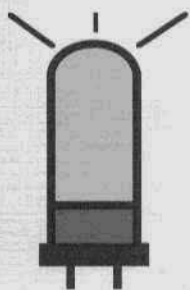


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celebrating a bygone era

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Bruce Vaughan, NR5Q

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

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

Regular contributors include:

Walt Hutchens, KJ4KV; Bill Kleronomos, KDØHG; Ray Osterwald, NØDMS; Dave Ishmael, WA6VVL; Jim Hanlon, W8KGI; Chuck Penson, WA7ZZE; Dennis Petrich, KØEEO; Bob Dennison, W2HBE; Dale Gagnon, KW1I; Rob Brownstein, K6RB; Don Meadows, N6DM; Lew McCoy, W1ICP; Kurt Miska, N8WGW; Warren Bruene, W5OLY; Brian Harris, WA5UEK; Thomas Bonomo, K6AD and others.

Editor's Comments

New Collins Book

Just as we were going to the printer with this issue, Jay Miller's (KK5IM) new book arrived, "A Pictorial History of the Collins Amateur Radio Equipment". Next issue we'll have a review, but for now just let me say that this is another great book adding to the history of the Collins Company. The photographs in this book are absolutely fabulous. The book is available from the ER Bookstore.

New Product Detector for the R-390A and 51J Series

Ron Hankins, KK4PK, has designed and is manufacturing a product detector (PD-1) for the R-390/R-390A/51J series that I think is a real winner; so much so that I'm selling it through the ER Store. See the display ad on page 51. I've been using the PD-1 with my R-390A and R-390 for the past month or so and I think that this is what I always wanted for these two receivers. In my opinion, the poor audio quality and the poor ability of these receivers to tune sideband made them less than what they could be. Now, with Ron's unit I've got a super sideband receiver and the audio quality is superb. The PD-1 connects to the BNC IF output connection on the back of the receiver. No internal connections are necessary. Then the PD-1 is connected to your amplifier and speaker. I'm using an EICO amplifier with push-pull 6L6s and a big old speaker in a wooden cabinet. The audio is now as good or better from the R-390A/R-390 as from any receiver I have. See K6AD's review on page 3.

15 Meter Jamboree, the Weekend of January 8/9

The October 23/24 15M Jamboree was a success but it could have been better had I given more advance notice. In light of this I'm announcing another Jamboree for January 8/9. I'm hoping that this turns out to be the biggest, best AM Jamboree that has ever happened on 15 meters. Plan to participate and don't forget to send in your logs and reports. See the October 23/24 report on page 18.

AMI Thanksgiving Day Jamboree November 26/27/28

Conditions on all bands were great over Thanksgiving and everyone turned out for this annual AMI sponsored event. Next month Dale, KW1I, AMI President, will have a full report in his January Update.

continued on page 41

TABLE OF CONTENTS

2	Looking Back.....	W1ICP
3	Product Review—Product Detector for Collins R-390	K6AD
4	The BC-610 Revisited, Part 3.....	K7AK
12	Fred Hammond, VE3HC, Silent Key	
16	Photos	
18	15M Jamboree Report	
19	Vintage Nets	
20	Christmas Tree and Other Lights	NR5Q
24	The T-195 VFO	W8KGI
28	K7BDY PTT Unit Update.....	N7WEK
30	Some Thoughts Down an Old Log.....	N6DM
32	A Screen Grid Modulated Transmitter.....	W5BM
42	Classifieds	

Cover: Bruce Vaughan, NR5Q, frequent ER contributor, in his hamshack with some of his homebrew gear. See Bruce's Christmas story on page 20.

Looking Back

by Lew McCoy, WIICP
8865 E. Baseline Rd., Space 1607
Mesa, AZ 85208
lewmccoy@uswest.net

I asked Barry what might be a good column this month as I was having some difficulty deciding what to write about. He was quick to respond, "How was Christmas at ARRL back in the early days.?"

I have many nice memories of Christmas at ARRL Headquarters. Sometimes a restaurant space was booked for a Christmas time party and those that wanted to could attend. We always had a lot of eggnog and good food at those affairs and ham radio was not a subject of conversation as most of us brought our wives.

At Headquarters, we always closed the office at noon on the day before we took off for Christmas. The afternoon was devoted to individual parties in each department. The Communications Department in those days was the second largest group and they usually staged a big affair.

As I recall a couple of times we drew each other's name in the department and got a gift for that person. Ed Handy, the Communications Manager, was the lord and master and he would dole out the gifts. Nobody ever got intoxicated but we did serve drinks.

The biggest group at headquarters was the membership division, which consisted of shipping, membership records, and stuff like that. Dave Houghton was the League's treasurer and headed that department.

The mail room on La Salle Road was in the basement along with the techni-

cal department lab. For a while, we joined with the gals in the mail room and the three or four of us that worked in the lab had a party in the basement.

Even before that time, the guys in the tech department and the secretarial staff were having parties. These characters built a small night club (really a day club) in the back of the basement and I was told that they had some real rip-snorting parties back there.

I remember quite well when By Goodman, W1DX, decided that we needed a Christmas party with an Italian motif for the Technical Department. He collected donations from all of us and then went out and got a mess of Italian cheese, a huge salami and some red wine. He took some Italian newspapers and papered the wall of our office and as I recall we had quite a party.

Another type of party worth mentioning was the Ten Year Club affairs. Whenever a person reached 10 years of employment or 25 years, such employees were inducted into the Ten Year Club. This was always a nice affair at a good restaurant and such an honor—I guess that this meant that one had arrived at being a Headquarters' person!

Working at the League didn't provide much income but it did have its moments. I am told that many of these activities no longer take place and I think that is a shame. Meanwhile Merry Christmas to all and may the New Year arrive and leave all your computers still working. WIICP

Product Review

Product Detector for Collins R-390 and 51J Receivers

by Thomas J. Bonomo, K6AD

Ron Hankins, KK4PK, has just released another great new product: the PD-1/390 product detector for the Collins R390/A and the PD-1/51J for the 51J series receivers. Now you won't have to fiddle with the BFO, RF, and AF gain controls to receive SSB. In addition to providing both USB and LSB, the PD-1 also provides AM detection. Just like his frequency display products, everything about its construction is first class.

Connecting the PD-1 product detector is easy and requires no modifications to the receiver. Simply plug it into the i.f. output on the back panel of the receiver. That's all there is to it! The output of the PD-1 is line level, so you will need a separate audio amplifier with a volume control. When you consider the poor quality of the audio stages in the R-390, you will appreciate the benefits of this approach: fantastically great audio. You will be surprised how good an R-390 can sound when you use the PD-1 and an amplifier with separate bass and treble controls. The improvement is just as dramatic for AM as it is for sideband.

The i.f. output on the R-390, which serves as the input to the PD-1, bypasses the 390's noise limiter - probably one of the best variable limiters ever created. Even so, it is rarely used, and so should not present a problem unless you operate in an extremely noisy environment. I cannot remember the last time I used the noise limiter on mine.

The only difference between the R-390 and 51J models is the crystals used inside. If you supply your own crystals, the PD-1 could be used with virtually any radio. Ron includes the AC supply, the IF cable and a manual that includes the schematic. There are three internal adjustments, but because none of them is particularly critical, it is unlikely you will need to touch them.

If you have an R-390, R-390A or a 51J series receiver, the improvement in audio alone makes the PD-1 product detector a must. It is available through the Electric Radio Store for \$129.95 plus \$4.50 shipping.



The product detector features AM in addition to LSB and USB modes and requires no modifications to the receiver.

The BC-610 Revisited

Celebrated in battle, esteemed in Amateur Radio¹

Part 3

by Robert E. Grinder, K7AK
7735 N. Ironwood Dr.
Paradise Valley, AZ 85253
atreg@asu.edu

Section III: Synopses of the Practices of Current BC-610 Owners

A few years ago, I acquired a BC-610E and its speech amplifier (BC-614E). Both had been stored since 1955 in a barn on an avocado farm near the coast of Southern California. I anticipated the worst, given the somewhat damp, humid climate from which I salvaged them: leaky coupling capacitors, desiccated filters, decayed resistors, frayed wires, rusted connections, corroded plugs and sockets, dirty relays, and perhaps open or shorted transformers.

I obtained manuals from BC-610 aficionados, WØOGH/7 and KB7LOQ, and I went to work. I burnished hardware with a Dremel tool, boiled moisture out of power transformers, replaced leaky capacitors, rebuilt filters, and changed several resistors. Further, I introduced a few refinements, particularly for PTT operation. Tuneup was a breeze; the two pieces of equipment functioned precisely as the manuals specified.

As my BC-610E became operational, I began to speculate about circumstances that may have confronted other operators of BC-610s. Were their problems comparable to those that I was facing? Had their experiences led to similar solutions and to the emergence of common practices? I elected, therefore, to query a sample of amateurs who are currently operating BC-610s on AM. I started with owners with whom I am acquainted, and then, to increase the

size of my data base, I asked these owners and other amateurs to suggest additional BC-610 owners whom I might contact. I asked each participant in the sample to respond to a brief, written questionnaire that dealt with his history with BC-610s and his experience with the following topics: (1) speech amplifiers, (2) operating frequencies, (3) crystal or VFO frequency control, (4) antenna tuners, (5) transmit-receive switching, (6) TVI, (7) tube substitutions, and (8) restoration. I also asked each of them: "What to you is particularly appealing about the BC-610?"

Eleven amateurs, including myself, constituted my sample. The call letters of the participants and their BC-610 histories are listed here in order of descending years of involvement: WA6IPD, E-model, 1949, then I-model, Korean War/present; K2JVM, I-model, 1960-63, then E-model, 1995/present; W8JBT/7, E-model, G-, H-, then I-model, 1961/present; WD8DWR, I-model, 1991/present; WICKI, E-model, 1994-95/present; KD6TKX, E-model, 1994-95/present; K7BDY, I-model, 1994-95/present; KØXI, E-, H-, and I-model, 1994-95/present; N3XON, F-model, 1997/present; W8ACR/Ø, T-213/GRC-26 model, 1997/present; K7AK, E-model, 1998/present.

Synopses of Practices⁴ Speech Amplifiers

A complementary or matching speech amplifier (BC-614), which is housed in a 8.25" high, 16.5" wide, 9.5" deep, black-wrinkle, rectangular box, was designed



Figure 1. The author with his BC-610E.

for use with the BC-610. The front panel of the BC-614 includes jacks for a telegraph key, carbon mic, dynamic mic, gain controls for each mic and a limiter or compression control. A meter for measuring the modulator plate current of the BC-610 is centered toward the top of the panel. The functions of the BC-614, including two wires that connect the 500 ohm output of the speech amplifier to the 500 ohm input of the modulator, are coupled to the BC-610 via a rubber covered eight-wire cable.

Every participant in the sample, except K7BDY, reports that he uses the BC-614. K7BDY uses a homebrew speech amplifier, which he feeds via 500 ohms into his BC-610. No one appears to use a carbon mic or the limiter.

KD6TKX, W8ACR/Ø, and KØXI report excellent results using the original dynamic mic input of the BC-614. KD6TKX feeds a D-104 directly, W8ACR/Ø uses an amplified D-104, whereas KØXI prefers a low-Z, broadcast-quality mic. W1CKI and K7AK modified the dynamic input circuit to accommodate especially high impedance mics like the D-104. KØXI recommends replacing the 6SN7s with 6SL7s for greater gain.

Operating Frequencies

Every participant in the sample either operates or plans to operate his BC-610 on 160 meters. A special tank coil was manufactured after WW II so that Armed Forces Radio could operate BC-610s on broadcast frequencies for overseas service personnel. The coil, #C-454, covers 1.5-2.0 MHz, without requiring the plug-in, fixed-vacuum capacitor

(see Part II). The coil was last available on the surplus market in 1985 from Fair Radio Sales (AM Press/Exchange, 1985); now it is occasionally for sale at hamfests.

KØXI possesses a #C-454 tank coil. W1CKI uses a homebrew substitute constructed with PVC pipe and #14 wire; thereby, he covers the entire 160 meter band sans the fixed-vacuum capacitor. However, several participants use the 55 mmFd fixed-vacuum capacitor, the 2.0-3.5 MHz coil (#C-387) and the 2.0-2.5 MHz exciter tuning unit (TU-47) to stretch the BC-610 L/C circuits as low as 1885 kHz, a venerable AM frequency. K2JVM recommends using either crystal-control or external VFO with the TU-47, because he found the internal VFO tunes only to 1.954 MHz.

Amateurs shortly after WW II often operated BC-610s on 10 meters (Offringer, 1949); however, many contemporary owners explicitly dismiss any prospect of operating their BC-610s on either 15 or 10 meters. KØXI holds that these bands are "foreign territory," and W1CKI presumes that "efficiency will be very low."

Frequency Control

A toggle switch for selecting either crystal or VFO frequency control is mounted on each tuning unit. Each of the eight tuning units is fitted with a crystal socket and a variable-tuning capacitor, which determines the frequency of the VFO. The plate and screen of the 6V6 oscillator tube are regulated at 300 and 150 volts, respectively. Since variable-frequency oscillators were relatively new and primitive prior to WW II (Norton, 1939), the effectiveness of a 6V6 as a VFO with substantial power input was overestimated by the engineers who designed the tuning units. Consequently, all models of the BC-610 may manifest unsatisfactory frequency drift and residual carrier hum whenever the internal VFO is activated. Indeed, WA6IPD observed that when he operated BC-610s in Korea, he calibrated tuning-unit VFOs on the hour and never turned power off the exciter.

All of the participants in the sample, except KØXI, deal with the intrinsic VFO problem by using crystals or auxiliary VFOs. W8ACR/Ø and K7AK are mainly crystal-controlled. In addition to using crystals, both WA6IPD and WD8DWR plug a T-368 VFO into the crystal socket; N3XON uses a VFO from a restored ART-13; K2JVM adapts a Heathkit VF-1, and W1CKI uses a commercial Marconi VFO. W8JBT/7 also prefers an auxiliary VFO. KD6TKX and K7BDY occasionally use the BC-610 tuning-unit VFO, and KØXI uses it exclusively. KØXI plans to experiment with crystals, but he refuses to use an auxiliary VFO on the grounds that it would not be inherently original.

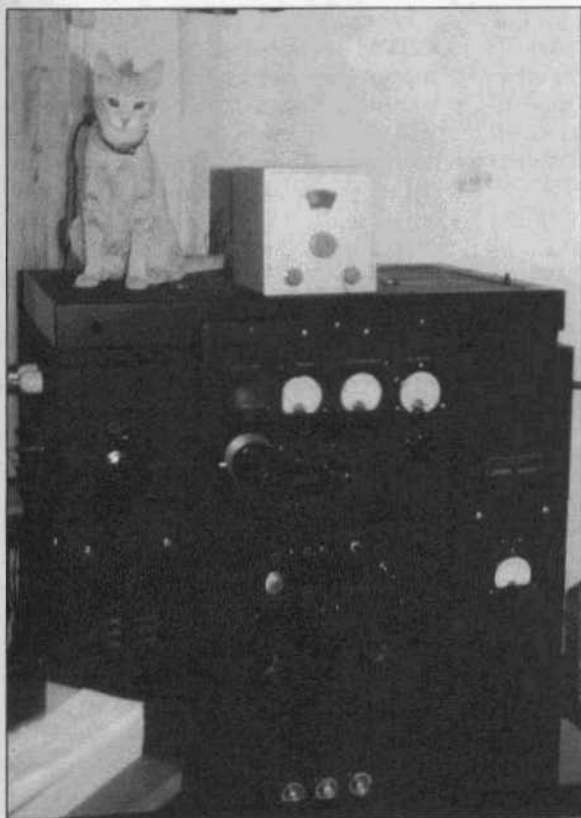
Antenna Tuners

The BC-939 antenna tuning unit is the most elaborate antenna coupler ever devised for medium power transmitters. The Signal Corps designed it for field operations with the BC-610, and four wing nuts fasten it to the top of the transmitter. The BC-939 will transform the impedance of a feed line of virtually every conceivable antenna from 2 to 18 MHz to the plate load impedance of the BC-610. It also serves to filter out harmonics of the carrier frequency.

