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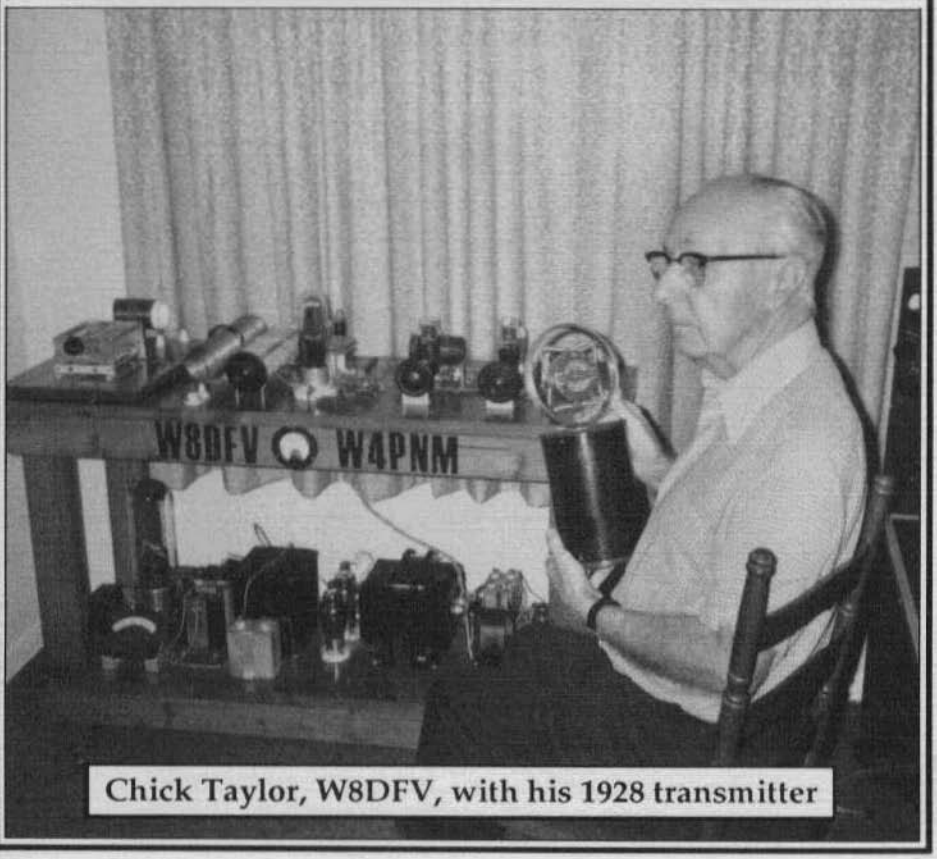
ELECTRIC RADIO

celebrating a bygone era

Number 16 August 1990



Chick Taylor, W8DFV, with his 1928 transmitter

ELECTRIC RADIO

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The Purpose of Electric Radio

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

Electric Radio Solicits Material

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

EDITOR'S COMMENTS

Barry Wiseman N6CSW/Ø

Walt Hutchens, KJ4KV, has prepared an excellent report on the comments sent to the FCC regarding the rule making petitions that have been concerning us AM'ers for the last few months. The report is on page 2. Where do we go from here? Next month Dale, KW1I, will supply us with another update and talk about what comes after a comment period.

This afternoon (August 7) I had a long conversation with William Cross at the Personal Radio Branch of the FCC. In our conversation -which lasted over an hour- I came away with the impression the folks at FCC are very impressed with the number of comments they have received regarding the AM petitions. Mr. Cross said that the number of comments received on these petitions may exceed those received on the Communicator license petition which was a very controversial issue.

From my conversation with Mr. Cross my feeling is that the chances of RM-7401 going any further are somewhere between slim and none. The power petitions are another matter; I think we may have some difficulties here. Mr. Cross said that sometime around October/November we should have some action on these petitions from the FCC.

Please note our new address for all mail:145 CR 123, Hesperus, CO 81326.

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Reflections Down the Feedline

by Fred Huntley, W6RNC
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"Levelling the playing field" is a favorite phrase of FCC officials who discuss the amateur DSB-AM power limitation issue. However, the FCC is attacking the wrong end of the problem.

Amateur radio below 30 Mcs is in a state of stagnation. Instead of a process of levelling (downgrading everything to a status of equality), what the FCC should do is emphasize 'quality' (upgrading operating performance).

A levelling trend in amateur radio means reducing all standards to the lowest common denominator - the end result of which would be the 'CB-ization' of the ham bands - a destination that we have already almost arrived at.

Instead of spending it's time nitpicking on the DSB-AM power limitation issue, the FCC could more constructively uphold higher standards and goals for quality operation in the amateur radio service.

Why does the power output calculation of amateur DSB-AM have to consist of both the carrier and two sidebands, while CW and FM are measured by just the carrier and SSB measured by one sideband? Where is the consistency in this method of measurement? In commercial AM broadcasting, the unmodulated carrier alone, always has been the basis for power output measurement in that service.

Just because FCC officials take a position on amateur power output measurement that doesn't mean they are infallible oracles of all things technical dealing with amateur radio. SPAM and the DSB-AM amateur community are not without people with technical knowhow that can compare with that of the FCC. Offhand, just on the West Coast, I know of several electronics engineers, several broadcast engineers, and a Ph. D. nuclear physicist that operate AM almost exclusive of any other mode.

So, who are these guys in the FCC to tell us that after 60 years of satisfactory usage, that the amateur DSB-AM power output maximum is a problem, is archaic and has to be fixed?What the FCC and ARRL should be doing, is supporting and encouraging the interest and involvement of amateurs in the classic radio mode of DSB-AM.

They should be doing this because DSB-AM is a hands-on technique which is more appropriate and adaptable for radio amateurs to acquire technical know-how (theoretical and practical) on electronic equipment. The acquiring of technical know-how by amateurs is one of the basic reasons for the amateur radio service being in the "public interest, convenience and necessity" and therefore deserving of usage of the public airwaves.

SSB amateur radio is a wonderful mode. It has enviable efficiency and convenience, but is not very conducive to hands-on experimentation, modification or repair, because of it's fragile, miniaturized, delicate solid state construction in commercially made equipment.

SSB operators are, for the most part, reduced to being 'appliance operators' because of the complexity of their equipment. They don't understand how it works and can't repair or experiment with it. Therefore the technical aspect of amateur radio is gone. Now we have a new era of 'recreational broadcasting' consisting mainly of levity, idle chitchat and very, very little discussion of electronics or radio.

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A Visit To The FCC

an update on RM-7401,7402,7403 and 7404

by Walt Hutchens, KJ4KV
3123 N. Military Rd.
Arlington, VA 22207

Across Key Bridge, through traffic in Georgetown..... it is Wednesday July 25th and my wife, Marie, and I are on our way to see what the world has been telling the FCC about RM 7401; time permitting we'll look at the others.

Downtown Northwest Washington, D.C. is a mixture of medium size office buildings and stores, mostly those selling to the office trade and office workers -- banks, bookstores, office furniture and places to eat lunch. About two blocks from our destination we park at a meter. We check our watches carefully as we feed it six quarters -- the District's parking enforcement is legendary. (The best story I've heard -- a woman parked at an unmetered space. When she came back, she found that the city had installed a meter while she was gone and the meter maid had already given her a ticket!)

1919 M Street belongs almost entirely to the FCC. The second floor is a rabbit warren of narrow corridors, painted two or three times too often with a roller, but clean. After some wandering (the people are pleasant and helpful) we find the Public Reference Room. There's a service counter at one end, a group of copy machines (10 cents a page) and half a dozen six person tables. Here too, the decor is 'cheap but clean' -- it's much like a junior high school lunchroom with a carpet. The room is mostly filled with young researchers, with scattered lawyer types -- these are not FCC people, but the 'public'. From occasional overheard words, it sounds like most are here to research FCC action affecting a broadcast license or other communications business.

I ask one of the ladies behind the counter for the comment folder for RM-7401; she hands me a form (Name, home telephone number, time...) and goes over to shelves holding hundreds of folders and binders. In a moment we are settled at a table with more than an inch of comments forms in a manilla folder. Unfortunately, the only pair of seats is opposite one of the lawyer types who is either expecting to get axed from his present job, or thinking of running for office; the next hour is filled with his 'networking' loudly with other similar types. I can't help remembering the joke -- "Question: What do you call 2000 lawyers chained together at the bottom of the sea? Answer: A good start."

What we have is copies of the comments which you (and I) sent in. Or most of them -- the last comment in this file arrived two days ago. It's obvious that the file has been put together carefully: each comment is stamped with the date and time it was received and some problems have been fixed. One (fairly common) case -- a comment covering three or four of the RM's on one page has been copied by the FCC staff so it appears in all of the folders.

We divide the work: Marie heads for the machines to copy the original request and one comment favoring RM-7401 while I start writing. After about an hour and a quarter we have what we need and we return the folder and go -- there's just time to get to the car before the meter expires! We have not had time to check the other folders and there are only 85 opposing comments to RM-7401 -- not an impressive showing. We planned 'A' visit to the FCC but clearly we will have to make at least two.

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ELECTRIC RADIO IN UNIFORM

by Walt Hutchens, KJ4KV
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'Military Miscellany'

In the first twelve of these columns we have toured some of the high roads of military radios and also visited a couple of real potholes. However, space is limited (the editor of E.R. seems to think that some readers may be interested in other topics!) and the basket of interesting reader comments and other short items is overflowing. This month we'll try to clear it out.

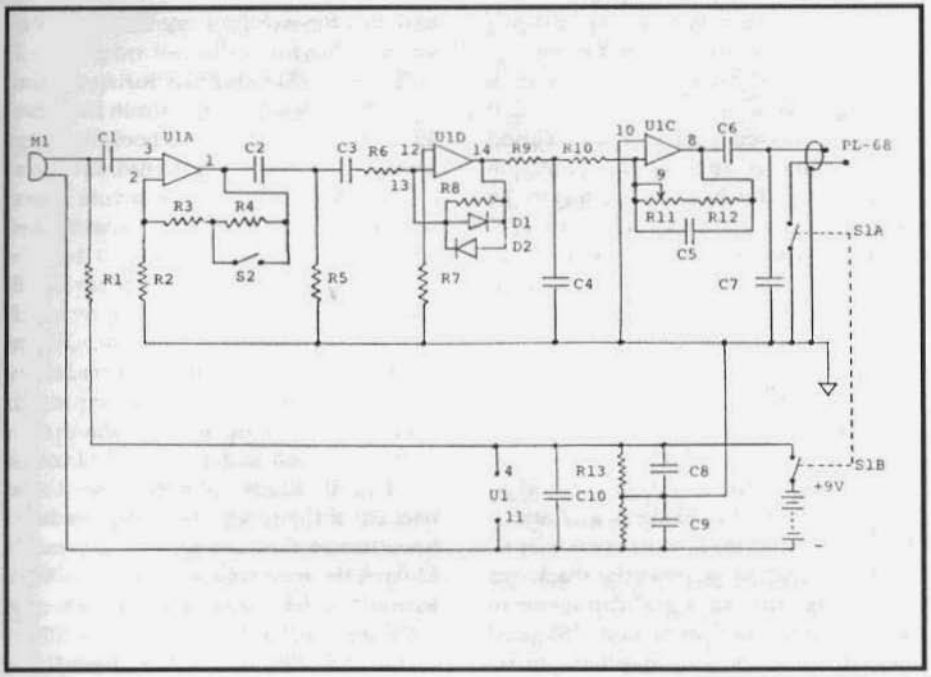
Another Carbon Microphone Replacement

Most military sets are designed for carbon mics, but after you make one or two contacts with a T-17 or other 'authentic' unit, you will probably want something better. A very simple replacement for a carbon microphone was shown in the November, 1989 column. However, after using that circuit for a while, I found myself wanting three things: (1) An adjustable output level to give full modulation with different sets; (2) Speech clipping and filtering to make the most of low powered rigs; and, (3) 'Self powered' operation to allow use with sets designed for dynamic mics. The circuit below meets these requirements and is not hard to build.

Parts List: (Numbers in parenthesis are Radio Shack catalog numbers, "*" is a substitute part, see text. Resistors are 1/4 watt unless otherwise stated.)

C1,C4	.01 mf 50 wv (272-1065)
C2,C3,C7	.047 mf 50 wv (272-1068)
C5	.001 mf 50 wv (272-126)*
C6	10 mf 50 wv (272-999) non-polarized
C8,C9,C10	470 mf 10 wv (272-1018)*
D1,D2	1N914 or 4148 (276-1122)
M1	Electret mic (270-090)
R1	1000 ohms
R2	1.5 k
R3	4.7 k
R4,R9	22 k
R5,R6,RIO,R12	10 k
R7,R8	100 k
R11	100 k pot (271-092)* (output level)
R13,R14	4.7 k 1/2 watt
S1	DPST Push-to-talk -- See text
S2	Clipping in/out (275-612)
U1	LM-324 Quad op amp (276-1711)

This circuit is adapted from a mic preamp described in the 21st edition of Bill Orr's Radio Handbook (Editors and Engineers, 1978). U1 contains four op amps (only three are used) in a single 14 pin DIP package; 741-type single amps could be used instead.



A carbon microphone replacement. This unit will deliver up to 1.5 volt RMS output and can be plugged in to almost any military set without internal changes.

The first amplifier increases the voltage from the mic. With 52 closed, only mild (almost unnoticable) clipping occurs. This position may be used with radios having built-in clipping or under very good conditions. Opening S2 gives three times the voltage gain, resulting in over 10 db of clipping -- a good compromise between intelligibility and acceptable voice quality when conditions are poor.

R5/C2 and R6/C3 are high pass filters; this must be done before clipping. Clipping occurs in the second amplifier; R9/C4 is a low pass filter to reduce harmonics generated by clipping. The third amplifier raises the output level; R11 lets you set the level to suit the transmitter.

