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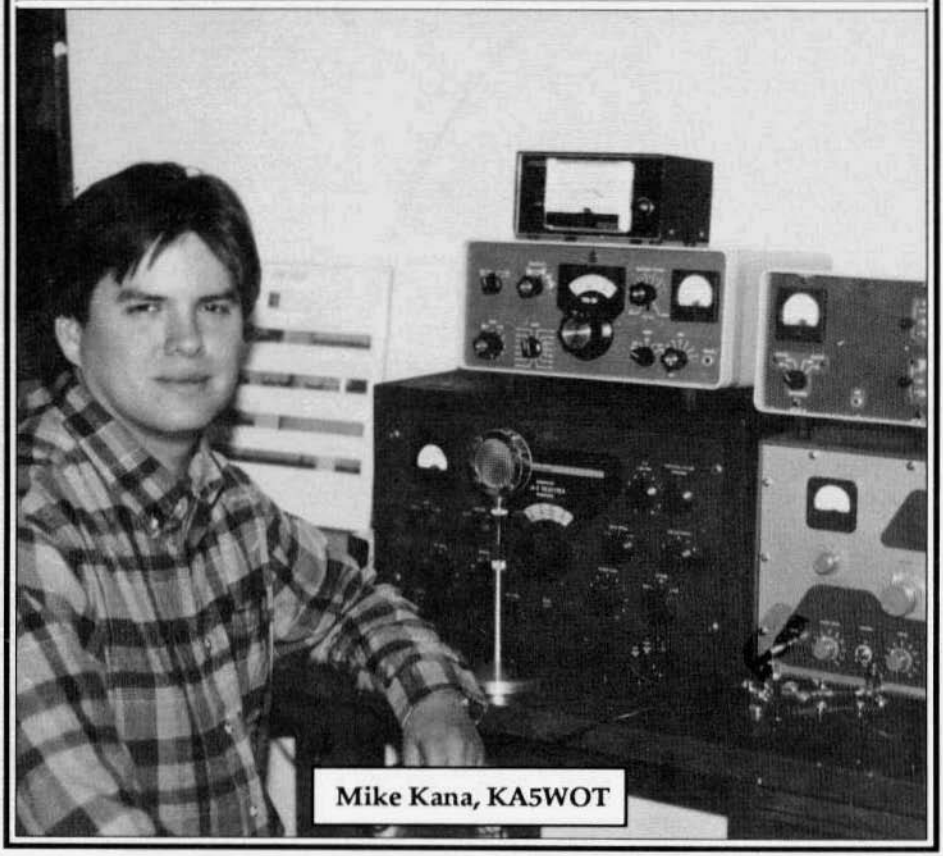
ELECTRIC RADIO

celebrating a bygone era

Number 21 January 1991



Mike Kana, KA5WOT

ELECTRIC RADIO

EDITOR/PUBLISHER Barry Wiseman N6CSW/Ø

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The Purpose of Electric Radio

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

Electric Radio Solicits Material

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

EDITOR'S COMMENTS Barry Wiseman, N6CSW/Ø

Mike Kana, KA5WOT, on this month's cover, has been operating AM for two and half months. He's 26 years old.We haven't had too many young hams on the cover of ER. Maybe that's because we fail to realize just how important young people are to ham radio and particularly to our special interest, AM/Vintage operating. Lately I've been observing that there are quite a number of young hams getting involved with us 'old buzzards". I think most of us find their exuberance and excitement very refreshing. They add something to the hobby and of course we need them to sustain the ranks. Let's all help them out as much as we can and make them feel welcome.

As we go into a new year and into a new decade, I'd like to report that all is well at ER. In fact, December was the best month we've ever had as regards new subscribers and ad revenue. There is definitely a renewed interest in vintage equipment and in operating AM. I hope this is a beginning of a trend that will continue on and on and on. As the number of subscribers grows so will the magazine. I'm hoping that by year's end we'll be up to at least 48 pages.

One of the small success's here that I'm most proud of is the ER Parts Unit Directory. I think it's a 'first' or something unique in amateur radio. Maybe it never happened before because there just wasn't a demand for it. But now with the increased interest in restoration - it's time has come. It doesn't make money - I hardly break even on it - but it does help get a lot of the older gear back on the air.

continued on page 31

TABLE OF CONTENTS

2	Reflections Down The Feed-line	W6RNC
3	Update on Last Months Harvey -Wells Story	N6CSW/Ø
4	Electric Radio in Uniform	KJ4KV
11	Letters	
12	Russ Olmsted, K4UJZ....silent key	N6CSW/Ø
14	Update That Super-Pro ...part two	KDØHG
16	Letters	
17	Did W9FGJ Invent The Inverted V Antenna?	K7INK/6
18	Collecting/Repair/Restoration...Tips	
19	AM Frequencies, Contest Information	
20	WW II Radios Displayed At Calif. Airshow	Henry Engstrom
22	Modifying The Johnson Desk KW For 160 Meters	W7FG
26	Using The T-368 Exciter	AJ7O
32	Classifieds	

Cover: Mike Kana, KA5WOT, with his vintage equipment. Mike who is 26, says that all the equipment in the photo is older than he is.

Reflections Down the Feedline

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

In the May, 1990, issue of ER, yours truly related how as a BCL, in New York in 1935, he was dialing around and heard Florida radio station WRUF offer a free box of cigars to the most distant listener - and how the actual winner was someone in the Panama Canal Zone.

A few weeks ago a letter arrived from Lou Duncan, K4MNY. And as the saying goes,"Here's the rest of the story":

"The box of cigars offered for the best DX from WRUF, Gainesville, Florida, in the early 1930's was probably my Dad's idea. He was WRUF's first chief engineer when they went on the air in 1927. They could not find anyone else around town qualified for the job, except him, so he did it. He was in college at the time.

"As a kid during the 1930's I had the run-of-the-station not realizing I was in the middle of history-in-the-making.

"You could open a steel cage door and walk inside the transmitter. The antenna started at the transmitter and went straight up. It was a squirrel-cage top loaded T antenna and was supported by two 210 foot towers approximately 200 yards apart. The power supply room was very noisy due to the large AC motor turning several generators. I spent time in there also because that was where the work bench and tools were - a kid's paradise.

" I enjoyed watching the Orange Grove String Band in action, looking through the large plate glass window between the transmitter room and large studio.

"WRUF means Wireless Radio from University of Florida and it was located on the University campus. It was dismantled in the early 1950's and so history-in-the-making was destroyed. WRUF moved to a new site west of town with a new RCA transmitter about 1950 with one omni antenna and three directional-phased antennas (for night use).

"Dad, Banks Duncan, was licensed W4IX in 1920, rode the seas starting about 1922 as wireless operator aboard various ships, then attended college until 1927. He became a silent key in 1982 still holding W4IX. He left WRUF in 1940 or 1941.

"Sorry about the box of cigars you didn't win. Maybe this story will substitute. If Dad could have read your story on the WRUF DX contest, I'm sure you would have received a full box of cigars mailed first class anyway within a few days of reading it - somewhat belated though.

"WRUF, 5 KW on 850 kcs (not 860) is still going strong. It was 5 KW when you heard it. Sorry for the long delay in getting this note off. I hope you still have the Philco cathedral radio. 73, Lou Duncan, K4MNY".

I'm writing back to Lou that the Philco radio is long gone but I still have the WRUF QSL card somewhere and I'm going to dig it out and send it back to him as a memento.

It sure is nice to get feedback from ER readers. Writing this column is a voluntary and honorary position. Any of you out there who have something of interest to relate, are more than welcome to send it to me. You don't have to write a finished product. Just include the details - anything about AM operating, building, collecting, unusual experiences, DX worked or heard etc.. Some of you AM'ers can spin tales over-the-air by the hours. How about sharing some of those stories with the entire ER readership?

Update on Last Month's TBS-50/Dick Mahler/Harvey-Wells Story

This story was received very favorably. It seems almost everyone involved with AM/Vintage operation and all the 'oldtimers' either have, or have had, or are familiar with the TBS-50. It is certainly a 'classic' rig.

The photo of Dick Mahler, W1DQH, was provided by Ken Bolin, W1NG. It was taken within the last couple of years. In a future issue we may have some additional information on Dick.

I received the following letter from Clifford S. Harvey, WBØBKF, the son of Clifford A. Harvey, the 'Harvey' in Harvey-Wells Electronics. Here is part of what he had to say:

"I am writing to thank you for printing the article concerning the TBS-50 in your December, 1990, edition. My father was Clifford A. Harvey, and it was good to read about the 'old days' again.

" I remember my mother telling me that Harvey-Wells Electronics was really a three-way partnership; my dad was the electronics wizard, John Wells was the money behind getting started and Dick Mahler was the management arm.

"Although I have not been really active for many years, memories from my first twenty years of life are filled with the 'noises' from my dad's ham contacts. He literally introduced me to the entire world during my younger years. Relative to the article, I believe the 'original' TBS-50 still sits on the floor of my mother's basement, just next to all the ham gear that my father built from scratch.

"Dad became a ham back when each person was allowed to choose their own call letters, and he chose 1RF, for 'one radio frequency'. When the feds said each callsign must be preceded by a W, he became W1RF. For many years his auto plates read W1RF as well. Somewhere I still have his vast collection of QSL cards from all around the world."

I called Cliff on the landline and we had a very interesting conversation. He has offered to provide me with further information on his father that we'll print in a future issue. His father died in 1987 at the age of 79. His mother is 81 and still lives in Massachusetts.

N6CSW/Ø

Dick Mahler, W1DQH

continued on page 29

ELECTRIC RADIO IN UNIFORM

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

"The ATB Aircraft Transmitter"

We have hit a number of high points in U.S. military radios but this month we're touring a valley -- a radio so unsuccessful that many hams and military collectors today have never heard of it. But (as we will see) it wasn't unsuccessful because of poor design; in fact it even beats the performance of the famous ART-13 in one important area!

Overview

The ATB was used in some long range Navy aircraft -- the PBY 'Catalina' for one, and probably the SBD 'Dauntless' and other early carrier planes -- during WW-II; generally it was used with the much better known ARB receiver and a 'command set' installation. It is a compact 7-1/2" x 10-1/2" x 15-1/2" (H x W x D) and weighs 35 pounds. It covers 2.3 to 4.3 and 3.0 to 9.05 Mcs by means of two plug-in tuning units.

The set holds two tuning units; the left one controls the frequency for channel 1 and the right controls channel 2. The tuning range of each unit is covered in five or six bands, selected by sliding switches inside. The frequency dial is calibrated in arbitrary units. Only rough calibration curves are supplied, so setting to a specified frequency must be done by zero beating a received signal or with an external 'CFI' (crystal frequency indicator) unit -- typically the famous LM frequency meter. Dial settings for a particular frequency can be recorded on charts which slide into the bottom of each tuning unit.

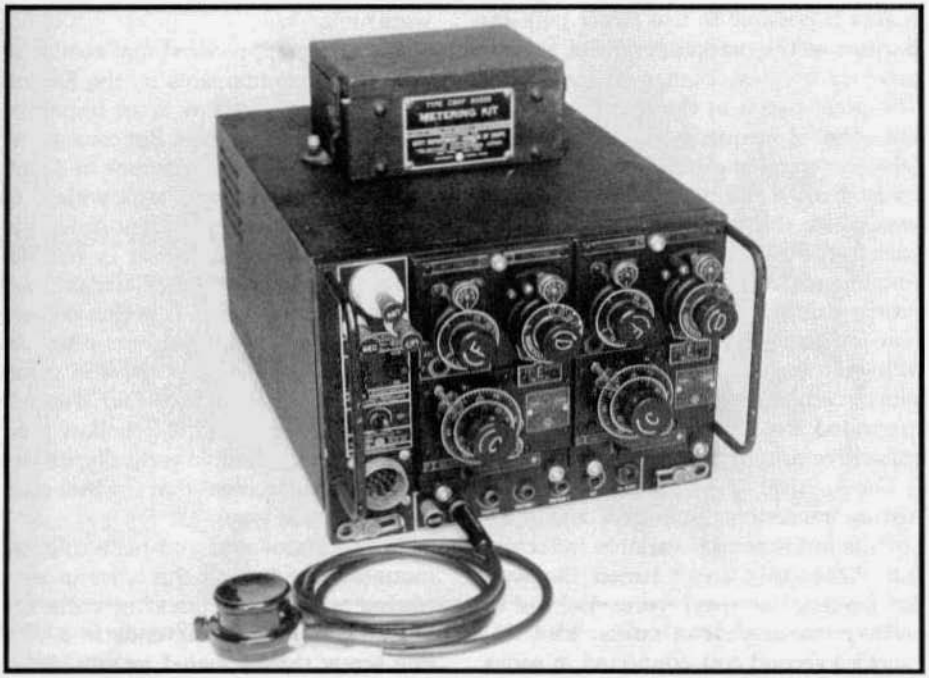
With an output of 20 watts AM or 25 watts CW, the ATB isn't as powerful as the usual 'liaison transmitter' used to make reports to a distant base, but that is the job it was assigned.

Accessories are a dynamotor, pilot and operator control boxes (at least one box is required), and a 'metering kit' -- a box mounted on top of the set which contains two milliammeters which can be connected with plugs to measure PA plate and antenna current or (for bench testing) PA grid drive.

History

The ATB is said to be the RCA AVT-50 commercial aircraft transmitter, rushed like other radios (and quite a few people) into a wartime uniform. Based on the types of tubes used, it was designed about 1938 but it was probably improved right up to the February 23, 1942 contract date. As far as I can determine, there was only one contract; from the serial numbers I know (thanks to collector Henry Engstrom for supplying several numbers), I estimate that about 5000 were built. I can find no mention of the ATB in later wartime publications listing aircraft radio sets; since it was in any case the least effective of the Navy liaison sets, its unlikely that many were still in service at the end of the war.

After the war, the ATB appeared on the surplus market, being sold by Fair



The ATB transmitter. The `Metering Kit' attached to the top is used for tune-up; the cables are folded up inside and plug into jacks on the front of the set. The kit can be detached for use.

