most military, all Collins & Drake designs, & the better efforts from others. Laboratory performance documentation on request. Work guaranteed. Chuck Felton, KD0ZS, Felton Electronic Design, Box 187, Wheatland, WY 82201. (307) 322-5858, feltoned@coffey.com

FOR SALE: 7 & 9-pin tubes, my choice, untested - 10/$1; Xmtg tube sale, list free. L. Gardner, 458 Two Mile Crk Rd., Tonawanda, NY 14150

FOR SALE: Dr. Radio repairs vintage ham gear. Steve Trimble, K5DJH, Box 73, Weston, TX 75097-0073. (888) 73-K5DJH. k5djh@texoma.net

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

FREE SAMPLE: Transistor Network Magazine for collectors of regular & novelty transistor radios, & related items. Articles & ads. Subscribers get a free 50-word ad monthly. Subscription: $17 (US); $28 (Canadian); $36 (Foreign). POB 43, Live Oak, FL 32064-0043. Visit our Web Site at: http:www.suwanneevalley.net/~rmorison/

FOR SALE: Military and commercial communications items: www.maxpages.com/murphyjunk. For up to date lists: murphy@cts.com. Mike Murphy's Surplus, 401 N. Johnson Ave., El Cajon, CA 92020. (619) 444-7717

FOR SALE: Collins 51J series drum overlay - $10 ea, specify which. Ron Hankins, KK4PK, 555 Seminole Woods Blvd., Geneva, FL 32732. (407) 349-9150

FOR SALE: Collins repair: FCC Licensed Technician, we repair the Collins Gray Line i.e. S-Line, KWM-2/2A etc. & other select models. Merle, W1GZS, FL, (352) 568-1676

FOR SALE: R-390A Repro nameplates - $9 shpd. N5OFF, 242 Chestnut Oak Dr., Mondeville, LA 70448. trinit698@dt.net, (318) 989-3430

WANTED: Gearshift for Teletype Model 28, or complete machine with one. Ivan, WA6SWA, POB 248, Reno, NV 89504. (702) 329-7738, idh@cs.unr.edu

TONY'S LIST AT LAST!!

Tony Snider has finally compiled his complete list of vintage/military gear.

The list can be accessed at the webpage below. Just click on the button that says "online classified". It has "Marine", "Communications" and "Test Equipment" sections. It will be updated every 2 weeks with new items and people can sign up for a e-mail update right on the page.

http://www.meob.com

WANTED: Hallicrafters Village/Hamlet radios TR-5/TR-20 & Gonset Civil Defense 6m radios/ accessories, manuals also. Daniel Cahn, 3444 Greenwood Ave., Los Angeles, CA 90066. Fx/msg (310) 398-7159 or danielc4116@aol.com

WANTED: Japanese WW2 Chi 4 radio plugin coils. Yes, Chi 4 not Chi Ichi. Stan, JA1DNQ fwgf8431@mb.infoweb.or.jp

WANTED: Command sets ART-13's; Collins radios & all accessories top $ paid; most radios repaired reasonable. FCC licensed. W1DEJ, MA, (781) 485-1414 eves, hobfact@tiac.net

WANTED: E.H. Scott Philharmonic rcvr. EA4JL, Contact in the States, Kurt Keller, CT, (203) 431-6850.

WANTED: Gonset G-50 power transformer (parts rig OK); VG+ Heathkit SB-303 front panel. Emil, KA8GEF, (216) 883-5134, EZela573836@aol.com.

WANTED: PE73-C dyamotor for BC-375E. **FOR SALE:** HQ120X - $145. W7RBF, AZ, (602) 864-9987.

WANTED: Collins 310B3, spare 70E8A linear glass scale, & Chicago 500W CMS-1 modulation xfmer. Jerry, W8EGD, CO, (303) 979-2323.

