

The
Indiana
Historical
Radio Society



BULLETIN

Volume 48

Spring 2019

Number 1

**A Subminiature Tube
Junk Box Radio**

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page 16



**Spring Meet, Kokomo
Friday & Saturday,
May 3 and 4**

**The Indiana Historical
Radio Society meets at
Shrine Club, Kokomo**



The BULLETIN

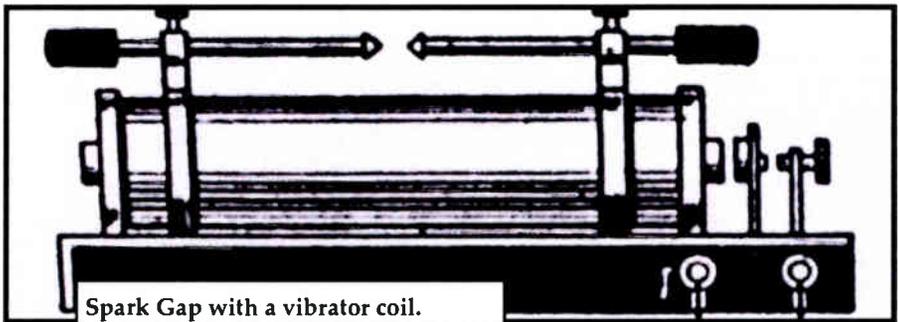
A PUBLICATION OF THE INDIANA HISTORICAL RADIO SOCIETY.
CELEBRATING FORTY-EIGHT YEARS OF DOCUMENTING EARLY RADIO

The Indiana Historical Radio Society Bulletin

Spring 2019

In this issue:

The Junk Box Radio, created by Ed Dupart. Ed describes his design and construction of a TRF AM radio using three subminiature vacuum tubes and rescued parts. Ed adds to his project challenge by constructing the cabinet from Jarrah wood. Beginning on page three of this Bulletin Ed describes construction of the AM receiver. A part two of his project, "*Junk Box Jarrah Wood Radio Cabinet*" will follow in a future Bulletin as well as part three titled: "*LED's for the Junk Box Jarrah Wood Radio*".



"King Spark" A Spark Gap Transmitter Demonstration by Darrell Darby. Darrell, through his construction and presentation, provides the basics of Wireless Spark Gap transmission. Darrell has demonstrated the early wireless technology at Ham Fests, radio clubs, and classrooms of students studying technical subjects. Darrell's "King Spark" details begin on page 16.

The IHRS Spring Meet, Shrine Club, Kokomo—May 3 and 4. Pages 14 and 15 provides directions to the Shrine Club, the Spring Meet schedule, and Contest Categories for this meet. Note that the Friday schedule begins at 4PM with meet setup (buying and selling is authorized during this time). A Vintage Radio Tech Talk is planned for 5PM; and at about 6PM the Shrine Club will have food available.

The Junk Box Subminiature Tube Radio

By Edward Dupart



About 60 years ago my brother Victor started giving me surplus electronic equipment and parts that he got at a nearby surplus place near where he worked at in Detroit. Among some of that stuff were some subminiature tubes, two of them were 6021's, a dual triode and I made a radio with them and it worked pretty good. They were taken apart and the pieces were used to make something else, but I did keep the two 6021's. The iddy biddy tubes fascinated me and over the decades I wanted to do something with them. The 6021's and others like them are about .400" in diameter. Another collector thought I should build something with them and maybe give ideas to others that may have some of these little tubes lying around. I said, "OK, I will."

There was a lot for me to learn about these tubes and there were more than just dual triodes. There were diodes, triodes of various types, dual triodes, tetrodes, pentodes and beam power tubes. They ran on low voltages, 100 volts B+ or less, and many had the same heater voltage and current ratings as the larger tubes, typically 6.3 volts and the currents were .15, .3 and .45 amp. There are exceptions to this. These tubes were used by the military and industry and were very rugged and reliable. They could withstand high altitudes and high G forces that they would encounter in jet aircraft and missiles. I think they could even withstand the tortures a 5 year-old could give them. The date range I came up with was WWII through the early 70's, when obviously the transistor and IC's took over.

The hearing aid tubes are even smaller and ran on 45 volts B+ or less and the heater voltage could be .625 to 1.25 volts and 15 to 50 mA. My grandmother gave me two hearing aids when I was around 12 and they had the popular CK512AX and the CK533AX and I made radios with them. I still have those tubes as well. They

Three Subminiature Tube Junk Box Radio—continued

measure .385 width by .285 thickness and 1.25 and 1.5" in length, respectively.

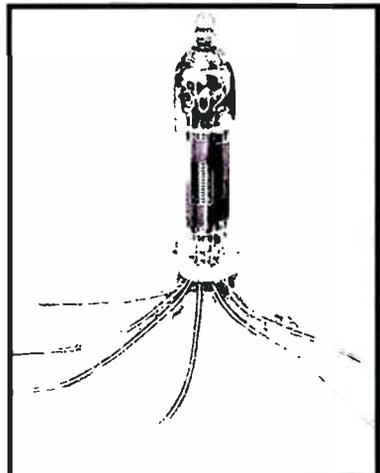
Are these tubes still being used today on a commercial basis? Yes they are. They are used as a pre-amp in high-end microphones, \$1000 is not unusual and they are in the microphone housing. A friend has one of these microphones and I was really surprised to see this tiny tube, a 5840 in the microphone. These are studio microphones. I also discovered music people like using them in low powered amplifiers for their guitars and there are a lot of schematics out there for amplifiers using these subminiature tubes.

