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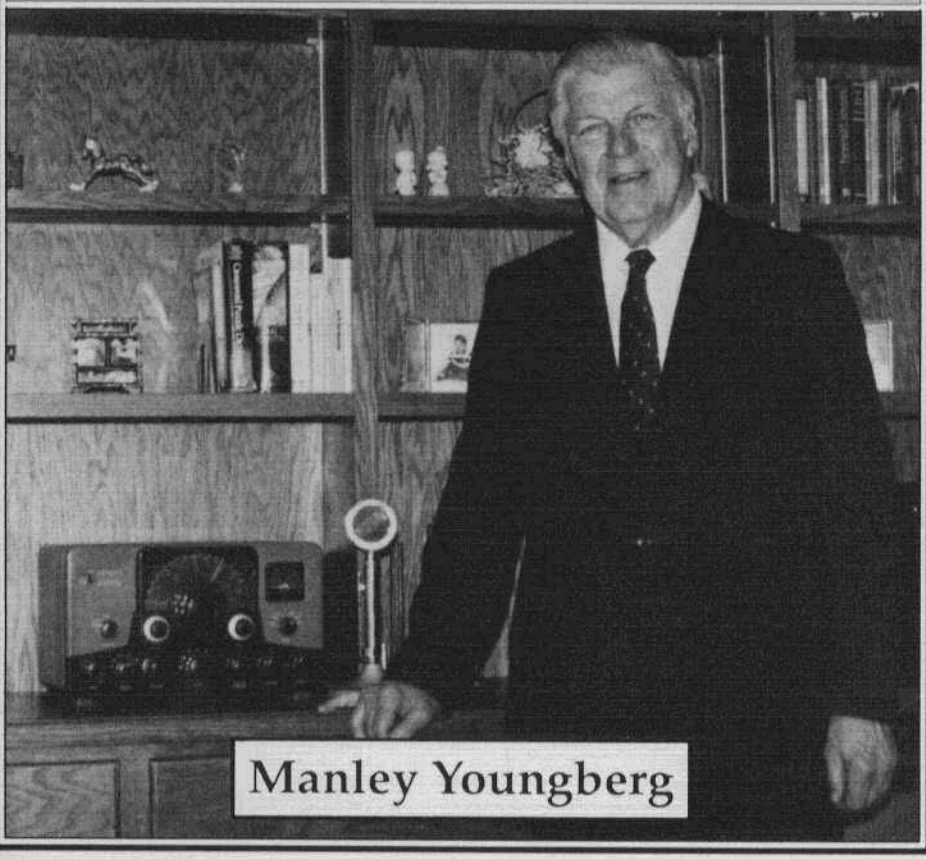
ELECTRIC RADIO

celebrating a bygone era

Number 14 June 1990



Manley Youngberg

ELECTRIC RADIO

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

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

Regular contributors include:

Walt Hutchens, KJ4KV; Bill Kleronomos, KDØHG; Ray Osterwald, NØDMS; John Staples, W6BM; Dave Ishmael, WA6VVL; Jim Hanlon, W8KGI; Chuck Penson, WA7ZZE; Jim Musgrove, K5BZH; Dennis Petrich, KØEOO; Bob Dennison, W2HBE; Dale Gagnon, KW1I; Rob Brownstein, NS6V; Dick Houston, WØPK; Andy Howard, WA4KCY; Skip Green, K7YOO; George Maier, KU1R; Albert Roehm, W2OBJ; Mike O'Brien, NØNLQ, Bob Sitterley, K7POF (photos) and others.

EDITOR'S COMMENTS

Barry Wiseman N6CSW/Ø

First of all I would like to direct your attention to an article reprinted from QST Canada, the official journal of the Canadian Radio Relay League. The article - "The Romance of AM Phone"- on page 3, is probably the best description of why we all operate AM that I've ever read. Don't miss it.

The AM power issue: June 2 was a sad day in the history of Amateur Radio in this country. For over 70 years it has been legal to run what is known as a 'Kilowatt' rig but now it is illegal. Now we are limited to "1500 watts PEP" which equates to 375 watts of carrier modulated 100%. Since the late '20s the classic big transmitter has been designed to run a 'Kilowatt' - 1000 watts DC input to the final which would generally deliver about 750 watts of carrier to the antenna.

I find the whole business to be rather frustrating and rather depressing. I'll tell you why. I just can't understand why this power reduction was ever proposed in the first place. John Johnston told me in a recent telephone interview that AM has enjoyed an 'unfair' power advantage. This reduction was to "level the playing field". I don't think anyone on the 'playing field' perceived AM to have an 'unfair' advantage.The ARRL, which represents every amateur in the U.S., was not complaining. No one was complaining. Why was it necessary to 'level the playing field'.

continued on page 30

TABLE OF CONTENTS

Cover: Manley Youngberg the designer of the Johnson Viking I, Viking II, 122 vfo, Viking Mobile and the Ranger. We had hoped to use this photo with last month's story on Manley but unfortunately if did not arrive in time. Photo by Bill Knish, WBØKEK

Reflections Down the Feedline

by Fred Huntley, W6RNC
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CW isn't phone, but on/off radiotelegraphy is AM. It has a carrier an two sidebands, the same as AM. The main differences between CW and phone are the keying rates. CW maintains a constant rate, whereas the phone rate varies according to an audio pattern.

DSB AM phone is an art -- the perfection of which is known as 'broadcast quality'. CW telegraphy is an art also, and its ultimate is (was) called 'tape perfect'. (referring to automatic perforated paper tape)

Properly executed CW is a music and a language all of it's own. There is a beauty to the rhythms of perfect code sending. The personal embellishments made possible through the use of a bug or hand key allow the receiving operator to sense the personality of the sender -- including his nationality, feelings, mood, and even gender in some cases. It is quite fascinating to realize all the accents possible through manual CW. The best place to hear a wide selection is in a job as radio operator aboard a ship going to far away places.

Perfect CW is like a melody - a constant flow of error-free text, uninterrupted by unnecessary punctuation (commas) or pauses (long spaces) between material sent. Speed has nothing to do with it. A perfect 12 WPM is as beautiful to hear as is 45 WPM. In the 1960's, W6EAR, the maestro of paper-tape mechanical keyboard CW, wrote an article entitled: "Speed Without Accuracy is Meaningless" in one of those Hallicrafters 'Guest Editorial' full page advertisements in QST magazine. (Maybe someone ought to tell Kenwood, Yaesu and Icom to try some of these instead of all those multi-page, glitzy, glossy, equipment ads)

Sadly, with the advent of the electronic keyer, and later with the appearance of the electronic keyboard, good CW suffered. A few of these instruments sounded good, but on average, this is one instance of new technology causing backward progress.

During the past few years, however, more keyers and keyboards are putting out good stuff, and in a few cases, some are very close to perfection. One of the best sounding keyboards ever built was the first one - the first Curtis model.

Today, CW is an orphaned constituency like DSB AM phone. While AM phone is making a comeback, CW seems to be waning. Night time 80 meters and daytime 40 meters are like CW ghost towns. AM phone has SPAM to coordinate survival efforts; CW doesn't have anything comparable.

There was ARTS -- the Amateur Radiotelegraphy Society in the 1970's. It lasted a few years - mainly handled some traffic; then folded. There was the Five Star Club of high speed CW operators. Bill Eitel, W6UF, (the El part of Eimac) was very involved with this group. W6UF was an enthusiast of higher speed CW. In the mid 1970's he used to be on 40 meter CW most weekday afternoons from Dayton, Nevada, as WA7LRU - just a regular guy shooting the breeze with all comers. He had an 'inker' - an automatic inking paper-tape recorder. One afternoon, I ran my Boehme automatic keyer at 90 WPM for him, and he copied it with his inker to show me how it looked at the receiving end. I still have the 25 feet of tape that he copied and mailed to me.

The Five Star CW group is long gone. Today, we still have the FOC - Friends of CW, and a humorous counter-group - the OFC - the 'chicken pluckers' who sign off with a CW simulated imitation of a chicken squawk. The FOC are hotshot CW operators; mainly holding QSO parties.

In any event, CW is becoming an endangered species like DSB AM phone. They need an organization like SPAM. Maybe, we ought to get together?

It Seems to Us.../Il nous semble...

Reprinted with permission from QST Canada, June, 1990

The Romance of AM Phone

by William Skidmore, VE3AUI

In the beginning, there was spark. Then CW took over. Then crystal-controlled CW and Fone, which in the early days meant AM. There were excursions into other modes, but for half a century, Amateur Radio was divided into CW Men and Fone Men -- and Fone still meant AM. CW drove out spark completely and no one ever went back to self-excited oscillator transmitters after crystal control and decent VFOs became available. But AM became a survivor. Some amateurs continued operating AM, ignoring SSB and even splendidly isolating themselves from it, claiming that SSB was an unpleasant aggressive mode that went against the spirit of Amateur Radio.

If you have tuned across the HF phone bands lately, you have noticed a growing number of amateurs using AM and enjoying it immensely. These amateurs are fully aware that AM is less efficient and requires more spectrum than SSB. They don't care. Not that much more space is required when AM stations for a roundtable, and who really cares how much electricity you have to buy from the utility company to work your friend in Moose Jaw? AM is fun, and its use squares nicely with some current trends in Amateur Radio.

Almost everybody has an old receiver, perhaps a Hallicrafters or a National, a medium priced set that works great for listening to the BBC. Why bother with this junk? Most of us do it because playing around with the old gear recaptures a lost feeling of Amateur Radio the way it was -or we think it was- which comes to the same thing in 1990. It is relaxing to turn a knob you can actually handle without needlenosed fingers. The warm yellow glow of an SX-28 S-meter cannot be duplicated in art or nature. And there's nothing more orderly and reassuring than a nice row of tubes with warm filaments, promising pleasure or a little excitement.

It is impossible to have these kinds of feelings towards neat, modern rigs that don't even get warm. AM equipment is gear of the forties and fifties, the salad days of US manufacturers when everything from Heathkit novice transmitters to Collins and Johnson kilowatts could be put on phone. Of course, that fabulous old gear is part of the fun of AM today.

But today's AM is by no means all commercial gear. Many amateurs build or restore the classic homebrew designs of yesteryear. AM is accessible to the average amateur today, whether in terms of parts, gadgets, knowledge or skills required. And today, as always, AM men take their signal quality very seriously. There is even a small industry developing around the modification of audio circuits and the elimination of design flaws in certain manufactured gear.

But there is more to AM than restoring or building. Forget what they taught you in community college. All the intelligence in a phone signal is not contained in one sideband, and the carrier is not a dead freeloader soaking up power. The carrier is extremely significant. Psychologically, it is indispensible.

When an AM operator hits the transmit switch, that lovely fat carrier comes bang on the air, bending S-meters for

continued next page

miles around. Without saying a word, the operator has established what he's doing: he is "on the air".

The expression "on the air" is part of AM phone. With SSB, when you aren't talking, you aren't "on the air", even if your microphone button is depressed. Being "on the air" means having the frequency for a few moments. It's like having the floor in a discussion. You are having your little time in the limelight.

Since your carrier establishes that you are "on the air", there is no need to hurry about what you have to say. In fact, oldtimers usually wait for a moment before they start to speak, just to let the carrier soak in at the receiving end. In the old days, this delay was planned so the receiving operator could bring his drifting receiver onto frequency before the conversation resumed. Nowadays, it's more like a tip of the hat to tradition and the romance of the carrier. It makes "on the air" really mean something.

Since you are "on the air", there is no need to hem and haw between ideas and words. SSB operators do this to keep their VOXs locked on in a vain attempt to create a sense of being "on the air". In SSB, there's a good chance that if you aren't talking, someone else will be. This results in the edginess and sense of hurry found in most SSB operators' speech, as each operator desperately tries to think of something to say to hold the frequency. Not so in AM. The carrier takes care of that. You have all the time you can decently use. You "make a transmission" in the same way Radio Canada International makes a transmission.

Of course, that carrier is what the S-meter responds to. Strong carriers establish a strong, manly presence, heavy with the significance of being "on the air" and all its nuances. Weak carriers are like little boys trying to be grown up. They struggle against the static and the QRM, but eventually, they have to give way to a carrier equal to the task.

Every AM operator wants a carrier that will turn heads. It's like driving an XK-120. Big class-C final amplifiers and high-level plate modulators are the essence of striving in AM. And like the XK-120, the plate-modulated kilowatt in the six-foot black krinkle-finish rack, with a nice row of meters, all matching, is the sign of having arrived.