The BC-939 is not a highly sought after accessory among amateur BC-610 operators, perhaps because it is relatively cumbersome. Further, most owners of BC-610s possess antennas that resonate at AM frequencies, and they find that with link coupling in the plate tank-toil, BC-610s load easily, whether antennas are fed via coax, ladder-line, or open-line. Thus, WA6IPD (who possesses a BC-939), WD8DWR, W8JBT/7, K7BDY, N3XON, and KØXI do not use an antenna tuner. However, KD6TKX, who also owns a BC-939, uses it to tune a long-wire antenna. K2JVM and W1CKI use homebrew antenna tuners on 160; W1CKI uses a Johnson Matchbox on other bands. W8ACR/Ø uses a Ten-Tec 238 tuner with coax fed antennas and a homebrew tuner for open-wire fed antennas. K7AK does not use an antenna tuner for 160 but uses a Millen 90200 tuner for 80 meters.

Transmit-Receive Switching

The Signal Corps SCR configurations used separate antennas for transmitter and receiver, and a junction box (JB-70-A) to control power to the BC-610 relays. KD6TKX, N3XON, and KØXI use the JB-70-A junction box with an external antenna relay. Indeed, every BC-610 participant in the sample uses an external relay, usually a Dow-key or an open-frame relay, to switch an antenna from transmit to receive. A common practice, adopted by W8JBT/7, W1CKI, W8ACR/Ø, and K7AK, is to wire the



This BC-610E (and the cat, Maggie) belongs to Herb Ulrich, K2JVM. Some modifications to his rig include a knob to control the swinging link on the upper left panel and an AC line meter on the right panel. He also uses a Heath VF-1 external VFO.

BC-614 Speech Amplifier for PTT operation by placing a small, low-voltage DC relay inside the 614, powering it from rectified filament voltage, and thereby controlling power both to the BC-610 and to external relays for antenna switching and receiver muting.

Television Interference

Consumer preoccupation with reception of television programming accelerated exponentially during the 1950s, and for a time outpaced construction of conveniently located television stations. Consumers thus mitigated the effects

of fringe area reception, like snowy pictures, by elevating TV antennas high above their rooftops. In the process of orienting their antennas toward faraway TV transmitters, often they pointed them simultaneously at numerous amateur transmitting antennas. Surplus BC-610s were in widespread use during these initial years of television broadcasting, and as W6IPD points out, they were "notorious" for causing TVI.

However, K2JVM states that today he can operate a BC-610E without a low-pass filter or antenna tuner, and with cable hookup and underground feed, he encounters no TVI. W1CKI, who does use an antenna tuner and a low-pass filter finds also that the E-model is not a problem, even with outside TV antennas. Current-

ly, WA6IPD, W8JBT/7, K7BDY, KD6TKX, N3XON, and K7AK indicate either no TVI problems or sometimes only an isolated one. Yet KØXI and W8ACR/Ø report difficulties associated with overload of neighborhood TV sets.

Tube Substitutions

The cost would exceed several hundred dollars should a prospective restorer choose to purchase on the commercial market all 23 tubes necessary for operating the BC-614 speech amplifier and the BC-610 transmitter. Fortunately, all but three of the tube types are readily available at hamfests for a few dollars each. The exceptions are the Eimac 100TH, which sells for \$30—\$50, the Eimac 250TH, for \$50—\$75, and the rare 2A3, which may exceed a price of \$75. Power for the push-pull 2A3 modu-

lator driver is obtained from a unique bias supply in the BC-610 (see Part II); therefore, converting the driver to other tubes might entail substantial modification of the bias-supply circuit as well as changing tube sockets and filament supply.

Nearly all of the participants in the sample avoid making tube substitutions in their equipment. WA6IPD said "I am a purist and have never made tube substitutions." KD6TKX proclaimed, "no way." And W1CKI stated: "Tubes are all original types... I love those 100THs and the 250TH." In contrast, K2JVM has used a 250TL in place of the 250TH; K8JBT/7 plans to use a 3-500Z when his 250TH goes bad, and WD8DWR has already replaced the 250TH with a 4-400 and a pi-network output circuit. He uses a high wattage potentiometer to control screen voltage to the 807 driver tubes, and, in turn, to control grid drive to the 4-400.

Restoration Issues

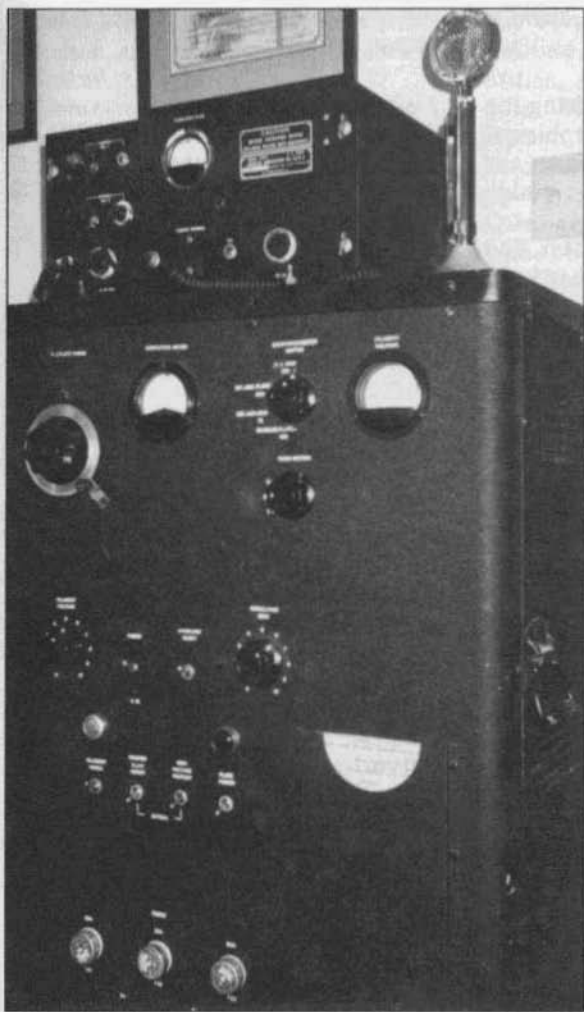
WA6IPD, W8JBT/7, K7BDY, KD6TKX, W8ACR/Ø report that they obtained their BC-610s in mint to good condition and that restoration for them was a non-issue. Nearly every participant in the sample, regardless, has stockpiled spare parts by acquiring them from friends and hamfests. KØXI holds that the average time is two years for obtaining a particular component; however, he said that he has never required more than one year. He spoke for the sample when he stated: "I do not find it hard to get parts." Even today, more than a half-century after it was manufactured, a BC-610 can be restored from the ground up. For example, W1CKI indicates that his BC-610E was barely a parts set when he brought it home in bushel baskets and cardboard boxes. And K2JVM reclaimed his BC-610E from the remnants of two old dis-cards. In such instances, facilitative friends and bountiful hamfests are indispensable.

When he restored his BC-610E, K2JVM introduced modifications to suppress parasitic oscillations in the PA by conducting plate voltage with a half-inch solid copper strap and grid drive through a 47 ohm, two-watt carbon resistor wound with three turns of #16 wire. He also installed heat-dissipating plate and grid caps on the 250TH and 100THs to extend tube life. Further, he provided for easy adjustment of antenna loading by drilling a hole in the front panel of the BC-610 for a shaft that attaches to a link on a reconstructed, standard tank coil.

Perhaps more importantly, K2JVM and several other participants in the sample recommend attaching a capacitor from the center tap of the high voltage plate transformer to ground in order to suppress talk-back from the overload relay, which is in series with the center-tap to ground (See Part II). Hall (1949a) first proposed this solution to a major annoyance in the BC-610. It was subsequently reprinted in *Hints & Kinks* (Hall, 1949b), and noted years later by Frith (1985). The coil in the overload relay, in returning modulated DC to ground, functions analogously like the driver coil of a 1920s horn speaker, and the ensuing talk-back is sufficient to cause audio chatter and acoustical feedback through a microphone. Since the relay functions at a few negative volts above ground, the cure is to attach the negative lead of a capacitor, of approximately 100 mFd, ten volts or more working voltage, to the high-voltage transformer centertap and the positive lead to ground, which places the capacitor across the relay and bypasses the offending audio component of the DC to ground.

Part IV. Accolades

The treatment of subject matter in Parts I-III it avowedly celebrant. The HT-4/BC-610 represents, in the annals of twentieth-century electronic products, an attainment of *sui generis* mag-



One of the last BC-610s made, the T213/GRC26. This unit, owned by Ron Skipper, W8ACR, is for sale. See page 42 for his ad.

nitude. What if Bill Halligan had remained in Boston as a retailer at Radio Shack and had never moved to Chicago to establish a radio manufacturing company? Would the Signal Corps have established a satisfactory communications system for its mobile command posts? Certainly! The exigencies of WW II required that something be devised. The BC-610, nonetheless, is hardly a

serendipitous accident of history. Several companies during the 1930s competed fervently to be at the leading edge in manufacturing and marketing electronic equipment. However, it was Halligan's centrifugal genius—at throwing off practical ideas like electrons roll off a grid—and savvy foresight in anticipating which of them were most promising that led at the dawn of WW II to the HT-4. Whereas Halligan could not have foreseen that the HT-4 would later become the basis of communications for the military services, the inherent qualities of the transmitter, which enabled it to stand apart from its competition in achieving that stature, were products far less of luck than the acumen of an astute manufacturer.

The BC-610 undeniably performed notably during WW II; equally significantly, it has performed admirably in amateur radio for more than a half-century. Moreover, as the accolades presented below demonstrate,⁵ the BC-610 will be performing admirably for as long as AM and amateur radio survive:

"The BC-610 and the SX-28 operated together make one of the most beautiful eye appealing stations ever put together. I often have visitors, Boy Scouts etc., drop by just to look."—WA61PD.

"It's a beautiful transmitter to look at. It's easy to work on (once you get it open)."—W8ACR/Ø.

"High power—built in 110 volt power supply and awesome WW II styling. It is a real performer too and sounds great

on the air. It was my first big transmitter so I will always be attached to it!"—KD6TKX.

"In the time that I've been using the 610 it has never given me any problems. Very reliable, get good reports on audio. And I really like the black-wrinkle finish."—N3XON.

"The pure huge clunkiness of it. The impressive dance one has to do to keep it from arcing and sparking. The procedure of T-R switching. The bright tube filaments, the orange glowing plates, the noise and heat. The beautiful, bright, clear audio on the air when you have it set up and tuned right will make you proud."—KØXI.

"The appeal of A BC-610E to me is many things, the warm glow of the old tubes, the solidness of the transmitter, the work and pride of restoring a fine old military workhorse of WW II and of course knowing that no matter what the conditions the 610 will get through."—WICKI.

"The rig is a classic vintage radio. It will run close to today's legal limit on AM, and do it with class. These rigs, especially those that served in the Second World War, deserve our gratitude and respect, and should be preserved for future generations. The BC-610 is a simple, straightforward transmitter, yet a sophisticated and well-designed rig that can be understood and maintained personally by its owner. It is a handsome piece of equipment. But you've always got to let a BC-610 know who's the boss, as some 610 owners swear the old giants have a mind of their own. Never let a BC-610 run you; you run it, and then you will get along just fine with this icon of World War II."—K2JVM.

"The unit is a classic. Because of this transmitter and the men that used it, it has given us a freedom that many take for granted. Though I'm not a veteran I'm proud to operate a piece of equipment that gave the old US of A an edge

during WW II. Hooray for our side!"—WD8DWR

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Footnotes

1. I wish to express my appreciation to George H. Fathauer for helping me clarify portions of the text. I am very grateful, too, to Paul Finell, W7EFQ, for photographing and preparing the six figures for publication.
2. The Hallicrafters Company always referred to the SCR-299 in its wartime advertisements — never to the BC-610.
3. A question persists as to how extensively the HT-4 was modified to create the BC-610. Read (1943, p. 45), after describing most of the modifications that have been observed in this paper, declared "the unit [BC-610] was essentially the same as the HT-4." In contrast, Teeter (ER, 1996, #88, p. 29) holds that after discussion with the Signal Corps

Fred Hammond, VE3HC, Silent Key

Ed. Fred Hammond, VE3HC, became a Silent Key on November 7, 1999, at the age of 86. I asked some of his friends to contribute to this remembrance of him.

From Nori Irwin, a close friend, and the curator of the Hammond Museum of Radio in Guelph, Ontario

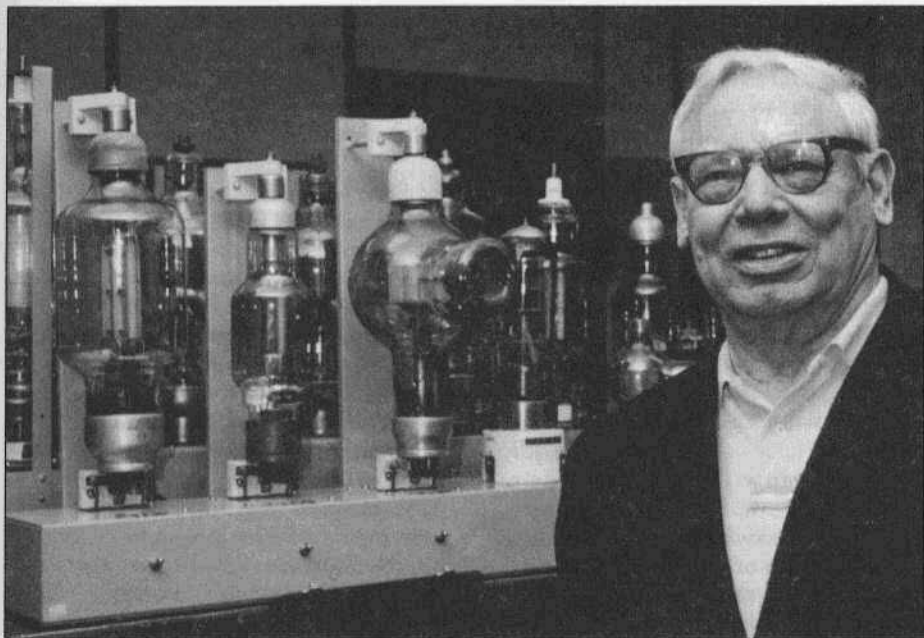
Losing a best friend through illness and death is heartbreaking and we feel helpless because we have no control over what is happening. Perhaps the thing I miss most about Fred was that he took such enormous delight in everything. Not a day passed when he couldn't be found either at his desk or in his workshops at Hammond Manufacturing. Keeping up with him as he raced through either the Edinburgh Road or Southgate plants was a challenge for even the fittest of employees.

Amateur radio and the museum were his life. Visitors to the museum were treated to a personally guided tour and he would always try to be available any day, any time, to open the museum. Always in demand as a public speaker, Fred was a great conversationalist and had that unique quality of being able to discuss anything with anyone. Occasionally there were quiet times at the museum which Fred enjoyed a great deal. He would spend hours operating the museum station VE3BJ and on Sunday afternoons would join in on the Collins net. Quiet times were also spent vacuuming, dusting and cleaning. I always seemed to be delegated to cleaning the tubes and the breadboards; the two things Fred disliked cleaning the most.