WANTED: Manual, schematic, etc., for Mason FG, model 3C rcvr, tunes DC-10 gig. Bob Bakinowski, 1524 Saint Tropaz, Tucson AZ 85713. (520) 624-8029

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

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

WANTED: Military survival communications equip: radios, beacons, manuals, books, historical info/photos. Daniel Cahn, 3444 Greenwood Ave., Los Angeles, CA 90066. (310) 398-7159. danielc4116@aol.com

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

WANTED: Visitors and tubes by museum. Old and odd amateur or commercial tubes, foreign and domestic purchased, traded or donations welcome. All correspondence answered. K6DIA, Ye Olde Transmitting Tube Museum, POB 97, Crescent City, CA 95531. (707) 464-6470

WANTED: WW II Japanese, German, Italian radios & communication equip for display in intelligence museum. LTC William L. Howard, 2191 Harborview Ln., Largo, FL 33770. (813) 585-7756, wlhoward6@gte.net

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

WANTED: RCA 140, 141, AVR5A. GE K80, K80X, K85. Any condx. James Treherne, 11909 Chapel Rd., Clifton, VA 20124. treherne@erols.com

WANTED: Broadcast gear; tube or solid-state, compressors, limiters, equalizers, microphones, consoles, micpreamps, recorders. Mike States, Box 81485, Fairbanks, AK 99708. (907) 456-3419 ph/fax or mstates@polarnet.com

WANTED: National HRO 500 & LF10; Hammarlund SP600-JX21A; Johnson AN/FRT-505. Ric, C6ANL POB N4106, Nassau NP, Bahamas.

WANTED: Drake 1A spkr (1AS) & Kenwood R599 spkr (S599). Pay reasonable price. San, K5YY, AR, (501) 756-5010, weekends only.

WANTED: Looking for homebrew AM and/or CW xmtr. RF output should be in the 500-1KW range. I would prefer rack type construction, but will consider all. Interested in top quality build, would prefer 833 mod/finals, but others OK. Can pick-up or arrange shpg. Thank you. Bruce, KG2IC, (716) 689-6727, kgic@amsat.org

WANTED: Johnson Viking 275W matchbox w/ meter. Ron Mayer, W8KYD, 5410 Alber Ave., Parma, OH 44129. (440) 888-1904

FOR SALE: Drake R4C w/NB, T4XC xmtr, MS4 spkr/PS. All in exc condx - $475 + shpg. Bob Morgan, W7ZSB, 8130 Finlandia Way, Sandy, UT 84093. (801) 943-7721

FOR SALE: Collins HF-380, sn 925, all SB's, PIN diodes, blanker, processor, Kiron, keypad, exc, over $6k, Cubic Astro-D Diplomat, two suitcases & all frequency xcvr, pwr sply, tuner, batteries, key, antenna, manuals - $600; Racal 6790GM rcvr, exc, 5 filters, computer interface, manuals, spares, lightning protection - $1500; Collins 180S-1 tuner, RE, VG - $275; Hallicrafters S-38D rcvr, VG - $35. Wes, K5APL, TX, (903) 831-4636 eves, k5apl@sdinknet.com

FOR SALE: (1) BC-453; (1) BC-455. Both rcvrs have been modified, 12 volt filaments, phono jack for audio output, AM-CW switch & volume control located on the front panel. James Barton, WØKNJ, POB 417, Burke, SD 57523. (605) 775-2044

FOR SALE: 35 amp DC pwr sply w/2 meters not working. **WANTED:** Hallicrafters #S 72 portable, reasonable. Noonan, SC, (843) 726-5762.

FOR SALE: Teleprinter Mite AN/UGC-40 NIB, manual - BO. Charlie, W4HKZ, SC, (864) 244-5700.

FOR SALE: Rare Boulevard Electronics communications rcvr, see Moores book pg. 15 - accepting offers, (HRO trades). Jim Leathem, K7BTB, POB 50355, Parks, AZ 86018-0355. (520) 635-2117

FOR SALE: RIT for KWM-2 and S-Line. No modifications for KWM-2. $59.95 tested/42.95 for kit. SASE for details and order info. John Webb, W1ETC, Box 747, Amherst, NH 03031.

