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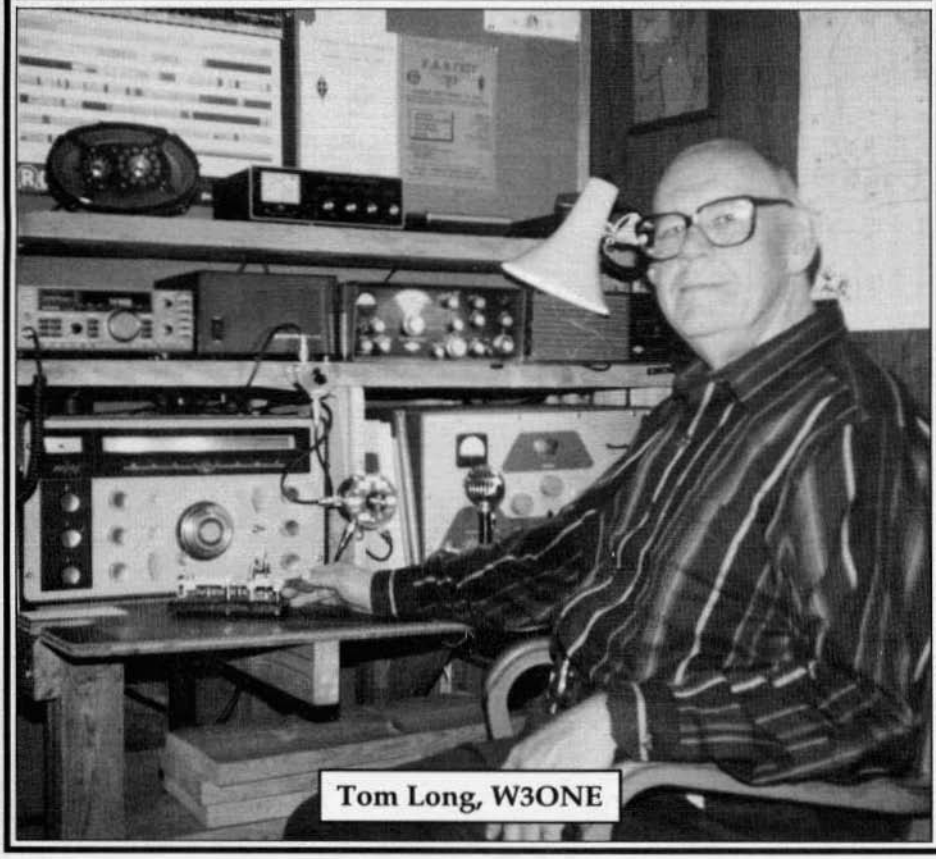
ELECTRIC RADIO

celebrating a bygone era

Number 52 August 1993



Tom Long, W3ONE

ELECTRIC RADIO

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WALT HUTCHENS,KJ4KV.....ELECTRIC RADIO IN UNIFORM
FRED HUNTLEY,W6RNC.....REFLECTIONS DOWN THE FEED-LINE
BILL KLERONOMOS, KDØHG.....VINTAGE PRODUCT REVIEWS
DALE GAGNON, KW1I..... AM REGULATION UPDATES

Electric Radio is published for amateur radio operators and others who appreciate the older tube type 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 to-wards 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 CW operator and the SWL. Good photo's 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

My wife Shirley and I attended the Flagstaff hamfest over the weekend of July 23-24-25. It was the second year for us at this hamfest and as we did last year we throughly enjoyed it. It's always fun to get together with our fellow vintage enthusiasts and AM'ers. Although Shirley is not a ham she does enjoy meeting the people that she sees in the magazine and the ones that I talk to her about.

One thing that we both feel is that our 'fraternity' is small but very close-knit. Everyone in our 'niche' of the hobby knows everyone else that's involved in it. And everyone appreciates everyone else and tries to get along. We both think that it's a great privilege to be a part of this outstanding group.

The hamfest itself was a let-down for most of us interested in vintage equipment. There just wasn't much there. This is the same news I'm getting from all over the country. The vintage gear is becoming scarce. It was the same regarding tubes and other parts; it just wasn't there. I think that the days of plenty- regarding cheap vintage gear- are behind us.

Dale Gagnon, KW1I, tells me that membership in AMI has passed the 200 mark. I think that is encouraging but there are still a lot of AM'ers who have not signed up. Please remember to do that ASAP. AMI will be the organization that will defend AM down the line. Let's not forget the hassle we went through a couple of years ago when the powers to be wanted to ban AM.

I've had my certificate (No.4) hanging in my shack for some time. I'm proud to be a member of AMI and I think as time goes on 'our' organization will become one of the best in amateur radio. Send in your $2 today.

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Cover: Tom Long, W3ONE, a long-time AM'er. His vintage station consists of a National NC-303 receiver, a DX-100 transmitter and a Gonset G-76 transceiver.

Rock IV: The Ultimate Challenge

by Paul Courson, WA3VJB
P.O. Box 73
W. Friendship, MD 21794

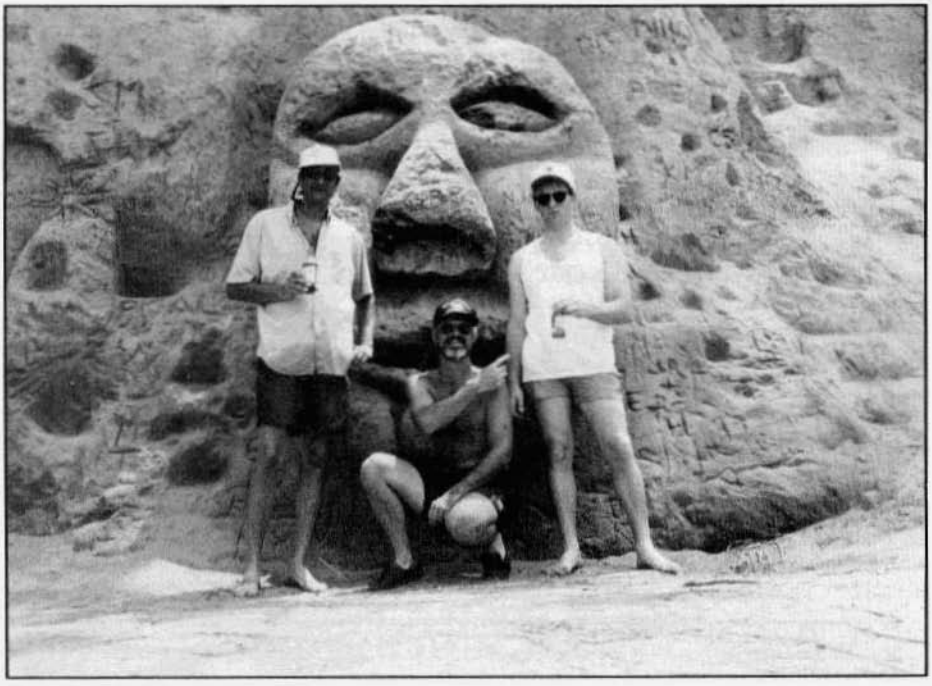
Friday, Sept. 10, 1993
Station Call: WB3HUZ
Operating Sked: (Pending Antenna and Station Proof-Of-Performance)
20M -- 14.286 5PM-7PM Eastern Time, ahead of the West Coast net.
Other activity will follow on:
75M (3.885 apx), 40M (7.290) and 160M (1.885).

East Coast listeners should check all three of these bands, with activity guaranteed on one of the three at any time throughout the Friday evening, Saturday morning hours. Later Saturday, activity is planned on either the 20M frequency or on the 40M frequency, until the station shuts down Saturday afternoon. Q-R-T will depend on band conditions and weather conditions as operators prepare to take down the station and return by boat to the Mainland.

Q-S-L with SASE via WB3HUZ, Box 752, Savage, MD 20763-0752. Tape recordings (airchecks) are welcome and guarantee special certificates.

Special Event: Rock IV Details!

Rock IV is the latest in an ongoing series of events sponsored broadly by the AM radio network, which is a social coalition of members of the AM community who are interested in occasional get-togethers and on-air QSO parties.



The organizers of the event, from left to right, Gary Burrows, N2INR; Paul Courson, WA3VJB and Steve Ickes, WB3HUZ.

The first "ROCK" of the airwaves honored those gathered for the Gaithersburg, Maryland Hamfest in September 1991. Subsequent "Rocks" have been held to note the passing of the Deerfield, New Hampshire Hamfest, which has traditionally been one of the strongest draws for the AM community in the Northeast.

By maintaining a strong social context around AM activity, members and supporters of the "Rock" series also underscore the state of mind that the AM radio network ultimately creates -- one of unity and enjoyment of classic radio as a nostalgic specialty within the amateur hobby.

This year, for Rock IV, we are honoring and promoting the inaugural "A-M-I Discovery Weekend", which is, in itself, a nationwide special event organized by AM International, Box 1500, Merrimack, New Hampshire 03054-1500. Details are in the July 1993 issue of Electric Radio.

The Rock IV special event station will be located on an uninhabited island in the Chesapeake Bay, near Annapolis, Maryland. The call letters will be WB3HUZ and all operations will be on AM phone, with possible occasional reception on SSB to encourage the broadest participation.

Through the use of an AC generator, power will be sent to a variety of vintage, tube type radios established in a radio camp at the summit of the island, which is a heavily-wooded, approximately one acre oval shaped mass of land, whose peak altitude above the bay is just 40 feet.

Equipment, personnel and supplies will be brought in by power boat from the mainland in a series of trips originating in Annapolis on Friday morning.

The main operating antenna will be a series-fed long wire held aloft by a helium balloon. Altitude will vary depending on short or long-haul band conditions. The ground system will include bare copper radials extending outward from the island, immersed in the saltwaters of the Chesapeake Bay.

The backup operating antenna will be a doublet, fed with open-wire line, tuned for selected activity on the 160, 75, 40 and 20 meter bands. It will be positioned by bow and arrow in trees on the island that are about 50 feet above land mass. The ground system for the vertical will also be used beneath the doublet for maximum pattern enhancement.

The main transmitter will be a modified 1962 Johnson Viking II, offering high-fidelity audio and an effective radiated power of about 100 watts.

The main receiver will be a 1967 R390A, using the high-fidelity diode detector output to a Macintosh audio amp, driving the radio camp's monitor speaker. Alternate and backup equipment was still being readied at press time.

This is the first known special event station specifically established by and for the AM community. Complete coverage for expanded media opportunities includes still photography (120 and 35mm formats), video cinematography (mastered on 8mm, produced to broadcast U-Matic, dubbed to VHS), and audio mastering at the site (stereo digital audio tape, left channel transmit, right channel receive), to be produced and dubbed to analog diskette for general distribution. **ER**

MARK YOUR CALENDARS FOR SEPTEMBER 10, 11 AND 12

DON'T MISS THIS BIG AM WEEKEND.

And don't forget to send in your $2 for AMI membership.

The T-368 Exciter As A QRP Rig

by Albert A. Roehm, W2OBJ
22 Brookdale Rd.
Cranford, NJ 07016

I acquired a T-368 exciter in late November, 1991. Although it had not been used in years this unit appeared to be in good shape and included the type 6000 output tube. Unfortunately, I had no documentation on this tube nor a schematic of the exciter. A month or so later ER No. 21 came to the rescue with an article on "Using The T-368 Exciter" by Dave Mills, AJ7O. It was at this point that I decided to convert my exciter into a QRP rig for CW. A letter full of questions was sent to Dave who kindly answered them and supplied me with a large, easy to read schematic.

Before I get into the conversion details, let me mention two things. First, from the data presented in ER No. 21, I mistakenly assumed that the filament voltage for the type 6000 tube was 6.3 volts. When the tube tester was set up that way, I was disappointed to learn that my tube had no output even though an ohmmeter showed continuity across the filament pins. The filament is actually rated at 26.5 volts and when the tube was tested at that value it passed with flying colors.

Secondly, the basic exciter is designed to drive the high impedance grid circuit of the power amplifier stage in the T-368 transmitter. Therefore, to use the exciter as a low power rig some sort of network will be required to match the output into a typical 50-ohm antenna system. Since the exciter uses a switch to select the various bands my goal was to minimize the number of additional knobs required to

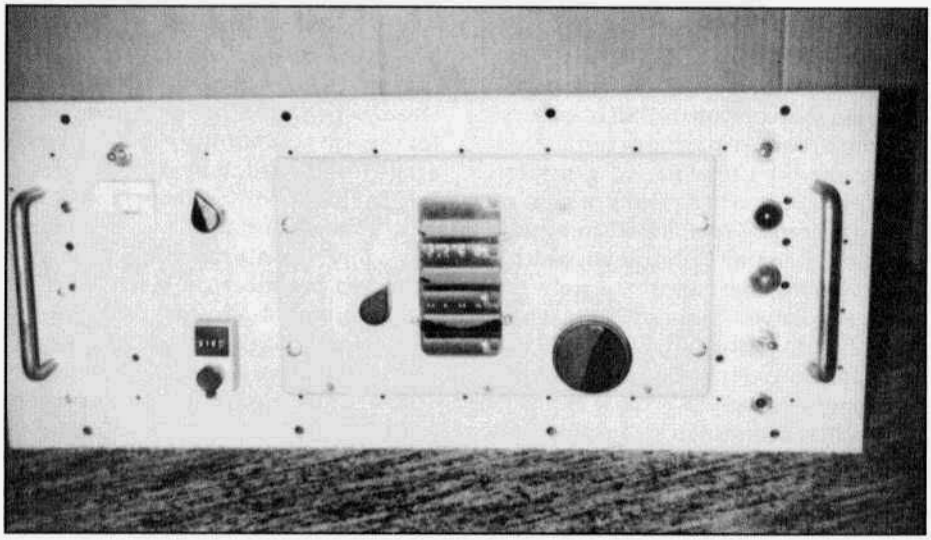


Photo A shows the arrangement of controls on the front panel. To the right of the exciter, from the top, are: B-plus on/off switch; "red" transmit indicator lamp I2; power on indicator lamp I1; main power on/off switch; and, at the bottom, the key jack. On the left side of the panel is the output meter; the meter on/off switch is above the meter; to the right of the meter is the LOAD switch with the TUNE counter knob below it.

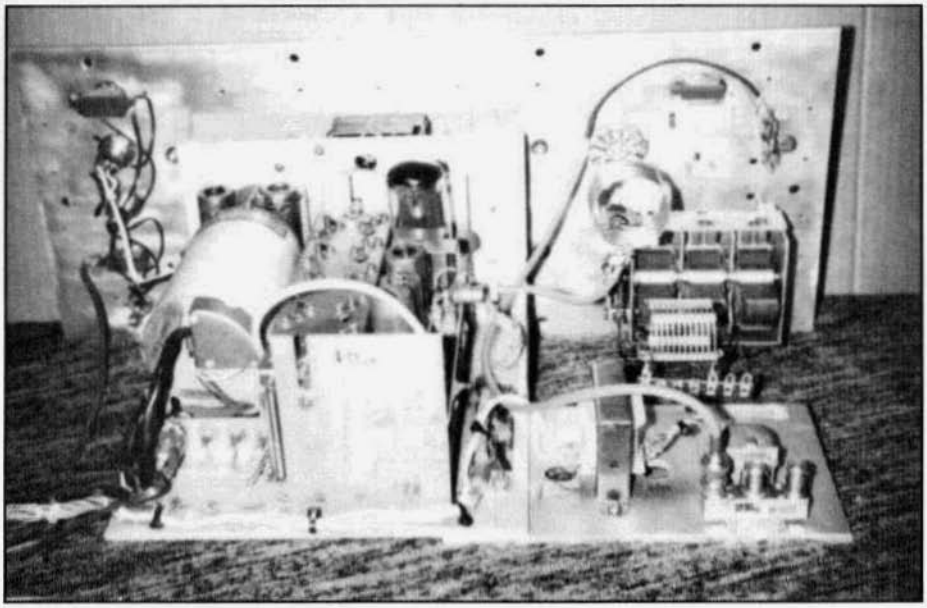


Photo B shows the wiring layout behind the panel. The large rectangular plate cut out of the front panel was salvaged and attached to the bottom of the exciter chassis. It is shown in the lower right of the picture and is used to support the coaxial T/R relay, relay driver transformer, and L1. C1, the 3-gang tuning capacitor (only 2 gangs are used) is mounted to the panel with four 1/2 inch spacers to accommodate the turns counter. The grounded end of L2 is soldered to a stand-off attached to C1. The other end of L2 is supported by a stiff wire coming from L1.

adjust the output circuit. Obviously, the typical three-knob pi-network had to be ruled out. However, I want to emphasize here that electrically the pi-net could be used if you figure out the plate impedance of the 6000 tube (I still have no data on it) and like twisting a lot of knobs. The circuit I selected was developed over 45 years ago, which is probably before most active AM'ers were born. It's called a "Multiband Tuner" and covers all the HF ham bands by merely adjusting one two-section capacitor. Some editions of radio handbooks published in the 1950's and 1960's devoted a few paragraphs of general comments to this unique design but the best information I could find appeared in *QST*, July 1954. This issue of *QST* carried two detailed articles of data on the single-ended network that I used to design my circuit. If you read and follow these QST articles you will be able to duplicate or modify my design to suit your junkbox parts.

I mounted the T-368 exciter in a rack panel which contains all of the controls, indicator lamps, switches and key jack. An external power supply is used to furnish the various filament, bias and high voltages.

The Power Supply

The T-368 exciter was designed to interface with its parent transmitter via a 15-pin plug, P-101. You can replace this plug with a terminal strip as suggested in *ER* No. 21, or obtain, as I did, the matching socket from Fair Radio Sales (either cable or chassis mount sockets are available for about five dollars). I also used a 2-pin Cinch-Jones plug and socket for an extra

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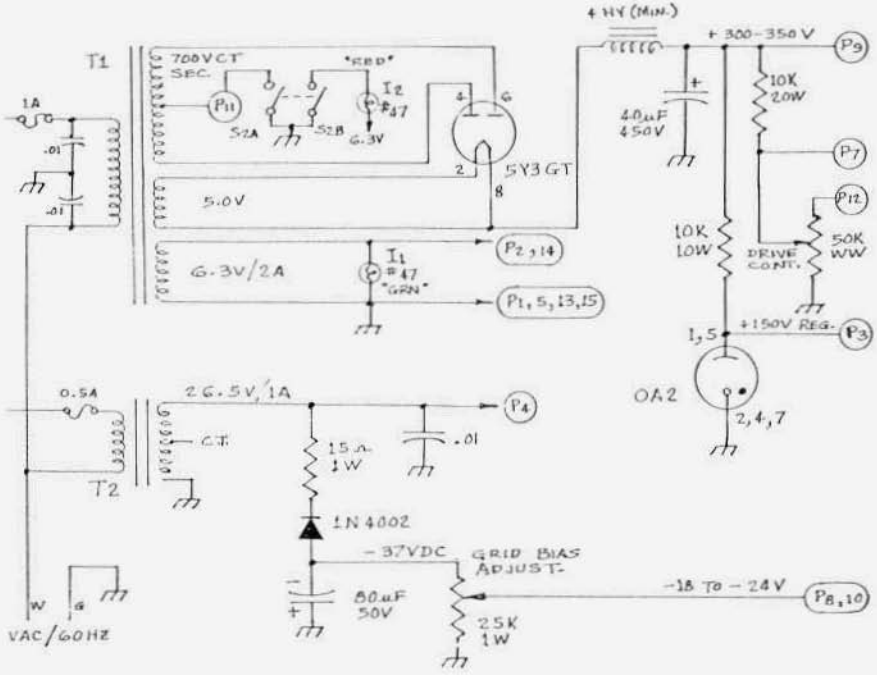

Figure 1. Schematic of a suggested power supply.

pair of wires going to the main On/Off power switch.