The balanced modulator kicked all this out of Amateur Radio. Hooking up grids in push-pull and plates in parallel and applying audio to screen grids was an act of violence against the essence of Amateur Radio phone. It was comparable in mischief to putting closed cabins on airplanes and automatic transmissions in cars -- fine if all you want is efficiency or the capability of carrying out a mundane task in a mundane way in record time. But if it's experience you want, if youwant to get a kick out of your hobby, you have to select a technology that will give it to you, and not withhold it in the name of narrowness and niggardly conservation. You have to splurge a little.

Everyone has noticed that the current generation of transceivers have an AM position on them. These little creations do actually work on AM, and they are tolerated wherever AM is in use. But don't be fooled. Putting a Japanese transceiver on AM in the august presence of a Johnson 500 or a Globe King is not really AM operation in the true sense. Continuing the sports car analogy, this is a little like driving a Miata when you really want an MG-TC or a TR-3. The Miata is a cute car and the top comes off, but the ambience of the 40s and 50s just isn't there.

If you like the idea of trying AM, find or build some gear that once roamed the bands in its youthful vigor. Don't bother with controlled-carrier or grid modulation. Go for high-level plate. Don't bump up the power of your new AM transmitter with a SSB linear.

continued on page 30

AM Power Issue Update

by Dale Gagnon, KW1I
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The June 1, 1990 termination of the 'grandfather clause' allowing historic AM maximum power level operation has occurred. Maximum power for AM is now 1500 watts PEP. Many of us now have transmitting equipment that can no longer be legally operated.

AM enthusiasts were hopeful the FCC would postpone this rule change as a result of requests in recently submitted petitions.

William Cross of the Personal Radio Branch of the FCC in a May 29 interview stated that the FCC has four petitions covering AM on file now. Three of these petitions ask for rule changes to prevent the reduction in maximum allowed power for AM (ARRL, KW1I, SPAM). One petition is asking for the elimination of AM (W3KO). Mr. Cross reports that staff is studying them now and has a timetable to respond in some way to them by the end of summer.

When asked about postponement requests, Mr. Cross mentioned the adequacy of time since 1983 to file petitions to address this situation. He explained how the FCC staff concerned with the Amateur Service is heavily engaged with a new licence class and omnibus Part 97 rule making actions, as well as with other petitions, including the AM petitions.

There is good cause to be alarmed at this situation. AM interest on the amateur bands is considerably more than that of 1982-83 when the level of interest was sufficient enough for the FCC to institute a 'grandfather' clause for high power operation and a promise to reconsider in 1990. Note that the 'grandfather' clause period was not instituted so much to put high power AM operators on notice to dismantle their equipment by the end of the period, but to set a period of time after which there would be a reconsideration, presumably to confirm whether AM usage had fallen to a level that would no longer justify special power measurement considerations. Since the period of the 'grandfather' clause was arbitrary in the first place, there is every reason to have expected a postponement during a period of administrative rule making on this issue. The failure of the FCC to postpone, taken with discouraging public comments from FCC officials, places in doubt whether the administrative rule process, starting with the assignment of Rule Making (RM) numbers for petitions on file, will actually occur.

One possible reason for the reluctance of the FCC administrators to sympathize with AM enthusiasts may be their lack of understanding of the number of amateurs who use this mode and are affected or care about this rule change. We had hoped that following RM number assignment and an eventual Notice of Proposed Rule Making (NPRM) there would be opportunity to file comments, which would demonstrate the vitality and size of the AM community. If the AM power petitions are denied, we will not have the chance. For that reason I recommend the following action:

1. Write the FCC now. Your letter should urge assignment of RM numbers to the 3 AM power petitions on file. Urge the reinstatement of the 'grandfather' clause for the duration of the rule making process as a good faith gesture. Your letter does not have to be typewritten, but it does have to be legible. It should be brief and should be constructive. Remember " You catch more bees with honey than with vinegar!"

ELECTRIC RADIO IN UNIFORM

by Walt Hutchens, KJ4KV
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'The ARC-1'

At the beginning of WW-II, the aircraft command function (control and coordination of planes in a formation) used medium and high frequencies - mainly the famous ATA/ARA and SCR-274N equipments. Early British combat success with VHF command equipment and its obvious technical merits – many more available channels and a range usually limited to line of sight -- led to a U.S. switch to VHF for this function in 1942. When a change this big is done this quickly, there is bound to be improvisation, and so it was --our first VHF sets were copies of British radios and 'drafted' civil aviation equipment. This month's radio is the first U.S. set to be designed from the ground up as a VHF command set and it cast long shadows of what command radios were to be, even into the 1980's.

Overview

The AN/ARC-1 is a ten channel crystal controlled aircraft transceiver used by the U.S. Navy beginning about 1944. It covers 100-156 Mcs with a transmitter output of about 8 watts AM and a superhetrodyne receiver having a sensitivity of five microvolts. The 28 tubes are a mixture of miniature and octal types with 832A's in the transmitter driver and PA stages. The transceiver is 7" x 10" x 20" (H x W x D) and weighs about 40 pounds.

Three Collins Autotune units control receiver, transmitter, and antenna tuning; these are preset during tune-up for channels 1 through 9 and 'guard'. A separate receiver front end is fix-tuned on the 'guard' channel allowing continuous monitoring of a single frequency.

A single remote control box selects the channel; audio input and output normally were tied to the plane's intercom system or another control box.

The Origin Of The Guard Channel

Before WW-II aircraft generally cooperated only in a simple and fairly well planned fashion. But war is more complicated than training and the problem of friendly aircraft meeting by accident or having to cooperate without preplanning created a need for an 'intercom' frequency. The Navy seems to have been first to see the problem; the first USN VHF set (the Western Electric type 233, later called the AN/ARC-4) had four transceive channels plus a separate receiver front end pre-tuned to what was called a 'plane to plane' channel. The Army's first VHF radio was the SCR-522 (a copy of a British VHF set); this lacked the separate front end, but one of its four channels was often set to the plane-to-plane frequency of 140.58 Mcs.

Since most military aircraft were monitoring 140.58 Mcs, it was an effective 'emergency' frequency as well; by about 1944, sealed hand-held transceivers for this frequency were included in aircraft bailout and life raft kits. The CRC-7 and PRC-17 are the transceivers I know of; both are large enough to be a real hazard during bail-out.

The ARC-1 transceiver. At right are the tuning tool, TS-80 meter used for tune up, C-45/ARC-1 control box, and front panel cover with tuning curves.

Between about 1947 and the early 50's, the military converted to UHF (225-390 Mcs) for 'command' functions and the VHF frequencies of 108 to 136 Mcs were assigned for civil aviation use. Control of complex military operations had advanced greatly during the war and a factory set 'all aircraft' frequency was no longer seen as necessary. The 'emergency' function was still important, however. 121.5 Mcs became the civil aviation emergency frequency, with 243.0 Mcs assigned for military aircraft emergency communications. These frequencies remain in use today. All military units with UHF capability (all ships, all planes) listen continuously on 243.0 and are capable of transmitting on this frequency on short notice. I believe that civil aviation facilities (perhaps some aircraft?) have the same capability for 121.5 Mcs.

The combination 'always receiving, able to transmit on short notice' is called 'guarding' a frequency. When I was in the Navy in the 60's, ships did it with a separate receiver but in military aircraft, weight is critical. Beginning with the ARC-1 and continuing to the present, military VHF and UHF aircraft transceivers include the separate fixed-tuned receiver front-end of ARC-4 'plane-to-plane' channel, now called the 'guard' channel.

The harmonic relationship between the two emergency frequencies simplifies building a portable transceiver covering both; the URC-4 is the first such set. Later models are the URC-11 and PRC-49.

Ground forces, of course, have used mostly 30 to 70 Mcs FM since the end of WW-II. During the Vietnam War (perhaps because of the growth of Army aviation), 40.3 Mcs FM (40.3 = 121.5/5) became an emergency frequency. The URC-68 transceiver covers all three frequencies. The URC-4, 11, 68 and PRC-49 were part of air crew equipment; they are small enough to be carried in a vest over your flight suit and under your life jacket, though in the case of the URC-4 it would be like flying with a brick in your shirt.

Continued next page

ER in Uniform from previous page

In addition to the portable transceivers mentioned, modern aircraft carry 'hardened' beacon transmitters for the appropriate emergency frequency. These may be started manually or automatically upon impact.

As I write this column, searchers for a light plane which has been missing for several days in rural Virginia have reported wasting time hunting a false signal on 121.5 Mcs. Except in a real emergency, no signal must ever be radiated on the frequencies of 40.3, 121.5, or 243.0 Mcs or on the HF emergency channel of 8364.0 kcs. I do not even test on a dummy load on these frequencies.

History

The ARC-1 is discussed in "Westinghouse in World War 2", the company history for this period; much of what follows is from that source. I'm indebted to Joe Meagher of the Westinghouse Baltimore facility for providing me with a copy.

The Type 233 or ARC-4 Navy VHF command radio was successful as a stopgap, but this radio was obsolete when introduced and the need for changes to suit the requirements of military use had quickly become apparent. By Spring, 1943, Bell Laboratories (the research arm of Western Electric) and the Navy had agreed upon specifications for a new set, designated AN/ARC-1. (The change to the 'AN' system of nomenclature occurred in July, 1943.)

The Navy wanted 15,000 sets; Western Electric was not able to handle an order that size, especially as considerable development was still needed to turn the specifications into a working radio. Western Electric gave Westinghouse a subcontract for half of the sets; as part of the agreement, Westinghouse sent a group of engineers to W.E. to assist in the development work. The initial Westinghouse production was in the (peacetime) appliance division plant at Mansfield Ohio.

The first sets were completed in April, 1944 -- an astonishingly short development cycle for a VHF radio.

The problems of development and early production included parasitic oscillations, variation in the properties of ceramic coil forms from different suppliers causing tracking problems, and unreliable Autotune units coming from Collins Radio.

Up to the end of the war (when the contracts were cancelled) Westinghouse built 18,377 sets; I believe that Western Electric built 7750 more, for a total production of 26,127. My set is s/n 37442, suggesting that more than ten thousand additional sets were built on a post-war contract.

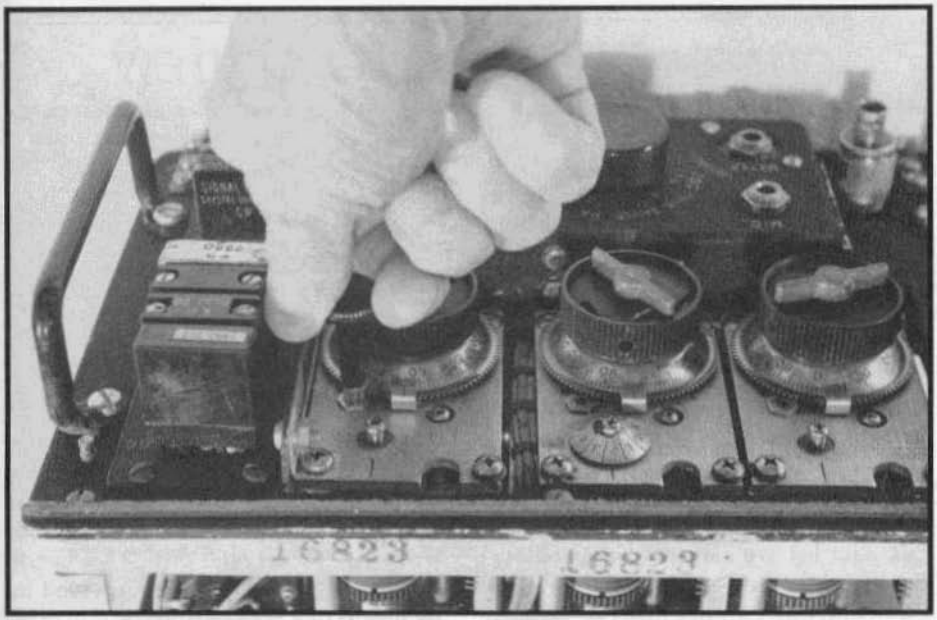
The ARC-1 was the last USN aircraft VHF transceiver. It continued in service in some units at least into the late 1950's, partly because of the long period required to fully convert to UHF and partly because of VHF navigation aids and other services and the need to communicate with the civil air traffic control system.