So what was I going to build? I like radios so I decided on building a radio and I set my criteria up for it:

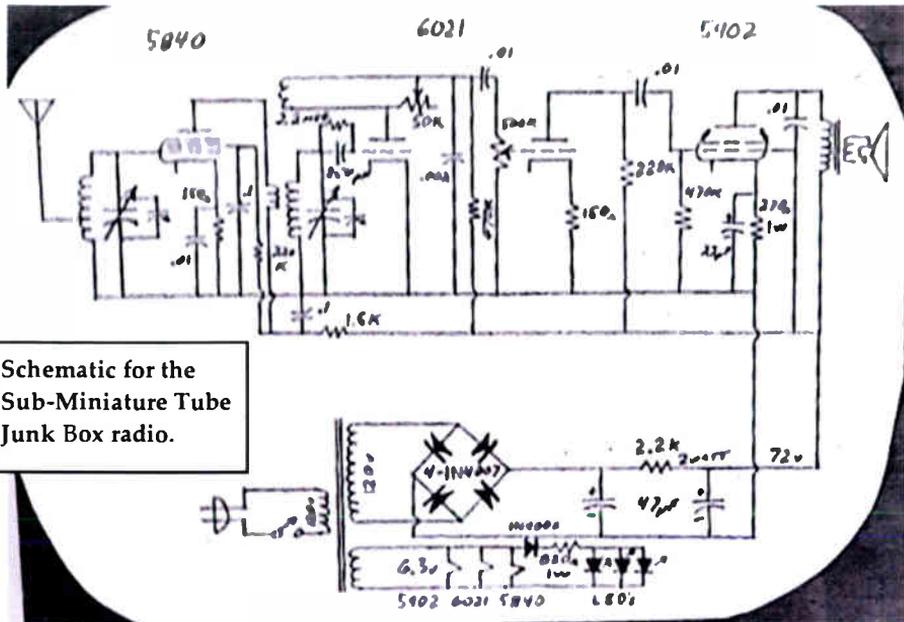
- It had to be cheap, so almost everything had to come from the junkbox.
- It had to drive a speaker
- It had to have a clear sound
- The chassis had to be small enough to accommodate the Jarrah wood I will use for the cabinet.
- It had to be easy to use.
- The circuitry had to be relatively simple, no more than four tubes.
- It had to have a metal chassis.

- I wanted to use one of my 6021 tubes.

What I came up with was a TRF similar to what was used in the depression 4-tube radios of the 1930's. A TRF has a cleaner sound than a superheterodyne, because it does not use a local oscillator that beats with the incoming signal. It takes a good ear to hear the difference between a TRF and a superhet, but there is a difference. I thought of building something similar to the Knight Kit and Heathkit regenerative radios, but then I have a lot of dual gang variable capacitors I wanted to use and they are ideal for a TRF. That and I really wanted to keep my single gang 365 pf capacitors for crystal and transistor radios. So a TRF it will be.



Sub-Miniature—5902—Beam Power tube



Schematic for the Sub-Miniature Tube Junk Box radio.

I needed a couple of tubes to go along with my 6021 and I found that a 5899 semi-remote cutoff pentode and a 5840 sharp cutoff pentode could be used for my RF amplifier. A 5640 and a 5902 are beam power tubes capable of about 1 watt output, not bad for a tiny tube. These I did not have in my junk-box so now to obtain them. I looked on EBAY and somebody had about 30 of these subminiature tubes, mostly triodes but among them was a 5840, 5899, 5640 and a 5902 so I bought the lot of them. It turns out there were about 40 tubes. Also, Raytheon likes to stick CK in front of their numbers, so a CK5840 is the same as a 5840. There are also European versions of these tubes.

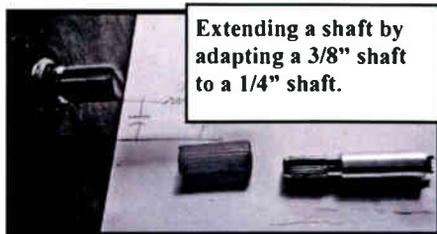
The subminiature tubes came with long leads so that they could be soldered in place without using a socket. If sockets are desired just cut off the leads to a reasonable length and plug the tube into a socket. I had a couple of sockets but not enough and they were different, not matching, so back to EBAY and I found four sockets with very long leads, so I bought them. I wanted matching sockets that could be mounted to a metal chassis. I did not want to hardwire the tubes into the circuit, although I could have done that. What I discovered was that subminiature tube sockets are pricey, but an 8 pin IC socket that fits a common 741 or 555 IC will work and would be ideal if one wanted to build this

Three Subminiature Tube Junk Box Radio—continued

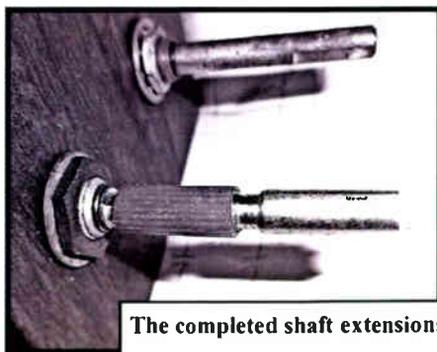
on a vector board. IC sockets are cheap and I considered using them, but mounting them to a metal chassis might be a problem, but not insurmountable. Hot glue anybody? If you are looking for sockets, don't forget to look at old military and industrial equipment that may have them. They could be a treasure trove for you.