The schematic of a suggested power supply is shown in Figure 1. Two double row flat mount terminal blocks connect the supply's internal wiring with the extension cable going to the 15-pin plug. In my case, each terminal block holds 8 pairs of screw terminals. Nothing critical here, just parts from my junkbox. These terminals were designated as P0 through P15 and match the wiring on the existing plug, i.e.-terminal P15 goes to pin-15, P14 to pin 14, etc. In Figure 1, these terminals are shown in a circle, e.g.-P15. I recommend using crimped or soldered spade lugs on all wires connected to the terminal blocks. Proper labelling of each wire will reduce initial errors and aid future maintenance. A recommended sequence of terminal block wiring assignments is shown in Figure 2.

Exciter Modifications

The good news is that there are no exciter modifications. However, you do need to remove the shell covering the 15-pin plug and do the following:

* - unsolder the wire from pin-6. Label and pull this wire back out of the neck of the shell. Extend it back along the bundle of wires and connect it to the ungrounded terminal of the key jack on the front panel.

* - splice a new wire to either pin-2 or pin-14 to supply 6.3 volts AC to the new indicator lamps, I1 and I2. Do not remove the wires attached to pins-2 or 14. The new wire can be routed through the neck of the shell and on to the front panel along with the keying lead.

* - unsolder the wire from pin-11 (originally used to supply 12 volts DC to relay K-101). Since we won't be using this relay, pull the unsoldered wire back out of the neck of the shell, label it, and tape. Now, solder a new wire to pin-11 and extend it

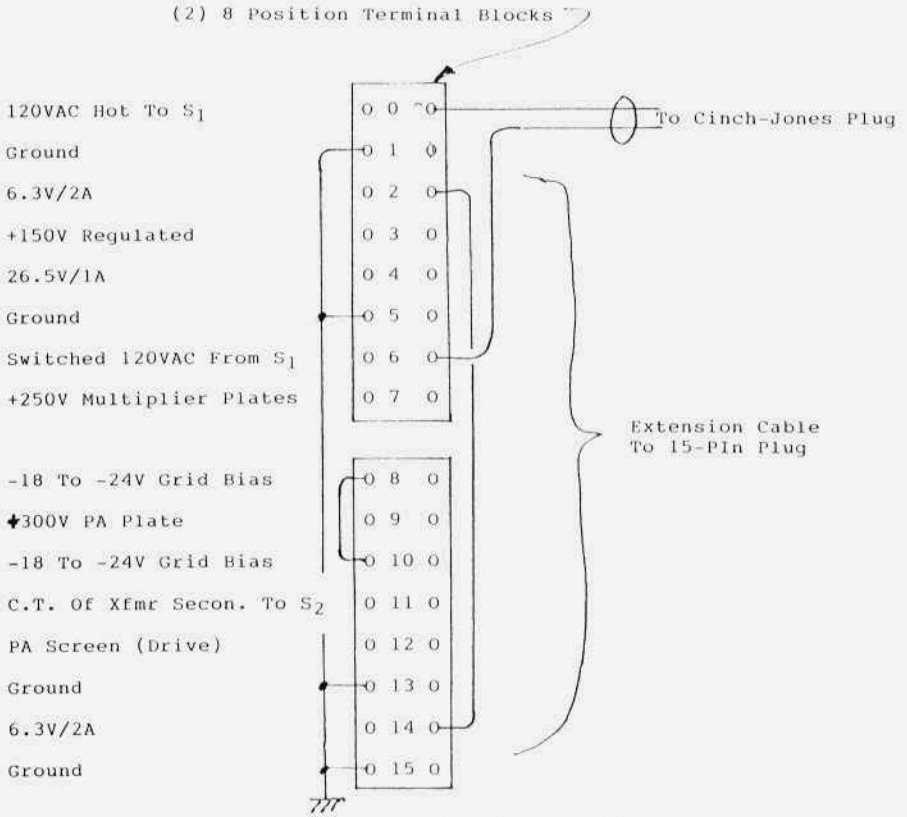

Figure 2. Suggested sequence of terminal block wiring.

through the neck of the shell to the new B-plus switch on the panel. The new switch is a DPST toggle type. One pole grounds the center-tap of the HV winding via the new wire soldered to pin-11. The other pole of this switch completes the 6.3 volt AC circuit through a red "transmit" indicator lamp, I2 . It also energizes the coil of the coaxial relay for T/R switching. The details are shown in Figures 1 and 4.

* - replace the shell cover on the 15-pin plug.

Cut a 5-1/4" by 8-1/2" rectangular opening in the panel and mount the exciter using the four existing screw holes.

The Output Circuit

RF output is taken from the exciter's high impedance BNC connector J-103 and coupled to the output circuit. This network is actually a multiband tank circuit capable of covering the entire 160 through 15-meter tuning range of the exciter. Tuning is accomplished without the need for changing coils since two tank circuits are adjusted simultaneously with a single dual capacitor. One tank circuit tunes from approximately 1.8MHz to 6.3MHz, while the other one covers 6.3MHz to 21.7MHz. A sufficiently large capacitor is required and I used one from the BC-453 or R23 Command Receivers (190-550kHz). The correct part number of this capacitor is 3936 and is available from Fair Radio Sales for about six dollars. The same capacitor is used in the BC-946 or R24 models (520-1500kHz). These capacitors are rated at 346pF per section. Other capacitors can be used but tuning is quite sharp on some bands so be prepared to include a vernier drive.

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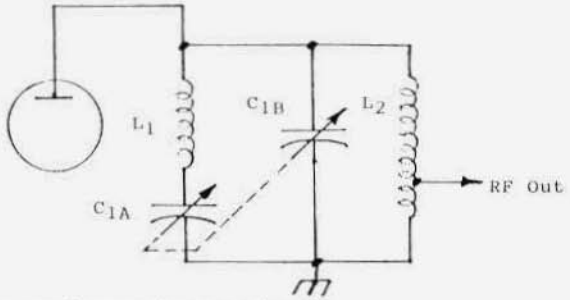


FIGURE 3A - Basic Multituner Circuit

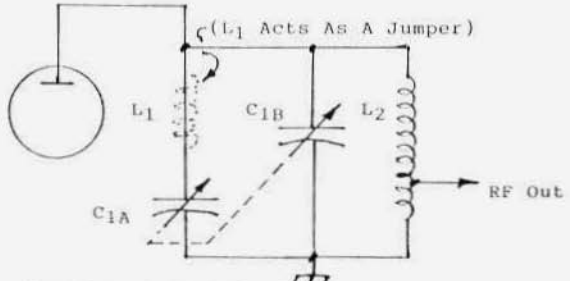


FIGURE 3B - Low Frequency Operation

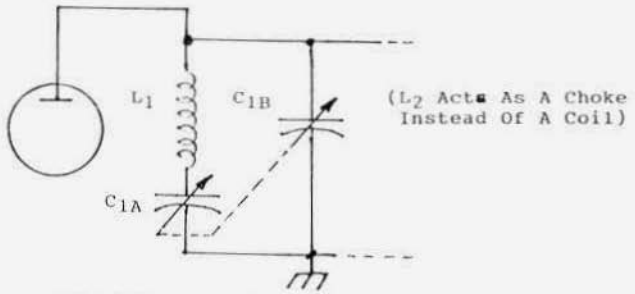


FIGURE 3C - - High Frequency Operation

A basic unbalanced or single-ended multiband circuit is shown in Figure 3A. Note that L1/C1A forms a series circuit while C1B/L2 are in parallel. Both circuits are tuned simultaneously via the ganged capacitors. While this circuit may look mysterious at first, it becomes understandable when frequency is taken into consideration. In practice, the reactance of the high-frequency coil L1 is negligible at the lower frequencies (and acts merely as a jumper wire) so that C1A and C1B are effectively in parallel across L2, as shown in Figure 3B.

Conversely, at high-frequencies the reactance of L2 is so large it acts as a choke (rather than a coil) across C1B. The circuit then gets tuned by C1A and C1B in series with L1, as shown in Figure 3C.

To accommodate the wide range of frequencies, I used four taps on the cold end of L2 to improve the loading at low im-

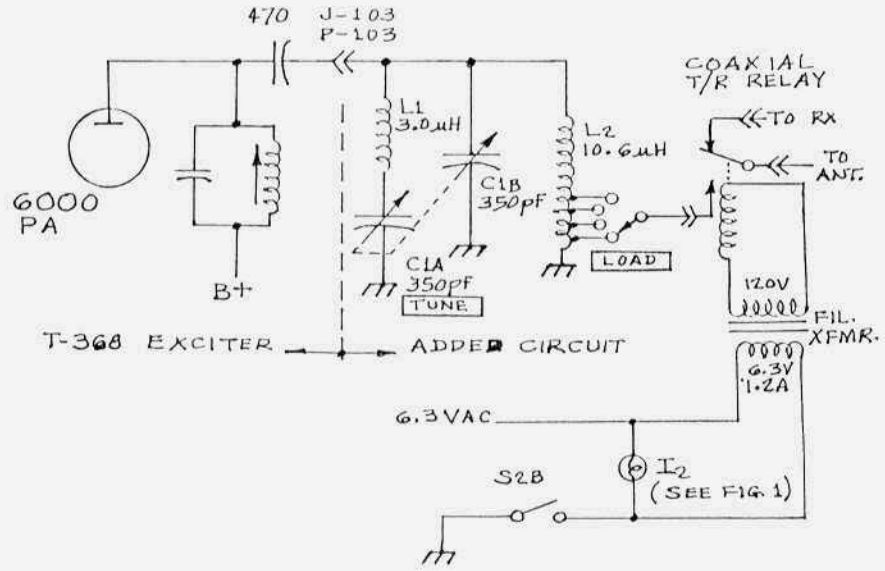


Figure 4. Output circuit.

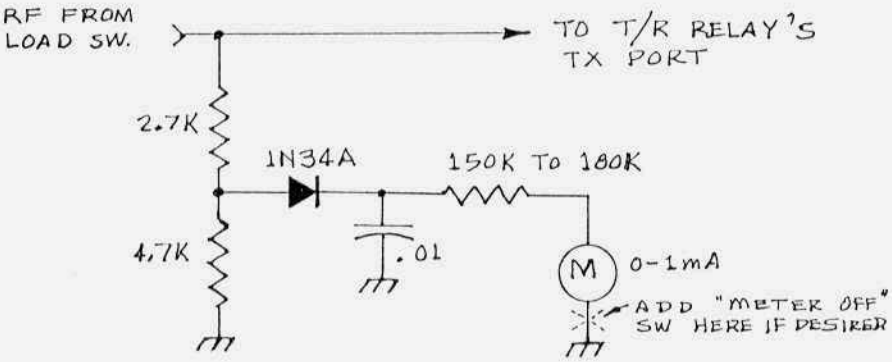


Figure 5. Optional RF output indicator.

pedances. Taps were placed at 1-1/8T, 2-3/8T, 3-5/8T and 4-7/8T above the grounded end of L2. A four position ceramic rotary switch is used as a loading control. See Figure 4 for a complete schematic.

Tuning Meter

It is convenient to have a tuning indicator built into any QRP rig. I used a conventional resistive divider network to sample, detect, and display the RF output. A switch in series with the meter protects the meter's movement and bearings from excessive wear once tune-up is completed. See Figure 5.

Relay Driver

In keeping with the theme of maximizing the use of junkbox parts, I came across a small, unknown brand of coaxial relay and decided to use it. The ports use BNC style connectors and a few quick tests revealed that the coil rating was 120 volts

continued on page 33

The National SW3

or, The Quintessential Regenerative Receiver(1)

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

Most of the "Regenerative Fever" that seems to be raging in the pages of *Electric Radio* of late is directed either toward commercial, kit-built receivers that were essentially sophisticated toys in their day or toward home brew receivers like those built and used by hams during the Great Depression when money was dear and a "regenerative and one-step" (a regen detector and one stage of audio, in case you weren't "there") was the most for the least. Now, I don't mean to put down these fine little receivers, but there is one regenerative from that era that clearly stands out above all the rest, the National SW3.

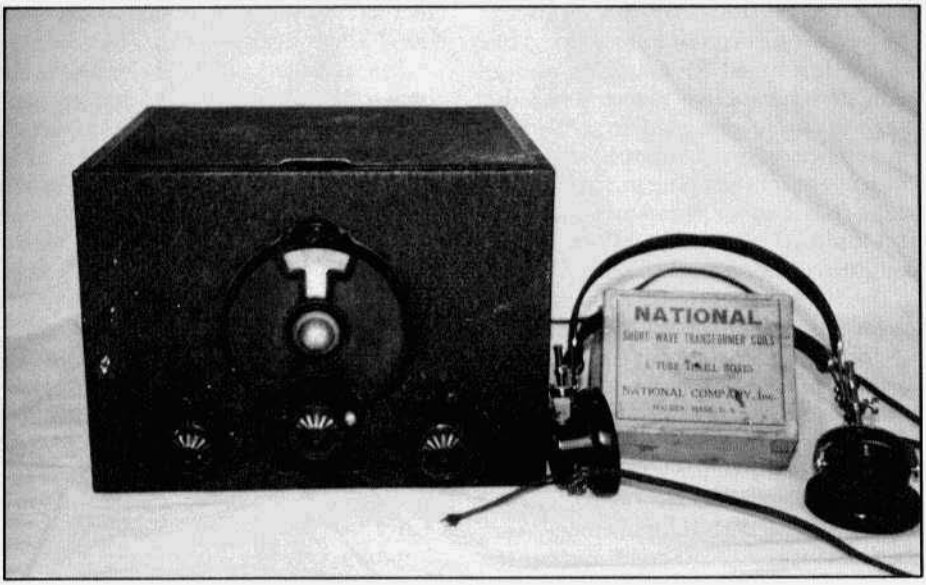
The SW3 was designed in the late 1920's by some serious radio engineers. The circuit was developed by the engineers of the National Company, assisted by David Grimes (ex-W2GKM), the director of the RCA License Laboratory. The first prototypes were built in the home workshop of James Millen, W1AXL, later to become W1HRX. (His call was to be W1HRO, but the FCC made a mistake. Nothing changes!) Far from being a toy, the SW3 was intended from the very outset to be a real, if inexpensive, communications receiver. It was purchased and used not only by amateurs, but by airlines, fishing boat operators, explorers, and more. And the fact that it entered the market in 1931 and continued to be available until 1946 says a lot about how functional and cost effective it really was against a lot of rapidly developing superhet competition.

So let's settle into the seat of our DeLorian, set the clock to the summer of 1931 in North Reading, Massachusetts, rev up to 88 miles an hour, and see what the development of the SW3 was like.

State of the Art in 1931

In 1931, a young Mechanical Engineer named Jim Millen had been working for the National Company for five years, and things were pretty bleak. The Great Depression was at its worst, and there was not much market around for a luxury item like a shortwave radio receiver. Nor was there a great selection of components to build one from. The entire list of vacuum tubes for both receiving and transmitting in the 1931 ARRL Handbook covered one page, and contained only 27 type listings. About the only commercial receivers available to amateurs were the Pilot Super Wasp, offering a regenerative detector directly coupled to the antenna and two stages of audio to drive a loudspeaker, or the National SW5, which had a tuned RF stage but no bandspread and again had two stages of audio to drive a speaker.

The typical ham receiver of 1931 was homebrew, had a regenerative detector, usually capacitively coupled to a long wire antenna, and a single stage of audio amplification feeding ear phones. The detector suffered from its direct antenna coupling in a number of ways. A swaying antenna would pull the frequency of the oscillating detector, especially on the higher frequency bands. Near the resonant frequency of the antenna, the detector would be so heavily loaded that it would stop oscillating altogether, known as "suck out" in those days. Direct coupled regeneratives could easily be heard for miles on other receivers; they were after all just low power transmitters coupled to an antenna. The QRM caused by a number of regen receivers near one another was an annoying problem. There were also problems with "tunable hum" that resulted from radiation of the oscillator signal, pickup on the power leads of the



The SW3 shown with coils and headphones.

same receiver and perhaps mixing it with 60 cycle AC powering the filaments. And there were "hand capacitance" effects (everything that you touch tunes the receiver) again connected with the oscillator signal being present everywhere, on knobs, leads, and so forth.

The 1931 Handbook shows some more advanced regens with an untuned rf amplifier stage ahead of the detector intended to cure some of these problems. This was simply a broadband amplifier, which should have prevented "suck out" and radiation, providing the receiver was reasonably well designed and shielded. But its frequency response probably didn't extend much above a couple of megacycles, as anyone who has worked with broadband audio or video amplifiers would readily understand. To get good gain from a tube amplifier much above that, you have to include an LC matching network. These untuned RF receivers were probably OK on 160, marginal on 80, and considerably less sensitive than a "barefoot" detector above that.

Ham band bandspread was also a feature not found, or not well implemented on many sets. Most regens had a mechanical vernier dial. Some had a small "bandspread" capacitor in parallel with a larger "bandset" capacitor, basically a good approach except that there was no single size of bandspread capacitor that would spread each ham band across its entire tuning range.

Another problem experienced by regenerative receivers of the era was a nasty tendency to become unstable, both in tuning and in regeneration setting with changes in humidity. At higher frequencies, apparently identical coils would not behave the same; some refused to oscillate at all. No one knew just why this was happening, until the Boonton Rubber Company, a relative of Boonton Radio, switched over from steam moulded, wood flour filled bakelite coil forms to mica filled bakelite moulded in electric presses. The new material, called "R-39" by National, had no built-in water and absorbed none, resulting in uniform, stable, high Q coils, even in ocean air environments.

