Hints & Kinks 05

For electrical artifact conservation and restoration.

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Hints-N-Kinks URL

I intend to post an annotated version on my website.

These Hints & Kinks are all about problem solving. We all have different interests in hardware You may never encounter the exact same challenge. But hopefully you will take away some tidbits that you can modify to suit your own needs.

Here I've limited my ideas to that of conservation and restoration and very little to repairing items so they work again.

Do you know about Mama Stamberg's Cranberry Relish Recipe?

Susan Stamberg

You really should try it!

Preparing Mama Stamberg's cranberry relish.

Here is my perpetual (until I croak) ritual call for you to **TRY** the following simple modification to your band saw, you will **LOVE** it.

Do you know about Mama Stamberg's Cranberry Relish Recipe?

You really should try it!

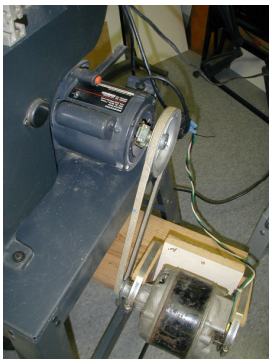
Here is my perpetual (until I croak) ritual call for you to **TRY** the following simple modification to your band saw, you will **LOVE** it.

This is the **best** modification I have ever made to a shop tool that gets constant 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.



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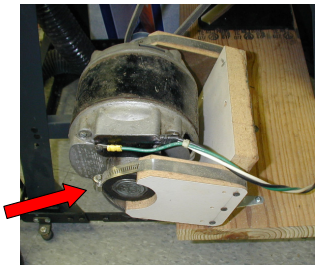
This pulley set reduces the saw speed by a factor of 2.5.

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.

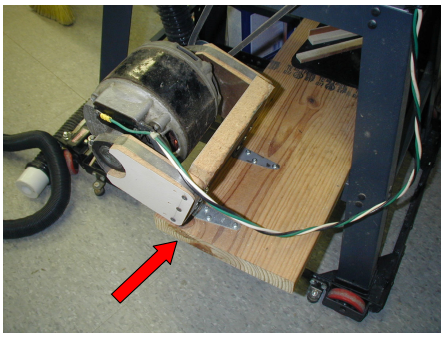
No modifications to the saw required;
just add this extra motor.

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



Install **14 tooth** per inch bands specified for cutting non-ferrous metals.

Simple strap hinges allow the motor cradle to pivot freely.



Unplug built-in motor from its power switch.

Remove fan cover from built-in motor.

Remove fan blade.

Install large diameter pulley.

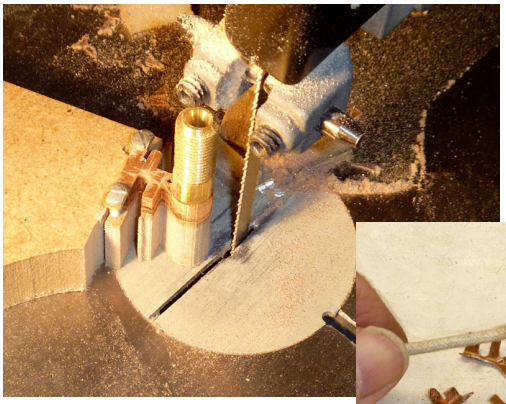
Stainless Steel heavy duty hose clamps secure the salvaged motor to the cradle.

Simple strap hinges allow the motor cradle to pivot freely.

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 composites. These same band saw blades 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.

Make your own custom vintage crimp lugs.

Stack 8 or 10 blanks and secure to MDF board. Brass pin is diameter of lug and guides blade for easy cut of smooth radius.



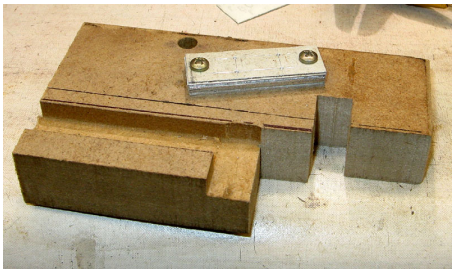
Odd ball ring terminal used on 1924 Ozarka radio.

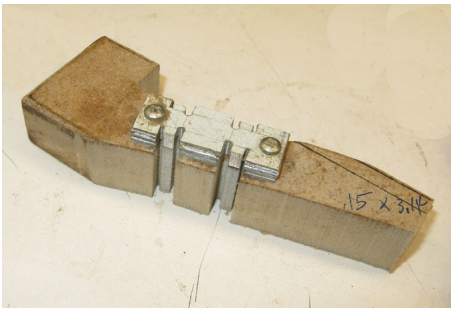
Make your own custom vintage crimp lugs.

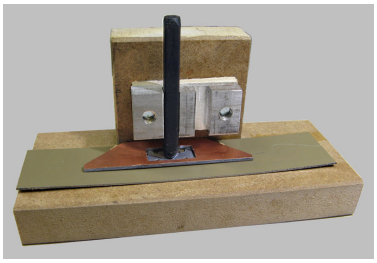
Stack 8 or 10 blanks and secure to MDF board. Brass pin is the diameter of the lug I want to replicate and guides blade for easy cut of smooth radius.

In this case, I needed an odd ball ring terminal used on the first versions of the 1924 Ozarka radios.

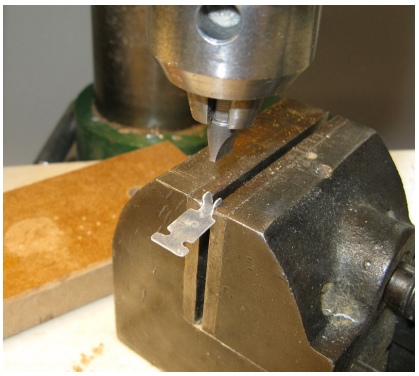
Or make aluminum battery cable tags.
Same idea to cut out.





