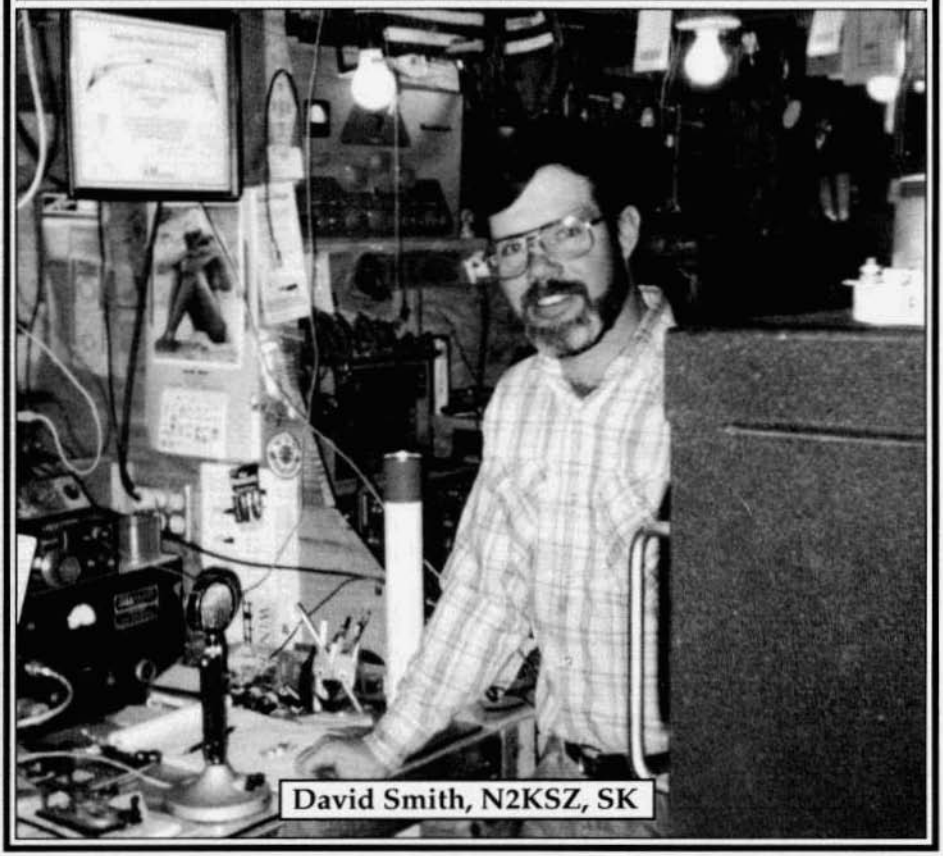
$2.50

ELECTRIC RADIO

celebrating a bygone era

Number 95 March 1997



David Smith, N2KSZ, SK

ELECTRIC RADIO

published monthly by Barry R. Wiseman and Shirley A. Wiseman
14643 County Road G, Cortez, CO 81321-9575
Second Class postage paid at Cortez, CO and additional offices

Authorization no. 004611
ISSN 1048-3020

Postmaster send address changes to: Electric Radio
14643 County Road G
Cortez, CO 81321-9575

Editor - Barry R. Wiseman, N6CSW
Office Manager - Shirley A. Wiseman

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; Steve Thomason, WB4IJN; Don Meadows, N6DM; Bob Sitterley, K7POF (photos) and others.

EDITOR'S COMMENTS

David Smith, N2KSZ, became a Silent Key recently. The article that appears on page 4 is a collaborative tribute to him by his many AM'er friends, led by Paul Courson, WA3VJB; Paul Maikranz, KB2MUQ and Dale Gagnon, KW1I. I found it particularly touching that he was such a young man - 37 - and that he had accumulated so many friends that respected him so much. I didn't know Dave - although I may have spoken to him on the telephone - but I did know of his enthusiasm for AM and vintage radio technology. It also tickled me that he took our annual 160M AM contest very, very seriously - he won it two years in a row. It was suggested to me by another of his good friends (and another 160M AM contester) Dennis DuVall, WA3YXN that I attach Dave's call to our annual contest. I think that's a good idea. Henceforth our annual 160M contest will be "The Annual Electric Radio/N2KSZ Memorial 160-Meter AM Contest". Once a year at least we'll be able to think again of Dave and remember what a truly outstanding individual we had in our midst. As an AM'er I'm very proud of Dave and I'm proud of his friends who thought so much of him.

Other things. In the March issue of CQ Magazine, George Jacobs, W3ASK, in his column "Propagation" makes some interesting predictions. I would recommend the article to everyone interested in good news. He says that we're in store for a great Cycle 23 ("Cycle 23 --Great Years Ahead") and indicates that as early as this month we should be enjoying some good conditions. On March 5, 10-11, 17-18 and 25 we should experience conditions above normal. On March 9, 13, 16, 19, 23-24 and 26 the conditions should be high normal. I suggest that we all note these dates and make a special point to get on ten in the AM window (29.0-29.2) to see if we can't make some contacts. George Jacobs, W3ASK's column - which I have always enjoyed - is in its 47th year. He

continued on page 37

TABLE OF CONTENTS

Cover: David Smith, N2KSZ, now a Silent Key. See page 4 for a tribute to him from his friends.

Looking Back

by Lew McCoy, W1ICP
1500 Idaho St.
Silver City, NM 88061
mccoy@zianet.com

Looking back, through the fog of all the years, I can recall no end of interesting yarns. I hope they're interesting to ER readers.

I am sure that just about all of you remember who A.L. Budlong, W1BUD, was. For those of you who don't; Budlong was the Secretary and General Manager of ARRL. He succeeded the famous K.B. Warner, W1EH, who was the first secretary of ARRL.

When I came to ARRL in 1949, I was by hired by F.E. Handy, W1BDI, the Communications Manager of the League, to fill the position of Asst. Communications Manager for Phone. (This is another story in itself.)

In any event, Budlong and what we called the front office had very little use for the Communications Department and the people in it. In fact, Budlong really wasn't that friendly with many of the League employees. I would say good morning to him when I came in or saw him but he never even bothered to acknowledge me.

But then a strange thing happened. I was in the habit of going to lunch with Byron Goodman, W1DX, who worked in the Technical Department and Joe Moskey who was Deputy Communications Manager. We would go to lunch around the corner from ARRL to a place called Les Shaw's, a restaurant bar, a kind of ordinary bar typical of every bar in the country then. You could get a beer and a satisfactory lunch for a buck or two. Some of you who visited League Headquarters back then will probably remember Les Shaw's. That's where we sometimes entertained visitors.

In any event, the three of us would have a hamburger and a beer and that was our lunch. Budlong would usually come in and sit away from us in a corner of the bar-and would never - and I mean NEVER - engage us in conversation. At first I couldn't understand this behavior because he was a good friend of By Goodman. Later, as I came to know 'Bud' I just grew to accept his 'different' behavior.

This day in question Byron, Joe and I got into a discussion about cooking and I mentioned that my wife's father was the famous chef-Billy Dennisen, 'Pappy' as we called him. He was a very notable man, he had been chef of the Waldorf in New York and other famous places.

The discussion we got into was about bread and I told the guys of a bread my father-in-law had told me how to make and that it was outstanding.

After lunch when I got back to the office I was no sooner at my desk when the phone rang; it was Budlong. He said, "McCoy, I would like to see you in my office immediately!" Needless to say I was scared, "what the hell had I done now."

I went up to Bud's office and he said come in and close the door. He then asked me if I drank - meaning strong stuff. I admitted that I did on occasion. He reached into a desk drawer, took out a bottle of gin and two paper cups, and poured us both a drink. This did not change my feeling of apprehension totally but I did feel a little easier.

Bud then he told me that he had heard us talking back in the restaurant and that he had heard of my father-in-law and had read his book on cooking. He asked me if I could give him the recipe for the bread I had been talking about. Of course, I said. I was only too glad to give it to him, anything to get on his good side. We spent the next two hours together - getting pleasantly high - discussing many things. After that I found that Bud actually counted on me for

many tasks and we became close friends.

Over the years I have heard some hams criticize Bud's work and particularly his desire for liquor. Well, let me tell you something else about Bud. All of us hams owe him a tremendous debt of gratitude. Here's the story.

Bud went over to Switzerland to one of the international radio conferences and he swung a deal at that conference - and it was him alone - whereby we swapped 50 kiloHertz of our 20 meter band and in exchange, got the entire 15 meter band - 450 kiloHertz. Now that was what I would call a darn smart deal, and to me, it made what the League was all about worthwhile. If only we had some of that thinking now!

I remember so clearly today those events when Bud past away. Nan, Bud's wife, had a party (wake?) and only the people who were close to Bud were invited. All of us who went to that affair shed a few tears as we drank toasts to his memory. That was a very cold bitter day on the shores of Long Island Sound. Bud's final wish was to be buried at sea - he was a Coast Guard officer - so the Coast Guard buried him at sea in the Atlantic. He got his wish. Amateur radio lost a real champion.

So every time any of you get on 15 meters, think of the guy that got it for you-and say a little prayer for him--I do. W1ICP

I DON'T THINK YOUR "MOBILE DIPOLE" CONCEPT IS GOING TO WORK, WILLARD

AM International March Update

by Dale Gagnon, KW1I, President
Box 1500, Merrimack, NH 03054
dgagnon@concentric.net

Membership is closing in on the 1000 mark. Certificate #985 was assigned at the end of February.

Mark your calendars for April 17. The regular Thursday night Collins Collector Association Net on 3875 kHz at 2100-2300 EST (April 18, 0200-0400 UTC) will be devoted to AM. Special event station WØCXX, the Collins Amateur Radio Club in Cedar Rapids, IA will be on frequency exchanging AMI certificate numbers. The club's call sign which used to belong to Art Collins will be assigned AMI Certificate #1000. QSL's confirming contacts with WØCXX will be available. It is not necessary to be running Collins gear to call in, but if you do have Collins equipment, this is a great time to fire it up.

Planning for the AM activities at the Dayton Hamvention is underway. The forum committee has thrown us a curve ball. They scheduled the AM Forum for late Saturday afternoon in a nearby high school auditorium. It is unlikely any self respecting classic radio buff or AMer would want to leave the vicinity of the massive Hamvention flea market especially at the end of the biggest flea market day. We are making appeals to the Hamvention committee. Even if there is no official forum, we are already considering expanding the traditional Saturday evening activities to make sure we have enough time to have our annual eyeball QSOs with each other. More on this in next months ER.

To join AMI send $2 to:
AMI
Box 1500
Merrimack, NH 03054

Tribute to Dave Smith, N2KSZ, 1960-1997

A farm accident recently took the life of Dave Smith, N2KSZ, described as "an all around great guy" and avid AM-er at DeKalb Jct. New York, near the Canadian border.

Dave was killed in mid-February, possibly before word reached him that he had won the 8th Annual Electric Radio 160m contest for the second year in a row. This was a very important event for him. And the family says that there's an ER tee shirt under the suit he wore to the grave.

He was a dairy farmer, and often hand-crafted ranch equipment as well as radios to make them work as needed. And as farmers help neighbors, so did Dave help other AMers.

Jack Shults, W2EED, recalls how Dave overheard him talking about looking for parts to put a BC-610 on 160m. "Then a package arrived in the mail with a mic connector and a homemade tank coil." In the box was a note: "hope these will help -Dave."

N2KSZ was licensed for about a dozen years, but it's clear he held true to the time-honored traditions of homebrew. Ed "EJ" Prior, N2CWJ, remembers a noteworthy bench job to repair rather than replace a DX-100 plate transformer.

"He took and locked it in the vise, put a torch on the case to heat the potting tar, and found a winding that had shorted to the case." EJ was impressed that Dave then took some of the tar as a spacer, reassembled the transformer, and "it was still working fine the last time he had it on the air about two months ago."

Dave died about a month short of his 15th wedding anniversary. His wife Brenda notes her husband was a born-again Christian, and that this should reassure everyone about his future. The couple had three girls, Sarah, Samantha and Sadie, ages 12, 9 and 2.

Bill Mottes, W1CKI, is among those who spent hours on the air with Dave. "I remember how happy he was when the last daughter was born... he would have her on his lap and I could hear her gooing away at the radio equipment.....I must say that 160M and AM will never be the same again for me....I can't write any more."

N2KSZ's second consecutive win of December's 160m contest leaves a legacy for the AM Community. Dennis Duvall, WA3YXN, says Dave "was particularly keen on winning. He and I went along neck-and-neck, not really competing but enjoying the challenge together."

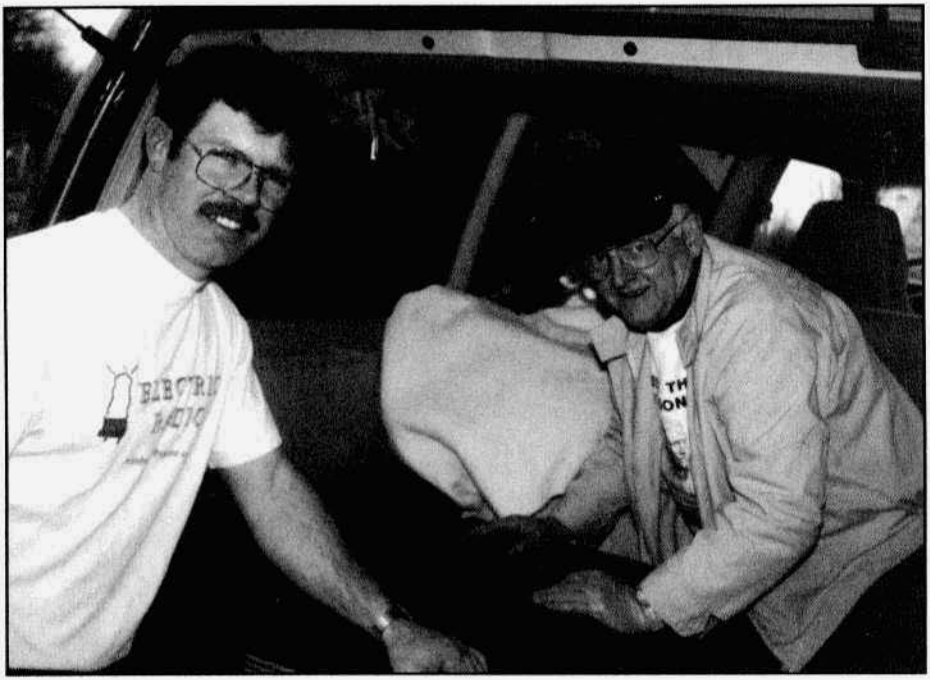
Dennis recalls that "In the wee hours of the last day I went to bed but Dave hung in to the end and came out 5 points ahead. This was even though he was fighting a bad case of the flu throughout." He added, "I know I'll always think of it as "Dave's contest" from now on - maybe we should make it official."

From Russ Ochsner, KF2TX: "I think Dave would be happy if we would just tell people what he really was, a real friend, the kind you only meet once in a lifetime."

Russ remembers coming back from a "radio raid" in Dave's truck that had "these awful wobbly tie rod ends" which made the truck weave. New York state troopers pulled the pair over, thinking Dave, the calm and composed Christian, was drunk. Satisfied that he was sober, "they let us go," Russ recalls, in what Dave called "the Rambling Wreck."

In many ways, Dave's goodwill lives on. For example, when you work Dave Maikranz, KB2GIO, on his new 813 rig, you'll hear part of KSZ.

I gave him the phonetics "King Size Zipper," Dave points out, because "he truly was a king size man in my book." It was another case where KSZ had over-



Dave on the left with Bob Richmond, W8MNQ at a hamfest last fall. ***Photo by Herb Ulrich, K2JVM***

heard a QSO of a ham in need, this time, as GIO ruminated about a modulator deck.

"He gave me a complete mod deck, with tubes, plus a spare, no charge," Dave exclaimed. "It's now seeing service in my 813 rig and works flawlessly."

N2KSZ was active on 160, 75 and 40 meters, mostly using a BC-610E and an SP-600. "He loved the old military gear," said Dale Gagnon, KW1I, president of AM International, "he was a regular on the military radio net, and was a great supporter of AM and AMI. Dave got his radio start in Rhode Island when he was 17. He got a job with Merriam Instrument, Inc., a marine electronics firm on the recommendation of his high school science teacher. Bob Merriam, W1NTE taught him electronics and gave him his first radio equipment. Dave left marine electronics and moved to Dekalb Jct. to operate a dairy farm. There he was first licensed as N2KSZ. Dave often returned to Rhode Island to see family and to volunteer at the New England Wireless and Steam Museum that Bob Merriam founded. It was a perfect match for Dave. He loved tractors and machinery, as well as radio. He will be remembered fondly by the steam community as well as the radio community."

Paul Maikranz, KB2MUQ, says the family has received an overwhelming response from people as word spreads on the airwaves that Dave has passed away. Examples include the anonymous benefactor who has picked up the entire cost of the funeral, and the donations that are being gratefully received by the family. MUQ says many are in the form of sympathy notes, signed with call letters and checks. [Mrs. Brenda Smith & Family, Rural Rt. 1, Box 18 DeKalb Junction, NY 13630]

Paul is in one of the best positions to help us know Dave's life. He says KSZ

continued on page 37

TheBC-312/342 Receivers

by Dennis L. DuVall, WA3YXN
8011 Frontier Dr.
Severn, MD 21144
wa3yxn@aol.com

Many fine radios became available during the "Golden Age" of military surplus following WW-2. Two military receivers which appeared on the market during this period stand out as being particularly suitable for serious Ham use. The first of these was the BC-348 which has been covered before by Walt Hutchens, KJ4KV, in his excellent article (see Note 1). The BC-348 was designed for airborne use and served in every large Army aircraft of the period. The other receiver was the Army's BC-312 and its twin the BC-342 which were equally ubiquitous in Army WW-2 ground based communication and surveillance systems. This article will focus on the BC-312/342 receivers.

Overview

The BC-312 is a ruggedly built, nine tube superheterodyne receiver intended for general field use. The BC-312 was designed for an external supply voltage of 12-14 VDC and included an internal dynamotor power supply. Two later versions of the BC-312 were also designed for 28 VDC operation. The BC-342 receiver came with an internal 120 VAC power supply but is otherwise identical to the BC-312. The BC-312 measures 10" x 18" x 9" (H x W x D) and weighs 58 lbs. The BC-342 has a slightly heavier power supply and weighs in at 61.5 lbs. The frequency coverage of these receivers is 1500 kHz to 18 MHz in six bands.

There were also low frequency members of this family, the BC-314 and BC-344. These covered 150 to 1500 kHz but will not be discussed here.

Design

The circuitry of the BC-312 is conventional for the mid 1930's when it was designed. The tube lineup is as follows:

1st RF	6K7
2nd RF	6K7
1st Det.	6L7
HF Osc.	6C5
1st IF	6K7
2nd IF	6K7
2nd Det./AVC/1st Audio	6R7
CW Osc.	6C5
2nd Audio	6F6 (12A6 in two late BC-312 models)
HV Rect.	5W4 (BC-342 only)

The two RF amplifier stages are conventional except for three early models which included a dual antenna input circuit designed to cancel out vehicular ignition noise. This was apparently less than completely successful and later maintenance instructions were to remove it if any servicing was required. A protective neon bulb is connected between the antenna input terminal and ground. The gain of the RF section is rather low (high cathode bias and low screen voltage) and two stages were probably included to improve image response on the high frequency end of the receiver range and reduce external radiation from the HF oscillator. The "first detector" uses a 6L7 pentagrid converter circuit with a separate HF oscillator which operates on the high side of the input frequency on all bands. Two tuning controls are brought out to the front panel, VERNIER, which provides a tuning rate of 53 kHz per turn

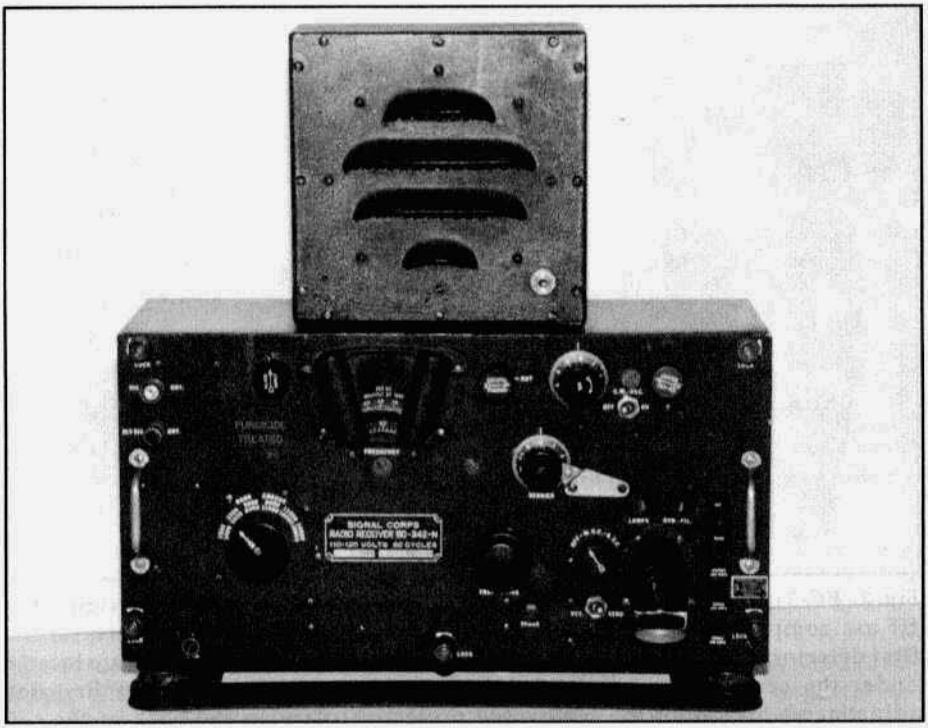


Fig. 1. BC-342N with companion LS-3 speaker and FT-162 mount. Controls across the top (L to R) are ALIGN INPUT, CRYSTAL PHASING, VOL, CW-OSC. OFF/ ON, and CW-OSC. ADJUST. The VERNIER tuning control is the skirted knob located below VOL, and FAST TUNE is the large knob below this. The OFF-MVC-AVC switch is the small knob to the right of FAST TUNE. The protuberance on the lower RH corner of the panel houses the input/output connector S01. Jacks described in the text are mounted down the RH side. BAND CHANGE is the large knob on the left. The ANTENNA connectors can be seen in the upper LH corner.

on 80 meters and FAST TUNE with a 4:1 step-up ratio. A locking mechanism is included on the VERNIER control. The VERNIER and (on later models) FAST TUNE controls include integral slip clutches to negate any attempts at forced tuning when the lock is engaged.

The IF frequency is 470 kHz. The crystal filter uses the basic 1930's single crystal circuit and a combined phasing and "in-out" control is brought out through the front panel. The RF and audio gain pots are ganged together and controlled by a single knob labeled "VOL." AVC (automatic volume control) can be switched in or out with the front panel "OFF - M.V.C. - A.V.C." switch.