The unit must be built in a shielded case; I used the Hammond #1590 (2-1/4" x 4-1/4" x 1-1/8" inside dimensions) cast aluminum box. The substitute parts ("*" in the list) are Radio Shack parts which will work in the circuit but are larger than necessary; if you use these it is difficult to get everything to fit so I suggest trying other dealers or flea-markets for the smallest parts which meet the specs. Radio Shack has no switch suitable for S1, which should be a miniature DPST spring return pushbutton.

To avoid RF pickup and other problems, use a shielded cable and ground the shield to the box where you bring it in. Keep the leads from the junction of C8 and C9 to ground and from the ends of C8/9/10 to pins 4 and 11 of U1 short and direct.

The Antenna

When using low powered sets, such as the usual small military radio, antenna efficiency is very important. My favorite antenna -- on which I work the Eastern half of the U. S. with as little as four watts AM -- is a full wave horizontal loop averaging about 15 feet above ground.

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It's efficient and it is easy to put up if you have trees around Radio Central.

For 80 and 40 meters, get 250 feet of #18 insulated hook up wire and string it from tree to tree to tree in any closed figure –mine is an irregular pentagon surrounding the house. Support it by passing the wire through loops of 1/8" or larger diameter nylon line tied to the trees; no other insulator is required. (If your neighbors are 'fussy', use 260 feet of #28 enameled wire for the antenna and fishing line for support -- the antenna will be invisible and will work well.)

At the point nearest your station, fasten one end to the shield of a 52 ohm coax, the other to the center conductor. Bring the coax into the shack and attach whatever connector is most convenient.

Hook a small loop across the shack end of the coax and use a grid dip meter to check for resonance at or near 3885 and integral multiples; you may have to remove a few feet of wire. (The dips you are looking for will be rather broad and shallow; if there are also sharp dips, they are caused by a mismatch between the feed line and antenna. Ignore them.) When 'pruning' is complete, weatherproof the connections and the exposed end of the coax.

This antenna will make more and better contacts out to about 1000 miles than any simple antenna you ever tried. If you have kept the wire a few feet from all the trees it may also work on 20 and perhaps even 10 meters but check with a grid dip meter before trying to load it up as some tuners or transmitters will supply more voltage than the coax insulation will stand if the antenna is antiresonant.

The B-24 Radio Operator

Recent columns have covered two of the radios used in the B-24, namely the BC-375 and the HF and MF command sets. The following story -- from Quen, W3REZ, during a post-midnight QSO right after Christmas of 1986 -- is as close to word-for-word as my writing speed would allow.

"I was a B-24 radioman during the war. I went to school at Ft. Scott in Illinois in 1943. At the end of the school they gave us the exam for a ham license, though of course we couldn't get the actual license till the war was over. But that was how I came to get my license."

"I worked with all the sets on the B-24s. They had the command sets, also the BC-375 transmitter and BC-348 receiver for liaison. They had ground crews to do things like change the frequencies and tune them up so the plane crew didn't do much with them, but of course we had to know how in case it was needed in flight. On the raids we didn't have to use the liaison sets very much. Most of the time we used the 348 to listen to the London broadcast stations until we were over the target area."

"On solo flights it was different. The morning before a raid they would usually send a single plane to the target area to check the weather -- particularly the visibility. Then we would use the BC-375 to report back. One time though I remember I couldn't make contact with the liaison set so we waited till we were about halfway back and the pilot raised the base on the command set. I don't know if he used the HF set or the SCR-522."

"After the war I heard people say the BC-375 wasn't very stable or a good radio and such but it was what we had at the time and we thought it was fine."

"The radioman also manned the waist guns -- two .50 caliber machine guns mounted on opposite sides of the plane. So we kept busy, even when there wasn't much radio operation."

Still More On The BC-191

Wes Chatellier, W5DPM, writes how he got acquainted with the 'older brother' of the BC-375; I have taken a few editorial liberties with his letter:

"For Christmas 1941 I received a notice to report for military duty from the local draft board. (I was 27 at the time and a bit too old to volunteer.) Since I held a ham radio license (same call as now!) and had attended RCA night school classes at the Merchandise Mart in Chicago during '36 and '37, I was rewarded (?) by being sent to the Signal Corps School at Ft. Monmouth, NJ. Along with many others, I was herded into a group that attended 'Radio School' which was of about four months duration."

"Apparently I successfully completed the course for I became an instructor in a section called 'Test and Repair of Ground Radio Equipment'. Here I first came eye-to-eye with the behemoth, the BC-191. My first reaction was to the four fifty-watt bottles that stood out when the panel was removed from the front! As a small time country boy, I could never enjoy a fifty watt tube (like a 203 etc.) and now I could really touch one."

"In time I became building chief of this section. I had about two dozen instructors to watch over and we ran two shifts for test and instruction. To tune the BC-191 rigs we used BC-221 frequency meters which ran from batteries; when the unit was left on, they made quite a mess in the case!"

"We would insert gremlins like tying the grid to ground on the type 10 tube prongs, etc. and the students had to find them. I remember one student who labored on a problem until I took it on myself to help by telling him the tube was purposely bugged.

Well his reaction upon pulling the tube and seeing the shorting wire was to slam the tube against the wall in disgust! Of course this resulted in disciplinary action... a trip to the battery room to clean up the smelly acid belching batteries which powered our BC-191's..."

And Still More On Radioactive Military Radios

(Because of space limits, part of the discussion of radioactive front panel markings didn't make the June column.)

In response to a reader's question, I checked the panels of several dozen types of old military radios; here are the ones with significant levels of radioactivity:

Set	Intensity Mr/hr.	Problem Areas
ATD	0.5	Plastic buttons in the ends of the toggle switch handles. I also checked buttons on a dozen other switches of this type; only those on the ATD were radioactive.
BC-654	0.3	Panel meter
BC-659	0.1	Panel meter
BC-1335	1.5	Markings on flip-up jack covers
T-195, R-392	0.35	Panel meters. Those on the R-390 are probably also 'hot' but I did not have a set to check.
TBX-8	5.0	Painted M.O. and receiver dials.
TBY-6	0.25	Painted panel markings. Markings on meter, painted pointers on knobs.
TBY-2	5.0	Painted panel markings. Markings on meter, painted pointers on knobs.

'Intensity' is measured at a distance of one inch from the first item in the list of problem areas. For comparison, a 1940's Westclox 'Big Ben' wind up alarm clock dial read 0.15 Mr/hr on this test. Notice that there's great variation among models of the same set; also, I found a 2:1 variation among individual sets.

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The June column suggested some precautions for owners of these radios.

If you have or expect to get many WW-II military sets, a geiger counter might be a good idea. Heath Co. sells a modern one; various models of the PDR-27 (standard military counter from the 1960's) are available from Fair Radio Sales. If you discover a set which isn't in the list above, let me know and I will spread the word.

What About A Military Radio Net?

In April I asked anyone interested in a net to discuss and/or use old military radios to get in touch. There were two answers; even with the three or four others I know are interested, there would not be a 'critical mass'. We will try the idea again in a year or so.

PP-4673(A)/GRC

Did you ever wonder how the military depots power the 24 volt monsters -- sets like the T-195 and later cousins which require heavy-duty electrical systems in the vehicles which haul them around? One of the answers turned up in June, at the (Fredrick) Maryland Amateur Radio Club hamfest. The only item being sold by a young man (less than half my age, that is!) and his wife, I could see right away this was an interesting unit from the panel markings: "A.C. Input 115/230V (and) D.C. Output 27-29 Volts 50 Amp." I could see little through the louvers in the top, but there was a hole in the panel through which the output voltage could be adjusted with a potentiometer -- it must be regulated! said "$20?". "Sold!", he said.

It's as heavy as a whole lifetime of sins -- every ounce of the claimed 125 pounds -- and lacks any sort of handle or lift arrangement. But most of the weight is iron and copper, so it's easy to excuse.

The unit is indeed regulated (using one large SCR), adjustable from 25 to about 30 volts output, has voltage and current meters, and even crowbar (output is shorted if voltage goes too high) over-voltage protection. Even the mechanical design is superior, which is often not the case in relatively small production items like bench power supplies.

The seller said, "I checked for output voltage", but back in the radio room at KJ4KV it blew the 20 amp line circuit breaker after a few minutes on a ten amp load. The problem was an intermittent short in the input line filter -- solved (till a replacement can be found) by removing it.

I haven' t yet tested the PP-4673 with a large dynamotor, but it works well on steady loads such as the T-195 (35 amps) and ARC-58 (55 amps when running AM) .

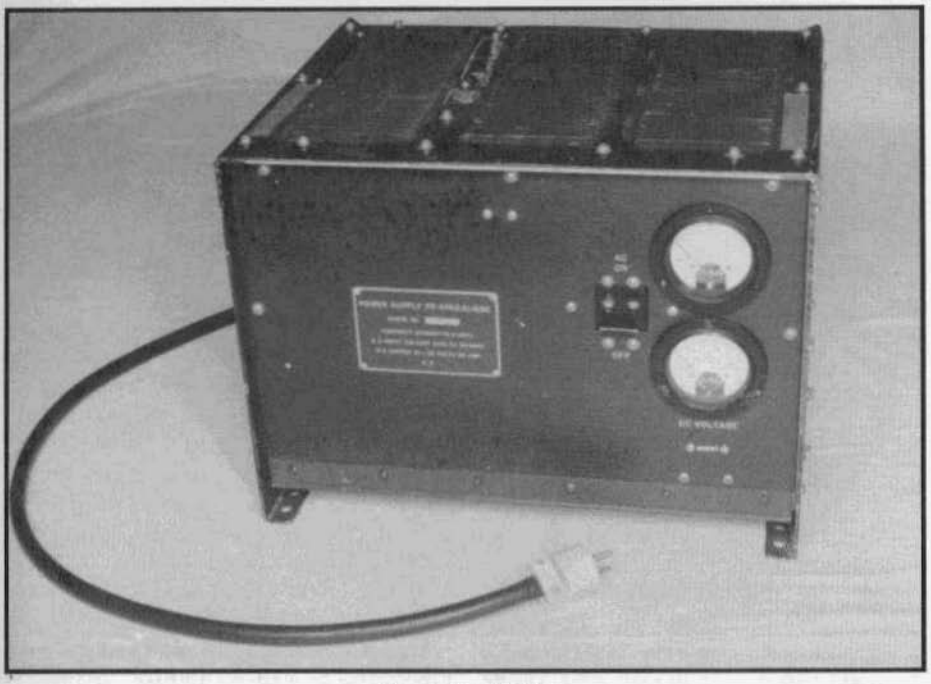
I don't have a manual or diagram so the real limits are unknown. Fortunately, except for the regulator circuit board, this power supply is simple enough that most problems could be fixed without the documentation.

There's no date on the unit but the technology seems to be 1970' s . It may have became surplus because of the line filter problem, which was not easy to find since it was intermittent.

Building Battery Packs For Military Radios

Good battery packs for the older portable military radios are usually impossible to find. However, modern alkaline flashlight batteries are so much better than the old zinc-carbon cells that it may be possible to build up an effective battery pack even though you can't find exactly the right size cell to fill the space.

Begin by choosing the cell size and number of cells for each of the voltages the pack must supply. You can get a good idea of the current a given cell can deliver from the rating of the flashlight bulb with which it is used: for example the size 'D' cell is often used with a PR-2 bulb which draws 0. 5 amps at 2 . 38 volts. If you stay below this current, your pack will last longer than the batteries in the typical flashlight.



PP-4673(A)/GRC

Even 'identical' cells don't have exactly the same voltage. Connect cells in series strings and put strings in parallel (rather than connecting parallel groups in series) to minimize power lost to currents flowing within the pack.

Try different sizes of cells, physical arrangements and circuits until you get a combination which (as nearly as possible) exactly fills the space -- remembering that there must be room for connections between cells, some sort of packaging, and the socket or other connection scheme. Don't cut it too close, as different brands can be slightly different sizes.

A pack I made for a transceiver consisted of three parallel strings, each of ten size ' C ' cells, and delivers 15 volts at 1 . 4 amps. A tap connects the first two cells of each group and another two cells are in parallel with this group; this tap supplies 3 volts at O . 4 amps.

Cells can be assembled into blocks using 'Krazy Glue' and connected with wires soldered to the end plates. Modern flashlight cells have plastic insulation so connections must be made with great care to avoid causing an internal short. Solder very quickly and only near the center of the end plates. If a cell starts to get warm, it is shorted; remove it quickly to a pail of water as a shorted alkaline cell can explode.

At least several hours work will be needed to build a complicated pack, so be sure you start with good cells. I tested three brands before making a choice; the Radio Shack #23-551 was the best. A 'bargain' cell made by a famous camera maker turned out to be weak. Buy all the cells at the same time, make sure they are fresh and of the same date, and get a few spares in case of problems.

This isn't a cheap technique: at $2.59 for two, the cells for the pack described cost over $40. But a pack built with alkaline cells should stand at least a couple of years of occasional or demonstration use.

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NOSTALGIA, 1928

by Jim Taylor, W4PNM
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In the fall of 1985 my father ,Chick,W8DFV, (82 years old, first licensed in 1927) and I had a discussion of amateur radio activities of yesteryear that ultimately resulted in the construction (or re-construction) of his 1928 transmitter. As always in those conversations my father was quick to describe all the radio activities of that period. We also had a lot of laughs talking about the old equipment and the people involved. It must have been real fun back then since most building activities were really primitive by today's standards.

Today's hams have really missed the spirit of ham radio and all the fun. If you are too young to have experienced ' the good old days' you just don't know what ham radio is all about. For example; the hams of that period didn't discuss what frequency they were on - to a cycle of two as we do today - but rather if they were on the right band!