The chassis was my next problem. It had to be small enough for the scrap Jarra wood I'm going to use for the cabinet. I have some nice aluminum Bud chassis, but way too big and I found chassis on EBAY are very pricey so I went to the Dollar Tree and checked out some metal baking pans and they weren't the right size. I did have a Radio Shack (I miss them) wood vinyl covered project box and that was the right size and I would use one half of it and the other half can be used for another project. So the project box is now my chassis.

Most of us have some dual gang 365-400pf variable capacitors kicking around, but the problem with most of them is that they have a 3/8" shaft and what is needed is a 1/4" shaft to fit the common knob. Why not attach a 1/4" shaft to it but how? I love JB Weld. In my junk-box I have saved cutoff shafts from controls that had too long a shaft



that got cut down to size. I found a cutoff shaft of the right length and put the nice machined end of the shaft on top of the large variable capacitor and JB Welded it to it. I used the new quick set JB Weld that sets up in six minutes. It's not as strong as the regular JB Weld, but it doesn't have to be as strong for this job and I wanted the quicker setup time. The trick is getting the shaft perfectly centered and straight up and down so the knob doesn't wobble. I waited until the JB Weld got a little stiffer and just eyeballed it for straightness and then left it alone and it came out perfect. Now I have a useable variable capacitor.

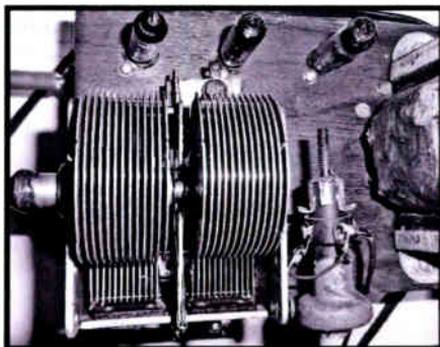


Finding a volume control was not a problem at all, but I decided to add regeneration to the circuit and I needed a 50K pot with a long shaft and I didn't have any. I did have a 50K pot with a short shaft so I headed for my junk box and found another chopped off shaft and I used a short piece of 1/4" tubing to join the two shafts together and it works perfect. Heat shrink would probably work just as well. The control issue is now settled and cheaply.

Powering this radio does not require a massive transformer and I had one with a 2-amp 6 volt winding for the heaters and a 120-volt secondary for the B+ and it was a smaller transformer. I settled on using three tubes and the heater currents are: .15 amp for the 5840, .3 amp for the 6021 and .45 amp for the 5902 for a total of .9 amp, so the 2-amp transformer is sufficient. The 120 volt winding after rectification and filtering would yield about 150 volts and wouldn't take too much to knock that down to under 100 volts. Looking up the typical plate and cathode current for the tubes gave me an approximate total of about 60 mA and to reduce it to 100 volts would require about an 800-ohm resistor. I really wanted it under a 100 volts and settled on a 2.2K 2-watt resis-

tor which gave me about 72 volts and the radio worked great at that voltage. I tried higher voltages but there wasn't any improvement. At this voltage things run pretty cool.

The coil between the RF stage and the detector came from an early 1930's radio and had a nice L shaped bracket on it that made it easy to attach to the chassis. Then I had to hand pick the antenna coil, one that would match the RF coil impedance wise and I settled on one that came from a 1950's RCA 3 way portable that had an RF stage.

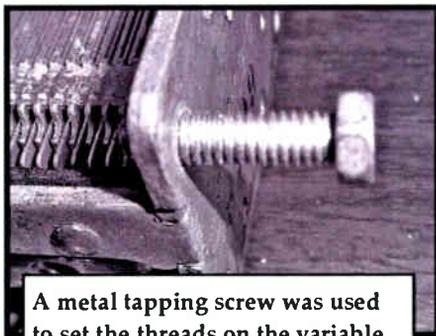


The antenna coil was mounted on the variable capacitor.

The coil has an adjustable ferrite slug and the external antenna is just a tap on the coil making the coil resemble an autotransformer. I mounted the antenna coil on the back of the variable capacitor. The tuning range for this radio is 500kHz to 1.7MHz, quite a span.

Three Subminiature Tube Junk Box Radio—continued

After building the radio I needed to attach a solder lug on the back of the variable capacitor and none of the holes were tapped with threads to accept a screw, so this is what I did. In my assortment of screws I found a metal tapping screw of the right size that required a $\frac{1}{4}$ " nutdriver which is ideal since the nutdriver won't slip off like a regular screwdriver could. Just screw it in slowly and back it out every few turns to clean out the burrs and screw it back in until it is all the way through. How about that! You've got threads without having to use a tap and die set. Metal tapping screws taper a little bit at the tip and have a slot at the tip. See the accompanying picture.