Fred had a marvelous laugh and you couldn't help but laugh along with him. Believe it or not, his favorite Christmas movie was "Christmas Vacation" starring Chevy Chase. Every year he would watch this movie laughing from its beginning to end. Twice a year he would drive the van through the local African

Lion Safari. There are strict rules forbidding you to feed the animals. Fred never paid attention to these rules and would feed the monkeys marsh-mallows. This usually resulted in the van having more monkeys on it than were on the ground. He took great delight in this excursion even when one year he rolled his window down a bit too far and one of the monkeys grabbed his hair; "I guess he thought I was a marsh-mellow", he said laughing.

Fred had no fear of heights; the higher off the ground he was, the better he liked it. He continued to climb towers right up until he became ill and took great delight in announcing it over the radio, much to the concern of his friends and family. I have been encouraged to tell this one story and I'm sure Fred would want me to. One windy day Fred decided to climb the tower; the storm the night before had knocked something loose and he had to go up and fix it. I was to hold the guide wire away from where he was working so the cable wouldn't snap back and knock him off the tower. He proceeded to climb one of the highest towers he had in his backyard leaving his safety harness hanging on the side. He would never wear it no matter how much you pleaded with him to put it on. As he stretched up to make his adjustments, his trousers fell down around his ankles. He looked down at me and then started to laugh. He couldn't let go of the tower to pull them up because he didn't have a safety belt on, so he kicked them off, finished his repairs and climbed down in his underwear—laughing all the way. The both of us were laughing so hard we had to sit down on the grass beside the tower. "I might have to start wearing



Fred Hammond, VE3HC, at his museum.

suspenders", he said, "golly, this is the second time that's happened".

These are just a few of the many wonderful memories I have of my dearest friend Fred. He was a kind, gentle man who never wanted to hurt anyone's feelings and took great enjoyment out of the simple things in life such as a drive in the country or chasing a hot air balloon. He will forever be a part of my every day life, my heart and my soul.

From Bill Gittere, K2LNU, another close friend of Fred's

I remember the first time I went to Guelph to see the Hammond Museum. Bruce Howes, KG2IC, found a brochure on it and the pictures of all the vintage equipment intrigued us. Bruce contacted Fred Hammond and made an appointment for about 12 of the people from the Lancaster Amateur Radio Club to visit the museum on a Saturday. We were going up to see all the great vintage gear. The thing that we did not realize on the way up was that the gear

was only half of the story. The other half was Fred himself.

We arranged to meet Fred at about 11:00AM at a restaurant to have lunch before touring the museum. We were a bit early but Fred was already there. We had a great lunch and it took only minutes before we realized that we were talking with someone very special. Fred was an extremely warm person who radiated honesty and friendship in a way few people could match. I could immediately see that there was a case of role reversal building here. We came to see Fred's museum and he acted like we were doing him the favor. As a starter, he wanted to pick up the lunch tab for everyone. We wouldn't hear of it and bought his lunch instead. He seemed a little disappointed at this but then we moved on to his wonderful museum.

Fred had a philosophy about his equipment that was: you could not have a good time unless you could touch the radios, open the lids and turn the knobs. He made a point out of letting us know

continued next page

that not only was this OK but that he wanted us to do it. Everyone was happy to oblige him in this request. He was only too happy to put on his demonstration of the spark gap transmitter and show us how his KW 1's and BC1H broadcast transmitters worked. He even threw the switch and lit up about 100 transmitting tubes which were on display in the middle of the room. He did all this with a huge smile on his face and enjoying it to the hilt. He also asked if you had any questions on the gear as he knew the history of everything on display. He would go into lengthy stories of his early years and the type of equipment he began with and developed during his 70 years as a ham. Conversations with Fred were far from one sided. He asked a lot of questions in an effort to get to know as much about you and your interests as possible. One question he always asked was if there was something he could do for you. On a couple of occasions I did point out a favor or two that he could help me with and he never failed to follow up. He was like that with everyone and it was easy to sense how sincere he was when he asked.

When we were driving back from our visit to the Hammond museum we did talk about the great vintage gear we were able to see, feel and play with. However, the bulk of the discussion was centered on the wonderful person who met and befriended us that afternoon. I knew that day that I would be back to see him again and I did return about a dozen times. I could never run out of topics to discuss with Fred and the only limiting factor was time. As a matter of fact, whenever I would call Fred to arrange a meeting, I would ask if there was anything I could bring for him. His answer was always the same "just bring time".

I will miss Fred Hammond very much but I must say that I consider myself very lucky to have known this Finest of Gentlemen.

From Ed Gable, K2MP, curator of the AWA Museum

I will always remember Fred Hammond, VE3HC, as being a true friend and benefactor to the AWA Museum. My fondest memories are those of Fred acting like a kid with 52 weeks of Christmas. Gosh, did he ever love his toys. He was so enthusiastic about each acquisition and he so much enjoyed telling others of them. Some would consider that bragging. "Oh, tonight I'm running the 833's modulated by 833's, maybe I'll come back with one of my KW-1's on the next transmission," he might say. Bragging? Well, maybe just a bit, but he had the toys to back it up and he so enjoyed sharing those with everyone. I'll never forget the summer a few years back when Fred asked the AWA gang up for an afternoon at his museum. "We'll look at some radios and then go get something to eat," was Fred's suggestion. "Looking" at some radios turned out to be a full tour, guided by Hammond employees, of the museum and the Hammond manufacturing facilities. "Getting something to eat," turned out to be a banquet at the Holiday Inn complete with AWA hats and door prizes for everyone. Hours of chatting went by and some of us decided to check into the Inn and stay the night. Upon checking out the next morning we found the bills had been paid, by Fred, such was his generosity and eagerness to share. You also had to be careful about what you said around Fred. A simple comment about needing replacement Radiola III audio transformers brought the Hammond Transformer Company's Engineering department to full attention. In no time they designed a transformer that would fit inside the radiola audio shell and work better than new. Fred came down to an AWA meet with his Lincoln dragging, so full was his trunk of Radiola audio transformers. We're still selling 'em! "Sharing, im-

mensely likeable, capable, successful," all describe Fred Hammond. But I'll remember the kid in a candy store, the boy and his toys. We should all be so lucky.

From Jim Walsh, W7LVN, QCWA General Manager

Fred served on the Board of Directors for the Quarter Century Wireless Association from 1986 to 1990. While undertaking that job, Fred represented the foreign members of the association and communicated with them all over the world. Due to his work a number of changes were adopted in the membership options for the foreign members.

At one of the meetings Fred presented a QCWA cap to the Board complete with the logo silk screened on the front panel of the cap. And then at his own expense he ordered a number of the caps and presented them to QCWA to be offered for sale to the members. That was typical of this man. He was an individual who was used to developing ideas and generally did it by himself.

His museum in Canada is also typical of Fred. He acquired all the items in the museum from people all over the world. It was interesting to get him to talk about certain items and how he was able to acquire them.

Fred will be missed by all of the groups with whom he associated. He was always a gentleman and ready to help anyone along the pathway of life.

From Lew McCoy, WIICP

Fred was really one of the greats. He founded Hammond manufacturing which makes very high quality power transformers among other things. He was also a noteworthy ham having 'done it all' over his long life. I knew Fred very well and over the years visited him many times at his home, at the Hammond factory and at his museum.

Fred had a tremendous interest in all facets of radio, so much so that he built

and fitted out one of the very best museums in existence anywhere. He had probably the largest individual tube collection in the world. What was particularly fascinating to me was that he had filament or heater transformers for every transmitting tube. I will always remember one time walking into his museum and Fred seeing me throw one switch and ALL the tubes lit up.

Fred visited China not too many years back and went to see BY1PK. BY1PK really didn't have a lot of equipment so Fred, at his own expense, gave the station complete high power amplifiers.

Fred was given the QCWA Hall of Fame Award in October of 1996. This is probably the highest honor awarded in amateur radio and I know that Fred really appreciated receiving the award.

If you ever visit Canada, make it a point to go to Guelph (not far from Toronto) and visit the Hammond Museum. Very 73, Fred.

From Orn Arnason, another of Fred's close friends and caretaker of the Fessenden Museum in Knowlton, Quebec

Fred was one of the closest friends I've had in my life. I was his house guest countless times and we made the annual pilgrimage to the AWA Conference in Rochester New York together for the last seven years.

Fred was a character and everyone that knew him will agree with me and was the sort of individual that anyone would enjoy being around.

A memory I have of Fred that makes me chuckle regards a gift he gave me one time while I was staying with him. One day he handed me a box that contained about 20 pairs of boxer shorts. Someone had given them to him but they weren't his size. He was absolutely delighted when I told them they fit me perfectly. So now and probably for a long time to come I will always have something with me to remember my dear friend by.



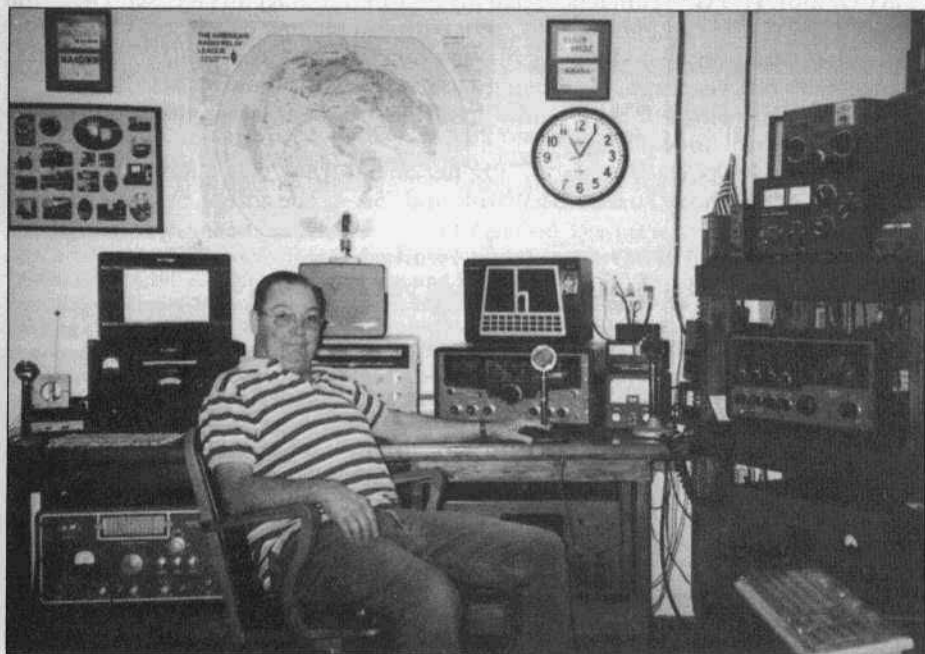
Malcolm "Mac" MacDonald, W8MPC, sitting with some of his neatly arranged vintage gear. *Photo by W3YXN.*



Jim Olson, W4JO, with his vintage Hallicrafters station. Note the 2 SX-88s on the desktop and also the collection of Lunchboxes on the top shelf. *Photo by W3YXN.*



Greg Carter, WX4R. Another neat and nicely arranged vintage station. Note the DX-100B to the left of the SP-600 and the DX-100 on the right. *Photo by W3YXN.*



Don Flenner, W3YCH, in his hamshack. He is very active on 10M these days and always puts out a great signal. *Photo by W5ZLC.*

15M Jamboree Report

The 15M Jamboree held on October 23/24 was a great success despite the fact that I gave little advance notice. The next 15M Jamboree will be on the weekend of January 8th and 9th. Mark your calendars now! I hope the January Jamboree can be the biggest and best yet. Please don't forget to send in your logs with comments.
N6CSW

From logs received for the 15M Jamboree, October 23/24:

Marvin Toepfer, W5TQO - 9 contacts. "It was surely fun and I hope we can do it again before the winter is out. I heard a lot of activity and got to work some states not possible on 10M".

Brian Roberts, K9VKY - 14 contacts. "I actually enjoyed hearing the heterodynes out there again."

Louie Poirrier, K5DAH - 5 contacts. "I only made 5 contacts. My only excuse is that I couldn't spend much time in front of the rig."

Abe Levy, W3DA - 26 contacts. "Great time! Enjoyed every minute. Let's do it again in January".

Dennis DuVall, W7QHO - 17 contacts. "Great fun and conditions were great for a change. Ran my Apache into a 125 ft. end-fed wire through a transmatch with excellent results. Receiver was a 51J4. Hope we can sustain an AM presence on 15."

Walter Schivo, KB6BKN - 7 contacts. "I could only get on Sunday afternoon. I used my Ranger and an HQ-170 receiver into a Mosley TA-33 at 50 feet".

Gary Gompf, W7FG - 8 contacts. "I had my first 15M contact this weekend with Bill, W8VYZ. Now I've completed AM QSO's with Bill on 160, 80, 40, 20, 15, 10 and 6 Meters—7 Bands on AM! Maybe I can work him on 2 M AM someday!! First 160 M contact with Bill, years ago. I was using a Johnson CB (Whiteface) that I'd converted to 160—5 watts output!! Sure would be nice to have the free time again to do something so ridiculous!"

Don Flenner, W3YCH - 8 contacts. "Rig her on Saturday was a Ranger II with an HQ-170 and on Sunday I used a B&W 5100 and 75A-4. The antenna was a 7-element log-periodic.

Barry Wiseman, N6CSW/Ø - 21 contacts. I worked 19 stations on Saturday and 2 on Sunday. 15M is a great band and we should be using it more.

The following callsigns were taken from the logs received:

AF1Z

K2LMQ, KB2YAO

W3DA, W3HM, W3YCH

AF4AT, WA4BUE, WA4KCY, N4VMY

WR5A, W5AQ, K5AVH, K5DAH, N5JGK, W5JPW, W5TQO, K5VAH, N5VF

KB6BKN, N6CSW/Ø, W6JEO, N6KN, K6QY, W6WRE/XE2

W7AMI, WB7BNZ, W7FG, W7HMU, W7JKY, W7ID, KA7NGT, W7QHO, KK7TV, AB7YD

K8BKE, NC8J, N8JDO, WB8UHZ, W8VYZ

K9HDQ, WB9HNS, N9HRT, K9VKY

WBØAGU, WØBQV, KØEOO, WØFD, WØØIFF, WAØNHD, WØNKL, WØNYQ,

AAØNZ, WØOD, WØPUF, WØSBNB, WØSUT

VINTAGE NETS

Arizona 40M AM Group: Meets on 7293 kHz at 10:00 AM MST (1700 UTC) on Sat. and Sun.
West Coast AM Net meets Wednesdays 9PM Pacific on or about 3870kc. Summer conditions have moved the net control to California with John, W6MIT and Tom, K6AD as net controls. In the winter months Randy, KK7TV usually runs the net.

California Early Bird Net: Saturday mornings at 8 AM PST on 3870.

California Vintage SSB Net: Sunday mornings at 8 AM PST on 3835

Southeast Swap Net: Tuesday nights at 7:30 ET on 3885. Net controls are Andy, WA4KCY and Sam, KF4TXQ. This same group also has a Sunday afternoon net on 3885 at 2 PM ET.

Eastern AM Swap Net: Thursday evenings on 3885 at 7:30 ET. This net is for the exchange of AM related equipment only.

Northwest AM Net: AM activity daily 3 PM - 5 PM on 3875. This same group meets on 6 meters (50.4) Sundays and Wednesdays at 8:00 PT and on 2 meters (144.4) Tuesdays and Thursdays at 8:00 PT. The formal AM net and swap session is on 3875, Sundays at 3 PM.