Well, the nostalgic discussion covered many topics that day but somehow we got 'fired up' on some of his old transmitters. Some of the questions that occured to us were: Were the transmitters of 1928 or so really that bad by today's standards? Did those old rigs really work? How difficult would it be to make one work? What was breadboard construction really like? and finally," Do you suppose we could make one work today?" We concluded that the only way we could find out (and have some fun in the process) was to build one.

My father revealed that he still had most of the parts that we would need. He had saved them for over 60 years! The parts were the exact same ones he had used in his 1928 original. And he was sure that he could remember the exact circuit! 1928 here we come!

We dug through the old parts boxes; out came the old chokes, tuning condensers (no capacitors), tubes sockets, filament transformers, the old neutralizing condenser and yes, the old tubes - the same ones from 1928 mind you! Most of the parts were still good but some had to be disassembled and cleaned and/or repaired. We didn't have everything we needed - and we wanted everything to be authentic from 1928 - so the word went out to old timers we knew, begging for parts.

While we were still gathering all the parts together we designed and built the table. This rig would be a breadboard but we wanted it to be pretty; something better than the top of an old work bench that was often used back in the early days. We built it from pine and gave it a nice stain and varnish finish.We made it 48 inches long by 18 inches wide with a shelf down below for the power supply.

Our search for old parts began to return results. We found many of the guys who knew of the project, willing to send anything they had that we could use. Through their efforts we found everything and more. We found out through land-line calls and on the air that very many hams were as interested in the project as we were. They kept asking us how we were getting along with the "Old Timer". After the parts were collected the authenticating took place, heaven forbid we should use any new parts -later than 1930!

Now I put W8DFV's memory to work. First I had him draw out the old circuit and then had him locate all the parts on the table. He had no trouble remembering;" Let's see that tube was about here, the crystal socket was here and the coil was over there, screw them 'Sangamos'down by the ears"! It was really something to see that detailed information come out of his memory.

W8DFV's 1928 transmitter. Only authentic parts - pre-1930 - were used throughout. However, if you look closely, you will see that the 866s in the photo are of the more modern type. When they first came out - in 1927 or so - they were pear shaped. We have only one pair of those tubes so we haven't been using them but we did intend to install them for the photo.

When we had located all the parts on the table top, we screwed them down and started to wire them up. If you have never built a breadboard rig you should try it sometime; it's different! The "Oldtimer" started to take shape.

Even when we had all the parts we needed and the rig was almost together the parts still kept coming in. Our ham friends really dug deep in their junk boxes for some of the stuff. We ended up with an unbelievable collection of parts.

The rig took shape. The tube line-up was no question; it had to be just like it was in 1928. Hold on to your hats; we had a 210 (10) in the oscillator, 210 (10) in the buffer, and a 211 in the final. [We should note that some of the guys have said a 47 would have been a better oscillator, and they are right, but W8DFV didn't have a 47 then so he used a 210, it had to be authentic.] The modulation was supplied by an old Western Electric 212D, in a Class A split Heising configuration. That 212D was a broadcast pull from WSMK in Dayton, Ohio. That station is now WING. We have two of those tubes. These were given to my father by Paul Braden, W8DSN, who was Chief Engineer of WSMK at the time.

Finally we had all the tube sockets screwed down; the 211 was in the old '50 watt' socket'; the same one! The coils were wound on the same old bakelite forms used then and the final coil was wound on 1/4" copper tubing. The filament transformers were hung upside down under the table top and the wires run up through holes to the tube sockets.

continued next page

All the coupling condensers and bypasses were screwed down by their ears, and a #10 buss wire was run around the tabletop edge for a ground. It was difficult to keep from thinking modern. We had to stay away from plastics, phillips heads, aluminum or any improvements in construction. Believe me, it is difficult to think 1928 when you weren't there! But W8DFV kept me on the right track. How simple it would have been to slap a Koolohm or a RCA Flameproof or a ceramic capacitor in there.

The top deck was finished, now came the power supplies and modulator. All the old transformers were taken apart and wire brushed, primed and repainted black. A tremendous amount of time went into cleaning up the old stuff. The power supplies were 400 volts for the oscillator/buffer and 1500 volts high voltage for the final and modulator. We used an 80 in the low voltage, a pair of old 866s in the high voltage. The 212D was mounted in it's home made socket - the same one used in 1928 (that socket was hand made by W8DFV's father, my grandfather). The old 30 Henry Heising chokes with the dropping resistor and coupling condenser were mounted and wired.

After many long nights and exciting weekends we were ready to turn it on and see if the old parts would still work. First came the oscillator/buffer. We lit up the tubes and what a relief it was to see them come on. Then, with some reservation, we turned on the low voltage. We then quickly tuned the plate coil and 'bingo' the xtal took off - we had RF! [We had to grind an old xtal to 3885 kcs - kcs not khz... shades of the good old days.] Next, the buffer and we had drive and the plate tuned but we had to neutralize since we were going straight through. The neutralization worked just fine and the plate dipped giving us pretty close to the right drive on the 211 final.

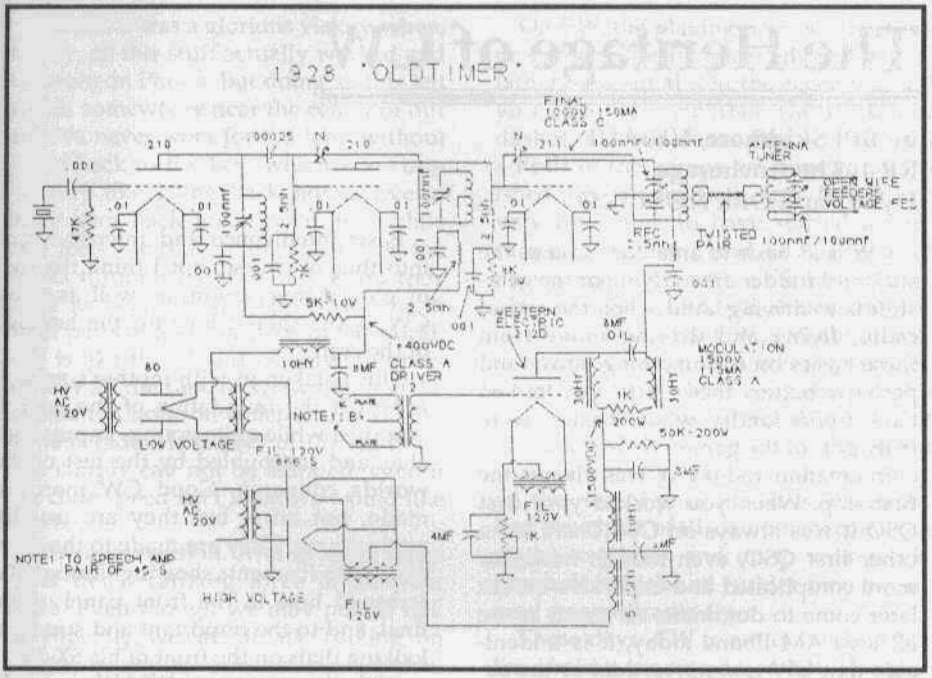
Next, came the neutralizing of the final. Our educated quess on the plate coil was right on, the final tuned, so we did our neutralizing with the old standard test equipment; the loop lamp. The final fell right in. Oh, the good old days!

Next, came the final plate voltage. I had calculated the plate dropping resistor but I really didn't have to. W8DFV told me what it would be and he was right; very simple to call on experience!

Well, there was one last thing to do - turn on the high voltage. Do we dare? There was only one way to find out and that was to stand back and throw the switch! I did, the old 866s turned that characteristic blueish green and we had voltage. A quick dip on the final plate revealed we had 10 mils minimum plate current. We then measured the B+ and it was right. The final tuned just as pretty as you please and it had no tendency to take off on it's own. The rig worked so far, what a trip!

Now the acid test. We put it on a dummy load with a wattmeter - Dad didn't have either in 1928 - and dumped the link in the center of the coil. The plate current came up to 150 mils and we redipped. It stayed there. We had 150 mils at 1000 volts; 150 watts input! The wattmeter said 110 watts output - not bad for 1928! The transmitter worked fine and we were just ecstatic over the whole thing. We were looking at ham radio 60 years ago!Of course as you might expect, we played with it, made a few slight changes in the coils - a little refining work.

Another interesting thing about this project was that back then my father didn't have a voltmeter or an RF current meter, or any of the modern test equipment we have now; he just couldn't afford it. Not many hams could. He had only one millampmeter, that was moved around in the circuits to measure the currents.



The circuit of the 1928 transmitter drawn by Lonni Taylor, WA4ASQ, from his grandfathers's (W8DFV) memory.

There was no way to measure B+; you just went by the manufacturers ratings or if you wound your own transformers you counted the turns and figured it out. So, Dad knew his voltage from ratings and he could measure his plate current but he did not know his output. There was RF but how much was a mystery. The most modern equipment he had was the wave trap and that told him he was on the right band.

Well, we had our transmitter built and it was generating RF. It looked pretty darn good too. But we still had to modulate it. Would the old 212D in the modulator circuit still work? We hooked up the 1500 volts B+, turned it on and low and behold the 212D drew plate current. We adjusted the slider on the bias resistor in the filament center tap and set the plate current to 100 mils. That's 1500 volts at 100 mils which is 150 watts to our Class A modulator!

The old tube showed a slight cherry red color but my Dad assured me that was normal.

Now the audio! We plugged in an old speech amplifier and the original Universal BB-1 microphone that Dad had used in 1928. With the loop lamp near the final plate coil, Dad turned up the mic gain and said,"Hello radio". The loop lamp just about jumped out of the socket! We had lots of modulation. But, what did it sound like?

With W8DFV at the microphone I ran into the house where the receiver was and listened. I could not believe what I heard! The audio was clear and the most beautiful I had ever heard. We just couldn't believe it. The 'old/new' transmitter was fantastic.

More tests.... real tests! In the ' good old days' the only test for signal strength and audio was to get on the air and go from reports you received from other hams.

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The Heritage of CW

by Bill Skidmore, VE3AUI
RR 1, The Anchorage
Hyde Park, Ont. NØM 1ZØ

CW is as basic to amateur radio as the stick and rudder are to flying or the gearshift is to driving. And when the arts of radio, flying and driving move from these basics on to something newer and perhaps better, these 'arts' are looked back upon fondly when 'basics' were truly part of the game.

In amateur radio CW was always the first step. When you worked your first QSO it was always on CW. There is no other first QSO, even though newer or more complicated and expensive modes later come to dominate. As much as we all love AM Phone today, it is undeniable that CW takes precedent as the absolute basic stuff of which amateur radio has been formed.

Describing CW is like describing music - almost impossible to the uninformed or unsympathetic. No one can quite say how it is we know a good operator from a bad one. Is it the number of mistakes in sending he makes, the speed of his copying, the set-up of his bug or his knowledge of abbreviations?All of these things may come into it, but somehow the good CW man can recognize another one instantly. He just knows who you can sling full-speed conversation at, and who you have to be careful with. And in these days of electronic keyers and keyboards, the tip-off is usually not simply a matter of letter character formation, either. The closest thing I know to this instant recognition and mutual understanding is just plain, ordinary, conversation. With some people, talk, the mutual exchange of notions and feelings, flows easily and quickly. Two minds join through the medium of speech. They lead each other effortlessly into other worlds. And then again, with other people such things are just not possible.

Basic intelligence and interest, come into this, of course, but I think the root of good conversation, as well as good CW, is the shared love for the heritage of the craft.

This is taken in with mother's milk. It is best if the foundation of the craft is absorbed while quite young, impressionable, and untroubled by the rest of the worlds concerns. Good CW men are made, not born, but they are usually made young. They are made to the glow of Elmer's filaments showing through the screened hole in the front panel of his final, and to the important and steadfast looking dials on the front of his SX-28.

With great respect to W1AW, real code practice is had on the national traffic system where each man's tone or his chirp or drift gives away his identity as truely as his call itself. I can well remember the sound of the original W8AL on the eighth region nets. His rig was a command set, with a pretty basic AC powersupply. He sounded like nobody else. You got the mental picture of a small man in a plaid shirt with side suspenders and a shock of grey hair falling into his eyes, sitting at a home-made table in his garage slapping away at an ancient Vibroplex with a frayed cord. He just sounded that way. I wonder if it really was like that.

CW is what we all graduated from to go on to Phone. It was something to leave behind. As soon as we got a functioning and stable CW rig, the next step was to modulate it, to lock the key down with a relay and talk into something shiny so that the world could actually hear our voice. And while gathering the parts, building the modulator and getting it right, lacing up the control wires and fixing the receiver muting, the goal of getting on Phone swept all else before it.

Indeed, it was a glorious victory when, finally, all this stuff actually worked and we were on Phone. But doing all this left a void somewhere near the center of our art. We never went for too long without going back to the key, which was comfortably like going back home. Everybody goes back home once in a while and feels the old feelings and sees the world through the eyes of the kid they used to be, even though most live in other parts of town, or parts of the world. CW is like that. We don't have to operate CW all the time to know that it is the foundation stone on which all else is built in ham radio. It is part of the tradition that simply can not be skipped, even if our code speed isn't what we would like it to be.

CW involves skill. And as such, it is a great democratizing force in amateur radio. Even though we may not all talk intelligently, we can all talk. Talking, on Phone, is not an outstanding achievement. Our achievements there lies in the areas of equipment quality and power, mastery over technical problems, and the mysterious relationship that an amateur gains with his gear, and with the RF itself. These are inconsiderable things. They constitute part of the romance of AM. But they are inherently elitist. In the old days, it took money and time, a modicum of space, and some sound engineering knowledge to get a dominant Phone rig on the air.