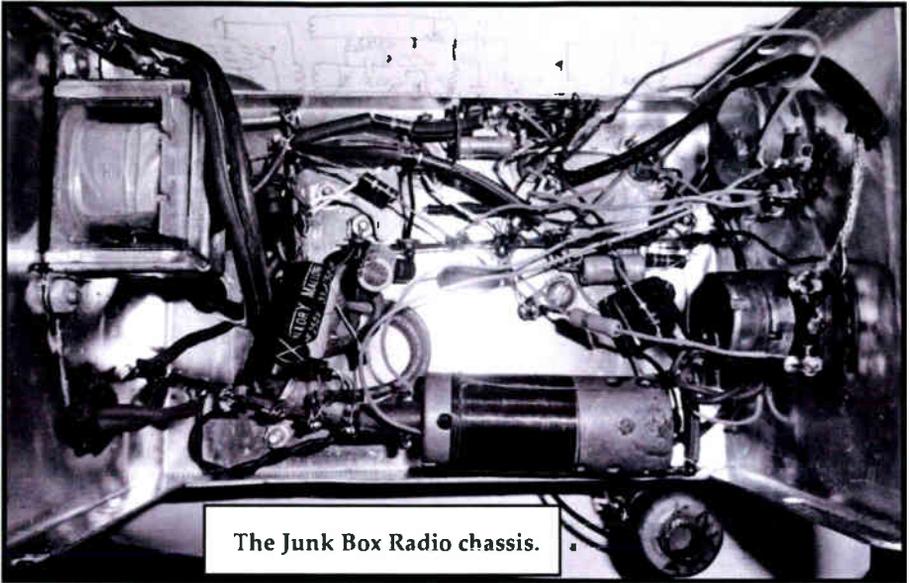
A metal tapping screw was used to set the threads on the variable capacitor.

My drill press worked great at accurately getting all the holes drilled where I wanted them. I used to use a hand drill but it likes

to slip around, whereas the drill press is stable. I bought a cheap Harbor Freight drill press for around \$100 and it works great and is small and easy to store.

About the circuitry: the 5840 is used as my RF amplifier, and the 6021 is acting as a detector and the second triode is an amplifier driving the 5902 output stage. The 5902's are capable of about one watt of output but with my reduced voltage I'm guessing it's in the $\frac{1}{2}$ watt range but is plenty loud enough for a small room.

After mounting all the parts I wired it and it didn't work. Stations came in faintly. Most of the subminiature tubes use pins 2,4, and 8 for the cathode and if they are hardwired they will clip off the unused wires on the tube. I only had pin two wired in the radio and they had pin two on the tube clipped, so I had to hook up pin 4 on the tube socket and then the radio worked, but it oscillated with a short antenna but not with a long one. At this point it is a TRF without regeneration and so it should not oscillate. I determined it had to be in the screen grid circuit of the RF amplifier. I had the screen grid tied directly to the bottom of the primary of the RF transformer which is typical for the AC/



The Junk Box Radio chassis.

DC radio, but there are a lot of IF and RF circuits where there is a dropping resistor in the screen grid circuit. I disconnected the screen grid and used a resistor substitution box and I discovered it worked great with a 220K resistor. The oscillation stopped and the sensitivity went up. What blew my mind was there was only 14 volts on the screen grid and 72 volts on the plate but the radio worked great.

As a TRF I was pulling in stations all over the dial, Nashville, Ontario, Chicago and many more and the sound was great. The only problem and is typical with simple TRF's is the selectivity is not good on strong stations and a strong station tends to block stations out for about +/- 40 kHz's. So I added

regeneration and that solved the problem and that increased the sensitivity, I even picked up Mexico! I can set the regeneration at one spot and not have to adjust it again and seems to be good across the dial. This radio outperforms the Knight Kit and Heathkit regenerative radios that I have and sounds a whole lot better. It also outperforms the four-tube depression era TRF's I have and have had. This radio works best with a 3-5 foot antenna.

When I added regeneration to the radio I had to use a feedback coil. I could wind a few turns around the RF coil or I could use a pre-wound coil and in my box of coils there was a nice small 4.5MHz sound trap coil from a TV. It fit nicely inside the RF coil so I

Three Subminiature Tube Junk Box Radio—continued

used the brightly colored solid wire telephone wire and soldered the leads to the coil and then across the regeneration control. The solid wires held the coil in place and it worked great! The ferrite adjustable slug was removed, as I didn't want it to change the inductance of the RF coil. To go along with the junk-box theme I used solid copper brightly colored insulated telephone wire the telephone people left behind. It's great hookup wire and works well for vector boards.

The only new parts I used were the brass screws for holding the base of the cabinet to the sides, the hinges, the tube sockets and a few

NOS capacitors. Most of the resistors were used. The knobs came from old test equipment and who knows where the power transformer came from and the power cord came from a junk radio.

What I'm hoping for is those of you that have some of these tubes lying around collecting dust or for someone who is just interested in playing around with these tubes to try building something with them. Many of these tubes will operate in the UHF range so let your imagination run wild. Check out the Internet for some interesting circuits, there are lots of them.
Ed Dupart, December 2018



2019— VINTAGE RADIO ACTIVITY —2019

Indiana Historical Radio Society indianahistoricalradio.org

May 3—4 Spring Meet Shrine Club, Kokomo!