A transformer is included in the plate circuit of the 6R7 second detector/first audio amplifier tube. The secondary of this transformer is brought out to an external connector on the front of the receiver and in early models is also connected to a jack on the front panel labeled PHONES 1ST AUDIO. In all models, however, the plate of the 6R7 is capacitively (not transformer) coupled to the grid of the 6F6 second audio amp. The output transformer in the plate circuit of the 6F6, in turn, has a high im-

continued next page

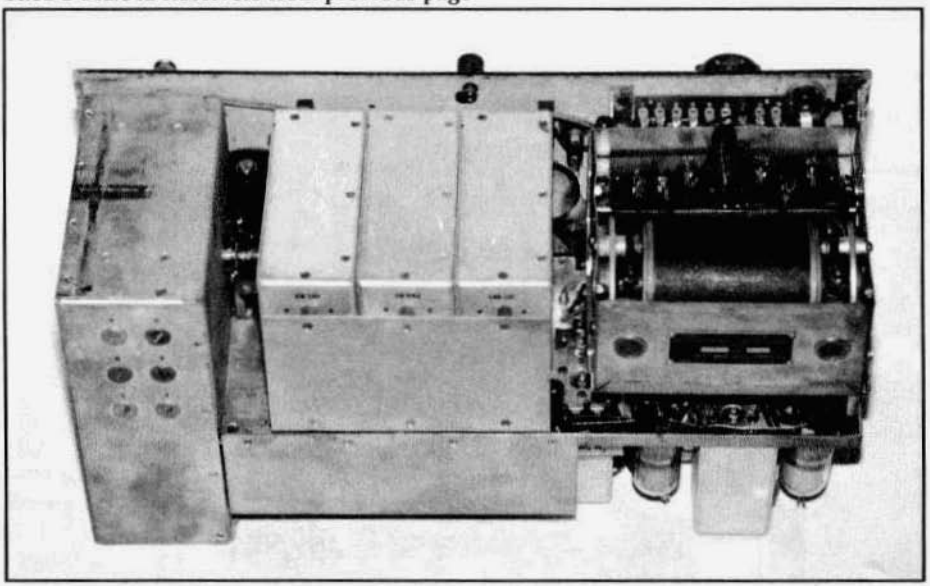


Fig. 2. BC-312 - Rear, bottom view. DM-21 with cover removed on the right. The HF osc. compartment is on the LH end of the chassis and the RF (two stages) and first detector coil boxes can be seen in the central area. Osc. trimmers are located under the screw plugs on the back of the compartment. RF and first det. adjustments are under the removable protective plate on the back of the coil boxes.

pedance secondary which is brought out to the SPEAKER 2ND AUDIO (See note 5) and PHONES 2ND AUDIO jacks on the front panel. In later receivers, there are two PHONES 2ND AUDIO outputs, the extra one occupying the position of the PHONES 1ST AUDIO jack found on earlier models. The output impedance of earlier receivers is 4000 ohms. Later models offer a choice of 4000 or 250 ohm taps on the output transformer.

Other front panel controls and switches include: CW-OSC ON/OFF, CW-OSC ADJUST, ALIGN INPUT, REC. SEND and BAND CHANGE. Microphone (MICRO) and KEY jacks are also included and these are wired out through a large connector assembly (S01) which protrudes from the lower RH corner of the front panel (see Fig. 1). This was used to interconnect with other equipment, notably the BC-191 transmitter in the SCR-177B, SCR-188 and SCR-193 systems, and the BC-610 in the SCR-299, 399 and 499. The BC-312 also receives its primary power (12-14VDC) through this connector.

Receiver muting is achieved by an internal 12 VDC relay which shorts the antenna input to ground and which also grounds the grid of the first audio stage in later models. This relay is activated by the keying circuit of the companion transmitter being used and/or through the MICRO and KEY jacks on the front panel. The SEND-REC. switch (see above) must be set to SEND for the relay to operate, and the muting circuit is inoperable when the receiver is used alone.

The BC-312 uses an internal dynamotor B+ supply (the DM-21, see Fig. 2) as mentioned before. A fuse for the primary DC input is located on the front panel of the receiver (DYN.-FIL.) and a

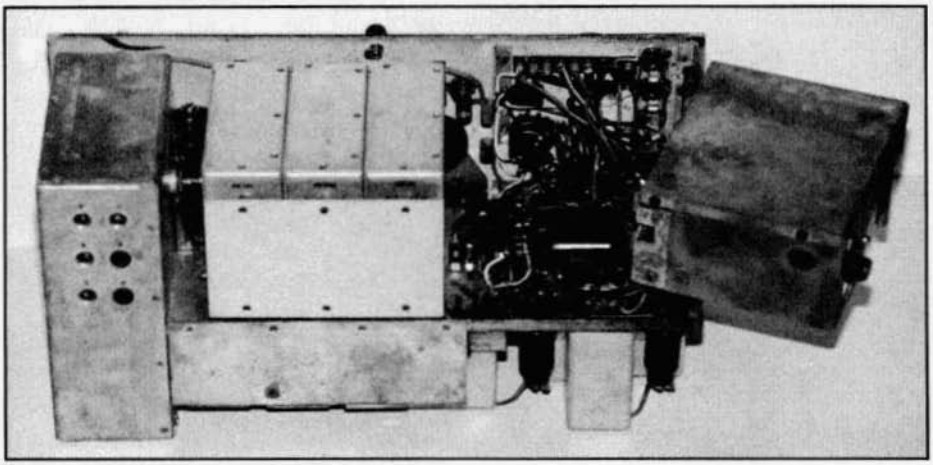


Fig. 3. BC-342 - Rear view. The RA-20 AC supply has been rotated to one side for access to under-chassis components and wiring.

second fuse (LAMPS) is provided for the two pilot lights that illuminate the main tuning dial window (see Note 5). A third holder stores a spare fuse. The BC-342 uses the RA-20 110/120VAC supply which fits into the same space and uses the same mounting brackets (see Fig. 3). The primary power for this supply is brought in through an opening in the rear of the cabinet, not through the front panel connector as with the BC-312. A power switch and 120 VAC fuse are located on the back of this supply adjacent to the input power connector, and the DYN.-FIL. fuse on the front panel protects the vacuum tube heater circuits only in the BC-342.

Mechanical construction is heavy and rugged. The front panel is 0.2 inch thick aluminum and the chassis is a heavy stamping. Sturdy brass castings are used in the main tuning and band switching mechanisms. All HF oscillator components including the tube and tuning capacitor are housed in a separate compartment mounted on the LH end of the main chassis (see Fig. 2). The coil compartments for the two RF stages and the first detector are mounted in separate aluminum housings on the underside of the main chassis. The RF and first detector tubes are mounted top-side on a separate sub-assembly adjacent to the main tuning capacitor. The IF and audio stages are mounted on the main chassis proper, and the CW-OSC (BFO) has its own compartment located on the top side of the main chassis (see Fig. 4). All cabinets were apparently manufactured with a cutout on the back to accommodate the RA-20 AC supply in the BC-342. A cover plate was provided to close this off when installed on BC-312s.

History

The BC-312/342 was designed at the Signal Corps labs at Fort Monmouth, NJ in the mid 1930's (Note 2). I would guess that the BC-312 was probably produced first and the earliest system use of the receiver I can identify is in the SCR-177B where it was paired with the BC-191 transmitter. Early sets were produced by RCA and General Electric. I have also seen Farnsworth labels on many units and other manufacturers were certainly involved during the war years.

The BC-312 was produced in 13 different models: the original BC-312 (no suffix), followed by the BC-312A, C, D, E, F, G, J, L, M, N, HX and NX. The BC-

continued next page

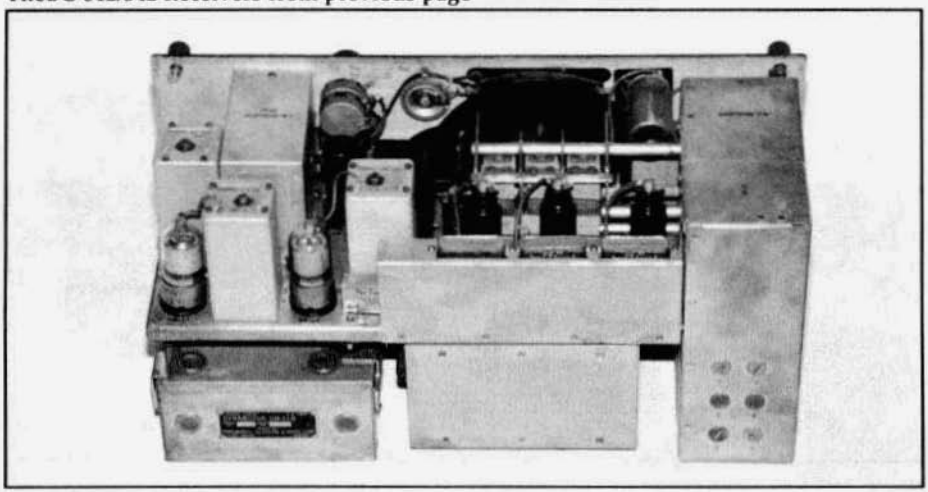


Fig. 4. BC-312N - Rear, top view. Note pilot light rheostat in the position occupied by crystal phasing control in earlier models. The BFO (CW-OSC)is housed in the box on the left side of the chassis.

342 came in nine flavors: (no suffix), A, C, D, F, J, L, M and N. Differences were relatively minor but worth noting. The original BC-312 and BC-342 "no suffix" models and the BC-342A included oscillator compartment heaters. This was dropped on all later models. The shelf holding the RF amplifier and 1st detector tubes was mounted parallel to the main chassis on early models and then tilted toward the main tuning capacitor on all "C" and later versions. All C and later models also had an additional antenna input terminal, a slip clutch on the FAST TUNE knob and a backlash adjustment mechanism which was accessible from the front panel. The antenna noise suppression circuit was eliminated on all "D" and later units. "L" and later models had a steel chassis and oscillator compartment, and "L" and later versions of the BC-312 were manufactured without crystal filters. These had a pilot light rheostat mounted in place of the crystal phasing control (see Fig. 4). Finally, the BC-312 HX and NX models were designed for 24-28 VDC operation.

The HX had a crystal filter but the NX did not. These 28 V. receivers also used a 12A6 in place of the original 6F6 second audio amplifier, the only tube change that occurred in the series.

The information in the preceding paragraph was gleaned from TM 11-310 and TM 11-850 (see Notes 3, 4 and 5). Other early/late model changes also took place. Aluminum cabinets were replaced by steel, probably along with the shift to steel internal components. Ceramic tube sockets were replaced by phenolic units. Engraved front panel labels were replaced by raised lettering. Stop pegs were added on the front panel to "GI proof" the band change mechanism and the thin vertical cursor wire used in the frequency readout window was replaced later by a line on a plastic insert (see Fig. 6).

The BC-312 was used in the SCR-177B, SCR-188A, SCR-193, SCR-210, SCR-197, SCR-245 and SCR-299/399/499 communications systems and probably others. The SCR 197 and SCR-299/399/499 systems included BC-342s as well. Some numbers of these receivers were provided to our WW-2 allies and a BC-312 with Russian markings turned

Fig. 5. BC-348 (top) and BC-342 - Which one do you like the best?

up at a local hamfest several years ago. I have no production figures but at least 50,000 total would seem to be a reasonable estimate. Production probably stopped shortly after the end of WW-2 but the sets continued in use for some time thereafter. Ted Young, W3PWW, has a successor to the RA-20 supply with a 1958 manufacturing date!

Maintenance, Modifications and Measurements

I currently have two operating BC-342 receivers, a 1939 "A" model (RCA) and a BC-342N with a 1944 contract date (manufacturer not identified). I also have a yet-to-be-activated BC-312K (Farnsworth). My first experience was with the BC-342A which only required replacement of the power supply filter caps to come to life initially. Things worked fine for about an hour before the first DBPC (darn black plastic capacitor) shorted out taking a decoupling resistor with it. Another one went out a couple of hours later and then another. After the third failure, I shut down and went into a wholesale capacitor replacement exercise.

This is not an easy job in these receivers. The troublesome components are to be found inside every IF can, the CW-OSC. compartment, each of the RF and 1st detector coil boxes, and buried down under the dual RF/audio gain control pot. The RF and 1st detector coil boxes must be removed which, in turn, necessitates removal of the band switch shaft, the RF and 1st detector tube subchassis, and unsoldering numerous connections. I also found it necessary to remove the crystal filter and first IF coil assembly to get at the two DBPCs buried inside. All this is not quite as bad as it sounds but still a three to four hour job. These receivers also include a number of metal cased "bathtub" caps. I have experienced only a single failure with these and this occurred in my oldest unit.

continued next page

My receivers both initially exhibited a certain amount of backlash in the VERNIER tuning control. Careful lubrication of the gear train helped and tightening the spring tension on the worm gear virtually eliminated the problem. This is done by loosening the retaining collar on the worm gear shaft, pressing it tightly against the spring washer and retightening in the new position. Adjustment of the ball thrust bearing on the tuning capacitor shaft (located in the oscillator compartment) may also help in stubborn cases.

Numerous modifications have been proposed for these receivers starting soon after their appearance on the surplus market. Many of these had to do with increasing RF gain and improving SNR on 20 meters and above and some included extensive component changes and tube substitutions. These make little sense in today's operating environment. Another common modification was to remove the front panel connector assembly and use the opening for a separate RF gain control. This, of course, would cause complications if one desired to use the BC-312 with its original dynamotor or the original muting circuit in either receiver. I have not found the lack of separate RF and audio gain controls to be any particular disadvantage in operating these sets (and the "snout" which houses S01 does have a certain vintage charm).

There are, however, a few simple, easily reversible modifications that I have found to be worthwhile. There is a significant drop in signal strength in these receivers when the crystal filter is engaged. This can be largely eliminated by the following modification: (1) Carefully scrape clean the stud which serves as a stop for the rotation of the phasing capacitor in the minimum capacity direction. (2) Solder a small wire between this stud and the switch contact mounted on the other side of the phasing cap. (This is the contact the blade normally engages for "Crystal Out"). (3) Turn the phasing control shaft until the switch blade rests firmly against the stud. (4) Replace the shield can on the IF transformer and adjust the top slug for maximum signal strength. The "Crystal Out" position is now 180 degrees from its former position, and the reduction in gain when the filter is switched in will be small. The crystal filters in these receivers are also very narrow. Increasing the grid resistor (R18) on the first IF amplifier from 100K to 470K makes the filter somewhat more useful on phone.

The 500K diode filter resistor (R49) in the second detector circuit is unusually large and at 50K the 6F6 grid resistor (R33) is unusually small. Changing these to 47K and 470K respectively gives significantly more audio gain.

In the BC-342, the filter capacitors in the RA-20 power supply should be replaced. A 8-8 mFd. can was all that would fit into the available space in the 1940s. Recommend replacement with 20-20 mFd. or more. These supplies also generate a lot of heat, see Fig. 5, and TM 11-310 (see Note 3) identifies RA-20 heating as a source of failure in bathtub capacitor CA276, a triple 0.1mFd. unit (C78, C79, C80). Out of consideration for 50 year old components, I would recommend locating the RA-20 outside of the cabinet if the receiver is going to see a significant amount of use. Alternatively, although I hesitate to advocate the mutilation of vintage equipment, additional ventilation openings could be cut into the cabinet. I did this with a junk cabinet and included a small fan which blows directly into the back of the RA-20. I swap my two receivers in and out of this modified enclosure when in use.

Heating doesn't seem to be a problem with the dynamotor supply. Ted Young, W3PWW, reports no significant heat buildup with his BC-312N even after prolonged periods of operation. The dynamotor is also relatively quiet and

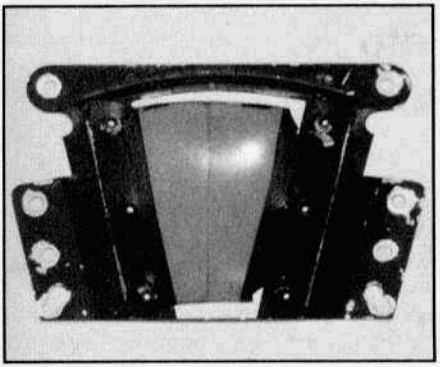


Fig. 6. Plastic cursor assembly from a BC-342N; note deteriorated condition. Earlier assemblies used a thin wire down the center of the assembly instead of the plastic insert seen here.

can be heard only as a soft purr when operating inside the cabinet.

The original muting circuit requires 12 VDC in on pin "J" of S01. Grounding pin "N" with the SEND-REC switch in SEND will then mute the receiver. A common modification was to rewire the B- connection to ground through the front panel SEND-REC switch. This also requires rotating the switch body 180 degrees to keep the labeling correct.

The plastic cursors used in the frequency readout window on later models do not age well, see Fig. 6. I replaced the entire assembly in my BC-342N with an earlier "wire" unit, a nasty little job requiring partial removal of the front panel. Repairs in-place should be possible, however, by replacing the old plastic with new material suitably scribed. A wire cursor could also be substituted with a little careful in-place drilling and soldering.

The -6 dB bandwidth of these receivers (crystal filter out) is between 7.5 and 8 kHz as close as I can determine with the test equipment I have available. The -20 dB bandwidth is about 16 kHz.

The crystal filter modified as described above gives a -6 dB bandwidth of approximately 200 cps. From a cold start at 3900 kHz in the ventilated cabinet described above, my BC-342N exhibited a steady downward frequency drift: 500 cps in the first minute, 1 kHz in 5 minutes, 3 kHz in 30 minutes and finally stabilizing at a total of 6 kHz after three hours. My old "A" model operating in a nonventilated cabinet drifted 8 kHz in the same period!

On the Air with the BC-342/312

I use my receivers regularly on 160, 75 and 40 meters. Selectivity is adequate for moderately busy conditions, and AM stations on 7290 and 7295 kHz, for example, can be separated effectively provided the signal levels are not grossly disproportionate. The crystal filter is helpful on phone in some cases but is better suited for CW. SSB reception is quite good; the audio mods described above help by allowing the receiver RF and IF stages to operate at lower gain and distortion levels. In use, I hadn't noticed any particular drift problems and was surprised by the test results (see above).

The overall placement of controls on the front panel does not seem to be according to any particular plan or design but works well in practice. The frequency display is well lit and easy to read. The tuning controls operate smoothly with very little backlash when adjusted and lubricated properly (see above). The VERNIER tuning control is comfortably slow for cruising around the ham bands, and I have found it very convenient to have both fast and slow tuning rates available.

So how does this "grunt" stack up against it's "fly-boy" cousin, the BC-348? First off, the symmetrically laid out front panel on the BC-348 looks nicer than the starkly utilitarian 312/342 (see Fig. 7). The BC-348 also weighs half as much and is far easier to service. I had to swap out the main dial mechanism in my BC-348K which, in turn, required removing the front panel - a snap on the 348 but almost impossible

continued on page 40

A Radio From Yamamoto

by Howard H. Hood, WA7QQI
5670 SW 44th
Port Orchard, WA 98366

Once in a while you get lucky and run into a piece of gear that has some real historic value. About a year ago I was asked to look at a Japanese radio set and see if it was worth saving, if not it was off to the landfill. What follows describes what I have been able to learn to this point.

The radio definitely was Japanese and of WW II vintage. I had seen this radio in the past and was told at the time it had been removed from a Japanese Navy cruiser shortly after WW II. It was definitely worth saving! Now I just had to figure out what it was (see photos 1 and 2).

All identification on the set was in Japanese but the tube line-up seemed to be American. All the tubes are located in the top half of the set in the rear. To gain access to them you remove several latches and lift the lid. I had expected to find Japanese tubes in the set, but instead found the following tubes; 77, 78, 6A7, and 238. Opening the lid to the top front compartment reveals a set of plug-in coils. (See photo 3) A search of the radio's storage area turned up a wooden box with 20 more coils and part of another. (See photo 4) Unfortunately no manuals or documentation were located. A tag was found from the U.S. Naval Intelligence - Commander Task Force Seventeen. It was dated September 9 with no year indicated. It is interesting to note it was listed as a transceiver, somebody else didn't know what it was.

To get further information I tried going back to the source - Japan. I contacted several individuals and quickly found that what little was available was in Japanese.

Takashi Doi was a great help with information and a photo of similar sets taken during WW II. It was his opinion the set was a Model 92 Improvement 3. More help came from Electric Radio readers. Ken Lakin put me in touch with Wil-

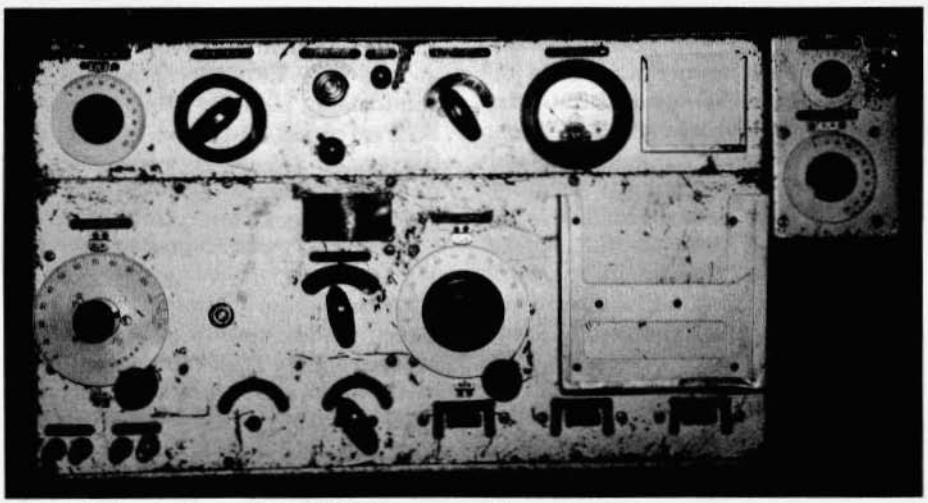


Photo 1: Front view of Model 92 Japanese Navy receiver.

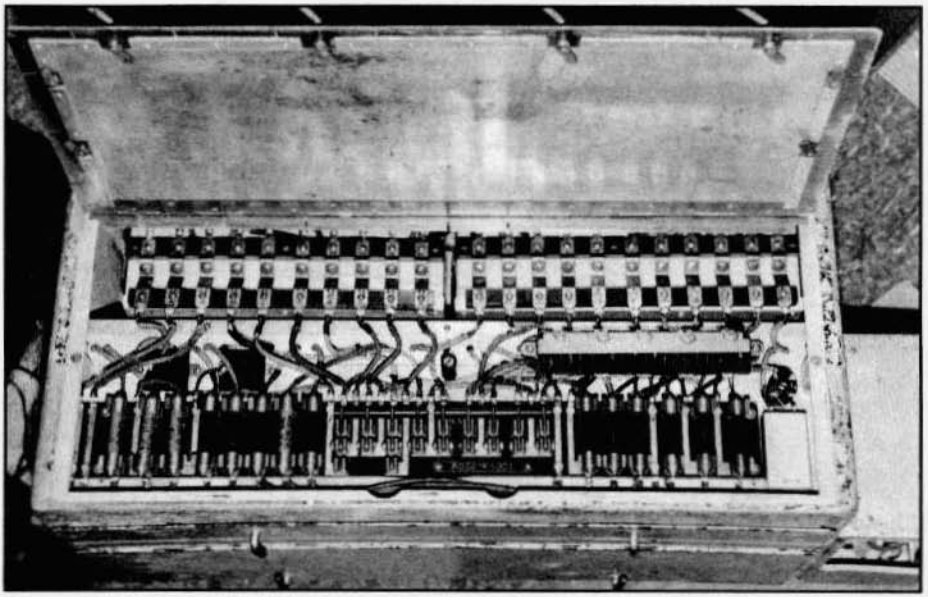


Photo 2: Rear view of Model 92 receiver showing terminal strips, fuses, and bypass capacitors.

liam Howard in Largo, Florida. William was also of the opinion it was a Model 92 Improvement 3 or a variation of it. Ken Lakin recently called on the land line to say that the Japanese had evidently stockpiled US tubes before the war. Not until near the end of WW II did they run out. So the tubes in this set may well be original.