Design

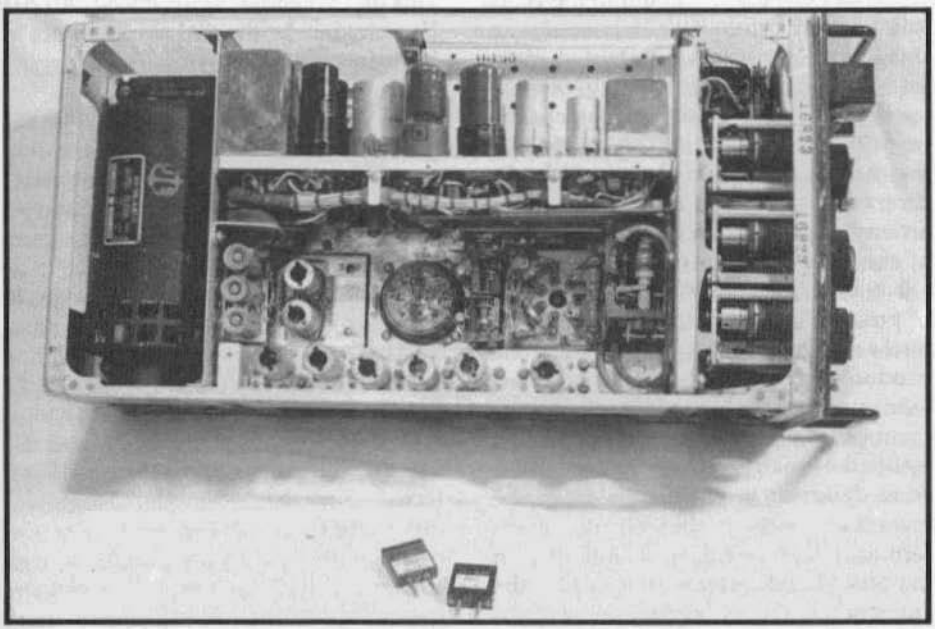
Like many well designed sets, the design of the ARC-1 looks simple. A 6AK5 pentode is used as a crystal oscillator with crystals from 5015.6 to 8126.6 kcs to cover the operating range of 100.0 to 156.0 Mcs. The screen of the oscillator tube is used as the plate of a Pierce circuit; such a low power oscillator nearly eliminates drift due to crystal heating.

The oscillator doubles in the plate circuit; it is followed by two 6AK5 triplers giving an output frequency from 90.28 to 146.28 Mcs which is used as the receiver local oscillator. There are two 6AK5 RF amplifiers, a 6AK5 mixer, and three 6AK5 IF amplifiers. The IF frequency is 9.72 Mcs giving a bandwidth of about 100 kcs. The RF amps and oscillator-multiplier chain are tuned by ganged split-stator capacitors controlled by the 'receiver' Autotune head.

continued on page 24



Adjusting the receiver with the tuning tool.



Top view of ARC-1 transceiver. At right are the Autotune units. The guard channel assembly is at the bottom. Across the center (left to right) are the transmitter mixer, driver and PA. The dynamotor is on the left and audio stages along the top with the tunable receiver circuitry behind them.

VINTAGE PRODUCT REVIEW

by Bill Kleronomos, KDØHG
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The Hallicrafters SX-28..."Super Skyrider"

There are a select few consumer products made in our industrial age that are instantly recognizable for what they are and almost immediately evoke an image of the era that they were conceived in. This includes things such as the '57 Chevy, the '60's Ford Mustang, the Douglas DC-3 and the Ford Trimotor. To this elite list we can add radio equipment such as the Fada Bullet, the Philco Cathedral and I would insist on adding the Hallicrafters SX-28 to this list of classics. Designed and first built in the years immediately before WW-II, it exudes an image of a powerful, substantial radio set with its large bakelite tuning controls, backlit dials and '30s era style steel cabinet with aluminum trim. This classic styling earned the SX-28 a place in the backdrop of several '40s movies starring Bogart and Cagney when the plot called for a "powerful" radio set to be used.

Not only is the SX-28 a superb example of pre-war industrial styling, but it performs extremely well. Many Hallicrafters products have been maligned by those who insist on the best in radio equipment, and in some cases this criticism is justified as many Hallicrafters products were designed to be 'affordable' to the masses and as such, the ultimate in performance was sacrificed. The SX-28, on the other hand, was the flagship of the Hallicrafters line throughout most of the '40s. Many were purchased by the government during the war and used to monitor the airwaves in search of enemy communications.

The SX-28 is a large (10"H x 15"D x 20"W) and substantial 75 pounds of steel chassis and cabinet. There are 15 octal tubes in the design. The receiver is a single conversion superhet with an IF at 455 kcs. There are two RF amplifiers with the accompanying two stages of RF preselection. Frequency coverage is from 550 kcs to 42 Mcs continuous in six bands. Amateur band coverage is provided for by means of a separate tuning dial operating an electrical bandspread circuit. This dial is calibrated for the 80/40/20/10 meter bands; the dial markings are in 10 Kc increments. There is also a logging scale on this dial and in most cases, frequency can be interpolated to within the nearest one to five Kc or so, depending on the band in use. Other features include a tone control, a bass boost switch (similar in function to that on stereo gear) and a noise blanker sensitivity control. Yes, I said noise BLANKER. The SX-28 was designed with the "Lamb" noise blanker rather than the simple and less expensive noise limiters or ANL circuits used in most other receivers.

A later version of the SX-28 was developed during the war years and is referred to as the "A" model. The major difference in the SX-28A over its predecessor is the use of a modular type of construction in the front end tuned circuits. This makes for somewhat easier servicing. Note that you cannot tell the difference between models from the front panel lettering; both models read "SX-28". I have never seen a SX-28A that was labeled as such.

Circuit Description

The two stage RF amplifier is a 6AB7 in cascade with a 6SK7. On bands 1 and 2 only one stage of RF amplification is used. The mixer and separate 1st oscillator are a pair of 6SA7s. The design of this convert is to minimize effects such as 'pulling' of the LO due to variations in tuning and received signals. However, the engineers at Hallicrafters were not entirely successful. More on this later. Line voltage changes have little effect on the SX-28 due to this LO design. There are two stages of IF amplification, a 6L7 followed by a 6SK7. The AVC is exceptionally well designed and is of the amplified type using a separate 6B8 to perform this function.

Audio amplification is handled by a 6SC7 dual triode phase inverter driving a pair of push-pull 6V6s. Note that there is no 8 ohm output; the receiver is designed to feed an impedance of either 500 or 5000 ohms. Unless used with the Hallicrafters accessory speaker, you'll need a matching transformer for best fidelity with a low impedance speaker.

The noise blanker uses a 6AB7 amplifier driving a 6H6 noise rectifier. The rectified noise pulses are then applied to a grid of the 6L7 IF amplifier to shut it off for the duration of the noise pulse. The front panel threshold control is used to set the proper operating point of the blanker to where it is most effective without introducing distortion to a received signal.

The power supply is a standard full wave type using a 5Z3 rectifier. My manual makes note that the main power transformer is designed to withstand continuous operation at 250 degrees!

There are six degrees of IF selectivity available via the selectivity control; a single crystal filter is used in the three highest selectivity positions. The selectivity selections are somewhat ambiquously labeled Broad, Medium and Sharp; and Xtal Broad, Xtal Medium and Xtal Sharp.

continued on page 28

The Tale Of The Found 500

by E.L. 'Mac' McKnight, WK7U
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Several weeks ago the XYL and I dusted off our old, but nice, 280ZX, a small sports car. This is an annual ritual for us in Montana, fourteen miles east of Helena, the Capital. The old buggy is usually tucked away in early November, well before the Arctic Express. It doesn't see daylight again until spring. For our christening trip of the year, I suggested lunch in Townsend, a small farming community thirty miles east of here. It's a nice drive, a good portion of Canyon Ferry Lake on the left; on the right, the Townsend Flats which abounds with antelope.

As we slipped down the main drag of Townsend the 'little lady' spied an antique shop. She said it was new. It was across the street from the only eatery in town; she put it on the menu. One illegal U-turn and we're parked in front of the cafe.

I wasn't fired up over the prospect of browsing the new find, but what the heck, there wasn't anything else going down. For the moment, being more interested in my stomach, I opened the cafe door, while thinking, mostly hoping, that there was some chance she might forget about that place across the street.

Not a chance! As I was settling up with the till, she had already broached the front door, crossed the sidewalk, and appeared to be steering dead-ahead, well to the right of the car. In short order I was following her, in hot pursuit.

The wavey plate glass window was advertising, in a semi-circle of crude block letters - "Antiques - Pawn - Used". My expectations were increasing as I pondered the difference between antique and used.

The place, I must admit, had the smell of something old, as did the fellow behind the counter. The little lady, Dale, was already well at the task of covering everything on the left side of the building. I moved off to the right, neither of us drawing anything more than an indifferent glance from the old fellow behind the counter.

"Hum"- Let's see, what do we have here? An old toaster, old shoes, a hackamore, another toaster, a Johnson 500, a rack of clothes,..... A WHAT!

Many moons have passed over the Big Sky State since I'd taken a blast of adrenaline like that. I stood there, transfixed, until I lost a little of my wobble and, gradually descending to my knee, beheld what was there, sitting on the floor, behind the rack of old clothes.

Indeed, indeed, indeed. There it was; a dusty, dirty, grimy, beautiful E.F. Johnson, Viking 500 transmitter. The exciter/rf deck was sitting on top of the ps/modulator chassis. On top of the exciter sat a coffee pot, more old shoes and a small Johnson Match Box. Behind the 'stacked pair' lay a Johnson phone patch, a Heath balun coil set, ear phones and an old microphone. The phone patch was plugged into the microphone jack of the exciter, a last final phone call? I wondered. There, sticking out of a shoe-box was, after some sorting, manuals for most of it.

By this time, I was aware that my wife had migrated up to and behind me. I rose to my feet, turned and said- "Do you have any idea what that is?" - pointing to the 500. "A boat anchor?" - was the reply. "Dale, I can't count on my fingers how many guys are looking for one of these".

She leaned over, wiped her finger across the top of the exciter, and drug back a dusty digit - "probably not too many guys in Townsend"! I looked into her face searchingly. This woman knew me, and yes, there it was, a faint semblance of a smile, followed by - "How much?" "I want it all, I gasped"! She said she knew that - " I mean how much in American?"

I was honest, I didn't know. I told her I would have to ask that silent fellow behind the counter; he'd most likely take an offer. He probably had no idea what this stuff was.

I had missed it, but she hadn't; she pointed to a piece of masking tape stuck to the exciter front panel, a dollar sign with some numbers. Back to the knee and glasses off - "It says five hundred dollars, but the tape is real old and peeling off"! I assured her, whoever was in charge of this operation, couldn't reasonably be asking that much. I would just go up and make an offer. She asked what I would offer? "I'll offer him one hundred dollars, just for that one thing", pointing to the 500. I could turn around tomorrow and sell it for five hundred bucks"! She looked at me, - "I thought you said that was an unreasonable price?"

I felt I had her consent. I could tell by looking at her; she wanted me to be happy. Everything looked good, no customers in the place, no one had come or gone since we'd been there. We were probably the first ones in the place all day, maybe all week; they were hungry.

I sauntered up to the counter, putting on my best look of indifference. "You taking offers on that CB gear over there?" He looked up from the paper he was reading - "On what?" I asked again, pointing toward the rack of clothes. "Oh sure", he said - "That's nice equipment, you can even make phone calls with it"! I looked at him, he looked back to the paper - "Whatcha offerin"? "I'll, I'll, ah, I'll give you three hundred dollars for all of it"! Without raising his head from the 'Daily Planet' - "Sold to the man with the little blue sports car"!

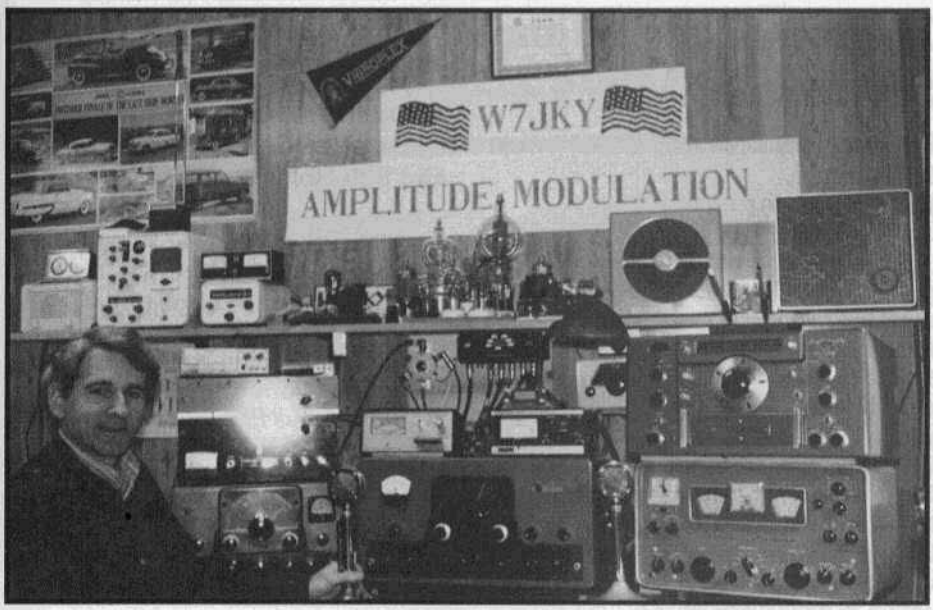
I wrote the guy a check from the big city. He looked it over, the front, the back and then turned it sideways, holding it to the light of the front window - "You gonna try getting all that stuff in the trunk of that little car without the front wheels coming up"?