See page 14 of this Bulletin

ARCI—Antique Radio Club of Illinois antique-radios.org

Swap Meet: February 24 American Legion Hall, Carol Stream, IL

2019 RadioFest, August 2 and 3, Medinah Shriners, 550Shriners Dr.,

Addison, IL 60101

MARC—Michigan Antique Radio Club michiganantiqueradio.org

July 18-20, Vintage Electronics Expo Kalamazoo Expo Center,

2900 Lake St., Kalamazoo, MI

CORA Central Ohio Antique Radio Association coara.org

SPARK Society for the Preservation of Antique Radio Knowledge

See sparkantiqueradio.com for monthly meetings

CARS—Cincinnati Antique Radio Society

cincinnati-antique-radio.org

PARS—Pittsburg Antique Radio Society

pittantiqueradios.org April 28—Tri State Radiofest

1495 Old Broadhead Rd, Monica, PA

MSARC - Mid-South Antique Radio Collectors

Swap Meet, April 27 at Strathmoor Presbyterian Church,

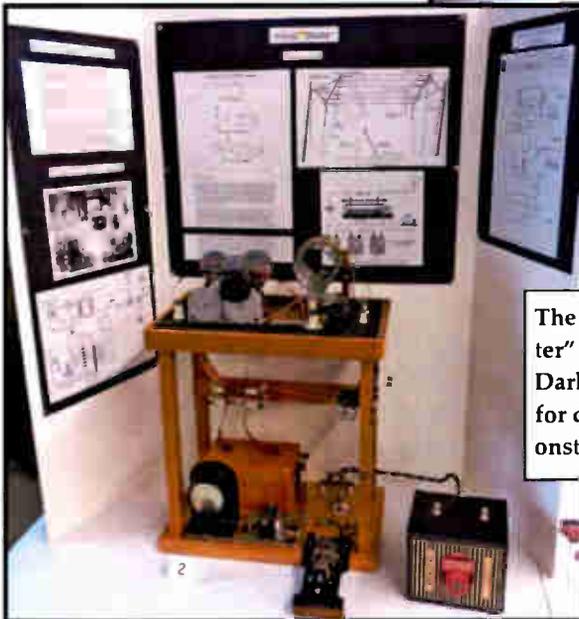
2201 Hawthorne Ave., Louisville, KY (see page 20)

AWA Antique Wireless Association www.antiquewireless.org

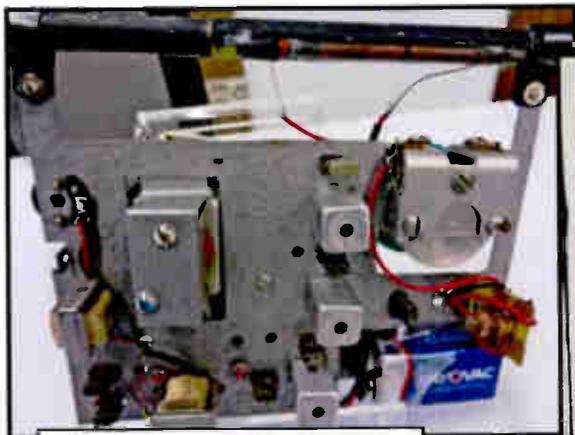
Winter Meet Popular Vote Contest - 2019



Plant A Radio Restoration entered by Jeremy Schotter. These oval shaped radios show up on eBay a few times a year and are often branded Silver, Climax, or Clinton. Manufactured by the mysterious "Plant A" in Chicago, Illinois. *Jeremy*



The "King Spark Transmitter" submitted by Darrell Darby. See pages 16 and 24 for details on Darrell's demonstration/contest entry.



A 1955 "Popular Science" Radio Chassis. Entered by Bill Morris. Bill constructed an AM Receiver described in the September issue of the magazine.



Transistor Portable Gets All the Stations

By Howard G. McEntee

T

...the most popular portable radio in the world today is the transistor portable. It is a small, lightweight, and rugged radio that can be carried in a pocket or a briefcase. It is also very easy to use and does not require any special maintenance. The transistor portable is a true revolution in portable radio technology. It has made it possible for millions of people to enjoy the convenience of a portable radio wherever they go. The transistor portable is a must-have for anyone who likes to listen to the radio on the go.



A very clean Arvin 7 Transistor "Pocket" Radio entered by Bill Green.



Ed Duparts "Junk Box Radio Jarrah Wood" entry. See the cover picture and article beginning on page 3.

**The Indiana Historical Radio Society,
and the Antique Wireless Association
invite you to a Spring Meet
Friday, May 3 & Saturday May 4, 2019
at the Kokomo Shrine Club,
Kokomo, Indiana**

The Kokomo Shrine Club, 3892 East US 35, Kokomo, Indiana, is approximately 1.5 miles East of the new US31 Kokomo bypass on US35. (SR22 East of SR931, old US 31) There is space for indoor and outdoor Swap N Sell setup. The indoor space is on ground level with easy access.

Registration fees: Admission to the Vintage Radio Meet is free. Swap table rental, two tables maximum: IHRS members - \$10.00 for each table; non-IHRS members – \$15.00 for each table.