It would appear that this radio is a modification of the Model 92, some where between Improvement 3 and Improvement 4. Since both sets are similar, I'll use the Model 92 Improvement 3 for a description. I think it best to quote from the material sent to me by William Howard.

"Frequency Range: 0.02 to 20.0 mc using 2 plug-in coil sets, one having three coils and the other two coils. Each coil has five tuning ranges.

Power Source: Plate, 110V or 220V; fil, 6.3V, 12V, or 110V.

Tubes: Two UZ78 RF amp, UT6A7 converter, two UZ78 IF amp, UZ77 regen detector, UY238B AF output.

Weight: 102 lbs.

Remarks: Equipment is a 7-tube superheterodyne receiver from 1500 kc to 20 mc; and tuned RF receiver from 20 to 1500 kc, with RF amp and converter stages disconnected, and IF amp used as tuned RF receiver with regen. detector.

Receiver is built in two sections. Top section houses coil sockets and tube sockets; bottom section houses tuning capacitors, IF amp tuning section, and the superheterodyne section. In the rear are audio transformer, chokes and bypass capacitor blocks. Compartments are interconnected with two terminal strips. All controls except certain power switches are on the front panel. Tuning dials are similar to U.S. types. Sensitivity of receiver is fairly good. Selectivity is sharp near peak, as is typical in regenerative sets. Absence of AVC permits it to overload readily. Receiver is cumbersome and difficult to tune."

This radio is not mint by any stretch of the imagination. The cabinet paint is in sad shape and is silver rather than the black I have seen in photos. One knob is broken off and some data plates are miss-

continued next page

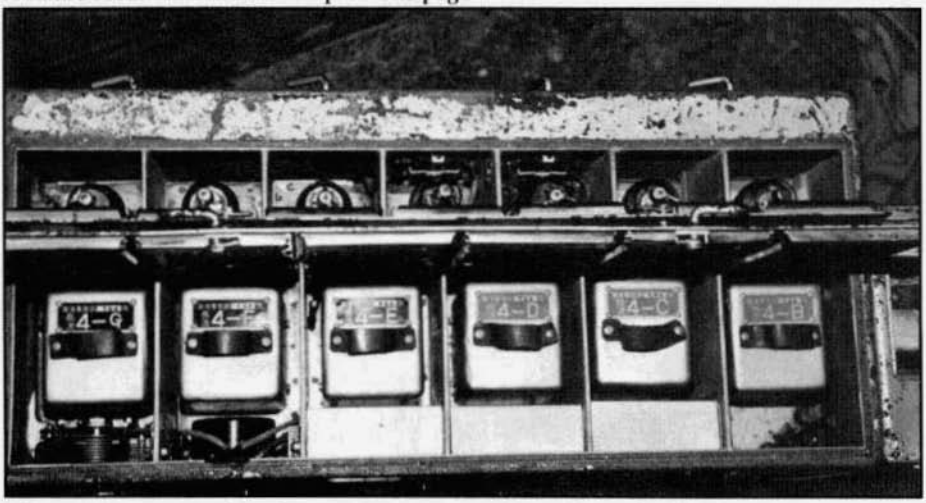


Photo 3: Top view showing compartments for coils and tubes.

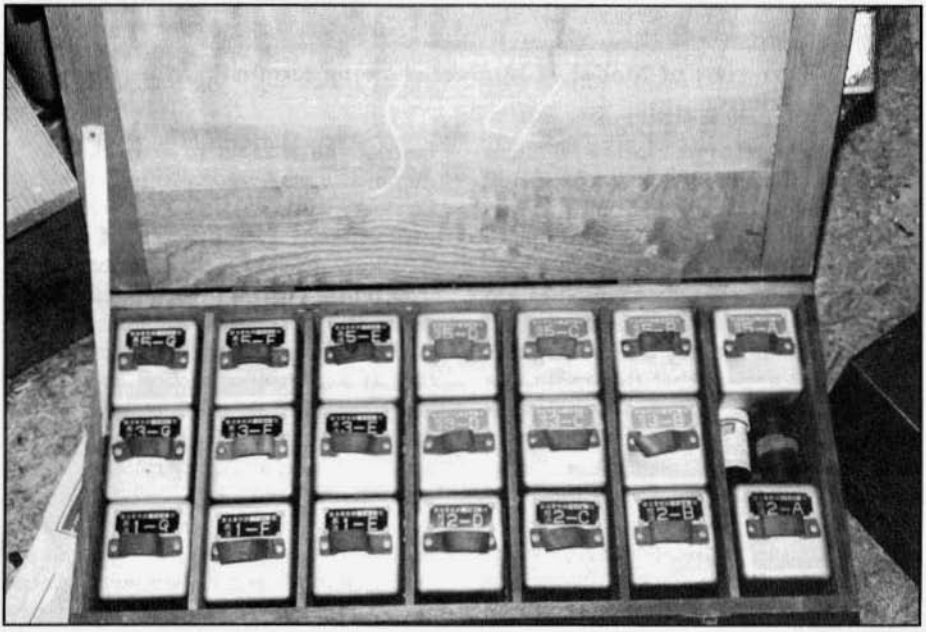


Photo 4: Box with additional coils.

ing. One noticeable modification is the switch to the left of the meter. This switch is not shown in the information I have for Improvement 3 or 4.

I have not tried to power up this set yet. I'll save that project until I have a little more information. I still need a good schematic and the modifications make me proceed with caution.

If anyone has any data on this set or knows where some might be located, I would be very interested in receiving that information.

My thanks to Takashi Doi, Ken Lakin and William Howard for their help. ER

Early Report from the Winter Classic Exchange

by Jim Hanlon, W8KGI
P.O. Box 581
Sandia Park, NM 87047

All the returns won't be in until two days after the September Newsletter is mailed for the next Classic Exchange, the CX for short, but early indications are that everyone involved had a blast! Marty Reynolds, AA4RM, outdid himself for this running, putting up CX web pages at http://qsl.asti.com/CX/Cee.html (rules) and at http://qsl.asti.com/CX (February Newsletter). This plus ample notice to the Boatanchors mail reflector attracted many newcomers to join the regulars in our 21 year old un-contest.

Twenty meters seemed almost universally uncooperative this running. Several Cxers including myself tried some CQ-CX calls on cw and phone, all to no avail. As usual, 7060 was a hotbed of cw CX activity early on in the contest, with the gang shifting to 3560 when the foreign phone finally blotted out 40 meters. But Marty and his Boatanchor buddies, especially from Atlanta and Raleigh, livened up 40 ssb as well around 7290 with such great rigs as N4OSJ's B&W 5100/51SB, W8ZR's Hallicrafters FPM-200, N4CH's Multi-Elmac ATR-4, And there were AM and ssb QSOs running on 75 too. (We must get the phone frequencies and times a little better organized next time).

Newcomers included Jim, W8ZR, noteworthy for his self confessed humming and chirping FPM-200, and Bob, W9RAN, who finally got on with a Maurader and an SX-111 after going through two non-functional HT-37's. Sandy, W5TVW, and Howie, WB2AWQ, had their 1928 Hartleys on the air. Your reporter, Jim, W8KGI, made four QSOs using a genuine 1933 National SW3 rx, and also got the Hammarlund Four-20 on the air as promised. Military gear included a lot of ARC-5's, TCS's, an AN/SRT-14, an R388 and even a BC375 sported by Dave, AB5S. Paul, K9NO set some kind of record with twelve and a half different stations on the air. Homebrew rigs and receivers were fielded by Dennis, W5FRS, George, K7DU, and of course Howie and Sandy.

Murphy made his usual showing. Roger, KD6CC had to make a quick QSY during the CX to Radio Shack for a reed relay and switching transistor to get his Heath HD-1410 keyer running again. And then later his Viking 122 VFO gave out. Dale, WD9GWH, had four of his eight pieces of gear develop some kind of problem the day of the CX! Marty, AA4RM, estimates he spent at least 4 hours operating and 3 hours fixing, including remembering that he'd exchanged the tip and ring connections on the mike plug for his Cosmophone, a shorted ceramic capacitor in his KWM-1, a cold solder joint in his TCS power plug, and assorted blown fuses.

Rich, K7SZ, a first-timer, summed up the CX as well as anyone with the following. "It was a real experience to get on the air with my 'ancient' Hallicrafters SX-117/HT-44 setup and work some of the BA gang. In all I made 10 QSOs, 4 on 40 meters and 6 on 80 meters with my station. Had a lot of fun and even recorded some of the chirpy and drifty signals for some of the guys in the local club to hear tomorrow night. (Not that all of the guys I worked had drifting or chirpy signals ... but there were a couple ... gives one a sense of adventure and a look at how radio really was in the old days)." Amen, Rich! You figured out why we all come back again and again on your very first try!

The next running of the CX will be on the afternoon of Sunday, September 28. Send me a double stamped SASE at the QTH above for a paper copy of the Newsletter, and keep an eye on Marty's

continued on page 39

Transmitter Impedance Matching Range

by Warren B. Bruene, W5OLY
7805 Chattington Dr.
Dallas, TX 75248-5307

A popular myth "that SWR can be reduced by adding transmission line length" is mentioned in the first paragraph of the article, "Finding RF Impedance Along A Transmission Line", by Albert Roehm, W2OBJ, in January '97 Electric Radio. He then correctly shows that adding transmission line length does not reduce SWR. I suspect that the assumption was reached by a ham who did add length and found that he could then correctly tune and load his transmitter whereas he couldn't before. This note will show how adding line length can make correct matching possible without reducing SWR.

For an example I will use the linear described in the 1995 ARRL Handbook For Radio Amateurs, "A 1500-W Linear Amplifier Using 3-500Z Tubes" on pages 13-31 to 13-39. I computed the load impedance matching range for which the linear could be tuned and loaded to produce a plate load resistance of 2000 ohms on the tubes at a frequency of 3.8 MHz. The result is plotted on a Smith Chart and shown in Fig.1. The heavy lines represent the boundary of the impedance matching range. Each arc represents the limit caused by the labeled element.

Now let us assume that our antenna and transmission line presented an impedance of 13.3+j0, represented by the large dot, to our linear. This is well outside of the matching range. Adding a quarter wave of electrical length to the transmission line (43 ft.) rotates the

continued on page 39

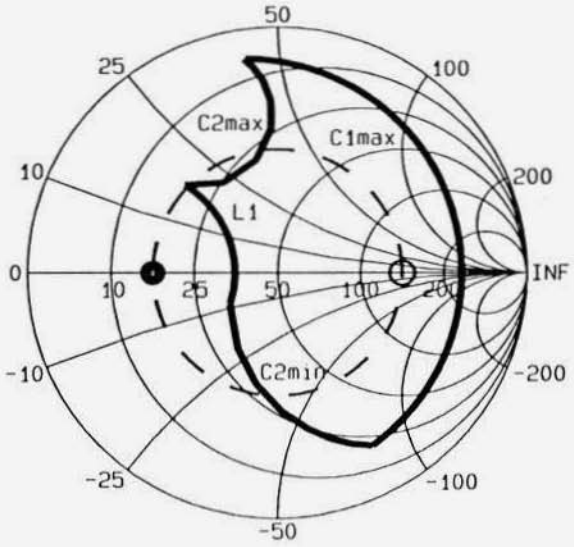


Fig.1 Load impedance range of pi-output network. C1 is plate tuning, C2 is loading capacitor.

VINTAGE NETS

Westcoast AM Net: Meets informally, nightly on 3870 at 9:30 PT. Wednesday at 9:00 PM PT they have their formal AM net which includes a swap session. Net control rotates.
California Early Bird Net: Saturday mornings at 8 AM PST on 3870.
California Vintage SSB Net: Sunday mornings at 8 AM PST on 3835
Southeast Swap Net: Tuesday nights at 7:30 ET on 3885. Net control is Andy, WA4KCY. This same group also has a Sunday afternoon net on 3885 at 2 PM ET.
Eastern AM Swap Net: Thursday evenings on 3885 at 7:30 ET. This net is for the exchange of AM related equipment only.
Northwest AM Net: AM activity daily 3 PM - 5 PM on 3875. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT. The formal AM net and swap session is on 3875, Sundays at 3 PM.
K6HQI Memorial Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 3:00 PM PT, 7 days a week and usually goes for about 2 hours. Net control varies with propagation.
Arizona AM Net: Meets Sundays at 3 PM MT on 3855. On 6 meters (50.4) this group meets at 8 PM MT Saturdays.
Colorado Morning Net: An informal group of AM'ers get together on 3806 Monday, Wednesday and Friday mornings at 7AM MT.
DX-60 Net: This net meets on 7290 at 2 PM ET, Sundays. Net control is Jim, N8LUV. This net is all about entry-level AM rigs like the Heath DX-60.
Eastcoast Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is Dennis, WA3YXN but sometimes it rotates to other ops. Saturday mornings on 1995 at 0500 ET. Will move to 3885 for summer.
Westcoast Military Radio Collectors Net: Meets Sunday mornings at 0930 local on 3975 + or - QRM, except the 1st Sunday of the month when the net meets at 2130 local. Net control is Tom, WA6OPE.
Grey Hair Net: The oldest (or one of the oldest!- 43+ years) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8:30 PM EST & EDST. Call-up at 8 PM.
Vintage CW Net: For CW ops who enjoy using vintage equipment. This is not a traffic net; speed is not important. The net meets on 3537, Sundays at 7 PM Mountain. Net control is Tracy, WB6TMY.
Vintage SSB Net: Net control is Andy, WBØSNF. The Net meets on 14.293 at 1900Z Sunday and is followed by the New Heathkit Net at about 2030Z on the same frequency. Net control is Don, WB6LRG.
Collins Collectors Association Nets: Technical and swap session each Sunday, 14.263 MHz, 2000Z, is a long-established net run by call areas. Informal ragchew nets meet at 0100Z Tuesday nights on 3805 and on Thursday nights on 3875.
Drake Users Net: Another relatively new net. This group gets together on 3865 Saturday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, WZ8O; Rob, KE3EE and Huey, KD3UI.
Swan Users Net: This group meets on 14.250 Sunday afternoons at 4 PM CT. The net control is usually Dean, WA9AZK.
Nostalgia/Hi-Fi Net: Meets on Fridays at 7 PM PT on 1930. This net was started in 1978.
K1JCL 6-Meter AM Repeater: Located in Connecticut it operates on 50.4 in and 50.5 out.
JA AM Net: 14.190 at 0100 UTC, Saturdays and Sundays. Stan Tajima, JA1DNQ is net control.
Fort Wayne Area 6-Meter AM Net: Meets nightly at 7 PM ET on 50.58 MHz. This net has been meeting since the late '50's. Most members are using vintage or homebrew gear.
Southern California Sunday Night 6 Meter AM Net: 8 PM Sundays on 50.4. Net controls are Dan, KV6I and Scott, K6PYP. Informal, supports restoring old gear and using it on the air. Loan gear available for those wanting to join in.
Westcoast 40-Meter Sunday Net: Net control varies. The group meets on 7160 starting at 4PM PT.
Collins Swap and Shop Net: Meets every Tuesday at 8PM EST on 3955. Net control is Ed, WA3AMJ.
Old Buzzards Net: Meets daily at 10 AM Local time on 1945. This is an informal net in the New England area.
Canadian Boatanchor Net: Meets Saturday afternoons, 3:00 PM EST on 3745. For hams who enjoy using AM, restoring and operating
Midwest Classic Radio Net: Saturday mornings on 3885 at 8AM Central time. Only AM checkins allowed. Swap/sale, hamfest info and technical help are frequent topics.
Nets that are underlined are new or have changed times or frequency since the last issue.

The Hammarlund Four-11 and Four-20

by Jim Hanlon, W8KGI
PO Box 581
Sandia Park, NM 87047

Here's the scene. You have just finished copying the code for your Extra Class CW test and now you're working on the fill-in-the blank answers. Amazingly, the transmission chosen for the test was from an old timer who said he was running 1940's vintage Boatanchor gear. You were a little nervous and excited, so your copy is a little thin in one critical spot, but the words "Hallicrafters" and "Hammarlund" are there clearly among your scribbles. Now the test is asking you to fill in the blanks in these sentences. "The transmitter here was made by ..... and the receiver by ....." Luckily, you are an avid reader of Electric Radio Magazine, so for you this will be a "no brainer." Hallicrafters made both transmitters and receivers in the 40's, but the name Hammarlund was synonymous with receivers up until the mid fifties when they made the HX-50 and HX-500 SSB rigs. So the answers are obviously ...

Oops, wrong! That's what you get for coming to a VE exam where KGI made up the code test! Our Boatanchor friend was using a Hallicrafters receiver and a Hammarlund transmitter, the Hammarlund Four-20 to be exact. (If he had not this would be a very short article, so don't get too upset. Besides, your ER-borne knowledge of Boatanchor lore helped you to get the other eight test questions right and YOU passed your exam!)

Indeed, for about a year from 1947 to 1948, Hammarlund did make and occasionally sell the Four-20 transmitter and its companion Four-11 modulator. The modulator was pretty straightforward, winding up running 15 watts to a pair of 7C5's (loctal 6V6's). The transmitter was innovative for its day, but it was also lacking in several critical areas that were probably responsible for its relatively rapid demise. But let's start off with their good points as told in some of the Hammarlund ads of this era.

From the Hammarlund ad in the 1948 ARRL Handbook showing a Four-20 and a Four-11 paired with an HQ-129-X, whose copy must have been written in later 1947, comes the following. "The Four-20 Transmitter is a complete crystal controlled CW unit with a full 20 watts output at the antenna terminals on all amateur bands from 80 through 10 meters. The oscillator and multiplier stages are controlled by MONO-SEQUENCE tuning, a Hammarlund development which tunes four circuits to four different, but harmonically related frequencies, by means of one control.

"All stages except the final can be switched to any band by means of the band change switch. The final stage uses plug-in coils. Stability is assured by means of an improved oscillator circuit. A tap on the output coil assures a match between the output of the transmitter and any transmission line from 50 to 600 ohms. ... Four-20 with 10 meter coil ... $120; ... 20, 40 and 80 meter coils $2 .70 each."

And the Hammarlund ad in QST for May, 1947 adds, "With MONO-SEQUENCE tuning you can tune four circuits to four different frequencies WITH ONE CONTROL. It's a patented Hammarlund invention which gives you highly efficient tuning and ease of control. The Four-20 is a complete CW rig for 80, 40, 20, or 10 meters. Plug in a crystal and a key and you're ON THE AIR.

The Hammarlund ad for the HQ-129-X, Four-20 and Four-11 from the 1948 ARRL Handbook.

"For years the name HAMMARLUND has stood for the finest in communications receivers. The same engineering skill and precision methods which produced the Super-Pro and the HQ-129-X now bring you an entirely new transmitter. Combine the Four-11 Modulator with the Four-20 and you have a complete phone transmitter ready to go on any band. When you build that high power final, the Four-20 will make a perfect exciter and the Four-11 a fine speech amplifier."

That was the good news. The bad news came a scant year later in the Radio Shack ads (pre-Tandy, Radio Shack was a Boston store that specialized in good deals in electronic surplus and close-outs) in QST for March and April of 1948. Said Radio Shack, "Save up to 2/3 on Hammarlund Gear ... Kits include all parts, punched chassis, cabinet, tubes, sockets, resistors, capacitors, wire, insulation, switches, knobs and detailed illustrated instructions for wiring and adjustment. ... Four-20 Xmtr was $120.00, Radio Shack Kit Price $39.50. ... Four-11 Modulator was $72.50, Radio Shack Kit Price $29.50. ... We have a limited number of factory-wired Four-20's and Four-11's. While they last, they're yours for Four-20 ... $59.50, Four-11 ... $49.60."

Those ads apparently brought a lot of interest, for in May they said, "(Radio Shack) now has factory wired Four-20 for $59.50 with tubes and coil for 10 meters. Coils for 11-20-40-80 meters are $1.70 each. Factory wired Four-11 Modulator for $49.50." Listed as "Going Fast" is the Four-20 Kit for only $39.50.

continued next page

The Hammarlund Four-11 and Four-20 from previous page

Wow! One year you're the product of skill and precision methods that produced the finest communications receivers, and the next you're a distress sale "kit" on the bargain block at 2/3 off! What went wrong to make the transition from star to bow-wow in such a short amount of time? Well, there were several things that ganged up on the Four-20/Four-11 all at once, including missing design factors, strong competition, and changing radio regulations. Let's look at the design factors first.

The Four-20 transmitter had one very strong, positive design feature. Its 80 meter oscillator plus gang-tuned doubler bank was the ultimate solution of its day to providing ample drive to the 807 final on all bands. If the drive was more than the operator desired, it could be adjusted simply by detuning the doubler chain a small amount. Other frequency multiplier schemes popular in the 40's and early 50's involved doubling, tripling, or even quadrupling in a crystal oscillator, switching or plugging in an additional doubler stage when needed, and doubling in the final to reach ten meters. These usually involved multiple tuning controls, plug-in coils, and marginal drive for the final on the higher frequency bands. Fixed tuned doublers with "band pass couplers" were also being used, but these were less efficient and thus required larger tubes and more power, and their output varied considerably across the band with no convenient means of adjustment. (This capacitor gang-tuned multiplier scheme would turn up again in the early 50's in QST's Bandbox, a frequency multiplier with a 6AK6, 6C4, 6C4, 6C4 lineup which included 15 meter output as well.)

But the Four-20 had a number of design deficiencies that made it rather awkward or inconvenient to use. It is almost as if Hammarlund spent all of its available effort on the elegant, patentable frequency multiplier scheme and seriously short changed the rest of the design. And the things that it did wrong or left out were easily correctable within the state of the art of 1947. Here's my list of complaints with the Four-20.

To start with, while the frequency multiplier is bandswitched from the front panel, the 807 amplifier uses plug-in coils. To get access to the coil, you have to find a screwdriver and use it to unlatch and remove the top cover. Among other things that means that you can't conveniently mount the Four-20 in an enclosed rack, and you can't pile other things on top of it. And if that isn't awkward enough, the only way you have of adjusting the loading on the 807 is by manually clipping a tap on its output link! So if you wanted to QSY from 3560 CW to 3885 phone and to keep the loading adjusted properly, you'd probably have to open up the top again and move the tap on the link. All of this was in an era when Art Collins' Pi-Match was well known and a tapped coil, bandswitching version of it was already designed into at least one competing rig, the Harvey-Wells Bandmaster.

And then there's the crystal socket. It's on the back wall of the chassis, hardly convenient for changing frequency. Again there's the problem of access if you rack mount the rig. There would be no problem if you used a VFO to drive the Four-20 as I suspect most users did, but the instruction manual contains almost no information on how to interface a VFO with the oscillator stage. Fortunately, ARRL Handbooks of the day had enough good advice to keep you out of trouble on this one, but Hammarlund certainly didn't help.

My next gripe concerns the metering. The meter can be switched to measure the plate current of the 807 and of the oscillator and each of the doubler stages. I definitely care what the 807 plate is doing, but I'm not really concerned about the oscillator and doubler plates. They are protected by cathode bias in case they aren't at resonance, so noth-

The Hammarlund Four-20 transmitter.

ing bad is going to happen to them regardless of where they are tuned. What I really want to know is how much grid drive is going to the 807. An 807 is not as touchy as a 6146 about overdrive, but it definitely will generate more harmonics as it is driven harder and I'd just as soon minimize that problem.

