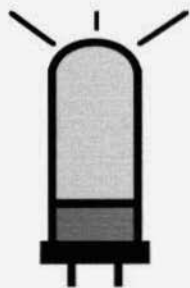


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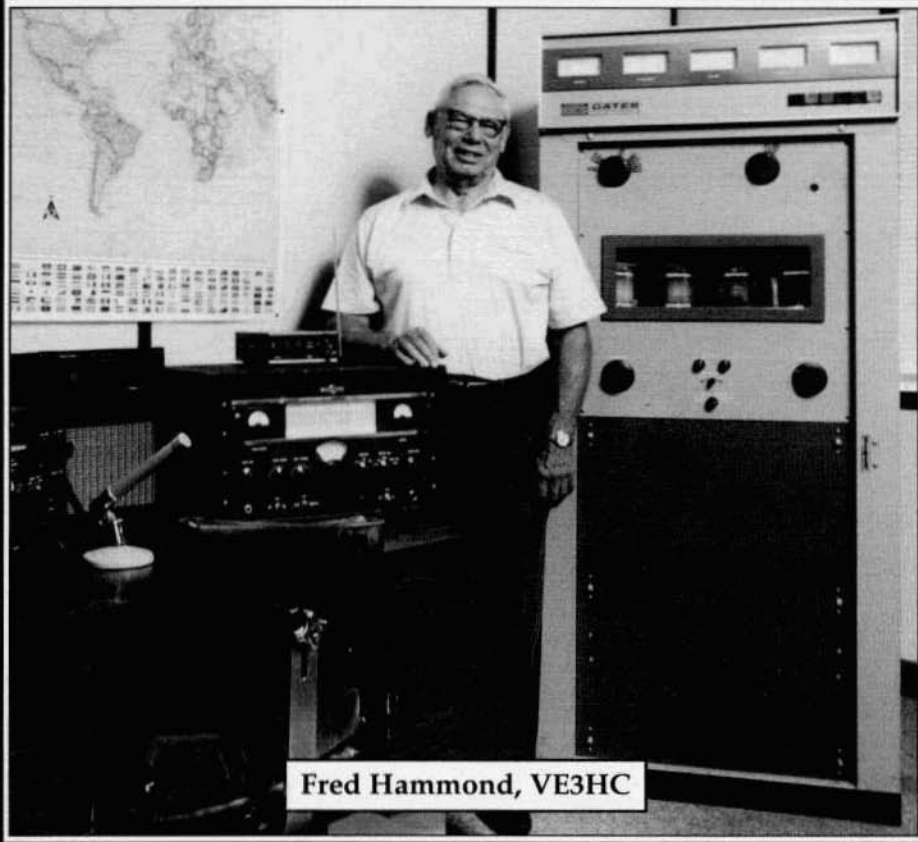


# ELECTRIC RADIO

celebrating a bygone era

Number 79

November 1995



Fred Hammond, VE3HC

# ELECTRIC RADIO

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**Office Manager - Shirley A. Wiseman**

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

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

## **Regular contributors include:**

Walt Hutchens, KJ4KV; Bill Kleronomos, KDØHG; Ray Osterwald, NØDMS; John Staples, W6BM; Dave Ishmael, WA6VVL; Jim Hanlon, W8KGI; Chuck Penson, WA7ZZE; Jim Musgrove, K5BZH; Dennis Petrich, KØEOO; Bob Dennison, W2HBE; Dale Gagnon, KW1I; Rob Brownstein, NS6V; Dick Houston, WØPK; Andy Howard, WA4KCY; Skip Green, K7YOO; Albert Roehm, W2OBJ; Steve Thomason, WB4IJN; Don Meadows, N6DM; Bob Sitterley, K7POF (photos) and others.

## EDITOR'S COMMENTS

As I write this the morning sky looks ominous. The weatherman says we could get our first snow today. For most people the coming of winter is looked upon with dread but for me winter is the best time of the year. I'll have more time now to spend in my hamshack and I know most of the other AM'ers will have as well. Conditions are always better too; particularly regarding noise, I won't miss the incessant thunderstorm crashes that plague me all summer.

I've read that we've started a new sunspot cycle - cycle 23 - and I'm hoping that this means propagation on the higher bands will start to improve. Wouldn't it be great to have 10 meters back! This winter we can expect more openings on this band; let's all spend some time up in the AM window from 29.0 to 29.2. This winter I hope to be more active than I have been previously. I hope to see you on the air.

On October 26 we picked up the Heathkit book from the printers and the following day mailed out the 275 copies we had pre-sold. A couple of days later we learned that page 144 was blank. Here's what we're going to do about it. First of all we've had our printer print page 144 and we'll be mailing that out to all those who bought prepublication copies. Then our printer will be inserting the missing page in all the remaining books.

The good news is that everyone who has seen the book is enthusiastic about it. It should be around for a long, long time. To order it see our ad in the classifieds. The price is now \$24.95 plus \$3 S&H. N6CSW

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**Cover:** Fred Hammond, VE3HC, with his 75 Meter AM station. The transmitter is a Harris-Gates Model BC1H. It uses 833A's modulated by 833A's and is capable of around 1600 watts input. The driver is a Collins 32V-3 and the receiver is a 75A-4. On 160 Fred uses an RCA broadcast transmitter with the same tube lineup.

# LETTERS

---

Dear ER

Thanks for running the article on the R-390A in the October issue of ER. Les Locklear, Wally Chambers, and myself have been working together to gather R-390A order number and serial number data. The intent of this exercise is to try and determine exactly who made them, and how many were made. To date, we have data contributions on about 160 rigs, but there are still holes in the data for certain contracts.

I am asking that R-390A owners, users, or folks that might have access to bunches of sets (military, surplus dealers, etc.) contribute to the data collection effort by sending me the following information: manufacturer, order number and serial number, odd features. We want information from as many rigs as possible, even those from "common" contracts as the number of contributions will validate the statistical inferences made in the final accounting.

The data may be sent to me at any of the following addresses (note there was a typo in my email address in the October issue). Thanks in advance,

email n5off%w5ddl.aara.org@usl.edu

packet n5off@k5arh.la.usa

snail T.F. Marcotte, N5OFF

111 Destiny Dr.

Lafayette, LA 70506-6648

Dear ER

Although I did not know him, I was impressed by the sincerity, the warmth of feeling and the sadness contained in the tributes to Vestal "Les" Lester, K6HQI, which appeared in the September and October issues of Electric Radio. As one who values tradition and happy memories, I think it is certainly appropriate to rename the 20 meter net, as has been done.

When I read your article in the September issue, I took note of the brief description of K6HQI's transmitter, and tried to imagine at what power level a rig with four 833A's might customarily be operated. You did write that "he always had a BIG signal. . ." I inferred from this that the legal power limit might well, in this case, have been substantially exceeded, certainly on occasion, and perhaps "always".

I confess to wondering from time to time about what opinions prevail among the community of AM operators with respect to power levels at 100 percent modulation. I realize that the legal limit for 100 percent plate modulated AM transmitters had undergone a reduction from the days when 1,000 watts plate power input was the limit, and that there are undoubtedly amateurs who look upon this change with a sense of loss, possibly coupled with resentment.

When treating the matter of actual power levels employed and their relationship to the present legal maximum, is there the same philosophy, or perhaps doctrine, that became well known in early 1993 when reaching a compromise solution to an issue involving the armed forces, that being "don't ask, don't tell?"

Charlie Moizeau, W2SH

From the Editor:

Like Les, many of us 'AM'ers operate transmitters that are capable of exceeding the legal power limit. When other hams hear us describe our finals as being 833A's, 4-400's, 450TH's or other BIG tubes they sometimes think that we're operating illegally. For most of us that is not true.

Les operated at less than 1500 watts PEP output, the legal limit, but he sounded very loud because he had a good antenna system (a homebrew monoband beam) and he used a system of ultra modulation. N6CSW

# Amplitude Modulation International - November Update

by Dale Gagnon, KWII, President

## AMI Discovery Weekend Report

AMI headquarters received 14 reports for the September 8-10 operating event. KE7KK (Bill), K7IEY (AL), W8EPQ (Bob) and NØTE (Allen) qualified for the "Participant" level certificate with contacts on 160-40 meters. N1RBM (Dave), W2IQ (Hank), WA1EWQ (Gary), N7LEH (Bob) and WA3WBC (Ron) qualified for the "Participant Plus" level with additional contacts on 20 meters or on 10 and 15 meters. KD3HT (Steve), K1GUP (Jerry), KE7TV (Randy), N3RIL (Rick) and AC6GF (Gerald), earned the "Participant Primus" certificate, by making contacts in all three frequency segments.

Band conditions for 20 meters and above were rough, but long distance contacts were made on 15 meters. The 10 meter contacts were local. KD3HT and KE7TV led the field with approximately 50 contacts each. W8EPQ reported many of his contacts had misplaced their AMI numbers!

N1RBM deserves special recognition for making his contacts while operating mobile during the weekend. Dave reports SSB stations operating near his frequency were very courteous, in fact one promised to fire up his old AM rig in the future. AC6GF reported having a "blast" operating the weekend on the west coast. Gerald was so desperate for a 15 meter contact, he took 15 minutes to talk a local SSB station through the tuning process to put his rig on AM. This guy is now interested in getting on AM! WA3WBC sent a photo of his station at his girl friend's house. Apparently he has a military communication van with two T-368s parked there! The portable AM operation using a T-368 at the Gaithersburg Hamfest under call sign W3PRL was a highlight of the weekend on the east coast.

In spite of conditions, this Discovery Weekend was a success. There was significantly more activity than last year.

About half of the AM contacts were AMI members. From the sound of the reports, everybody had fun. Award certificates will be mailed in November.

## Announcing the AM Jamboree

Plan to operate on the Thanksgiving weekend, November 24-26. AMI headquarters will award certificates to all stations submitting logs with 20 or more AM contacts on any bands. Be sure to capture AMI member numbers. Special notice will be made on the certificates for operators who successfully brave the lonesome 15 and 10 meter band segments. To improve our chances of making contact let's use 29.010 +/- for a calling frequency on the hour and 21.325 +/- for a calling frequency on the half-hour.

## K6HQI Memorial 20 Meter AM Net

It is important to maintain the AM presence on this band. It would be a fitting legacy to Les's decades of commitment. It also is necessary because on 20 meters AM penetrates to parts of the country and world that do not have other amateur AM activity. All amateurs should hear amateur AM signals from time to time or they might fall for some future argument that AM is obsolete, a band hog, AM operators are old fashioned, etc. Les used to get on at 5:00 PM Pacific time which is mid-evening for the east coast. I believe a number of people elsewhere in the US show up at this time and when they hear no signals they sign off. This may be too early for many AM operators in the west. I suggest we listen and call on the half-hour starting at the regular time. I am going to try to get in regularly on Friday nights, if not more often.

## AMI Headquarters

Membership is almost 800. AMI brochures have been reprinted. If you need a handful for a club meeting, drop headquarters a line. Please send in address changes. If you have lost track of your AMI membership number send mail with SASE. ER

# A Speech Amplifier For Everyone

by Bill Mottes, WICKI  
4 Boldgett Rd.  
Stafford Springs, CT 06076

The problem many of our old rigs have with audio can be found in the speech amp and driver section.

The preamp section, usually a 12AX7, should be set up according to the "Radiotron Designer's Handbook" and the RCA tube manual's "Resistance - Coupled Amplifiers" charts or the 1963 ARRL Handbook, page 260, "Resistance - Coupled Voltage Amplifier Data".

The driver is usually a single-ended power amp and this can be a major defect. The driver transformer must carry the audio signal and the DC plate current of the driver. When a sufficient amount of audio is needed for 100% modulation the transformer saturates and distortion develops. The use of a push-pull driver circuit and a good driver transformer will eliminate saturation and provide plenty of audio for the modulator grids. The ideal transformer is a multi-tap interstage transformer sold by Antique Electronics, part number PT20A14, for \$21.95. This is an excellent transformer made by Thordarson.

The PT20A14 is used as a 3 to 1 turns ratio step down driver transformer and with 58 Hy per plate it has very good frequency response.

The secondary is paralleled by an 18K 1 watt resistor across the full secondary and also by a 1000 pF silver mica and a 1.8K resistor in series.

The mic input at pin 2 of the 12AX7 can be 2.7M for a plain D-104 or 270K for an amplified mic. At pin 2 use a 470 micro-Henry choke and a 30 to 60 pF bypass cap to stop RF from getting into the audio input. The leads connected to the tube socket must be kept very short

so they do not become antennas.

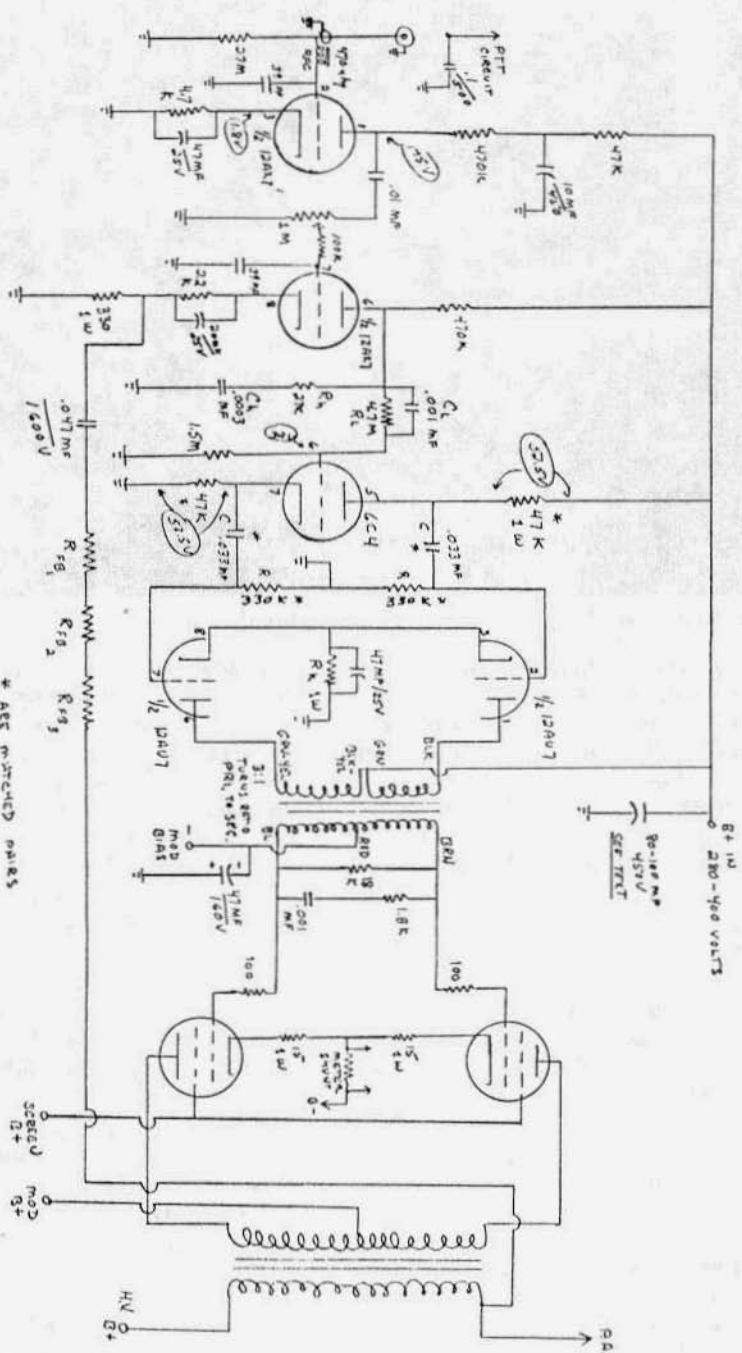
A 100K resistor is used to block RF at the audio gain wiper arm, again very short wire length is a must. If the old type shielded hookup wire is still in use in the gain pot circuit it should be replaced with RG-174U. Ground the shield at the tube socket end only, grounding both ends may cause ground loop induced hum.

The first cathode is bypassed with a large electrolytic to increase gain and to reduce hum. To decouple the first plate a 10 MF electrolytic will be large enough if the filter cap in the power supply is 80 to 100 MF or more.

In the audio shaping network, resistor  $R_h$  and cap  $C_h$  are used to cut the highs 6 dB per octave from 4 kHz to 8 kHz and 8 kHz to 16 kHz. The network  $R_l$  and  $C_l$  is used to cut the lows 6 dB per octave 120 Hz to 60 Hz and 60 Hz to 30 Hz, a 6 dB cut. The audio shaping network from Radiotron Designer's Handbook is used to assure a stable speech amp, an amplifier that will not oscillate or produce ultrasonics. Oscillations and ultrasonics produce considerable side channel interference and can destroy the modulator section of your transmitter.

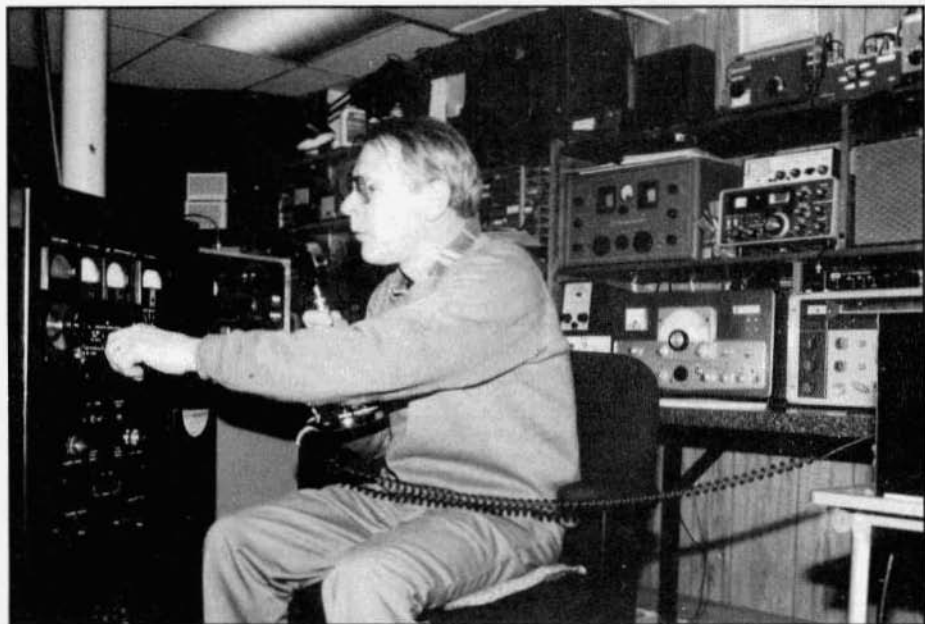
The plate and cathode resistors of the phase inverter must be matched pairs to prevent an unbalanced signal to the driver tube.

The driver tube cathode resistor will be determined by the value of the  $B+$  voltage. The resistor will have to be a value that will keep the plate dissipation less than the maximum value. The driver is a class A amp so the grid bias (voltage across  $R_k$ ) can be calculated.



\* ARE MISMATCHED PAIRS  
 R ARE 1/2 WATT  
 C ARE .050V  
 VOLTAGE MENTIONED WITH 315V B+ IN

Editor's Note: For a large-size schematic send a LSASE to ER.



The author, Bill Mottes, WICKI, tuning up his BC-610.

Class A bias =  $.66 E_p / \mu$  (12AU7  $\mu =$  approx. 14 when the total plate dissipation is 4.5 watts.) The grid bias, determined by the self bias cathode resistor  $R_k$ , would be 16.5 volts ( $.66 \times 350 / 14 = 16.5V$ .) The cathode current would be  $4.5 = (350 - 16.5) \times I$ ,  $I = 13.5$  mA. The resistance of  $R_k$  is  $(16.5V = .0135 \times R)$  or 1222 ohms; use a 1.2K ohm 1 watt resistor.

Feedback voltage is furnished by at least 3 resistors in series. Use at least three to withstand the high voltage from the modulator. Total value of 300K to 900K and a .047 MF @ 1600V cap. It is desirable to have as much feedback as possible. The signal must be in the proper phase or the amp will oscillate. If oscillation does occur then reverse the plate connections of the modulator tubes or increase the value of the feedback resistors. The feedback resistor and the 330 ohm resistor in the cathode form a voltage divider. With three 220K in the feedback line and 330 ohm in the cathode circuit, then about 1/2000 of

the modulator voltage is introduced in the cathode circuit as negative feed back.

I would suggest that if you are not familiar with feedback circuits you should consult someone that is. Wrong connections could destroy the speech amp and the modulator.

There is no secret to good audio, it is a matter of good design, proper coupling between stages and decoupling between B+ feed points and operating the tubes within their parameters. This circuit is being used in many Rangers, Valiants, Vikings, DX-100's and can be used in any AM plate modulated rig. ER

**John Shaw, K1DEU and Paul Frelick, WIECO also contributed to this article.**

**Parts supply sources are:**

Antique Electronic Supply - (602) 820-5411

Digi-Key Corp. - (800) 344-4539

Ocean State Electronics - (401) 596-3080

Mouser Electronics - (800) 346-6873



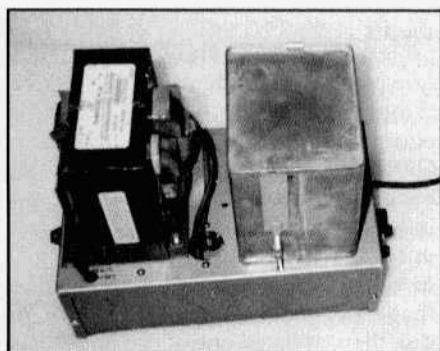
# A Source for High Voltage Transformers

by Berk Berkemyer, WØREP  
402 Kingridge  
Ballwin, MO 63011-2729

Many perfectly good transformers suitable for medium/high power amplifiers are being thrown away, and probably can be salvaged by the enterprising homebrew artist for little or no money. Every day older microwave ovens are being scrapped because the replacement magnetron costs more than a new oven. Most repair shops check a faulty oven, make an estimate to the owner and are told to throw it away.

Most of these units have similar transformers. A primary winding of #14 or #15 wire and a secondary of #26 wire and sometimes a three or four turn low-voltage winding. The output voltage is about 2200 VAC with one side grounded to the core. All connections are usually push-on terminals.

To use one of these transformers after recovering it from the scrap pile, carefully remove the grounded end of the secondary from the core. Work some insulating paper or tape between this lead and the core and tie the lead to a small, insulated standoff fastened into the threaded hole in the core where it

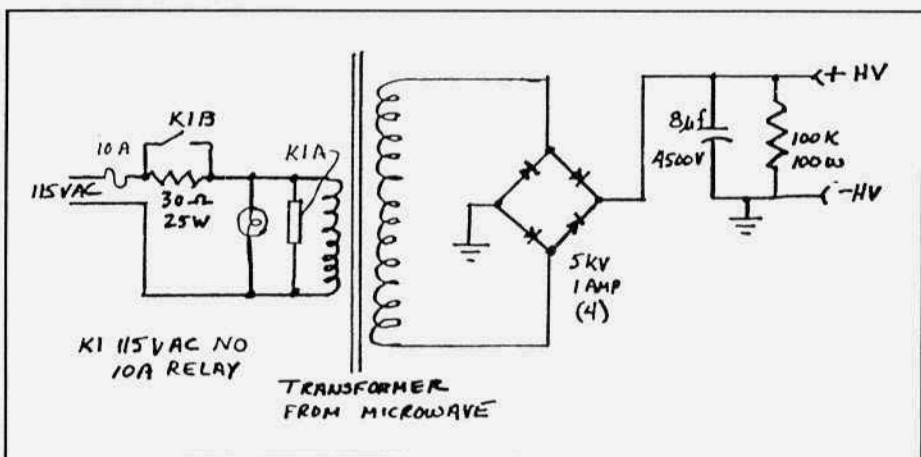


**A low-cost high-voltage power supply using a transformer from a microwave oven.**

was originally grounded. You now have a transformer which will furnish in the area of 1800 VDC at 350 or so milliamperes current when using a bridge rectifier. A few electrolytic caps in series or an oil filled cap from Fair Radio Sales (or elsewhere) and for perhaps \$30 you have a HV supply for those tubes you picked up at the last hamfest.

If you really want some power, search out two identical transformers. Now

continued on page 36



## The TMC GPR-92 Receiver

by Jay Spivack, N7JDT  
325 S. Washington Ave., Ste. 244  
Kent, WA 98032

Once in a great while we get our hands on a piece of gear which is clearly something very special. Just such a piece of equipment is the Technical Materiel GPR-92 general coverage receiver. I first encountered this unusual receiver during a foray to Los Angeles, California, in 1971. The expedition included a visit to Henry Radio which was located, at that time, on Olympic Blvd. Henry Radio, then, sported one of the finest used ham radio showrooms on the West Coast.

During the course of this particular outing, something really classy caught my eye. Kinda like seeing a Ferrari for the first time. You may not know it's a Ferrari, but you KNOW it's something special. And so it was with the GPR-92, one twist of its main tuning knob and the spell was cast. I was smitten, and the proud owner of the first of two GPR-92's that I have owned.

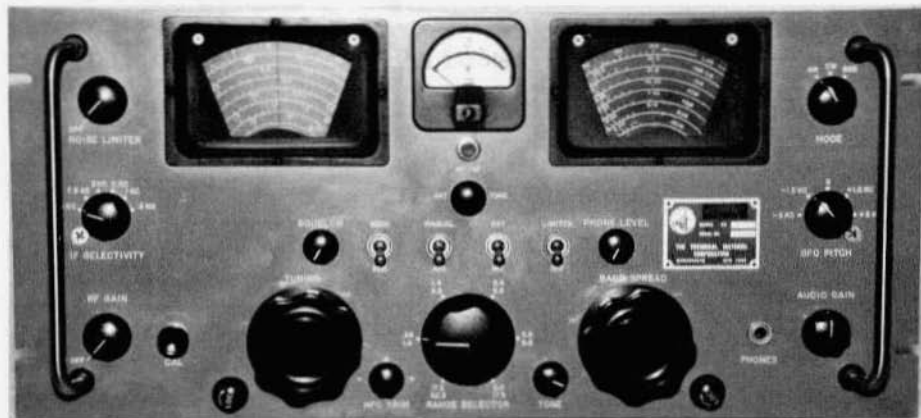
### Background

Technical Materiel Corporation was founded by Ray H. de Pasquale. Ray had been Chief Engineer of Press Wire-

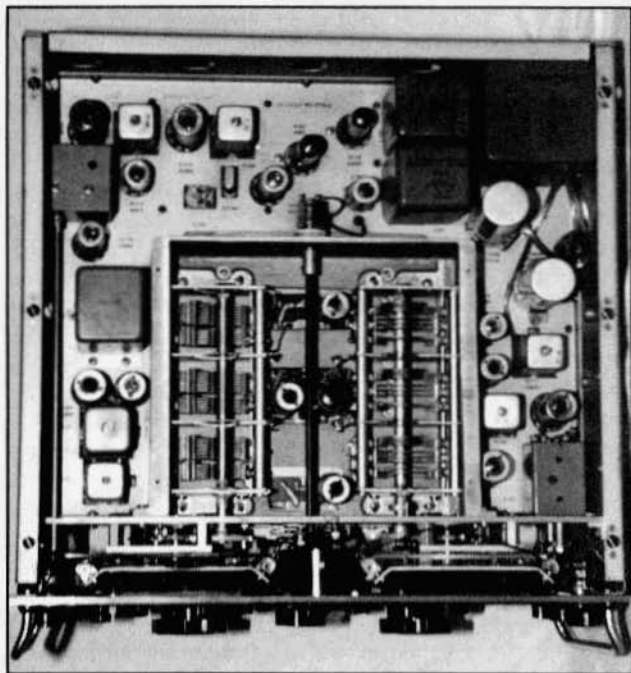
less, who was a supplier of large transmitters to the U.S. Government during World War II. Later, when Press Wireless was about to cease operations, Ray started TMC. Since the 1950's TMC has designed and produced some of the most beautiful communication gear ever made. Neil de Pasquale, his son, now carries on the tradition from his headquarters in Mamaroneck, New York.

The GPR-92, the successor to the GPR-90, was designed in 1963 by chief engineer Frank Budetti, assisted by Mr. Ollie Pose. The receiver was to fit the niche of having high sensitivity, low noise, superb selectivity, good stability and SSB capability. Additionally, advanced features such as dual-diversity reception, IF outputs and inputs, and ganged AVC capability were desired.

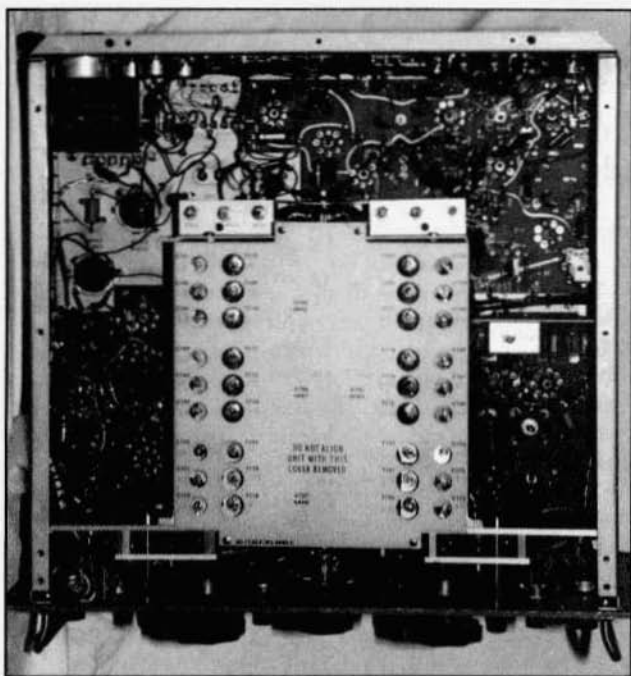
The receiver produced met all the criteria above and then some. Its basic starting price was \$920, less options. Why only 115 of these gems were produced is hard to understand. Neil de Pasquale feels that part of the reason was that the Collins S-Line, which came



The front panel of the GPR-92 is almost identical to that of the more common GPR-90.



Top side of the chassis.



Underside of the chassis. Note the printed circuit boards.

out about the same time, offered both a receiver and transmitter package which helped eclipse the GPR-92.

### Overview

The GPR-92 is a high-performance 18-tube superhetrodyne receiver employing dual conversion and a frequency range of .54-31.5 MHz. With an input noise figure of less than 5 dB and a sensitivity of 1 microvolt, the receiver is particularly suitable for reception of weak signals.

The receiver also features a product detector, an adjustable squelch, two stages of RF, two separate noise limiters, and variable IF selectivity ranging from .5-15 kHz, employing crystal filter circuitry.

Available at the rear of the unit is IF, AVC and BFO outputs plus HFO input, diode load, and squelch operated relay contacts.

It is worth noting that the receiver can be operated on 115-230 volts 50-400 cps.

### Circuit Description

The GPR-92 has two stages of RF (a 6DC6 and a 6BA6), the first mixer downconverts to 3955 kHz on the upper bands, and 455 kHz on the three lower bands. The second mixer downconverts the upper bands to 455 kHz. Between the second and third IF there is a self-adjusting series style RF noise limiter.

---

## The R326 Receiver

Oscar Steila, IK1XPV  
Via Bardonecchia 83  
10139 Torino, Italy

The end of the spring time brings the local hamfest to Torino, North West part of Italy. The Radio Expo Torino is organized by a technical school and is located in a building at the city exposition center. It's mainly an exposition of commercial equipment and components related to hams. It begins on Saturday morning and I was at the opening gate to enjoy its 9th edition.

During the first scanning between the tables I got two original boxes of 120 FT-243 crystals for \$6 each, a good start! Then I saw some CPRC-26 (Canadian walkie-talkies) at \$30 and a GRC-9 at an incredible \$400!

Looking around there was a lot of modern silicon, plastic housed, but that is not so interesting to me.

An Italian popular electronics magazine had the good idea to show working models of the first Marconi radios. It was unusual and wonderful to see a spark transmitter of that kind.

After four hours of walking around I was just ready to go home. Then on the rear of a table I saw some metallic boxes of the dimension of half a BC-348, painted in light cyan-grey color, completely closed. The seller told me they were Russian HF receivers, nothing more. Looking at one of them I opened the front cover and saw a square optical film ocular and some Cyrillic labels. I was attracted by the mechanical design before knowing of the electronics inside. The price agreed seemed to me a bit risky, but the look was exotic enough to lead me to buy. Together with the box I went home with a bad photocopy of the electric schematic and the original AC power supply. The real discovery of the radio started at home.

My very patient wife and children (our first harmonic Paolo is IK1YMP, the three daughters are not yet 'neutralized' recognized the 'tight pistons' disease and gave me the Saturday afternoon time to play with the radio.

I was careless and I connected headphones and switched it on, without any precaution. The R326 or P326, depending on Cyrillic alphabet, glowed and the audio started immediately in a few hundred milliseconds. I was surprised a little because of the fast start while the schematic shows all tubes, but the article by NODMS, "The Forgotten Science" in ER #73 I had just read, helped me to understand the miracle. It uses 19 miniature tubes with direct heating in all the functions except for the DC-DC converter and the external AC power supply stabilizer that uses three germanium power transistors.

After the first cleaning and power checking, the R326 radio continued to work perfectly as at the first try.

The schematic shows a double-conversion super heterodyne receiver, covering the 1-20 MHz range in the following bands: 1-1.92, 1.92-2.8, 2.8-4.3, 4.3-8.7, 8.7-12.0, 12.0-20 MHz. The first IF is at 2.2 MHz or 460 kHz and the second at 215 kHz. The radio label is "P-326 N 898226". I was not able to find any date inside but I suppose it was designed during late '60's.

The design uses two RF stages. The first mixer heterodynes the input signal with the buffered variable oscillator output. Each of the stages has a tuned circuit. The band change mechanism is based on a rotary drum similar to the SP-600, but smaller. Each input tuned circuit has a trimmable inductor and capacitor, while the oscillator components are not placed on the rotary drum. The RF stage tubes are inserted through the separation shielding. The oscillator inductors and capacitors are inserted into the double-shielded oscillator compartment. These inductors don't have



**R-326 receiver with open front cover. The AC power supply is on the left.**

trimming capability. A second mixing stage converts the signal of the first IF amplifier to the final IF, that includes a variable selectivity filter.

The front cover has a tuning control, a band selector, an AGC selector (off, AM, CW-SSB), a mode control (AM, CW-SSB variable BFO, CW-SSB fixed BFO), a BFO tuning control and dial ( $\pm 3$  kHz), a gain control and a selectivity control (continuous from 300 Hz to 6 kHz). On the left there are the antenna connector, an input antenna trimmer and the dial light switch. On the lower part of the front panel two output sockets carry the demodulated audio signal at an output impedance of 600 ohms. At the first look at the front panel, I confess that I assumed the lower left knob to be the volume and the lower right one to be the RF gain, because it looked like a potentiometer. Turning it and looking at the schematic I realized that the gain control works at IF and RF

level only. There is no volume control. It forces the operator to use the detector at the right level.

The right knob is a selectivity control acting on a single quartz filter with a double-tuned circuit. The other six tuned circuits shape the actual selectivity. The knob controls a gear that operates two variable capacitors with opposite spins. The effect is a very pleasant, smooth, variable selectivity control.

The R326 is a very rugged piece of equipment. The radio is housed in a metal moulded case with detachable front cover. A top leather handle helps to move its 12 kilos.

On the rear a bakelite holder opens to house two batteries. The operating voltage is 2.5 volt with 1 A drain, (yes, 2.5 watts!!). The two batteries were probably of nickel cadmium type. The size suggests some ten amps capacity. Luckily, the AC power supply feeds the radio also without the batteries. The radio is fully and heavily shielded and all the mechanical design is really wonderful: you can imagine that a signal tuned at 20 MHz returned to zero beat after a band change, with a precision far better than 100 Hz. The frequency drift is less than 100 Hz/hour.

The shielding is so effective that I was not able to detect any radiated signal, oscillator, or BFO going out from the radio.

All the controls are sealed using a leather pressed ring tightened with screws and a metallic pressure ring. All the labels are written in Cyrillic, using a removable marker; probably a way to adapt the radio easily to operators of different languages. In fact the electric schematic I got shows some words in a



Front view of the R326

Latin alphabet, Latvian or another similar language.

The tuning control is good also in SSB and CW, a two-speed epicyclical knob drives the tuning gears. The dial behind the tuning control offers just a rough frequency indication. The fine one is obtained with a film projection from the rear of the equipment to the front ocular. The lamp on the rear can be switched off, for night operation, while a second lamp is ready to operate by just turning an external control for back up.

Close to the fine tuning indicator there are two pairs of adjustment screws, used to align the oscillators and the tuning dial. Two, because imaging and other tricks allow the oscillator to use only two fixed inductors and trimming ca-

pacitors. I suppose that the screw that moves the ocular dial reference operates instead of inductor trimming for the dial tracking.

The radio has no calibrator inside, while the dial has 2 kHz marker spacing on 80 meters and 10 kHz on 20 meters.

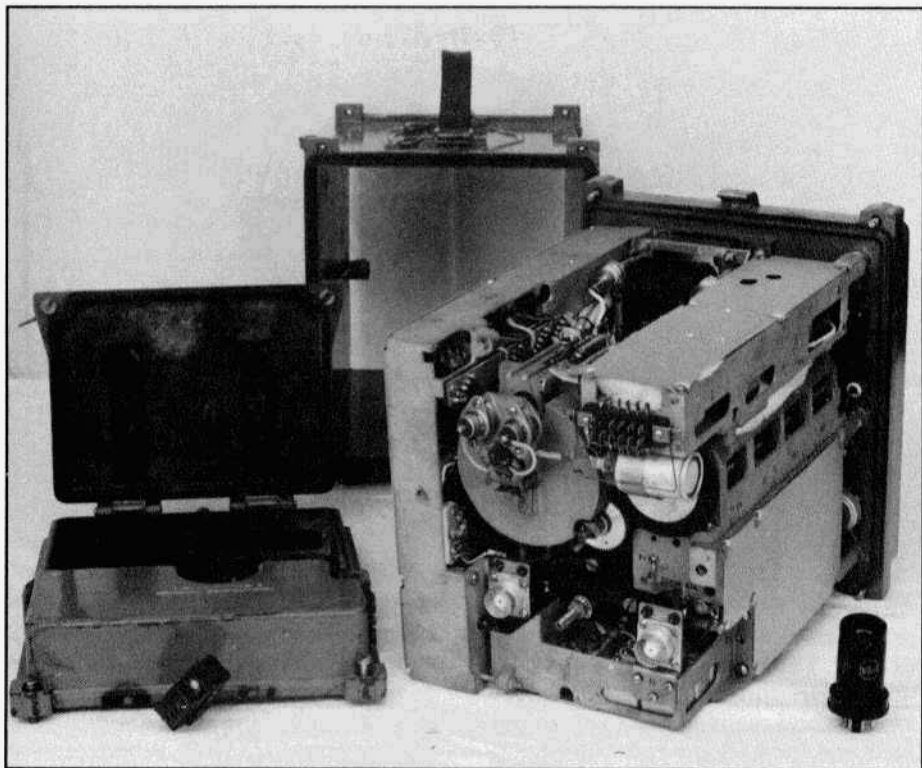
Going inside the radio, I realized the most astonishing fact. ALL the IF inductors are fixed using a heavy solder point, that looks quite impossible to remove without destroying the inductor itself. I am trying to get the technical manual, via some Russian ham, to understand if there is a provision for realignment, and in which way. The unit I got is performing very well without any realignment. I suppose this solution has been implemented against vibrations or against spurious radiation.

On the back of the radio, internally located, there are two connectors that carry out the first IF, I suppose for a panoramic display, and the output of the second IF, I guess for different demodulators.

There are some minor drawbacks: no signal strength indicator exists and an annoying whistle comes from the internal DC-DC converter (transformer?), that at the moment I have not been able to fix.

AM reception is fine and in SSB the radio sounds to me better than modern receivers like TS50 or IC725. I suppose that the less sharp filter has a lower group delay distortion. I don't know if it's true, but starting from June '95, R326 is my preferred all-mode receiver.

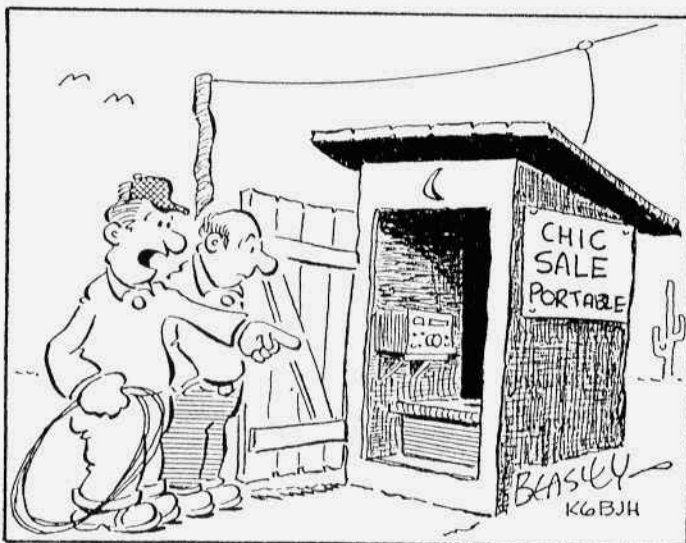
To make a long story short: on Sunday I went to the exhibition again to buy the second R326 for spare parts and



The open box on the left is the rear battery compartment. Notice the two dial projection lamps and the two auxiliary connectors.

future maintenance. I hope you too are able to find an R326, it will be an interesting discovery. I hope to be able to find some companion TX equipment for fully exploiting my Russian CW station.

If anyone has additional information regarding this set please write me. **ER**



EARTH GROUND IS JUST DOWN THERE ABOUT 10 FEET, BUT I SURE AIN'T GOIN AFTER IT!

## Station Accessory Extraordinaire, The Monitone

by James R. Buchanan, K8WPI  
9549 N. 17th St.  
Kalamazoo, MI 49004

One of the losses in technology from current equipment to the classics is knowing what you sound like on the air. I will admit that some of my newer gear which has "monitor" capabilities has been very handy on many occasions. I also remember what it was like in 1960 when I was first licensed as a novice, confined to CW on HF and phone on 2 meters.

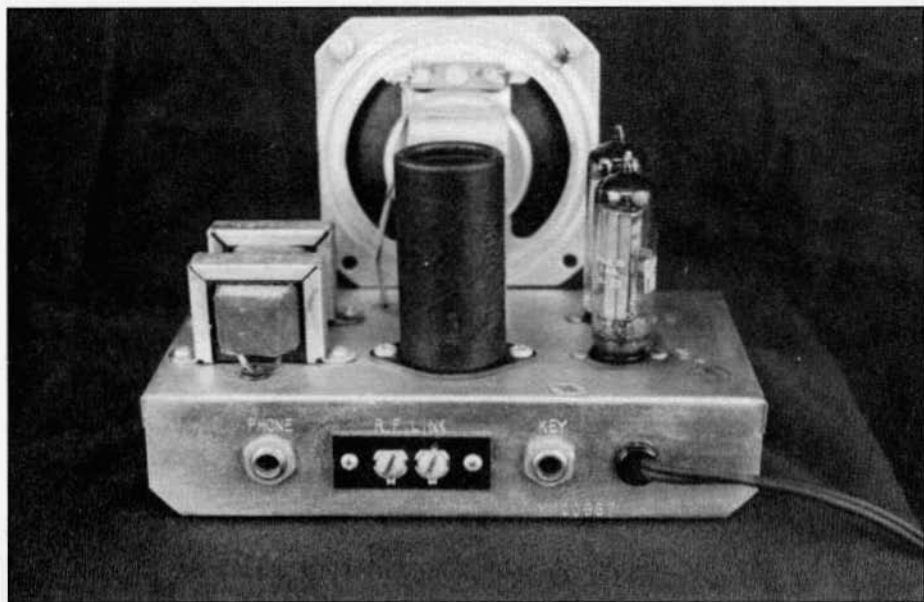
I started off with a DX-20 and AR-3 receiver. The AR-3 was, I feel, totally unsuited to actually making contacts on the amateur bands. It marginally sufficed as an SWL receiver, but trying to tie a transmitter to it left much to be desired. I acquired a Mohawk, (RX-1) with VHF converters within a few months, and really began to make contacts and increase my code speed.

The only way I had to monitor my CW not only for quality of transmitted signal, but also for character generation, was to turn the RF gain of the receiver down and listen to my own signal off the air. I believe this was a fairly common practice at the time. I thought about the possibility of damaging the receiver from overload, and decided that there should not be a problem. The "off the air" monitoring really was quite acceptable, and it also allowed me to evaluate the quality of the DX-20's output. The only real inconvenience was since all novices were rock-bound, you seldom worked another station on your frequency. You would have to tune around after calling CQ, realizing the responding station would probably be a few kHz away. When respond-



Front of Gonset Monitone. Red flocking on the speaker grille and corresponding red knobs highlight the front wrap-around panel. Dimensions are 6-3/4" wide, 5-1/4" high, 4" deep.





Chassis top layout is very similar to AC/DC radios of the day, with fewer tubes. Note the "pre-rivet" hardware.

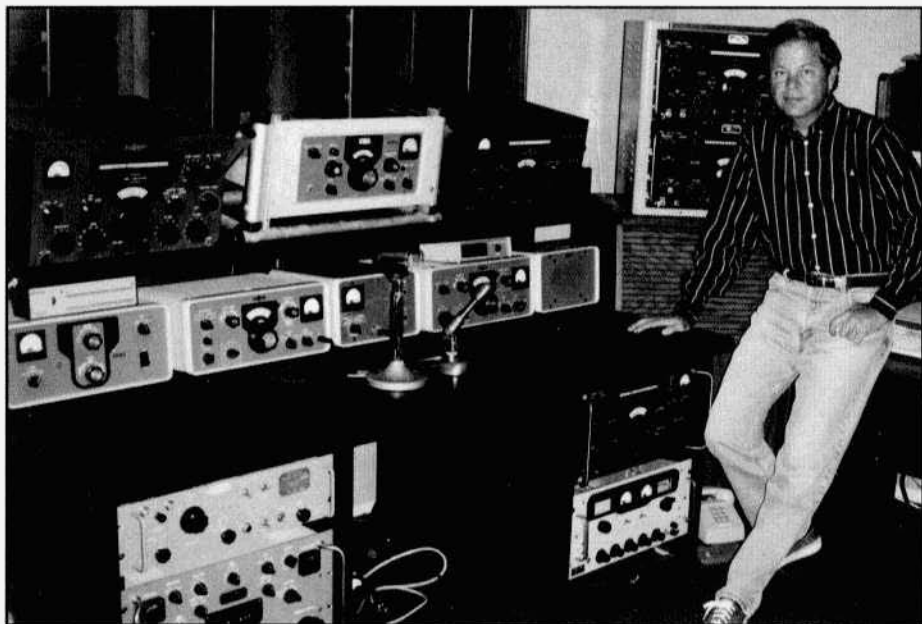
ing to a CQ, long calls were required, and I always hoped the station would stumble across me before someone else. This was more a game of skill, or quite likely dumb luck, as opposed to today's common practice of whoever is loudest gets the response. The obvious inconvenience was having to retune the receiver between transmission sequences, not much of a problem at 5-8 WPM, using typical novice communication ability.

As I gained proficiency in CW and conversational mannerisms, it became more difficult to adequately monitor my signal. Graduating to more sophisticated receivers and transmitters didn't seem to improve the situation any. The "real radios" would mute the receiver by any of a number of means, such as lifting the power transformer center tap when you hit the T/R switch. Some transmitters would provide a relay to open the audio line to the speaker when the transmitter was keyed. Things were looking grim.

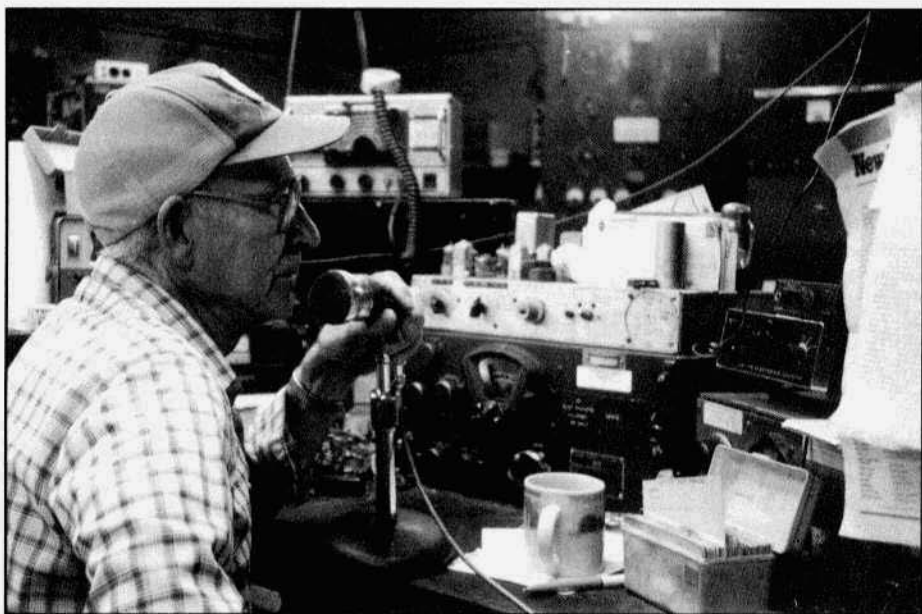
The most recent marvelous breakthrough in technology, the electronic keyer, was making a big splash. The Hallicrafters TO-1 was highly desirable, and it offered a "sidetone". Sidetone was a new word back then, but we knew what it meant, you had a monitor of your CW! Well, not only was the TO-1 out of my league, there was the philosophical aspect of manually generating the characters instead of having a machine (with no soul) do the work. There were many animated conversations to be heard on the air and at club meetings debating the virtue of a good fist and the tireless effort of "automated CW".

There was another option from Gonset, the "Monitone". In the 1962 ARRL Handbook, the two-page Gonset ad feature the new Communicator IV, GSB-201 linear, the 6, 2, 1-1/4 meter VFO, the GR-212 receiver, Super 12 mobile converter, G-76 HF transceiver, G-50 6 meter transceiver, GC-105 "gooney bird" and the monitone.

The monitone was made to meet the



Phillip Harris, WB6MYL, in his ham shack which consists almost entirely of Collins equipment. In a recent letter he said, "Of all the receivers I have heard, the warmest sound comes from the R-390A with the TMC CV-591 sideband adapter." *Photo courtesy of K. Fujimura.*



Bill Dolvin, W8VYZ, AKA "Ashtabula Bill" in his ham shack. He is one of the most well-known and best-liked AM'ers in the country. *Photo courtesy of NIHXA.*



John Vercellino, WB9OVV, at the Dayton Hamvention this year. He says, "How can you not be in a good mood when you're at the greatest gathering of hams in the world and it's not raining!"



Van Vanvick, WAØBGL, Sedalia, Missouri, at the corner of his shack dedicated to 160 meters. Many other vintage pieces grace the two ham shacks at his home. *Photo by WAØLEU*

## Running Dynamotors With Computer Grade Supplies

REF: Recent telecons with several collectors

Robert W. Downs, WA5CAB  
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Houston, TX 77043-2410

I recently had a lengthy telephone conversation with a fellow collector of military sets which eventually got around to the fact that he couldn't run (or at least start) a DY-88/GRC-9 dynamotor on a 12 volt/50 amp 'computer grade' supply that he has. During the course of the conversation, he mentioned that someone at Fair Radio had told him that they had had several similar complaints, and (he said) had even accepted return of equipment as defective because power supplies clearly rated to run it wouldn't.

A dynamotor is a DC motor which has one or more DC generator windings on a common armature (rotor). The motor and generator windings share a common field winding (stator). An inverter differs only in that the generator (inverter) portion produces AC rather than DC, and an inverter usually has some type of speed regulation independent of any voltage regulation to maintain constant frequency output. A DC motor draws much more current to start than it does to run. This is called the starting, or surge, current, and is typically three to ten times the rated full-load (motor) current, depending somewhat on the size and type of motor. In the worst case, it is equal to the locked rotor current; the current which would be drawn if you locked the rotor so that it couldn't turn, and applied full rated voltage. In the practical case, the surge current is usually limited to a lesser value by the inductance of the windings, and decreases as the rotor starts to turn. The peak current will generally be drawn for only a few milliseconds to a

few tens of milliseconds. For dynamotors and inverters between 150 and 1500 watts, 3X is generally a safe assumption, if the machine is in good condition.

Unregulated DC supplies, such as the PP-1104/U, rated at 28V/50A or 14V/100A, typically have a surge current capability of 300% (3X) of the continuous full-load rating for several hundred milliseconds, and are fused accordingly. The PP-1104/U will successfully start the dynamotors used with the AN/ART-13, AN/GRC-19, BC-191/375, and any smaller set. Solid state regulated supplies built from the early '70's on, often referred to in the literature as 'computer grade', are usually current limited at the full-load current rating, to protect the pass elements (the transistors which provide the regulation). They will not successfully start a DC motor whose full-load current rating approaches their full-load current rating, unless they are temporarily bridged with a battery or other high current source device, because the current limiting circuit, which overrides the voltage regulating circuit, acts to reduce the output voltage to limit the output current to an acceptable range. The technique is often called 'fold back'. The output voltage 'folds back' to near zero, and the motor never starts.

Besides the rapid response of the current limiting circuit, there is another basic difference between the two types of supplies. The filter capacitors are normally bridged across the output of the older unregulated supplies, and provide some of the surge current capability. In the solid-state regulated supplies, all of the hum filtering is gener-

# VINTAGE NETS

**Westcoast AM Net:** Meets informally, nightly on 3870 at 9:30 PT. Wednesday at 9:00 PM PT they have their formal AM net which includes a swap session. Net control rotates.

**California Early Bird Net:** Wednesday nights at 8 PM PT on 3835.

**Southeast Swap Net:** Tuesday nights at 7:30 ET on 3885. Net control is Andy, WA4KCY. This same group also has a Sunday afternoon net on 3885 at 2 PM ET.

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

**Northwest AM Net:** AM activity daily 4 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.

**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. Net control varies with propagation.

**Arizona AM Net:** Meets Sundays at 3 PM MT on 3860. On 6 meters (50.4) this group meets at 8 PM MT Saturdays.

**Colorado Morning Net:** An informal group of AM'ers get together on 3808 Monday, Wednesday and Friday mornings at 7 AM MT.

**DX-60 Net:** This net meets on 7290 at 2 PM ET, Sundays. Net control is Jim, N8LUV. This net is all about entry-level AM rigs like the Heath DX-60.

**Military Net:** It isn't necessary to check in with military gear but that is what this net is all about. Net control is usually Walt, KJ4KV, but sometimes it rotates to other ops. It starts at 5 AM ET Saturday mornings on 3885.

**Westcoast Military Radio Collectors Net:** Meets Fri. at 2200 local on 3990 and Sat. at 0800 local on 3990 + or - QRM. Net control is Tom, WA6OPE or Andy, KD6TKX.

**Grey Hair Net:** The oldest (or one of the oldest) 160-meter AM nets. It meets on Tuesday nights on 1945 at 8 PM in the winter and 9 PM ET in the summer.

**Vintage CW Net:** For CW ops who enjoy using vintage equipment. This is not a traffic net, speed is not important. The net meets on 14.050, Saturdays at 1 PM PT. Net control is Tracy, WB6TMY.

**Vintage SSB Net:** Net control is Chuck, N5SWO. The group meets on 14.293 at 1 PM CT, Sunday afternoons.

**Collins Users Net:** The oldest of the 'users nets'. It meets on 14.263 Sunday afternoons at 2 PM CT. The net control revolves. This group also gets together for an informal ragchew on 3805 Tuesday evenings at 7 PM CT.

**Drake Users Net:** Another relatively new net. This group gets together on 3865 Saturday nights at 8 PM ET. Net controls are Criss, KB8IZX; Don, WZ8O; Rob, KE3EE and Huey, KD3UL.

**Heath Users Net:** A new net started by Marty, WB2FOU/5. Net control is shared by Fred, AA5LW. It meets on 14.275 at 4 PM CT Sundays. Check in on either AM or SSB.

**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 has been meeting since 1978.

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

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

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

**Southern California Sunday Night 6 Meter AM Net:** 8 PM Sundays on 50.4. Net controls are Dan, KV6I and Scott, K6PYP. Informal, supports restoring old gear and using it on the air. Loan gear available for those wanting to join in.

**Westcoast 40-Meter Sunday Net:** Net control is Bob, K7POE. The group meets on 7160 starting at 4 PM PT.

# The National NC-100 Receiver Family

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

Warning! This story contains a Mystery. Read at your own risk!

It's funny what kind of things I can recall sometimes. I remember a bright, breezy, warmish April day in 1984 at the Dayton Hamvention when I attended a lecture by John Nagel about old National receivers. It was in one of those stuffy meeting rooms off the corridor by the bar, and it was packed, standing room only. John had some nice slides and a good story to tell; I don't recall the details. But it inspired me once I made my way back out into the flea market to retrace my steps to the southwest arm of the lot and buy that old NC-200 that I had earlier seen languishing on the blacktop. I loaded it into the trunk of the old Pontiac, and when I arrived home in Columbus at the end of the day, sun/wind burned and with my legs aching all the way up to my knees, I left it there until the family had turned off the TV and gone upstairs to bed. Then I snuck it through the family room and kitchen and downstairs to my basement inner sanctum, hoping that my wife wouldn't notice or wouldn't complain too loudly about another boat anchor that I had just brought home. Great gal that she is, she never did.

Even as I look at that NC-200 today, now sitting front and center on my operating desk between the 75A-4 and the Drake Twins, it still gives me a warm-all-over-feeling. What a thrill it must have been for its original owner to bring it home back in 1940. I can see him opening that big, heavy, cardboard box from National, pulling out the rectangles of slivered wood packing material, and finding nestled in its midst his

brand new Silver Anniversary NC-200 and its ornate matching speaker. How many times, in those dear departed days when radio was king, did he gaze into its great, "watch-crystal" dial and see in his minds eye the 40 meter CW band spread out before him, or picture the OM's he was ragchewing with on 75, or imagine the characters and setting of a shortwave BBC drama. What must it have been like for them during the war. Did he pack it carefully away and store it in his family's attic while he went to fight? Did they have a joyful reunion when he returned home, a little older and much wiser but even more anxious to get back on the air? Or perhaps he stayed at home and monitored signals from the German and Allied forces in Europe or listened to those shortwave broadcasts from the BBC with their cryptic messages to partisans behind enemy lines. What a time to be listening on the air with a solid receiver like that NC-200!

As you can no doubt tell, I really am fond of my NC-200. Readers of ER will recognize my affection for National receivers from the Jim Millen era. In just a few short years under Millen's guidance, National brought out the SW3 and FB7, small receivers gauged to a depression pocketbook, and then took a great leap forward with the fabulous HRO. But what do you do as a follow-on act to the HRO, the best communications receiver that cost-is-no-object technology could produce in 1935?

The first hint of what Jim Millen and Dana Bacon were up to appeared in a National insert in the October 1935 QST. It describes the new National catalog and some products therein, and says in part, . . . (The new catalog) is unusual not only because of the products it describes, but even more so for the products it does not describe. For instance, it



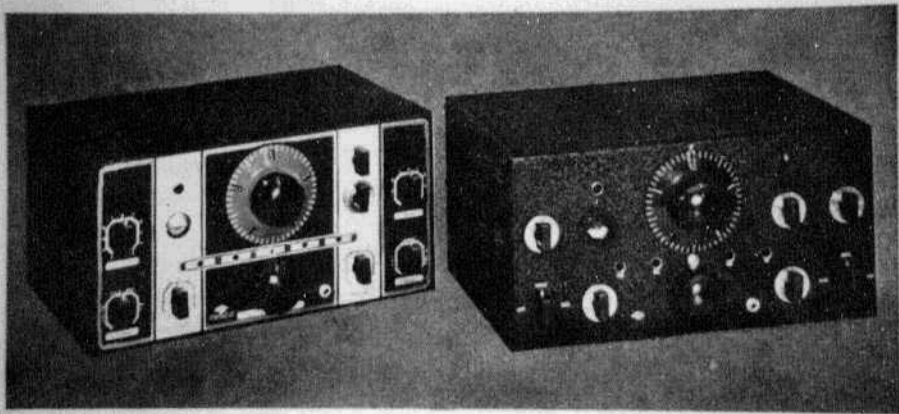
NC-200 and original speaker.

does not list our new amateur receivers. These receivers are not yet in production, and until they are, we are not going to say much about them. We will say this much in explanation: one of the new receivers employs automatic plug-in coils. Turning a knob on the panel plugs in each of the six coil ranges in succession. The system combines the efficiency of plug-in coils with the convenience of coil switching, and from almost every viewpoint it is the ideal system. However, in order to sell the new receiver for less than \$100, we are obliged to build such special manufacturing equipment that we are not promising yet just when deliveries will begin. We are working on a definite schedule but because we are determined to do a darn fine job at any cost, we are not making any announcements until the set is actually in production."

What Millen, Bacon and the National engineers did in developing the NC-100 appears to have been directed, not specifically at the amateur market, but at the growing commercial and consumer demand for a well-performing short wave receiver. In contrast to its HRO, AGX and FBX predecessors which

were all black boxes with crystal filters, plug-in coils, amateur bandspread, separate power supplies (to reduce hum), and modest audio output, the original NC-100 was quite different. To start with, it was pretty. Its panel was a bright, enameled red punctuated with vertical, metallic silver stripes. It offered five (instead of the earlier predicted six) bandswitched, general coverage only ranges covering from 540 kc to 30 Mc. Its National NPW dial and worm drive mechanism, inherited from the HRO, provided adequate mechanical spread, akin to the HRO on its general coverage ranges and, according to early ads for the NC-100, actually better than the FB7 even using bandspread coils! The NC-100, bowing to consumer demands, included a built-in power supply and ten watts of push-pull 6F6 audio, but a crystal filter was an extra cost option offered in the NC-100X model, and instead of an S-meter it had a green "magic eye" tube adding even more color to the panel. While the NC-100 was bandswitched, Millen and company had devised a way to retain the advantages of plug-in coils. In the bottom of the receiver, they included a cast

## NATIONAL *High Frequency* RECEIVERS



**THE NC-100**

**THE NC-101X**

The original NC-100 and NC-101X with tuning eyes, from the 1938 ARRL Handbook.

aluminum, sliding, catacomb rack which held each coil and its associated trimmer capacitors in a separate, shielded compartment. Each coil compartment had studs in its base which would make contact to phosphor bronze spring fingers that hung down from the base of the tuning condenser. To select a band, the operator turned a knob at the bottom center of the front panel which drove the catacomb rack across the bottom of the receiver until the desired coils were in place. The five tuning ranges covered by the NC-100 were 0.54 to 1.3 Mc, 1.3 to 2.8 Mc, 2.7 to 6.4 Mc, 5.9 to 14.4 Mc, and 13.5 to 30 Mc. Had this receiver been equipped with the originally planned six ranges, they probably would have been the same as those on the HRO. But that was not to be for several years as we shall see.

Even with what must have been a more expensive bandswitching mechanism, the NC-100 was initially priced at \$104.95, \$118.10 with speaker, and was quite competitive against the RME-69 at \$134.90 with speaker, the RCA ACR-175 for \$119.50 without speaker, and

the HQ-120 which came out at \$129 in 1938. Howard and Hallicrafters offered any number of 1 RF, 2 IF superhets that were much less expensive than the above four sets, but they were built from relatively flimsy broadcast receiver tuning condensers and other parts and were mechanically much less robust.

As things turned out, the NC-100 spawned a prolific family of sliding coil receivers for National. The first addition to the clan showed up in QST in December, 1936 as the black-boxed, 160 through 10 meter amateur band only NC-101X. The copy, written by Jim Millen, is titled "Special" and says, "Recently I made an extensive trip around the country during which time I discussed with many amateurs their receiver problems. The enthusiastic interest in a special bandspread receiver the laboratory designed for me some time ago, leads me to believe that such a receiver would be welcomed by many amateurs. Therefore we have made a limited number of these special receivers which are now available through





### THE NC-100XA

Continuous coverage from 540 KC to 30 MC with ample bandspread on amateur frequencies. Has noise-limiter, full-vision dial and crystal filter. List Price \$237.50 with speaker

your regular National dealers. The price (retail price, complete with tubes, crystal filter, 10" dynamic speaker chassis, etc, \$125) is unusually low, because the standard NC-100 tools as well and the standard HRO laboratory test equipment are used for the production and testing of these strictly amateur receivers, the only new tooling being the blanking die for the 'trick' condenser plates necessary for Straight Frequency Line tuning over the calibrated band spread ranges." That limited run became one of the more popular receivers of its day, and the 100/101 numbers carried over into the later day NC-300 and NC-303 which were National's next set of premium, ham band only receivers.

In that same December 1936 *QST* is an article by Jim Millen, "A Moving-Coil Tuning system for the High-Frequency Receiver". Millen goes to great length to point out the virtues of the new automatic plug-in coil mechanism and details some fine points such as

having the coil catacomb run on insulated bearings to avoid generating RF noise, using small switches to shut off the screen voltage from the RF tubes while the coils are being shifted, and using a double side-wipe design with four-point contact on the connecting springs which "locks the coils into exact position with unmistakable finality." He also uses the better part of two paragraphs to hit the highlights in the circuit diagram of the new receiver.

More changes were afoot for the new receivers. The following appeared in *QST* for June, 1938. "National announces the NC-100X in new dress, NC-100XA. Particularly notable is the new (lighted) dial with direct reading calibration in Megacycles. The pointer is ganged to the band-change mechanism and moves radially to point directly to the proper scale. An additional high-speed dial reads to one part in a thousand, for accuracy in logging. Other changes include the use of a meter for signal strength measurement instead of a



**The Mystery Receiver, an NC-100 spinoff. White dot indicates it's on the 1.3 to 2.8 MHz band.**

'magic eye' and complete restyling of the cabinet. Although the time-proven chassis remains unchanged, the cabinet has been made slightly larger to accommodate the dial. The new models will be designated the NC-100XA and the NC-100A. Older models can be factory-rebuilt to include the new features at a net cost of \$25, by arrangement through your dealer." And in the same issue, the inside National one-page ad written by Jim Millen said, "...The NC-101X strictly amateur band receiver is being changed so as to replace the 'cat's eye' with an HRO type 'S' meter." The calibrated dial, however, was not yet offered on the NC-101X.

The August 1938 QST one-page National ad showed the circuit used for the new S-meter in the NC-101X and offered an auxiliary S-meter in a sloping panel mounting case, SM80, for \$6, "in case you don't want to chop a meter-sized hole in the front panel of the receiver." S-0 corresponded to 2.5 microvolts, S-9 to 8.2 microvolts, and full scale to 65 microvolts.

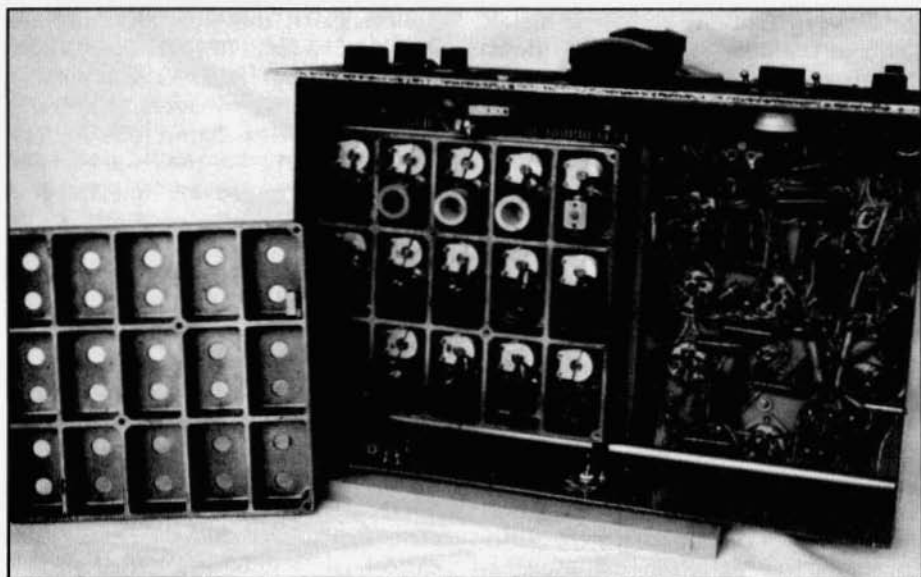
In August 1939, the QST ad, now signed by Dana Bacon and William

Larkin, announced, "While we are on the subject of receivers, we want to point out that the NC-101X amateur communications receiver is now also available with the direct reading dial used in the NC-100XA. The NC-101X is not being discontinued, however. Many operators prefer the PW micrometer dial, some like a direct reading dial. Take your choice."

And in October of 1939, the receivers acquired a noise limiter. Dana Bacon, in the May 1940 QST, offered to install a new noise limiter and to modernize the receiver, updating it to an infinite impedance detector, improving the tone control and adding an S-meter, for \$32.50. When was the last time we saw a modern manufacturer offer to update one of their transceivers with the latest bells and whistles so we wouldn't have to buy a new one?

Also not to be overlooked are "battery" models of the above receivers. They have a single 6F6 producing 2 watts of audio and no internal power supply. They operate from 180 volts at only 35 mA.

In 1940, after Jim Millen had left Na-



**The Mystery Receiver, bottom view with coil catacomb cover removed. To service the other side of the receiver, just move the coil catacomb.**

tional, the National engineers introduced my NC-200 which combined the best features of the 100 and 101X lines along with a major face-lift in the looks department and at a price of only \$147.50. Dana Bacon, W1BZR, and Jack Ivers, W1HSV, were the electrical design team, and Bill Larkin contributed most of the mechanical design. They returned to the six general coverage ranges originally planned for the NC-100 family, with ham bands at the top of the four highest short wave ranges as used in the HRO. With the addition of another set of trimmers, a few more coil contacts and four more detent stops on the coil rack drive, the NC-200 was then able to offer both the full general coverage of the NC-100 and the amateur bandspread of the NC-101X. It used the HRO's scheme of switching-in ham bandspread at the top of each coil set's tuning range. As a result, aligning an NC-200 is quite akin to doing the job on an HRO. Other electrical improvements include a variable threshold noise limiter, the same type of five-selectivity-

position, switched crystal filter later to be found on all of the better National receivers, and the use of a brand new material for coil forms in place of R-39, the newly developed polystyrene. New RF coupling circuits for the NC-200 improved the signal-to-image ratio to better than 30 dB at 10 meters, better than many receivers with two stages of RF amplification.

The NC-200 is also far more handsome than its predecessors. As you can see from the photo, it has a two-tone gray finish, half crackle and half smooth, with chrome strip dividers and a large "watch glass" cover over its bronzed-toned white tuning dial. Markers on the lower right and left of the dial indicate the band in use, red for bandspread and black for general coverage ranges. The National type R bar knobs are now an olive brown instead of the 100/101/HRO black, as are the S-meter bezel and chrome skirted HRK tuning knob.

There's a red National Diamond at the base of the tuning dial and another in the illuminated S-meter. And top cen-

## The National NC-100 Receiver Family from previous page

ter above the tuning dial is a metal National Diamond with an inscription around its edge proclaiming the set to be a "Silver Anniversary" model, in honor of the ARRL's 25th in 1940, which also coincided with National's 25th. The functions of tuning and bandswitching have now been combined into a single knob, pull out and turn to change ranges, push in and turn to tune, with a 30 to 1 vernier ratio and comfortable inertia loading.

One would think that with the arrival of the NC-200, the NC-100 would have been discontinued. But because of the oncoming war, such was not to be. The US Navy found the rugged, available NC-100 adaptable to their needs, and many different versions of it were made during the war. Variations include a 0.2 to 0.4 Mc tuning range (easily adopted from the HRO G coil set) in place of the broadcast band. The RAO-1 through -8 (NC-120 and NC-127) had a second RF stage with associated extra coils in the catacomb and an additional gang on the tuning condenser added to the rear of the set. This model, by the way, is probably as close as you will come to the fabled "bandswitching HRO" you occasionally hear about. Other family members were the NRCL, RBH, RCE, RCL and RCP. The NC-200 also went to war, initially as is and then in a general coverage only version.

When the NC-240 replaced the 200 in 1944, it was first made as a general coverage receiver and then with amateur bandspread in the NC-240D version in 1946. By 1948, the sliding coil NC-240D was selling for \$225, well above its competition, the HQ-129X at \$189.15, the RME-45 at \$198.70, or the SX-43 at \$169.50. It was also out of place with the other National receivers, the conventional bandswitching NC-173 at \$179.50 and NC-183 at \$269 and the still plug-in coil HRO-7 at \$279. And so, in 1949, a great line of receivers was finally retired after a 14 year manufacturing run.

Electrically, the NC-100 family are straightforward, 1 RF, 2.455 kc IF, single conversion superhets. As with most of National's better receivers, they use a separate local oscillator tube for improved stability. For the reader who is interested in "improving" one, Bill Orr, W6SAI outlines some good tips in CQ, November 1957, that he put into a used NC-240D that he too snuck into the house after a trip to his local ham radio store. Bill replaced the RF amplifier tube with a 6SG7, the mixer with a 6SB7-Y, and added a VR-150 to regulate voltage for the local oscillator and BFO. Bill also suggests cleaning the finger contacts to the coil catacombs, but he warns "DON'T try and remove the coil catacomb in order to make the cleaning job easier! The author (Bill) tried it, and spent four or five hours getting it back in the receiver. It's a nasty job - sort of like putting catsup back in the bottle." To which I can only add, "amen!"

If you run across one in need of some serious restoration, you'll be interested in several articles by William Fizette, who among other things restored Jim Millen's personal HRO for the Antique Wireless Association's W2AN Millen Station. Bill's articles in the The Old Timer's Bulletin, the Official Journal of the Antique Wireless Association, include "Restoring the National Company Sliding Coil Receivers" in the May 1988 issue, "Restoring National PW and NPW Capacitors" in May, 1992, and in his Communications Receiver column in August 1994, "Notes on Removing a Frozen PW Dial" (with a great tip that really does work), "Setting the PW Dial Correctly on the Tuning Shaft", "Cleaning the PW Dial Gear Box", "By-pass Capacitors in National Receivers", "Unique Components", and "That Old Hookup Wire". The PW capacitor and dial articles are also of interest to HRO owners. Bill's address is RD 1, Box 55, Henryville, PA 18332, and he has offered to answer questions if they are accompanied by an SASE.

I can also pass along one trouble-shooting experience of my own that might help a few NC-200 owners. When I first powered up my receiver, it worked well except that the local oscillator would occasionally do a little frequency dance on all of the ham bands spread ranges. The general coverage ranges were all fine. In a case of that sort, I am inclined to look for some component, capacitor for example, that is common to the local oscillator circuit on all of those ranges. Well I was almost right. It turned out after more than a little trial and error that the trouble lay in a whole set of pink ceramic variable trimmer capacitors, one associated with each oscillator coil. Apparently over the years the silver metalization in those capacitors had migrated to the point where they all became intermittent (I have X-ray vision, don't you know). Replacing each one of them with modern trimmers brought down the curtain on my local oscillator ballet.

Another restoration tip. My receiver came missing one of the brown-olive colored bar knobs. I was able to find a black, National type R knob, and a small bottle of paint in a hobby shop that is almost an exact match for the NC-200 knob color. The only noticeable difference is that my "restored" knob has a slightly more "flat" finish than the originals.

This pretty much completes my stories of the "great" ham receivers from the Millen era at National. There were several other interesting offerings, for example the NC-80X and NC-81X, less expensive, general coverage and amateur band receivers respectively with sliding coil bandswitching, no RF stage, and a 1560 kc IF with a wide range crystal filter that stayed in the circuit all the time (shades of the NC-300). If any of you folks have one, I'd like to read your article about it in ER sometime. And the NC 1-10, 1 to 10 meter, plug-in coil of course, super regen came on the scene in 1936 and helped open up the VHF range in its day.

Oops, I almost forgot that I promised you a mystery when I began this article. Here 'tis. Besides my NC-200, I have one other National Sliding coil receiver, whose picture I hope Barry will be able to find room for with this story. It shed its nameplate before it came to me, so I don't know exactly what it is. But it doesn't seem to be quite the same as any of the NC-100 clones described in Raymond Moore's "Communications Receivers." It most nearly resembles the RCL shown on page 123, and it shares with that receiver a squelch circuit. But it has only a fixed IF bandwidth, where the RCL has a two position variable bandwidth, and it has an option to switch in a crystal in place of the variable tuned circuit in the local oscillator. Like the RCL it has 12 tubes, but the middle one on the end of the chassis opposite the power supply is a 6H6. There is a phenolic terminal board on the rear lip of the chassis behind the 80 and 6V6 with four pairs of screw terminals labeled (top to bottom) "speaker, 600 (ohm) output, relay, and monitor." The chassis has serial number B366 on the top rear beside the second IF output transformer. Perhaps some of you National experts out there can help me identify this *Mystery Receiver*.

So to bring the curtain down, the act that followed the HRO turned into a well respected, multiple member family of its own. I can recommend without hesitation that if you're looking for a good, honest, solid receiver to add to your collection, one that will still cut the QRM on a Classic Exchange or AWA QSO party, run to the nearest flea market and make a ridiculously low bid on any member of the NC-100 family. A little bit of good natured bargaining should get you just what you desire and a fine piece of radio history as well. ER

# Signal Corps VT-Type Vacuum Tubes

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In 1917, on the eve of American entry into the World War, the U.S. Army Signal Corps, as well as the U.S. Navy, began standardization of vacuum tube types used in their communications equipment. Tubes built for the Army were to carry the prefix VT followed by a sequence number. The Navy prefix would start with C (for communications equipment) followed by a manufacturer code of one or more letters (W for Western Electric).

The first of these standardized tubes, the VT-1 (Navy CW-933) was the Western Electric 203A general purpose receiving triode. This tube was used in the Signal Corps SCR-68 air-to-air radio set and the Navy CW-936 shipboard radiotelephone, first installed on subchasers for ship-to-ship communication. The VT-2 (Navy CW-931) was the Western Electric 205A power amplifier triode that eventually was developed into the famous commercial type 10.

By November 1918, one thousand Western Electric Tube Shop employees were building some 25,000 of the VT-1 and VT-2 type tubes every week. This will give some idea of the large number of radio sets that had been built, as well as the short lifetime of these early tubes. It is also a good indication of productivity at that time, with each tube requiring almost two hours of hand labor!

According to Bernard Magers, Western Electric Senior Engineer: "After WW I, many tubes were surplused from the Signal Corps and sold in the open market for use by amateur-radio enthusiasts." If this sounds just a tiny bit testy to some of us "enthusiasts", remember

that AT&T, Western Electric's parent company, did not change from leasing to selling tubes (except to the military) until 1923.

After the Second World War, surplus tubes and equipment were again made available, and many of us used and still use them. When restoring or even just repairing such equipment, we sometimes need to replace tubes. These may be identified only by their VT numbers in the equipment, in manuals and schematics, and other documents.

Several lists cross-referencing VT type numbers to their commercial equivalents have been published. I have not seen the opposite kind, listed by commercial type with the VT number shown for each. I have found such a list useful, especially when checking commercial types found in military equipment bought this late in time. This article is an attempt to rectify this situation, and to supply cross-reference information to those who haven't had access even to the out-of-print original references.

Not all VT types are listed here. The full list is about twice as long. This list excludes very early types not usually found in the equipment available to us today, which is primarily World War II issue. Nor does it contain many of the rare later types that were mainly used in units that are not readily convertible to the amateur service.

There are sometimes suffixes to the VT numbers. These refer to different bulb styles. Suffix A often means a G type bulb and B a GT type. For example, 6K7 is VT-86, 6K7G is VT-86A and 6K7GT is VT-86B. But as this is not totally consistent, these variations are ignored. ER

0A3	VT-260	6J7	VT-91	12SQ7	VT-104
0B3	VT-184	6K6	VT-152	12SR7	VT-133
0C3	VT-200	6K7	VT-86	25L6	VT-201
0D3	VT-139	6K8	VT-167	800	VT-64
1A5	VT-124	6L5	VT-213	801	VT-62
1A7	VT-147	6L6	VT-115	803	VT-106
1C5	VT-125	6L7	VT-87	805	VT-143
1D8	VT-148	6N7	VT-96	807	VT-100
1E5	VT-170	6Q7	VT-92	811	VT-217
1H5	VT-223	6R7	VT-88	813	VT-144
1LC6	VT-178	6SA7	VT-150	814	VT-154
1LE3	VT-239	6SC7	VT-105	815	VT-287
1LH4	VT-177	6SG7	VT-211	816	VT-216
1LN5	VT-179	6SJ7	VT-116	829	VT-259
1N5	VT-146	6SK7	VT-117	832	VT-118,286
1R5	VT-171	6SL7	VT-229	836	VT-236
1S4	VT-210	6SN7	VT-231	837	VT-101
1S5	VT-172	6SQ7	VT-103	841	VT-51
1T4	VT-173	6SR7	VT-233	842	VT-72
2A3	VT-95	6SS7	VT-199	843	VT-73
2X2/879	VT-119	6ST7	VT-205	845	VT-43
3A8	VT-149	6U5/6G5	VT-98	850	VT-60
3B7	VT-182	6V6	VT-107	851	VT-41
3LF4	VT-180	6W5	VT-196	860	VT-17
3Q4	VT-264	6X5	VT-126	861	VT-19
3Q5	VT-221	6Y6	VT-168	864	VT-24
3S4	VT-174	6Z4/84	VT-84	866	VT-46
5T4	VT-114	7A4	VT-192	869	VT-39
5U4	VT-244	7B8	VT-208	872	VT-42
5V4	VT-206	7C4	VT-243	884	VT-222
5W4	VT-97	7C7	VT-193	918	VT-246
5Y3	VT-197	7E5	VT-241	923	VT-252
5Z4	VT-74	7E6	VT-188	954	VT-120
6A8	VT-151	7F7	VT-189	955	VT-121
6AB7	VT-176	7H7	VT-190	956	VT-238
6AC7	VT-112	7Z4	VT-181	957	VT-237
6AG7	VT-247	12A6	VT-134	1005	VT-195
6B7	VT-68	12AH7	VT-207	1006	VT-249
6B8	VT-93	12C8	VT-153,169	1613	VT-175
6C5	VT-65	12H6	VT-214	1616	VT-266
6C8	VT-163	12J5	VT-135	1619	VT-164
6D6	VT-69	12K8	VT-132	1624	VT-165
6E5	VT-215	12SA7	VT-161	1625	VT-136
6F6	VT-66	12SC7	VT-268	1626	VT-137
6F7	VT-70	12SG7	VT-209	1628	VT-140
6F8	VT-99	12SH7	VT-288	1629	VT-138
6G6	VT-198	12SJ7	VT-162	1630	VT-128
6H6	VT-90	12SK7	VT-131	9002	VT-202
6J5	VT-94	12SL7	VT-289	9003	VT-203

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## Rebuilding the W1JEO-Edmunds SSB Exciter

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by Chuck Teeters, W4MEW  
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A recent move forced me to clear out my storage shed. There I found the remains of my W1JEO, Edmunds SSB exciter which I used from 1951 to 1956 on 75 meters. Over the years it had given up components to other projects and had water damage, but was still mostly intact. I decided to put it back on the air.

The W1JEO exciter was described in the November 1950 *QST* as the first "simple and nearly foolproof design for a SSB exciter unit". All the previous SSB articles were phasing rigs, or low frequency LC filter rigs that required some expertise to build and get working. Ed Edmunds, W1JEO had designed a 3-tube, 4-crystal, SSB exciter that was simple to build and easy to adjust. Add a VFO and speech amplifier, and you were on 75 SSB. Edmunds put filter rigs a step up on phasing rigs and popularized the use of crystals in SB filters. The 1JEO was put on the air by a large number of amateurs throughout '51, '52 and '53. Only when the first commercial SSB rigs and kits became available in very late 1952 did the 1JEO start to lose some of its popularity.

In 1951, I was an instructor in the Signal School at Fort Monmouth, New Jersey. We had WECO SSB equipment, D-15600 transmitters and LDR-1 receivers. I had been listening to the SSB activity on 75 meters. The WECO transmitters only went down to 4.5 MHz, and besides, I only had a class B license, so no 75 for me. The Edmunds exciter looked like the way to go. I had an excellent source of parts and a good workshop across the street at K2USA, the Fort Monmouth Radio Club station. An order to Sun Radio in Washington, DC, for crystals and I started building.

My only construction troubles were caused by the kibitzing committee at K2USA. A trip to 641 Washington Street, the FCC in New York City, took care of the Class A problem.

My first transmission was in June to K2USA, about 250 feet away, and checks with the LDR-1 showed the signal to be OK. With the 4 watts from the 6AG7 I was off and running on 75 SSB. 8 contacts later, a report from W3KPP showed I could use more power. Grandpappy extolled the virtues of his 829B linear so I copied it and upped to 50 watts. There were about 100 SSB stations that operated on 75 and I could make SSB contacts every night. In 1952 I added voice control and in 1953 a pair of 811s push-pull. In 1956 I succumbed to the temptation provided by W0CXX and replaced the 1JEO/829B/811s with a KWS-1. I had worked 237 different SSB stations with the 1JEO, from Nicaragua to Nova Scotia, and 18 states in 5 years.

After locating a November 1950 *QST* I put everything back in the 1JEO that I had robbed over the past 40 years. When I put the power to it nothing worked right. My 6SL7 audio amplifier oscillated and the 6K8 oscillator didn't. I got 5 watts from the 6AG7 on whatever frequency it felt like oscillating on. My trouble was the poor ground due to the rusted out chassis. After several attempts to clean it up I took an unusual approach, removing the wired exciter intact from the chassis. By unsoldering the 2IF cans and power transformer and unbolting everything else, sockets, terminal strips, pots and variable caps, I dropped the wired unit out on the bench. Then it was easy to clean all the ground lugs and terminals. A new chassis was drilled out and the wired unit was





The author in his ham shack with the W1JEO SSB exciter.

put in and everything bolted down. Replaced a few leaky caps, then soldered the IF cans and power transformer back in place. An LM frequency meter replaced the long-gone VFO and lo and behold the rig worked the way it did in 1951.

With great enthusiasm I fired up on 75. Nobody heard me, 4 watts didn't cut it on 75 anymore, day and night. Some fast thinking led me to 40 meters on weekdays, the ideal place for low power. Only two coils to rewind and the transmitted image should be far enough away (900 kHz) to be stopped by the two tuned circuits. The coils were rewound, the rig tuned up, and it worked great on 40. Heard W2VOA on the Georgia coast calling CQ, called him and 20 minutes later I signed with Jerry after the first QSO with the 1JEO in 40 years. Then Fort Myers, and Pensacola. Called CQ and got a mobile in Tampa. After the initial enthusiasm wore off, I put together a pair of 6146s and got 75 watts out. Now I could work with the best of them.

Several days later I had the best QSO to date. I heard a station in QSO with W2VVC, a familiar call from the early '50s, but the handle he was using was Grady. The W2VVC I knew was Fox. I called anyway and it turned out to be Grady Fox. The last time we had worked was June 4, 1953, when I was running the same W1JEO rig, and amazingly Grady

was still running the same transmitter he had used then also! 42 years, and the same rigs! Even though I am still an instructor in the Army Signal School I sure don't work as good as I did 42 years ago.

If you are in a tube building mood, and want a simple rig that will talk SSB to the Icoms and Kenwoods on 75 or 40 try the 1JEO. With the three tube, 6K8, 6SN7, and 6AG7 rig, a 1 tube speech amp and VFO that will operate on 3.4 to 3.6 MHz you can be on SSB in a short time. Add a linear and you can work anyone. The only unusual parts needed are the WW II surplus LF crystals. These are FT-241s marked from 28 to 38 MHz in three-digit numbers or 20 to 28 MHz in two-digit numbers. You could buy 4 new crystals however, if you can't find any surplus. Everything else is common junkbox stuff. If you want to give it a try and can't find a November '50 QST, or a 1953 ARRL Handbook, send me a large SASE and I will send you a copy of all the data you need to duplicate the W1JEO exciter. Give it a try and join me having fun on SSB with a 45 year old design. ER

# Thinking Ahead

by George Babits Jr., WA7HDL

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Nearly everyone has an addiction. Some people do drugs, some are boozers, and some pick up stray dogs. I can't pass up a boat anchor. I would take the whole boat if I get a chance! There is no known cure. Even a constantly aching back won't stop acquisition of real boat anchors. I just plan ahead and line up appropriate help. I guess I'm a "Boat Anchor Junkie."

The real tragedy of this disease is that, unless your shack is a giant warehouse, you never have any space for living. In mild cases the garage fills, then the wife starts complaining because she can't get her car out of the weather. This is OK in the summer, but in the winter she gripes about having to scrape the windshield.

In more serious cases, overflow from the garage starts filling the house. First the family room; then the living room. Hopefully, by that time the kids have gone off to college so you can start putting treasures in their rooms.

And then there is the consideration about floors. A large assortment of heavy radios needs to be on the ground floor or basement, especially in an older house.

If you plan to put all that vintage equipment on the air (don't we all?) you probably will need several 50 amp service outlets to provide adequate juice for running it all.

## So what's the point?

Think about what you are getting. Ask yourself a few questions before you get that incredible TBM-8 or whatever. Here's a check list of questions:

1. Do I have room for this?
2. Do I want to look at it, or use it?

3. Can I move it around by myself, or will I need help every time I need to change a tube?

4. Is it worth restoring?

5. Do I need more electricity for it?

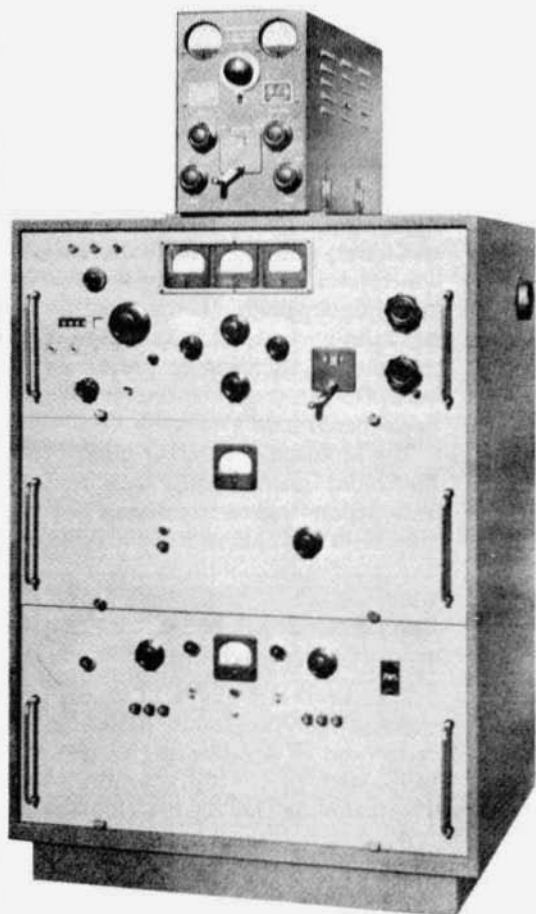
I'm sure you get the idea. The cost of the unit really isn't a consideration. If you want it, you can always afford it.

Before acquiring a "large" unit is the time to be sure you really want a whatever it is. Anything under 150 pounds can be shipped UPS. Get over that weight and the crating and shipping costs will often exceed the value of the equipment. Once you get a big rig you are probably stuck with it, especially if you live a long way from areas where there are a lot of other boat anchor junkies.

A good case in point is my GPT-750. This is an incredible transmitter. It covers from 2 to 32 Mc/s. With a pair of 4-250A's, it puts out about 1200 watts in continuous commercial service. It is a masterful creation from the golden age of radio communications. Four times as big as a KWS-1. Twice the size of the T-368. It weighs 850 pounds and needs its own 20 amp 220 service. It is the ultimate antithesis of today's no-knob Japanese rigs.

I always put up an "I love Boat Anchors" sign at hamfests. Last winter I was approached by a ham who started telling me about his GPT-750. He had already made the mistake I was about to make! He bought it with the idea of making a linear from the PA section, then decided the transmitter was too good to cannibalize.

I once had a GPT-750 that slipped through my fingers before I ever plugged it in. I always regretted that error and by the time I got to his place, I had talked myself into getting his transmitter. Needless to say the unit was



**TMC GPT-750, TAC tuner mounted on top.**

beautiful. It even had all the books with it. A fool and his money are soon parted. With an heroic expenditure of effort, 850 pounds of GPT-750 soon filled my one-ton pickup.

I played with it some in the spring. Even tuned it up into a dummy load. Worked great. The first problem that popped up was that I was going to have to run another 20-amp 220 line into the shack if I wanted to use this beast. The second problem was that my shack, which is still under construction, wasn't big enough for all the stuff I already had and the GPT-750. Something was going to have to go! That is easier said than done. I love my boat anchors almost as much as I love my wife, kids, and horse.

The upshot of it all was that I placed an ad in ER to sell the GPT-750. TMC gear is high quality

and I got a lot of calls. But when prospective buyers learned how big and heavy the transmitter was, interest in buying it ended. I even offered to haul it half way myself trying to entice a prospective buyer into taking it off my hands. No sale.

There remained only one option. Butcher the equipment. Make a linear out of the PA and use the oscillator and driver section as a 100-watt transmitter. Not very appetizing for a person who appreciates vintage equipment. Somehow hacking up a beautiful piece of equipment simply because I don't have room for it is the ultimate hypocrisy. Maybe I could find a CB'er who wants to run high power?

So here I am, stuck with a beautiful piece of gear that nobody wants bad enough to come and get. I don't have any room for it and my conscience won't let me gut it out. Nobody wants to trash good vintage equipment. Did I rescue the GPT-750 from such a fate, only to commit the crime myself? See what I mean about "thinking ahead?"

Excuse me a minute. Have to answer the land line.

That was a friend in Boise. His wife is all bent out of shape because she can't get her car in the garage. For a very nominal sum he will let me haul off his BC-610. The price is really good. Let's see. That's 540 miles round trip. If the weather holds I can leave at 4:00 tomorrow morning and be back by 9:00 PM or so. Addiction is a curse! **ER**

**Editor's Note:** George finally found a buyer for the GPT-750. The new owner plans to put it on the air.

### The Monitone from page 15

needs of everyone! It was a code practice oscillator, a CW monitor, and an AM monitor. All this with only two tubes and three controls. A fairly ingenious circuit provided all functions, with a fairly high degree of sophistication.

The code practice oscillator used the 50C5 as a transformer-coupled oscillator. This would allow for the frequency to be adjusted, as well as the volume. Both speaker and headphone outputs are available. A 35W4 rectified the 110V line to provide B+. The selection of two fifths of the "all American five" tube line-up indicates they were thinking about dependable operation, low cost, and easy replacement.

The monitor functions are where the ingenuity of the Gonset Guys really shines. The monitone is "link coupled" to your transmitter or antenna tuner to sample RF energy. Although there are numerous references about the inherent safety of the unit in the owner's manual, (obviously pre-litigious society days) they did offer cautions regarding connection to the tank circuits!

In both the AM monitor and CW modes, the sample link, which should be "...approximately one turn per ten meters of wavelength" is fed to the 35W4 and rectified as the B+ for the unit. I find this very clever. This absolutely guaranteed the monitor would reproduce a signal which accurately mimics the transmitted signal. For fast response, all filtering in the power supply is removed by the mode switch. DC filtering is not needed as with a ripple frequency of at least 1.5 MHz (half wave rectified 80 meter RF) the passband of the amplifier can't pass it. The rectified CW is applied as bias to the tone generator. In the AM mode, the 35W4 acts as a diode detector which is then fed to the 50C5, now acting as an audio amplifier, rather than an oscillator. Neat!

The unit has enough gain to be driven by transmitters offering only a few watts

of power. The suggestion is made that you plan on using the unit with the volume cranked wide open and adjust your link to achieve the desired volume level. This reduces negative effects such a device could have on your transmitter or antenna if you were to tightly couple many turns of sample loop, acquire gobs of signal, and then turn the volume control down for comfortable listening. Another suggestion is that you use the headphone output when used as a modulation monitor, to prevent feedback. Oh yes, it was a more simple time back then!

The Monitone, which originally sold for \$29.50, is occasionally seen at swaps, and depending on condition and desire, sells from between \$2 to \$50. ER

## 2nd Annual AMI Thanksgiving Day Bash

Thanksgiving day will again find most of the AM'ers out here in Colorado (and in neighboring states) participating in the 2nd Annual AMI Thanksgiving Day Bash. Orlin Jenkins, "OJ", K00J started this informal get together last year and it was a great success with over 30 stations participating. This year's event promises to have even greater participation.

It all starts at 7AM MST on 3875. Net control will be K00J.

## Stolen Central Electronics 200V

My CE 200V Ser.#E 1379, was stolen from Northern California last year. (1994). It had the audio limiter board modification using zener diodes instead of the mercury batteries. If anyone comes across this rig I would appreciate a letter or a call.

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### The TMC GPR-92 Receiver from page 9

SSB reception is accomplished with a conventional product detector. For AM reception, a diode is used for detection followed by a diode noise limiter. The S meter circuitry is unusual in that the meter is calibrated in dB above 1 microvolt.

One point worth mentioning here is that the GPR-92 alignment procedure calls for use of a sweep generator and oscilloscope when aligning the IF's and crystal filter circuits. I have tried shortcuts but had to resort to the factory recommended sweep generator method to obtain satisfactory results.

### Design

The design of the GPR-92 is interesting in a number of areas.

The main and bandspread tuning capacitors are mounted in a solid cast aluminum compartment for mechanical stability. These tuning capacitors are connected to a very effective gearing system attached to large flywheels, which produces the smoothest tuning feel I have ever experienced.

All of the tubes and a majority of the components are mounted on PC boards which can be removed for servicing.

Special bandspread dials were offered for ham bands, international broadcast bands or a third optional bandspread dial for general coverage purposes.

An HF oscillator trimmer knob is located on the front panel to accurately calibrate the dials, in conjunction with the built-in crystal calibrator.

The construction of the receiver is top-notch and there is no evidence of corner cutting to be found.

### Listening To The GPR-92

Pure pleasure is how I would best describe the many hours I have enjoyed using this receiver. The main and bandspread tuning knobs are silky smooth, with a minimum of backlash. The receiver is very sensitive and quiet compared to any receiver I have listened to of its vintage. Selectivity is good, due in part to an extremely effec-

tive crystal filter network. Image rejection is better than 80 dB on all bands.

The product detector in the GPR-92 is excellent. The sideband signals are easy to tune and the AGC characteristics are good with a 3 millisecond attack and a 1.2 second decay.

The audio characteristics are satisfactory with a 6AQ5 output tube driving a good sized output transformer. A tone control on the front panel also helps.

### Conclusion

The GPR-92 was a great achievement in communication receivers for its time. It is more than just an updated version of the GPR-90. The GPR-92 is a re-designed receiver, which was clearly targeting the governmental market. The main differences between the 92 and the 90 are the provisions for diversity reception, built-in product detector, enhanced mechanical stability using a cast aluminum tuning capacitor enclosure, series RF noise limiter, improved image rejection, and a low-noise front end.

The GPR-92 is a sophisticated, high-quality receiver that would definitely be a worthwhile addition to any vintage radio collection. Given the rarity of this receiver, the trick will be to find one. ER

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### Restoration Tip

I have recently found an old Mercury Electronics model 204 tube tester. This model was formerly used in the electronics stores so that customers could check their tubes. The tester features a 7"x5" meter. The needle in these meters was originally made of paper, which of course deteriorates over time. To replace the missing needle, I glued a small piece of straw from a broom to the meter movement with crazy glue. Other materials I had tried were found to be too heavy, restricting power movement of the meter.

Al Persichino, WA2BMB

### High Voltage Transformers from page 7

there is no need to unground the HV windings, just mount the two units and use them in a full-wave arrangement, making sure to properly phase the primaries. If you don't get it right the first time, no problem - you just won't get any voltage out. If that happens, merely reverse one primary. For just a little more effort and a little less money (two rectifiers instead of four) you have a 600-700 mA supply, which is a full gallon.

All terminals on the power transformers should be insulated. Shrink tubing will do fine on the primary and one secondary terminal (those with push-on terminals). Bathtub caulk and plastic shields can protect the other HV terminal so that the transformer won't be damaged by an accidental human (or pet) load!

As in any large power supply, in-rush current at turn-on can be a problem. A 115 VAC relay across the primary with the contacts across a series resistor, as shown in the schematic, will do the job. Be sure that the relay will operate positively with the resistor used. 20 to 30 ohm resistors will usually work fine. With the power supply filter in place, there should be a noticeable pause between the snap of the on-off switch and the positive pull-in of the relay. If you can hear the delay, it's long enough.

The unit shown in the photo was built on the metal box because that's what I had. A metal chassis or a piece of wood will work just as well, so, as always, use what you have at hand. The unit powers my 3-500Z g-g linear to over 400W out, furnishing 1800 volts to the plate at 350 mA.

These transformers mount easily, almost all look brand new, and you can't beat the price, but REMEMBER - THESE ARE LETHAL VOLTAGES. Good hunting. ER

### Computer Grade Supplies from page 18

ally accomplished ahead of the pass elements, so there are no output capacitors to share the momentary load. Don't try to fix the problem by adding large capacitors across the output as you will probably destroy the pass elements, if not immediately then eventually.

Although somewhat messy, connecting a battery of the proper voltage across the output of the power supply will often work. However, you should first adjust the no-load output voltage to a value which won't overcharge the battery. For lead-acid batteries, this is about 2.3 volts per cell (13.8 volts for a nominally 12 volt battery). Also, many solid-state regulated supplies will self destruct if the AC power is removed with the battery still connected. To avoid finding out the hard way, connect a silicon diode between the supply and the battery, and connect the load to the battery. The diode current rating must be greater than the power supply's full-load rating, but not necessarily greater than the motor starting current. Measure the power supply output voltage at the cathode of the diode, not the output of the supply. Turn the current limit control to the minimum before connecting the battery, and then slowly advance it, watching the charge current. Some adjustment of the output voltage may be necessary to limit the long-term charge current (when the battery is fully charged), which should usually be around the C/100 range (1/100 of the rated ampere-hour capacity of the battery).

The moral of the story is that newer isn't necessarily better. Everything has its limits, and if you don't understand the limits, you may be in for an unpleasant surprise. ER

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## DEADLINE for the DEC. Issue: DEC. 3

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

**FOR SALE:** Surplus military gear. New BA-386 batteries. SASE for current listing. Tim Banse, POB 2522, Iowa City, IA 52244-2522.

**FOR SALE:** BC-610H w/speech amp, ant tuner & plug-ins, working - \$375. Larry Wright, IL (708) 658-7328.

**FOR SALE:** R-390A/URR orig, 12/61 maintenance manual TM 11-5820-35, 189 pgs - \$28 includes priority mail. Aben, POB 4118, Jersey City, NJ 07304.

**FOR SALE:** SX-42, VG, documentation, possible trade, PU only, SX-43, VG, gray, possible trade. Fred Clinger, WA8KJ, OH, (419) 468-6117 after 6 PM.

**FOR SALE:** "Introduction to Key Collecting", 64 page softcover illustrated guide - \$11.95 ppd USA. Start now in this fascinating hobby. Artifax Books, Box 88-E, Maynard, MA 01754.

**FOR SALE:** New Ranger I, Valiant I & Navigator plastic dials, 160-10, freq numbers in green, w/ all holes, like orig. - \$17.50 ppd. Bruce Kryder, 4003 Laurelwood La., Franklin, TN 37064. (615) 794-9692

**FOR SALE:** Collins 75A-4 - \$500, Heath VF1 - \$20; Harvey Wells TBS 50A - \$100. Larry, VE3RF, ONT, Canada, (519) 632-7921.

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

**FOR SALE:** Receiving tubes, new and used; multi-section twistlock electrolytic caps to 500-VDC; SAMS photofacts. Send stamp for lists. Turner Electronics, 16701 Main St., Ste. 121, Hesperia, CA 92345.

**FOR SALE:** Ranger II, super nice - \$425; Shure 555W - \$150; Heath filters: AM - \$75; CW - \$45; SB 300-400, very nice - \$150 ea; SB303 - \$175; PS 23 - \$80; S-36, rough - \$40; Swan 500CX w/117 XC, exc - \$275. All + UPS. Larry Rau, Box 1139, Occidental, CA 95465. (707) 874-1000

**FOR SALE:** Hallicrafters SX-100 w/manual, very clean - \$200; Hickok 534 tube tester - \$100; Knight r/c tester - \$20; Eico 720 w/manual - \$75; HP 410B - \$50; HP 400D - \$25; Lampkin 205A modulation meter - \$25; Lafayette Comstat 25B - \$50; Browning tube CB separates - \$75; McIntosh audio compensator C108 - \$25. All + shpg. Donzil Worthington, WSOE, 9842 Juniper Cir., Prescott Valley, AZ 86314. (520) 772-1297

**FOR SALE:** Large accumulation of smt's, rcvr's, scvr's, test equipment, manuals, etc. Virtually everything AM & military (some avionics), & hollow state Large(55e) SASE. Military Marketing, Inc. Box 741, Norcross, GA 30091-0741. Attn: Gene. KD4YIZ.

**WANTED:** Collins pre-WW II xmt models 30W, 32A, 32B, 32G, 30FX & 40B, desperately needed to finish my station. Paul Christensen, N9AZ, 11142 Raley Creek S., Jacksonville, FL 32225. (904) 646-0129

**WANTED:** National/RCA/Hammarlund. National AGS w/coils for 5 bands; National SW-3 w/588-AB pc; RCA RAL; HRO-60 (rack mount type). Taka, CA. (415) 697-6719.

**WANTED:** Old meters & any aircraft stuff. Chris Cross, Box 94, McConnell, IL 61050.

**WANTED:** HRO plug-in xtal for HRO variation two (only xtal). Tajima, JA1DNQ, c/o The Nakagawa's, 22942 Cedarpring, Lake Forest, CA 92630.

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

**WANTED:** Johnson gear, all models, any condition. Please state asking price. Wen Turner, AD7Z, Box 451, Cal-Nev-Ari, NV 89039-0402.

**WANTED:** SX-42, SP-400 only in very good conds. Jose Cangas, EA4JL, Contact in the States, Kurt Keller, CT, (203) 431-6850.

**WANTED:** Globe King 500B; Swan mono banders; GM tube amp; 6/2 AM gear. Scott, K6PYP, 210 Mantua Rd., Pacific Palisades, CA 90272. (310) 459-0337

**WANTED:** Collins 305-1 round emblem only; 325-3A (R.E.) late model w/plastic finger hole ring; 302C-3 watt meter wing & RE; equipment must be in exc to mint conds for personal use. Kerry, NSCET, TX, (800) 776-4976 (d), 214-271-0017 eves.

**WANTED:** Collins mech. filters for S-Line F455FA-05-500 Hz, X455Q200-200 Hz, F455FA-31-3.1 kHz; F455FA-60-6.1 kHz. Kerry, NSCET, TX, (800) 776-4976 (D), (214) 271-0017 eves.

**WANTED:** Collins mics 5M-1, 5M-2, 5M-3; Electrovoice 664 w/desk stand only. Kerry, NSCET, TX, (800) 776-4976 (D), (214) 271-0017 eves.

**WANTED:** National 50th Anniversary photo album, 1964. Harry Blesy, N9CQX, 95740 Clarendon Hills Rd., Hinsdale, IL 60521. (708) 789-1793

**WANTED:** HRO rcvr (HRO-7 & before) any conds or just parts. Jerry Boles, N5KYG, 14857 Redbud Ln., Piedmont, OK 73078. (405) 373-2228

**WANTED:** Tech manual for info: Tech M200E RTTY, ASCII & Morse terminal. W7TSJ, 10332 Camino De La Placita, Tucson, AZ 85748. (520) 886-3087

**WANTED:** T368 xmt, T368 mod xmt, GPT-750; FRT24; 500-1 kw BC xmt. Freeman, POB 1773, Pinehurst, NC 28374. (910) 215-0599

#### Vintage Manuals Available

Your only stop for the finest quality vintage, amateur, audio, Lafayette and many radio-related manuals. Get catalog #5, two \$32 stamps. Pete Markavage, **The Manual Man**, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964

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

**WANTED:** KWS-1; HF-380; 6251; R-389 and SP-600JX. Need exc. conds. Mitsugu Shigaki, JA6IBX, 2825-2, Jozan Kamidai Machi, Kumamoto. 860 Japan. FAX Japan-96-329-4601

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

**WANTED:** HI-FI spkr's & enclosure by Altec, Electrovoice, Jensen, JBL; tube components. Tim Phelan, 845 Lilybud, Ballwin, MO 63011. (314) 227-9264

**WANTED:** Heathkit, Eico, Fisher, Dynaco or similar tube audio amplifier in any condition or manuals for same. Mike Nowlen, WB4UKB, POB 1941, Herndon, VA 22070. (703) 716-1363

**WANTED:** Military sets, US GRC-13, AIBK, APX-1; British WS No. 21, Canadian WS No. 29 A & B sets. Leroy E. Sparks, 924 W. McFadden Ave., Santa Ana, CA 92707-1114. (714) 540-8123

**WANTED:** Collins KWM-380 late model high serial number. Must have speech processor, noise blanker & accessory filters. Kerry, NSCET, (800) 776-4976 (d), (214) 271-0017 eves.

**WANTED:** Tuning drive knob assembly for Command Set rcvr's; manual for ART-13 xmt. Al Kaiser, W2ZVR, 713 Marlowe Rd., Cherry Hill, NJ 08003-1551. (609) 424-5387

**WANTED:** Manual for repairing an Alda 105 xcvr which operates 80-10 meters. Steven Putman, N8ZR, 6009 Boulder Creek Dr. #2109, Hazelwood, MS 63042-3921. (314) 731-4703

**WANTED:** Manual for Hallicrafters SX117. **FOR SALE:** 6m & 2m converters for NC300. Ron Beaver, WB4OQL, 740 Brookdale Dr., Greer, SC 29651. (803) 879-3133

**WANTED:** 75A-4 F-455J-08 or 05; main tuning knob Viking II; Ranger-I V6T, T-bolt Bezel; SX-101A glass dial. K6RCL, CA, (805) 683-2876

**WANTED:** Collins mobile mount #351D-1; 12V pwr sply #516E-1 for KWM-1; thermal overload relay for 305-1; Westinghouse MW-2 pwr sply. Gary, WA4ODY, POB 58506, Houston, TX 77258-8506. (713) 291-9236



FOR SALE: New Collins PJ-068 mic plugs for 5-line/KWM-2 - \$8 each. Clint Hancock, KM6UJ, 4567 Ashfield Ct., San Jose, CA 95120-4502.

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

FOR SALE: BC-348 for parts - \$offer, Heath HM2410 counter & manual - \$60; DX150 short wave, complete but has been modified, works - \$60; Cardwell variable transmitting capacitors, new in boxes, NP75DD dual 75, NP35DD dual 35, MT356D single 35, NA10NS single 10, ES-7SD HV neutralizing, make offer. Vin Legare, KQ4DZ, FL, (904) 486-1249.

FOR SALE: Collins 7563B, 3253, ps, mic - \$1000. Richard Petersen, IA, (319) 377-9126.

FOR SALE/TRADE: Drake 2B, 2BQ spkr, Eimac 3-1000-Z chim. & socket. Ray, MO, (314) 428-1963.

FOR SALE: Hallicrafters Stations: SX-117 rcvr, HT-44 xmtr, ps-120/150 pwr sply spkr, HT-45 Loudenboomer amp - \$750; SX-101 rcvr, HT-32A xmtr, HT-33B, 2 KW amp - \$850; Hammarlund HQ-170 w/matching spkr - \$175. All +shpg. Gary, K7MHE, OR, (503) 257-6525.

FOR SALE: Collins KWS-1, 75A-4 w/3 filters, spkr & orig. manuals - \$3000. Firm. Lee, K7MBJ, WY, (307) 587-9506 or 864-3286.

**ELECTRON TUBES FREE 1995 Catalog, over 2,000 types in stock.**  
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FOR SALE: Collins SC101 lamp hoods; 75A-4 slug rack covers; manuals. Call or SASE for list. WANTED: 62S-1, Butch Schartau, K0HBS, 5361 St. Mary Dr., Rochester, MN 55901. (507) 288-0044

FOR SALE: Alpha 374A 160-10M, no tune, 2000 watt CW amp, rare model, comes with 3 extra 8874 tubes - \$1500. Don, KK6AN, CA, (415) 467-9669.

FOR SALE: Collins radio gear, 1934, 1939 xmtr's; 3 military mic's; 515-1 rcvr; 4515-1, 6515-1, 8515-1 service bulletins; manuals: 75S-1, 325-1, 548S-1; 3011; KWM-1, 2, 2A; 302C-3, 205G-1; 671U-11; 981-G-1; HF-2050; HF-8050; 618-1, 2, 3; 516F-1; HF-80; Sig. & Columns; Collins memorabilia. Bill Coolahan, 1450 Miami Dr., NE, Cedar Rapids, IA 52402. (319) 393-8075

FOR SALE: Collins 208U-3 3KW RF linear, VG cond. - \$4000; USSR radio set R-105M w/acc., exc cond. - \$280; East German R-105M w/acc., exc cond. - \$280. Mike, CA, (619) 588-7817 or 444-7717.

FOR SALE: TMC XFK freq. shift exciter - \$75 + UPS. Alan Dale, W9ZPP, 2824 Forest Ave., Evansville, IN 47712, (812) 424-5208

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**FOR SALE:** UTC CVM-1 mod TX - \$25; Brodhead Garrett #525 variable pwr sply 2.5A - \$40; Heath Umatic SA5010 - \$15; Popular Electronics Apr-May 72 to Oct 84, 110 issues - make offer; Sams CB Service Books, 9 volumes - \$20; Northern shortwave model "EDC" serial #58 July 1951 - \$150; Electrotech 15 MHz (to-60) dual trace - \$120; misc test equipment, books, send for list. Clayton Vedder, POB 2823, Durango, CO 81302. (970) 247-2969

**FOR SALE:** Drake L4-B, 80-10 M linear amp in exc conds, includes ps & connecting cables - \$875 + shpg; Collins WEKWM-2, 312B-5, includes Waters rejection filter, exc conds. - \$975 + shpg; Collins 32V2 AM xmt, exc conds. - \$525 + shpg, but prefer local PU; Swan 250 6 meter xcvr, includes 117XC ps - \$225 + shpg; Hammarlund HQ 180A gen. cov. rcvr w/spkr, very clean, working; clock, exc conds. - \$350 + shpg. Joel, MO, (417) 889-6415.

**FOR SALE:** Surplus military gear. New BA-386 batteries. SASE for current listing. Tim Barse, POB 2522, Iowa City, IA 52244-2522.

**FOR SALE:** New in box CVM-4 mod xfmr - offers. Marty Drift, NJ (609) 466-4519.

**FOR SALE:** Repair! Radio repair, tube or solid state, reasonable rates. Jim Rupe, AB7DR, Western Amateur Radio Repair Co., (WARRC), POB 697, North Cove, WA 98547. (360) 267-4011

**FOR SALE:** Johnson Valiant II, exc looking, untested, orig. manual - \$500; Central Electronics 200V, exc looking, untested, manual copy - \$375; matched spare NOS 6550's for 200V - \$85; Panoramic PCA-2T-200 Panadapter (like SP-44), looks great & works well - \$159; Collins ARC-2 xcvr, looks good, untested - \$149; Collins R-105/ARR-15 rcvr, looks good, untested - \$129; BC-1000 WWII FM backpack xcvr w/nearly all accessories - \$179. Don, N3RHT, 47 Hazel Dr., Pittsburgh, PA 15228. (412) 234-8819 EST weekdays.

**FOR SALE/TRADE:** Following vintage xmt's: 1937 Harvey UHX-10 - \$275, 1938 Harvey UHX-25 (50 watts input on all bands) - \$425; both made by Harvey Radio Labs in Brookline, MA. Larry Drago, 383 Lincoln Dr., Cheshire, CT 06410. (203) 272-6030

**FOR SALE/TRADE:** Hallicrafter S-20R Sky Champion - \$200; Hallicrafter S-77A - \$325; Hammarlund Comet-Pro (variation 5) w/stal & all coils - \$825. Larry Drago, 383 Lincoln Dr., Cheshire, CT 06410. (203) 272-6030

**FOR SALE/TRADE:** Two (TM 11-235) World War II military walkie-talkies in exc conds. w/manuals & spare battery sticks - \$350 for pair. Larry Drago, 383 Lincoln Dr., Cheshire, CT 06410. (203) 272-6030

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

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

**WANTED:** Anyone know if a meter movement & indicating tube were ever used together in the same case? Is there a book which shows photos of almost every kind of meter ever made? Chris Cross, Box 94, McConnell, IL 61050.

**WANTED:** Navy ETN3&2, RM3&2 ratings manual (early 60's to early 70's editions). Robert Harding, KCSLHR, 1321 Monte Largo Dr. NE, Albuquerque, NM 87112. (505) 291-0950 eves

**WANTED:** 19" rack panels. FREE: RTTY 32K5R & 33ASR - U pay shpg. Tom Hoitenga, K8NGV, GA, (770) 426-8682.

**WANTED:** SCR-283 components especially dynamotor BD-AO-93, control box BC-AO-232, antenna relay BC-AO-408 & FT-99, 100, 141 & 118. Don Merz, 47 Hazel Dr., Pittsburgh, PA 15228.

**WANTED:** S-meter for SX-17, also copy of manual. Vern Snyder, GA, (770) 307-1459.

**WANTED:** Radio Amateur Handbook in real good condx. Years needed 1961, 1962, 1965, 1968 & all of the '50s. Bob Mitchum, IN, (317) 881-9083.

**WANTED:** Plastic dial escutcheon for RCA 81612; Hallicrafters SX-11 dial plate; National SW-3, model 1, versions 6 volt & 2 volt; RCA Communications rcvr's, model 60, 111, & 175; Collins 310B xmttr; James Millen, 90711 VFO, 90801 exciter & pwr sply's. Dean Showalter, WA6PJR, 72 Buckboard Rd., Tijeras, NM 87059. (505) 286-1370

**WANTED:** V7OD tube sockets for Globe King 400B restoration, intact & clean front panel for the final deck. Greg Hill, KC6ISQ, 214 Grange Rd., Eureka, CA 95503. (707) 442-4283

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

**WANTED:** National NTX30, Hallicrafters HT6 or RCA ACT20 xmttr. John Zitzelberger, 1673 Devonshire Ct., Thousand Oaks, CA 91361. (805) 449-1036

**WANTED:** Collecting early Heath gear 1940's - 1950's; early Heath catalogs and literature; Heath mics, spkr's, supplies, access., any parts units. Byron, WA5THJ, 1215 Fresa Rd., Pasadena, TX 77502-5017. (713) 941-3631

**WANTED:** Magazines: pre 1936 'Radio', pre 1934 'R/9'. Have some duplicate 'Radio' for trade. Wayne, N0TE, 1212 17th Rd. NW, New Strawn, KS 66839. (316) 364-5353

**WANTED:** BC-611. Andy, WA4KCY, 105 Sweet Bay Ln., Carrollton, GA 30116-8519.

**WANTED:** Ham equipment flyers & catalogs. No manuals. Eugene Rippen, 105 Donnington, Auburn, CA 95603. (916) 885-6147

**WANTED:** Hallicrafters SR-75 scvr. **FOR SALE:** ART-13, 300W modulation xmttr, 300W output xmttr. Sandy, W5TVW, 417 Ridgewood Dr., Metairie, LA 70001. (504) 836-2134

**WANTED:** Benton Harbor Lunch Boxes & related items. Bill pay shpg. Bud Fritz, N3SFE, 104 2nd St., Montgomery, PA 17752. (717) 547-2674

**WANTED:** Coils & dial scale E & F for the HRO-60. Please help, will pay your price. Richard J LaMark, N2TXL, 6822 Tuckahoe Rd., Williamson, NY 14589-9589. (315) 589-2552.

**WANTED:** Schematics Hickok 188X, RCA WR-49B; Heath HR-10 (al. knob, VF-1 dial scale. Jack Berthoff, WA4CSM, 8109 NW 58 Ct., Tamarac, FL 33321. (305) 721-2337

**WANTED:** Bird slug HF 100W, Viking Challenger meter. **FOR SALE:** SB-220 meter - \$10. Tom, W3BYM, 13806 Parkland Dr., Rockville, MD 20853. (301) 871-7463

**WANTED:** Unmodified front panel for Hammarlund Comet Pro version 2. Most any condx OK. Fred Watson, K8NRF, 581 W. Summit St., McClure, OH 43534. (419) 748-8798

**WANTED:** Teletypes and any other teleprinter machines, parts, literature or information from the 1940's to the 70's. Gary Ashbaugh, POB 2008, Corvallis, OR 97339. (503) 758-8006

**WANTED:** 75A2/75A3 parts source; 30L1 trim ring; Signal magazines; your retired McElroy bug. Brian Roberts, K9VKY, 3068 Evergreen Rd., Pittsburgh, PA 15237. (412) 931-4646

**WANTED:** Manual for PRC-77 & info to convert to carrier operated spackch. Carl, W2YH, 24 Fox Hill Dr., Franklin, NJ 07416. (201) 827-7441

**WANTED:** Shure 440SL mic, Heath SB-102 scvr w/HP-23 sply. Rick, KF5NU, 9031 Troulon Dr., Houston, TX 77036. (713) 774-5102

**WANTED:** Need parts radio or battery meter for Johnson Messenger 109, hand-held model 242-109; band-change knob for Hallicrafters SX-96. Charley, MO, (816) 726-3038

**FOR SALE:** Vintage CBs: Polytronics Poly Comm Senior 23 CB, near mint, working - \$77; Browning Golden Eagle S-23 & R-27, exc, works - \$177; Fanon FCB-33A "Explorer" 1 ch. CB walkie talkies, boxed pair, one antenna broken, otherwise exc - \$37; Regency "Range Gain" 23 ch. CB, 110 VAC & 12 VDC, nice - \$29. Don Merz, 47 Hazel Dr., Pittsburgh, PA 15228. (412) 234-8819 EST weekdays.

**TRADE:** Eimac AF-67 xmtr, PMR-6A rcv & psr, 116S pwr sply (for PRM-6A). **WANTED:** Mint/clean Eimac AF-68. Jim, MI, (616) 229-4318 till 10 EST

**FOR SALE:** Viking II & VFO w/orig. manual & match box - \$325; Hammarlund SP-600 & parts unit - \$200; Hallicrafter SX-24 - \$75; National RCK rcvr (similar to NC-100) - \$125; BC-1031A Panadapter & manual - \$75; BC-221 freq. meter - \$25; misc VTVMs & GDOs. Send SASE for complete list. Peter Kapp, POB 1620, Mendocino, CA 95460. Tele/Fax (707) 964-0762

**FOR SALE:** National HRO 600, collector quality rcvr - \$3800; RCA OB-6, OB-7 portable mixers-cpt. set - \$575; Collins 212Z-1 portable mixer - \$350; Rockwell HF-8050 rcvr - \$1650; HF-8096 processor - \$700; HF-8023/8032, 1KW amp/sply - \$4500; HF-8032 pwr sply - \$850; KWM 380 spare parts kit - \$850; Collins 6371-1 portable dipole ant (new) - \$225; HF-8021 manual (2 vols) - \$135; HF-8014A manual - \$75; Collins Radio Co.: Fundamentals of Single Side Band, exc condx. - \$100; Collins Broadcast catalogs #42, 44, 46, 47, 48 - \$35 ea.; Collins Communications catalogs, 1960, 1964-65, 1970 - \$65 ea.; Collins Avionics catalogs 1964 #35, 36 - \$25 ea.; Gates Radio Co. catalogs #98 (1968), 99, (1971) - \$35 ea.; Harris #76RT (1976) - \$20; Continental 1981 catalog - \$10. Jim Stitzinger, CA, (805) 259-2011, FAX 259-3830.

**FOR SALE:** HP200CD wide range audio osc; Vibroplex VibroKeyer deluxe; Antique Elect. Supply audio amp, Realistic Minimus 3.5 spkr. Other items available. Tom Waters, 3703 Bonview Ave., Baltimore, MD 21213. (410) 488-5356

**FOR SALE:** Hallicrafter SX-101A rcvr, mint - \$300; Hallicrafter HF32A xmtr, good condx. - \$150; Heathkit HW101 scvr w/ps & spkr - \$150; Eico tube tester 666 - \$75; Eico tube tester 667 - \$100. All items + shpg. Bill Riley, W7EXB, 863 W. 38th Ave., Eugene, OR 97405. (503) 345-2169

**FOR SALE:** Heath Apache TX1, mint - \$250; DX100 - \$150; Johnson Valiant - \$325 + shpg; Hallicrafter S38's w/manual & shpg USA - \$85; many AM rcvr, smtr's; ARRL handbooks, LSASE for list. Bob, WA7HN, POB 442, Aumsville, OR 97325. (503) 749-1149

**FOR SALE/TRADE:** National NCX-3 - \$75; NC-57 - \$85; ARRL Handbook 1948 - \$20; 1945 - \$20; LS-11-A - \$20. Wayne Childress, KC7KUE, 1903 Jerome Pl. #3, Helena, MT 59601. (406) 443-7255

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**FOR SALE:** Heath SB10 SSB adapter - \$50; BC142 ant relay - \$20 +shpg. Kathleen Smith, VE3WKW, 951 Wonderland Rd., S #507, London, ONT N6A 2X7, Canada. (519) 472-2738

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**FOR SALE:** Knight T60, good - \$60. **WANTED:** Cabinet &/or desk for Johnson desk xmtr; SX24/25 5-meter. Brian, WA5UEK, TX, (214) 596-2914.

**FOR SALE:** Old radios: Ranger, Viking II, HQ-129X; Galaxy 300; Johnson Match Box; etc. Arnold Rickford, WDOHOP, ND, (701) 652-3916.

**FOR SALE/TRADE:** Heath SB-401, SB-303, SB-600 & SB-630, includes CW filter & xtal option, retubed & aligned, everything works - \$400, OBO; Heath SB-401 & SB-301, retubed & aligned, everything works - \$250, OBO; Hammarlund HQ-170 AC, VG condx. - \$160. **WANTED:** Collins 32S-3C & 516F-2 RE. Will purchase or trade for 32S-3, 75S-3 & 516F-2 WE. John, AE4EN, 2859 Scotts Hill Loop Rd., Wilmington, NC 28405. (910) 686-4236 before 2 PM.

**FOR SALE:** Rcvr's: Gornet GR212, Heath GR54, Laf. HE230 - \$57.50 ea + shpg. H. Mohr, 1005 W. Wyoming, Allentown, PA 18103.

**FOR SALE:** Eico 722 VFO - \$55; Eico 720 xmtr - \$85, both exc. **WANTED:** Globe King 500 A or B. George, WA6HCX, CA, (805) 682-3094.

## WANTED

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

**WANTED:** McIntosh and Thordarson amplifiers any condx. Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53228-0803. (414) 297-9310

**WANTED:** Radar equipment, the bigger the better! Also early TV cameras. Allan H. Weiner, 507 Violet Ave., Hyde Park, NY 12538. (914) 471-9500

**WANTED:** Help Vibroplex build its Company collection of Vibroplex bugs, keys and memorabilia. Call Mitch, WA0QSR, at The Vibroplex Co., (800) 478-8873

**WANTED:** Collins - Amateur catalogs, sales literature, manuals, promotional items & Signals-Richard, KD6CPE, POB 992, El Toro, CA 92630-0992. (714) 855-4689

**WANTED:** Collecting Pre-1950 commercially built amateur gear, xmtrs, rcvrs & accessories. Dean Showalter, WA6PJR, 72 Buckboard Rd., Tijeras, NM 87059. (505) 286-1370

**WANTED:** Old tube amps & xmtrs by Western Electric, UTC, Acro, Peerless, Thordarson, Jensen, JBL, EV, ALTEC, WE spkrs. Mike Somers, 2432 W. Fargo, Chicago, IL 60645. (312) 338-0153

**WANTED:** Kleinschmidt "Teletype" equipment, literature, 7/8" paper tape, Hallicrafters elevating base for SX-42. Tom Kleinschmidt, 506 N. Maple St., Prospect Heights, IL 60070. (708) 255-8128

**WANTED:** TMC GPR-92 HF Rcvr. Hank, W6SKC. (602) 281-1681 FAX: 281-1684

**WANTED:** Military tube testers TV2, TV3, TV7, also tech manuals on repair. Alan Mark, POB 372, Pembroke, MA 02359.



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**WANTED:** Info on winding a modulation xfmr for 2E26, 6DQ6, core, winding gap sizes? Dave Dameron, KC6BP, CA, (310) 318-5311.

**WANTED:** R392, TV3B/U Hickok 6000 tube tester, BC348J,N,Q. Alan Mark, POB 372, Pembroke, MA 02359.

**WANTED:** Schematic for RCA Radiomarine model 8712 direction finder. Charles T. Mooney, N3RQY, 13018 Midsummer Ln., Bowie, MD 20715-3030.

**WANTED:** 9-pin octal socket & matching plug. Used on Johnson Ranger, etc. Bill, W7US, AZ, (520) 290-6064.

**WANTED:** UM-1 WRL modulator. Bob Mattson, KC2IK, 10 Janewood Rd., Highland, NY 12528. (914) 691-6247

**WANTED:** Globe Champion 300 or 350, clean condx, working or not. Sue, MI, (616) 229-4318 till 10 EST.

**WANTED:** Clegg Zeus/Interceptor pair of Gonset 2 meter Communicator IV, Collins 516-F2 pwr sply. Randy, WA7CPA, AZ, (602) 266-2256.

**WANTED:** Heath MT-1, 88 mH toroids, 60's Allied (Knight) catalog, Bill, N5LWX/DA1WG, (49) 9321 702 669 (0700-1500 YTC) bgraham@tccnet1.jctc.jes.mil

**WANTED:** Johnson TR switch; KW matchbox w/ meters, Pacemaker. John Fernandez, KE6UVT, CA, (818) 249-9142, FAX 249-9100.

**WANTED:** TBY-7, BC-222, WW II Japanese military radios of any kind. Takashi Doi, 1-21-4, Minamidai, Seyaku, Yokohama, Japan. FAX: 011-8145-301-8069.

**WANTED:** For BC-610 TX Junction Box JB-70 or equiv.; patch cord for same. Joe, AB5LL, AR, (501) 257-2567.

**WANTED:** Instruction manual or other info for the Wells Gardner 250GSC xmtr. Please help! Jim Jorgensen, K9RJ, 1709 Oxnard, Downers Grove, IL 60516. (708) 852-4704

**WANTED:** Viking II spinner knob; 32V1 manual; Valiant II manual. Carter Elliott, WD4AYS, 1460 Pinedale Rd., Charlottesville, VA 22901. (804) 979-7383

**WANTED:** Manual for a Gates HFL20000Z 20KW linear amplifier. Charlie Solie, WB5LHV, NM, (505) 526-5778.

**WANTED:** WRL-70 xmtr; HB xmtrs for display, must be museum quality; thousands of QSL cards to paper walls of Amateur display. Call Leo, (402) 392-1708, Western Heritage Museum, Omaha.

**WANTED:** Hammarlund manuals, parts, parts units, from the series Comet, HQ, SP. Also accessories, catalogs, spec sheets, memorabilia. Robert, Amateur Radio Surplus, (517) 789-6721

**WANTED:** Collins 30J, 30FXB/C, other pre-1940 Collins amateur gear for my collection. John Firey, WBSHRL, 14818 Delbarton, Houston, TX 77083. (713) 5615-KW1

**WANTED:** Uniden CR-2021, Kenwood T-999 xmtr; SB-610 scope. **FOR SALE:** 6550 tubes, NIB - \$30; Stancor mod xfmr #55C028, stamped 2-STC-45 - \$100. U-ship. Rick, K8MLV/O, 1802 W. 17th St., Pueblo, CO 81003. (719) 543-2459

**WANTED:** Paying immediate cash for old Fender and VOX guitar amplifiers. Frank Czaja, A9PT, 8968 W. Forest Home #4, Greenfield, WI 53228

**WANTED:** Manuals, manuals, manuals for radio-related equipment to buy or swap. Catalog available. Pete Markavage, WA2CWA, 27 Walling St., Sayreville, NJ 08872. (908) 238-8964

**WANTED:** For Collins 75A-3, mech. fillers F455B-60, F455B-31, F455B-08; 8R-1 xtal calibrator, 148C-1 NBFM adapter; Collins spkr's. Joel Thurtell, 11803 Priscilla, Plymouth, MI 48170. Tel/Fax (313) 454-1890

**WANTED:** WW II Japanese xmtrs & rcvrs (and parts) for restoration and ER articles, information on T1083 30's vintage British aircraft xmtr. Ken Lakin, KD6B, POB 310, 701 SE Salmon Ave., Redmond, OR 97756. (503) 923-1013, e-mail klakin@aol.com

**WANTED:** Best price or TRADE for your National SW-4 or Hallicrafter Sky Buddy 519 (not 519R). Robert Enemark, W1EC, POB 1607, Duxbury, MA 02331. (617) 934-5043

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**WANTED:** ARRL Handbook-1946, 1948, 1950; Radio Handbook 4th Ed. (1937). Lynn Stolz, N8AJ, 2461 Bean Oller Rd., Delaware, OH 43015. (614) 369-9777

**WANTED:** Mics: EV619, 641, 605; Shure 707A, 5455; Astatic JT30, T-3; Turner CX, BX, VT-73; others also. Tom Ellis, Box 140093, Dallas, TX 75214. (214) 328-3225. FAX 214-328-4217

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**FOR SALE:** Western Electric BC-AR-429, C-376, tubes, VGC - \$30; Flesher TU-170, orig. manual, VGC - \$20; Eico 710 grid dip meter, GC, no book - \$15; Swan 240, manual copy, no ps, photo available - \$50. Shpg extra. Patrick Marimeau, K9HF, 5055 1/2 Lakewood Ave., St. Louis, MO 63123. (314) 752-3611.

**FOR SALE:** PRC-108 HF SSB radio w/back pack battery box, ant & handset w/4 stals checked - \$150. Barry Fairwood, 371 Wood Ford Ave., Apt 28, Plainville, CT 06062.

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**WANTED:** Drake C line, TR4CW/RIT, 2B, late production, very clean. KB0W, 11456 Fortyniner Cir., Gold River, CA 95670. (916) 635-4994

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**FOR SALE:** Circ-1EP1 tube, N05 - \$25; two 931A's, N05 - \$30 pr; Lear radio pilots beacon & broadcast rcvr, model APR-1, portable, Rooseveltfield, NY - \$125; JT 30 mic - \$35; 675 at 4.5 kv Caldwell variable - \$45; Palomar VLF converter - \$45; Hallicrafters HA-10 LF/MF tuner, exc - \$50; MFJ 941-B tuner - \$45; D-104 xtal mic w/grip to talk amplified desk stand, orig. box - \$50; TV-12 tube tester, oak case, no manual, VG - \$45; Stromberg Carlson mic, model MD27, wrong base - \$20. Donald Moth, W2MFK, POB 73, Chittenango, NY 13037. (315) 687-6453

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