Radio in the 50's and 60's (I got a tuning unit there in 1964) and on Radio Row in New York City. I remember hearing that a sizable batch still existed when the Cortland street area was torn down to make room for the World Trade Center and that they were sent to Taiwan to be scrapped for silver and other metals at that time.

Design

The mechanical design of the ATB is distinctly 1930's. The set is built on a spot welded and silver soldered stainless steel frame plated with copper and nickel and made up of about 60 individual parts -- you can't believe the number of little brackets, gussets, clips, and bushings. (Contrast that with the three piece chassis of the `command' transmitters!) The intricacy of the design is part of the key to the ATB's compactness; with the freedom to put a bracket anywhere, one can use every bit of space.

The lower left front section is taken up by a large and intricate keying and antenna relay; forward of the relay is a small front panel with all the `local' controls. To the right of the relay are stalls for two slide-in tuning units, each of which holds a full set of coils and capacitors. Buttons on a ceramic plate at the rear of each tuning unit are the fixed contacts for a relay which selects one tuning unit or the other according to the setting of the channel switch on the control box. A tightly packed chassis holding all the other circuitry takes up the rear 1/3 of the set.

The electronic design is modern (for 1938) and very carefully thought out. The MO (master oscillator) is a 1625 (12 volt 807) in a Colpits circuit with the screen grid serving as the plate. The oscillator runs at half the channel frequency; this

continued next page

ER in Uniform from previous page

makes it possible to use larger tank capacitors so that variation of tube capacitance causes less change of frequency. The plate circuit of the MO is tuned to the channel frequency. Such an 'ECO' (electron coupled oscillator) circuit effectively makes one tube do the work of two. Since the plate circuit is coupled back to the oscillator 'triode' only by the fraction of the cathode current which passes through the screen to the plate, reaction from the plate circuit and the following stage is minimized. In the Colpits circuit, the plate (the 1625 screen) is grounded for RF so there's almost no capacitive coupling.

The physical design of the oscillator is just as interesting. Both grid and plate circuits are tuned by variable inductors but these coils aren't tuned the way Collins (and later, everyone else) did it, with powdered iron cores. Instead, there's a second coil, connected in series with the coil to be tuned and mounted inside it, near one end. The winding of the inner coil is connected to buck the field of the main (outer) coil; the inner coil rides on two rails which also makes it's electrical connections. As the bucking coil is moved further into the main coil, the opposing field causes the total inductance to be reduced.

Sliding contacts in an oscillator tank are a 'no-no' for top stability but aside from that, this is a slick method. For one thing, it was easier (with the technology of the late 30's) to build a stable and uniform bucking coil than an equally good powdered iron core.

According to the manual, the oscillator coils are wound of Invar – an alloy with nearly a zero temperature coefficient of expansion. Tuning capacitors of Invar are used in frequency meters (the LM, for example) and also in the BC-375 MO; this is the only Invar tank coil I know of.

All the capacitors in the oscillator tank are silver plated on ceramic tubes – a new technique about the time these sets were built.

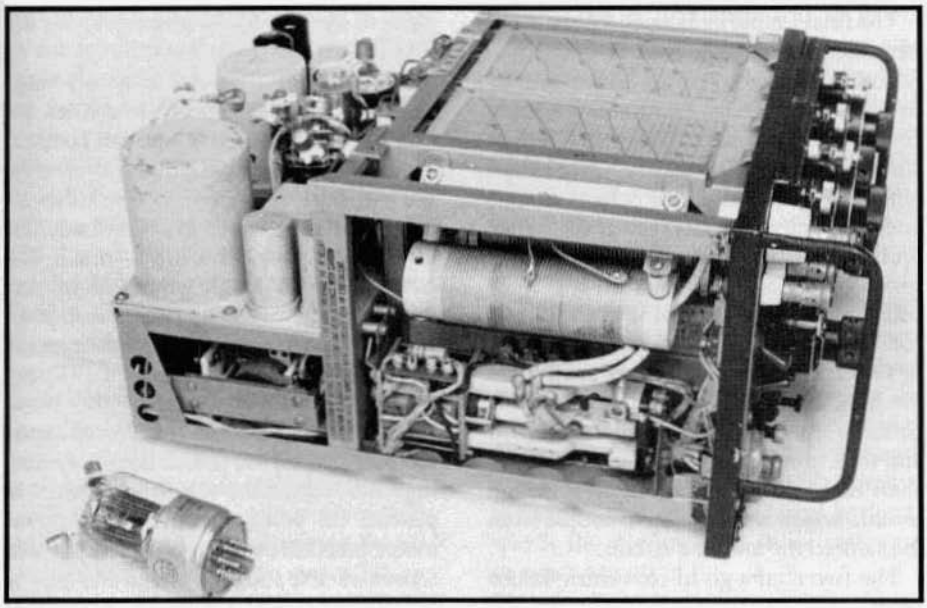
It is rarely appreciated that heating of tank circuit components by the RF currents flowing in them is an important source of oscillator drift. But consider an oscillator with a grid current of 1 milliampere supplied by a tank with a 'Q' of 100; the circulating current flowing in the tank coil and capacitor is 100 Ma! That is a major reason oscillator coils are wound of heavy wire. It is also the reason that fixed tank capacitors often are made up of smaller capacitors in parallel – here there are at least four, depending on the frequency. The 'hollow tube' capacitors are mounted vertically; do you think it is an accident that the best cooling occurs that way?

The oscillator grid and plate coils are mounted one behind the other in each tuning unit. Both bucking coils are moved by a rod which ends in a very fine screw thread mated to threads inside the hollow shaft of the 'C' control of the tuning unit. This setup (screw moved by a threaded sleeve) is called a 'micrometer' mechanism, for its similarity to the common measuring instrument.

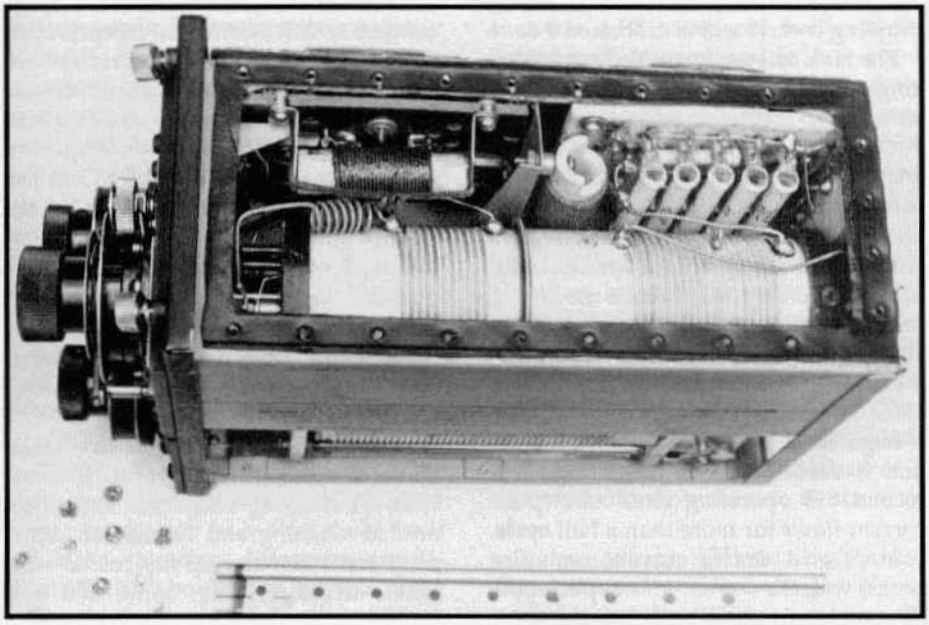
The 'C' dial is itself a complex instrument. The knob mounts on the threaded hollow shaft; it holds a dial calibrated 0-100. An epicyclic gear drives an outer dial which counts full turns of the knob, 0-58, giving 5800 oscillator frequency settings per band; one dial division is about 150 cps at 3885 kcs. There are about three dozen parts in this dial mechanism. This is aircraft radio as it would be done in an instrument shop!

Only if all oscillator parts are at the same temperature can accurate temperature compensation be done; for this reason it is a fundamental of good MO design that everything should be in a closed box. I thought Collins Radio (in the ART-13 transmitter) was first to do this, but it now looks like more or less a tie that the ATB was designed at the same time and it too has 'closed box' design. More of this later.

continued on page 8



Left front view of the ATB with case removed. Note the calibration curves on top of the tuning units.



Looking into a tuning unit from below you can see the oscillator grid tank at the right with tubular tank caps above it on a ceramic terminal strip. All ceramic parts in this compartment are glazed to reduce absorption of moisture. The `bucking coils' used to tune these circuits are hidden inside the outer coils seen here.

ER in Uniform from page 6

The final amplifier is an 815 twin beam pentode with the sections in parallel; it is not neutralized. The PA tank is inductively tuned by rotary coil with a sliding contact. Here again, things are not as simple as you might expect! The rotary tank coil is actually two rotary coils -- one long and one short (about six turns), mounted end to end and connected in series by a spring contact on the short coil which slides on a ring on the long coil. The two coils are turned separately, by concentric shafts. The inner shaft turns the long coil; the sliding contact on this coil sets the amount of inductance used and thus tunes the plate circuit. The outer shaft turns the short coil; it has a sliding contact which acts as a tap to couple from the tank to the antenna circuit.

The two shafts go to concentric knobs (both with epicyclic counters!) on the tuning unit panel. The 'D' knob is the plate tuning control; it's counter is calibrated in frequency. The 'E' knob is the coupling control and is calibrated 0-6.

The tank coil tap is coupled to another long rotary coil (the 'F' control) which serves as an adjustable series loading coil. A swinging arm switch allows adding another fixed series coil (or on the high band tuning unit, a fixed series capacitor) if needed for a particular aircraft's antenna. Finally, there's a second series coil at the left of the set above the keying relay; more internal switches lets you use all, half, or none of this coil. This transmitter will actually load a 12" clip lead at 3500 kcs.

High level plate and screen modulation is used. The modulator stage is a second 815 operating class AB2 (plate current flows for more than a half cycle, control grid draws current on voice peaks) with the two sections in push-pull. The modulator screens are regulated by a VR-150. A 6N7 twin high mu power triode with it's two sections in parallel is used as a transformer coupled driver; there's inverse feedback from the driver plate to the preceding stage to lower the effective driver impedance.

A second 6N7 serves as a two stage resistance coupled speech amplifier. Either dynamic or carbon mic can be used. There is no speech clipping.

The use of four dual-section tubes allows a lot of circuitry in a small amount of chassis space. The 815 -- much like two 807's in a single envelope in performance -- was for its time a real powerhouse and makes this transmitter capable of more output than you'd expect; mine delivers 22-28 watts.

Plate voltage comes from an external 425 volt dynamotor which runs only during CW or when the mic button is pushed on voice operation. The dynamotor junction box also has a relay which senses the DC supply voltage and inserts an extra resistor in the filament supply if the input is greater than 24 volts.

The 'keying' relay is a monster solenoid which slides a ceramic bar carrying contacts which transfer the antenna from the associated receiver, ground the receiver antenna line, apply MO screen and plate voltage, and remove blocking bias from the final, all in the proper sequence. The solenoid has a 2 amp pull-in coil and a 0.3 amp holding coil; contacts on the bar disconnect the pull-in coil as the relay reaches the closed position. It is probably capable of keying at around 20 WPM and would not be too noisy for use in a PBY cruising at 8000 feet on anti-submarine patrol.

On The Air With The ATB

My ATB did not seem to have been operated since it left the factory, about 1943. The keying relay was stuck and needed cleaning and lubrication. Most relay contacts were heavily coated with black silver sulfide; some 400 grit 'Wetordry' paper fixed that. The sliding contacts on the tuning coils were intermittent until the coils had been turned end-to-end a few times.

Three of the rotary coil forms were

broken, but the pieces were held in place by the windings. A dose of 'Krazy Glue' made a good repair, though the guarantee for use in an SBD 'Dauntless' dive bomber making carrier landings is probably void.

Drift of my set on channel 1 after four minutes warmup totaled -207 cps at 3885 Kcs during 30 minutes of four minutes receive/one minute transmit cycling. During 10 more minutes key down, drift was an additional -28 cps. On channel 2, net drift was -81 cps and the maximum excursion was 185 cps; the frequency went up, then back down. This is the best warm up stability observed for any early WW-II transmitter tested so far.

Detuning the antenna circuit by enough to reduce power output by half, changes the frequency by about 125 cps; the comparable figure for the ARCS 'command' set is 200 cps, in spite of the fact that the command transmitters are neutralized. This shows the value of using a pentode ECO rather than a triode in an MO-PA set.

Lacking a control box, I improvised one, including in it the controls for an associated ARB receiver. The very flexible antenna loading arrangements make an antenna tuner unnecessary with the usual ham antenna, but the 'low band' tuning units I have require series capacitance; 750 mmf works fine.

The ATB Master Oscillator

As noted above, the ATB MO has the best warm-up stability of any prewar set tested; the figures quoted above are about half those of the famous Collins ART-13 (E.R., November 1989). Since the oscillator designs are so similar, it is interesting to explore how this could be. I think the important differences are: (1) The ATB MO box is smaller and better isolated from the main chassis because it is in a slide-in tuning unit; these features help keep it at a more uniform temperature. (2) The ATB oscillator coils are wound of heavy Invar wire whereas those of the ART-13 are of smaller gauge copper wire; the ART-13 oscillator also has a powdered iron core with its own temperature coefficient. Both of these differences mean less change of inductance with temperature in the ATB. (3) The ATB's tank capacitors are vertically mounted hollow-tube capacitors which have negative temperature coefficients chosen to minimize drift.

There was much discussion of high stability VFO's in the ham magazines of the 50's and 60's. It is surprising how much of this was focused on 'magic' oscillator circuits (Clapp, etc.) when both the ART-13 and ATB used the tried-and-true Colpits and how little talk there was of the thermal and mechanical basics to which the designers of those sets gave so much attention.