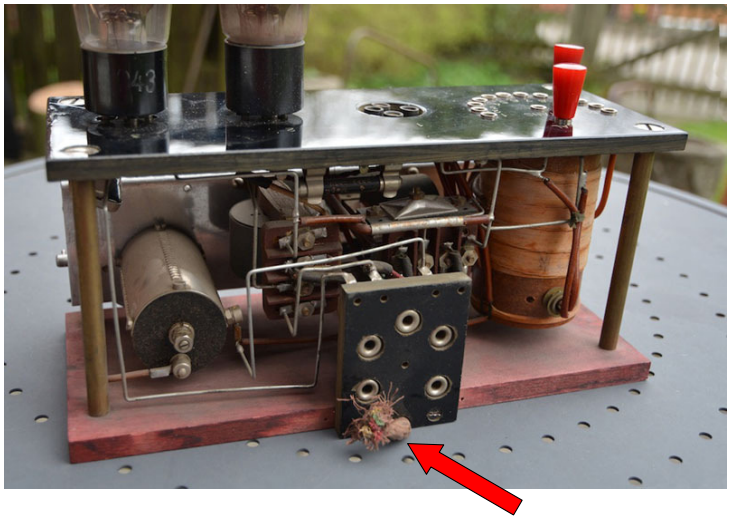


You really need fixture to hold your letter punches in alignment.



Or make aluminum, brass or steel battery cable tags. Same idea to cut out. My aluminum for this jobl was salvaged from a piece of scrap rain gutter that had been in my shed for over 30 years. (Therefore my motto is apparently… NEVER throw anything away.) You can buy sets of letter punches easily on-line starting at about $15. My advice is to never attempt to use the punches free hand… You need to have a simple guide like this little fixture I made.

Braiding Fixture



The Problem – Highly desirable Swedish radio with original battery cable cut off.

In a small set like this, **this is a real deal killer.**

Braiding Fixture

The Problem - Highly desirable Swedish radio of 1927 vintage with original battery cable cut off.

In a small set like this, **this is a real deal killer.**

1926/27 GE Superheterodyne prototype.

No replica battery cable available anything close to this original form factor.

A 'make do' repair unacceptable for a museum quality preservation.

Insects chewed-off about 15 inches of the braid covering to build a nest.

How could I come up with an acceptable solution?

Just six months ago I took on one of my most difficult restorations ever, a circa 1926/27 GE Superheterodyne Engineering prototype.

In recent times insects had chewed-off about 15 inches of the braid covering this wire bundle They used it to build a nest on the side of the built-in rotating loop antenna.

No replica cable available anything close to this original form factor I needed to connect the Power Supply to the receiver chassis..

How could I come up with an acceptable solution?

Here is how I repaired the braid.

Unfortunately without control of tensioning, pulling individual threads tight was **extremely tiring** and really slow.

There has to be a better way.

Fortunately the bugs stopped chewing on the braid about 2 inches short of the fanning strip. If they had gone into that region of the cable, it would be a whole ‘nother level of restoration grief.

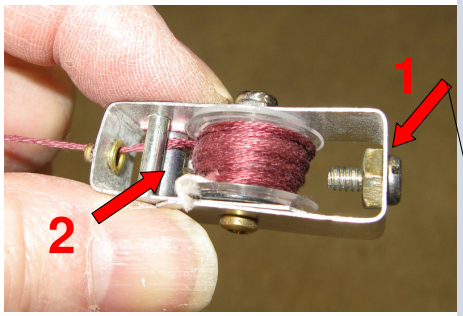
I made this doughnut of rigid insulation board to hold 12 bobbins. I could then braid a new covering. Unfortunately without control of tensioning, pulling individual threads tight was **extremely tiring** and really slow. I made it through to a successful end but the new battery cable for the little Swedish radio in the previous slide would need to be over **THREE** times as long.

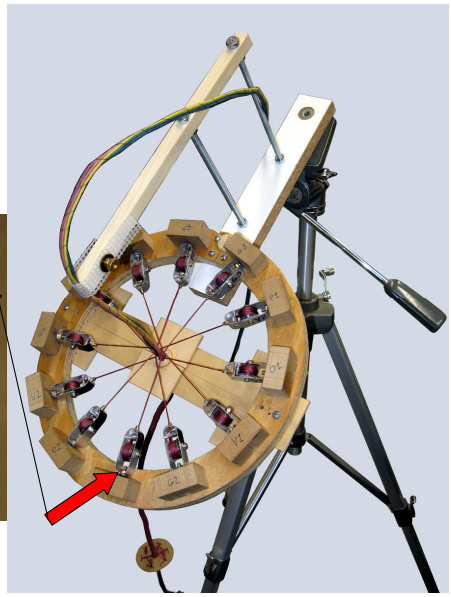
There has to be a better way.

Not a magic bullet but relatively painless and straightforward.

Shuttle consists of standard plastic sewing machine bobbin in a thin aluminum cage.

Uniform drag on the thread is a critical requirement.