Friday schedule:

3:00pm – Swap N Sell setup

4:00pm – Spring Meet begins

5:00pm Technical presentation – Ed Dupart

6:00pm – Food – Made available by the Shrine Club

7:30pm – Doors close for the evening

Saturday schedule:

7:00am – Doors open for general setup

8:00am – Meet officially begins

8:00am to 9am – contest setup

9:30am – Contest judging begins

10:30 – Contest results announced

11:30am – Donation Auction

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

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

category 1 – Indiana Made Radio

category 2 – Open to all radio and radio related equipment

category 3 – Vintage Tube Amplifiers

Operating radios will be judged in the appropriate contest category.

On Display – Want to show off a radio set or unique electrical device, generate a discussion? Space will be available to display your “electronics at work” equipment.

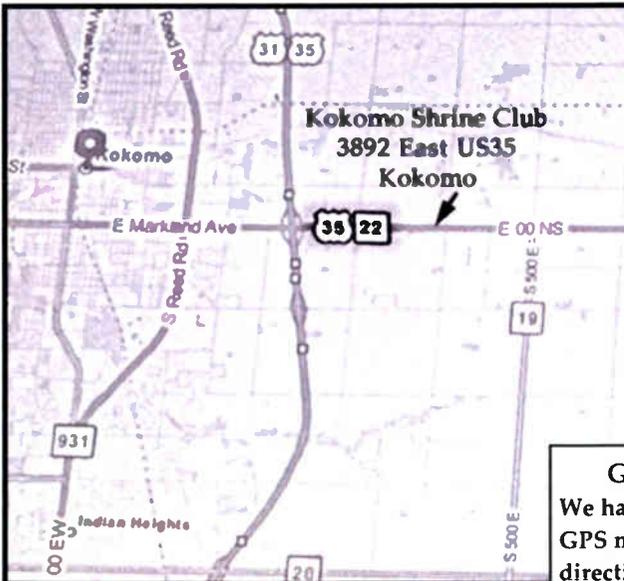
The IHRS welcomes the Hoosier Antique Phonograph Society to our Spring Meet. They will set up with us in the Swap N Sell area. Have a vintage phonograph to show off? Bring it for display.

Meet contact – Don Yost 765-945-7014

Check indianahistoricalradio.org for updated information.

Convenient Motel – Comfort Inn, 522 East Essex Drive, Kokomo

(765) 452-5050 The Comfort Inn is a couple blocks north of SR22 on SR931

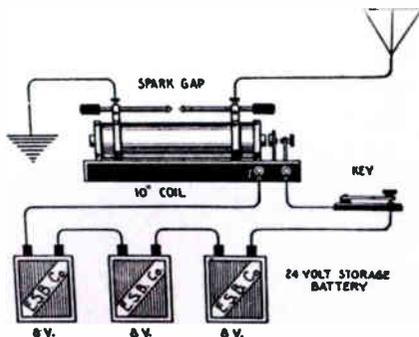


GPS notice!

We have reports that some GPS mapping sources give directions for the Shrine Club to the west of Kokomo. This is not correct—the Kokomo Shrine Club is East of Kokomo along US 35.

“King Spark” A Spark Gap Transmitter Demonstration

by Darrell Darby



The first wireless transmissions (1888-1905) employed spark technology. Reginald Fessenden (1866-1932) recognized that continuous wave transmission was required for speech. He felt that he could transmit and receive Morse code better by the continuous wave method than with spark apparatus as Guglielmo Marconi (1874-1937) was using. Fessenden was right, but “King Spark” was slow to die.

As CW systems were developed (1906-1912), Marconi sought to use his spark technology to achieve a semi-continuous timed spark that would approximate CW. Eventually the Marconi spark transmitter was replaced by the Fessenden/Ernst Alexander-son (1878-1975) HF alternator which in turn was replaced by vacuum transmitters. The three element vacuum tube was well known by 1915 to be capable of regeneration and oscillation. It

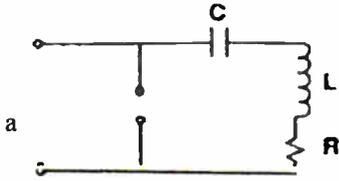
could therefore generate CW. WWI spurred transmitter tube development. The rise of CW followed in post war years.

By 1924 spark was forbidden on the new 80, 40, 20 and 5-metre amateur bands. But spark was still used on the lower bands, and for another decade or more in the maritime service as back-up for distress messages on the international distress frequency of 500KHz (600 metres) right up to the beginning of the WW2. Had it not been for the war, spark should have been completely phased out in the maritime service except for emergency purposes by the end of 1939.

The distinctive sound of spark is not easily forgotten, yet I suppose the vast majority of modern radio scientists and operators have no knowledge of how the spark transmitters used from about 1900 to about 1925 sounded, when received on the simple crystal receivers of the day. Or what the first crude attempts of Fessenden to transmit voice on a spark transmitter might have sounded like.