Conclusions

Let's begin in the crow-eating department. In the introductory paragraph at the end of last month's column I said that the ATB compared badly to the 'command' transmitters in just about every possible way: it turns out that the truth is somewhat different. When I compared the output power, I was looking at specs which quote results on a one-ohm resistance in series with 60 mmf, roughly the characteristics of a fixed wire antenna on a fighter plane. This is a bad situation for any transmitter; with so much loading inductance needed most of the transmitter's power is wasted warming the cover plates on the tuning unit. Comparing the ATB and command transmitter outputs under similar conditions (for example, a matched load of 20 ohms) would show them to be about the same.

I also said the ATB was bigger than the command transmitters but if you consider that the ATB has two channels (so is equivalent to two command transmitters) and that the command sets use a separate modulator, the two equipments are similar in size.

continued next page

ER in Uniform from previous page

There are definitely some good things to say about the ATB. It is, for one thing, very stable; it is also quite logical to tune up. (Because the ART-13 does so much with so few controls, it can be quite a 'handful' to tune up on a new band or antenna.) On transmitters with switch-selected taps or capacitors, I often find the 'right' setting is between two of those provided; the continuous adjustments on the ATB never do that to you.

Overall, this set's 'detail design' is outstanding. The MO is superb; the radio is very compact yet reasonably easy to service – there's almost nothing of which you can say, "Looks like they didn't think of that".

Yet as a military set, the ATB was a flop, given a discharge 'for the convenience of the government' at the earliest possible date. One reason, clearly, is that 20 watts isn't enough for a liaison transmitter -- would you expect to be able to work 500 mile ranges reliably on 80 meters with a Dx-40 and a 25 foot antenna?

Probably most important, the ATB is far too expensive to build. There are too many parts, too many of them require machine work and too many (for example about 40 different ceramic coil forms,rods, plates, spacers, etc.) that are unique to this set. The chassis is a work of art, but surely required a couple of hours of work to make.

Stainless steel is a poor choice for a military radio chassis because nickel and chrome are 'strategic materials', critical (and usually saved) for things like gun barrels, armor, and aircraft engines. But this chassis design would only work with high-strength material; to use aluminum the set would have had to be completely redesigned.

Tuning the ATB to a new frequency is a slow and 'fussy' job. You take out the tuning unit, remove a cover (four snap slides), loosen some thumbscrews and move two different sliding switches to the proper bands. You might need to change the series coil (or capacitor) switch in the tuning unit and also the one on the frame of the set itself. Of course, there are lots of possible 'wrong' answers to these settings.

With the tuning unit back in the transmitter, you plug in the plate and antenna current meters from the metering kit -- be careful, because the plate meter plug will fit the key jack just an inch away and plugging it in there will make the meter movement vanish in a blue flash.

You continue with the normal tune up procedure for a two-stage transmitter -- I hope you are doing this on the ground, because the knobs are much too closely spaced to wear your flying gloves and at 20,000 feet your fingers will get stiff mighty fast.

As a military set, it would be easy to call this a dismal failure,but we should remember that the ATB was a 'draftee. Like many drafted civilians, it didn't plan a military career and it doesn't have to apologize for not being George Patton or another ART-I 3.

The reason we have maintained substantial (and fully equipped) armed forces since the 50's is that we realized that any future war might not give us the time to throw a lot of bank tellers,carpenters, and civilian radio sets into uniform and sort out the problems later. And it has worked: not only did we win a 40-year 'cold war', but our country has (in less than six months) sent half a million men with everything needed to fight, including radios, to the Persian Gulf.

The ATB did the best it could when there was no time to build the right radio; I think it would be okay to be a little proud that we learned our lesson and are not now scrambling to find and repaint enough 'best we can do' equipment for our men overseas.

That's not to say that all our radios are perfect for service in the Saudi desert! I heard the other day that our military is

continued on page 31

LETTERS

Dear Barry

I thought I'd drop you a quick line to tell you how much I enjoyed Jim Musgrove's article on the HRO [The Classic HRO and It's Evolution, ER #19, Nov. 1990] and to give you an update on my research activities surrounding the National Company. From what I've been reading in the last two issues of ER, it appears that more interest is being generated in National and I'm pleased to have been a part of it.

After writing the article on Ed Harrington and the NC-300 [ER #16, August, 1990], I had the good fortune of being invited to the National Company annual reunion. There I met many nice people who, in retrospect, were some of my childhood heros. They were the folks that designed, built, tuned up, sold and serviced the ham gear from Malden, Mass., that we all came to know so well in the pages of CQ and QST.

Except for the equipment, National is a difficult company to identify with on a personal level. Unlike Oscar Hammarlund, Bill Halligan, Arthur Collins, Edgar Johnson and several other well known founders, William A. Ready of National was pretty much a behind the scenes kind of guy except to his employees. As Musgrove pointed out in his HRO article, William Ready was a very generous person, well liked and highly respected by all. This point was made time and time again at the reunion, where most people still rather reverently referred to him as "Mr. Ready". Quite a number of attendees told me that National had a team spirit that they'd never experienced anywhere else. It is said that a company's attitude comes from the top and as I see it, William Ready never really got the public accolades he deserved for being the true spirit of National.

Bill Bartell, W1PIJ, who served in many capacities, including sales manager, told me that the 1952 sale of the company by Mr. Ready was really a hostile takeover, and it set the stage for a slow demise. The new management understood very little about traditional markets and how to keep them. All they cared about was pushing up the stock prices.

Max Fuchs, who still sells National tech manuals, was quick to point out that the company had several sides that the amateur community was not aware of; military and commercial among them. One unique commercial product development was an atomic clock built for NBS (I think it was called the NC-1000), now at the Smithsonian. It was believed to be the first functioning commercial application of an atomic time standard.

The reunion itself was really fun, and has lead me to a number of sources to help further my slow but continuing research into the company. My hope is to compile anecdotes from the people that lived them, and put it together for all to enjoy.

Back to the NC-300 for a moment. KT2L's letter regarding image and spurious responses in November ER was right on; it was one of the reasons I called W1JEL, the designer of the NC-300, in the first place. In several conversations that I've had with Ed about that specific aspect of the receiver, he's admitted that the LO doubling scheme compromised mixer linearity, but that the unwanted responses should be down about 60 dB. Some quick numbers I've run on my NC-303 suggest that Ed is right, but some of the 11 Mhz foreign broadcast stations that I've heard as images on 15 meters are 60 dB over S9 when looked at directly. He was quick to add that single band antennas were pretty much the general practice in the mid '50's and as I remember, matchboxes were also proliferating. I suspect that small high pass filters (like most modern Japanese

continued on page 30

Russ Olmsted,K4UJZ Silent Key

Russ Olmsted, K4UJZ, Murfreesboro, Tennessee, became a silent key December 26. He died suddenly of a heart attack while standing in line at his post office. He was 68 years old. Russ was first licensed in '39 or '40 in Iowa as W9BCB at the age of 19. Later he became WØBCB.

I was very fond of Russ - he was a great supporter of ER - and he was very well thought of, particularly down in the Southeast where everyone knew him. He was 'avid' in his love for vintage gear/AM operation and I think he 'sparked' a lot of people into this aspect of amateur radio.

From time to time Russ would write me a letter telling me about his activities and he always added a few words of encouragement regarding the magazine. One of the first letters I received from Russ, I reprinted in ER #2, June '89.

The last letter from Russ came in September:

"I recently went to a local tailgate swapfest where I met WA4SJK, Rich Wilson, who was selling an estate and he told me he had a Johnson KW without the desk. I dragged my feet for several days and finally I called him on the landline. He still had it so I drove to Linden, Tenn., (not knowing what a Johnson KW was) and he and I drove out to the estate of a Doctor who had passed away. We found out that the rig weighed close to 500 pounds and it was in a basement or lower level about 75 feet from the door. Well, we went and found a dolly and also got the manual which was in Rich's truck.

"We finally got the KW on the dolly and Rich wheeled it out. It barely made it through the first door. In fact we did have to take some of the other doors off. It was quite a job. I had left Murfreesboro at 4:00 a.m. and arrived at Rich's place about 7:30. As it has been extremely hot here (100 +) I was trying to beat the heat by travelling in the early hours. Rich is in his early 70's (an ex-marine) and looks 55. He did all the heavy work. I have two hernias (lifting too many boat-anchors, Hi). After we got it outside the house we found out how to take it apart.

"Reading the manual, we found it is shipped with the transformers removed so we took out all the heavy ones and finally got it where we could get it in the van. The rig is in fairly good condition, however, I did notice that a mouse had been stripping some of the wires and also one of the 872 sockets had blackened. I'm very anxious to get it working. I have also been collecting transformers for a home brew rig which I still plan to build.

"Good luck with the magazine, may your work double. I would like to see it become bigger and bigger. We need a Bible to let everyone on SSB know that there still is an AM mode."

73, Russ, K4UJZ

N6CSW/Ø

Russ removing transformers from the Johnson KW before loading it in his van.

This photo was taken at the Cedars of Lebanon, Tenn., hamfest this summer. On the left is Don Chester, K4KYV, (Editor/Publisher of the AM Press Exchange), next to him is Don Scott, WA4UGR. Russ is on the right side.

Update That Super-Pro

Part Two

by Bill Kleronomos, KDØHG
POB 1456
Lyons, CO 80540

Last month's installment described several changes you can make to the Super Pro to enhance the stability. I discovered a couple of errors that crept into last month's article that must have sneaked in somewhere between my brain and ER's printers that I'd like to clarify. The LM-317 is designed as a voltage regulator, but can be, and is configured as a current regulator by the use of a resistor between REG and OUTPUT pins. It will adjust it's output voltage until there is a 1.25 volt differential between OUTPUT and REG pins or across the load resistor. Since the regulator holds the voltage across the resistor constant, any current changes through this resistor are also regulated. Enough on that.

This month's installment covers the construction and installation of a high performance product detector and some tube changes to dramatically improve the sensitivity. These additions are not limited to application with the SP-600 - they also apply to many other receivers designed and built in the pre-SSB era.

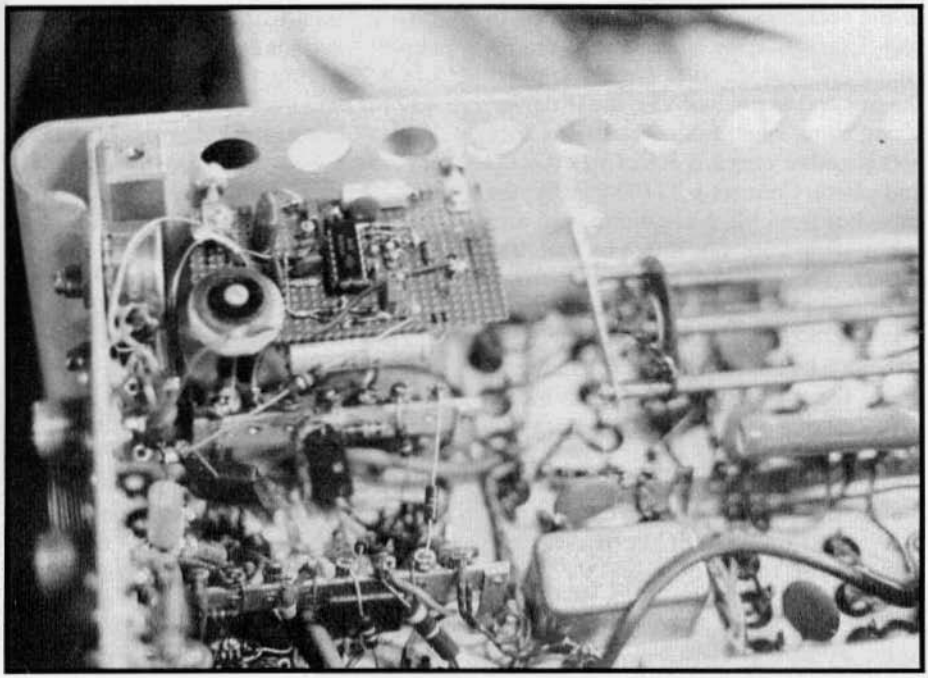
Product Detector

This change involves the construction of the detector circuit itself on a piece of perfboard. Other changes include converting the BFO buffer to a cathode follower to drive the product detector and replacing the MOD/CW switch on the front panel to a SPDT type.

The device I selected for a product detector is the Motorola MC1496 balanced mixer IC. This chip is almost as much an old timer as the receiver itself, having been in use now for some 20 years. It has some truly impressive specifications such as a dynamic range of some 90 dB or in other words it can handle a signal from 2 microvolts to several hundred millivolts. This IC can be obtained from almost any electronics parts distributor, if not under the Motorola number, it is sold as part of the lines of replacement parts under the brand names ECG, NTE and SK. Note that it can be obtained in two packages; a round can (G package) or the DIP package (L or P). Either can be used, but be warned that the pin outs described here are for the DIP package only!

Modifications to the SP-600 are extremely minimal. The BFO tube is converted to a cathode follower and a triode connected 6AH6 is used in the socket.

Okay, let's go over the details of the product detector installation. The circuit is first constructed on a piece of perfboard. It is important that good quality carbon film or matched 1/4 watt composition resistors be used as the circuit balance of the detector is important. For the most part, any value changes from those shown here are not recommended unless you are armed with the Motorola linear devise specification sheet. There is a balance of conversion gain, dynamic range and input levels that are juggled by component selection. 12 volt DC power to run the detector is provided by the DC power supply added last month to run a filament regulated circuit. C2 and R2 are for the purpose of additional filtering of the DC power supplied to the product detector. Without them, a 60 Hz hum is audible in the audio output. You



The product detector mounted in the SP-600. The large choke is for additional power supply filtering.

may elect to replace R2 with a small choke of several hundred millihenries or better.

The levels of the BFO and IF input signals must be proper. Here's some guidelines. The BFO injection needs to be about 200 Mv to fully saturate the detector. Better performance will not be achieved if the BFO level is greater. In fact, the MC1496 has built in limiting of the BFO signal, similar to a FM limiter circuit. It can work with a pretty awful looking BFO waveform.

