Hints & Kinks

For electrical artifact conservation and restoration.

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First presented at Antique Radio Charlotte - 2017

Robert Lozier – KD4HSH
Monroe, NC – USA
kd4hsh@carolina.rr.com
704-283-2638

704-458-1076 - cell

Agenda for Hints & Kinks.

1. Call for presentation items from the audience.
2. Lozier filler for this time slot.
3. Closing discussions.

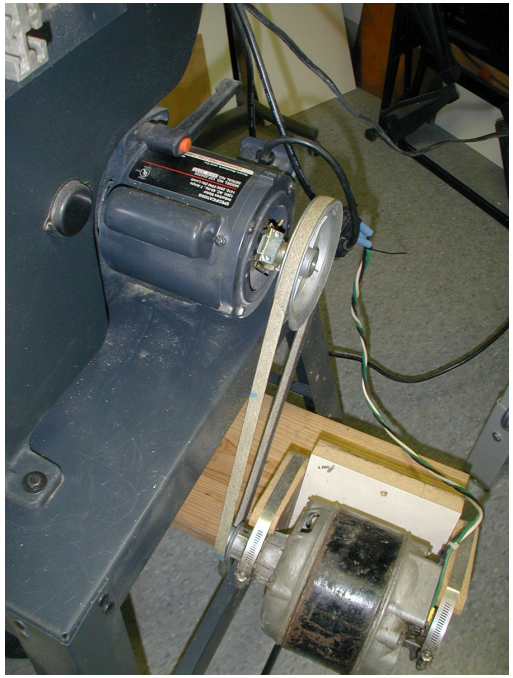
You need useful tools.

This is the **best** modification I have ever made to a shop tool that gets heavy usage in my shop.

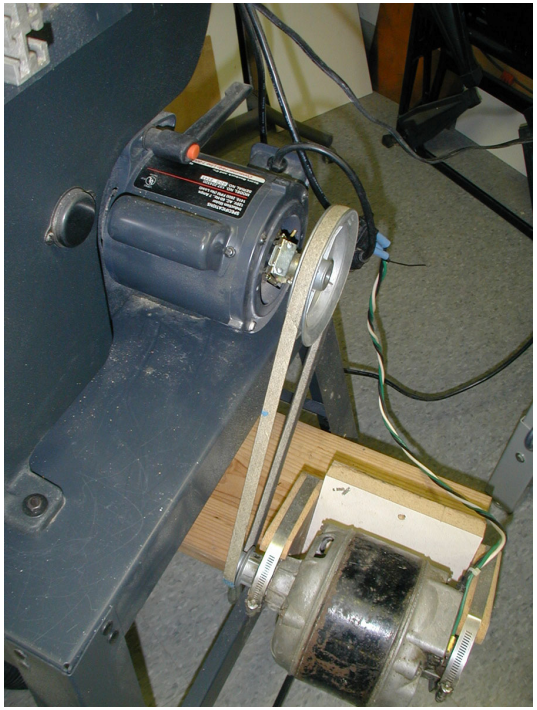
Slow down a wood cutting band saw so you can cut soft metals, Bakelite, fiberglass, plastics, etc. by adding an extra motor salvaged from an old washing machine.

This pulley set reduces the saw speed by a factor of 2.5.

If you can, look for a two speed motor. That should allow you the option of a 30% slower speed; helpful for sawing thicker metal.



No modifications to the saw required; just add this extra motor salvaged from an old washing machine.



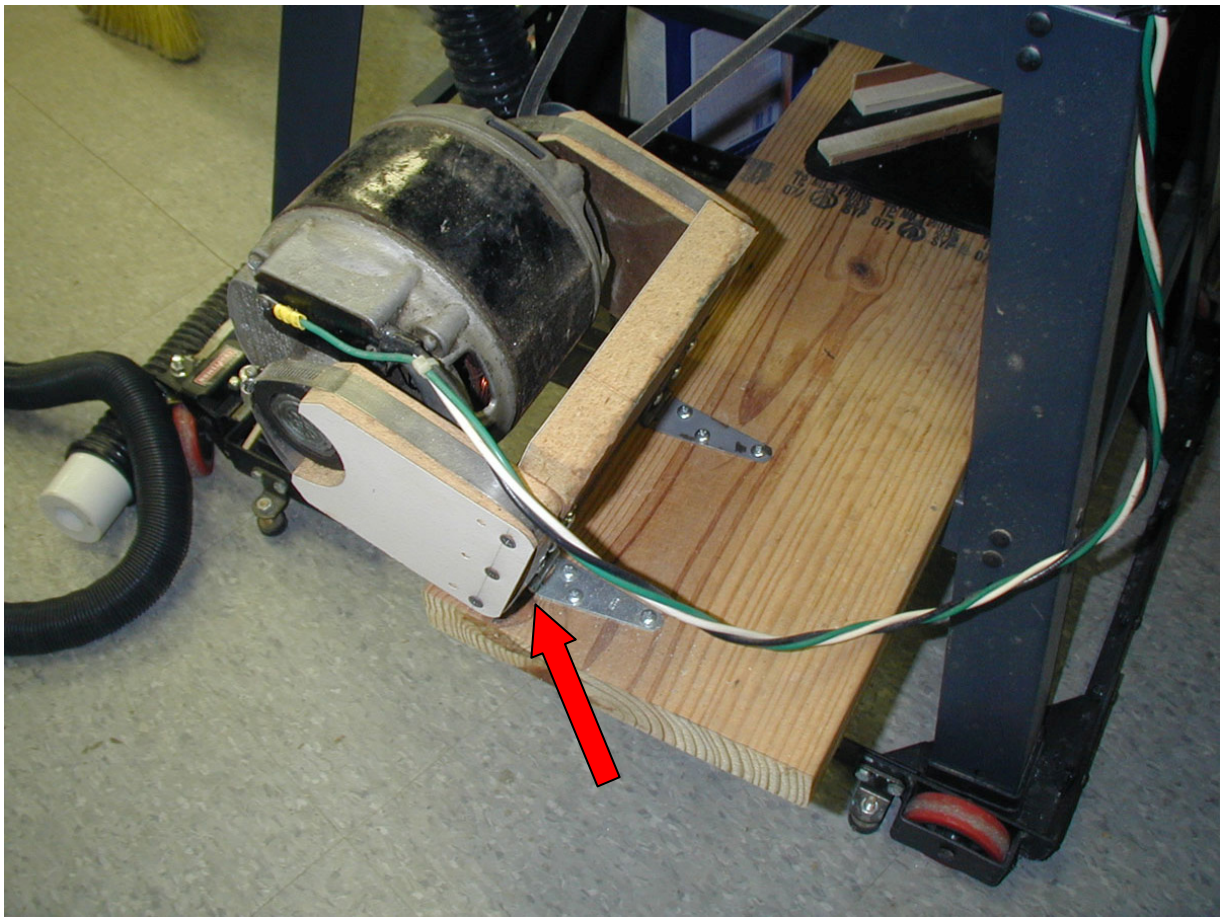
Unplug built-in motor from its power switch.

Remove fan cover from built-in motor.

Remove fan blade.

Install large diameter pulley.

Fabricate a cradle for your salvaged motor.



Simple strap hinges allow the motor cradle to pivot freely.

Stainless Steel heavy duty hose clamps secure the motor to the cradle.

Install **14 tooth** per inch bands specified for cutting non-ferrous metals. They work great for precise cutting of wood, Bakelite, plastic, fiberglass, brass, aluminum, mild steel and Corian. These same bands are destroyed almost immediately in these materials if run at the speeds of the saw as normally configured for general purpose wood cutting. I almost never need the higher speed from the original built-in motor.

Scratch free micro abrader for little rust and corrosion spots.

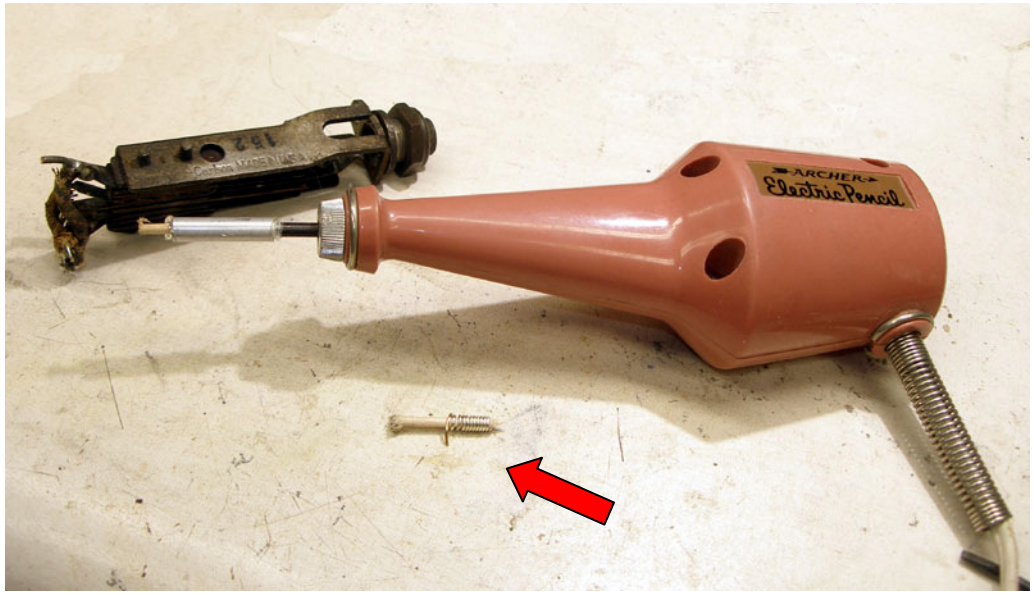
Got an old ‘buzzer’ type engraving pen gathering dust?

Find a aluminum spacer about ¾” long with internal thread of 4x40.

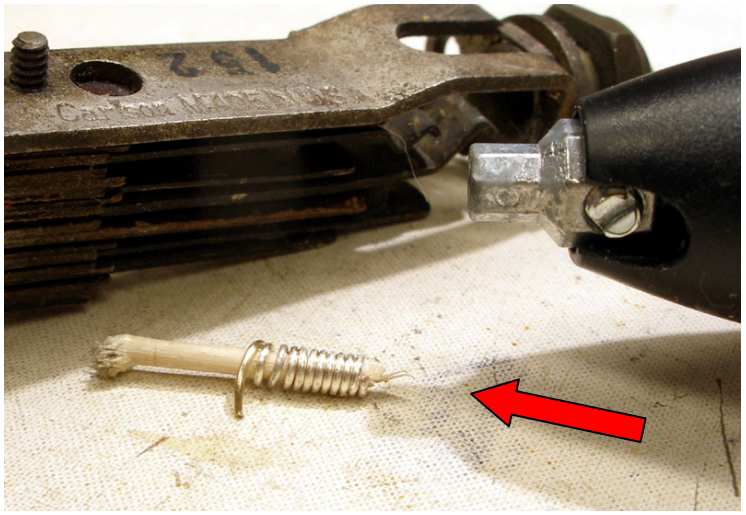
Drill out the spacer **part way** to the diameter of the engraver point .

Heat the spacer and force a little hot melt glue into it, then slip onto the engraver point.

Take a length of toothpick and wrap with small buss wire so as to make it fit snug in the spacer. You are good to go.



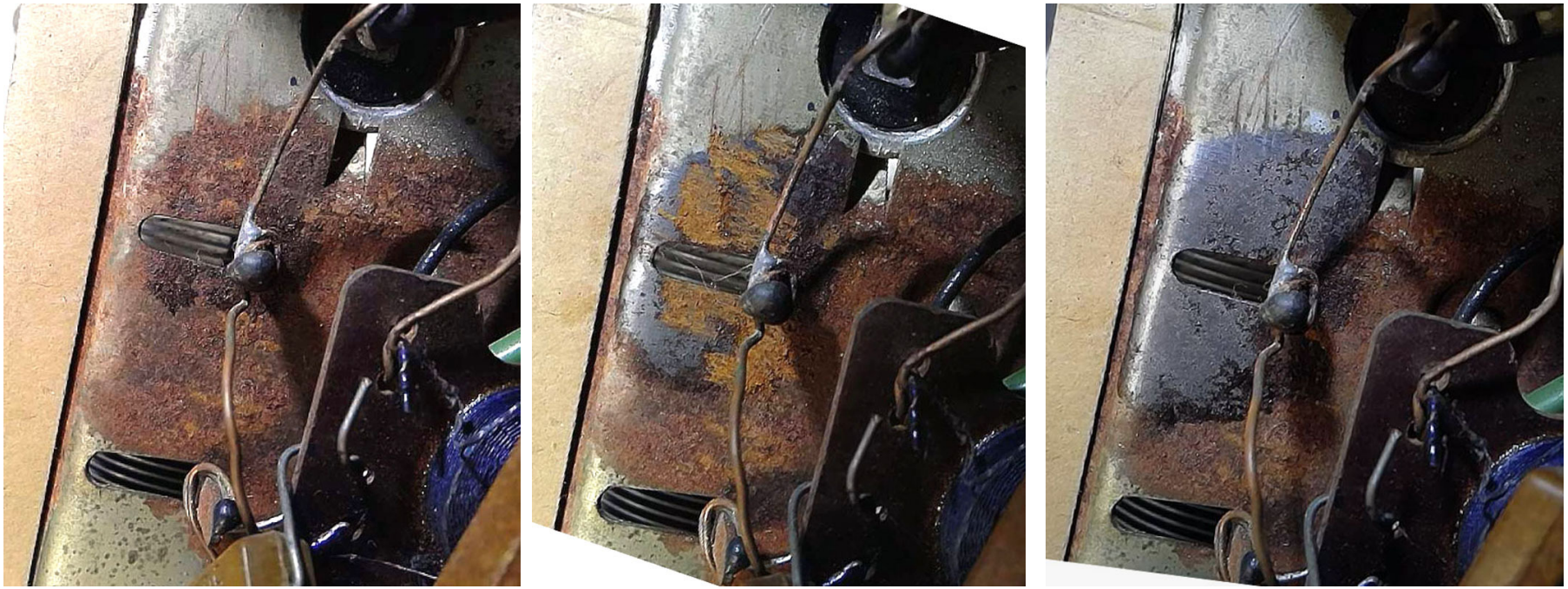
40 year old Archer brand engraver tool from Radio Shack.



Wrap the toothpick with buss wire to fit snug in the tool. The wire will easily slip onto a new pick.

A drop of rust converter or wet rottenstone applied to the toothpick works **great !**

This new Dremel tool is more comfortable to use than the 40 year old Archer tool.



The near vertical impact motion of the engraver tool almost guarantees no visible scratches that you will often get when using a rotary tool. Tilt your tool a little to get more aggressive abrasion.

The small size of the toothpick head allows you to work much closer to delicate features you need to preserve.

The toothpick can be replaced with **1/8” diameter fiberglass rod** for really aggressive cleaning; or the **paper stick of a ‘Q-Tip’** for very delicate cleaning.

Washing wiring? **Don't start** with water. Go **ballistic!** with mineral spirits **first**.

Cloth covered cables to loudspeakers, line cords, etc. can be loaded with soil. Cleaning them in place with vacuum, brushes or solvent rags do not work nearly as well as this…..

Place the cords in a shallow pan outdoors and pour in mineral spirits (white spirits). Saturate the cords with the solvent using a brush. (No need to scrub with the brush.) It can often look as if nothing at all is happening.

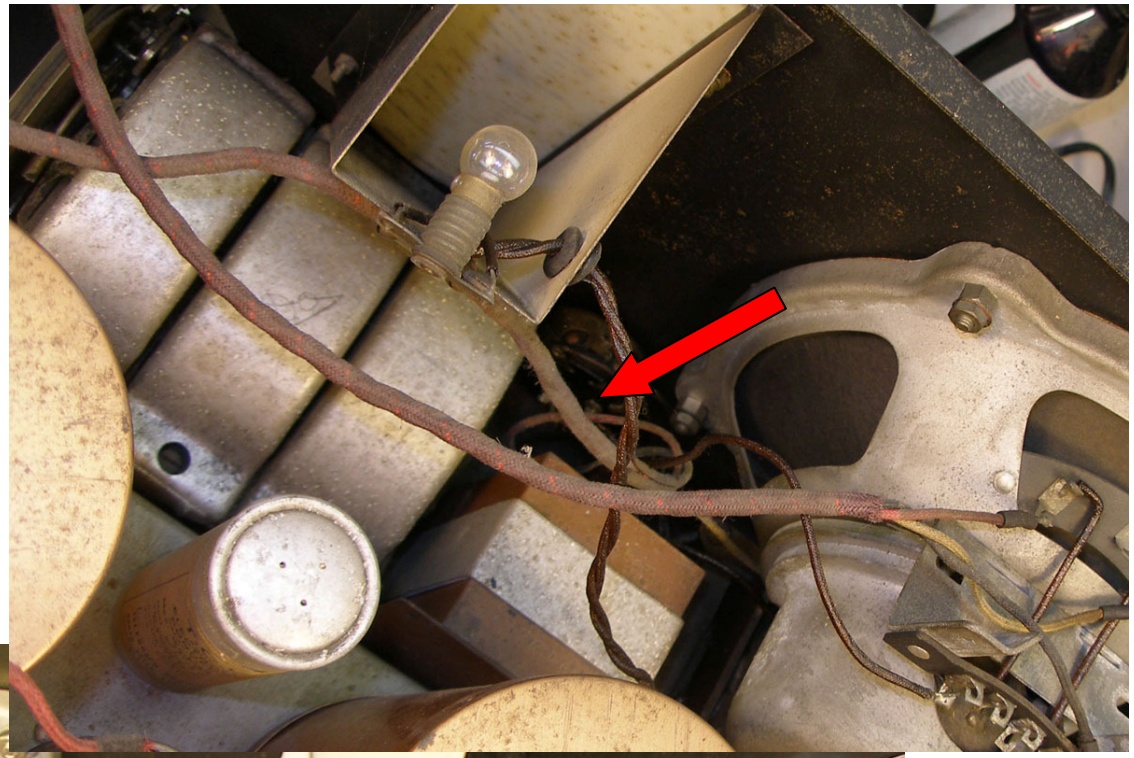
The secret to the process is to expel the solvent **in a cloud of aerosol** with **compressed air**.

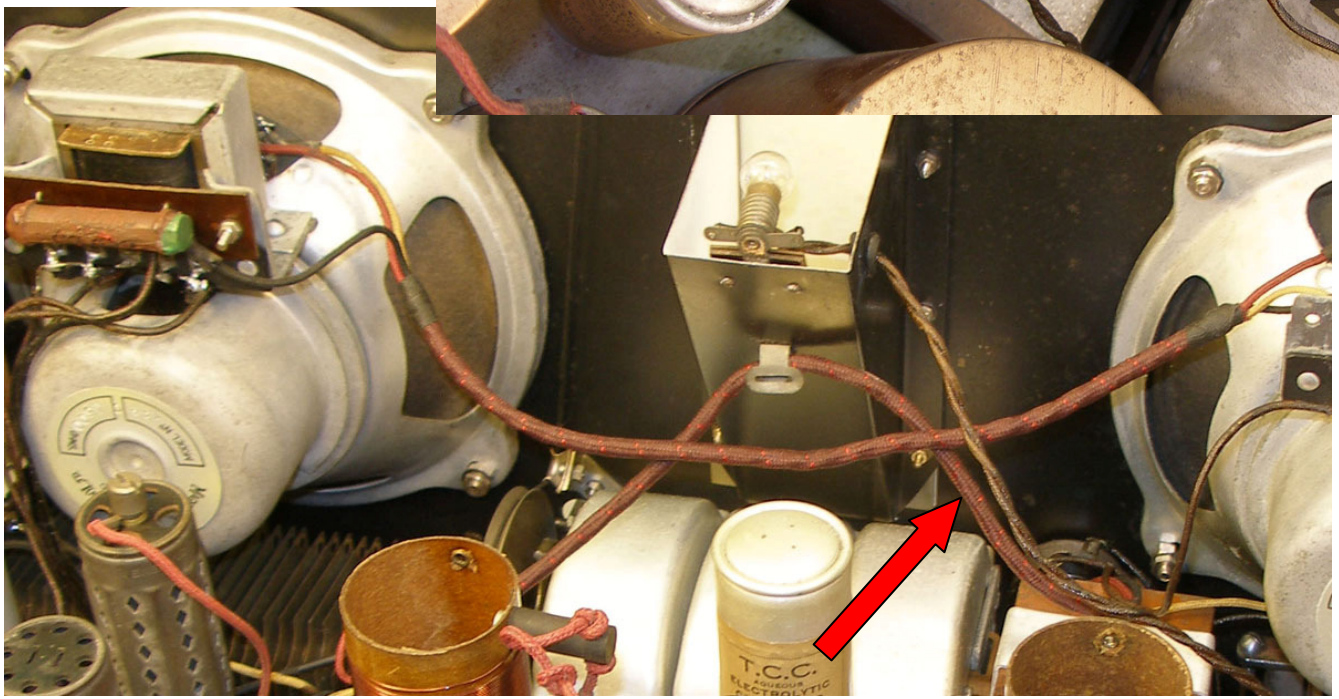
I set my blow gun air supply at about **30 p.s.i.** (Too high a pressure can damage old coverings.) Repeat three times and allow to dry. **It's quick and easy.**

Filthy cords can come out looking almost new.

