


The
Indiana
Historical
Radio Society

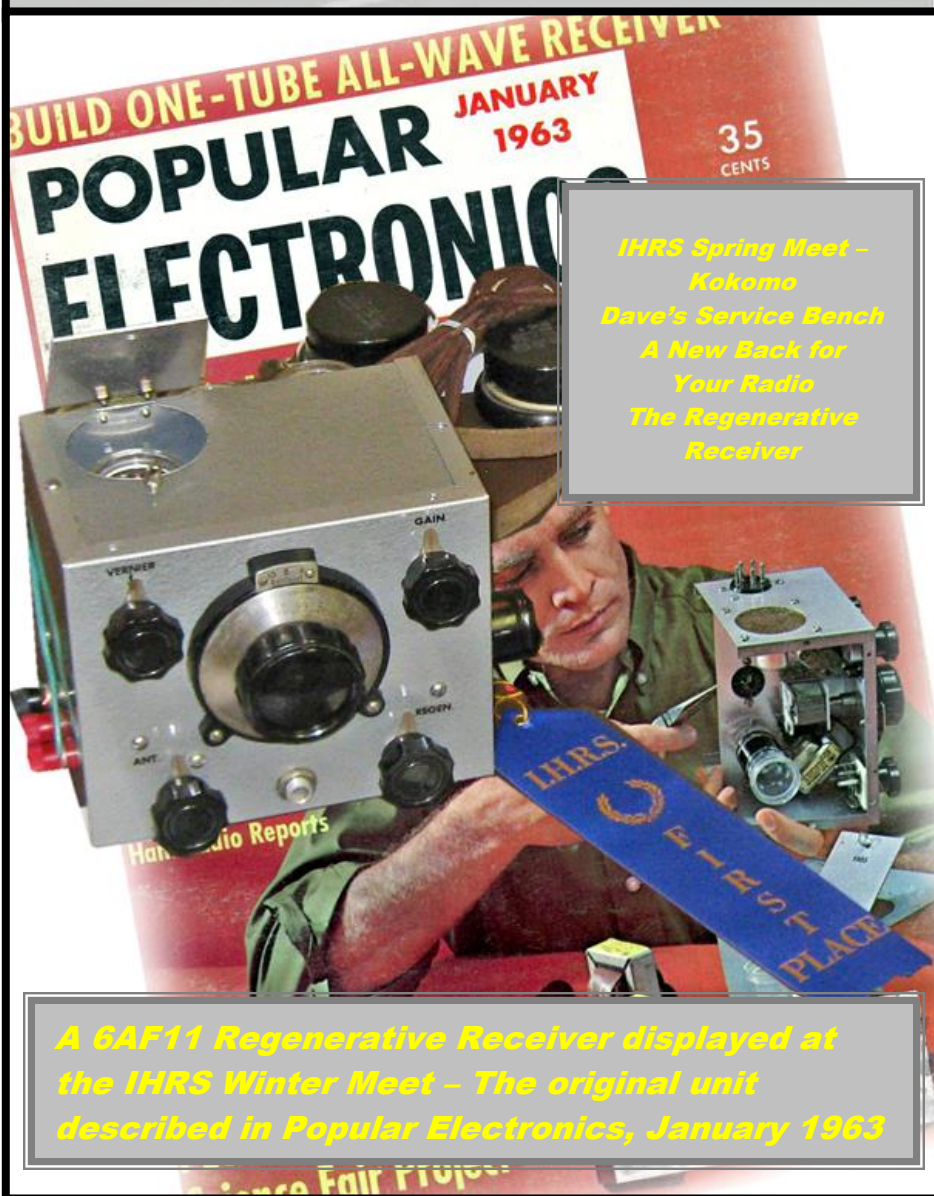


BULLETIN

Volume 41

March 2012

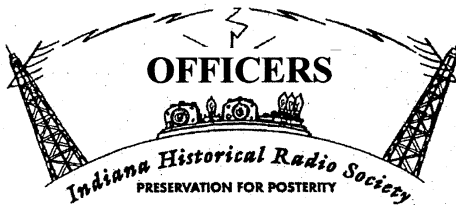
Number 1



BUILD ONE-TUBE ALL-WAVE RECEIVER
POPULAR ELECTRONICS
JANUARY 1963
35 CENTS

***IHRS Spring Meet –
Kokomo
Dave's Service Bench
A New Back for
Your Radio
The Regenerative
Receiver***

***A 6AF11 Regenerative Receiver displayed at
the IHRS Winter Meet – The original unit
described in Popular Electronics, January 1963***



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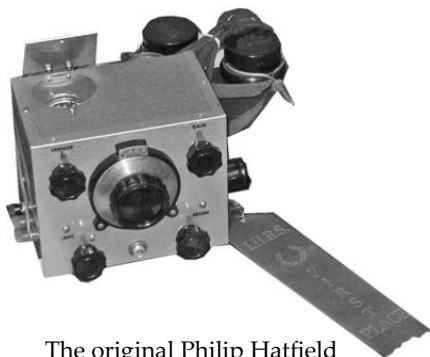
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The BULLETIN
A PUBLICATION OF THE INDIANA HISTORICAL RADIO SOCIETY
CELEBRATING FORTY ONE YEARS
OF DOCUMENTING EARLY RADIO

The Indiana Historical Radio Society Bulletin

March 2012

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The original Philip Hatfield
one tube regenerative receiver.

In this issue: As we look forward to our joint IHRS/AWA Spring Meet we can anticipate meeting with friends, appreciate what is now truly "Antique Wireless Radio" in the Old Equipment Contest, and of course, finding a treasure at a swap table.

In a 1963 publication of "Popular Electronics", Philip Hatfield presented his design and construction of a one tube receiver. Dave Mantor has the actual receiver and showed it at the Winter 2012 IHRS Meet. Dave describes the radio in "Dave's Service Bench". We are glad to see "Dave's Service Bench" back in the Bulletin and look forward to future "Service Bench" insight.

Herman Gross shares with us his method of creating new backs for table radios – page 14 and Ed Dupart continues to develop radio circuitry beyond the simple crystal receiver with a description of the Regenerative Circuit beginning on page 18. On page 28 you'll find a Jim Fred reprint, from the March 1984 Bulletin offering us insight on "private brand radios".

Fred Prohl, Editor



Renew your membership for 2012 now!

If the date on your mailing envelope for this issue of the Indiana Historical Radio Society Bulletin is 12/11 or earlier, it is time to renew your membership. Please send a check payable to the ***Indiana Historical Radio Society*** in the amount of \$15.00 per year.

Send your payment to:

**Herman Gross, IHRS
1705 Gordon Drive
Kokomo, IN 46902.**

Include your current mailing address, if not on your check, and your email address, if you have one.

Membership questions? Contact Herman at w9itt@comcast.net or call him at (765) 459-8308.