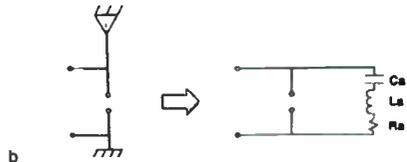
In its simplest form a spark transmitter consists of a spark gap connected across an oscillatory circuit consisting of a capacitor and an inductor in series. The

capacitor C (see Fig a) is charged to a high voltage by an induction coil (not shown). When the potential across it was sufficiently high



BASIC SPARK TRANSMITTER

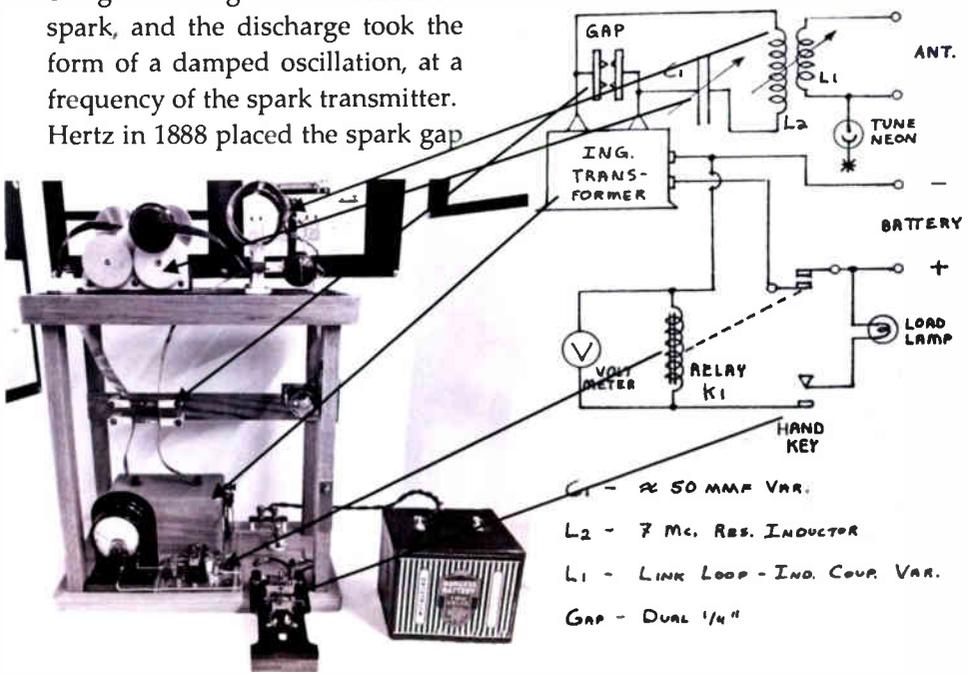
to break down the insulation of air in the gap, a spark then passed. Since this spark has a comparatively low resistance (an ohm or two), the spark discharge was equivalent to the closing of an L-C-R circuit. The condenser then discharged through the conduction spark, and the discharge took the form of a damped oscillation, at a frequency of the spark transmitter. Hertz in 1888 placed the spark gap



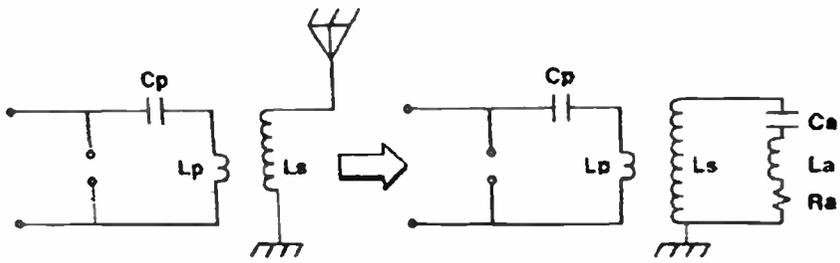
HERTZ / MARCONI SPARK TRANSMITTER

across the terminals of the antenna, and so the frequency transmitted was determined by the self resonant frequency of the antenna system (an end loaded dipole). Marconi, following the work of Alexander Popov (1859-1905), used an end fed wire aerial (a monopole). (Fig b) The damped wave had a very short duration, since as soon as the spark ceased,

SPARK GAP TRANSMITTER JUNE 2007
ORIGINAL PLD
SEP '00



- C₁ - ≈ 50 MMF VAR.
- L₂ - 7 Mc. RES. INDUCTOR
- L₁ - LINK LOOP - IND. COUP. VAR.
- GAP - DUAL 1/4"



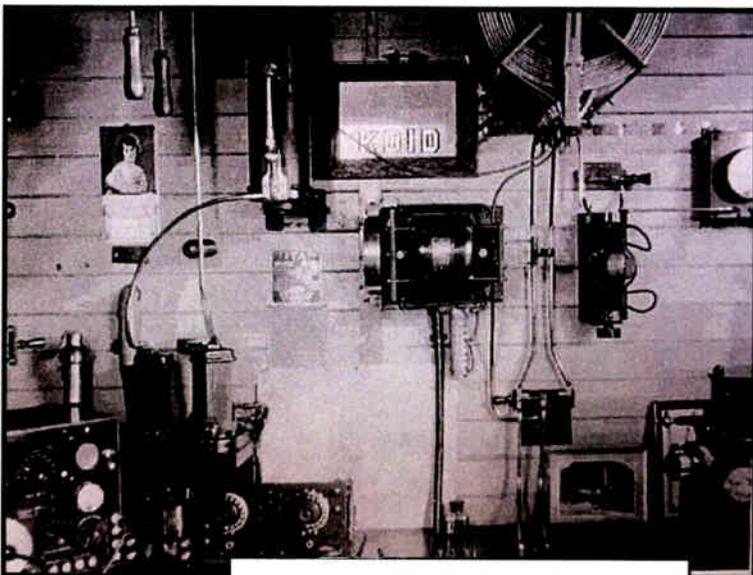
C

BRAUN / FLEMING SPARK TRANSMITTER

the oscillation ceased, since the connection for current flow between the antenna terminals (or connection to ground in the case of a monopole antenna) was by way of the spark.