I look out the window at my 'Z', trying to visualize lifting the power supply over the lip of the trunk, under the hatch, which moving it forward and down.

Up until now I hadn't lifted this thing. I walked over to it, removed the exciter, leaned down and grabbed, jerked and heaved it. I didn't move it. I picked the manual out of the shoebox, blew off the dust, and thumbed through it. Let's see, "hum"....., page 6; "CAUTION: When carried by the handles, the power supply will be top-heavy and should be steadied to avoid upsetting"

....page 1; "The power supply-modulator unit is 10 7/8 by 20 3/8 by 15 3/4 in size, weighs 120 pounds."

continued on page 31



Barry Sims, W7JKY, Oregon City, OR. "Your AM Voice of the Oregon Trail"is one of the more active AM'ers in the Pacific Northwest. He can be found on almost any band 160 thru 6. Barry is not only a very serious operator/collector/restorer of vintage radio gear but is also into vintage cars.

Pete Orobko, VE7FY, Maple Ridge, British Columbia is one of the few AM stations we hear from that part of Canada. One glance at the photo and you immediately get the impression that Pete is a big fan of Collins.

Dayton Hamvention SPAM UPDATE

by Dale Gagnon, KW1I
9 Dean Ave.
Bow, NH 03304

At 1:15 PM, Saturday, April 28, approximately 60 amateurs gathered in the meeting room #7 at the Dayton Hamvention for the second annual SPAM forum. The room had been nicely redecorated from the year before when part of the ceiling, having been soaked by a leak, let go during the first SPAM Forum. Unfortunately, the room was still the same size and a number of AM'ers had to stand and a few who came later decided not to come in because of the crowd and the warmth.

The meeting began with a SPAM update, which included the relay of a request from SPAM president, Norm Scott for a volunteer to administer AM Jamboree planning, promotion and reporting.

Upcoming features, award programs and a new contest from Electric Radio magazine were announced.

Highlights of Mini-Audio mods utilized by Pete Whelpley,W1VZR for Heathkit DX-100, Apache, Johnson Valiant, and Viking I and II were presented. These modifications result in a tremendous improvement in audio quality with a minimum of effort.

Don Chester, K4KYV, gave a report on the AM power issue starting with the historical background. Don covered the important detail of petitions know to be on file on this issue with the FCC. He also reported on the FCC Forum that had occurred earlier that Saturday morning. A spirited discussion followed. Many of the attendees wanted to know what action they could take to help resolve this issue.

continued on page 31

Fred Schrader, W5JKD Silent Key

by Barry Wiseman, N6CSW/Ø
and Bob Hohertz, W5PYT

Another old timer as passed away. Fred Schrader, W5JKD of Priddy, Texas died May 2. When I learned of Fred's passing I called his good friend Bob Hohertz, W5PYT, in Ozona, Texas, to get the information for this short article.

Fred was born in East Central Texas in 1918. He was first exposed to radio in 1924 by a neighbor who was a telegraph operator and also a farmer like Fred's parents. This neighbor had a one tube regenerative receiver that also functioned as his transmitter.

Because there was no electricity on the farm and because his parents were poor Fred was not licensed until 1939. Incidentally, it was Fred that got Bob started in radio. In the summer of 1932 he introduced Bob to radio via his crystal set.

Fred was inducted into the Army around '39 or '40 and spent the war years in Karachi, Pakistan with the Signal Corp as a radio operator. After the war he worked for Westinghouse and also at Southwest Research in San Antonio. At Southwest Research he worked with John Mohn, W5MEU.

Fred was quite an artist; he did a lot of sign painting and when SPAM started up he designed the first certificates. He was also a avid gardener and enjoyed the animals he had around his farm.

As a ham he was a great builder and innovator. The transmitter he used didn't have a modulation transformer. Bob says Fred used a 829B -which is a twin pentode- using one half for the carrier and one half for the audio. He achieved a very high percentage of modulation... maybe 400%! He also designed a lot of interesting antennas and they were like nothing you would see in an antenna book.

continued on page 27

Steve's Hamfest Report

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

Wabash, Indiana

As I was driving to the Wabash hamfest I had an opportunity to reflect a moment on my experience exactly a year ago while attending the same hamfest. I have yet to attend hamfests in other parts of the country, but perhaps you understand my statement that Wabash is a typical small town country fairgrounds type hamfest. It is not the type of area where one expects large amounts of rare and vintage equipment. Nor is it the type of hamfest where you can plan on leaving by 8:00 AM if you arrived at 6:00 since sellers continue "strolling" in all morning long. (Possibly because of church since it's held on Sunday)

Anyway, while I had just started my 'inhaling' last year, and not being very knowledgeable, I came across a rig that really caught my fancy. It was a HRO50-T1 in mint condition with speaker. I passed that rig by three times before I finally came to the conclusion that, although I knew nothing about it, I had to have it. It was calling me. Well, that day started an affair of the heart with National gear that burns steadily today. I learned a big lesson: even the smallest hamfest can have some of the largest surprises. This year was no exception.

The Wabash hamfest was held on May 19, and the morning was cool with sporadic showers not lengthy in duration. (It later cleared up with the sun coming out).

The following equipment was noted as being available for adoption:

The first unit noticed was a Hammarlund HQ-170 ($125). Also included was a HQ-110 -apparently for parts- ($25). There were two Hallicrafters HT-37's ($75, $125) along with a SX-100 ($175) and SX-99 ($125). Drake was represented by a C-Line ($350), 2B with 2AQ ($150) and L4B with spare 3-500Z ($675). Heath linears were available: SB1000 ($650), SB221 ($475), along with a couple of unpriced SB110's. Not much in the way of military equipment was being offered, but I recorded the following: BC-348R ($25), TS62AP ($3) and R-390A ($300). Seldom seen before at local hamfests was a Clegg Apollo 6 with the Clegg Venus and AC power supply ($600). $350 was the asking price for the Kenwood pair R599 and T599, while a Swan 700CX was going for $250. A mint RME VHF152A ($40) was presented along with National's NC-109 ($50) and NC-270 ($175).

At most hamfests there are dealers who spot bargains they cannot resist and thus the same piece of equipment winds up on a table different from where it started (with higher prices of course!) This happened with two pieces at Wabash: A Central Electronics CE 10V was sold initially for $20 and seen later marked up to $50 and a Globe Scout Deluxe was offered for the second time around for $30. I can only imagine what it sold for initially!

continued on page 30

Collecting/Repair/Restoration...TIPS

This month contributed by
Robert Gates
Mountainside Rd., RD #3
Mendham, NJ 07945

Chuck Dachis'informative article about radio restoration (ER, April 1990) made good reading. I would like to add a few comments in reference to it:

When I overhaul a radio, I replace all paper, molded and electrolytic capacitors as a matter of course. I have habitually tested each one after removal, and over the years have found that about 20% of those made in the mid 30's and later could not meet capacity specifications, and as high as 90% showed evidence of leakage. Leakage is damaging in the ways that Chuck cited, and even a little can upset the operation of high-impedance circuits, such as those associated with grids and some AVC's.

Curiously, 20's and early 30's paper caps have shown far fewer defects than the later ones and leakage in an early unit having the proper capacitance has been rare indeed. Curiously also, WW-II vintage molded capacitors, 0.01 ufd and above, are the worst offenders. Possible to mistake for micas, these little devils are programmed for suicide. Bathtubs are generally fine, if you don't mind their above average internal resistance.

All sorts of problems disappear when leaky caps are replaced. In a 1947 Capehart, for example, clicks heard while turning the stepped tone controls were eliminated once the associated capacitors were changed, even though those removed leaked only slightly. In a 1939 Capehart, changing the AVC filters inhibited the loud pops formerly present when switching bands.

In addition to a VOM, I find a good capacitor checker invaluable. The type that I prefer provides sensitive leakage tests at the rated voltage of the component. Such an instrument involves a 6E5 or 1629 eye tube, which gives a semi-quantitive indication of the leakage; an example is the Eico 950B. I have seen caps which showed no malfunction at low voltage, (such as applied by a VOM), but decided to pass current at higher potentials. They would be doubtful, at best, if left in the radio.

I differ from most restorers in the way I replace capacitors and resistors. I rarely unsolder a component because, first, I hate to disturb a good joint. It is always possible that the new connection will be imperfect, and believe me, I have had this happen. Moreover, when I pull out a lead twisted around a terminal, solder drips down and little beads fly all over the place. And finally, I worry about the effect of the heat on other joined components. Note, please, that during such a replacement, each connection has to be "fried" thrice; first, to get the old piece out, second, to vacuum up the solder, and third, to fuse the new part in.

My method is to clip out the old capacitor or resistor, bend hooks at the ends of the wire stubs left, engage these hooks in similar ones formed on the new element's leads, and crimp them tightly about each other. I then solder, using heat sinks to protect the new part. This replacement technique lacks the aesthetic appeal of the usual method, but I have never had one of these joints fail, nor have I had to give a neighboring component a multiple hotfoot.

continued on page 30

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.

I DON'T THINK THIS IS THE WAY THEY PUT THE "KRINKLE-FINISH" ON THESE OLD RADIOS!

More on the 20 Meter All-Nighter

The results of the First Annual Electric Radio 20 Meter Allnighter contest will have to wait for next month. Although I have already received about a dozen logs I know there a few more to come in. And one of those yet to come may be the winner. But at this point I can say that three of the high scorers were Bill, WA8LXJ, John, WA6ZJC and Les, K6HQI. I think everyone enjoyed the contest but there were very many suggestions for changes in the rules. Some operators didn't like the time the contest started - it should have started earlier - and some didn't like the extra points for working the entire contest. A few mentioned that the rule not allowing a contester to work everyone in a group for points should be scratched. I've taken all the suggestions into consideration and next year there will be some changes.

Field Day June 23 and 24

This Field Day Saturday and Sunday, June 23 and 24th I will be participating with the Durango Amateur Radio Club. The club will be setting up about 25 miles from Durango near the town of Mancus. I plan to take a Ranger and HQ-180 and will probably operate some CW as well as AM. Listen up for WIØS, the callsign the club will be using. I think that Field Day is a good opportunity for all us to take our portable gear and head for the hills or to participate with a club like I plan to do. One of the advantages of participating with a club is that we have an opportunity to expose other hams to vintage equipment and AM operation. Many hams - particularly hams licenced in the last 20 years - have never seen a piece of American made gear. And many of them have never heard an AM signal. And I think a lot of them are under the impression that the older American vintage gear is just junk. I'm looking forward to showing off my Ranger and HQ-180.

LETTERS

A copy of a letter to E.F. Johnson

Dear Mr. Johnson:

Let me join with the others in wishing you a speedy recovery from your recent medical problems.

I'd like to add a special note of gratitude to you, if I may. It's been a long time in coming - more than 30 years, in fact - but I hope you'll accept it as "better late than never".

I'm referring to a visit I made to Waseca back in 1957, when I was an 11 year old with a crisp new Novice ham license in my pocket. My family recently had moved to Missouri, but I still felt south Minnesota was home, having spent most of my life to that point in Faribault and Rochester. I rode the bus back for a summertime visit with my grandparents in Faribault, and pestered poor ol'Grandpa into driving me the few miles to Waseca so I could see that hallowed shrine, the E.F.Johnson plant, birthplace of the transmitters I so lusted after.

We arrived early on a weekday afternoon, and I naively marched into your plant's front office and announced I was there to look the place over. I quickly sensed your busy staff was somewhat taken aback, and for the first time it dawned on me that you folks had jobs to do and couldn't just drop everything on the spur of the moment to entertain a starry-eyed kid who obviously wasn't in a position to place a large order.

However, the woman at the reception desk didn't shoo me out the door. She spoke briefly into her telephone and a few moments later a pleasant fellow appeared. "We don't usually give tours like this", he confirmed, "but seeing as how you made this special trip, I'll let you take a quick look around."

He graciously escorted my grandfather and me through the plant. My two most vivid memories are the dozens of gleaming chassis on the assembly line (Oh, how I yearned for just one) and the intoxicating aroma of hot solder.

I went home a happy lad, with an armload of literature and enough memories to keep me dreaming for months.

Eventually I was able to realize one of those dreams and became the proud builder of a Johnson Ranger purchased in kit form. I filled many pages of my logbook with that rig in the early 1960's.