The IF input signal is critical only as to the maximum level. With the component values specified here, the maximum level you should apply is about 250 millivolts. Greater signal will create some distortion on the demodulated audio. If you keep the IF input signal to the proper level, the recovered audio from SSB sounds smooth as silk - high fidelity and low distortion. The SP-600 provides a convenient place to pick off an IF signal at the IF output jack, where the level is several volts. R1 is used to reduce this signal level to the input of the IC. The exact value of R1 is best determined experimentally depending on the level of the IF output signal. You should shoot for about 250 millivolts on the IC side of R1. This value is not really critical; too large a signal applied to the IC will cause some audio distortion when receiveing very strong signals, while too small a signal will reduce the audio output of the product detector. If you add this detector to other receivers that don't have a low impedance IF output sample provided, you will need to construct a cathode (or emitter-source, if a FET is used) follower to drive this circuit. Pick off the IF signal after the last IF stage.

Begin the modifications to the SP-600 by converting the BFO buffer, V12, to a cathode follower. Remove all the wiring

continued next page

Update That Super-Pro from previous page

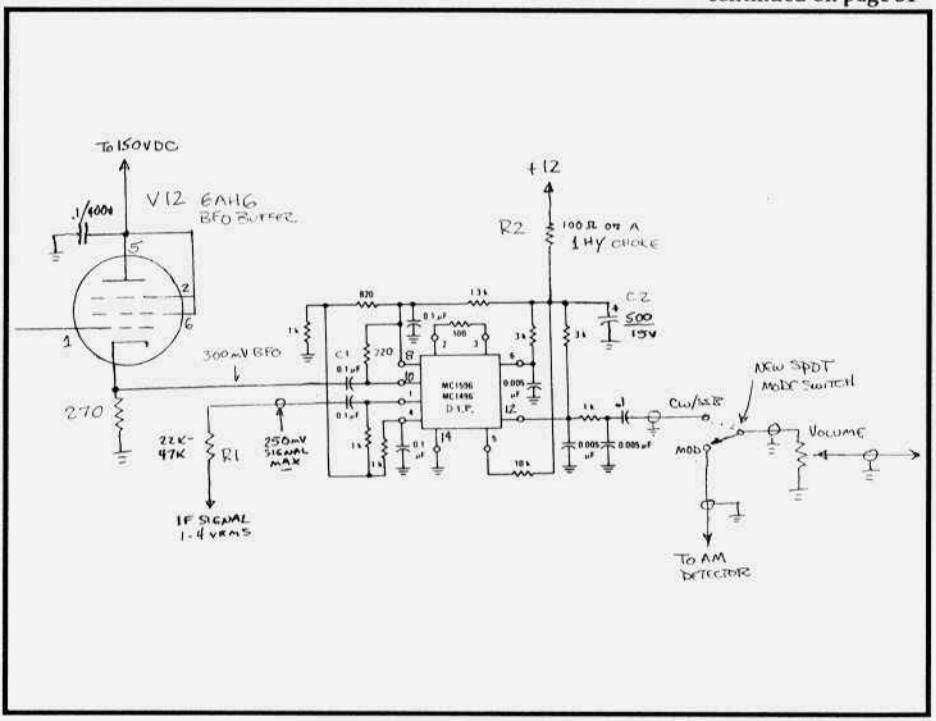
to the socket except for that attached to pins 1 (grid), 3 & 4 (filament). If the RF choke L47 was wired to pin 5, reconnect the free end to pin 5 of V11, the IF driver. Using some small tinned bus wire, connect together pins 2, 5 & 6 of V12 (G2,G3 and plate). Connect a .1/400 volt bypass capacitor from pin 6 to ground, and also run a wire from pin 6 to pin 1 of V18 (OA2). This provides +150 regulated VDC plate voltage to V12. Lastly, connect a 270 ohm 1/2 watt resistor from V12 pin 7 (cathode) to ground. This completes the conversion of the BFO buffer to a cathode follower. Don't forget to change the tube to a 6AH6!

Once this wiring is completed, you can mount the perfboard with the product detector to the side of the chassis just about over the socket for V12. Use threaded spade lugs through two small drilled holes for a good looking installation, and use star washers and a ground lug for a ground connection to the perf board. Run a wire to the 12 VDC power supply and connect the two inputs: R1 to the IF output and C1 to the cathode of V12 for BFO injection.

Now, lets move on to the changes to the audio circuitry. With this modification, the BFO will run all the time - in AM or CW/SSB. Don't worry that a beat note will be audible on AM; you previously removed the coupling wire between the BFO buffer and IF stages.

Time to start working around the front panel. Switch the front panel BFO switch on-it'll stay "ON" permanently. Carefully remove the switch from the front panel, being careful not to scratch the panel, tape up the two connections on the back and using a tie-wrap or piece of small wire, tie the BFO switch back out of the way. This facilitates the restoration of your SP-600 to stock if ever desired in the future. Put a SPDT toggle switch in the vacant panel hole. Clip the center conductor of the shielded wire to the hot

continued on page 31



Did W9FGJ Invent The Inverted V Antenna?

by Bill Neeley, K7INK/6
2900 Serramonte St.
Denair, CA 95316

During one of the nightly west coast AM roundtables on 3870 Khz, the subject of antennas - and specifically the directional properties of antennas - came up as the main topic of discussion. I commented that at most heights the inverted 'V' seemed to be virtually omni-directional and Willis Seaman, W9FGJ/7, in Lake Havasu City, Arizona, agreed and then, after hesitating for a moment, said,"You know, I think I invented that antenna."

I had always assumed that the inverted V configuration of the dipole had been around "forever" but Willis said that it had originated in the late 1940s. I checked the ARRL Handbooks and the first reference to the dipole antenna in such a configuration did not occur until the early 1960s. I queried him further, and said, "You should write this up for Electric Radio . " Willis modestly declined but did agree to allow me to interview him by telephone the following evening. Below is the possible origin of the Inverted V as related to me in that interview.

Willis received his Class C license in 1940 and operated 160 meter AM before the war. He served in the Merchant Marine during WW II. After the war, he earned his Class B and then Class A license and as a result of his study of electronics he became a professional broadcast engineer. He spent his entire postwar career as a broadcast engineer for a variety of television stations, retiring after a number of years as broadcast engineer at Southern Illinois University's public broadcasting station. He is now retired in Lake Havasu City, where he operates both AM and sideband, with the nicest sounding HT-37 on AM that this station has heard.

The Inverted V came into existence during a cold and icy winter in 1948 or 1949. Willis was the operator at the transmitter site of WGLS-TV. The site was located on top of a flat top mountain near Beckley, West Virginia. Willis and his XYL lived in an apartment adjacent to the site. Willis started at the site using a standard 75 meter dipole from a utility pole to a tree. The antenna was not very high and subject to a good deal of sag due to icing and the long run.

Willis decided to use the pole as the center support for his antenna and as a "quick fix" tied the ends to a fence on either side of the pole forming an 'inverted 'V'. The results were great! Stations naturally asked about the rig (which was 100 watts) and the antenna. Willis described the antenna as a dipole hung from the center that looked like an "inverted V". The name stuck and the antenna was widely advertised over the air during those winters in the late 1940s. It seems that the news gradually traveled from east to west; I had not heard of the Inverted V configuration when I first went on the air in Washington state in 1959.

I guess this shows that what we accept as common place and having been around forever, did have an origin. For lack of an alternate explanation, I think W9FGJ did invent the "Inverted V".

Collecting/Repair/Restoration...Tips

S-Line Touch-up Paint

There is a paint available in hobby or model shops that is a match for the S-Line front panel. The paint is MODEL MASTER Custom Enamel System FS 16081 Navy Gloss Gray. As the name states it is a glossy paint but after it is dry it may be dulled with thinner applied to a rag and daubed on the surface. I used it to touch up on winged and round emblem gear and it did a good job for me.

Doug Morgan, KH6U

Johnson Dark Maroon Paint

I've found a near perfect match for the dark maroon Johnson (Ranger, Valiant, etc) gear. Plasti-Koat Auto Color #GM 7191 does a fine job. The 6 oz. can is enough for 3 coats on a Ranger cabinet and 2 coats on a Valiant/Viking size rig. A Ranger just completed looks nice and original.

Bill Kipping, KE7KK

Starting Nuts In Impossible Places

When you need to get a nut on a machine screw under the bandswitch in a corner of a chassis, use a piece of wire solder. Fold one end 'til the nut fits tightly, then twist it in about halfway, leaving enough threads free to catch the end of the screw. Bend the solder to whatever shape is required to reach that 'impossible' place. This works better with the 'real' solder used on older tube gear than with the 'wimpy' stuff used on PC boards and the like....

Better Looking Screws For Miniboxes

Don't you just hate those chinzy looking sheet metal screws you get for fastening the covers on aluminum mini boxes? But you can't tap the holes for machine screws because the metal is too thin and the screws would pull right out. Instead, cut the head from a steel machine screw of the same thread (6-32 is usually best) and file the end to a sharp point. Chuck it in a variable speed electric drill (a hand drill would also work), grease the point liberally, and force it into the small holes provided for starting the sheet metal screws. The holes will be enlarged and threaded but by forcing the extra metal aside, rather than by cutting, as a tap would do. The resulting thread will be strong enough to hold almost any cover or front panel.

Cigar Boxes For Storage

For a variety of reasons I prefer cigar boxes for storage of small parts etc. in my ham shack. They stack nicely - I label the ends - they're about the right size and the full-size hinged lid makes access easy. However, it is becoming harder and harder to find quality, well made cigar boxes these days.

I think the answer to the problem is to keep your eyes 'peeled' at garage sales, flea markets etc. Sometimes I'll buy the box and contents just for the box. Another idea might be to 'cultivate' a friendship with someone who smokes cigars with the hope that you might beg his empty boxes. But there's not too many cigar smokers around these days.I think some enterpising individual should start manufacturing the boxes just for those of us who like them for storage.

N6CSW/Ø

AM FREQUENCIES

2 Meters - 144.4, calling freq., activity in most cities; **6 meters** - 50.4 calling freq. **10 meters** - 29.0-29.2 operating window; **12 meters** - 24.985 calling freq.; **15 meters** - 21.385 calling freq.; **17 meters** - 18.150 calling freq.; **20 meters** - 14.286 for the nightly SPAM net starting at 5:00 CA time; **40 meters** - 7160, 7195, 7290 are the main freqs. Westcoast SPAM net every Sunday afternoon ,4:00 PM on 7160; **80 meters** - 3825, 3850, 3870 and 3890 are the main freqs. Westcoast SPAM net Wednesdays nights, 9:00 PM on 3870. Northeast SPAM net Thursday nights, 7:30 PM on 3885; **160 meters** - sporadic summer-time activity but during the winter signals can be heard anywhere on this band.

First Annual ER 160 Meter Contest .... preliminary report

The 160 meter contest sponsored by ER over the week-end of Dec. 28th and 29th was another big success. Despite the poor conditions the level of participation was high and everyone enjoyed the event.

My observation is that it isn't the 'contest' that most AM'ers enjoy, it's really just the 'event' of having everyone show up on the air. It's the atmosphere of a convention or a reunion and we all enjoy the increased level of activity. It's an opportunity to work all our friends (we know they'll be there for a 'contest') and to hear and work the new AM stations that are coming on the air. I'm thinking that we should have a monthly 'Jamboree' as well as the annual contests on the various bands. Please let me know your ideas on this.

The logs are just starting to come in: Gary, W7FG, had 69 QSO's; Dave, W6PSS had 37 and Bob, W2HBE, logged 4.

Gary, W7FG, had this to say:

"The contest was a lot of fun and I was surprised to hear so many stations trying AM for the first time with their Japanese transceivers. I also heard a lot of 'OT's' rediscovering the mode.

"Friday night was most productive with 45 QSOs and signals good for the most part. Saturday night was a big disappointment here in Oklahoma, with noise levels the highest I've ever heard and very weak signals besides. The noise was caused by rain/sleet/snow static 40 dB over S-9 and peaking 60 dB over at times! The noise lasted for almost 4 hours with breaks in the noise lasting only a few minutes at a time. When the noise subsided about midnight signal levels were unbelievably low. I can say without question in 10 years of chasing DX on 160, the Eve of December 29th was the worst band conditions I've ever experienced.

"All in all the contest was a kick, and I was relieved to hear others complaining about the weak signals Saturday night. I just wish I'd have stuck with it Friday night instead of hitting the sack, Hi.

" In what other contest would anyone hear someone talking about using a "hydraulic jack" to lift up a corner of their transmitter so they could work on wiring underneath it!!"

Next month we'll have a complete report on the contest with more comments from the participants. If you haven't sent in your log yet, please do so.

N6CSW/Ø

WW II Radios Displayed At California Airshow

by Henry Engstrom
POB 5846
Santa Rosa, CA 95402

Last year there was an airshow at Petaluma Airport, California, to which our local aviation group was invited to exhibit historical aviation artifacts and memorabilia. My contribution was a display of the radio equipment carried by a WW II B-17 bomber.This same equipment was used on all WW II medium and heavy bombers and the SCR-274N command sets were also used extensively in single place aircraft.