And then there's what I'd call control problems. As delivered by Hammarlund, the Four-20 has only an "off-on" switch which controls the 120 volt line to the power transformer and a key jack in the common cathode line of all of the stages, and the Four-11 has only a switch in the 120 volt line. If you want to use the Four-11 by itself as a CW rig, there is no problem. Just like the advertisement says, "You just plug in a crystal and a key and you're ON THE AIR." But if you want to use the pair together as a phone and CW rig, you're in trouble. When you're operating phone, you will want to be able to turn off the B+ to the modulator during off the air periods so that you don't operate it into an open load, something that the wisdom of the AM era said was likely to cause the modulation transformer to arc over. But there's no way to do that within the limits of the switches and wiring built in by Hammarlund. And when you're on CW, you want the B+ to the modulator turned off and the secondary of the modulation transformer shorted. Again, there's no way to do it supplied by Hammarlund. Now any amateur of the era would have no trouble ginning up ways to get around these control circuit problems, but it sure would have been nice if they had been properly designed in by Hammarlund.

Because of this litany of problems, I suspect that most users of the Four-ll/Four-20 pair made quite a few modifications. Indeed, the previous owner(s) of the units I acquired made several improvements. My Four-20 has the final plate tank modified with the addition of a two-section, broadcast receiver style, variable condenser that, depending upon the wiring of the coil you plug into the final plate tank socket, acts either as the output condenser in a pi-match or as a variable in series with the output coupling link. Either way, it pro-

continued next page

vides an effective loading control. However, it is mounted inside the box with its shaft pointing up, so you have to take the top off the box to adjust it anyway. It would have been a lot more convenient if the shaft had been brought out to the front panel, but from my collector's standpoint I'm just as glad that there's not one more wart on this pickle.

My predecessor also apparently used the Four-20 with a VFO, because he added a quarter inch jack on the rear chassis wall labeled for a VFO and wired to the crystal socket. He made a few other changes back there too, replacing the two ceramic feed-throughs that were the RF link output connectors with a SO-239 coax socket, changing out the terminal strip that was used to connect to the modulation transformer for a six pin Jones Plug that carries control leads to the modulator as well, and installing yet another quarter inch jack for a meter to monitor the 807 grid current. He also rearranged the internal circuitry, floating the shields of a bunch of coax cables off DC ground but bypassing them for RF, so that he could put the grid current meter in series with their common DC ground return lead. So much for my complaint about measuring the drive to the 807.

There are two additional front panel switches as well, one tastefully placed in line with the bandswitch and meter switch in the hole where the pilot light had originally been and the other further up in the panel in a spot which balances against the position of the relocated pilot light. This guy apparently had some esthetic talents. The lower switch is a DPDT bat handled toggle which acts as a send-receive control. Half of it opens the center tap of the power transformer high voltage winding, thus cutting off the B+ supply when it is open. The other half switches 120 AC to leads going out the Jones plug to the modulator. Out in the modulator, that 120 volts drives a relay that closes the center tap of its power transformer HV winding and opens a short across the modulation transformer secondary, this provided that the modulator power switch is on. If it is off, a second section in the modulator power switch opens the path to that added relay in the modulator so that the relay does not operate and the modulation transformer stays shorted during transmit. So the modulator power switch also acts as a phone-CW control. The other added switch in the transmitter panel was not wired when it came to me, and I really can't figure out anything else I want to do with it at the moment. So it will just stay there to balance off the panel.

There are still more improvements in my Four-20. The crystal oscillator was originally a straight tetrode circuit which would oscillate only when its plate was tuned within a rather limited frequency range below the crystal resonant frequency. It had been replaced with a Colpitts circuit which oscillates regardless of where the plate is tuned. And my rig sports an added VR150 which regulates the screen voltage of the oscillator tube. My predecessor made one change which did not strike me as an improvement. He pulled the oscillator cathode off the keying line and grounded it. Not only did the oscillator run full time when the B+ was on, which doesn't particularly please my taste for break-in CW, but worse yet if the meter switch was set to the oscillator plate position and the key was not closed, the meter would pin backwards! Returning the oscillator cathode to the keying line solved both problems.

Lesser changes included scraping the paint away from the bottom of the top cover and the top of the cabinet flange where the two mated and adding extra cover hold-down screws, no doubt to reduce TVI, changing the 807 to a more stable 807W, bypassing each side of the AC line to chassis ground, also a TVI reduction measure which I had to remove due to my shack being on a ground fault breaker which doesn't like leakage

The Hammarlund Four-11 modulator.

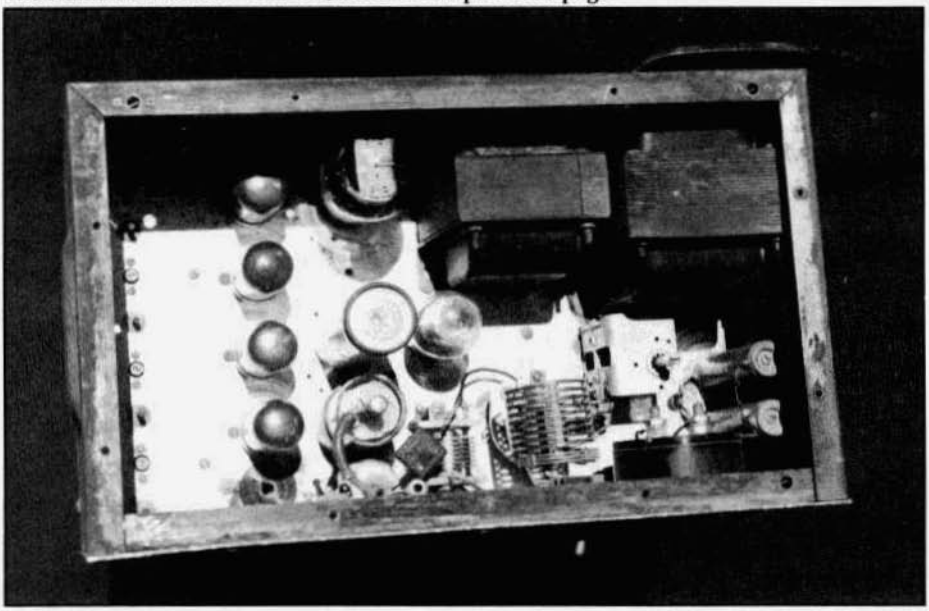
currents, and adding an extra loctal socket near the end of the multiplier string. This extra socket was not wired to anything, but I can speculate that perhaps someone may have been thinking of adding 15 meter coverage to the Four-20.

And speaking of 15 meters, that is the radio regulation change that may also have helped to put the Four-20 into the Radio Shack ads. In the same 1948 Handbook where the Hammarlund ad touted the features of the Four-20, the following notice appeared. "The 1947 International Radio Conference has resulted in certain changes to the present bands expected to become effective in late 1949. They are ... a new band 21,000 to 21,450 kc ..." Now who in 1948 would buy a brand new transmitter that didn't cover what would obviously be an important new ham band in another year or so? Too bad the Hammarlund engineers didn't know of or foresee this new band; their nice little rig might have stayed around a bit longer.

I also mentioned that the competition was rather stiff. Instead of spending $120 for the Four-20 transmitter and another $72.50 for its companion Four-11 modulator you had several alternatives in the same power class or better that were either less expensive, more functional or both. Hallicrafters offered the HT-17 in 1948 for $69.50, a 6AG7/807 CW only rig with a built-in power supply and the same nominal power output and band coverage that also used plug-in coils. Leo at WRL had his 6L6/807 Globe Trotter out for $69.95 in kit form and $79.95 wired. Of course you had to throw in an additional $17.15 for the 'accessories' which included the tubes, meter, and one set of coils. But the rig also included a pair of 6V6's in a Heising AM modulator, and like its Globe Scout cousins to come, it was a lot of value for the dollar. Rigs in the same class without power supply included the McMurdo Silver 701, a 6AQ5/807 lineup with 6AQ5 modulators for $24.95 as a kit and $36.95 wired (less tubes and coils), and the Millen 90800 6L6/807 strip exciter for $42.50 less tubes and its WRL Exciter copy for $19.95 as a kit and $25.95 wired and tested but less tubes, coils and meter . (I wonder if Leo

continued next page

The Hammarlund Four-11 and Four-20 from previous page



Looking inside the Four-20 transmitter. The added output capacitor is just behind the meter.

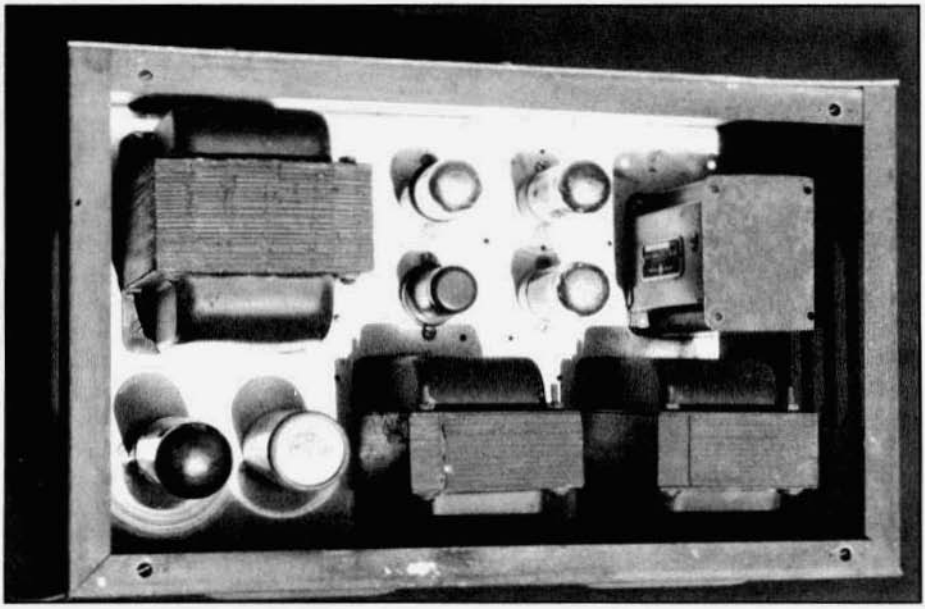
took lessons from a car salesman? And how did they test those rigs without a meter?) You could also get substantially more power in the 125 watt Stancor ST-202A which sold in kit form for $92.50, with power supply but without modulator.

But probably the toughest competitor of that era and the most popular and long lasting of the entire bunch was the Harvey- Wells TBS-50 Bandmaster. In a box not much bigger than the Four-20, it offered a complete bandswitching rig with pi-match output that covered all bands, including 15 meters, from 80 to 2 meters! It didn't deliver a whole lot of RF output on 2, but with a decent antenna it was still pretty functional up there. And it also included a pair of 6L6's in a transformer coupled modulator. The basic 1947 Bandmaster cost $99.50 with an extra $39.50 for its "accessory" AC power supply. You could also buy a Harvey-Wells branded dynamotor to run it mobile - if you couldn't find a surplus PE-103 for less - and a matching VFO. The TBS-50 C and D versions continued to be made until 1955.

So those are likely the reasons why the Hammarlund Four-20 and Four-11 remained relatively obscure and why you guessed wrong on your CW test answers.

All of that being said, I'm still lucky enough to have become the proud protector of the pair you see in the pictures. I really haven't had to add much value beyond that already put in by the previous owners to get them back into working shape. Even the original electrolytic filter capacitors in both the transmitter and modulator were still good, no small feat for a 1947 boatanchor. I did supply a copy of the original long pointer knob for the final plate tuning control thanks to a generous stock of junk box parts inherited from an old Ohio State friend, Bob Higgy, W8IB (SK).

I haven't said much about the Four-11 Modulator so far, and that's because it is relatively straightforward and required only the control relay modification I've



Looking inside the Four-11 modulator. The "iron" is a power transformer, two filter chokes and a modulation transformer.

already described to make it fully functional. The tube lineup is typical of the day, a 6SL7 twin triode cascade microphone preamp, 6C5 phase inverter and push-pull 7C5's rated at 15 watts output. The modulation transformer matches the 6000 ohm load of the 807 final in the Four-20. An available option with the original Four-11 was an output transformer that would drive a 600 ohm line for use as a speech amplifier per the original advertisement. Coupling and bypass capacitors and a capacitor across the modulation transformer primary are chosen to roll the audio response off below 200 Hz and above 3000 Hz. The power supply uses a 5U4G rectifier and has a 1 microfarad input capacitor followed by two sections of LC filter. Control leads for the relay, modulator output to the transmitter, and a ground are routed through a six-pin Jones plug that replaced the original terminal strip screw contacts on the rear chassis wall.

Bringing the modulator to life was quite easy. All of its resistors were adequately close to their original values, the tubes tested good, and none of the capacitors were shorted. I took the precaution of running the high voltage up in small steps over a several hour time span to reform the electrolytic filter caps. To do this, I temporarily replaced the 504 with a silicon diode and series resistor, pulled the other tubes, and drove the power transformer primary from a Variac. Everything came up without incident and the speech waveform into a 6000 ohm resistor looked normal. Matching the modulator with the transmitter and an Astatic model 200 crystal mike produced 100% modulation with the audio gain control about 1/3 open. Once again, 50 year old original parts worked as well as new. Hammarlund obviously did something right when it built this equipment.

Having gotten this far, I just had to take the Four-20 out for a spin even if I wasn't quite through with it. It was New Year's Day and I was tuning up crystal controlled on 7060, my favorite 40 meter CW

continued on page 38

National Radio's HRO-500 - Revisited

by Dennis Petrich KØEOO
6419 Berwickshire Way
San Jose, CA 95120

The first time I laid eyes on an HRO-500 was in Hong Kong during an R&R leave while I was serving in Vietnam.

I can remember discovering an area of upscale shops on Victoria Island near the swank Hilton Hotel that sold all sorts of exotic goods. As I browsed the shops with their ivory tusks, leopard skin rugs, precious gems from places I had never heard of, I was stopped dead in my tracks at the vision of what to me, was the most exotic prize of all, just as unattainable as the others, the National Radio HRO-500 reference standard receiver. The shop display lights were dim so the panel lights of the 500 glistened. I can still remember the scene as if it were yesterday. At that time the HRO-500 represented the pinnacle in receiver design with its discrete PLL based frequency synthesizer and all transistor vs tube line-up.

So you might understand why a couple of years ago when I got a chance to buy an almost new-in-the-box HRO-500, I jumped at the chance. According to the owner, the receiver I purchased had only one problem, its gain was down about 10 dB from where it should be. Well that didn't discourage me so I purchased the set, brought it home and found the problem by that next weekend. It was due to an open 15 mFd electrolytic in the emitter circuit of the second IF amp.

With no problems in the synthesizer I then performed a full alignment on the receiver and put it on-line with my Central Electronics 100V transmitter, and proceeded to use my two favorite rigs. Well, it didn't take too long for me to become irritated with the audio quality while copying SSB. AM signals sounded just great and even CW seemed OK - but the SSB audio was distorted in some way (even more than SSB usually is...). I couldn't put my finger on where this distortion was coming from but I knew something was not quite right. I put it back on the bench and tried, off and on, for the next 2 years to fix the problem. I was starting to think it was a built-in design flaw just like I had found in the early NC-300's. National wasn't too keen when it came to SSB product detector designs (a problem that normally doesn't really bother us Am'ers, right!).

Well it's November of '96 and by now I've tried everything including replacing every component in the product detector circuit, except the IF transformer, putting every transistor on a curve tracer, checked every electrolytic and checking voltages until I was blue in the face. I might mention at this time that another HRO-500 owner Mike Student, W7MS, in Reno, Nevada, was experiencing the same audio problem. He I had spent many hours on the air discussing this problem. The fact that all of the solutions we had tried had failed to solve this audio distortion problem was very frustrating.

Well, back to November of '96. One evening I had invited a friend of 20 years, coworker and fellow ham, Jan Wilstrup, WBØILB, as in 'I Love Beer', over for a look at the shack. We listened to a few of my rigs, talked old times for a while and started working our way to the door when we passed the room that I use as my workshop. I took him in to look at the line-up of rigs waiting for restoration. On the bench was the 500 belly-up with its innards exposed. I no sooner started to show the problem to

HRO-500 sitting on an HRO-50T.

Jan when he asked if I had a scope so he could look at a few points. Well I turned on my scope, handed him the probe, showed him where the product detector was and in just under 5 minutes he declared that the signals from the last IF transformer were not of equal amplitude and that this would create audio distortion products because of the lack of balance in the circuit. Well I turned off the set and connected an ohm meter to the secondary of the last IF. Sure enough, one side to center tap was 1.6 ohms while the other side measured 3.6 ohms. I never thought to look at the IF transformer before. I couldn't believe it, after all of this time, HOPE was still alive. I passed the new information along to Mike as soon as I could. He checked his 500 and found that his last IF transformer secondary had just a 0.2 ohm difference, not as bad as mine but enough to unbalance the circuit.

So, Mike decided that instead of removing the last IF transformer (UGH...) as I did, he would redesign the circuit adding two more diodes and a balance pot to assure proper operation. See figure 1 for the circuit Mike used.

Well, I had to perform an autopsy on the transformer so I removed it and counted all of the turns on the secondary. I found that one side had 15 turns to the center tap while the other side had 30 turns of a number 34 wire. Excited at the prospect of actually finding the real problem, I rewound the secondary making sure that the turns were balanced this time - 30-30. I put the transformer back, wired it up, turned the set on and behold, NO distortion! So back together she went and back alongside the 100V she sits and the enjoyment has begun again.

National Radio

The high end National HRO receivers all have plated steel chassis and cabinets, high-Q LC tuned IF stages, rugged tuning condensers and PW dial assemblies, stable LC HFO tuned circuits, broad-band frequency ranges, great notch interference filtering with their crystal filter designs, military quality workmanship, the best noise limiter in any receiver and AM performance second to none. This was the trademark of all HRO receivers for over 30 years. Consequently, when the transistor came along all they had to do was swap the tubes for transistors and keep everything else the same .... and in the 500 they literally did! This is called the evo-

continued next page

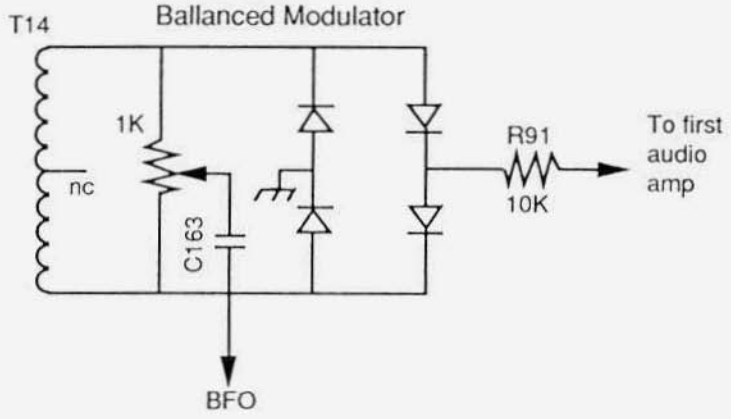


Figure 1

lutionary migration of a product. National changed two things. They added the PLL synthesizer (even though the PLL is LC based) and went to transistors.

Receiver Features

Now I can get to the fun part of this article, namely, talking about why I like this receiver so much. The features of this set are many, like the PASSBAND tuning control using 6 very high-Q ferrite tuned circuits with a shape factor of 2.5 to 1. Crystal or mechanical filters have shape factors of around 1.5 to 1 and the normal vintage AM IF's shape factor (shape factor is the ratio of the -6 dB to -60 dB down bandwidth) can run from 4 to 1 to 6 to 1. So 2.5 isn't too bad for tuned circuits, and its ability to discriminate between USB and LSB or interference is virtually as good as my 75A-4. In fact, in most cases for SSB and CW I can slice off interfering heterodynes or SSB signals with the PASSBAND tuning control and don't have to even touch the excellent REJECTION tuning control provided. For AM I have found the 2.5 kc position useful during high QRM QSO'S to listen to only the upper or lower sideband of the AM signal. The 2.5 shape factor is soft enough to reproduce AM quite nicely but during conditions when a wider bandwidth is usable, the rig has 5 kc and 8 kc widths for higher fidelity reception, plus the REJECTION tuning to make life easy when needed. No expensive plug-in mechanical filters to buy to get the selectivity you need for today's crowded bands.

The 500 has another feature to improve the third order-intercept point or input overloading on strong adjacent channel signals. They give you 10, 20 and 30 dB steps of attenuation on the front end. You simply add the AGC THRESHOLD setting to the accurate S-meter reading when giving reports. In this case S-meter action doesn't change like it does when using the RF gain control.

The 500 is dual conversion like the HRO-60, but with a discrete phase lock loop (PLL) synthesizer driving the first mixer and a LC tuned VFO driving the second mixer. I bet you're saying to yourself, "if the HRO-500 has a PLL it must have phase noise all over the place like the Japanese radios and a poor noise floor". Well, yes and no! It does have a synthesizer but the synthesizer is only used to set the band or HFO frequency to the first mixer on 500 kc increments, 60 in all. The actual tuning is done by an LC tuned oscillator/VFO that has been voltage and temperature compensated.

In fact, it is more stable than my S-line, KWM-2 or CX-7A. From a cold start, drift is not noticeable!! And the dial calibration on my rig was accurate to within I kc across the entire 500 kcs of the dial on all 60 band segments covering from 5 kcs to 30 Mcs. National provides a technique so the user can mechanically adjust the frequency tracking every 50 kcs over the entire 500 kc PW dial range by bending small tabs on the tuning shaft next to the main tuning capacitor.

Another noteworthy feature of this receiver is its low noise floor. Disconnect the antenna and the set goes dead. On AM signals in the presence of band noise my 75A-2 will sound irritating while the 500 shows almost no sign of band noise, in fact, the difference was so striking I had to do the A/B test several times just to make sure I wasn't hearing things.

The Back Apron

This next feature will probably be interesting only to those of us who like to work on their radios. The HRO-500 was designed for YOU, with its back apron full of phono jacks to look at all of the oscillators, there's audio output at 500 ohms, supply voltages, AGC voltages, it provides 5 different muting schemes and selects either AC or DC operation in true National style. It was obvious to me or to the most casual observer that the 500 was designed with integration to another rig in mind. If anyone has any insight on whether National had any plans to bring out a transmitter to work in conjunction with the HRO-500 I would like to hear from you.

The Line-Up

The transistor/stage line-up in the HRO-500 was revolutionary in 1966 but quite commonplace in rigs of today. For example, the set has the usual RF amp driving the first mixer circuit fed by the PLL synthesizer circuit, for bands covering 4.0 to 30.0 Mc. But, on the lower two bands covering 5 kcs to 4.0 Mc the HRO uses an up-conversion circuit to skip over the first and second IF's so there is no break in the frequency coverage like between the G and F coils at 455 kcs on early HRO'S. This up-converter stage has a tunable IF and uses a crystal controlled oscillator at 26 Mc. This makes the HRO-500 a triple conversion receiver on the lower two bands. My CX-7A used the same circuit in 1969.

As was mentioned before, the 500 has a step attenuator circuit in the front end to reduce overloading common to most solid state receivers. The second IF is tunable from 3.25 to 2.75 Mc and the third IF is fixed at 230 kcs. The VFO running from 3.48 to 2.98 Mc s controls the receiver over it's tunable range of 500 kcs. In the fixed IF you can select one of four selectivity ranges. 0.5, 2.5, 5.0, or 8.0 kcs. In the 0.5 and 2.5 positions you can use the excellent passband tuning control which gives you +/- 1.0 and 3.0 kcs of shift in the IF's bandpass respectively. A rejection tuning T-notch filter is also in the last IF circuit for the excellent heterodyne rejection needed on the crowded AM bands these days.