Unfortunately, I evenually allowed my license (KØMYW) to lapse, and I gave away the trusty Ranger many years ago. However, my interest in ham radio has been rekindled and I'm looking forward to earning a new ticket and getting on the air again in the near future. In preparation, I looked around for a classic rig - and settled for nothing less than a Johnson Ranger II that I purchased through an ad I spotted in Electric Radio magazine.

I really didn't meant to get carried away and write such a lengthy letter. Please pardon my wordiness. But I just couldn't pass up this opportunity to say, "Thanks!"for producing such fine radio gear and for running the sort of company where employees would take time to give a kid the thrill of a lifetime.

May you enjoy good health for many years to come, Mr. Johnson.

Mike O'Brien
Springfield, MO

Congress of the United States
House of Representatives
Washington, DC 20515

May 31, 1990

Mr. Albert Sikes, Chairman
Federal Communications Commission
1919 M Street N.W.
Washington, D.C. 20544

Dear Mr. Sikes,

I understand that on June 2, 1990 a Federal Communications Commission ruling is due to go into effect which would reduce A3E Double Side Band AM radio emission from three thousand to fifteen hundred watts PEP. I am writing to urge the FCC to reconsider this ruling and to maintain AM power measurement at its current transmitting level.

While it is true that A3E DSB Full Carrier radio presently operates at twice the power allowance of other amateur radio modes, it is also true that it is half as efficient and requires more power accordingly. I understand the Federal Communications Commission's desire to be equitable yet I am concerned that this reduction would adversely affect amateur radio operators, especially those operating vintage equipment.

We must not lose this tradition of American Amateur Radio. It is a rich and prominent part of American broadcasting history and it continues to be an important link in worldwide communication. From World War II to the recent San Francisco earthquake, "Ham" radio operators were "on the air", saving lives and keeping contact when all other systems failed. Classic vintage radio equipment epitomizes the beauty of design, the industrial grace and the technological ingenuity of American "know how".

I urge no power reduction that might discourage or inhibit vintage radio operation in the United States. I encourage you to implement policy within the Federal Communications Commission that fosters and protects this valuable American tradition.

Sincerely,

Ben Nighthorse Campbell
Member of Congress

Deluge AT Deerfield

by Bill Barry, K1KV
5 Oak Knoll Rd.
Burlington, MA 01803

The semi-annual pilgrimage to Deerfield, New Hampshire took place on Saturday, May 5, for the 'Hosstraders' tailgate swapfest. Unfortunately, mother nature provided a New England spring day with plenty of rain and 40 degree temperatures. Dampened spirits limited attendance to (surprisingly) a little over 4,000. This was a day for only the serious buyers and sellers. Neeless to say, there were bargains!

To those individuals in the 'hinterlands' who are not familiar with this now spring tradition perhaps a short history is in order. Originally, back in '73 it began as a group of 'Downeasters' horsetrading amongst themselves; usually weekends on 75 meters. The local boys grew considerably in number with more and more discovering 3940 +or- while tuning the band evenings. After several months, organizer and MC, Joe, K1RQG decided it was time for us to meet each other in person. Many fondly remember the first swapfest that took place at Seabrook, New Hampshire, with a showing of approximately 30 - 35 cars and not many more people. I still have a classic group picture I took of a handfull of diehard AM'ers that were the last few still operating the mode back then.

On Sundays for the next few years, Joe and Norm, WA1IVB, put in countless hours of time and dedication to running the net and organizing 'THE' spring radio event here in New England. However, we soon outgrew the old field and a new site was selected at Deerfield. This is a beautiful, wooded, fairgrounds occupying about 35 acres. In the beginning we actually shared this location with a horse show for a few years (once with a dog show too) but our numbers eventually required the whole area. Sometime around 1980 a second date was added to the schedule for the fall. This remains so today which brings us to the present and the first meet for '90.

Early shoppers arrived Friday evening to get the best selection, with this author seeing many deals being conducted by flashlight. By 1:00 AM the rains began and never stopped. Many were up at dawn for a hot breakfast provided by the many vendors. Fortified with a full belly and fresh hot coffee most took little notice of the downpour. After all, were in search of deals!!

Here's a short list of transmitters and receivers that were seen:

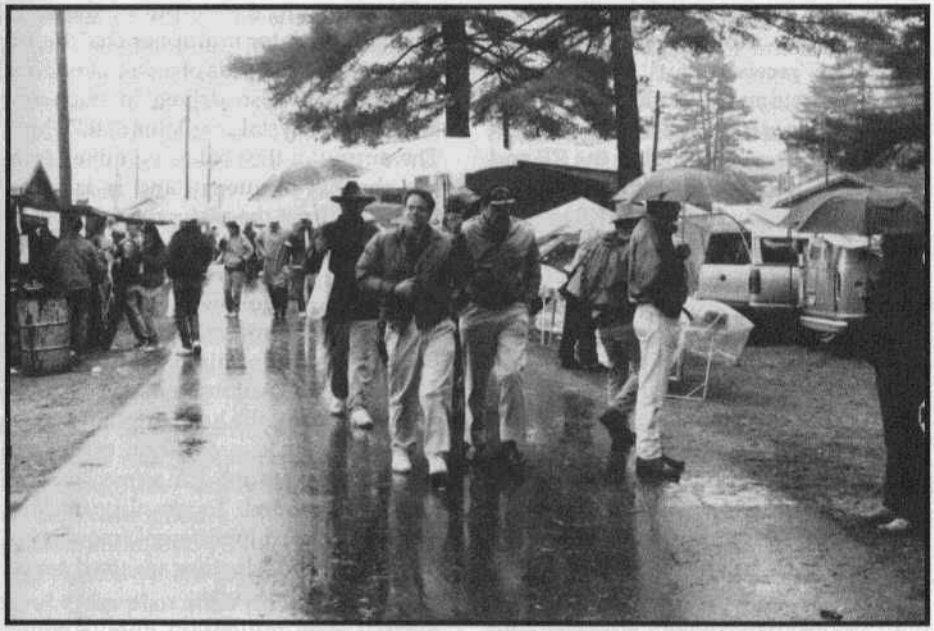
Transmitters: Viking II, Invader 2000, Rangers, Globe Chiefs/Scouts, Knights, Apaches/Mohawks, DX-60s, B&W 5100B, DX-100s and Viking 6N2.

Receivers: NC-54, 57, 183, 183D, 240D (2 ea.), SX-122, SX-71s, SX-146, R-390 (4 ea.), RME 6900, RME 45, SP-600, HQ-129X, 140, 180A, NC-100, 120A, HRO-50T1, HQ-170 and SX-111.

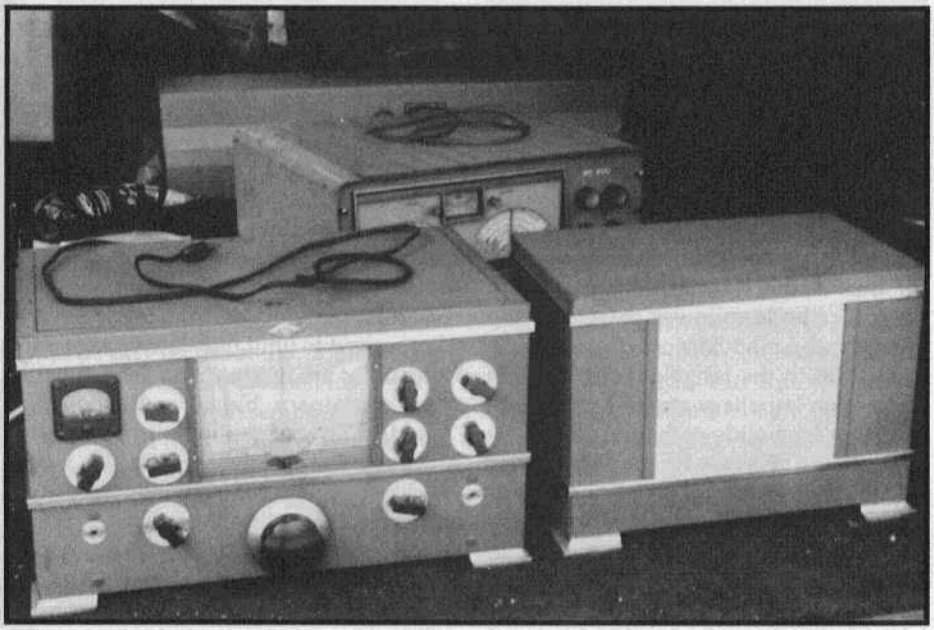
Before closing I would like to give special recognition to the two individuals most responsible for the existance of the Hostraders Swapfest, Joe, K1RQG and Norm, WA1IVB. As with these types, neither would blow his own horn, so I'll take the liberty to do so.

Over the years this event has ALWAYS operated as "not for profit". All proceeds, after expences, are turned over to the Shriners Burn Unit Hospital in Boston. With an admission price of $5 and at times several thousand in attendance this represents an impressive charitable donation. To Joe and Norm a round of applause. I salute your compassion to those in need. Thank you from all of us.

Rain or shine,
Deerfields always a good time.
See ya' Oct. 6th at the fall meet.



"This was a day for only the serious buyers and sellers"



These two receivers (background, NC-400) found a new home at the authors QTH.

Er in Uniform from page 8

Since the receiver local oscillator signal is also an input to the transmitter mixer, the 'receiver' must be tuned up first when setting a new channel.

One diode detector drives an amplified AVC system controlling the RF and first two IF stages. One might wonder at the use of the sharp cut off 6AK5 in AVC controlled stages, but it is 'almost' a semi-remote cutoff tube.* In the world of 1944 -- which had few strong VHF signals to cause cross modulation problems -- it was probably the right choice. The alternative would have been the remote cutoff 9003 but this tube has less than half the transconductance, so performance would have suffered.

* A pentode is considered sharp cut off if the cutoff control grid voltage is less than 10% of the operating screen voltage. A semi-remote cutoff tube requires from 10 to 20% of the screen voltage for cutoff, and a remote cutoff tube requires over 20%. The 6AK5 requires about 8%.

The detector is followed by a series noise limiter and a squelch circuit which turns off the audio output in the absence of a carrier. The squelch can be disabled by a pushbutton on the panel during tune up; the noise limiter is always on. Two separate output stages (driven in parallel) provide independent high level audio outputs; I could not find any reason for this. A third audio output is taken from a cathode follower driven by the detector; the manual describes this output as flat in the range of 90 to 150 cps and as for "auxiliary apparatus" so it is probably for a glide path indicator.

There is a separate RF amp and mixer unit having its own crystal and multiplier chain; this is the guard channel unit and was fixed tuned at the factory to 140.58 Mcs or (later) to 121.5 Mcs. Its output is fed to the IF amplifier in parallel with that from the tunable front end when 'BOTH' is selected at the control box.

On transmit, the output of the main channel oscillator multiplier chain is fed in parallel to the grids of a pair of 6AK5's; the grids are also driven in push-pull from a 6C4 crystal oscillator at 9.72 Mcs. The output of this 'balanced mixer' is on the channel frequency and is taken in push-pull from the plates thus effectively cancelling the local oscillator frequency.

The mixer output goes to an 832A driver which is followed by an 832A PA. The transmitter mixer, driver, and PA are tuned by the 'transmitter' Autotune unit. The 'antenna' Autotune unit tunes the antenna circuit; the link coupling system was designed to present an essentially constant load to the PA so no 'loading' control is needed. To simplify tracking of circuits tuned to different frequencies, ganged roller inductors are used for all of these tuned circuits.

High level amplitude modulation is used. The final plate and screen are modulated, as is the driver screen, and the set is capable of 100% modulation with little distortion. The modulator is a pair of 6V6's operated class AB1; it is driven by a 6C4 phase inverter which gets its input from the usual aircraft carbon mic or intercom system. No speech clipping is used.

A dynamotor at the rear of the chassis furnishes high voltage; the output is connected across a voltage divider to supply -110 and +240 volts on receive and -2 and +355 volts on transmit. A varistor is used to limit the plate voltage while the tubes are warming up. The dynamotor contains a blower which gives a modest flow of cooling air to the rest of the set. The disadvantage of this simple cooling system (used in many other aircraft radios) is that it deposits a layer of fine carbon dust (from the brushes) throughout the set. I have never seen this cause a problem, but it makes your hands filthy every time you work on a new corner of a set.

Spurious emissions were obviously a design consideration for this radio, as shown by those low power (6AK5) oscillator and multiplier stages, the balanced mixer, and the four tuned circuits on the output frequency. And it paid off -- WW-II VHF sets are often TVI generators of the worst sort (one was claimed to give TVI even when turned off!) but my ARC-1 causes no detectable interference even when it and its antenna are located within a few feet of the TV and 'rabbit ears'.