Such was the state of the art when the National Engineers put together their SW3.

continued next page

SW-3 from previous page

Enter the National SW3

The SW3 turned out to be a three tube set, with a tuned RF amplifier tracked with its regenerative detector and one stage of audio designed to drive high impedance, magnetic headphones. It uses thirteen sets of two, plug in, general coverage coils to cover from 9 to 3000 meters. In addition there are tapped bandspread coils providing optimal coverage for each of the 10, 20, 40, 80 and 160 meter ham bands. Considerable effort went into developing the most effective interior and exterior shielding to prevent the RF amplifier stage from oscillating or "locking" onto the detector and to keep external 60 cycle magnetic fields from inducing hum. National even developed a special tuning capacitor with both rotors isolated from the frame and each other to improve the isolation from the RF stage to the detector. They developed an improved RF choke to keep signal from the detector out of the audio circuit and they built the entire receiver into a welded, steel box to eliminate "hand capacity" effects from the cabinet, controls, power cables and headphone leads. All of this effort resulted in a receiver whose radiation is so low that I have to listen very carefully to hear the oscillator in my SW3 on an HRO sitting right beside it.

All of the coils are wound on forms made from the new, electrically stable R-39 material. They have a peculiar, nonstandard, 6 pin base used only in the SW line of National regens (not the SW54!) and in the FB7 and ACS superhets; so original SW3 coils and coil forms today are sought after and fairly expensive. Fortunately, new forms and winding information are readily available. More on that later.

During the life of the SW3, three basic designs were used. The one most often found and the one shown in this article is the Model II version that used either 2.5 or 6.3 volt glass tubes.

The Model I

The very first SW3's were apparently not made under an RCA license. To limit liability, receivers were sold as "unwired kits" and (presumably) were wired by "Jackson Laboratories" before shipment. Jackson Laboratories was a dummy company named after one of the streets on which National was located. An early SW3 with the Jackson Laboratory stamp on its shipping carton is indeed a vintage collector's item. This first version used a 35, variable mu tetrode in the RF stage and the detector and a 27 triode as the audio amplifier, all 2.5 volt tubes. Other versions of this Model I receiver used 6 volt heater-type 36 and 37 tubes (for mobile use) and those fragile, microphonic 1.4 volt tubes that Dave Ishmael prefers, the 30 and 32, for dry battery operation. All Model I's use the 10-20 series of coils. Early coils in this series are not numbered but color coded. Few of these early, Model I SW3's seem to exist today.

The Model II

The Model II SW3 is the one most often found. Bill Orr reports that it appeared around 1936. Bern Hilts, W4NDF, who sold me my Model II in 1981, told me that it was purchased in 1933 or 1934 by a radio club in Niagara Falls. The Model II can use interchangeably either 2.5 volt tubes, a 58, 58, 27 line up, or 6.3 volt tubes, 6D6, 6D6, 76. The coils series for this model carries numbers from 60 to 72. Gain is controlled with a pot in the cathode of the RF stage, which is conveniently calibrated in S units. An auxiliary RF tuned circuit "compensates for minor mistracking of the RF stage as may be caused by antenna detuning" according to the SW3 manual. The audio output stage has headphones connected directly in series with its plate on this and all other models of the SW3, so today's user must be careful of B+ on his phones or use a matching transformer for safety - I'd recommend the latter!

The Model III

The Model III and last version of the SW3, called the "Universal" came out in 1941. It could be operated either from an AC power supply using 6J7G and 6C5G

The topside of the chassis.

tubes or from battery power with 1N5G and 1A5G tubes. A clever switching arrangement took care of the necessary circuit changes between the two modes. Coils for the Model III's were numbered from 30 to 42. Relatively few of the Model III's were produced, probably because of the War and competition from superhets.

What did an SW3 cost?

In the mid '30's, a new SW3 was one of the lower cost amateur receivers available. My 1938 handbook reports the list price of any Model II SW3 as $35 without coils, tubes, phones or power supply. The 5880-AB power supply was $29.50 without an 80 rectifier. Bandspread and general coverage coils were $5 per pair. These were all "list prices." The average amateur could get all of these items for about half the list amount from many dealers. By 1941, the Model III SW3 was still $35 list, but coils had dropped to as low as $3.50 per pair for the ham band bandspread models and the general coverage ones from 9 to 200 meters. Coil sets covering 200 to 3000 meters varied in price from $4 to $8.50.

In 1981, I bought my SW3 with one set of general coverage coils and bandspread coils for 80, 40 and 20, but without power supply, for $100. Even then, it was a hot item. Bern Hilt's letter from Florida says "This must be a collector's item in demand. I've had 4 calls since yours from as far away as Colorado! One fellow wanted to buy it just to get the coils."

Today? Well like any good collector I can only guess. But if you can find an SW3 for $150 or so, I'd suggest you snap it up. You would not lose any money on a resale.

On the Air with the SW3

The SW3 can still be used as a viable amateur receiver, even in the '90's, and it's certainly a lot of fun. I presently have bandspread coils for 160, 80, 40, 30 (yes! more about that later), and 20 meters. On 20, SW3 stability leaves a little bit to be desired, and of course on all of the bands its selectivity is only what your own ears

continued next page

SW-3 from previous page
and brain can provide unless you use an audio filter. The regenerative detector plus RF amplifier is quite sensitive on CW and works amazingly well on SSB. I can hear "antenna noise" even on 20, signifying that the internally generated noise of the SW3 is not yet the limiting factor for weak signal reception. Many superhets of this era did not do as well. For receiving AM phone, you have your choice of running below the point of detector oscillation or of letting the detector oscillate and zero beating the carrier. Neither way is particularly satisfactory.

My Model II AC SW3 requires from 135 to 180 volts dc at about 25 ma. and either 2.5 VAC at 3.75 amps or 6.3 VAC at about 1 amp (there is a dial light that pulls a little power in addition to the tubes). National made a model 5880-AB doghouse power supply for the AC SW3, but finding one is probably next to impossible. I use a home brew power supply which includes an 0A2, 150 volt regulator tube to help out in receiver stability, built into a little black crackle box of course.

Set-up adjustment of the SW3 takes more time to tell about than to perform. It amounts to peaking the RF trimmer and reducing the regeneration together until the detector just oscillates for a very narrow region of adjustment of the RF trimmer around maximum RF stage gain. Today's louder signals tend to block the SW3, even with the RF gain control backed all the way down. I detune the RF to compensate. Other ideas would be to put a series capacitor in the antenna lead or merely to use a separate, short wire antenna on the little receiver.

SW3 Coils

There are three series of coils for the SW3, one for each major receiver version. The difference across the series is primarily just the number of turns in the "tickler" winding used to provide feedback for the regenerative detector. So any set of SW3 coils can be used in any receiver, with perhaps a little adjustment of the tickler winding. James Fred(2), whose ad I found in the *ER* classifieds, makes available newly made SW3 coil forms and has a chart telling how to wind the 60 series coils used in the Model II receiver. His chart is verified by my own coil sets and by information I obtained a number of years ago from Bob Gunderson, W2JIO. James' data package also includes a figure showing information for the 10 series coils used in the Model I. More information on the SW3 coils can also be found in the 1934 Official Shortwave Manual (3) on pages 8, 176, and 180-182.

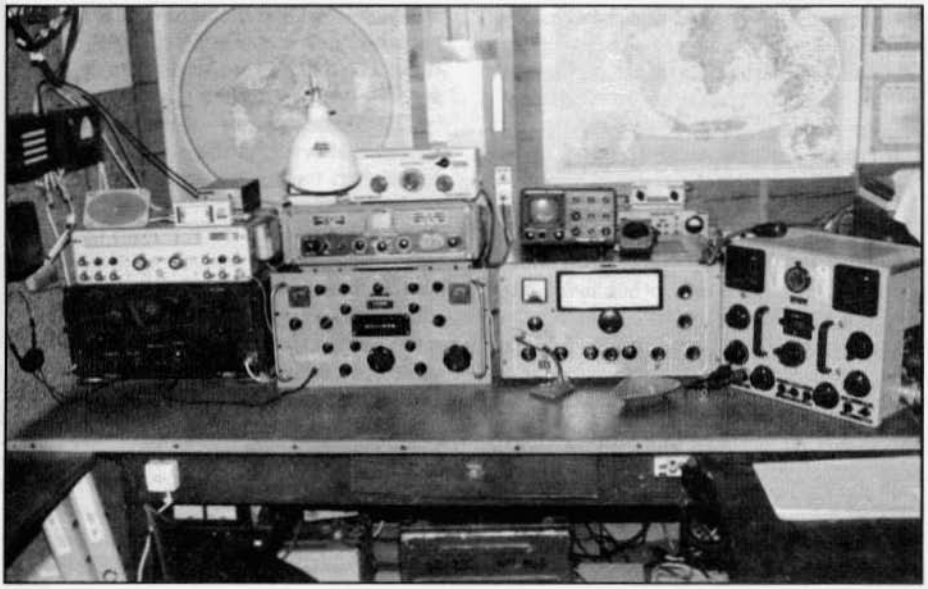
Even if you don't have an SW3, James' information can be quite useful. If I were building a regenerative receiver with an RF stage, I'd duplicate the SW3 coils and use a 2 section, 90 (or 100) pF per section tuning capacitor. If I were building a regen without an RF, I'd use the SW3 "tickler" and "secondary" windings, including the tap point for ham bandspread, and I'd feed the antenna either through another winding the same size as the tickler but on the grounded end of the secondary or through a small, variable capacitor attached to the grid end of the secondary. Either way, this is a great starting point for the coil set for your home brew regen. James offers forms similar to the SW3 forms on standard 6 pin, 7 pin and octal bases.

And last but not least, here's how to wind 30 meter bandspread coils for your SW3. Wire sizes are what I used. Anything close would do just as well.

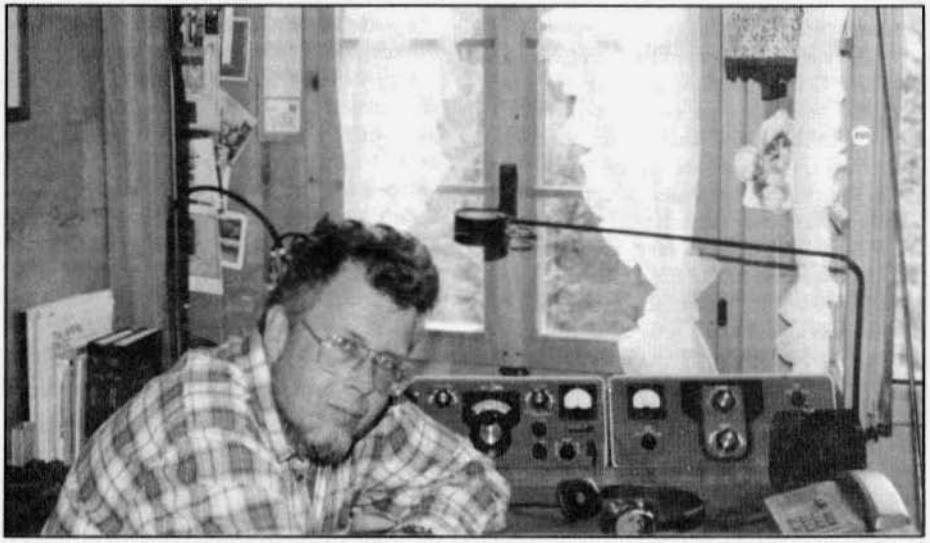
RF amplifier coil: antenna winding 25/6 turns close wound, #30 enamel, spaced 1/8 inch from bottom of secondary; secondary winding, 10-5/6 turns, 1-1/4 inch long, #18 enamel, tapped at 1-5/6 turns; primary (resonator) winding, 85/6 turns, 1 inch long, interwound with secondary. The top of the secondary winding goes to the RF amplifier grid cap, which is wired to a lug mounted on the top rim of the coil, as with all bandspread coils.

Detector coil: tickler winding 3-1/6 turns close wound #30 enamel, spaced 1/8 inch from bottom of secondary; sec-

continued on page 33



Hans Zimmermann, HB9AQS, lives in the Swiss Alps. His home is a 260 year old farm house and all of his equipment is from the '50's and '60's. The gear shown in the top photo is in his upstairs station. On the top of the BC-348 is a rare, restored Hallicrafters FPM-200 (1959) transceiver; the transmitter is a British K.W. Viceroy (1961) and the square box at the right is a Swiss-made military transceiver (1958) for 160 metres.



With their classic design, the Collins KWM-2 and 30L-1 fit into the livingroom. Wire antennas are suspended between the tall 50-foot fir trees around the house. The altitude of 3500 feet above sea level helps the signal get out.

LETTERS

Editor's Note: The three letters that follow relate to John Staples' article "Good Audio" published in the last three issues of ER. After the letters we have John's response.

Dear ER

I read with interest the article on Good Audio by John Staples, W6BM. I wish to add a note of caution to his otherwise excellent approach to the subject of audio quality and amateur AM.

Under the heading "phasing" on page 13, John mentions the possibility of inverting the phase of the audio either by reversing the microphone or the secondary of the modulation transformer. Interchanging the secondary leads to the modulation transformer could result in degradation of the high frequency response, and even worse, cause modulation transformer burn-out.

Modulation transformers are usually designed for one of the leads to carry the audio voltage to the final, while the other lead serves as the audio ground return. The secondary may be wound in such a way as to minimize internal capacitance at the "hot" lead, but generally, no such precaution is taken with the "cold" side of the winding. Therefore, the capacitance at the "cold" side of the secondary may be sufficient to affect the high frequency response, if this side of the winding is wired to carry the modulator audio output to the final.

Just as the "hot" side of the secondary may be designed with special care in regard to capacitance, it may likewise be better insulated than the side intended to serve as the audio ground return. The "cold" side of the secondary is likely to be insulated well enough to safely withstand the unmodulated high voltage from the power supply, but not necessarily designed to handle the modulated high voltage going to the final, which may contain peaks in excess of twice the unmodulated plate voltage. If this higher peak voltage is allowed to occur at the "cold" end of the transformer secondary, it could be sufficient to break down the insulation and destroy the transformer.

The phase can more conveniently be inverted by reversing the modulation transformer primary. This winding, on a well designed transformer, is wound symmetrically, and reversing the connections will not upset the balance of anything. Better still, if the modulator tubes have their anode leads brought out at the top, it is simply a matter of reversing the plate cap connections!

Don Chester, K4KYV

Dear ER

Enjoyed the May article "Good Audio," which will put many people on the way to a more natural-sounding transmitter. But in Part One of the series, the author claims good hamband AM audio is not the same as hi-fi audio. Many people would disagree.

What the article mistakenly assumes is that transmit audio must be tailored, and limited, to the restricted audio quality of a typical receiver. But there's always the option of improved receive fidelity, a concept supported by articles ER has already published. (The R390A series, in particular)

Many of us who use hi-fidelity receivers very much enjoy and appreciate "broadcast" quality audio available from a variety of AM stations on the ham bands. Such reception is really the other half of the AM experience for a lot of people, and is among the reasons for the enthusiasm that comes with Classic Radio.

Paul Courson, WA3VJB

Dear ER

I enjoy your publication and take heart in seeing that so many amateurs still appreciate ham radio as it used to be and are interested in preserving that culture.

I read with interest articles on improving AM audio such as "Good Audio" by W6BM, appearing in the May issue of ER. They're all interesting and can certainly improve the audio response of amateur AM transmitters.

But, aren't we forgetting that amateurs are not licensed to operate wideband AM? That we are legally restricted to an RF signal bandwidth of 6 kHz when operating AM, corresponding to a 3 kHz high end audio cutoff? John Staples, in his article, suggests that the reason for bandwidth-restricting circuitry in amateur AM transmitters is to provide more QRM-cutting punch. That's only part of it. The circuitry's also there to keep us legal. We just ain't licensed to put out a signal with the same bandwidth as an AM broadcast station.

This certainly isn't a criticism of John or others wanting to improve the audio quality of amateur AM transmitters; we all know that many need it. Just a reminder to keep things in perspective. We are not broadcast stations. Some AM amateurs fantasize that they are, a few even broadcasting prerecorded program material, including music!

Now, I've never had a problem with fantasies. Outfitting your station like a broadcast studio or adding reverb to your voice might be fun, and what else is a hobby for? But when they result in illegal operation and violation of good amateur practices, I believe it should bother all of us. AM operation, with its two sidebands, takes up two seats on a crowded bus as it is. Why aggravate the situation further by selfishly hogging even more bandwidth and increasing hostility towards AM through inconsiderate behavior and unnecessary QRM?

Wouldn't it be nice if AM'ers could provide present day amateurs with a taste of vintage operating practice and courtesy to complement the sound of their vintage equipment? Of how it used to be in the golden days of amateur radio?

George A. Flanagan, W2KRM

John Staples' response:

Dear ER

I thank my readers for these and other useful and well thought-out responses. It proves that people actually read these articles. It also shows that when you stick your neck out, your head may get chopped off.

Paul Courson and George Flanagan seem to be at opposite ends of the bandwidth issue, with me somewhere in the middle. Paul chides me on calling for a restriction of the audio bandwidth, and George accuses me of advocating too much. In fact, the Combined Federal Regulation Part 97, the rules covering the amateur radio service, are mute about the actual bandwidth a phone transmission should occupy except to say that FM or PM transmitters should not occupy any more than a DSB AM signal below 29 MHz (Sect 97.65(c)) and that the sidebands be contained within the allocated phone subband limits. My article strongly advocates the use of a microphone like the D-104, whose response is optimized for ham band communications, with a very clean, low-distortion transmitter without clipping, resulting in an overall bandwidth determined by the response of the microphone itself without adding any more due to imperfections in the transmitter. Judge for yourself the punch of a so-called "high fidelity" signal in the presence of QRM, although I agree with Paul that under very good conditions wideband audio through a wide receiver may sound excellent.

Don Chester's point on reversing the modulation transformer secondary leads to correct an audio phasing problem is a good one. Since I point out there are other ways to accomplish the same thing, it's better to leave the secondary leads where they are.

In passing, let me say that I have been gratified by all those who have modified their Johnson Valiant transmitters according my article in ER #24. The very low distortion and improved bandwidth of the modified transmitter seem to result in better communications through QRM as well as a very much more pleasing sound. As a technical memo, I would like to point out that the 4.7K resistor in the plate circuit of the driver stage dissipates at least 2 watts, and a 5K, 5-watt resistor is recommended in this position.

John Staples, W6BM

An Inexpensive AM Filter For the 75A-4 Receiver

by Pat Keogh, WB9GKZ
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Green Bay, WI 54313

I'm just an ordinary average ham operator. I have a wife, two kids, two car payments and a mortgage. However, I also own a "rich man's" receiver, the Collins 75A-4. Not being rich enough to afford today's prices for accessory filters for this fine receiver, I came upon a very affordable and easy way to fashion a 6 kHz filter for the set. If you're a true experimenter and money is tight in your ham budget, read on.

While flipping through a recently received copy of Digi-Key Corporation's catalog, I noticed a line of ceramic filters (455 kHz) designed for AM receiver applications. These filters are small, about 1/2 inch square, and are made by Toko America, Inc.