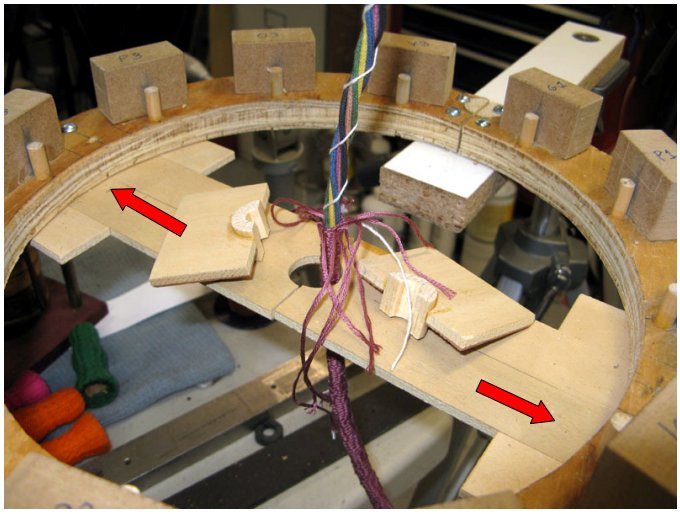
Finding an ergonomic positioning for your fixture is critical.

Not a magic bullet but relatively painless and straightforward.

The shuttle consists of a standard plastic sewing machine bobbin contained within a thin aluminum strip bent to form a cage. (Thanks again to my 30+ year old scrap rain gutter.) At # 1 there is a steel screw and nut that is attracted to small super magnet embedded in each of the small MDF blocks glued around a plywood ring.

#2, Uniform drag on the thread is a critical requirement and can never be achieved by placing drag directly on the bobbin. It took me some time to arrive at this simple solution that is completely independent of the bobbin. A steel rivet has a super magnet stuck to its side but with the thread pinched between the two. You reduce the tension if necessary by wrapping a few layers of aluminum foil duct tape to the body of the magnet to lower the flux. It works! Finding an ergonomic positioning for your fixture is critical. A camera tripod with tilt head works great for me.

Eyelet for cable is wood dowel with appropriate hole. Glued to two thin plywood plates. After glue is dry, the dowel is split with a knife.

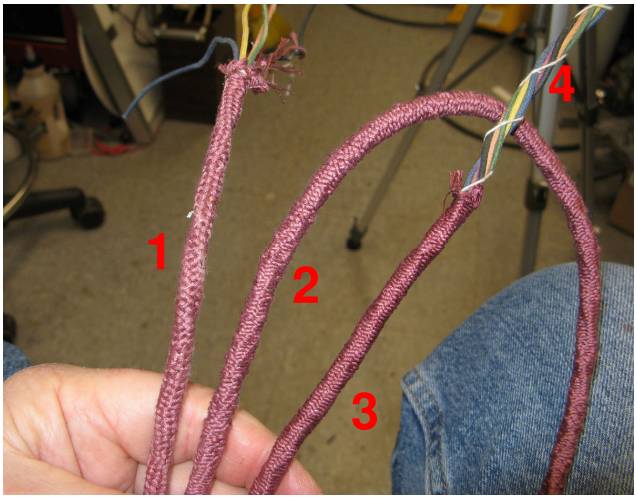


The eyelet for the cable is a wood dowel with appropriate hole glued to two thin plywood plates. After the glue is dry, the dowel is split with a knife. The eyelet is captured by two plywood strips with a slotted hole in each far end that are clamped to the plywood ring.

This shot is before I came up with the idea to use super magnets to hold the bobbins to the ring instead of these pegs. Those pegs worked but a seemingly tiny detail upgrade to the super magnet made a BIG difference in operator ease of use. The MDF blocks keep you from pulling excess thread off the bobbins as you move them to the next location..

Success was definitely an iterative process.

1. Old way.
2. First try on new fixture.
3. Shuttle refinements produce good results. **BUT**
4. The wire bundle should not have been twisted.



To make an automated braiding machine for the home shop would be a far greater machining challenge.

What I define as Success was definitely an iterative process.

#1 = Old way I used on the GE prototype. Too loose and **very** tiring to braid.

#2 = First try on new fixture. Too uneven, lumpy and too tight because I was trying to apply thread drag to the bobbin directly.

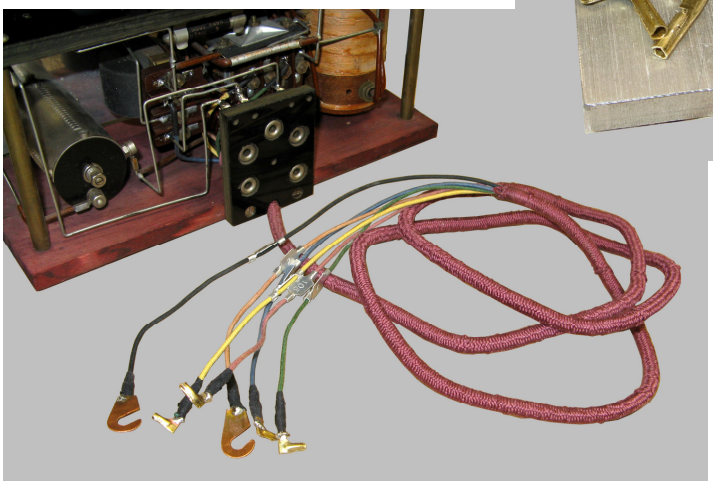
#3 = Shuttle refinements with magnetic drag produce good results. BUT !

#4 = In this case, I realized the wire bundle should not have been twisted. Time to start over!

To make an automated braiding machine would be a far greater machining challenge. You can see on YouTube where folks have thought about making the machine parts using 3D printing but none have succeeded in making a braided cloth jacket like this. If I had to, it would take me a week or two to design a machine I have in mind that could braid at maybe one or two feet per hour, a few hundred dollars in materials and a month of milling machine and lathe work would be necessary to make it work as well as those machines from 90 years ago but not nearly as fast.

The results from my current fixture.

Hopefully a battery cable that will not detract from the over-all appreciation of the receiver.