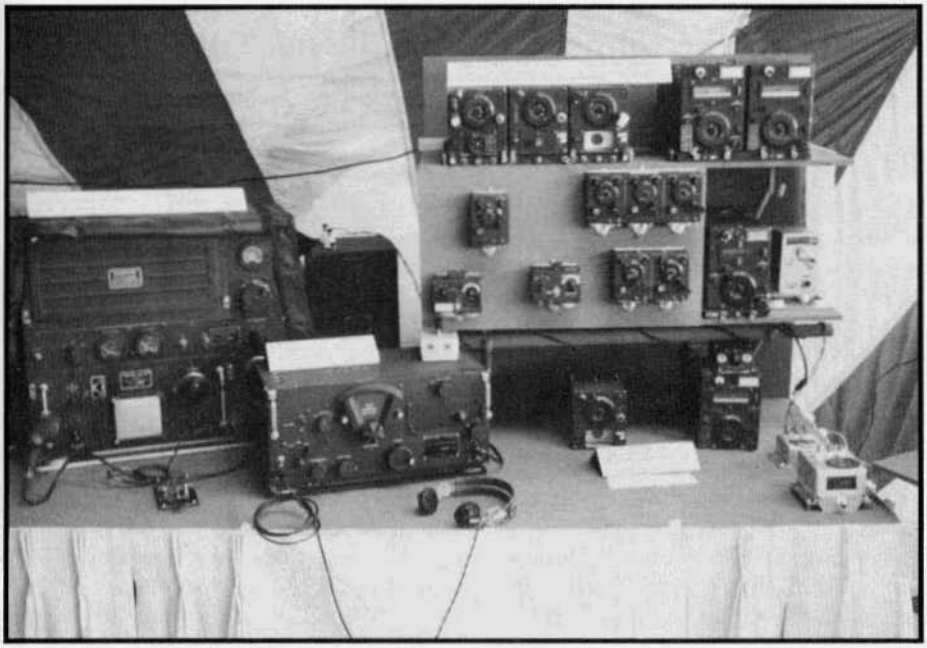
The photograph of the main exhibit shows the command sets (SCR-274N), a BC-348 receiver and a BC-375 transmitter. The BC-348 and BC-375 were known as the liason sets; radios for communication with ground stations. The Command set equipment (used primarily to communicate between aircraft in formation) was intended to be representative, since there are some ARC-5 pieces shown as my collection had as yet not been completed. I later was able to put together a 100% 274N collection (Incidentally, the 274N came in both black crackle and bare aluminum, whereas the ARC-5 and ARA/ATA was always black crackle). The small aluminum box on the lower right shelf is a 75 Mc BC-357 marker beacon receiver which was used for navigation. Shown also in this photo are various receivers and transmitter control boxes and an antenna relay. The background behind the display is a WW II parachute.

The second photograph shows a portion of a SCR 634 direction finding set. The chest contains a BC-639 receiver, RA-42 rectifier and send/receive controls for an SCR-522. The receiver covers 100 - 156 Mc and was used extensively for ground reception of aircraft transmissions. I had the 'pleasure' of using a set like this on a 5000 foot mountain top in Korea as a DF Controller in 1955. I use the word 'pleasure' facetiously as Matcon mountain was a lonely rat infested site serviced by a very treacherous road.

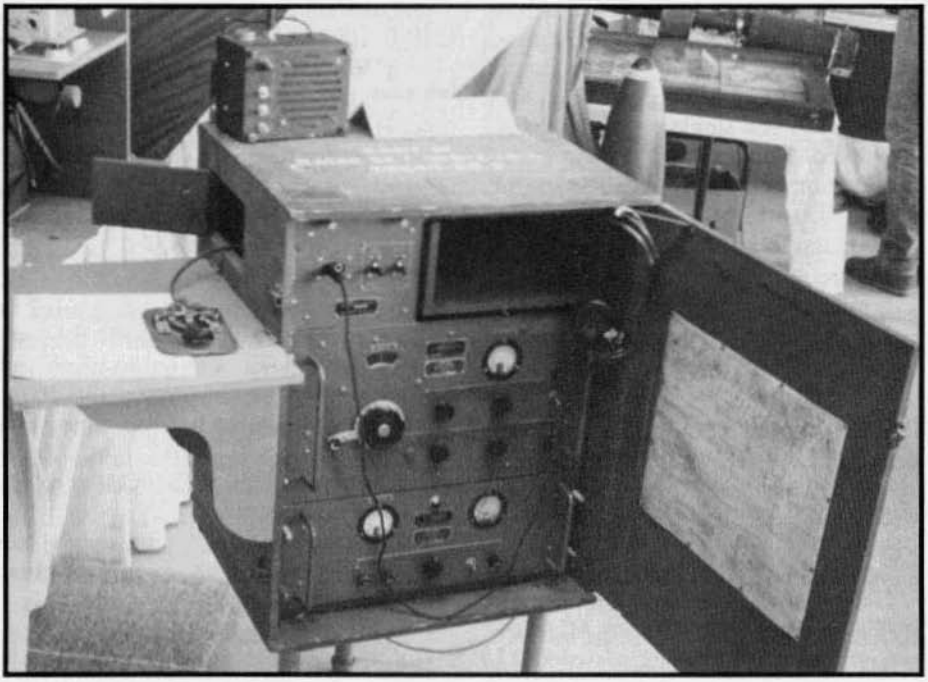
The reaction to the display was outstanding as former aircrew and technicians reminisced about using this equipment. A lot of hams also fondly recalled the postwar period when they put these radios on the ham bands. Today, as we all know, this same radio equipment is again being seriously collected and used, however this time it's in it's original state with much effort going into the restoration of some scarce, previously modified sets.

Editor's Note

Henry Engstrom is an avid collector of WW II military radio equipment of all types: aircraft, ground and vehicle. He has assembled the major components of a B-17 radio room for an eventual aircraft restoration. He is about to slow down his collecting activities to find some time to get his ham license. He welcomes your calls about any WW II radio equipment and has a fairly extensive reference library.



The main exhibit showing command sets, BC-348 receiver and BC-375 transmitter.



SCR 634 direction finding set

Modifying the Johnson Desk Kilowatt For 160 Meters

by Gary Gompf, W7FG
3300 Wayside Drive
Bartlesville, OK 74006

The modifications I made to my Desk Kilowatt for operation on 160 meters are rather simple and straight forward. Before I began the modifications I dealt with a number of concerns:

1. Does the plate choke need to be replaced?
2. Is present bypassing going to be sufficient?
3. Will there be room for additional tank circuit inductance?
4. Will the addition of components in both grid and tank circuits add enough stray capacitance to cause problems on 10 meters?

I decided up front that if any of the above problems were encountered, the project would have to come to a halt, as major modifications to existing component layout or radical changes to the chassis were totally unacceptable. As it turned out not a single problem was encountered. So here is what I did to correct the number one 'downfall' of the E.F. Johnson Desk Kilowatt.

Materials Needed

Grid Circuit

1. roll of 26 gauge magnet wire
2. 2 feet of 20 gauge solid insulated hook-up wire
3. 2 inch piece of 1/2 inch diameter plexiglass or teflon rod
4. screw for mounting the 2 inch rod to chassis

Final Tank Circuit

1. three Amidon T-200 toroids
2. roll of glass fiber tape
3. 20 feet of 14 gauge stranded wire insulated for at least 600 volts AC
4. piece of bakelite or plywood 1/4 inch thick 4"x 9 3/4"
5. 200 pf at 7.5 KV door knob type capacitor with mounting hardware
6. 1/4 inch bolt 1/2 inch long with nut
7. 1/4 inch nylon bolt 4 inches long with nut (can be found at model shops where materials are found for RC airplanes)
8. Fiber or plexiglass washer 2 inches in diameter with 1/4 inch center hole (I made mine out of 1/8" plexiglass formed into washer look alike)
9. 3 inches of copper braid from RG-8 coax or flat copper stock

The first thing to work on is the grid input circuit. There is plenty of room for just about any reasonable inductor. The inductor I used was wound on a 1/2 inch diameter plexiglass rod 2 inches long. The grid coil was made of number 26 magnet wire close spaced and measured 1 inch in length, with a 4 1/2 turn link made of number 20 insulated hook up wire wound over it. The new inductor which we will call L160G was mounted to the same chassis separation panel as L-101, 1 1/2 inches away.

Installation of L160G

1. Remove the nuts holding L-101 in place and move L-101 out of the way carefully, making sure not to break any of it's jumpers loose from switch S-100.
2. Remove jumper between pins 5 and 6 of S-100-2.
3. Wire one end of L160G link to pin 6, freed up in step 2.
4. Ground the remaining end of the L160G line to the same ground point used by the link of L101.
5. Move L-101 back in place and secure it to the chassis, making sure that all wire jumpers are back to their original locations.

E.F. Johnson's response to the Collins KW-1, the Desk Kilowatt. On the left is the Ranger exciter and next to it is a National NC-300 receiver.

6. Move the lead from L-101 closest to it's mounting tabs and reconnect it to one end of L160G.

7. Connect the remaining end of L160G to the freed up terminal of L101 in step 6.

8. Move the jumper connecting L-101 to S-100-1 pin 7 to the same tie point connected to in step 7.

Once the above steps have been taken the grid switch markings will take on a new meaning: the 4.5 to 6.6 Mhz position will become 3.5 to 4.7 Mhz and 3.5 to 4.7 Mhz will be 1.8 to 2 Mhz.

Operation of the grid circuit should be checked by applying a couple of watts of RF to the input of the RF chassis on 160 meters and make sure the input SWR is below 2:1. While making grid circuit checks it is not necessary to have the filaments turned on. When running VSWR/ Resonate checks keep the power low so as not to destroy R101 and R102.

If 160 meets your expectations, confirm the other bands are still functional while the component layout is fresh in your mind.

Final Tank Modifications for 160

Moving the final tank circuit to 160 required a little more work than the grid circuit, but with all the available room and size of components it was actually easier to perform. Before we get started, ground rules must be established so we can all be think of the RF deck with the same perspective.

1. The top of the RF deck will be referenced to the "Little Viking" (E.F. Johnson logo of yesteryear), where the Viking will be right-side up.

2. The front of the RF chassis will be the front panel where all the controls and meters are located.

3. The back of the RF chassis will be considered the side where the SO-239 connectors are mounted.

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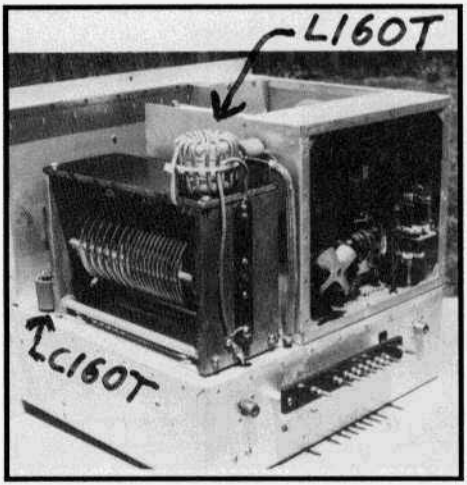
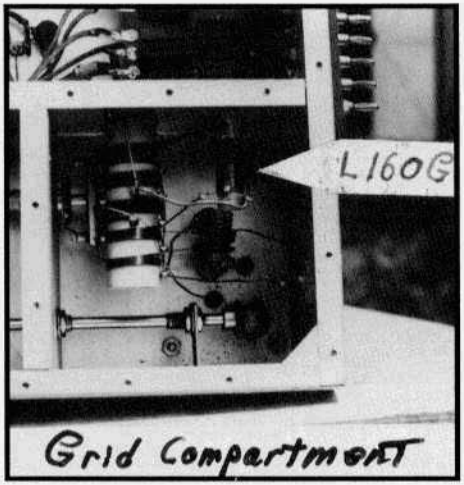




An overview of what we are going to do is probably in order and hopefully will save some headscratching. To move the final tank circuit to 160, it is necessary to add inductance and 200 pf of capacitance, drill a few holes here and there (my favorite part), and cut a plate to mount the extra inductor on. We will call the new inductor L160T and the 200 pf capacitor C160T from here on out.

Building L160T

Stack the three T-200 toroids and wrap them heavily with the glass tape making sure all surfaces are covered well. (Don't put tape between the toroids when stacking.) Wind 17 turns evenly spaced with the 14 gauge wire on the stacked insulated toroids.

Mounting and Wiring in L160T

Providing a platform for L160T is done by installing the piece of bakelite or plywood to the top of the roller inductor. This can be done by drilling and taping holes on each end of the roller inductor's fiber mounting plates (3/8" end plates), drilling matching holes in the new mounting plate and securing to the roller inductors fiber mounting plates.

Mounting of L160T is done by placing it as far back as it will go on the new mounting plate, marking it's center on the mounting plate and drilling a 1/4" hole through the mounting plate. Secure L160T to the mounting plate with the 1/4" nylon bolt and fiber or plexiglass washer.

Preparation for wiring L160T must be done to the roller inductors back end plate. Note on the back of the roller inductors back plate near the chassis is a silver plated wire that connects the roller inductor to the loading capacitor C122. We must remove the connecting wire and provide a new means of securing it and insulating it from the roller inductor. This can most easily be accomplished by drilling a 1/4" hole 1/2" to one side of the brass vertical mounting plate that connects the wiper and center rod of the roller inductor. Install the 1/4" diameter 1/2" long bolt in the new hole and attaching the previous disconnected silver plated wire going to C122.

Wiring L160T is now done by taking one of it's leads and connecting it to the 1/4" diameter 1/2" long bolt, thus connecting L160T to C122. Install the remaining end of L160T to the top of the brass vertical mounting plate on the roller inductor by loosening one of the small screws used in securing the brass track of the roller inductors wiper mechanism. Take cautions to make sure the leads of L160T are not going to move around and possibly cause arcing problems later down the road.

Installing C160T

C160T is mounted in front of the roller inductor near the outside of the chassis. Trial fit C160T close to switch S102 which connects C119 to the roller inductor. Drill a hole in the chassis where C160T best fits being careful not to damage under chassis wiring. Install C160T on the chassis and run a piece of braid from C160T to S102 and close the contacts of S102.

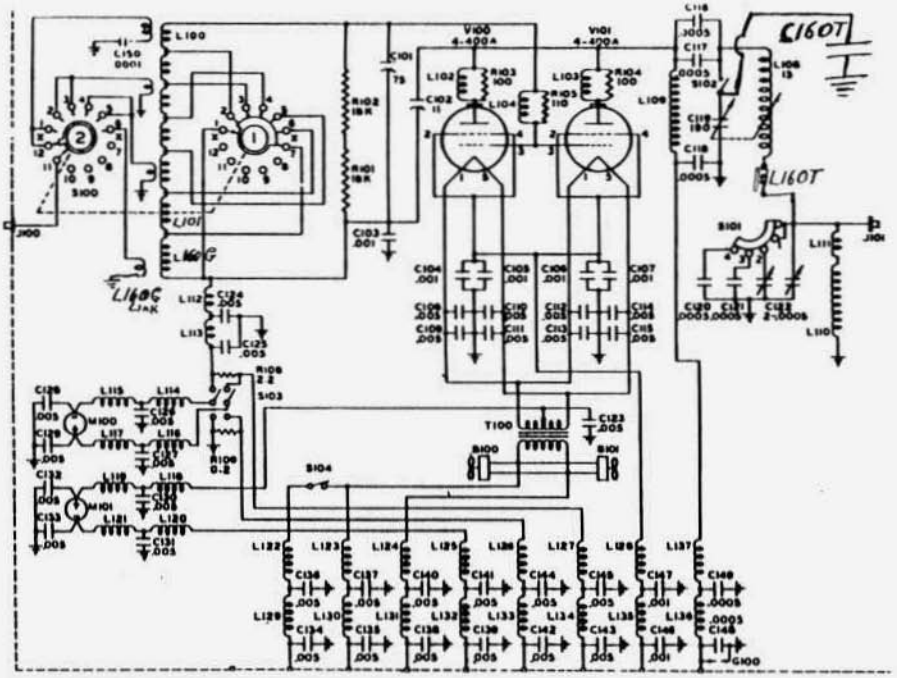
The modifications are essentially complete at this point and a quick final checkout with a grid dip oscillator to the final tank network would not hurt at this point. Check all your wiring and reinstall side panels and drop the RF deck back into the pedestal.