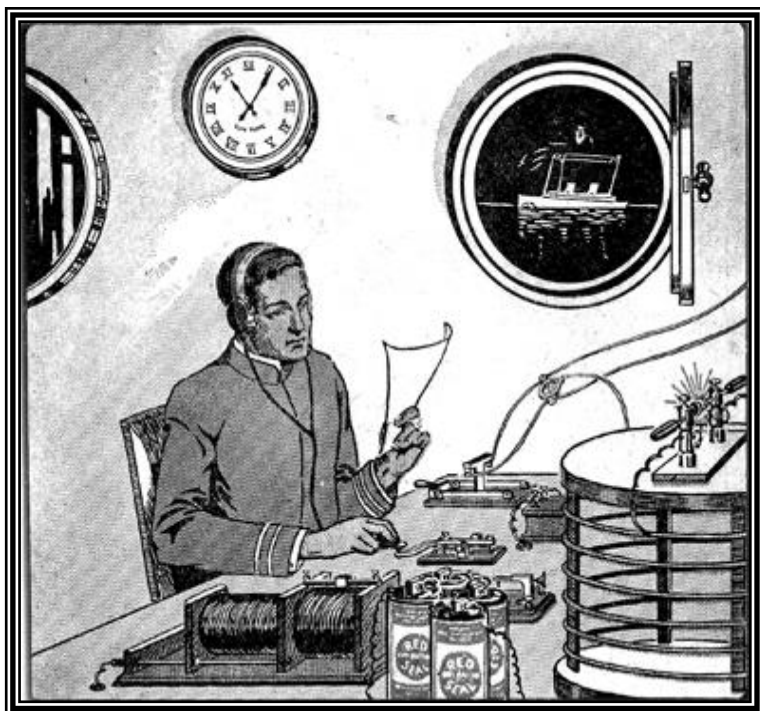
“Wireless!”

The cover of the March 23, 1912 issue of Scientific American depicts the Wireless Room aboard the U.S. revenue cutter “Gresham”. (See page 32 of this issue of the Bulletin.) The significance for us is the visual we have of a set up not unlike the Wireless Room on the SS Titanic. It was twenty-two days later following the magazine’s publishing date that distress signals were sent from the Titanic reporting the striking of an iceberg.

The April 2012 issue of QST has two articles reviewing the action (and inaction), and importance of the wireless communications related to the Titanic. Both articles, the first written by Commander Paton of the Steamship Historical Society, the second by a regular QST contributor, John Dilks, K2TQN, offer a wealth of detail regarding 1912 “Wireless”. It is appropriate we have an IHRS Spring Meet “Old Equipment Contest” category of WIRELESS EQUIPMENT. The category is wide – pre-1918 commercial or homebuilt equipment designed to transmit and/or receive code and related literature.

Dust off your wireless gear and bring it to Kokomo.

(The picture below is from the cover of “Manual of Wireless Telegraphy”
A 1914 catalog of the Manhattan Electrical Supply Company)



**41st Indiana Historical Radio Society
and Antique Wireless Association Spring Meet**
Friday, May 4 & Saturday May 5, 2012
Meet at the Quality Inn Suites, Kokomo, Indiana



The Quality Inn Kokomo is located at 1709 East Lincoln Road, Kokomo, on the US31 bypass. There is space for indoor and outdoor Swap N Sell setup. The indoor space is on ground level with easy access..

Friday May 4, 8:00AM – Indoor and outdoor Swap N Sell space is first come first serve. **Important – check with IHRS Meet registration before selecting a parking space for outdoor setup! The motel management has asked we use a specific area of the parking lot – we intend to honor the request.**

Friday, 8:00 pm Doors locked for the evening.

Saturday, May 5, 8:00 am Radio Swap N Sell setup continues.

Set up for Old Equipment Contest, Operating Radio Display

Set up for Silent Auction

9:00 am Old Equipment Contest and Operating Radio set-up closes. Contest judging begins. Silent auction begins

11:00 am Silent Auction ends

12:00 noon Spring Meet concludes

Fees – General admission is \$5.00 per family.. One Swap N Sell space for the sale and trade of vintage radios is \$15.00 for IHRS/AWA, \$20.00 for non-members, good for both days.

Old Equipment Contest - Contest is open to all Indiana Historical Radio Society and Antique Wireless Association members. Non member entries will be for display only. The Founders Award is reserved for IHRS members. The entries are judged by historical significance, documentation, and condition of radio.

Contest Categories: *Contest categories judged by team of IHRS members.*

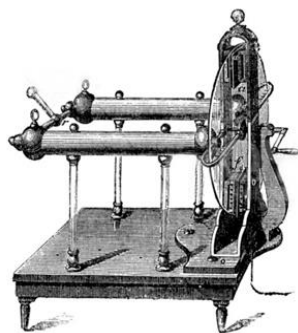
1. Made in Indiana
- 2 Wireless equipment pre commercial radio, 1918 and earlier. Passive and vacuum tube, spark gap, tuners, military, etc.
- 3 1930's radio
4. Post WWII, 1940's 1950's table radios
- 5 Open for any radio related entry.



Operating radios will be judged in the appropriate contest category:

Radio Display – Want to show off a set, generate a discussion? Space will be available to display your radio related equipment.

Eclectic Electric Display - Have a unique “electron flow” device you’d like to display? Be it a toaster or Wimshurst Influence Machine - a table will be available to show it off!



Meet contacts: Fred Prohl, 812-988-1761
Herman Gross 765 459 8308

The Kokomo Quality Inn is offering a discount for IHRS Spring Meet guests. Be sure and say you are attending the Radio Meet when making reservations. For reservations call 765 459 8001.

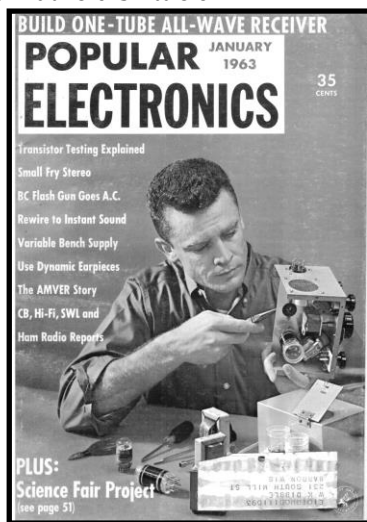
Dave's Service Bench

Greetings from Fairmount, hometown of James Dean. It's been quite a long time since I last submitted an article to the IHRS Bulletin. With a myriad of responsibilities as well as some physical challenges to work through, it hasn't been until



now that I've been able to think about contributing. The two high points of my radio activities over the past several years have been the refurbishing of the Shenandoah 5 and the acquisition of Philip Hatfield's little 6AF11 regenerative receiver that was built and tested in 1962. Its fame came about when it was featured on the cover of the January 1963 issue of Popular Electronics along with a very detailed article. Well, more about the regen later in this writing.

One more item of note before we get into the substance of this writing: there are three (3) areas of information that I'm seeking...1) more details than what is currently available on the Internet on the manufacturer and schematic of the Shenandoah Five...2) experiences and life details on Philip Hatfield...3) experiences and life details on John T. Frye. There were several members of IHRS, now passed on, who knew Frye, and I missed out on talking with them. Are there any others? You may contact me via email at merrijoy@frontier.com or by regular mail to PO Box 1, Fairmount, IN 46928-0001. Thanks. Now, on to the radios.



Fred Prohl covered many of the historical and significant details on the Shenandoah in the last Bulletin. I appreciated what he wrote with the compliment given to my father-in-law, C.E. Strand and the recognition of the memorial to my brother, Warren J. Mantor USN. So, what I'll discuss here will be more in line with my work on the set.

Fortunate it is that Carl tried to protect the radio from the ravages of storage and non-use by keeping it covered. However, when I first lifted the cover, I saw only two 201As left. He must have had use for the other three elsewhere. While there was no evidence of living creatures of any kind within the radio from the past 25+ years, the dust had still collected and



The Shenandoah Five

some of the metal surfaces were discolored and in need of polishing. So the first order of business was a general clean up.

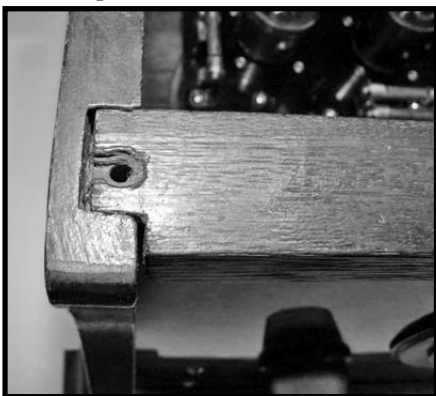
I remembered Carl letting me listen to the Shenandoah late one evening, and I found it to be an intriguing set. According to Carl's log that I have from that evening in 1982, we listened to WOWO in Fort Wayne, WGOM in Marion as well as WLW and WJYM. The dial settings were 35-31-33, 50-56-54, 72-70-68 and 68-68-66 respectively. I have other logs that he wrote down over the years as he listened to his favorite radios.

The only manufacturer's tag that I have that came with the radio – no name on it, however – was directions for the battery connections using 5 Type A tubes or 4 Type A tubes and one Type 112 tube. The appropriate A-B-C voltages and their color-coded wires are also shown.

Carl enjoyed radio testing. He had started working up a schematic for the Shenandoah, but for some reason, he didn't finish it. Evidently, information was even scarce in the late '70s on into the '80s on that radio.

There is one missing piece, a wooden brace that secures the bakelite in position with an underside groove left to right and ties to the radio by means of a screw set vertically at each end. The picture of that brace is from a Shenandoah Super Six owned by a friend of mine. The dimensions are a bit different, but the design is the same. So, my little bit of woodworking skills will be put to the test as I attempt to complete that.

The chassis with the attached bakelite front panel comes out in one very careful lifting process. It's set on an angle, so extreme care is needed when one removes it from the case. There are three (3) 2 ½ inch metal support rods that are threaded at the top for the securing screws when it's all assembled. They give the chassis rigidity and keep it from moving. Of course, just as most wood-cased radios, the battery cords and wiring exit through the bottom of the back panel. Again, lots of care is needed.



A Shenandoah Super Six brace.

One of my concerns when I decided to launch my Shenandoah Five project was the lack of tubes. When Carl passed away, Merrijoy (my wife and Carl's daughter) and I tried to help my mother-in-law out financially by selling off Carl's radios and parts. There wasn't much in the way of insurance, so his investment in the radios paid off. Perhaps some of you remember Merrijoy and me setting up at some of the IHRS meets in 1993 and 1994. Also, I am happy to remember that many of you were recipients of some of his radios and parts.

But...because we had to sell everything, I didn't have any tubes left.

So, I went to Portland for their big tractor meet and lo-and-behold, amid all the old car parts and stuff, I found a home-built radio complete with the tubes I needed. Out came the tubes, the radio was put on eBay tubeless and for once, I made a little besides. Of course, tubes with the Henry Fields nomenclature on them would have been ideal, but using classic car terminology, I decided to "run what I brung."

The job ahead was to clean and polish the wooden case. I exhibited a great deal of care in choosing what I was going to use. A carefully applied, diluted solution of Windex and Q-tips did the best job. After the cleaning, I applied a polish for antique wood and thought I'd move on to the chassis

and bakelite. First, some pictures of the completed job on the case. Looking at the pictures taken with our new 14x digital camera, I found areas that still needed cleaning and polishing. The camera revealed what I had missed.

The bakelite also needed cleaning. I again used a diluted solution of Windex to keep from accidentally removing the lettering. It worked well and the gentle use of the Q-tips greatly aided my procedure.

I removed the dials and viewed the accumulation of who-knows-how-many years worth of dust and grime underneath. A soft-bristled tooth brush cleaned the knurling in the dials and after another set of photos to make sure I had indeed removed all traces of dirt, it was time to reassemble the Shenandoah. A point to be noted here...always exhibit extreme care removing dials from a bakelite panel. Any pressure will crack the old material, and I have no idea where one would ever find a replacement panel.

The finished product gave me a satisfactory shine; now I can move on to the wooden brace across the top. So, now what else do I need? Well, my choice is that I'm looking for a horn speaker that is in perfect condition at an utterly low price. My second choice, knowing full well the absurdity of my first choice, will be a working speaker in nice shape.

By the time you read this, some of you will already have seen the Hatfield regenerative receiver at the Lawrence Park meet. I visited Glenn Fitch at his home about 17 years ago and saw for the first time, in person, the little 6AF11 receiver which I recognized immediately from that 1963 issue of Popular Electronics. In our conversation, I was to learn that this very receiver was built by Hatfield, and it is the exact same radio used in the magazine article. Glenn has shared with me since that the radio was included in the final trip to gather up the rest of the radios and electronics to be



The original Hatfield one tube regenerative receiver used in the January 1963 issue of Popular Electronics. Upper left is the power supply, the frequency tune coils are stored on the back of the receiver.

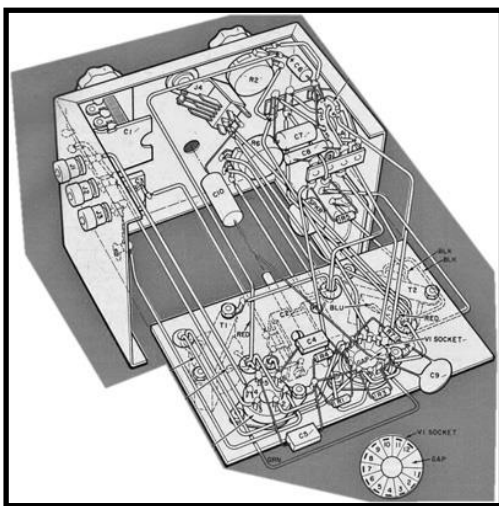
removed from the home of Hatfield's widow.

Over the years, I used mild to moderate arguments in trying to convince Glenn that I would like to have it. So, on May 7, 2010, after Glenn and I had decided on a price, I again made the trip to Glenn's home in Carthage to pick it up. I'd like to say at this point that, just as in the case of the Shenandoah, I consider myself to be a caretaker of the Hatfield radio. I'm the owner for now, but perhaps more like being the next guy privileged to have possession and care of it.

I've been in contact with Jeff Duntemann, a collector from Colorado who built one like it in 1962. He's an experienced builder who shares my enthusiasm with anything Hatfield and the Carl and Jerry stories. Incidentally, after receiving the necessary permission, he's re-published all of the CJ stories in his own series of books. Included on the website is a complete list of the Carl and Jerry stories and a month by month synopsis of each episode. To view Jeff's website, go to <http://www.copperwood.com/carlandjerry.htm>.

Hatfield's dedication to detail and clean electronic building and wiring is in evidence everywhere in this set. I also have a 40/20 meter linear amplifier built by him, and at times, I just enjoy looking at it.

The cut-away views in the Popular Electronics article show the detail of parts placement and connections. Looking at what he built, Philip Hatfield seemed to be a master in metal bending, the perfect placement of variable capacitors and the winding of coils. With my clumsy fingers, I have a high appreciation of his ability to place 5 parts, the plug-in coil, the 6AF11 tube, 2 transformers and the main tuning single-gang capacitor on a $3\frac{3}{4} \times 5\frac{3}{4}$ " plate situated within the Bud box. And his solder joints? Well, all I can say is they're next door neighbors to perfect. I hope you got to see it at Lawrence Park.



An exploded drawing of the Hatfield One Tube regenerative Receiver. (page 41, Popular Electronics, Jan 1963)

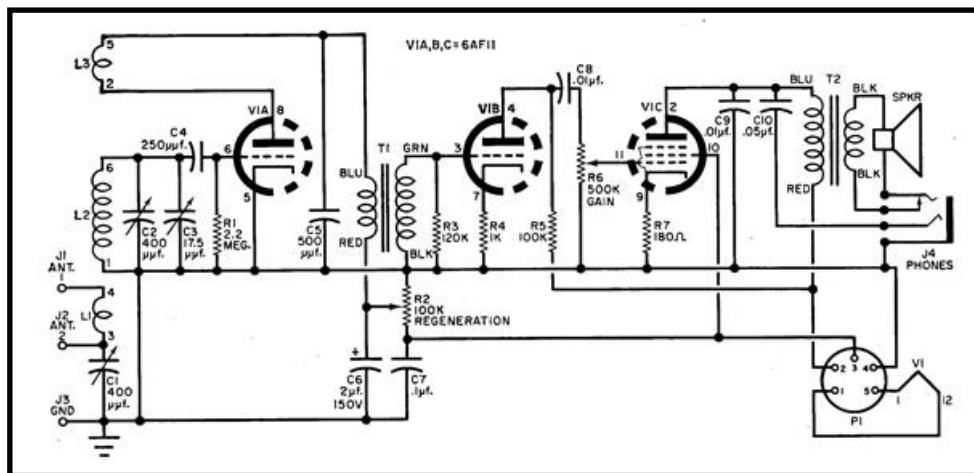
After visually checking everything for any apparent defects, I plugged it in and Eureka!!...the tube lights up and with an antenna, I can hear, low in volume to be sure, voices using the broadcast coil. Other than cleaning, I'm going to make neither any modifications nor any parts replacement if I can help it.

One of several goals that I have for the 6AF11 receiver is to pair it up with a small 6AQ5a 4 watt CW transmitter and to make at least one contact on 40 meters with it. I'll let you know how that goes.

This little radio is "history in the flesh." In my mind's eye, I can see Hatfield as he carefully drilled the necessary holes for mounting the various parts and hardware. I can see him, with soldering iron in hand, carefully joining wires and terminals. I can even visually see him scratching his head after making a human mistake, as we all do, and carefully un-doing what had gone wrong and the subsequent fix. His expertise of design and building is certainly at the same level as an artist with his paints and easel working diligently as a masterpiece is being created. You can see this love and care in each solder joint he made. I am indeed privileged to have it. Many thanks, Glenn, for trusting me with it.

Dave Mantor

w9ocm



Schematic for the Hatfield One Tube Regenerative Receiver. Copied from the Philip E. Hatfield construction article, Popular Electronics, January 1963.

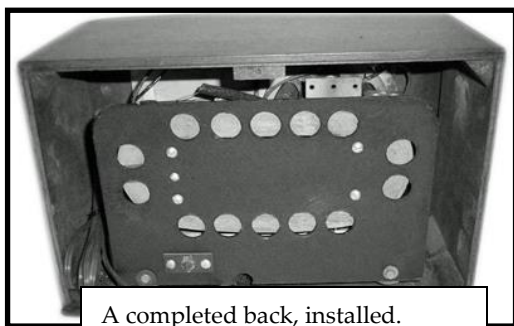
Note the power supply is not included in the above drawing.

Pay special attention to the L3 coil at the front end of the circuit – read Ed Dupart's article (page 18 of this Bulletin), and return to the above schematic with a better understanding of the L3's role in regeneration.

A Method for Making New Backs for Radios

Herman Gross

We've all seen those old table radios with their loop antenna assemblies broken to pieces. The "cardboard" used in their construction having turned soft and weak with consistency of half dried Silly Putty. I recently ran across two radios I wanted to restore that had this "condition". There was no way to repair them. They had to be rebuilt from scratch....so I did.

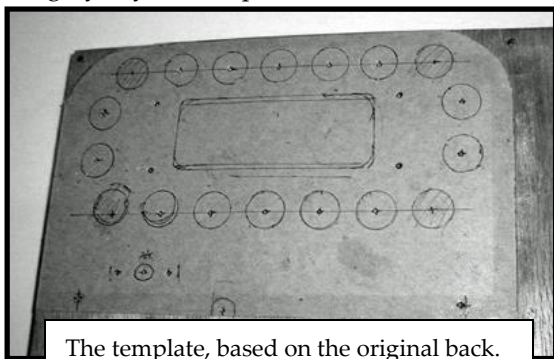


A completed back, installed.

The backs are about 1/8" thick and perforated with holes for ventilation. Frequently an antenna connector is fastened to them which complicates the matter a little. First problem was where to get the new material with which to make the new backs. Craft stores, those with picture framing facilities, have various matting materials. They also have cardboard in several thicknesses. I've used some a bit over 1/8" thick to cover the back of an antique (1887) mirror, but I had none left over. I do have a nice supply of picture matting material though and this is what I elected to use.

To make a nice stiff back, I glued two pieces of matt board together slightly larger than the original back being sure to keep the upper and left-hand edges aligned with each other to minimize trimming later. I placed the "sandwich" on the work bench and laid a piece of plywood on top weighted with a couple transformers to insure a nice flat piece of material. This was left overnight to thoroughly dry in the "press".

Using pieces of the original back as a guide I drew a matching template on cardboard. This template was placed on a 1/4" piece of plywood which was in turn placed on top of the new backing material.



The template, based on the original back.

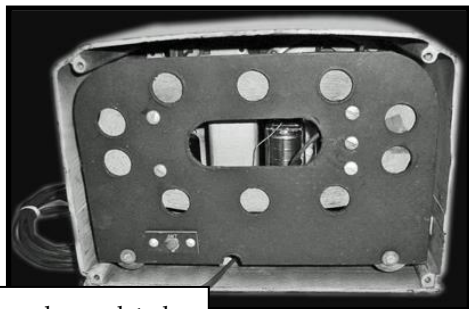
All of this was placed on a $\frac{3}{4}$ " piece of plywood. It was necessary to keep the new back material, $\frac{1}{4}$ " plywood and template, in that order, aligned at the left-hand side and top. This arrangement can be seen in the photos and is easy to do.

I tacked the pieces together to the $\frac{3}{4}$ " base board to keep the assembly tight and so the pieces would stay in place during the drilling process. Small screws would've worked better. I used a drill press with Forstner bits to make the $\frac{3}{4}$ " holes making sure I drilled all the way through into the bottom $\frac{3}{4}$ " plywood. Smaller holes were drilled with standard high speed drill bits.

Once the drilling was completed I disassembled the "sandwich" and used a scalpel to cut the right-hand side and bottom to match with the template. Satisfied that all the holes were OK I painted both sides flat black to match the original.

I used some old, tarnished, 8-32 screws to reassemble the loop antenna supports. Two of these assemblies were made, one with a large oblong hole near the center for better ventilation.

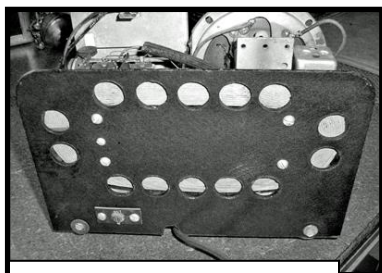
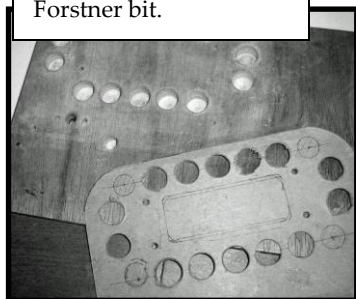
Herman



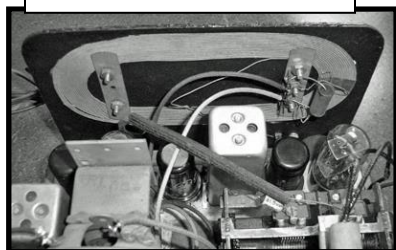
A second completed back, installed!



Drill the holes using a Forstner bit.



The finished back assembled to the chassis



Popular Vote Contest – Winter Meet – Lawrence Park

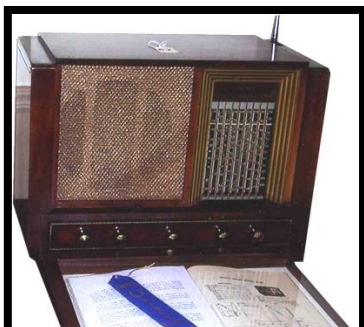


Above: 1st place was awarded to Michael Feldt for his **RACO** entry in the Pre WWII Multiband category.



Above: 2nd place went to Ed Dupart for his **Detrola** receiver in the pre-WWII multiband category. On the right, Bill Morris won a 2nd place ribbon for his **Philco Trans-World** entry in the post WWII multiband category..





Above: Randy Frasure won 1st place in the Popular Vote contest Post WWII Multiband Category for his Philco 53-960 entry. A pair of Pilot receivers were entered in the post WWII multiband category by Joe Farkas.



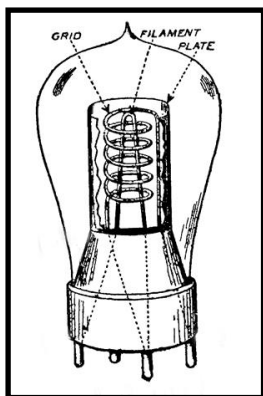
In the Open category of the contest - 1st place was awarded to Dave Mantor for his Popular Electronics Project radio (above)
And Randy Frasure earned 2nd place for his Philco 46 and advertising sign (below)



Regenerative Radios

by Edward Dupart

We talked about crystal radios last time and while we are fascinated with the crystal radio it does have some drawbacks; it has poor selectivity and sensitivity and it is not very loud and rarely can it drive a speaker. Let me define selectivity and sensitivity. Selectivity is the ability to separate one station from another and sensitivity is the ability to pick up stations. So now we want to improve upon our radio. Later I will take you on a trip down memory lane of what I did with simple radios and that will probably conjure memories of your own.



In the infancy of wireless all they had were crystal receivers and they were fervently looking for ways to improve upon their receivers. The big improvement was when Lee De Forest in 1906-07 invented the three-element vacuum tube, the triode. Many believe that this was the birthday of electronics. The triode vacuum tube had the capability to amplify a signal, something that couldn't be done with the crystal detector. We will be looking at the triode as an amplifier and a detector in radio.

As a review the basic systems in the crystal radio are:

- Antenna ground system
- Tuning system
- Detector system
- Reproducer/headphone system

The antenna ground system picks up the radio signal.

The tuning system selects a desired frequency or a band of frequencies.

The detector system separates the audio component from the radio frequency component of the radio signal and instead of using a crystal detector we will be using a triode vacuum tube.

The reproducer or headphones allows the listener to hear the audio component of the radio signal.

So the big difference in our simple radio is exchanging the crystal detector with a vacuum tube for our detector.

How did Lee DeForest discover the triode vacuum tube? Like many discoveries, the triode came about from the observations and experiments

others had previously done. Knowledge built upon knowledge. Edison who is given credit for developing the first successful light bulb was looking for a way to improve his light bulb that was accumulating a black film inside the bulb from the carbon filament. He thought if he put something inside the bulb that it would attract the carbon and not be deposited on the inside of the bulb. He put a piece of metal inside the bulb and curious as he was, he placed a meter between the plate of metal and the filament and discovered a current was flowing. This was in 1880.¹ He thought it was interesting so he jotted it down in his notes and called it the "Edison Effect". Year's later Fleming was looking for a better radio detector and he saw Edison's notes. He discovered that if he put a positive end of an electric current to the plate and the negative end to the filament a large current would flow. If he reversed the polarity there would be no current flow, so he invented the diode vacuum tube, which did work fine as a detector, but it would not amplify.¹ Lee DeForest looked at all this and wondered how he could possibly improve the Fleming valve (1904) and make it amplify. Controlling a large voltage with a small input voltage was his objective. He started by patenting his own variation of the Fleming valve in 1906.² By placing various things in the diode; he finally came up with a wire mesh screen that was placed between the filament and the plate. The plate at this point in time did not wrap around the filament but was across from the filament and the grid did not wrap around the filament, but was just a mesh inserted in between the filament and the plate. Lee DeForest then discovered that a small voltage on the grid would cause a large voltage change on the plate, hence, amplification. Mike Dale has written many fine articles on the vacuum tube, so I will let you get more details on the operation of the tube from him. I also recommend Elements of Radio by Marcus with many editions published in the 1940's and 50's.⁷

Two immediate uses were applied to the triode amplifier, one was in the telephone industry and the other to wireless communications, later to be called radio.

For some of us this starts to bring back memories of the time we started experimenting with our first vacuum tube and this is our next step to improving our crystal radio. Somebody out there is probably thinking, "What about the transistor? I started with the transistor!" Transistors are fun and I could do a separate article just on transistors, and Oh how I had fun with the 2N109 and CK722 transistors but for this article I'm going to stick with the vacuum tube. Some of the more popular tubes that were experimented with were the 01A's and 1H4's, but I didn't have those, so

what I used were 12AX7's, 26's and a CK512AX hearing aid tube and other common tubes found in televisions. I'd like to hear from some of you of what your favorite tube that you first experimented with.

OK, so now we have our completed crystal radio and we found some nice simple amplifier circuit for hooking our one tube amplifier up to. We hook up our power whether it is batteries or a power supply, put on our headphones and if everything is wired right we should hear something and I remember tuning in that local station WXYZ 1270 in Detroit and it came blasting through. It was so loud I could take off the headphones and still hear it! Was I a happy 12 year old! I was using $\frac{1}{2}$ of a 12AX7. It seems that I could come up with power transformers, filament transformers, 10-20 watt dropping resistors easier than I could batteries, which were expensive. My older brother, Vic and my dad would come up with junk electronic stuff for me to tear apart for parts and it was free. So at an early age I studied power supplies and built lots of them and that is what I used for my first tube radio.

My crystal radio with an amplifier still had two major problems. It wasn't very selective and it wasn't very sensitive, but the amplifier did help in picking more stations, but it wasn't good enough. The grid leak detector circuit replaced the diode and that seemed to help the selectivity, but it still lacked sensitivity. Earlier I mentioned I used $\frac{1}{2}$ of the 12AX7, so with a little more study I was able to add a second stage of amplification and that really made it louder! Strong stations could be heard on a speaker. For those of you that lived or live in the Detroit area these stations may sound familiar, but these are the ones I could now hear on a speaker with my two tube amplifier; WXYZ, WWJ, WCAR, WJBK, WJR and CKLW. This was a big improvement over the crystal radio and I was happy.

I was so happy with my simple radio that in the 7th grade I built a lamp, which I still have, and I crammed that 12AX7 powered radio in the bottom of that lamp. A $\frac{1}{2}$ wave power supply and a dropping resistor was used to power it. I remember the Industrial Arts teacher laughing about my idea of putting a radio in my lamp and that it would never work and in his room it didn't work, but at home it worked fine. I was devastated. My science and homeroom teachers saw and heard my homemade transistor radios work. They watched me tear apart pocket watches and scramble up the parts and put them back together and have it work again. The science teacher even put my description of how a triode vacuum tube works and all the inner parts of a 26 on the bulletin board. These teachers had faith in me, but not this Industrial Arts teacher who said I couldn't make my lamp radio work. But it did work; it just wasn't sensitive enough to pick up stations in

his room. I took the radio apart with the intentions of rebuilding it, but never did.

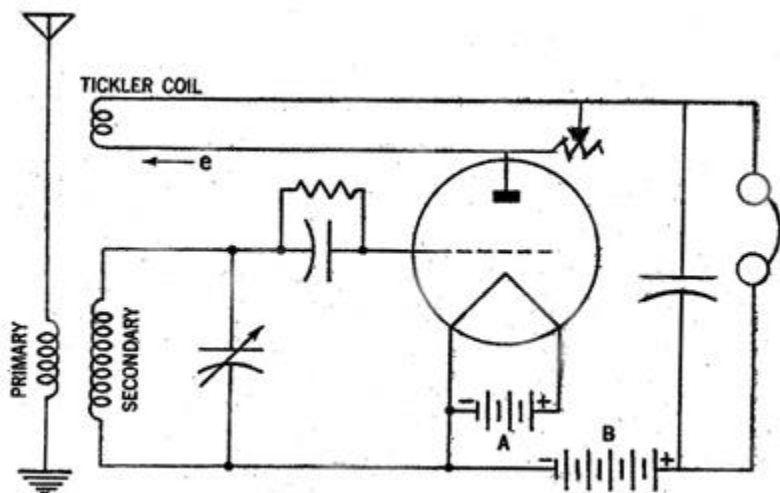
As you can tell I wasn't happy with that brain dead Industrial Arts teacher and I said if I would ever become a teacher I would not repeat the mistakes he made with me. Instead of teasing me and telling me I was a failure he could have taken some extra time and worked with me to get it to work in his room. All we had to do was string an antenna outside the window, but he wasn't willing. Years later when I did become an electronics teacher it became my philosophy to create success experiences for students and if they failed, to try again and that it wasn't a disaster to fail. The disaster would be to give up. The lamp in my radio shop is a reminder of how not to teach.

All my problems with the Industrial Arts teacher was because my radio still wasn't sensitive enough and now to find ways to make it more sensitive. It was about this time that my middle brother, Don, gave me his old Elements of Radio book by Marcus and I gobbled up the contents of that book and one of the circuits that caught my eye was the regenerative circuit invented by Edwin Armstrong in 1912 and patented in 1914.⁶ This circuit would make my radio sensitive, but how?

The tuned circuit, that Quaker Oats box, actually a cylinder, with the coil of wire on it hooked to a variable capacitor is not perfect. It has losses. I don't want to get real technical here, but a capacitor and a coil hooked in parallel is called a parallel resonant circuit and will exhibit high resistance at resonance and a capacitor hooked in series with a coil is called a series resonant circuit and exhibits low resistance at resonance. Most of the tuned circuits and the ones I generally hooked up were parallel resonant circuits that would have high resistance at our tuned frequency which would keep that tuned signal from going to ground, but rather pass on to the detector. One of the experiments I had my college students do was to hook a storage oscilloscope up to a parallel resonant circuit and pulse it with a voltage where they could observe the flywheel effect and how it would decay. Now, what is the flywheel effect? A resonant circuit will generate a sine wave when pulsed and that sine wave will decay or decrease to nothing. If we can keep the flywheel effect going then we will have created an oscillator. What the Armstrong regenerative circuit does is continually pulsing the resonant circuit so that the sinewave does not diminish and effectively reduces the losses dramatically.

How is this done? A small coil, about 10-20 turns for the broadcast band is wound on top of or next to the main tuning coil. This is called the tickler coil. Some of the output energy from the tube is fed back to the

tickler coil and pulses the tuned circuit and it generates a sine wave at its resonant frequency and is further amplified. What we now have is a transmitter and this was a vast improvement over the spark gap transmitters that were full of harmonics and would transmit over an entire band of frequencies. Spark gap transmitters and Tesla coils, another interesting topic.



See the circuit diagram, which is for the radio, but is basically the same for the oscillator. There are many variations of this circuit, but this is the most common one in use. In newer circuits the regeneration control, around 50 k ohms, is across the tickler coil. In the antique radios they usually used a variocoupler where the tickler coil rotated inside the tuning coil or moved closer or farther away from the tuning coil and there would not be a variable resistance across the tickler coil.

Wow! So Armstrong has invented an oscillator, which became the forerunner of our modern transmitters, but what does this have to do with our simple radio? What we do is control how much feedback is applied to the tuned circuit and that is done with a variable coil, variable capacitor or with a variable resistor, potentiometer or a rheostat. What we want to do is feed back some of the signal to the tuned circuit to reduce the losses of the tuned circuit, increase the Q of the tuned circuit, but not drive it into oscillation. When this is accomplished, the tuned circuit becomes very sensitive to the incoming signal and we are now able to pick up very distant stations, as Armstrong was able to do back in 1912-14. He really invented

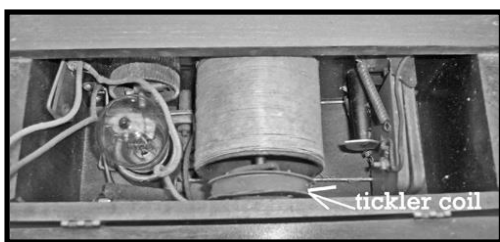
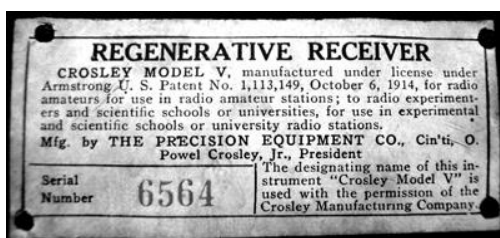
the regenerative receiver and the vacuum tube oscillator. Also note the Crosley tag with reference to the Armstrong patent.

The Armstrong regenerative receiver became an immediate success and was popular from its inception through the later 1920's, when the TRF and the superheterodyne circuits took over as the circuit of choice. The regenerative receiver remained popular with radio amateurs on a budget well into the 1950's and 60's and with electronic hobbyists all of whom were fascinated with simple circuits that do a lot and were inexpensive to build. A look on the Internet will tell you that this circuit is still popular today.

Problems with this circuit is that in the process of setting the feedback or more commonly known as the regeneration control to get your desired station, is that the circuit would squeal and become a transmitter. This would interfere with your neighbor's radio if it was tuned to the same station and it too, would squeal. The other problem is that as you tuned across the band, adjustment of the regeneration control had to be continually done making tuning the radio tricky. Something grandma or grandpa or the five year old would have difficulty doing.

Because of the tricky tuning, interference and sometimes-patent problems, another circuit became popular in the 1920's and that is the TRF or tuned radio frequency receiver, which we will take a look at next time.

As a side note, Edison did not invent the light bulb, he improved it to make it last longer. Joseph Swan from England had patented a similar light bulb a few months before Edison patented his.^{4, 5} Needless to say there were a lot of patent disputes that had to be settled in court. Actually many people



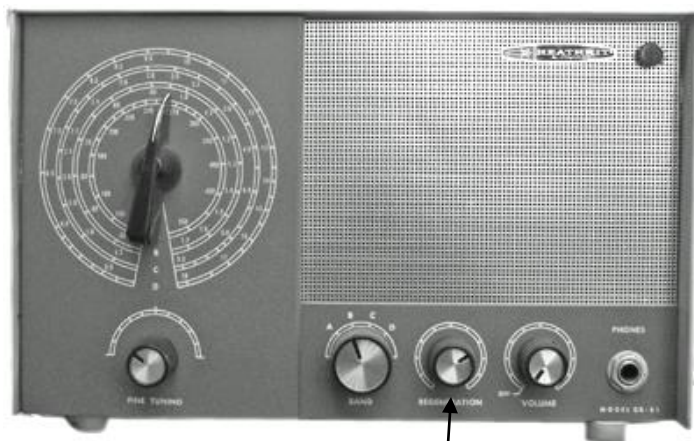
The 1922/23 Crosley Model V – A Regenerative receiver – licensed under the Armstrong patent. This set uses a variocoupler with a cylinder tuning coil.

were working on the making of the light bulb and it was a race to see who could come up with the best light bulb first and Edison won. The earliest electric light I could find was developed in 1840 by William Grove who devised an electric light, to be used in mines, using platinum as the filament that was coiled neatly like today's tungsten filament and hooked to a nitric acid battery. This gave a reliable light for miners that would not explode the methane gas they would sometimes encounter.³ This is 39 years before Edison's patent of 1879. The development of the light bulb is a fascinating study and it is not unusual for electronics people to have an antique light bulb or two sitting around.

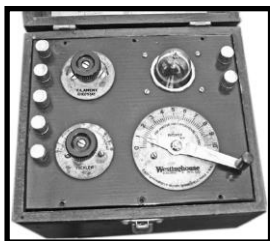
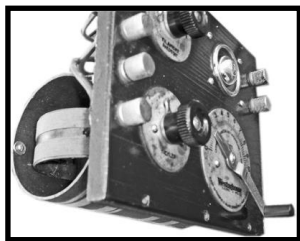
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3. On Some Phenomena of the Voltaic Discharge", W.R. Grove, The Philosophical Magazine, XVI, 1840, pp. 478-482 William Grove 1840
4. Will it Sell.com James E. White & Associates
5. About.com/library/inventors/blight2.htm
6. Radio-electronics.com/info/radio_history/gtnames/armstrong.php
7. Elements of Radio by Abraham and William Marcus 2nd edition third printing 1949 Prentice-Hall, Inc Copyright 1943, 1948

I have pictured several radios showing the various ways of controlling the feedback to the tickler coil and I tried to pick a few uncommon radios you don't see at many radio shows.



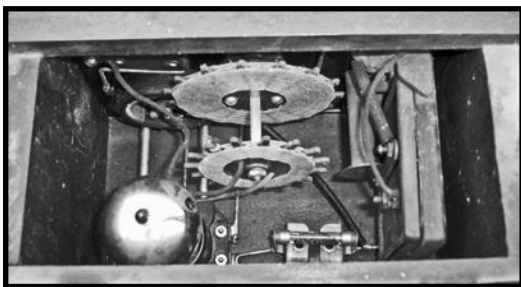
The Heathkit is the newest one and uses a potentiometer.
Notice the control is labeled regeneration.



The 1922 **Aerola Senior** uses a variocoupler and this is one of the smoothest operating regenerative radios I have used.

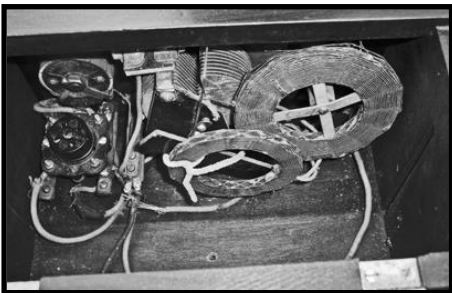
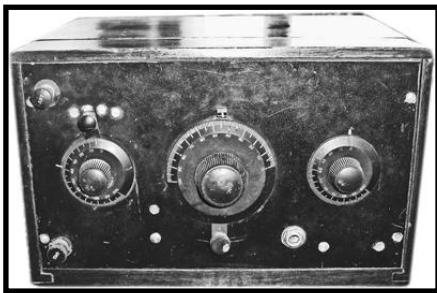


This 1923 **Michigan/Klitz** uses a variocoupler. The regenerative control is labeled "Intensifier".

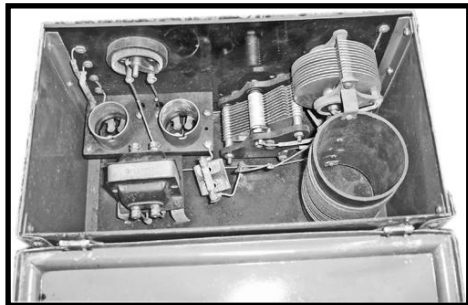
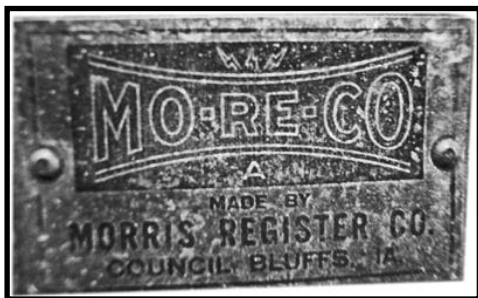


The above 1924 **Crosley 50** uses a variocoupler. Both the tickler coil and the tuning coil are spider wound for reducing losses.

Regenerative Radios (continued)



This 1923/24 **Tri City** was made for Wards and labeled Airline. The tickler coil is what I call the waving kind. It doesn't go inside the tuning coil, it just gets close to it.



The above 1923/24 **Mo-Re-Co, Morris Register Company** regenerative receiver was made in Council Bluffs, Iowa and is probably the rarest one tube radio I have. If any one has seen one like it, let me know. This unit uses a variable capacitor to control regeneration. This is the same company that made the Morris coil winder.

"I was so happy with my simple radio that in the 7th grade I built a lamp, which I still have, and I crammed that 12AX7 powered radio in the bottom of that lamp. I took the radio apart with the intentions of rebuilding it, but never did." Ed Dupart



The Indiana Historical Radio Society

2012 Meeting Schedule

SPRING MEET - Kokomo – Quality Inn

May 4 and 5, 8am Friday & 8am Saturday

SUMMER MEET - Bartholomew County Fairgrounds, Columbus

Saturday, July 21 doors open at 8am

FALL MEET - Riley Park Shelter, Greenfield

Saturday, September 29 – doors open at 8am

- Regional Vintage Radio -

Mid-South Antique Radio Club – MSARC

MSARC has been reactivated with the following 2012 schedule:

April 21 and October 27 at the Collectors Gallery, 835 Porter Place,
Lexington, KY 40508.

Contact information at layvinrad@insightbb.com

(Google Maps for Layman's Vintage Radio, the Collectors Gallery is
directly across the street.

Antique Radio Club of Illinois www.antique-radios.org

April 15 - American Legion Hall, Carol Stream

June 17 - DuPage Co Fairgrounds, Wheaton

August 2-3-4 – **Radiofest**, Holiday Inn Willowbrook

Oct 7 - American Legion Hall, Carol Stream

Dec 2 - American Legion Hall, Carol Stream

Michigan Antique Radio Club www.michiganantiqueradio.org

Extravaganza – July 12-14, Lansing MI

Fall Meet – Oct. 20, Kalamazoo; MI;

Winter Meet – Jan 18, Farmington Hills, MI

AWA-Antique Wireless Association www.antiquewireless.org

The original and largest historical radio group. The AWA publishes a quarterly AWA Journal. Membership is \$25 per year. Write to: Antique Wireless Association, Inc. Box 421, Bloomfield, NY 14469

Go to YouTube and search Indiana Historical Radio.

Bill Morris has done a great job on showing the IHRS

Fall and Winter 2011 Meets – Thanks Bill!

'Private Brand Radios' - History Interesting

by James A. Fred

(A reprint of Jim's article published in the March 1984 issue of the IHRS Bulletin.)

In past stories I've written about old radios I have often referred to "Private Brand Radios". We all know about RCA, Philco, Atwater Kent, etc. Almost without exception the companies that used these brand names on radios made these radios in factories that they owned or controlled.

We also know about Sears Roebuck, Montgomery Ward, Western Auto Supply, etc. These companies were all merchandisers of radios, but did not manufacture them. The names used on their radios, i.e., Silvertone, Airline, and True-tone were known as "private brands".

Simply stated we can say that a radio not sold by the original manufacturer with his name on the cabinet or dial, was a "private brand" radio.

There is one other category of private brand radios and that is automobile radios. To my knowledge General Motors was the first automobile company to establish a wholly owned radio manufacturing plant. This was the Delco Radio Division located in Kokomo, Ind. It was established in 1936. For a brief time the same factory building was occupied by the Crosley Radio Corporation, who made some Chevrolet auto radios. Even after Delco Radio went into production GM bought radios from RCA and Colonial.

Prior to WWII Zenith and Philco made the majority of automobile name branded radios, i.e., Ford, Chrysler, Hudson,, Studebaker, Cord etc. So in effect we have private brand auto radios. In addition there were the after market private brand auto radios sold by chain stores, i.e., Sears and Wards, and radios sold by auto accessory stores, i.e., Western Auto, Bearcat, Pep Boys, etc.

Who then was the number one private brand radio manufacturer? Among my reference books I have one titled, Radio Troubleshooters Handbook. It is a third edition, published in 1943, written by Alfred A.

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Ghirardi. This book has a list of radio manufacturers in business prior to 1943 and the brand names used. Heading the list was the Warwick Mfg. Co., 1700 West Washington St., Chicago, 111. They made radios with at least 40 different names on the cabinets or dials.

May I digress a moment with two interesting sidelights? In 1938 I owned a radio shop in Mishawaka, Indiana. Since it wasn't a major appliance store I couldn't get any brand name radios to sell, i.e., Philco, Zenith, RCA, etc. In order to cash in on the coming Christmas season sales I drove to Chicago to the Warwick Mfg. Co. I went to the sales department and ordered 24 radios from their sales display, paid cash, drove around to the shipping dock, and picked up the radios. The radios were small AM radios in nicely finished wooden cabinets, and cost wholesale between \$5 and \$9 each, depending on the number of tubes and other features.

Warwick Mfg. Co. survived (most of the others didn't) and later Sears Roebuck bought a controlling interest, and for many years Warwick made most of the Sears television sets. Finally in the 1970s Sears sold its interest to Sanyo (a Japanese firm). The plant was moved to Arkansas and still builds Sears color television sets.

Other private brand companies in Chicago were: Clinton Radio Mfg. Co. With 11 brands, Wells-Gardner and Co. (still in existence) with 12 brands, Belmont Radio Corp. (bought by Admiral) with 10 brands, and Continental Radio and Television Corps, (later Admiral Corp.) with 16 brands. As far as I know Wells-Gardener is the only survivor of the 40 or more radio manufacturers located in the Chicago area in the 1930's.

Some companies, such as Zenith only make TV sets, other companies such as Hallicrafters were sold and operate in other states, Admiral Corp. was sold and manufactures TV sets in Canada. Chicago is no longer the radio manufacturing capitol of the United States. That title may now be held by Kokomo, Ind. The Delco Radio Division (now the Delco Electronics Division) still makes millions of auto radios each year. © James Fred 1984

Jim Fred, now deceased, wrote articles for many electronic publications during his career. Jim, one of the original thirteen members of the IHRS, held several officer positions in the IHRS including president and editor. Jim, for a number of years, produced his own Vintage Radio publication.



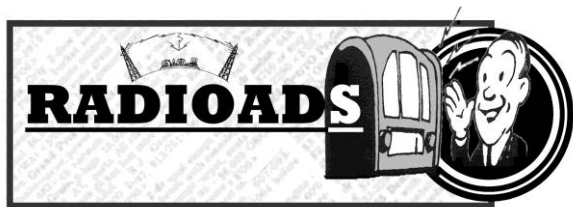
We Remember

Indiana Historical Radio Society members
Robert Avey and John Kellar.

Robert Avey was 93 when he passed away in October 2011.
We remember Robert as a frequent contestant in the IHRS Old
Equipment contests.

John Kellar will be remembered as the historian and go to person
on the John Meck Company in Plymouth.

John was 81 when he passed away in March of 2011.



Submit your "FREE TO CURRENT MEMBER" RadioAd by the 15th of February, May, August, or November in time for the Bulletin issue that follows.

For Sale the following consoles , Stromberg Carlson model 440-M , \$ 200 , Midwest model D-17 , \$375 , American Bosch model 28 with matching speaker cabinet , \$150 , and Philco model 190 X , \$125 , also code practice key with oscillator \$50 . Bob Pote, 317-881-5721 , Greenwood, IND. or contact me via e-mail mrzenith41@aol.com 3/12

For Sale: 1928 Scott Shield Grid Nine, Custom Cabinet, Excelsior, Copper Clad Beauty. \$1500 PU ONLY! Please call Don Johnston [\(765\) 945-7735](tel:7659457735), 3621 East 700 North, Windfall 46076. 9/11

For Sale Consoles, Zenith 10S160-400.00, Zenith 12S471-350.00, Zenith 9S367-350.00, Zenith 10S470-300.00, Atwater Kent 328-300.00, General Electric A87-100.00. Can send pictures. Contact Scott Beard 812-236-8071 or Triodesb@att.net 9/11

Wanted: John Meck Transmitter Model 60T-1, ca. 1947, easily recognizable by the 4 white insulators on the upper left hand corner of the front panel. They were manufactured in Plymouth, IN. Bill Ross W9WR, 300 Oxford Road, Kenilworth, IL 60043-1167; (847) 251-7447; william.ross@comcast.net 9/11

Information wanted: I am researching the first generation Delco farm radios (Models RA-3 & RB-3 and the unique dynamotor called the Electrifier.) designed to run from the 32 Volt Delco light plants. These sets are fully documented in the United Motors service manual but I have yet to find ANY advertising related to these particular radios and the Electrifier... I have the RA-3 and Electrifier and always want to properly document these artifacts for posterity....

Any information would be greatly appreciated. kd4hsh@juno.com

For pictures go to: http://kd4hsh.homestead.com/delco_RA-3_1.html

Robert Lozier, Monroe, NC 3/12

For Sale: REPRODUCTION RADIO BATTERIES: I've developed replica battery solutions for most tube and transistor radios--batteries that have not been available for nearly thirty years. They look, they feel and they work--just like the originals! Plus, they are a reusable resource. Inside are holders for AA, C, D and 9-volt batteries. When the batteries wear out, simply remove them and install new ones. Contact Bill Morris at batterymaker@gmail.com or at 317-895-1334. 3/12

For Sale: Reproduction cabinet parts (wood). In stock parts; front panels, rear arch supports, base molding, for Philco models 20,21,70,90 (others per sample). Philco Colonial Clock top trim including finials, Grandfather Clock finials for Philco 570, GE H-91, Crosley 124 (others per sample). Almost any wood part available per sample, any make or model (per quote) (tooling charge may apply). Dick Oliver c/o Antique Radio Service, 1725 Juniper Place #310, Goshen, In. 46526. Ph. (574) 537-3747, e-mail- dolivears@aol.com 3/12

Write!

Radio ads - Free to IHRS members. Unless we are advised otherwise, we will run ads for two issues. The exception would be where services, etc. are being listed. Please send your ads to the editor at the address shown on page 2. If you cannot submit an electronic copy, we can scan in a typed copy.



Articles for publication. Radio history or restoration and repair of radio, your own radio collection; someone else's radio collection; your recent or memorable radio find; your experience at a radio event. Pictures are encouraged. We can scan good quality color or B&W prints. Sending jpeg pictures on CD-R works well. Fred Prohl

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Wireless room of the U. S. revenue cutter "Gresham." Life-guard of the rocky New England coast.

She depends on her wireless apparatus to keep informed of the location of wrecks, and her urgent dispatches have at times been delayed for hours by the working of amateur stations.

REGULATION OF HERTZ TELEGRAPHY.—[See page 266.]

The Wireless Room – on the U.S. Revenue Cutter "Gresham".