Brass ‘B’ & ‘C’ battery plugs never used in the USA had to be fabricated from sheet brass.

The results from my current braiding fixture.

Hopefully a battery cable that will not detract from the over-all appreciation of the receiver.

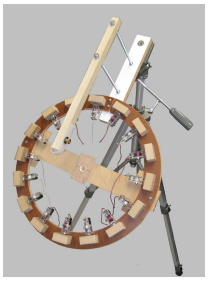
This project had an additional complication, in that

British and Continental ‘B’ and ‘C’ batteries before about 1936 had little individual socket connectors with 1/8” ID bore. This particular radio used a bare bones plug made of stamped brass about 0.4mm thick. No chance of ever finding them here in 2018. Again I used the same techniques for sawing out a stack of blanks as shown in making the odd ball ring terminals and battery tags. Then I made a crude die to shape the soft brass into the correct form. Thank goodness I only needed to form a half dozen parts.

Existing wire beyond salvage. My next candidate for a braided cable.

Larger gauge wires + 3 more conductors mean a need for 16 shuttles.

Fortunately the cable is shorter so that the time to braid will actually be slightly less in this case.



The Oriole Model 100 by W-K Electric Co. Kenosha Wisconsin circa 1927

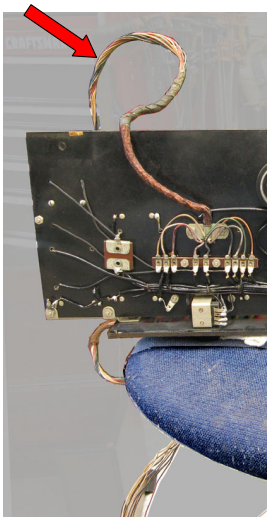
Existing wire beyond salvage. My next candidate for a braided cable.

This is a rare radio featuring an important first-use technical innovation… The cathode follower RF amplifier. Currently this innovation is unrecognized in widely accepted historic chronicles.

The problem here is that this cable has larger gauge wires plus three more. To braid a convincing jacket will require at least 16 shuttles for the increased diameter. I have already made a 16 position ring. Fortunately this cable is shorter so that the time to braid may even be slightly less.

Something a little less daunting and easy to implement.

Just a week ago I wanted to show this 1926 Bosch Amborola….. BUT



Braided Rayon battery cable jacket falling apart.

Here was my quick and easy fix.

Something a little less daunting and easy to implement.

Just a week ago I wanted to show this 1926 Bosch Amborola….. BUT

On pulling it down from the shelf I was reminded that the original braided Rayon battery cable jacket was falling apart.

So here was my quick and easy fix.

Decorative mesh tubing.

Cheap and easy-to-get at your local crafts store.

Under $6 for **20 yards**.

You can make bundles up to **3/8” dia.**

NOT UL rated.

This mesh used with….

Decorative mesh tubing.

Cheap and easy-to-get at your local crafts store.

Under $6 for 20 yards.

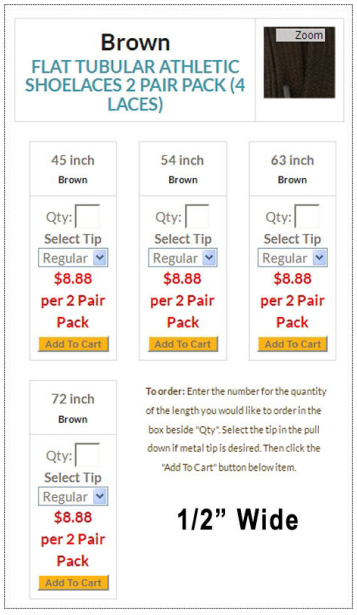
You can make bundles of wires up to about 3/8” dia.

NOT UL rated but my informal tests say it is self-extinguishing when placed over UL rated PVC wiring.

This mesh is used with….

½” Wide Tubular Cotton Shoe Laces.

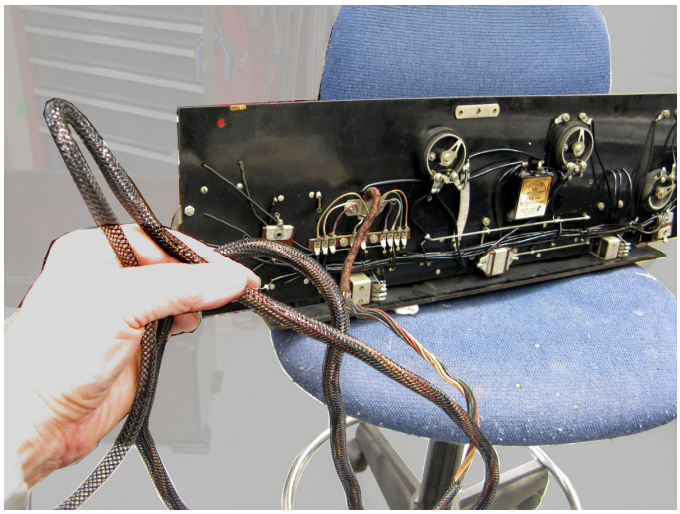
One $3 lace will cover a 4 to 5 foot bundle of wires.



½” Wide Tubular Cotton Shoe Laces.

One $3 lace bought on-line will cover a 4 to 5 foot bundle of wires.

Here is how it works with the mesh in the previous slide.