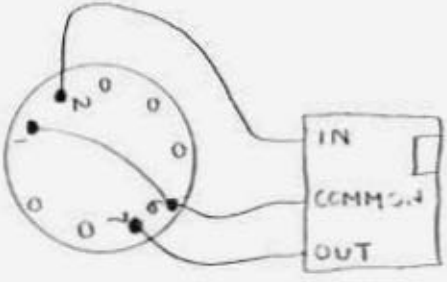
They are 3-terminal devices having one "in", "out" and a "common" terminal. They come in different bandwidths, I chose the 6 kHz filter, model HCFM2-455B. I ordered one filter for the almost ridiculous price of $3.64 from the Digi-Key operator at 800-344-4539. (Being truly frugal, I was happy to dial toll-free.)

The filter arrived and I went to work on the installation of it in the 75A-4. Could this little gem really work? The filter was removed from the shipping bag. Where was it? There it was - as light as a postage stamp and as small as a transistor! Thinking of all the money I saved with this imported ceramic wonder, I carefully soldered 3 wire leads to each terminal. I then fashioned these leads to a 9-pin tube extender socket. The socket was then plugged into the "A" filter socket of the 75A-4 (see diagram). Please note that prior to insertion of this filter I confirmed, schematically, that no B+ appears on the filter input from the 6BA7 2nd mixer, V5. My 'A4 is a 5000 series serial number. Also note the "ground" jumper from pin 1 to 6.

Now, time for the smoke test. No smoke, it worked! Tuning the receiver, I could tell this little filter was quite something. It does not have the steep skirts of a mechanical filter but it does "sound good" while tuning side to side of an AM signal.

Not being a Collins purist, I found the filter to be a very acceptable means of getting AM bandwidth on my 75A-4 very cheaply. Not owning test equipment to test the skirts of the filter, I invite other hams to test this little gem and possibly publish the results. I would also invite experimentation with this filter in other Collins 455 kHz IF receivers employing mechanical filters.

Happily, now as a result of using this very inexpensive filter, I can readily enjoy AM on my 'A4 and make next month's house payment! **ER**



Toko America HCFM2-455B 6 kHz ceramic filter installed in the 9-pin filter socket.

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** - 21.400 - 21.450; **17 meters** - 18.150 calling freq.; **20 meters** - 14.286 for the nightly net starting at 5:00 CA time; **40 meters** - 7160, 7195, 7290 are the main freqs. Westcoast AM'ers net every Sunday afternoon, 4:00 PM on 7160; **80 meters** - 3870, 3880 and 3885 are the main freqs. Westcoast swap net Wednesdays nights, 9:00 PM on 3870. AM Swap net Thursday nights, 7:30 PM on 3885; **160 meters** - Gray Hair net every Tuesday at 8:00 PM EST on 1945. Mostly sporadic summertime activity, but during the winter signals can be heard anywhere on this band.

From the Editor:

Ed Mantick, N3GWE, sent me the obituary of Clarence Zener inventor of the Zener diode. The obituary was cut out of the *Pittsburgh Post-Gazette*. I quote:

"Clarence M. Zener, a world-renowned physicist died of heart failure yesterday [July 3] at his home in Squirrel Hill.

"Mr. Zener, 87, was a professor in the physics department at Carnegie Mellon University whose work expanding the theoretical study of solid-state physics often was years ahead of its technological applications.

"The Zener diode, a voltage regulator developed in the 1950's and used in modern computer circuitry [and in hollow-state circuitry], resulted from a paper explaining the breakdown of electrical insulators that Mr. Zener published in 1934.

"He was very well known for early work he did on the properties of solid materials ...some of which led to the Zener diode", said John Fetkovich, the associate head of the physics department and assistant to the president of the university.

"The most remarkable thing about him is how he could be given a problem he hadn't faced before and, with speed and accuracy that is very rare, come to understand it... and see the way to deal with it," Fetkovich said.

"Even in recent months, at that age (87), he was as sharp as most scientists that I know and he continued to be intellectually curious and active... Just being with him and seeing how he worked actually helped me," Fetkovich said.

"Before joining the Carnegie Mellon faculty in 1968, Mr. Zener had been dean of science for three years at Texas A&M University. He joined Texas A&M after retiring from Westinghouse Electric Corp. Research Laboritories, where during his 14 years he was director of research and director of science.

"Mr. Zener was a physics instructor at Washington University in St. Louis in 1935-37 and at the City College of New York in 1937-40. He was an associate professor at Washington State University from 1940-42, then a principal physicist at the Watertown (Mass.) Arsenal during World War II. After the war, he taught at the University of Chicago until 1951.

"He was the author of more than 125 papers and books and a member of the National Academy of Science.

"A native of Indianapolis, Mr. Zener graduated in 1926 from Stanford University and received his doctorate in physics in 1929 from Harvard University. He also studied at the University of Leipzig."

And now we know about the man that gave us the Zener diode. **ER**

Report From Korea

by Skip Green, K7YOO
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Winona, MN 55987

Last fall I had the opportunity to return to Korea on one of my many business trips overseas. As fortune (and conniving) would have it I managed a day off for a little exploring in Seoul. On previous trips I had made the usual tourist shopping trips to Itaewon street to purchase various gifts for the family and haggle with the merchants. As luck would have it I had met a young amateur at the Reebok outlet store and struck up a friendship by donating my stash of well read radio magazines always with me on long trips. (This trip had started in China a week earlier). This time I was determined to find the real shopping areas so I dropped in on my friend to find out where the electronics parts stores and surplus stores were located. (If indeed they even existed).

I made my visit and was soon on my way, map marked and heart pounding to a district a few KM from Itaewon, near the old imperial palace park area. One enduring phenomenon in many parts of the world that has largely disappeared from the American scene, is the grouping of businesses selling similar products in one area. For example, Cortlandt street in New

Photo No. 1. Two storefronts displaying their electronic parts in an out of the way alley. Note the display of Variacs.

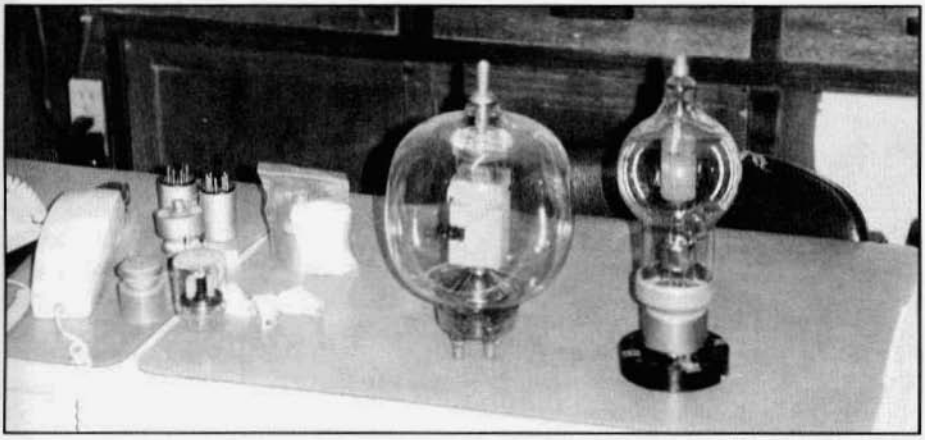

Photo No. 2 shows some of the power tubes the young lady in photo No. 4 was preparing for display in the store window.

Photo No. 3. A young lady prepares a tube display for the front window of one of the shops.

York where there was a large grouping of surplus and radio supply houses. These are sadly gone from the American scene.

I was not disappointed in what I found. I came upon the area after passing through at least 3 or 4 blocks of what I can only describe as large market "condos" selling every imaginable product from tools and hardware to Macintosh amplifiers and Summiheisai microphones. As can be imagined the prices on these later items were high - but the very fact they were there, in shops and on display was exciting. I finally came to the core of the district where there were literally hundreds of shops selling every imaginable electronic component.

Each shop seemed to have a specialty. One ic's, another power resistors, ceramic caps, connectors and tubes and surplus high power components. I have included photos of some of the shops. Many of these were hamshack sized and were literally crammed with parts from floor to the ceiling.Photo No. 1 shows the store fronts of 2 of the surplus stores hidden in an out of the way alley. Like many of their counterparts in the US, the shopkeepers were "street wise" and knew he value of vacuum variables and related items but the possibility was still there to bargain for lesser items. In fact I came away with some

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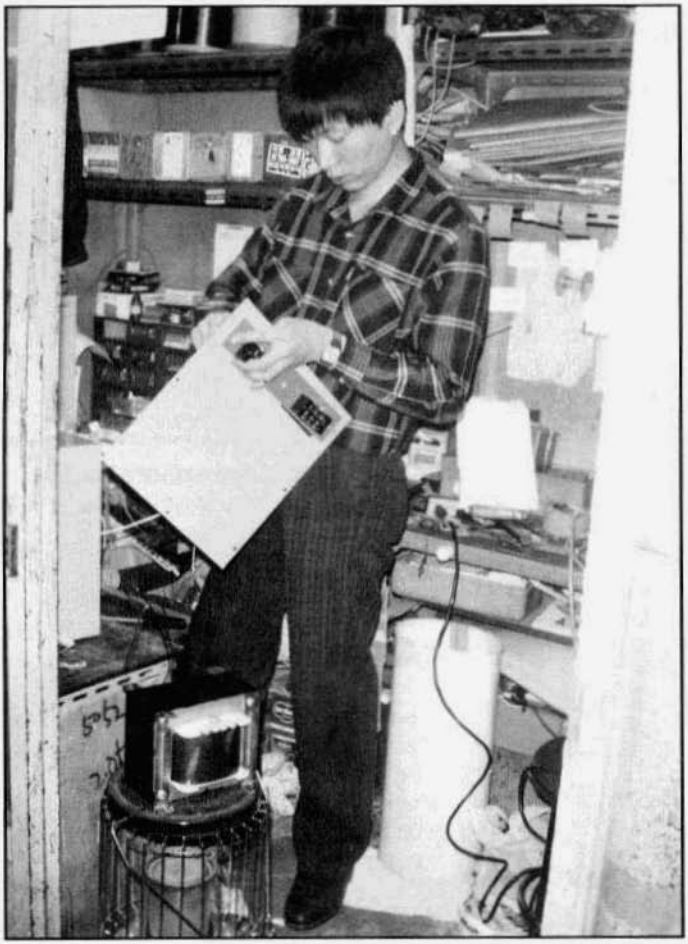


Photo No. 4. Transformers are built in this shop. Note the one 'cooking' on the kerosene heater.

rather unique ceramic switches that will have a place in some of my future projects. Photo No. 2 shows some power tubes the young lady in photo 4 was preparing for display in the store window. You will recognize the Eimac 250 ?? on the right of #3. The "fishbowl" in the center was some sort of Chinese manufacture power triode. I'm not sure of the application but the shajai is reminiscent of a 3-1000 although the square anode is quite unique.

Probably the best bargains were for components. Photo 4 is of a gentlemen building power supplies and transformers. Note the completed transformer "cooking" on top of the kerosene heater. It appears that a custom wound transformer is both readily available and reasonable in price. I gauge this by the fact that a cased, 4 KVA Variac with outlets can be purchased for about $80 US. In another shop I found some high voltage rectifiers used for microwave oven power supplies. These are the units similar to the ones advertised in QST by K7AW. The ones I bought were 10 KV at 1.2 amps, which is just perfect for high power AM transmitter projects. These were about $3 each and I loaded up on them. (Or so I thought!) I now wish I'd purchased more.

It was a thrill to be able to go to one area and find nearly every component available on the spot! Everything from phenolic board, to hardware, wire, etc. was available. I even found a couple of shops selling custom made aluminum cases for equipment at decent prices. It would be a real boost to many of our projects to have this kind of access to parts. Of course, many of us (myself included) would have to resist the urge to "stock up" for those rainy days! **ER**

Indianapolis Hamfest

by Bill Bogart, WA9CWK
RR 1, Box 84
Hillsboro, IN 47949

Well, there just wasn't a lot of vintage gear at the Indianapolis Hamfest this year. I saw a few nice pieces. There were a couple of 75A's for $125 each. My friend picked up a mint DX-35 for $25. I found a fair NC-188 for $25. Would you believe someone had a rusty, beat up DX-40 and was asking $100. He got a few comments, but no offers. I didn't see any R390's or DX-100's. There were two BC-348's. One was fair and had a power supply for $145. The other was rusty, banged up and had no supply for $145. I missed a good bargain on a DX-60 and HG-10 vfo for $30. I could have kicked myself! The two '348's were the only military gear I recall seeing there. There sure wasn't much for the builder/restorer either.

If you wanted computer related 'stuff', it was everywhere. Most of these places were congested with the newer hams. You could tell because everyone here seemed to be going 100 miles an hour.

Indy used to be four buildings of ham gear, one commercial building and flea market. And, this year, it was one building of ham gear, two of computers and one commercial and flea market. The flea market was the best place to go. You had not only ham gear and computers but tools, Avon bottles and -get this- rummage sale clothes!

Well, enough reminiscing - it was fun and it was hot. I got to meet some of the AM boys, 'Uncle Roger', 'Uncle Gil' and 'Uncle Pat'. We all had a good time and plan to be there again next year, even if it isn't still called a hamfest. **ER**

AM'ers at the Indy Hamfest, back row left to right; Bill, KA9CWK; Roger, W9BZ; Charlie, W4MDY; Eric, KB9BGS and Tim, WA9EEC. Front row, left to right: Gil, WA8JIW; Dick, W8GNV; Pat, W9PSD and John, K9OVP.

Restoring a Lettine Model 240 Transmitter

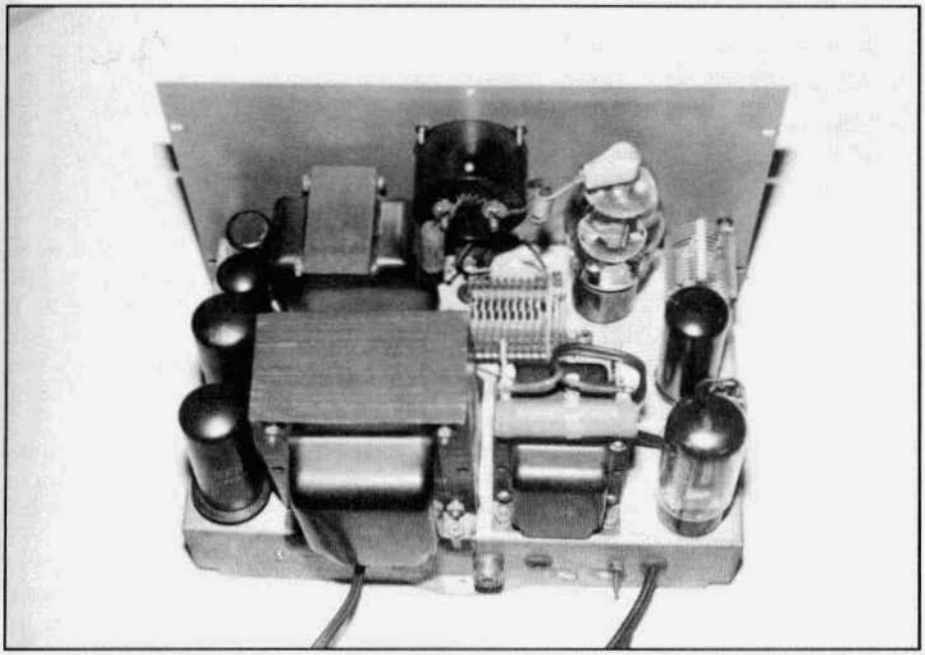
by Stan Tajima, JA1DNQ/KD2HB
3126-44 Nasecho
Totsukaku, Yokohama
Japan

I acquired a Lettine Model 240 transmitter at the 1992 Antique Wireless Association's annual convention (at an auction of general equipment). Those of you who have attended the convention may remember the auctionwhere I won the bid at US $65. The set included a dozen of B &W's "Junior and Baby" air wound coils for the final plate and oscillator plate.

There are but a very few AM addicts or boat anchor collectors/operators in JA, and the brand name of Lettine was never heard before. When I saw the transmitter at the auction preview session, I immediately fell in love with it so I decided to bid for it. Like many of you, I made my old transmitters with 807s, 6L6s and plug-in crystals back in the '50's and this little Lettine very much resembles my first 807 transmitter.

Since I acquired the Lettine, I have tried to get some info on it from the Ham Equipment Buyer's Guide (issued by the HTYS WA9MBJ) but I found only a little description about this model. According to the Guide, it is capable of transmitting "40-50 watts phone/CW covering any frequency from 160 to 10 meters for fixed, mobile and portable". It has 6V6 as a

Front panel of the Lettine 240.



Rear view of the '240 with cabinet removed.

"Miller (tuned plate crystal)" oscillator and an 807 as its final, modulated by PP 6L6s driven by 6N7. The first audio amp uses a 6SJ7.

The power supply uses a 5U4 and all power/choke/modulation transformers, etc., are neatly installed in a tiny 8x14x4 inch steel cabinet. The chassis is tin plated steel. The original price is reportedly US$79.95 wired at the factory.

The set came with a manual (but only three pages, with one side printed) showing its diagrams and very brief instructions. The appearance looks neat but the under the chassis wiring, the mechanical construction and the quality of the "manual" makes it difficult to believe that it was designed and assembled by a manufacturer. It looks so amateur. The transformers and coils are so closely installed that it is rather difficult to pull out the coils. The plate cap of the 807 has to be taken out when the chassis is pulled out from the case.

Restoration

Together with other stuff which I have acquired (Johnson Valiant, HRO Variation two, and a few other items), I had to air freight the Lettine to JA1. (Guess how much it cost to air freight the Valiant)

After having received the air freighted boxes, I was busy restoring the Valiant for a while. I use it for AM on 20 meters every Saturday/Sunday and only recently I have started to restore this tiny Lettine 240. I first checked all the transformers and tubes. Then resistor values. All seems to be okay. But for safety's sake, I rewired most of the wires, replaced most of the resistors, changed all capacitors. When I couldn't wait any longer, I plugged in to 117 volts and switched it on. I assumed I had the right 7-Mc crystal and the right (at least I thought) coils. The pilot lamp in the front panel glowed like a warning sign of radio active materials and that was (always is) an exciting moment. It looked like the TX is ready to go on 20 meters.

But I could not resonate the oscillator plate, no matter what. I changed the 6V6, the crystals and so on but still it would not resonate.