FOR SALE: Japanese Radio Communications Equipment Technical Manual (enemy) TM E-11-227A, 12/1944 cover-to-cover professional reprint, great graphics, profusely illustrated - $24 incld's bookrate postage for insured, tracked (via UPS) - $4.42 additional. Visa/Mastercard accepted, mail or telephone. **WANTED:** US military TMs, any subject, will trade. Military Marketing, Inc, POB 741, Norcross, GA 30091-0741. (770) 729-9315

FOR SALE: Cambridge Soundworks Ensemble, dual subwoofers, dual mid-high spkrs, cost $500 in 1972, but new version costs $600, brand new - $230 incds UPS, 30 days return privilege same as factory. Request literature, pictures. Charles Graham, K2GVE, 4 Fieldwood Dr., Bedford Hills, NY 10507. (914 (666-4523

FOR SALE: Uniden (Tempo) 2020, exc condx w/mic & manuals - $300; Tempo I, exc condx w/mic (Silver Front) - $100; PS - $60; Heath100 w/SB104 front panel, CW filter - $100; PS - $60; Heath HW 12, works - $70; Swan 350 w/PS - $110; Systron Donner 6152A counter - $100; B&W 410 distortion meter - $100; Spectrum analizer TS1379A .1.3MC to 30MC - $300; TEK RM31A oscope, good w/two plug-in units - $150, (2) used 572 - $30. Jim Rupe, POB 697, Grayland, WA 98547. (360) 267-4011

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

WANTED: Collins R389, 30K-, 310-, 399C-1, KW-1, HF80 i.e. HF8014, 851S-1, Hallicrafters SX-115. Richard, WAØAKG, NE, (402) 464-8682.

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

WANTED: McKay Dymek radio literature & info. Gene Peroni, KA6NNR, POB 58003, Philadelphia, PA 19102. (215) 665-6182

WANTED: Collector/builder seeks lge & small vacuum tubes & vacuum tube collections, sockets, etc. Will pay good prices. Please call Marc, OR, (800) 330-2004.

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

WANTED: Cash for Collins: SM-1, 2, 3; 55G-1; 62S-1; 399C-1, 51S-1; 75S-3A, C 32S-3A; any Collins equip. Leo, KJ6HI, CA, ph/fx (310) 670-6969, radioleo@earthlink.net

WANTED: TM listing communication equipment, (similar to TM-487H for test equipment). David Boardman, 10 Lemaistre, Sainte-Foy, Quebec G2G 1B4. Canada. (418) 877-1316.

WANTED: Late issue of International (foreign) call book, will pay reasonable cost & postage. G. Liccione, W2TPL, 118 Hiawatha Trail, Liverpool, NY 13088.

WANTED: Repair for Hallicrafters S-77 & National NC-54 within driving distance of Montgomery, AL. Fred, POB 3, Kent, AL 36045. Phone/Fax (334) 541-3914

WANTED: Manual or other info for WW2 British R-1155 aircraft rcvr. Robert Haus, POB 231321, Anchorage, AK 99523. (907) 338-0057, airspy39456@aol.com

WANTED: Military electronics, RDF, radar, communications, test, manuals, literature, etc. What have you got? William Van Lennep, POB 211, Pepperell, MA 01463. (508) 433-6031

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

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

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

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

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

WANTED: Information-WW2 TCS Radio System: Design, Manufacturing & Operation for article. Any help appreciated. Thanks. Greg Greenwood, WB6FZH, POB 1325, Weaverville, CA 96093. (707) 523-9122 (message) greg6fzh@aol.com

WANTED: Tektronix memorabilia & promotional literature or catalogs from 1946-1980. James True, N5ARW, POB 820, Hot Springs, AR 71902. (501) 318-1844, Fx 623-8783, james.true6@bn.net

WANTED: TMC GPT-750; TAC Tuner, GPR-90/92 & GSB-1. Alan Gray, W3BV, PA, (215) 795-0943.

WANTED: Limpanders or other equip by ESECO. Richard P. Robinson, POB 1425, Wallingford, CT 06492. (203) 949-0871, richmix@erols.com

WANTED: Bandcoil sets for HRO-50 & HRO-60. Tom Bonomo, K6AD, CA, (650) 578-1897.

WANTED: Maintenance manual for BC-375; xmtr tuning unit TU-5-B. Charles Lackey, W4QBE, 1252 Worley Creek Rd., Lakemont, GA 30552.