K6HQI Memorial Twenty Meter AM Net: This net on 14.286 has been in continuous operation for at least the last 20 years. It starts at 5:00 PM PT, 7 days a week and usually goes for about 2 hours.

Arizona AM Net: Sundays at 3 PM MT on 3855. On 6 meters (50.4) at 8 PM MT Saturdays.

Colorado Morning Net: An informal group of AM'ers get together on 3876 Monday, Wednesday Friday, Saturday and Sunday mornings at 7AM MT.

DX-60 Net: This net meets on 3880 at 0800 AM, ET, Sundays. Net control is Jim, N8LUV, with alternates. This net is all about entry-level AM rigs like the Heath DX-60.

Eastcoast Military Net: It isn't necessary to check in with military gear but that is what this net is all about. Net control is Ted, W3PWW. Saturday mornings at 0500 ET on 3885 + or - QRM.

Westcoast Military Radio Collectors Net: Meets Saturday evenings at 2130 (PT) on 3980 + or - QRM. Net control is Dennis, W7QHO.

Gray Hair Net: The oldest (or one of the oldest - 44+ years) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8:00 PM EST & 8:30 EDT. URL: <http://www.crompton.com/wa3dsp/grayhair.html>

Vintage SSB Net: Net control is Andy, WB0SNF. The Net meets on 14.293 at 1900Z Sunday and is followed by the New Heathkit Net at about 2030Z on the same freq. Net control is Don, WB6LRG.

Collins Collectors Association Nets: Technical and swap session each Sunday, 14.263 MHz, 2000Z, is a long-established net run by call areas. Informal ragchew nets meet on Tuesday nights on 3805 at 2100 Eastern and on Thursday nights on 3875. West Coast 75M net that takes place on 3895 at 2000 Pacific Time.

Collins Swap and Shop Net: Meets every Tuesday at 8PM EST on 3955. Net control is Ed, WA3AMJ.

Drake Users Net: This group gets together on 3865 Tuesday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, WBNS; Rob, KE3EE and Huey, KD3UL.

Swan Users Net: This group meets on 14.250 Sunday afternoons at 4 PM CT. The net control is usually Dean, WA9AZK.

Nostalgia/Hi-Fi Net: Meets on Fridays at 7 PM PT on 1930. This net was started in 1978.

K1JCL 6-Meter AM Repeater: Located in Connecticut it operates on 50.4 in and 50.5 out.

JA AM Net: 14.190 at 0100 UTC, Saturdays and Sundays. Stan Tajima, JA1DNQ is net control.

Fort Wayne Area 6-Meter AM Net: Meets nightly at 7 PM ET on 50.58 MHz. This net has been meeting since the late '50's. Most members are using vintage or homebrew gear.

Southern Calif. Sunday Morning 6 Meter AM Net: 10 AM Sundays on 50.4. NC is Will, AA6DD.

Old Buzzards Net: Meets daily at 10 AM Local time on 3945. This is an informal net in the New England area. Net hosts are George, W1GAC and Paul, W1ECO.

Canadian Boatanchor Net: Meets Saturday afternoons, 3:00 PM EST on 3745.

Midwest Classic Radio Net: Sat. mornings on 3885 at 8AM Central time. Only AM checkins allowed. Swap/sale, hamfest info and technical help are frequent topics. NC is Rob, WA9ZTY.

Boatanchors CW Group: Meets nightly at 0200Z on 3579.5 Mhz (7050 alternate). Listen for stations calling "CQ BA" or signing "BA" after their call signs.

Wireless Set No. 19 Net: Meets the first Sunday of every month on 7.175 +/- 5 kHz at 2000Z (3760 +/- 5 kHz alternate). Net control is Dave, VA3ORP.

Halicrafters Collectors Assoc. Net: Sundays, 1730-1845 UTC on 14.293. Net control varies.

Midwest net on Sat. on 7280 at 1700 UTC. Net control Jim, WB8DML. Pacific Northwest net on Sundays at 22.00 UTC on 7220. Net control is Dennis, VE7DH.

Nets that are underlined are new or have changed times or frequency since the last issue.

Christmas Tree and Other Lights

Bruce Vaughan, NR5Q
504 Maple Drive
Springdale, AR 72764
Nr5q@aol.com

When time who steals our years away
Shall steal our pleasures too,
The mem'ry of the past will stay,
And half our years renew.
Thomas Moore (1779-1852)

Monday, November 11, 1996—9 AM...

While he finished off a breakfast far too rich for a 74 year old, Ned was thinking of how he would spend the day. There was a local football game on TV this afternoon. This morning should be good for rag-chewing on forty meter CW. Then too, the bands seemed to be gradually improving—there might even be a few DX openings on twenty. "Boy, I'll be glad when 15 and 17 opens up again," he thought.

"Ned, I was just thinking—here it is almost Thanksgiving. It is only a little over three weeks before we put up our outdoor Christmas lighting. You know how much trouble you always have with all those lights. Why don't you start checking those bulbs and things today?" said his XYL, Dorothy. "For once in my life, I would like to have them up and working on time. If you remember, last Christmas it was almost the 20th of December before you finally got all the bulbs burning."

"Yes, dear," replied Ned. "That's a good idea—I'll get right on in."

"Darn Christmas lights," thought Ned, "I know the kind of Christmas decoration I want. I would like to have one big sign—just a plain sign with no lights. A sign with the words Bah-Humbug in big red and green letters."

"Let's see now," said Ned, muttering to himself, as he poured a second cup of

coffee. "I put those lights in one of those old army foot lockers upstairs in the attic. I'll mosey on up there and get out a string or two of lights to make Dorothy happy, then I'll go get on forty meters. No use getting in a hurry about all this.

Ned opened up a foot locker. "Oops—wrong one. This one is full of stuff I stored when I cleaned out the shack back in the sixties. The lights must be in one of the other lockers." Ned tried a second locker. "Say.....how about that, muttered Ned. There is the old Superior signal tracer I used when I was doing radio repair part time. And there is my old Simpson meter, and Sprague condenser analyzer. The money I made with the stuff in this box sure came in handy. We were newly married and I was trying to make a living, and keep up payments on this house. I earned enough repairing those old broadcast radios to make my house payments."

The third box contained their Christmas decorations. Ned pulled a maze of wiring and bulbs from the foot locker. He spent quite some time untangling the mess before plugging the lights into a wall receptacle. Wonder, of wonders, they all lit up instantly. "Now, I must be living right," thought Ned. "I believe that's the first time that ever happened."

Ned decided to roll up the lights, put them back in the box, and keep quiet about his good fortune. Now, his curiosity was aroused about the contents of the first two lockers.

His old DX-60 looked brand new. Ned

was glad he had the foresight to wrap it up in an old sheet when he put it away. He wondered if it still worked.

"Someday I'll carry it downstairs to my workbench in the basement and see," thought Ned. "What a kick it would be to fire it up on straight key night."

Tuesday, November 12—8:30 AM...

"Says here in the paper that we might expect a early winter," said Ned.

Dorothy cradled her coffee cup in both hands. "Hmmm, I wouldn't be at all surprised," she answered. "How are you coming along on our outdoor Yule decorations?"

"Just fine, Dear, just fine," replied Ned.

"What about the snowman, and the Santa. Have you checked them out yet?" asked his XYL.

"Yes, Dear, I'm taking care of everything."

The same day—9:30 AM...

"Now where did I put that darn Santa, and snowman," said Ned to himself. "I remember wrapping them in plastic leaf bags.....now I remember. They are over behind that old chest of drawers."

Ned found the figures in pretty good condition. One AC plug looked a little doubtful. After he replaced the plug, he found two bulbs needed replacing. There was a whole box of spare bulbs in the basement, he remembered putting them in a mayonnaise jar on a shelf over his workbench. "Since I have to go down there for the bulbs, I'll just carry the DX-60 along and save myself a trip," thought Ned.

With several new bulbs in hand, Ned returned to the attic. "If I ever build another house, I'm gonna' have everything on one floor. This running up and down steps gets irritating faster than a 'policeman' in a DX pileup."

Same day—1:30 PM...

The DX-60 loaded up just fine...no sign of smoke. It sure was nice to see the old tubes glowing and feel their gentle

heat. Ned turned it off. "Now, I know better than that," he thought. "Why risk a power transformer? Those old caps are almost forty years old. I'm gonna replace any doubtful ones. Then I should clean all the electrical contacts—and the detents on the switches will need lubricating. And while I'm about it, I may as well replace the line cord. The old one is a little brittle."

Wednesday, November 13—10:30 AM...

This time when Ned loaded up the DX-60 he didn't flinch. He felt it was almost as good as new. For a few seconds he thought he might burn out the sixty watt bulb he was using for a dummy load.

"Yep," muttered Ned, "I'm gonna' put this little jewel on the air. I may even try a few QSO's on it before Straight Key Night. But you know....to really get the feel of old time radio I should use crystal control. A VFO is convenient, but I can remember when they were as rare as courtesy in a 20 meter SSB pileup. I'm gonna' dig out a few crystals and clean them up. I think I'll just set the VFO aside for awhile."

Ned turned up a treasure trove of parts looking for forty meter crystals. Old National dials, a few RF chokes, lots of tubes, tube sockets, plug in coil forms, some nice, heavy, copper clad PC board material, a Groth turns counter, a Millen right angle drive,—even a couple of rolls of stranded copper antenna wire, and some six inch long Johnson antenna insulators.

Thursday, November 14—8:20 AM...

"How are you coming along on the Christmas lights and decorations?" asked Dorothy.

Ned arose, walked over to the coffee pot, and poured his third cup for the morning. "I'm drinking too much coffee," he thought. "From now on I'm gonna' limit myself to two cups for breakfast, and maybe one or two in the afternoon. When I was soldering in

those caps I noticed my hands were a little more shaky than they were 30 years ago."

"Everything is coming along fine, Dear, I'm getting ready to repaint the NOEL letters we always put along the front porch. Then, all I need do is check out those lights and the timers. Everything is on schedule."

Ned searched around the attic until he found the four plywood cut-out letters—the NOEL sign. The N and E were painted red, while the O and L were green. After removing the bulbs from each letter he carried them to the backyard and gave each letter two coats of spray enamel.

He left them in the sun to dry, then made his way up the stairs to start cleaning up his mess. Again the old Supreme signal tracer caught his eye.

"You know, I'll bet I could use the parts from that old junker to make a regenerative radio to go with the DX-60. That would really catch the ears of the boys on forty. Wonder how many stations you would have to work to find someone using a regenerative receiver?" **Friday, November 15—8:45 AM...**

"Next week is Thanksgiving, you know," said Dorothy. "I think I'll invite Cindy and Jeff over for Thanksgiving Dinner. You know how our grandsons love to eat. After we eat, you might get Jeff to help you run the Christmas lights along the roof line. You don't have any business up on a ladder—not at your age."

"Well, I need to do a little more work before I'm ready to run the lights," answered the OT. "It takes a little longer for me to get things working right, you know."

Saturday, November 16—9:00 AM...

Ned was anxious to get to work. He even skipped his second cup of coffee.

"The first thing I'm gonna' do is disassemble that old signal tracer. If I remember correctly it has a good husky power supply and uses a 6V6 audio

output. I can get all the parts I need for my receiver's power supply and audio amplifier. Of course, I'll use a voltage regulator tube in the plate supply of my detector tube. I'm sure to find a regulator tube and seven pin socket in this pile of part somewhere."

"I think I'll use a 75 dual diode triode tube, or a miniature triode for the detector. I am not going to bother with a stage of tuned RF. It would just mean more parts, and another coil to wind. Anyway, a properly designed regenerative detector has about all the sensitivity you can use. A tuned RF stage would help the selectivity...but it is surprising what you can do with a simple antenna tuning network."

Ned needed no diagram. He had built so many sets over the years that he could, in practice, build simple receivers and transmitters without referring to schematics. His two needs were a tube manual, and any ARRL handbook from the vacuum tube era. He used them to double check his memory.

By lunch time Ned had all the parts neatly arranged on his workbench. He would use a hardboard panel, and cover it with a thin sheet of aluminum for shielding. He was lucky enough to find a chassis about the right size—one he had purchased years ago and never used.

"I'll get out my hole saws and chassis punches. I can have all the parts mounted by Monday night. Then, it should only take about ten hours to wire up the thing. Winding the coils will take another hour or so. I'm really pretty close to having a genuine classic station ready to go on the air," thought Ned.

"Oh rats, I need to put up a Zepp or a dipole. It just don't seem right running a classic station into a trapped vertical or a beam. A Zepp is a little impractical because of the feeders. I'll just solder up a dipole using that stranded antenna wire and those Johnson insulators."

Friday November 22—2:00 PM...

Well, the regenerative receiver worked great. Naturally there was a little 'tweaking' to do. The 60 mmfd. variable capacitor he chose for his regeneration control was too small, and had to be replaced with a 140 mmfd. And, as Ned well remembered, smooth regeneration is directly related to the voltage on the plate of the detector. The goal is to use only enough voltage on the detector plate for the tube to go into oscillation. Arriving at just the proper voltage involved changing the plate supply resistor a couple of times.

Audio howl was a problem that never seemed to bother Ned. Whatever he was doing, he must be doing it right. He always used resistance coupled audio stages, and ran them nice and easy—with less than 150 volts on the plates. At 150 volts the 6SQ7 could just loaf along. He normally ran his 6V6 output tubes with less than 200 volts. For this reason he preferred using three stages of audio—more than most builders thought necessary, but it worked for him.

Shielding, and rugged mechanical construction is a top priority in regenerative radios—perhaps more important than your choice of detector circuits. Such construction practice came naturally to Ned. He still lived in the age of 'overkill' when it came to radio construction. His old 'Elmer' insisted you could buy a receiver by the pound and not go wrong. If it was heavy, it just had to be better.

"Well, that's all changed now," thought Ned. "But some habits die hard. I'll just continue to build 'em solid."

Monday, December 2—9:00 AM...

"Do you realize it's already December?" asked Dorothy. "You have been pattering around with those Christmas lights for three weeks now. When do you think you will have them ready to turn on?"

"I will have every bulb burning bright, and this house looking like Christmas

before sundown," replied Ned.

"Now you be careful on that stepladder," said Dorothy. "Why don't you wait and let Steve do the climbing. You don't have any business up on a ladder. You are not a youngster anymore—and don't you ever forget it."

"No, Dear, I can do it. There is no use to bother Steve. I've made some simple hooks to attach the lights to the gutter. It's a real easy job."

Ned made a hasty exit before his XYL could object. If there is anything he didn't need today it was his family helping. "Let's see now—I'll need my safety belt, a roll of tape, and of course my tool pouch and belt. I'll put the extension ladder up against that tree branch in the back yard, then I'll bring the twelve foot ladder to the front of the house."

The dipole was on the floor, neatly tied in a coil about two feet in diameter. He made sure the coax was longer than needed. Once the antenna was up, all he had to do was tape the coax to the piece of number twelve wire already pushed through the hole in the shack wall, then go inside and pull the coax into the shack. He must remember to leave a drip loop outside.

He planned to tie one end of the dipole to his tower at the end of his house, and the other end would tie to the tree branch in the back yard. The tower end would be about fifty feet above the ground; the tree end some twenty feet lower. Not a bad dipole antenna—very similar to those he used as a new ham sixty years ago.

The same day—3:30 PM...

"Come outside and look at our lights, Dear," called Ned from the front door.

"They are all up and working. I want you to check and see if I remembered everything." Ned stepped out near the curb for a good look at his antenna.