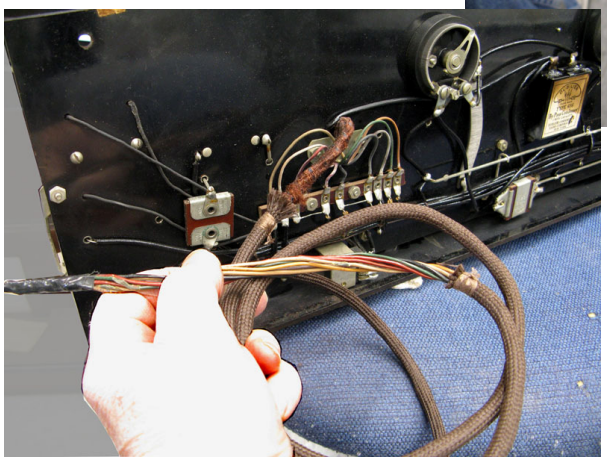
Use gentle heat to soften old insulation and work out the kinks and wire crossovers.

Slip the plastic mesh over the bundle.

Use gentle heat to soften old insulation on the wires and work out all the kinks. And then work the wire bundle to remove wire crossovers.

Then the plastic mesh will easily slip over the bundle.

Pull mesh TIGHT to consolidate wire bundle.



Bonus: Cotton lace won't snag on the old wires.

Not a perfect solution but will keep most folks from being distracted by badly damaged wiring.

Pull the mesh TIGHT to consolidate the wire bundle.

The bonus is that the Cotton lace does not snag on the old wires and drive you crazy sliding it on.

Not a perfect solution but it will keep most folks from being distracted by badly damaged wiring.

Note I elected to leave the part of the old jacket that was protected under the chassis so the next investigator will know the true original covering. The ends of the lace are whipped with embroidery floss and trimmed. A much better way than wrapping with plastic tape or heat shrink. The embroidery floss method was often used way back when…

Laminating lumber core plywood.

Both inside plies loose.

Rotted veneer ply.

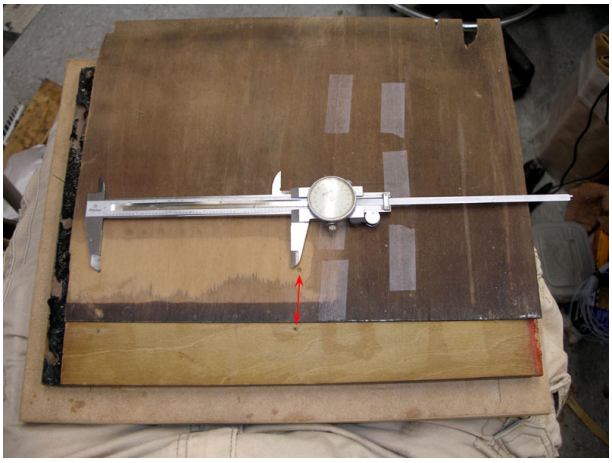
On that GE Engineering Sample Superheterodyne, the cabinet sides were broken away from the back panel and as it is pretty easy to see were in terrible shape on the inside… Fortunately the outside veneer is still tightly bonded. Time to steam off the bad wood and fix or replace.

Norelco travel clothing steamer found at a church for a dollar or less.

My steamer is an old Norelco travel clothing steamer found at a church sale decades ago for a dollar or less.

It takes about 20 to 30 minutes to peel-back a square foot of thin veneer. The thicker ply next to the lumber core will take a little longer.

Sheets are washed in water to remove old glue, bleached if moldy and washed again. Then while slightly damp, sprayed with ***Veneer Tamer*** and dried under pressure between sheets of news print.



Note that whenever you recycle old veneer it will stretch a few percent.

Sheets are washed in water to remove old glue, bleached if moldy and washed again. Then while slightly damp, sprayed with a proprietary product called ***Veneer Tamer*** and dried under pressure between sheets of news print.

Note that whenever you recycle old veneer it will stretch a few percent in one direction. Usually that is not a problem unless there are cutouts in the sheet, in that case you may have to remove a thin strip between cutouts. When joining strips of veneer, I simply use Scotch brand removable tape. There are traditional thin paper tapes with water soluble glue but they leave a slight residue. I've not had residue problems with the acrylic adhesive on the Scotch removable product.

I use an old cast iron book press to make **really flat** bonds.

Use slow set PVA veneer glue.

1. Bottom plate of ¾" MDF board.
2. The board being laminated.
3. Cover sheet of newsprint in case of glue squeeze-out.
4. Top plate of ¾" MDF board.
5. Sheet of **high density** polystyrene insulation board insures even pressure distribution.

I use an old cast iron book press to make **really flat** bonds. I bought it over 40 years ago and it was already really old back then.

The surfaces of my old book press are not ground flat so I have to compensate by inserting MDF shelving boards which have a really flat surface.

My logic for using modern PVA adhesive is this… In these cases I'm repairing severely damaged wood. If I were to use traditional hide glue for the repairs, I would give up the ability for the excess glue to squeeze-out: and if the hide glue failed again, it is questionable if the separated parts could withstand another round of processing.

1. Bottom plate of ¾" MDF board.
2. The board being laminated.
3. Cover sheet of newsprint in case of glue squeeze-out.
4. Top plate of ¾" MDF board.
5. Sheet of **high density** polystyrene insulation board insures even pressure distribution.

Inserting glue with shim stock…

Use 0.005” **phosphor bronze** shim stock to clean and carry **slow set PVA veneer adhesive** deep into the gap without stressing old brittle veneers.

Glue ‘wets’ to this metal alloy better than anything I know of.

Loose veneer on edges of panels is very common problem. You must clean out the old glue and soil and apply new glue.