The PLL synthesizer is made up of discrete transistor circuits and takes up almost 1/3 of the receiver's available space. The PLL circuit replaces the 60 crystals required to cover this same frequency span but does it with one crystal. That is 60 crystals with 500 kc spacing or 30 Mc in all. In today's rigs with PLL's the circuit itself is all in one or two chips taking up about one square inch or so. In this design the phase noise described in Ed Fong's article in ER #92 is limited to the 0 and 500 points on the PW dial and is noticeable only when there is no antenna connected to the receiver - not like today's rigs with PLL based VFO circuits. In these newer rigs the phase noise can be at every frequency you tune. The HRO-500 uses a conventional LC tuned VFO oscillator

continued next page

to eliminate by design all phase noise at these other frequencies.

The last IF feeds a product detector for CW and SSB reception or a diode envelope detector for AM work. The BFO in this receiver is a crystal controlled oscillator at 230 kcs. There is a S-meter amplifier and AGC circuit for the PNP and NPN transistors that is accessible from the rear apron.

Finally, the audio circuits are quite simple with a single stage of amplification driving push-pull output transistors and coupling transformer for a 3.2 ohm speaker or 500 ohm audio line.

Balanced Modulator

The balanced modulator circuit W7MS added to his 500 as mentioned earlier, is in Figure 1. If you measure your T14 and find it to have unbalanced resistance then you have two choices besides selling your rig. You can remove your T14 and rewind your secondary as I did or you can simply add Mike's circuit. If you elect to remove the transformer, be careful. It's not easy to remove and you could damage surrounding components. The secondary windings are easy to remove and rewind as I found, if you take it easy with the small wire. Also, if your transformer is balanced but your SSB signals are distorted then check to see if the diodes in your circuit are matched. That means the forward and reverse characteristics should be equal on the two diodes in the circuit. This goes for the four diodes in Mike's circuit as well. Also on Mike's circuit adjust the pot for minimum S-meter reading with no signal present. This balances the circuit.

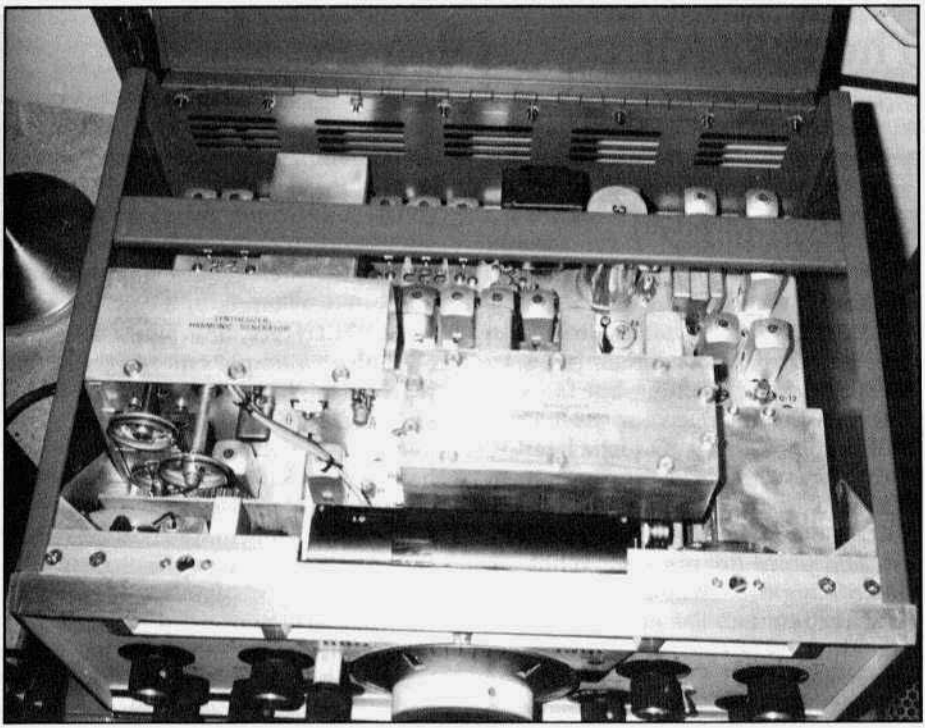
Mike used matched silicon diodes (1N914's) in his circuit and I used the original germanium diodes in mine. Point of fact is that Shottky (hot carrier) diodes would introduce the least distortion because of their 0.2 volt forward bias level and would be the best choice for this circuit. I plan to put Shottky diodes in my unit the next time I find it on the bench.

Things to Know

If you plan to own a HRO-500 then here are some things you may want to know. First, all of the transistors are in sockets. They probably did this because tubes are in sockets and because these rigs were originally designed for military application where up-time and quick repair is an issue. Also, in those days transistor sockets were an accepted idea. It was later that the world discovered transistor sockets introduced interconnect problems. Consequently, if your 500 doesn't work, simply unplug and re-plug in each transistor, being careful to put them back the way they came out, and in most cases this will solve most problems - this cured most of the flaky problems in my unit.

Secondly, look at the serial number on your HRO-500. If it has a 75- xxxx vs an 88-xxxx or 102-xxxx than there are some modifications you may want to put into your receiver. The 75 series 500's were the first consequently, they will need a few modifications to bring them up to the 88 or 102 series levels. I have sent the 75 series upgrade sheets I had to HI-Manuals so that those of you interested can get copies. They are worth doing to help circumvent some of the easy to fix problems. From what I have seen most of the 500's that need work are 75 series units. To my knowledge there are no upgrades to the 88 and 102 series units. Also, if you are lucky enough to have an original manual with your HRO-500 it will have the same serial number stamped on its front cover as is stamped on the receiver itself.

Thirdly, if your 500 isn't working too well check the electrolytics in your set. It seems that they are a failure mechanism in these units. And finally I would check the balanced modulator circuit as mentioned earlier in this article. I know of several people who have 500's with the same distortion problem and several where their balanced modulator works just fine. It obviously is a quality



Topside of the HRO-500 chassis.

issue vs a design issue. Dave Kuraner, K2DK's, article in ER issue #88 gives more information along these lines and is a good reference.

The only circuit in the 500 that, in my estimation, is truly temperamental is the 50 kc calibrator. It seems that National had problems with this circuit oscillating at cold temperatures. In fact most of the modifications to the 75 series are to this circuit. My 88 series has these upgrades but still doesn't want to come up when it is cold - not that I really need to use it. But if I did there is a real neat dial locking mechanism that you can use to mechanically calibrate the PW dial to the VFO circuits.

Some mention of the alignment is in order I think. I simply followed the manual to the letter as I did a full alignment of the non-synthesizer circuits. If you do this all should go well. I was impressed with the detail in the manual. It gave all that I needed to do a good job of alignment. Maybe, if my synthesizer goes on the fritz, I will do another article on this subject. I have worked on 3 sets myself and all have been 88 or 102 series units and all had no problems with the synthesizer or bandswitch as Dave mentioned in his article. I'm just lucky I guess.

Conclusions

Well, what else can I say? I still get a sparkle in my eye when I look at my HRO-500. I plan to keep it around a long time. Chances are if you hear me on using my 100V I will be using the HRO-500 as well.

Being it runs so cool I like to keep it on all weekend monitoring the various swap and AM nets while I am in the shack working on projects. It was truly a receiver before its time and deserves an honored spot in any ham shack. **ER**

The 1937 Allied Catalog

a brief look 60 years into the past

by Kurt H. Miska, N8WGW
3488 Wagner Woods Court
Ann Arbor, MI 48103

What do neon lamps, tungar bulbs, he Little Giant crystal set and interstage ransformers have in common? The an-wer is, as such, nothing but from an istorical perspective, they do have a ot in common. They are just a handful of the many thousands of products to e found in the pages of the classic Allied Radio catalogs of yore. Here's nother point to ponder. What do Millen, Knight, RCA and Hammarlund ave in common? The answer is a sad ne. They were electronic equipment manufacturers that have gone to the reat radio land in the sky, but they also hared pages in legendary Allied Radio atalogs. Thanks to Heath expert Chuck enson, we can take a short trip through he 1937 catalog. Shortly before Christ-nas I received a surprise package from huck in form a bound photocopy of hat particular catalog. While the whole dea of a huge article on Allied is, at east temporarily, on the back burner, I hought it'd be fun to browse through he 60-year old catalog and look at some f the more unusual but also mundane ems.

I guess the first thing that strikes you re the prices. Prices seem absurdly low. onsider that some items, such as a ahnstock clip, were listed for one cent. he then widely used and now very recious Type 45 triode came to a whop-ing 37 cents. Admittedly, there were lso many products that sold for well ver $100. However, we must put things nto perspective. Keep in mind, America as ever so slowly emerging from the epression and weekly wages were measured in terms of a few dollars a week. Therefore, the bits and pieces making up a simple super-regenerative receiver might have come to $5, which represented a significant portion of a person's weekly wage. Three-figure hamgear was only for the extremely affluent amateur.

The other thing that strikes the reader is the considerable emphasis on the do-it-yourself aspect of radio and electronics whether it concerned the generally more knowledgeable radio amateurs or the home handyman. All manner of gadgets, tools, accessories and more were aimed at the DIYs. Kits abounded and were almost always described as being exceptionally easy to build. There were countless bits and pieces to build antennas. Allied also offered a custom chassis building, drilling and hole punching service. For example, the charge for drilling up to a dozen small holes (up to 1/2 inch) was 20 cents. Transformer cutouts were 25 cents. As if that wasn't enough, the company also offered a power transformer rebuilding service that included winding new primary and secondary coils, if there was no replacement power transformer to be found among the countless standard ones already listed. Try that today.

It is also interesting to see how the language of radio and electronics has changed since then. The old catalog contained references to condensers, oscillographs, megacycles and analyzers. There was no listing for capacitors; instead you purchased condensers. What we call a scope or an oscilloscope now

was called an oscillograph. Frequency was expressed in cycles which everyone understood to mean cycles per second. While honoring Wilhelm Hertz is commendable, I am, at times, forced to wonder if everyone really understands the exact meaning of 60 Hertz as opposed to 60 cycles per second. Also, among the test equipment there were always various analyzers which, I suppose, we might call testers now.

So, let's move on to a few of the curious and by now long obsolete devices that once were very much part of the electronics industry. Also, let's take a look at some of the "there's nothing new under the sun" devices.

Candohmeter Resistance Indicator

An item that struck me in the section on resistors was the Candohmeter Resistance Indicator and I quote the catalog's description, "An accurately calibrated dual-range resistance indicator. Consists of two Candohm resistor units in a single mounting, insulated from and enclosed in neat metal casing. Sliding test prod moves freely in exposed slot. Quickly and accurately determines value necessary for replacing any burned out or defective resistor. Two scales reading 0-10,000 and 0 - 100,000 ohms are accurately stamped into the metal housing of the Candohmeter - the upper scale for determining approximate values and the lower to permit of more accurate reading within its range. Excellent for experimental or service work. Complete with test leads, insulated handle prod, and alligator clips. List Price $2.00; your price from Allied only $1.18."

For those radio repair shops or experimenters with a few more dollars to spend, there was the IRC Resistance Indicator at $4.50 list or only $2.64 from Allied . It featured the same resistance range as the Candohmeter but a more accurate and permanently attached ball bearing slider.

Without knowing more, I suspect both devices were temporarily wired into a circuit together with a milliammeter and then adjusted to whatever current value was correct for that particular circuit. A reading was taken off the slider and the correct fixed resistor was then installed. On second thought, wasn't this a very inexpensive substitution box? If any readers have more accurate information, why not send a letter to the editor or you can contact me directly.

The Lowest Cost Scope Ever

In what must surely have been the most inexpensive approach to an oscilloscope, we have an oscilloscope kit for $2.00. Yes, you read correctly -- $2.00. The catalog description is as vague and as intriguing as they get. Again, I quote.."Amateurs and experimenters can now build their own oscilloscope with this inexpensive kit. Will indicate audio distortion, R.F. wave form, percentage of modulation, etc. Kit contains contain neon tube with mounting clips, 3" x 5" unbreakable mirror with motor shaft adaptor and complete instructions. Price was $2.00 for the kit or $1.50 for the neon tube only.

I really don't think it was a scam but merely an extremely simplistic electromechanical approach to examine waveforms. Certainly there will be an ER reader out there who can help me with this one. The whole idea is probably related to the early days of electromechanical color TV. Help!

Test Equipment

With my more than passing interest in test equipment, this section of the catalog has a special fascination. Of the companies listed, only Triplett survives. Gone are RCA, Supreme, Readrite, and several other less well known names. Assuming you wanted to go into the radio repair business, you would need at the very least a VOM, a tube tester, some sort of signal generator, perhaps an oscilloscope. The classic VTVM, such as the RCA Voltohmyst or the Heath V-

continued next page

The 1937 Allied Catalog from previous page

series were not on the scene yet. A good scope, the Jackson Cathode Ray Oscillograph at $79.50, might be good for 100 kc (kHz), a signal generator, the Jackson model 540 at $56.25 without batteries, might reach 70 Mc, and the Triplett Model 666 VOM at $14.70 could handle up to 1,000 volts. It is noteworthy to mention that some of test equipment sold in those days was available for 25 cycle (Hz) operation, 110 volts DC and much of it also used battery power.

Walkman Move Over

Walkman make way for the One Tube Pedestrian Belt Receiver. For a mere $4.65 you could buy and build Popular Mechanics' extremely compact receiver designed to be carried on one's person. It used a single Type 19 high mu twin power triode for "two tube performance." I guess what I want to know is that what manner of filament battery did you have to carry around since the Type 19 had a 2 volt filament that drew 260 mA. A single cell of a lead-acid battery develops about 2.2 volts and they would not have been small at that time. Further, the catalog did not list such a cell. However, at the Belt Receiver's price of $4.65 there was a hitch, the kit did not include the tube, batteries, headphones and a carrying case. Those vital items required you to shell out another $4.55. The filament battery was conventional. The 90 volt B battery was a curious ribbon battery made by Burgess. Other than the advertised weight saving, there is no further mention in the catalog's battery section. The purchaser was also reassured that the large, easy-to-follow diagram and instructions would enable anyone with little or no radio experience build this ideal receiver for hikers and campers.

The Magic Eye

In the radio industry's quest to make it easier to tune in elusive stations, it developed what was called the "magic eye", also dubbed cathode ray tuning unit. This took the form of a special tube that featured a phosphorescent target that responded to changes in controlling voltage. For tinkerers, experimenters or hams, who wished to install one of these in the family radio, there was a kit for 73 cents that consisted of a socket with a little wiring harness and instructions. For an extra 88 cents you became the owner of the tube, very likely a 6E5 electron ray tube. Called Magic Eyes, these tuning devices survived well into the late 1950s. When I was in the army in '59 in Europe, my Grundig receiver had one of these.

Remember Vibrators?

Sixty years ago, car radios were, if not experimental, probably temperamental. Accessories to reduce static and interference abounded. One thing all car radios had in common were vibrators, those clever devices to chop the 6 volt DC into some vague form of AC to step up and ultimately rectify for the ever necessary B+ supply. Most vibrators were cylindrical with at least four pins to plug them in. I can still recall disassembling one in my first go-around with the radio hobby. The actual vibrating mechanism was heavily padded with sponge rubber to protect it from damage as you bounced along country roads and also to dampen the rather strong humming noise these gadgets generated. (My brother and I owned a 1953 Crosley with a radio that still used a vibrator.)

Some Ham Gear

In the "there's nothing new under the sun" category, consider the Haigis 5 Meter Portaphone Jr., a portable transmitter-receiver operating in the 50 to 60 mc band. This very modest approach to the now ubiquitous transceiver used only two tubes, a type 30 medium mu triode and a type 33 power pentode. You supplied your own 150 volt B+ and filament supplies. The catalog description assured the buyer that it transmitted and received on the same frequency

and delivered 100 mA to the antenna when transmitting. It was considered a terrific value at $14.94.

For the more affluent hams there were, of course, the offerings of Hallicrafters, Hammarlund, National and Knight. But, here you're talking big, very big bucks. For example, the Hammarlund "Super Pro", five band 15 to 560 meters communications receiver set you back $241. National's NC-100 receiver was $132 with the crystal filter. Still out of your price range? Try National's "One-Ten" Ultra High Frequency Receiver at $39. Finally you could spend $5.58 and get a Knight 5 Meter Transceiver Two-Way 56 - 60 Mc Amateur Phone Kit.

Your Very Own Powerplants

Sears Roebuck's success in selling to the rural communities of America must not have gone unnoticed at Allied Radio. Many farms were still without electricity and so Allied stepped into the breach and offered electric lighting systems for 6 volt operation with the power coming the Rurlpower 6 Volt Light & Power Plant at $39.95 list but only $29.95 from Allied Radio. It consisted of a gasoline engine driven 6-volt generator capable of supplying about 150 W of power. Charging 6-volt storage batteries was one of its jobs and this was done at 20 amps at 2,350 rpm. Wiring a house was simplicity itself with the Complete 6 Volt Lighting System that set you back all of $7.95. Life was then complete with 6-volt light bulbs that came in 15, 25 and 50 W sizes. A generous selection of suitable six and eight tube table and console radios, operating from your 6-volt system, enabled you to listen to classic radio drama.

For those preferring the more quiet approach there was the New Rurlpower Gyroscopic Windcharger listed at $29.95 but only $19.75 from Allied. Quite simply it was a windmill driven generator meant more for charging 6 volt (or 2 volt) batteries. That wasn't all. Though not radio or electronics items, it is noteworthy to mention that Allied Radio also sold toasters ($1.30), waffle irons ($2.54), and a host of other small appliances. Interestingly, most of these were intended for 110 volt operation.

So, there you have a small sampling of what Allied offered. There's so much more and if any readers of Electric Radio know of other strange, quirky or odd-ball items that once were very much part of the electronics industry, why not drop me a line or send me an e-mail at 76247.1422@Compuserve.com

I wish thank Chuck Penson, WA7ZZE, for providing me with the photocopy of the 1937 Allied Radio catalog without which I could not have taken this nostalgic trip or written this article. **ER**

Tribute to Dave Smith from page 5

was a man "deeply in love with his family. His face would light up like a Christmas tree when asked about his wife and kids. He also loved those brown cows in the barn, and was proud of working shoulder-to-shoulder with Brenda to make a farmer's living. I will miss him like a brother." **ER**

Editor's Comments from page 1

started writing it in Cycle 18 and has written it through Cycles 19, 20, 21 and 22. He reports that solar experts have said that Cycle 23 will exceed the peak of 159 recorded during Cycle 22, which was the third highest in recorded history.

I'd like to keep track of developments on ten (it's the favorite band for a lot of us) in the pages of ER. I would like to hear from everyone with logs and comments on ten activity for a report in the April issue. E-mail, Fax or USPS your reports in. It should be interesting. N6CSW

The Hammarlund Four-11 and Four-20 from page 27

Boatanchor and Classic Exchange frequency. In the midst of tuning, I was hailed by my friend Al Lorona, W6LX, who had been calling CQ SKN nearby. My twenty or so watts didn't exactly clear the frequency and the crystal oscillator was somewhat wobbly (we call that a "distinctive signal" on the Classic Exchange), but Al and I did manage a nice chat about the S20R that I'd sent to him for his Dad's Christmas present.

Since that trial run, I've interfaced a VFO to the Four-20. To get rid of the additional grid to ground capacitance in the Colpits and make the oscillator easier to drive, I changed it back to the original straight tetrode circuit. For a VFO, I chose a T-19, 80 meter Command Set transmitter. It's the same vintage as the Four-20, and a lot of them were used as VFO's by those of us in that era. I capacity coupled from the hot end of the 1625 plate coil through a piece of RG-59 coax into the grid of the Four-20 oscillator. I pulled one of the 1625's, since both of them certainly aren't needed to drive a 7C5, and to reduce the plate-to-ground capacitance to the point where I could retune the 1625 plate to resonance by adjusting the Command Set's final plate padder capacitor. I'm powering the 1626 oscillator plate and 1625 screen from 150 volts regulated by a VR-150 and the 1625 plate from a 275 supply. I key the oscillator plate and final screen in the Command Set VFO for break-in. The resulting signal is much better than the crystal oscillator was.

The Four-20 was built in an era when TVI was just coming on the scene. Prior to 1947, hams had reduced their harmonics to the point where they would not interfere with other HF stations operating many miles away, but they had never been faced with the problem of broad band receivers in their immediate neighborhood trying to pick up relatively weak signals in the VHF TV channels where higher order ham harmonics were often still strong enough to cause considerable interference. Ham gear, of which the Four-20 is typical, used relatively powerful, nonlinear class C oscillator, multiplier and amplifier stages which generated more than enough harmonic energy to wipe out neighborhood television reception. The same 1948 ARRL Handbook that carried the Hammarlund Four-20 ad has one paragraph dealing with "Interference with Television Reception." It says, in part, "No general solution to the TVI problem is known at this writing, but reduction of harmonic radiation seems to be productive of best results. Additional information concerning TVI will be published in QST as progress is made."

Coming from this background, I did not have high hopes about using my Four-20 on its higher frequency ranges. My friendly predecessor had taken pains to use shielded wire on the control leads from transmitter to modulator, and he had scraped the paint away from the transmitter top cover and its cabinet where they mate and had installed extra screws as well. Still, there is that big, unshielded hole in the front panel for the meter and an open slot all the way around the bottom plate, both of which provide ample opportunity for those pesky TVI harmonics to make their way out of the rig. So I was most pleasantly surprised to find that the Four-20 lives in reasonable peace with my portable TV set on channels 2, 4, 5, 7, 11 and 13 when it is operating on 80, 40 and 20 meters and feeding its output through a low pass filter. With the rig on ten meters, there is a definite second harmonic problem with channel 2. But that still leaves me with plenty of bandwidth on which I can operate this newest addition to my Classic Exchange shack.

So look for W8KGI on AM or CW and you just might be lucky enough to work that entirely new transmitter brought to you by the same engineering skill and precision methods which produced the Super-Pro and the HQ-129-X. After 50 years, it's still chugging along. **ER**

Press Release

Collins Reflector Now Fully Automated

The Collins Collectors Association would like to invite those of you who have an interest in Collins Radio to subscribe to the now fully automated Collins Reflector.

Here are the instructions:

As of 1/6/97, the Collins Reflector will be is now a fully automated listserver.

The new automated list processor will be a real upgrade. It will enable you to get the material in nearly real time and does not require me to forward each message manually. You will get the material much quicker than before. The Collins Listserver behaves much like the Boatanchors list. Simply, you subscribe to the list, send it messages which it then "reflects" back out to all those who subscribe. This is done once every ten minutes.

You must resubscribe to the new listserver in order to continue to participate. The automated list server follows the same guidelines contained in the CCA FAQ. Please continue to follow those guidelines for posting and contributing.

Here is how to subscribe: Send the following E-Mail message to: listserv@listserv.temple.gov

Leave the "subject header" in the body of your message blank and in the body, simply type: subscribe collins

The listprocessor will output an E-Mail message back to you with easy to follow instructions asking for your confirmation. At that time, you will be asked to send a second E-Mail message to the listserver. Follow those instructions exactly and send the second, confirmation, message to the listserver.