Testing 160 Meter Operation

160 Meter tune-up and operation are no different than that found on 80 meters. Be careful the first time you fire it up on 160 and make sure to keep a watchful eye on the meters and an ear tuned for possible arcs. Tuning it up in the low power position the first time is highly recommended. Roller inductor settings are very close to that on 80 meters.

Bandswitching 160 through 10 meters is very easy without front panel modifications. I will cover that at some later date. If you have problems with the modifications or wish to discuss the band switching don't hesitate to give me a call on the landline, 918-333-7893.

I hope to hear you on 160 soon with your E.F. Johnson Desk Kilowatt and hope you have as much fun with yours as I've been having with mine for the past eight months.



Using The T-368 Exciter

by Dave Mills, AJ7O
6782 Marilyn Dr.
Huntington Beach, CA 92647

The exciter used in the military T-368 transmitter has been available from Fair Radio Sales for some time now and is rapidly becoming a favorite with the vintage radio crowd. This 5 7/8 inch by 10 3/8 inch by 10 inch unit is very ruggedly built and makes a superb vfo or exciter for vintage transmitters like the Viking II or it can provide enough power to drive a medium power tube such as an 813 or a 4-400A.

Basically, the T-368 exciter is a PTO (permeability tuned oscillator) followed by a three stage multiplier section and an output amplifier. The PTO is a Collins unit that covers 1.5 to 3.0 Mcs. The output of the exciter can be either at this fundamental frequency or multiplied to the ranges 3.0 to 6.0 Mcs, 6.0 to 12 Mcs or 12.0 to 24 Mcs depending on the band selected with the front panel bandswitch. The frequency is shown directly at the front panel by use of a mechanical Veeder-Root display.

In typical early Collins design style the multiplier circuits are tuned, not broadbanded. The coil slugs are mounted on a rack which is moved by a cam that is geared to the tuning shaft, raising and lowering them in the coils as the frequency is varied to keep the output tuned.

Once warmed up the stability of this exciter is very good. I got involved with these units because the poor stability (by today's standards) of my old Johnson vfo was causing many adverse comments from the 'Japanese transceiver ' crowd who expect an absolutely rock steady signal.

The exciter was designed to work with the T-368 so in order to make it useful in other applications the power supply connections will have to be changed to accommodate your needs.

Power Supply Connections

For most applications the wires should be removed from P101 and labeled as to their function. The wires are color coded but duplicate colors are used for the PTO and multiplier filaments. Many people remove P101 and bring these wires out to a barrier type terminal strip so that they are easy to use. If the wires are carefully removed from P101 and installed on the terminal strip by putting the wire that went to P101 pin 1 to terminal strip terminal 1, P101 pin 2 to terminal 2 and so forth, then you won't lose track of the wiring. For purposes of this discussion I will refer to the wires by their P101 designations.

The filaments for the PTO, multiplier tubes, and output tube are brought out separately. They should all be connected in parallel so the exciter can be powered by a single 6.3 VAC source. Connect the wires that formerly ran to P101 numbers 1, 5, 15, and 13 (chassis) to a common ground terminal. Then by connecting P101 numbers 2, 4, and 14, which includes the output tube socket, to a 6.3 VAC source. You can use a tube in the output stage later if you decide to boost the output.

Wires for plate voltages for each section of the exciter were brought out to the P101 connector separately. The PTO plates were on P101 pin 3, the multiplier on pin 7 and the V104 output tube was on pin 9.

For use as a vfo with low level output only, the PTO and multiplier sections need to be connected. The PTO is designed to run on 150 volts regulated DC. The multiplier will work with a wide range of plate supply volts up to 300 VDC but something like 250 VDC is ideal.

A simple power supply can be built that supplies approximately 250 VDC to P101 pin 7 for the multiplier plates. It will also supply the regulated 150 VDC for the PTO if a 10K ohm 20 watt dropping resistor is connected from the 250 VDC to an OA2 voltage regulator tube and then to P101 pin 3. The total current required by the exciter without an output tube is 55 ma at 250 VDC and 2 amps at 6.3 VAC. If you plan to use the output stage you must provide for the additional current. Any old ARRL Handbook describes suitable power supply circuits.

I turn the exciter on when I transmit by using an extra set of relay contacts on my Dowkey antenna relay to turn on the high voltage by grounding the transformer center tap. For spotting the frequency I put a SPST switch on the exciter panel that will ground the center tap of the transformer.

Low Level Output Connections

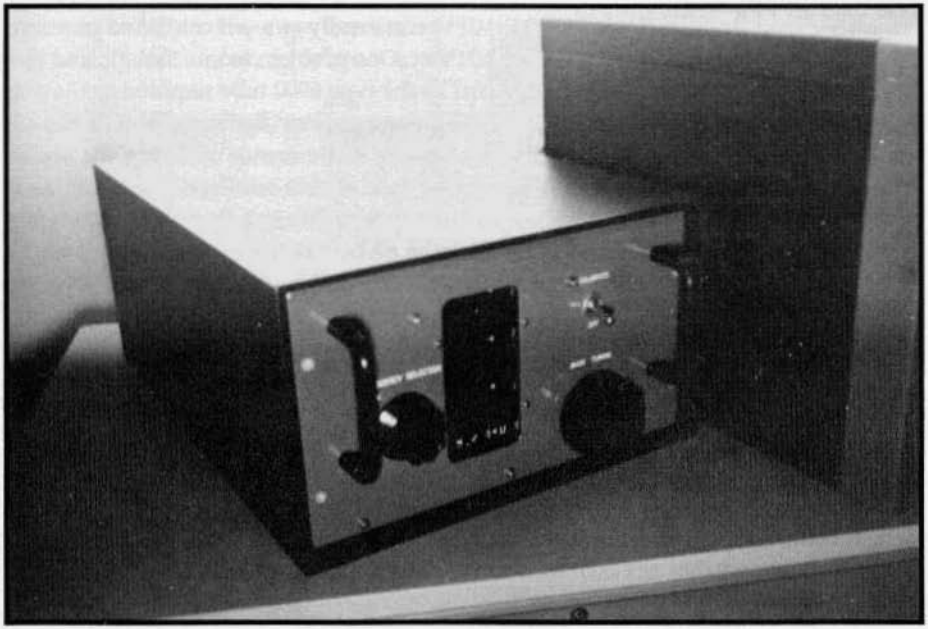
For output as a low level vfo for rigs such as the Viking II you only need a few volts of output. The RF drive to the 6000 tube (V104) inside the exciter is more than enough so you can just leave the tube out.

A convenient way to get this signal out of the exciter is to use J103. Install a 500 pf (value is not critical) capacitor between the grid (pin 1) and plate (pin 5) pins of the 6000 tube socket. Mount the capacitor on an octal plug and insert it into the V104 socket.

Using the Output Stage

The V104 output tube was originally a type 6000. These are hard to find but a substitute can be used. I have used a 6AU5GT which is a tube used as a TV horizontal output amplifier. It has a rated

continued next page



Bill Webster, K6EOB , mounted his T-368 exciter in a wood cabinet. He uses it with his Viking 1 and II transmitters.

Using the T-368 Exciter from previous page

plate dissipation of 10 watts so it will put out some useful power.

The screen grid connection of V104 is brought out separately (P101 pin 12) so the output can be varied by adjusting the screen voltage. This makes it handy for use as an exciter for a tube like an 813.

Charlie, W5TOP, uses an exciter in his 813 rig [see Dec. 1990, ER] and suggested the following ideas for screen voltage control and CW keying circuits:

1) To control the screen voltage of the exciter output tube connect the ends of a 40k or 50k wirewound pot between P101 pin 12 and ground and the wiper through a 10k, 10 watt resistor to the 250 VDC plate supply voltage.

2) For CW work the exciter is already set up for grid block keying. All you have to do is to put negative bias on the grid resistors that went to pins 8 and 10 of P101. Connect them together and put approximately -18 to -24 VDC to them. Then key the white wire that went to P101 pin 6 to ground.

The Exciter as a Viking VFO

Bill Webster, K6EOB, uses his exciter only with Viking I and II transmitters so he made up an interface circuit that uses the 300 VDC from the Viking. The circuit is built on a narrow chassis (LMB 850) at the rear of his excellent homemade wood cabinet.

He uses two dropping resistors. One, a 5K ohm 10 watt, to lower the 300 VDC from the Viking to approximately 200 VDC for the multiplier plates and the other a 10K ohm 10 watt resistor from the 300 VDC to an OA2 regulator tube to provide 150 VDC to the PTO.

The filament current needed by the exciter is more than the Viking will provide so he uses a separate 6.3 VAC filament transformer. T/R keying is by use of a relay that switches the 300 volts to the interface circuit on and off.

Alignment

The PTO frequency accuracy is pretty good but you will probably find that there is some tracking error. The exciters I have seen are very good over the ham bands so I haven't tried to align the PTO.

The PTO output is 1.5 to 3.0 Mcs. The multipliers hand the higher band outputs and are kept tuned with a cam actuated coil slug rack method similar to the early Collins receivers.

For each band there is a coil slug and a capacitor adjustment. To align the output use a scope or watch the grid current on your transmitter and use the coil slug adjustment to peak the output at the low end of each range and then the capacitor to peak the output at the high end of the range.

Editor's Note:

Recently I received a letter with some additional information regarding the T-368 exciter:

"What a wonderful boon to the Am'er and others who use them as vfos and occasionally as a self contained transmitter. One problem looms though, and that is the type 6000 tube required as the output stage. Fair Radio ,who sells the exciters, recommends rewiring the socket to take a 6146 which is a real job. As it turns out there are two older tube types, the 6AU5 and the 6AV5 (there is also a 12AV5 and a 26AV5) which have the same pin basing as the 6000 and will plug right in with no wiring modification. They can usually be found in any old tube box at a second hand store (that's where I found mine). I have used them in my exciter for awhile now and found them to be quite satisfactory."

Michael D. Runyan

Alignment Data

Band	Coil slug	Capacitor	
1.5 to 3.0	L108	C136	Z107 Output
3.0 to 6.0	L102	C110	Z101 Multiplier
	L103	C112	Z102 Multiplier
	L109	C138	Z108 Output
6.0 to 12.0	L104	C118	Z103 Multiplier
	L105	C123	Z104 Multiplier
	L110	C140	Z109 Output
12.0 to 24.0	L106	C128	Z105 Multiplier
	L107	C131	Z106 Multiplier
	L111	C141	Z110 Output

P101 Connections

Pin	Wire Color	Purpose
1.	White/brown	6.3 VAC to multiplier tubes
2.	White/brown	6.3 VAC to multiplier tubes
3.	White/red	150 VDC regulated for PTO
4.	White/orange/brown	V104 (6000) tube filament
5.	White/orange/brown	V104 (6000) tube filament
6.	White	Grid return for V101,104
7.	White/red/green	250 VDC for multiplier plates
8.	White/green	Grid return 150K to grid 6
9.	White/blue/red	Plate voltage for V104 (6000)
10.	White/green/blue	1 meg. to grid of V104 (6000)
11.	White/orange	12 VDC to relay
12.	White/red/green	V104 screen voltage
13.	White/black	Chassis ground
14.	White/brown	6.3 VAC to PTO filaments
15.	White/brown	6.3 VAC to PTO filaments

Letters from page 11
transceivers use) could be incorporated into the RF amplifier stage.

Personally, like all of us that are engaged in gainful employment, my time is limited, and has been more so lately due to an early 1990 job change, and heavy travel requirements. However, I'll quietly go on gathering information on National and give you occasional new tidbits, as I find them.

Your monthly contributors, like Walt Hutchens, Fred Huntley and Bill Kleronomos, et al, are to be sincerely congratulated on keeping up their good work; I know how difficult it can be to do voluntary material on a timely basis. Best wishes for continued success with ER in 1991.

George Maier, KUIR

Dear ER

Has anyone had experience running the Hallicrafters R-274/SX-73? Mine was hum-modulating the signals on the higher-frequency bands. Feeding the local-oscillator and first-mixer heaters with DC seemed to help. But then I found that the oscillator injection was very low on the upper two bands and by selecting an especially active 6C4 the problem went away. Is this a common problem? I could always build a rectifier and current regulator to plug in place of the ballast tube (by adding a ground connection at the socket, to return the filter capacitor) but the ballast has given me no trouble and anyway, I have a spare so it's easier to leave it alone.

Of course I had to replace three or four molded-paper capacitors in the audio and AGC circuits (the ones that look like molded micas but aren't) and also the meter movement. Now it takes a tremendous signal to get the meter past center, while it mostly wants to peg off-scale to the left, no matter how the meter-zero pot is set. But the receiver works fine and the stage gains that I measured seem pretty close to spec. There again, is this normal?

Finally, could anyone tell me about the design of this set? Did the military come up with the original specs? The circuitry is amazingly similar to the Hammarlund SP-600, though you'd never suspect it to compare their mechanical designs. Evidently Hammarlund began with a front-panel layout and worked backward from that - and then had trouble squeezing in the bells and whistles. I would guess that Hallicrafters had a similar problem: they originally had a logical chassis layout and a great panel design (their dial has about twice the "length" of the SP-600's) and then it appears that the crystal-controlled local oscillator and it's two panel controls were 'shoehorned' in. I can just picture the scene in the engineering department when the revised specs arrived from Washington. But does anyone know what really happened?