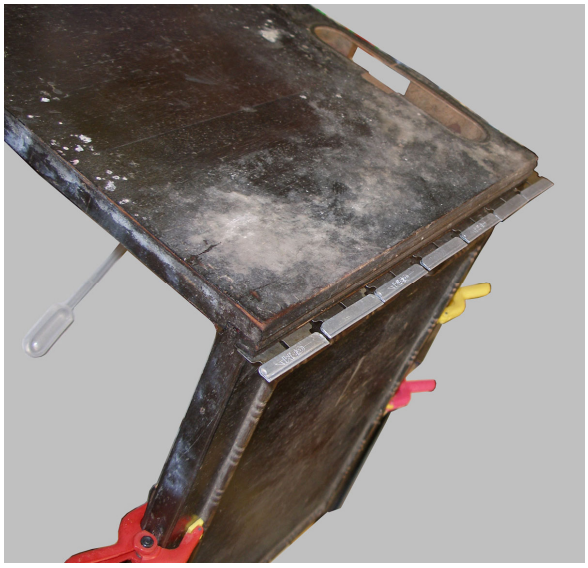
I now use 0.005” **phosphor bronze** shim stock to clean and carry **slow set PVA veneer adhesive** deep into the gap without stressing old brittle veneers. Much better than using a hypodermic syringe.

Glue ‘wets’ to this metal alloy better than anything I know of.

The slow set characteristic of this glue gives plenty of time to squeeze and roll-out the excess.

Almost all old cabinet joints can be taken apart.

All it takes is patience, thin razor or utility knife blades and a little water.



Almost all old cabinet joints can be taken apart. Very few if any nails are used and can be found with a super magnet; then either extracted or driven through the joint.

All it takes is patience, thin razor or utility knife blades and a little water.

Drive blades into the joint interface and apply a few drops of water. Wait 20 minutes or so and drive the blades deeper into the joint and add more water.

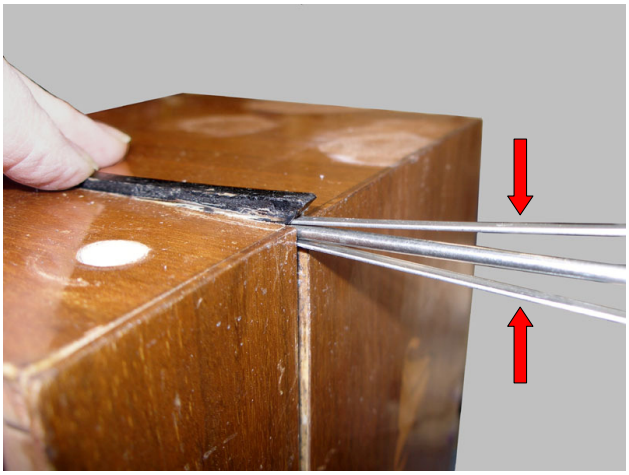
After a while it will be loose enough to flex the joint.

Drive-in additional row of blades to protect surfaces then place long knife or steel rule **between blades** to pry joint apart.

Drive-in additional row of blades to protect surfaces then place long knife or steel rule **between blades** to pry joint apart.

Use SS flat stock salvaged from **old windshield wiper blade** to drive down into joints. Grind end to wedge profile.

Use extra long (6”) 2 or 3 mm drill bits to get water into ends of lock joints. **Very cheap on eBay.**

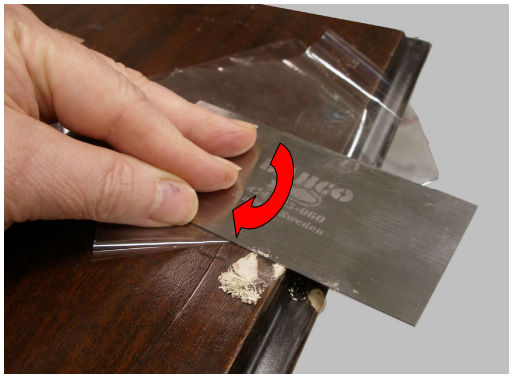


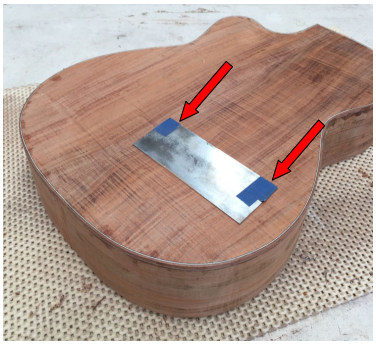
Use SS flat stock salvaged from **old windshield wiper blade** to drive down into joints. Grind end to wedge profile.

Use extra long (6”) 2 or 3 mm drill bits to get water into ends of lock joints. **Very cheap on eBay.** From China of course; postage paid about $1.70 each for the 2 and 3 mm diameters.

Use cabinet scraper to plane-off excess filler.

Keep **pressure** on scraper **over the film** and **rotate scraper** to cut through your excess filler.





Where you have a flat area inside, use it as a **plainer blade**.

Use cabinet scraper to **plane-off excess filler**. Separate it from your work surface using clear party wrapping film that is just 0.0006” thick.

Keep **pressure** on scraper **over the film** and **rotate scraper** to cut through your excess filler.

Where you have a flat area inside your edges, you can also apply tape to both ends of the scraper and use it as a **plainer blade**.

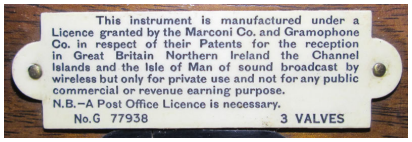
Here is my new favorite material for fabricating replica tags.

Incredibly tear resistant and stable.