If all is successful, you will be signed up to the list and a complete set of instructions will be sent back to you in the form of an E-Mail by the automated list server.

Finally, a very big thanks to Dave Kelly, AI7R and the City of Tempe, AZ who have graciously provided and set up the server. Dave and the Collins Collectors Association sponsor the Collins Reflector as a no charge benefit for Collins aficionados everywhere.

Chuck Rippel, WA4HHG, Secretary, Collins Collectors Association

---

Classic Exchange from page 17

web page, the Boatanchor site, and Electric Radio for upcoming CX news. And whether you run an AWA antique, a CX classic, or a brand new sand state rig get it going and join us to experience from out of the days of yesteryear that sense of real ham radio adventure. **ER**

Impedance Matching Range from page 18

coax input impedance clockwise around the 3:1 SWR circle to the small circle at 150+j0 ohms. This is well within the matching range boundary. Therefore, correct tuning and loading can be made possible by the addition of line length.

The matching range for the above linear is a little larger at 3.5 MHz and a little smaller at 4.0 MHz. It probably is much larger on the higher frequencies. Each different output-network design has its own matching range limits. A pi-L network can easily match to lower resistance values, for example. Tables listing network component values typically just list the values for matching to 50+j0.

Thus adding line length can make matching possible without improving SWR in some cases. **ER**

The K6HQI Memorial 20M AM Net on 14.286 has been reactivated. There is activity on the net most days. It starts at 4 PM Pacific, 7 days a week.

The BC-312/342 Receivers from page 13
without special tools on the 312/342. The 348 has as many DBPCs as the 312/342 but these are much more accessible and easy to replace. The BC-348 is also far more stable. My BC-348K drifted only 500 CPS in three hours from a cold start as compared to 6-8 kHz for my 342s (see above). I have also found the BC-348 crystal filter to be better on phone (but these filters leave much to be desired in both receivers). On the other side of the coin, the BC-312/342s have much more audio and I find having both fast and slow tuning rates to be very convenient as mentioned before. (One can do a lot of cranking with the BC-348). The BC-312/342s are also a bit more selective, 7.5-8.0 kHz at -6 dB (see above) as opposed to 8.0-8.5 kHz measured on the BC-348.

However, during many hours of side-by-side use under many different band conditions I have found no significant operational differences between these two receivers. In no instance have I been able to hear anything on one that I couldn't hear equally well (or equally poorly) on the other. The BC-312/342s have more audio but the 348 has enough. The BC-348 crystal filter is better but not enough to make any real difference. The 348 is more stable but this is of no particular advantage in normal ham use where one has a hand on the tuning knob most of the time anyway. Both receivers are great fun to use under light to moderate band conditions, but it's tough going with either on 3885 in the early evening hours.

Conclusions

They're homely and they've got their problems but they did the job required at the time and probably did it well.

Maintenance personnel may not have loved them, but other radios of the period (the BC-191, for example) were no particular pleasure to work on either. All in all, a competent design competently executed and fortunately available when needed.

Inquiries and comments are welcome. I would be especially interested in hearing from readers who have had military experience with these receivers. **ER**

Notes:

1. Hutchens, Walt: "Electric Radio in Uniform, The BC-348 Receiver," Electric Radio, Number 31, November 1991.

1. "The United States Army in World War II, The Technical Services, The Signal Corps: The Emergency" dated 1956.

2. War Department Technical Manual TM 11-310, "Schematic Diagrams for Maintenance of Ground Radio Communications Sets" dated October 1943.

3. War Department Technical Manual TM 11-850, "Radio Receivers BC-312, -A, -C, -D, -E, -F, -G, -J, -L, -M, -N, -HX, and -NX; BC-342, -A, -C, -D, -F, -J, -L, -M, and -N; BC-314, -C, -D, -E, -F, and -G; BC-344, and -D" dated September 1946.

4. War Department Technical Manual TM 11-850 N, " Radio Receivers BC-312-N, BC-312-NX, BC-342-N, BC-314-G, BC-344-D" dated February 4, 1943.

5. The SPEAKER 2ND AUDIO jack is a three-way JK-68. The "sleeve" connection is grounded and audio is brought out to the "tip" in all receivers. The "ring" connection is not used in the BC-342 and is left floating. In all BC-312 receivers except the "N" and "NX" models, DC from the LAMP fuse is brought out to the "ring" connection. This was apparently done to power a remote application of some sort and would explain the inclusion of a 10 amp. fuse in a circuit apparently feeding only two small pilot lights. I find no information on this in the documentation listed above, however. Does anyone know more?

CLASSIFIEDS

Advertising Information

Subscribers receive 1 free - 20 word- ad per month. **Extra words are .20.** 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 20 words send payment for the extra words.**

Non-subscribers: $3 minimum for each ad (up to 20 words). Each additional word is .25. **Please call or write for display rates.**

VINTAGE EQUIPMENT ONLY

ER
14643 Road G
Cortez, CO 81321-9575

Phone/FAX (970) 564-9185
e-mail: er@frontier.net

DEADLINE for the APRIL Issue: APRIL 3

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

FOR SALE: "AM FOREVER" quality Haynes T-shirts, grey, blue, green & red. Sizes M, L, XL - $15 shpd. Rick, K8MLV/Ø, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

FOR SALE: 3' x 5' reprint of factory schematic for Collins KW-1 - $25 ppd US. Tom Berry, K9ZVE, 1617 W. Highland, Chicago, IL 60660. (312) 262-5360

FOR SALE: HW-99 w/manuals - $250; new Heath #404-328, 2.1 khz at 3.395 MHz SSB crystal filter - $25. D. A. Mike Michael, W3TS, 129 Church Ln., POB 593, Halifax, PA 17032-0593. (717) 896-3973

FOR SALE: Bristol Electronics Variac 0-140 VAC, 7.5 AMPS MAX, w/knob and 0-100 round scale - $35; GE AC amp meter, 0 to 10 amps, 2.75" mounting hole, 3.5" rectangle face with white background $10. W7FG, Vintage Manuals, 800-807-6146.

FOR SALE: Ranger, HW-16/spkr/VFO; DX-60B/VFO. All work, w/mans. Also 450TL. Manny, 70 Orme Ct., St. Paul, MN 55116. (612) 699-7932.

FOR SALE: 2KW Cubic Communications antenna tuner Model ST-2B, reduction drive, lighted meters - $175. Larry Steeno, K9LWI, 1838 Bluespruce Ct. Green Bay WI 54311.

FOR SALE: Zenith Transoceanics H-500 - $85; Royal 1000 - $ 80. Carter , (804) 979-7383

FOR SALE: Collins S-Line aluminum knob inlays: small (exciter/PA tuning) - $1; 30L-1 - $2; spinner/plain (main tuning) - $3. Charlie, K3ICH, 13192 Pinnacle Lane, Leesburg, VA 20176. (540) 822-5643

FOR SALE: Hallicrafters, RME, Conset, other. Also power supplies, test equipment,VHF/RF amps, more. LASE, Don Jeffrey, POB 1164, Monrovia, CA 91017.

FOR SALE: R-390A/URR Orig.1961 Maintenance Manual TM11-5820-35,189 Pgs.,$28 incl.dom Priority Mail. Aben POBox 4118 Jersey City,NJ 07304 Avidov@juno.com

FOR SALE: Ultramodulation info and schematics. Increase the amount of audio sent and received - $2 WB8BEM,410 Robinhood Dr. Florence, AL 35630.

FOR SALE: HW-32A w/pwr sply & manual - $125; HW-12 w/pwr sply & manual & 2HP13 sply & 1HP10 - $150; RT-67 w/sply - $50; RT-68 w/sply, no meter - $40; Heath IG-28 Color Bar Dot Gen w/manual - $25. All work, all plus shpg . Will trade all for good R-390. William R. Bogart, KA9CWK, 4146 S. Goff Rd. Hillsboro, IN 47949. (765) 397-3860

FOR SALE or TRADE: 32S-1,75S-3, 32S-1, 75S-3B,75A4,KWM-2A. All ps. Fred, W6YM, (209) 296-5990, fhonnold@juno.com

FOR SALE: RME VHF-152 2/6/10M converter. Exc, condx - $75. R. J. Moraine, W5LX, 3700 Cliffwood Dr., Bedford, TX 76021. (817) 281-1128.

WANTED:

In pristine condition: Collins 32V3, 75A1, 30S1, 270G1, KWM1, 30K1, mech filter adapters, 55G1. Not for resale, willing to pay top dollar.

Lee, W9VTC, (847) 439-4700 (d), 726-1660 (n)

WANTED: SC-101; SC-301; KW-1; 30K-1 thru 5; 302C1; 75A thru 75A-4 rcvrs and spkrs, any condx. Purchase entire estates, pick up 48 states and top $ paid. Rick, (800) 462-2972

WANTED: Still collecting early WW II radar equip. & manuals, what have you. Allan H. Weiner, 97 High St., Kennebunk, ME 04043. (207) 985-7547

WANTED: QST, CQ, Radio Craft & Radio News magazines, 30s, 40s, 50s. Advise price + shpg. Beni Fernandez, KP4DN, 1674 Atlas St., Summit Hills, PR 00920.

WANTED: Good R-389, R-390A and SP600JX. Mitsugu Shigaki/ 2825-2, Jozan Kamidai Machi Kumamoto 860, Japan. FAX: JAPAN (0)96-329-4601, fle8316340pcvan.or.jp

WANTED: Info on military entertainment radios, photographs, manuals, personal histories on use, or any set you may have to sell. Henry Engstrom, KD6KWH, POB 5846, Santa Rosa, CA 95402. (707) 544-5179

WANTED: Collins - Amateur catalogs, sales literature, manuals, promotional items & Signals. Richard Coyne, POB 2000-200, Mission Viejo, CA 92690.

WANTED: Marantz, McIntosh, or similar tube audio amplifier in any condition; Heath catalogs. Mike Nowlen, WB4UKB, POB 1941, Herndon, VA 20172

WANTED: Collins 75S3C, 312B3. John Miller, 907-337-9157, Alaska time, mcmiller@alaska.net

WANTED: Info/history on WW2 TCS radio system for article. Your help appreciated. Thanks. Greg Greenwood, WB6FZH, Box1325, Weaverville, CA 96093. gregbfzh@aol.com

WANTED: Mics-EV638, 641; Shure 520, CR80, 705, 707, 545S/54PE; Astatic JT-30/40,600; Turner 211, VT-73; Universal 312; American RC, C6; Ronette G210, B110. Tom Ellis, Box 140093, Dallas, TX 75214. (214) 328-3225/Fax 328-4217. 74053.3164@compuserve.com

WANTED: 697 PS for HRO M; 5880 AB PS; National spkrs, to restore, love, enjoy. Not for resale or profit. Sylvia Thompson, N1WVJ, 33 Lawton Foster Rd., Hopkinton, RI 02833. (401) 377-4912

WANTED: Pwr sply & telegraph key for TBY-8 to complete set. Bob Forte, K2RGM, POB 160, Lake Luzerne, NY 12846. (518) 696-2400

Vintage Manuals Available

Step way up to the finest replicated and original vintage manuals available. Get new Catalog 7, three $.32 stamps. Pete Markavage, **The Manual Man**, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964

WANTED: WW II German, Japanese, Italian, French equipment, tubes, manuals and parts. Bob Graham, 2105 NW 30th, Oklahoma City, OK 73112. (405) 525-3376

WANTED: Tektronix memorabilia & promotional literature or catalogs from 1946-1980. James True, N5ARW, POB 13280, Maumelle, AR 72113. (501) 851-8783, FAX 851-8784.

WANTED: Non-working B&W ant. tuner; early QST and CQ mags in binders; Heath HR-20 rcvr; new 813 tube. Smitty, AD6V, CA, (209) 255-1177

WANTED: Vintage AM equipment for personal use, must be collector quality or mint. Prefer Collins, will consider others. Bob Tapper, K1YJK, Box 61538, Denver, CO 80206. (303) 740-2272, FAX 777-6491

WANTED: Heath gear, unassembled kits, catalogs and manuals. Bill Robbins, 5339 Chickadee Drive, Kalamazoo, MI 49009. (616) 375-7978. billrobb@net-link.net,

WANTED: German WW2 radios. Clandestine sets all periods. Will pay freight. Offering cash/swap. Rag Otterstad OZ8RO, Hosterkobvej 10. DK-3460 Birkerod, Denmark PH: ++45-4281 5205. Email: otterstad@mec.dk

WANTED: Collins 51S1; also need a Penta PL172 amplifier tube. Don, MI, (616) 649-4646, k8pou@juno.com

WANTED: Orig. manual for Collins 75A-3; VFO for Johnson Viking II. Deric Affleck, VY2DA, Bedeque RR1, PEI, C0B 1C0. Canada

WANTED: AM Broadcast xmtr, pickup in Florida possibly Georgia. Lloyd Scott, FL, (941) 533-4654, wpul11308@concentric.net

WANTED: 4CX1500A tube; Harvey Wells R9A; mint Drake R4A, CC-1, SC-6, SC-2. Chuck, K1KW, POB 369, Bolton, MA 01740. (508) 779-5051

WANTED: Hallicrafters SX-88, SX-100. Must be in exc. or better condx. Joe, WA5HNK, 5233 Spencer, Pasadena, TX 77505. (281) 487-5233, jsm@phoenix.net

WANTED: Hammarlund HQ-180A main and bandspread dials, plus dial fiducials, unscratched, & not warped. Bob Gustafson, 7340 Furrow Ct., Cherry Valley, IL 61016. (815) 332-9520

WANTED: Copy of tech manual for GR model 916A RF impedance bridge. Will pay. Larry Bush, W5NCD, 399 Arrowhead Point, Waco, TX 76712. (817) 848-5155

Sandhilll Technical Services
Larry Tucker, N4KVP
P.O. Box 651
Candor, NC 27229-0651

Repair/restoration services for all vintage transmitters and receivers

* we guarantee our work
* quick turn-around
* $35/hour bench time

e-mail sts@ac.net
http://www.janrix.com/com/sts.htm
Phone 910-974-7867, leave message

FOR SALE: T-Shirts w/Johnson Viking logo - $15, state size. Viking Radio Amateur Radio Society, POB 3, Waseca, MN 56093.

FOR SALE: Used technical books - radio, electronics, math, military, magazines, etc. List: $1 (stamps OK). Softwave,2 Dept. ER, 1515 Sashabaw, Ortonville, MI 48462

FOR SALE: B&W 5100/5100B VFO dial overlays, super quality - $10 postpaid. Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53228-0803.

FOR SALE: 75A-2 - $350; SBE-34 - $75; Hallicafter SP44 - $75; Central Electronics 458 VFO - $50 Central Electronics 20A - $140; Eldico SSB 100F- $275; Hallicrafters SX 25 - $80; Gonset GSB-100 SSB xmtr - $350; Davco DR-30 mobile rcvr - $90 ; Hewlett-Packardpwr sply Model 712B - $40; Hammarlund SP200 - $150; Lakeshore Industries Bandhopper SSB VFO - $50; Swan SW-240 SSB xcvr - $150; Yaesu FT-50 SSB xmtr, FR50 ham band rcvr - $300; Swan 175 SSB xcvr - $200. Matt Parkinson, KE6OUS, 3701 E. Chapman Ave., Apt. 5, Orange, CA 92669. (714) 744-6127, maattradi@themall.net

FOR SALE: Heath QF1 - $25. **WANTED:** Nat'l spkr for HRO-7,(MCR); dial knob for HRO-7. Doug, (541) 367-6486.

FOR SALE: Drake pwr sply/spkr for TR-3/4, exc condx - $110 shpd. Craig, WA9HRN, IL, (847) 367-1599, cpitcher@cahners.com

FOR SALE: Strong steatite antenna insulators. Lengths from two to fifteen inches. SASE for list. John Etter, W2ER, 16 Fairline Dr., East Quogue, NY 11942. (516) 653-5350

FOR SALE: NC 183 rcvr, near mint, late run w/15 mtr bandspread, XCU 50 calibrator, orig manual - $250. Bob, KL7HDY, AK, (907) 346-1044.

FOR SALE: Approx 15 lbs radio stuff, lots of coax connectors, tubes, sockets, resistors & lots of misc hardware - $110 ppd. Lyle, CO, (303) 660-0232.

FOR SALE/TRADE: EICO 460 oscilloscopes (2), good CRT, manuals, clean, repairable. Louis L. D'Antuono, 8802 Ridge Blvd., Brooklyn, NY 11209. (718) 748-9612 after 6 PM.

ELECTRON TUBES FREE 1997 Catalog, over 2,000 types in stock. **Electron Tube Enterprises,** Box 8311, Essex, VT 05451. (802) 879-1844, FAX (802) 879-7764

FOR SALE: Ten-Tec electronic keyer, model KR1-A - $20; B&K scope model 1460 - $65, OBO. Frank S. Law, W8SET, 1 Wildacre Rd, Charleston, WV 25314. (304) 343-0415

FOR SALE: Dynaco SCA-8 two- (or 4) channel transistor amp 40 watts (or 20) per channel, perfect; $100; Pat 5 kit - $150; SCA-50 amp kit, 25 watts/channel - $125. All ppd. Charles Graham, 4 Fieldwood Dr., Bedford Hill, NY 10507. (914) 666-4523

FOR SALE: 100' RG218, LC males - $200; B&W terminators for high power 'V' antennas - $300/pr; LC to 1-5/8 EIA - $50ea; WW2 USN RCA PA horns - $40ea; Westinghouse TBL or TDE remote pwr switch, NOS - $50; QST '24-'30 - $5 ea, '70's, $2 ea; HF-80 stuff: Baby Rockwell wall rack - $20; TE-233 Rockwell HF modem - $150 ea; 450TL - $75; 150TH - $30; 2-450 - $50; 810 - $20; 860 - $75. Dennis, AZ, (602) 710-0803. dgilliam@maricopa.edu

FOR SALE: Tube audio: Knight KN140 FM tuner -$30, OBO; Philmore SA-2000 stereo amp/preamp - $50 OBO. W8QA, MI, (810) 362-2656. Fax 362-2706.

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

FOR SALE: Repo manuals for R1451, (V)/WLR6(V) - $85 + shpg. Robert Folwaczny, 1701 Westminster Pl., Oklahoma City, OK 73120. (405) 721-7478

FOR SALE: Chrome knob for Heath TX-1 tuning, etc - $7; TV alignment gen, Heath in kit form - $125; SB-10 parts unit - $10; Orr VHF handbook - $5; Heath T-shrts - $15 ea; xmtr meter rack by Link - $25. Marty, NJ, (609) 466-4519.

FOR SALE: Oscilloscopes; VTVMs; comm. rcvrs; sig gens; tube testers; test equip; pwr splys; vacuum tubes; parts, etc, send $2 for the 40 pg list & receive a $5 credit on your first order. F.J. Conway, W4YIG, ER, 2217 NE 17th Terrace, Ft. Lauderdale, FL 33305-2415. (954) 563-2515

FOR SALE: Mackay, no weights, cast iron base, 9-34 casting date; Speed-X model 515; Speed-X model 509, repaired T bar; Speed-X straight key. Jack, K6LVD, 5636 Del Monte Ct., Santa Rosa, CA 95409.

FOR SALE: Perfect copy of MIL-HDBK-161 Jan 1959, 2152 pgs - $200. Walter M. Chambers, K5OP, POB 241371, Memphis, TN 38124-1371. (901) 761-9381

FOR SALE: 75A-4 MHz drum decals, 20.5 or 20.8 MHz (you specify), buff color, install instructions - $8.50 ppd. W3HM, Rt 3 Box 712, Harpers ferry, WV 25425

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

FOR SALE: Books, some on very early radio, some technical, some Amateur Radio. Send SASE for list. Fenton Wood, 109 Shoreline Dr., Star Harbor, Malakoff, TX. 75148 (903) 489-0204

FOR SALE: Collins 50E7, Collins 32RSI w/antenna tuner; Collins 51J4. Jack, K6LVD, 5636 Del Monte Ct., Santa Rosa, CA 95409.

FOR SALE/TRADE: Antique radios: Philco, RCA, Zenith. List LSASE; sell, trade for ARC-5, BC-375, others, any condx, parts, etc. Jon Chamberlin, 1458 Wilderness Dr., Maumee, OH 43537. (419) 893-1737

FOR SALE: CBY-52211 military xmtr, 7-9, 1 mc, very nice condx. Fred Clinger, OH, (419) 468-6117 after 6 PM EST.

FOR SALE: Gonset Commander 160-6M - $90; Johnson 6N2 w/VFO - $90; panadapter USNrbw-2M, 5.25 mc IF - $75. Van Field, W2OQI, 17 Inwood Rd., Center Moriches, NY 11934. (516) 878-1591

FOR SALE: Globe HG303 xmtr & V10-VFO - $125. Harry Blesy, N9CQX, 95740 Clarendon Hills Rd., Hinsdale, IL 60521. (630) 789-1793

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

FOR SALE: Vintage tubes, (833A, VT4C, etc.); assorted radio/wireless telegraph books & magzines, 1880-1935. SASE list. Jan Perkins, 524 Bonita Canyon Way, Brea, CA 92621.

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

FOR SALE: Superior Powerstat #117T, 120 at 10A, like variac, enclosed - $20 + shpg (heavy). Henry Mohr, W3NCX, 1005 W. Wyoming, Allentown, PA 18103.

FOR SALE: Service. Reproduction dial covers, clock lenses (Hammarlund, etc) old or dimensioned drawing - $10 ppd. William P. Turner, WA0ABI, 1117 Pike St., St. Charles, MO 63301. (314) 925-1307

FOR SALE: Autek QF1 audio filter - $25; Jones 636N, 600W load 0-3000 MHz - $40. Dave McClelland, W3KDD, 5129 Avoca Ave., Ellicott City, MD 21043. (410) 465-3884

FOR SALE: SX-25 - $125; SP600 - $145. **WANTED:** 6JB6 tubes. W7RBF, AZ, (602) 864-9987.

FOR SALE: KWS1/75A4, very good - $1950 US, no shpg. Will deliver to US border. Lorne, VE7BOX, BC, Canada, (250) 675-3338.

WANTED: Very early Hallicrafters and Hallicrafters/Silver Marshall equipment including Skyriders with entire front panel dull aluminum color, S-30 radio compass, S-33 Skytrainer, S-35 panadaptor, wood console speakers - R-8 & R-12, HT-2, HT-3, BC-939 antenna tuner, parts, advertising signs, paper memorabilia of Hallicrafters. Also want RCA model AVR-11 airport tower receiver. Chuck Dachis, WD5EOG, "The Hallicrafters Collector", 4500 Russell Dr., Austin, TX 78745. (512) 443-5027

WANTED: Info on the old Allied Radio in Chicago. I'm researching the company for an article in ER. Need anectodes, stories, history, etc. Kurt H. Miska, N8WGW, 3488 Wagner Woods Ct., Ann Arbor, MI 48103. (810) 641-0044 wk. FAX (810) 641-1718. khm@tir.com

WANTED: Visitors and tubes by museum. Old and odd amateur or commercial tubes, foreign and domestic purchased, traded or donations welcome. All correspondence answered. K6DIA, Ye Olde Transmitting Tube Museum, POB97, Crescent City, CA 95531. (707) 464-6470

WANTED: Oscillator xfmr, 1600 kc, Millen #65163. David L. Muse, KD4FEB, 510 Minturn Ave., Hamlet, NC 28345.

WANTED: SX43 & S38. Les Mathews, WB2DQV, 421 Carvin St., Clayton, NJ 08312.