If there is soil remaining, you can remove it with soapy water in your cleaning setup.

Some types of wiring look better with a light coat of shellac afterwards.

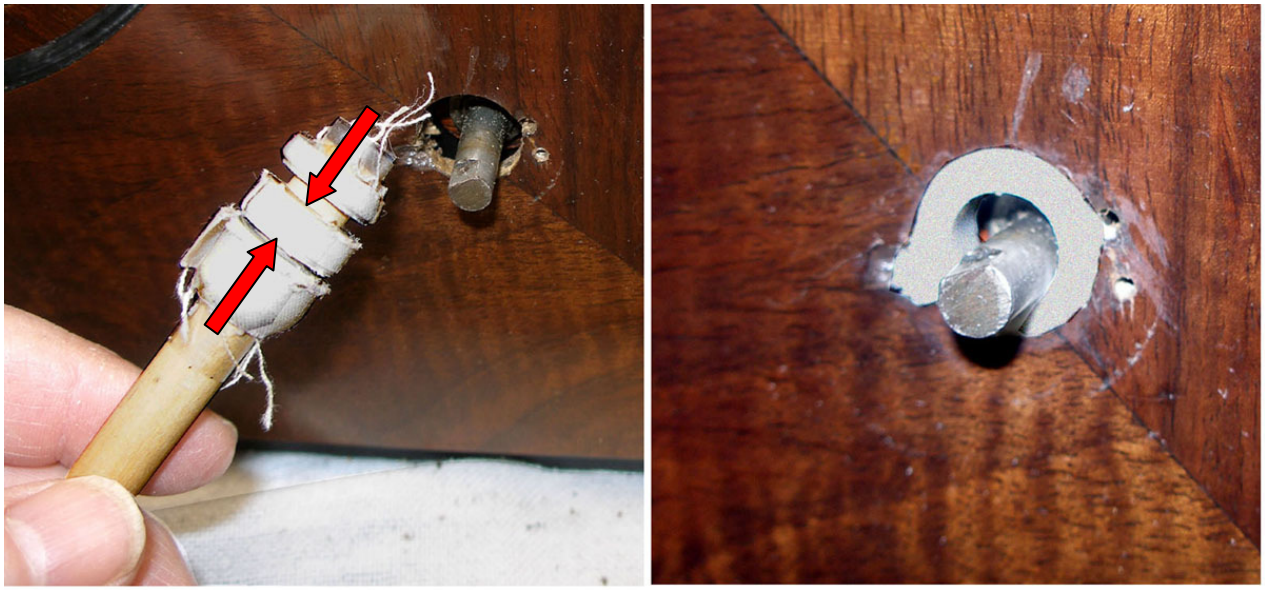




Bushing around knob hole.

Tiny screws or nails are fastening a bezel very close to a cabinet hole. The wood breaks away leaving no sound material to anchor the screws or nails.

Solution: Create a fibrous bushing that **will not** split and inlay into the opening.



Wrap dowel with polyester film. Wrap cotton sheeting around dowel while saturating with thin CA adhesive. After cure, cut bushing to proper length and glue into hole. Paint if necessary. Screws or nails will now have a durable split resistant anchor.

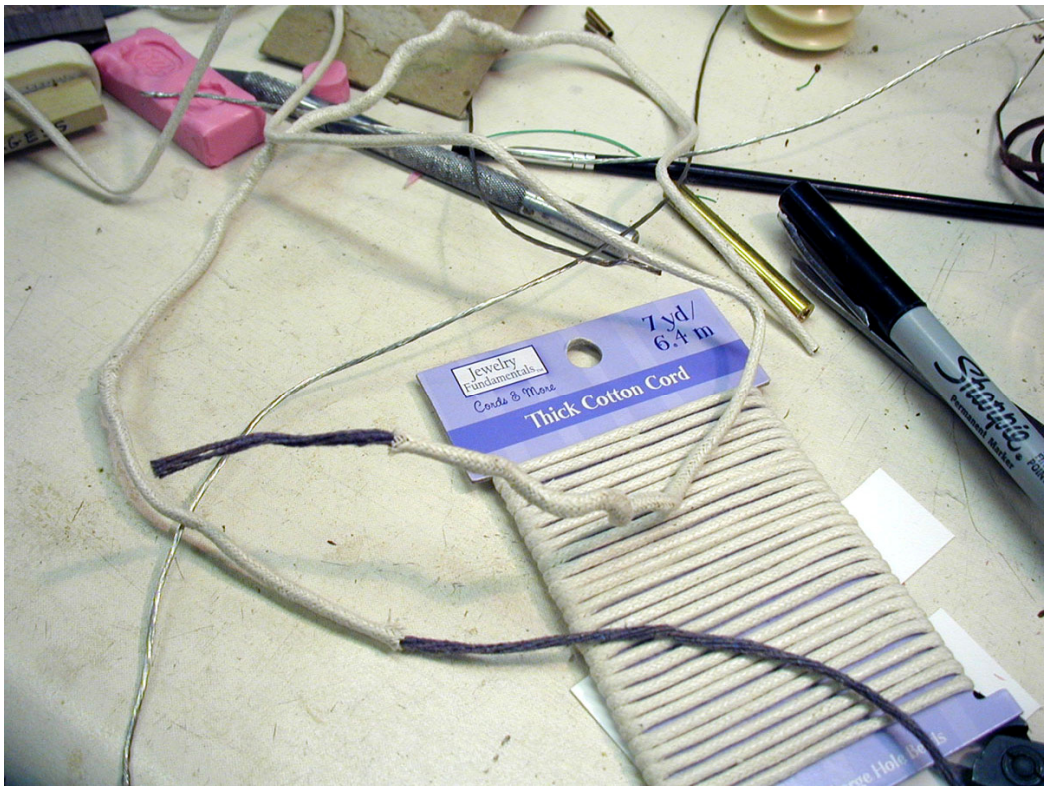
Make replica wire.

Craft stores have this thick cotton cord in their jewelry making supplies.

Available in black; or white that you can dye.

The braid has a denim thread core that simply pulls out.

You insert bare or insulated wire to duplicate wiring found in old electrical devices.

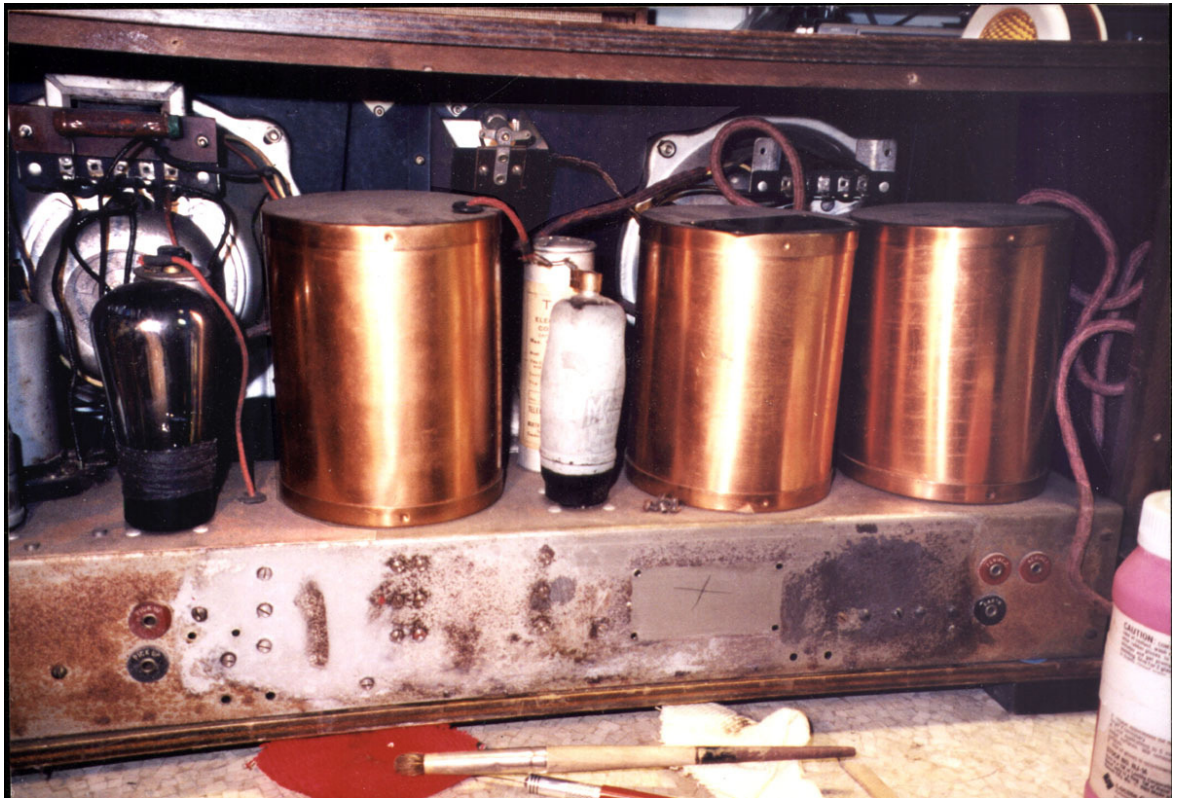


There is a **very small** version that is useful when repairing vintage coils in headphones and pin driver speakers.

Need 18 or 20 gauge solid copper wire? It is still the standard for thermostat wiring; available in 4 to 8 circuit cables sold by the foot at your local home improvement store.

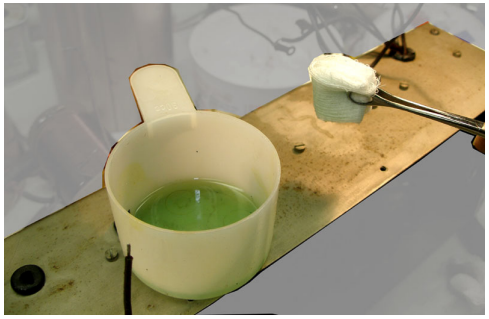
The problem: Part of a plated chassis looks really bad but the rest of the chassis is OK.

My solution: Use mottled paint top-coats on newly painted surfaces to **reduce the apparent contrast** to original surfaces.



This 1995 rust removal attempt was a miserable failure.

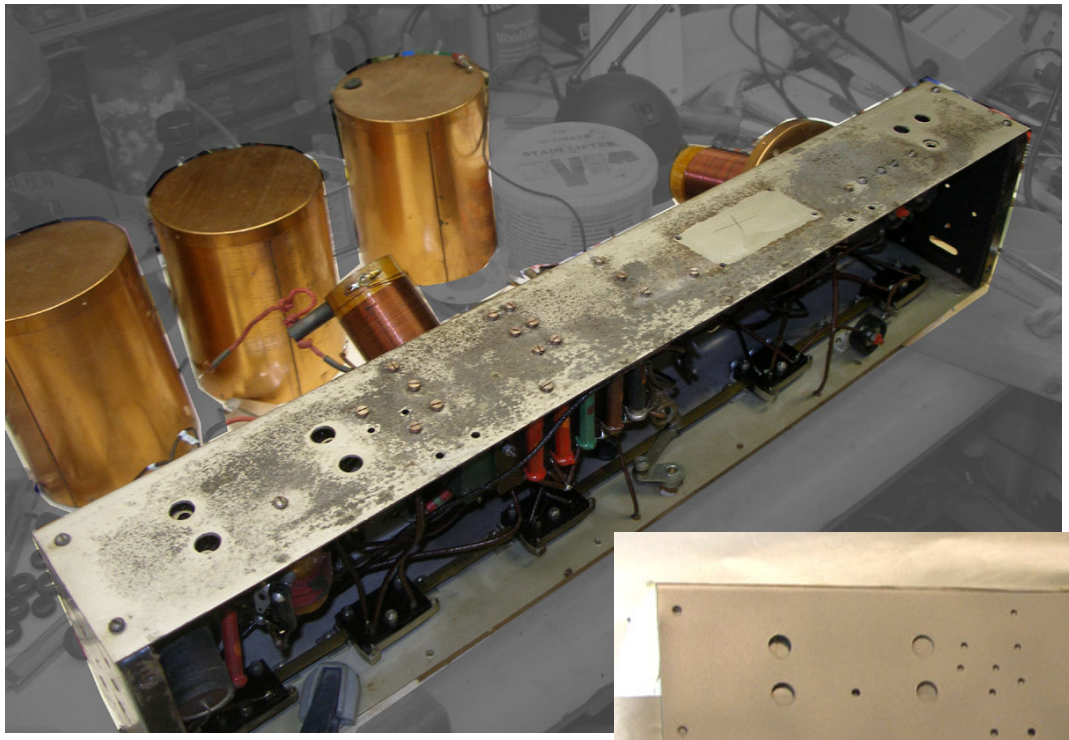
The other two sides of this satin nickel plate chassis were almost free of rust just needing only a good cleaning.

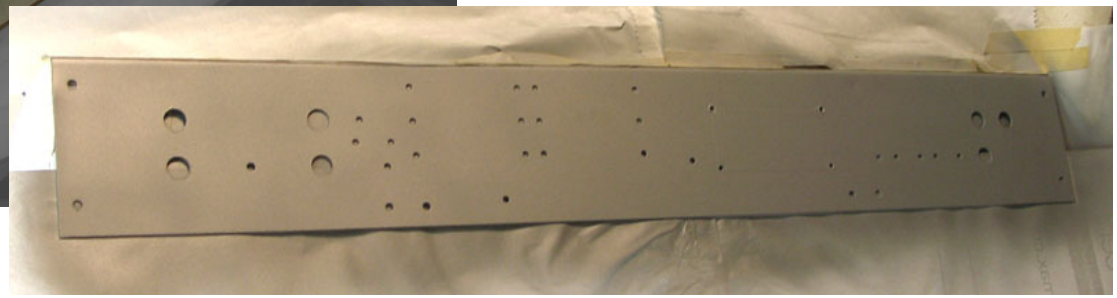


Use ‘rust converter’ to go after light rust on nickel plate.

After **ANY** cleaning of metal parts, finish by complete rinse and **force dry**; ending with a clear coat of satin lacquer or acrylic.

Dig out all the rust and fill metal with auto body glazing cream and sand flat.





Your paint job is going to look **way too good**.

Paint your chassis and a scrap the same way. Then experiment on the scrap using a mixture of acrylic paints applied '**artistically**' with a gauze or terry pad. (In this case a blend of silver, gold and flat black.)

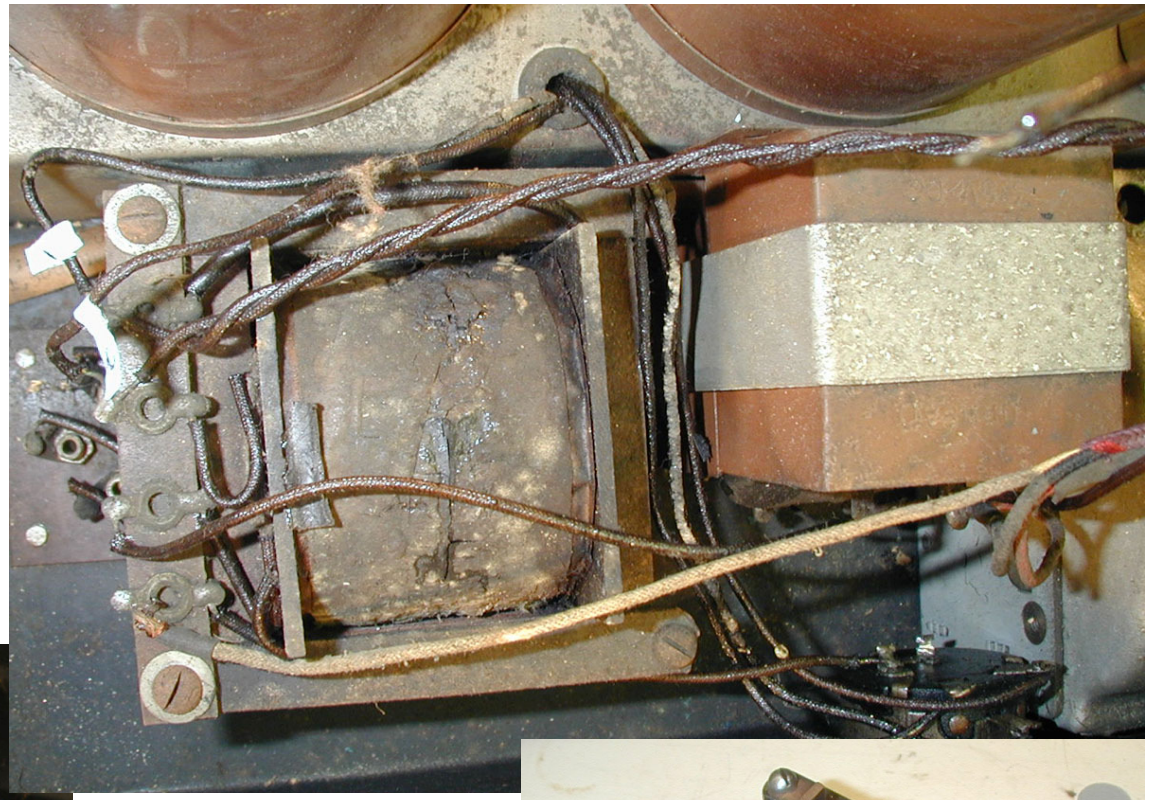
When happy with the results, apply a clear satin coat.

The goal is to **reduce the contrast** between the **old** and **new** so that the viewer is not side-tracked from the history exhibited by the artifact onto issues of what may have been done to make it presentable.

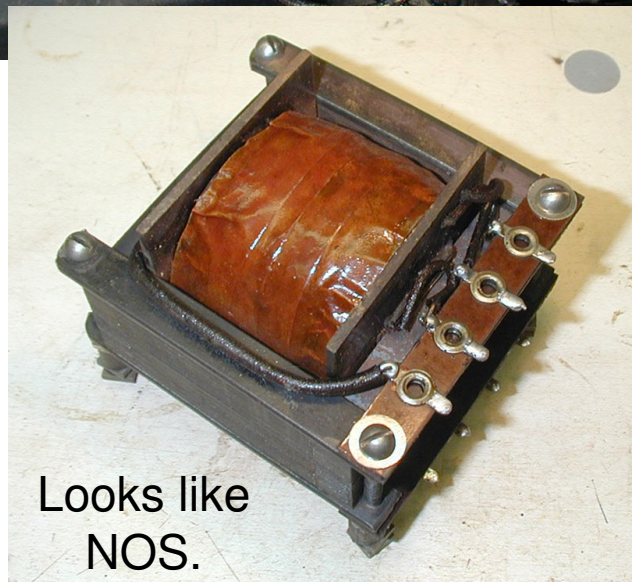
Moldy paper tape falling off. Replaced with new kraft paper tape.

Modern transformer varnish has a red stain…looks wrong.

Mixture of PVA veneer glue and wood dye gives really good vintage look.



My heat test shows no short term discoloration at 250 to 300F. Don't know about long term use.



Looks like NOS.

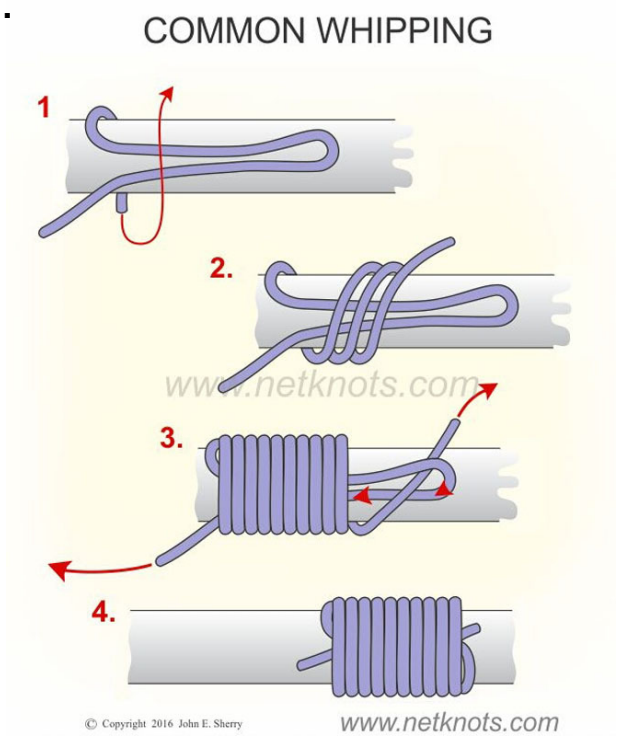
Got a vintage set with an old cloth covered line cord? Is it hard and bent helter-skelter?