"I hope she don't notice the dipole," he thought.

Dorothy came out of the house, walked to the center of their front yard,

The T-195 VFO

by Jim Hanlon, W8KGI
P.O. Box 581
Sandia Park, NM 87047
w8kgi@arrl.net

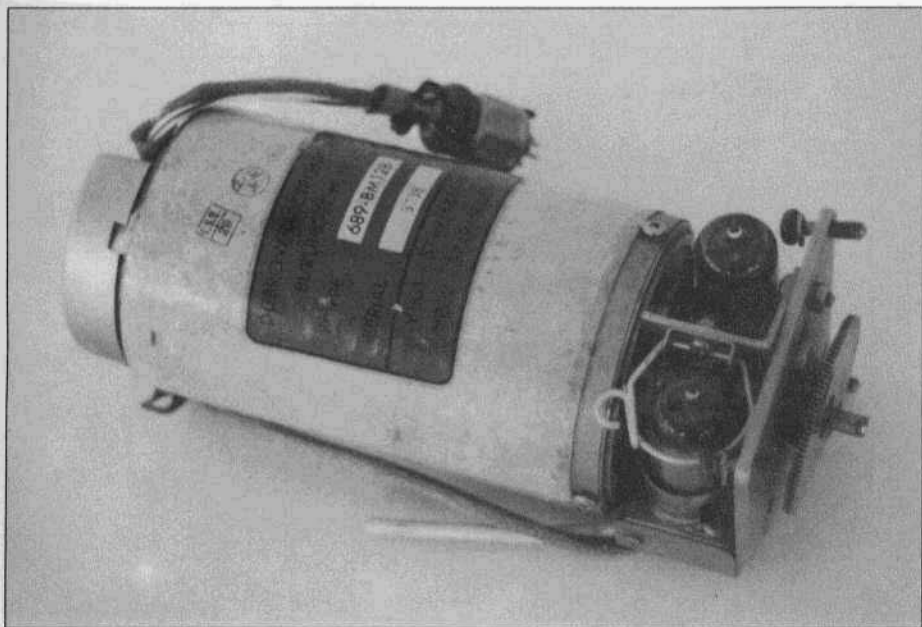
What's the best deal you've seen on a VFO lately at the local flea market or (ufdah!) on e-bay? How about 20 bucks for a 1.5 to 3 MHz PTO? No kidding, you can find it as the T-195 VFO on page 13, top, center of the 1999 Fair Radio Sales catalog, and in addition to selling for an old-fashioned price it's also an excellent performer.

The T-195 is a 1.5 to 24 MHz AM/CW transmitter¹ designed by Collins and built by Collins and by Stromburg-Carlson in the early 1950's. It is the companion to the R-392 receiver in the GRC-19 set. Entire T-195s are scarce to nonexistent on today's surplus market, but Fair Radio still sells the VFO. Electrically as shown on the accompanying schematic, it is a 6BA6W/5749 in a Hartley circuit followed by another 6BA6 as an untuned, class A amplifier. From the outside it looks a lot like the Collins 70E series of PTOs from the 1950's, although the three I've acquired are all Type 689-BM128 built by Dubrow Electronic Industries of Burlington, NJ. The large, cylindrical shield in the rear covers the permeability-tuned coil and its associated capacitors, and the tubes and most other components are on a small porch out front. It takes ten turns of the shaft to cover the 1.5 MHz span, and the coverage is of course linear throughout. All you have to do is to mount the VFO in a box or on a chassis, connect a dial to its tuning shaft, feed it B+ and filament power, and pipe all of that beautiful, stable RF into the crystal oscillator stage of your favorite boatanchor.

The pictures show how I mounted one T-195 VFO in a 10 x 6 x 3-1/2 inch

Minibox. There are two handy mounting lugs on the front porch and two more on the rear of the cylindrical shield. All I did was to tie a couple of simple, hardware store L-brackets to the front lugs and attach the brackets to the side of the box and mount the rear lugs directly to the back wall. There is a thermostat switch on the rear that originally controlled 24 volts DC to a heater winding wound on the outside of the cylindrical shield. I just removed that since I wasn't planning on using the VFO in any temperatures where I have to wear gloves to pound my key. That allows the back to mount flush against the back wall of my box. The control shaft is an odd-sized 3/16 inch diameter, but fortunately it comes with a cog-toothed wheel attached to it. I just attached half of an old National insulated shaft coupling to the wheel and mounted a quarter inch shaft into the coupling. For a dial, I used an old National, 4:1 Velvet Vernier long ago salvaged from a BC-375 tuning unit. On this version of the VFO, I left the original 0 to 100 scale on the Velvet Vernier dial. On another, rack-mounted version I replaced the dial scale with a larger aluminum disc that I've calibrated for all of the ham bands including the new WARC bands from 160 through 10.

The VFO likes about 8.7 milliamps of 150 volt regulated B+, originally supplied in the T-195 by using a single OA2 voltage regulator tube. I use 3.75K ohm of series resistance to feed the OA2 from an external 280 volt power supply. As it comes, the 6BA6 filaments are wired in series and require 12.6 volts. You can easily rewire them in parallel if you would rather run them from 6.3 volts. The RF comes out of a white coax lead that has been cut about 4 inches long on the three units I've acquired so far. I extend the lead to a connector in the back of the Minibox. To increase the drive to the following crystal oscillator, a help when I ask it to double to 40 meters, I also



The T-195 VFO as it comes from Fair Radio. Note the thermostat box on the rear of the cylindrical shield.

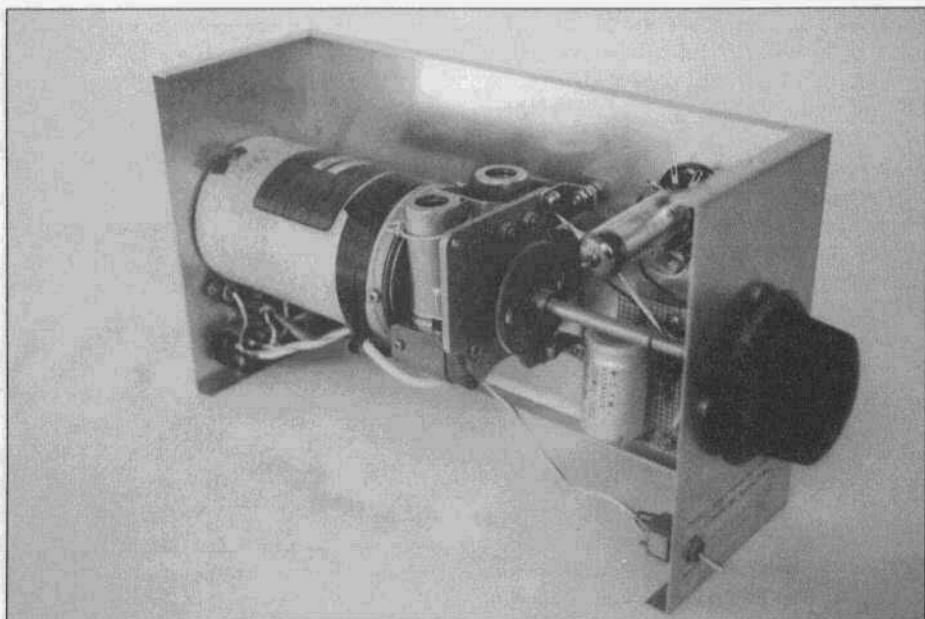
connect a slug tuned coil across the output of the 6BA6 buffer and resonate it for maximum output at about 3550 kHz. And that's just about all that's really necessary for a basic application of the T-195 VFO as a 1.5 to 3.0 MHz ham VFO-in-a-box.

There are a few more bells and whistles to this story that might interest you. The VFO is well shielded and leaks very little signal. In the combination VFO and driver that I'm using with my Hallicrafters HT-20 with the VFO enclosed in yet another shielded box, I just let the oscillator run all the time when I'm running break-in CW. I can hear a faint, on-frequency whistle on 80 and not even that on the higher bands. I do key the Minibox mounted VFO, however, using a small, mercury-wetted relay in the B+ line between the VR tube and the oscillator. The keyed VFO has zero chirp even listening to its eighth harmonic on ten meters.

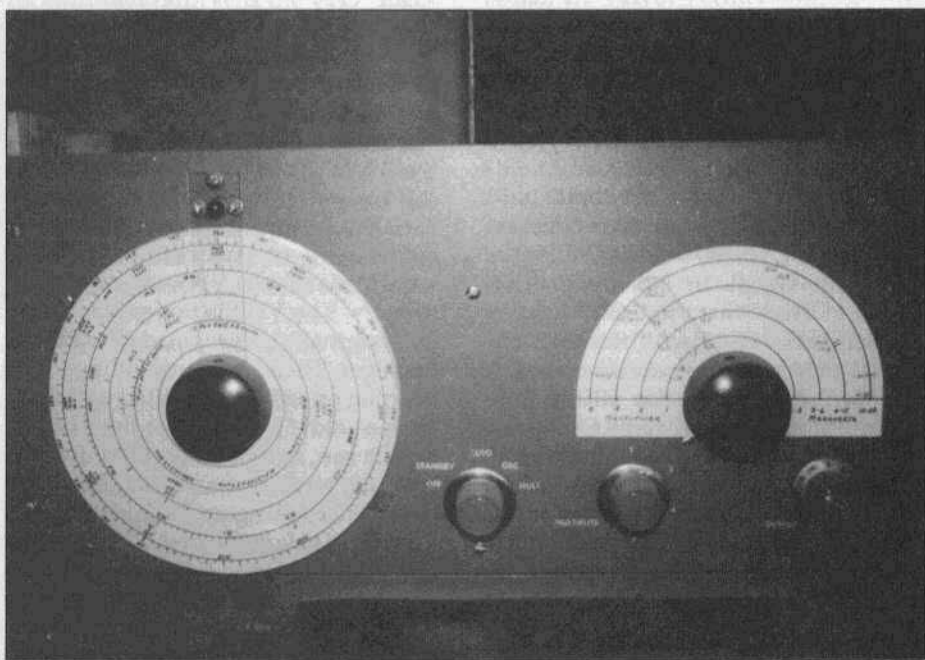
I managed to shift the tuning range of the Minibox VFO to 1790 to 4069 kHz

simply by temporarily removing the back can-cover and disconnecting capacitance from the tank circuit. I tried to get inside the can to see which caps I disconnected for this article, but wouldn't you know I couldn't find the right Allen wrench. So it will be left as "an exercise for the student" to do some cut and try on capacitors if you too want to make your VFO cover 80 meters directly. The VFO is not as stable as it was originally before I made this change however. The HT-20, unmodified VFO running on 1812 kHz drifted up 185 Hz from a cold, 55° F start for the first half hour it ran, and then it settled down to virtually no drift afterwards. The modified VFO running on 3522 kHz drifted down 2.17 kHz in the first hour of warm-up and 0.83 kHz in the second.

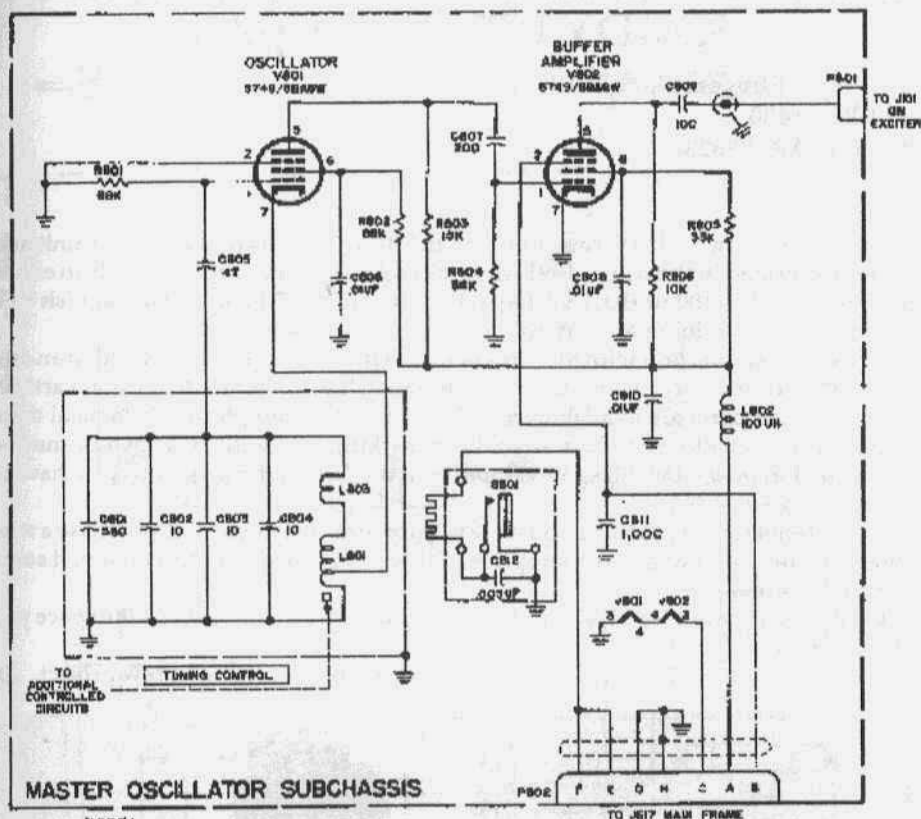
If you were lucky enough to have bought a T-195 VFO from Fair Radio several years ago as I did when I needed a multiband output driver for my HT-20, you also might have gotten one of the T-



The VFO mounted in a Minibox. Note the 1/4 inch shaft coupling mounted on the front of the cog wheel. The OA2 voltage regulator and some control circuitry are in the front of the box.



The T-195 VFO and exciter unit mounted together and calibrated for all ham bands 80 through 10.



195 exciter units to go along with it. Fair has not advertised the companion T-195 exciter unit for several years now. It is a ganged, slug-tuned frequency multiplier unit, reminiscent of the doubler stages in my 32V-3, that amplifies straight through and successively doubles for output on 1.5 to 3, 3 to 6, 6 to 12, and 12 to 24 MHz. In the T-195, the VFO and the exciter tuning are mechanically ganged together. In my HT-20 driver, I just attached the tuning shaft of the exciter unit to yet another National Velvet Vernier dial, and I peak the exciter output as needed. I take output from links wound around each of the exciter plate tank coils. The links provide more than ample drive to the 6AG7 crystal oscillator in the HT-20, even when I ask it in turn to double or triple.

So if you're looking for a good VFO to drive your old, crystal controlled boatanchor, run - do not walk - to Fair Radio in Lima, Ohio (or let the postman or the Internet do the running for you) and order this "VFO for T-195," part number "VFO/T195," shipping weight 5 pounds, used, for \$20. Perhaps you'll be lucky and get there before our esteemed editor has bought the last one for himself. He gets to read these articles before they show up in the magazine. ER

Reference

1 - Dennis Du Vall, WA3YXN (W7QHO), "The T-195/GRC-19 Transmitter," Electric Radio in Uniform, ER #104, December 1997, page 4.

K7BDY PTT Unit Update

by Floyd Fitzgerald, N7WEK

PO Box 1480

Oracle, AZ 85623

Martin Heiman, K7BDY, came up with the design of this outboard PTT unit and it was published in the April, 1991 issue (#24) of ER. It works equally well on either the Heathkit DX-100 or the TX-1 (Apache) transmitter. The idea is to furnish PTT function without doing any internal mods to the transmitter.