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

WANTED: GPR 90, 91, 92; Hallicrafters SX-88; Eddystone rcvr's. James B. Geer, 1013 Overhill, Bedford, TX 76022-7206. (817) 540-4331

WANTED: Military radios: Canadian WS #29 (CDN) A set; eastern European RM-31 set. Leroy Sparks, W6SYC, 924 W. McFadden Ave., Santa Ana, CA 92707-1114. (714) 540-8123

WANTED: Mics by Altec, Neumann, AKG, WE, Sony, any vintage; tube compressors/limiters; will trade my rare NOS tubes for mics. Mike States, Box 81485, Fairbanks, AK 99708. (907) 456-3419 ph/fx

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

WANTED: HQ-100 rcvr, signal tracer & 80 meter novice band xtals. Pete Cullum, KØWRX, 1332 Harlem Blvd., Rockford, IL 61103. (815) 965-6677

WANTED: Kenwood DFC-230 freq controller. Mike Murray, KE2LH, NY, (516) 489-4094

WANTED: Manual schematic TMC rcvr GPR1105. Harry Weber, 4845 W. 107th, Oak Lawn, IL 60453-5252.

FOR SALE: New list -hundreds of manuals, schematics and service information. Send 2-stamp LSASE. David Crowell, KA1EDP, 40 Briarwood Rd., North Scituate, RI 02857-2805. (401) 934-1845

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

FOR SALE: HG-10 VFO - $85. Chuck, KØRFQ, MO. (417) 863-7415

FOR SALE: Copy, Collins Radio Fundamentals of Single Side Band - $19; Collins Wing Emblems, small - $30, big - $40. Gary, CA, (714) 552-1068.

FOR SALE: Books: Television Simplified (Kiver); Mandl's Television Servicing. Your choice - $8 ea ppd. R.J. Eastwick, N2AWC, 224 Chestnut St., Haddonfield, NJ 08033. (609) 429-2477

FOR SALE: Hallicrafters SX-99, orig tubes! - $125; several S-40/B's, from - $35; Johnson 6N2 - $75. Charlie Talbott, K3ICH, 13192 Pinnacle Ln., Leesburg, VA 20176. (540) 822-5643

FOR SALE/TRADE: Xmt'g/rcv'g tubes, new & used - 55¢; LSASE for list. Many thousands added lately. I collect old & unique tubes of any type. **WANTED:** Taylor & Heintz-Kaufman types & large tubes from the old Eimac line; 152T through 2000T for display. John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455. johnh.walker@alliedsignal.com

FOR SALE: One TCS; one BC-348. Gene, UT, (801) 635-7343

FOR SALE: RME 1000T, 1 kw AM xmtr, one of two in the US. Picture & pedigree from Mr. R.M. Plank. Needs work & T.L.C., pair of 250TH's modulated by a pair of 810's, link coupled final amp & exciter. Two 6 foot high cabinets, big & heavy. Call for details, evenings; new modulation xfmr for Ranger - $60. Fred, KC4MOP, MD, (301) 567-2012, eves.

FOR SALE: TU-10-B tuning unit (BC375) - $30 + shpg; BC654 w/PE 103 dynamotor - BO. Gary Reiss, WAØJRM, Rt 1 Box 141, Wilcox, NB 68982.

FOR SALE: Xtals 7010 kHz, type CR-1, NOS military - $2 ea, quanity pricing available. WA5THJ, Rt 9 Box 163, Alvin, TX 77511. (281) 331-2956

FOR SALE: Knight T-60 - $45 + shpg. James Barton, WØKNJ, Box 353, Broken Bow, NB 68822. (308) 872-5900

FOR SALE: Collins KWM-380 accessories, filters, keypad KIRON, PIN diodes - $3600; 51J4 - $600. Paul, W5NTQ, TX (713) 645-6601, Fax, 645-6626.

WANTED: SP400, RME, EH Scott rcvrs, only in very good condition. EA4JL, contact in the States, Kurt Keller, CT (203) 431-6850

WANTED: Schematic or manual for Morrow MBR-5 rcvr. Al Lemke, 10004 206th Ave NE., Redmond, WA 98053-5108.

WANTED: For my 'fixer upper' HRO rx: table spkr; S meter, working or not; coils G, H & I; 1931 & 1991 ARRL Handbook; Globe Scout, 40, 65 or 66; Conset Monitone; Philmore catalogs, 1958-64, WW II MD-7, BC-456, FT-221, FT-225 and black wrinkle 6-9 MHz rx (ARC-5 or 274N). Greg Greenwood, WB6FZH, Box 1325, Weaverville, CA 96093. (707) 523-9122. greg6fzh@aol.com

WANTED: ARC-5 dynamotors TX DM-33, Rx DM-32 or equiv. David Boardman, 10 Lemaistre, Sainte-Foy, Quebec G2G 1B4, Canada. (418) 877-1316

WANTED: Working & in good shape DM-33A & DY8/ARC-5 dyamotors as used on modulator BC-456. Emidio Ciccone, 116 Floyd St., Belleville, NJ 07109. (201) 759-4840

WANTED: Small 0-1 milliammeters; 0-50 RF milliammeters; National HRO S-meters. **FREE:** Illustrated meter list. Chris Cross, Box 94, McConnell, IL 61050.

WANTED: Audio gen RCA WA-44-C or similiar; National ballast tube 4H14-C. G. Liccione, W2TPL, 118 Hiawatha Trail, Liverpool, NY 13088. (315) 457-7928

WANTED: Collins KWM2-A labeled on chassis Collins Radio Co of Japan; early KWM2 serial No. below 100. Bill, KD4AF, NC, (910) 699-8699.

WANTED: Schematic for the GF12 aircraft xmtr. WØBVA, 305 N. Keith St., Scammon, KS 66773. (316) 479-2756

WANTED: Aircraft or airport radios, xmtrs, pre WWII; flight gear from all eras. James Treherne, 11909 Chapel Rd., Clifton, Va. 20124. 703-830-6272.

WANTED: Huge Navy equipment: shipboard & shore radio, radar, & sonar, mint thru junkers. William Donzelli, 304 S. Chester Ave., Park Ridge, IL 60068. (847) 825-2630, integrat@usr.com

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

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

WANTED: Globe King 500, A, B or C xmtrs, any condx., reasonably priced. Terry Collins, KB9AUP, 18 N. Tomahawk Ave., Tomahawk, WI 54487. (715) 453-3707 d, 453-4633 eves

WANTED: In pristine condx.: Collins 32V3, 75A1, 30S1, 270G-1, 32S3A (RE), 310B3, 30K1, mech filter adapters, 55G1, SP-600X, cabinet, TV-7 tube checker & 75A-4. Lee, W9VTC, IL, (847) 439-4700 d, 726-1660 eves.

WANTED: S-meter for CR-88. Gene Peroni, KA6NNR, Box 58003, Philadelphia, PA 19102. (215) 665-6182 dys.

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

WANTED: Echophone rcvr; Hallicrafters S-41 & S-76. John, MN, (612) 890-1875.

WANTED: Pwr sply for BC-639A military rcvr, types RA-42-A, RA-42-B or dynamotor unit PE-100-A. C.R. Filer, 1163 Hawksbill Ln., Sugarloaf Key, FL 33042-3159.

WANTED: Cable connectors for BC-645/ABA-1. Harold S. Meltzer, 592 Loma Verde Ave., Palo Alto, CA 94306. (415) 493-1016

WANTED: Four legs & manual for military WW II SCR 284, or any other parts. Pat Stewart, W7GVC, 1404 Ruth Ave, Walla Walla, WA 99362-3558. (509) 525-1699

WANTED: Manual copy for EICO 685 transistor analyzer. Will pay for copying & postage. Gus Enquist, VE3MAL, 534 Songis Rd., Redbridge, ONT P0H 2A0, Canada, (705) 663-2387

WANTED: Radio test set AN/GRM 21 for Collins AN/TRC 75. Jack, KC5VS, Rt3 Box 334, Fredericksburg, TX 78624. (210) 997-9766

WANTED: Hallicrafters HT-20; Collins 310A-3 & 30J. Butch Schartau, KØBS, 5361 St. Mary Dr., Rochester, MN 55901. (507) 288-0044

WANTED: Schematic for Logitronics Copy One CW regenerator. A. McGinnis, WA2DTQ, 793 Queens Grant, Hilton Head, SC 29928.

WANTED: WRL-70 xmtr; HB xmtrs for display, must be museum quality; thousands of QSL cards to paper walls of Amateur display. Call Leo, (619) 321-1138

WANTED: Johnson 940/1042 SSB xcvr; Johnson Viking Avenger SSB xcvr; Ranger I; Valiant I. Bruce Hering, 41120 State Highway 13, Waseca, MN 56093-4217. (507) 835-5619.

WANTED: Orig. tube-type CB radio operating/owners manuals; also tube-type CB radios. Walter Ryan, 7114 Geyser Ave., Reseda, CA 91335. (818) 344-8735

WANTED: Knight equip, all types; ham, shortwave, CB test, etc. Thank you. Walter, CA, (818) 297-7249.

WANTED: National sets MB-29 & 30; LC-3; SW-58C; SW-34 & HFC. Cash or trades. Robert Enemark, W1EC, POB 1607, Duxbury, MA 02331.

WANTED: Collins KWM-2A labeled on chassis Collins Radio Co. of Japan; early KWM-2 serial # below 100. Bill, KD4AF, NC, (910) 699-8699.

WANTED: Navy xmtrs: TCA, TCE, TCN, TCX, TDE; rcvrs: RAX, RBD, TBM; modulator CAY-50065. Steve Finelli, N3NNG, 37 Stonecroft Dr., Easton, PA 18045. (610) 252-8211

WANTED: Eddystone rcvr. I will pay fair price for Eddystone gen coverage rcvr. James B. Geer, WB5LXZ, 1013 Overhill, Bedford, TX 76022-7206. (817) 540-4331

WANTED: WW-2 Japanese military radio of any kind; pre-war Japanese QSL cards. Takashi Doi, 1-21-4 Minamidai, Seyaku, Yokohama, Japan. Fax: 011-8145-301-8069

WANTED: Hammarlund Comet Pro parts & parts sets; coils & coils sets; National SW-3 model 1, 2 volt version (32-32-30 tubes); Browning Labs preselector, 1947; Hallicrafters xmtrs: HT-1, HT-4, HT-9, HT-19; Collins 310B exciter; other pre 1950 commerically built ham gear. Dean Showalter, WA6PJR, 72 Buckboard Rd., Tijeras, NM 87059. (505) 286-1370

WANTED: 6900, 845, EL34 tubes, Dynaco, Eico, Fisher, Marantz, etc.; Western Electric tube audio amps. Robert, IL, (815) 229-1344

WANTED: Condenser, carbon and other early broadcast microphones; cash or trade. James Steele, Box 620, Kingsland, GA 31548. (912) 729-2242

WANTED: To buy any Lunch Boxs & related items. Arthur Fritz, N3SFE, 104 2nd St., Montgomery, PA 17752. (717) 547-2674

WANTED: WW II Japanese xmtrs & rcvrs (parts, plug-in coils) for restoration & ER articles. Ken Lakin, KD6B, 63140 Britta St., Ste. C106, Bend, OR 97701. (541) 923-1013. klakin@aol.com

WANTED: One and two tube receivers (regenerative), kits or homemade. Bob Mattson, KC2LK, 10 Jane Wood Road, Highland, NY. 12528-2607. (914) 691-6247, rmattson@freemark.com

WANTED: Still looking for Swan 160, other Swan stuff any condx. Eric, KB0XP, Box 98, Stanton, IA 51573. (712) 829-2446

WANTED: Manuals for the following: Sprague TO-6; Heath IT-11, capacitor checkers; B&W 5100B xmtr, copies OK. Chuck Maas, W0IUH, 9917 Irving Ave S., Bloomington, MN 55431. (612) 888-7104

WANTED: JW Miller RF coils; IF trans; chokes. Buying JW Miller & Millen parts, esp. need Miller B-727; B-727C; S-27; 912-C2; 912-C4; 912-C5. WA5THJ, Rt 9 Box 163, Alvin, TX 77511. (281) 331-2956

WANTED: Will pay up to $1000 for Harvey Radio Labs FT-30 xmtr, pg 57 Rippen book. Robert Enemark, W1EC, POB 1607, Duxbury, MA 02331. (617) 934-5043

WANTED: National NCX-5 xcvr. Jerry, N5KYE, OK, (405) 373-2228.

WANTED: 6-meter VHF amp; Gonset 913A or Swan Mark 6B w/manual. Bill White, K4MLJ, 1010 Carson St., Greeneville, TN 37743. (423) 638-5943

WANTED: WRL CW-7 xmtr; Philmore CR5A rcvr & assembly manual Heath EK2A regenerative rcvr. Gary Wagner, K3OMI, 11124 Oak Hollow Rd., Knoxville, TN 37932. (423) 690-4217 dys

WANTED: Cabinets for R390A & R388; Hammarlund HC-10; Drake spkr MS-4. Dave Humbertson, W3NP, HC86 Box 123A, Fort Ashby, WV 26719. (304) 298-4596

The Radio Finder®

11803 Priscilla, Plymouth, MI 48170
TEL/FAX 313-454-1890
e-mail: thurtelljh@aol.com

March Specials:

HALLICRAFTERS SX-88; SX-73 in original cabinet; Military T-368-F complete with BC-939-A tuner + RTTY modulator and power meter; **COLLINS** 62S-1; 51S-1; 75A-4; 75A-3; 75A-2; 75S-3B; 32S-3; 30L-1; 312B-4; KWM-1; 312B-1 speaker; **DRAKE** T4XC; AC4; MS4; **JOHNSON** Desk KW; mobile VFO; **NATIONAL** HRO-60; 1935 HRO complete; NC-101-X; NC-183; FRR-59A; **HAMMARLUND**: SP-600; SP-200; Military R-391; R-392; Miltronix: R-389; R-390; R-390-A; R-725; SX-25; SX-17; **CLEGG** Interceptor 6 & 2 meter receiver; Zeuss high-power 6 & 2 meter AM/CW transmitter; **HARVEY-WELLS** Bandmaster TBS-50 w/PS, VFO. **LAFAYETTE** HA-225; Mechanical filters for 75A-4, 75S-3, 51S-1. **QST** bound 1968-1996.

WANTED: 62S-1; KWS-1, 75A-1/2/3/4; 310 exciters; 32V-1/2/3; 75S-3B/C, 32S-3/32S-3A; 51S-1; KWM-1; KWM-2/KWM-2A; MM-1, SM-1/2/3; other Collins accessories; HALLICRAFTERS SX-28/28A; SX-42; SX-73; SX-88; SX-100; SX-115;

new Radio Finder website: http://www.radiofinder.com

FOR SALE: Just released: Send 2-stamp LSASE for latest Olde Tyme Radio Co. Flyer 196A. Olde Tyme Radio Company, 2445 Lyttonsville Rd., Ste 317, Silver Spring, MD 20910.

FOR SALE: Heath HW-30, Twoer, VGC - $35; Hallicrafters S-41, re-capped, nicely repainted w/manual copy, exc - $25; SB-300 front panel, exc - $18, + shpg; Allied Electronics Builder's Handbook 1963, orig. - $12 ppd. Patrick Marineau, K9HF, 6300 Kingsway Dr., St. Louis, MO 63123.

FOR SALE: SX-100, beautiful, works great - $350; Blue Racer, used on flying boats in early 30's - $200; S-85, looks new, operating - $145; extra fine VHF-152A, untested, appears mint - $110; Globe Scout, very fine, working good - $125; S-19R, looks, works great - $125; nice SX-71, perfect panel, some buffing on sides, working but intermittent on high bands -$125; extra sharp DX-60, HG-10 - $135; HQ-129X - $150; HQ-140, none sharper - $275. All + shpg. This gear is 'way above average. Old age forces sale. Bruce Vaughan, NR5Q, AR, (501) 751-6536. nr5q@aol.com

---

FOR SALE: All Hallicrafters: HA-5 VFO, exc cond. -$85; SX-100, exc condx -$250; SX-140, good condx, cabinet repainted - $100; SX-71, cabinet cosmetically rough, no dents - $75; All prices include shpg. Joseph Falcone, N8TI, 3000 Town Center, Suite 2370, Southfield, MI 48075. (810) 357-6610 (d), (313) 261-2094 (n), falcone@counsel.com

---

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

FOR SALE: ALR5 rcvr, .04-1GHz, good condx - $450 + shpg. SASE 9 inch, for list of more stuff. Rich, K9RLF, 1140 S. Taylor, Oak Park IL 60304. (708) 383-4579

FOR SALE: National RBL-6, 14 to 640 kHz - $225; NC-125, nice - $125; Telrex 500-RIS rotator - $1000. Charlie Talbott, K3ICH, 13192 Pinnacle Ln., Leesburg, VA 20176. (540) 822-5643

FOR SALE: Collins 32V-1 - $500; 75A-3 product detector - $525; Radio Shack DX-100 - $65; MFJ8100 regen - $45. Charlie Talbott, K3ICH, 13192 Pinnacle Ln., Leesburg VA, 20176. (540) 822-5643

FOR SALE: Gonset Monitone (ER #79) orig condx! - $40; Meissner Signal Shifter coil kit, 3 pieces: 2040 - 2410 kc, orig box - $25; Astatic Model 332 xtal mic, lavalier, stand adapter, A-7 Stand all NIB - $35; NOS manuals: Hallicrafters SR-400; National HRO-500 series 88 & 102 - $30 ea. Robert, CO, (303) 988-2089, 6-9 PM.

FOR SALE: SP-600 JX-12 John Leary Hammarlund Special #31 w/manual - $475; set of QSTs 1921-1996 - $450; Tek 454 150 MHz scope - $150. All + UPS. Dan Mason, R.RT1 Box 204F, Santa Fe, NM 87501. (505) 455-3416

FOR SALE: Vintage equipment manuals starting at - $5; Hallicrafters, Johnson, WRL, others. SASE for list. DSM Diversified, 909 Walnut St., Erie, PA 16502.

FOR SALE: Collins repair. I specialize in S-line equipment. Reasonable, & work guaranteed. Steve, N6HK, Box 1136, Goleta, CA 93116. (805) 967-7466

FOR SALE: Japanese Kenwood Kencraft Communications Kit radio working but needs work - $120 + UPS. L. Schimmel, POB 1234, Spanaway, WA 98387.

FOR SALE: 651S-1 & extras; Collins 18J-6 xmtr; 32V-2 xmtr; 50th Year Book; memorabila. Bill Coolahan, 1450 Miami Dr. NE, Cedar Rapids, IA 52402-2933. (319) 393-8075

FOR SALE: Heath SB-310 w/SB-600 spkr, near mint, very little usage - $135 + UPS. Mervyn Ellsworth, 2309 N. 25th St., Boise, ID 83702. (208) 345-6878

FOR SALE: 122 VFO, rough - $25; WRL Clipper - $25; gray HRO dial NPWO - $25. Kathleen Smith, VE3WKW, 160 Cherry Hill Dr., Apt 313, London, ONT. N6H 4M4, Canada. (519) 679-5926

FOR SALE: Heath SB610, monitor scope w/ manual, near mint - $125; Cantenna w/manual - $35; orig Collins manuals: 32V-2 (2), 32V-3, 75A-1, 75A-3. Mike, CA, (209) 322-0459.

FOR SALE: Hallicrafters rcvrs, just aligned: SX-99 - $110; SX-110 - $120; SX-130 - $130. Chase Hearn, 104 Glenwood Dr., Williamsburg, VA 23185. Ph/Fax (757) 229-7263.

FOR SALE: Vintage Eimac 2-150D, 152-RA, 30 kv rectifier tubes, NIB, great displays! - $6 ea. Lowell Thomas, K6KC, CA, (209) 227-1605. k6kc@lightspeed.net

FOR SALE: Like new 3-1000Z - $200; SK-510 socket - $25; SK-506 chimney - $50; 7.5V/21 amp fil xfmr - $30; heat radiator cap - $5; NOS Cardwell dual section xmtg variable cap 110pF/section, 7500V - $75. James Owens, NWØO, 1363 Tipperary St. RR#3, Boulder, CO 80303-1621. (303) 673-9019

FOR SALE: Amperex 6360 tubes NIB - $5; R390A audio mod, ER #93; Knight T60 - $55. Norm, W1CIX, POB 402, W. Bridgewater, MA 02379. (508) 583-8349

FOR SALE: New orig. PJ-068 mic plugs for Collins S-line/KWM-2A/HF-380 shp'd in USA - $8 ea. Clint Hancock, KD6H, 6567 Ashfield Ct., San Jose, CA 95120-4502.

FOR SALE: KWM-2 fan bracket - $15 ppd. Dave Ishmael, WA6VVL, 2222 Sycamore Ave., Tustin, CA 92780. (714) 573-0901

FOR SALE: Knight Ocean Hopper, coils - $150; Knight R100A - $150; Heath Lunch boxes -$35; manuals. Stuart T. Carter II, W4NHC, POB033177, Indialantlic, FL 32903-0177. (407) 727-3015.

FOR SALE: Hallicrafters HT-9 restorable - $225; Apache - $225; Viking II w/122 VFO - $225. Robert Braza, N1IPRS, 23 Harvard St., Pawtucket, RI02860. (401) 723-1603.

FOR SALE: URM-25F; ad in Feb. issue pg 43, shows incorrect phone number. Sorry. Bob Bakinowski, 1524 St Tropaz, Tucson, AZ 85713. (520) 624-8029

FOR SALE: Henry 3K linear amp - $1250. W7GS, WY, (307) 684-5496.

FOR SALE: Hallicrafters SX25 - $145. **WANTED:** 6JB6 tubes. Nicholas, AZ, (602) 864-9987.

FOR SALE: Heath HW-9 w/WARC kit - $250; Siltronix VFO - $30; Hallicrafters Sky Buddy II - $50. Steve, IN, (317) 298-9967.

FOR SALE: Hallicrafters S-53, circa 1948, exc condx, scarce - $70 + shpg. **WANTED:** Mosley CMS-1 spkr for CM-1. Jack, AZ, (520) 634-2028.

FOR SALE: Hallicrafters S40A rcvr - $65; Gonset GSB100 - $125; Heath DX100 - $125; EICO 753 & ps - $100. **WANTED:** ARR/41 rcvr or parts unit; Globe King 500B modulator deck. Herb Reich, KØUBK, 1201 8th Ave. S., S. St. Paul, MN 55075. (612) 455-7898

FOR SALE: RAK/L w/ps - $110; AF-67 - $90; 120 watt modulation xfrm, 1.68:1 - $30; parting out SX-28. U-shp. WA7HDI., ID, (208) 756-4147 after 0030Z.

FOR SALE: Swan/Siltronix FD1011 digital display - $55. **WANTED:** Various knobs for the Valiant II, DSB100, GSB201, SR400. Bill, KE7KK, 6712 Lake Dr., Grand Forks, ND 58201. (701) 772-6531

FOR SALE/TRADE: Command sets 80/40M RX & TX w/pwr sply; Heath SB401 xtal pack for split opr. Joe, K2QPR/4, FL, (561) 220-7362.

FOR SALE: Hammarlund SP-600-JX-17 & SP-600-JX rcvrs, very nice - $250 ea; CV-591-A SSB adapters - $150 ea. Larry, AA8HO, MI, (810) 353-5293.

FOR SALE: Yaesu FRDX-400 rcvr - $150; URM-25-F sig gen. W/manuals - $75. Bert, KC8BR, MI, (517) 736-8020.