WANTED: Coils or specs for Simpson model 380 wavemeter. Harry Blesy, N9CQX, 95740 Clarendon Hills Rd., Hinsdale, IL 60521. (630) 789-1793

WANTED: Copy of schematic for Conar instruments model 255 solid state oscilloscope, will pay $20. Please help. Harry Greulich, WA6IWZ, 442 S. Alpine Rd., Orange, CA 92868. (714) 978-3121

WANTED: Badly, (2) 2" panel meters, (1) a Weston model 506, 0 to 1 mA & (1) a Simpson model 145-S 0 to 1 mA. Don't care what the dials say. Tim, W1GIG, 19 Woodside Ave., Westport, CT 06880.

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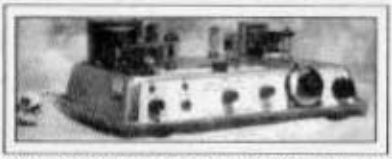

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Web site @ http://www.mnsinc.com/bry/vintage.htm

FOR SALE: Copies: Hard to find schematics for radios, also kit radios 1922-1950; manuals: test equip.ham gear.Contact me for prices, availability. Duane Ballew, KB7QZK, 6813 152nd St. Ct., NW, Gig Harbor, WA 98332. (206) 851-4505

FOR SALE/TRADE: Still remaining from lge collection of boat anchors: Collins 75A4 w/1 kw station; Heath SSB mod NW101; Globe Scout Deluxe; Swan 500 xmtr; S40A; SX42; S-94; SX 36; (2) Collins 75A-4, high serial #s rcvrs: Heath HX-10 Marauder; Heath SB300; & SB401; Collins military CMX 46159 U.S. Army issue rcvr; Hallicrafters S-11 & S15, S11, SX99, SX100, 390A, R1247, military xmtr/rcvr mod PP-109 & PP-112; National NC 240; Johnson Viking II; BC 148; 75S-1; 30L1; 32S-3 & p/s, (will sell individually) Central Electronics 100V (originally owned by Wes Schrum pres. of Central Electronics Co); Hammarlund SP 600 Panadaptor; Collins 618T; Collins 380. Call me for the best prices! First come, first served. Larry Drago, 383 Lincoln Dr, Cheshire, CT 06410. (203) 272-6030, fx 272-2002, theradioman@webtv.net

FOR SALE: Drake R4A, manaul, good - $140; TR4, RV4C, MS4, AC4, manual, good - $350; Johnson Ranger 2, manual, exc - $300; prefer PU. Roger Lowary, W9BZ, 465 Lacy Dr., Greenwood, IN 46142. (317) 881-7466, lr-jl@juno.com

FREE: Encyclopedia of Amateur Radio Equipment. Hundreds of photos & descriptions spanning over 80 yrs. http://www.aade.com/hampedia/hampedia.htm

FOR SALE/TRADE: Transmitting/Rcvg tubes, new & used - 55¢. LSASE for list. I collect old & unique tubes of any type. **WANTED:** Taylor & Heintz-Kaufman types & large tubes from the old Eimac line; 152T thru 2000T for display. John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455, johnh.walker@alliedsignal.com

FOR TRADE: (2) good RCA 833A's for one Taylor 833A. Also looking for Taylor 803, 813, 875A. John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455, johnh.walker@alliedsignal.com

FOR SALE: Radio Handbook, 10 & 15th edition; ARRL Handbook 1952, 1963, 1968; GI: Ham News, hardbound. All - $25 ea. Gary, MN, (612) 496-3794.

TRADE: My AN/PPN-2 Eureka Paratroop beacon for your wireless set (Canadian) 29A set. Leroy E. Sparks, W6SYC, 924 W. McFadden Ave., Santa Ana, CA 92707-1114. (714) 540-8123

FOR SALE: 1934 RCA model 125A; 1941 Philco battery radio, model 41-95; 1938/39 Delco AC, model R1140; Mopar 6V auto radio, model 606; Harmon Kardon AM/FM Tuner, model ST360 Madrigal; Stromberg Carlson Signet Mono 70W amp, model SAU-70; very rare Customatic Loop Tape Player, model CTC-60 w/6 8x9 inch tapes - open to offers. E.F. Hayes, WØJFN, 3109 N. Douglas Ave., Loveland, CO 80538-2548.

FOR SALE: NC183D, perfect except scratches on lid, w/spkr & manual - $350; NC173, very nice, spkr &manual - $195; SX99, exc, manual - $120; NC300, man copy & spkr, works well but has some dings - $175. **WANTED:** Modulation xfmr & a pair of 809's for WRL Globe Champ/300; carrier control relay (Collins P/N 970 1014 00) for 32V3. Dick Dixon, W7QZO, 16032 Lost Coyote Ln., Mitchell, OR 97750. (541) 462-3078, richdix@bendnet.com

FOR SALE: EICO 720 - $100; EICO 730 - $100; Johnson mobile xmtr - $100; Millen 80M VFO - $75; (2) Motorola FM tube type xcvr - $50 ea; manuals included; shpg xtra. Greg Richardson, POB 405, Callipolis Ferry, WV 25515.

FOR SALE: Classic gear - SASE for list. **WANTED:** Vintage rigs. The Radio Finder, Joel Thurtell, 11803 Priscilla, Plymouth, MI 48170. Tel/Fax (313) 454-1890

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

FOR SALE: Books, all electronics related; 200 titles; SASE. Paul Washa, 4916 Three Points Blvd, Mound, MN 55364. wøtok@email.msn.com

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

FOR SALE: Rare Fisher AM, FM stereo, SW1 & SW2 tuner 150B - $150 + shpg. L. Schimmel, POB 1234, Spanaway, WA 98387.

FOR SALE: Tubes, send SASE for new list X. **WANTED:** Connectors, MS (military olive drab) unused, quantities. Typetronics, Fred Schmidt, N4TT, POB 8873, Ft. Lauderdale, FL 33310-8873. (954) 583-1340, fx 583-0777

FOR SALE: TenTec SP325 general coverage solid state rcvr, described in Osterman's 1998 Short Wave Rcvrs book - $350. Walter M. Chambers, POB 241371, Memphis, TN 38124-1371. (901) 761-9381

FOR SALE: Boatanchor paints; Heathkit Tech Journal Subscriptions; phone filters - call or write for free catalog. R&R Designs, 202 Midvale, Marshall, WI 53559. (800) 372-4287

FOR SALE: Early National HRO w/coils, works perfect, manual dated 1935 - $750 + shpg; ER issues 1 thru 96 - $50. Chris Cross, POB 68, Cedarville, IL 61013. (815) 868-2323

FOR SALE: Convert any wattmeter to read PEP! Perfect for AM/SSB - $19.99 ppd for complete kit! HI-RES, 8232 Woodview, Clarkston, MI 48348. (248) 391-6660, hires@rust.net

FOR SALE: Collins 75A4 & KWS-1 - $2250 or trade on RE S-line. PU only. Steve Taylor, N4CE, 103 E. Oak St., Alexandria, VA 22301. (703) 299-8569

FOR SALE: Unbuilt kits: NIB Knight Kit Audio Generator 83YX137 - $85; EICO RC Bridge & RCL Comparator 950B - $85; Tubes: NIB Eimac 4X150A - $23; Penta Labs SD22 (4-250A) - $95; (6) 813s - $35 ea; used tubes: (2) Eimac 4-250A - $75; (4) 805 - $30 ea; (3) NIB old National Velvet vernier dials - $25 ea; ICN dial - $30; James Knights 100kc xtal in oven - $45. **WANTED:** National R-175A choke. George Shute, W4BDG, 2910 Virginia St. NE, Albuquerque, NM 87110. (505) 298-7347

FOR SALE: NIB 6-8 Ballasts for RBA, B, C rcvrs - $7 ea ppd. Cliff Kurtz, N6ZU, 6727 N. Pershing Ave., Stockton, CA 95207. (209) 477-1235

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FOR SALE: Nice Collins KWM-1 & 516F1; Viking Valiant. W2AO, NY, (914) 691-7957.

FOR SALE: Nationals: NC46 rcvr, nice, recapt - $90; TMA100 variables 6000V - (2) for $19 + shpg. H.Mohr, W3NCX, 1005 Wyoming, Allentown, PA 18103.