By contrast, CW was everyman's mode. It is impossible to get more basic than the simplest CW transmitter. And an MOPA, adjusted correctly, sounded great. After all, a watt is a watt is a watt. And on CW it doesn't make much difference whether that watt comes from the biggest and best, or the most sandlot primitive of rigs. It is the operator and his ability that counts. Almost anybody can succeed, with a modest amount of capital invested. On CW, you succeed according to your skill, ability and clever determination.

On CW, the playing field is almost entirely level. Twelve year olds and grandfathers are equal. On the receiving end you can't tell whether the dots and dashes start out from a five acre lot with a Rolls in the garage, or from an unfinished attic on the tram-line. And it is a very fine thing to have started a ham career in that attic and to finally wind up on five acres with a Collins station. This is what individual achievement is all about. This what CW is all about. CW is where you start. It is where you hone your skills. It is where you learn to use a receiver and follow a signal in and out of the QRM. It is where you figure out some basics of propagation that you rely on the rest of your life. It is where the first principles of RF equipment come out of the text book and on to your workbench. It is stick and rudder time for the new amateur radio flyer.

These days, CW is not quite dead but I'm afraid it is going down hill. This past field day I operated almost twenty-four hours of CW, and heard some splendid code put out by some crack amateurs. I suppose the best CW there is left is found in the ham bands. But during a normal afternoon and evening of listening on forty and eighty, the number of quick-witted CW QSOs is small indeed. Sometimes tuning around the CW sub-bands can be positively embarrassing. Often enough, the best CW on twenty is coming out of eastern Europe. This is understandable I suppose. Today, the economics of ham radio make the basic rig a Japanese transceiver which is to say, SSB for the most part, even though all these rigs work CW.

Today, the new ham is bypassing a basic step in the heritage of ham radio that we all took, in our day, as an unconscious matter of course. What we gained in taking that step has stood us in good stead, and provided for us a satisfaction from ham radio that, I often think, is completely absent from the world of the new ham. It's not his fault.

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Tim Green, VE6GYJ, Calgary, Alberta, Canada. Tim is 17 years old. Wouldn't it be nice if we had more young men like him involved in AM/Vintage operation?

Charlie Vaughn, KD4AJ, at his AM operating position.

Bob Dennison, W2HBE, working on the front panel of a homebrew superhet that will be the subject of a future article.

AM'ers at Puyallup, WA hamfest. Standing from left to right; Barry, W7JKY, Pete, VE7FY, Casey, W6PKW, Cliff,AI7Y, Frank?, Rod, WA7AMI and Ken, K7GCO. Kneeling; Pat, K7YIR and Dale, K7MJ

Collecting/Repair/Restoration...TIPS

Humid Environments and Older Gear

Humid basements in the summertime can actually prevent older tube-type receivers from functioning properly, if at all. The dampness in the air has a detrimental effect (albeit temporary, for the duration of the summer) upon the mica dialectric of the trimmer capacitors of local oscillators,etc.

This was my experience one muggy July evening with an old Hallicrafters S-77A. To at least minimize the amount of moisture inside the rig's cabinet affecting the components, I obtained a quantity of silica sand from a local craft shop and poured some into open, empty, individual aluminum tart shells (silica sand is the stuff they put into those tiny cloth packets marked "Do Not Eat", which accompany your imported VCR's, portable radios, etc. — craft shops sell them as agents to help dry flowers); I then located these containers at several places inside the receiver, atop the chassis.

This fix, in conjunction with keeping the receiver warm by leaving it "on" for most of the time, worked reasonably well in stabilizing the rig until the day I relocated it, forgetting all about the sand! It was no picnic cleaning the fine grains from between the plates of the variable capacitor. This ultimately convinced me to replace the mica trimmer outright in the local oscillator with a small variable trimmer; although not "stock", it did allow me to use the S-77A 12 months of the year.

Eddy Swynar, VE3CUI

Easy Breadboarding

If you 'home brew' vacuum tube gear, watch for vacuum tube breadboarding kits at fleamarkets. A common type consists of a clear plastic board 9 1/2" x 14 1/2" having 750 holes joined in groups of five by metal clips inside the board and some number of octal and miniature sockets and other common radio parts which can be plugged into the holes. Connections are made using pieces of solid hook-up wire pushed into holes; other small parts such as resistors can also be mounted this way. These sets were distributed by DeVry Technical Institute and others as part of correspondence courses and often have all the major parts for dozens of radio projects; other parts can easily be added. Using one of these breadboard sets makes it possible to test the circuit for a project in a fraction of the time needed to build it with conventional methods.

Grow Your Own Skyhook

When moving to a new QTH, don't overlook the possibility of planting trees for future use as antenna supports. Many species will grow one or two feet per year if given water and fertilizer; if you plan to be there ten years or more you may get years of use from a new planting. The neighbors can't object and in almost all cases trees will add to the value of your property. Pick the type which makes architectural sense -- evergreen if you need a year-round windbreak or deciduous for summer shade and winter sunshine. Then look for fast growth and evenly spaced branches to allow easy climbing. At one W3 location, white pine and horse chesnut have been successful, as has a large magnolia.

AM FREQUENCIES

2 Meters - - - 144.4 - calling frequency Activity in most cities.
6 Meters - - -50.4 - calling frequency
10 Meters - - - 29.0 - 29.2 operating window. Most activity occurs here, although there is some activity around 28.325
12 Meters - - - 24. 985 - calling frequency
15 Meters - - - 21. 385 calling frequency
17 Meters - - - 18.150 calling frequency
20 Meters - - - 14.286 nightly SPAM net starts around 5:00 PM CA time.
40 Meters - - - 7160, 7195, 7290 - main operating frequencies. Westcoast SPAM every Sunday afternoon on 7160. Starts at 4:00 PM CA time.
80 Meters - - - 3825 - 3850, 3870 - 3890 main areas of operation. Westcoast SPAM net , Wednesday evenings, starting at 9:00 PM CA time. The frequency is 3870. The Northeast SPAM group meets Thursday evenings , starting at 7:30 EST. The frequency is 3885.

Parts Unit Directory Update

Last month I announced the creation of a directory of parts units. I thought that this might be of great benefit to collectors/restorers in need of vintage parts. Although the response has not been overwhelming I think that I can report that the directory idea has met with some favorable response. At the moment the directory contains about 30 units; by next month I expect we'll have double that amount and some of you may consider sending your 'buck' and a LSASE for a printout.

I've reconsidered my stipulation that the list would be available to only those with a unit on it. I think that that would have created a problem for those new people just getting into vintage radio. I'll just say that I hope those taking advantage of the directory will consider putting a unit in it themselves.

A few of the rigs we have on the list so far are: 32V-2, 32V-3, SX-101, BC-610, Viking I, Viking II, Valiant, Globe Champion 300, HT-37, AF-67, Sky Buddy, S-120 ,etc.

In a recent conversation with Joe Sloss, K7MKS, who has advertised parts units in the classified section a few times, I learned his pricing method. He says," I just ask the person what they would be comfortable paying, and then I add UPS costs; I've never been disappointed".

Please drop me a card if you have a unit to add to the list. Barry, N6CSW/Ø

15 Meter Contest

August 31 through September 2 are the dates I've set for "The First Annual 15 Meter AM Weekender Contest". The contest will begin at 0000 hrs GMT Friday, August 31 and end at the same time on Sunday, August 2.

Learning from the '20 Meter Allnighter' we had back on May 5, I've made some changes to the rules. First of all, working from a group is ok in this contest.

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LETTERS

Comments of Rick Miczak, K8MLV/Ø, 1802 W. 17th St., Pueblo, CO 81003

RE: RM 7401

To: The Commission

I am vehemently opposed to this petition submitted by W.B. Prechtl, to eliminate the AM (A3E) mode from the Amateur Radio Service.

I am also equally puzzled as to why this rule making proposal was assigned an RM number in the first place, since it is a classic example of a "petition which wastes the FCC's time, raises no new or novel issues and attempts to address matters previously settled in recent rule making actions," i.e. RM-3665 submitted by Robert W. Stankus; clearly and soundly rejected by FCC in ORDER of Feb. 26, 1981. The words quoted above are the approximate words of the Chief of FCC's Personal Radio Branch, John Johnston, at the Dayton Hamvention, only last April!! I am, therefore, totally perplexed as to WHY this petition was not promptly and properly DISMISSED!!

I sincerely hope assigning an RM number to this petition is not the result of personal bias of a person (or persons) in the Personal Radio Branch of FCC, thus, interfering with their official duties. This action by PRB is clearly an unwise use of taxpayer monies, especially in light of the serious and enormous federal budget deficit!!

With digital audio transmission technology just around the corner, I wonder if Mr. Prechtl would be equally anxious to submit petitions to do away with SSB (J3E) and FM because they are not "state of the art".

I wonder if Mr. Prechtl operates the CW (A1A) mode. Without a doubt, technically knowledgeable persons would consider AM to be more advanced than CW, and CW to be more primitive than AM. Therefore, I see convoluted logic in his comparison of eliminating AM, today - with the elimination of spark transmission (a primitive mode) 55 years ago, in favor of CW. He therefore, should advocate the elimination of the primitive mode of CW!! Truly, this CW mode is much more (quoting from text) "far removed from modern state-of-the-art communications" than is AM!!

Mr. Prechtl's further statement that AM "no longer serves a practical purpose in any communication service is blatantly untrue! He needs only to ask any airline pilot or control tower personnel to find out. Evidently, he has not done his "homework". (He should also tune WWV once in awhile, or the many time and frequency standard stations throughout the world, which all use the AM mode.)

If Mr. Prechtl's concerns about "the Amateur Service where spectrum conservation and interference reduction is of prime importance" were real, may I suggest that he petition FCC to do away with spectrum-wasting subbands on the basis of mode of emission, rather than to eliminate AM. One has only to tune the GAPING HOLES OF UNUSED SPECTRUM in our "CW" bands, while our "phone" bands are overcrowded at the same time, to get the message here! Subbanding, strictly on the basis of mode, SHOULD BE ELIMINATED with the Novice subbands, by reason of their very nature, being the ONLY EXCEPTION. The 160 meter band is a classic example of harmonious and efficient use of spectrum by ALL MODES OF OPERATION — WITHOUT SUBBANDING!!

Furthermore, if Mr. Prechtl's concerns about spectrum conservation were real, which didn't he petition for the elimination of SSB, as well?? Six or more CW stations can use the same spectrum as ONE SSB station!!

I also wonder if Mr. Prechtl would advocate the elimination of classic automobiles because they are not "state-of-the-art"!

AM operation is probably the last facet of the many and varied in amateur radio, where a person can build, experiment, modify, and simply LEARN BASIC RADIO! The commercially built (mostly Japanese) SSB equipment is far too sophisticated for the vast majority of amateur licensees for this purpose, not to mention the adverse effects on our trade deficit.

AM operation is an ART!

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To summarize:

I believe there is room for ALL of the many faceted interests and modes of operation in the Amateur Radio Service. I think the time is long overdue that the Personal Radio Branch of the FCC should use their resources in a much more constructive manner, and study the problem of unused spectrum created by this ridiculous and counterproductive practice of subbanding in the regulatory structure. I, personally, find Mr. Prechtl's views to be very narrow minded, intolerant, ill informed, grossly contrary to the true basis and purpose of Amateur Radio, totally without justification or foundation and in no way serving the public interest, convenience, and necessity. I, therefore, respectfully urge the FCC to properly and promptly DENY THIS PETITION.

I certify that a copy of these comments has been sent to the petitioner.

Respectfully submitted,
Rick Miczak, K8MLV/Ø

As of August 2, this was the only comment in the public file at the FCC in favor of RM-7401. Editor

This comment in support of petition RM-7401 is from Rodney W. Gray, WA1DVU, Box 924, Velchertown, MA 01007.

July 9. 1990

I would like to register my support for RM-7401which has to do with the elimination of AM from the ham bands. AM for amateur purposes is not only a technological antique and a nuisance, it seems to attract a disproportionate share of kooks. These are readily heard by the public and reflect poorly on amateur radio as a whole.
Thank you for your consideration.

signature... Rodney W. Gray

The following letter was sent to Les, K6HQI. With the writer's permission I have reprinted part of it here. Editor

Dear Les:

You might consider this letter to be something of an "SWL" report. Although I myself have been a licensed radio amateur for going on 28 years, my current circumstances prevent me from getting on the air in any frequent or substantial manner. I do, however, do a great deal of listening on the bands.

When I was active on the air in the past, I never really used the conventional AM mode. Nevertheless, I derive a great deal of pleasure from listening to you and the other gentlemen who gather on 14.286 Mc. It is my habit to flip on the receiver when I come home from the office after work, and to listen to you fellows while I prepare my evening meal. It's a lot more relaxing and informative than watching television, I assure you.

I do most of my listening with a Collins 75A-4 with a 6 Kc mechanical filter. Even with the 6 Kc filter, I shift the passband off center just a bit to pick up a little more of the high-frequency components of the voice spectrum. Although my receiving antenna is just a random length of wire run inside my house, your signal come in S-9 plus 20 db on most evenings here in the Denver area. With SSB one must ride the tuning knob all the time to keep the signals sounding just right. With you fellows on AM, however, I can go about my other activities and still have a lot of fun listening to good sounding audio.

I want to thank you fellows for the listening pleasure you provide and to express the hope that we might meet on the air one day when I have my station going again. I picked up a Heathkit Apache at a local swap meet just the other day. Getting it going should be a lot of fun. Who knows? Maybe you'll hear me on with "Angel Music" before too long.

73, Bob, KØKR

Ed Harrington, W1JEL

The man behind the NC-300 "Dream Receiver"

by George Maier, KU1R
64 Shadow Oak Drive
Sudbury, MA 01776

When I first called Ed Harrington to ask if he was interested in talking about his days at National, he said "Why me? There were a lot of people that did more interesting things than I did." In fact National did have a great deal of talent pass through its portals over the course of time, but Ed's work had a profound impact on Ham Radio, and its effects are still recognized today by many classic radio enthusiasts.