Conclusions

My first thought when I looked inside the ARC-1 was "This radio was designed by a committee" -- only later did I learn of the Westinghouse - Western Electric collaboration. Everything is there, but it was located where it would work, with no obvious plan other than that dictated by the tuning shafts. The panel is the same -- a couple of knobs, a switch, three Autotune units, and ten crystal sockets are located 'where they fit'.

But that's not a dime to the dollar of a fair evaluation of this set. When (after 40+ years) I fired up my ARC-1, I had to lube the dynamotor and Autotune units, change a bad 832A, and wipe the roller coils with a cotton swab. And it works absolutely smoothly -- 'no tricks' operation is impressive on almost any radio, but in a VHF transceiver designed in less than a year, it is astonishing.

Corrective maintenance would not always be easy on this radio. Some stages are nearly impossible to reach for testing or repair. Most subassemblies are not removable and those that are, aren't easy. Like many of the more complicated radios of the 40's and 50's, six volt tubes are connected in a tangled series parallel network to allow operation from a 24 volt line; this system has the disadvantage that when a tube burns out it increases the voltage on the parallel tubes.

As far as I know, this is the first military set to use a balanced mixer. Other than that, there's little cleverness here; of course the familiar has much to recommend it if you want to build a trick-free radio in a hurry. The technical manual is one of the two or three best for a WW-II radio.

The controls tune quite sharply so it is hard to set them accurately. This was handled by placing gear teeth on the circumference of the knobs and supplying a small pinion on a tool as a fine tuning control. This device was stored in a clip in the front cover of the set; when tuning up a new channel you push its shaft into a hole next to the knob to mesh the pinion teeth with the knob.

It is easy to lose small special tools. Of course, to be sure I (the radioman tuning this set) have a tool when I work on a set from which it is missing, maybe I better take this one...

A feature I like a lot is the use of a single crystal (per channel) for both the transmitter and receiver. Not only does this cut the number of crystals required by half (probably the main reason it was done in the ARC-1), but it eliminates several kinds of SNAFU (Yes, that is an authentic WW-II Navy word!) such as interchanging the receiver and transmitter crystals. It is amazing that this wasn't required for all crystal controlled military transceivers and transmitter/receiver pairs, but it is actually rather uncommon.

The receiver bandwidth of 100 kcs and 5 microvolt sensitivity are very poor by modern standards, but this radio was designed to work line of sight paths (that is, with fairly strong signals) with all kinds of other sets, and to do so dependably, even under adverse conditions. These features are right for the job.

The ARC-1 is in many ways a transitional radio. It is (for example) the first small U.S. military communication set to exceed twenty tubes -- but most later radios this complex used plug-in subassemblies.

continued next page

ER in U from previous page

Earlier VHF command sets had only 4 channels (to the ARC-1's 10), then came 20, and then synthesized radios with 1750 UHF channels.

The front panel controls are for tune up only -- GUARDBOTH/MAIN, volume setting and channel selection must be done at the control box, as with later radios. It appears, however, that only one remote box was allowed; most later sets allowed at least two.

The ARC-1 uses the 'ATR' package and rack, but unlike many later sets the connector is at the rear of the set and mates with one in the rack, so you must pull and replace or modify the rack to install a new type of radio.

Overall, the ARC-1 is a fine military radio and by the end of the war it was the standard command radio in many types of Navy aircraft. Though it was swept into the background as the military adopted UHF for command functions, it had a successful career and set the pattern for much that was to come.

On The Air With The ARC-1

This is one of the most practical WW-II era VHF sets for ham use. It is well built but not too complex, so getting it working should be relatively simple. The use of a single crystal for both receiver and transmitter simplifies things and the lack of TVI is a real plus.

The CR-1 crystals used by the ARC-1 (1/8" pins on 1/2" centers) are found at all larger flea markets; I made units for 144.4, 144.5 (etc.) by 'adjusting' some of these. A commercial source is C-W Crystals, 570 N. Buffalo St., Marshfield, MO 65706. C-W made CR-1 crystals when the ARC-1 was brand new, and I have found them to be fast and efficient -- also, most reasonable in price. I don't know if they have the original holders, but if you send them yours, they will 'refill' them!

Washington DC seems to be in a dead zone for VHF AM but I was fortunate to find a fellow military collector, Mike Feher, N4FS, of Manassas Virginia, who had just gotten a nice ARC-1 and was eager to fire it up and try to make contact. Unfortunately, Manassas is about 50 miles from here and there is some higher ground between us. With less than 10 db antenna gain at each end and only 8 watts of output we were not able to make contact. I was, however, able to open the squelch on a modern 2 meter receiver at Mike's QTH, so there's hope.

Little is needed to use the ARC-1 as a ham AM set. A mic and headphones can be plugged into the front panel. I put a potentiometer in a minibox with a phone plug on one side and a jack on the other; this unit can also be used with the many other aircraft radios which expect external volume control.

If I were going to upgrade the ARC-1 for ham use, I'd give the receiver double conversion, using a plug—inunit in the second detector socket; a second IF around 1 to 2 Mcs would get the bandwidth down to 20 kcs and improve the sensitivity by 6 db or so. A cascode RF stage on a plug-in would get you another few db. Using a clipping/filtering microphone would give the transmitter 4 or 5 db of help; I promise the circuit for this device in the near future.

Because of the filament circuit, if some tubes are missing or open, the life of the others on that branch may be a few minutes or less. As with any autotune set, change the channel immediately when you apply power. If the set doesn't channel, shut down and find the problem.

More About Radioactive Paints on Military Sets

Robert P. Morrison, KE4XI, writes that he saw the article on the TBY in the February 1990 issue and "was surprised to learn that the front panel labels were done with radioactive paint. Are there other surplus radios that contain this type paint...?"

I have done some more tests on this and other sets and will summarize what I know.

First, some background. A 'glow in the dark' substance is one in which electrons which can be boosted to higher orbits by absorbing an amount of energy comparable to a photon of visible light. Some time after the absorption (microseconds, hours, millennia!) the electron will drop back to its normal orbit and a photon of light will be emitted. The excitation energy can be provided in many ways: in a neon lamp or light emitting diode, for example, it comes from an electric current.

Modern luminescent paints are excited with visible or ultraviolet light. Since UV light is the most energetic, it does the best job, but sunlight or even an incandescent bulb will work.

Another way to excite the florescent compound is to mix it with a radioactive substance; it is then excited by the alpha and beta particles given off as the substance decays. This method has the advantage that you need not expose the paint to light to make it glow and was commonly used on watch, clock, and other dials in the early years of this century. Mostly because of the serious hazard to the workers applying the paint, this method died out during the 1940's but generally it was thought that the small amount of radiation from the equipment was safe.

Today it is recognized that there is no 'safe' level of radioactivity. There's some inescapable 'background' radiation from the sun and naturally occurring radioactive substances; anything which increases your exposure above this level increases the slight risk of radiation-induced cancer.

If the radiation source is outside your body, the risk isn't large for the amount of radiation given off by military radios. But swallowing or inhaling radioactive material is much more serious because it can stay in the body delivering radiation at close range for many years.

While these risks should be taken seriously, they're no worse than others faced by hams. A 1000 volt plate supply is often lethal the first time, only one important mistake will be made at the top of a 100 foot tower, and breaking a large CRT can cause severe injury. If you want to work with these things, you learn and observe the necessary precautions.

The same is true of owning the few military sets with radioactive markings. Don't keep the 'hottest' of them where you'll be continuously nearby. For example, don't display a TBY at your operating position or store it under your bed. When cleaning items with radioactive markings, wear rubber gloves and take extreme care not to inhale or swallow dust or flakes. Clean markings only with paper towels or swabs dampened with water --never with solvents or abrasives. Dispose of used materials (including the gloves) as you would anything contaminated with a very small amount of deadly poison.

Young children should not have access to these sets, any more than they should a high voltage supply or tower.

W5JKD from page 16

I used to enjoy listening to Bob and Fred on 75 in the late afternoons. Bob told me that he used to come home from work, fire up the Techrad on 'the good antenna' and carry on with Fred until just before sundown when Fred would sign to do his chores.

Although Fred died of lung cancer, he told Bob shortly before his death that the only time he smoked was when he was in Karachi, in the army, and cigarettes were free. When he had to start paying for them he quit.

Fred, W5JKD - "Jacks, Kings and Deuces" will be missed.

Vintage Product Review from page 11

The charts in the manual imply that these positions correspond to selectivities of 12, 7, 4.1, 1.8, .8 and .2 respectively at 6 db down. The shape factor (6 to 60 db) of the IF stages ranges from 3:1 to 5.4:1 depending on the selected bandwidth. This is actually a respectable value for skirt selectivity, even by today's standards. The S meter is calibrated in 6 db S units.

Tuning in the SX-28 is accomplished through the use of brass and steel anti-backlash gear trains directly driving both the main and bandspread tuning capacitors. The tuning shafts run in ball bearings and include flywheel type weights. The tuning controls have a very good, almost velvety feel as you tune the receiver. The entire front end assembly is contained within a heavy gauge steel enclosure bolted to the main chassis.

Stability

A series of electrical and mechanical stability tests were run after a 90 minute warm up period. I noticed that the BFO needed a good ten minutes after being switched on to settle down to about zero drift; during the first ten minutes I observed some 200 Hz of BFO drift. Overall, the stability I observed is quite good, being, for some reason, better at 14 than at 7 Mcs, the two points I checked. At 7 Mcs, drift was measured at 5 Hz after 5 minutes and 50 Hz after 10 minutes. At 14 Mcs, drift was unmeasurable after ten minutes and was only 25 Hz after 20 minutes. This low drift is astoundingly good for a receiver built some fifty years ago. In fact, I'd have to say that the stability I measured at 14 Mcs is unsurpassed by any tube type receiver I've ever used except perhaps a Collins 32S3 (S-Line).

One stability problem that does exist is one mentioned in the manual. The local oscillator gets "pulled" by large variations in received signal strength when the BFO is on and the AGC is switched off. This problem is observed when receiving SSB or CW when there is strong fading of the received signal. While this effect only creates a drift on the order of 50 Hz and does not impair the reception of signals, it is an annoyance factor to hear the pitch of a CW signal change as the RF gain is varied.

Mechanical stability is average. The frequency does jump some 100 Hz when a blow is applied to the cabinet, but it does jump back. Shaking the operating desk creates an audible 'wobble'.

Image Rejection

Due to the single conversion scheme and low IF frequency of 455 Kcs, I didn't expect that the SX-28 would perform well in this regard, and this assertion is correct. At 30 Mcs image rejection was 30 db, at 14 Mcs it was 40 db and at 7 Mcs I measured 55 db. It is no wonder that a popular homebrew accessory for this receiver was a tuneable preamp/preselector back in the '50s. Such an add-on would work wonders on the 10 meter band with any single conversion receiver like the SX-28.

Sensitivity

This was checked using the 10 db S+N/N method. My measurements at 1, 4, 14 and 30 Mcs came in at 2uV, 2uV, .7uV and 1uV respectively. This is the AM sensitivity and the effect of having one RF amplifier switched out at the lower frequencies is apparent. A CW or SSB signal needed to be .25uV or better at 14 Mcs to be readable.

To be fair, note that the 1st RF amplifier tube in the receiver used for these tests is a 6AC7 rather than a stock 6AB7. The 6AC7, a direct replacement, has higher transconductance and lower noise than the 6AB7 and I recommend its use in the SX-28. Also note that if your interest is the reception of signals at 40 Mcs, the SX-28's sensitivity falls off dramatically at the top end of band six, being on the order of 50 uV. I suspect that this is due to losses in the circuitry and insufficient local oscillator injection.

Selectivity

Notwithstanding the specifications listed in the manual, I measured the selectivity at several positions. At the -6 db points, "Broad" measured 14 Kcs wide, and "Sharp" came in at 5Kcs wide. "Broad Xtal" measured 3 kcs wide and tuning the crystal phasing allowed the effective notching of the 5 Kc beat note from adjacent shortwave broadcast stations. The crystal filter provides highly effective single signal reception when both it and the BFO are properly adjusted. Measurements made in the "Xtal Sharp" position showed a bandwidth of about 30 (yes), 30 Hz at -6 db and a rejection of signals the other side of zero beat of at least 70 db when tuned for the absolute tightest selectivity.