FOR SALE: Heath SB400, HD1410, HD19, HW29A; Swan 250 AC/ps, spkr. Cliff, WA9SUE, WI, (608) 625-4527.

FOR SALE: Galena xtal radios, homemade, or parts to make your own; 304TL, unused - make offer. L. Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150. (716) 873-0447

FOR SALE: HQ-129X, NC-125 & Viking phone patch. All + shpg. Don Dillard, 5106 Red Oak Dr., Amarillo, TX 79110. (806) 352-4776

FOR SALE: Collins ARC1 xmtr w/24V dynamotor, manual - $75. **WANTED:** BC733 radio, unmodified. Robert Martin, 111 Bancroft Dr., Rochester, NY 14616. (716) 663-4182.

FOR SALE: SW-3 replacement plug-in coil forms - $7.50 ea; 19 pg SW-3 data pkg, includes coil winding data - $5; 4, 5 & 6-pin generic coil forms - $6 ea; Pilot Super Wasp plug-in coil forms - $6.50 ea. All above + shpg. James Fred, 5355 S. 275 W., Cutler, IN 46920.

FOR SALE: Drake, mint L4B - $750. Drake R4C noise blanker & .5 kh filter; Drake T4C ps MS4, mint - both $600. John Fernandez, KE6UVT, CA, ph/fx (818) 249-9142.

FOR SALE: Homebrew antenna tuner for 80, 40, 15, SWR meter - $20 + UPS. RJ Eastwick, N2AWC, Unit 19, The Commons, 400 N. Haddon Ave., Haddonfield, NJ 08033. (609) 429-2477

FOR SALE: USM/3A multi-tester - $125; 75A4 3.1 kHz filter - $125; 8122s NIB - $125 ea. Keith Perry, K7PSZ, 384 S. 48th St., Springfield, OR 97478. (541) 726-1512 after 6pm.

For Sale
Cliff's Collection

Receivers: SP-600JX-21, R-390A, R-390, CV-157 URR SSB adaptor, 51S-1 w/spkr, R-388 w/prod detector & hang AGC, HQ-145A w/prod detector, NC-190, HQ-100 w/spkr, S-36A 28-144 mc, Rycom 2170 3 kc-200 kc, Panalizer, SB-8A self contained panadaptor, Collins RUQ, fixed frequency receiver.
Transceiver: KWM-2 w/ps/spkr +NB & xtal pack.
Test equipment: of all types by General Radio, Boonton, Measurements Corp, TEK, HP and others.
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Misc: blank rack panels, rack cabinets, power supplies, large xfmrs, chokes, capacitors, towers, masting, cable, coax, multi-conductor cable and much more.

Chuck Felton, PO Box 187,
Wheatland, WY 82201.
(307) 322-5858
feltoned@coffey.com

FOR SALE: Mono tube audio amplifiers, Stromberg Carlson SAU33 signet, 25 watt 6L6 - $60; David Bogen Challenger CHA33, 33 watt 6L6 GB - $75. all + shpg. Onerio Sabetto, 1717 Burgess Rd., Cleveland, OH 44112. (216) 481-1036

FOR SALE: Collins 75A2 - $425; HRO-60 - $450; HQ-150 - $285; Gonset G-76 w/AC - $225. Free list. Richard Prester, 131 Ridge Rd., W. Milford, NJ 07480. (973) 728-2454

FOR SALE: NIB S-line rubber feet w/washer; 10K field audio spkr in case; 1952 Ford & 1947 Chevy car radios; Collins rack mount AC control panel; amplifier spkr in case; HQ145C, spkr, manual, advertisement. Bill Coolahan, 1450 Miami Dr. NE, Cedar Rapids, IA 52402-2933. (319) 393-8075

TRADE: Nintendo game collection & accessories for small working commerical CW xmtr w/ manual. Louis L. D'Antuono, 8802 Ridge Blvd., Brooklyn, NY 11209. (718) 748-9612

FOR SALE: Collins KWS-1, SAC model, big talk, needs work - $1500. George Rancourt, K1ANX, MA, (413) 527-4304.

FOR SALE: Perfect replica Atwater Kent, type 2A twin xtal detector - $95, incldscertified mail. Roland Matson, POB 956, Lake Panasoffkee, FL 33538

FOR SALE: Signal generator HP8640B, 5-512 MHz AM & FM LED display, .1 microvolt-3V output in 16 steps, all units tested & guaranteed - Opt 1 & 3 - $600; Opt 1, 2, 3 - $1100; Opt 323 in case w/ operating manual - $300. Tony R. Snider, 512 Princess Anne Rd., Virginia Beach, VA 23457-1312. (757) 721-7129, fx 426-6454

FOR SALE: Watkins-Johnson/CEI surveillance rcvr 30-1000 MHz AM, FM & CW w/panoramic spectrum display, rackmount x 6 inches high, selectable IF filters, very sensitive - $595. Tony R. Snider, 512 Princess Anne Rd., Virginia Beach, VA 23457-1312. (757) 721-7129, fx 426-6454

FOR SALE: Harris RF 505A rcvr, 100 kc-30 mc, decade tuning, built-in spkr, all mode 115V or 24 DC input, Collins mech. filters all solid state, 19 rack mount by 6 inches, tested & guaranteed - $495. Tony R. Snider, 512 Princess Anne Rd., Virginia Beach, VA 23457-1312. (757) 721-7129, fx 426-6454

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FOR SALE/TRADE: HR-10B, DX-60B, HW-101, DX-40, QF-1, AF-67/PMR-7, SP-200, HQ-145A, S-40B, S-120. SASE. Sam Timberlake, KF4TXQ, POB 161, Dadeville, AL 36853. (256) 825-7305 stimber@lakemartin.net

FOR SALE: Our new 1999 54 pg. catalog of WWII communications items - $3. Sam Hevener, W8KBF, 3583 Everett Rd., Richfield, OH 44286-9723. (330) 659-3244

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FOR SALE: Mackay Linear amp 2-24 MHz, 500 watts by 813s, lge vaccum variable in output tuner and many other parts, but no pwr sply, approx 70 lbs - $275. Tony R. Snider, 512 Princess Anne Rd., Virginia Beach, VA 23457-1312. (757) 721-7129, fx 426-6454

FOR SALE: Harris RF-301 HF xcvr, all mode w/ RF302 antenna tuner, 100 watt 115V SS, except for 6146 outputs, good condx, untested - $395; auto tuner, spares & manual available. Go to www.meob.com for large listing of surplus. Can be mailed or faxed upon request. Tony R. Snider, 512 Princess Anne Rd., Virginia Beach, VA 23457-1312. (757) 721-7129, fx 426-6454

FOR SALE: BC-620A & RAL-8, both w/pwr sply. Jim, OK, (918) 836-9113.

FOR SALE: Collins ant relay 115 VDC - $35; B&W model 800 choke - $20. Joe, W6CAS, CA, (916) 731-8261.

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

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WANTED: Manuals for RBO-2 rcvr & RAL-6 rcvr. **FOR SALE:** Knight T-60 xmtr - $60; Hammarlund HQ-110 rcvr w/clock - $100; RME-4350 rcvr - $140; RME-45 rcvr - $120; RME ham band pre-selector - $35; Radio Shack DSP - $30; Harvey-Wells TBS 50C xmtr - $70; B&W ant tuner VS300A - $60; Heath IG-5280 RF osc (sig gen) - $35; Heath IB-5281 RLC bridge - $35; Linear Systems 500-12M ps (easily run any Swan mobile) - $70; Bell & Howell 6 ch. audio mixer - $25; Drake T4XB xmtr w/ps - $150; Drake T4XC xmtr w/ps - $170; pair 4CX250Bs w/ SK636B sockets - $40; MFJ model 17010 QRP ant tuner - $20; Hammarlund SP-400X rcvr - $140. Ray, K6VX, CA, (530) 398-4377.

WANTED: (1) UTC, model CG-16. Robert, CA, (707) 568-5805, rbtr6@hotmail.com

WANTED: Amphenol molded 4-pin tube sockets, paying up to $1.25 (+ shpg) ea for new & 50¢ for used. James Fred, 5355 S. 275 W., Cutler, IN 46920.