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Heath IP-32 Power Supply

"Real Power Supplies Glow in the Dark"

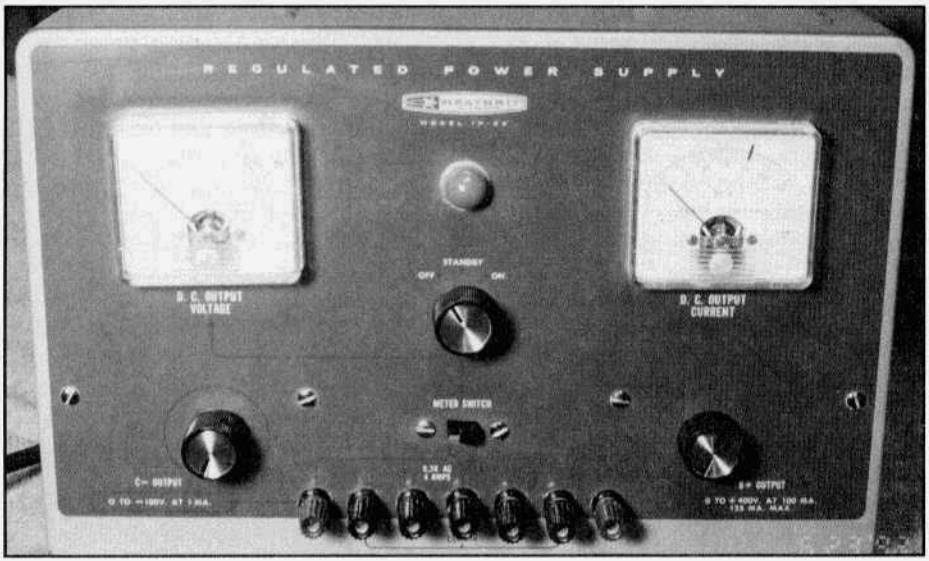
by Dave Ishmael, WA6VVL
1118 Paularino Ave.
Costa Mesa, CA 92626

If you do even a modest amount of work with vacuum tubes, a variable DC regulated power supply can be a valuable addition to your shack. My Heath IP-32 & IP-17 are the most often used pieces of test equipment in my shack. They can be used for reforming electrolytics, powering breadboards, testing meters, power supplies for projects built without them, troubleshooting low power transmitters and receivers - the list is endless.

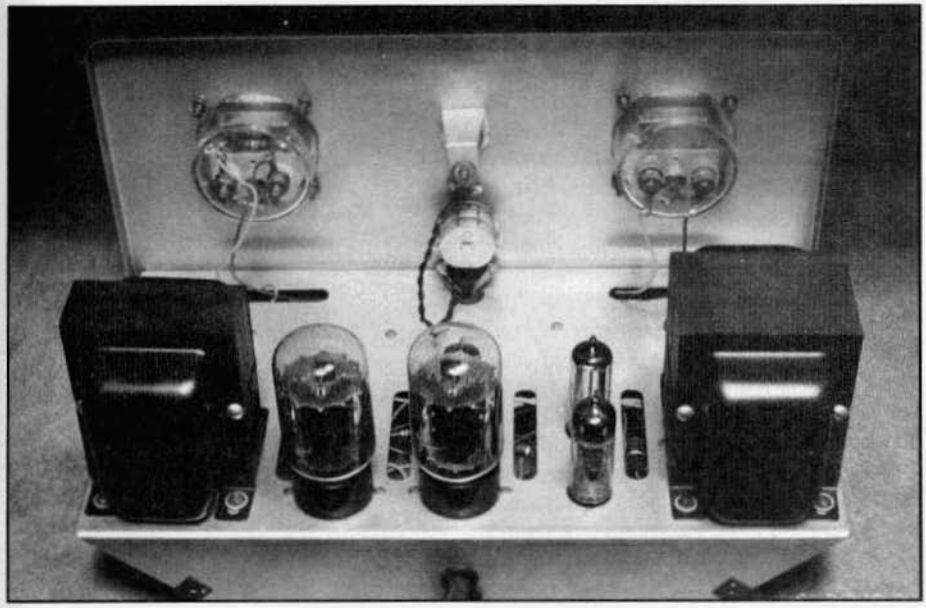
I purchased my first IP-32 at a computer swapmeet for $5. The second and third were purchased at the TRW swapmeet for $10 each. I have seen quite a few IP-32s at TRW in the $10-20 range. The IP-17, while more desirable (it is smaller and has an additional 12.6VAC at 2A output), is a bit rare. When they do show up, the asking prices are pretty high, upwards of $75 in some cases. An exception were three SP-17s at the 7/93 Rio Hondo swapmeet for $20 each.

The IP-32 sold for $56.95 in '62-'63. It is a 6-tube DC regulated power supply that provides 0-400VDC at 100mA continuous (125 mA intermittent), 0 to -100VDC at 1 mA, and 6.3VAC at 4A. The DC outputs are fully metered with 0-150VDC or 0-400VDC and 0-150mA 2-1/2" meters. The IP-32 is an improved 2nd generation PS-3. The 3rd generation IP-17, basically a repackaged IP-32, was introduced in the new beige low profile instrument case. IP-17 variants include the SP-17A and SP-2717A.

Once you start using these supplies, you're going to wonder how you got along for so long without one. Send me a LSASE and I will send you the schematic and specs for the IP-32 and IP-17. ER



Front panel of the IP-32 power supply.



Rear view of the IP-32 chassis.

A Premier Quality Homebrew Stereo Amplifier

The Rebirth of the Classic Williamson

Part Three

by Bill Kleronomos, KDØHG
P.O. Box 1456
Lyons, CO 80540

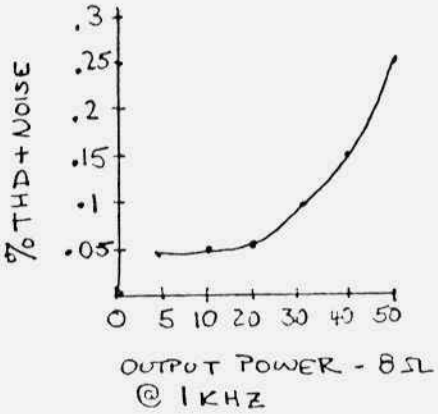


Figure 1

Performance

Ahh! The best part! Firing up the new piece of gear for the first time, running some bench checks and hauling it (grunt) into the house for those first listening tests. I played scope jockey for an evening optimizing things and charting out the performance. Some of the results are graphically shown in figures 1 and 2.

Many of the specs were better than expected. In addition to the remarkably flat response shown on the graph, the distortion specs are far, far better than any amount that could be audible, being under .1% at midband where the ear is most sensitive.

Other measured specs, not graphically shown: Hum and noise output of .0005 volts RMS, which equals a signal to noise ratio (or dynamic range) of 92 dB. Channel to channel gain matching is within 1/10 dB. When fed with a 5 kHz squarewave and driven to full power, the maximum rise and fall times are slightly less than 1.5 microseconds, an indication of the excel-

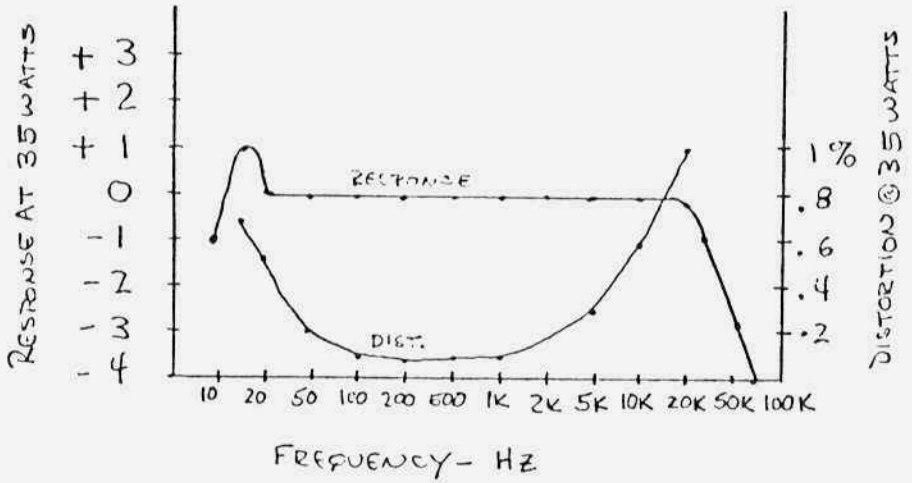
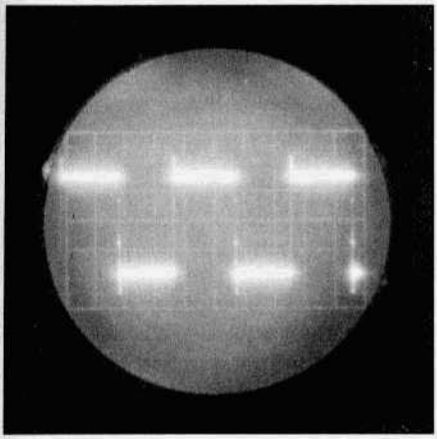
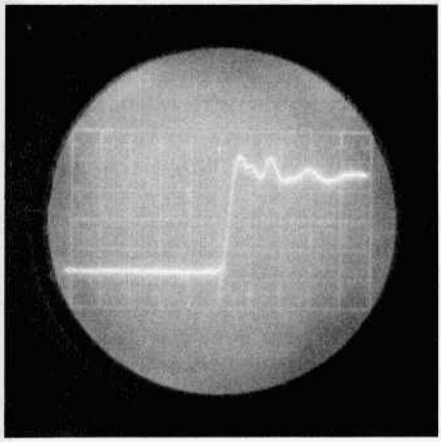


Figure 2



#1 5 kHz squarewave response. Flat tops indicate excellent power supply transient response.



#2 Expanded, delayed sweep version of above. 5 microseconds/division. Note excellent risetime of 2 uS, an indication of output transformer quality and low wiring capacitance.

lent quality of the output transformers.

So enough of the lab tests! How does it sound?

Let me start out by defining my system. My program sources for my home audio system consist of a modified mid-'50's era Knight AM-FM tuner, a CD player and an older Dual turntable using a Shure V15 type 3 cartridge. My preamp is a Hafler DH-110 of recent vintage and my speakers are a pair of mid-'70's vintage Large Advents - still a darn good on-axis loudspeaker.

I pulled the old Pioneer out of line and replaced it with the Williamson and played several CDs my wife and I were both familiar with - some contemporary, some old, including Mozart piano pieces, Sting, Paul Simon's Graceland, Benny Goodman and even Stevie Ray Vaughn. After about a half an hour, my wife's first comment was, "How'd you make it to sound so good?" And, indeed it did. The old upper midrange harshness that I found evident on some CDs was largely gone. The amp was incredibly, subjectively quiet as evidenced on the classical pieces with their wide dynamic range requirements. Perhaps the most stunning difference was the sound of percussion instruments, including drums and piano. Drums and cymbals came alive with a sound that one can only recollect from live concerts, must as certain smells bring back vivid memories. You could hear the impact of stick on drum, not just a vague thud. You can hear the sound of the hammers in a piano striking the strings, and the following tone, not just a note generated by a vibrating string. On some, but not all CDs, the presence of the playback apparatus in my living room seemed to disappear; the medium became transparent to the software. In short, we were impressed.

But why? I wasted little time in throwing my old amplifier on the same bench the new one had just departed from, hooked up the same test equipment and ran the same tests. In virtually every regard, the solid state Pioneer met or approximated the specs of the Williamson, even having somewhat better distortion at the same power levels. The only significant difference I could find was that the solid-state amp had an inferior response in the 20 kHz + supersonic range, and its 5 kHz squarewave risetime reflected this, being on the order of 25 microseconds. But, audio response in the supersonic range shouldn't matter, should it? Perhaps it does, a little bit at least.

continued next page

Homebrew Amplier from previous page

Or, perhaps, is the explanation for why the Williamson sounds so darn good one that enthusiasts of hollow-state electronics have known for a long time? Vacuum tubes are simply superior to transistors when it comes to amplifying analog signals. But we already knew that! Happy building!

In Case of Trouble...

This circuit can be deceiving in its simplicity. Due to the high degree of inverse feedback used, this 'simple' circuit can cause one to pull out mass quantities of hair in debugging.

This circuit, as described, will work incredibly well but I can only vouch for its success with the use of the recommended Magnequest transformer, or another that meets the original Williamson specs (again, 100 HYS minimum primary inductance, 50 mH maximum leakage inductance). Other transformers can be used, but the tradeoffs might include slightly higher distortion or lesser frequency response. A decent scope and audio generator are essential to any circuit modifications or debugging! Here's some problems you might encounter and some fixes:

1. Test the amplifier first without any inverse feedback. Leave the feedback resistor from transformer to cathode of 1st amp disconnected. If unit works reasonably OK, connect feedback. If you get a HARD oscillation, reverse the primary connections of the output transformer from tube to tube. This eliminates phase problems.

2. Low frequency oscillation below 25 Hz. This can be caused by inadequate decoupling capacitors in the plate circuits of the 1st two stages or the specs of the output transformer. A cure can be effected by reducing the amplifier's open loop low frequency response by reducing the value of the coupling capacitors between the phase splitter and 12BH7 driver. When feedback is connected, the response will flatten out.

3. High frequency oscillations. Could be anything, there's lots of gain present! Some things to try are: Add a .01 uF disc capacitor between the common cathode connection of the 12BH7 and ground. Remove the series high frequency stability network from the plate circuit of the 1st amp (the 820 pF/4.7K series network) and replace same with a 47 pF disc from grid to plate of the phase splitter. The last thing to try is the addition of a high frequency snubber network across the primary of the output transformer. This network is a series connected capacitor and power resistor connected from plate to plate of the output tubes. Good values to start with are from 500 pF to .001 uF @ 2 KV or better and about 10K, 20 watts for the resistor. Use the largest value of resistor that clears up the oscillation, 15 or 20K might also work. Normally, the resistor won't even get warm, but during high frequency testing with an audio generator, heat will be generated.

4. The above suggestions always worked where I had problems during construction of different amplifier models. However, if all else fails, increase the value of the feedback resistor (thereby reducing the feedback) to where the complete amplifier is stable. This will, of course, increase the distortion but I doubt anyone would notice. As I mentioned earlier, Theo Williamson's major discovery was that with the use of an output transformer that had exceedingly good specs, one could use enough inverse feedback to essentially eliminate any distortion products. There are tradeoffs and no free lunch!

Finally, do not exceed 500 plate volts when using the 6CA7/EL34. I recommend 475 max. If using 500 volts or better volts, I'd suggest using the 6550 instead. Good luck! ER

Corrections to part two parts list and schematic

R3 value is 1200 times the square root of output impedance.

C2 is 820 pF not mF.

V1 is 6DJ8, not 6DT8.

R20 and R21 (1KW, 2-W) are to be replaced with D1+D2 (75 volt, 5 watt zener diodes for plate voltages up to 500 or 100 volt, 5 watt zener for plate voltages near 525. The cathodes of the zeners are connect to taps on T1, anode to screen grids.

Power Supply Parts List

T1 - 'Surplus' power transformer from H.P. scope. Other similarly rated transformers suitable.

T2 - 115 volt to 6.3 volt filament transformer.

L1 - 4 Hy, 500 mA filter choke.

FL1 - Surplus 'Corcom' EMI filter - 10 A rated.

K1 - SPST power relay - 90VDC coil.

K2 - Amperite Thermal delay relay - 30 sec., 115 volt (115N030)

D1-D5 - 2500 PIV, 300 mA diodes

C1-C4 - .005/3KV disc ceramic

C5, C12 - .47 uF/200V Vitamin Q

C6-C9 - Mallory TCG capacitor - 180 uF/350VDC

C10 - Mallory TCG capacitor 210 pF/ 250V

C11 - 35 uF/250V electrolytic - low leakage type

R1 - 470K/2W carbon composition

R2-R6 - 47K/2W 5% " "

R7 - 2.2K/1/2W " "

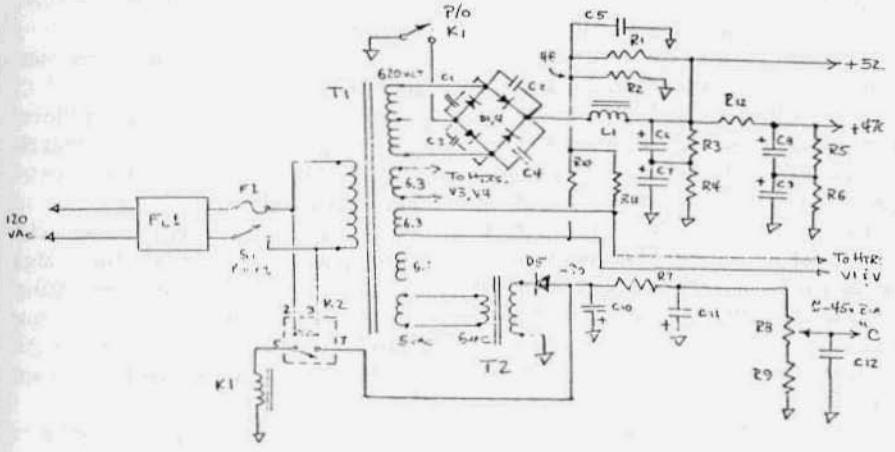
R8 - 20K linear taper

R9 - 4.7K/1W carbon film

R10-R11 - 390/1W " "

R12 - 2K/2W wirewound

F1 - 5A fast blow



Power supply schematic

Lettine Transmitter from page 25

The 6V6 became very hot so I had to switch the rig on and off frequently.

However,I soon lost the first 6V6. I just could not figure out why I could not get the rig to resonate. Then, just as a safety precaution, I checked the frequency coverage of the coils with a grid dip meter. Oh no! The oscillator plate circuit does not resonate at 14Mc. The B&W baby coil is labeled as 20 meters but frequency coverage with the Lettine variable capacitor is much lower. I guess those B&W coils were sold separately and not readily usable without fine tuning the resonance frequency with the set. I thought the previous owner had actually used the transmitter with those B&W coils included. But not so obviously. So I checked all the coils with my grid dip meter and now after some easy resoldering work on the coils, all the coils do resonate.

Now that I had that problem solved another one surfaced. The plate current is more than 100 mA at the plate voltage of 450 volts. I quickly checked (I did not want to lose another metal tube) all the voltages. The resistor values are all as per those written in the diagram, but I found out the screen voltage of both the 807 and 6L6s was just too high (almost 400 volts) I checked the resistor values again and again but all were in accordance with the manual's values. I pondered this problem for several weeks and then decided to change the values of some of the resistors (I felt that I could not trust the original diagram).

I figured out new values from the Radio Handbook 11th edition and added a bleeder voltage divider circuit for lower voltage including screen voltage for the 6L6s. (A 4K ohm bleeder resister from my Valiant works fine.)

I do not know for sure if the new voltages for the various tubes are okay, but it appears that they are well within the specifications.

A stand-by relay to control both the Lettine and the receiver (Collins 75S-3) was added series to the keyer jack. Now this Lettine is ready to go "on the air".

On the Air with Lettine 240

Now this Lettine sits in my shack with my other AM boat anchors, hooked up to my AM system. I use the 75-S3 for AM/SSB reception and now use three AM transmitters; namely Johnson Viking Ranger-2, Valiant and this lovely Lettine. The plate current now shows a little more than 90 mA at 420 volts and MFJ antenna tuner shows about 20 watts output.