FOR SALE: National NC-2-40D rcvr, exc condx, spkr, manual, works great - $225, + shpg. Carleton T. Rand, 85 Black Hall Rd., Epsom, NH 03234. (603) 736-9695

The Collins Video Library

featuring Dennis Brothers, WAØCBK assisted by Floyd Soo, W8RO

The Collins KWM-2 Video 4 hours
Highly detailed video on operation, rebuilding, alignment, troubleshooting and neutralizing of this classic! A must for anyone who owns and operates a KWM-2 / 2A. Printed documentation included.
$89.95

The Collins 75S-3/32S-3 Video 3.5 hours
An in depth examination of the most popular version of the S/Line. Operation, modification, alignment, neutralizing and more! Much of this information applies to all versions of the S/Line!
$74.95

The Collins 30L-1 Video 1 hour
A complete guide to the 30L-1 amplifier. Operation and safety, updates and a discussion of the 811A triode. Learn the secrets to greater performance.
$39.95

The Collins 30S-1 Video 1 hour
Finally, the one everybody has wanted! This extraordinary video describes operation and user safety, maintenance and modifications of this classic Collins amplifier. Very informative - truly a must for all 30S-1 owners. Printed documentation included.
$39.95

The Collins Amateur Radio Equipment Video Spotter's Guide 1 hour, 40 minutes
Close to 90 individual pieces of Collins Radio equipment are shown in the video. Examples of some of the gear covered are: KW-1, KWS-1, 30K-1, 20V-3, 75A-4, KWM-2, S/Line, KWM-1, 30S-1, 30L-1, KWM-380 and much more!
$24.95

Purchase three or more videos and get 10% off the retail price!
Add $4.50 each for the first two videos for shipping & handling within the U.S.A., additional videos are shipped free.

Produced by Floyd Soo, W8RO (ex-KF8AT)

ER Bookstore, 14643 County Road G, Cortez, CO 81321

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

WANTED: Need good used 572Bs; Heath SP-600 spkr. **FOR SALE:** Heath SP-600 spkr - $60. Lane, KM3C, CA, (619) 470-6528.

WANTED: Collins S-line, KWM2A-30L-1, etc. Marks pays the most for clean gear. WD4AAS, FL, (954) 776-5996 (d), 566-0014 (n).

WANTED: Info about Dentron HF-200 HF xcvr shop manual. Ken, K8TFD, MI, (313) 522-8645.

WANTED: National SW-3 coils-60-70 series; NDC-8, NDC-10 spkrs; NFM 83-50 FM adapter for NC-98; doghouse 5886 AB & 5880 AB; I love National radios. Any info to help me learn about the restoration of these wonderful radios, identification of equipment, please send it to me. I will reimburse you. This is for personal enjoyment. Sylvia Thompson, N1WVJ, 33 Lawton Foster Rd., Hopkinton, RI 02833. (401) 377-4912

WANTED: Couple of Dow-Key relays to get my boat anchors on the air; restorable Swan 500C; restorable SR-150; Swan 410 remote VFO. Ron, WØOIZ, KS, (913) 268-5973. arongv@aol.com

WANTED: Need help. Starting restoration on a Sargent 21-MA general coverage rcvr. Desperatley need info on schematic & alignment. Willing to pay, of course. Ron, WØOIZ, 10701 W. 54th St., Shawnee, KS 66203. arongv@aol.com

WANTED: Manual or copy of schematic & parts list for Hallicrafters SX-42 rcvr. John B. Keil, 4618 Norwalk St., Union City, CA 94587. (510) 471-4838

WANTED: Military entertainment radios, manuals, info on their use, US or foreign. Henry Engstrom, KD6KWH, POB 5846, Santa Rosa, CA 95402. (707) 544-5179

WANTED: For Atwater Kent early model 20C bakelite variable capacitor & two grid resistors or junker chassis. Gale Roberts, Box 152, Clyman, WI 53016.

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

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

FOR SALE: Rcvr preselector filters. Tight bandpass filter eliminates broadcast band interference on 160 meters. Works especially well with older rcvrs, limited quantity - $54 ea ppd. James Owens NWØO, 1363 Tipperary St. RR#3, Boulder, CO 80303-1621. (303) 673-9019

FOR SALE: RME-45 rcvr - $225; Johnson Ranger I - $175; Lionel J-36 bug (Vibroplex Lightning) s/n 5200 - $100; Drake L-4B - $750; Drake twins, R4B, T4XB, AC4, Drake desk mic - $375; Heath HO-10 monitor scope - $125; Ameritron AL-811 amp, runs (3) 811A tubes, 160-10 meters - $475. Lane, KM3C, CA, (619) 470-6528

FOR SALE: Heath HW100 HF SSB/CW xcvr w/ HP23, AC, HP13, DC splys, manual, needs work - $150; GRC109 Spy radio - $200. Dave, W1DWZ, MA, (508) 378-3619

FOR SALE: HT32A, manual, exc - $150; SX101, spkr, manual, exc - $175; NC300, spkr, manual, works good - $250; NC173, spkr, manual, very nice - $175; DX40, manual, vy exc - $75; HW101, SB600, HP23A, SB650 dig freq display, all vy clean w/ manuals - $300; SB101, ps, man, vy clean & functions - $125; SX140 & HT40, both work - $125. All + shpg. Dick Dixon, W7QZO, 16032 Lost Coyote Ln., Mitchell, OR 97750. (541) 462-3078

FOR SALE: NOS 2E24 tubes. **WANTED:** Pre-1929 issues of QST magazines; vintage mobile rcvr. Eddy Swynar, VE3CUI, 3773 Concession Rd. 3, RR8, Newcastle, ONT L1B 1L9. Canada

FOR SALE: PRC-10 test set URM, 113A w/ instructions latest model, like new - $75. Henry Engstrom, KD6KWH, POB 5846, Santa Rosa, CA 95402. (707) 544-5179

FOR SALE: Convert any wattmeter to read PEP! Perfect for AM/SSB - $19.99 ppd for complete kit! HI-RES, 8232 Woodview, Clarkston, MI 48348. (810) 391-6660, hires@trust.net

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

FOR SALE/TRADE: Hallicrafters HT-37, very nice w/ manual. Prefer PU, no shpg. A.J. Bernard, POB 690098, Orlando, FL 32869-0098. (407) 351-5536

FOR SALE: Heath SB-620 Scanalyzer - $110; SB-610 modulation scope - $90; SB-630 station control - $70. Clean & working. Jeff Holmquest, K2EWM, 58 Saddle Shop Rd., Ringoes, NJ 08551. (908) 782-2346

FOR SALE: Heath SB-614, SB-634 - $100 ea; National NCX-5, sply - $200; Heath Two'ers (3) - $50, all. Richard Lucchesi, WA2RQY, 941 N. Park Ave., N. Massapequa, NY 11758. (516) 798-1230

FOR SALE: MFJ versa tuner II model MFJ941D - $60; Realistic DX-150 - $65; Zenith Royal 3000-1, w/ rare BFO - $250, + shpg. Tom Murray, 3177 Latta Rd. #409, Rochester, NY 14612. Ph/Fax (716) 723-1672. tomvidtek@aol.com

FOR SALE: Used 807 tubes, tested OK, guaranteed - $5 ea + $3 priority mail. James Schliestett, W4IMQ, POB 93, Cedartown, GA 30125. (770) 748-5968

FOR SALE: Rycomm VLF rcvr, works - $40; PRC47 HF xcvr, complete & spare - $200. Ed Hammond, WN1I, POB 390, Buckfield, ME 04220. (207) 336-2858

FOR SALE: Rare Heath CA-1 Conelrad alarm, see ER #72, pg 15 photo - BO. Sam Hevener, W8KBF "The Signal Corps", 3583 Everett Rd., Richfield, OH 44286-9723. (216) 659-3244

FOR SALE: SX-115, SX-88, SR400, HA20, HT44, HT45. John Adams, 908 E. Southmore, Pasadena, TX 77502. FAX (713) 477-8726

FOR SALE: WE BC-459A, new in box - $80; BC 906D test set, good - $35. U-shp. Ken Kolthoff, 5753 David Pl., Fairfield, OH 45014. (513) 858-2161

FOR SALE: All electronic repairs welcomed. Specializing in ham gear, qualified. Stocking Collins, Heath, etc. Tiki Electronics, 1564-62 Front St., Cuyahoga Falls, OH 44221. (330) 922-8454.

FOR SALE: PRC47 LSB/USB kit - $40; new machined coax antenna panel - $9. All restorable. Jay Craswell, WBØVNE, 321 West 4th St., Jordan, MN 55352-1313. (612) 492-3913.

FOR SALE: Fiberglass rods, 5/8" dia., 13' long, UV resistant, good standoff insulators, twinlead spreaders, ten ppd - $10. Ron, K5YNR, NM, (505) 327-5646.

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

FOR SALE: Vintage Radio Kit. Complete kits available for low pwr & QRP CW. Write or call for complete list of kits and components available. Want a "fun project?" Build the CPCW-5 Cake Pan xmtr. The CPCW-5 is a two tube xmtr built on a 9x9 inch cake pan that you have to see and hear to believe!!!! Article on the CPCW-5 was in Nov. ER. Contact us at: Vintage Radio Kit, 427 N. Main St., Sharon, MA 02067. (617) 784-0847, Mon thru Thurs 9:00 AM to 4:00 PM EST.

FOR SALE: S-22-R, rough but complete - $40; S-38-A, semi-rough - $35; 390 (A?) IF amp - $7; Link CFL-43059 FM xmt/rcvr - $40; Gonset III 6-meter - $60; Motorola Conelrad monitor - $60; phase angle comparator - $20; Viking II, modified - $95; Heath VC-3 voltage calibrator - $25; Signal Corps keyer - $35; (3) hefty Oressen/Barnes pwr splys - please inquire; homebrew remote tuner?-roller inductor/servo, unk. - $15; American mic D 501C - $15; Pomona Elect. 30 kv test probe/meter - $25; EV mic #636 NIB - $100. + shpg. Mike Taylor, KA6OIO, 225 N. Adlena Dr., Fullerton, CA 92833. (714) 871-6665, days or eves before 0330 UTC.

FOR SALE: Drake CC-1, TC-2, TC-6, SC-6 & CPS-1 - $300; TCS ant. loading coil - $25; GPR-90 RX in orig factory cabinet - $500. George, K1ANX, MA, (413) 527-4304.

FOR SALE: Radio & electronics related books, 160 titles, call or write for list. Paul Washa, WØTOK, 4916 Three Points Blvd., Mound, MN 55364-1245. (612) 472-3389.

FOR SALE: Heath pwr meter model AM-2 - $35; solid state 6AL5-12AU7 for Heath VTVM - $17. Joe, W6CAS, CA, (916) 731-8261.

FOR SALE: All postpaid: Globe VHF-62 Hi-Bander, looks VG, 3 knobs wrong, unchecked - $60; RME VHF 2-11, good, some knobs wrong, unchecked - $50; R-388, looks VG, complete, unchecked - $275; Drake Q5-er, VG - $15; Heath transistor portable - $15; HW-7, VG - $75; EICO 324 sig gen, poor output - $20; GP Phantom antenna (dummy load) 350-9050 kHz 500W nom. - $20; TRC-77, 3-8 MHz, 15w xtal xcvr, 2 tubes + transistor, looks & checks VG - $95; VRC boxes C-2298 & C-2742 - $20 ea; BC-1306, good, no cover, unchecked - $75. Not postpaid: BC-654A w/dyno from PE-103, legs, manual, cover, PE-104, unchecked - $160; RT-68, known good - $75; PP-112 ditto - $25. **WANTED:** 6M SSB/CW/FM rigs; 2M conversion info for T-416. Eric Jones, N4TGC, 6537 Cnty 61, Florence, AL 35630. (205) 764-0675.

FOR SALE: EV-664 - $100; Timewave DSP 59+ - $150; MFJ-411 code practice - $40; Palomar noise bridge - $25. **WANTED:** For HT-32B, cage over finals & freq dial (or complete junker). Richard, K1MD, RI, (401) 732-4026 eves.

FOR SALE: QST 1934-1970; CQ 1945-1970; some Radio News singles, much more. Send 2-stamp LSASE for list. Don, N3RHT, 47 Hazel Dr., Mt. Lebanon, PA 15228. No calls on magazines please.

WANTED

Collins promotional literature, catalogs and manuals for the period 1933-1993. Jim Stitzinger, WA3CEX, 23800 Via Irana, Valencia, CA 91355. (805) 259-2011. FAX (805) 259-3830

FOR SALE: Hallicrafters SX-62B, 9+, orig tubes - $275; matching R-42 spkr (sold only w/radio) add - $50; Hallicrafters SR-160 HF xcvr w/AC & DC splys, cables, orig manual, AC sply unworking, one knob wrong - $135; Millen Model 90810 VHF xmtr, good, one coil set, manual copy - $115; RCA Radiomarine Cruisephone 35, 12 VDC, 2mc marine band, good looking, untested - $32. Don, N3RHT, PA, (412) 234-8819 EST weekdays.

FOR SALE: Heath IM-18 VTVM w/PK-3 RF probe, both like new, will shp UPS - $35. Ros, WB0GKL, CO, (970) 259-0785.

FOR SALE: 16mm proj., P-P 6L6 amp, spkr in carrying cases; TDT VHF xmtr, 35W, A-2 & A-3, Wt 400 pounds. W5WBA, NM, (505) 831-2646

FOR SALE: Kenwood 820-S, good condx, complete - $400. W7TSJ, AZ, (520) 886-3087.

FOR SALE: Audio gen. URM-127, 20-200 kHz at 0-10V in waterproof metal case w/handle, 5 lbs, w/freq. meter and output meter, 115VAC, tested - $25 plus UPS. Tony Snider, VA, (757) 721-7129

FOR SALE: 2-30 MHz antenna multicoupler, 1 in 10 out, allows operation of 10 rcvrs from 1 antenna w/no loss, 19" rack, 115VAC, tested, guaranteed - $200 plus UPS. Tony Snider, VA, (757) 721-7129

FOR SALE: 5 kc - 30 MHz Cubic R-3030A dual HF rcvr, 2 fully independent rcvrs in 1 19" rack, all electronic/digital, 4 IF bandwidths, 100 memories, remote controllable (RS-422). Late 80's vintage, Collins mech. filters, exc. physical and electrical condx, tested & guaranteed - $1900 plus UPS. Tony Snider, VA, (757) 721-7129

FOR SALE: Sig. gen. URM-25D, 10kc-50MHZ, int. or ext. modulation 400 Hz or 1000 Hz, 115VAC, no cover, tested for output - $40 plus UPS. Tony Snider, VA, (757) 721-7129.

FOR SALE: Transistor analyzer, tests type, leakage, beta, in or out of circuit, silicon or germanium, in case, 115VAC, 8" wide meter face, tested - $35 plus UPS. Tony Snider, VA, (757) 721-7129

FOR SALE: ARC-5s; Viking 2s; parts; more! 2-stamp SASE or $1 for list. Jim Miccolis, N2EY, 126 Summit Ave., Upper Darby, PA 19082. (610) 352-5247

FOR SALE: Tube Cross References for military, industrial, & VT numbers - $8 ppd. DSM Diversified, 909 Walnut St., Erie, PA 16502.

WANTED: BC-191 or BC-375; schematic for SRT-502; manual for TA-12. **FOR SALE:** RDZ-1 rcvr - $80. Greg Richardson, WA8JPC, POB 405, Gallipolis Ferry, WV 25515.

WANTED: Cash for Collins SM-1, 2, 3; 312A-1, 2; 55G-1; 62S-1; 399C-1; 515-1; 302C-3; KWM-1, KWM-380; also buy estates. Leo, KJ6HI, CA, ph/fax (310) 670-6969.

WANTED: Help, does anyone have a schematic &/or other info on Sargent 21-MA rcvr. Mike Taylor, KA6OIO, 225 N. Adlena Dr., Fullerton, CA 92833. (714) 871-6665 days or before 0330 UTC

WANTED: DM-24 dynamotor, R25/ARC-5 1.5-3.0 mc rcvr. Pete Hamersma, WB2JWU, 87 Philip Ave., Elmwood Park, NJ 07407.

WANTED: Teletype corp model 28 compact, RO and/or KSR considered. George, K1ANX, MA, (413) 527-4304

WANTED: Hallicrafters SX-115 or SX-117 rcvr, not pristine but good working. Pete, N7DUC, 1040 SE 58th Ave., Hillsboro, OR 97123-6326. Phone/FAX (503) 591-9312

NOTICE: Stop by spaces 1960-1961 at Dayton. Bring manuals to trade or sell. The Manual Man, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964

WANTED: I would appreciate info from anyone w/personal anecdotes, paraphernalia, including logs, maps, & equip. associated w/the "War Emergency Radio Service (W.E.R.S.)" during WW II. I would like to include this data in a forthcoming presentation at the Antique Wireless Association, Sept. 3-7, 1997. Bob Grinder, K7AK, AZ, (602) 948-2743, Fax, 922-3666. atreg@asuvm.inre.asu.edu

FOR SALE: Collins 30S1, exc condx, new spare 4CX1000 & spare relays, orig cables & manual - $1700; 4-1000A homebrew amp, 10-80 meters, vaccum plate cap, tuned input, 6kv 1-amp HV sply, variac controlled, fully metered, built in four foot Bud cabinet, beautiful amp - $1000; Drake TR4C ,AC4 ,MS4, manual, exc condx, all new tubes - $300. Gene, AA5JR, AZ, (520) 646-0370

FOR SALE: Orig ARA Command set; ARC-5/T-18; BC-221-AK; TS-297/U - $10 ea, + UPS. Chris Cross, Box 94, McConnell, IL 61050.

FOR SALE: 51J4 w/3 filters, s/n 6000+, clean - $900; R388 w/cab - $375; RCA AR88, needs work - $350; HRO 50 R w/4 coils & spkr - $475. **WANTED:** Hi-fi amps, tube-type, & Fender guitar amps. Rob Rodriguez, CA, (510) 845-2625 eves.

FOR SALE: Send for the free K7FF Mailorder List of parts/equip, two first class stamps/mailing label. Many new items! Spring specials! Look for me (or write/call to schedule a QSO) on 160 meters, phone/CW, using the K7FF 160 Super Sloper, article scheduled to appear in the June/July issue of CQ Contest mag. Derek, K7FF, 5191 Rimwood Dr., Fair Oaks, CA 95628. (916) 965-4904

FOR SALE: NC-300 - $285; Ranger I - $250; SX-101 - $200. **WANTED:** Couple of Dow-Key relays; restorable Swan 500C; restorable Hallicrafters SR-150. Ron, W0OIZ, KS, (913) 268-5973. arongv@aol.com

FOR SALE: R-390A parts, see display ad, pg 55. George, K1ANX, MA, (413) 527-4304.

FOR SALE: Acrosound TO-330 ultra-linear output xfrmers (matched pair) brand new in orig boxes w/Acrosound manuals. Best offer over $400. Don, N3RHT, PA, (412) 234-8819 EST weekdays.

FOR SALE: Military: WW II Navy RBM-5 HF rcvr CAY-46077-A, 2 MHz-20 MHz, complete, orig, unworking, front panel is exc - $100; RBM AC pwr sply CAY-20086, good condx but 1 unorig toggle switch on front panel, w/connectors for RBM - $60; RBM remote control box CAY-23278 controls 2 RBM radios, some paint chips, but very nice, rare - $90; WW II Navy RDZ VHF-UHF radio made by National, huge, as-is, orig manual - $60. **TRADE:** SCR-284 BC-654 (have 2) including near complete vehicle setup. Don, N3RHT, PA, (412) 234-8819 EST weekdays.

FOR SALE: Hallicrafters SX-122, R-50 - $150; National RAS DC vibrator pwr sply - $35; Heath HW-101, HP23, needs work - $75; Heath HW-12, needs work - $25; EICO GDO - $50; Knight T-150 - $85; Collins 70E-2, 70E-3, 70E-10, 70E-11 - $15, ea; T-368 Exciter - $45. All + UPS. More, LSASE for list. Geoff Fors, WB6NVH, POB 342, Monterey, CA 93940. (408) 373-7636

FOR SALE: 3CX1000A7 Amperex, NIB; (2) 4-65A NIB. **WANTED:** Gonset rcvrs. Bob Kerby, VA, (540) 942-4356 before 2200 EST. w4bld@juno.com

ELECTRIC RADIO STORE

BACK ISSUES

All back issues are available at $34 per year or $3.25 for individual copies. Buy the entire first 7 years (#1- 84) for $195. This price includes delivery in the U.S. Foreign orders please inquire.

COMPENDIUMS

Collins 75A-4 Modification Compendium- all the factory modification bulletins from Collins Radio Co., all the articles printed in CQ, Ham Radio, QST and ER, 85 pages- $20 plus $3 S&H

Service Modification Compendium for the S-Line, KWM-1/2/2A series - 260 pages - $45 plus $4 S&H

Service Modification Compendium for the KWS-1, 32V and 75A series - 42 pages - $15 plus $3 S&H

HATS

Finest quality, U.S. made, tan in color, embroidered ER logo -$15 delivered.

T-SHIRTS

The front displays the logo from the cover of ER (the tube outline, Electric Radio, and 'celebrating a bygone era'). The back has "Real Radios Glow in the Dark" (used with the permission of Classic Radio).The T-shirts are U.S. made by Hanes and come in S-M-L-XL. The color is just a little lighter than the cover of ER - **$12 delivered (While they last - Closing out on this style)**

BOOKS

Vintage Anthology - Book 1 by Dave Ishmael, WA6VVL.....$14.95

The First Fifty Years: A History of the Collins Radio Company and the Collins Divisions of Rockwell International $49.95

Fixing Up Nice Old Radios by Ed Romney.....$24.95

Communications Receivers, The Vacuum Tube Era: 1932-1981 by Raymond S. Moore.....3rd Edition $19.95

Don C. Wallace, W6AM, Amateur Radio's Pioneer by Jan D. Perkins....$25.95

Oscilloscopes, Selecting and Restoring a Classic by Stan Griffiths.....$19.95

McElroy, world's champion radio telegrapher by Tom French $19.95

The Pocket Guide to Collins Amateur Radio Equipment 1946 to 1980 by Jay H. Miller, KK5IM.....$19.95

Heathkit A Guide to the Amateur Radio Products by Chuck Penson, WA7ZZE.....$24.95

Radios By Hallicrafters by Chuck Dachis----------$29.95

Transmitters, Exciters & Power Amplifiers by Raymond S. Moore---------$21.95

The Cathode-Ray Tube, Technology, History and Applications by Peter Keller -------$29.95

Receivers Past and Present by Fred Osterman----------$19.95

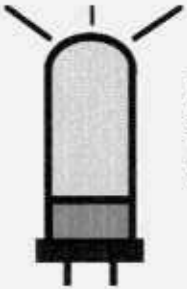
Please add $3 S&H for one book and $1 for each additional book.

Three or more books shipped free!

ER Parts Unit Directory

If you need a part for a vintage restoration send $2 and an LSASE (.32 postage) for a list of parts units. If you have a parts unit, consider putting it on the list.

ER, 14643 County Road G, Cortez, CO 81321-9575



ELECTRIC RADIO
14643 County Road G
Cortez, CO 81321-9575

FIRST-CLASS MAIL
U.S. POSTAGE
PAID
MAILED FROM ZIP CODE 81321
PERMIT NO. 23

FIRST CLASS

TO: