THE ANTIQUE RADIO CLUB OF ILLINOIS

ARCI NEWS

www.antique-radios.org

Affiliated AWA
Antique Wireless Association AWA

Volume 41, Issue 5
October 2021

ARCI LIVE ONLINE VIDEO MEETS

MONTHLY LIVE ONLINE MEETINGS CONTINUE
Generally, 3rd Saturday of the Month

10AM – 12 NOON CENTRAL

THE AGENDA FOR EACH LIVE ON-LINE MEET IS ISSUED JUST BEFORE THE EVENT

Upcoming ARCI MEET SCHEDULE

SATURDAY, October 16, 2021 10AM CT
10:00 AM CT - NOON CT (Zoom Meeting opens 15 minutes before)
Register at
https://zoom.us/meeting/register/tJAqc-Ggqz8rG9MEptY6YI04gqoxjM6yKAWQ

Upcoming ARCI IN-PERSON MEET SCHEDULE

October 3, 2021	Outdoor Business Mtg / Officer Election 7:00 AM to 11:00 AM	American Legion Hall Carol Stream, IL
December 5, 2021	Indoor Business Meeting 7:00 AM to 11:00 AM	American Legion Hall Carol Stream, IL

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WELCOME TO ARCI

Visit ARCI on the WEB

Website: www.antique-radios.org

FaceBook: https://www.facebook.com/ARCI.org

YouTube:https://www.youtube.com/channel/UCEyMw9QGrvcquC1vZBvHWbQ

Join ARCI

http://www.antique-radios.org/membershipinfo.html

-or-

Use the application in this newsletter

Leadership

President:	Tom Kleinschmidt
Vice President:	Jim Novak
Vice President:	Tom Zaczek
Treasurer:	Rudy Hecker
Secretary:	open
Membership:	Elaine Hecker
Radiofest chair:	Steve Muchow
ARCI News editor	Maureen Blevins

Contact ARCI

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ARCI News is published bi-monthly, February through December.
Antique Radio Club of Illinois is a registered non-profit in the state of Illinois.

PRESIDENT'S MESSAGE

Inquiries to the club email and phone continue to come in from the public in generally three categories of requests; want to sell a radio/find its value, get a radio repaired, or have an inherited collection to dispose of.

On the sell/value side we often direct people to eBay listings by make and model filtered by "Sold Items". The reason: this is a public source and not just my or another member's opinion. If it is something uncommon then we use our members expertise. No appraisal is perfect, especially those done through pictures. This generally helps the owner understand the magnitude of a radio's value. On radios that have low to no value to radio collectors, such as 1960s stereo consoles that are five feet long or more, we direct people to list them on Craig's List or Facebook Marketplace as there are people looking to decorate in the "mid-century modern" style. When there are items of interest to radio collectors many times they are listed in our email blasts. We hope you enjoy them and take advantage of them.

By the way, each era of style gets its name after the fact. When I was a kid there was no such thing as mid-century modern. It was just modern or Danish modern. My dad commented the same thing about Art Deco and Machine Age as after the fact designations. History is no more stagnant than any other aspect of life.

Fortunately, we have a great roster of repair folks on the ARCI website and generally we assist the person to get their radio fixed. Thanks to all of you that keep the technology working!

The inherited collection is becoming a growing segment of calls. Often it is the daughter or niece of the deceased that contacts ARCI with the "what to do?" question. Pictures are a starting point. Sometimes a visit is in order. It is important to understand the owner's needs, objectives, and timelines. If a house must be sold quickly, that focuses the plan to a few immediate remedies. Many of these collections go out as listings in the email blasts. Some are referred to auction companies. Many are donated to ARCI. Donations continue to come in at a rapid pace. The club's 5' x 10' storage locker in Addison is again stacked to the ceiling. We have had some very successful inventory reducing donation sales at recent meets yet keeping up remains a challenge.

Give it some thought, what will happen to your collection when you are gone? Do you have someone that has the same passion for radio as you do and will continue as caretaker? If not, why not put a plan together and reduce the burden on your heirs?

ARCI UPDATE

A few photos from our **August 2021 SWAP MEET** which was held at the American Legion Hall on S. Gary Ave in Carol Stream, IL. *Photos by Daniel Schoo*

There is a link to more photos on the club website. http://www.antique-radios.org/pictures.html


GREBE

August Swap Meet Recap

The weather was great at the ARCI swap meet on August 7th at the Carol Stream American Legion Post. As *Radiofest* was canceled due to Covid uncertainty again for 2021, a local meet was held on Saturday in honor of the normal last day of *Radiofest* rather than Sunday as is tradition.

Drop the club a note to say if you prefer Saturday or Sunday swap meets.

Financial results

- 7 Membership receipts of $175.00 and 1 member paid for 2 years for $50.00 totally $225.00
- 24 Seller Table spaces for $240.00
- Cups and shirts sold for $35.00
- Donation Auction totaled $718.00

Swap meets are a great time to catch up with friends and find that special item.

RADIOFEST 2022 PLANNING UPDATE

By Steve Muchow, *Radiofest* Chair

Despite the cancellation of *Radiofest 2021* this year, ARCI hosted an outdoor flea market and donation auction on Saturday, August 7th. This was the same day that was originally scheduled for the *Radiofest 2021* outdoor flea market. It was held at our regular swap meet location, the American Legion in Carol Stream, IL.

Both the weather and attendance were good, offering attendees a great opportunity to finally get outdoors to buy, sell and trade radio gear. Thanks to everyone who made possible this "commemoration" of what would have been the *Radiofest 2021* swap meet.

Initial planning for *Radiofest 2022* is underway. While the planning focus is typically on *Radiofest* activities and logistics, we also realize that we are not yet "out of the woods" with the Covid-19 pandemic. It is still early and even though we are in a "better place" now than last year, there are many unknowns. Time will tell if there may be restrictions or other factors imposed that might influence *Radiofest 2022*. At this point, we are optimistically moving forward with the plans described below.

We are planning to again host *Radiofest 2022* at the Medinah Shriners Facility in Addison, Illinois with the adjacent Hilton Garden Inn providing overnight accommodations. The Medinah Shriners is located at the junction of I-355 and Army Trail Road in Addison, Illinois. This is a very convenient location that can be accessed from all directions within the entire Chicago area. The Hotel has agreed to provide a discounted room block–rate for attendees. This discounted rate along with reservation details will be announced in a future issue of ARCI NEWS and on the ARCI Website. The preliminary plan is to offer the same great activities that *Radiofest* is known for. This includes the world-class Friday Night Auction followed on Saturday by the large outdoor swap meet and donation auction. Additional Saturday activities typically include speaker programs, the popular ARCI outdoor ham station and an evening dinner/banquet. This format tends to offer something for everyone and has proven to be popular with *Radiofest* attendees. Again, this is preliminary and details will evolve over time.

Clearly, there are many elements involved in hosting a successful *Radiofest*. It is the enthusiasm and dedication of the many volunteers that continues to make this world-class event possible. Thank you to all of the volunteers that have helped over the years and we hope that you will, again, be willing to assist next year. Please let me know if you would consider being a part of the *Radiofest* Team. Contact me at smuchow@att.net with questions or comments.

Watch future issues of ARCI NEWS, the ARCI Website and E-mail blasts for future information on *Radiofest 2022*!

Radiofest 2022

Friday August 5 – Saturday August 6
Medinah Shriners
550 N. Shriners Drive
Addison, IL 60101

ARCI ONLINE ZONE
By Tom Zaczek

ARCI Online Meet #15:
SATURDAY, October 16, 2021
10AM CT

Join in on your computer, pad or phone to be a part of our online video meetings!

Click here to Register
or
https://zoom.us/meeting/register/tJAqc-Ggqz8rG9MEptY6YI04gqoxjM6yKAWQ

After registering, you will receive a confirmation email containing the link required to join the meeting.

IMPORTANT- You need to receive the confirmation email back because this link gets you into the meeting when the time comes. So, if you don't receive the confirmation email it could be that it is in your spam folder.

Reminder: ARCI is now on YouTube. All the prior Online Meets (through July 2021) are available for viewing. You can find the channel here: https://www.youtube.com/channel/UCEyMw9QGrvcquC1vZBvHWbQ

Check it out, subscribe, and stay tuned to the ARCI emails for more info!

AGENDA (may be revised without notice)

9:45 AM – OPTIONAL PRE-MEETING – Time to get logged-in and troubleshoot any access issues.

10:00 AM – Meeting Agenda

- Introduction – *Tom Zaczek*
- We're on YouTube – *Matt Pollack*
- PRESENTATIONS: All of the presentations have not been lined up yet for this meet, but this section is where we have several 15-to-25-minute presentations of interest in the areas of radio restoration, company history, and technology, just to name just a few. Here is the agenda at this time.
    - Tech Wars: RCA and the Television Industry - *Gary Hoover*
    - Wood Cabinet Restoration Part 1 - *Joe Koester*

- SHOW & TELL, TIPS & TECHNIQUES: 1-to-3-minute informal presentation of something you'd like to share with the meeting … Join in and spend a few minutes to show your item, a helpful tip, radio restoration technique, or how you solved a tough restoration problem

- ARCI SWAP MEETS- An update on the upcoming swap meet and the one we just held

- ITEMS WANTED----ITEMS FOR SALE

    - If you want to offer something for sale OR see if others have what you're looking for, please use this time to discuss it.

- OPEN SESSION: Non-moderated chat session as time permits

12:00 PM – Close

Planned ARCI live on-line video meets for 2021 - Generally, the 3rd Saturday of each month 10AM CT--*(dates subject to change)*

Planned ARCI live on-line video meets for 2021 (2022 schedule coming soon)
Generally, the 3rd Saturday of each month 10AM CT--*(dates subject to change)*

Saturday, November 20th Saturday, December 18th

Be a presenter!
Share your project and passion with a 10-minute or longer presentation. Send an email to remote-events@antique-radios.org with your idea. Photos help too.

Become a member of ARCI!
These meets are open to everyone interested in antique radio. You do not need to be a member of ARCI. If you like these meets, your support of the organization is truly appreciated. Please consider joining. Please click this link for the membership form: Antique Radio Club of Illinois (antique-radios.org)
or http://www.antique-radios.org/membershipinfo.html

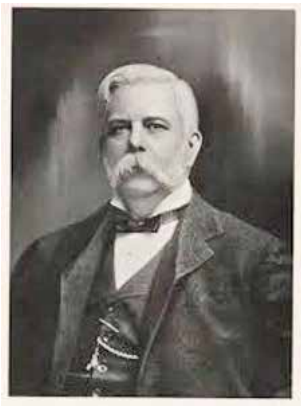
I look forward to the upcoming meetings and hope you all get a chance to attend. I encourage you to be a presenter to share your experiences, knowledge, and passions about these old radios!

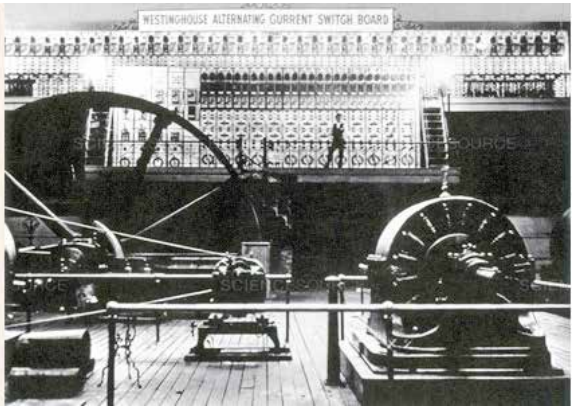
The ARCI On-Line Meeting Team
Tom Kleinschmidt, Bill Cohn, Matt Pollack and myself are the ARCI On-Line Meeting Team and can be reached via email at remote-events@antiqueradios.org

George Westinghouse: Servant Leader, Inventor, Captain of Industry

by Gary Hoover

His father owned a machine shop, but young George Westinghouse had no interest in doing what he was told. Obsessed with his own inventions and ideas, George earned his first patent at the age of nineteen. When he died forty-eight years later, he held over four hundred patents—granted one on average every six weeks throughout his life—and was working on an electric wheelchair idea. Like Thomas Edison, Westinghouse was a prolific inventor, but unlike Edison he successfully built and ran multiple great enterprises employing tens of thousands of workers. Those workers were treated better than at almost any other industrial employer of the era. His companies registered over one thousand patents. George Westinghouse always dreamed big and acted boldly, focused on the biggest issues in technology, attributes seen again today in dreamers like Elon Musk. This is his story.





Beginnings

George Westinghouse, Sr. (the father), was born in Vermont and migrated to upstate New York with his wife, Emmeline. After starting out as a farmer, he invented and patented improvements in threshing machines. After three sons and three daughters, their seventh child, George, Jr., was born in Central Bridge, New York, on October 6, 1846. The father soon started a machine shop and in 1856 moved to the larger town of Schenectady to be closer to his suppliers of iron parts.

While his older brothers obediently worked in the machine shop, young George proved problematic. When he didn't get his way, he screamed and hollered. He later commented, "I have always known what I wanted, and how to get it. As a child, I got it by tantrums; in mature years, by hard work."

Nevertheless, he showed early signs of being a perfectionist. As his father was

whipping him for some misdeed, his father's punishing switch broke. Though crying, the little boy pointed to a leather whip on the wall, saying, "There's a better one, Father."

When George (the son) was given a job in the expanding machine shop, his mind drifted to his own ideas and inventions. His father called his collection of incomplete machines "trumpery." But a foreman took a liking to the boy and set him up in his own secret shop in the attic where George toyed with the idea of a rotary engine, an idea he never let go of.

In school, teachers called George "inept" and "languid." The textbooks bored him. Penmanship, spelling, and grammar were "a deadly burden," but he loved math and was the best draftsman in the class, continually drawing locomotives and engines.

When, at the age of thirteen, his father berated him for wasting time, unlike the other workers. George protested, "But they get paid for their time." His father, who considered play as "idleness," started paying him fifty cents a day, hoping to instill a work ethic in the child. When George said he was taking off work to play with friends, his father sternly informed him that they had a deal and that he needed to cut some metal pipes. George rigged up a machine to do the task and took off with his friends.

Despairing about the boy's future, his father asked his minister for advice. The minister told the father, "He isn't the kind of boy you can shape against his will." So his father began to give George more leeway. But George continued to "waste" his time on toys, building a working boat with an engine of his own design.

As the Civil War began, his friends and older brothers got the urge to join the fight, despite their father's protests. At fourteen, George ran away and jumped on a train headed for the battlefields, but his father got word, caught the train, and whisked George off the train just before it departed. In 1862, the father relented and let two of George's older brothers go to war—one never returned, dying in battle in Louisiana. By 1863, his father permitted the now seventeen-year-old George to join the war effort. After a stint in the army, George moved to the navy, where he served as "Acting Third Assistant Engineer," running and maintaining the engines on two ships. He gained some discipline and a great deal of knowledge about marine engines, continuing to develop new models and ideas while in the service.

When the war ended, in September of 1865, his father enrolled George in Union College in Schenectady. But he skipped classes to go see the latest machines in nearby shops. By Christmas, he had dropped out. That October, nineteen-year-old George registered his first patent, for a rotary steam engine. He was now making two dollars a day working for his father.

Entering the Railway Supply Business

On the way home from business in Albany, George's train was delayed for hours when two cars in the train ahead derailed. As he watched workmen lift the cars back onto the track, he turned to a fellow traveler and said, "That was a poorly handled job." The other replied, "But that could not be helped," to which George answered, "Yes, it could." He then invented a "car replacer" device and patented it with $10,000 raised from local investors (his father was skeptical and invested little).

As George sold his car replacer to the railroads—at the time America's most important industry—he learned much about trains and how they work. He saw plenty of opportunity to do things better. One was the "frog," the moving parts of the track used to switch trains from one line to another. Made of cast iron, frogs were neither reliable nor durable, requiring constant repairs. George used the less common technology of cast steel to make a better frog and patented it in 1868.

Riding a train in 1867, he met beautiful Marguerite Erskine Walker and immediately fell in love with her. By August, they were married. Throughout their forty-seven-year marriage, virtually every day when they were apart, George telegraphed or telephoned her. They eventually had one son, George Westinghouse III.

As Westinghouse's small company continued to improve on his car replacer and cast steel frogs, he observed the railroads making their own changes, avoiding his patents. Thus he began a lifelong tradition of not only defending his own patents, but also buying up the patents of others when he sensed opportunity. Westinghouse also gradually surrounded himself with the best minds and engineers he could find. He was a demanding but compassionate leader, often working alongside the craftsmen as they worked to improve upon every product.

The Air Brake

Braking a train was one of the most dangerous jobs in America. Most trains were only ten cars or less in length, with a brakeman stationed every two cars, perilously riding on the tops of the cars. When the engineer gave the whistle to brake, they jumped down between two cars, turned the giant wheel on the car in front of them to set its brakes, then turned the wheel on the car behind them. The cars gradually came to a stop, bumping into each other and knocking passengers or freight around. Brakemen often fell between or under the cars, losing limb or life. Here George saw a big opportunity.

For months, George tried every possible idea. First were repeated attempts to rig up a chain system that ran under the length of the train. All failed. Then came the idea of using the locomotive's steam to brake the cars, but the steam evaporated before it reached the last car.

One day a young woman tried selling a magazine subscription to George, but he was not interested—until he saw an article in her sample copy about the

construction of a new tunnel between France and Italy. He signed up for a subscription and convinced the woman to give him her sample copy. In it, he discovered the Italians were experimenting with a new way to safely bore through a mountain, using compressed air to drive the hammers. That was his big "aha" moment.

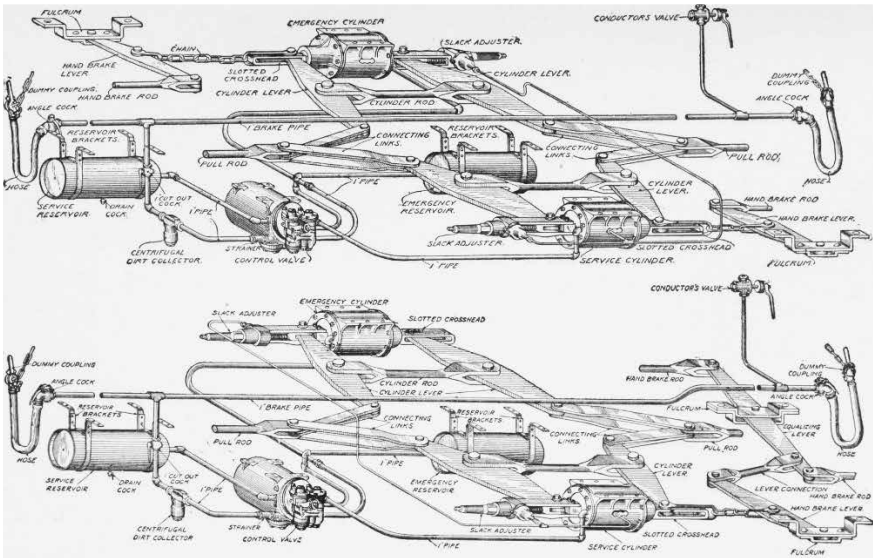


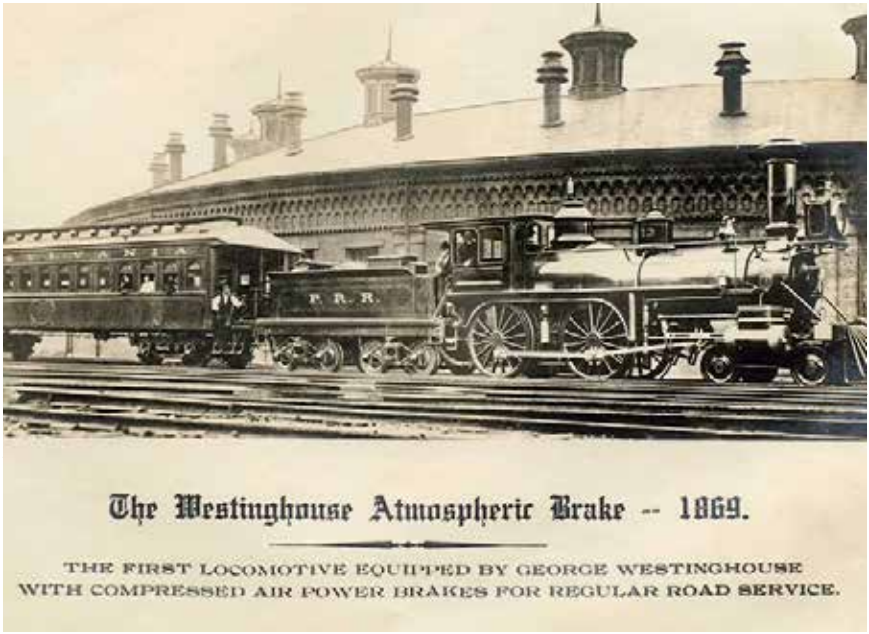
Fig. 107. Westinghouse "PC" Brake Equipment. Upper, Cylinders Pointing in Opposite Directions; Lower, Cylinders Pointing in Same Directior

Hell-bent on solving the braking problem, George experimented with a line of compressed air running the length of the train. Early efforts were not promising, as the last cars in a train jarred the first ones when the brakes were applied. But when George got his mind set on something, he would not let go. By putting smaller air reservoirs on each car, controlled by a main compressed air line, he gradually reached the point where the entire train stopped within seconds of the engineer throwing a switch. Lives could be saved, trains could be longer, and passengers and freight more gently handled.

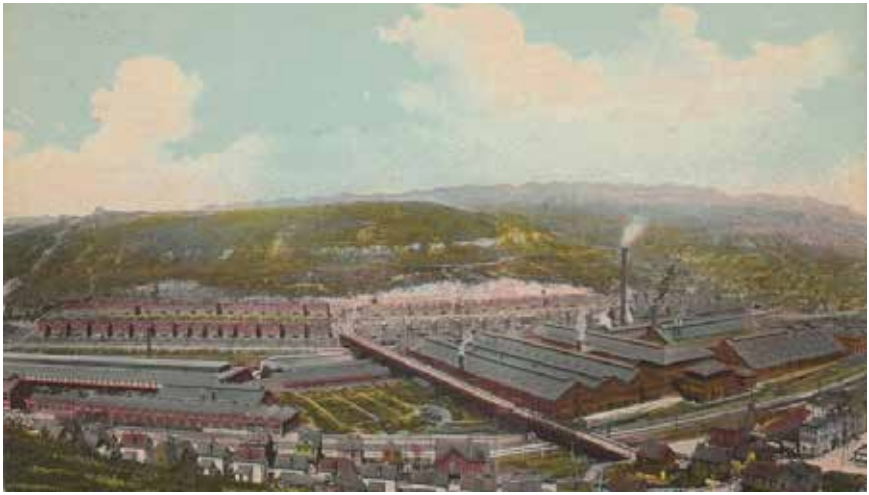
One can only imagine the resistance of the railroads—air brakes would require a massive new investment in locomotives and cars, an entire new system. And how would you deal with through-cars running coast-to-coast over different railroads, including cars from railroads without the new system?

George and his backers went from railroad to railroad, only to be rebuffed. People were happy with things as they were, despite all the drawbacks. Every "expert" said Westinghouse's system would not work. After many unsuccessful sales calls, the most powerful railroad in the land, the Pennsylvania Railroad, agreed to a test. Upon its success, a young executive of the Pennsylvania named Alexander Cassatt convinced the massive company to adopt the new Westinghouse Air Brake. (Cassatt, brother of the more famous Impressionist painter Mary Cassatt, later

went on to lead the railroad and develop the largest non-government construction project in world history up to that time, Pennsylvania Station in New York City, and tunnels under the Hudson and East Rivers.)



George was convinced that the entire world needed his invention. With great effort, he convinced the British to try it. He was among the earliest American industrialists to establish branch offices and sometimes factories around the globe. By 1881, the system was in use on sixteen thousand cars and locomotives in the United States and over twenty thousand in other nations.



View of the Great Westinghouse Air Brake Industries at Wilberding, PA.

Westinghouse's controlling ownership of the company made George a wealthy man. Its work continues into the twenty-first century as Wabtec, a major transportation supplier. (In 2018, Wabtec agreed to acquire the diesel-electric locomotive manufacturing business of General Electric, one of the largest global producers.)

Broadening Horizons

By the early 1880s, George had become interested in the switching and signaling systems used by the railroads. He made significant improvements and filed patents. In 1881, he incorporated the Union Switch & Signal Company, which became the largest producer of such equipment. This business led George to study electricity, using it in Union's products. (Today, Union is part of the Italian company Ansaldo STS, which in turn is controlled by the Japanese Hitachi company.)

In the mid-1880s, natural gas was found in Murrysville, Pennsylvania, twenty miles from Pittsburgh. While local gas companies provided street lighting, they had no means by which to move gas such long distances. George became interested in the challenge of "gas transmission." Failing to interest others, he drilled a well in the backyard of his Pittsburgh estate, which his wife, Marguerite, had named "Solitude" because it was supposed to give George a break from his work. But that was not to be. George's well struck gas, causing an explosion that shook the neighborhood.

Continuing the work on the transmission problem, he figured out how to move gas under pressure over longer distances. He wanted to get gas to Pittsburgh's homes and industries—it was cheaper and cleaner than the coal then in widespread use. But the older local gas companies fought his rights to dig tunnels under the city for his pipes. When his lawyers discovered a dormant company which under Pennsylvania law had the rights to do such work, he bought it and recapitalized it at $5 million. Keeping the geographically incorrect name of The Philadelphia Company, this Westinghouse company quickly became the largest supplier of natural gas to Pittsburgh. (Today it operates under the name People's Natural Gas.)

Building these successful enterprises did not fully consume George's drive and curiosity. His most impressive work was yet to come.

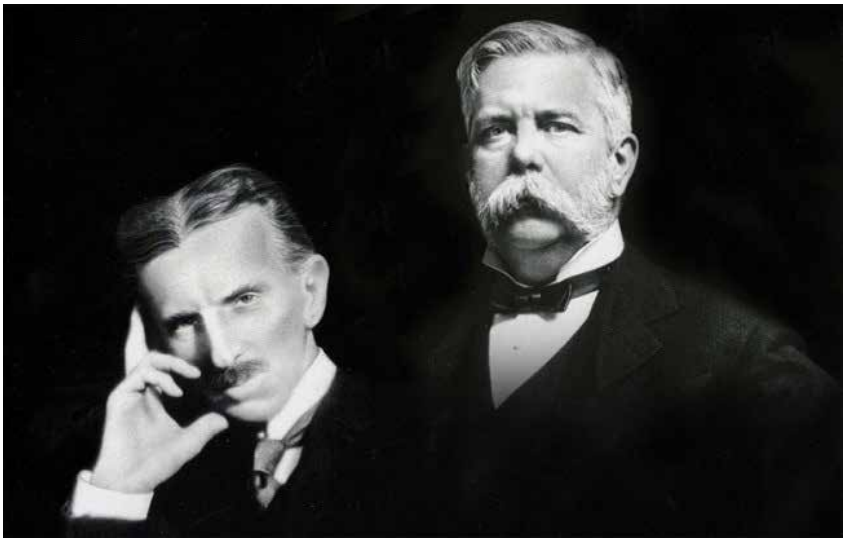
The Current Wars

George had organized the Westinghouse Machine Company in 1880 to build engines to power arc lighting systems, which were the main way city streets were lit. This system was replaced by the Direct Current (DC) electrical generation and distribution system of Thomas Edison, which used the smaller, less-intense incandescent lights. In 1886, the forty-year-old Westinghouse created yet another corporate entity, the Westinghouse Electric Company, and began to manufacture DC systems. Within two years, this company had over three thousand employees. George's curiosity about and knowledge of electricity had grown dramatically

since his creation of Union Switch & Signal.

Thomas Edison had achieved international fame with his DC system. With it, individual factories, homes, and offices could be lit with incandescent lighting. Yet there were limitations. Because of the nature of DC, a generating station could only serve about one square mile of customers. Any further reach required a prohibitive investment in large-diameter copper wires. There was no way to transmit DC power over long distances. But Edison remained firm in his belief that direct current was the only way to give the world accessible electricity.

At the same time, experimenters in Europe were toying with the idea of Alternating Current (AC), a different approach to the problem. With the right transformers, the voltage of AC could be "stepped up" to extremely high voltages and carried over longer distances, before being "stepped down" in transformers near the factories and homes that might use it. Such high AC voltages were more dangerous than DC, and many kinks in the AC system were yet to be worked out, including the invention of a motor for factory and shop power that worked on AC. The greatest electrical engineers of the world—then called "electricians"—all agreed that AC would never work, with Edison leading the charge. His Edison General Electric Company had installed his DC system in cities across America. (Edison General Electric was later merged into the General Electric Company we know today.) Into this story steps the brilliant and eccentric Serbian-American engineer Nikola Tesla, an advocate of AC despite all the opposition. Through a lifetime of invention and a sense of showmanship, Tesla made progress on AC and came to the attention of Westinghouse. George backed his experiments, had him visit Pittsburgh, and bought Tesla's AC patents with a generous offer of royalties.

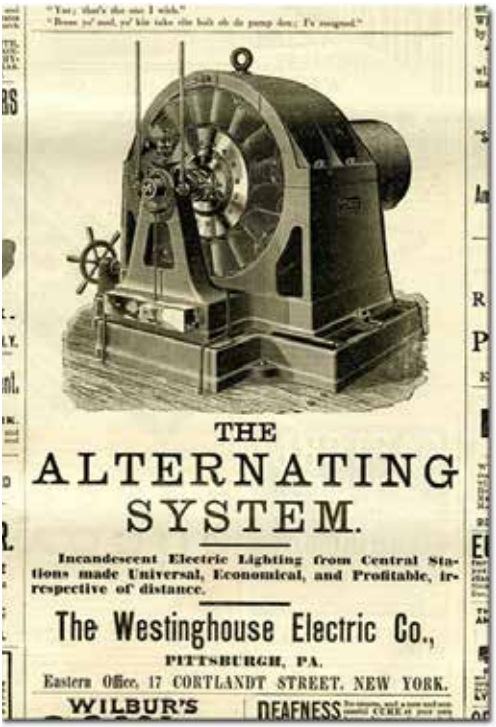


The collaboration of Westinghouse and Tesla set the stage for a great battle among experts and users as to the trade-offs between AC and DC, known as the Current

Wars. Tests were held around the nation and in Europe. Newspaper editorials raged against AC. Edison was committed to defeating AC, leading a massive publicity campaign. His primary tactic was to show how dangerous AC power was. In public demonstrations, AC power was used to electrocute dogs. When New York State changed the death sentence from hanging to the electric chair, AC power was used. Edison called it "the Westinghouse chair," hoping to further discredit his rival and Tesla.

Edison also controlled all the patents on incandescent electric light bulbs—then called "lamps." Westinghouse had to invent his own "stopper lamp" in order to compete and avoid patent infringement. Yet over time, as Westinghouse, Tesla, and their fellow engineers worked through all the problems, AC won out and gradually replaced DC everywhere. Edison had lost. The Westinghouse Electric Company went on to become the largest and most important of the many companies George Westinghouse founded and ran. Westinghouse systems were installed around the globe, from Europe to Canton, China. George's ability to continue inventing and working in the shop at the same time he administered thousands of employees was remarkable, perhaps unique in his era.

Now an industrial baron, Westinghouse befriended everyone from presidents to up-and-coming inventors, whom he liberally sponsored, buying more patents. He established a winter home in Washington DC and a summer retreat in Massachusetts. He traveled everywhere east of Chicago in his luxurious private railway car, the Glen Eyre.



A Close Call

In 1890, the British Baring Brothers' bank collapsed, and credit dried up on both sides of the Atlantic. With his electric company growing like a weed, it ran short of operating cash. Like its competitors, the company had accepted stock and bonds in lieu of cash from the many new electric power and light companies springing up around America, further depleting its cash reserves. George found himself in a struggle to save the Westinghouse Electric Company from banker control. He was not a man who could share or cede control of his enterprises.

Westinghouse always paid his workers more than other companies. He innovated safety programs, initiated the revolutionary idea of giving workers Saturday afternoons off, added benefits, and most importantly, worked alongside them and considered them family. So when he faced ruin, his loyal employees offered to work for half-pay until the crisis passed, but he turned them down.

On the other hand, he asked Nikola Tesla to relieve the company of the promised royalty payments. In view of the great support he had received from George, Tesla agreed to waive all royalties. It has been estimated that Tesla gave up as much as $17 million in future royalties. He later died in poverty, having spent his wealth on new ideas and experiments.

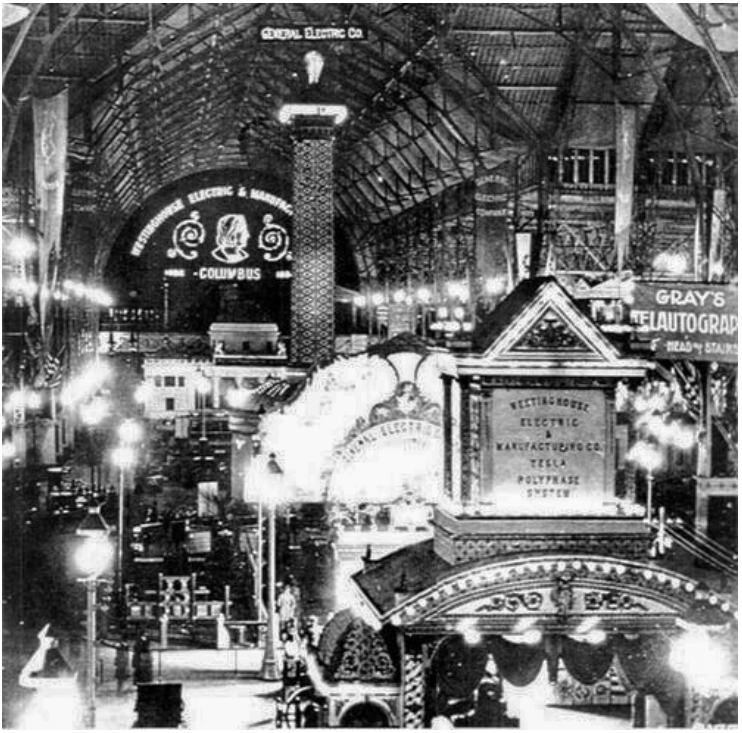
George and his beloved company, recapitalized with new financing, thus weathered this storm. Throughout the crisis, he continued to tinker, invent, and explore new fields and challenges.

The World's Columbian Exposition, Chicago 1893
Chicago won a national competition to host a celebration of the 400th anniversary of Columbus's 1492 "discovery" of the Americas. Due to the extensive construction required—some say in deference to the 1892 presidential election—the great World's Fair did not open until 1893 and was held for one brief summer.

All the great leaders of Chicago got behind the effort and appointed the great Chicago architect Daniel Burnham (New York's Flatiron Building, Washington's Union Station) to be the "Director of Works." Burnham and his fellow architects envisioned a spectacular "White City." About $17 million ($500 million today) was spent on the construction of the fair, including the first Ferris wheel, which had thirty-six cars, each the size of railroad cars and carrying up to sixty people.

Part of the fair plan was for it to be brilliantly lit, with colored dancing fountains and awesome night lighting. At the time, the largest installation of incandescent lights in any city had ten thousand "lamps." In a hard-fought battle, Westinghouse (seeing the publicity opportunity) under-bid the Edison company, and put in a system with over one hundred thousand lights. It was truly a wonder of the world.

When the United States population was about sixty-five million, twenty-seven million visited the fair during its brief run. They witnessed Westinghouse's massive machines and saw the power of electricity, at a time when well under 10 percent of American homes had electricity. No one who saw the fair left unchanged. And George Westinghouse's fame grew.



The Great Niagara Project

For years, dreamers had desired to harness the power of Niagara Falls to power mills and factories but could not raise the money. To preserve the Falls' natural beauty, the government had taken control of the surrounding property, and building mills there became impossible. Determined engineers designed a system of giant underground tunnels to carry the water and produce power without disturbing the natural environment, yet still could not raise the enormous funds required.

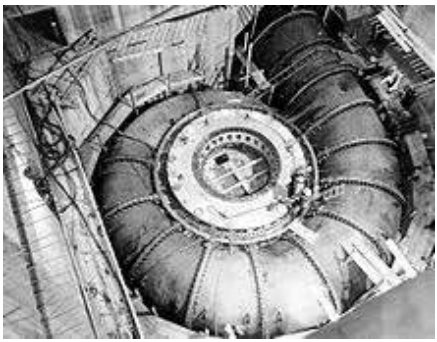
In 1899, lawyer William Rankine undertook the project, and convinced J. P. Morgan and other wealthy New York investors to back the project. Generators and

turbines of unprecedented size were required. How would they carry the power to distant Buffalo, a large market twenty-six miles away? And would there really be enough demand for the great amount of power such a plant could provide?

Unsurprisingly, Westinghouse and Tesla rose to the challenge, again outbidding General Electric (in which company Edison was no longer involved). As was his norm, George went to his best engineers and said, “Make me a generator of such and such a size,” using big numbers no one thought possible, five times the power of those at the World’s Fair, considered giants just a few years earlier. And as usual, the engineers, with Westinghouse’s prodding and ideas, came through.

On August 26, 1895, the water began to flow through the huge turbines that turned the generators in the $4 million project. Power soon flowed to Buffalo over Tesla and Westinghouse’s long-distance AC transmission system. Heavy users of electricity, including Alcoa and many others, built plants nearby. Demand for the cheap hydroelectric power far exceeded any predictions.

George Westinghouse, twice in a decade, had enabled a new wonder of the world.



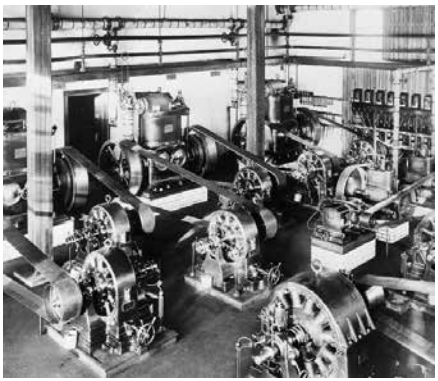
The Great Ordeal

By 1907, George Westinghouse was on top of the world, ever-inventing, always breaking records, running numerous companies employing

tens of thousands. But that same year, the country experienced one of the worst economic depressions in history. Depositor runs on banks dried up available cash and credit—the bankers closed their gates and called in loans.

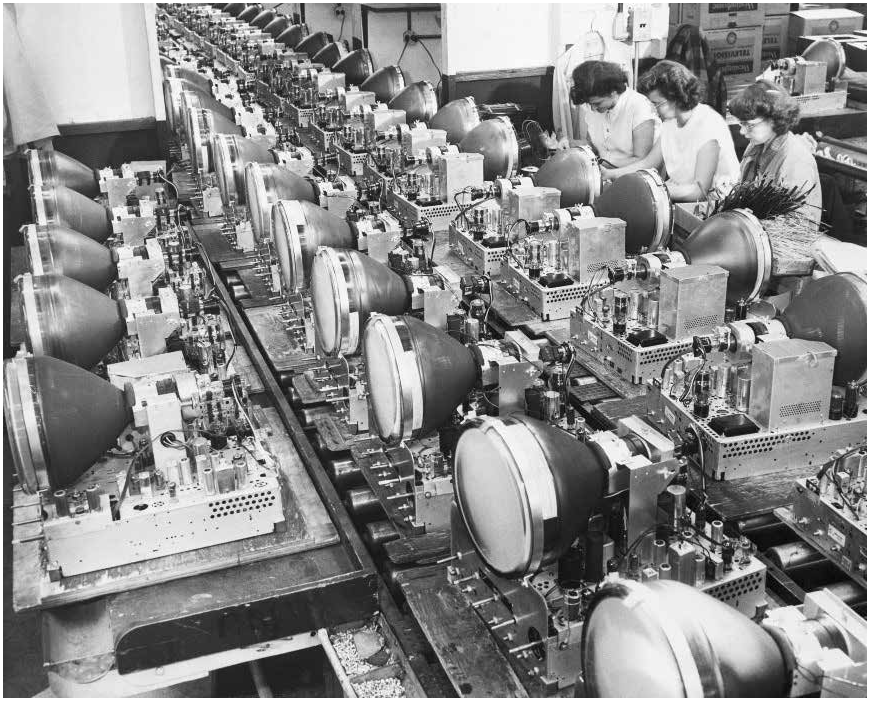
While the Westinghouse Air Brake Company, the Philadelphia (Gas) Company, and other entities were soundly financed, the Westinghouse Electric Company had borrowed large amounts to keep up with its tremendous growth. And it had continued to hold stocks and bonds of the power and light companies which were its customers. These securities plummeted in value.

Despite strenuous efforts to save the company and its glowing long-term prospects, this time George was unable to prevent receivership. He lost control of Westinghouse Electric to the bankers. The bankers ran Westinghouse out of the company and made public their claim that Westinghouse spent too much on overseas expansion, too much on fruitless experiments, and paid his workers too much. Yet his track record and the continuing success of his other companies belie these claims. Far more than Edison, Westinghouse had proven he could build big companies and finance and run them. His biographers say he was never quite the same after this loss, but nevertheless he retained his eternal calmness, and continued drawing and inventing until his dying breath.



Even without his leadership, the Westinghouse Electric Company went on to great fame, known for the standards of quality and innovation initiated by the founder. The company continued to compete with General Electric (where Edison was also run off) for power plants around the globe. The Westinghouse brand of home appliances, radios, and televisions were found in homes throughout the land. In 1920, the company started the first commercial radio station, KDKA in Pittsburgh. Westinghouse Electric also became a major builder of elevators, escalators, and nuclear power plants.

By the 1990s, as the growth in demand for many heavy power products slowed, new management decided to entirely “reinvent” the company. Focusing on its highly profitable Group W chain of radio and television stations, Westinghouse Electric sold off all the original electrical businesses and in 1995 renamed itself



CBS after purchasing the CBS television network for $5.4 billion. In 1999, Sumner Redstone, owner of Viacom, took control of this new CBS, a company worth $16 billion today. George Westinghouse's many electrical businesses and the company's later operations live on under new owners, including European giants ABB, Schindler, and Siemens, as well as Canada's Bombardier and American defense company Northrop Grumman.

The End

Despite the heartbreaking loss of "his favorite child," the electric company, George Westinghouse remained a wealthy and famous man, and kept inventing. He died in March 1914 at the age of sixty-seven, with drawings for an electric wheelchair idea at his side. The love of his life, Marguerite, followed him in death three months later. At his death, Westinghouse's wealth was estimated at $50 million ($1.2 billion today).

George Westinghouse, the Man

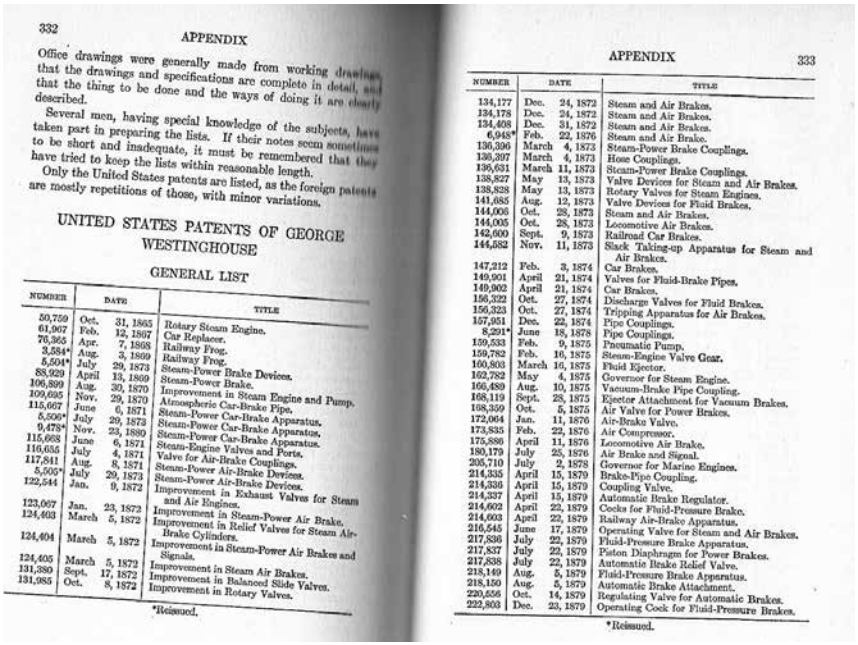
In contrast to some of the others described in this "American Originals" series, including George Eastman, George Westinghouse had few hobbies or interests outside of work. From his pre-teen years until his death, he focused his mind and tremendous energy on inventing things and building companies.

Once he became convinced of an idea or path of action, he could not be swayed, even by all the experts in the world, and often by opposition from his own people.

"Pig-headed" and "obsessed" would be understatements. Yet he was capable of admitting he was wrong, and always worked around the clock to improve upon his own work, which seems to have never been finished. His creative spirit never died.

Early patents of George Westinghouse

Westinghouse was a far different man from his more famous adversary, Thomas Edison. While Edison focused on products that entertained the public and drew their attention, like movies and the phonograph, Westinghouse wanted to have a massive impact on the underlying structure of society. He was more interested in providing power to factories than lights to homes, as Edison did, although Westinghouse did both. Like the railroads, he focused on the freight that served everyone rather than the passenger business that served the few who had the money to buy tickets. The World's Fair brought publicity, but Niagara brought real power. No part of American industry was untouched by Westinghouse's inventions. And in everything he did, he wanted the fruits to be global, opening offices around the world before other companies.



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Office drawings were generally made from working drawings, that the drawings and specifications are complete in detail, and that the thing to be done and the ways of doing it are clearly described.

Several men, having special knowledge of the subjects, have taken part in preparing the lists. If their notes seem sometimes to be short and inadequate, it must be remembered that they have tried to keep the lists within reasonable length.

Only the United States patents are listed, as the foreign patents are mostly repetitions of those, with minor variations.

UNITED STATES PATENTS OF GEORGE WESTINGHOUSE

GENERAL LIST

NUMBER	DATE	TITLE
50,759	Oct. 31, 1865	Rotary Steam Engine.
61,967	Feb. 12, 1867	Car Replacer.
76,365	Apr. 7, 1868	Railway Frog.
3,584*	Aug. 3, 1869	Railway Frog.
5,504*	July 29, 1873	Steam-Power Brake Devices.
88,929	April 13, 1869	Steam-Power Brake.
106,899	Aug. 30, 1870	Improvement in Steam Engine and Pump.
109,695	Nov. 29, 1870	Atmospheric Car-Brake Pipe.
115,667	June 6, 1871	Steam-Power Car-Brake Apparatus.
5,556*	July 29, 1873	Steam-Power Car-Brake Apparatus.
9,478*	Nov. 23, 1880	Steam-Power Car-Brake Apparatus.
115,668	June 6, 1871	Steam-Engine Valves and Ports.
116,655	July 4, 1871	Valve for Air-Brake Couplings.
117,841	Aug. 8, 1871	Steam-Power Air-Brake Devices.
5,505*	July 29, 1873	Steam-Power Air-Brake Devices.
122,544	Jan. 9, 1872	Improvement in Exhaust Valves for Steam and Air Engines.
123,067	Jan. 23, 1872	Improvement in Steam-Power Air Brake.
124,603	March 5, 1872	Improvement in Relief Valves for Steam Air-Brake Cylinders.
124,604	March 5, 1872	Improvement in Steam-Power Air Brakes and Signals.
124,605	March 5, 1872	Improvement in Steam Air Brakes.
131,380	Sept. 17, 1872	Improvement in Balanced Slide Valves.
131,985	Oct. 8, 1872	Improvement in Rotary Valves.

*Reissued.

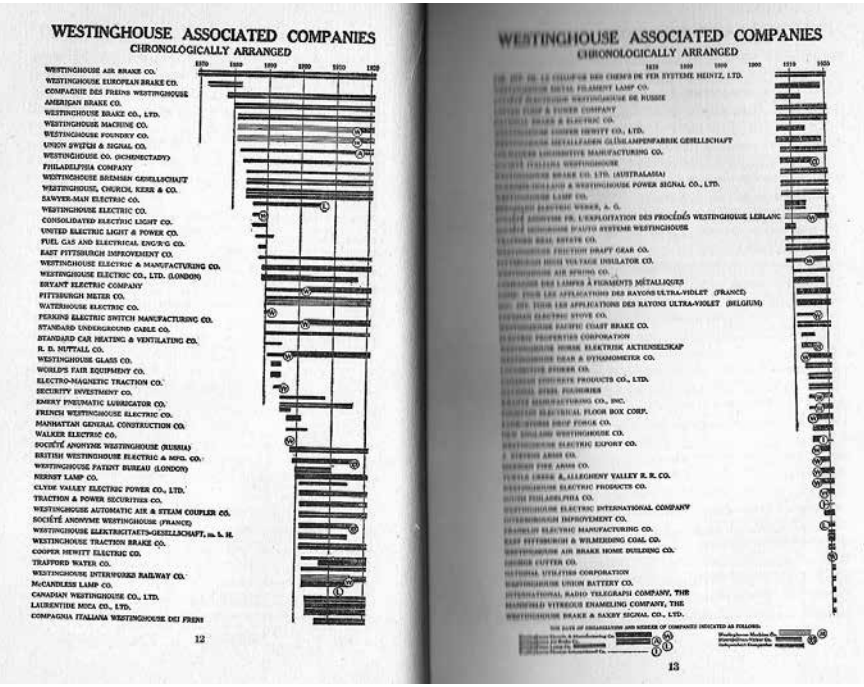
APPENDIX 333

NUMBER	DATE	TITLE
134,177	Dec. 24, 1872	Steam and Air Brakes.
134,178	Dec. 24, 1872	Steam and Air Brakes.
134,408	Dec. 31, 1872	Steam and Air Brakes.
6,948*	Feb. 22, 1876	Steam and Air Brake.
136,396	March 4, 1873	Steam-Power Brake Couplings.
136,397	March 4, 1873	Hose Couplings.
136,631	March 11, 1873	Steam-Power Brake Couplings.
138,827	May 13, 1873	Valve Devices for Steam and Air Brakes.
138,828	May 13, 1873	Rotary Valves for Steam Engines.
141,685	Aug. 12, 1873	Valve Devices for Fluid Brakes.
144,006	Oct. 28, 1873	Steam and Air Brakes.
144,035	Oct. 28, 1873	Locomotive Air Brakes.
142,600	Sept. 9, 1873	Railroad Car Brakes.
144,582	Nov. 11, 1873	Slack Taking-up Apparatus for Steam and Air Brakes.
147,212	Feb. 3, 1874	Car Brakes.
149,901	April 21, 1874	Valves for Fluid-Brake Pipes.
149,902	April 21, 1874	Car Brakes.
156,322	Oct. 27, 1874	Discharge Valves for Fluid Brakes.
156,323	Oct. 27, 1874	Tripping Apparatus for Air Brakes.
157,951	Dec. 22, 1874	Pipe Couplings.
8,291*	June 18, 1878	Pipe Couplings.
159,533	Feb. 9, 1875	Pneumatic Pump.
159,782	Feb. 16, 1875	Steam-Engine Valve Gear.
160,803	March 16, 1875	Fluid Ejector.
162,793	May 4, 1875	Governor for Steam Engine.
166,489	Aug. 10, 1875	Vacuum-Brake Pipe Coupling.
168,119	Sept. 28, 1875	Ejector Attachment for Vacuum Brakes.
168,359	Oct. 5, 1875	Air Valve for Power Brakes.
172,064	Jan. 11, 1876	Air-Brake Valve.
173,835	Feb. 22, 1876	Air Compressor.
175,886	April 11, 1876	Locomotive Air Brake.
180,179	July 25, 1876	Air Brake and Signal.
205,710	July 2, 1878	Governor for Marine Engines.
214,335	April 15, 1879	Brake-Pipe Coupling.
214,336	April 15, 1879	Coupling Valve.
214,337	April 15, 1879	Automatic Brake Regulator.
214,602	April 22, 1879	Cocks for Fluid-Pressure Brake.
214,603	April 22, 1879	Railway Air-Brake Apparatus.
216,545	June 17, 1879	Operating Valve for Steam and Air Brakes.
217,836	July 22, 1879	Fluid-Pressure Brake Apparatus.
217,837	July 22, 1879	Piston Diaphragm for Power Brakes.
217,838	July 22, 1879	Automatic Brake Relief Valve.
218,149	Aug. 5, 1879	Fluid-Pressure Brake Apparatus.
218,150	Aug. 5, 1879	Automatic Brake Attachment.
220,556	Oct. 14, 1879	Regulating Valve for Automatic Brakes.
222,803	Dec. 23, 1879	Operating Cock for Fluid-Pressure Brakes.

*Reissued.

Each of the several biographies of Westinghouse mentions his amiability and friendly nature, to everyone he met. He loved people. Unlike Edison, he hated the spotlight, and avoided making speeches at all costs.

He always expected excellent, speedy work from his colleagues, but he treated them better than almost any other employer of his era. He took great pride in creating worthwhile, durable jobs for thousands.



Despite his power and wealth, he was never obsessed with profits, especially over the short term. He had confidence that if he made things that made the world a better place, the businesses would prosper. He was "purpose-driven." Even in the direst of crises, his optimistic spirit did not waver. He knew he was right and he believed in the future of his ideas and his companies.

While, as described above, his companies have changed hands and changed names many times, his legacies live on every time we throw on a light switch or turn on a computer. His whole life was devoted to serving society at large and serving those who worked for him. Few men in American history have had such an impact, yet been less known to the average citizen.

Sources: A great deal has been written about George Westinghouse and, especially, the Current Wars. The most vivid, well-written history of Westinghouse, Edison, Tesla, and those wars is *Empires of Light: Edison, Tesla, Westinghouse, and the Race to Electrify the World,* by Jill Jonnes, published in 2003. That book is full of color and detail, yielding a great sense of all three men. It also tells the story of the world's fair and Niagara. *The Power Makers: Steam, Electricity, and the Men Who Invented Modern America* by Maury Klein (2008) covers the same stories. *The Electrical Manufacturers 1875–1900: A Study in Competition, Entrepreneurship, Technical Change, and Economic Growth* by Harold C. Passer (1953, reprinted 1972) is an outstanding, detailed academic study of the Current Wars and earlier history of the development of electricity.

The first biography of Westinghouse was *George Westinghouse: His Life and Achievements* by Francis E. Leupp (1919), which gives a good feel for the man and his upbringing. This was followed in 1921 by *A Life of George Westinghouse* by Henry G. Prout, which focuses on the details and technologies of his endless inventions. The year 1962 saw the publication of a book for young readers, *Inventive Wizard: George Westinghouse* by I. E. Levine. In 2007, Pittsburgh business aficionado Quentin R. Skrabec, Jr., wrote *George Westinghouse: Gentle Genius*, but we found this book poorly edited. The book also reflects opinions of the author that do not always reflect the story as told by others (for example, the book casts all the blame for the 1907 loss of Westinghouse Electric on the shoulders of mean and short-sighted bankers, whereas J. P. Morgan had a history of backing innovators like Edison, and Westinghouse was enough of a businessman to know the risks of taking on large amounts of debt, which in the end cost him his company.)

In writing this summary of Westinghouse's life, we found the Leupp, Jonnes, and Passer books most useful.

This article first appeared in the Archbridge Institute's American Original Series *on February 27, 2019. Reprinted with permission.*

A Westinghouse H-126 "Little Jewel" Manufactured in the late 1940s, it stands roughly 9" high by 6"wide. Shaped like one of their refrigerators, it comes in a variety of colors and has a pop-up handle.

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Look on page 52 of this newsletter for the renewal form.

RADIO ZONE
An Occasional Column on Radio Related Items of Interest

Was This Man The World's First DJ?

by David Kruh

His name was Reginald Aubrey Fessenden, and some say that what he did in December 1906 led to Wolfman Jack, Martin Block, Murray the K and anyone else (including yours truly, David Kruh) who made a living playing records on the radio. For, if the story is true, then Fessenden could be credited as being the world's first disc-jockey.


Left: Reginald Fessenden, Right: Wolfman Jack

The idea of exploring a Fessenden-to-Wolfman link, as well as unraveling of the mystery of that first broadcast is too much fun to pass up, and since several of Fessenden's discoveries and inventions were needed for the radio business to exist at all, it is appropriate that we take some time to look at his role in the history of the radio DJ.

As with any story about radio we must start with Marconi, of course. In the 1890s he saw how a spark-producing device on one side of his laboratory caused the movement of iron filings on the other side of the room. By organizing the static into the long and short pulses of Samuel Morse's code, Marconi devised a way to communicate over long distances wirelessly using what came to be known as Spark Gap (which I talk about in some detail in my blog, Predictably Unpredictable: Adventures in the Ionosphere). By 1904 Marconi's company was sending news and information to subscriber ships at sea using Spark Gap.

Fessenden enters our story by way of Quebec (where he was born in 1866,) a couple of Canadian colleges (neither of which he finished,) and a brief stint working for Thomas Edison. Yes, *that* Edison. The Wizard of Menlo Park himself. It was 1886 and Edison was installing New York City's first power distribution and lighting system (which I wrote about in my blog, Edison and the elephant NOT in the room) and Fessenden, in an admirable display of chutzpah, applied for a job though he admitted to Edison that he did "…not know anything about electricity, but can learn pretty quick." Not the most compelling elevator pitch, so

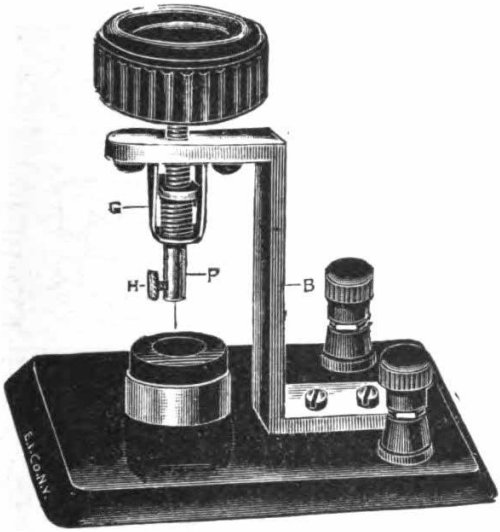
it's not surprising that Fessenden didn't get the job, at first. But the young Canadian was undeterred and, after some hounding, was given a role in Edison's New York power project where he quickly displayed an almost uncanny aptitude for electronics. Before long Fessenden was literally working by the Wizard's side at Menlo Park.

In 1890 financial reversals forced Edison to lay off Fessenden. But, as you can imagine, having Thomas Edison on your resume opened doors, and Fessenden parlayed his three years with Menlo Park's Wizard into two University professorships in electronics. Not bad for a guy who never finished college *or* studied electronics. While teaching in Pittsburgh he became interested in the work of Marconi. It is at this point in Fessenden's story that I'm again compelled to use the word *chutzpah*, because our young Canadian decided he knew a better way to transmit and receive spark gap than the guy *who invented it*. After a public demonstration of his improved radio transmitter and receiver Fessenden was hired in 1900 by the United States Weather Bureau to build a radio network of observation stations.

During his time with the Weather Bureau Fessenden continued to improve radio receivers with several inventions, two of which go hand-in-hand in the development of radio as we know it today. The first was his development of the heterodyne principle, which states that when you mix two signals you get two new signals; one is the sum and the other is the difference between the original signals' frequencies. This discovery lead to the construction of transmitters and receivers that produced a "Continuous Wave" signal, or tone, instead of the hash and static of legacy Spark Gap transmitters. But, even with heterodyning, radio receivers still reproduced only dots and dashes that had to be translated into words by men and women trained to read Morse Code.

We are now at an amazing point in time for the development of radio, with theories such as the heterodyne principle so advanced that their practical application had to wait for technology to catch up. That's because heterodyning required a stable source of the mixing signal (known as a Local Oscillator,) which wasn't possible until after the invention of the triode tube by Lee De Forest in late 1906. Up to this point tubes were two element devices which could not amplify or oscillate. De Forest combined the advances made by two men; Phillip Lenard - who was experimenting with a third element in vacuum tubes as far back as 1902 - and John Fleming - who built the first vacuum tube used in a radio, inventor of the eponymous Fleming Tube. Although De Forest's triode tube got its patent in early 1907, it was another five years until researchers were able to create a true vacuum which enabled the true potential of the triode as an amplifier.

But here's the thing, in 1906 we had just… enough… technology to *modulate,* however imperfectly, a radio signal with intelligence. "Intelligence" is used by engineers to describe the audio - could be voice or music or even data - that modulates the RF signal and is picked up by a receiver where the reverse process



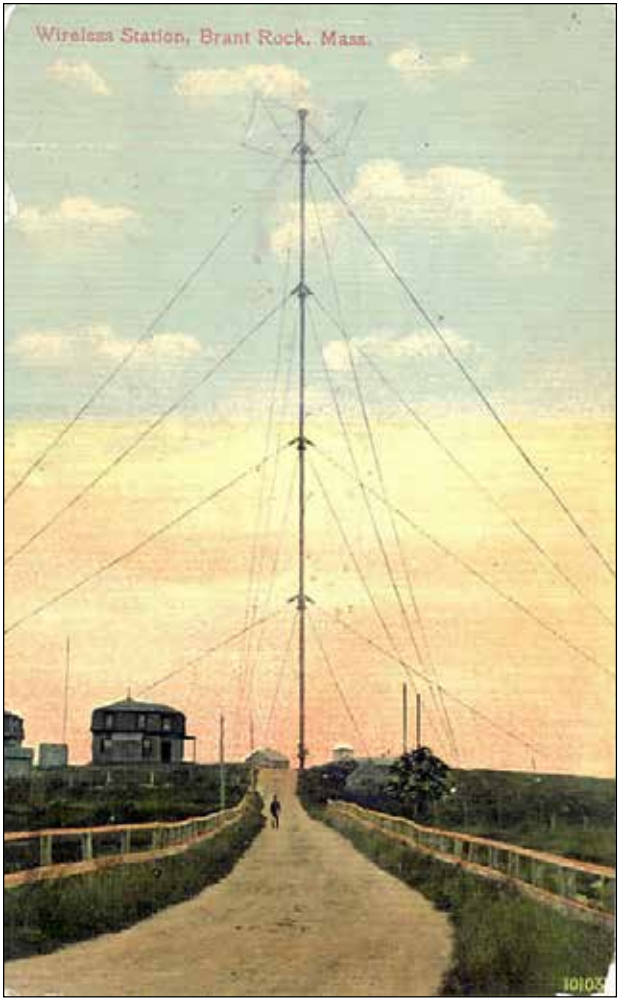
Fessenden's Electrolytic Detector

of *demodulation* strips away the RF and delivers only intelligence to the listener. (Some might take offense at the definition of what is coming from our AM radios these days as intelligence. But we move on…) The key was Fessenden's next invention - a highly sensitive detector known as an "electrolytic detector," which did something that no other device had ever done - it performed the task of demodulating the signal, delivering the intelligence to the listener. Fessenden's detector was a major step on the road to radio for the masses, since one didn't have to know Morse Code to understand the broadcast.

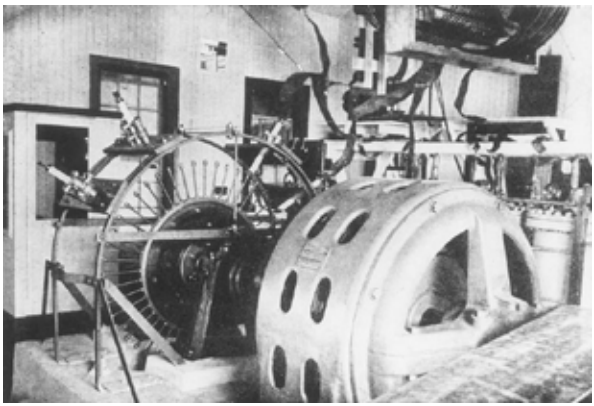
By this time Fessenden, who had quit the Weather Bureau in 1902 (claiming that the head of the Bureau was illegally attempting to grab a share of his patents) was now working with two Pittsburgh businessmen. They formed a company called the National Electric Signaling Company (NESCO) to finance Fessenden's radio research. After an attempt to build a wireless communication system for GE plants in New York failed, the men of NESCO next tried to license Fessenden's radio equipment to the U.S. Navy, which claimed the cost was too high. When the Navy turned around and contracted with competing firms that were using Fessenden's design NESCO sued, which began a series of patent infringement lawsuits. (For those of you keeping track, Fessenden now had two sets of ongoing lawsuits. This seems to be an occupational hazard of the early radio business, as evidenced by the mounting billable hours for firms representing De Forest, Edwin Armstrong, Lucien Lévy, David Sarnoff, and other radio pioneers.)

Despite the failure of the GE scheme and the snub by the Navy, Fessenden and his backers then boldly proposed to establish a reliable trans-Atlantic wireless service that would compete with existing underwater telegraph cables. Two stations were built, one in Machrihanish in western Scotland and the other in the Massachusetts coastal community of Marshfield, in a section called Brant Rock. Both locations featured huge transmitting towers. The one at Brant Rock was over 420 feet tall.

Located near the base of each tower on both sides of the Atlantic were similar Rotary Spark Gap transmitters and a pair of highly sensitive receivers based on Fessenden's design. (Pictures of tower and transmitter on the following page.)



Penny postcard of the Brant Rock, Massachusetts tower



Rotary Spark Gap Transmitter at Brant Rock

On a cold January night in 1906 the two stations engaged in the first successful two-way conversation across the Atlantic. (I haven't forgotten Marconi, but his scheduled reception of a cross-Atlantic transmission of the Morse letter "S" in Newfoundland was just a one-way affair and is itself clouded with doubt.) The Machrihanish tower collapsed during a gale in early December of that year, ruining any chance of establishing the business of a trans-Atlantic wireless message service. But Fessenden had plans for the Brant Rock tower that, if successful, would demonstrate the true potential of radio.

Radio Gets a Voice

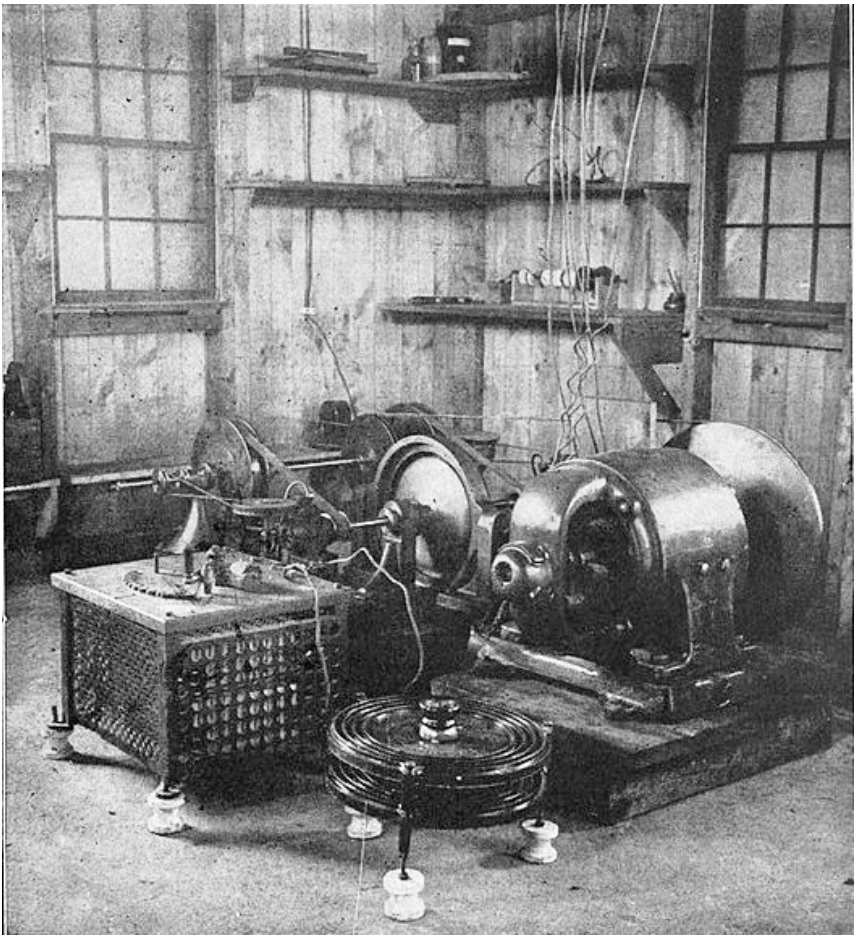
As far back as 1891 Fessenden was experimenting with spark gap generators that ran at much higher speeds than conventional devices. Fessenden's work in this area is what lead him to develop the heterodyne principle and continuous wave transmitters, both of which were critical in the development of radio. By inserting a telephone carbon microphone into the transmission line of a higher-speed arc transmitter, he found he could modulate the signal with his voice. The first test, in 1900, produced a weak signal that could only be heard about one and a half miles and was of poor quality, but it was the first time anyone had ever broadcast speech over the air.

That was only the beginning. Over the next six years, as he went from university professorships to the trans-Atlantic wireless business venture, Fessenden sought someone who could manufacture a new kind of transmitter. In August of 1906 Ernst Alexanderson (another pioneer in the development not only of radio but of television, as well) delivered an alternator-transmitter to Fessenden's specifications. Though it produced much less power than a spark gap transmitter, Fessenden used the arc generator on December 21, 1906 in a public demonstration of the wireless broadcasting and reception of both voice and music. As explained on Fessenden's Wikipedia page,

> *As part of the [December 21] demonstration, "speech was transmitted… 11 miles to a listening site at Plymouth, Massachusetts. A detailed review of this demonstration appeared in* The American Telephone Journal *and a summary by Fessenden appeared in* Scientific American*. A portion of a report produced by Greenleaf W. Pickard of the Telephone Company's Boston office, which includes additional information on some still existing defects, appeared in Ernst Ruhmer's* Wireless Telephony in Theory and Practice*."*

Three days later, according to Fessenden, on December 24, 1906 he again fired up his high-frequency alternator transmitter and, speaking into the microphone, announced he would play a phonograph record of Ombra mai fu by Handel. This simple act, if true, would have made Fessenden the world's first disc jockey. He was then said to have performed the Christmas carol "Oh, Holy Night" on the violin, followed by his singing of two more Carols, making him radio's first performer, as well.

But did the Christmas Eve broadcast really happen the way Fessenden said it did? Author H.P. Davis, in his 1928 book The Story of Radio, only writes that "Reginald Fessenden, probably the first to attempt… [entertainment on the radio,] broadcast a program Christmas Eve 1906." Note the word "probably." Davis' uncertainty is understandable, since his only source for this history-making claim was a letter that Fessenden himself wrote, just a few months before his death in 1932, to writer Samuel Kintner. It was in that letter where Fessenden detailed the content of his supposed Christmas Eve broadcast.



Fessenden's high-frequency alternator transmitter (from the January 26, 1907 issue of The American Telephone Journal)

I Love a Mystery

As the centenary of the 1906 broadcast approached several researchers and historians searched for independent verification of the Christmas Eve broadcast. Almost anything from an outside source would do; a ship's log, a newspaper article or even letter from a local resident – anything to corroborate Fessenden's

claim. In 2006 three prominent broadcast researchers published pieces in which they detailed how they tried, but failed, to find corroboration of the event. In a Radio World article posted in October 2006 ("Fessenden, the World's First Broadcaster") James O'Neal dismisses Fessenden's claim outright, saying that "If Fessenden had transmitted special programs of music and speech on Christmas Eve or New Year's Eve, these events would have sparked a tremendously large "buzz" for days thereafter among the community of land and sea radio operators." O'Neal also wrote:

> *"No press reports at the time, or for a quarter-century after. No mention for decades by an inventor who knew how to promote himself and wrote hundreds of articles about his work. No mention in a contemporary log and no known logs elsewhere, whether official naval logs or otherwise. No commemorations 25 years later. No challenge to De Forest's published competing claim. No followup to Clark's finding that the year needed to be verified; no consensus as to the date among the group cited by Clark. No mention of 1906 once the year 1907 began to be cited."*

Dr. Donna Halper and Dr. Christopher Sterling, in their article "Fessenden's Christmas Eve Broadcast: Reconsidering an Historic Event" for the August edition of the Antique Wireless Association Review, also wrote of their failed efforts to find evidence to support Fessenden's claim. But they are not as quick as O'Neal to dismiss that it might have happened simply because there was no "buzz." Halper and Sterling wrote that general skepticism about radio being anything more than a toy in 1906 was prevalent, and that Fessenden had "…the need to keep such a 'frivolous' event from the ears of his financial backers who were seeking success with other lines of wireless business." Given the recent collapse of the Machrihanish tower and the problems Fessenden's backers were having finding customers for the service, the idea would seem to have some merit. Halper later expanded on this argument in her follow-up article "In Search of the Truth about Fessenden," published in February 2007 by Radio World. In it, she said that while no one can verify that the Christmas Eve broadcast did take place, neither can they prove the negative, that the broadcast did not occur. As to the lack of press for what we today consider a history-making event, Halper says "Just because nobody in the media thought it worthy of coverage doesn't necessarily mean it didn't occur."

But Halper and Sterling then say that all the attention being paid to the Christmas Eve broadcast misses the point. They argue that the broadcast Fessenden made three days earlier, on December 21, 1906 (during which Fessenden broadcast not only voice, but also music from a phonograph record) was, in fact, the history-making broadcast. James O'Neal, in his December, 2008 Radio World article Fessenden, the Next Chapter, agreed:

> *"The fact that speech and music were transmitted on Dec. 21, albeit a distance of only a few miles, could qualify Fessenden as the world's first broadcaster. His signal was not encrypted, nor was it directed into a narrow*

point-to-point beam that could only be intercepted at Fessenden's receive site. Anyone within range possessing an AM receiver could have listened in."

Perhaps defenders of Fessenden's place in broadcast history are guilty of nothing more than being romantics for wanting that first-ever broadcast to be on the holy night of Christmas Eve instead of the pedestrian date of December 21st. I find no better example of this romanticism than this quote from a July 30, 2006 Boston Globe article in which a member of the committee which organized a 100th anniversary celebration of the Fessenden broadcast said "It's a wonderful thing to picture people at sea sending and receiving Morse code, and suddenly they hear a man's voice and a recording of a Handel piece and playing `O, Holy Night' on the violin, and throwing off their headphones and saying, `Captain, you have to hear this!'"

After the (alleged) Christmas Eve broadcast Fessenden apparently never broadcast music again. His Pittsburgh partners, disheartened by the collapse of the tower in Scotland, began searching for a buyer for NESCO, and Fessenden's relationship with them frayed quickly. After they unceremoniously dumped Fessenden from the company in 1911, he sued. (This would be lawsuit #3.) As that case dragged through the courts, ownership of NESCO shifted first to Westinghouse and then to RCA, which finally settled the case with Fessenden in 1928. By that time, Fessenden had left radio and moved on to other fields in which he built a diverse legacy, including early versions of SONAR, microfilm, and tracer bullets. He also developed an iceberg locator (a few years too late to save the Titanic,) a device to allow submarines to communicate and, among his many patents, one for a seismology device to help companies search for oil without the expense of drilling.

The Rise of the DJ

There were other progenitors of the Wolfman. Opera star Ada Eugenia von Boos-Farrar didn't howl, but she did say "Here goes something into nothing…" before belting out "I Love You Truly" into a microphone in Lee De Forest's Manhattan studio in 1907. That broadcast was heard by a seaman aboard the USS Dolphin (which was docked in the Brooklyn Navy yard at the time) thus providing De Forest with the confirmation that eluded Fessenden and his Christmas Eve broadcast. By the way, if Eugenia is not the first person to sing over the radio, she certainly is the first woman.

Just two years later, in 1909, a young electronics student at the Herrold College of Engineering and Wireless in San Jose, California, named Ray Newby began the world's first regularly scheduled broadcast of music and news. Appearing decades later on the television show I've Got a Secret, he explained what he and inventor Charles Herrold did…

"We used popular records at that time, mainly Caruso records, because they were very good and loud; we needed a boost... we started on an experimental basis and then, because this is novel, we stayed on schedule continually without leaving the air at any time from that time on except for a very short

time during World War I, when the government required us to remove the antenna... Most of our programming was records, I'll admit, but of course we gave out news as we could obtain it..."

Ray Newby and Charles Herrold at Harrold's radio station "San Jose Calling"

Herrold, who built the station, is credited with coining the term "broadcasting," (as opposed to "narrowcasting" – another word he invented – to describe point-to-point or ship-to-ship communication) and even designed omnidirectional antennas so his station's signal could be heard as widely as possible. (Radio veterans will love the fact that Herrold also engaged in what is known in the business as "trade," accepting records from a local store in exchange for on-air publicity.)

Newby was followed by others, like Elman Myers of New York City who in 1911 began his own radio station, filling 18 hours a day with recorded music. (Myers had worked with De Forest on the development of the Audion tube.) Back in San Jose Herrold's wife, Sybil True, went on the air around this time with "The Little Ham Program" (ham being a nickname for radio amateur) and so earns credit as the first female DJ. She too, used records from a local store for her playlist, noting with satisfaction, as she later explained in an interview with author Gordon Greb, that the store owners would notice an uptick in sales after she played a record on the air (a cause-and-effect that would, fifty years later, lead to radio's great payola scandal.)

But there's a problem with Newby, Fessenden, Myers, True and others who lay claim to the honor of first disc jockey – they only used one turntable. This naturally slowed down the pace of the program as the finished record was removed from the turntable and another put in its place. (Pace being deliberately slow, and the manner of presentation dignified – no one was howling like a wolf in between Caruso records.) The idea of using two turntables and transitioning, or segueing, between records is credited to New York announcer Martin Block. Tasked with providing "filler" in between bulletins coming from WNEW's coverage of the

1935 Lindbergh kidnapping trial, Block played records. (Musicians *hated* and fought against the playing of pre-recorded music on the radio, even at the smallest of stations, since it took away work.) "Borrowing" the idea from a Los Angeles radio host, Block would present several records from the same artist as if it were a live performance (yep, musicians hated this even more.) Because he was on a nationwide hookup for the trial, Block became famous for what he called the "Make-Believe Ballroom." Noting his success, syndicated columnist Walter Winchell, on his own weekly radio program, called Block a "disc jockey," which most historians agree was the first public use of the term. **Variety** magazine would be the first to put the words into print, in 1941.

The Golden Age of the Disc-Jockey would begin soon after the end of the end of Second World War and can be attributed to several factors. They include the relaxation of FCC rules on the identification of recorded material, the 1944 agreement that established artists' fees for recorded music played on the air, and a post-war boom that put millions of Americans into cars, all of which had AM radios. By the mid-1950s a new form of music – rock and roll – was taking hold, thanks to disc-jockeys across the country who boldly exposed their listeners to music heavily influenced by the blues and performed by African-Americans. Station owners who might have otherwise balked at having their stations associated with… *that* kind of music heard a sound which more than mitigated their concerns – that of the cash register ringing up sales of commercial airtime.

By then, the only complaint one might have heard from those owners was that they wished their stations could operate with more power, as stations in the United States were limited to 50,000 watts. The answer lay just over the border in Mexico, where there was no such power limit, and stations operated with so much power – a quarter of a million watts – that it was said the headlights of cars parked near the transmitter would light from induced RF. It was at one of those "border blasters" that Robert Smith became nationally known under the guise of a howling, baying-at-the-moon character known as "Wolfman Jack."

Okay, so we can't draw any stylistic comparisons between Reginald Aubry Fessenden's somber introduction of Handel's *Ombra mai fu* to Wolfman Jack telling his listeners to "lay your hands on the radio and squeeze my knobs." But that misses the point, because lost in the arguments over the who was the first disc-jockey is the sheer audaciousness of those early experimenters who imagined that total strangers would listen to their broadcasts at all, and who developed the equipment upon which a new industry would be born.

This article is from a blog authored by David Kruh and was originally posted on Analog Devices EngineerZone community in The EngineerZone Spotlight blog *on 7, February, 2019. You may find a listing of David Kruh's blogs here:*
https://ez.analog.com/search?q=radio#serpauthor=61394&serp=1
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RADIO ZONE
Radio Cabinet Restoration: Part 2

by Joe Koester

In Part 1 Joe discussed techniques for dealing with a damaged cabinet, e.g., veneer repair. Here he describes staining and final finishing.

Editors note: This article references products that may no longer be commonly available. Be sure to read, understand and follow instructions for safe use of equipment and chemicals.

Staining

There are about as many stains as there are opinions, and each has its own merits, but I found one brand that I think is particularly good—the solvent or alcohol-based Behlen stains. Behlen is a subsidiary of Mohawk, a major manufacturer of finishing and refinishing products. Unlike waterbased stains, these will not raise the grain in the wood by swelling. They go on quickly, don't use up much material, are easy to work with and dry quickly. What more could you ask for? Specifically, ask for Behlen Master Solar-Lux Non-Grain Raising Stain. Behlen offers a number of different colors. I like the Medium Brown Walnut (B503-6A205) and Nutmeg (B233-66666) but there are many other colors to choose from. I have some Jet Black and Blood Red, and any and all of these stains can be mixed to achieve a different color. Other stains I have used include Formby's, Carter Tripp, and Lenmar from Baltimore. But to my way of thinking, you can't beat the Behlen stains.

Application

This is fairly straightforward. I usually pour a small amount in a container and apply with a clean paintbrush, reserved only for stains. Work it into the grain and make sure all surfaces are covered. Like the stripper, avoid applying it to the top and letting it run down the side as you may end up with uneven applications and visible runs. I usually go over the radio twice and then dip a rag in the stain (use gloves by the way) and wipe over the entire surface. Wipe in a circular motion to cover the surface evenly, but always end up wiping ***with*** the grain. This stain dries quickly. Behlen claims you can put a final finish on the cabinet after an hour, but I always wait at least a day. Brushes (and sometimes your hands) clean easily with warm water and some hand soap if you need it. If you use other products follow their recommendations, but this method seems to work well with most stains. Just be sure to wipe it down with a rag with stain before you put it aside and you will have an even finish.

Filling the Grain

A critical step in making your radio cabinet refinishing a professional job is to fill the grain. Much of the wood used in radio cabinets is open-grain wood, e.g., walnut and mahogany. The veneer is flat but has minute valleys that must be filled to allow a smooth professional finish. I like to use darker or tinted wood filler that fills these valleys with a dark material and gives the wood a very smooth finish—

and the contrasting filler beautifully highlights the grain. There are distinctly different kinds of wood filler. The first category consists of substances like Plastic Wood and DAP Wood Dough or Wood Filler. These are designed to fill actual holes or larger gouges in wood. They are invaluable in filling cracks between veneer seams, small nicks out of the back of a cabinet, or other such minor repairs. The "wood filler" used to fill the tiny valleys in the grain is a completely different animal—wood *grain* filler. It is a paste-like substance applied with a brush, normally with the grain to get the maximum amount in the pores. I have had success with Bartley's dark walnut, but have been unable to find it recently, and now I use Behlen's Paste Wood Filler (Medium Brown Walnut). It should run $12 to $15 for a quart, but if you aren't going to do too much cabinet repair, get a pint or even a half-pint if available. Apply it following the directions on the container, and then after the recommended interval, remove it *across* the grain so as not to pull it from the pores. You must remove the excess filler at the right time, and you have only a small window of opportunity. If you remove it too soon you will remove too much. If you take too long, it can set like concrete. It can be softened with mineral spirits, but put it on and remove it properly and you will see instant results. I use a flat-blade plastic paint scraper to scrape it off, or an old credit card. Wipe the scraper after every pass. Some people prefer to wipe off the filler with burlap. You can toss out the scraped off filler or even put some back in the container. Scrape the excess filler off properly, and you will notice a sheen on the finish. You have just succeeded in making a real difference before you even apply a final finish.

Update

Recently I have been unable to find the oil-based wood grain filler, which I prefer. It seems that everyone has switched to water-based fillers, which I will soon be forced to try. When you purchase water-based wood grain filler make certain it is tinted dark (walnut usually) or that stain can be mixed with it to tint it dark. For best results use a color darker, rather than lighter than the stain, on the main veneer so as to contrast and highlight the grain.

Options

Spray nitrocellulose lacquer was the final finish coat on almost all radio cabinets from the mid-1920s through the 1950s, and that is what you should use, both because it makes for an authentic restoration and also because it is the most convenient finish to use. It dries quickly so that multiple coats can be applied the same day. You can apply the wood grain filler right after the stain, and before the first coat of lacquer, and this is what I usually do. However, another option is to apply the first thin coat of lacquer and then apply the wood filler before subsequent coats. If you apply a tinted or darker wood grain filler over the unsealed cabinet it will tend to make the cabinet darker by bleeding a portion of its stain over the lighter stain already applied. This may or may not be a bad thing. I tend to like the slightly darker finish on the cabinet. On the other hand, if you achieved the precise coloring you intended with the initial application of stain, then by all

means shoot a coat of lacquer or sanding sealer over the cabinet before you apply the wood filler. It will then fill the grain and will not bleed over on the other portions of the wood. Another option is to apply sanding sealer—a clear lacquer with an agent designed to help fill the pores. I have used it only a few times and do not claim to have mastered the art of sanding sealer. If you wish to try it, spray a thin coat, then sand with very fine sandpaper (400 or 600 grit) to level the surface, then spray another coat, or proceed to the final lacquer finish. Several coats of sanding sealer can be applied, and will fill the voids in lieu of the wood filler. The difference is that sanding sealer will retain the original coloring of the stain without the contrasting and darker wood filler. Regardless of which approach you choose, when the grain has been filled, apply the first coat of lacquer. I always use Deft Semi-Gloss lacquer for the final coats, and I always spray it on with my touch-up spray gun. The newer cans of Deft refer to it as a "brushing lacquer." I was concerned when I recently contemplated the purchase of another can. I called the company and they assured me that their formulation had not changed. They were suggesting it be applied by brush rather than by spray gun to reduce the "amount of volatiles released into the air." So Deft is still Deft.

A Mistake

Sometimes when sanding over a sanding sealer (a thin coat of lacquer), you can accidentally penetrate through the finish and sand into the stained wood. If that occurs and the mistake is evident, apply a touch of the matching Behlen stain and then continue to apply the finish coats. I have even sanded through multiple layers of lacquer when doing the high gloss finish (see Epilogue), but it is possible to touch up at that point and add more lacquer. Remember that the cabinet must always be clean and free of wax, so if you need to apply more lacquer, lightly wipe the cabinet with mineral spirits to remove the wax and allow it to dry. Then wipe the cabinet with a soft cloth before putting on more lacquer. Do not use lacquer thinner or you will remove much of the final finish and can create major problems.

Graining Pen

This is essentially a small, sharp-pointed pen filled with toning lacquer. It is used to simulate the random patterns of grain where none exist or where you need to blend in or hide a veneer patch that stands out. Graining pens are available at woodworking shops. Simply draw a grain pattern on the wood to help match it. This is normally done after the staining and wood filling, but before the application of the final lacquer finish.

Toning

This is a *second critical step* that will make any radio look like a million dollars. Toning is the application of different colored lacquers to highlight areas of the cabinet, to cover plain or grain-less woods, and to shade different areas. Typically, the base of a console will be darker than the rest of the radio, and a medium dark walnut, extra dark walnut, Van Dyke brown, or some such color will work well.

These come in spray cans and are applied directly to the cabinet area. Remember you have already sprayed one coat of Deft over the cabinet. This seals the wood and after a day or so of drying you can mask the areas to be toned using that wonderful blue masking tape and then taping newspaper to keep over-spray off the rest of the cabinet. Apply the toning lacquer in very light passes, only a little at a time. If you apply it too heavily, drips or runs will result, and they will have to be removed or they will show! Multiple passes will build up the tone to somewhere close to the original or to what is pleasing to your eye. If you apply it lightly you don't have to worry about it bleeding under the blue tape–another good reason for a light touch. In addition to bases, many cabinets have areas of plain wood trim around the top, shoulders, or strips running up the front. Typically these trim pieces need to be toned because the wood lacks character, and without toning, would detract from the otherwise nice finish on the cabinet.

Detailing

In addition to toning there are a few other areas of the cabinetry that require a little extra effort—work that will pay big dividends. One is speaker grilles. Many radios have ornate cut-out grilles. The procedures above create a nice finish on the front surface, but what of the edges? They will show too, and can be dressed up easily. If there is a rough edge from, say, excess stripper sludge, it will show up during the sanding of the cabinet prior to staining. Much of the grille work will have to be sanded on the edge *across the grain,* so use caution so as not to dislodge the thin grille veneer, which is susceptible to damage during sanding.

Applying gesso to a speaker grille

Use medium (150 grit) and fine (220 to 240 grit) to smooth this area. At this point the cabinet has been covered with a first coat of Deft lacquer and the toning lacquer has been applied. The next step involves an artist's product called gesso to cover the edge of the grille. Gesso (basically, color tinted plaster of Paris) is used by artists to cover a canvas to provide a smooth and colored finish prior to painting. It comes in black, burnt umber (brown), and white. There may be other colors available, but I use black and brown. Try to determine which color had been used on the radio originally. Most speaker grilles were black on the edges, but some sets, such as the Zenith Walton sets, had brown edges on the speaker grille. Gesso is water-based and dilutes well. Put a little on something like the plastic lid of a margarine or Cool-Whip container. Use a small paint brush, ¼-to ½-inch wide, and have a container of water and paper towels available. Paint the gesso on the raw edge and use a damp towel to remove any excess from the finished front of the grille. It is much easier to remove if there is a coat of lacquer on the wood. If the gesso is applied before the lacquer, it can bleed into the pores and can be tough to remove. I have used brown gesso in place of toning lacquer on trim on a tombstone or two, as well as on the base of a tombstone. I recently used black gesso on the very bottom of an Atwater Kent console, and for various trim pieces on a cabinet. When the gesso dries it has an unappealing flat finish but the final coating of Deft will cure that.

Special Effects

Another way to achieve a "blended finish" is to use an air gun to spray lacquer tinted with the stains I mentioned. An air gun is simply a much smaller version of a paint spray gun; it puts out much smaller patterns of spray and allows for exact placement of the colored lacquer. An air gun provides precise control over the application of stains, stain and lacquer mixtures, and clear lacquer for small applications. If you have seen feathered finishes where a darker finish bleeds off or blends into the surrounding finish, chances are it was done with an air gun. Air guns use very low air pressure and volume and can even be powered by an aerosol can of air. You can buy several cans of pressurized air and need no additional equipment, or you can purchase a miniature compressor designed specifically for an air gun. The sprayer is attached to a small (one ounce) or larger reservoir. It allows great freedom of movement and expression. In essence you are making your own toning lacquers, and can obtain the same or better results than possible with spray cans. Pour a little Deft lacquer in a small clear glass container and add the desired stain. Remember to stir the Deft well before pouring it, and stir the stain as well in the smaller container. You can even apply darker stains over existing stains before you ever put the first coat of final finish or Deft over the cabinet. But I prefer the tinted lacquer best.

Spraying Lacquer

Conditions

Lacquer must be sprayed when the humidity is below 70 percent. The first time I sprayed lacquer in Maryland it must have been in the 90 percent range and my

Atwater Kent cathedral turned white! Lacquer picks up the moisture in the humid air and captures it, hence the white finish. There are agents that can be added to the lacquer to speed up drying time or retard it, but I have not found them necessary. I normally spray outdoors, but not when the dandelions are winging their way about or there are swarms of small insects, which are always drawn to the smell of fresh wet lacquer and land for a sample. So if you don't want amber on your radio, take heed. Have your cabinet finishing jobs saved up and ready to go for that nice day with low humidity and temperature in the 60s or above. When the weather conditions are ideal it makes sense to spray several radios at once, as in the picture. You can see that no toning or detailing was done. After this first application dries for a day or so you can work on the toning and detailing. Remember to mask off adjacent areas when you spray the toning lacquers to avoid over-spray. When detailing with the gesso you normally needn't mask surrounding areas as you can easily wipe off the gesso with a damp paper towel.

Never spray lacquer on a humid day. Save up your cabinets and wait for a clear, sunny day with low humidity and no wind, and then do several at a time as I did here. That way you have to clean your spray gun and other tools only once, instead of multiple times.

Application

This is a very easy way get a killer finish on a radio. I use a little "touch up" gun that holds maybe a half pint of lacquer. I always use the Deft semi gloss lacquer and set the air pressure to around 65 pounds—you will need to experiment with your particular gun and adjust the flow such that the pressure is not too high. The lacquer flow rate is also adjustable. If the air pressure is too high, it will result

in a bumpy orange peel finish, so cut the air down. If the spray is mostly air, increase the flow of the product until you get a uniform pattern emerging from the gun. Most air guns have an adjustment for a horizontal or a vertical fan pattern. I use both, but most often vertical, which covers a larger area per pass on, say, a console. Like the toning lacquer, spray the finish lacquer on lightly and in multiple passes. On a day with favorable humidity and warm temperatures, when you have finished spraying the first coat on the cabinet it may already be dry in the area where you started. Resist the impulse to spray on a heavy coat or you will find out what "sags" or runs are. Six or eight coats will usually be plenty. When you get the feel of the gun and have done a few radios, you will learn that you can spray a couple of fairly heavy coats if the weather conditions are ideal (really quick dry). Otherwise, it is sag and run. By following these directions, your radio is going to look super, but take your time! Spraying is really very simple, slow and easy. When you are done be sure and clean the spray gun. Fill the container with lacquer thinner and spray it into the air (not near the radio or neighborhood kids and dogs!) and wipe the exterior off with a wet paper towel or rag to remove any dried lacquer. I have been using my gun for nearly twenty years and I have a new back-up in reserve. They are available at places like Harbor Freight and probably cost $25 to $30, though I haven't priced one in years.

Here is a close-up of some of the cabinets I sprayed on a perfect weather day. You can see the deep shine even in this photo.

Option

In the wintertime you can't spray on a cold day, even if the humidity is low. Lacquer has an application temperature range, and spraying on a day near freezing isn't advisable. While spraying lacquer inside is dangerous and not recommended,

I must confess I have done so more than once in my two-room workshop, separate from my house. Spraying in one's basement is a mistake because the fumes will smell up the entire house, in addition to the fire and explosion hazard. What I have done is heat my two-room workshop up and turn off the gas heaters (pilot lights too!). I move the compressor into the second room and shut the door. You require a neutral environment with no chance of sparks igniting a room full of highly volatile lacquer overspray. Even a spark from turning on a light switch or a static discharge from stroking a nylon jacket could possibly lead to an explosion or fire. Also, when spraying indoors, you must wear a respirator as the fumes are highly toxic. I spray the cabinets as mentioned above. Then I quickly move them in the other room, shut the door, open the doors and windows in the room where the spraying was done, and air the place out thoroughly before relighting the heaters.

Lacquer Tinting

One of the nice things about the Behlen stains and the Deft lacquer is that they are very compatible. The two can be combined for touch up or in a coat or two of the lacquer finish.

Mixing Multiple Stains

Let's say you have prepared the surface and stained and filled the wood, and sprayed a coat or two of lacquer, but you aren't quite happy with the color of the radio—you might like it slightly darker. Take some of the stain you used, mix it with the Deft lacquer, and spray another coat over the cabinet. You can apply multiple coats if you wish, or you can add a little more stain, or perhaps introduce a bit of a different color or darker Behlen stain to the Deft. If you started with nutmeg but want it darker, try some medium dark walnut, or a touch of mahogany, or maybe a very small amount of hickory, or even an eyedropper of jet black (careful here). To darken mahogany or cherry, add some blood red. Add a touch of blood red to the walnut to give the cabinet a warmer reddish tone. Tinted Deft can even be used for touch-up where the stain may not be quite even. Since the finish has been sealed with a coat or two of clear lacquer, you can go back and touch up here and there if necessary.

Finishing Up

After the cabinet has dried for a day or two, go over it lightly with some 0000 steel wool. This will smooth the lacquer finish and will turn it somewhat dull in the process. Again - be gentle; you want a smooth finish and don't want to bear down hard, especially on the edges where you can end up going through all the lacquer. You will see white lacquer residue in the steel wool. Shake it out occasionally. As always, wipe with the grain. When I finish with the steel wool, I blow the cabinet clean (an air compressor is a wonderful addition to any shop!) and wipe it off with a clean T-shirt or soft towel. Then I apply a coat of Antiquax (described in Part 1 of this article) and buff the cabinet. You will be surprised at the nice finish you get using these methods.

Epilogue

Another Option

Before you wax that cabinet you might like to go a step further and get a high gloss piano finish. A colleague and I addressed this technique several years ago in the MAARC Newsletter (October 1996, p. 10) and called this method the Fine Abrasive Restoration Technique. If you choose this method, finish the cabinet with Deft high-gloss lacquer rather than semi-gloss. Essentially what you do is continue to sand the finish with increasingly finer abrasives, starting with 400 grit and continuing to 600, 1000 and 1500 grit, using wet and dry paper. Use water or paraffin oil as a lubricant. After the finest grit wet and dry paper, progress to a fine pumice, and finally to rottenstone. The cabinet will shine like a new penny. I have seen people get excellent results with tung oil, but I have never tried it. There are far too many methods and products to attempt to address all within the scope of this article. Perhaps someone else will follow up and tell us about using tung oil. As stated before, this article is simply one man's opinions and methodology. Some of my early attempts looked like I applied polyurethane varnish with a broom. I like to think I have progressed beyond that point. These methods work for me, and I know they will work for you.

Some recommended supplies ... listed on the following pages.

Recommended Supplies

Stains:
Behlen Master Solar-Lux, Non-Grain Raising Stain:
Medium Brown Walnut (B503-6A205)
American Walnut (B503-6A235)
Nutmeg Brown (B503-6A265)
Medium Brown Mahogany (B503-3A135)
Hickory (B503-6A286)
Golden Fruitwood (B503-4A565)
Jet Black (B503-01A45)
Blood Red (B503-3A285)
Note: The Walnut, Nutmeg, and Mahogany stains will work for most radios. The Fruitwood is a lighter stain and can serve as a base for a stain mixed by using any of the Walnut and Mahogany stains. The Jet Black and Blood Red are used to color custom stains. The Hickory is a darker stain useful for very early cathedrals, tombstones and table radios.

Lenmar Permanent Brushing Stain:
Ebony Black (U-622)
Dark Walnut (U-617)
Note: These are also good stains and I used the Ebony for detailing until I discovered gesso, which is much easier to control (less bleed-over) and apply. The Behlen stains are so versatile and easy to use I seldom use anything else.

Lacquer Finish:
Deft Semi-Gloss Clear Wood Finish
Deft High-Gloss Clear Wood Finish
Deft Lacquer Sanding Sealer

Toning Lacquers:
Mohawk Tone Finish Toner:
Van Dyke Brown (M101-1478)
Medium Dark Walnut (M101-0234) [Excellent for cabinet bases]
Extra Dark Walnut (M101-0209) [Excellent for cabinet bases]
Dark Red Mahogany (M101-0227)
Perfect Brown (M101-0249)
Cherry Brown (M101-8359)
Note: You can start toning a cabinet base or trim pieces with multiple coats of a lighter toning lacquer, and if you are not satisfied with the results you an pick another can of darker toning lacquer and go over the area. You can intermix these toning lacquers for a custom look, or you can choose a darker lacquer (example: Extra Dark Walnut) to cover the first few coats of a lighter lacquer. Remember - light coatings, multiple coats!

Glues and Repair Products:
Titebond III, Ultimate Wood Glue
Weldwood Contact Cement
DAP Wood Dough (Wood Filler),
Walnut Wunderfil Dual Purpose Wood Filler,Walnut, 2 oz (from Rockler Co.)

Grain Fillers:
Behlen Pore-O-Pac Paste Wood Filler (Grain Filler),
Medium Brown Walnut (B744-1F156)
Bartley Paste Wood Filler, Dark

Finish Restoration Products: (To enhance existing finishes)
Howard Restor-A–Finish,Walnut
Mohawk Amalgamator (400-0006)
Old English Scratch Remover
Slagle Sauce – an equal mixture of one half boiled linseed oil and one-half pure gum turpentine. You can increase the turpentine slightly if you prefer.

Waxes:
Antiquax
Briwax
Butcher's Wax
Blue Coral
Classic Car Wax
Mother's Mag Polish

Detailing Products:
Liquitex Acrylic Colored Gesso (Black) (Arts & Craft Stores)
Liquitex Acrylic Colored Gesso, Burnt Umber (Brown) (Arts & Craft Stores)

Polishing Materials: (For High Gloss Finishes)
Behlen Paraffin Oil [For Rubbing Finishes], B740-28645
Mineral Oil
Behlen Pumice Stone, Medium Coarse 2F (B720-1402)
Behlen Pumice Stone, Fine 4F (B720-1404)
Behlen Rottenstone (B720-15006)

Miscellaneous
Behlen Master Graining Pen, Brown, Dark (B265-004)
Wood Medic Handyman's Repair/Touch-Up Kit
Go Jo Waterless Hand Clean (cream, without pumice)
OOOO Extra Fine Steel Wool
Crown Liquid Paint & Varnish Remover
Klean Strip K53 Premium Stripper, thick brushable paste
Scotch 14-day ShurRELEASE, Shurtape (Blue painter's tape), 1- and 2-inch width

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http://www.maarc.org/index.php?option=com_content&view=article&id=119:radio-cabinet-restoration&catid=49&Itemid=147

RADIO ZONE
Listening on your Restored Radio

Hello ARCI members. My name is Marty Linke from Bridgeview, Illinois. I am a new member joining in April of this year.

I recently expanded my electronics hobby interests from ham radio [WD9ABG] to include the restoration of AA5 radios, both plastic and wood models. At this time, I have restored about a dozen radios and like most of you have a backlog of radios on my waiting 'to do list.' I am not yet ready for a viewing of my collection but I am working on it.

While on the 7-17-2021 ARCI Zoom call, the group had a brief conversation about music on Chicago AM radio stations in an effort to hear how members restoration radios might actually sound with music. There are several ways to get music to play on antique radios such as feeding music into a benchtop or local low power AM transmitter or signal generator or modifying the radio's audio circuit to accommodate a Blue Tooth receiver.

The availability Over-the-air AM radio music is something I have been tracking recently and although there is no 24 hour or daytime station playing music full time in Chicagoland there are several stations that do play music either as a limited programming choice [an hour or two here and there] or in the case of brokered stations, to fill in unsold time.

I have put together a chart of current AM radio stations in the area who are playing music [those I can monitor from my location]. There are actually more than you might think. Some stations like WGN are 50kw clear channel stations and can be heard across many Midwest states but many are lower power stations with limited coverage area and directional RF radiation patterns.

Because of the odd irregularity of stations' programming [which can and usually change with little notice] it may be tough to tune into these lower power stations at these specific times but do try. There are opportunities to test and listen to your radio restoration projects in real time with over-the-air music content. Let me know how you make out.

Martin Linke
Bridgeview, Illinois
wd9abg@aol.com

Music On Chicago Area AM Radio Stations

Station	Frequency	Coverage Area	Genera	Host	Sunday	Monday
	[Khz]					
WMFM	**640**	Chicagoland	Spanish Music	Automated	24 Hours	24 Hours
WSM	**650**	Midwest	Country	Various	Nighttime	Nighttime
WGN	**720**	Midwest	Frank Sinatra	Dave Plier	7AM to 9AM	
			Sunday Standards	John Williams	7PM to 9PM	
CFZM	**740**	Midwest	Boomer Oldies	Various	Nighttime	Nighttime
					(talk)	
WNDZ	**750**	Chicagoland	Boomer Oldies	Automated		
			Eclectic Boomer	Glen Jones		
WLIP	**1050**	Southern WI	Music Of The Stars	Lou Rugani	7AM - 11AM	
		Northern IL				
WHFB	**1060**	Southwest MI	Motown & More	Various	Daytime	Daytime
		Northern IN, Chicago and S E WI lake fronts				
WJOB	**1230**	Northern Indiana	Polka	BFS Polka Hour	11AM - Noon	
		Chicago South Suburbs				
WSBC	**1240**	Chicagoland	Boomer oldies	Automated		
WDYS	**1480**	DeKalb County/	Adult standards	Automated	Daytime	Daytime
		Fox Valley				
WPNA	**1490**	Chicagoland	Polka	Tish Blazonczyk	Noon - 1PM	
			Irish	Hagerty Family		
			Irish	Margret O'Connor		
WWHN	**1510**	Will County &	Adult contemporary	Automated		
		Chicago south suburbs				
WCKG	**1530**	NW, West & SW	Boomer familiar	Automated	Daytime	Daytime
		Chicago suburbs				

as of September 2021

Tuesday	Wednesday	Thursday	Friday	Saturday	Comment
24 Hours	24 hours	24 Hours	24 Hours	24 Hours	Transmitter in Peotone,IL
Nighttime	Nighttime	Nighttime	Nighttime	Nighttime	From Nashville, TN;
					Tough to receive in Chicagoland
					Transmitter in Itasca, IL
Nighttime	Nighttime	Nighttime	Nighttime	Nighttime	From Toronto, CN
					Strong Signal w/ fading
				Sign on - Noon	Brokered station w/ music fill-ins.
				5PM - Sign Off	
					Transmitter in Racine, WI
Daytime	Daytime	Daytime	Daytime	Daytime	Transmitter in Benton Harbor, MI
					Transmitter in Hammond, IN
				Daytime	Transmitter located NW
					City of Chicago
Daytime	Daytime	Daytime	Daytime	Daytime	Transmitter in Somonauk, IL
				1PM - 2PM	Transmitter in Oak Park, IL
				9AM - 11AM	
				11AM - 1PM	
					Transmitter in Joliet, IL
Daytime	Daytime	Daytime	Daytime	Daytime	Transmitter in Elmhurst, IL

A radio broadcast circa 1920

BUSINESS CARD ADS

We invite all of our members to scan and send in your business card to be included in ***ARCI NEWS***. For $80 your card will appear in the next 6 issues! Your card will be seen by approximately 400 people per issue and up to 1,000 people at *Radiofest* where we make additional copies of ***ARCI NEWS*** available at no charge. If interested, please scan your card and send it to jbart1964@gmail.com and mail a check for $80 to Rudy Hecker, ARCI Treasurer, 127 Weymouth Court, Schaumburg, IL 60193.

Thank you all for your continued support of ARCI!!!

CLUBBING AROUND

CORONAVIRUS NOTICE

MANY RADIO RELATED ACTIVITIES HAVE BEEN CHANGED IN RESPONSE TO THE CORONAVIRUS SITUATION.

PLEASE CHECK WITH EACH ORGANIZATION'S WEBSITE FOR CURRENT INFORMATION.

EARLY TELEVISION FOUNDATION CONVENTION
http://www.earlytelevision.org/

ANTIQUE WIRELESS ASSOCIATION
http://www.antiquewireless.org/

WISCONSIN ANTIQUE RADIO CLUB, INC.
www.warci.org

NORTHLAND ANTIQUE RADIO CLUB
http://www.northlandantiqueradioclub.com/index.shtml

MICHIGAN ANTIQUE RADIO CLUB
http://michiganantiqueradio.org/

INDIANA HISTORICAL RADIO SOCIETY
http://www.indianahistoricalradio.org/

MID-ATLANTIC ANTIQUE RADIO CLUB (MAARC)
www.maarc.org

ARCI

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PLEASE CIRCLE YOUR MEMBERSHIP:

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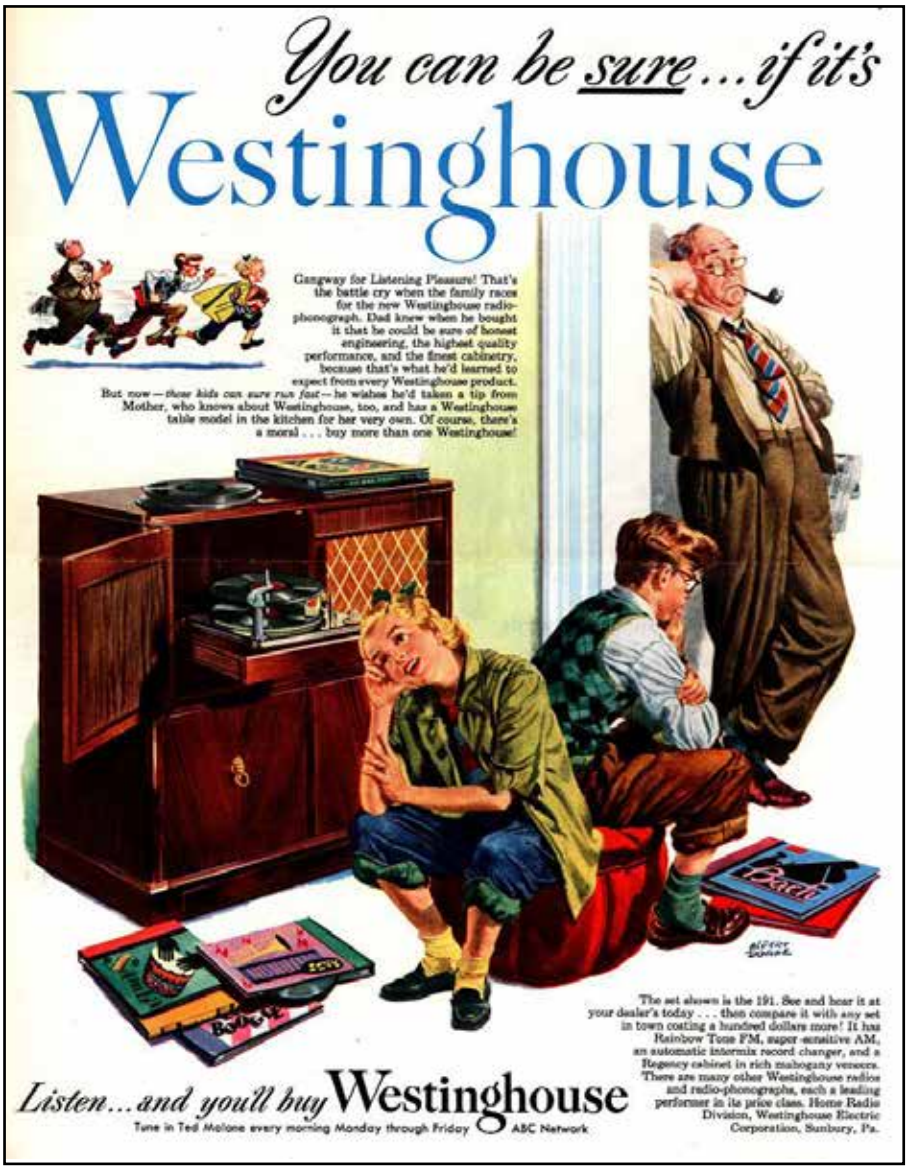

Westinghouse

About the cover: 1925 Westinghouse calendar, artwork by Edward Mason Eggleston, an American painter who specialized in calendar portraits of women, fashionable and fantastic. He was also a well known commercial illustrator.

ARCI NEWS

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