The not wanted gap across the antenna terminals was eliminated by Karl Braun, (1850-1918) who in 1898 patented a circuit in which the spark gap was in a separate primary circuit in series with an appropriate coil and condenser. The RF energy flowing in the in-

ductor was inductively coupled to an antenna, which was tuned to the same frequency of the spark transmitter (Fig c). The induced oscillation in the antenna circuit was also a damped wave, but the period of oscillation was considerably longer than the oscillation period in the primary, since when the spark ceased, the antenna circuit could continue to oscillate on a frequency determined by the antenna system resonant frequency. *Darrell Darby wa4uso*



Actual Spark Gap Station—circa 1915

We Remember

Indiana Historical Radio Society member Don Johnston passed away December 17, 2018. Don was one of the thirteen IHRS members that organized the Society in November of 1972. Over the years, Don was very active in the IHRS, including two terms as President.

After high school at Anderson High, Don worked as a radio repair technician in Camden, Ohio. In 1942 he enlisted in the Army and completed schools in radio and radar. After the service he worked at a number of locations in North Central Indiana.

Following his retirement, Don and his wife Marilyn traveled extensively to visit family and attend antique wireless radio, Civil War history, antique steam engine, and antique automobile events.

Don was a month from the age of 99.

**Don Johnston on the left
with Lionel Haid at the 1989
IHRS Meet at Valpo Tech.**



Events of Interest

Saturday, April 13 the Hoosier Antique Phonograph Society (HAPS) will meet in the South Theater of the Kruse Museums, 5634 County Road 11A, Auburn, Indiana. Fees—Free
Show time: Setup 11AM to Noon. Show time is Noon to 4PM.
HAPS invites IHRS members to set up a table for free.
There will be coffee, pop and pizza. You can attend any of the museums for free (just tell them you are from HAPS). There are tables for you to bring some of your collection to show or for sale. If you prefer not to bring anything, just bring yourself and spend part of the afternoon with us. John Hauger will be giving a talk. If you have any questions, please contact, Richard Buck, 317-777-1028.

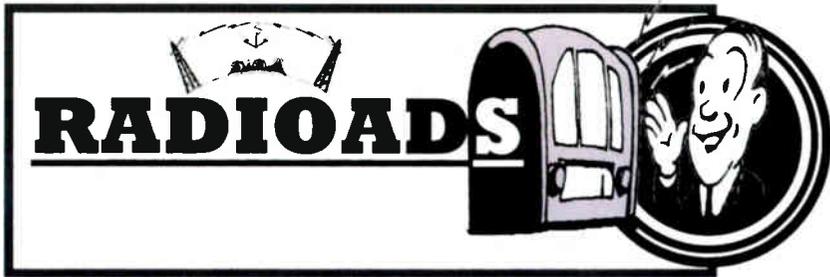
Saturday, April 27, 2019 the Mid-South Antique Radio Collectors (MSARC) will meet at the Strathmoor Presbyterian Church 2201 Hawthorne Ave., Louisville, KY 40205
Time: 9 AM – 1 PM Admission: Free. Seller Fee: \$10 - inside (tables are available) or outside (weather permitting) Contact Information—layvinrad@twc.com All Vintage Electronic Items are Welcome.

After you have attended the IHRS Spring Meet, May 3 and 4, at the Shrine Club, Kokomo, run on over to Hilliard, Ohio for: The 2019 Early Television Convention held in Hilliard, Ohio (a Columbus Suburb) on May 3 - 5. Check earlytelevision.org for information and an opportunity to win a 1954 RCA CT-100 Color TV Set - Complete with a Good CRT

IHRS 2019 Winter Meet, Franklin

Picture credit—Edward Dupart





Submit your "FREE TO CURRENT MEMBER" RadioAd by the 15th of February, May, August, or November in time for the Bulletin issue that follows. Unless otherwise requested, RadioAds will run two consecutive issues.

It's me again—and it is time to renew your Indiana Historical Radio Society membership. Send your check to.....

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the Old Man Says





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Responsibilities

Activities, business,
administration, & publicity

Sites and dates of meets

Dues, financial, and address
change. Please notify
immediately of change of address.

News articles, radio ads, photos
for Bulletin publication
Maintain indianahistoricalradio.org

Indiana Historical Radio Society
Historical Documentation

Bulletin Deadlines: News, Articles & Radio Ads, 2/15, 5/15, 8/15, 11/15

IHRS Web site address: www.indianahistoricalradio.org

The INDIANA HISTORICAL RADIO SOCIETY is a non-profit organization founded in 1971. Annual membership dues of \$15.00 includes the quarterly IHRS "BULLETIN." Radio-Ads are free to all members. Please include an S.A.S.E. when requesting information. Send applications for membership and renewals to Don Yost, our treasurer as noted above.

The BULLETIN

A publication of the Indiana Historical Radio Society
Forty-seven years of documenting early radio.

**Darrell Darby, WA4USO,
demonstrates a replica of
early wireless transmis-
sion. See page 16 of this
Bulletin.**