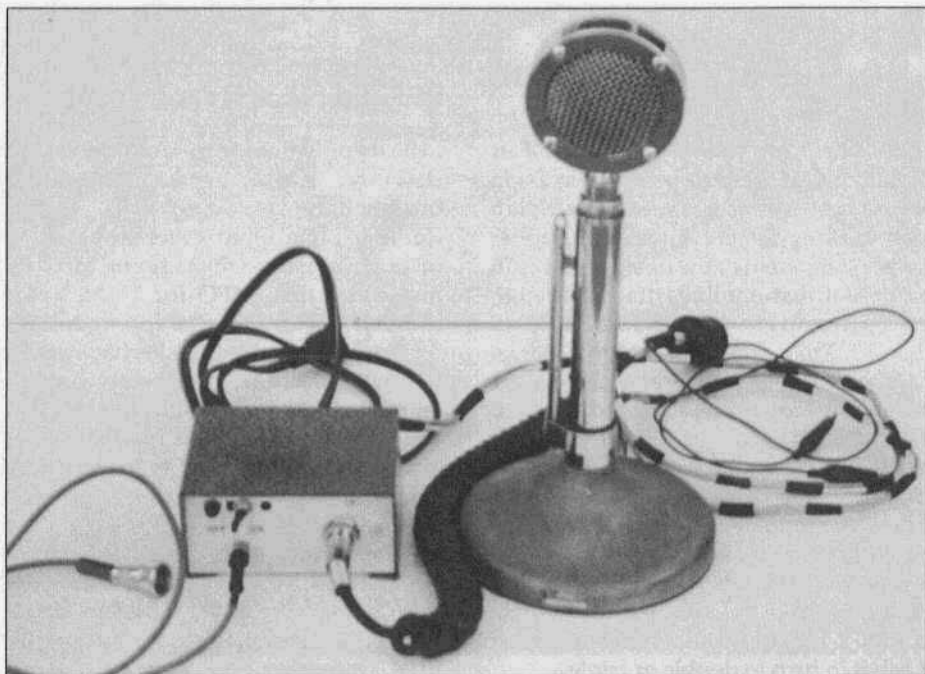
I constructed this unit with Martin's help and it worked perfectly. I added an on/off switch, fuse and a power indicator lamp which were not in the original article.

Most of the parts are available from Radio Shack although the 8-pin octal male plug may be a challenge to find. An old nonworking tube with an octal base may be used. Just remove the glass envelope and the internal parts and you have a satisfactory substitute.

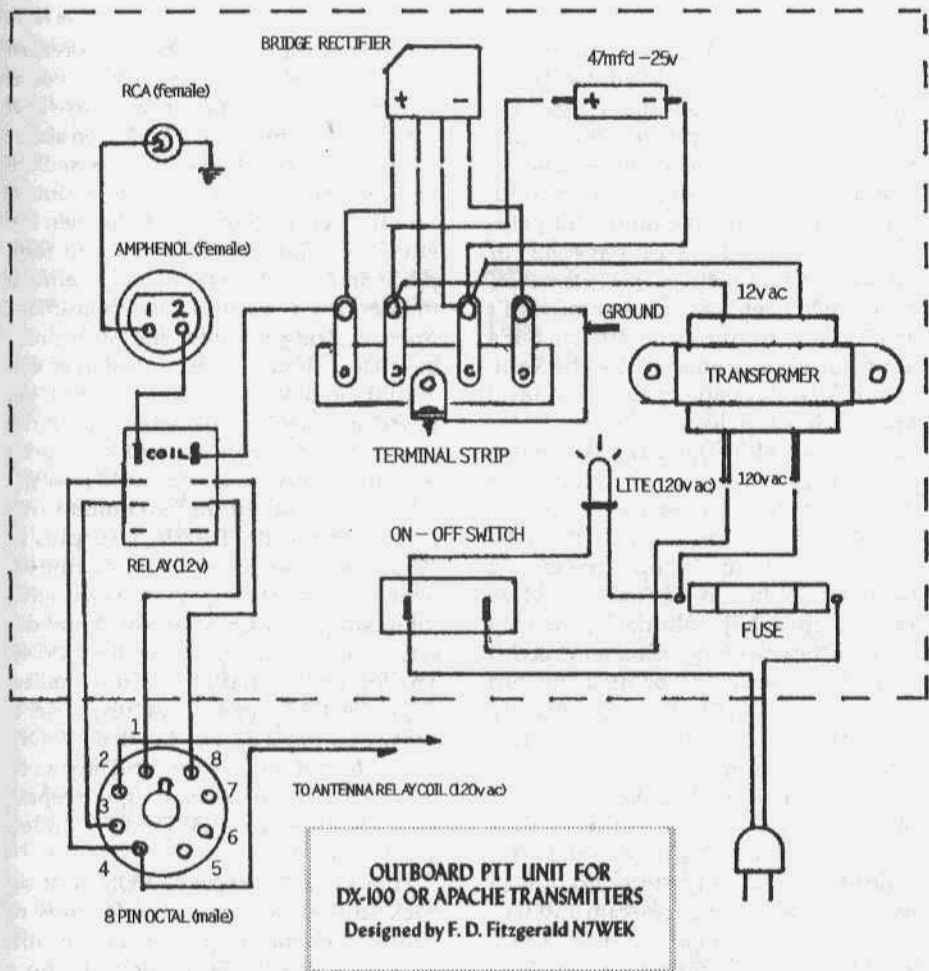
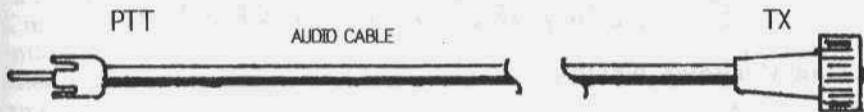
The cabinet can be anything you have in your junk box or you can purchase a new one from any number of parts suppliers. The one I used originally contained some sort of CB accessory.

Component layout is not critical and the circuit can be laid out to fit the space you have to work with.

For owners of DX-100s or Apaches this is a very practical homebrew project. ER



The outboard PTT unit shown with mic connected



Parts List - From Radio Shack

Power transformer - RS 273-1365A

Bridge rectifier - RS 276-1173

Neon lamp - RS 272-712

Capacitor - RS 272-1015

Fuse - 2A

Relay - Any 12 VDC unit with proper contacts.

Some Thoughts Down an Old Log

by Don Meadows, N6DM
1683 Daphne Ln.
Yuba City, CA 95993

I'm glad I've kept that very first log of my ham career that began in 1947 when I was 17 years old. Some later logs have disappeared, probably because they were scratched on loose sheets in haste. Commercial logbooks, spiral-bound, cost money. Each one equaled the price of several capacitors or resistors, or maybe a vacuum tube. Also, the FCC mandate to keep a log back then didn't specify what its format should be. But a record of each contact had to be kept, even if on toilet paper. Most of today's hams still keep logs voluntarily, I'd guess, especially DXers and contesters who need a record of what was worked—date and time, frequency and mode, QSL info if available and maybe a notation giving the op's name and location. Maybe most of today's active hams keep a log voluntarily, simply because they want a permanent record of an experience, probably brief but never again to be duplicated in exactly the same way—a record frozen in time.

The record of my first hamming year is contained in a spiral-bound ARRL logbook with a gray cover. I recall purchasing this blank logbook at the local radio store a week or so after I'd passed my FCC code and theory exam and was awaiting my new call. Recently, I saw an ad that offers faithful reproductions of these logbooks for about 9 bucks a whack. I'm glad that someone out there still sees value in the format upon which many young hams, years ago, recorded part of their soul.

I still recall clearly the day my new call, W6ZGM, arrived in the mail. It was a sunny day, around noon. I found a small white envelope tucked in between other letters—its small size at first didn't

impress me until I saw the FCC's return address in the upper left corner. It could only mean one thing—my license had finally come through. It had been about six weeks since I'd taken and passed the license exam in Los Angeles. I almost tore the license in my haste to open the envelope. The log shows that this took place on April 4, 1947. I recall feeling a momentary twinge of disappointment upon viewing my new station licence, because I thought surely my new call would be a W6Y—call. I hadn't yet heard any W6Z—calls when I tried the bands. But this concern was very brief—I had my own call and could now get on the air, and within two hours I was indeed on the air. The rig, a surplus B-19 tank set, had been waiting on line for over a month. My experiences with this interesting radio, by the way, were described earlier in ER (September, 1994). The log shows that at 2:30 pm I called CQ on 80 CW, but with no response. It shows that at 2:55 pm I called W6DIJ, about five miles away—and my very first QSO resulted. His signal report was 589. Mine was 454. The QSO ended at 3:15 pm.

Those earliest recorded QSOs bring back to the old-timer recollections of happy moments long gone, but yet still alive in a pencil's faded graphite on a logbook page. Why do I still have this log? Two reasons. I was required to keep it by law. Back then, I also wanted to keep it for proof to the world that I'd communicated with other people via the airwaves, something that I, at least, took great pride in. But maybe there's a third reason why I've kept it. Being the original record of my entry into a lifetime hobby, it had value. And thus it

remained in my archives beyond the FCC mandated two-year period for log retention.

When was I active during my first hamming year? The log shows that I was mostly active in the late afternoon after school, shortly before dinner time, or later on in the evening shortly before bedtime—times when 80 and 40 CW most likely would produce a Stateside QSO. On weekends and during the summer vacation months, the log shows that I also operated around noon or in the early afternoon, when local ragchews on 40 CW were fairly easy to come by. I found that there were some young guys out there like myself, recently licensed, who also were eager to ragchew on CW with their homebrew crystal oscillators or with converted ARC-5 surplus transmitters. The beginning and ending time of each QSO was carefully logged, along with every CQ sent out, according to the FCC mandate. The log often shows a couple column-inches of CQ's sent, each with the exact time. Now and then this column of CQ's is interrupted when a call came back to me.

Exact time? Yes. My station clock was a spring-wound alarm clock which was set as closely as possible to the time announcements given on AM radio on the hour (or maybe half hour—I forget). If WWV was then providing a time standard, I wasn't aware of it. Therefore, all the time entries in this first logbook are in local time, which then seemed to be the custom anyway.

My very first contacts were of course on CW, because at that time new hams could only use phone on 28 MHz and above. My CW reports ranged from T3 to T9—back when a 593, a 457, a 596, were not too uncommon, back when oscillator stability and power supply filtering were a major hurdle for young hams with homebrew equipment. It was a far cry from the usual "5NN"—short for 599 reports that one always hears

today in the CW pileups on a DX station. Today, ham technology provides nothing but T9 signals everywhere. Anything less is rare and attracts attention.

Back then, most old-timers who coached the young hams were active prior to WW II and had matured during the time when CW signals were often impure. They had been there and were thus tolerant. For them, the "T" component of the RST signal report was as important as was readability and strength. Their tone reports on CW were to be taken seriously. During my first logbook's time record, there were many CW signals on the air that were impure. They came from pre-WW II equipment rehabilitated, or from surplus gear that young hams in droves were putting on the ham bands for the first time. I, too, was using WW II surplus, but without proper power-supply filtering. The FCC ticket, which suddenly arrived about six weeks into my ham career, forced me to read again the chapter in the ARRL Handbook that dealt with power supplies—and to understand it. Simply memorizing the ARRL License Manual in order to pass the FCC written test had proved to be inadequate.

This first logbook also records my first contacts on 40 CW with a female ham. By the time I first worked her, I had corrected the raunchy-tone problem by building a new, small power supply with good filtering that now powered a homebrew crystal oscillator on 40 meters that ran about 20 watts input. I had one crystal on 7154 kc (now kHz), back when the whole 40-meter band was CW only for American hams.

She came back to my CQ on 40 CW. It was early in the month of May, just after dinner time. Her call was also brand-new. It was W6Z—and was just a bit down the alphabet from mine. I could be more specific in detailing this topic, but I prefer to let the haze of time gently blur this segment of my old log.

A Screen Grid Modulated Transmitter Using A 4-1000A Tube

by Louis W. Erath, W5BM
P.O. Box 177
Abbeville, LA 70511

Last fall (1998) I was browsing through some of my old QSTs, when an article titled "Negative Feedback Modulation" by Richard Clay (Aug. 1953) caught my eye. The mode of modulation in this article was actually screen-grid modulation, however the author had devised an overall loop of negative feedback to reduce the harmonic distortion generated by his method of screen-grid modulation. Richard Clay's arrangement was very interesting to me, because it demonstrated how easy it is

to apply overall negative feedback where there is no modulation transformer in the loop.

Looking a little further, I found some information in the twentieth edition of William I. Orr's Radio Handbook, page 15.6. This source explained that good SGM can be achieved if the modulator driving the SG is of very low impedance and is able to swing negative by 50 volts or more, to cut off the plate current in the RF amplifier tube being modulated. The above information

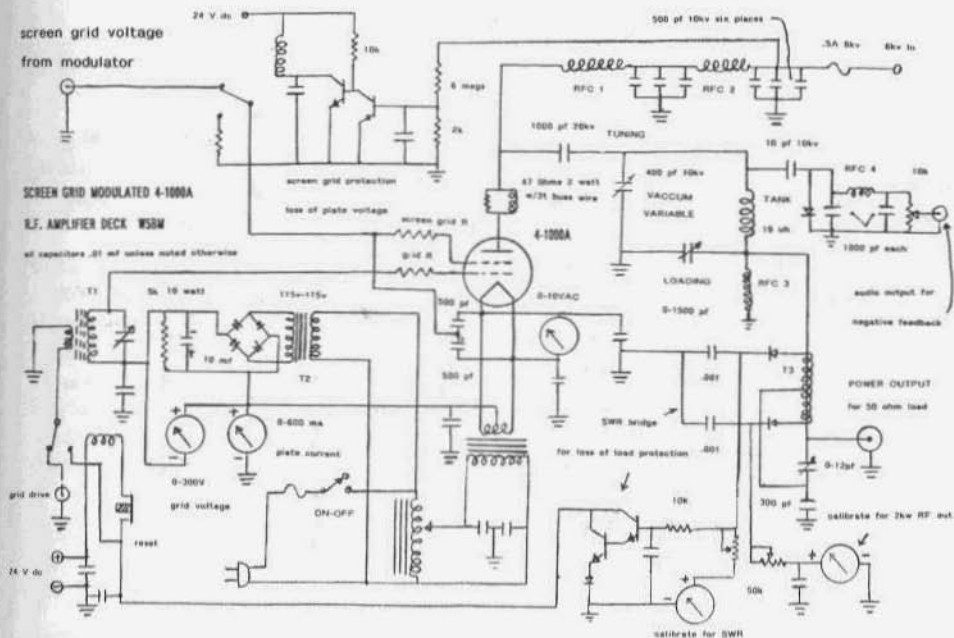
stimulated me to build a SGM transmitter. I happened to have several used Eimac 4-1000A tubes and one new one plus an air chimney socket and all of the other parts required. The SGM transmitter which resulted is now in use in my ham shack.