When I find early radios that appear to be **essentially exactly as they left the factory**, I choose not to put in new parts just to make them work for a little while longer. **I value them more as a record of the technology of the day.**

This line cord is original to the set and I want to retain it but it needs to be coiled in an orderly fashion.

Use an adjustable temperature hot air gun to slowly heat the line cord. The hardened rubber will soften and allow you to guide the cord into orderly loops. Just be sure to use the minimum heat necessary.

Take the time to ‘whip’ frayed line cords, speaker cords, headphone cords, etc. to slow deterioration.



Whip using **embroidery floss**.

Saturate whipped area with **Dritz ‘Fray Check’** PVA glue available in store ‘sewing notions’.

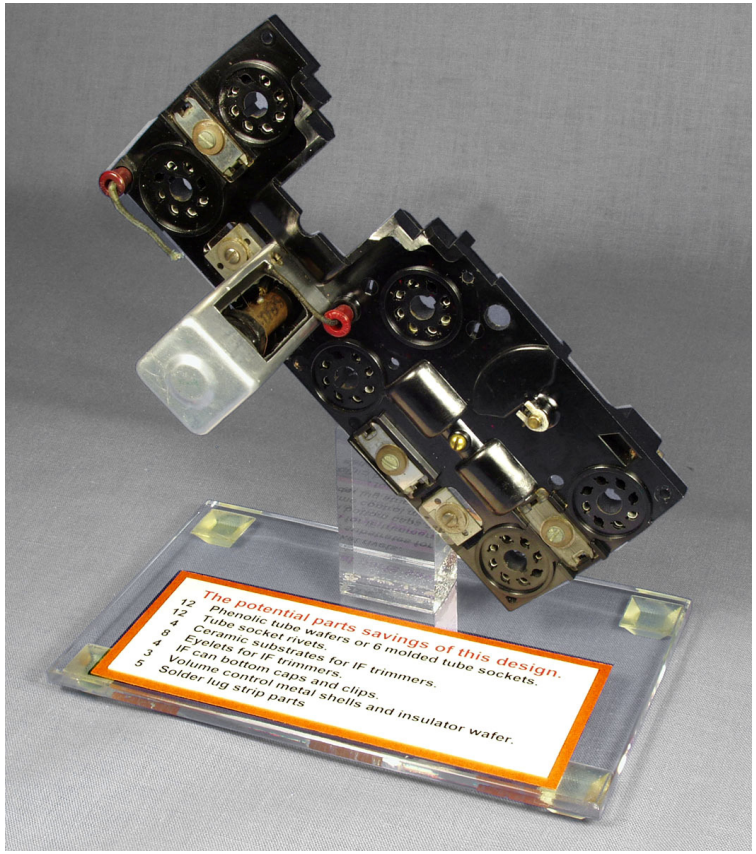
Use spare parts to illustrate interesting design features not evident from the outside.

1940 Zenith Bakelite chassis.

This was a bold attempt to use a sophisticated molded part to eliminate many small fasteners and stampings.

However this part is **too fragile**. Too much breakage in assembly and during shipment. No viable way to rework the very expensive molds to make the part more robust.

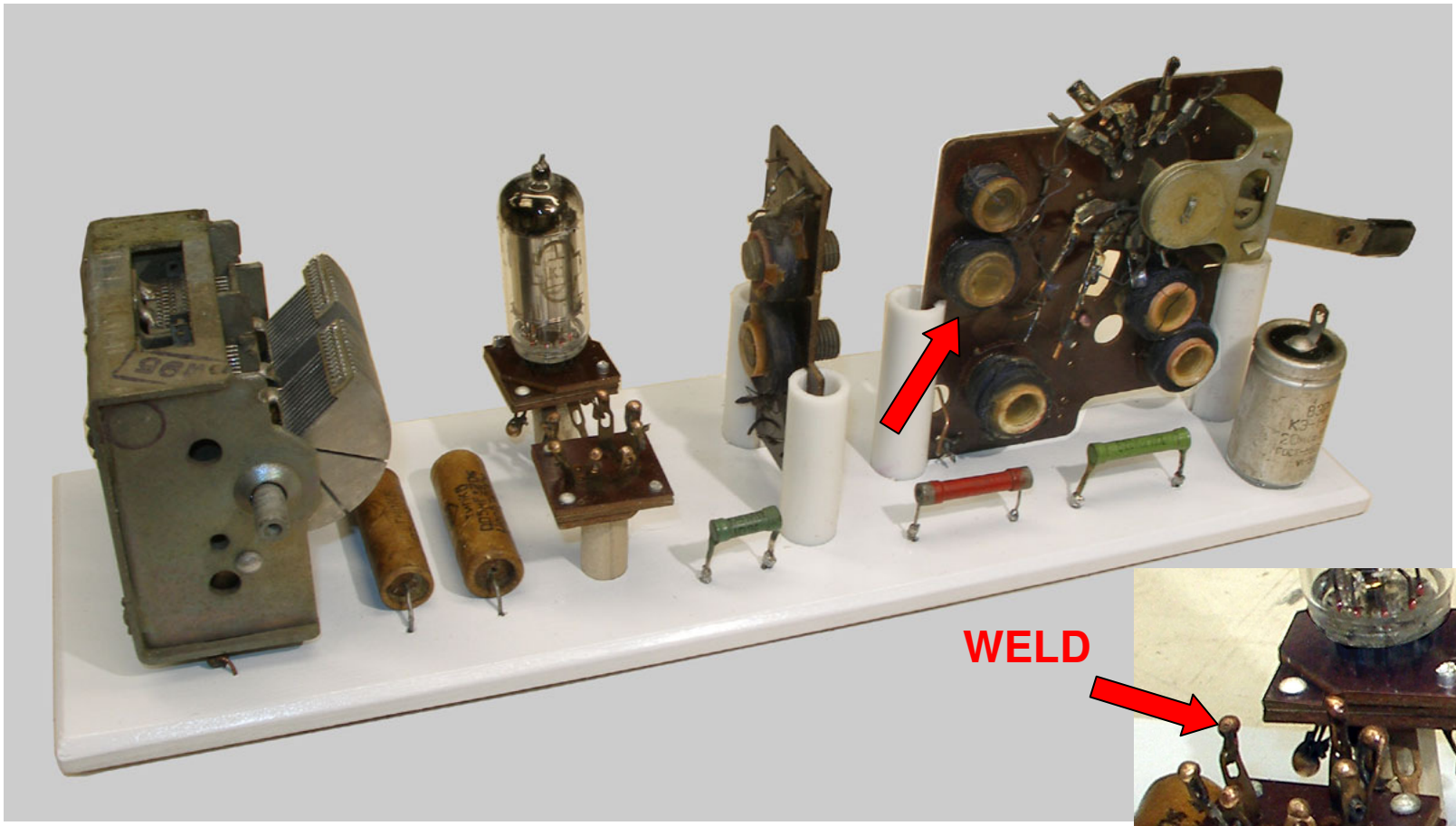
Production abandoned after about five months.



Tidbit: Zenith researchers, Bryant & Cones report that Commander McDonald's personal files appear to be completely devoid of information on this project. It seems if he did not want to be reminded of a costly project failure.

In a 1958 Russian tube radio, connections are **welded** rather than using conventional tin/lead solder.

A technique never used in the USA for broadcast receivers. Easy to mount spare parts on a board like this to illustrate the technique.



Construction of RF and IF coils also strange to American eyes.

Gauze sponges and long-nose **curved** forceps get a lot of use in my clean-up of artifacts.

Forceps sold on eBay are **much** cheaper if advertised for **veterinary use**.

Non-sterile **4 ply** (not 8) cotton gauze sponges can be found at old Army/Navy or 'Prepper' stores. Or sometimes very cheap at 'Buy It Now' deals on the Web.

★ Small sponge forceps also great for holding tiny pads of steel wool.

Still ! In **DESPERATE** need for graphics documentation.

Pre-1927
(B&W image)

Also **Burgess #6**
Cell (same size)

E-mail: kd4hsh@juno.com

1924

Radio towers in graphic.
With either studs or
Fahnestock clips.

BOY ! – Would I like to get my hands on this ***National Airphone*** 1-Tuber and scan those batteries!

HERE'S WORLD'S LARGEST ONE TUBE SET

There have been many freak receivers constructed by amateurs and manufacturers, but this one tube set probably outdoes all others for size. Photo shows Miss Agnes Leonard at Radio Show, Grand Central Palace, New York City, operating the receiver. Note the size of the batteries and the tube. (Photo by International Newsreel.)

I’ve built a new scanner just for #6 size dry cells.

No damage whatever to cells scanned.

Scans look terrible but they provide precise information on graphic feature placements. And very important ‘kerning’ of text characters.

What do all these digital cameras have in common?

My favorite: A **$2** workhorse.
Olympus C-7000

You don't need high megapixel images. 5 Meg. Is fine. What is most important is that they **focus sharply in close-up mode.**

These cost me less than **$10** each at the local flea market. Most needed a new battery or memory card; so maybe another $15 to $20 to make up a perfectly serviceable camera outfit for documenting your restoration and repair work.

Use one and use it often!

You have an artifact you have chosen to acquire and maybe restore or conserve.

WHY ?

Here is an excellent display to tell that story **for an exhibition.**

The problem? The parts of this display are **not likely** to stay with the artifact after the exhibition has ended.

For the **long run**, take the time to assemble your documentation into a **standard size notebook.**

It is **much more likely** to be kept close to the artifact in its usual location. (The documentation likely **will not** stay nearby if left in a loose file folder.)

Things I want to know when viewing an object.

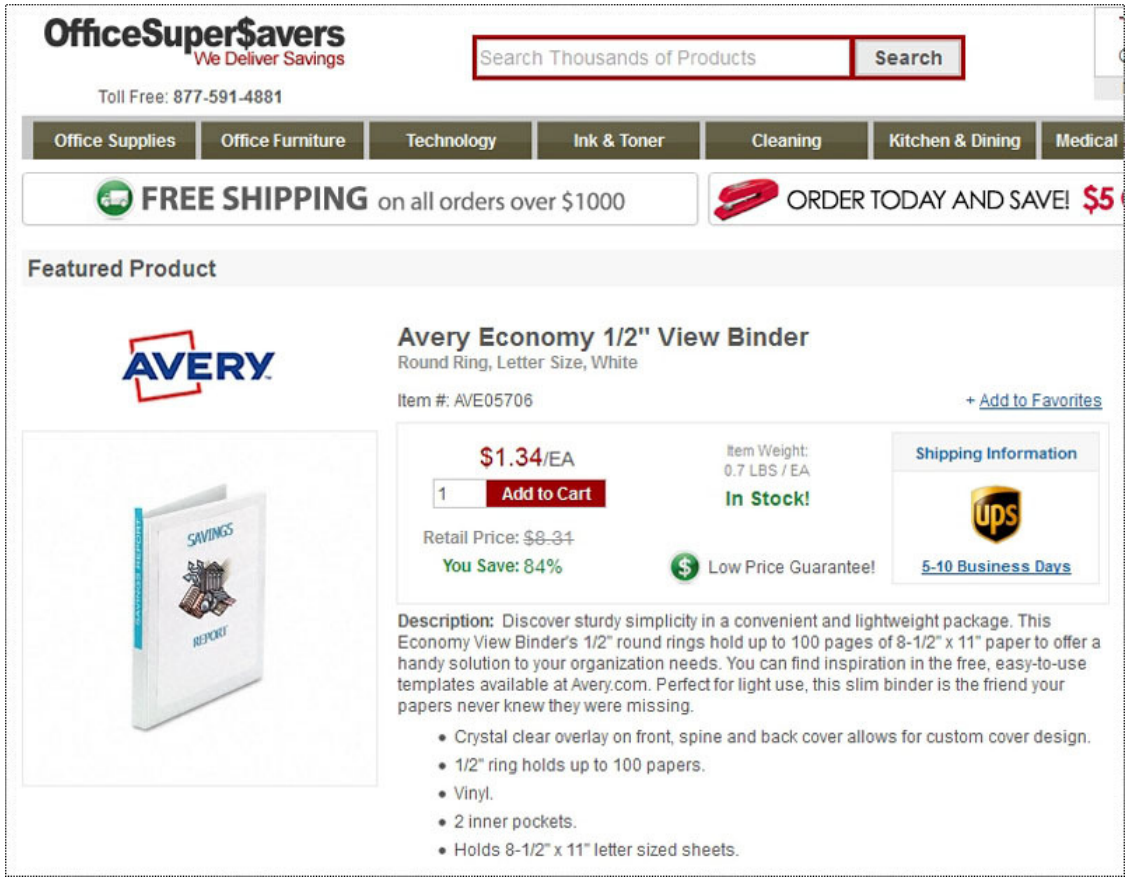
Some are often mentioned but others that I rarely see explained.

1. What is it and what does it do?
2. Who made it, when was it made and where was it made?
3. A brief background of the person or business that made the artifact.
4. How was it received in the marketplace? i.e. A successful product, niche product, one-of-many of its kind, unique or a failure?
5. Did it infringe on patents or avoid patent infringement in novel ways?
6. Were parts made in-house?
7. Is the artifact associated with interesting personalities or events?
8. What was the social, technical and marketplace environment at the time that might have prompted an entity to create such an artifact?
9. How was the artifact advertised to potential customers?
10. How did the artifact enter the marketplace? i.e Through distributor networks, direct sales, etc.?
11. Show me vintage supporting documents, schematics, drawings, and **photographs of important things inside that I cannot see**.

Order notebooks in bulk for a <u>much better price</u>.

Choose the **<u>0.5 Inch</u>** binder ring which can hold as many as 100 punched pages or about 30 pages in protective polyester sleeves.

Clear pockets on front and back allow insert of cover page.



Begin with “hooks”. One or two stand-up placards that will store in sleeves in your notebook.

The reality in any exhibition is that you have only a very few seconds to tell a viewer why your artifact is worth their attention.

Without very brief statements in large easy-to-read text you may never get the viewer to stop and read deeper into your documentation.

Adding a **border** with decorative corners to **ONLY ONE** placard is a visual clue to the **starting point** of your presentation.

Adding a light color background **to only one placard** like this can also help to make it stand out.

Examples of: A Dull, Better & Best "Read Me First" card for your display.

From the 1950s the *'Spark'* 53

A little broadcast receiver for a VERY different social environment.

USSR, rural electrification lagged that of the USA by more than 25 years creating a significant need for battery powered radios into the 1970s.

Unreliable production and distribution of batteries gave rise to a solution never employed in the West; that of a thermoelectric generator powered by a kerosene lamp.

The wiring of this radio is <u>welded</u> rather than soldered. Why? Some detective work was necessary to find the answer.

And this radio also tells us a little about 'cable radio' employed extensively in the USSR at the time.

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Now that you have ‘hooked’ the viewer, time to present in a very concise way, your ‘talking points’.

Do it on one page using a minimum of 16 point **BOLD** text in a clear font such as **Arial**.

Set the borders of your text to about 0.7” **for all sides**.

Insert a photograph of your artifact on this page.

The whole point for this exercise is that **no vintage artifacts** (that I know of) **can tell you why they exist** and how they may have changed over the years. And for many artifacts, **the whole story may have never been documented**. What better way to increase the value and interest of future owners than by providing information **only you may have discovered**.

Make a cover page.

Simple text.

A little bit of clip art flair can make the subject seem more like something worth checking into.

Very important is identification of the author and contact information.

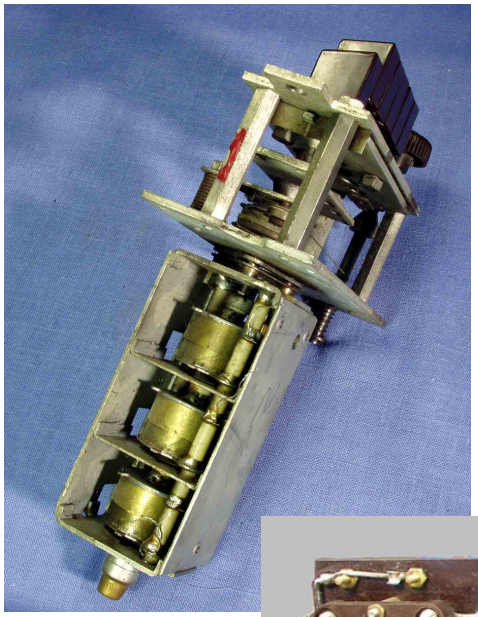
The TZGK 2-2 Thermoelectric Power Source for Broadcast Receivers of the USSR.

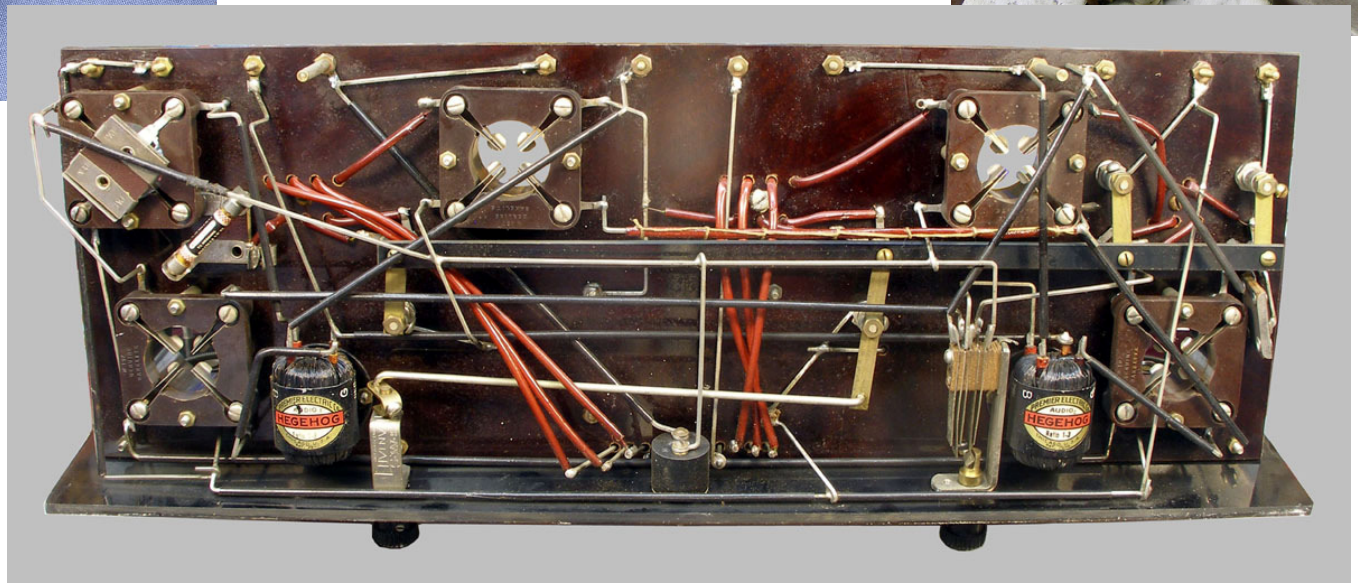
A unique 1950s solution for battery powered radios.

Its history, restoration and conservation.

From the collection of:
Robert Lozier
Monroe, NC; USA
Kd4hsh@juno.com
704-458-1076

Show interesting or distinctive features not viewable while on exhibit.



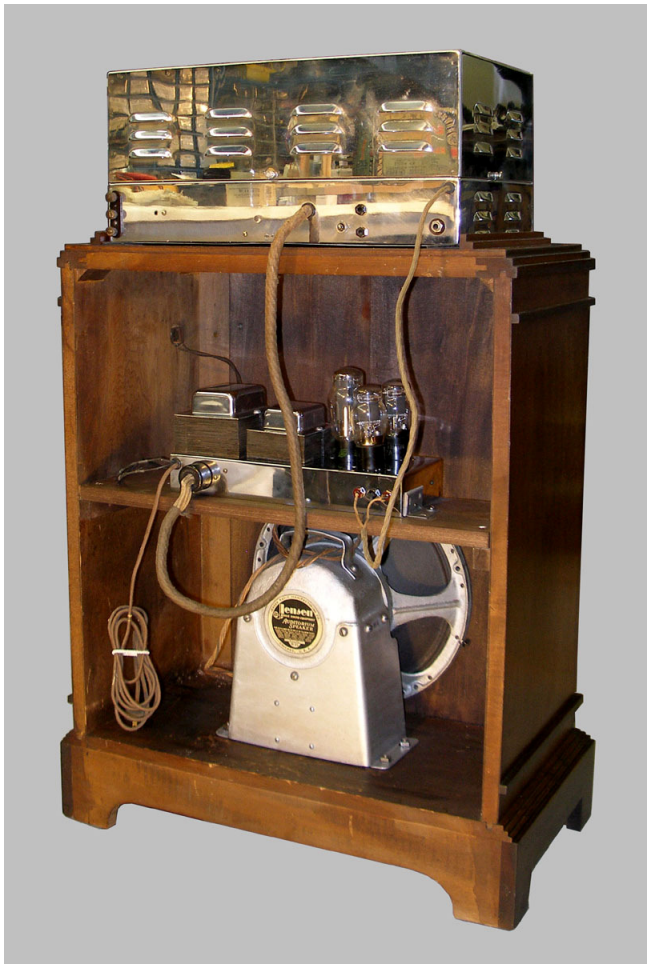


A great opportunity to show a panoramic view of a chassis on a tabloid sized (11” x 17”) fold-out. It cost me just $1.29 per sheet.

Simple photo editor tools let you make less visually confusing illustrations.

Original image on the left.

Easy to make much better with open source tools like GIMP or an old version of Photoshop.



Use Lasso Tool to outline area of interest, invert selection & paint a neutral color.

Tools most used: Crop, Lasso, Clone, Magic Wand, Erase, Text & Paint.

Filters: Contrast & Brightness, Hue & Saturation, Sharpen.

It is **CHEAP** now days to get **high quality** color laser prints at your local chain office supply store in-house print shop. My local **OfficeMax** store makes letter sized prints on 24 lb. paper for $0.69. Tabloid prints for just $1.29. **These prints are very stable over time.**

Use a Program's Built-in PDF Export

1. Google Chrome: Click the menu and and click Print. Click the Change button under Destination and select Save as PDF.
2. Microsoft Office: Open the menu, select Export, and select Create PDF/XPS Document.
3. LibreOffice: Open the File menu and select Export as PDF.

How to Print to PDF in Windows: 4 Tips and Tricks Norton
www.howtogeek.com/150891/how-to-**print-to-pdf**-in-**windows**-4-tips-and-tricks/

In the setup for PDF export, set print resolution to **600 d.p.i.**

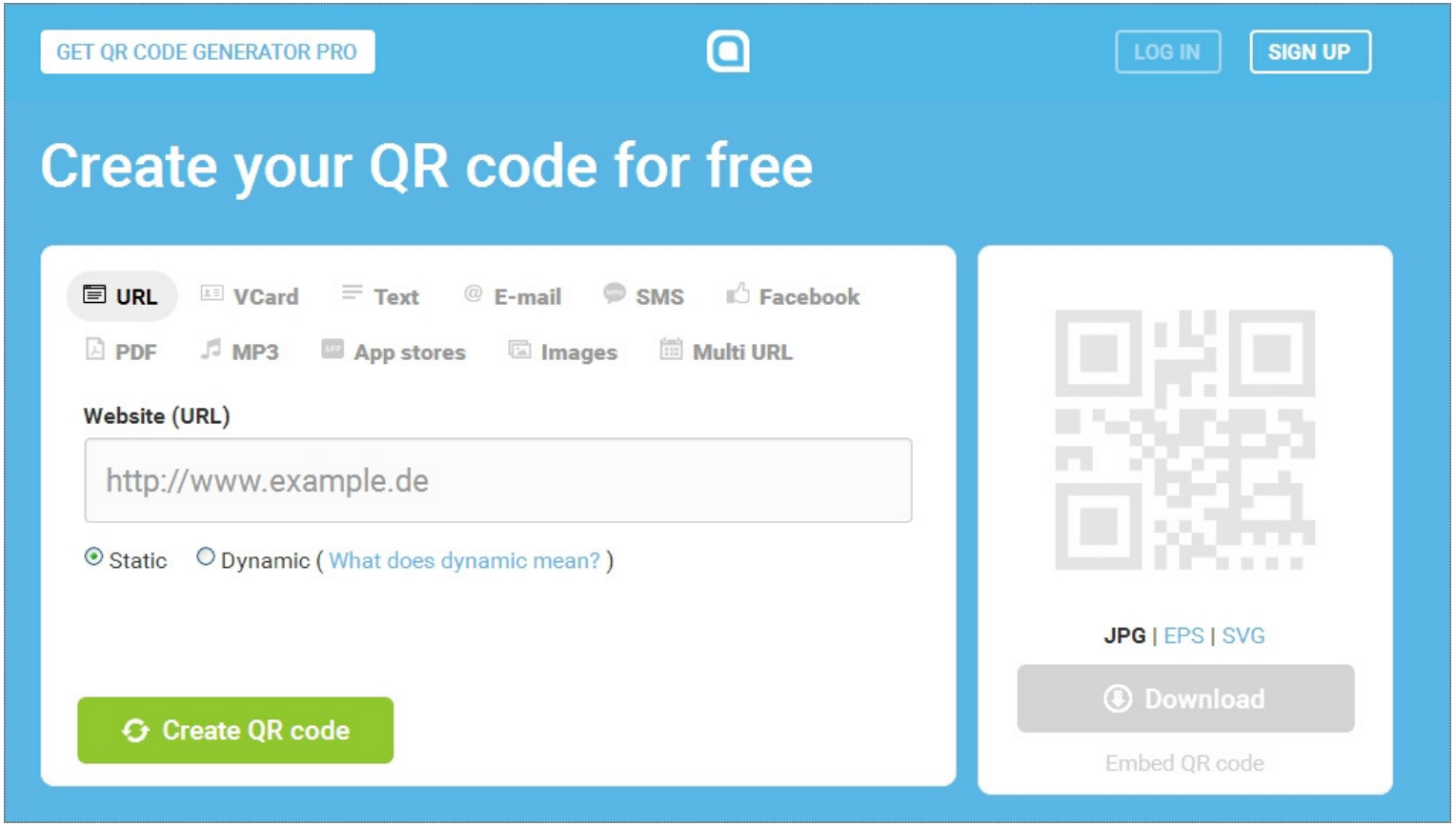
Tip: If you have a .jpg photo you want to print, **convert it to a .pdf.** For some reason, some shops can only print .jpg at 300 d.p.i. resolution.

In the 21st. Century there are even more ways to share your knowledge. Powerful ways!

Ever heard of QR Codes ?

They are compact graphics that will link your smart phone or tablet to all kinds of information. Without a subscription service they will link you to any static URL less than 180 characters long that can contain just about any type of content; text, photos, audio, video and more.

With subscription services, you can collect all kinds of statistical use data that many non-commercial sites will not care about. I certainly don't need them for my use.



Your smart phone probably has a bar / QR code reader capability. All it needs is a tiny free App available for all smart phone platforms. (Look for ad free versions.)

If you have Internet access enabled on your phone, see what happens when you recognize this one…

The previous page is a service with a monthly fee structure… There are other commercial solutions… Some allow you to create the graphic for free.

BUT !

Within **Google Docs** you can generate the QR codes **for free** if you have a free Google account. Access from any Web browser. I find it really easy to use…. Educators love this tool!

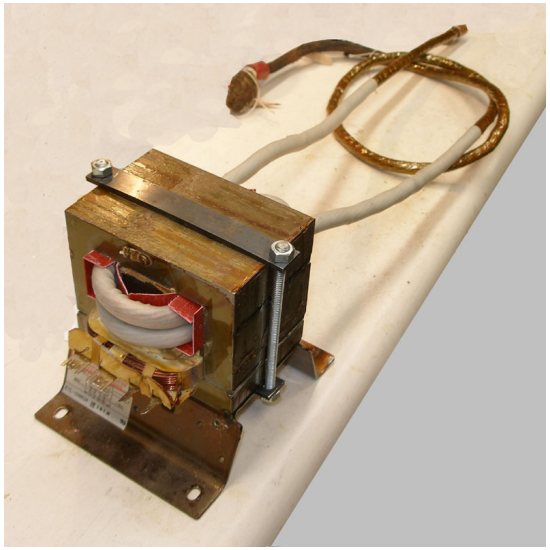
There are a number of **You-Tube** videos on the subject.

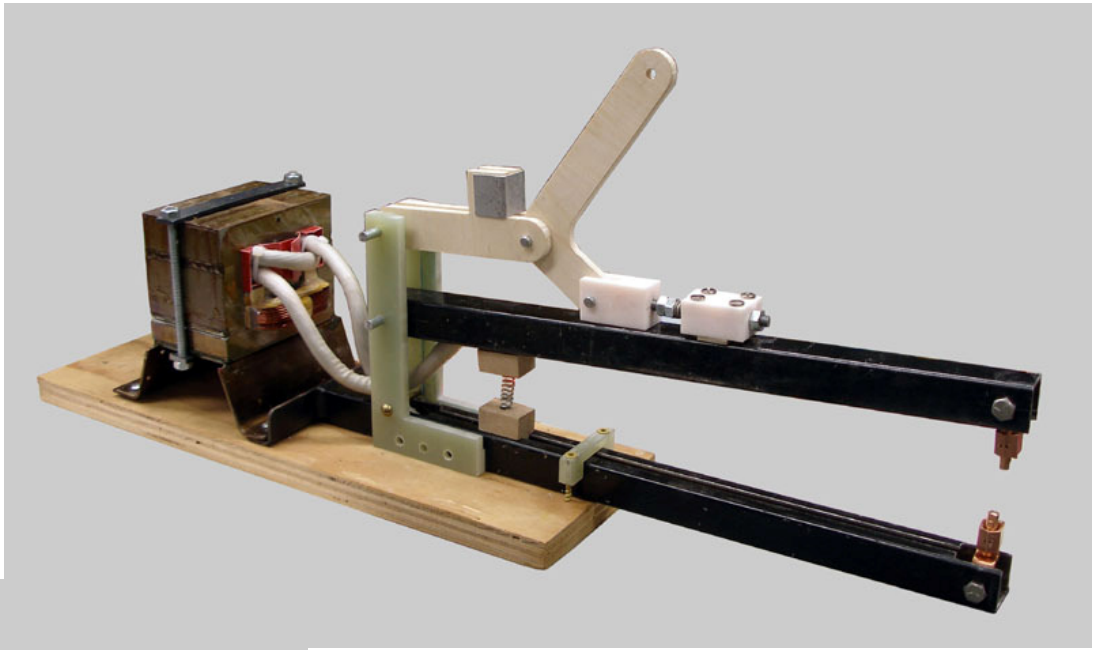
Two examples of the highest density 180 character QR code.

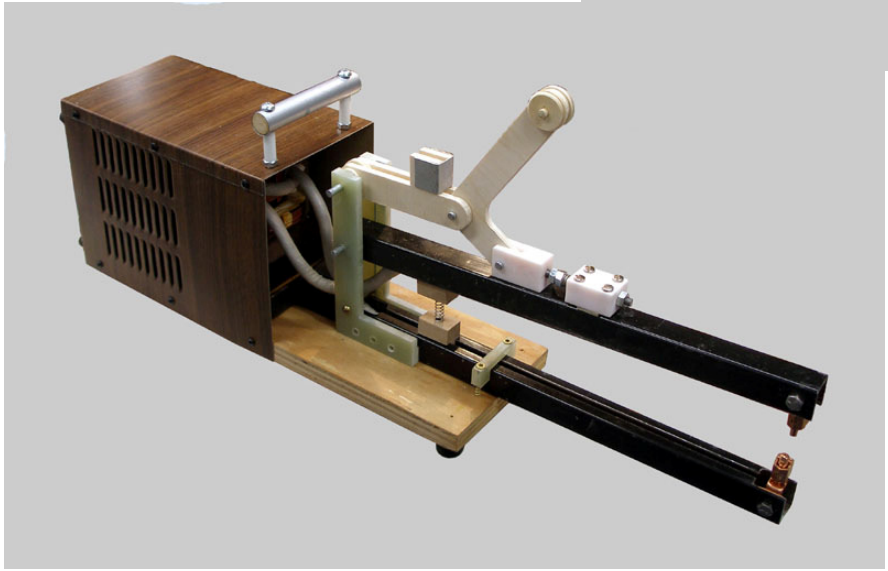
'factoids' for your display. Just 1.5" square; readable from at least a foot away.

No Internet connection required.

Make a resistance welder.







Transformer from old microwave.

Secondary: 00 gauge welder wire.

Spring-loaded clamp feature.

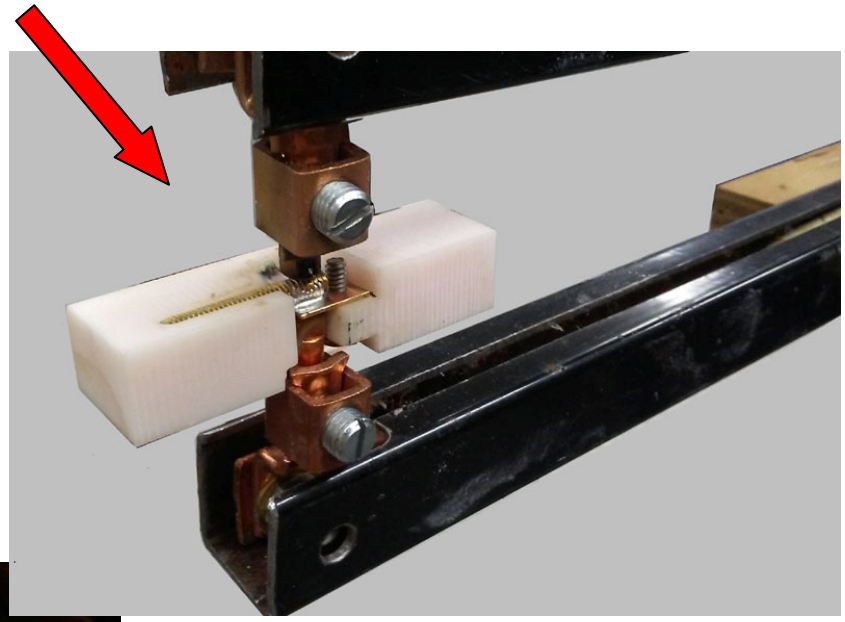
A $9 40 Amp Triac brick, 1 Ohm resistor & foot switch for control.

Cover fabricated from part of the scrapped microwave oven cabinet.

The right tool to make identical parts quickly.

Fixture holds parts in near perfect alignment.

Brass and copper parts are not spot welded because they have low resistivity. But current can be high enough to quickly reach soldering temperatures. This setup reaches full temp for silver bearing solder in 2 seconds while drawing 15 Amps from 120 VAC.



In just one second it is cool enough to release the clamp.

In short, for this task it is a 1800 Watt soldering iron!

OK, this is just nuts but it helps to prove that few things are just impossible.

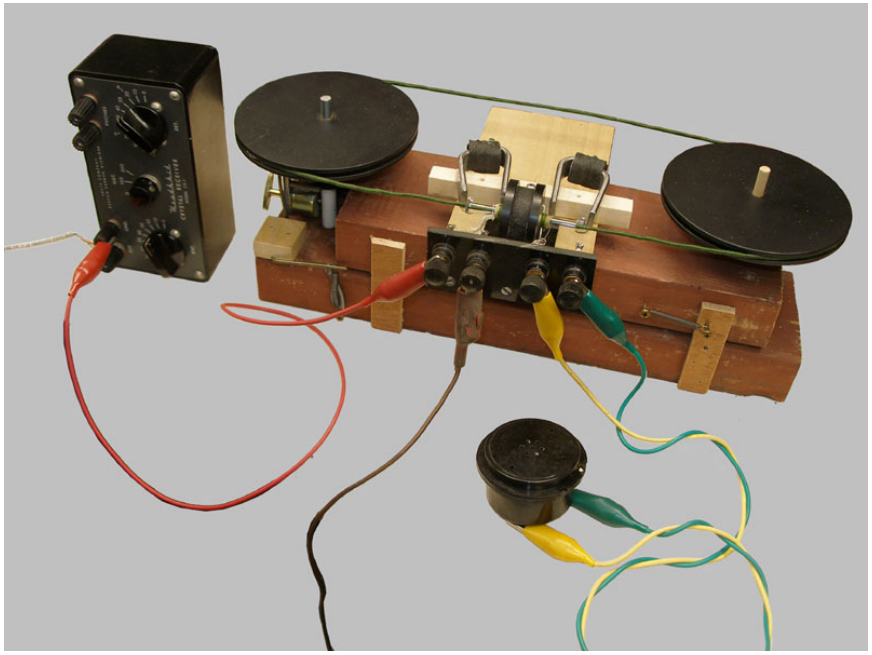
Task: I wanted to build a Marconi Magnetic Detector for experiments.

I need <u>insulated</u> small gauge <u>iron wire</u>. Nobody has it as a on-the-shelf product. Special order with setup charge and minimum buy requirements, sure. **But no way I can justify that cost.**

So how to do it in your home shop?

You have to:

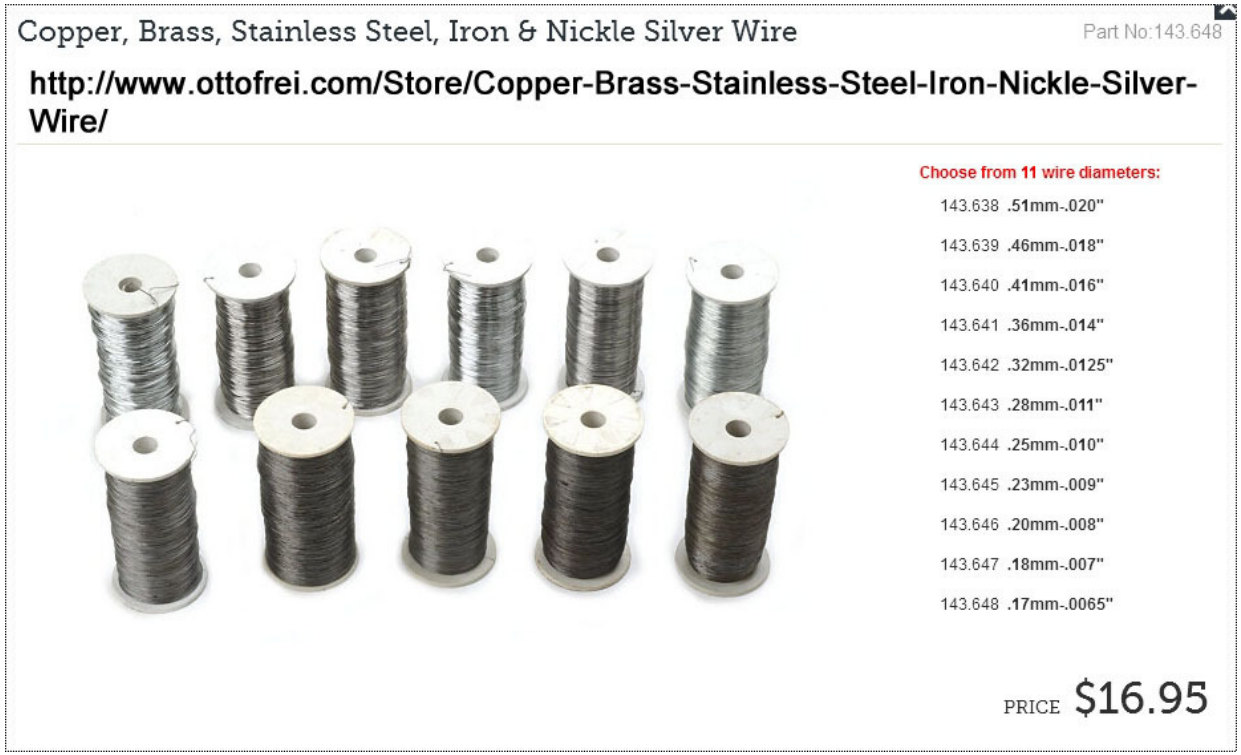
1. Find the wire.
2. Clean the wire.
3. Coat the wire.
4. Dry the coating.
5. Coat it again.
6. Dry the coating…. **Again.**



HOW ?

Find the wire:

Straightforward Google searches for iron wire get me nowhere. A 1998 book by Jensen tells of his projects to build functional replicas of Marconi equipment. He mentions use of fine iron wire by florist. A search there links to iron wire used in jewelry crafting. Finally! To jewelry making supplies and to a US vendor of the smallest gauge available (37 AWG).

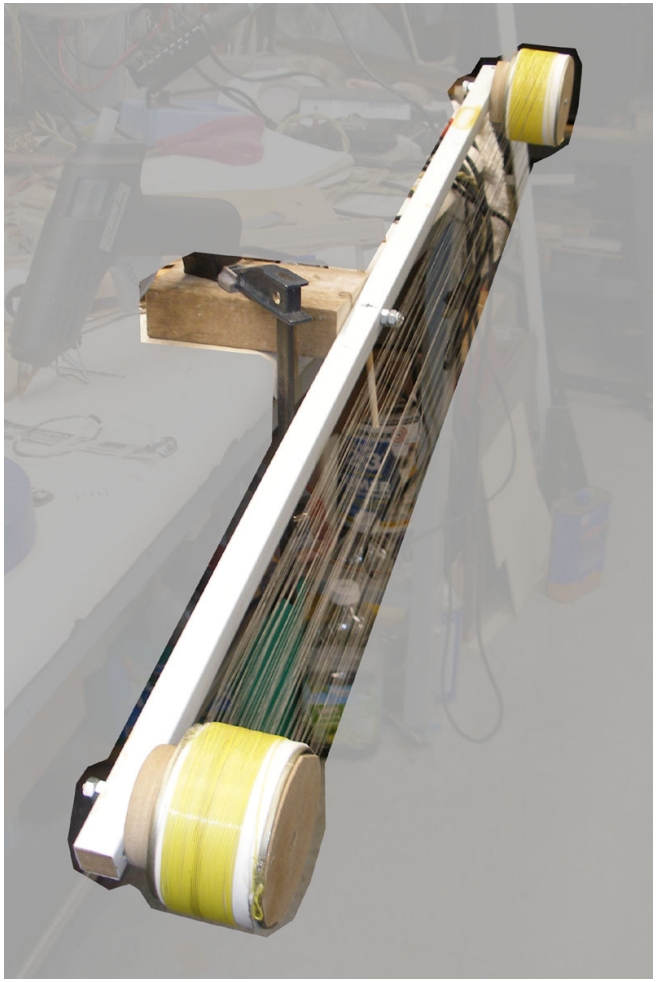


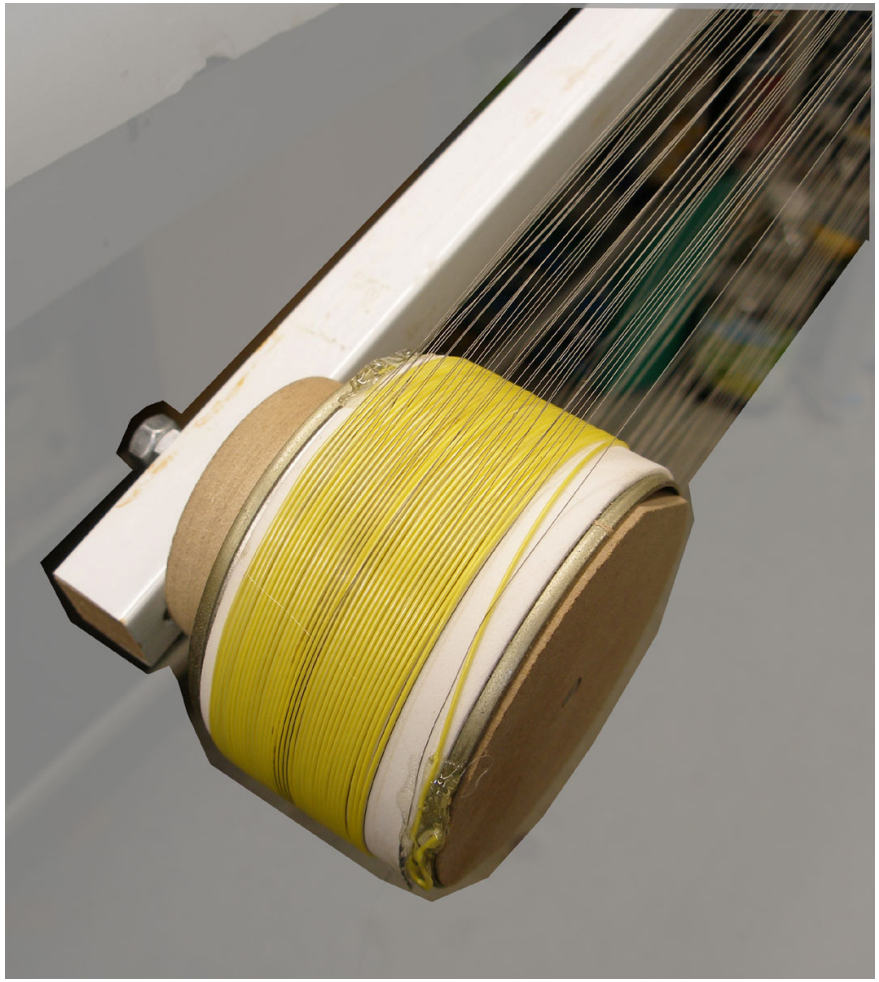
I get lucky, 37 AWG is almost identical size to the 40 SWG wire used in the original magnetic detectors. Cheap! And enough to make maybe 10 belts.

Clean the wire:

This cheap stuff comes with grease and sticky soil to remove.

Make a winder to spread the wire for cleaning.

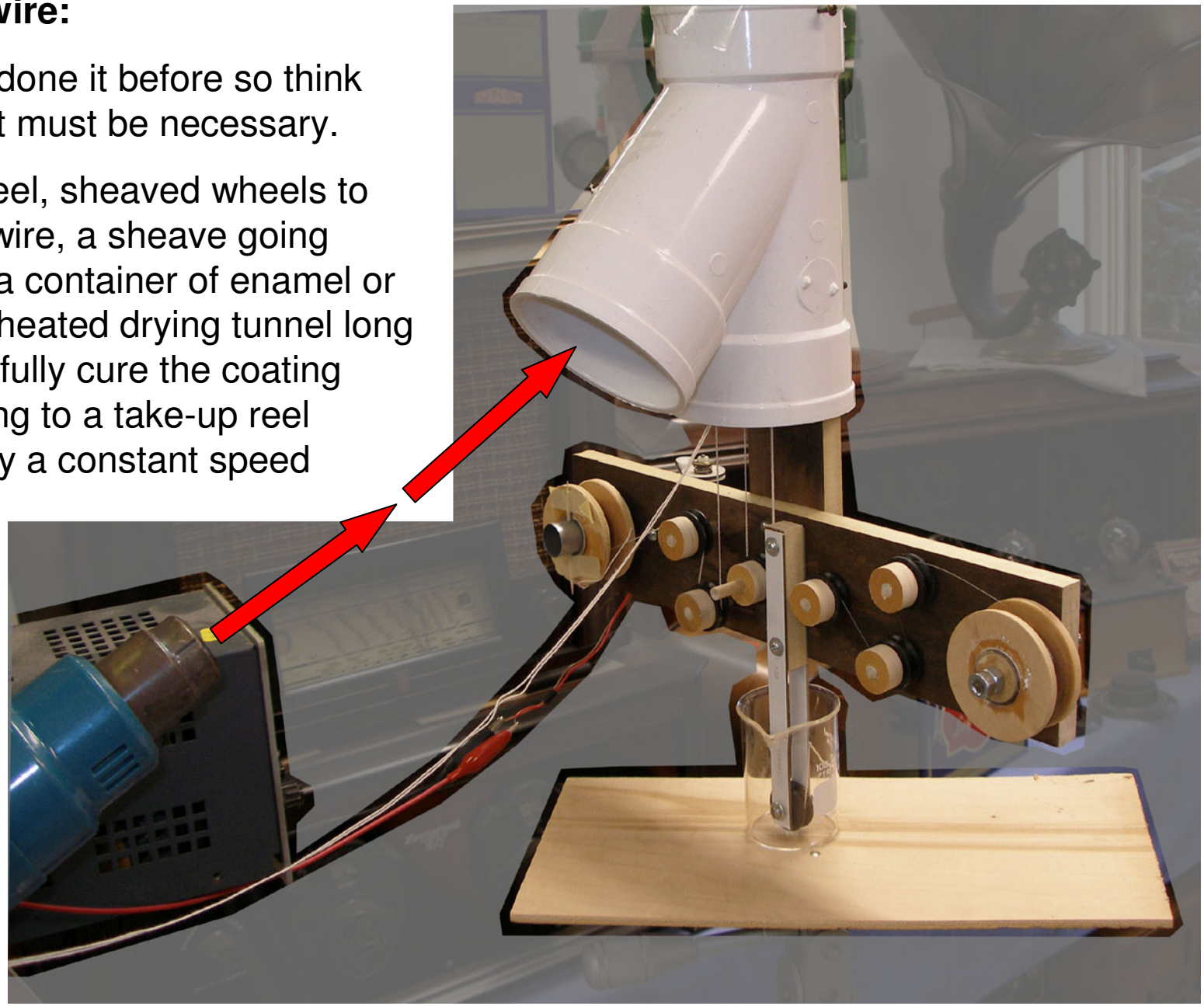




Coat the wire:

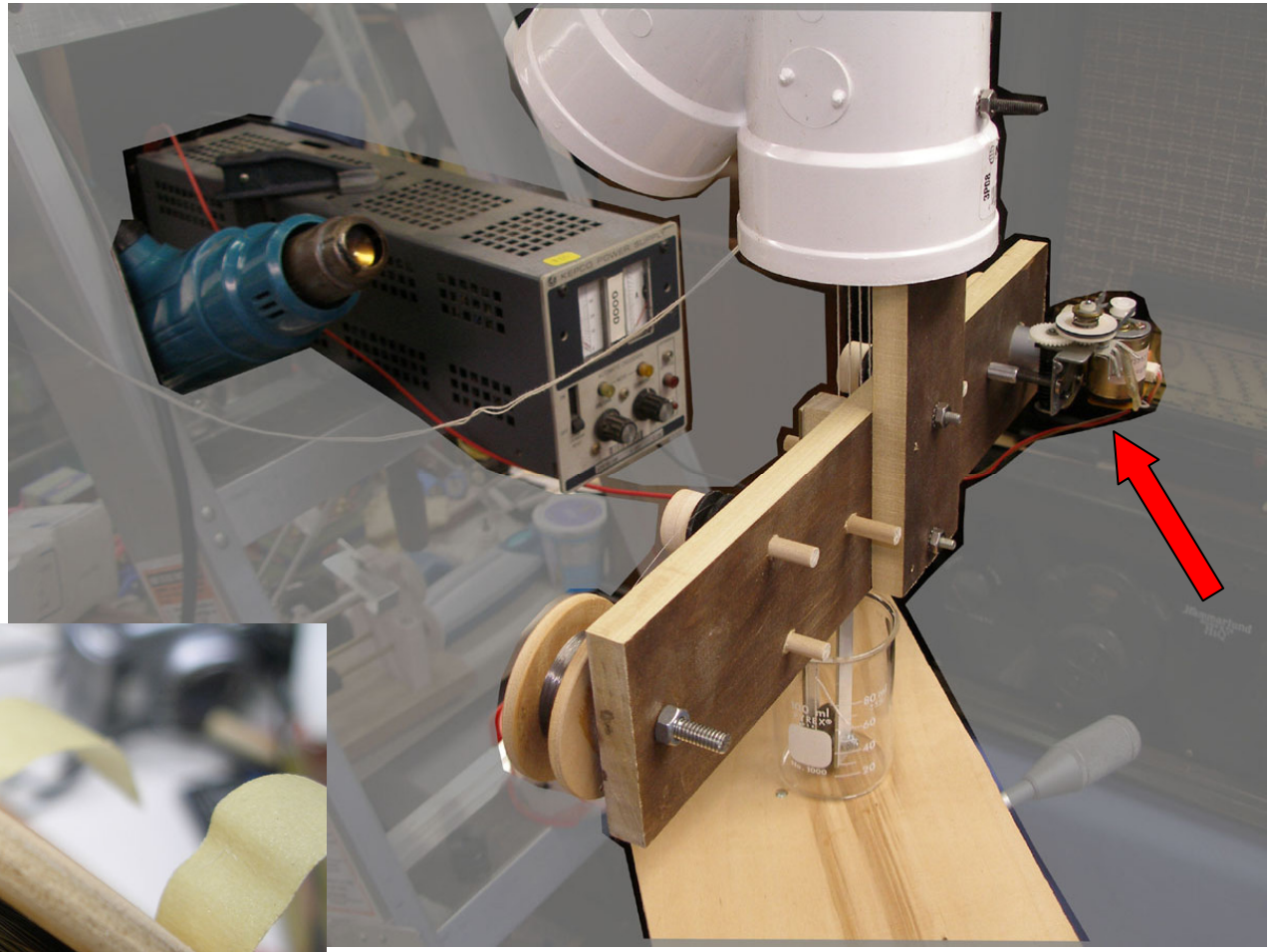
I've never done it before so think about what must be necessary.

A supply reel, sheaved wheels to guide the wire, a sheave going down into a container of enamel or varnish, a heated drying tunnel long enough to fully cure the coating before going to a take-up reel powered by a constant speed motor.



Back view showing take-up spool motor drive. Salvaged from old VHS tape player loading mechanism.

Moral: There is no junk, just misplaced resources.

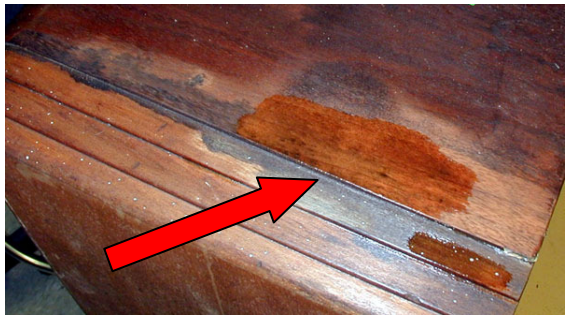


First spool of wire after making **two passes** through the coating operation. Finish looks just as smooth as stock magnet wire.

Completely satisfactory for experiments.

Motorola 6T: Iron stains on this ratty $35 flea market find.

Had not tried my hand at iron stain removal with oxalic acid in maybe 30 years. Cleaning with GoJo highlights severe stains on the top. This ought to be a great test bed; if it fails, I'm out just $35.

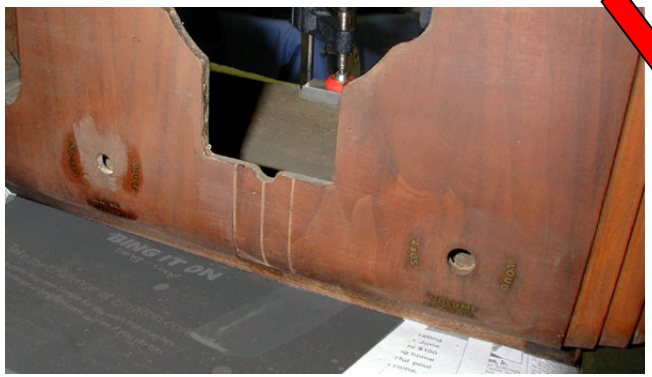


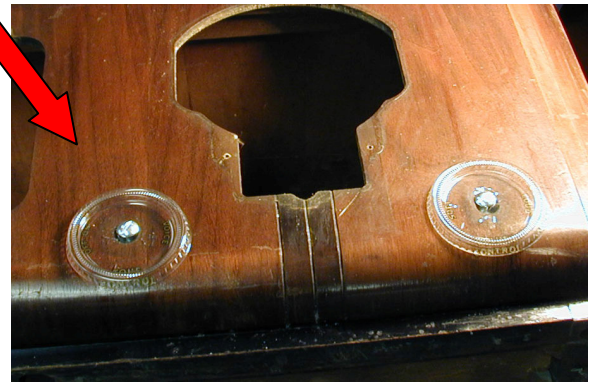
I'm amazed by initial results.

OK, it looks to me like it just might come out alright **IF** soaking in all that water base acid does not lift the veneers.

As a precaution in this area, I used thick blocks of MDF and heavy clamps to apply pressure while the wood dried completely for more than a day.

Success! Veneers don't pop so I complete the stripping of the cabinet and fill the grain. Decals were not damaged. I used condiment lids to protect them.

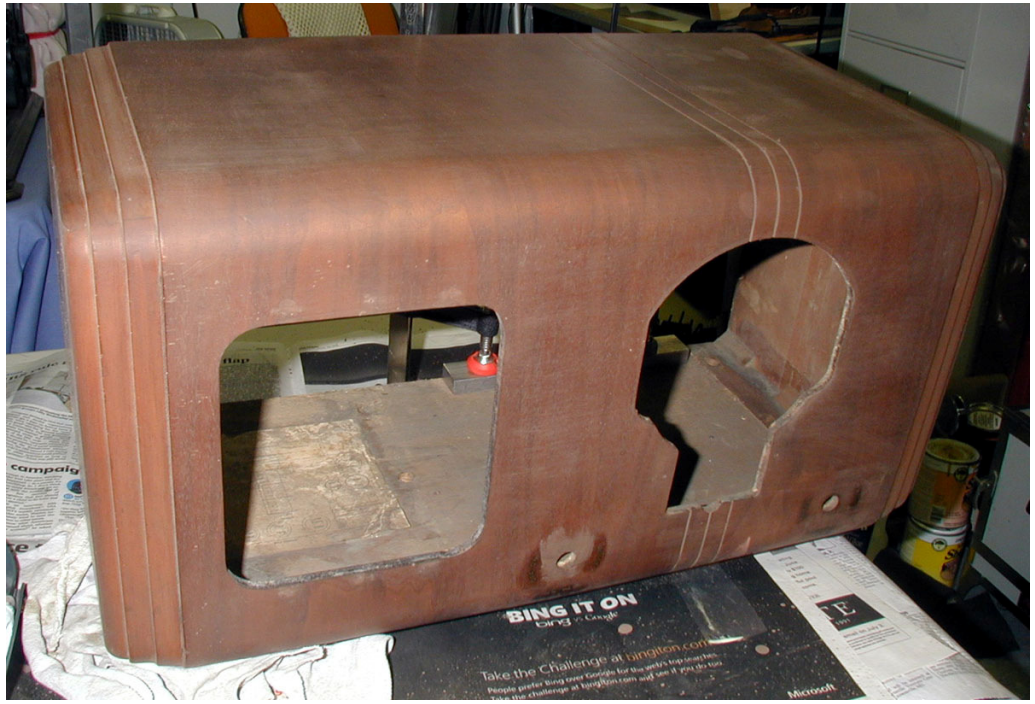




Heavy dents and gouges in side panels. No way to touch-up the problems that I know of.

Veneer is almost **1mm thick!** and **inset** into corner moldings. So cannot just replace the sheet of veneer.

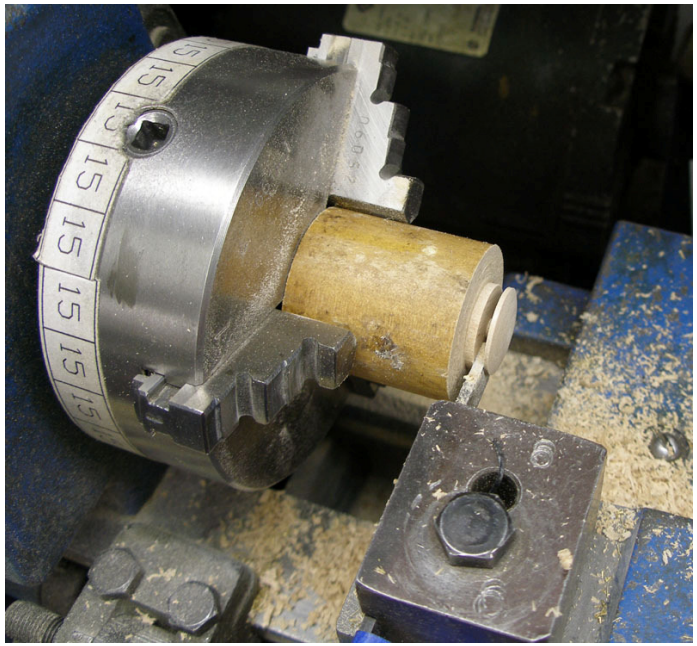
After patching, I decide to hide defects with heavy coat of stain.

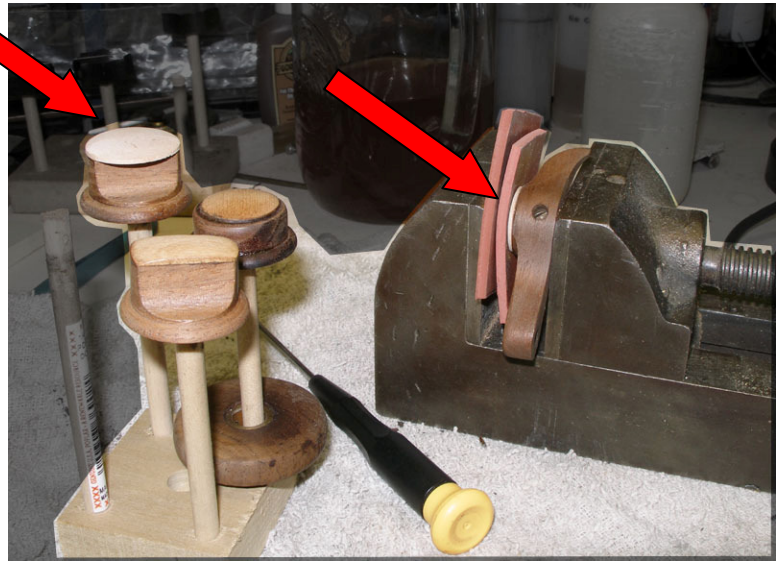


Problem: Maple caps on wave change and volume control knobs were missing.

I did not have any maple. I find a broken maple bar stool on the side of the road. A piece of the leg is just what is needed to turn discs.

Finished repairs have good color match. All that was done after this picture was to rub with rottenstone to dull the lacquer gloss.





So not a really accurate refinish job because of the dark coloration of the end panels but an excellent test bed for removal of iron stains using oxalic acid.

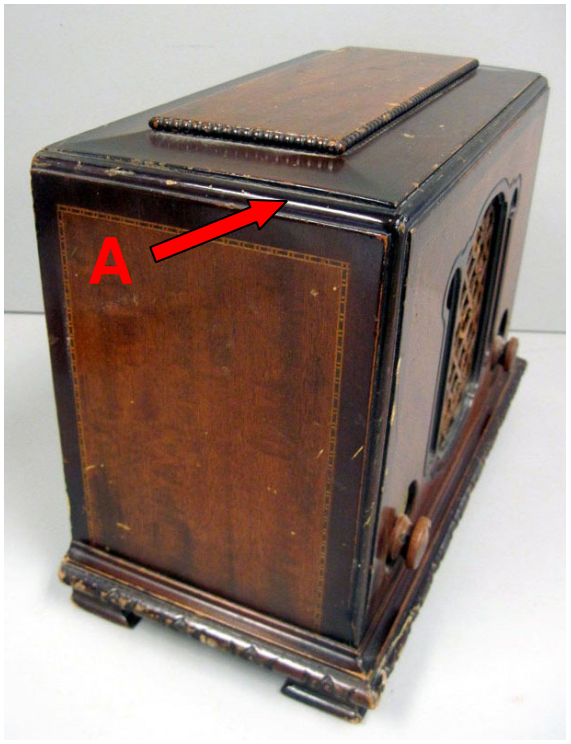
This Colonial 400 given to me by the widow of a friend.

He was proud that ‘it works’ and was ‘very pretty’.

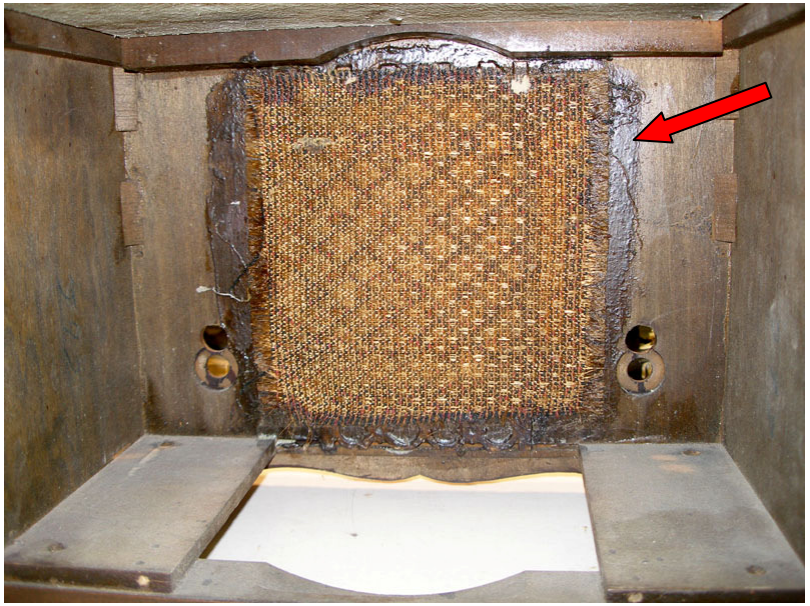
But the finish he put on the set after stripping was very wrong.

End grain and solid secondary wood showing. I was sure that there should be shading and opaque toners evident but needed confirmation.

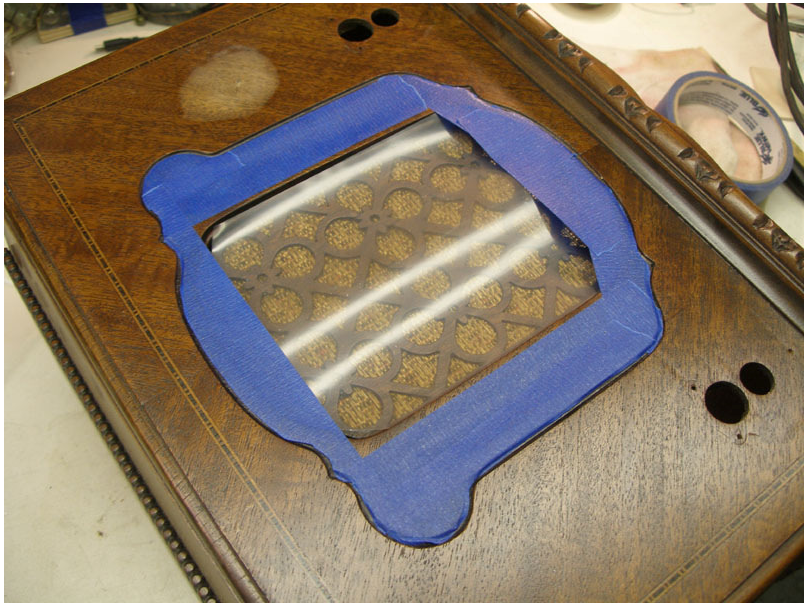
E-Bay to the rescue.



Sharp images in this e-Bay listing confirm my thinking on how the cabinet would have been colored at the time. **Opaque** coloring of cabinet corners & top secondary wood **(A)** and decorative molding around the bottom **(B).** **Shading** of grain just outside of the decorative banding inlay on the three sides **(C).**



He saturated original grill cloth edges with PVA adhesive. **No way to remove it** for cabinet refinishing.



Mask area before stripping.

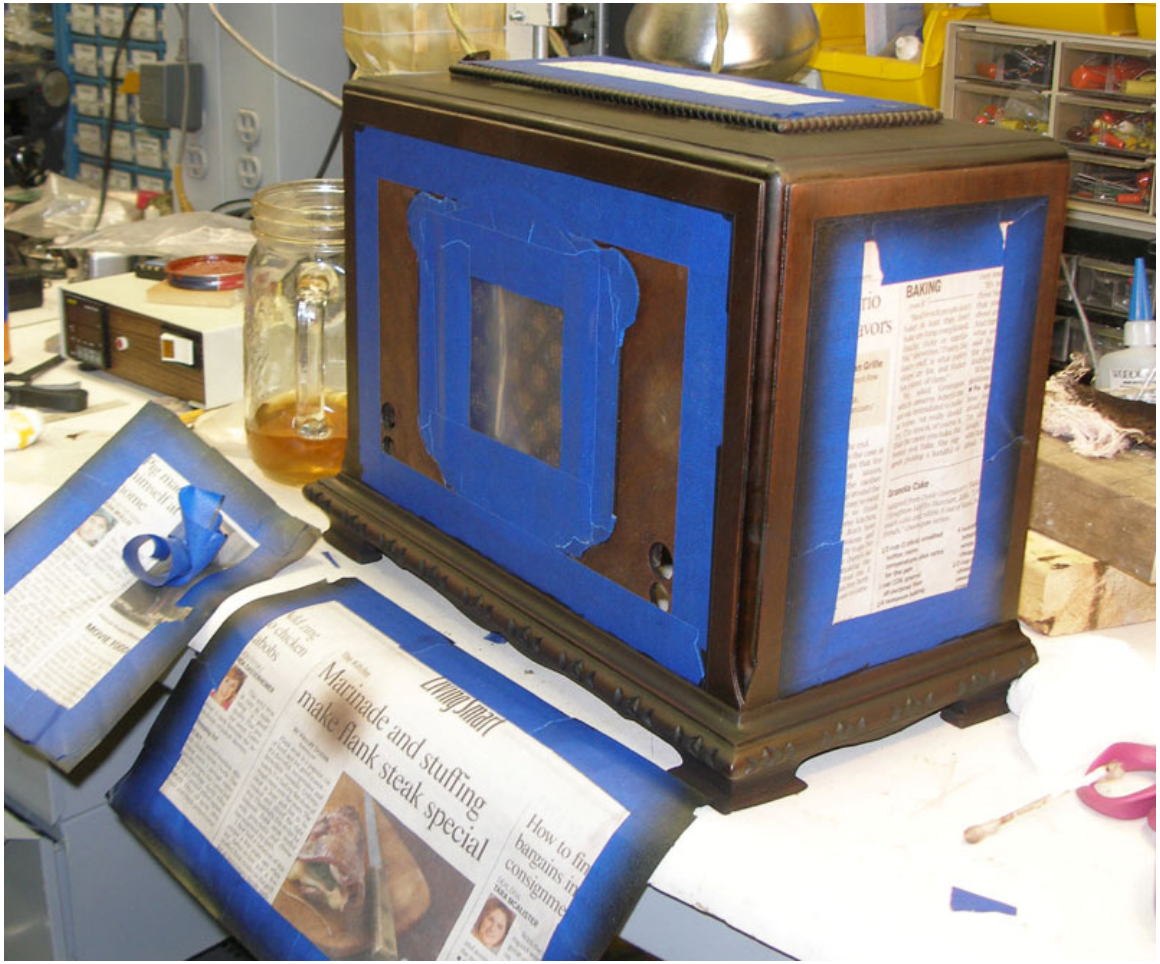
I take extra care to make sure stripper does not wick under blue tape.

Two feet have sections broken off. Sand breaks flat and glue on walnut strips. Use 23 gauge pin nailer to fixture strips while glue dries. Shading will hide the almost invisible pins.

Use Dremel sanding discs and jewelers files to shape foot profile.

I use an air brush to spray **VanDyke Brown** opaque stain.

Light shading on three sides and then heavy enough to fully hide grain on base, box corners and top.



On the back he had applied multiple coats of polyurethane over wood stripped of most of its coloration. **Got to fix that as best I can.**

I have a Silvertone with identical sticker so take this snapshot.

Not much of RMA sticker left so make a replica in *Photoshop* using this snapshot.

Print on 20lb. paper. Looks just right when attached.

Not perfect, but an improvement.

With filled grain and two coats of clear lacquer, I think it is now very close to the look as it left the factory.

Made by Cleartone Radio Co.
Cincinnati, OH – Circa 1924

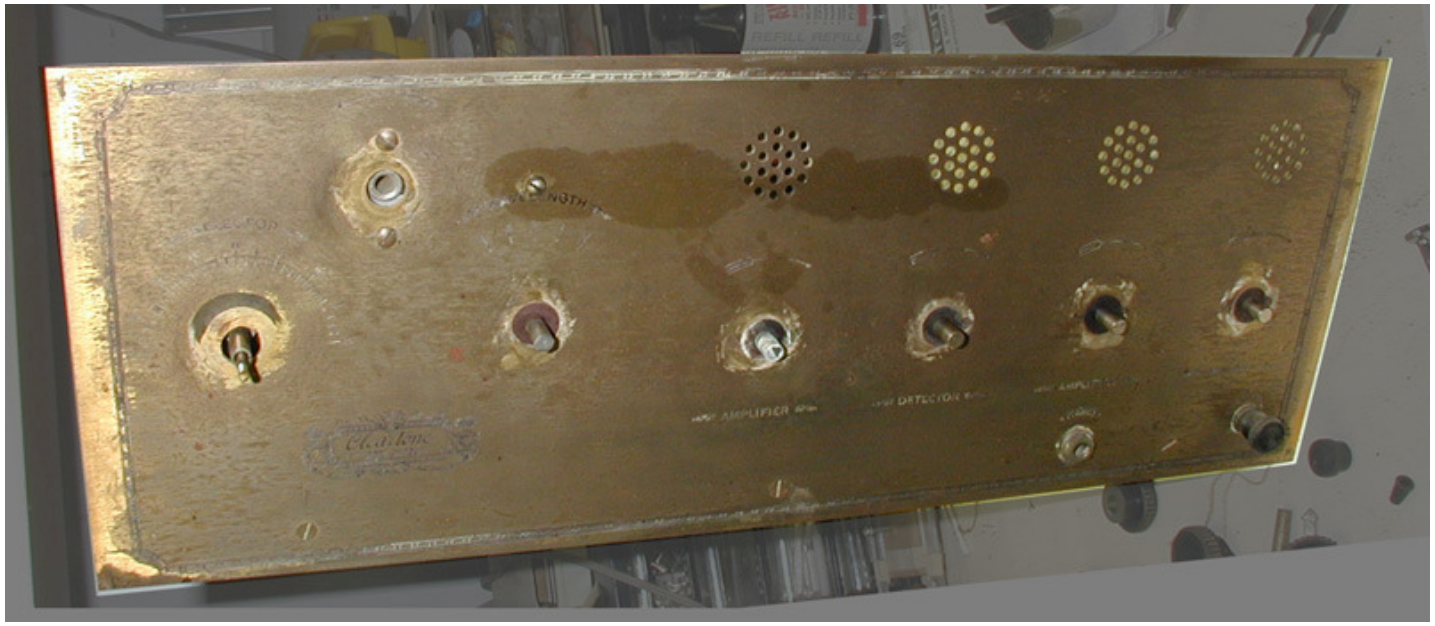
Yellow brass etched panel probably unique in American practice; this one in sorry state. The chassis no better. Missing clip-in RF transformer. Paper tag on chassis destroyed.

Could it be made presentable?

Clean with **GoJo** and wipe down with lacquer thinner.

Use cotton rags saturated with **sodium bisulfate** acid solution to remove oxidation. (The dry acid used to lower ph in swimming pools and spas.)

Finish with fine sanding pad lubricated with mineral spirits. Carefully applied in long lateral strokes to restore grained texture.



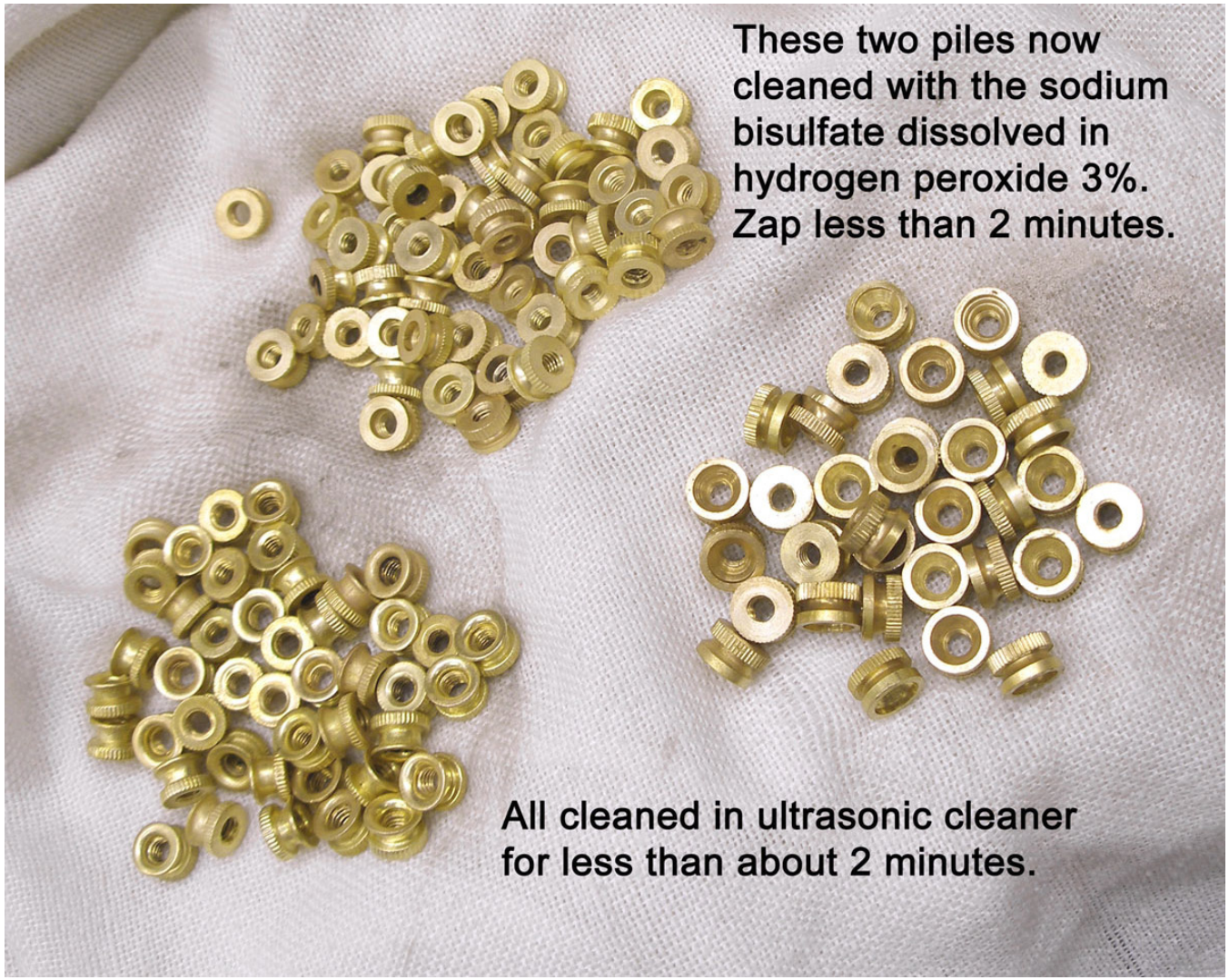
Problem: Some excess copper evident in the pitted surface adding an unwanted pink cast to the otherwise yellow brass. Traditional references say the way to eliminate it is by ‘pickling’ in strong acids. **Too risky** for a one-time home shop operation. (Buffing & sanding help to eliminate much of it.)

But  there is a better way !

While checking how to spell ‘pickling’ on the previous slide, I see the term ‘pink blush on brass’. That sort-of describes the problem I had on this panel, so I click on this **YouTube** link.

John Ahr tells you to dissolve your sodium bisulfate **not in plain water** but ordinary drugstore strength **(3%) hydrogen peroxide**. **And here is the result.**

Some of the thumb nuts mailed to me by Alan Douglas the day before he died. (RIP)



After the acid, **neutralize parts** by washing in water with a little baking soda followed by a thorough rinse. **Always force dry parts and coat with brushing lacquer.**

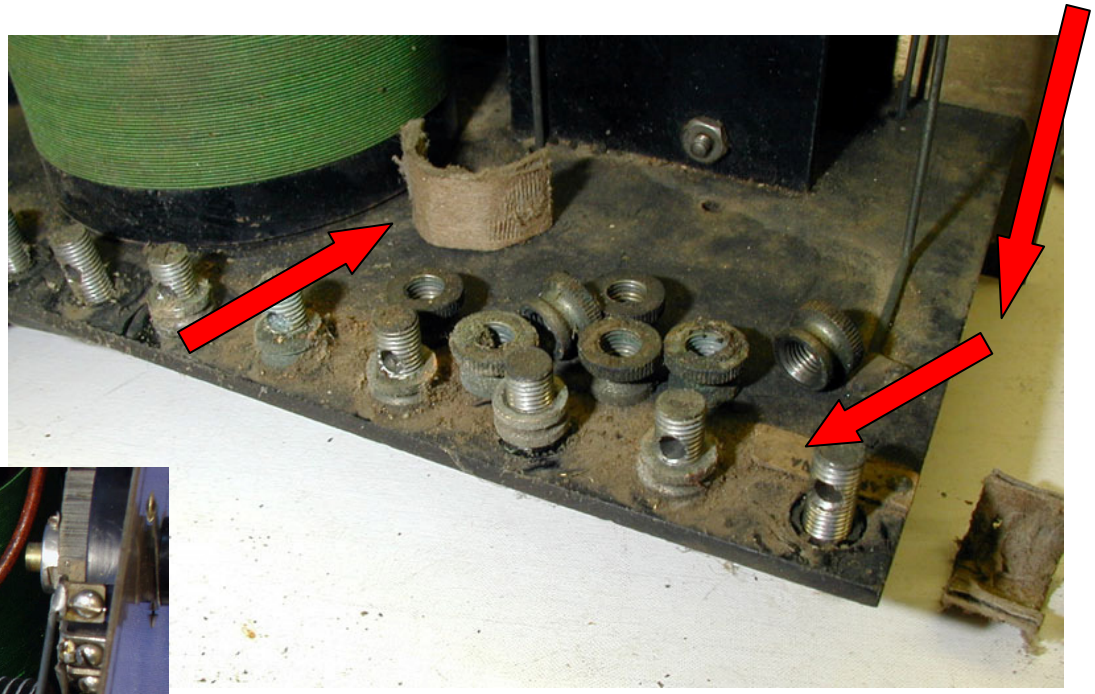
I'll sure try this method on my next brass cleaning task. More later…

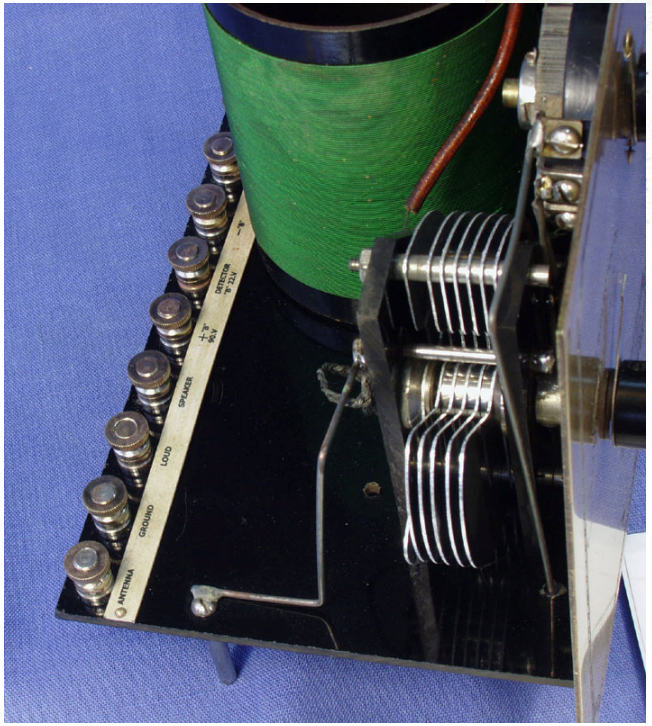
Graphics etched (not engraved) into panel are **very shallow**. I spray a **very thin** coat of lacquer on the panel to keep yellow brass from oxidizing while filling with very opaque water base acrylic ink. Use very smooth **slightly** damp cotton/polyester sheeting to rub off excess ink. Keep rubbing to an **absolute minimum**, since the ink particles will scuff the clear lacquer. After thorough drying, spray on several coats of clear lacquer.

This was a very tedious process.

Only a fragment of the original paper terminal i.d. tag strip survived. However, good enough to tell me the font type and exact character size.

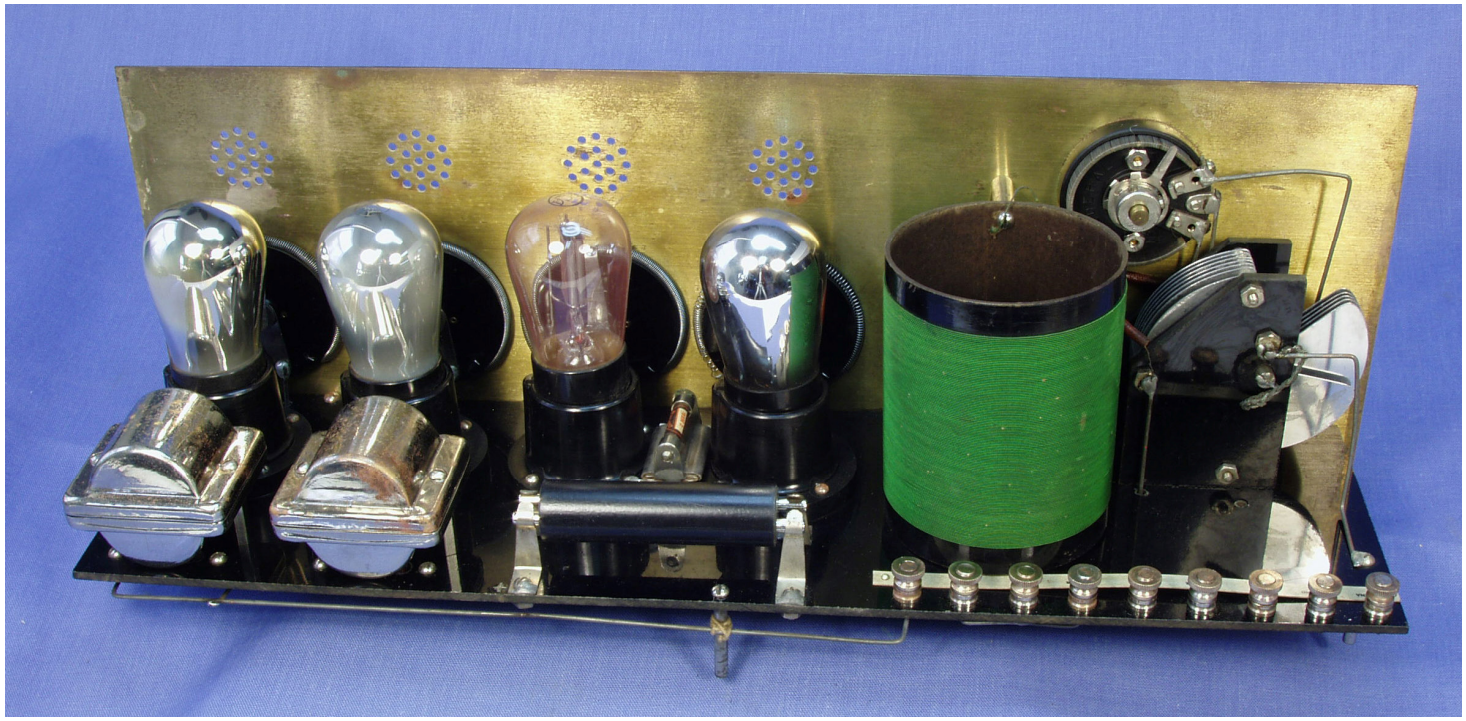
Note: I try to remember to wrap a scrap of card stock around knurled nuts when having to remove forcibly with pliers. **Boy!** was it ever necessary here.





I get to inspect Gary Alley's Cleartone and get photos from Merrill Bancroft to make this spiffy replica tag.

Caliper measurements of Gary's R.F. transformer allow me to make a dimensionally accurate non-functional replica. (The originals are not made to be opened without considerable risk of damage.)



The thumb nuts were re-plated with nickel. One of the transformer covers has some notable plating loss, but I elected to leave as is. (All the plating now has a protective coat of clear lacquer.)

After six years on a display shelf, the panel appears essentially the same.

Back to that brass cleaning method…

The problem: This cleaning method brings the brass ***'back to day-one'.*** It is going to scream out **NEW !**

What you probably want to do is bring the brass ***'back to day-10,000'.***

There are ways to get there.

1. Do nothing, just wait 10,000 days.
2. Accelerate oxidation of the surface with **heat**.
3. Accelerate oxidation with **heat** and vapors.
4. Dip it in various chemicals to accelerate the process.
5. Apply clear coats containing stains or dyes.

Accelerate oxidation with heat.

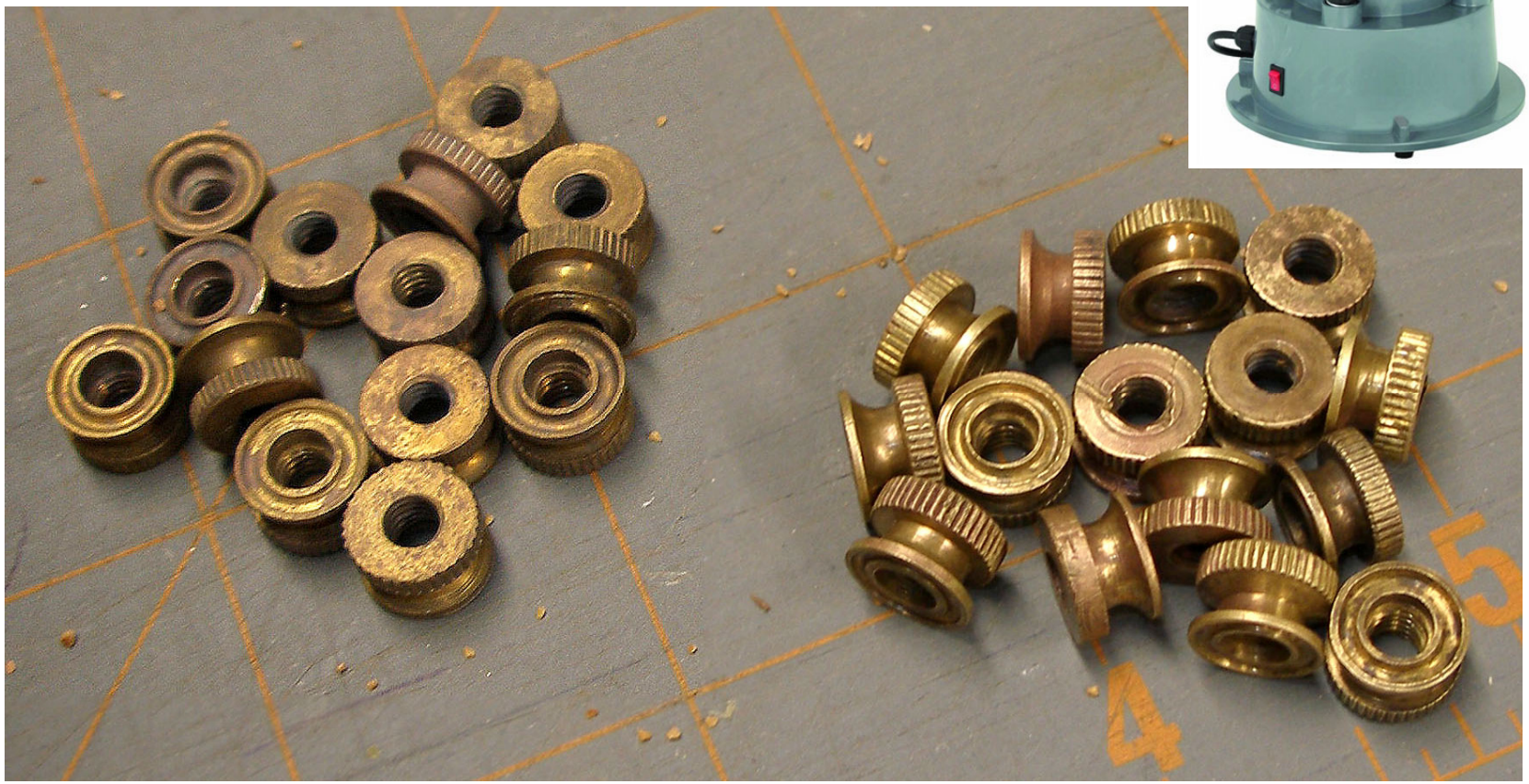
Place in stainless steel bowl and place into 400 F oven for 10 to 15 minutes. **INSPECT FREQUENTLY !**

After 15 minutes.

Coloration very uneven, blue and red hues. Have not yet experimented with other temperatures or times.

After heating, tumble in medium grind **walnut shells**.

Pile on **right** tumbled for about 7 hours. Note that tumbling gets into recessed cuts fairly well. Parts are bright, but not too bright.



Accelerate oxidation with heat and chemical vapors.

Done in commercial operations but vapors are **NASTY**.

Best not attempted in the home shop.

Dip in chemical solutions.

Many suppliers to jewelry and ornamental metal casting trades have solutions to add patina to surfaces. I've used **JAX** products for years.

Parts on **left** dipped in **JAX Brown**, rinsed and dried with hot air gun.
Much less variation in coloration as seen with the 400F heating experiment.

Colored parts are usually buffed to achieve desired results. A small part like this with knurls and under cuts would be difficult to process. They may be a candidate for tumbling in ground walnut shells.

This example is more black than bronze but you get the idea….

Original too corroded to be presentable.

Part painted with ***JAX <u>Black</u>*** and after drying, highlights brought out with sheeting charged with rottenstone and wrapped on flat stick.

Part cleaned and highlight areas polished smooth.

Coat ‘new brass’ with lacquer into which a dye has been added.

A few drops of amber or light oak stain.

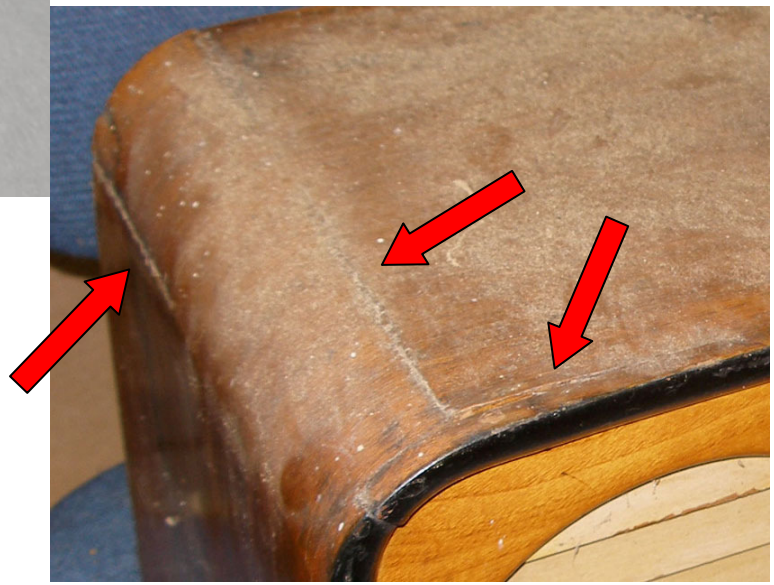
As an example, this product is on the woodcraft.com site.

Don’t get carried away… Too much tinting will make it look like a dreadful tchotchke**.** (Yiddish literal: Useless dust collector.)

RADIO SAVIGLIANO Model 91 Torino, Italy – 1936

The problem: Core lumber of the top and sides were made with **green** wood. Obviously a mistake for a company noted for high quality.

The core wood shrank, warped **AND** bowed dramatically tearing the mahogany veneer at the corners and front face joints.



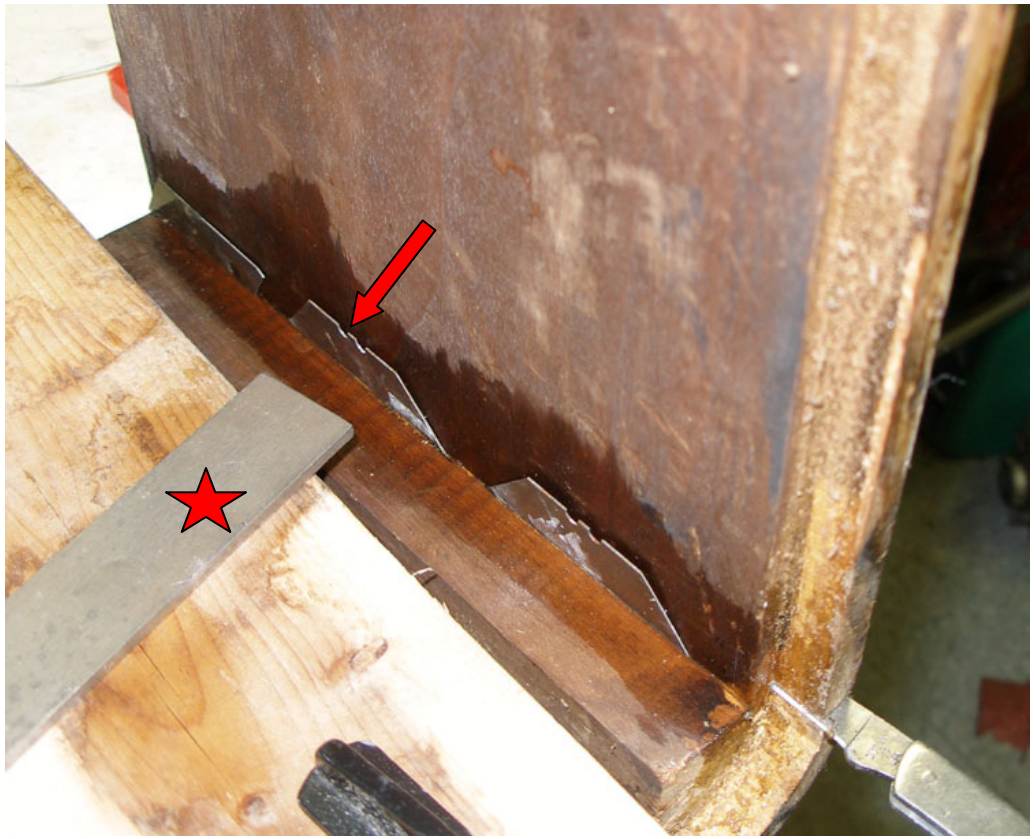
Not just a relatively simple task of taking off the old veneer and gluing on a new sheet. Things were going to have to **go RADICAL.**

The Italians used traditional hide glue.

It is water soluble…. That's Good.

I used an old Norelco travel clothes steamer, bought at a church yard sale many years ago for less than a dollar but never used until this project. There was no possibility to salvage any of the veneer. That is something of a problem right there. I find that wood used 70+ years ago almost always has a tighter grain structure than woods available today.

Once the veneer was off, I used a magnet to find where finish nails had been driven to hold the joints together while the hide glue dried. Some 8 of 12 nails had to be ground out using a carbide burr in a Dremel Moto-Tool.



With the nails cut, it was time to break the old glue joints. I found that you could drive utility knife blades into the joints to create fissures where water could seep in to loosen the old hide glue **without flexing** the wood enough to make it crack. After several hours of soaking and driving the blades in deeper, the joints could be pulled free.

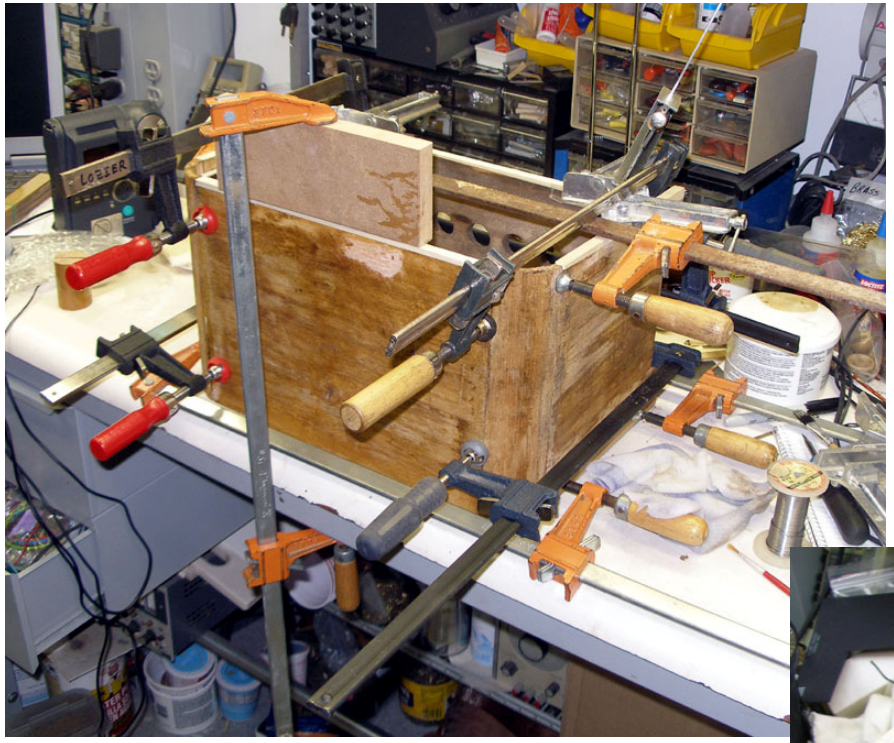
You just cannot afford to rush this process!

A *CRACK!* is just another whole level of grief.

★ Strip of tool steel held against the back of the blade. Hammer at the red star.

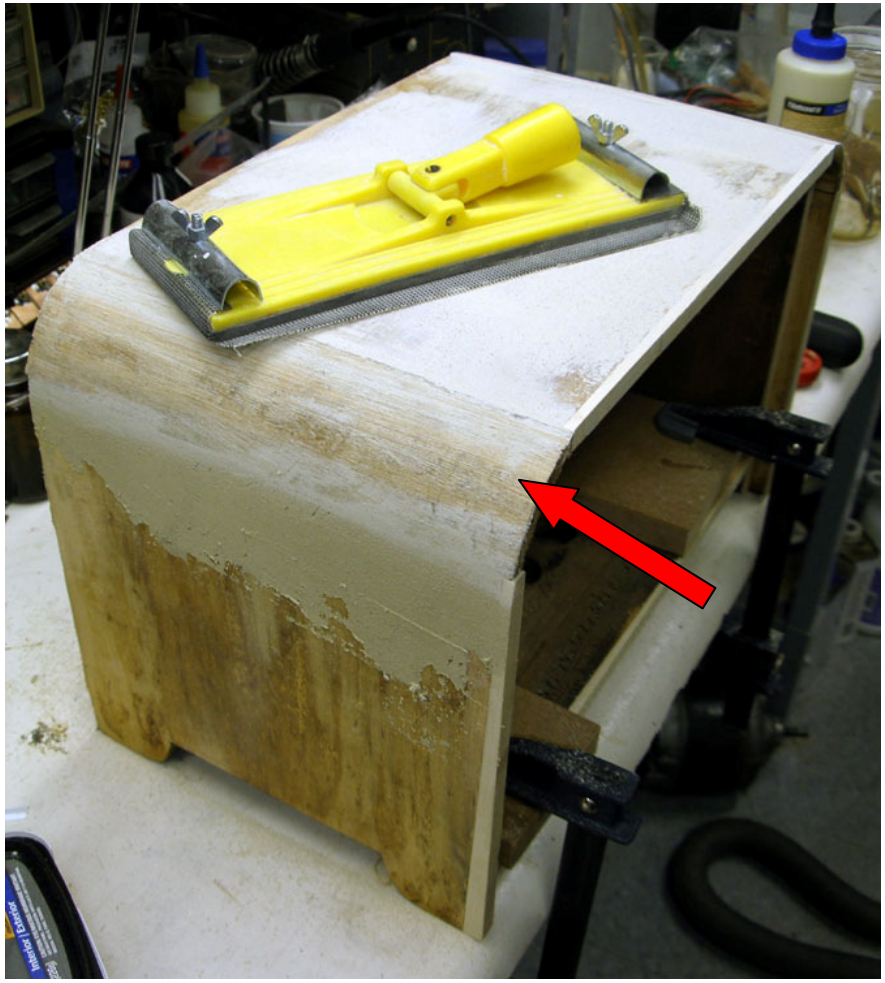
As you can see from the photos, the shrinkage was severe and uneven.

Now that I had individual panels to work on, I could butt glue strips of poplar to the panels and then re-cut and route to make them square and true to dimension.



I used just about every clamp I own to glue the cabinet back together so that it was square. Because of the knots, there is still some warp in the cabinet but it is not enough to notice.

Note that I elected to add the wood along the front face of the cabinet where it is hidden by the veneer and front bezel thereby keeping the original appearance of the back edges.



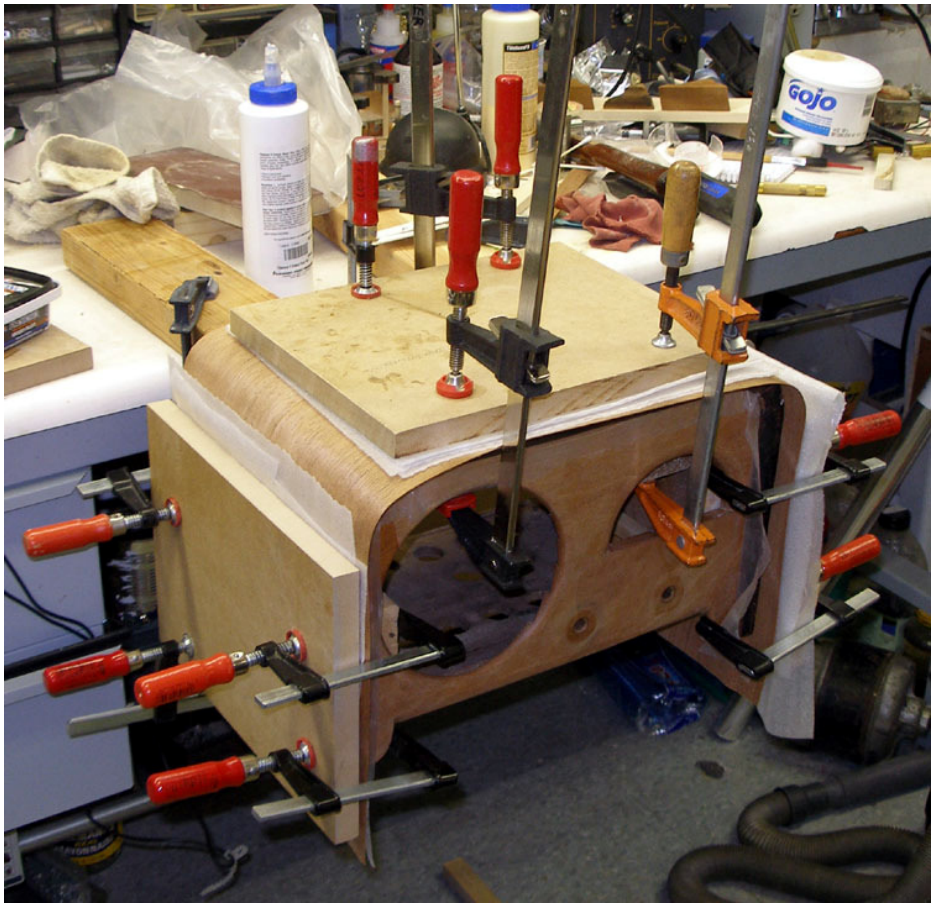
I did not have access to a surface planer to true the boards. To compensate for the bow in the boards, I used **Elmers *ProBond Stainable Wood Filler***. This is a filler that adheres very well to the residual hide glue that bonded the original veneer. It was absolutely necessary to get as level and square a surface as I could manage for the veneer. I used a dry wall sanding screen to remove gross excess filler and then made the surface flat using a cabinet scraper blade.

I had considered using an iron-on veneer product but determined that it simply would not work well on relatively small radius - rounded surfaces. It needs very flat surfaces to bond. Also the product I saw available was not very close in color to the solid mahogany front panel of the radio.

The mahogany veneer I could get was not as wide as the cabinet so it was necessary to butt glue two flitches. Also the veneer was 0.025” thick and would not wrap the top corners of the cabinet without cracking. (The original veneer was 0.015” thick or less.)

I had to go thru the ritual of applying several coats of veneer softener to make it more pliable. Even with this operation, it was necessary to pre-bend the veneer. I clamped the ends of the veneer sheet to keep them flat and add weight; then carefully draped the veneer over the cabinet shell that I protected with a poly sheet. I brushed water onto the veneer at the bends and within an hour could safely clamp the veneer to the sides and allow it to dry.

Then it was time to brush on slow set PVA veneer glue to the cabinet.
You need to apply enough, but too much can cause problems as well. In retrospect, I did not apply enough glue. The pre-bent veneer was draped over the cabinet and then (ideally) use a veneer hammer to squeegee out the excess glue. In my case, I used a very stiff four inch wide stainless steel putty knife with a rounded and polished edge to squeegee the veneer.

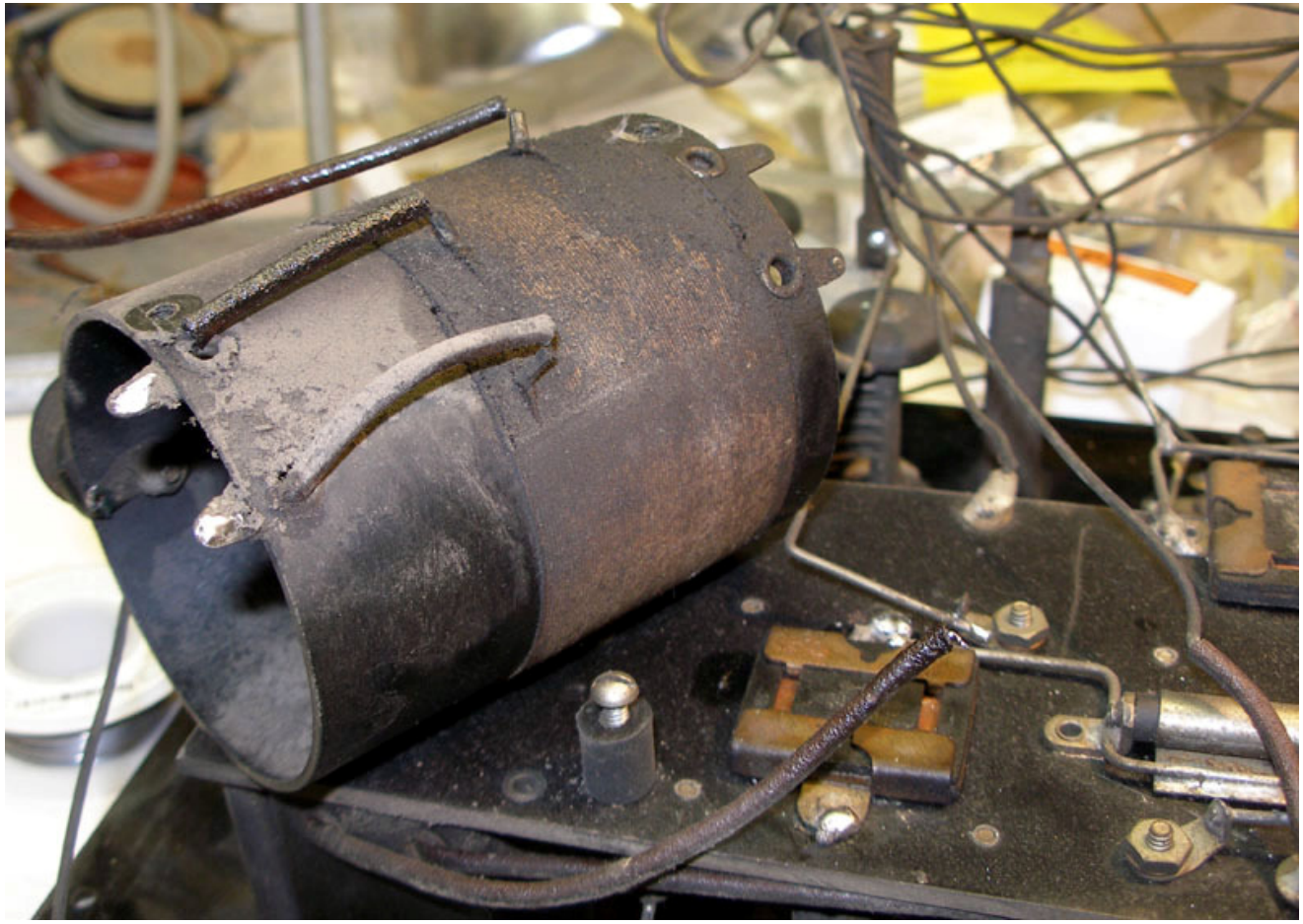


After working the top and the rounded corners with the 'veneer hammer' I quickly placed a 1/16" thick sheet of foam plastic on the top and a sheet of ¾" thick MDF shelving cut to size on top of the foam; then clamped this sandwich down **tight**. (The foam sheet inserted because of the slight residual warp remaining in the glued cabinet.) The sides were then worked in the same fashion.

Getting the right coloration for the new veneer was the most stressful part of the project. I glued scraps of veneer to plywood scraps and began to experiment with stains. I wanted to use oil stains to minimize raising grain on my sanded veneer. By combining 30 parts of MINWAX Wood Finish *Colonial Maple # 223* and 12 parts *Gunstock # 23* I got the best match. I noted the ratios in case I had to rework the finish later. Fortunately I did not.

The fact that the new mahogany veneer is less dense means more grain to fill and another opportunity to really screw up.
But after two coats of lacquer I had an almost perfect color match to the original finish of the front.

SUPERDIRT! Maybe the worst I've ever had to deal with.



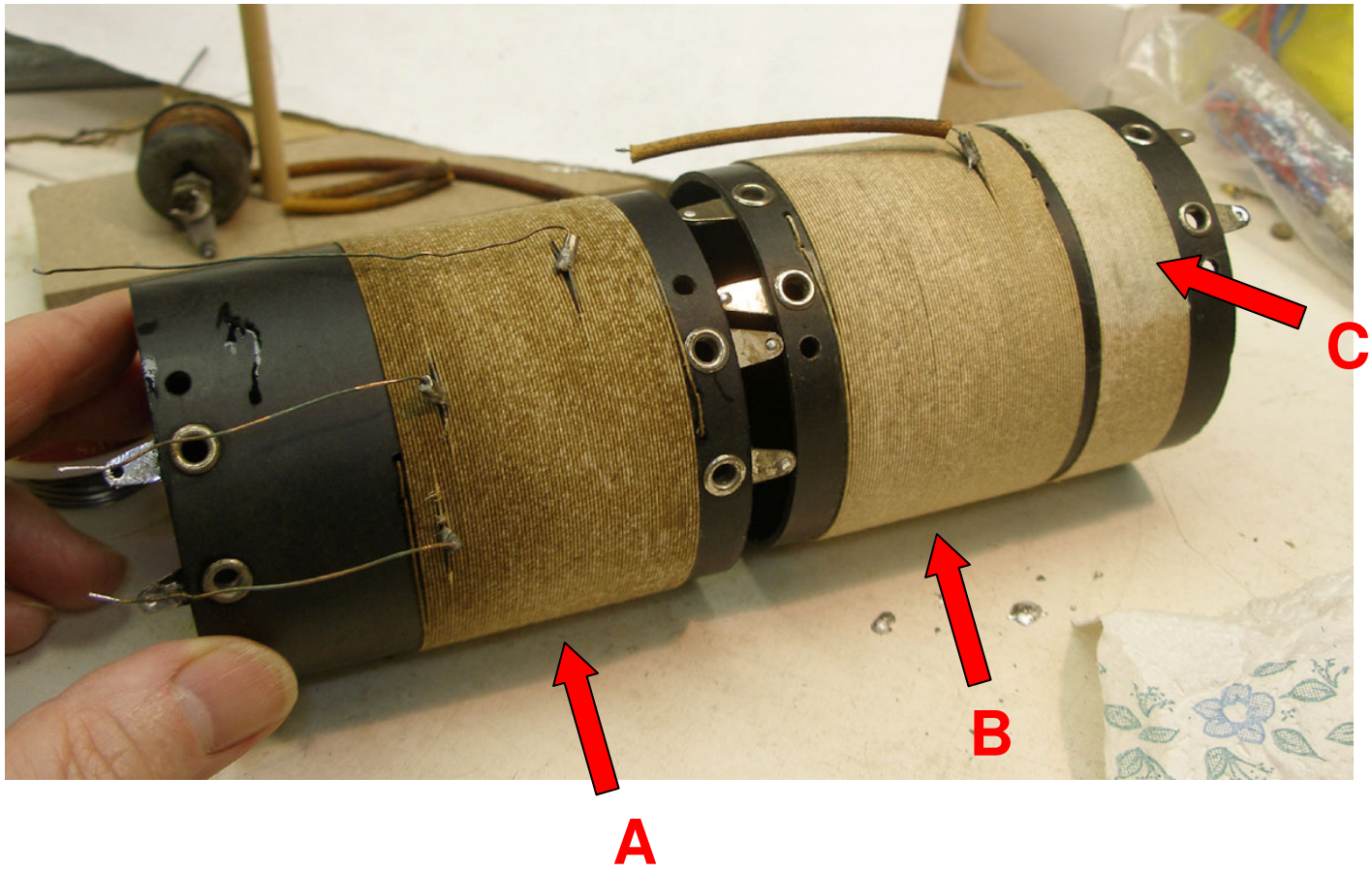
This Eaglet Neutrodyne chassis was stored in a basement with a coal fired boiler for many years. **How was this crud removed?**

Got to get the creosote off first. Lacquer thinner works well but with so much soil embedded, ultrasonic cleaning certainly will help.

But this is with lacquer thinner…. **Do this outside!**

Coil after zap.

Ditto, zap in alcohol since I think the coils may have originally had a thin wash of shellac. In this picture, the coil is still wet with alcohol.



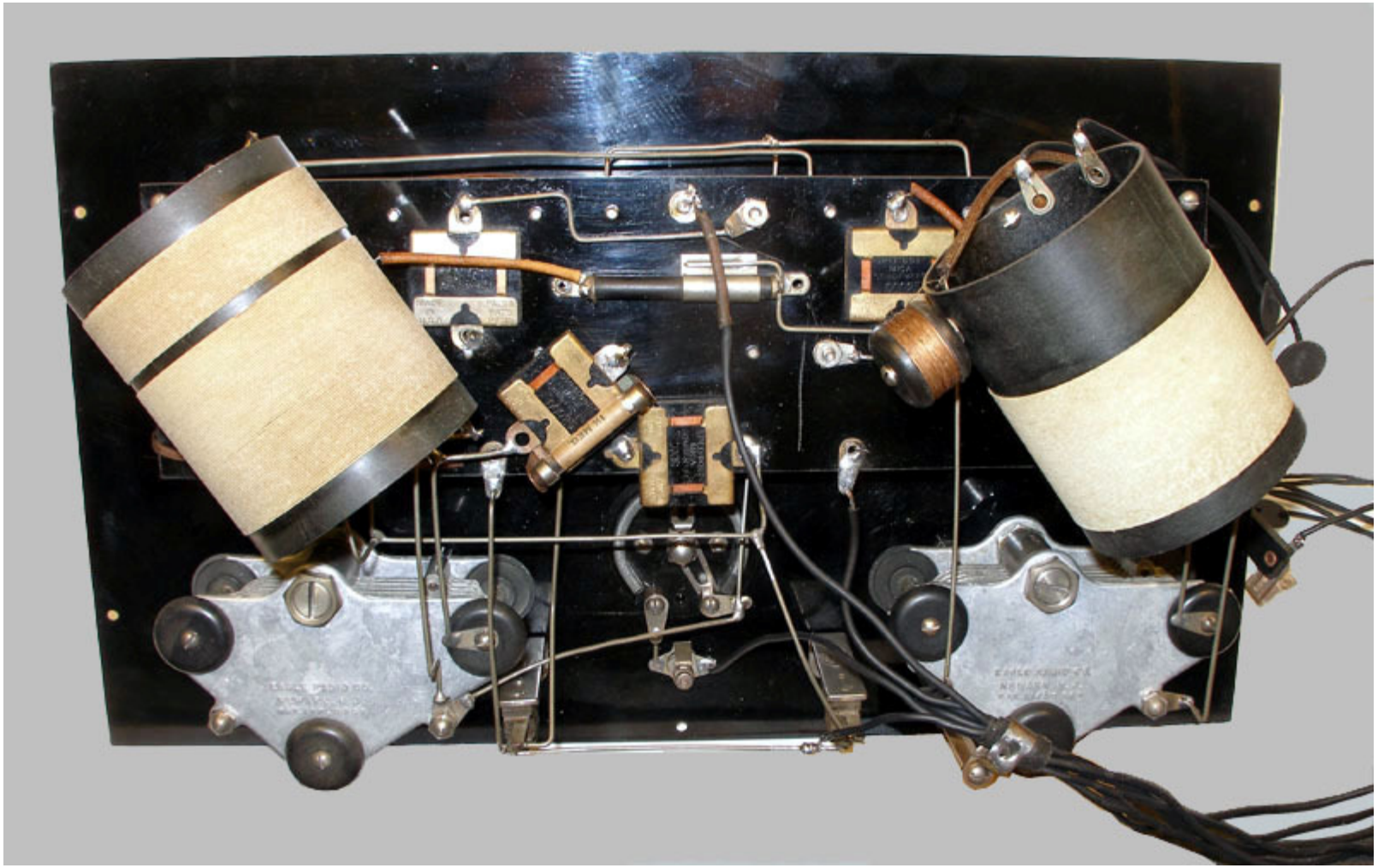
A. Cleaned with lacquer thinner to remove creosote.

B. Cleaned with alcohol to remove shellac.

C. Area bleached with ordinary chlorine bleach. Used vacuum to suck away rinse water applied with camel hair brush. Then get the winding **DRY !** As soon as possible.

Not too bad considering the as-found condition.

Solvents appear to have done no damage to the Bakelite coil forms.



Learn to love hide glue.

You don't have to have a heated glue pot and buy pounds of glue flakes any more. It now comes as a liquid as well.

1. It is traditional to the cabinet trade before WW-II.
2. It is reversible. That is why instrument makers use it.
3. It is great for attaching grill cloth.
4. It will mix with sanding dust to make a filler paste.
5. Easy to heat in a microwave oven. Ready in 3 – 5 minutes.

Make strong repairs to thin parts with Ultra Thin Fiberglass cloth made as laminate stock for printed circuit boards. Only 0.003” to 0.006” thick.

Dirt cheap on e-Bay.

Saturate with thin CA adhesive & apply cure accelerant.

Hints & Kinks

For electrical artifact conservation and restoration.

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Robert Lozier – KD4HSH
Monroe, NC – USA
kd4hsh@carolina.rr.com
704-283-2638

704-458-1076 - cell