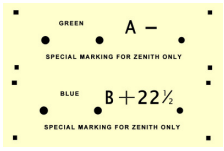
TERRASLATE PAPER

7 Mil Waterproof Copy Paper 8.5" x 11"

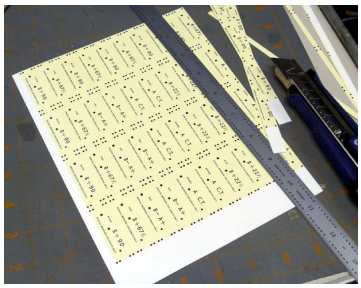
$16.99



Common type tags on British & European equipment.



Tags used on rare Zenith battery cable.



Works with any laser printer.

Thick Celluloid stock was used on battery cables and ID tags in the 1920s. However it seldom survives the decades. Here is my new favorite material for fabricating replica tags. Incredibly tear resistant and stable. Works with any laser printer. I just take my file and paper to my local Office Max print shop. They run it for me for 69 cents a sheet…

Original **Jones** plugs rarely survive.

The original Jones plugs rarely survive. Some highly collectible radios of the 1920s use a **Jones** 7 circuit socket for battery connections. Zenith, Howard, Mercury, etc. The plugs rarely survive because the cables were assembled using rubber jacket wiring that crumbles over time.

There are two versions of the plug. The first version has an internal snap ring that rusts over time. It becomes impossible to release without breaking the shell if you need to repair crumbled wiring. The second version has a threaded button that solves the problem and this is the version I made.

Shell can be made by turning down Schedule 80 PVC pipe and pipe caps. Any small lathe is going to be good enough to turn the shells.

Shell can be made by turning down on a lathe Schedule 80 PVC pipe and pipe caps. Shell is tapped 1”x20. 1” Delrin rod is threaded to make pin button. Fortunately with the tap and die you don’t have to do threading on the lathe. So any small lathe is going to be good enough to turn the shells. Fortunately the Jones male pins are standard brass cotter pin stock. (Some plugs found with pins nickel plated, others in yellow brass.)

Use faux paint technique to hide rust blemish.

Spray metallic paints just won't imitate old tin plate.

Rust on thin catacomb case too deep to sand down to good steel.

Sand surface level then saturate with high temp clear lacquer.

Daub silver guilders wax while lacquer is still slightly tacky.

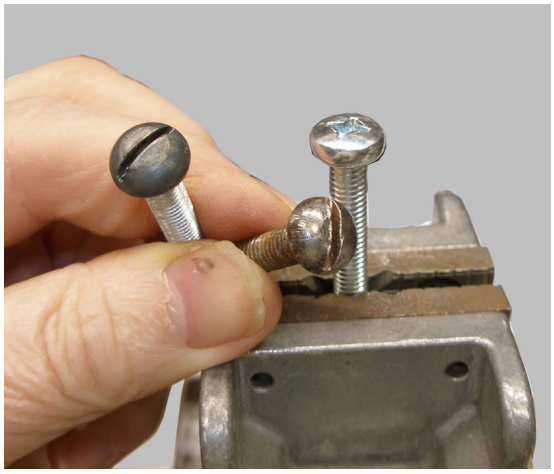
Rust on thin catacomb case too deep to sand down to good steel.

Sand surface level then saturate with high temp clear lacquer.

Daub silver guilders wax while lacquer is still slightly tacky.

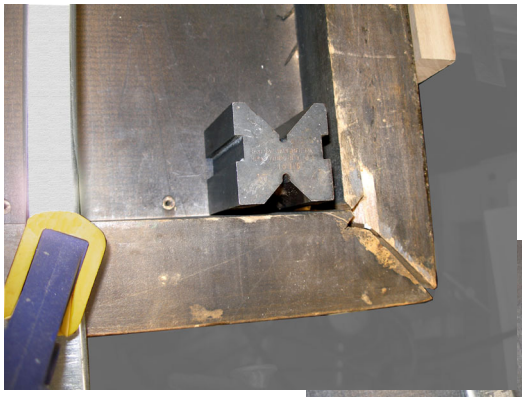
Apply thin cover coat of lacquer. Mixture is slightly waxy, use heat lamp to bake area at about 120 F for a day or two. Will last a long time in protected areas.

Desperate for an old screw? ***Stay-Brite*** low temperature silver solder and a new screw are all you need.



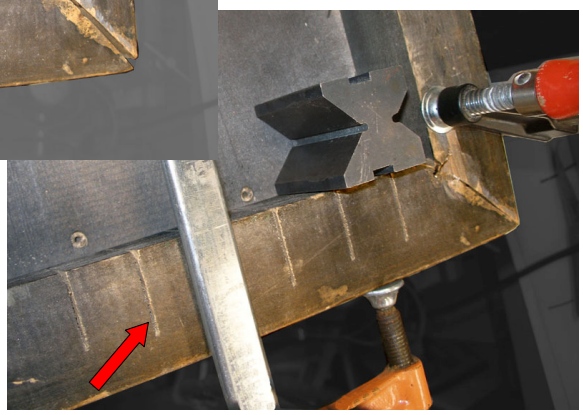
Desperate for an old screw? Stay-Brite low temperature silver solder and a new screw are all you need.

Melt ball of solder on top of Philips head screw. Use hack saw to slot the head and file round while spinning in the drill press or lathe. Apply metal darkening solution and buff.



Repair warped wood.

A heavy molding warped this bad will take extreme force to pull back in place.



Relieve the warp with deep multiple thin cuts across the grain.

A heavy molding warped this much will take an extreme amount of clamping force to pull back in place. Even if you pull it back in place, the glue will probably fail over time.