Noise Blanker

As far as I'm concerned, the noise blanker in the SX-28 was 30 years ahead of the competition. When properly adjusted, it is amazingly effective on power line, SCR and brush type motor noise. As a test, I tuned in a broadcast station with about an S9 signal and used a blender and later, a noise SCR type light dimmer as noise sources. These devices were located so that they produced a noise level of S9 to some +10 over 9, making the reception of the broadcast station almost impossible. When the blanker was switched on, and very carefully adjusted, it completely - and I do mean totally - eliminated the noise from the light dimmer and was almost as effective on the blender motor hash. There was very little distortion or other effect on the audio quality of the BC station. It is necessary to ride the blanker gain control when tuning around as the proper setting is somewhat dependent on the strength of the desired signal. Too much blanker gain causes an undesirable cross modulation effect where strong adjacent signals will modulate the desired one, but overall, this just might be the best feature of the SX-28 for those who love old receivers but have lots of local RFI.

Audio Quality

This is best described as smooth, high-fidelity, low distortion and there's lots of it available. I made a series of measurements with the bass switch on, the tone control set for maximum highs and the selectivity in "Broad". Using 1 Kc as a reference, I measured a +/-2 db response up to 6 Kcs, progressively down 6 db at 7 Kcs and 10 db at 8 Kcs. Looking at the bass side of things the response was -3 at 200 Hz, -6 at 100 Hz and -10 at 50 Hz. Even at 50 Hz the scope showed little visible distortion. A series of distortion measurements were made at 1 Kc. The measured distortion was 3% or less up to 500 MW output, 4% at 1 watt, rising to 5% at 8 watts out. The SX-28 has darn good audio for a communications receiver.

Other Notes

As with the SP-600JX reviewed in last month's ER, one of the prices paid for covering the entire HF spectrum in six bands is the difficulty in dial calibration. It can be difficult to determine one's exact frequency with any degree of accuracy where the calibrated ham band bandspread is not used. For truly serious work with the SX-28 I'd recommend the use of a tuneable preamp/preselector on the higher frequencies and a crystal calibrator. But let's not dwell on the few negatives; let's emphasize the best features of this receiver.

For a product designed and first manufactured over fifty years ago, the SX-28 provides truly impressive performance, in many areas being the equal of much more modern equipment. With a well balanced combination of good sensitivity, selectivity and amazingly good stability and audio response, the SX-28 is an ideal choice for SWL and AM amateur use. It is no wonder that even today the SX-28 has held much of its value in an era where many of its contemporaries have not. Its package of features will be hard to beat even for another fifty years.

The Romance of AM Phone from page 4

It isn't the same as the real thing. If you are a new amateur and want to start small, get a Johnson Ranger or an AF-67. If you want to build a little, find a modulator circuit in a 1955 Radio Amateurs Handbook and plate modulate a DX-35 or AT-1. Of course, be careful. There are high voltages in this kind of equipment, and high voltages can kill. But living a bit dangerously to partake of the mystery and romance of the carrier is worth the risk. William Skidmore, VE3AUI.

Editor's Note: We're very grateful to QST Canada for their permission to reprint this editorial. And thanks to Skip, McElfresh, VE6WHM, and Eddy Swynar, VE3CUI for bringing it to my attention.

Tips from page 18

There have been exceptions. For reasons unknown, some Zeniths have come through with the shortest capacitor leads known to man. Since no wire stub was left after the cut, I was forced to make the swap in the traditional way.

Because I have seen so many high-value resistor failures in late 30's and 40's radios, I now routinely replace all resistors of one megohm and above, and look with suspicion on those in the 100K range. Even though an old composition resistor may test good, if in a grid circuit it can make a radio sound like a popular cereal when the milk is first poured on. The new ones, especially the metal-film types, tend to be much quieter.

Hamfest Report from page 17

I spoke earlier of surprises. Every hamfest has them, and I've never really been disappointed. But I was amazed to find sitting on a tarp one the ground a National 5886 power supply belong to a National NC1-10A which was still inside the trailer. The price was $100, but the gentlman was willing to settle for $75 for this equipment in excellent condition. Apparently, this "vacuum tube addict" is on the road to recovery because I was able to resist the severe temptation. But it sure makes me wonder what I will find at the next hamfest.

Editors Comments from page 1

To my knowledge no other country has - or is considering- 'leveling their playing field'.

The only other reason for the change in regulation, given by the FCC, is that measuring the output of the transmitter is safer for their field technicians. I wonder why it didn't occur to them to just change the regulations to read 750 watts carrier output as the maximum power and then they wouldn't have to get inside the transmitter. But they wanted that playing field 'level' so had to go for the change to 1500 watts PEP output.

The bottom line is "if it aint broke don't fix it". I don't think there was any logical, reasonable, rational reason for this power reduction.

Now we have to keep plugging away to get our power back. There are three petitions before the FCC now. One is from SPAM drawn up by Norm, WB6TRQ, one is from Dale, KW1I and another is from the ARRL. All three of these petitions are excellent and would give us back what we have recently lost. We must write letters to the FCC urging them to assign RM (Rule Making) numbers to them so that the process might begin. Please read KW1I's update on page 5.

There are a lot of individuals from the AM Fraternity working hard on this issue; Dale, KW1I, Don Chester, K4KYV publisher of the AM Press Exchange, Dave, W6PSS, Bill, KDØHG, Fred,W6RNC and Norm Scott, President of SPAM and others.We all have to lend a hand with telephone calls and letters to the FCC.

continued next page

Editor's Comments from previous page

Another avenue that I've persued is talking to my representative. Here in Durango I found our Congressman, Ben Nighthorse Campbell and his staff very 'sensitive' to our problem. On page 21 see a copy of his letter to the FCC.

To finish up; I know that if we ALL do what we can -write letters, make phone calls to the FCC and our representatives - we can get our power back. Stranger things happen every day.

Tale of the Found 500 from page 13

Dale, with her innate co-ordinate sense, anticipates what's going on; she crosses the street and moves the car to the front of the store, another illegal turn. I look down at the power supply and continue to ponder the task. The front door opens, but doesn't close. I look. Its her, she's holding it open.

I get determined; grab, jerk and lift - I'm up and moving, with a slight wobble and bowed legs, in the general direction of the front door.

I pass her; she has a funny look on her face. I head for the car, she passes me. She says my face looks funny, am I alright? I tell her I will be if she can get the trunk open real soon. With RF speed she has the hatch open and moves off toward the front of the car where she seems to be watching the front wheels.

I get it in, not exactly where I want it, but in. What a relief! I'm pooped! I remind myself that I'm fifty years old, as I slowly walk around the car flapping my arms over my head. I walk around the car three or four times. Dale is still watching the front wheels.

Everything loaded, I turn, wave goodby to the old gent. He looks up over the paper, smiles, and continues to read. I wonder what he's thinking? I give the front wheels a glance then slide behind the wheel.

With no time to waste, down the main street, a turn right to the highway and west, into the sunset.

This story had a good ending. The exciter/rf deck and ps/modulator were de-gunked and shined. Some of the ps electrolytics were leaky and later replaced, but everything worked out the first time around, as some of you have heard. I've never owned one of these transmitters before, but like a lot of us 'old timers', have talked to many in the days gone by; more in the past, unfortunately, than present.

My curiousity recently got the best of me and I called the owner of the store, who wasn't the old gent. These items were the remnants of an estate sale held in Whitehall, Montana, some years back; there were no takers at that time and everything was hauled up to Townsend for sale (a somebody knew somebody deal). As I try and remember back, I can't place anyone ever operating from Whitehall. Do you?

Dayton Hamvention from page 16

Names and addresses of amateurs attending the session were recorded for future information mailings as the AM power issue develops.

A photographic exhibit of over 80 pictures of AM'ers and their stations were on display.

Complimentary copies of the AM Press Exchange and Electric Radio were eagerly collected by Forum attendees. Schematics of W1VZR's mini- audio mods were handed-out as well.

A get well card for E.F. Johnson was signed by over 50 AM'ers at the meeting.

A small group of Amer's attended a pizza get-together at a local restaurant Saturday evening as a follow-up to the Forum.

Planning for next year has already begun!

CLASSIFIEDS

Advertising Information

Subscribers receive 1 free - 30 word- ad per month. **Extra words are .10.** Here's how to count the words in your ad: the heading - For Sale, Wanted, etc count as **1 word**. Your name, call, address and telephone number count as **6 words**. Hyphenated words count as **2 words**. **Please count the words in your ad and if you're over 30 words send payment for the extra words.**

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VINTAGE EQUIPMENT ONLY

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DEADLINE FOR THE JULY ISSUE: JULY 7

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

WANTED: RCA AR-88/CR-88 receiver. Will drive 500 miles or call regarding shipment. Bill Armstrong, N6TKG, 26670 Latigo Shore, Malibu, CA 90265. (213) 457-2441

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: 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.

WANTED: Pre-1953 TM11-487, TM11-227; TO16-30ARC3-?, TO16-40SCR274N-?,TO16-45-?, TO16-1-8; FM20-100, FM31-35, FM100-20. Letter prefixes may vary. Ken Gillis, 27217 Garden Way, Franklin, MI 48025. (313) 851-3240

FOR SALE: Transmitting/receiving tubes, new and used. Exa: OA2, OC3, 2E26, 3B28, 4X150, 4-65A, 12A6, 803, 809, 811, 813, 815, 829, 832, 836, 872, 1619, 1625, 1626, 5894, 6130, 6146, 9003 plus others. SASE 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

FOR SALE: 1923 CW power equipment: Acme plate & filament transformer for four "five watt" tubes - $35; large, heavy duty CW (or spark) RF inductance - $20; RCA 1627 heavy cased filter choke, 300 ma - $35; Thordarson 1 kw spark transformer, circa 1915, page 49 Vintage Radio - $195. All plus shipping. Paul C. Crum, W9LC, 6272 N. Cicero Ave., Chicago, IL 60646. (312) 282-3033

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WANTED: Schematic or hook-up info for Elenco "Power Gainer" compression amplifier. Will pay. John Morehead, N9HRS, 535 Brown Circle, Elk Grove Village, IL 60007. (708) 351-8593

FOR SALE: HT-33A linear, excellent shape - $300; HQ-100 receiver, excellent - $125. Al, AI4U, (407) 298-3493

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

WANTED: Gonset 220 Mhz Comm. IV and Gonset G-28 and G-50 for parts. J.M. Roseman, 2716 W. 3rd St., Coal Valley, IL 61240.

WANTED: Two 100th's, good used or new. Al, W6NRO, 11190 El Capitan, Madera, CA 93637. (209) 431-3970

WANTED: Lysco transmitter model 600; B&W 5100B; 32V3; Valiant II; RMC ET 8010 or ET 8019; NC-140; NC-190; all RME; AR-88; LF coils for HRO-5, MFJ 40T; MFJ 40V; rockbound 80/40 QRP TX, 80/40 C RX; old ribbed plug in coil forms; Palomar PT 3000 tuner. Must be in very good condx, 150 miles radius of my QTH. Al, K8CFC, 1240 Galaxy Dr., Cleveland, OH 44109. (216) 741-8999

WANTED: E.F. Johnson Speed-X bug; Johnson 122 vfo/manual; Viking Navigator; Hammarlund Four Twenty transmitter; Hammarlund Comet Pro receiver. Brian Roberts, 3068 Evergreen, Pittsburgh, PA 15237. (412) 931-4646

FOR SALE: Lab test equipment; generators; scopes; meters; etc. Lots of equipment. LSASE for list. Stuart T. Carter, II, W4NHC, POB 033177, Indialantic, FL 32903-0177. (407) 727-3015

WANTED: KW-1; NC-303; HRO-60; infor and manual for HRO-M rack receiver (R140/PSM-1). Also histories, brochures, and info on Collins and other vintage companies. Tye, KB8FJ, 777 Brightridge, Bridgeport, WV 26330.

TRADE: Hammarlund SP-600 JX-26 receiver W/metal cabinet, value estimated $175-$225 for Swan HF equipment. Jack, KJ6KI, (714) 686-5407

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

FOR SALE: Heath SB-10 sideband adapter - $55 shipped; Collins 32V2 , good - $100; Hallicrafters HT-32, fair to good - $75; both transmitters plus shipping, with manuals. Greer Craig, AA5HN, 312 Northwind, El Paso, TX 79912. (915) 581-5680 after 2300Z

WANTED: New 4CX250B's, need a pair for my KWS-1. Buy or trade. Also would like to meet on the air other hams using a Collins KWS-1 to compare notes etc. Looking for a 75A speaker. Gary Elliott, K7OX, 6229 E. Joan De Arc, Scottsdale, AZ 85254. (602) 948-4772

WANTED: Early National receivers, communication receivers from 20's and 30's. Need schematic for Elmac PRM-8. Steve Barnes, K6PFW, 848 N. Silverwood, Upland, CA 91786.