Ed grew up in Medford,Massachusetts, and attended the local vocational high school where he became licensed as W1JEL during his third year. After graduating, Ed found that jobs were very difficult to get; it was the mid-thirties, and the country was still feeling the effects of the great depression.

Having an interest in radio paid off because Ed found work as a part time radio repairman, afternoons and Saturdays, for $8 a week. A few years later, in 1940, things improved considerably when he found full time employment, through a ham friend, at the National Company in Melrose. His first assignment was learning how to align HRO receivers, as a great many of them were required to fill orders placed by the British Military; it was the start of World War II in Europe. In two years Ed was working in the final test department, which, as the name implies, was the last performance evaluation prior to shipment.

In 1942, Ed joined the Coast Guard and attended classes in Radar, Sonar and Loran at the Anacostia Naval Base in Washington, DC. After that he spent some time at a base in New Jersey and at the Coast Guard Academy in New London, Connecticut, lecturing young cadets in circuit theory; all the while hoping for a shipboard assignment. As the war was drawing to a close, his wish for sea duty came through; much to the chagrin of his new bride.

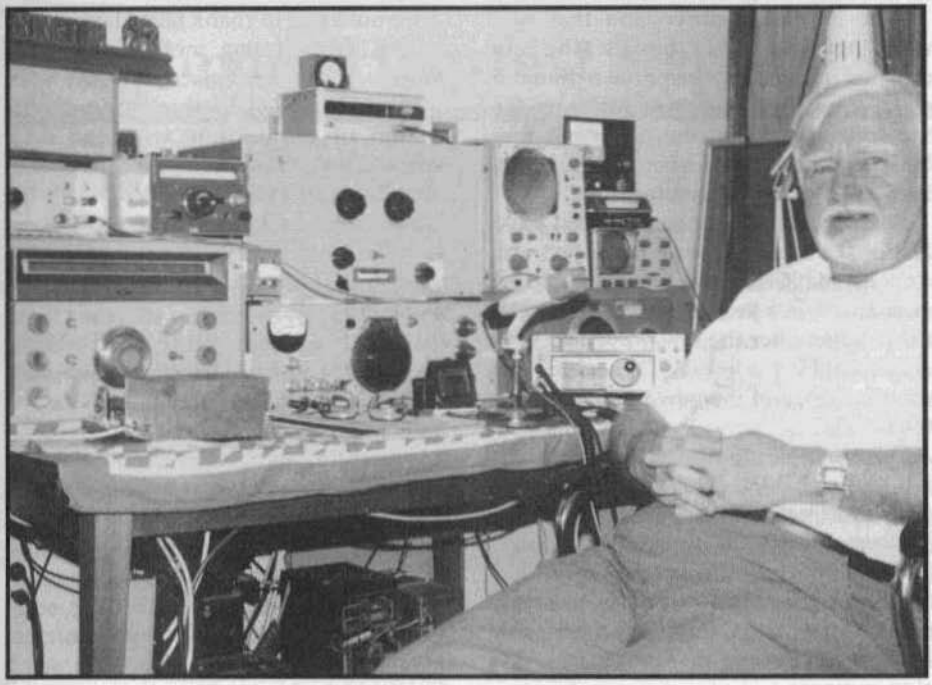
After roaming the Pacific for a few years, Ed had enough points built up to leave the service, and in 1948, he rejoined his wife along with their new daughter. Fortunately, he also rejoined the National Company.

A year and a half later, and with more test experience under his belt, Ed was assigned to the engineering department to work with Ray Calk (designer of the NC-173) on a multi-channel VHF transmitter project for the CAA (forerunner of the FAA). "The funny thing about that was, that Collins, who had a great reputation in transmitters at that time, won the receiver contract, and National (who specialized in receivers) won the transmitter contract."

Later, Ed designed the military version of the NC-183, which required changing the frequency range from the standard version. "Then I did the HRO-50-2, which became the HRO-60 before it hit the market;after that, I did the NC-300".

During that period of time, a lot of changes took place at National. Bill Ready, the owner and one of the original founders, sold the company, and of course the management structure as well as the general business philosophy changed considerably. One of the new owners was a member of the Macy family, and National built consumer Hi-Fi's for a while that were sold in Macy stores.

The NC-300 was Ed's project from the start. He attended many trade shows for National and answered technical questions from customers.



Ed Harrington, W1JEL

At one particular show he looked longingly at the Collins gear and thought " how nice it would be if we could come up with something that was somewhat competitive but nowhere near the price".

Taking this thought home with him, Ed launched into a period of brainstorming and decided to work on a plan for the "Dream Receiver". "During a visit to the ARRL, we kicked a few ideas around, and Ed Tilton, W1HDQ, suggested putting a converter range in the new receiver". Ed (Harrington) thought that was a good idea and took it a step further by adding direct calibration on 6M, 2M and 220 Mhz.

Another noteworthy contributor was radio store owner Carl Evans, W1BFT; in fact, several National dealers gave their inputs. "When I was done gathering ideas, I put it all together in a proposal, wrote a design objective, presented it to the new National management, and they approved it." At completion, the entire receiver cost National about $35,000 in engineering, and each unit ran about $100 in parts to produce. With overhead added, the final cost was about two and a half times that.

When the NC-300 was introduced, it became an overnight success. The first production run of 2000 units sold out immediately, and a second run of 2000 units followed quickly. "We had never made so many units at one time, except for SW-54's, maybe."

The crowd at Hallicrafters "was taken completely by surprise, and admitted that they had no Ham band receiver in the works." They wired me immediately and made me a nice job offer, but I didn't want to move to Chicago." "It didn't take them long to get going though, they moved pretty fast." And so the SX-101 came into being!!!

When I asked Ed what he would change if he had to do the NC-300 over, he answered this way: "The biggest drawback was the dynamic range."

continued next page

Ed Harrington, W1JEL, from previous page

"The harmonic conversion that was used on the upper bands (the LO doubled in the mixer) required 6 dB more drive from the RF amp to make up for the conversion loss, the net result was better stability, but the compromise was in mixer overload characteristics."

Before leaving the company, Ed gave National a scenario for an improved version of the NC-300 that he felt should be introduced in a year to regain interest in the product after the first wave had subsided. Cal Hadlock, W1CTW, carried out the changes, and the new model became the NC-303.

During 1956, after leaving National on a high note, Ed spent a short time with AMF Electronics, then settled into Hycon Eastern and wound up, with his family, in Germany on a long term military VHF antenna project. In 1964, when the project was completed, Ed found work with Radio Free Europe in Munich as a design engineer.

"I was told to go back to the states, to be hired officially in New York. When I went to be interviewed, I had a Chinese lunch, and the fortune cookie said - Very shortly you'll be going to Europe!!" Sure enough, W1JEL/DJØMW returned to Germany and stayed with RFE until his retirement in 1984. He now lives in Melrose, is an ardent DX chaser, and travels at every opportunity, e.i., never misses an Octoberfest in Munich. He's very surprised at the renewed interest in AM, and although he has no plans to operate that mode, he agrees that it certainly does sound better than SSB. He's also promised to listen in on occasion.

Ed tells me that there are many more stories about National that could be told, and more people that are still around to tell them. Over the next few months, he's promised to introduce me to some of them so that their knowledge of the National Company can be shared with all of us.

I would like to thank Jack Harrington, W1PSG, for putting me in touch with W1JEL in the first place, K1KZY, who sold me the NC-303. that made an old dream of mine come true and also sparked my in interest in this project, and also Ed Harrington, for all of his help, enthusiasm, and some absolutely great German beer that we consumed in developing this material!!!!

Postscipt

When I was a novice (KN1GXT - 1958), an older technician friend of mine had an NC-300 on six meters with a National converter cabinet, a home brew quarter KW, and BIG antenna. I remember thinking what a really nice receiver the NC-300 was; it was the first time I'd seen one in real life.

Soon after seeing the '300, a novice friend of mine won an NC-303 at a regional ARRL Ham convention in Swampscott, Massachusetts; boy was I jealous. I had many an opportunity to operate the '303 along with his new Ranger, Matchbox and Johnson TR switch; all acquired with the money received from the sale of his old gear. My station was a Globe Chief and an HQ-100. His was the neatest station that anyone in our age bracket (early teens) had. Half a dozen years later, I had a KWM-2, an SB-200, a TA-33 tri-bander and all the fixins, but I never forgot the feeling of operating that National/Johnson station.

For several years now I've been acquiring and restoring an occasional bit of older gear. Initially I just wanted to get a good sounding AM rig together, but I wound up going quite a bit further. I found I really enjoyed bringing vintage stuff back to life, and preserving some history in the process.

About a year ago, I was lucky enough to find a well kept NC-303 for sale in the Boston area. Buying it made a long term dream come true; and the really neat part is that time hadn't changed a thing.

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Steve's Hamfest Report

by Steve Sauer, WA9ASZ
1274 Londonerry Lane
Greenwood, IN 46142

Have you ever thought about attending an antique radio convention or meet? Although very different from hamfests in some respects, they have their similarities. On thing they have in common is that you never can tell what will show up.

On June 23, I attended the Indiana Historical Radio Society's meet here in Indianapolis. Generally, these meets are held at a motel near a major interstate interchange. The flea market section is often located in the parking lot of the motel. Also, the event is longer in duration than the average hamfest, often covering 4 days. Of course, many of the participants are as ancient as the equipment they enjoy and therefore can attend one of these events on a Wednesday or Thursday. The younger, still working population, has to wait for the week-end or find some vacation time.

One of the nice things about the antique radio meets is that there is sometimes a better selection of paper items than found at hamfests. Old magazines, handbooks, schematics are to be found among the seasoned table and console radios. I found a wonderful Allied '40s industrial catalogue, bound, for a couple of bucks. I also picked up 1938 and 1949 Allied catalogue from an excellent selection, but at $7 each, they were a bit pricey.

A small amount of ham gear is usually present. On this day, Sunday, there was a ham with a NC-270 and HQ-160, both in very nice condition, not mint, but excellent.

Seems that since it had rained the day before, he had carried these units indoors and was not inclined to carry them back home. They were being displayed from his car's trunk. Last day attending and buying can be very rewarding if you have the patience and can stand to see the good stuff slip away from you (or know that it did the day before you got there). Both of these units worked and had matching speakers. The negotiated price was a 'C' note for the pair. I don't regret the buyer's impulse, but I have to wonder if even the new house will have enough room for this one man's obsession!

Antique radio shows have parts for sale of course, especially since much emphasis is placed on the restoration of these radios with the original parts (new old stock). It's always a good idea to look under the tables and into the junque boxes. How rewarding it is to do so and find unopened boxes of goodies like audio output xfmrs, especially when their owner is willing to part with them for 15 cents each! But I have a problem doing this sort of thing when I first arrive because I get uncomfortable thinking about the 'big stuff' I might be missing at the same time. So, my procedure is to swing around the market once (or twice) looking for the equipment and standout items and then go around the next time for the not-so-obvious.

As I said earlier, you can never tell what will show up at one of these meets. On this occasion I found two Knight Kits that had just been opened at auction.

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'Secret' Valiant Changes

for improved Audio quality and VFO stability

by Marcus Frisch, WA9IXP
Box 28803
Greenfield, WI 53220-0803

Replace 18K 2W resistor in VFO with 18K 5W

Drill vent holes in VFO cover

Replace C99 in audio section with 47uf 35V

Change R53 from 220K to 100K

Change R26 from 47K to 470K

Change R30 from 47K to 100K

Change C95 & C94 from .001 to.00062

Replace drive control with 20K pot + 9K resistor

Replace clipping control with 50K pot + 68K resistor

Change C77 from 300pf to 100pf

Change C80 from 200pf to 100pf

Put cooling fan on top of rig for better cooling and VFO stability

Frequency response should be flat to 3500 Hz

-3db @ 4200 Hz
-6db @ 5000 Hz
-12db @ 6000 Hz

Will Your Amateur Radio Equipment Get Proper Disposition

by Bill Mills, KC5PF
1740 Tonys Court
Amissville, VA 22002

Over an individuals life span as an Amateur Radio Operator, we can devote many years collecting equipment appropriate to our hobby. Then when we become a Silent Key, our spouse or other loved ones are faced with the task of disposing of the gear. Pre-supposing that we enter the "ham" fraternity at an early age, we could devote three to four or more decades active in accumulating a large inventory of radio equipment, test equipment, documentation, and other related items. Over these years we often fail to record (or want to forget) the initial purchase cost and a realistic current resale value. In addition, our basements, garages and attics become storage havens for old tubes, parts, magazines and books related to the hobby. Some are old and outdated and should be relegated to the trash bin, but others may have retained their value or possibly be of use to a collector or restorer of old wireless gear. To avoid confusion and uncertainty in disposing of our "ham" radio estate, we should take the time now to plan the disposition of our many years of accumulation.

1) Create and maintain an inventory of equipment and realistic, current resale values.

2) Designate a knowledgeable "ham" (or club) who can assist the family with the disposition of the equipment.

3) Provide written instructions if specific items of equipment are to be given to family members, friends, radio clubs, schools, etc.

By devoting a little time to organization, we can be of immeasurable help to our heirs and can be confident our radio collection will be handled as we would wish.

Several clubs in the Washington area, as well as the Foundation for Amateur Radio, offer a volunteer service in assisting families in the disposition of Amateur Radio estates. Give it some thought now.

1990 Atlanta Hamfest And AM Forum

by Andy Howard, WA4KCY
105 Sweet Bay Lane
Carrollton, GA 30117

The 1990 Atlanta Hamfest was well attended by amateurs from all over the Southeast. Among those amateurs was a great group of AM operators who brought a good selection of AM gear to sell and trade. Many pieces changed hands including a nice Hallicrafters SX-88 receiver.

Although most of the AM swap activity was conducted outside of the main hamfest area where temperatures approached 100 degrees much trading and selling went on. Some equipment seen included a Globe Champion, a 75A-4, a Ranger, a Valiant, a HQ-140 and several R-390A's. It seems that as AM activity increases, more and more gear is showing up in the Southeast at the various hamfests and fleamarkets.

A large group of the more active AM enthusiasts meet each year for a 'High Level' lunch and discussion. This year it was held at the Hyatt Hotel adjacent to the hamfest site. Among those attending were Jim, W4PNM, Hank, W2IQ, Ernie, KØOCC, Bill, WA4GZK, George, K4RYN and several others including some XYL's. A great meal was enjoyed by all and several important AM-related topics were discussed.

An AM forum was held at 3:00 PM on Saturday at the hamfest. A good turnout of AM'ers attended along with some SSB operators curious about AM activity on the bands. The forum was conducted by Jim, W4PNM and myself (Andy, WA4KCY). After opening remarks video tapes were shown of the 1989 slide show conducted by Dale, KW1I.

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Some of the AM'ers who conducted segments of the AM Forum at the Atlanta Hamfest. Pictured left to right are: Jim, W4PNM, Marty, AA4RM, Ernie, KØOCC, Hank, W2IQ and Jimmy, KQ4S.

A Visit to the FCC from page 3

One thing we have done is list the arguments given against RM-7401; they form such a good statement of the value of AM that I am summarizing them below. In most cases several of many related statements have been 'squashed' into one according to the general topic. The list is roughly in frequency of occurrence order, with the reasons at the top of the list being used by many persons and those at the bottom being cited only a few times. Note too that about 15% of the comments filed said only "I oppose this petition".

Summary of Comments Opposing RM-7401

1. This petition raises no new or substantive issues. It is essentially the same as a previous petition which was dismissed.

2. AM operation is more enjoyable that other modes. AM sounds better than SSB. " I have impaired hearing; AM is easier for me to understand than SSB".

3. Collecting and restoring old AM equipment is enjoyable.

4. Earned privileges should not be reduced.

5. AM interest is increasing in spite of a decline in other areas of ham radio. AM is important as a way to 'discover' ham radio. Many of today's hams became interested through hearing AM operation, this could be an important source of new hams in the future. Many 'shortwave' receivers can 'hear' only AM. It would be bad for ham radio if AM disappeared.

6. AM encourages hands-on technical work, it can thus play an important role in learning electronics. SSB gear is so complex as to discourage building, repairing or experimenting. The pride of construction which comes from building and restoring AM gear is important.

7. Classic AM radios should be preserved just as classic cars and airplanes are preserved. Allowing use of AM helps keep our historic radios at home – the Japanese (for example) are scooping them up at a great rate and would do so even more rapidly if their 'use value' here became zero.

8. If (as petitioner says) there is little AM activity then it follows that interference is insignificant. Few AM transmitters exceed 100 watts output, (whereas many SSB users run 'the limit') and AM use is confined to small segments of the bands; interference is not a problem. Spectrum efficiency is a misleading issue because AM is mostly in roundtables accomodating several or many participants at once.

9. Foreign broadcast stations use 80 and 40 meter AM. AM is the primary mode for many types of commercial broadcasting. Both civil air traffic control systems and military aircraft communication use AM. Since use of AM is widespread, it can't be 'obsolete'.

10. If AM is eliminated because it is 'obsolete', what mode will be next? Should CW be eliminated? Should SSB be replaced by packet or spread spectrum techniques?

11. Sizable investments in AM gear would go to zero value if AM is forbidden. Proposal would obsolete a feature (a part) of most currently manufactured receivers and transmitters. Eliminating AM would be unfair and represent an injustice.

12. Proposal would reduce the diversity of modes which is vital in communications emergencies. AM gear (using vacuum tubes) will function after an electromagnetic pulse from a nuclear explosion – ham solid state gear will not.

13. This petition is ridiculous (or other similar adjectives). It contains logical errors, for example in comparing AM gear to spark transmitters.

14. AM is a medium of experimentation which helps improve the quality of AM broadcasting. Broadcast engineering magazines contain many references to ham radio. Amateur AM is an important

source of experienced technicians for the broadcast industry and for RF-related industry. Some AM operators are conducting state of the art experiments, for example the transmission of video using one of the AM stereo broadcast modes, and pulse techniques for generation of AM. AM played an important role in early radio -- who knows what contributions it may make in the future?

15. Some hams are not financially able to use modern gear -- AM gear (often purchased many years ago) is cheap. Phasing out the use of low cost gear in favor of expensive sets will discriminate against young and poor hams.

16. AM is a window on social, political and emotional discussion -- a way to look at public opinion. Amateur AM is important to those studying radio/TV/film broadcasting.

17. Being able to use AM is important for the study of historic military radios which are a window on our military procedures/preparedness and defense industry.

One comment I expected but did not see: a dollar spent on AM gear stays in the USA; a dollar spent on SSB goes to Japan.

In all, Marie and I visit the FCC three times: on the 25th when 85 opposing comments had reached the RM-7401 file, on Friday the 27th when we find 180 opposing comments, and finally on Wednesday August 2nd, after all comments received by the closing date were in the file. Here are the final results:

RM Number	Subject	#For	#Against
7401	Elimination of AM	1	333
7402	ARRL request to lift AM Power limitation. (1 KW plate input)	115	1
7403	SPAM request to lift AM power limitation. (1.5 KW carrier output)	34	0
7404	D. Gagnon request to list AM power limitation. (750 watts carrier output)	142	1

Those numbers are more like it! It seems to me that this must be a large fraction of the active AM'ers, which is impressive. Whatever the decision may be, a lot of people took the time and trouble to write comments; more than a few not only sent comments themselves but wrote or called others to do so. And not all the comments are from hams: there are several from SWL's and some from non-ham engineers and others. Whether or not we win on these RM's we owe a lot of other people a hearty "Thanks!"

And Marie and I never even got a parking ticket!

Editor's Note:
I talked with Mr. William Cross at the Personal Radio Branch on Tuesday, August 7. The numbers he gave me were much higher than Walt's and he said that the final totals had not been computed yet. Next month we will have the final numbers.

Please note ER's new address; all mail should be sent to Electric Radio, 145 CR 123, Hesperus, CO 81326

ER in Uniform from page 9

Our tour of duty next month will be the radio for which this pack was assembled. Till then, remember: "Do NOT change the mc and kc tuning controls or the BAND switch while the radio is keyed... Damage to modules in the radio may result or the wrong channel frequency may be set up..."

Ed Harrington, W1JEL from page 24

The NC-303 is every bit as good as I had remembered, and stands up well to many modern receivers. Last fall I found a Valiant to complete the station.

I currently have eight top of the line (for their time) receivers of various types (Collins, Hammarlund and Hallicrafters) including an HRO-60 and an NC-173 that is presently being restored. The '303 is my personal all round favorite, while the 75A-4 and HQ-120X are categorical favorites.

The Heritage of CW from page 15

Most people would say it was crazy to build a rig out of an old television set and slog away on CW with a fifty year old receiver full of leaky capacitorsif we could have the latest in solid state technology for less than two weeks pay. They would probably be right. But the ham radio that is produced by doing it the modern way is not the same, will never be the same again, and shows aggressive signs of wishing to wipe out the ham radio the rest of us know and appreciate.

I'd like to see a resurgence of interest in CW for it's own sake, just like the reawakening of interest in AM phone. CW operators with style and skill should make it a point to display their craft, just like the guys who dress up in striped overalls and engineers caps and drive steam traction engines around the fair grounds on the fourth of July. CW is worth saving, for it's own sake, every bit as much as Victorian architecture, B-17s or '32 Fords. It is part of amateur radio and I hope it doesn't die with our generation.

Steve's Hamfest Report from page 25

One was a Power/SWR meter kit, and the other was a 12 watt hi-fi amplifier with cover. I look forward to the wonderful hours ahead building these kits that cost me $15. Kit building is one of the fondest memories of my early ham days, and I am unable to turn down any opportunity for the vintage equipment still available in kit form. (I have been advised that there is still a Johnson 500 out there still in kit form, so don't give up hope if kit building is 'your thing'.

Another area that I like about the antique radio shows is their auctions. Many of the items seen out in the flea market area are later brought inside to be sold at auction. For the patient, this can be a real boon. This is because the auctions are often held later in the day (many attendees have already left), and frequently you cannot pay for a winning bid until after the auction is completed (many do not like to stay that late.) All of this cuts down on the competition, and you sure can get those tubes cheap!

Speaking of auctions, consider attending a local radio club on auction night. Drive to faraway places and be rewarded. Recently, a Johnson 500 sold at auction for $25 just a state away from me, not because it didn't work or was just a basket case (I don't believe either statement is true), but because nobody wanted the boat anchor. They all laughed when it was brought out, but you know how that goes. By the way, if any of you have an extra 500 instruction manual or the interconnecting power cord, please drop me a line.

Whether it be a hamfest, antique radio convention, or simply a radio club meeting, take a friend and attend. Take some money too. Or trade. But participate. It's always a great time. And you never know what will turn up.

1990 Atlanta Hamfest from page 27

An interesting highlight of this tape was an interview with Ashtabula Bill, W8VYZ, by Dave, W6PSS and Rick, K8MLV/Ø. Another tape contained interviews and visits to stations of several prominent west coast AM'ers including Les, K6HQI, and Norm, WB6TRQ, President of SPAM. These fine videos were supplied by Dave, W6PSS and were enjoyed by everyone present.

After the videos and a short break the forum continued with a lengthy discussion of the AM power issue. Sample petition reply letters were handed out and everyone was encouraged to make their voices heard in Washington. There was general agreement among attendees that KW1I's petition for 750 watts carrier output power had the best chance of approval by the FCC. Thanks to the AM Press Exchange and Electric Radio most everyone was knowledgeable about the power issue and were eager to voice their opinion. Even one SSB operator could not understand why the FCC would want to cut the AM power level.

A discussion of speech amplifier design and construction, using both solid state and vacuum tube technology was presented by Jim, W4PNM. It seems that speech amplifiers are one subject that everyone has an opinion about and there was great participation by forum attendees. Jim is a broadcast engineer and has spent many years experimenting with speech equipment related to AM broadcasting. Some of the speech amplifiers designed by Jim include one for the 813 rig of WA4KCY and the Collins broadcast transmitter that W2IQ uses on 160 meters.

Another interesting topic covered was using a pair of R-390A receivers for dual diversity reception of AM signals by Jimmy, KQ4S. According to Jimmy this greatly improves reception during periods of selective fading. George, K4RYH, gave a talk on restoration of older gear and Marty, AA4RM talked about the Collins KW-1.

After a general discussion and a final plea to reply to the FCC before July 27, the forum was adjourned. Thanks to all who attended and participated in the various segments of the forum. Special thanks to Barry, N6CSW/Ø for supplying a stack of Electric Radio magazines. One SSB operator was quoted as saying, "AM'ers appear to be well organized - they even have their own magazine".

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15 Meter Contest from page 19

Secondly, Canadian and U.S. hams will not be able to work each other for DX points. They will be considered as one country for this contest. Again, DX contacts will count for 10 points; all others 1 point. And there's no bonus for working the entire contest. And I won't require that you log the other stations output power; just the rig he's running. Again there will be certificates for the first, second and third highest scores. Which reminds me that I still haven't sent out the certificates for the 20 Meter Allnighter; I'd better get to that. Barry, N6CSW/Ø

Reflections from page 2

By sidestepping DSB-AM, today's radio amateurs have missed an important step in the amateur radio learning process. In any learning process, basic building blocks cannot be omitted without leaving an intelligence gap. They're also missing the classic amateur radio experiences of building, repairing, modifying and experimenting.

If the ARRL really wants to revive amateur radio from it's present doldrums they should at least try another go-around with classic DSB-AM. If mainstream amateur radio continues on it's present unaltered course, it is doomed to become a carbon copy of CB. Let's introduce novices and newcomers to 'real radio'. Let's find out for sure, whether lighted filaments, arcs, sparks and smoke can compete with modern gadgetry in reinstilling some enthusiasm for our hobby.

Nostalgia, 1928 from page 13

You really didn't know if your antenna was working or not. You just swung in the link, and if the load was still there after re-dipping the plate you knew the antenna was taking the load.

But today things are different, we're not in the dark anymore. We have test equipment that can tell us just about anything we want to know. So with our modern test equipment we could find out just how good our old transmitter was. We brought out the scope, sine wave generator, distortion analyzer and we went to work. We did the equivalent of a minor broadcast proof; checking efficiency, audio response at two modulation levels, distortion and noise.

The modulation envelope surprised us; it was perfect at 1000 cycles and the response was flat from 200 to 10,000 cycles. The distortion was great for a ham rig; -45db across the audio response and believe it or not the noise level was -52db. The 'dad gum' thing was incredible. I wish we had known it was that good in 1928! Even though it was breadboard construction, there was no sign of any instability, no parasitics and would you believe no TVI!

The project has been a lot of fun not only for Dad and myself but for everyone even remotely connected with it. Everyone got a big kick out of it. We now have our authentic, operational, 1928 breadboard transmitter on the air. It's on 3885 kcs just about every night from W8DFV's QTH. It's really too bad that most hams will never experience the pride, joy and satisfaction of talking on a rig they built themselves. All the oldtimers did it with little help, little knowledge and no test equipment.

This rig was shown at the Augusta, Georgia Hamfest and through the efforts of Marty, AA4RM, and the Antique Wireless group it was also shown at the Atlanta, Hamfest, front center, in the Antique Wireless booth.

There were many oldtimers who came to the booth to look the rig over. From the look on many of their faces I knew that the old rig had taken them back into the '20s. Some were actually overcome and had tears rolling down their cheeks.They didn't move on but instead pulled up chairs and sat around the old transmitter swapping stories with each other. Some said they were going to go home and re-build their old rigs. Nostalgia was certainly the order of the day. Of course, the newer hams didn't know what they were looking at. One even asked if it ran on batteries!

This project has been a great experience for my father and I. I don't know what we could do now that would cap it. I suggest that anyone who wants to have a lot of fun and learn something about ham radio in the process should consider some kind of project like this.

Editor's Note:

The author, Jim Taylor, W4P'NM, was first licensed in 1947. He has worked in the radio business for 40 years for such companies as Collins, R.L. Drake, Hy-Gain and New-Tronics. He has also operated his own antenna business in Augusta.

The interest in radio in the Taylor family goes back to Jim's grandfather who, although he was never a licensed ham, was a pioneer of sorts in that he built the first receiver in Franklin, Ohio, in the early '20s.

Sometimes three generations of the Taylor family are on the air and in QSO; Chick, W8DFV, Jim W4P'NM and Jim's son Lonni, WA4ASQ. All three are a part of a large group of AM'ers in the Southeast.

Jim is well known for helping out other hams with their building projects. One thing of interest is that he has built several high quality speech amps for other hams. Maybe we'll have him write about that sometime in the future.

Next month we'll have a photo of Jim and his homebrew 4-400 transmitter.

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VINTAGE EQUIPMENT ONLY

E.R.
Box 139
Durango, CO. 81302 **303-247-4935**

DEADLINE FOR THE SEPT. ISSUE: SEPT. 7

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

WANTED: National receivers NC-45, NC-80, NC-81, TV7. Also National brochures, advertising items, displays, knobs, speakers etc. Anything National. Steve Sauer, WA9ASZ, 1274 Londonerry Lane, Greenwood, IN 46142. (317) 882-4598 eves. after 7:00 EST

WANTED: Johnson Viking 500; National NC-400; speakers; R42 (Hallicrafters), NTS-2 (NC-303). Bill, K1KV, (617) 272-3522

WANTED: Matching pwr sply for the Harvey Wells TBS-50D in working condition. James T. Schliestett, W4IMQ, POB 93, Cedartown, GA 30125. (404) 748-5968

WANTED: RCA AVT-15 transmitter; AVA-120 trailing wire antenna reel and related hardware; SCR-319 items. Ken Gillis, 27217 Garden Way, Franklin, MI 48025. (313) 390-6873 days.

WANTED: Manuals for Heath AT-1 and AC-1. **FOR SALE:** Heath Mohawk RX-1 with manual; manual for HX-10. Mary Drift, WB2FOU/5, 108 Hickory Ln., Hickory Creek, TX 76205. (817) 497-6023

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

FOR SALE: Collect keys? You'll enjoy W1IMQ's illustrated references. "Introduction to key collecting", 64 pages - $9.95, "Vibroplex Collectors Guide", 87 pages - $14.95. Add $2 s/h to total. See your dealer or order direct from: Artifax Books, Box 88-E, Maynard, MA 01754.

FOR SALE: 75A-3 3.1Kc filter - $65; new DX-100 pwr xfmr- $20; S-40B, - $25; HRO-60 xtal calibrator - $30; HRO-60 AD coil - $25; Ranger II, exc. - $145. **WANTED:** Clegg 99'er manual/copy. Joe Sloss, K7MKS, 4732 119th St., SE, Belleview, WA 98006.

CLASSIFIEDS

FOR SALE: Newly published instruction books, authorized by Rockwell International, are now available for the Rockwell/Collins S-Line. These instruction books are brand new and have been printed from the latest editions - complete in every detail, including the front and rear color covers. A money-back guarantee of the purchase price ensures your complete satisfaction. Instruction books for the following models are currently available. KWM-2/2A ($35); 75S-3B/C ($30); 32S-3A ($30); 75S-3/3A ($25); 32S-3 ($25); 312B-4/5 ($20); 516F-2 ($15). For U.S. orders, include 7% of the purchase price for shipping and handling. (Canada and Mexico add 12%; all other international countries add 25%) Ohio residents add 6% sales tax. VISTA Technology Incorporated, 3041 Rising Springs, Bellbrook, OH 45305. (513) 426-6700

WANTED: Old National sets: esp. SW-4 and NHV for cash or nice trades. Also need a SP-400. Robert B. Enemark, W1EC, Box 1607, Duxbury, MA 02331. (617) 934-5043

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

WANTED: Glow in the dark audio gear and old speakers. Especially love Western Electric, Fairchild, Regency and old theatre gear. Have mint SX-115, Thunderbolt, 310B, misc other radios to trade or pay cash. Joe, N4WQC, Box 19302, Alexandria, VA 22320. (703) 683-2955

FOR SALE: Large quantities of R390A modules and other parts unused. Dennis Kimble, 3171 Ramesses Ct., Herndon, VA 22071. (703) 435-3060

WANTED: QST'S --Dec. 1915, 1916 -- Mar - May- June-July-Aug-Sept-Dec.; U.S. Amateur Callbooks -- all 1920 -- 1930 and 1941 - -42 --45 and 55. **FOR SALE or TRADE:** Some QST's from 17 and 19. Bob, W4JNN, POB 166, Annandale, VA 22003. (703) 560-7161

FOR SALE: VRC-34 Radio Set includes, RT-77/GRC-9, DY-105 (24V), ME-61 meter, LS-203 speaker, cables, mounts, bag, and antenna, 140 lbs, used - $210; RT-77, 40 lbs, used - $75; DY-105, 40 lbs, used - $45. Add for shipping. Send for list. Tartan Electronics, Inc., Box 36841, Tucson, AZ 85740. (602) 577-1022

WANTED: Geloso receiver, model G-250. D.H. Moore, POB 521, Palo Alto, CA 94302. (415) 322-2728

WANTED: Very old or unusual Hallicrafters equipment, entire 1934 "H" and "Z" line of Silver Marshal, parts, memorabilia and manuals. Chuck Dachis, "The Hallicrafter Collector", WD5EOG, 4500 Russell Drive, Austin, TX 78745.

WANTED: Globe equipment: 500 B or C, Globetrotter, Globe Scout 40, 40A, 65A, 65B, Globe Champion 300A, Champ 300 etc. Steve Abbott, WBØHUR, R-1, Box 140, W. Branch, IA 52358. (319) 643-2617

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

WANTED: Pre 1950 ARRL handbooks. WA7NNH, 1024 Main St., Boise, ID 83702.

FOR SALE: Do you need tubes, parts, schematics? Send SASE. Nick Marshal, 2207 Peachland Ave., Sebastopol, CA 95472.

FOR SALE: Antique radios, parts, tubes, books, vibrators, knobs, amateur items, test equipment, (5) scopes, transmitter crystals etc. Eleven lists. LSASE + $2 cash (no checks). Richard and Rose's Radio Mart, POB 691443, Tulsa, OK 74169.

WANTED: BC-375E and BC-348 R or Q, complete and unmodified. Also need black ARC-5 components and accesssories, plugs etc. Peter Patton, WØEWQ, 7053 Delaney Ave., S. St. Paul, MN 55076. (612) 457-5665

CLASSIFIEDS

WANTED: Any National model RAS-5 receiver parts or accessories; Navy rack mount version of HRO-5; CNA10036 mounting rack; CNA20090 power unit; CNA49105 speaker. Charles Pierce, WD4KQD, 4380 E. Brookhaven Dr., Atlanta, GA 30319. (404) 233-1340

FOR SALE: HX-50 - $100; SX-99 - $75; R-390 - $150; HQ-110 - $75; SX-43 - $75; Eldico TX, RX, PS, SWR, manuals (like S-line), not working - $200. Don, KV7S, (602) 795-6228 or (602) 743-9711.

WANTED: Replacement meter for 1950's vintage multimeter TS-297/U; any clues or information leading to this and other meters. Chris Cross, 115 W. Olive St., McConnell, IL 61050.

FOR SALE: Sky Challenger - $35; factory wired Valiant II - $395; factory wired Ranger II - $350. Bud Harris, W7IYG, 16306 Midland, Nampa, ID 83687. (208) 466-2803 after 6 PM MDT

FOR TRADE: Mint condition SX-25, works great. Pre WW-II gear for any WW-II military radio set. Also will buy WW-II military sets. Sam Hevener, W8KBF, 3583 Everett Rd., Richfield, OH 44286. (216) 659-3244

FOR SALE: HQ-215, 2 filters, manual, many xtals - $250. WANTED: SP-4; HQ-180AX. Levy, 8 Waterloo, Morris Plains, NJ 07950. (201) 285-0233

FOR SALE: Signal Generators, URM-25D 10Khz - 50Mhz AM/CW; URM -26A 3-405 Mhz AM/CW; other makes, styles, hundreds available, from $30. Send for list. URM-127 Audio Oscillator 20-200 Khz used Ex, 15 lbs $45. plus shipping. Tartan Electronics Inc., POB 36841, Tucson, AZ 85740. (602) 577-1022

WANTED: Audio output transformer for HRO-60; clean Viking II and 122 VFO. Clay Pace, WA6FDF, 923 Aileen St., Oakland, CA 94608. (415) 658-3745

FOR SALE: Heath 2 kw HM-102, mint - $40; Heath 1 kw dummy load cantenna - $15; 2 kw isolation transformer, 115 v - $40; 4-400s - $35; 805s - $20; 813s with sockets and plate cap - $20. Inquire on all tube needs. Levy, 7600 Blanco Rd.#608, San Antonio, TX 78216. (512) 341-9549

WANTED: Wierd tubes (duds ok) for display. Marcus Frisch, WA9IXP, Box 28803 Greenfield, WI 53220-0803.

WANTED: Coils for HRO-50T; original HRO-50T manual; manual and schematic for 2 meter Gonset Sidewinder; any modifications for the DX-100. Rick Lutzinger, KD6ZR, 647 Choctaw Dr., Fremont, CA 94539. (415) 657-8341

FOR SALE: Hallicrafters HT-33A, good condition, may need PL-172 tube - $150 firm, PU only or part out. WANTED: Power xformer for HT-32 and meter for SX-73. Rich Lucchesi, WA2RQY, 941 N. Park Ave., N. Massapequa, L.I. NY 11758. (516) 798-1230

FOR SALE: Collins 325S and 516F2, both round emblem and absolutely beautiful inside and out, aligned and serviced by Classic Radio 7/90 - $495 shipped UPS prepaid. Dale, N6DW, (415) 685-7364

FOR SALE: Gibson Girl Kites, M-357A, with two baloon inflation tubes and case, used - $30. kite only - $25; RC-292 Antenna Sets, 55 lbs, used - $95; AB-35 Mast Sections $3.50, set of 12 for 30 ft $36; AB-12, 22, 23, 24, Antenna Elements - $2 ea. URM-120 Wattmeters, used, 20 lbs. $140. plus shipping. Tartan Electronics Inc. POB 36841, Tucson, AZ 85740. (602) 577-1022

FOR SALE: Heathkit Q-multiplier - $5 plus UPS. WANTED: 5514 tubes. Fred Huntley, W6RNC, POB 478, Nevada City, CA 95959.

FOR SALE: Military, Ham, test equipment, books, tubes, etc. Send LSASE for list. Gary Cain, 1775 Grand, #302, St. Paul, MN 55105.

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WANTED: National AGS or AGS-X, any condition. Have several quality trades or will purchase. Henry Rogers, WA7YBS, POB 501, Minden, NV 89423. (702) 267-2725

FOR SALE: HRO-50T-1, mint with 7 coils - $150. Jerry Boles, N5KYE, 14857 Redbud Lane, Piedmont, OK 73078. (405) 373-2228

FOR SALE: selling everything, 70 years electronic accumulation. 1920's radios, tube testers, transmitter/receiver parts, catalogs, books, TV's, flyers, testing equipment; 48 page list - $1. Francis Yonker, W2IBH, 7 Old Farms Road, Saddle River, NJ 07458. (201) 825-1895

FOR SALE: Collins ART-13, with tubes - $50; RCA commercial dispatch transceiver with tubes (approx. 100 watts FM, 30 Mcs) - $50; BC-603-D receiver - $125. Wilma Bodziuch, 1555 Montgomery, Allison Park, PA 15101. (412) 366-0252

WANTED: Melchan "Valiant" dual pendulum bug. Jay, KI1W, (617) 227-5228.

WANTED: BC223; MK2/B19; BC191AA; BC224; RCA series 80ETS transmitter; SCR187; CG51039; antenna coupler for TCK; National AGS; table model transmitters prior to 1940 such as Collins, Gross, B&K, ICA etc.; Super Pro coils and manuals for DX-35 or any of the above. T. Buehlmann, N4IQA, 1314 Chaney Road, Raleigh, NC 27606. (919) 851-7738 weekdays only to 7 PM EDST

WANTED: I will pay top dollar for excellent condition KWS-1, 75A-4 and 270G. Will pick up in lower 48. Gene Gee, AA5JR, (405) 323-7789

WANTED: BC-375; BC-191; BC-614F speech amp.; Collins exciter 310A; FT-237 rack; circuit of Collins 30K-2;TM11-233; TM11-232. Fenton Wood, 109 Shoreline, S.H., Malakoff, TX 75148.

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FOR SALE: Collins RT-380/AR transceiver, 2 to 18.5 Mcs, 100 watt AM/CW, with dynamotor, tubes, no control box or cabling, ex United Airlines - $40; RT18-ARC/1 transceiver, 100 to 150 Mcs, 30 watts, partial tube compliment, chassis complete, no control box or cabling - $30. John Lippincott, N7BEG, Box 429, Salome, AZ 85348. (602) 859-3963

FOR SALE: Heathkit SB-200 linear amplifier, good tubes, new power supply filter capacitors and bypass caps - $300 plus $20 shipping. Wayne Beeson, K8WB, 5261 Jane Way, Las Vegas, NV 89119. (702) 795-2652

WANTED: Gonset 220 Mhz Communicator IV. J.M. Roseman,W9UD, 2716 West 3rd St., Coal Valley, IL 61240.

WANTED: Globe model 755 VFO, HF band coverage. Tom Calantonio, WB3HLH, 409 Anderson Ave., Rockville, MD 20850.

FOR SALE: Collins mech. filters: F455 FC60, 8 khz, AM type (75S3C style), adaptable for 75A-4 - $55 each, unused; 2.2 khz USB or LSB mech. filters, F455 type (75S3C style) - $30 each, $55 pair, unused. Limited number of filters available. No CW types. Bill Marvin, KB9IV, Rt 2, Box 287, Waseca, MN 54093. (507) 835-7180 8 PM Central or later.

WANTED: Manuals for mil. multimeter TS-505/U, Hickock tube tester 1575B, Motorola test set TU546P and Motorola dispatcher D33BAT-1100A. Please write before sending copies if possible. Will pay appropriate costs. Thanks. Clyde Sakir, N7IOK, 4243 E. First St., Tucson, AZ 85711.

WANTED: Information and trivia on Eldico of New York; particularly that on TR-75TV transmitters. Jim Musgrove, K5BZH, 4217 Buckeye, Fort Worth, TX 76137. (817) 232-9438

FOR SALE: Hammarlund HQ-215 w/3 filters, mint - $250; B&W L-1000 amp - $325; BTI LK-2000 Amp w/2kw load - $650; Loudenboomer in 6'rack - $750; Collins 32S3, 312B-4, 75S3C, SB-620 - $1000; Swan 350 w/pwr/spkr - $250. Send SASE for complete list. Ron Mauceri, WA6IUH, 1660 Castlehill Ct., Westlake Village, CA 91361. (805) 494-1712

WANTED: Transformer for Hallicrafters HT-32; speaker for 75A-4. Phil Leonelli, WF6L, 3564 Strawberry Pl., Oceanside, CA 92056. (619) 757-7008

FOR SALE: AN/URM-25D R.F. signal generator with manual - $55; General Radio variac, 115 volts, 1 amp - $15; Radiaphone panadaptor model 44 - $25. Ward Becht, 625 Tufts Ave., Burbank, CA 91504. (818) 842-3444

WANTED: Hallicrafters SX-62A receiver; metal cabinet for SP-600; Hallicrafters SX-28 for parts. Barney Greene, 17280 Camden Dr., Madera, CA 93638.

FOR SALE: UTC transformers, brand new in factory cartons, 100 different types: transmitting, filament, chokes and modulation transformers. Also audio interstage and outputs etc. Commercial, military and amateur grades. Send #10 SASE for catalog and inventory to: Len Crispino, POB 702, Hudson Falls, NY 12839. (518) 638-8199

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FOR SALE: Tubes, new in box. Please send $1 for list of 300+ tubes. Refundable. Wilson Hauck. BTB. Inc. E.R., 6820 Stout Rd., Memphis, TN 38119

FOR SALE: Connectors for ART-13, ATD, TA-12, ARB, TCS, GP-7, SCR-543, others using K, MS, large banana type; M-38/A1 radio power connector. Robert Downs, WA5CAB, 2027 Mapleton,Houston, TX 77043. (713) 467-5614

FOR SALE: Transmitting/receiving tubes, new and used. Exa: OC3, 2E26, 3B28, 4X150, 4-65A, 4-125A, 6L6, 12A6, 45, 807, 809, 810, 811A, 815, 829, 832, 836, 872, 1619, 1625, 5894, 6130, 6146, 9003 plus others. LSASE for list. I also collect old and unique tubes of any type. Maybe you have something to trade? John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455

WANTED: Brown case "Oceanic" type radios. Also want SR-500 and Electro-Voice 419 mike stand, mike or both. Edward Deptula, KA3OTT, POB 751, Havertown, PA 19083.

FOR SALE: Bigelow Electronics has been in the electronic mail order business since 1954. Vintage parts and equipment available. Request free "Vintage Flyer". Bigelow Electronics, Box 125, Bluffton, OH 45817.

WANTED: Colored plastic radios from the 30's and 40's. I have a nice Hallicrafters SX-62A to trade or will pay cash. Kevin Eftink, 16 Edgewood Dr., Quincy, IL 62301. (217) 228-2221

WANTED: U.S. Army technical manuals: TM-11-809-20 Organizational Maintenance Manual; TM-809-35 Depot Maintenance Manual for radio transmitter T-368 and antenna book, "Radio Antenna Engineering" by E.A. Laport. Bill Mills, KC5PF, 1740 Tonys Court, Amissville, VA 22002. Office: (703) 818-3955 Home: (703) 937-4090

WANTED: Manual, schematic or hook-up info for Elenco "Power Gainer" compression amplifier. Also, copies of '80 - '82 W2NRM, "Press Exchange", will gladly pay. John Morehead, N9HRS, 535 Brown Cr., Elk Grove, IL 60007. (708) 351-8593

FOR SALE: Heath VF-1, clean, needs a little work - $20. WANTED: manual for Ameco model AC-1; manual for Heath HD-19 phone patch. Marty Drift, WB2FOU/5, (817) 497-6023

FOR SALE or TRADE: Navy TBK modulator, very good; Collins 30FXC, near mint with spare tubes; GPR-90, good; Collins 32V-3, very good. Cliff Fleury, AI7Y, 64174 Tumalo Rim Dr., Bend, OR 97701. (503) 382-9162

WANTED: Knobs for Collins 32V TX; Collins 'A' series speaker; 4D32 tube. Vin Tese, WA2UXO, 90 Gold St., #13-B, New York, NY 10038. (212) 285-2971

WANTED: Hallicrafters SX-42 receiver in good condition. Tracy Reese, WB6TMY, Box 4694, Santa Rosa, CA 95402. (707) 527-8124

WANTED: Pre WW-II National Radios, highest prices paid or trade for nice other sets. Robert Enemark, Box 1607, Duxbury, MA 02331. (617) 934-5043

FOR SALE: Military, Ham, test equipment, books, tubes, etc. Send LSASE for list. Gary Cain, 1775 Grand, #302, St. Paul, MN 55105.

WANTED: Eico 730 modulator; 722 VFO; Heathkit Mohawk/Mohican receivers; work/repairable. Bill Colligan, N1DJR, 35 Quail Run, Hampstead, NH 03841. (603) 329-7879

WANTED: RAX LF receiver; R-393; Gonset Comm. IV (2 meters). Steve Davis, KD2NX, 2372 84th St., Brooklyn, NY 11214. (718) 265-2390

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FOR SALE: SX-101, no spkr, w/manual - $125; Globe Champion 300 - $125. WANTED: 4-250s with sockets; mod. transformer for 810s to 4-250s; SX-101 glass dial face plate. Jeff Garrett, KEØMT, 2822 W. 55th Ave., Denver, CO 80221. (303) 455-5658

WANTED: Manuals or copies for the following equipment: Clegg 99'er; Clegg Thor 6; Clegg 22'er; and Clegg Interceptor. Need schematics and alignment info. Ron Reu, WBØLXV, RR 1, Box 334, Winfield, MO 63389.

WANTED: Military radios and related equipment; tubes, 801 and 843; GP-7 tuning units. Charles DiCecca, KA1GON, Mystic Valley Parkway, Medford, MA 02155. (617) 396-935

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FOR SALE: Radio Broadcast Books catalog and Antenna/Radio Propogation Books list now available. Send .25 stamp for each one wanted. Rainy Day Books, POB 775, Fitzwilliam, NH 03447.

FOR SALE: Hammarlund HQ-215 w/cw filter and speaker, near mint - $325; Hammarlund HX-50 transmitter - $150. **WANTED:** Mobile bracket for Atlas 210X. Charlie, KD4AJ, (404) 396-0276

FOR SALE: HQ-170A - $175; SX-101A - $150; NC-300 - $150.**WANTED:** 75A-1, speaker, mechanical filter unit, mint Adventurer. Carty Ellis, KA2Y, 32 Upland Dr., Rochester, NY 14617.

FOR SALE: ART-13, excellent condition, no cables, no ps, no manual - $100 plus shipping. Woody Bindford, W6LHH, 561 Atherton Ave., Novato, CA 94945. (415) 892-2643

WANTED: FT-241A, channels 49 and 50; BC-604 crystals; Collins mech. filter F 455 FB-21; still need ART-13 dynamotor. Thanks. Peter Hamersma, WB2JWU, 87 Philip Ave., Elmood Park, NJ 07407.

WANTED: Schematic, info etc., for Collins 45A transmitter restoration project. Also want KW-1 and any pre-WW-II Collins xmtrs, National and REL receivers and transmitters. Parker, W1YG, 87 Cove Rd., Lyme, CT 06371.

FOR SALE: HQ-110A - VHF, near mint - $125; CV89A/URA-8A freq shift converter - $75. **WANTED:** SP600JX front panel; Gonset G76; manual for Gonset G66/G76, manual for HQ-170A; manual for Drake SSR-1. Harry Enmark, WA6IUR, 680 Auburn Ave., Sierra Madre, CA 91024.

WANTED: Copy of manual for Hallicrafters S-119, S-120; Electronics Illustrated June, July, 1961; Sept. 1962; June 1968. Al Bernard, NI4Q, POB 690098, Orlando, FL 32869-0098. (407) 351-5536

FOR SALE: VOl-TA-DROP voltage dropping resistor, 12 vdc to 6 vdc at 6 amps, model 12-6PM, NIB - $10 ppd; original service manual for National models NC-TV7W and NC-TV7M TV receivers, good condition - $15 ppd; General Electric Co. type 1231-P2, 400 or 1000 cycle, switch selected tuned circuit, like new - $25 ppd; Jack Box BC-1366, NIB - $10 ppd; Collins Relay 974-0177-00, condition unknown - $7.50. James Fred, Box 41, Cutler, IN 46920.

FOR SALE: QST, 86 issues, 1931; Radio, 9 issues, 1936-38; CQ, 26 issues, 1952-56. All for $10 plus shipping. **WANTED:** Utah Junior transmitter manual and/or schematic, circa 1938. Bob Mattson, KC2LK, 10 Janewood, Highland, NY 12528. (914) 691-6247

WANTED: Brown Brothers keyer paddle; crystal set parts. John Strang, K9HBM, (714) 454-2701

WANTED: Military radios - any vintage - any country - any related items. Will trade. Also need 801 and 843 tubes. Charles DiCecca, 501 Mystic Valley Pkwy, Medford, MA 02155. (617) 396-9354

WANTED: Hallicrafters S-38E (my first receiver); Heath VF-1 VFO; tube type RTTY gear (Norther Radio, Electrocom, TMC, military, etc.) Jack Hart, WA2HWJ/7, (206) 487-2111

WANTED: Millen coils for #90651 Grid Dip Meter; audio driver xfmr, multi-match, capable of 2:1 ratio at 25W or better; good 813s. **FOR SALE OR TRADE:** 211s - $12 ea.; 100THs - $14 ea.; 803s - $15 ea. All tested. Mike Carroll, NI4N, 108 Wessington Ct., Hendersonville, TN 37075. (615) 822-0082

FOR SALE: Drake 1A, with manual, works, vry gd cond. - $175 ppd. Joe Cook, K5VDD, 2151 FM 740 N., Forney, TX 75126. (214) 722-3551

WANTED: Manuals for Collins 75A-4 receiver and Knight T-150 transmitter. Geoff Fors, WB6NVH, 769 Pacific St., Monterey, CA 93940.

FOR SALE: Hallicrafters S38E (fair) and Heath SB-620 (excellent) - make offers. **WANTED:** Hammarlund HQ-150/160/200 receivers. Top dollar paid for quality units. Harry, AA6FW, 7445 Andasol, San Diego, CA 92126.

WANTED: Collins 32V-2 or 32V-3 transmitter; pair of 4X250Bs; any history, brochures etc. on Collins KWS-1 transmitter. Gary Elliott, K7OX, 6229 E. Joan De Arc, Scottsdale, AZ 85254.

FOR SALE: Collins autotune ribbon roller inductor; autotune vacuum variable capacitor, rated 3KV; ARC-5s in 4 assorted freq.; panadaptor, tested; Globe Scout 680A xmtr, reproduced manual; Globe Hibander VHF 6/2 xmtr, reproduced manual; Bendix RA10 with control head, no cables; Instructograph code sets, electrified, all tapes, one Morse, other Continental Morse. Electrical Collectibles, Box 429, Salome, AZ 85348. (602) 859-3963

FOR SALE or TRADE: 75A-3 -75A-4 filters: F455-B-31 - $25; F455-J-21, will trade for 2 Bird elements; need 250H, 500H and 1000H. Don, KC9PO, 809 Spear Dr., Normal, IL 61761. (309) 452-5618

FOR SALE: Used technical books: radio, electronics, math, military, magazines, etc. $1 for large list. Stamps OK. Softwave Communications, Dept. ER, 1515 Sashabaw, Ortonville, MI 48462.

FOR SALE: Sonar exciter model VFX 680, nice condx, 80-10 meter, have coils for 80 meters, orig. manual - $50; Hallicrafters Sky Buddy trade for Howard 430. **WANTED:** 812A, 812, 6L6, 450th tubes. R. Olmsted, K4UJZ, 608 W. Thompson Ln., Murfreesboro, TN 37129.

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

WANTED: Collins 75A-2, 75A-3 or 75A-4 and matching transmitter. Also want Boston key and other old keys or bugs. Frank White, POB 2012, Olathe, KS 66061.

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