WANTED: Mobile rcvr by Sonar model MR-4. George Rancourt, K1ANX, MA, (413) 527-4304.

WANTED: Drake SPR-4 in exc condx. Wies, Steinstrasse 12, D-48465 Schuettorf, Germany. Fax +49.5923.5761

WANTED: North American callbooks 1961-1969. Bob Tapper, K1YJK, CO, (303) 768-9200 or k1yjk@aol.com

WANTED: WW-2 Japanese military radio of any kind. Takashi Doi, 1-21-4, Minamidai, Seyaku, Yokohama, 246 Japan. Fax 011-8145-301-8069, taka-doi@kk.iplu.or.jp

WANTED: Miller AM tuner model 595, RCA Radiomarine Direction Finder model AR8712, & RCA rcvr model 18T, service manuals. Al Kaiser, W3LEQ, 713 Marlowe Rd., Cherry Hill, NJ 08003-1551. (609) 424-5387

WANTED: Crystal calibrator for NC-300. Dave, K9HDQ, IN, (765) 354-2884.

WANTED: Viking 500; Globe King B or C; Globe Champ; T-368; or any HF xmtr. **TRADE:** Ranger; HQ-170; SX-100; SX-101; KW matchbox; 250W matchbox; 51J3; 51J4; & lots more. Dave, K9HDQ, IN, (765) 354-2884.

WANTED: Function switch for Heath DX-60B. David L. Muse, 510 Minturn Ave., Hamlet, NC 28345.

WANTED: RME-70 cabinet; HRO-50 coils, A, E, F. Pete Rusch, 2711 Struhar Dr., Rocky River, OH 44116. (440) 333-6035

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WANTED: BC-652 military WW II rcvr; Johnson 6N2, 6 & 2 meter converter. Joe, W5JDY, 317 White St., Norman, OK 73069.

WANTED: Non working Drake Twins (R-4C, T4X-C) and accesories. Disassembled or incomplete units OK. Dan Langston, KO4RA, (912) 453-9066, danman@accucomm.net

WANTED: Heath HR10, SB10, VHF1, HS1661; EICO 720, 730, 723, 753, 751. Bill Tipton, 1332 Pinewood Rd., Jacksonville Beach, FL 32250. (904) 241-0134, AD4UY@aol.com

WANTED: Globe Scout 680, working or parts unit. Ken, W2OSO/6, CA, (909) 861-7040.

WANTED: Stock ticker; WWI ± spark rcvr; Baird Televisor; telephone w/Blake xmtr; reproduction of Bell's first telephones. James, SC, (864) 639-2939. jac34356@aol.com

WANTED: Black plate and loading knobs for Globe Scout 680A. Bernie, WA6HDY, 300 James Way, Arroyo Grande, CA 93420. (805) 481-6558

WANTED: Booster unit for the NAVSHIPS AN/SRT-14 xmtr group. Booster contains the MD-230/SRT Radio Modulator, PP-1096/SRT Power Supply, MT-1423/SRT Mounting Blowers, CY-1573/SRT & CY-1572/SRT Cabinet and CW-341/SRT Cover. Paul Metzger, 10940 Rio Hond Dr., Downey, CA. 90241. (562) 928-4332 KQ6EH@juno.com

WANTED: James Millen pwr sply #90281, RF AM #90810, RF pwr amp #90881, Exciter 50 #90800, 4800 series coils - 20, 6, 2 meters; operating manual/schematic for Millen xmtr #90810. E.M. Melton, WØZI, 6407 W 159th St., Stilwell, KS 66085. (913) 897-2942

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WANTED: Keyer paddles of all kinds. Cap, WØXC, CO, (970) 247-0088. capallen@frontier.net

WANTED: Hallicrafters S40, S40A or S40B, S76 & SX42. Bill Smitherman, KD4AF, 9401 Hwy 67, E. Bend, NC 27018. (336) 699-8699 after 5 pm.

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

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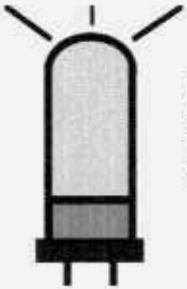

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