ER Johnson's crystal mic (for CB?) is used and I can get a very good report both on unmodulated carrier and modulated audio. Every Saturday and Sunday, I talk to my AM friends in JA with either the Ranger-2 or the Lettine (when there is no QRM) on 20 meters and I am fully satisfied. This lovely Lettine surely brings me back to the memories of the late '50's when I built my poor transmitter with an 807 for QRMed AM QSOs. Now I suffer almost no QRM because only a fewhams operate AM in JA on 20 meters (but I do need more AMers on the air in JA).

Epilogue

I would really appreciate it if someone could tell me:

AA. What happened to the Lettine company? Were there any models other than 240, 130, 242 produced? When was the 240 produced?

BB. Has anyone ever experienced the same voltage trouble i.e. much higher voltage with the original resistor values?

CC. Is there anyone else still using a Lettine? Can we work a scheduled QSO?

DD. Does anyone want to sell me a Lettine VFO?

Any information about Lettine would be appreciated. **ER**

Are you a member of AMI? If not send $2 to AMI, Box 1500, Merrimack, NH 03054-1500. AMI promotes and protects AM, we should all be members.

SW3 from page 10
ondary and primary the same as the RF amplifier coil. The top of the secondary winding goes to a parallel 100 pF capacitor and 5 megohm resistor whose far end is tied to a lug on the top rim of the coil. A lead with a grid cap for the detector is also tied to this lug. And a 3 to 30 pF variable trimmer capacitor is tied between this lug and the bottom of the primary winding. Adjust this trimmer for proper frequency coverage.

Conclusion

If you are serious about using a regenerative receiver on the air, save yourself some time and look for a real receiver instead of building or buying a semi-toy that you won't be too happy with. Go for the ultimate; get (or build a copy of) the Quintessential National SW3! ER

Footnotes:

1 - Opinions expressed in this article are entirely the enthusiasms of the author.

SW3 information for this article comes from the following sources:

Instruction manual for the National SW3 Receiver, copy available from HI Inc.

William I. Orr, W6SAI, "The Year is 1931. National Radio introduces the SW-3 All-Wave Receiver," CQ, July 1971, page 34 to 38, 94, 96.

2 - James Fred, Route 1, Box 41, Cutler, Indiana 46920. Jim offers newly made coil forms for the SW-3, $7.50 per form plus $2.00 shipping per order. He also has a list of the winding information for all the 60 series coils.

3 - 1934 Official Short Wave Manual, Hugo Gernsback, Editor, reprinted by Lindsay Publications, Inc., available from Antique Radio.

The Alamogordo Amateur Radio Club will hold its ninth annual hamfest on Friday and Saturday, Sept. 3rd and 4th. Operating hours will be: Friday - 3PM to 9PM, Saturday - 8AM to 2PM.

Contact for hamfest info is Bill Leehan, N5SUM, (505) 437-9781

T-368 Exciter from page 9
AC. Not having 120 volts AC available along the front panel (the main On/Off switch is in series with only one side of the AC line), I decided to make some. Another trip to the junkbox provided a Radio Shack filament transformer rated at 12.6 volts center-tapped, at 1.2 amperes. This transformer was wired with half of its low voltage winding (center tap and one end) across the 6.3 volt "Red" indicator lamp I2. The 120 volt primary winding was used to power the relay as shown in Figure 4. Turning on the high voltage switch automatically activates the T/R relay.

Final Comments

This has been a rewarding project in many ways. Since I'm no stranger to homebrewing-over 50 years of experience with hollow-state and solid-state circuits-I didn't need this project to feel fulfilled. But mostly, I wanted to make efficient use of the T-368 exciter as a QRP rig and do it with a "one-knob" matching circuit.

At a total cost of under thirty dollars the rig performs well and the junkbox is a little lighter. Keying is clean, properly shaped and free of chirps or clicks. The stability and calibration of the Collins PTO are better than expected. For example, from a cold start my unit drifts downward about 300Hz over a period of three hours on the 30-meter band. Not bad for a piece of hollow-state equipment made over 30 years ago.

I had no TVI with the rig running without a shielded enclosure. Therefore, a custom wooden cabinet was made for me by Jack Thompson, W2OPE. As a precaution, the inside of the box was lined with overlapping pieces of aluminum foil and held in place with staples. The lining extends out over the edge of the cabinet so that it is in contact with the rear surface of the front panel when the rig is in place.

I hope this article inspires other owners of idle T-368 units to put them on the air. ER

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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: Nine 837 tubes - $30; Multi-Elmac AF-67, manual - $75; RME 4350, manual - $110. Pete Ferrand, WB2QLL, 65 Atherton Ave., Nashua, NH 03060-1904. (603) 889-1067

WANTED: Manuals or copies for Hallicrafters HT-40, S-85 and Globe Scout 680; Heathkit VF-1 vfo; BC-348R; Johnson Matchbox. Gary Lang, WN9U, 5129 N. Elkhart Ave., Whitefish Bay, WI 53217. (414) 332-5872

FOR SALE or TRADE: SX-62 and NC-190. **WANTED:** Hallicrafters to SX-28A, especially SX-11, S-14 also National NC-100X and Lafayette HE10 (KT200WX). Jim Dillon, 201 Seward, Juneau, AK 99801. (907) 586-3223, 10-6 PDT

WANTED: Electron tubes: military surplus, Western Electric, transmitting & receiving tubes. Cash or trade radios, dynamotors, etc. Can pick up lge quantity. I pay more than some and much more than others. Tim Metz, 221 Wheatland, Fairview, OK 73737. (405) 227-2456

FOR SALE: Collins S-Line aluminum knob inlays: small (exciter/PA tuning) - $1; 30L-1 - $2; spinner/plain (main tuning) - $3. Charlie, K3ICH, 13192 Pinnacle Lane, Leesburg, VA 22075. (703) 822-5643

FOR SALE: New list of 1000's of tubes! Includes new, used, antique, collectible, Majestic and Western Electric types. Send SASE to Jim Cross, 2817 Parklawn Dr., Dayton, OH 45440-1538. (513) 298-5827

FOR SALE: Tek 545 xcond. near mint with CA and 1A2, manuals - $250; Tek 661 sampling scope, good condx, w/4S1 and 5T3 - $150; Tek 567 sampling scope with 3S76, 3T77A, 6R1A - $100; Tek modules: 3A6, 2B67, 3S1 - $15 each as is, $35 for all. Entire lot of above items for $400. Shpg xtra or pick-up. Bill McCombs, WBØWNQ, 10532 Bartlett Ct., Wichita, KS 67212-1212. (316) 722-7669

TRADE: Mint unbuilt Knight Ocean Hopper kit for my wants (diff. in cash): Scanning disc TV; Quaker Oats, Murdoch or factory Navy coupler xtal set; Martian Beauty 1-tube rcvr; Hallicrafters S-1. No final decision before Oct. 1. Bill Ross, 875 Gordon Terrace, Winnetka, IL 60093. (708) 441-6462

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

WANTED: Top and bottom covers and original cabinet for R-390A; data on Cetron UXCVII triodes; manual for HP 606B. Clark Hatch, WØBT, 2546 SE Peck Rd., Topeka, KS 66605. (913) 235-2721

WANTED: Top $ for WRL SS-3 Q-multiplier (1965), mint Galaxy V MK II, w/ps accessories. Gary, K3OMI, 11124 Oak Hollow Rd., Knoxville, TN 37932. (615) 690-4217 days

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FOR SALE: Johnson Viking Valiant - $190; repairable Viking II's - BO; Hammerlund HQ-110 - $80; National NC-300 - $125; Lafayette HE-10 - $40; Hallicrafters SX-62 with no dial plate - BO; Knight T-150 - $75; Drake T-4X with 6146 finals and AC-3 - $100; Hallicrafters SX-117, HT-44, SX-100, SX-42, SP-44 panoramic adapter, T-54 television, Johnson Viking 500, Johnson Messengers, Gonset GSB-201 available after Oct. 1 - make offers. **WANTED:** Hammarlund PRO-310 for cash or generous trades. Can't ship over 70 lbs UPS limit. May be able to pick up or deliver along I-80 between Chicago and Salt Lake City. Jim Jorgensen, K9RJ, 1709 Oxnard, Downers Grove, IL 60516. (708) 852-4704

FOR SALE: Two R-390As with SSB and audio conversions from ER#24-25-26 and 42. Both have been carefully cleaned and aligned; tubes check high in the green. Knobs have been stripped and refinished, both complete with meters, top and bottom covers, new power cords. These radios work better than new - $400 ea firm. PU only; Johnson Ranger, factory wired, exc. condx. All new tubes including a new 6146B final and 6L6GC modulators. All electrolytics have been replaced. New power cord and built in PTT. Two new 6146B spares and D-104 mic - $400 firm, PU only. Will sell all for $1,100. Equipment will be shown and demonstrated upon request. Ed Hart, W4EOU, 1711-A Linda Ln., Normal, IL 61761. (309) 454-4375

FOR SALE: Cardwell air variables - #154-3 (old E.F. Johnson #500E20) 500 pF, 2000-V; #154-14 (old E.F. Johnson #100E45) 100 pF 4500-V, mint condx - $20 each, 2 for $35. Price includes shpg. Jack Dubbs, Box 5575, Security, CO 80931. (719) 392-2043

FOR SALE: Classic amateur and all Lafayette radio manuals. Will match or beat any published price. List available. Satisfaction guaranteed. Pete Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964

FOR SALE: New reprint "Tubes and Circuits" by Wholesale Radio Laboratories, circa 1942-43 - $8 ppd. James Fred, R1, Box 41, Cutler, IN 46920.

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

FOR SALE: Keys and bugs. All in exc. and complete condx. Bugs have orig SN tags; Vibroplex (2) deluxe, all chrome Originals - $85 ea; std gray Orig - $60; std gray Lightning - $65; black (old) Lightning - $85; 8 AMP Brit key - $35; Navy WW II Flameprf - $40; Lionel J-38 Bug - $55; Hamkey combo paddle/key - $55; Sig E1 KOB, very nice brass/wood - $55. Pete, WB2BYQ, (201) 818-4311

FOR SALE: 1 Brass key new surplus - $20; 1 new Jenning Vac 302 to 9 min. - $65; 1 Bud Cimix 10 to 80 - $15; 1 Bliley Crystal case CR-23-U - $5. Joe, W6CAS (916) 731-8261

WANTED: For Collins ART-13; plugs 6/U, 1 1/U, 12/U and CU-32 antenna tuner. Pete Patton, WØEWQ, 6908 Clearview St., Phila, PA 19119. (215) 898-1787 days

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WANTED: AN/FRR-59 or AN/WRR-2; also R-518/FRR-27 and R-1051B. John Richardson, 1163 Highland Pl., Dubuque, IA 52001. (319) 556-5504

WANTED: Manual/copy for TMC-Freq. shift exciter model XFK. Mike Oxenreider, WB3CTC, 63 Hellers Church Rd., Leola, PA 17540 (717) 656-8746

FOR SALE: Heath SB-401 xmtr, good condx w/manual - $90; **WANTED:** Junker Heath DX-35 w/good front panel. Cal, N6KYR, 1747 Pesiadoro Dr., Salinas, CA 93906. (408) 443-0649

FOR SALE: WE 312B-5 - BO over $285; 516F2 - BO over $175; CC-1 case - BO; PMR-6, w/DC pwr sply - $40. Have early KWM-1, would like to correspond with one who is familiar with mods etc. Joe Sloss, K7MKS, (206) 747-5349

FOR SALE: R-390A service: Module repair and alignment to complete remanufacture, new front panels, knob sets, VFO calibration,expert service, reasonable, any condition accepted. Rick Mish, (419) 726-2249

WANTED: Parts, assistance to reconstruct Stromberg Carlson 160L Acoustical Labyrinth! France is not on the moon, will pay all expenses. Reinhard Wieschhoff, 7, rue du Debuche, F78120 Rambouillet, France.

FOR SALE: Electronics suite from U.S. aircraft carrier. MF-UHF rcvrs, xmtrs, radars, PPI displays, RTTY cnvters, terminals. Much more.Bob Mantell, W6VQT, 3135 N. Ellington Dr., Los Angeles, CA 90068. (213) 851-2786

WANTED: Johnson 500. Must be in perfect condx. Top $ for right one. Tom, (716) 634-2545, 10 AM to 4 PM EST, (716) 741-9574 eves

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FOR SALE: Barker and Williamson 650 Matchmaster exc - $95; Johnson 6N2 xmtr, good - $135; SX-101 good - $175; Heath Warrior amp exc. - $295; (3) AX9909/6083 tubes as new - $75ea; Turner 533 mic - $35; HQ-170 exc. - $175. Tim Metro, 2344 N. Kearney Dr., Saginaw, MI 48603. (517) 793-3426

FOR SALE: Collins 75S-3 rcvr W.E. mint with manual - $350; Dyna stereo 70 amplifier - $175. Ron, KC6WTG, P.O.Box 783, Santa Rosa, CA 95402. (707) 539-8319

WANTED: Schematics and/or manuals for following -copies OK- Knight VFO and Hallicrafters S-41. B. Lee Cornwell, KD3KD, HCR 1 Box 95, Mt. Pocono, PA 18344. (717) 839-2710

FOR SALE: General Radio manuals (approx.40). Buy them all - $2.50 ea; one at a time - $8 ea. All original, NO ZEROX! Bob Bakinowski, 1524 Saint Tropaz, Tucson, AZ 85713. (602) 624-8029

TRADE: My Edison Standard 2 minute cylinder machine, good working, for your Collins 75A-4, VG or better. J. Mente, N9UEM/AA, 916 Olive Rd., Homewood, IL 60430. (708) 957-9455

WANTED: Maintenance info for Kepco 615B and Manson 540 high voltage supplies; Military 1-221 indicator. William Donzelli, 304 S. Chester, Park Ridge, IL 60068. (708) 825-2630

ELECTRON TUBES FREE 1993 Catalog, over 2,000 types in stock. **Electron Tube Enterprises,** Box 311, Essex, VT 05451. (802) 879-0611, FAX (802) 879-7764

FOR SALE: Radio tubes; repair and restoration of all vintage amateur and commercial radios, 25 years experience. Herbert Stark, 321 N. Thompson St., Hemet, CA 92543. (714) 658-3444

WANTED: Collins literature, manuals, catalogs, SM2, SM3, MM2 mic's, TD1, 647T dipole ant, 35C low pass filter, 55G1. Rick Coyne, KD6CPE, POB 2000-200, Mission Viejo, CA 92692. (714) 855-4689

FOR SALE: New RCA 802 tubes - $3; type 1616 - $2; type 2E26 - $1.50; type 673 (same as 575A except base) - $10. Write for special pricing on other tube types. Antique Electronic Supply. See ad inside back cover.

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

FOR SALE: Heath Nostalgia - 124 page paperback covers Heath history in pictures and stories. $9.95 postpaid (plus tax in WA). Heath Nostalgia, 4320 - 196th SW., Suite B-111, Lynnwood, WA 98036.

FOR SALE: Siltronix (Swan) 1011D - $125; S-Line VFO knob, non spinner - $35; **WANTED:** Globe King 500 B/C, xcu-400 calibrator, NTS-3 spkr. Bill, KE7KK, 6712 Lake Dr., Grand Forks, ND 58201. (701) 772-6531

FOR SALE: Hallicrafters S40A - $50; Hallicrafters S85 - $75. Buyer pays shpg/ handling. James Barrows, W7BCT, 15121 41st Ave. S.E., Bothell, WA 98012. (206) 337-4880

FOR SALE: Pair of 4-1000A tubes with Eimac sockets - $300. K7BDY, (602) 537-2450

WANTED: Quality audio recordings of AM QSOs. Trade Eastern U.S. activity for elsewhere. Open reel, cassette, DAT. WA3VJB, Box 73, W. Friendship, MD 21794.

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

WANTED: Help! Can someone in Radioland get me a schematic or a manual for an ITT Mackay 3010-B? **FOR TRADE:** Dudley-Gray 101D sig. gen. from avionics shop. Ray, NØDMS, 10679 W. Dartmouth Ave., Lakewood, CO 80227. (303) 987-3836

WANTED: Johnson accessories, code keys, SWR bridge, station monitor, etc. Even good clean rigs. Bob Kemp, POB 470, Lake City, MN 55041. (612) 345-5345 days

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WANTED: Feb. 1944 Radio News, "Signal Corps Issue". Will pay $20 each. Also Fair Radio and John Meshna catalogs, '50's-'60's Sam Hevener, "The Signal Corps" 3583 Everett Rd., Richfield, OH 44286-9723. (216) 659-3244 before 8:30 EDT

WANTED: Mint SX-100 front panel overlay; 1957 Allied catalog; complete AT-1 manual; Heath IP-32 current meter; early 1960's Stancor catalog; 455.8 kHz xtal for 75S-1; Eico 730 modulator; octal 100 kHz xtal for SX-100; 75S-1 S-meter adj. pot. **TRADE:** My VG SX-28A for your VG Adventurer or Challenger. PU only. David Ishmael, WA6VVL, 1118 Paularino Ave., Costa Mesa, CA 92626. (714) 979-5858

FOR SALE: Collins 51S-1, s/n 1753, fair, partially working condx - $350; complete tube set for KWS-1/75A-4, NIB - $150, U-ship. Jim, WB2LHP, (315) 446-5895.

WANTED: Buy and sell all types of electron tubes. Harold Bramstedt, C&N Electronics, 6104 Egg Lake Rd., Hugo, MN 55038. (800) 421-9397, FAX (612) 429-0292

Western Heritage Museum Omaha, Nebraska
"a magnificent home for your equipment"

Leo Meyerson, WØGFQ, (founder of WRL) needs donations of gear and related materials for the amateur radio exhibit at Western Heritage Museum in Omaha, Nebr.

This permanent display is the only one of its kind in the country and is something that all hams can be proud of. We expect 50,000 visitors annually.

Your tax deductible donation will be permanently noted on a plaque that will be prominently displayed.

For more information contact Leo at (402) 392-1708, May-Nov.; 619) 321-1138, Nov.-May.