Alan Douglas
Box 225
Pocasset, MA 02559

Dear ER

You will be pleased to know that with QST, CQ, Ham Radio and a number of newsletters from Antique Radio Clubs, my dog chose the November, 1990, issue of Electric Radio for lunch. This should prove that you have a quality publication.

Harold Parshall, N8FRP

Editor's Note:

I think that most of you have information and ideas that are of interest to us all. They don't have to be contributed in the form of an article; a letter will work too. Please keep that in mind.

ER in Uniform from page 10

rushing to overhaul depot stocks of KWM-2 transceivers -- which the military calls the RT-718 -- for service in the Persian Gulf. Turns out that a small grain of sand can carry a small charge of electricity; in a sandstorm there are a lot of grains and an exposed antenna or power cable can collect a big enough static charge to take out solid state components in some of the gear on duty in Operation Desert Shield.

Of course all modern military sets have static protection built in, but evidently in some cases (maybe the GRC-106 400 watt PEP HF transceiver?) it isn't up to the job. 'Hollow state' to the rescue!

Update That Super Pro from page 16

side of the volume control. Run a piece of shielded wire from the hot side of the volume control to the center pole of the SPDT switch. Run another piece of shielded wire from the now disconnected end of the cable you clipped off the hot end of the volume control to the pole of the toggle that is used when the switch is in the "MOD" or AM position. Now, the audio is as before, except only when "MOD" is selected. Run another piece of shielded cable from the free terminal of the switch to the audio output of the product detector perfboard, so that it's output is fed to the hot side of the volume control when the switch is in the "CW" position. A small hole may have to be drilled in the chassis to pass this cable through to the switch if you can't fit it through one of the grommets. This basically completes the modifications to the receiver. Tie down or dress the added cables along the front panel so that they won't get gummed up in the dial drive gears.

I recommend the tweaking of the BFO trimmer coil, L44, after you're done. The procedure is in the book.

Operation of the modified 'Pro' is as follows: for SSB reception, use the 3 Kc selectivity position and tune in a station for maximum meter reading with the receiver in the AM mode. Switch to CW/SSB and tune the BFO until the SSB signal is tuned in properly. CW works in much the same manner, except the selectivity options are more varied. You will be able to vary the BFO tuning within the passband of the IF after some experimentation - so as desired, you can chop QRM off the high or low side of the desired SSB or CW signal. How about that - you also have passband tuning!

It's a real pleasure being able to use the Super-Pro as a "real" CW/SSB receiver with the AGC switched on - no more riding the RF gain, just tune around the band!

Next month we'll cover the sensitivity improvements I made to the 'Pro'.

Editor's Comments from page 1

And it does provide some encouragement to those people just getting into vintage collecting/operating who might wonder where they're going to get parts. At the moment the list contains about 150 units. If you have a 'junker' please consider putting it on the list; drop me a card with the info. On to 22...

OH! YOU RE-STYLE THIS ? I WAS WEARING IT WHEN I TOUCHED THE PLATE CAP OF MY OLD TRANSMITTER.

CLASSIFIEDS

Advertising Information

Subscribers receive 1 free - 25 word- ad per month. **Extra words are .15.** 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 25 words send payment for the extra words.**

Non-subscribers: $3 minimum for each ad (up to 30 words). Each additional word is .20. **Please call or write for display rates.**

VINTAGE EQUIPMENT ONLY

E.R.
145 CR 123
Hesperus, CO 81326 303-247-4935

DEADLINE FOR THE Feb. ISSUE: Feb. 3

WANTED: Drake TR4CW; SPR-4; C-4; Collins 51S-1 receiver. Charlie Vaughn, KD4AJ, 1968 Huntington Hall Ct., Atlanta, GA 30338.

WANTED: 813 sockets; 1940's -1950's Radio Master catalogs and UTC transformer catalogs; used 450TL tube. Geoff Fors, WB6NVH, 769 Pacific St., Monterey, CA 93940. (408) 373-7636

FOR SALE: NIB pair of Eimac 304TLs - $70; 304TL socket - $10; Collins F-455B-31 mech. filter for 75A-3 - $55. All plus UPS. Val M. Johnson, WA9DZJ, POB 51, Henry, IL 61537. (309) 364-3160

FOR SALE: Heath Seneca, very nice - $70; Globe Scout w/manual, very nice - $80; TBS-50, excellent, w/supply and vfo - would trade for operating National 101X with 'S'meter.. or cash. Roland Matson, RFD #1, Box 2943, Kennebunk, ME 04043. (207) 985-3751

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

WANTED: Gonset G-77 xmtr w/ps and modulator. M. Toepfer, W5TQO, Rt 2, Box 217N, Comfort, TX 78013. (512) 995-3571

TRADE: Drake TR-3, 80 - 10 meters, 300 watts PEP for 390A or 51J receiver; purchase or trade for Collins R-389 rcvr - 15 to 1500 Kcs. Tons of sockets, tubes and parts. Write for list. Russ Hunt, W9HZD, 201 Sharon Dr., Barrington, IL 60010. (708) 381-6237

FOR SALE or TRADE: Collins 30K-2; Gonset G-76 w/Heath HE-23 ps - $150. **WANTED:** QSTs 1950 - 1975; NC-303 w/ speaker; B&W L-1000A; GPR-92 and Ranger II. Steve, KE4MN, 4070 W. Hwy 4, Century, FL 32535. (904) 327-4179

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

CLASSIFIEDS

WANTED: ARC-5 xmtr variable capacitors with worm gear drive; Johnson and Millen neutralizing capacitors; B&W turns counters; 10V CT 10 amp filament transformers. Clark Hatch, WØBT, 2546 SE Peck Rd., Topeka, KS 66605. (913) 235-2721

FOR SALE: National model 98 rcvr; Hallicrafters SX-99 rcvr; Drake 2A, ham bands only; Eico model 720 with 730 modulator. All items selling for reasonable prices. Art Reiss, WA2YBG, 169 N. Delaware Ave., Lindenhurst, L.I., NY 11757. (516) 884-8527

WANTED: Collins accessories. Type 270G-3 speaker for 75A-4; mech. filters type 455J-05 (500 Hz) and 455J-60 (6 Khz). Mike Cornett, (602) 869-9650.

WANTED: Complete National SW-3, SW-5; Pilot Wasp; Viking Navigator, Adventurer; Ranger meter; HRO-5 parts source. Brian Roberts, K9VKY, 3068 Evergreen Rd., Pittsburgh, PA 15237. (412) 931-4646

FOR SALE: Estate magazines: QST, partial 1931-32, complete 1933 to April 1981 - $600; CQ, May 1947 to August 1964 (missing two) - $150; Radio World, 27 issues, 1928-1933 - $75; Radio, 28 issues, 1939-1942 - $50. SASE for additional list. Stu Stephens, K8SJ, 1407 Hollywood Rd., Sandusky, OH 44870. (419) 627-0460

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

FOR SALE: Western Electric tubes for sale or trade. Also W.E. caps, xfmrs, inductors and relays. Vogt, 330 S.W. 43rd St., #247, Renton, WA 98055.

WANTED: Hallicrafters SX-115 and SX-73; National NC-300; speaker for National NC-303. Will pick up receivers within 300 miles or in Texas or will pay UPS. Bill Smitherman, KD4AF, Rt #4, Box 79, East Bend, NC 27018.

FOR SALE: Collins F-455Y160-6415 (2.7 kc) filter - $20; F-455Z56609 (16 kc) filter - $10; Contex 6706 linear (CB?) - $10; HP-608D - $35; National NPW gear reduction - $10; 211 tubes - $20; tube list, 3000 + - $1 plus LSASE; SWR bridge - $5; 8 station intercom, wooden cabinet - $10. Older stereo/hi-fi: Tanburg reel-reel - $15; Magnavox 1-D speakers, pair - $20; Monarch AM/FM tuner - $5; Eico HFT-90, FM tuner - $5; 8 track player - $3. **WANTED:** Manuals for SP-600JX and HRO-50, copies ok. Shipping charges extra. George Babits, WA7HDL, Rt 1, Box 178-A6, Salmon, ID 83467. (208) 756-4147

WANTED: Ranger I or II; Valiant; Viking II; Navigator; Viking mobile dynamotor, needed for Viking Mobile. John Brewer, WB5OAU, 7605 Roberts NE, Albuquerque, NM 87109.

FOR SALE: NC-300 - $95; NC-183R- $95. **WANTED:** Collins gear: 51S1; 62S1; S-Line; KWM-2 and 302C-3. Cash or trade. Ron Follmar, K5GIT, 1409 W. Willis, Alvin, TX 77511. (713) 331-1074

FOR SALE: Lafayette HA-410, 10 meter, AM transceiver - $100. Darrell Brooks, WA5VGO, 7707 Magnolia, Houston, TX 77023. (713) 923-4877

WANTED: Burgess type B30 and 2F4 (Eveready 762 and 718) batteries with good cases; Hallicrafters RE1 rcvr. R. Haworth, W2PUA, 112 Tilford Rd., Somerdale, NJ 08083. (609) 783-4175

WANTED: Sam's CB Vol's 1, 2, and 3. Fred Emerson, 627 Illinois Ave., Elgin, IL 60120.

WANTED: Globe King 400, any condition; GO-9 or TBW surplus transmitters. Ted Bracco, Quincy College, 1800 College Ave., Quincy, IL 62301. (217) 228-5213

WANTED: Schematic diagram and manual for Johnson Viking II-CD (must be Civil Defence model). Gordon Yost, N7PFB, POB 321, Gig Harbor, WA 98335. (206) 851-6715

CLASSIFIEDS

FOR SALE: RCA Radiomarine Radio Phone, type CRM-I'ZA-5; Globe "Tenname-ter"; several pocket type 'B' battery meters; early tube type xmtr/rcvr for door opener; misc. books, parts, and tubes. Jim Dill, Box 5044, Greeley, CO 80631. (303) 353-8561

WANTED: Exc/mint Lafayette HA410, 10 meter AM xcvr and Lafayette Comstat 25-B 23 channel CB for conversion to 10 meters. I am also looking for a Cushcraft A26-ZP 6M/2M portable "zipper beam". Harry Schools, KA3B, 1606 S. Newkirk St., Philadelphia, PA 19145. (215) 468-1512

WANTED: The following coils: one (1) 160 JVL, two (2) 160 MEL; two (2) V70D tubes; several 100TH tubes; also want reduction tuning assembly, top cover & back for a Collins 75A-4. Dewey Angerhofer, WØZUS, POB 540, Edgemont, SD 57735.

FOR SALE: Exciter deck for T-368, minus tubes but with cables, recently aligned, works fine, light grey not blue-grey - $30 shipping prepaid. WA3VJB, Box 73, W. Friendship, MD 21794-0073.

FOR SALE or TRADE: 51J4 for R4C, late model w/sw xtals; 1990 callbook NA/DX/SUPP - $25 incl. shipping. Levy, 8 Waterloo, Morris Plains, NJ 07950. (201) 285-0233

WANTED: National NC-400; HRO-50 or HRO-60. Greg Richardson, WA8JPC, POB 405, Gallipolis Ferry, WV 25515

WANTED: Complete AN/GRR-5 or components as R-174 rcvr, PP-308 ps, CY-615 case and tech manual. Homer Henrioud, 2772 Plantation Dr., East Point, GA 30344. (404) 767-0404

WANTED: ARC-65 and ARN-7 equipment, accessories, etc. Mark Meltzer, 335 Prentiss St., San Francisco, CA 94110-6140. (415) 826-3889 home or (415) 826-8994 ext. 3019 work

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WANTED: Lettine model 240, CW-AM transmitter. Don Soule, RR #2, Box 2510, N. Dexter, ME 04930. (207) 924-3220

FOR SALE: Mackay type 220-B radiotelephone, 220 watts AM, 2 to 6 Mhz, 110 v AC, manual, SASE for photo and info - $50. **WANTED:** HRO "A" coil. John V. Smith, W4ACG, 1924 Dolphin Blvd., St. Petersborg, FL 33707. (813) 345-0464

WANTED: Type 6000 electron tube for T-368 transmitter and "Radio Antenna Engineering" by Edmund A. Laport, McGraw-Hill, 1952. Bill Mills, KC5PF, 1740 Tonys Court, Amissville, VA 22002. Office: (703) 818-3955, Home: (703) 937-4090

FOR SALE: Matching speakers for Hallicrafters SX-16/17 and 1930 vintage HRO 8" cabinet style - $44 each; Hallicrafters model SP-44 panoramic with manual - $70; original SP-600 manual - $10. Ward Becht, 625 Tufts Ave., Burbank, CA 91504. (818) 842-3444

FOR SALE: 304TL sockets (3) - $15 each. **WANTED:** 837 tubes; LG or HK 254 tubes; UTCO-Z and UTCP-51 audio xfmrs. W.S. Baker, K2LZF, 1388 Ridge Rd., Lansing, NY 14882. (607) 533-4686

WANTED: Drake DSR2; Varitronics (Icom) FDFM; Lafayette HA410, HA1200; Heath Pawnee; Hallicrafters SR-42, HT-46, SX-146; Swan 140, MB80/A; Gonset 220 Communicator, G-76; Regency XR2A. Herman Cone, WB4DBB, 305 Foxwood, Goode, VA 24556. (703) 586-5643

FOR TRADE: My mint Millen 90800 exciter (6L6-807) for your 90801 exciter (5763-6146). John Kelly, N3GVF, 19133 Stedwick Dr., Gaithersburg, MD 20879.

WANTED: 2 shades for Collins speaker 312A-1, 2 small skirted knobs and vernier tuning knob for 75A-4. Butch, KØBS, (507) 288-0044.

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

CLASSIFIEDS

FOR SALE: NC-173 rcvr - $70; Heath Cantenna w/oil - $20; BC-603 10 m FM - $20; BC-924 - $35; BC-375 tuning units - $10 each; 805 tubes - $20; 813 tubes - $20. Levy, 13330 Blanco Rd., Apt. #907, San Antonio, TX 78216. (512) 493-2927

FOR SALE: Drake: 4NB noise blanker - $75; pair of 6JB6 finals, new - $40; 144 Mhz TC-2 and conv. console CC-1, SC-2, SC-6 and power supply - $300. Clem Duval, W8VO, 33727 Brownlea, Sterling Heights, MI 48312. (313) 268-2467

WANTED: Government printed book: "History of Communications Electronics in the US Navy". State price and condition. Frank R. White, KBØTG, POB 2012, Olathe, KS 66061.

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

FOR SALE: General Radio precision condensor, 500 micromicrofarad; McMurdo Silver Micromatch w/manual; Clegg 99'er and Gonset 2 meter Comm. I, both w/ manuals; NC-303 w/manual. Would like to trade if possible. **Need:** Bird model 43 and elements. Clyde Sakir, 4243 E. First St., Tucson, AZ 85711. (602) 323-1120

FOR SALE: BC-148, early transceiver, good with tubing for antenna - $145; BC-430 xmtr with 30 coil sets - $75; RME HF 10/20 converter, excellent w/manual -$55; complete run of CQ magazines 1945-1970 - $200. **WANTED:** Wireless era equipment. Craig Smith, 1935 1st Ave. S., St. Petersburg, FL 33712. (813) 822-7592 days

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WANTED: Tuning knob and response knob for Hallicrafters SX-101; band selector knob for Gonset G-63 rcvr. Must be in good, undamaged condition. John Tucker, KB7FEC, 2802 N. 34th St., Phoenix, AZ 85008. (602) 956-0369

CLASSIFIEDS

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WANTED: Collins KW-1, 30K, 32V-3, 75A-3, 270G speaker for 75A-4, KWM-2, late W/E for my collection. Will pick up or pay shipping. Joe Rose, WA2PJP, 60 Sunset Ave., Selden, L.I., NY 11784. (516) 736-0261

WANTED: WW-II military radio sets, operating spares and mounting racks. Sam Hevener, W8KBF, 3583 Everett Rd., Richfield, OH 44286. (216) 659-3244

WANTED: Manual for R-390A; tubes - 806s, 810s, 861s and 851s. Mike Nichols, KE9FK, 105 N. 4th St., Ft. Atkinson, WI 53538. (414) 563-2825

FOR SALE: National NC-300 with XCU-300 calibrator, good condition w/manual - $125; Hammarlund HQ-140X, good condition w/manual - $100. Steve Kennedy, KK4FB, POB 402, Waverly, TN 37185. (615) 296-1897

WANTED: Manuals or copies for Clough Brengle model 411 audio oscillator,Hickok model 610A universal television FM alignment signal generator, and National NC66-RDF66.Also need schematic/service manual for Simpson model 458 Colorscope. Jim Alexander, KØHIP, 1511 N. Jackson, Russellville, AR 72801. (501) 968-7270

WANTED: Any model of Brown Brothers Machine Company key, paddles or bugs. Jim Zimmerman, KG6VI, 2316 W. Dallin St., Lancaster, CA 93536-5702. (805) 945-6539

WANTED: Collins F455 J60 (6 kc filter for 75A-4); RME 4350; Collins 32V-2 or 3; manual for 75A-4. Ron Smith, AD6V, 4682 E. Terrace, Fresno, CA 93703. (209) 255-1177

FOR SALE: MIT Radiation Laboratory Series books - good selection of first edition and reprints. Also other Radar/microwave books. Send $.25 stamp for list. Rainy Day Books, POB 775, Fitzwilliam, NH 03447. (603) 585-3448

FOR SALE: Hallicrafters SX-133 rcvr w/manual - $50; Heathkit SB-10 SSB adaptor, no manual - $30; Viking Ranger w/manual - $100. Jerry Jetzer, WB9TKO, 3212 N. 21st St., Sheboygan, WI 53083.

FOR SALE: Collins 516E-1, 12 v ps - $70; Drake 2A w/Heathkit Q-multiplier and speaker - $80. Shipping extra. Lots more, list - $.50. J. Orgnero, Box 32, Site 7, SS 1, Calgary T2M 4N3 Canada.

FOR SALE: Transmitting/Receiving tubes, new and used. LSASE for list. I also collect old and unique tubes of any type. Maybe you have something to trade? **WANTED:** Large tubes and sockets from the old Eimac line; 750T through 2000T for display. John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455

WANTED: 500 watt modulation xfmr, Stancor A3899 or Thordarson 21M65 or UTC CVM-5 or RCA 901769 or Chicago CMS-3. Bruce, W90TM, (708) 474-8910

WANTED: Schematic, manual, info on telegraph test set TS-888/UG made by Stelma. Marvin Moss, W4UXJ, Box 28601, Atlanta, GA 30358.

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

CLASSIFIEDS

TRADE: 75A-3, excellent front, good cabinet, w/calibrator + 3 Kc filter, needs minor work. Offered in swap or partial trade for mint 75A-2 or HRO-60. Vin Tese, WA2UXO, 90 Gold St., #13B, NYC 10038. (212) 285-2971

HAMFEST NOTICE: Sterling, Rock Falls, Illinois, Hamfest Sunday, March 17, 1991 at Sterling High School Field House. Advance tickets - $3, at door - $4, tables - $5. Info call Sue Peters, 511 Eighth Ave., Sterling, IL 61081. (815) 625-9262

WANTED: WW-II military radio sets, manuals, accessories, mounting racks, etc. Must be in military condition. Sam Hevener, W8KBF, 3583 Everett Rd., Richfield, OH 44286-9723. (216) 659-3244

WANTED: Schematic and operating instructions for Heathkit Marauder. John Anderson, KA7QKB, 572 S. Deer Trail, Maricopa, AZ 85239.

WANTED: McElroy and Telegraph Apparatus Company keys; McElroy Chart of Codes. Please send description (photo if possible), condition and price. Tom French, POB 26082, Tempe, AZ 85285.

FOR SALE or TRADE: 75A-3 drum dial in good condition. I need 75A-4 drum dial.Bill Jenkins, WA5MWJ, Rt 2, Box 429K, Fort Smith, AR 72916. (501) 646-3859

WANTED: Restoring Collins 32V-3 transmitter. Need low voltage xfmr, T-301 (Collins part no. 662 0009 00) and glass dial scale or complete dial assembly. Wes Chatellier, W5DPM, 1950 Chevelle Dr., Baton Rouge, LA 70806.

WANTED: Military sets: RT-53/TRC-7; AN/PPN-1; AN/PPN-2; ATB xmtr; BC-966 (SCR-695) I.F.F. transponder. Also British WW II radios. Leroy E. Sparks, W6SYC, 924 W. McFadden Ave., Santa Ana, CA 92707. (714) 540-8123

CLASSIFIEDS

FOR SALE: Have many pieces of literature for lesser known transmitters, converters, etc. SASE for list. Can make 4, 5, and 6 prong coil forms from $3 and up. Have tuning capacitors for transmitters. **WANTED:** 864 tubes for cash or will trade for WD-11/864 plug in replacements.James Fred, R1, Box 41, Cutler, IN 46920

WANTED: BC-348 and a B-29 to go with my ART-13 transmitter. Send price and condition. Andy Howard, WA4KCY, 105 Sweet Bay Lane, Carrollton, GA 30117. (404) 832-0202

FOR SALE: Resistors. Large selection of values and wattage. $1 per 100. SASE for list. Stuart T. Carter, II, W4NHC, POB 033177, Indialantic, FL 32903-0177. (407) 727-3015

WANTED: Military radio manuals. Any books or pamphlets on surplus radio conversion. Rainy Day Books, POB 775 Fitzwilliam, NH 03447. (603) 585-3448

Electric Radio - the first year - all twelve issues delivered First Class in a padded envelope - $25. Individual copies $2.50 delivered. #1,#2 #5 and #11 are reproductions.

FOR SALE: Drake 1A with matching speaker, both near mint condition - $250. WANTED: Response and selectivity knobs for SX-100. Richard Wood, 155 Avery Dr., Atlanta, GA 30309. (404) 847-2919

WANTED: Collins 51S1, 62S1, 51J4, KWM-1, KWM-2A, S-Line, 312B3, 312B4, 312B5, 75A-1, 75A-4 with filters, 270-G speaker, 30L-1, 30S-1 round only. Larry, NE8V, 9307 Worley Mill, Hillsboro, OH 45133. (513) 981-2462

WANTED: SCR-399A;HO-17 shelter;BC-610E;BC-312;BC-939;BC-614;JB-70A;tuning units; coils; chests; reels; whips; cables etc. Bill Harris, W7KXB, 852 W. Jerome Cir., Mesa, AZ, 85210. (602) 838-0215

FOR SALE: Please see my ad for AM xmtr in Dec. issue, page 32. Robert B. Enemark, Box 1607, Duxbury, MA 02331.

ER Parts Unit Directory

At this point the directory has 135 units in it and it's growing daily. If you need a part for a vintage restoration send $1 and an SASE for the list. If you have a parts unit consider putting it on the list. Your dead unit can help bring others to life.

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FOR SALE: 2 new Synchro, 115 v, 60 cycle, selsyns, 2" dia by 4" - $95; Western Electric straight key, brass, new - $25; receiver subassembly, tubes - 2C51, 6AK5, new, complete - $20. Jos Battyany, W6CAS, 1501 Sherwood Ave., Sacramento, CA 95822. (916) 731-8261

FOR SALE: Johnson 275 w. Matchbox w/ SWR meter - $95; Johnson 20 uH. roller coil - $30; Hammarlund HQ-129X - $95. Ben Deovlet, W6FDU, 933 Robin Lane, Campbell, CA 95008. (408) 374-0372

WANTED: Modulation xfmr for Johnson Mobile and kit assembly instruction book, junker mobile chassis ok too. Henry Engstrom, POB 5846, Santa Rosa, CA 95402. (707) 579-2070

WANTED: Matching speaker and manual for NC-183 (not 183D). Pat Keough, WB9GKZ, 2511 Memorial Dr., Green Bay, WI 54303. (414) 499-1336

TRADE: S38E, very good with service data toward other AM gear. **WANTED:** Base for EV664; speakers for HQ-170 and NC-300. Bill, KE7KK, 6712 Lake Dr., Grand Forks, ND 58201. (701) 772-6531

WANTED: Meter for my 75A-4 or equiv.; Collins F455J-60 filter. Evan Haydon, NØGMR, 4308 N. 15, Lincoln, NE 68521. (402) 435-4083

WANTED: Morse keys, telegraph keys and related items. Also knobs for SX-101 MK III - right side tuning knob. Thanks. Paul Wipperman, POB 81, Elmwood, MA 02337.

FOR SALE: HQ-170 and TBS-50 manuals, originals - $15 each; Command sets,1957 Cowan Publication, original, mint - $20; TM 11-245 (SCR-511) 1943, original - $25; RME VHF converter (152A) - $35; PE-157 power supply - $45. Send want list for WW II military radio items w/SASE. Lots available. Henry Engstrom, POB 5846, Santa Rosa, CA 95402. (707) 579-2070

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

WANTED: Transistor Radio's from the 1950's and early 1960's. Cash or Trade. James Weil, 15915 Armada Ctr. Rd., Romeo, MI 48065. (313) 784-9860

FOR SALE: Hallicrafters S-38 - $30; Johnson 6N2 - $25; DC supply for PMR-7 - $20; SX-43 with R-42 spkr - $75; Johnson Adventurer - $30; parting Valiant and HRO-60. Joe Sloss, K7MKS, 4732 119th SE, Bellevue, WA 98006. (206) 747-5349

WANTED: National receivers: NC45, NC80, NC81, TV7; HRO-5 coils; E, F; HRO-7 coils; E, F; HRO-50 coils G, H, J, AA, AB; HRO-50 FM adapter, NFM-50; NC-183D xtal cal, XCU-83; HRO-7 main tuning knob (black); feet for the NC-2-40D and it's speaker. Also National Brochures, advertising items, displays, knobs, speakers, etc; Johnson 500 instruction manual (copy ok); Johnson SignalSentry model 250-25; Johnson T/R switch 250-39; Ameco AC-1 40 meter coil; any tube kits complete but unbuilt: receivers, transmitters, audio equipment. Steve Sauer, WA9ASZ, 1274 Londonerry Ln., Greenwood, IN 46142. (317) 882-4598 eves. after 7:00 EST.

WANTED: 5 Kc, 6 Kc and 500 cycle filters for Collins 75A-4 rcvr. Dennis Cody/Marla Banuelos, 1386 St. Louis Ave., Apt. #C, Long Beach, CA 90804. (no phone)

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

Please remember to count the words in your ad. If you are over 25 words please send 15 cents for each addictional word.

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

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

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

WANTED: Coils, power supplies, speakers, manuals and accessories for National HROs (early black wrinkle models). Also, want early HRO receivers. Absolutely top dollar paid. Jim Allen, 1653 Newcastle Drive, Los Altos, CA 94024. (415) 968-0640

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

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

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FOR SALE: Antique radios, parts, tubes, books, 150 panel meters, knobs, amateur, test equipment, transmitter crystals, etc. 13 lists. SASE + $2 cash (no checks). Richard & Rose's Radio Mart, POB 691443, Tulsa, OK 74169.

WANTED: WW-II military electronics; test equipment, radios, radar, odd-ball items, counter measures, APS-13; also manuals, books, articles pertaining to same. William Van Lennop, POB 211, Pepperill, MA 01463. (508) 433-6031

WANTED: Intelligence museum wants German, Japanese, Italian, Russian and Chinese communication equipment and any British or U.S. spy radios. LTC William Howard, 219 Harborview Lane, Largo, FL 34640. (813) 585-7756

ELECTRON TUBES: All types - microwave, transmitting, receiving, obsolete, military--Large inventory. **Daily Electronics Corp.**, POB 5029, Compton, CA 90224. (213) 774-1255; (800) 346-6667

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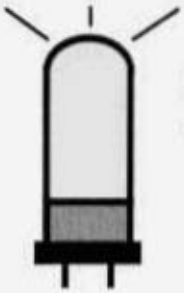

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