Schematic 1 shows the circuit diagram. The circuit is more or less conventional, however I would like to point out the demodulator which is used for the overall negative loop. A 10pF 10KV ceramic (door knob) capacitor is connected to the high voltage end of the pi network in the RF amplifier plate circuit. This cap goes to ground through a 1000pF silvered mica capacitor to form a 100:1 RF voltage divider. This reduced RF voltage is rectified by the diode

shown and the RF is filtered out of the audio signal by RFC 4 (3mH) and a



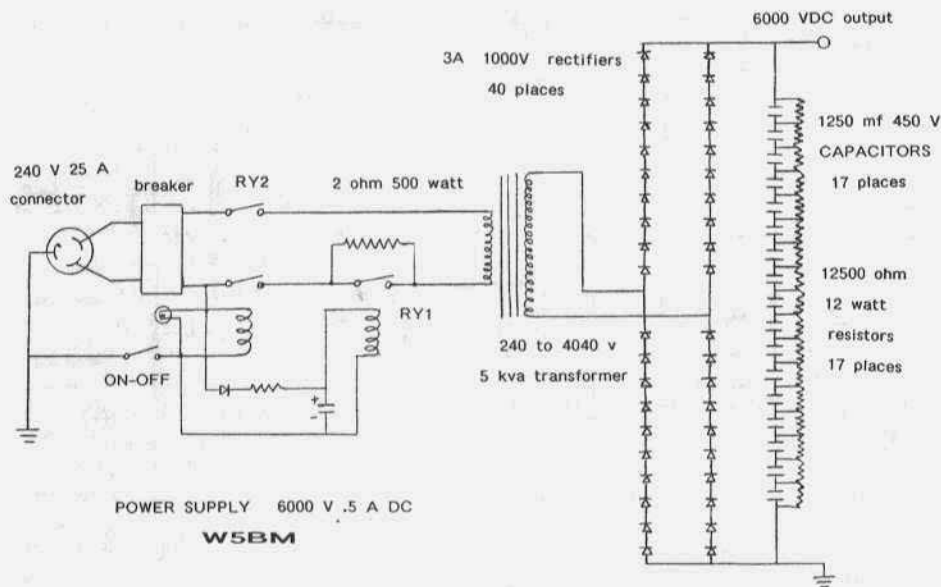
The author with his HB transmitter.



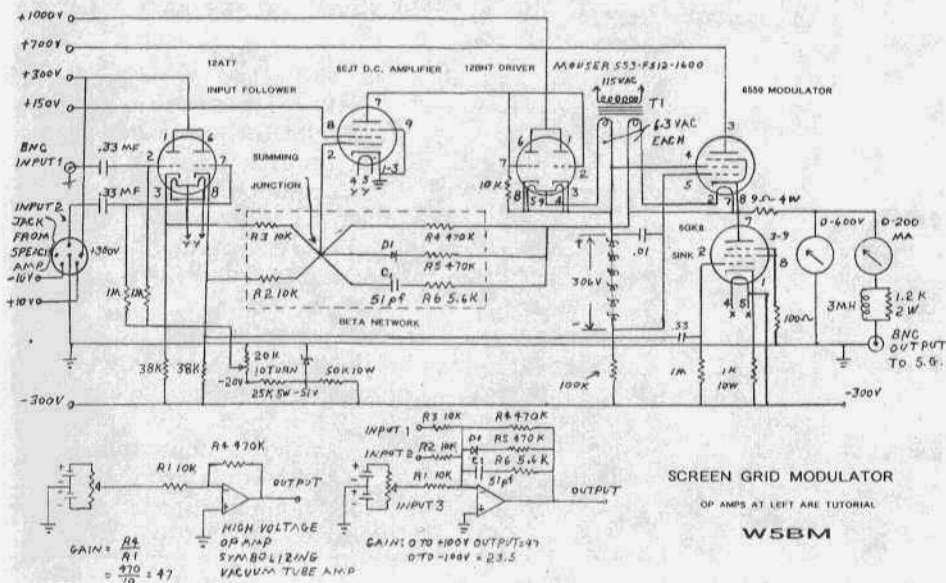
Schematic 1. The RF amplifier deck.



The author's operating position showing speech amplifier and compressor to the left of the Heil Goldline microphone. The CE 100V on the shelf is used as the RF driver. The modulator is to the left of the 100V.



Schematic 2. The power supply.



Schematic 3. The screen grid modulator.

TABLE 1 Performance Of The 4-1000A Amplifier

IMAC's ratings on the 4-1000A tube.

	VOLTAGE	CURRENT	DISSIPATION
PLATE	6000V	700mA	800 watts
SCREEN	500	140 mA	70 watts
GRID	-200V	42 mA	6 watts

Grid drive power	15 watts
Plate power input	4200 watts
Plate power output	3400 watts
Plate efficiency	81%

Performance of the 4-1000A amplifier at W5BM

An RF grid drive power of 20 watts produced grid current of 40 mA and grid current bias of -200 volts. All measurements below were made with this setting.

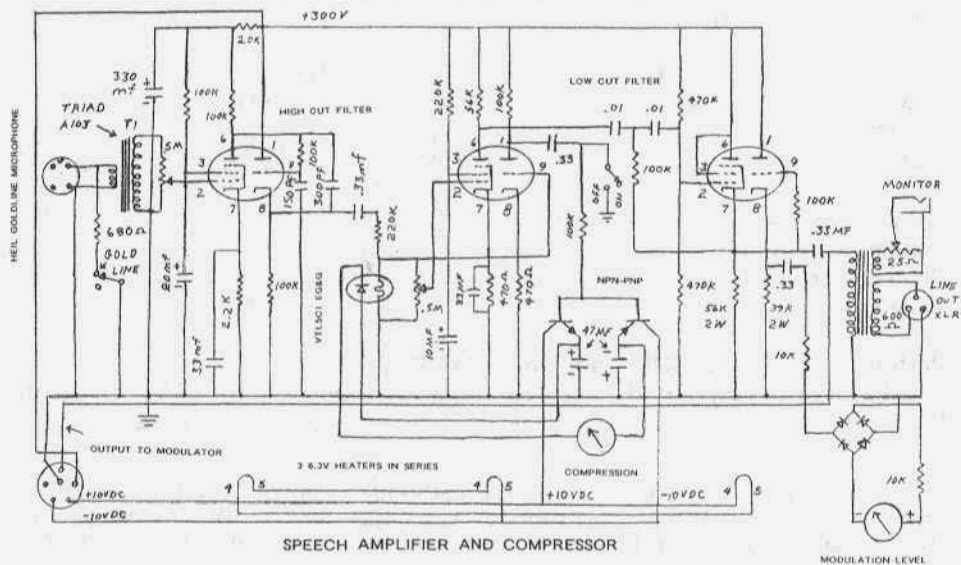
POWER OUTPUT WATTS	PLATE CURRENT MILLIAMPS	PLATE VOLTAGE VOLTS	SCREEN CURRENT MILLIAMPS	SCREEN VOLTAGE VOLTS	POWER INPUT WATTS	PLATE DISS. WATTS	PLATE EFFICIENCY PERCENT
2000	440	6000	75	300	2640	640	75%
1500	380	6000	40	200	2280	780	65%
1000	300	6100	10	100	1830	830	55%
750	260	6200	15	50	1550	802	48%
500	210	6200	15	0	1302	800	38.4%
250	150	6200	0	-25	780	530	32%
0	0	6200	0	-100	0	0	—

second 1000pF capacitor. The 10K pot across this cap makes a time constant of 20 microseconds which is plenty fast to follow the highest audio signal encountered. The DC component in the output of this demodulator is about 25 volts for a carrier level of 375 watts. A BNC connector is provided to connect this signal back to the input of the modulator.

Schematic 3 is the circuit diagram. The audio output of the speech amplifier is fed to the input follower from the 6-pin connector shown. A second input labeled BNC input 1 is connected to the demodulator on the RF deck. The 6550 modulator together with the 6EJ7 amplifier and the 12BH7 driver is arranged as a DC amplifier to supply DC voltage to the 4-1000A SG as well as the audio modulating signal. The output of the modulator is capable of swinging from

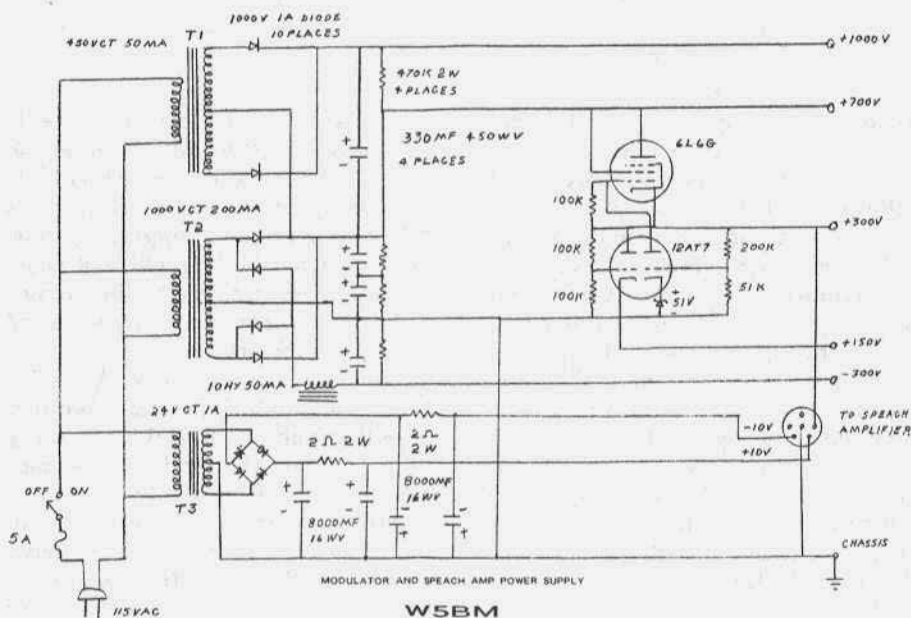
500 volts @ 150 mA positive to -150 volts negative. The audio input signal (about 20 volts RMS) is mixed with the negative feedback signal of 15 volts RMS. Two operational amplifier circuits are shown on the lower left of Schematic 3. These circuits are illustrations of the relations of the components in the "beta" network.

The two inputs are summed by R2 & R3 into the summing junction. R4 establishes the basic gain and D1 & R5 modify the gain when the modulator swings negative to make the amplitude characteristic of the modulator inversely fit that of the SG modulation characteristic. This yields a THD (total harmonic distortion) of 6% @ 1 kHz. C1 & R6 provide rolloff of the high frequency response of the modulator of 6dB/octave over the seven octaves from 5 kHz



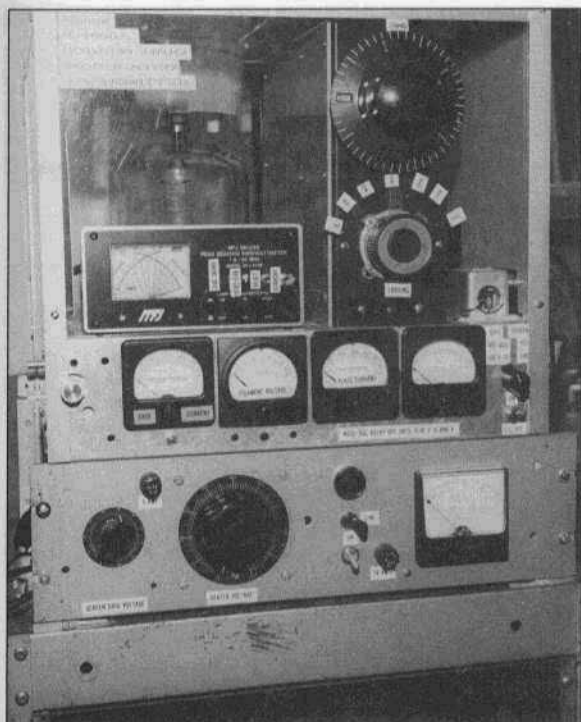
W5BM

Schematic 4. The speech amplifier and compressor.



W5BM

Schematic 5. Modulator and speech amp power supply.



Front view of the transmitter.

to 600 kHz. This roll-off allows the overall negative feedback loop to be unconditionally stable when 12dB of overall negative feedback is applied and the THD is reduced to 1.5%.

Schematic 4 shows the circuit of the speech amp. It is a straightforward vacuum tube amplifier with plenty of headroom. The VTL5C1 element provides about 8dB of distortionless compression to make control of the modulation level easy. This concludes a brief description of the transmitter as it is presently configured. Additional details are provided below for those who might be interested in building a SGM transmitter.

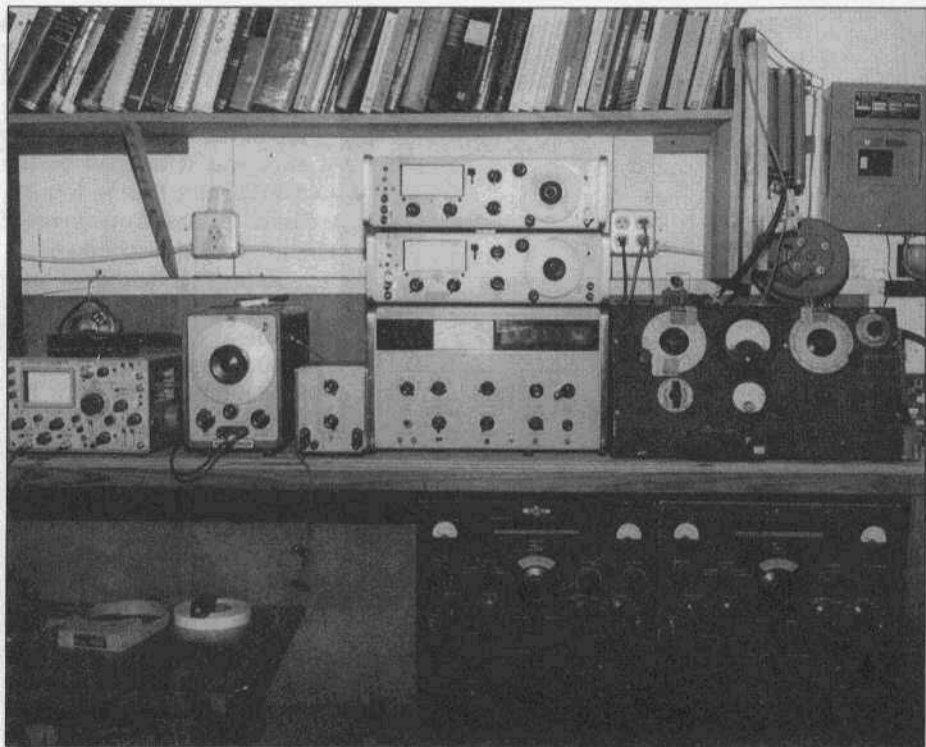
The RF Amplifier Details

The RF deck is built on a 17 x 17 x 4" aluminum chassis. The HRO dial at the top drives a 20-400 pF 10 KV vacuum variable which tunes the tank circuit. The 20-1500 pF 1 KV loading cap at the

bottom of the tank circuit is driven with a velvet vernier dial drive. An MFJ 815B wattmeter is mounted on top of the chassis on the left side and it is used as the SWR bridge for the loss-of-load protection circuit shown on the schematic.

Referring to the RF amplifier deck Schematic 1, the filament or heater of the 4-1000A is shown connected to a filament transformer which is connected to a Variac to adjust the filament voltage to 7.5 volts as read on the 0-10 AC voltmeter. The 115V AC line is also connected to T2 which is a small isolation transformer to supply a fixed bias of -150 volts to bias the grid to cut off the plate current when there is no RF drive. The RF drive of about 20 watts at 50

ohms is fed to the BNC connector marked "grid drive" on the schematic. It is connected to the primary of a 1:8 step-up transformer through the loss-of-load protection relay. This step-up transformer is tuned by the variable capacitor shown and is connected between the fixed bias supply and the grid through the "grid R". This resistor is 23.5 ohms made up of two 47 ohm 2 watt carbon resistors in parallel. It reduces the "Q" of the parasitic tuned circuit formed by the inductance of the grid lead in the tube and the capacitance from the grid to the filament and screen grid and to some extent the plate. The grid is driven positive by the RF drive and it is adjusted for a grid current of 40 mA. The 500 volt grid voltage meter will read -200 volts because of the voltage drop in the 5K, 10 watt resistor which is shunted by a 10 mF electrolytic capacitor. This -200 volts is larger than the fixed bias of -150 volts provided by



Test instruments. TEK scope, HP low distortion oscillator, attenuator, spectrum analyzer. Above—two HP distortion analyzers. On right— a Boonton Q-meter (great instrument). Below—two KWS-1 transmitters. Above shelf, next to power panel is the 2KW dummy load. Note thick red book on shelf above—Radiotron Designers Handbook published in USA by RCA, long since out of print. Great book for vacuum-tube engineers.

the bridge rectifier and causes the bridge rectifier to automatically switch off. It switches back on when the RF grid drive is removed either by turning off the drive source or by the SWR in the antenna being too high.

When the relay is actuated to "off" it latches until the fault is removed and the reset button is pushed. The grid current does not affect the plate reading on the 0-600 mA meter because it is returned directly to the 4-1000A filament center tap.

The screen grid is fed power from the modulator through the BNC connector shown, through the loss-of-plate-voltage protection relay and through the

screen grid resistor R. This R is approximately 8 ohms @ 12 watts and is made by connecting six 47 ohm 2 watt carbon resistors in parallel at the screen grid terminals on the 4-1000A socket. This resistor reduces the "Q" of the parasitic tuned circuit made up on the inductance of the screen grid lead inside the tube and the capacitance between the screen and the plate and the grid. Note that the two 500 pF ceramic capacitors are separated from the screen grid by R, contrary to conventional practice.

The plate of the 4-1000A is connected to a heat sink and thence to a parasitic suppressor made up of a 47 ohm 2W carbon resistor which is shunted by 3

turns of #16 tinned buss wire. DC current is fed to the plate through the shunt RFC 1 which is a 5/8" G10 tube 7" long wound solid with #24 thermaleze wire. It has 300 uH of inductance and is bypassed to ground by three 500 pF 10KV ceramic capacitors. A second pi section is made up of RFC 2 and three 500 pF ceramic capacitors at 10 KV in parallel to ground. This two section filter greatly reduces the RF voltage dancing around the power supply circuits. A .5 amp high voltage fuse disconnects the power supply in the event of an arc-over. The plate tank circuit is insulated from the 6000 volt DC by a 1000 pF 20 KV ceramic (door knob) capacitor. The tank coil is a 19 uH inductor with a "Q" of 400 at 3883 kHz. The loading is adjusted by a 20-1500 pF 1 KV capacitor on the low end of the pi network. RFC 3 grounds the pi network for DC.

The modulator is shown in Schematic 3. The modulator tube, type 6550 is a beam power tube originally designed for hi-fi amplifiers. The Central Electronics 100V transmitter uses a pair in class AB1 as a broad-band, untuned amplifier to produce 100 watts of output. It is used here in a cathode follower configuration augmented by a 12BH7 driver and a 6EJ7 amplifier. The 6EJ7 shown in Schematic 3 has an undegenerated gain of 300. It is directly coupled to both sections of a 12BH7 in parallel. The 12BH7 cathode drives the SG of the 6550 and a string of 51 volt zeners to produce a 300 volt drop to the grid of the 6550. The cathode of the 6550 which is the output to the 4-1000A SG goes to the plate of a 6GK6 which is used as a current sink. The 6550 cathode also goes to R4 which is feedback to the control grid of the 6EJ7. A 12AT7 is used as input followers for the signal input and the negative feedback input. R2 & R3 sum these two signals together at the summing junction as shown. D1 & R5 are used to bend the amplitude characteristic of the modulator so that

the gain is 47 for positive going signals and 23.5 for negative going signals. This distorted amplitude curve inversely fits the distorted amplitude response of the SG being modulated and reduces the THD to 6% as measured by HP distortion measuring instruments. C1 & R6 roll off the high frequency response at 6dB/octave and the input coupling cap of .33 mF and 1 meg resistor roll off the low end (below 5 Hz). The DC output to the SG is controlled by the 10 turn 20 k pot shown going to the two 1 meg input resistors. The heaters of the 12BH7 and the 6550 are powered by a special low capacity, high isolation transformer from Mouser. The catalog number is given on Schematic 3. These windings are tied to their respective cathodes. All zener diodes are 51V, 1 watt also purchased from Mouser. The modulator power supply, Schematic 5, is unusual because it is fairly simple but has voltages from -300 to plus 1000. It uses primarily surplus parts.

The speech amplifier shown on Schematic 4 contains a high-cut filter which is 3 dB down at 5 kHz and a low-cut filter which is 3 dB down at 200 Hz. It uses a plus and minus 10 volt DC supply for the three filaments in series which also serves as a low voltage supply for the NPN-PNP transistors. These transistors are from Radio Shack and cost about 20¢ each. The input microphone transformer and the output transformer are from my junk box. The VTL5C1 element is listed in the current (#117) Newark catalog on page 583 under "Vactrol Analog" photoisolators. ER

DX on 10 AM

Labib, OD5IU, Lebanon
Kazu, 9G5DX, Ghana
worked by Bob Tapper, KØYJ

A reminder: Don't forget the Annual
160M Jamboree on Dec. 26/27

Christmas Tree from page 23

and said, "Now turn all of them on. I want to see what they look like when all the bulbs are burning."

Ned, flipped the switch.

"Now that is real pretty. You have to admit it was a good idea starting to work on them two weeks before Thanksgiving. Now, they are all ready to turn on. We will wait until this weekend to turn them on. We don't want to rush the season too much."

"You are quiet right, Dear, we will wait until this weekend," answered Ned.

Tuesday December 3—7:00 AM...

Ned arose early and went directly to the shack. Everything was ready to go. He soldered a PL259 to the end of the coax and hooked it up to his antenna change-over switch. Then he connected cables—prepared days ago—to the DX-60, and his regenerative receiver. All worked as planned. His first QSO, a rag-chew, was with a W7...a rancher in Montana. That first QSO was followed by one with a young college student in Virginia. He received a good report from each. The regenerative receiver was certainly less selective than a 'super,' but the bands were uncrowded. He had no trouble at all with 100% copy.

Ned turned the rig off and went to the kitchen for breakfast. Dorothy was on the phone talking to their daughter, Cindy. She was unaware he was in the room.

"Yes, our Christmas tree lights are all ready to turn on this weekend. I want you and Steve to be sure and drive by with the boys. They enjoy Christmas so much. Your dad managed to get all the lights working on time this year. I don't want to worry you Cindy, but you dad has slowed down a lot. It took him almost three weeks to get those lights burning—and he used to be so good with electricity and such. I worried about him up there on that step ladder. You know he is not young man anymore. I tried to get him to let Steve do

the climbing—but you know your dad—stubborn as a mule."

Ned turned and slipped from the room unnoticed. A smart operator knows when to transmit—and when to stand by. ER

The BC-610 Revisited from page 11

engineers who evolved the BC-610, "if you thought the 610 was a military HT-4 you found out you were wrong." Elements of truth reside in both viewpoints. Mechanical modifications to the HT-4 and upgrading of components increased reliability substantially; improvements in its efficiency as a Class C, plate modulated transmitter were inconsequential. 4. I am especially indebted to the ten owners of BC-610s who responded to my informal survey. I hope that I have summarized their statements accurately and that my synopses writ large are representative of the experiences and values of other BC-610 owners.

5. The accolades are printed by permission. ER

Ed. Next month the author will have a short postscript to this article.

Down An Old Log from page 31

her first name and middle initials now followed by her husband's name. The Callbook shows that she still resides in the same large town in the San Joaquin Valley from where her fist across the airwaves once gave joy to a young male ham who had never before contacted a female—especially a teenage girl who liked CW. The log shows that we set up a schedule, about once a week. I recall that each of our contacts was a warm ragchew, dealing with radio things, and with personal things, too. But we never got to the point of describing ourselves physically in detail or of exchanging photos. Today, I wonder why. Maybe we both feared that such a revelation might detract somehow from the rap-

port we had established via the airwaves. The log shows that we had several schedules covering more than a month, but the log also shows they suddenly came to an end. The log shows I never called her following our last schedule, nor did she call me. Maybe we agreed to terminate the skeds. If so, I can't recall why. Maybe she found herself getting too much involved in her hobby. Maybe I found myself getting too much involved with a girl I'd never seen, especially when another young local girl was making inroads into my free time. Today, only a fuzzy memory can try to interpret a few pencil scrawls in an old logbook.

When looking over the QSO columns of this first logbook, I keep seeing two calls that stood out then and still stand out today. One of them is Floyd, W6ZOH. Our first QSO was on August 5, 1947. Floyd is still active on CW and we have been in touch with each other recently. The other call is W6ZRY. Louie and I first worked each other when we both ran crystal oscillators on 40 CW. Our very first contact was on July 17, 1947. Louie is still very active; we chat several times a week on 75 meters. The QSL cards for these first contacts with W6ZOH and W6ZRY still occupy a prominent position on my shack's wall.

This old logbook contains many other fond memories that I won't deal with here. Maybe that's why it has survived over time—a simple record of things that seemed important, both then and now. ER

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A complete index of the entire 10 years of ER is available for viewing or downloading at the following website: <http://www.qsl.net/n9oo>

The Sixth Annual Colorado Morning Group AMI Thanksgiving Day Bash

I had Shirley haul me out of bed at 5:30 on Thanksgiving day. Normally I'm a late-night person and it's only for the most important occasions will I leave my bed that early. At six I was warmed up, tuned up and on-the-air. OJ (KØOJ), net control, was holding forth on 3876 and already there was a large group. After I checked in I listened for an hour or so as the checkins came in from everywhere. OJ sent me the log of checkins (50 total) that included the transmitter each station was using and their AMI number: ABØFT, GSB-100, 1062; ALØF, Viking II, 1140; KØKE, CE100V/600L; KØLEE, FT847; KØOJ, 32V-3, 155; KØRZ, Ranger; KØSKI, Ranger II, 1150; KØTIV, IC-730; KØYJ, Ranger II, 886; K5AYD, Apache; K6GZL, HB 4-400; K7DU, Viking I, 206; K8MLV, DX-100, 175; KAØSKK, B&W 5100; KAØWIE, IC-737; KBØODM, Viking II; KCØOW, HT-37; KDØHG, HB 304TL, 10; KEØXL, DX-100; KFØOW BC500GY, 835; KGØMR, 32V-1, 780; KTØO, 32V-3; NØBF, FT 990; NØCFE FT-101E; NØNMP, TS440S, 795; NØTE, 30K-1, 538; NØTYL, Viking I; NØXDW FT-920; N5BWV; N6CSW, DX-100, 4; WØAGU, TS-440S, 390; WØBVT; WØFD, HB 813, 229; WØGM, 618T-3, 788; WØJFK, FT-847; WØJIM, IC-738; WØLEV, DX-40; WØLIN, FT-840; WØNKL, KW-1, 974; WØOD, Viking I, 915; WØVAD, HT-40; WØZUS, HB 100TH'S, 450; WAØEAJ, TS-430S; WAØLSB, IC-781; WAØNUH BC375H, 863; W10PH, TS-440S; W4BDG, GK 500C, 1107; WA5OES, Ranger; W7XS, BC250GY, 1158; W7XXX, HB 813; WB9NJB, IC-737.

I hope everyone has a wonderful holiday season enjoying the great band conditions we're experiencing now. Shirley and I send our season's greetings to all. N6CSW

Last month we neglected to give the phone number for the Hammond Museum of Radio. For those of you who might like to call for information the number is: (519) 822-2960.

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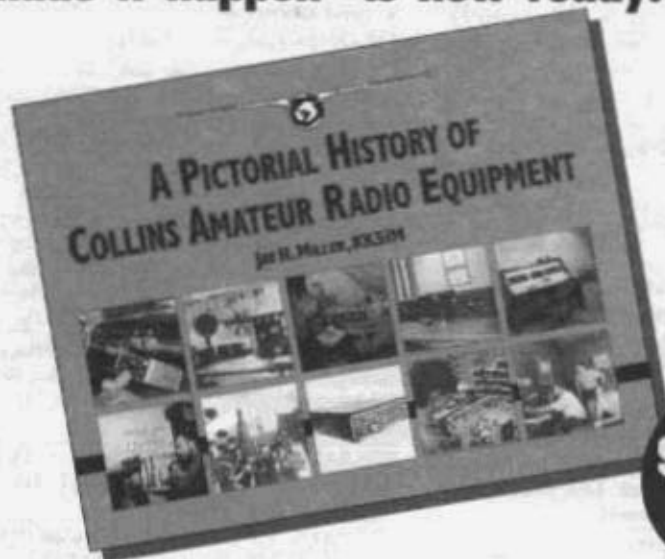
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WANTED: Globe King 500 B/C; Viking Valiant I/II; Viking 500; Heathkit Mohawk. Frank., (916) 635-4994, frank.dellechaise@sprintmail.com

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

WANTED: I wish to correspond with owners of National FB7/FBXA/AGS coil sets. Jim, KE4DSP, 108 Bayfield Dr., Brandon, FL 33511. j-c-clifford@juno.com

WANTED: Anyone having info on the Deltronic Corporation of Los Angeles, CA, please drop an email, letter or call. The company was in operation in the early 1950's. Thanks, George Maier, K1GXT, 64 Shadow Oak Dr., Sudbury, MA 01776. (978) 443-9659, gmaier@ultranet.com

WANTED: SW-3 coils any band; any early ham, spark or wireless equipment; early ARRL Handbooks. Mike Bald, W5SGLW, (918) 492-7361, radiomb@aol.com

WANTED: British, Commonwealth W.S. 62, W.S. 22, W.S. 18, W.S. 48, W.S. 46. George Rancourt, K1ANX, MA, (413) 527-4304

WANTED: Knight-kits; Ocean Hopper, Star Roamer II, T-150A, and others. Also Allied/Knight catalogs, especially 1959-1962, 1965, 1969-1972. Steve Donahue, 1773 Sterling Pointe, Cleveland, TN 37312.

WANTED: Iowa QSL cards pre 1940 during the '9' call district era. Also want any 1950s QSL of KNØCER or KOØCER at Ames, IA. W5USM, CBA or w5usm@aol.com

WANTED: Hammarlund PRO-310 dead or alive. Spencer Cromwell, K6VRS, 7607 Stevenson Way, San Diego, CA 92120. (619) 582-8280. 3232009764@pagenetmessage.net

WANTED: Hammarlund noise immunizer (silencer) for HQ170/180 rcvr. Ed, N5BFW, (817) 222-5355 days, ecuevas@juno.com

WANTED: 1930s Navy aircraft sets - Western Electric GP-1, Sylvania GO, Westinghouse GO-3, others. William Donzelli, 15 General MacArthur Dr., Carmel, NY 10512. aw288@osfn.org

WANTED: WW-2 Japanese military radio of any kind; Hammarlund PRO-310. Takashi Doi I-21-4, Minamidai, Seyaku, Yokohama, 246 Japan. Fax 011-8145-301-8069, takadoi@carnot.ocn.ne.jp

WANTED: BFO coil/xmtr for a Collins 75A1 rcvr. Jack Shutt, W9GT, 1820 Dawn Ave., Fort Wayne, IN 46815. (219) 493-3901. w9gt@fortwayne.infi.net

WANTED: Info on Ice Station Otto, former FAA/CLA radio site Moriarty, NM. Tom Berry, K9ZVE, 1617 W. Highland, Chicago, IL 60660. (773) 262-5360, 262-0016

FOR SALE: Hallicrafter's manuals, copies starting at \$5, some Johnson, WRL, others. SASE for list. DSM Diversified, 909 Walnut St., Erie, PA 16502.

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WANTED: Tektronix memorabilia & promotional
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WANTED: Test equipment & tube audio
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3366.

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