FOR SALE: Collins kHz dials for 75A-1, 75A-2, 75A-3, 32V-1, 32V-2, 32V-3, KW-1, KWS-1 - $30 per dial or $35 exchange. Butch, KØBS, (507) 288-0044

FOR SALE: Two NIB Penta 813 tubes & sockets - $40; P6458 xfmr - $10; NIB TS-530s front panel - $40. David Ishmael, WA6VVL, 1118 Paularino Ave., Costa Mesa, CA 92626. (714) 979-5858

WANTED: RCA CR-88 rcvr; RCA microphones; new surplus ART-13 complete; clean SX-73; SP-600 JX-21. Gary, KE6MS, (818) 774-9497 or (310) 696-0177

FOR SALE: Hammerlunds HQ-170, exc - $175; HQ-150, exc - $150; Hallicrafters SX-71 - $125; Knight T-60, VFO-V44 - $50 both. U-ship. Richard Lucchesi, WA2RQY, 941 N. Park Ave., N. Massapequa, NY 11758. (516) 798-1230

FOR SALE: New rack panels, 8-3/4" x 19", steel - $12; aluminum 14" x 19" - $25. Add shpg. A. Bruno, 24 Butternut Dr., New City, NY 10956. (914) 354-8899

FOR SALE: NC-173; DX-60B w/HG-10B VFO; DX-40 w/VFI VFO; Heath Warrior amp; S38B; B & W Matchmaster for 5100/6100; misc very large roller inductors; McJones micro match. Joe Perratto, K2QPR, 1341 S/W Evergreen Ln., Palm City, FL 34990. (407) 220-7362

WANTED: List, indexes or directories of WW II Navy tec mauals or equipment. Willing to help to identify WW II Navy 5-digit type numbers. Send SASE. Ray, W6RIC, (805) 985-6048

WANTED: Citizen Radio Callbook magazine for 1920 and 1921. Bob Arrowsmith, W4JNN, PO Box 166, Annandale, VA 22003. (703) 560-7161 collect

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WANTED: Indoor receiving antenna for general coverage rcvrs. Levy, 8 Waterloo, Morris Plains, NJ 07950. (201) 285-0233

WANTED: National NC-300C6A 6 meter converter; National XCU-303 crystal calibrator. Vance Gildersleeve, K5CF, 206 Michelle Dr., Poteau, OK 74953. (918) 647-9044

WANTED: Manuals, copy OK, for HQ-110 and Heath Q-multiplier. **FOR SALE:** RCA CR-10 fixed frequency rcvr; Gen. Radio type 1106 frequency transfer units; Hallicrafters S-27. Cliff Grinnell, 21429 68 West, Lynnwood, WA 98036.

FOR SALE: Collins 312B4 - $100; KWM2A-W.E. - $395; Spinner knobs for 75A4 or S-line - $60; HQ-129X - $95; SX-99 - $95; R-388 - $350; R 460/HRO-50 - $300. Ron, (713) 331-1074

WANTED: PRC-74; RAX; BC-652; ARC-114. Joseph Pinner, 201 Ruthwood Dr., Lafayette, LA 705503. (318) 981-7766

FOR SALE: Hallicrafters SR160 - $150; Heath SB200 - $300. I pay shpg. Tracy, WB6TMY, Box 4694, Santa Rosa, CA 95402. (707) 527-8124

FOR SALE: Johnson Matchbox - $45; Galaxy GT 550, w/sply - $195; TS 174U freq. meter - $45; SCR 924 tank xmtr - $50. Levy, 115 N.W. Loop 410, Apt. 24B, San Antonio, TX 78216. (210) 366-3290

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

WANTED: McIntosh and Thordarson amplifiers; poor to junk Collins 75A-2, 3 and 51J series rcvrs; poor to junk Hallicrafters louvered spkr. Serious sellers only! Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53228-0803. (414) 545-5237 (24 hrs) collect

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WANTED/FOR SALE: Vintage tube CB's. Send card or call with models you have for sale. LSASE for list. Steve White, WB5UGT, Box 1086, Clute, TX 77531-3814. (800) 374-6477 (9008) leave message.

WANTED: Modulation meter Weston M-891 for General Radio 1931A AM modulation monitor, or a whole GR 1931A monitor with good modulation meter. Vern Jackson, WAØRCR, 2109 Ebert Ln., Wentzville, MO 63385. (314) 327-5801

FOR SALE: Transmitting tubes: 810 - $25; 813 - $20; 4-125A - $20; (4) 814 - $15 ea. Bill Riley, W7EXB, 863 W. 38th Ave., Eugene, OR 97405

WANTED: Central Electronics 600L amplifier, any condx. Paul Johnson, W7KBE, 10817 Brookside Dr., Sun City, AZ 85351.

Photofacts and Parts for Collectors
Electrolytics, high voltage capacitors, power resistors, plugs, switches and more. Free catalog. **A.G. Tannenbaum, WA2BTB, P.O.Box 110, East Rockaway, NY 11518. (516) 887-0057, FAX 599-6523**

FOR SALE: QST's in deluxe book binders, mint condition, 102 volumes, 1931-1982, except '78 - $950; CQ's, same, 1945-1982 - $350, $1200 both; Collins manuals for 30L-1 - $30, 180-S - $20. **WANTED:** Collins S-line high frequency crystals and S-3 main tuning knob, or parts unit. Have cash or S-line cabinet to trade. G. Stevens, Box 704, Longmont, CO 80502. (303) 776-9036

FOR SALE: Classic audio equipment, amplifiers, tuners, receivers, P.A., etc. SASE list. Stuart T. Carter,II, W4NHC, P.O. Box 033177, Indialantic, FL 32903-0177. (407) 727-3015

WANTED: Ornamental feet for the National NC-200 rcvr and spkr; pwr xfmr for the NC-100A rcvr. James Schliestett, W4IMQ,POB 93, Cedartown, GA 30125. phone/FAX(404) 748-5968

WANTED: WW II & Korean mititary sets, xmtrs, rcvrs & test equipment. Send list of equipment along with price. Richard Mollberg, K6PWF, 2340 Almond Ave., Concord, CA 94520. (510) 283-6786 eves.

BOOKS FROM ER

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

Fixing Up Nice Old Radios by Ed Romney.....$25

Wireless Communication in the United States by Thorn L. Mayes.....$29.95

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

Don C. Wallace, W6AM, Amateur Radio's Pioneer by Jan D. Perkins....$29.95

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

Please add $3 per book for shipping. Colorado residents please add sales tax. Money back guarantee!

Electric Radio, P.O. Box 57, Hesperus, CO 81326

WANTED

Collins promotional literature, catalogs and manuals for the period 1933-1983. Jim Stitzinger, WA3CEX, 23800 Via Irana, Valencia, CA 91355. (805) 259-2011. FAX (805) 259-3830

FOR SALE: Collins 75A-4 filters: 6 pole ceramic for high quality AM. 3 bandwidths available: 4, 6, or 9 Khz - $83.50 ea.; single pole CW crystal filters - $88 ea. 10% discount for two filters. Money back guarantee. Calif. residents please add sales tax. Vector Control Systems, 1655 No. Mountain, Ste. 104-45, Upland, CA 91786. (714) 985-6250

FOR SALE: Vintage parts. Send stamp and request "Vintage Flyer". USA only. Copies of some obsolete Readrite/Triplett equipment manuals. Bigelow Electronics, P.O. Box 125, Bluffton, OH 45817.

FOR SALE/TRADE/WANTED: Vintage tube CB's, all makes/models available; old radio books. LSASE for lists (specify). Charles Zafonte, RFD #1, Box 75, Fort Kent, ME 04743. (207) 834-6273 eves.

WANTED: Broadcast equipment catalogs and transmitter brochures from 1930-1955. Magazines wanted: "Broadcast News" (RCA), "Pick-ups" and "Oscillator" (Western Electric). Sam, W6HDU, 1031 San Antonio Ave., Alameda, CA 94501. (510) 521-1429

FOR SALE: Zenith 4K035 - $60; Watterson 527 - $50; Mitchell - $50; Philco 46-250 - $40; Motorola 5X11U - $50; Emerson big portable - $50; Philco 40-130 - $60; GE 408 - $30; Detrola 579 - $40; Zenith 5S319 - $95; Bendix 847D - $75; RCA 6BX63 - $45; Federal 101 R/P - $50; S/H extra. Polaroids $1 ea plus SASE. Bud Santoro, 3715 Bower Rd., Roanoke, VA 24018. (703) 774-9153

FOR SALE: New tubes: 2A3, VT25, VT 4C, 6L6G, 6E5, 811 A, all original USA. Send $2 for price list. Andrea Moretti, Via Colle Bisenzio 31, 50040 Usella FI, Italy

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WANTED: Manual for National NC-188. Thanks all for the help with DX-35 manual. KA9CWK, RR1, Box 84, Hillsboro, IN 47949

WANTED: Hammarlund HX500, HX50; Johnson Messinger or Ranger. Ron Eisenbrey, (713) 491-7823

FOR SALE: Transmitting/Receiving tubes, new and used. LSASE for list. I also collect old and unique tubes of any type. Looking for Taylor and Heintz-Kaufman types and large tubes and sockets from the old Eimac line; 250T through 2000T for display. Maybe you have something to trade? John H. Walker Jr., 16112 W. 125th St., Olathe, KS 66062. (913) 782-6455

WANTED: Johnson gear, all models, any condition. Also parts and literature. Please state condition and shipped price. Wen Turner, AD7Z, Box 451ER, Cal-Nev-Ari, NV 89039.

WANTED: Collins 270G-3 or 312A-1 spkr; escutcheon for 75A-4 and Electro-Voice model 419 stand. David A. Clark, K5PHF, 9225 Lait Dr., El Paso, TX 79925. (915) 591-4184

WANTED: RME model DB-23 preselector; Hammarlund HC-10 converter; operator manual for Allied SX-190 rcvr (copy ok). John Keil, 4618 Norwalk St., UnionCity, CA 94587. (510) 471-4838

FOR SALE: Friend's Military radio collection. LSASE, 3 stamps, for list. **WANTED:** Shock mount for BC-191 or transmitter w/mount. Robert W. Downs, WA5CAB, 2027 Mapleton Dr., Houston, TX 77043-2410

FOR SALE: Pwr splys: 150V, 200V or 350V 400mA, regulated current limited, sens program, octal, 6in cube AC/DC - $15/$20/$25 + shpg. Victor, 7224 NE 8, Portland, OR 97211. (503) 289-6373

TRADE: 800 cps Collins filter for F-455C-60 filter or will purchase. Sam, N4VIB, (706) 695-5658 eves

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WANTED: 62S-1 Collins converter. Edward White, WA3BZT, 809 Seymour Rd., Bear, DE 19711-1121. (302) 322-1313

ELECTRIC RADIO PARTS UNIT DIRECTORY

If you need a part for a vintage restoration send $2 and an SASE (.52 postage) for a 6 page list of parts units. If you have a parts unit, consider putting it on the list. Your dead unit can help bring others to life!

FOR SALE: Millen 90651 grid dip meter, exc. condx, w/new tube, all standard coils and fitted case - $60 includes UPS. Terry Perdue, 23225 Woods Creek Rd., Snohomish, WA 98290. (206) 568-4403

FOR SALE: Repair & refurbishment of older tube-type amateur equipment. Fully FCC licensed; 35 years experience. Chuck Banta, N6FX, Claremont, Calif. (LA area) (714) 593-1861

FOR SALE: Narrow bandwidth (600 Hz) mech. filters for CW reception with Collins 51J-type rcvrs - $45 each. Limited supply. Joel Thurtell, 11803 Priscilla, Plymouth, MI 48170. (313) 453-8303

FOR SALE: Have you received your 1993 catalog of coil forms, literature, tubes and other radio parts? If not send $2 to Antique Radio Labs, R1, Box 41, Cutler, IN 46920 for your copy.

WANTED: Hallicrafters DD1 Skyrider diversity, only in very good condx. Jose Cangas, EA4JL. Contact in the states Kurt Keller, (203) 431-6850

WANTED: Heathkit wattmeter. Bob Braeger, WA6KER, 6634 Navel Ct., Riverside, CA 92506. (909) 682-5084

FOR SALE: Ranger I - $125. **WANTED:** Johnson TR switch; Dow-Key relay; Adventurer; Drake 2B/2BQ. Rob, NS6V, 3881 Winkle Ave., Santa Cruz, CA 95065. (408) 464-0505

WANTED: Schematic for TEK 514-D scope. Also PE-125/135S pwr cable for BC-223 xmtr. Jay Budzowski, N3DQU, 109 S. Northview Ave., New Castle, PA 16102.

WANTED: Tube types: 212E, 308-B, 300 A/B, 50, 250, 350, 205D,E,F, 252, 350, 274, 211, 845; audio xfmrs. Ed Billeci, 2310 SE 113th, Portland, OR 97216. (503) 281-4734

WANTED: Original knob for Heathkit Apache driver control; Riders "An Hour A Day" books. Alan Johnson, N4LUS, 6001 Goldsboro Rd., Bethesda, MD 20817. (301) 229-7069

WANTED: Knobs for Hallicrafters SX-101 MK III. Will take junker unit if knob set complete. Bob Kemp, POB 470, Lake City, MN 55041. (612) 345-5345

WANTED: All types of military electronics, especially RDF and radar items, manuals too. Also need URD2 antenna. William Van Lennep, POB 211 Pepperell, MA 01463. (508) 433-6031

TRADE: Good/excellent R390A for 51J4. Ed Cole, WB0SUT, 6060 4 Mile Canyon Dr., Boulder, CO 80302. (303) 444-7296

FOR SALE: Collins 204 F1 linear amp, 2-30 MHZ, (2) 4CX1500B, 2 Chan. remote operation, 230 VAC single phase - $2750/partial trade for 30S1, local preferred; 651S1 (Nixie) w/manuals, std config. - $1000; HP spectrum analyzer 140T/8552B/8555A - $1500. All good condx. Steve, W6YFK, (415) 948-1288, CA.

FOR SALE: Globe VFO's, 755A - $35, V-10 deluxe - $45. List of other ham, military and VHF surplus items, LSASE. Geoff Fors, WB6NVH, POB 342, Monterey, CA 93942. (408) 373-7636

FOR SALE: Hammerlund HQ-170C, matching spkr, manual; Collins 30L1; Clegg 22'er 45-W AM xcvr, manual. Carter Elliott, WD4AYS, 1460 Pinedale Rd., Charlottesville, VA 22901. (804) 979-7383 (H), 980-7698 (W)

FOR SALE: Hallicrafters WR-600 - $50; National JC coil set - $50; Hammarlund SP-600 main tuning and band change knobs - $25 ea; New Collins straight key - $50; custom made wood table top cabinet for Hammarlund SP-600 - $50. **WANTED:** bottom plate with feet for National NC-240D; top cover for Hammarlund SPC-10; Collins winged 30L1 with RCA 811-A finals and original manual. All plus UPS. Val Johnson, P.O. Box 51, Henry, IL 61537. (309) 364-3160

FOR SALE: McMartin LR-1004A broadcast limiter/compressors - $65; **WANTED:** manual copy for Heath AR-3 recvr. Gus Enquist, VE3MAL, R.R. 1, Redbridge, Ont. P0H 2A0 Canada. (705) 663-2387

FOR SALE: Signal One CX-7A - $850; Heathkit GD-1A dip meter - $45; SX-100 - $200; Realistic DX-160 - $150; Globe Scout 65B w/ Hallicrafter HA-5 VFO - $165. Lane, (505) 678-6401 wkdys M-TH.

FOR SALE: HQ-170 w/xerox manual, no spkr, works good, very good condx - $190. Willis, (501) 857-3366

FOR SALE: Small quantity of Bud 5-pin and B&W BVL, 1500 series and 3400 series coils and bases; also some B&W coils from 10 KW amplifier AN/MRC-2 (look like giant BC-610 coils) and extra BC-610 coils and tuning units (none for 160 meters). LSASE for list. Robert W. Downs, WA5CAB, 2027 Mapleton Dr., Houston, TX 77043-2410.

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

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

FOR SALE: RIT for KWM-2 and S-Line. No modifications for KWM-2; 75S- needs one wire - $59.95. SASE for info. John Webb, W1ETC, Box 747, Amherst, NH 03031.

WANTED: Manual (copy) for National NC-60; 1941-1946 Allied catalogs; Riders Vol. 22. Al Bernard, NI4Q, P.O. Box 690098, Orlando, FL 32869-0098. (407) 351-5536

WANTED: Manual for WRL SB-175 Meteor transmitter; Yaesu FT-620B AM filter; one and three kHz mechanical filters for 51J4. Al Norton, K7IEY, 1008 Liberty St., Lynden, WA 98264. (206) 354-4622

WANTED: S-Line R/E 32S3A, 75S3C, 312B-5 & 516F-2 set; 75A-4 S/N 5000, R/E KWM-2A, w/516F-2; REAL HF-380 or HF-8020/851S-1 or 851S-2. Mimi Kobayashi, 2212 Rockefeller Ln., Redondo Beach, CA 90278. (310) 379-6052

WANTED: Repairable or parts units tube-type SSB/CW gear, accessories or power supplies-Heath, Drake, etc. Byron Tatum, WA5THJ, 1920 Maxwell, Alvin, TX 77511. (713) 331-2854

FOR SALE: Tube testers: TV-2C/U - $175, TV-7D/U - $50; Oscilloscope USM-281A/HP180A - $200; freq. meter USM-159, exc w/acc. - $50; new HP410B probes - $25; HP5255A 12.4 GiG plug-in - $150; lge military weather balloons - $10; Plus shpg. Joe Bunyard, 1601 Lexington St., Waco, TX 76711-1701. (817) 753-1605

FOR SALE: Globe Scout w/manual, looks good and works - $75 plus UPS. Roland Matson, K1OKO, RFD #1 Box 2943, Kennebunk, ME 04043. (207) 985-3751

FREE TO GOOD HOME: Teletype Corporation 28ASR, plus many rolls of teletype paper. Howard Kraus, K2UD, 372 Callodine Ave., Amherst, NY 14226. (716) 838-2406

FOR SALE: Restoration of vintage radios; 25 years experience. Phil Goodman, K4FXB, 4112 Commodore Dr., Atlanta, GA 30341. (404) 457-4195

FOR SALE: Heathkit amateur radio repair by RTO Electronics, 4166 Maple St., Berrien Springs, MI 49103. (616) 473-3201

FOR SALE: 23-channel CB radios. All solid-state radios, guaranteed in good working condx - $25 + shpg. Burl, (214) 736-2397

FOR SALE: BC-610-I complete, VG - $475; (2) HT-37, VG - $110 ea; SX-111 VG - $125; ART 13 w/spare final, No pwr sply - $75; PU only. Joe Saah (Uncle Joe), WB5ZPQ/4, 114 Village Ct., Garner, NC 27529. (919) 779-5659

WANTED: Eldico TR-75 xmtr. Don Temple, AFØC, 5405 S. Florence Ct., Englewood, CO 80111. (303) 779-0923

FOR SALE: R-390A EAC (1967) S/N 51xx, complete, near mint. **WANTED:** Tube audio amplifiers: Heath, MacIntosh, Audio Research, etc. Mike Nowlen, WB4UKB, 12911 New Parkland Dr., Herndon, VA (703) 481-9614

FOR SALE: Put a class knob on your classic Collins 75A-4. 'Jupiter Superknobs' are solid brass, six times heavier than fragile plastic original vernier knob - Price reduced - $99 + $5 shpg 48. Joel Thurtell, 11803 Priscilla, Plymouth, MI 48170. (313) 453-8303