WANTED: Calibrator & AM filter for Collins 75A3. Manual or skmt for Breting 12, copies ok; need Drake AC4 pwrsply transformer, must be good. Parting out B&W 5100B -51SBB. WA7IHN, POB 442, Aumsville, OR 97325. (503) 749-1149

FOR SALE: BC-348P receiver - $43; National 183 receiver, real nice, with manual - $125; NIB tubes: GE 2A3 - $8.50 ea; Tung-Sol 57 and 58 - $3 ea. Ward Becht, 625 Tufts Ave., Burbank, CA 91504. (818) 842-3444

WANTED: Copy of manual for Knight R-100A. **TRADE:** Regency ATC-1 for Regency TCR-2. Al Bernard, NI4Q, POB 690098, Orlando, FL 32869-0098. (407) 351-5536

CLASSIFIEDS

WANTED: Schematic for Tompkins 1564S Tunaverter, 150 Mcs to 164 Mcs. H. Brown, W6DJX, 4141 W. L-2, Lancaster, CA 93536.

WANTED: TU61 and C454, used in BC-610. Ozzie, WB6ICM, 6221 Roblar Rd., Petaluma, CA 94952. (707) 795-1642

FOR SALE: Hallicrafters SX-101A, just completely retubed, excellent receiver - $200; Hallicrafters S-40A, very nice - $75; Drake TR-4 transceiver, recently Drake aligned, good tubes, AC-4, MS-4 - $300; Hygain 10-40 vert. antenna, good - $45. U-ship. Will trade. Frank Vardeman, 4612 Eddy Dr., Tampa, FL 33603-2710. (813) 871-2134

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

FOR SALE: Very old J.E. Albright bug - make offer; original Theodore McElroy, deluxe Mac Bug - make offer; Stancor 10-P transmitter $60; Gonset G-77 mobile transmitter with tubes, no power supply or mod. - $40. All plus shipping. John Chenoweth, W8CAE, 9130 Yankee St., Miamisburg, OH 45342.

WANTED: Hammarlund HQ-120 receiver, prefer black but will accept grey. Jerry Boles, N5KYE, 14857 Redbud Lane, Piedmont, OK 73078. (405) 373-2228

FOR SALE: T.R. McElroy Deluxe Mackey, a semiautomatic key bought in 1940, used but in like-new condition, in original box - best offer takes it. Dick Houston, WØPK, 159 Sortais Road, Durango, CO 81301. (303) 247-9159

FOR SALE: Collins 516F-2 supply (will power Heath SB series transceivers) - $50; Mil-spec 7/8" hardline w/connectors, new, 50+ft. - $25. John, WB8IPG, 183 Tacoma Blvd., Troy, MI 48084-5424. (313) 362-2656

FOR SALE: R-42 speaker - $45; R-48 speaker - $25. **WANTED:** GPR-92 or 90 receiver. B.E. Harris, W7IYG, (208) 466-2803.

FOR SALE: Hallicrafters S-94 - $20; clean Navy TCS-6 receiver with connector and homebrew AC supply - $45. **WANTED:** Johnson 122 vfo. Geoff Fors, WB6NVH, 769 Pacific St., Monterey, CA 93940.

WANTED: Command receiver spinner knob, aluminum screw on type; FT-222 (MT-98), FT-235 (MT-4) mounts. U. Joe Orgnero, Box 32, Site 7 SS 1, Calgary, AB T2M 4N3 Canada.

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: Hallicrafters Sky Buddy - $48. **WANTED:** Pilot and German radios. Bill Moore, 1005 Fieldstone Ct., Huntsville, AL 35803. (205) 880-1207

FOR SALE: Eimac 304TL's, new in cartons - $15 ea. plus UPS. L.L. Gibbs, W8BHT, 701 Brookfield Road, Kettering, OH 45429. (513) 299-3965

WANTED: Johnson Viking Ranger transmitter. Must be in excellent condition. Lenox Carruth, WA5OVG, 10135 Ferndale Rd., Dallas, TX 75238.

WANTED: Melehan Valiant dual-pendulum bug. Jay, KI1W, 62 Chestnut St., Boston, MA 02108. (617) 227-5228

WANTED: Collins Radio book entitled "The First 50 Years, History of Collins Radio". **FOR SALE:** DX Engineering speech processor for Collins 32S-3 - $95 postpaid. Bill Mills, KC5PF, 1740 Tonys Court, Amissville, VA 22002. (703) 818-3955 office, 937-4090 home

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FOR SALE: vintage ham rig manuals (some originals), radio books, SASE. **WANTED:** 1948 & pre 1941 ARRL handbooks, 1940's Radio News magazines, BC-375 (-191), BC-652, BC-669, BC-746, Wireless set #19, T-37 chest unit, BD-71,-72 switchboard, MS-54,-55,-56 antennas, Navy radios: TBY, GP-7, RU-18, (-19). Sheldon Wheaton, KCØCW, 14708 Murray Ln., Olathe, KS 66062. (913) 764-5436

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

FOR SALE: VRC-34 Radio Set includes, RT-77/GRC-9, DY-105 (24V), ME-61 meter, LS-103 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

FOR SALE: Collins SM-2 - $55; Johnson Pacemaker, excellent - $135; Olson 6M AM transceiver - $35; WRL 100 watt mobile amp - $60; Globe AT-3 tuner - $15; Heathkit HW22A HP23 - $90. Bill, KE7KK, (701) 772-6531

FOR SALE: 1920's radios, tube testers, wavemeters, transmitter/receiver parts, catalogs, flyers, books, TV, tubes, testing equipment. 48 page list - $1. Covers 1923 to 1970. Francis Yonker, 7 Old Farms Road, Saddle River, NJ 07458. (201) 825-1895

WANTED: R4C w/sw crystals, SP-600JX, HQ-180AX/HQ-180XE. Levy, 8 Waterloo, Morris Plains, NJ 07950. (201) 285-0233

FOR SALE: Electron tubes, all types - microwave, transmitting, receiving, obsolete, military -- Large inventory. Daily Electronics Corp. POB 5029, Compton, CA 90224. (213) 774-1255; (800) 346-6667

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WANTED: Globe equipment: 500 B or C, Champion 300A or Champ 300 etc. Collins: 75A-1, 75A-2, KWM-1 and 32V-2. Steve Abbott, WBØHUR, R1, Box 140, W. Branch, IA 52358. (319) 643-2617 eves.

FOR SALE: Johnson Viking II with matching vfo, as described in last issue of ER - only $100; white beehive standoff insulators - $1 ea; Elmac AF-67 transmitter - $50; assorted 19" rack enclosure cabinets from $25 to $40 ea; 5R4 rectifiers - $3 ea. Inquire on others. Levy, W5QJT, 7600 Blanco Road, San Antonio, TX 78216. (512) 341-9549

WANTED: Colored plastic radios from the 30's and 40's. Need not work. Will traded my Hallicrafters Transoceanic or pay cash. Kevin Eftink, 16 Edgewood Dr., Quincy, IL 62301. (217) 228-2221

WANTED: Knight Kit Ocean Hopper receiver, older model with octal tubes and Heathkit model AR-2 receiver. Charles Connor, KØNG, 1801 S. 48th St., Lincoln, NE 68506.

WANTED: T150, S-85 manuals and main tuning knob for Atlas 210. Bill, N8FOX, (616) 842-5274 collect.

FOR SALE: KWM2 and 516F2 PS - $500; 75A-4 with 3.1 filter - $275; National HFS w/ps - $100; Drake R4B - $165. All mint with manuals. E.G. Johansmeier, KØOCC, 8240 Grogan Ferry Rd., Atlanta, GA 30350.

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

WANTED: Desperately need the following dynamotors: DM-28ur; armature for BC-348; DM-17 or 21, 12v for BC-312, DY-108/DY-150 for R-836/ARN-59. Also want Collins R-392. Brian L'Huillier, POB 37, Brownville, NY 13615. (315) 788-2866 or 782-9475

WANTED: HRO-50T coils sets; E, F, G, and H. Also a Vibroplex Lightning bug. Jeff Garrett, KEØMT, 2822 W. 55th Ave., Denver, CO 80221. (303) 455-5658

FOR SALE: Misc. QSTs 1930 - 1950 - $1 - $2 ea; Navy TBY-4 transceiver - $65. **WANTED:** Pilot and German radios. Bill Moore, 1005 Fieldstone Ct., Huntsville, AL 35803.

FOR SALE: Tuning units for BC-610: TU-47 (2.0 - 2.5 Mhz) and TU-54 (12 - 18 Mhz) - $10 ea; used 211 tube (VT-4C) - $5; Dentron MT-3000 ant. tuner/p meter - $150. **TRADE:** My extra '48 and '51 ARRL handbooks, in nice shape, for your extra '40, '45, '50, '52, '53, '57 - '60 handbook (s) in same shape. **WANTED:** Socket for 304TL triode; 10 volt, 20 to 30 amp filament xfmr and 6 - 10 amp RF ammeter. Bill Kleronomos, KDØHG,POB 1456, Lyons, CO 80540. (303) 823-6438

WANTED: National NC-100X; Collins 51S-1; any pre-WW-II aviation related equipment. James Treherne, 11909 Chapel Rd., Clifton, VA 22024. (703) 830-6272

TRADE: My National PSK 19-33 Mhz RF coil for 80 meter PSK RF coil. **WANTED:** Johnson Navigator; 80 meter SW3 coil set 14A. Niel Wiegand, WA5VLZ, 911 North Bend Dr., Austin, TX 78758. (512) 837-2492

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FOR SALE: Hammarlund HQ-215 w/cw filter and speaker, near mint - $325; Heathkit SB-10 SSB adapter - $50; Hammarlund HX-1 amplifier - $220. **WANTED:** 811A and 572B tubes. Charlie, KD4AJ, (404) 396-0276

FOR SALE: Collins 32V-1, needs filter caps - $75; Johnson Viking I, no case - $50; 75A-4 with speaker, all mechanical filters - $325. Peter Orobko, VE7FY, 12347 Davison St., Maple Ridge, BC V2X 5N5 Canada. (604) 463-4904

FOR SALE: Parting out Collins R-388,Ranger, Viking II and Valiant; 3 qts close matching paint for NC-183D and HRO-60 - $10 per qt. **WANTED:** Knobs for HRO-60. Joe Sloss, K7MKS, 4732 119th St. SE, Belleview, WA 98006. (206) 747-5349

FOR SALE: Hickok precision AC voltmeter, 0-150-300 in wood case, 1940 vintage, mint - $100; Bliley HF2 crystal 14305, new in box - $50; BC-610 crystals 3.5 Mhz - $25. W7LJI, 291 Coachman Dr., Eugene, OR 97405. (503) 686-8879

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.

FOR SALE: Transmitting/Receiving tubes, new and used. Exa: OA2, OC3, 2E26, 3B28, 4X150, 4-65A, 4-125A, 6L6, 12A6, 803, 809, 811, 813, 815, 829, 832, 836, 872, 1619, 1625, 5894, 6130, 6146, 9003 plus others. SASE 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: Manual or schematic diagram for Eldico TR-75TV. Jim Musgrove, K5BZH, 4217 Buckeye, Fort Worth, TX 76137.

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: 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 Dr., Austin, TX 78745.

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

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

WANTED: General Radio Company instruments in wooden cases. Especially want laboratory type equipment. Also need GR experimenter magazines, manuals, and catalogs. Frank R. White, KBØTG, POB 2012, Olathe, KS 66061.

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FOR SALE: Johnson 500 - $600; Valiant I - $200; Pacemaker - $125; Heath Maurader - $100; Hallicrafters HT-37 - $125; Invader 2000 - $600; Atlas 210X - $350; Atlas 215X - $350; Kenwood 520S w/vfo/spkr -$525. Howard Mills, W3HM, Rt 3, Box 712, Harper Ferry, WV 25425. After 1900 EDST call (304) 876-6483

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WANTED: 1916 and 1917 QST's. Bob Arrowsmith, POB 166, Annandale, VA 22003. (703) 560-7161

WANTED: T-16/ARC-5 and T-17/ARC-5 for collection. Dan Greeson, KH6P, 98-1145 Kahapili St., Aiea, HI 96701.

Fall Classic and Homebrew Radio Exchange, sponsored by the Classic Radio Newsletter, from 2000Z Sept. 30 to 0400Z Oct. 1. Our object is to restore , operate and enjoy home-brew equip. and equip. at least 10 yrs old, but it not required for entry. Exchange name, RS(T), QTH, rcvr and xmtr type (home-brew send final amp tube or transistor). The same station may be worked multiple times with different equipment combinations on each band / mode. Scoring information and suggested frequencies in a later issue of ER. Sporadic awards. Mail logs, comments, plus SASE for Newsletter to Jim Hanlon, W8KGI, POB 581, Sandia Park, NM 87047

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