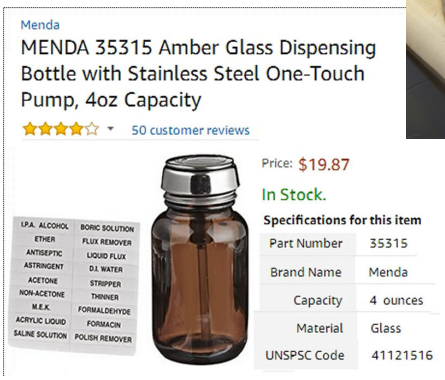
Relieve the warp with deep multiple thin cuts. After clamping in place, fill cuts with glue and force-in sheets of wood veneer.

You need good pump bottles for your solvents.

Beware cheap China bottles.

Useless for thin solvents.

I can only endorse the MENDA brand…. Expensive but durable.



3 bottles for Alcohol, Mineral Spirits & Lacquer Thinner.

3 ml poly Pipettes for transfer of stains and coatings. Less than 10 cents each.

You need good pump bottles for your solvents.

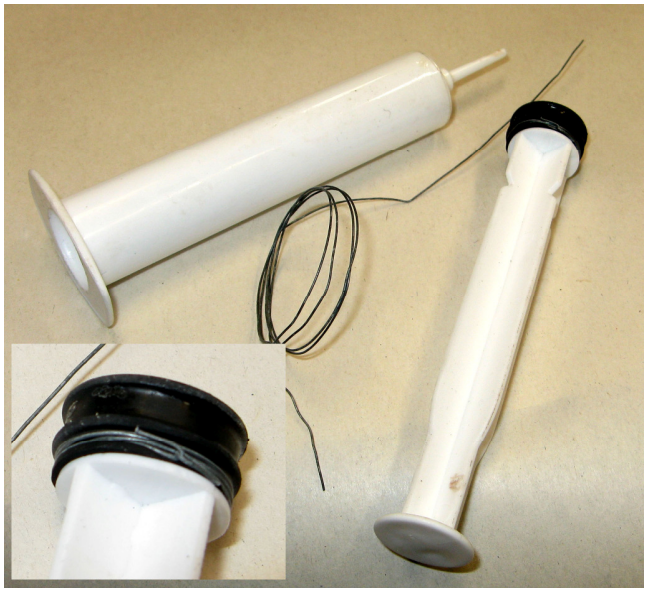
And I emphasize **GOOD** pump bottles. There are many cheap China made bottles on eBay and Amazon that prove **useless** for **thin body** solvents.

I can only endorse the MENDA brand…. Expensive but durable.

My workbench has 3 bottles for Alcohol, Mineral Spirits & Lacquer Thinner.

Have disposable 3 ml poly Pipettes at hand for transfer of stains and coatings. Less than 10 cents each.

Large plastic syringes made more useful by this simple mod.



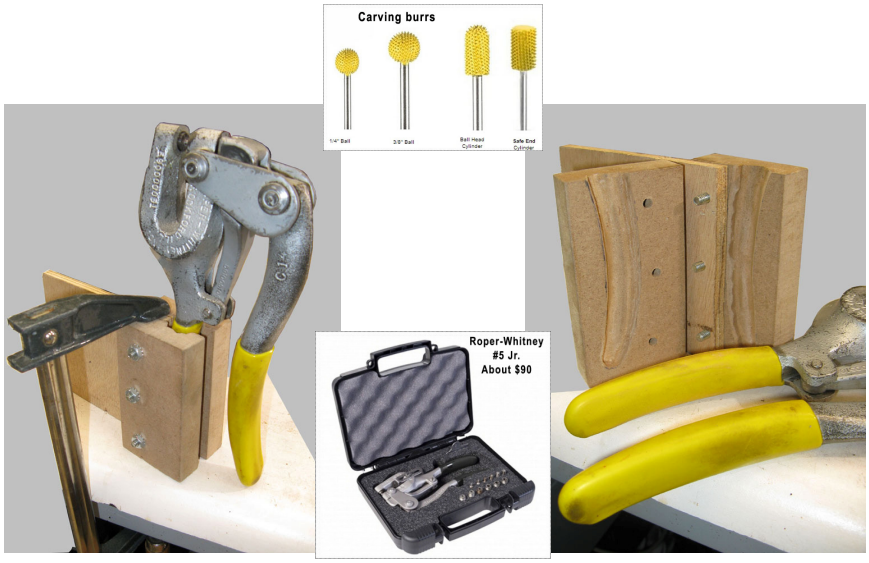
Three turns of small gauge iron wire used by florist does the job.

Large disposable plastic glue syringes made more useful by this simple mod.

I use a small detail spray gun and air brush for a lot of jobs so need to transfer only a small portion of lacquer at a time from a quart or gallon can. Disposable plastic glue syringes ALMOST work for this task but the neoprene plunger head will often pull off the plunger.. A simple upgrade is to wrap the head with the smallest gauge florist iron wire. Three turns is all it takes.

This style hand punch is currently available as: **Eurotool Punch Plier** for $30 - $50. Knockoff of USA made **Roper-Whitney #5 Jr.** @ about $90

Made much easier to use by this simple adaptor.



I use this punch pliers all the time in my shop to make little brackets, replacement insulators, washers, punch fiberglass board stock, etc.

Making this clamp to hold the unit to the bench **vertically** makes it far easier to use. It is just a scrap of plywood and two pieces of MDF board that you carve using a Dremel tool and a carving burr. I have both Roper-Whitney and a knockoff versions of this punch.. The main difference is in the quality of the punch and die steel. The knockoff is fine for occasional use… The R-W punch & dies will hold up longer. Both punches and dies can be easily dressed in a drill press using a grinder disk in your Dremel tool.

Hints & Kinks

For electrical artifact conservation and restoration.

Prepared January/March - 2018

I intend to post an annotated version of these slides on my Web site. Just Google KD4HSH

Hints-N-Kinks URL

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