WANTED: Pre WW II radio magazines, books, photos of stations, QSL cards, broadcast and ham collections bought. C. MacNeill Book Dealer, WA8ZNX, 3165 12 Mile, Berkley, MI 48072. (313) 543-1177 days

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WANTED: WW II Japanese military radio equipment, literature and pictures. Takashi doi, 1-21-4 Minamidai Seyaku Yokohama, Japan

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WANTED: Nems-Clarke VHF rcvrs & related literature; REL FM BC tuners; misc FM BC rcvrs. Joe, N4WQC, Box 19302, Alexandria, VA 22320. (703) 256-2468 phone/FAX

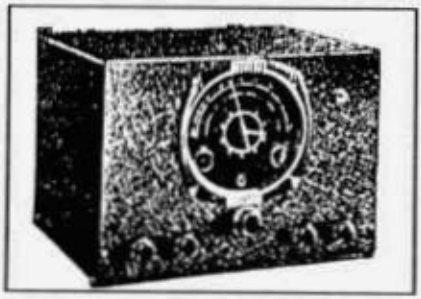
FOR SALE: Collins: 32RS7 - $200, 51E7 - $400, 180S1 - $150, 180U1 - $100, 51J1 - $150, 51J2 - $175, 51J3 - $200, 51J4 (serial 6000+, grn face) - $750, 51S1 RE - $1250, 390A - $250. Jack Osborne, K6LVD, 5636 Del Monte Ct., Santa Rosa, CA 95409. (707) 539-3949

FOR SALE: Drake TR4-C, AC-4 - $175; Swan 500C, 117XC - $125; Heathkit SB401, SB303, SP600 - $175. Dan, KF9BP, (414) 255-9165 after 1800 CDT

FOR SALE: 75A-4, (2) filters, mint - $500; NC-300, spkr & calibrator - $200. Chuck, (417) 863-7415

FOR SALE: Eleven Millen 43000 series, 120 watt, end link and center link coils, one bar socket for each style coil; original schematic for Millen 90800 xmtr exciter. Make offer. Bill Goodrich, W8LNL, 1417 Covedale Ave., Cincinnati, OH 45238. (513) 251-3004

WANTED: Surprise for my husband - Regency aircraft band rcvr, w/tubes. Mary Williams, 11646 Brownell, Plymouth, MI 48170. (313) 459-5122



WANTED: Any condition, Hallicrafters Sky Master and EP-132 as shown. Also want SX-46, S-48 and S-49. Chuck Dachis, 'The Hallicrafter Collector', 4500 Russell Dr., Austin, Texas 78745. (512) 443-5027

FOR SALE: National HFS1 w/pwr supply - $125; NCX5 w/ps - $250; NCX5 (needs finals) - $100; NCX500 H/B pwr supply - $150; HRO-W w/4 coils - $200; HRO 5 w/4 coils - $200. Jack Osborne, K6LVD, 5636 Del Monte Ct., Santa Rosa, CA 95409. (707) 539-3949

WANTED: Hallicrafters spkr R51 or R50; RME spkr 4302; Drake spkr MS4; service manual (copy ok) Hammarlund HQ-105TR. Doug, (206)472-3478

FOR SALE: Code keys, telegraph items, parts radio quack, meters, etc., 9 page list - $1 plus LSASE. J.H. Jacobs, 60 Seaview Terrace, Northport, NY 11768.

WANTED: EV 664 mic. Thanks. Tom Smith, N5AMA, 13034 Elmington Dr., Cypress, TX 77429-2062. (713) 376-3436 (h)

FOR SALE: Collins 312B4 - $125; 51S1 winged, no cabinet - $625, or swap for other Collins. **WANTED:** 75A-2 square Collins 2-3/8" meters esp. RF amps. Gary, WA9MZU (408) 266-2218

WANTED: Transistor audio module for R-392 offering $25. Dave Metz, 1016 Ridgemont, Staunton, VA 24401. (703) 885-7914 eves

WANTED: Will pay $15 for mint BC-434 WW II radio compass control box. Chris Cross, Box 94, McConnell, IL 61050.

FOR SALE: BC 221-D freq meter, 832 tubes used, make offer. Clayton Vedder, POB 2823, Durango, CO 81301. (303) 247-2969

FOR SALE: Hallicrafters S-38C; WE ground magneto; keys, flameproof, J-37, 38, 45, etc. 8 page list of etc. items - $1 plus SASE. J.H. Jacobs, 60 Seaview Terrace, Northport, NY 11768. (516) 261-1576

WANTED: RCA AVR-5A tombstone, AR-1496D battery set, BC-AA-191 xmtr; pre-1940 aircraft, airport radios. James Treherne, 11909 Chapel Rd., Clifton, VA 22024. (703) 830-6272

WANTED: Community college electronics instructor wants National HRO Senior rcvr & accessories for my station to share this era of rcvr technology with my radio communications students. Please advise me of condition and price. Will reply to all leads. John Zitzelberger, WB6JJE, 5257 Lewis Rd., Agoura, CA 91301. (818) 991-8358

FOR SALE: Pwr xfrms Primary 115V 50/60 Hz, secondaries 650 VCT- 150ma, 5 V-3A, 6.3 V-5A - $3 plus shpg.(7 lbs) Mark Castonia, N9EBA, 2061 True Ln., Green Bay, WI 54304. (414) 494-0787

FOR SALE: Beartifully crafted home brew 1 KW AM xmtr P.P. 833 finals, P.P. 805 modulators, complete - $600 cash. Ron Reu, WBØLXV, (314) 668-6518

WANTED: Military radio items: control rcvr C-2275/ARN, part of the AN/ARN-59 direction finder set and rcvr AN/ARR 11, which is the companion to the AN/ART-13 xmtr. Alan Schreier, WA5DJU, 12805 Powderhorn St., Austin, TX 78727. (512) 835-2056

FOR SALE: Limited quantity of orig. manufacturer new knobs for Collins 75A, 32V and KWS-1 series, 1:1 main tuning - $20; large pointer (1.75" skirt) - $10; medium pointer (1.5" skirt) - $8; small non-skirted pointer - $5. Shpg included. Money back guarantee. Jerry, AB8U, (513) 429-5457

FOR SALE: HW-16 - $100; HG10 - $40; DX-60A - $80; NC-88 - $65; SX-110 - $75. **WANTED:** Rider manual set. See our ad this page. Gary, (918) 333-7893

WANTED: Will pay for cards or card data for Hickock 123A tube tester. Bill, KC5SB, 3317 E. 87 Place, Tulsa, OK 74136. (918) 496-3195

FOR SALE: Collins MP-1 mobile pwr supply - $65 + UPS. K6GPB, POB 255, Rio Dell, CA 95562

WANTED: HQ-170 rcvr for parts. J. McCollum, W8VBQ, 6078 Price Rd., Loveland, OH 45140-9125. (513) 831-3195

WANTED: WWII Japanese military radio equipments and literaures; original S-meter, spkr, pwr sply for HRO-5T. Takashi doi 1-21-4 Minamidai Seyaku, Yokohama, Japan

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WANTED: Teletype crypto gear, as built by Crypto Ag., Ericsson, IBM, Kleinschmidt, NSA, Siemens & Halske, Teletype Corp., etc. Dave Ross, KA6EPI, (206) 465-2117

WANTED: Manual for AM/VHF Tecraft xmtr. Jim Musgrove, K5BZH, (512) 459-5564

FOR SALE: ARC-5 spin knob - $15; TMC GPR-90 rcvr manual - $20; Harvey Wells TBS-50 - $40; KWM-2 meter - $20. Jack, WA2HWJ, (201) 927-7784

FOR SALE: HQ-145, near mint - $175. **WANTED:** Radio Shack DX-400; Uniden CR 2021; RME 4350; TMC GPR-90/92; RCA model CRM R6A; SX-101 MK II. Rick, K8MLV/Ø, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

WANTED: Instruction manuals, circuit description, diagrams, anything on Raytheon 456 Khz notch filter, 441-848-000 and Collins signal control filter, part no. 528-0237-005 and RF-IF module 541-9325-005 George Rancourt, White Load Rd., Southampton, MA 01073

FOR SALE: Hand held mics, new-old stock. These are replacements made by International Crystal Co of Oklahoma City. They do not have a push-to-talk switch. Used on early radios like Heathkit, Johnson, etc. - $6.95ea. The same price as in the 1962 catalog. Add $1.50 shpg. Very limited supply. Mike Currie, POB 940375, Plano, TX 75094

FOR SALE: Drake A-line, 10 acc. xtals, excellent condx - $350; Drake TR-3 w/ps V.G.C. - $225. Tom Arnold, 2007 E. Powhatan Ave., Tampa, FL 33610. (813) 237-0317

WANTED: For BC-348 (Q or similar); RF/OSC coils 200-500 kc & nameplate; QST magazine May 1959. Hans Zimmermann, HB9AQS, POB 209, CH-3780 Gstaad, Switzerland

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FOR SALE: Racal RA6790/GM 500-30 MHz rcvr, still mfgr'ed today - $1600; PRC-74 w/ battery case - $200. Send SASE for new list. U-ship. Bob, WB2FOF, (315) 468-2691 eves

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FOR SALE: Robot 400, B & W SSTV, as is - $135 plus shpg; plastic tube table radios etc, local sales only. Steve Kalista, 9 Maple Dr., Jim Thorpe, PA 18229 (717) 325-4120

WANTED: Radio historian and former editor of Ham Radio Magazine is researching and preserving pre-1958 amateur QSL card and log books. Don't let our records be lost! Gladly pay all shipping and packing. Douglas Stivison, NR1A, 45 Norman Rd., Upper Montclair, NJ 07043. (201) 509-0585

WANTED: BC-474, Command set, Hallicrafters S-72, ARRL Handbook pre-1960. Dong-Hyun Cho, Biology Dept., Kang Won Natl. Univ., Chun Chon, 200-701, Korea

WANTED: Tube audio amplifiers: Western Electric, RCA, Heathkit, Fisher, Dyanco, etc., any condx, literature, parts. Need Heath W5M. Mike Nowlen, WB4UKB, 12911 New Parkland Dr., Herndon, VA 22071. (703) 481-9614

FOR SALE: Johnson Viking#122 vfo w/orig kit instr & brochure, very clean - $55; Stancor A-3801, 35w audio output xfmrs,6.6 K pri, clean - $40/pr; Fisher tube rcvr audio output xfmrs (2) & pwr xfmr - $30 for all 3; Eico HF 65 mono tube preamp & HFT 90 FM mono tuner, good condx - $25/pr; Altec 342B mixer-amp, parts unit - $20; Ampex PR-10 tube electronics, parts unit - $25; Gates tube (octal) mic/line preamp (2) - $30ea. Offers considered on all items. Plus shpg. Franklin Albanese, 1610 Prince St. #7, Berkeley, CA 94703. (510) 845-2625

FOR SALE: SX-110 - $100, I ship; **WANTED:** SX-101A or SX-115. Les Mathews, KD4RAT, 8908 Tar Hill Ln., Orlando, FL 32836.

FOR SALE: Swan 406B remote vfo; HW-16; HG10B vfo; Collins spinner knob. Marty, WB2FOU/5, (817) 497-6023

WANTED: Unbuilt kits by Heath, Johnson and Knight. Gene Peroni, POB 58003, Philadelphia, PA 19102. (215) 665-6182 days

FOR SALE: Tektronix RM 503 oscilloscope manuals, originals - $20 ppd. Also other Tektronix manuals. Alton Bowman, 4172 East Ave., Canandaigua, NY 14424.

WANTED: WW II German equipment and tubes, manuals and other parts. Bob Graham, 2105 N.W. 30th, Oklahoma City, OK 73112. (405) 525-3376

HEATHKIT FANS: Don't mourn their passing; enjoy learning more about their past in historic pictures and personal insights from many company oldtimers in 124 page book - $9.95 pp. Heath Nostalgia, 4320 196th S.W., Suite B-111, Lynnwood, WA 98036-6754

FOR SALE: High voltage disc capacitors, 200 for $5 plus $1.50 shpg. At least 8 common values, all are 500 or 1000 volt. Add $1 to your order for an extra 100 lower voltage capacitors. Limited supply! Mike Currie, POB 940375, Plano, TX 75094

WANTED: Tube type VHF monitor radios in the 30-50 & 118-136 MHz 152-174 range. Gene Peroni, KA6NNR, POB 58003, Philadelphia, PA 19102 (215) 665-6182

WANTED: Stromberg Carlson 22-24/52-54, 69, 83-84, 72-74, 130L/H, 160-180, 370M/470M, 430H,lit; etc; Stancor PC8412/8413, A3801/A8053; circa 1941 Thordarson CHT & Tru Fidelity; Gernsback vol 8 1941. Russell Worthy, 389 West Main St., North Adams, MA 01247. (413) 664-6442

FOR SALE: Repair! All makes and models, homebrew, maximum labor per unit - $96. Dan Rupe, W7HBF, Telo Technology, 1302 S. Uplands, Camano, WA 98292. (206) 387-3558

FOR SALE: Hammarlund HQ-140X rcvr - $95; Johnson Thunderbolt 80-10M amp - $475 PU only. Clem Duval, W8VO, (313) 795-4670

WANTED: A spkr for the Collins 75S1 model 312. Don, WØREO, 2105 Del Norte Ave., Loveland, CO 80538.

FOR SALE: Hammarlund HQ-180A - $195; HQ-170A-VHF - $175; National NC-303 - $150; NC-300 - $95; NC-60 Special - $30; Heathkit RX-1 Mohawk - $95; GC1-A Mohican - $35; Hallicrafters SX-101A - $150; HT-37 - $95; Johnson Ranger II - $150; Drake R4-C, T4X-C, MS-4, High S/N - $450; TR-4, MS-4, AC-4 - $150; RV-4 - $50; TR-6, AC-4, MS-4 - $295; CC-1 converter console, SC-6, SC-2 converters - $125. Many additional items available.. Lge SASE for 2 pg list. G. Hawrysko, K2AWA, POB 568 Boro Hall, Jamaica, NY 11424. (516) 364-5104

FOR SALE: Swan 500 w/ps - $225; 500C w/ps - $250; 500C w/ps, digital remote VFO w/ps, VX-1 - $275; All exc w/manuals. Jack Busk, W9FQK, 1511 E. Mingus Ave., Cottonwood, AZ 86326. (602) 634-8070

WANTED: RF deck only of KWS-1 for parts use and complete 75A-4; S-line KWM2A etc. Masahiro Nada, #503 1942-2, Murakami, Yachiyo Chiba, 276 Japan. Fax 011-81-474-86-7085

FOR SALE: BC-1335 - $65; PE-219 - $50; MN-26C - $50; MP-48 - $75. Henry, KD6KWH, POB 5846, Santa Rosa, CA 95402. (707) 523-9268

FOR SALE: Vacumn variables CVCD 3000-35-150, ITT Jenning ceramic 10-1000 5KV - $100; UCSL-750 3KV - $100; ITT Jenning UCSV 1-1000-0003 - $100; ITT Jennings UCS 300,7.5 KV - $100; ITT Jennings UCS 37.5 -$100; ITT Jennings UCSXF- 1500 10 KV $125; Eimac type C. All w/hardware. Jack Osborne, 5636 Del Monte Ct., Santa Rosa, CA 95409. (707) 539-3949

WANTED: Babcock MT-5B mobile xmtr, c.1954, AM/CW. **FOR SALE or TRADE:** Johnson Challenger xmtr in mint condx; Johnson 250-W Matchbox w/directional coupler. B.G. Martin, 127 S. Oliver St., Elberton, GA 30635.

FOR SALE: ART-13 - $100; BC-348Q - $100; RCA Radiola 17 fully tubed, nice wood - $85; Collins TCS-12 xmtr - $65; TCS parts rcvr - $20; SP-600 JX1, w/book - $235; measurements 560FM sig gen - $35; LP-5 sig gen - $20; LM-18, LM-21 fqy mtre - $10ea; HP-410BR, Ballentine 310 VTVMs - $15ea; Hallicrafters SX-24 - $80 OBO; CDE TRA-4 rotor/control, w/cable - $15; Swan 500 w/117XC pwr sply, cables, book, clean vintage SSB - $125 OBO; u ship. WA7HDL, (208) 756-4147

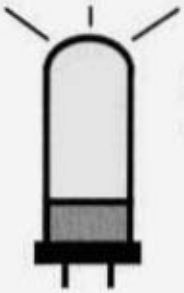
FOR SALE: BC-348L, internal AC ps - $100; FT-154 mount, new - $40; C-87/ART-13, new - $15; more, 6 page list-$1. Joe Orgnero, VE6RST, Box 32 Site 7 SS1, Calgary AB T2M 4N3, Canada (403) 239-0489

FOR SALE: Pal VFO-Plus, monitor scanner, no information available - $20 + $5 shpg; Aircraft Radio Corp. model R11A, less 2 tubes and tube cover, but with dynamotor - $25 + $5 shpg; Hallicrafters HT-20 parts chassis, no tubes, cover or front panel - $35, PU only; Heathkit model QF-1 Q-Multiplier - $25 + $5 shpg; Heathkit model HD-11 Electronic Keyer - $30 + $5 shpg; Heathkit model VF-1, vfo - $25 + $5 shpg; Eico HF30 HiFi amplifier, 30 watts - $25 + $10 shpg. James Fred, R1, Box 41, Cutler, IN 46920. (307) 268-2214

AMI Southeastern Division
Annual Swapmeet and Fellowship
Saturday, Sept. 11, 1993
Prater's Mill
(Just North of Dalton, Georgia)
Come as early as you want to.
The area is open 24 hours a day.
Cookout-bring your grill
Homebrew exhibition, bring a piece of your homemade gear to show off.

WANTED: For Ranger I: the operate switch SW-4. Paul Fritsch, W3HHC, 4251 Oakleigh Rd., Allentown, PA 18104. (215) 395-2180

FOR SALE: Hickock 600 tube tester/manual, exc. - $100; picture tube adaptor, NIB - $10; MX 1258/U tube socket adaptor, w/orig. manual - $25; Mercery AD-4 tube tester adapter AD-4 - $10; Gonset GSB201 II linear, restored, exc. (photo available) - $350; 833A NIB /clamps - $50; B&W roller inductor - $20; turns counter - $10; Johnson 3.5 KV 200 pF variable NIB - $15; National loading cap NIB - $15; ceramic ant. relay - $10; meter set for amp (0-3 KV, 0-500 mA, 0-100 mA) - $20; (2) Sangamo 4 mFd, 4 KV - $10 each; National R175A NIB - $10; (4) new 811A's - $10 each. David Bertman, AB7B, 1314 S.W. Hall, #E, Portland, OR 97201. (503) 223-5295



SECOND
CLASS

ELECTRIC RADIO
145 CR 123
Hesperus, CO 81326

TO: