Photo Etching for Modeling and Fun

Or, how to kill an afternoon and create parts for your ship models that otherwise are unavailable or so unique in nature that to do so otherwise would fly in the face of superb modeling and impress your friends and fellow modelers by adding that element of detail to any project evoking the applause and accolades of all those who gaze upon your modeling prowess ...or, not!

Let's get on with it!

“Photo-etching” is a process that uses a light-sensitive photoresist applied to the surface to be engraved to create a mask that protects some areas during a subsequent operation which etches, dissolves, or otherwise removes some or all of the material from the unshielded areas of a substrate.

A **photoresist** is selected which is resistant to the particular etching compound to be used. It may come in sheet form and be applied by laminating. It is then exposed to light—usually strong ultraviolet (UV) light—through a photographic, mechanically printed, or manually created image or pattern on transparent film.

Typically, the photoresist is hardened where it is exposed to UV light.
A developer is used to wash away the soft parts, laying bare the underlying material, which is then bathed in the etchant.

The remaining photoresist is removed after the operation is complete.

The more accurately named process is called . . .

Photochemical machining

...the end!

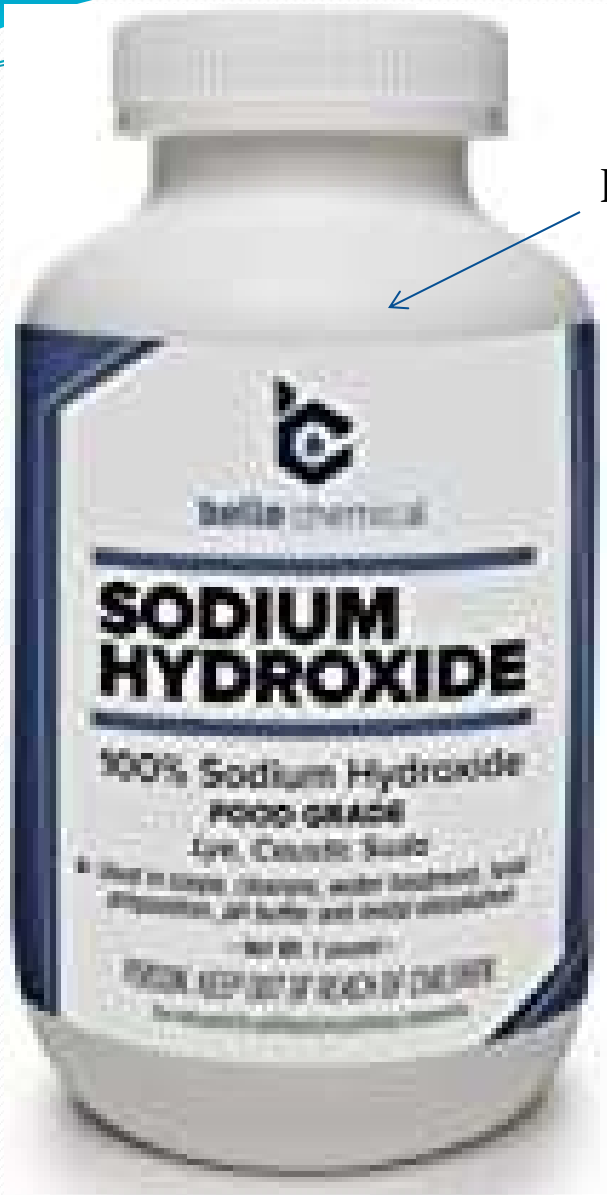
The Products

A good beginner's kit, however limited in application.


ProEtch
Etchant Solution
ProEtch
Developer / Stripper
PRO-ETCH
LAMINATOR
by Micro-Mark
VL-110
WARNING!
Surface high-temperature
Micro-Mark
PRO-ETCH
A True Photoresist
Metal Etching System
Instruction
Manual
Micro-Mark
340 Snyder Avenue
Berkeley Heights, NJ 07922
Model not included

Dual purpose Developer and Stripper chemical.

Mix 1-4 with water for developing the negative and full strength for stripping the photo resist from the finished brass.



Mask stripper

Developer

An alternate source for these available from Amazon at a greatly reduced cost.


Preferred chemicals
MG Chemicals
FERRIC CHLORIDE
COPPER ETCHANT SOLUTION
DANGER
MG Chemicals
SODIUM PERSULFATE
Copper Etchant/Etchant de cuivre
Dilute crystals to make 4 liters (1 gallon) of solution.
Diluez les cristaux pour faire 4 litres (1 gal.) de la solution.
CARB COMPLIANT
CAUTION/ATTENTION
MG Chemicals
AMMONIUM PERSULFATE
CAUTION/ATTENTION
Etchant options

I have not sourced a replacement for this….yet!


Laminator carrier sheets
Used for transporting brass and film thru heated laminator.

Photoresist film and inkjet film both sourced from Amazon at, again a better cost.

Used to sensitize brass for etching.

Used to produce printing negatives.

Photoresist film

Micro-Mark
THE SMALL TOOL SPECIALISTS

REQUEST CATALOG | LOG IN | CART | CHECKOUT

Search for products

MICRO-MARK HOME | MINI POWER TOOLS | MINI HAND TOOLS | MODEL TRAINS | MODEL KITS | HOBBY SUPPLIES | MICRO-MAKE™ SHOP | NEW, GIFTS & CLOSEOUTS

Home › Soft Touch Sanding and Polishing Pad Set (Set of 6)

Soft Touch Sanding And Polishing Pad Set (Set Of 6)

Item #: 81601

Our Price $12.95

QTY 1

ADD TO CART | ADD TO WISHLIST

Micro-Mesh Soft Touch Polishing Pads Are Ideal For Scale Model Finishing

A texture-free surface is the most essential element in creating a professional-quality finish on your projects. To achieve this result, the surface must first be sanded to a uniform level, then polished using a series of successively finer grits until all the blemishes and scratches have been blended out of the finish. With grits ranging from 2400 to 12000, Micro-Mesh Polishing Pads are not only ideal for creating or restoring a high-gloss finish on painted and unpainted surfaces, they can also be used for creating crystal clear finishes on full-size non-glass canopies and windscreens, polishing metals, and producing ultra-smooth finishes on wood. Micro-Mesh features micro grains of abrasive bonded with a resilient adhesive to a cushioned, soft cloth backing, providing a smooth shaving action across surfaces, rather than gouging and abrading them. And Micro-Mesh lasts longer than other sanding products, because its construction prevents the abrasive crystals from fracturing and overheating, whether used dry or wet. Soft Touch Pads feature Micro-Mesh abrasives laminated to both sides of a 2 inch x 2 inch x 1/8 inch soft foam pad with rounded corners. This unique cushioned design, combined with its comfortable size and ergonomic feel, provides additional control and less pressure for the more intricate contours and smaller areas.

See More

People Who Viewed This Item Were Also Interested In

Brass cleaning and preparation

To get in close for negative alignment.

Weighing chemicals

Cutting brass and film

Available in
4x10” and larger.

Commonly used brass. I prefer .005” for smaller details and .010” for more structural components. Both from Amazon.

Micro-Mark®
THE SMALL TOOL SPECIALISTS

REQUEST CATALOG | LOG IN | CART | CHECKOUT

Search for products

MICRO-MARK HOME | MINI POWER TOOLS | MINI HAND TOOLS | MODEL TRAINS | MODEL KITS | HOBBY SUPPLIES | MICRO-MAKE™ SHOP | NEW, GIFTS & CLOSEOUTS

Home › Strainer Funnels (Set of 3)

Strainer Funnels (Set Of 3)

Item #: 83119
Our Price $19.95

QTY: 1

ADD TO CART | ADD TO WISHLIST

Filter Funnels Prevent Airbrush Clogging

These miniature solvent-resistant paint funnels have a stainless-steel strainer that traps the clumps and bumps that clog airbrush nozzles and siphon tubes. They work with all types of hobby paint and are the perfect size and shape to prevent messy spills while transferring color from bottle to airbrush cup or siphon jar. Set includes 3 funnels: one each with medium, fine and extra-fine mesh strainers. Just clean with solvent and use again and again.

People Who Viewed This Item Were Also Interested In


PRO-ETCH
LAMINATOR
by Micro-Mark
VL110
WARNING!
Surface high-temperature
C
H
COLD
HOT
HOT COLD POWER

Orders over $50 qualify for a **free gift** claim yours here after filling your shopping cart.

CircuitSpecialists

Clearance Lab Kits Help

What are you looking for? 0 SALE

Test Equipment | Soldering Equipment | Power Supplies | Digital Panel Meters | Stepper Motors | Electronic Parts/Supplies | Printed Circuit Board Fabrication | Breadboards & Design Aids | DAQ & Industrial Control | Chemicals | 3D Printing

Home » Printed Circuit Board Fabrication

Printed Circuit Board Fabrication

Circuit Specialists stocks everything you need for printed circuit board (PCB) fabrication including PCB material, etching tanks, and much more. If you're looking to do a small production run have a look at our low-cost pre-sensitized PCBs; which allow you to go directly from your computer plot or artwork layout to the circuit board. If you're prototyping or building single-lot PCBs you'll be interested in our electroless and electroplating solutions and anode sets for through-hole preparation.

PCB Material

Exposure Units & Etching Tanks

PCB Accessories

Photochemicals

We work hard to provide you with the best possible shopping experience. But don't take our word for it — here are some past customer reviews:

★★★★★ Quick and easy to use. An order summary on the 'submit order' page would be nice to ensure everything is correct.

TAYLOR H
30 Apr 2018

Exposure Units & Etching Tanks

Have a look at Circuit Specialists' great deals on high-grade exposure units and etching tanks for your printed circuit board (PCB) fabrication projects. We carry deluxe UV exposure units with vacuum pumps that make for fast, even exposures of PCBs in seconds; the integrated vacuum pump "freezes" PCBs for perfect alignment with your artwork. Our low-cost etching tank system with agitator and heater is an ideal, low-cost choice for etching up to two boards simultaneously.

Filter results

Reset filters

Availability ×

- [ ] In Stock (4)

Categories +

Viewing 1–5 of 5 products

Sort by: Relevancy

Affordable PCB Etching System with Agitator and Heater

★★★★½

$59.95

In Stock

Item no. ET20

Low Cost PCB Etching System

$60.00

In Stock

Item no. 416-ES

Deluxe UV Exposure Unit With Vacuum Pump

$539.00

In Stock

Item no. KVB-30D

Fluorescent Exposure System

★★☆☆☆

$65.00

In Stock

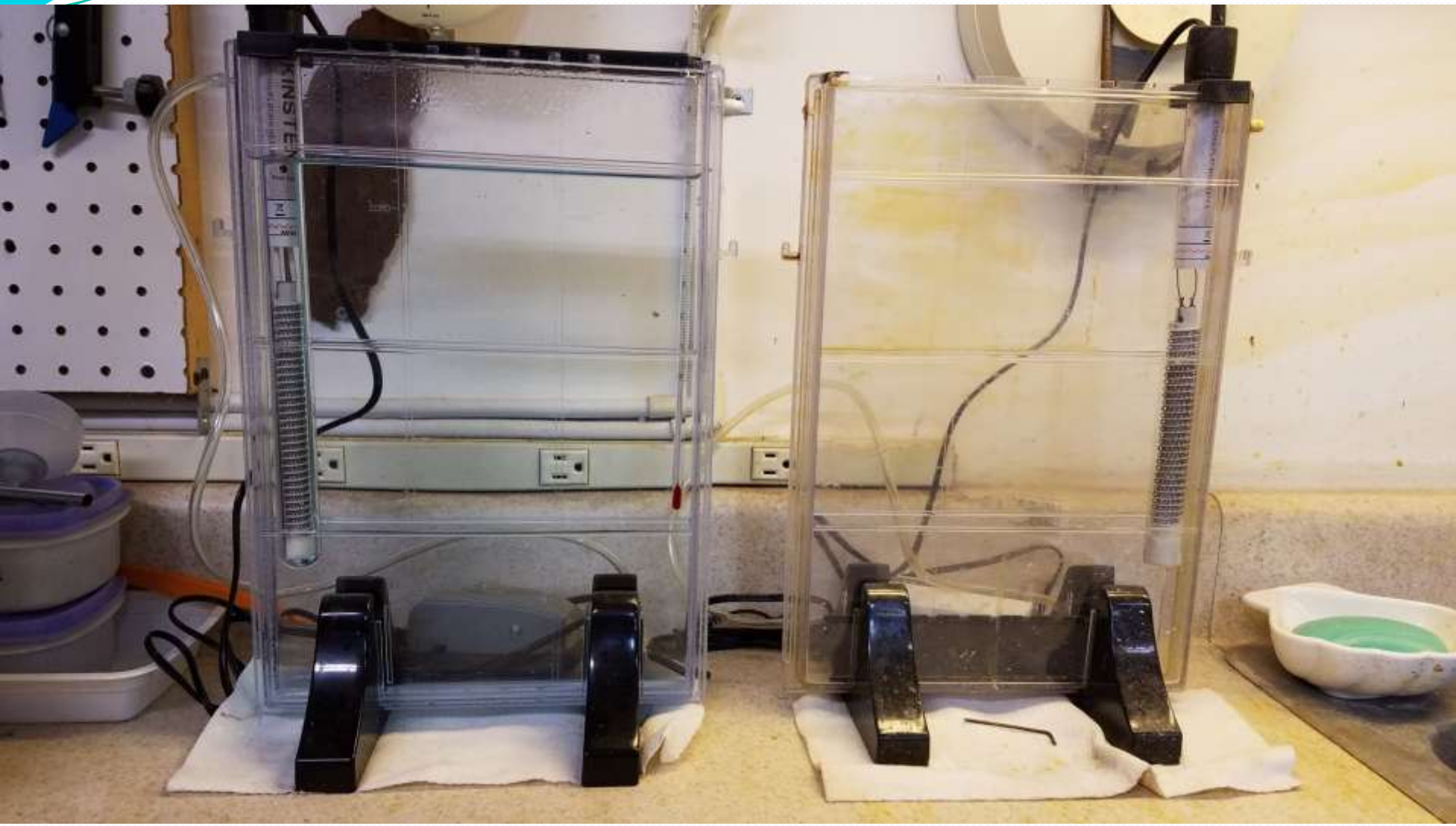
Item no. 416X

Replacement Fluorescent Tube for the 416X Exposure System

$13.35

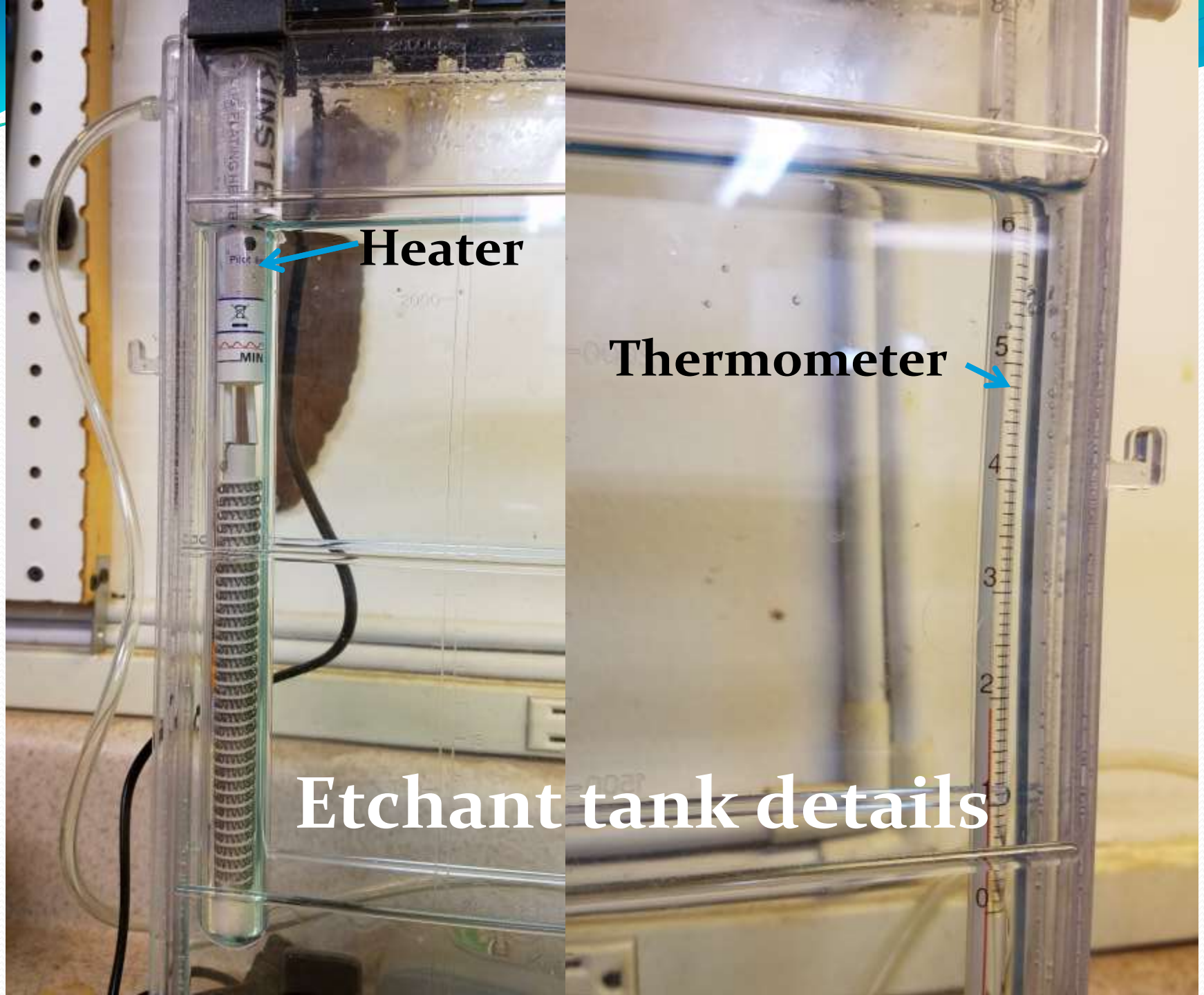
In Stock

Item no. 416B



Etchant tanks

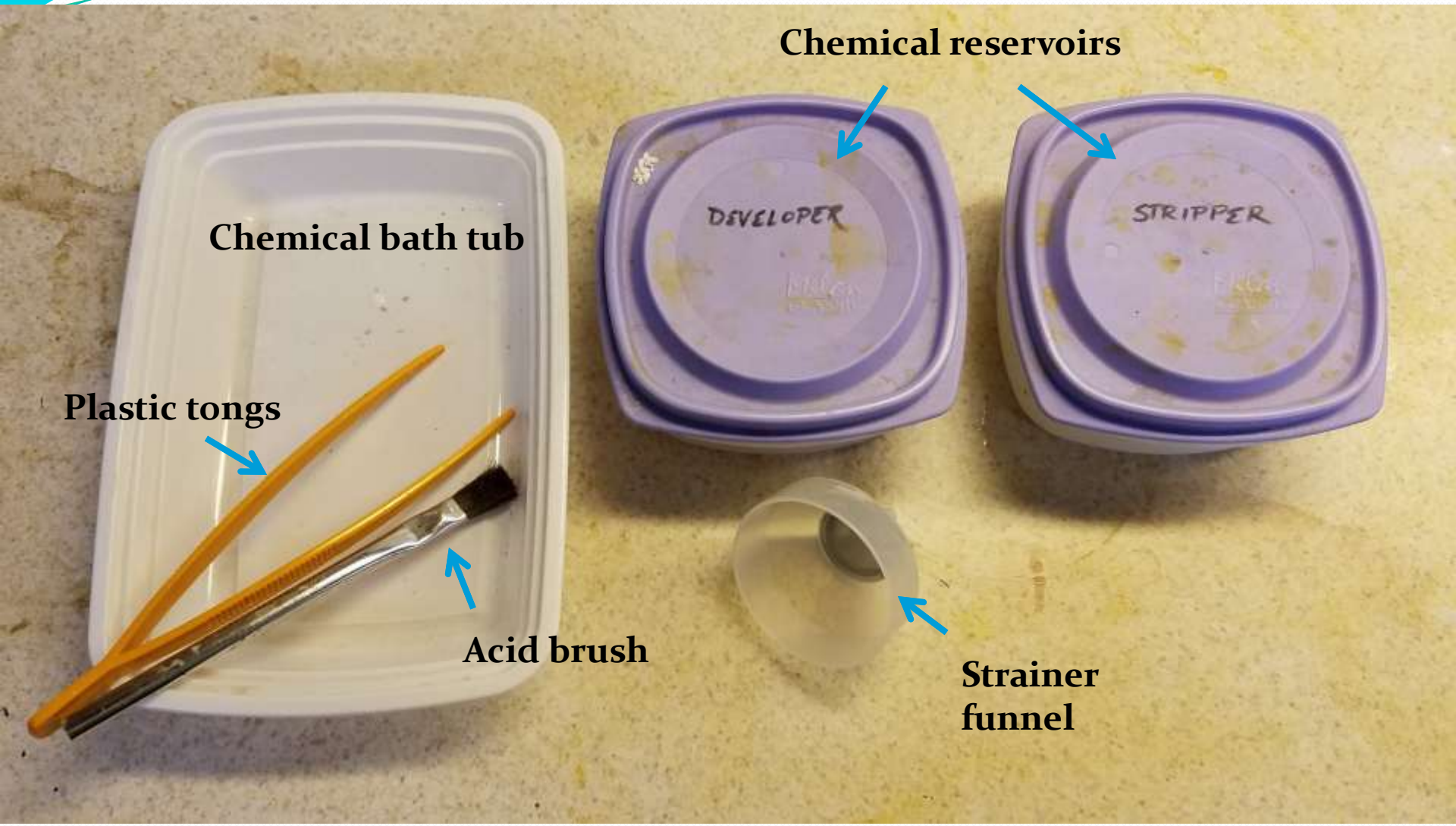
A complete work station



Etchant tank details

Heat Laminators

Air agitator

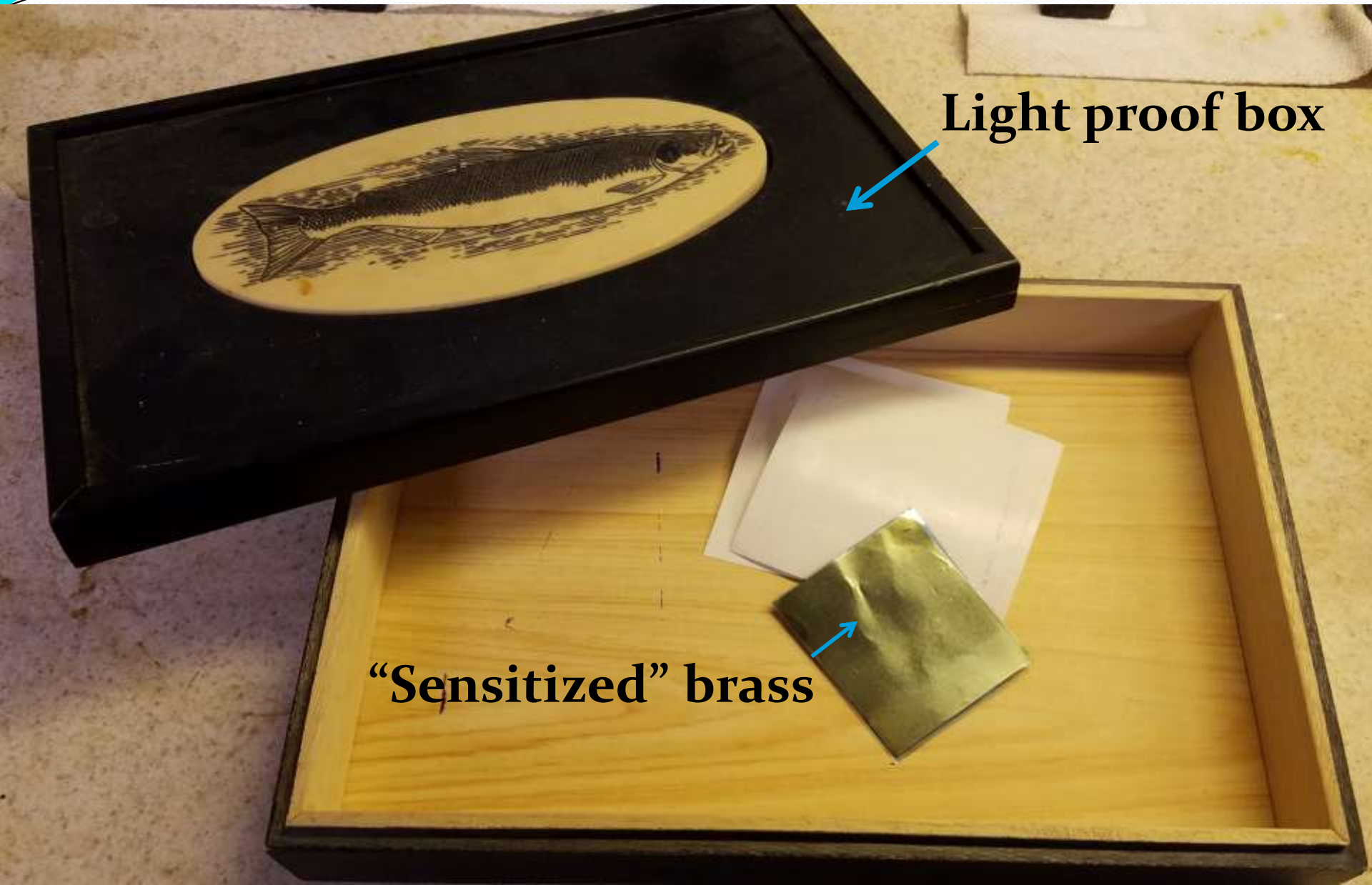


Additional containers and tools


Back light for negative alignment
Laminator
GBC
Exposure

Breaking Bad was a great **show**….wasn't it?

Here's all the good stuff.

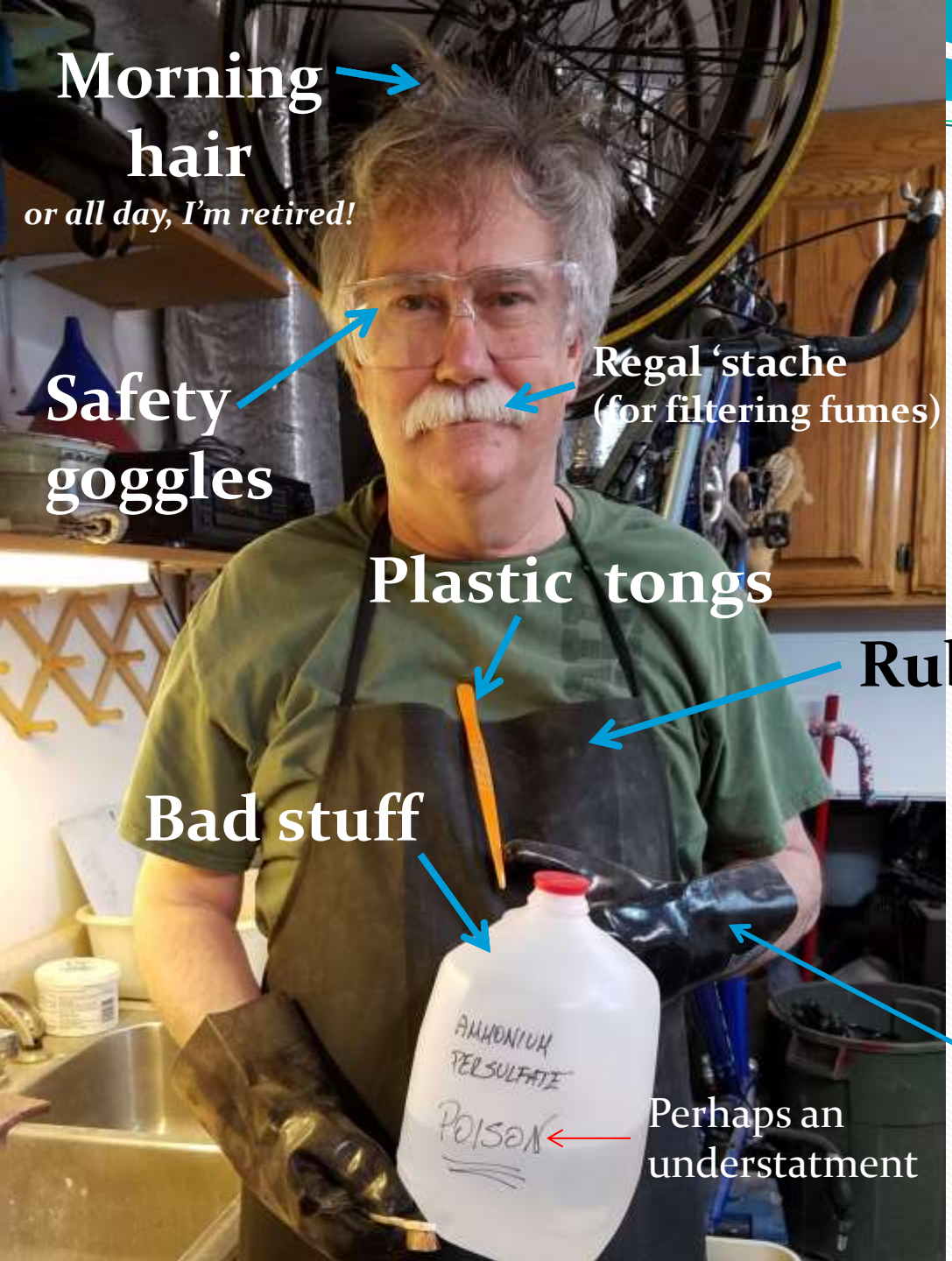

Light proof box
“Sensitized” brass

Now that we have all the product assembled, it's time to suit up, mix the chemicals, fill the tanks, cut the brass and film. Take a deep breath….ok exhale.

The entire process is very simple.

Design the part wanted on a computer. This may actually be the most complex part of the whole evolution .

The rest is basically Alchemy.

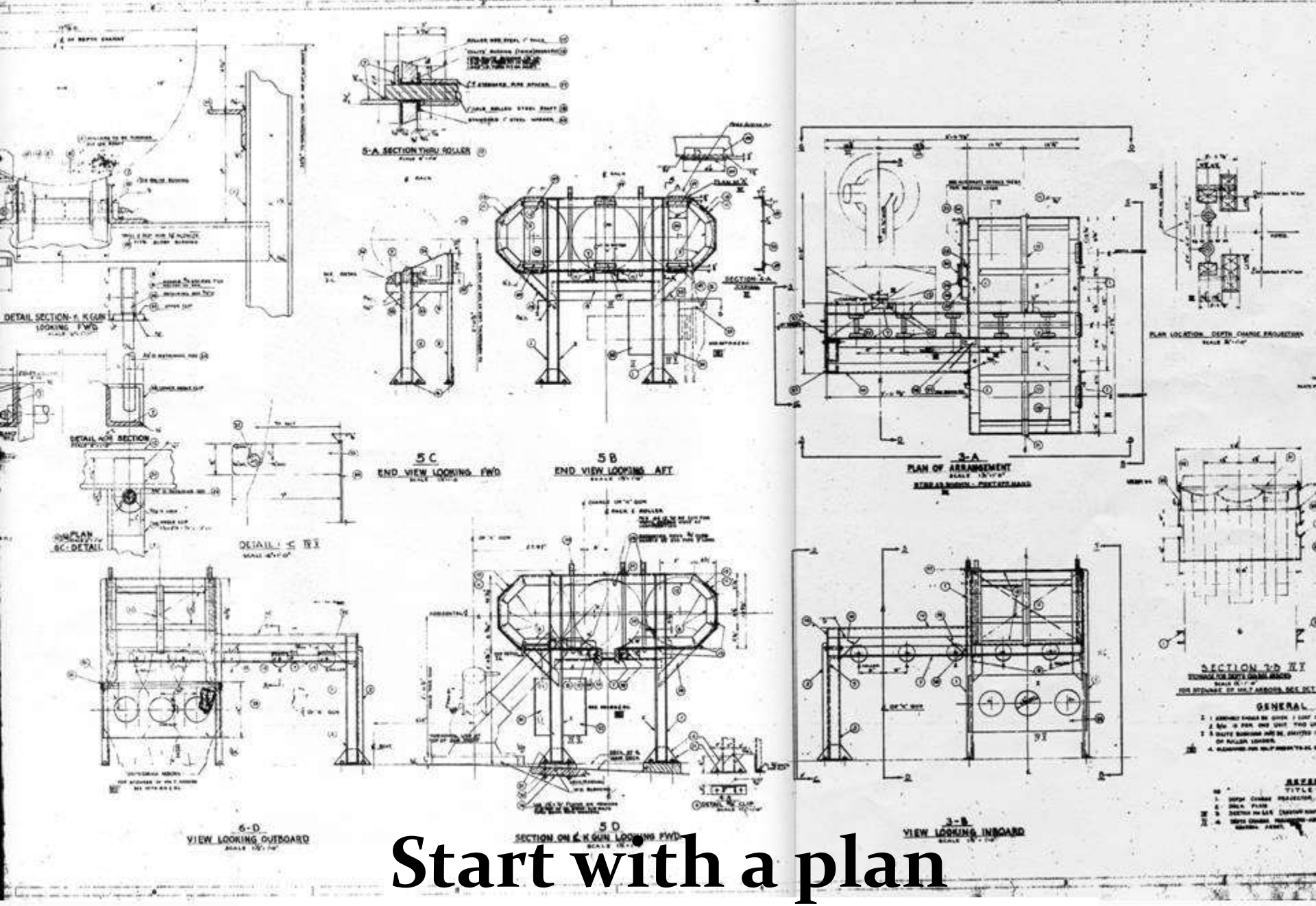


The well attired Photo-etching dude

Actually thinner gloves might serve better.

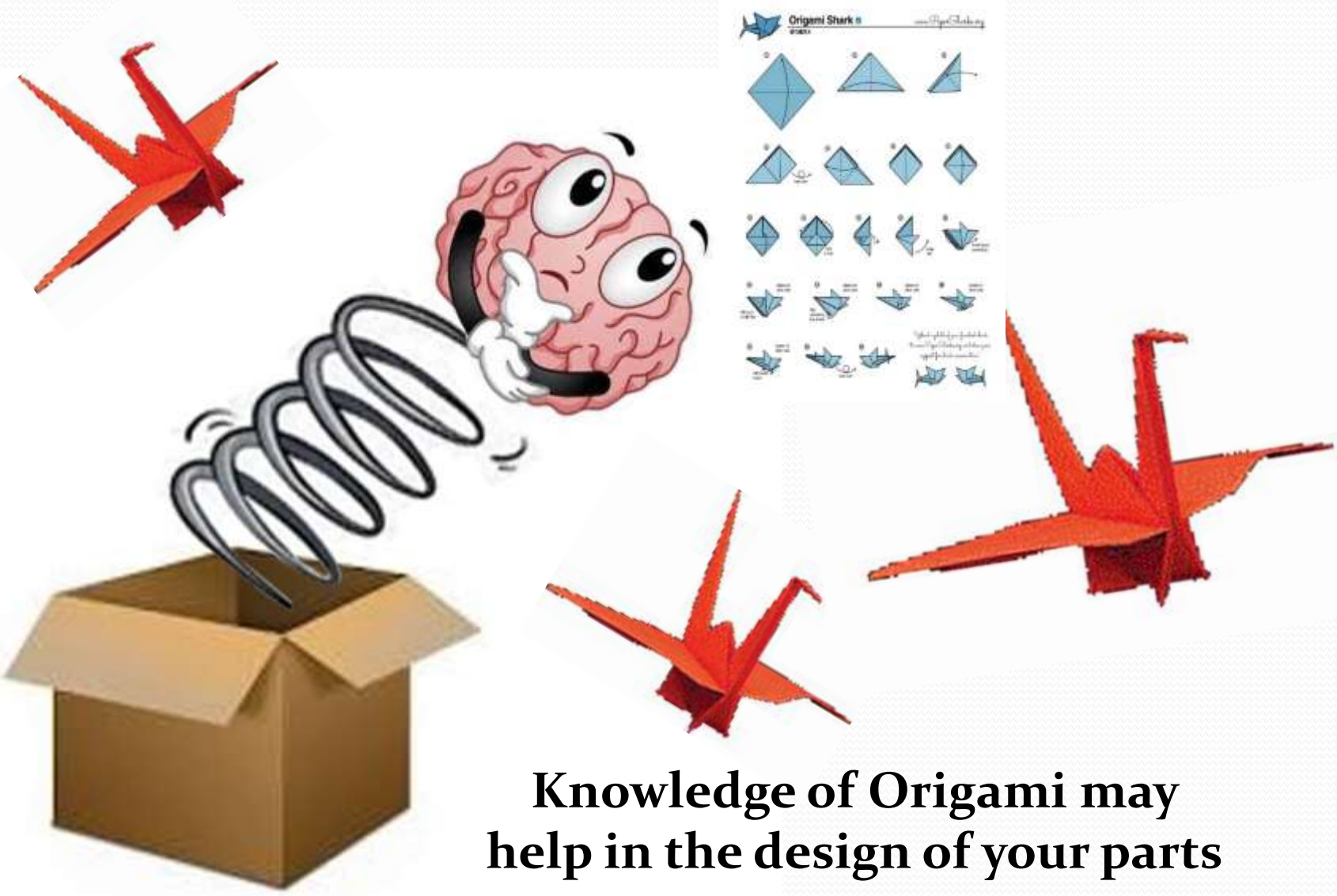
The Process

Creating Artwork

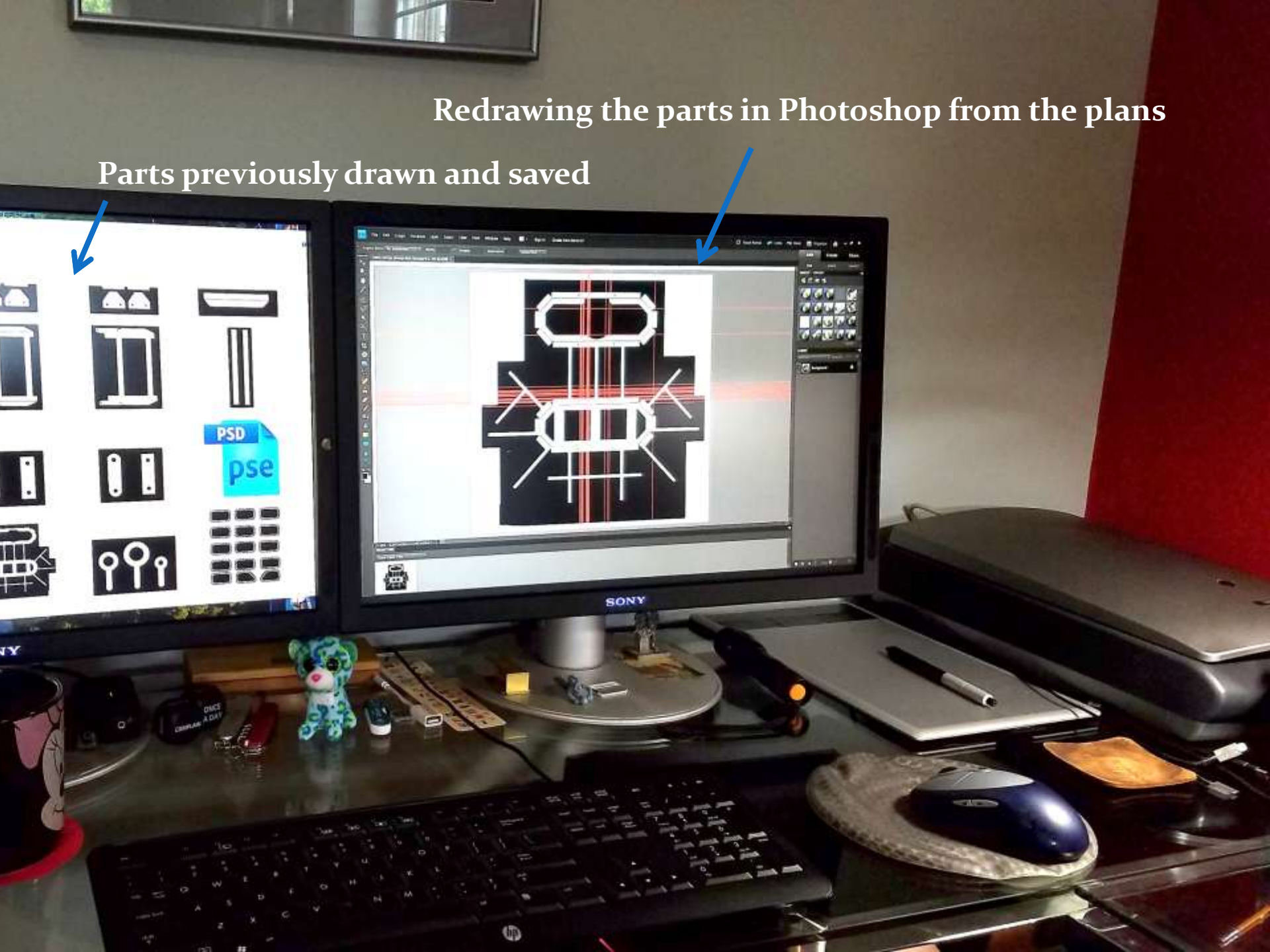


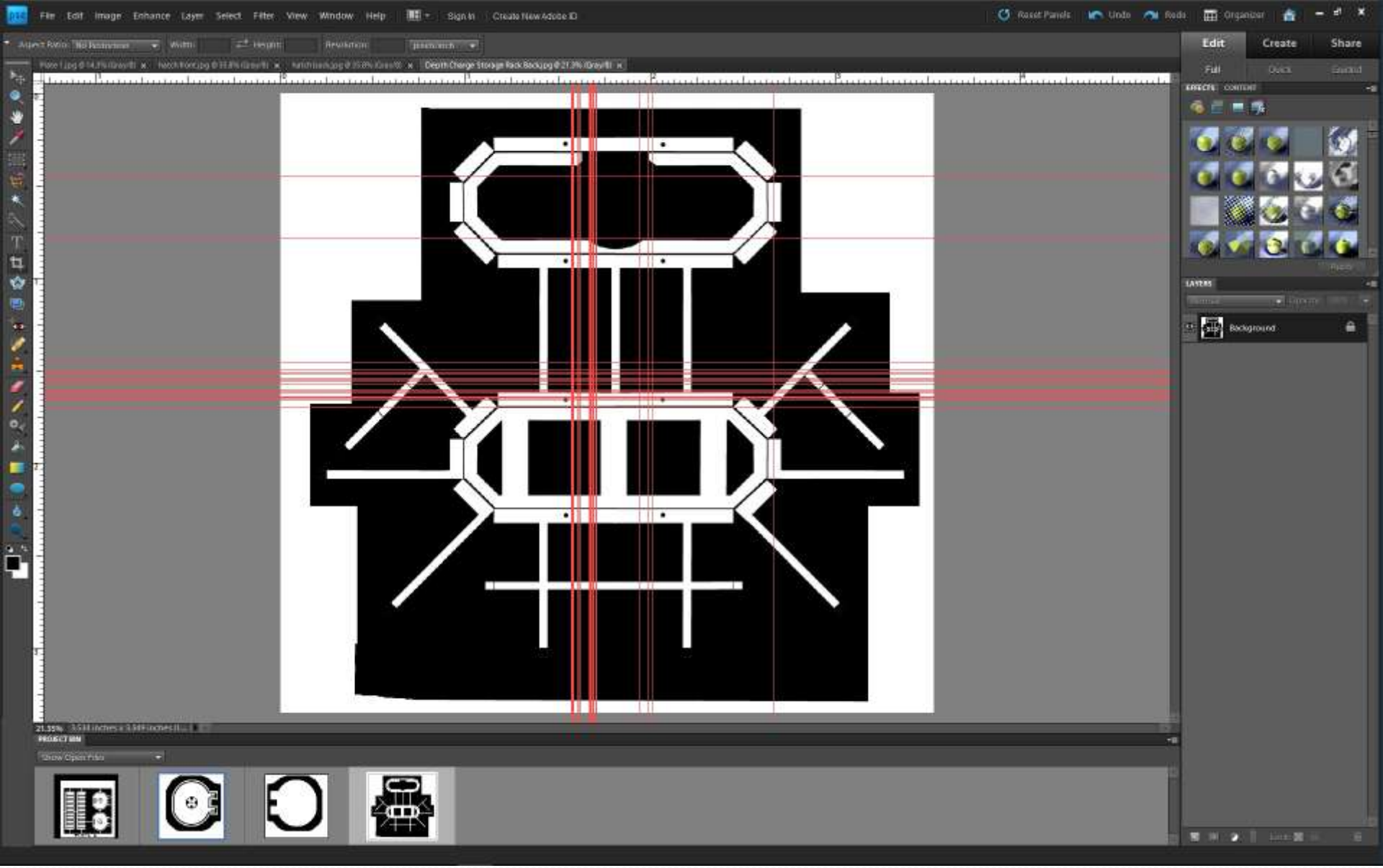
Start with a plan

Start with a simpler design until comfortable with the process.



Knowledge of Origami may help in the design of your parts


Redrawing the parts in Photoshop from the plans
Parts previously drawn and saved
PSD
pse
SONY



Photoshop is an easy and basic tool for drawing parts. All you need is a program that can draw lines, circles and fill spaces.

The best tool is the one which you know how to use.

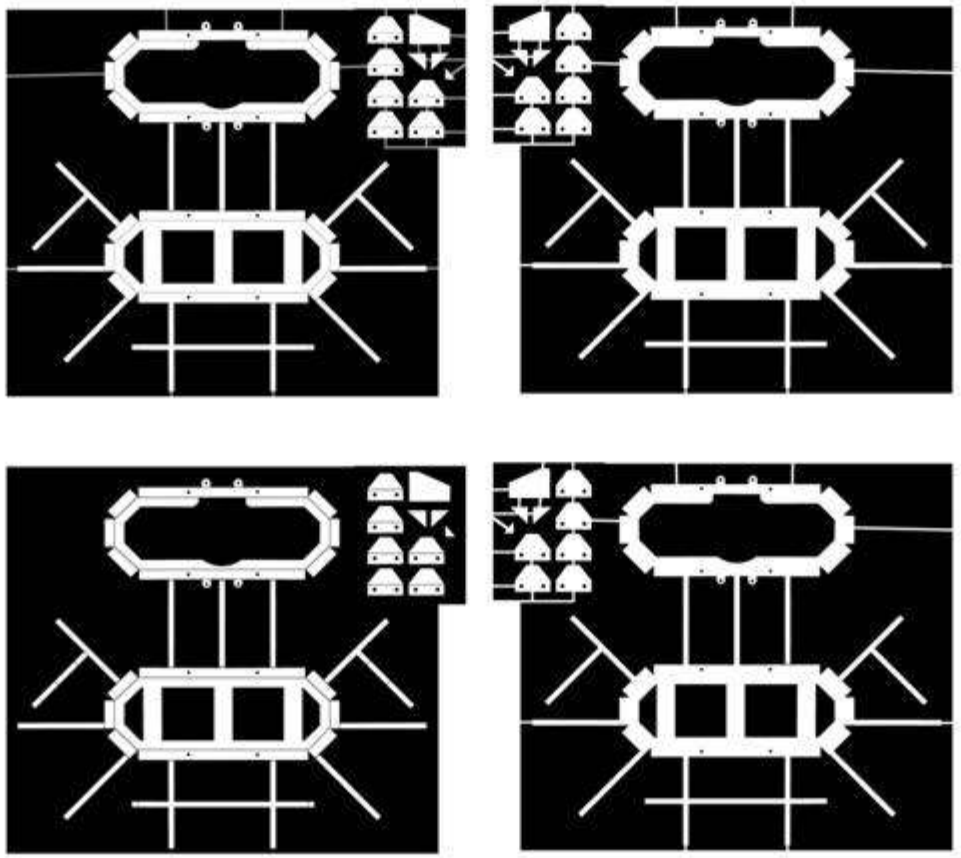
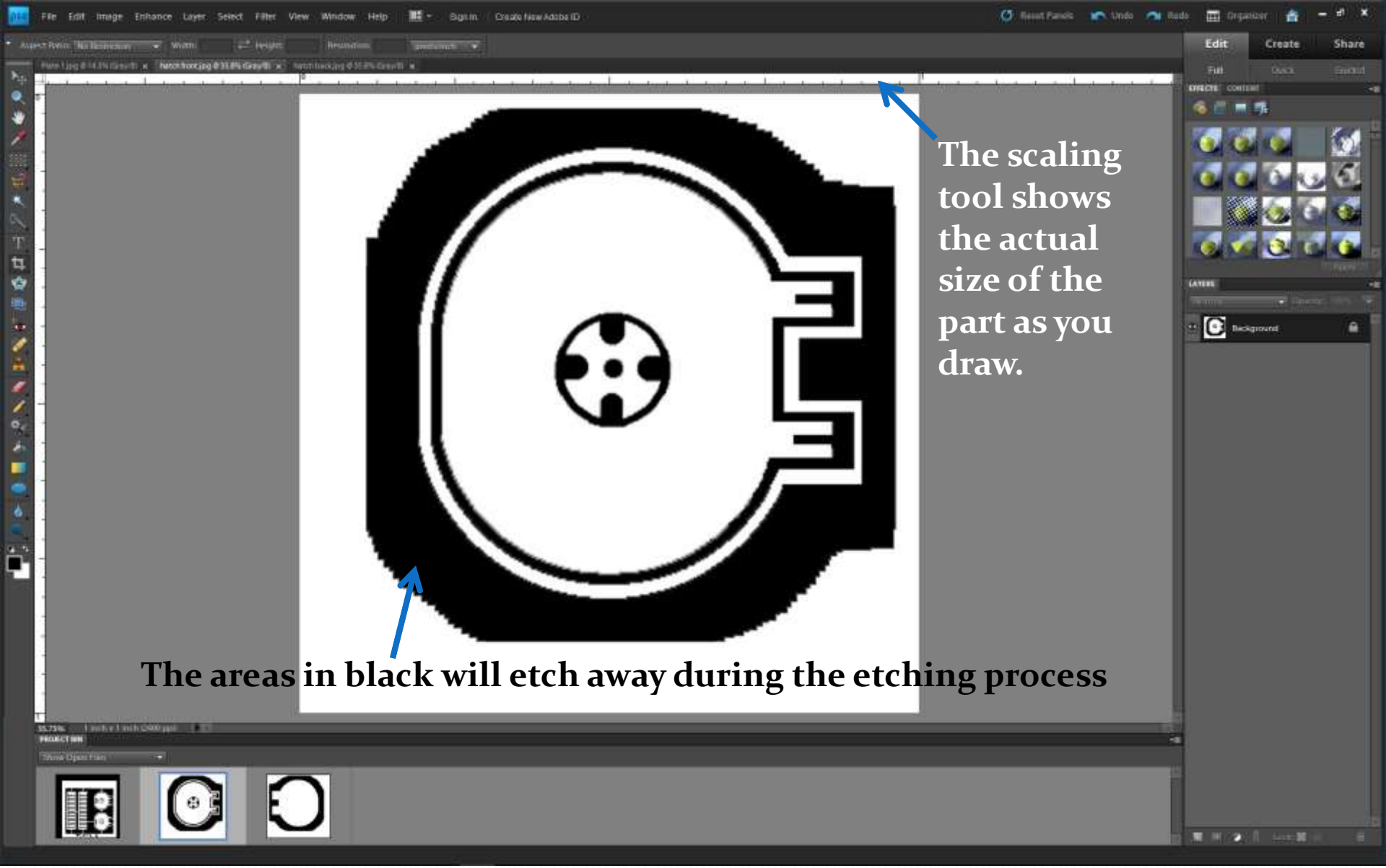
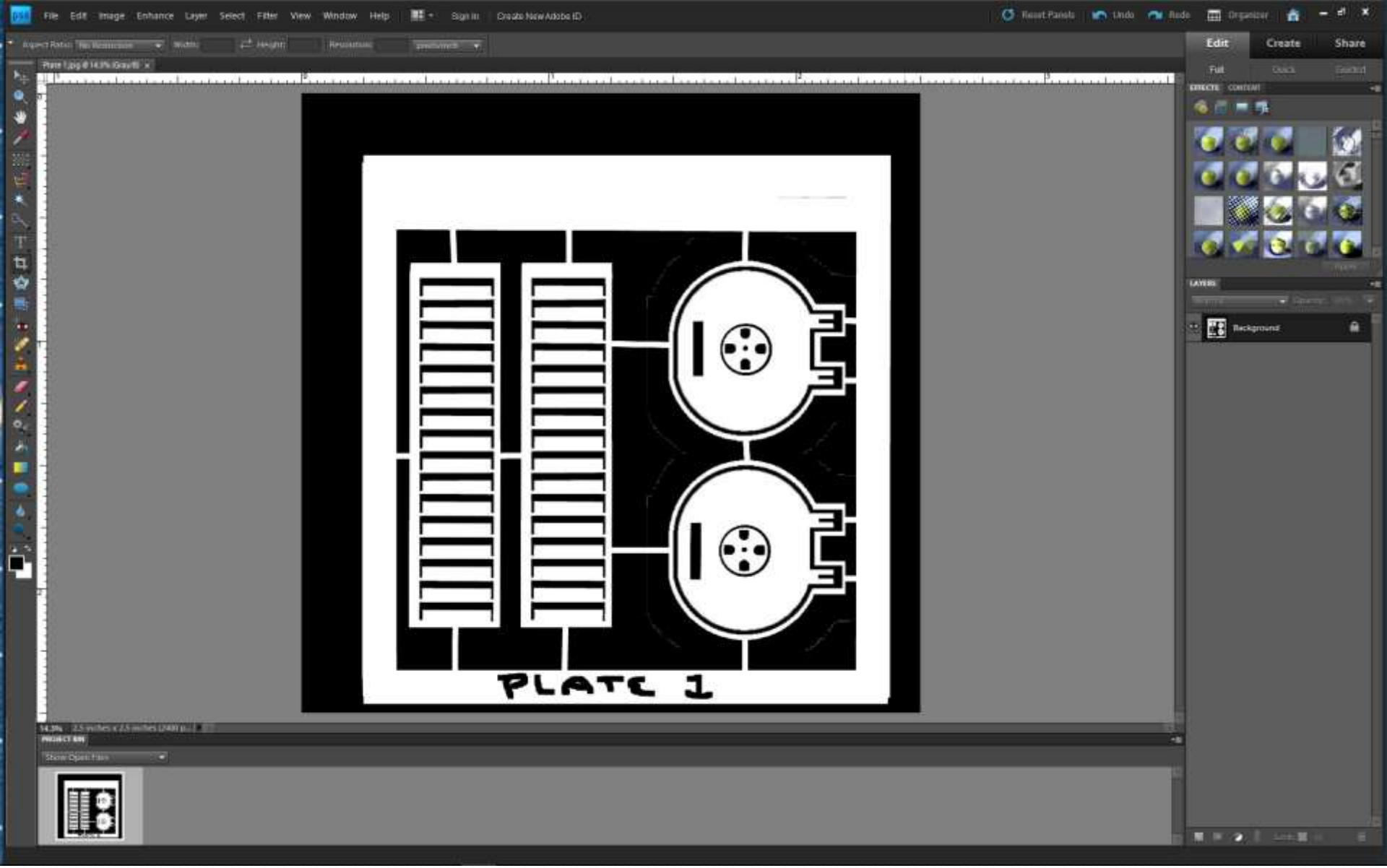


Photo etching art for the depth charge racks

More art being created for the Sub Chaser model



I typically draw at 1200 dpi which when printed onto the negative film is more than enough to smooth the edges. The printer can only print at 600 dpi anyway.

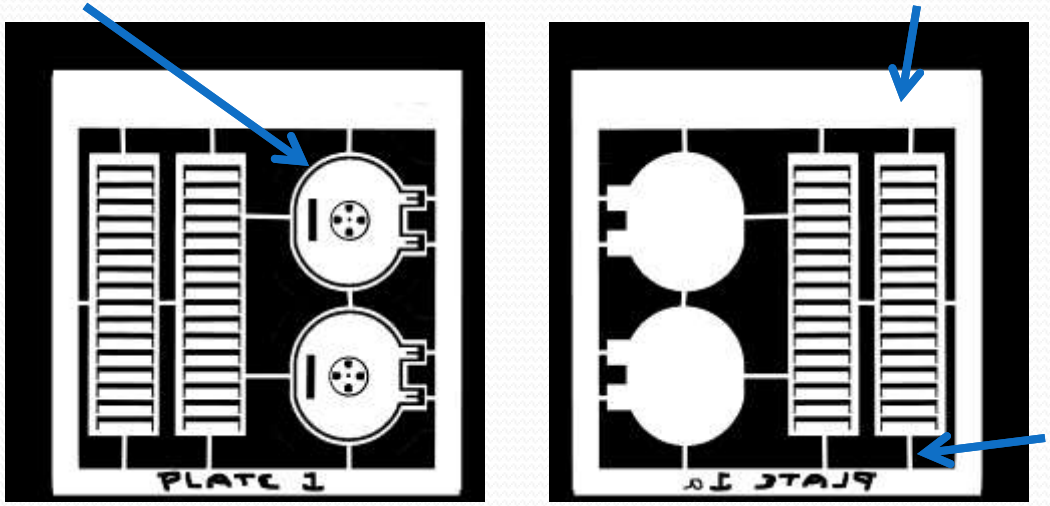


Drawings can be combined with other art to form plates for etching. Remember that the white areas are the parts that will be created, while that in black is dissolved and removed…etched away.

Front plate with detail to be relief etched.

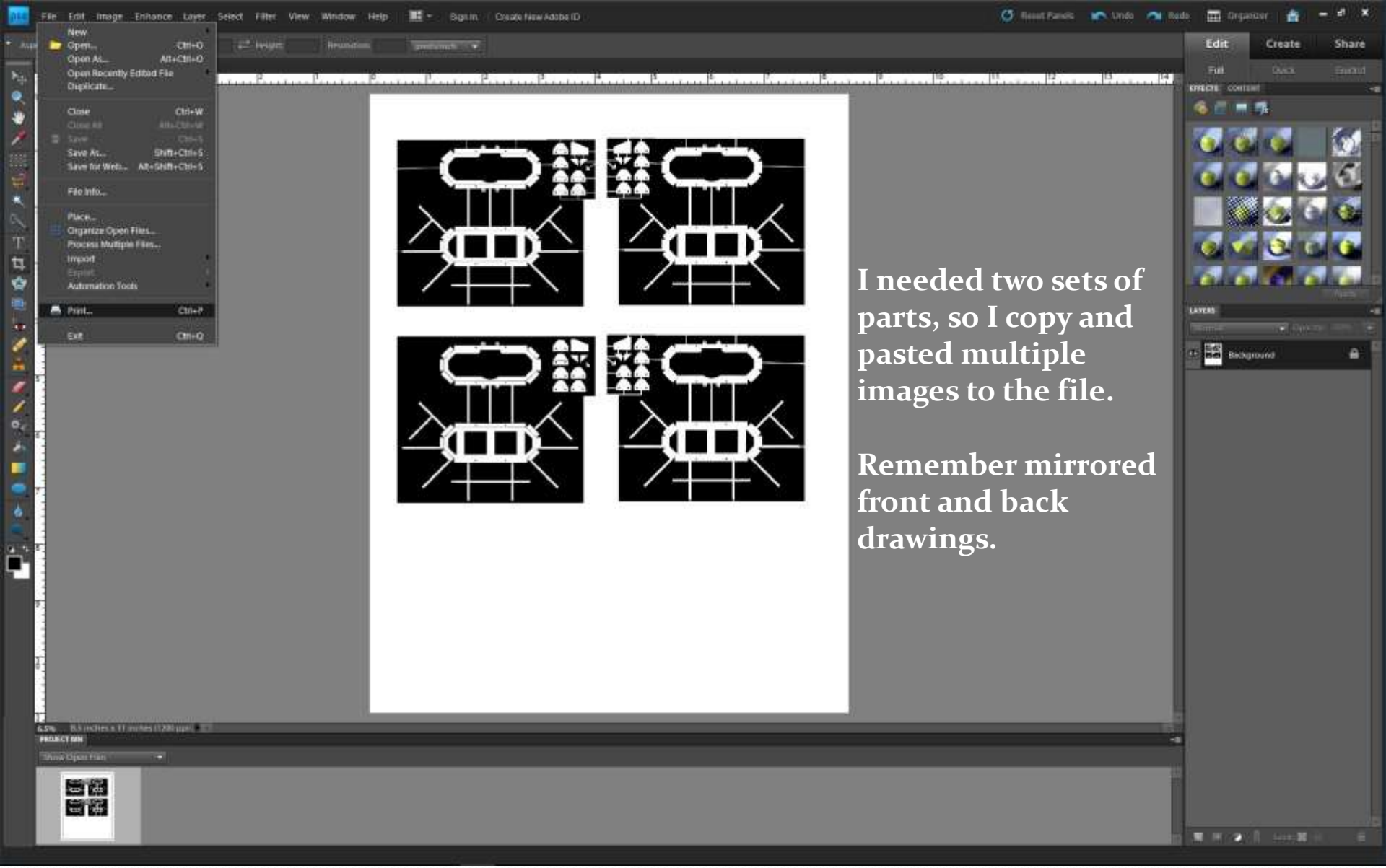
Back plate with no detail.

The two plates are mirror images of each other.



Sprue

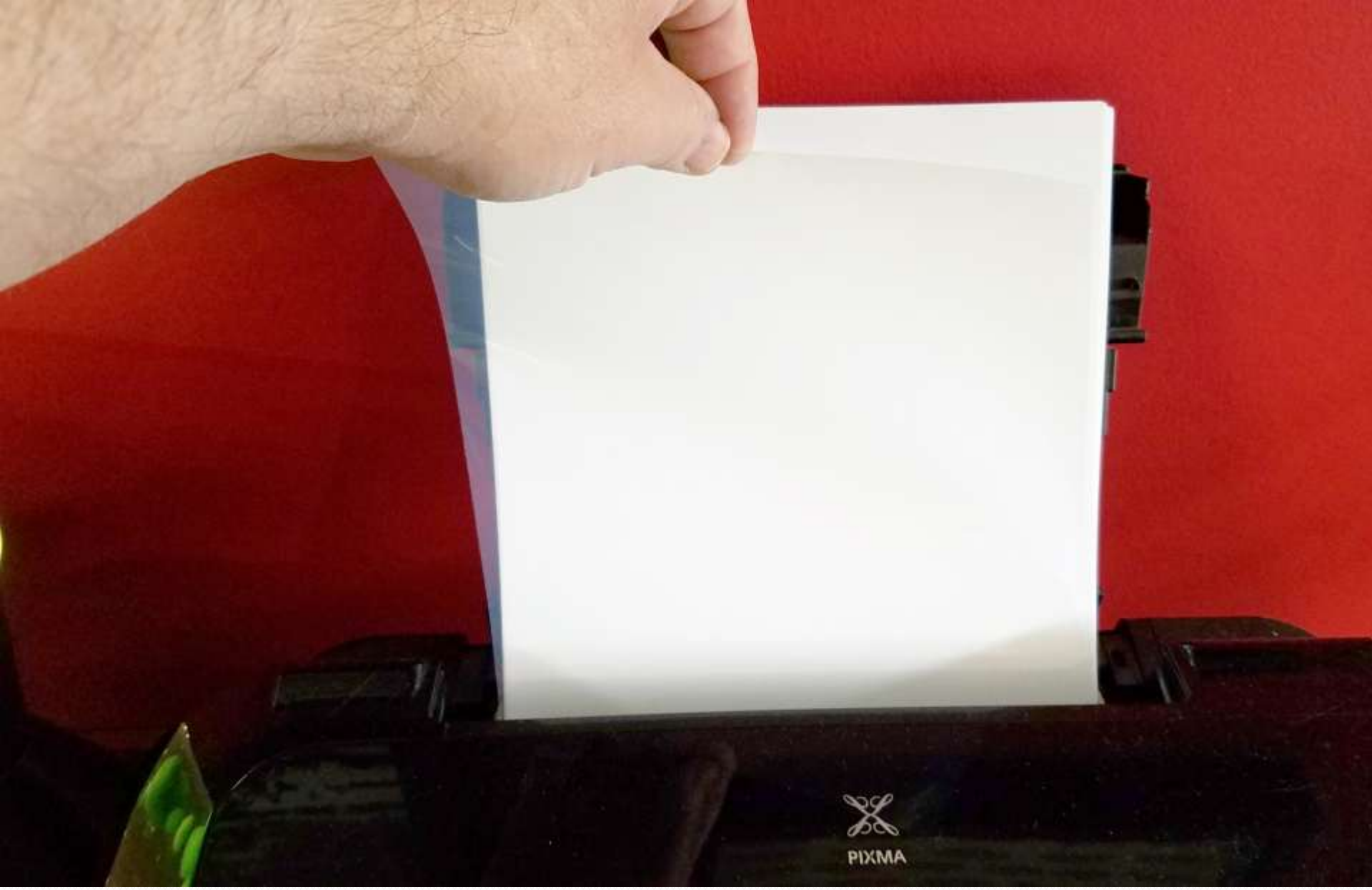
Because the brass is etched from both sides, both front and back art need to be made and may differ to create relief on one side only or cut all the way thru. Sprues must also be added to connect the parts to a tree, otherwise you *WILL* go fishing for them in the bottom of the etching tank....I KNOW!



Once the art is finalized, it's time to print your negative onto the film using any typical inkjet printer. Print at the highest resolution and highest contrast available for best results.

Printing the Negative

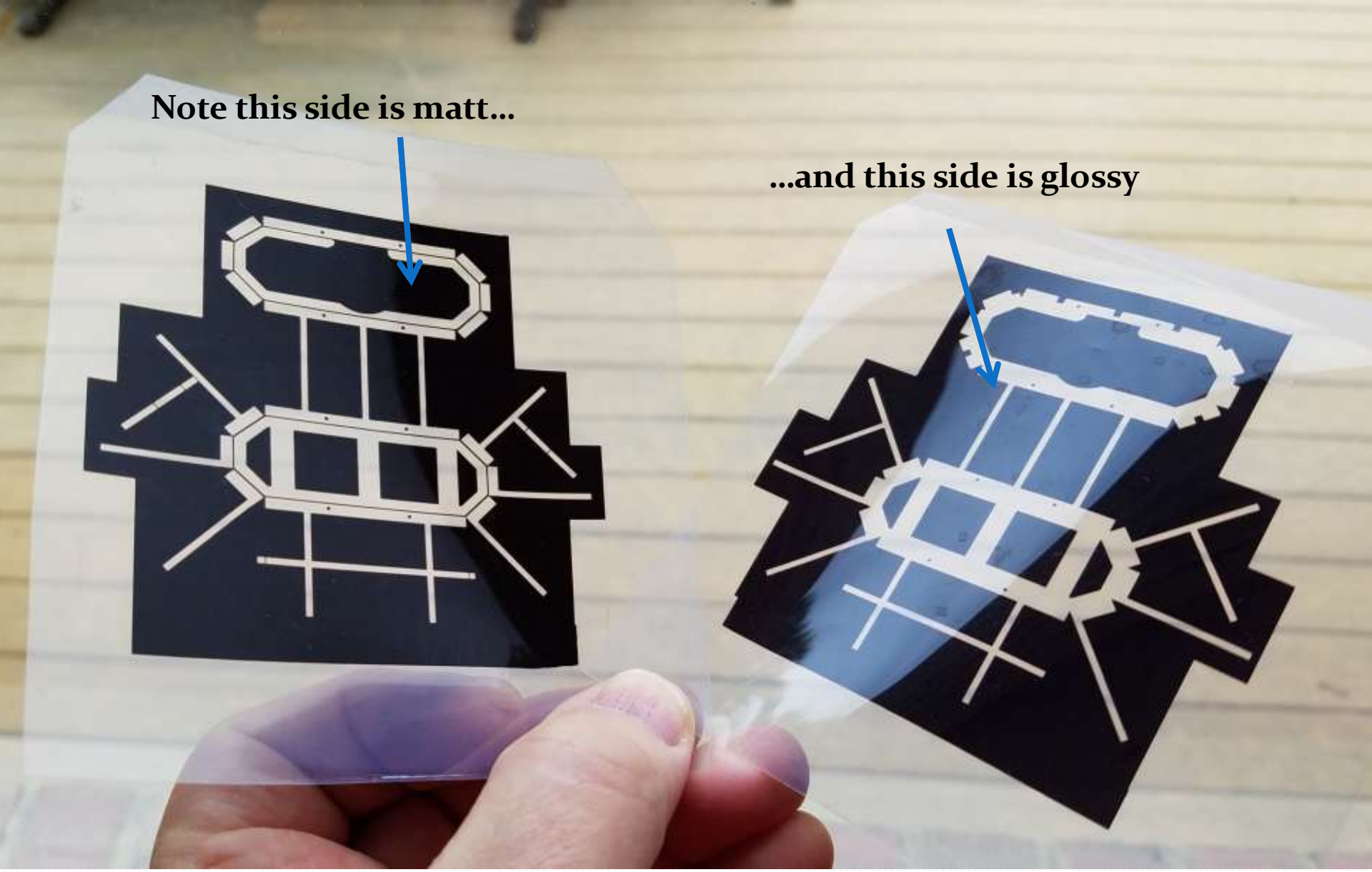
Pro-Etch inkjet film. Scraps can be saved for smaller print jobs thus saving material.



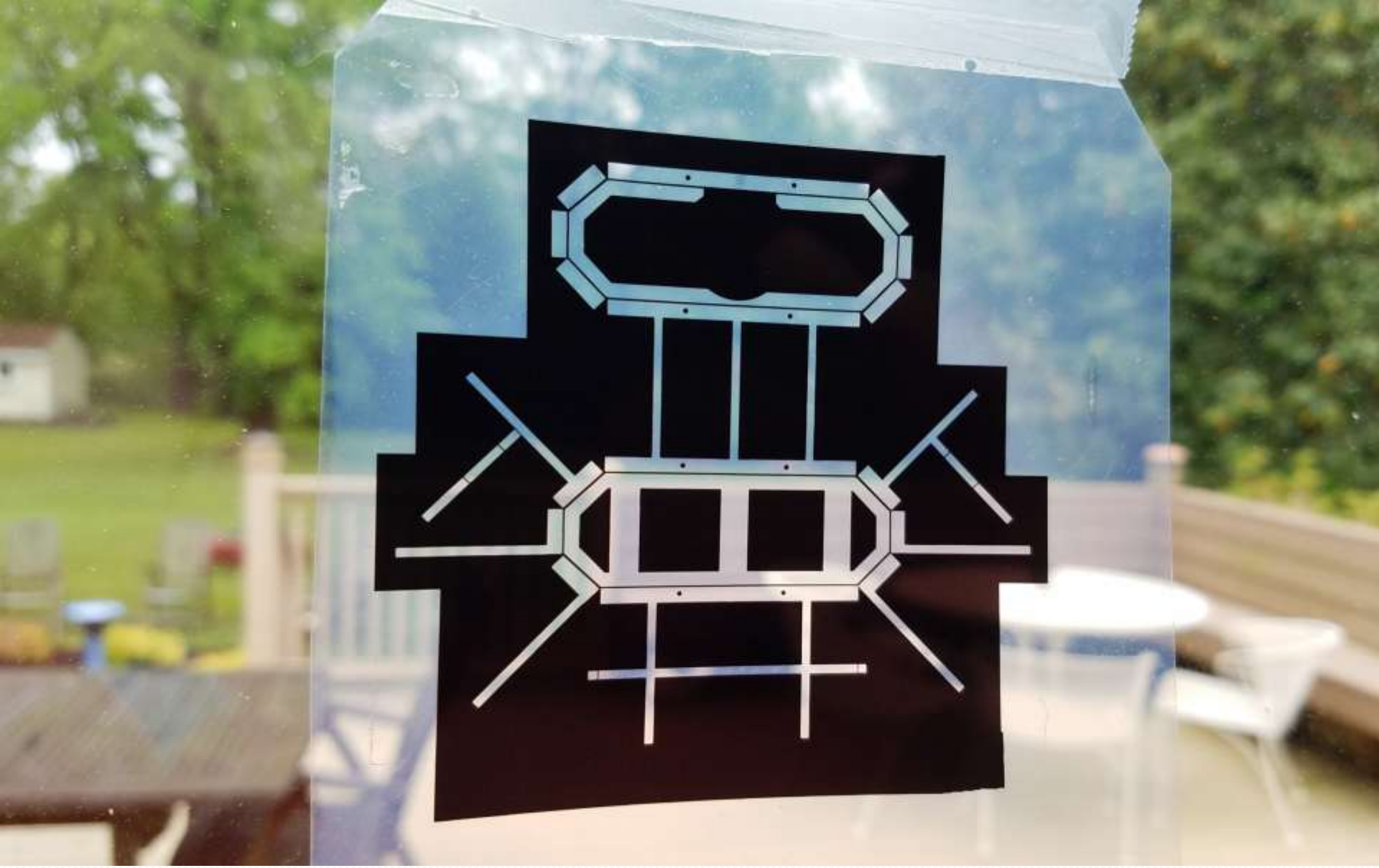
Insert the Pro-Etch film into the inkjet printer with the printable side up. It is noted by a slightly textured appearance as opposed to the high gloss of the back.


The printed surface will appear matted where the ink has been applied.
Canon
FINE
MG6220

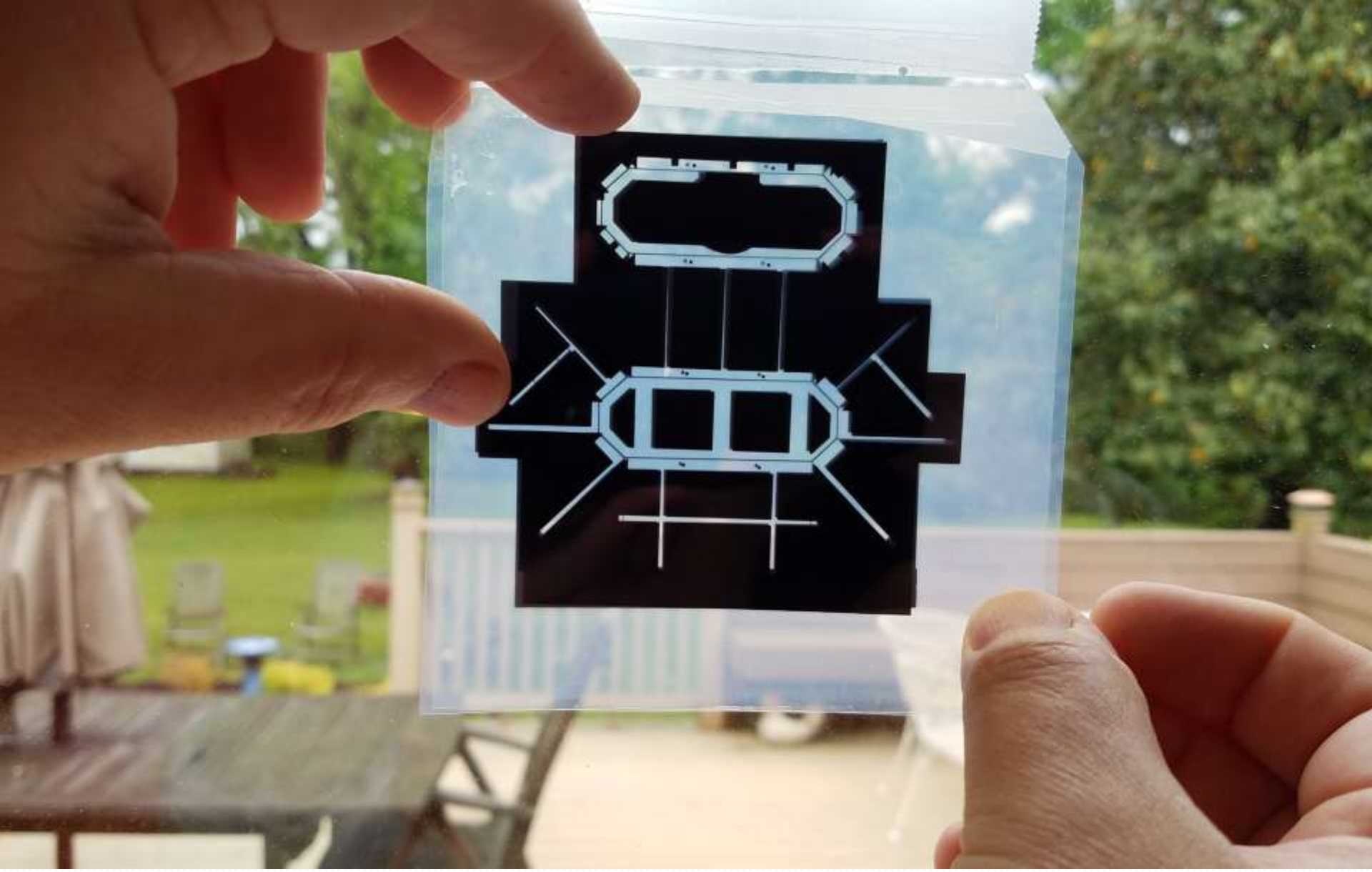
Assembling the Negative “Sandwich”



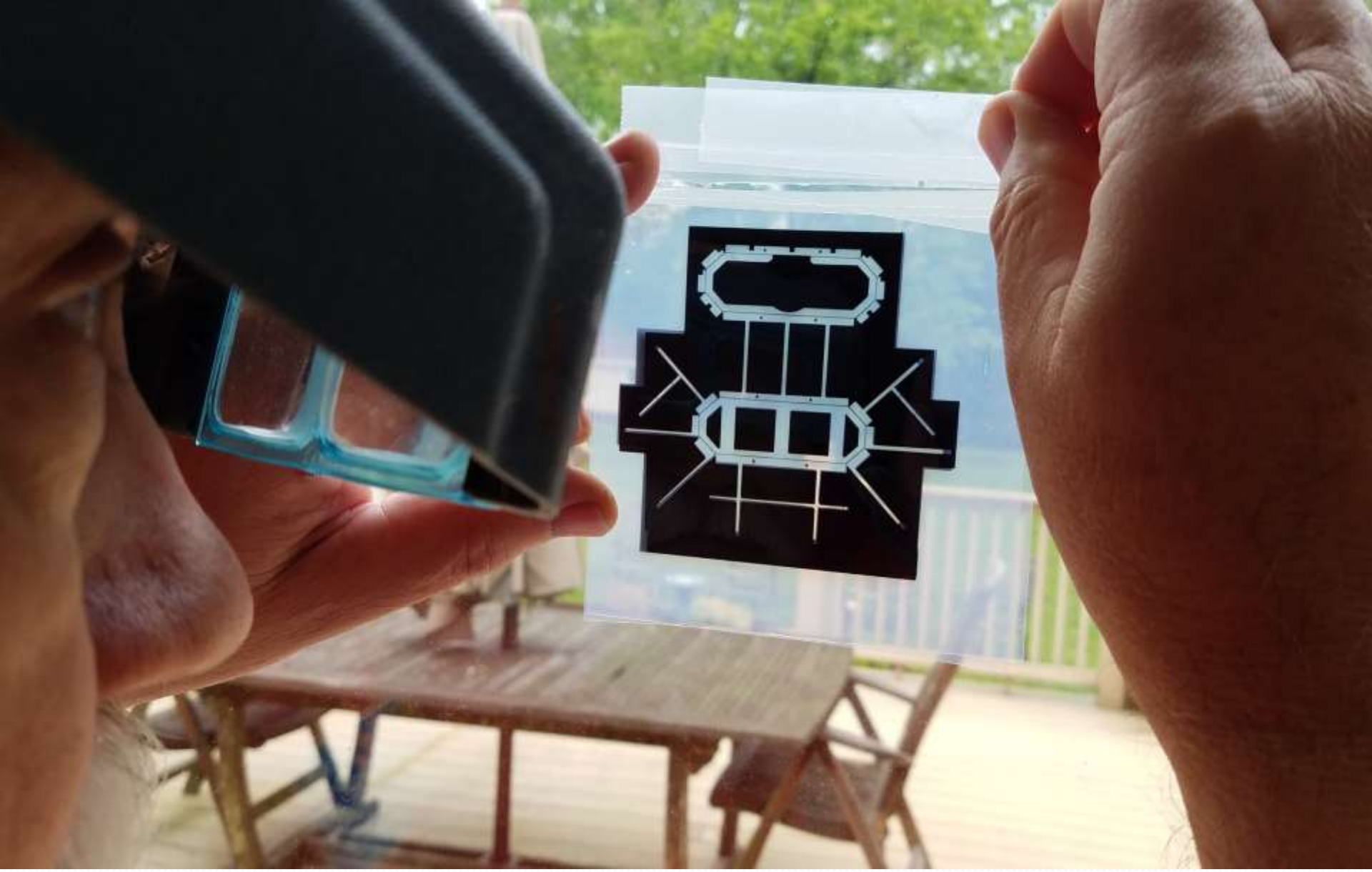
After cutting the negative apart, orient the two negatives matt side to matt side. You'll notice that they will index together perfectly.



If you don't have a light box, this will suffice. Tape one negative matt side towards you on a window.

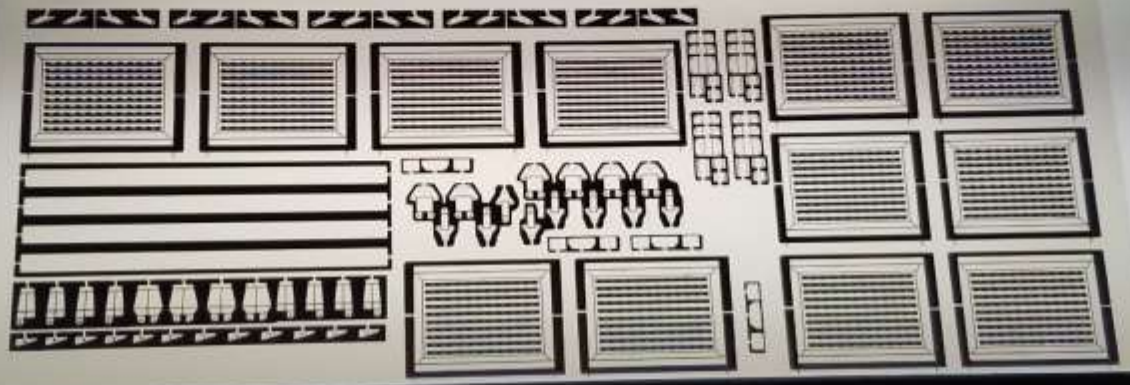


Place the second negative matt side towards the first negative (matt to matt) previously taped to the glass and align them together.

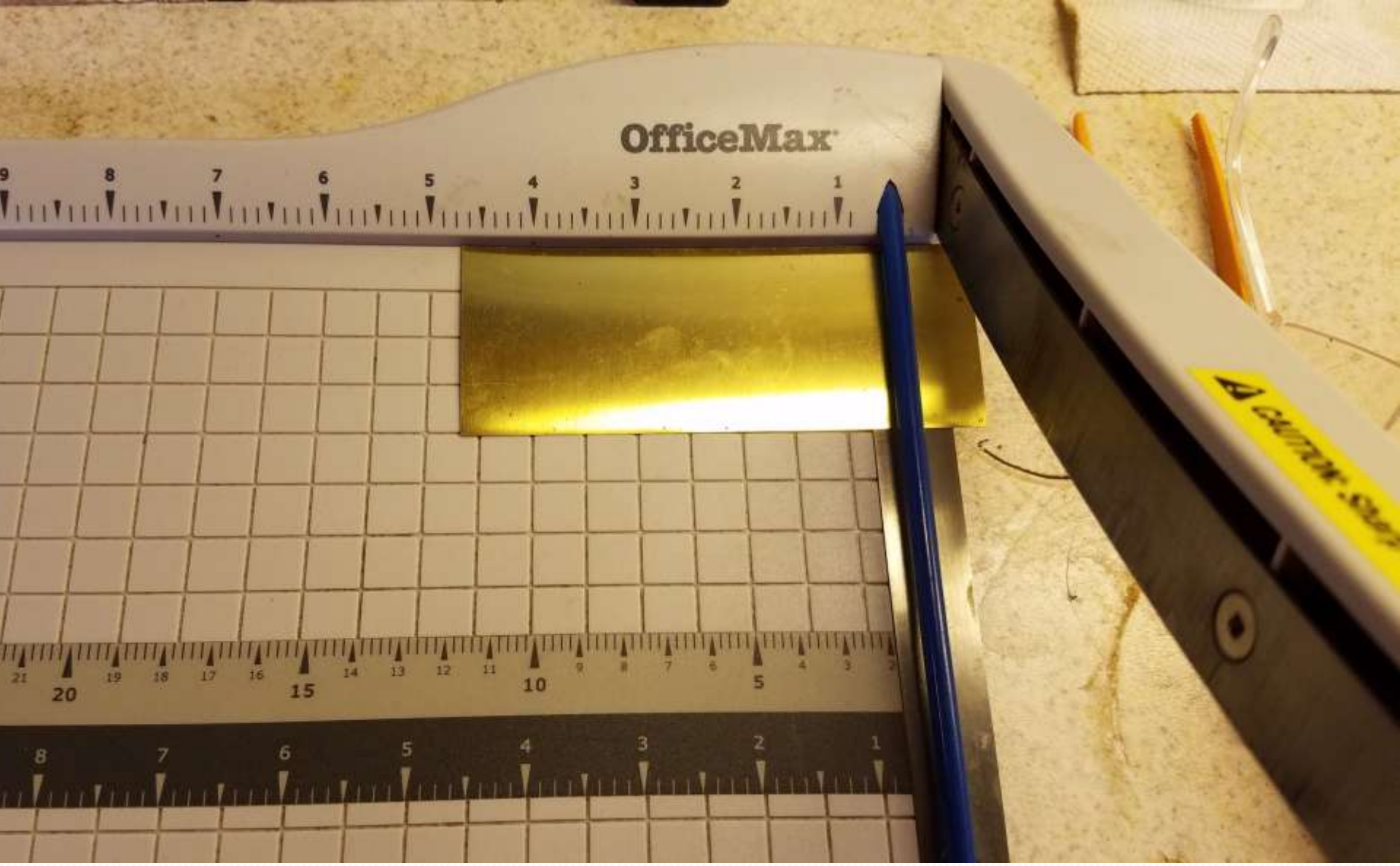


The use of magnifiers help in getting the two negatives in perfect sync. Then tape the second negative to the first. That's it. You now have a negative sandwich. Moving onto the next step.

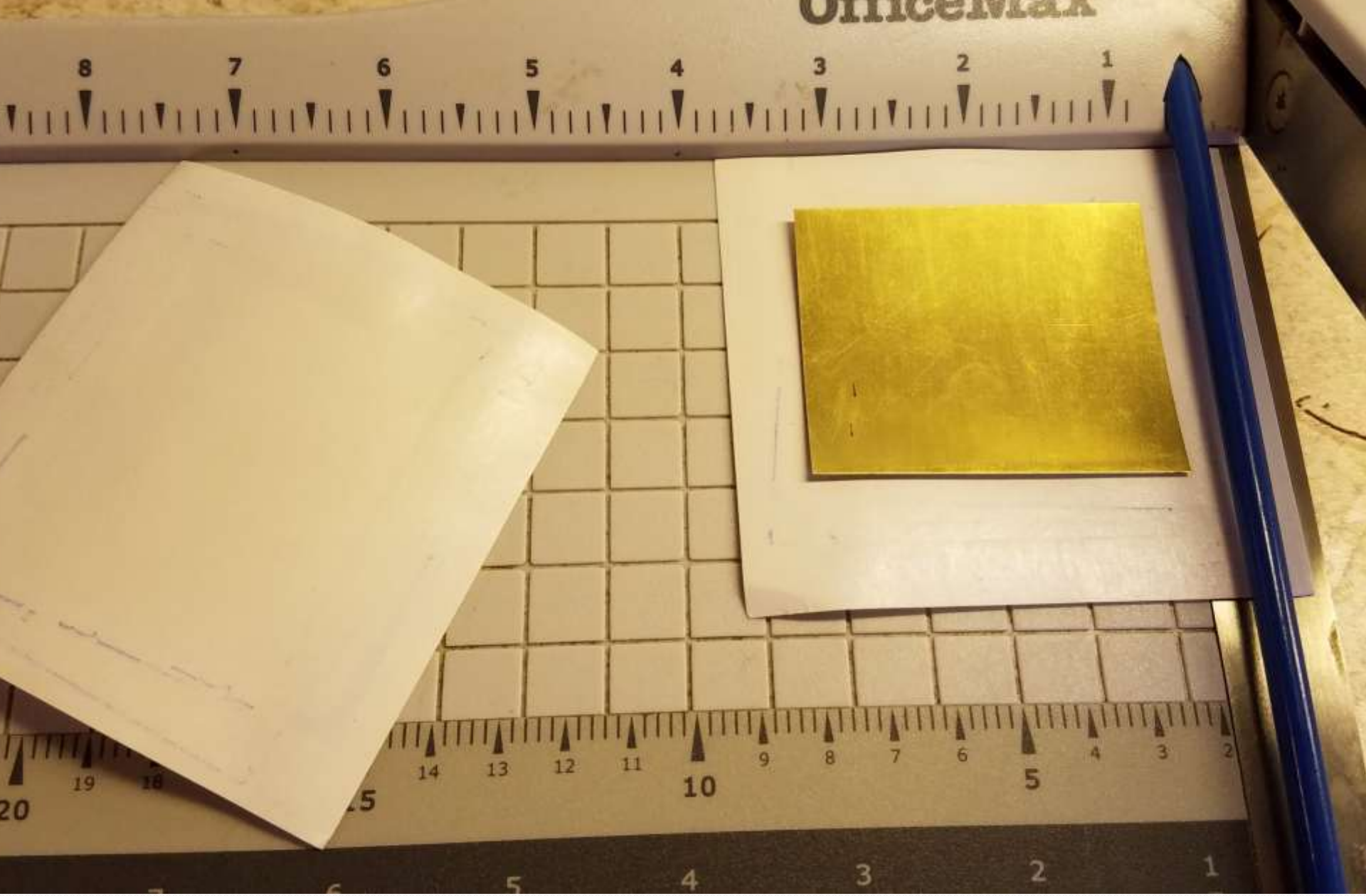
The use of a light box makes life a little easier. Especially when trying to explain all those finger smudges on the window.



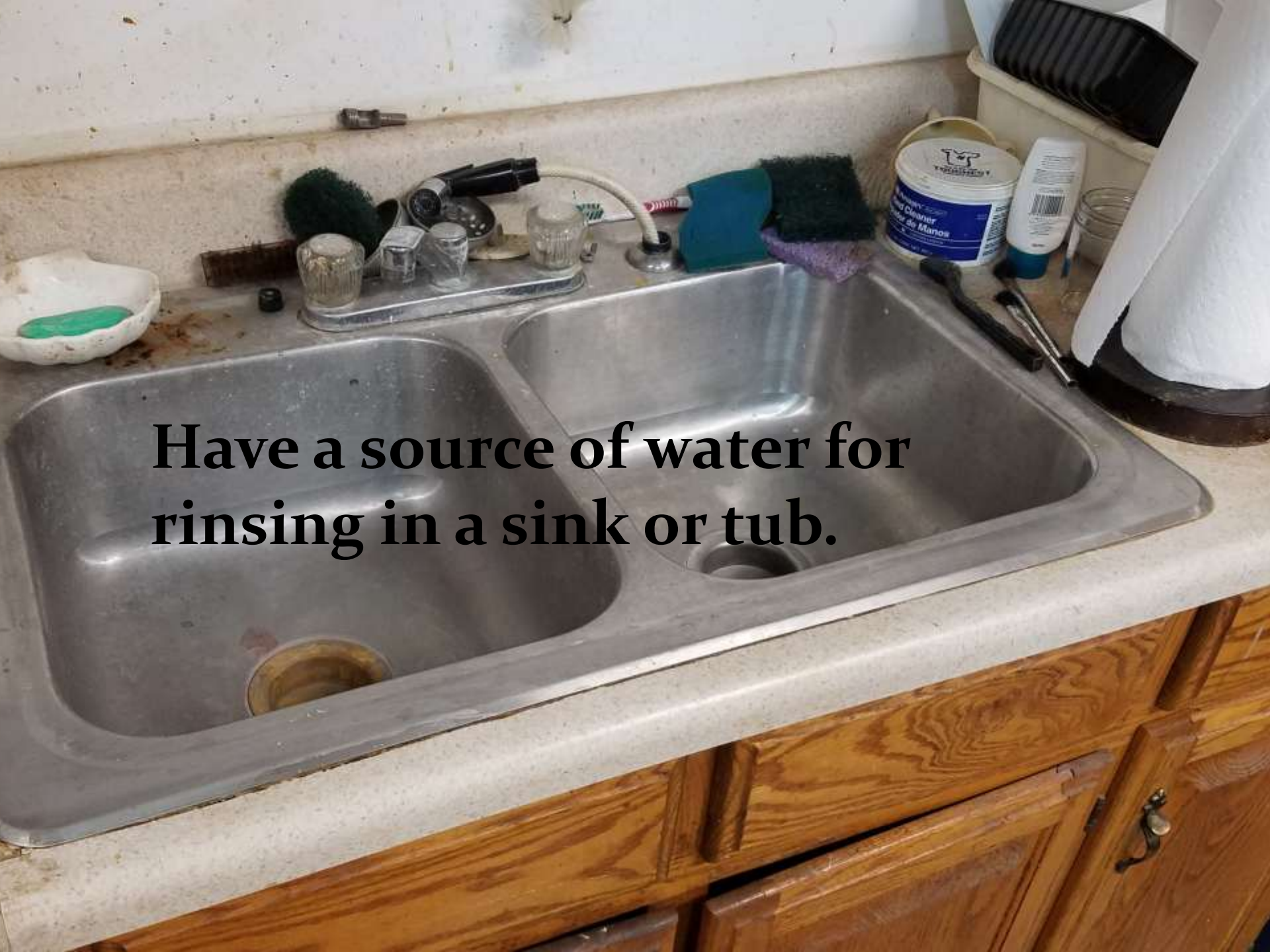
Preparing the Brass

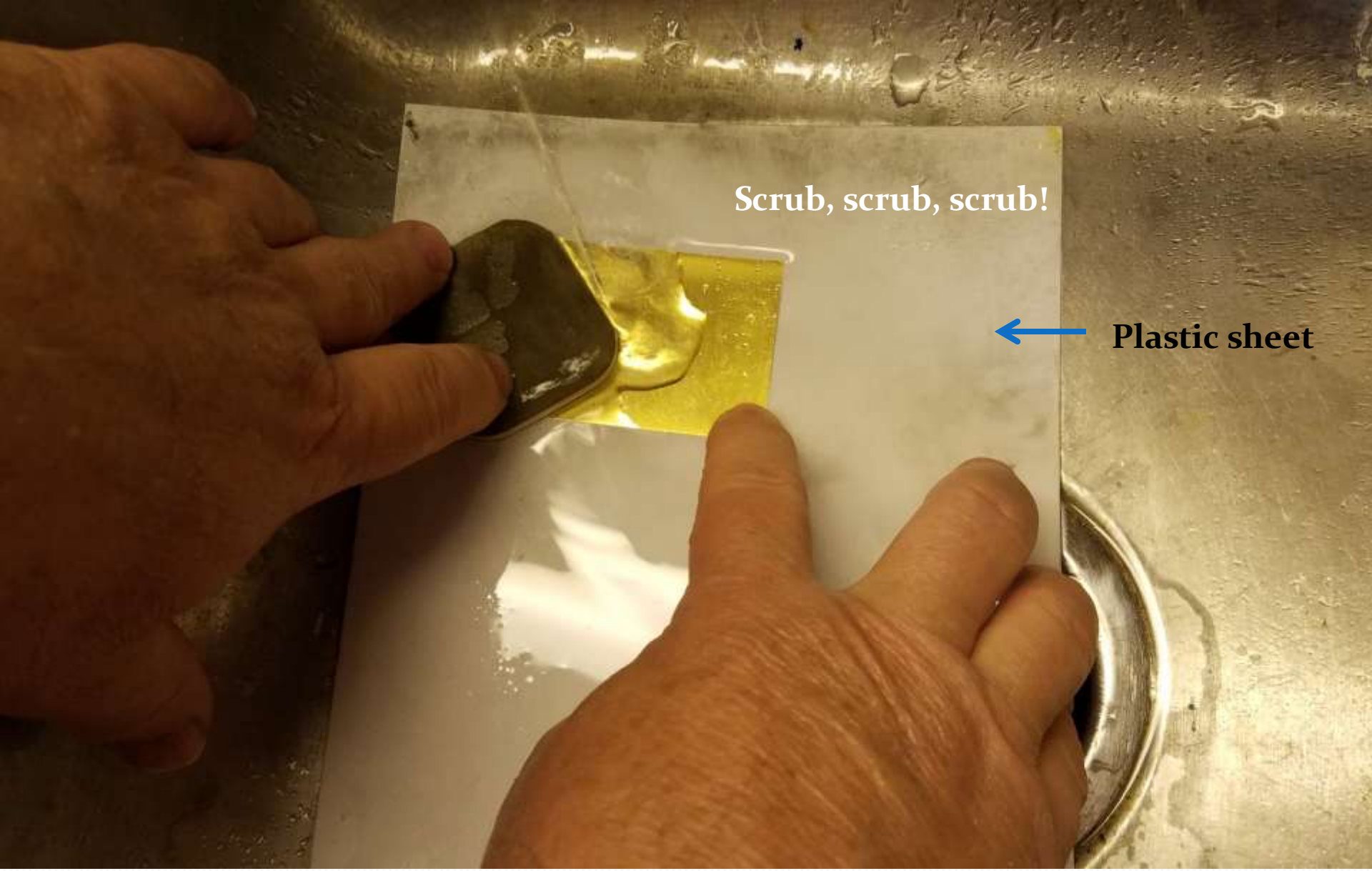


Cut a sheet of brass at least as large as your negative. I usually use .005 in. brass for most parts and if I want deeper relief to appear on one side, I'll go with .01 in. thick brass. Both available from Amazon or you favorite source.



When cutting the brass you will also need to cut two pieces of carrier sheets, at least a quarter inch larger than the brass for the laminating process.

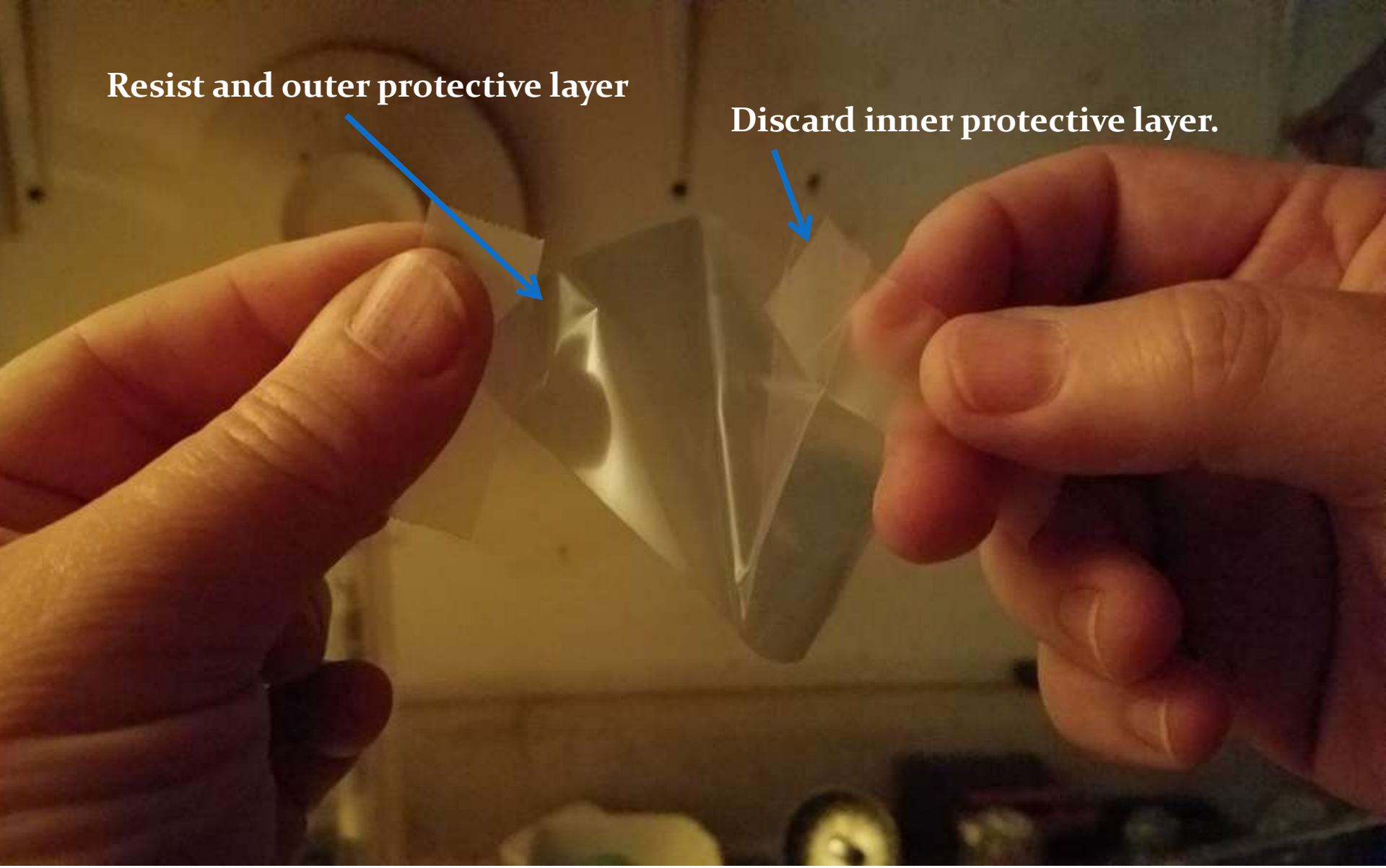

Have a source of water for rinsing in a sink or tub.



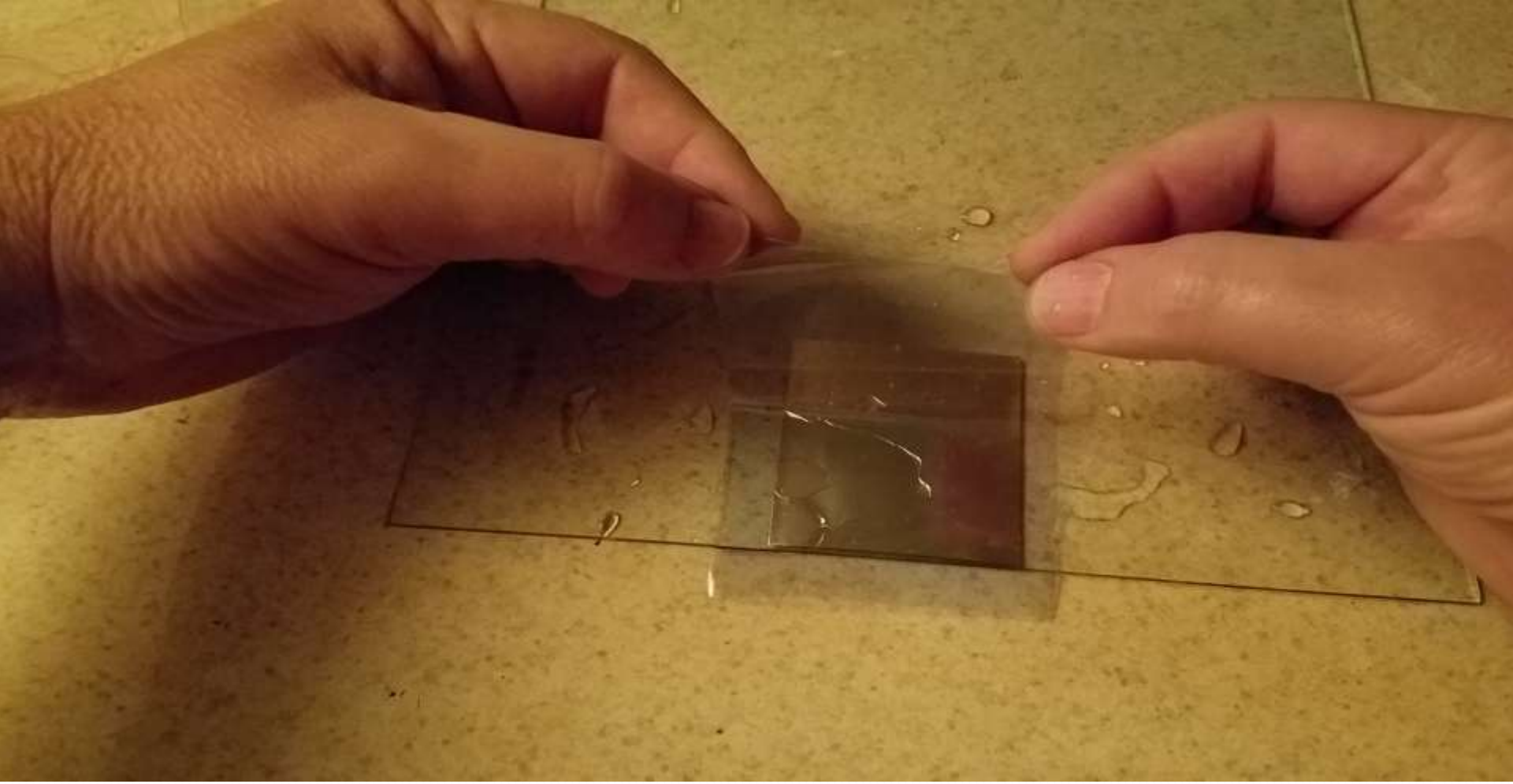
The brass needs to be cleaned of oxides by burnishing it with 3200 buffing pads with flowing water until nice and shiny, like your...?
Do both sides. Keep the oils from your fingers from touching the surfaces once cleaned by handling it by the edges. Now put it aside...

This process must be done in a “dark room” atmosphere. I use a bug light which doesn’t emit any or very little UV radiation to expose the Photoresist film.

Cut the film to a size slightly larger than the brass being used. Two pieces will need to be cut. One for each side of the brass.



The “resist film” is sandwiched between two protective plastic layers. Remove the first layer from the inside curled side. This side will be fused to the brass during lamination.



Place the moistened brass on a sheet of glass or similar clean surface and carefully lay the resist film <u>emulsion side down</u> unto the brass. A rolling motion helps reduce air being trapped between the film and brass. Water surface tension will help attract the two together.
Use a roller squeegee to flatten the film, remove air bubbles and excess water from the brass/film sandwich. Work from the center out to the edges.

Flip the brass over and do both sides the same. The brass is now sandwiched between two sheets of photoresist film with the emulsion contacting the brass. Remember that the film is still protected with an outer layer of plastic film so you can handle it carefully at this point.

The carrier sheet has a semi gloss side. Sandwich the brass between these two sides and proceed to the laminator, *forthwith and with vigor*. Remember you are still in the "dark room."

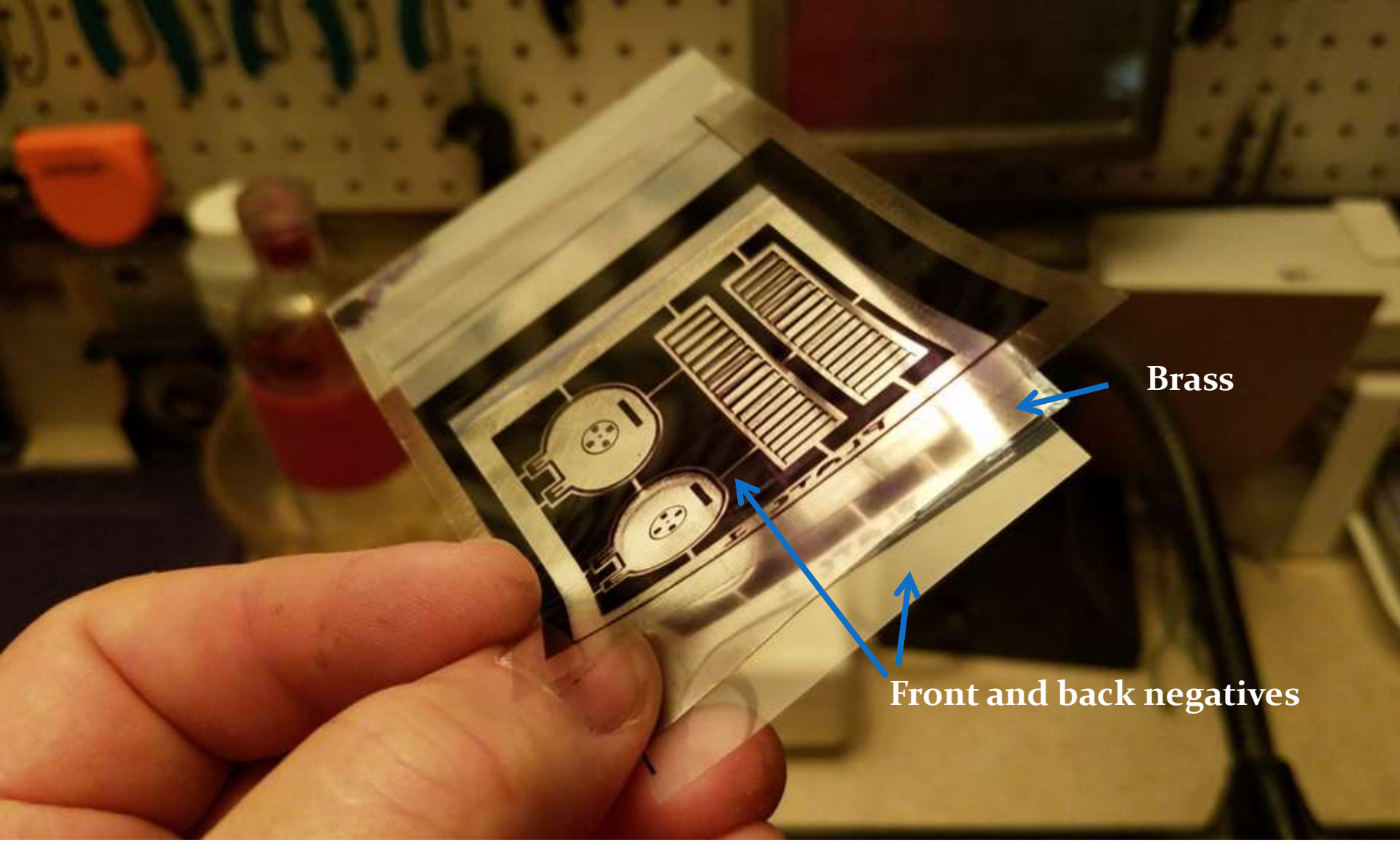
After allowing the laminator to warm up, run your sandwich thru.

After retrieving your sandwich from the exit, flip and rotate the sandwich 90 degrees…

...and cook it again for an even bonding of the emulsion to both sides of the brass.

Locate a box in which to place the prepared brass. You now have made your “film.” Keep it in the dark until ready to expose it.

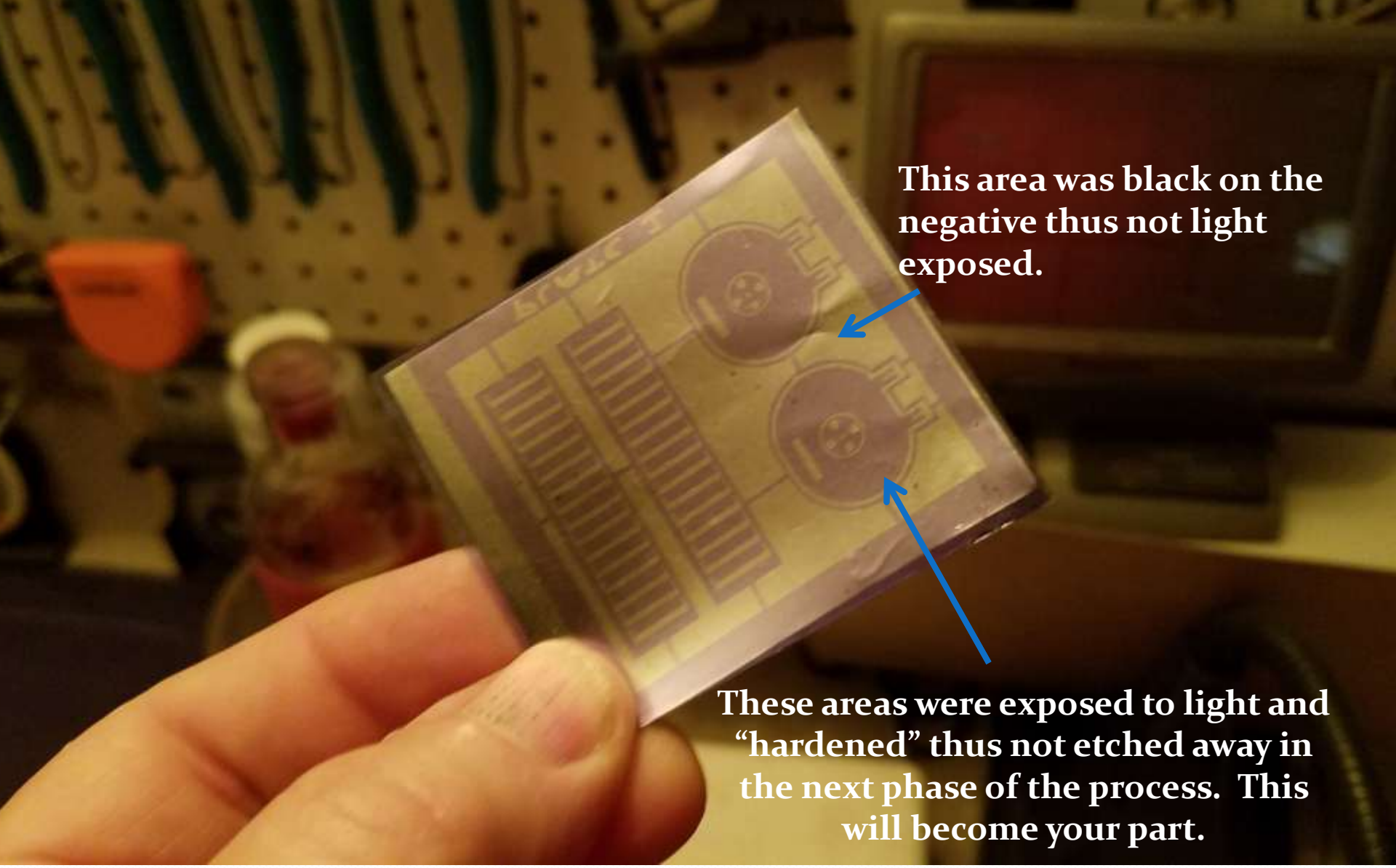
Exposing the “Film”



Take the previously prepared negative sandwich and place the brass sandwiched between the emulsion to create the exposure sandwich…
am I the only one thinking of lunch here?

I use a dedicated six bulb, vacuum, timer light box. It provides fast and consistent exposure for etching. Exposure takes 55 seconds for both sides at once.

Not cheap….it's a hobby.



After exposure remove the brass from the negatives, and you will notice a ghosting on the brass/film. As the emulsion is exposed to UV it will harden and darken.

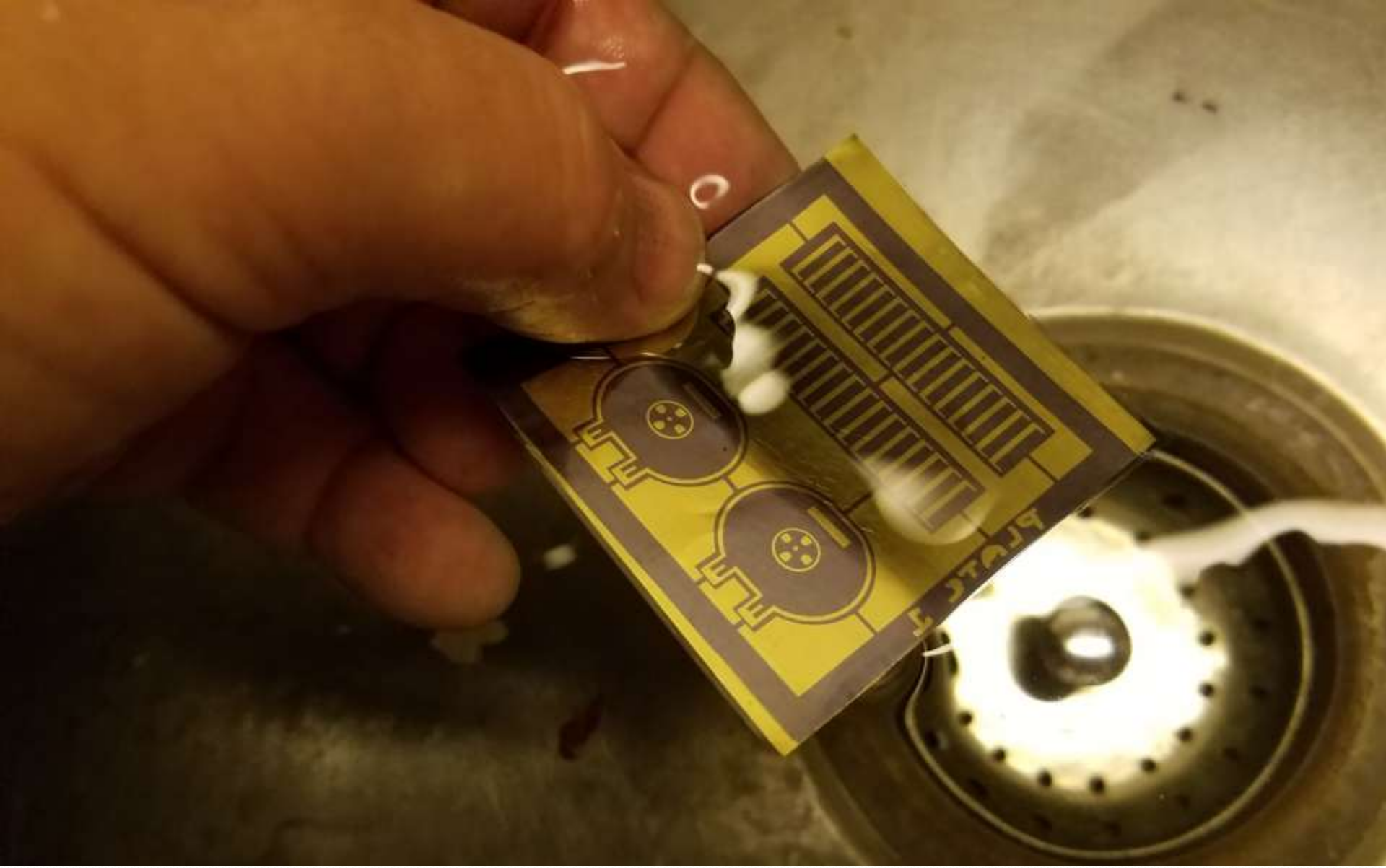
Developing the “Picture”

First and Most important!

Don't forget to remove the last outer layer of protective plastic after exposure. Trust me…it will not develop in the next step. Tack scotch tape to an edge and pull the protective layer away.

AFTER **having removed the protective plastic layer...bathe the brass in developer which is a 1% solution of Sodium Carbonate. Agitate both sides until bare brass is revealed and clear of unexposed/unhardened photo resist film.**

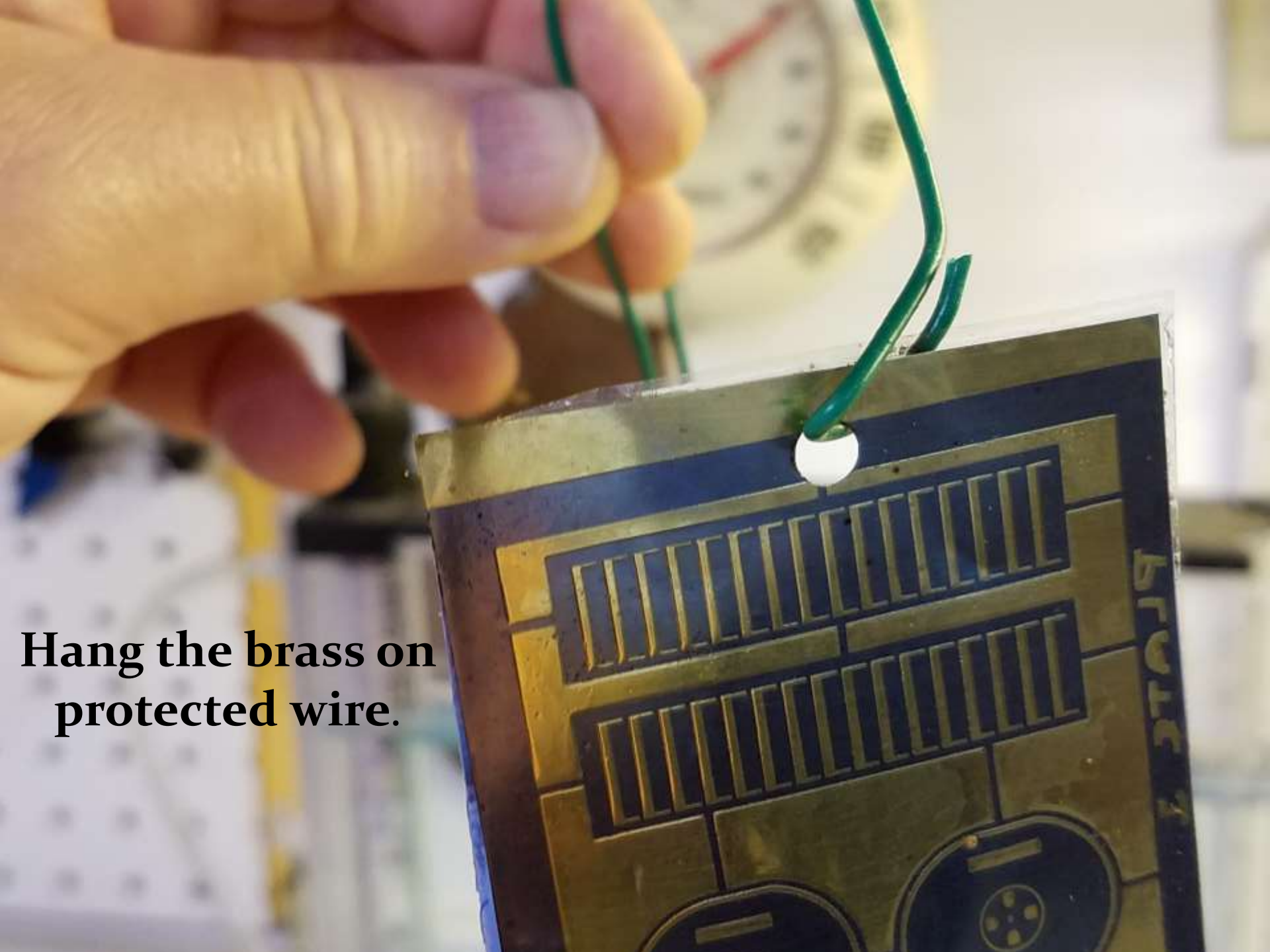

As the resist film is washed from the unexposed areas, the brass, where the film was removed, will appear bright.
The areas exposed to the light and hardened will prevent the etchant from dissolving the underlying brass.



Wash in water to stop the “development” of the brass. We're ready to etch. The masking is complete and will prevent the next step from dissolving your brass parts. Only the areas around it.


Unprotected brass to
be etched away

Etching

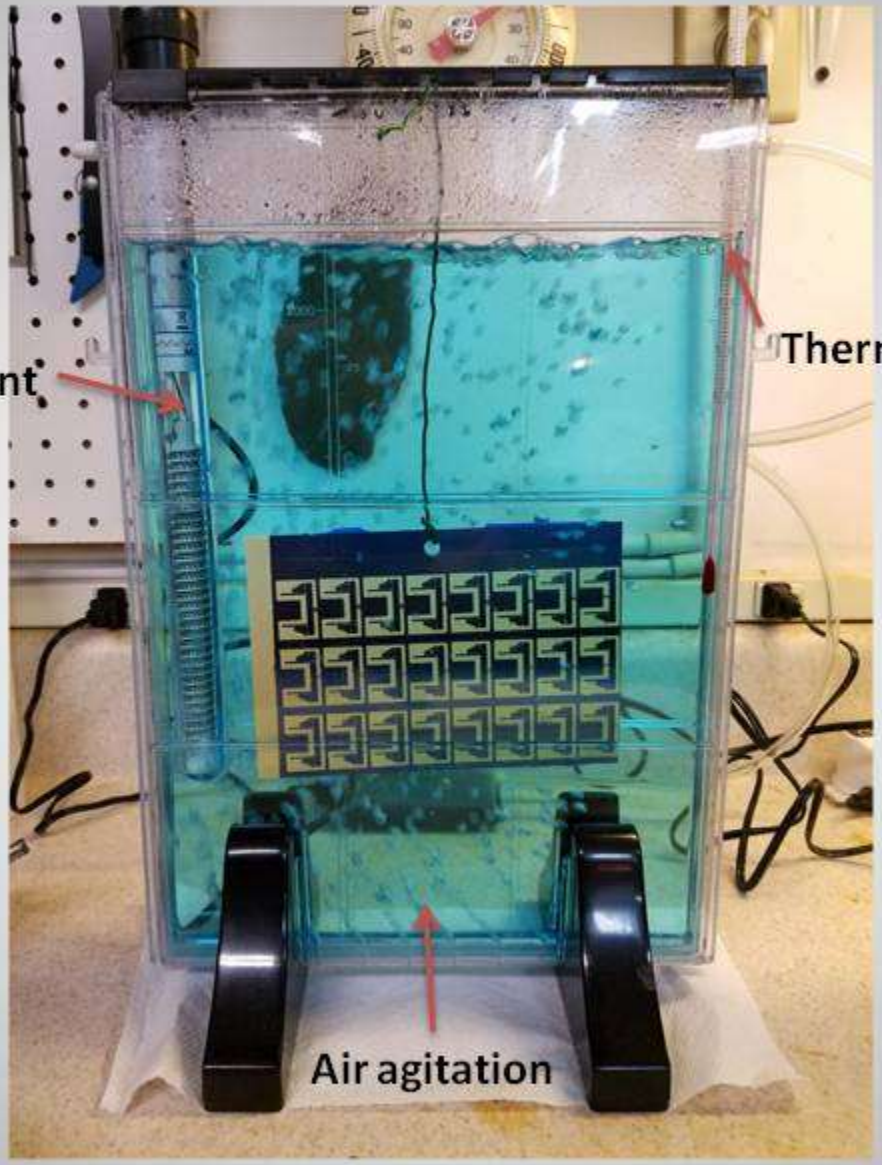


Hang the brass on protected wire.

Suspend the brass in a solution of your choice of etchant at 42C degrees and agitate it for anywhere from ten to fifteen minutes. The thickness of the brass, temperature of the solution and the gods will tell you when it's done.

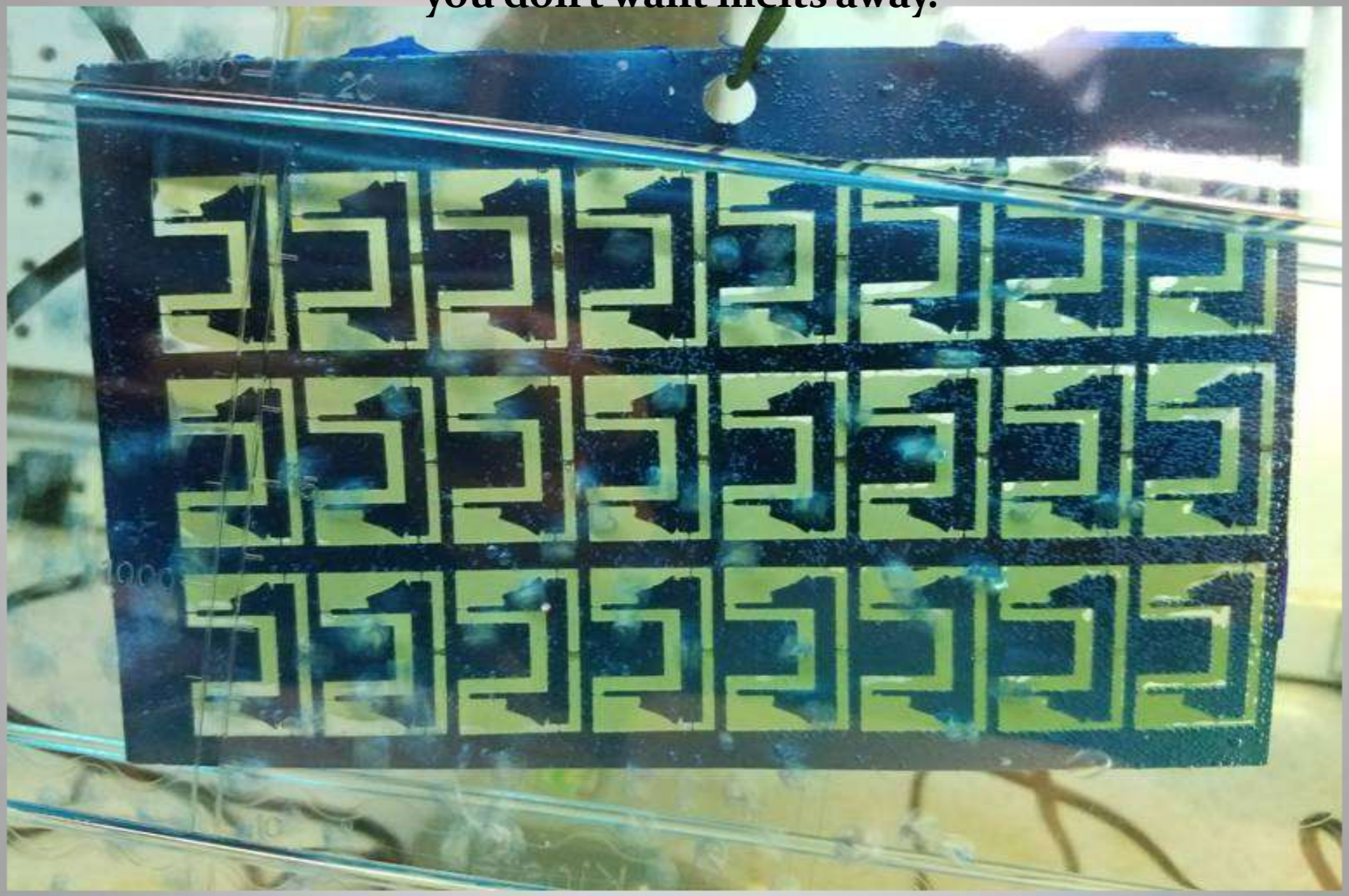
You are just going to have to watch the grass grow. Age and use of the solution also have an effect on time.

As the solution is used up, it attains a bluish hue.



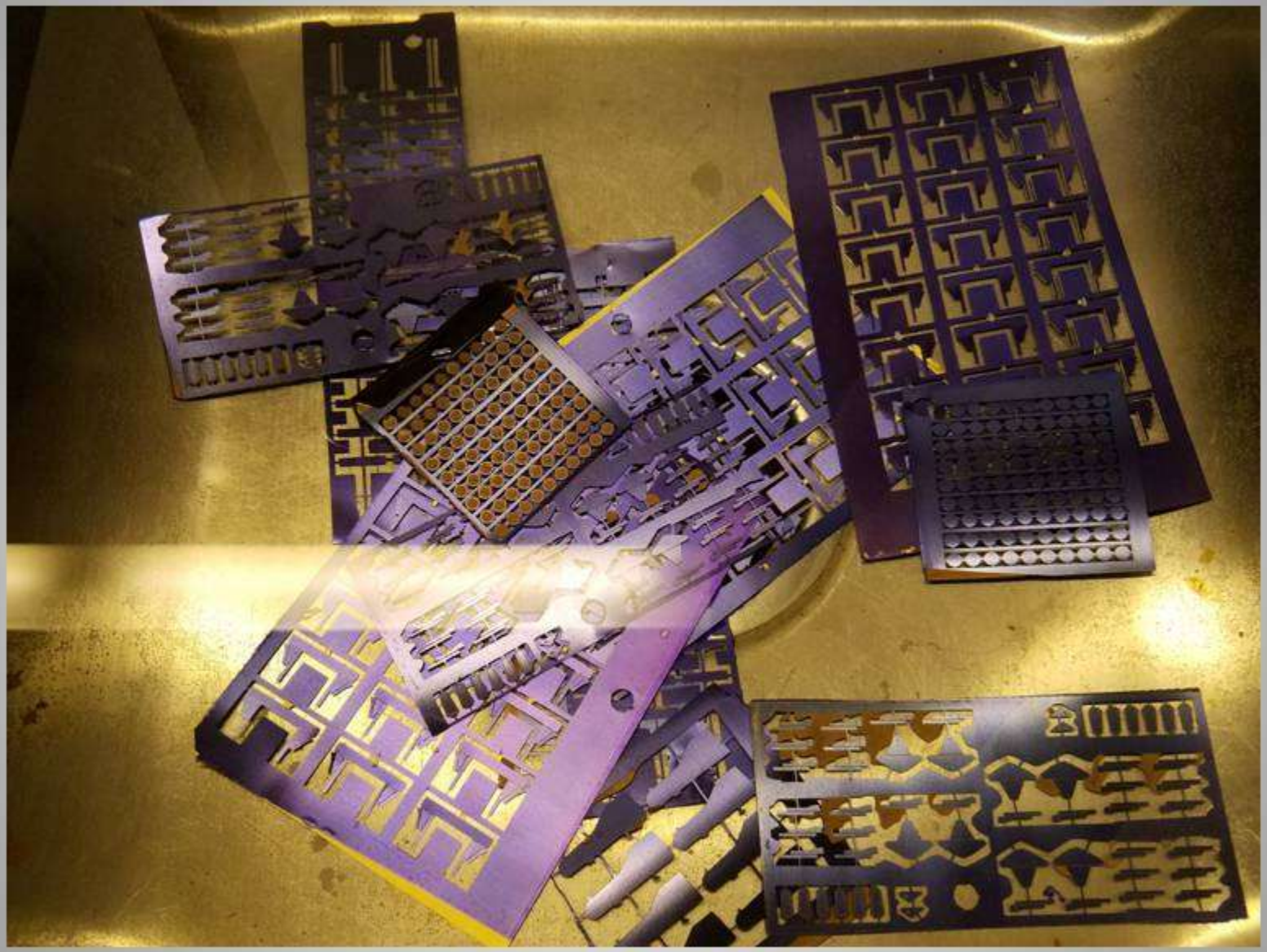
Etching tank

When time draws near, it will be evident as all that you don't want melts away.

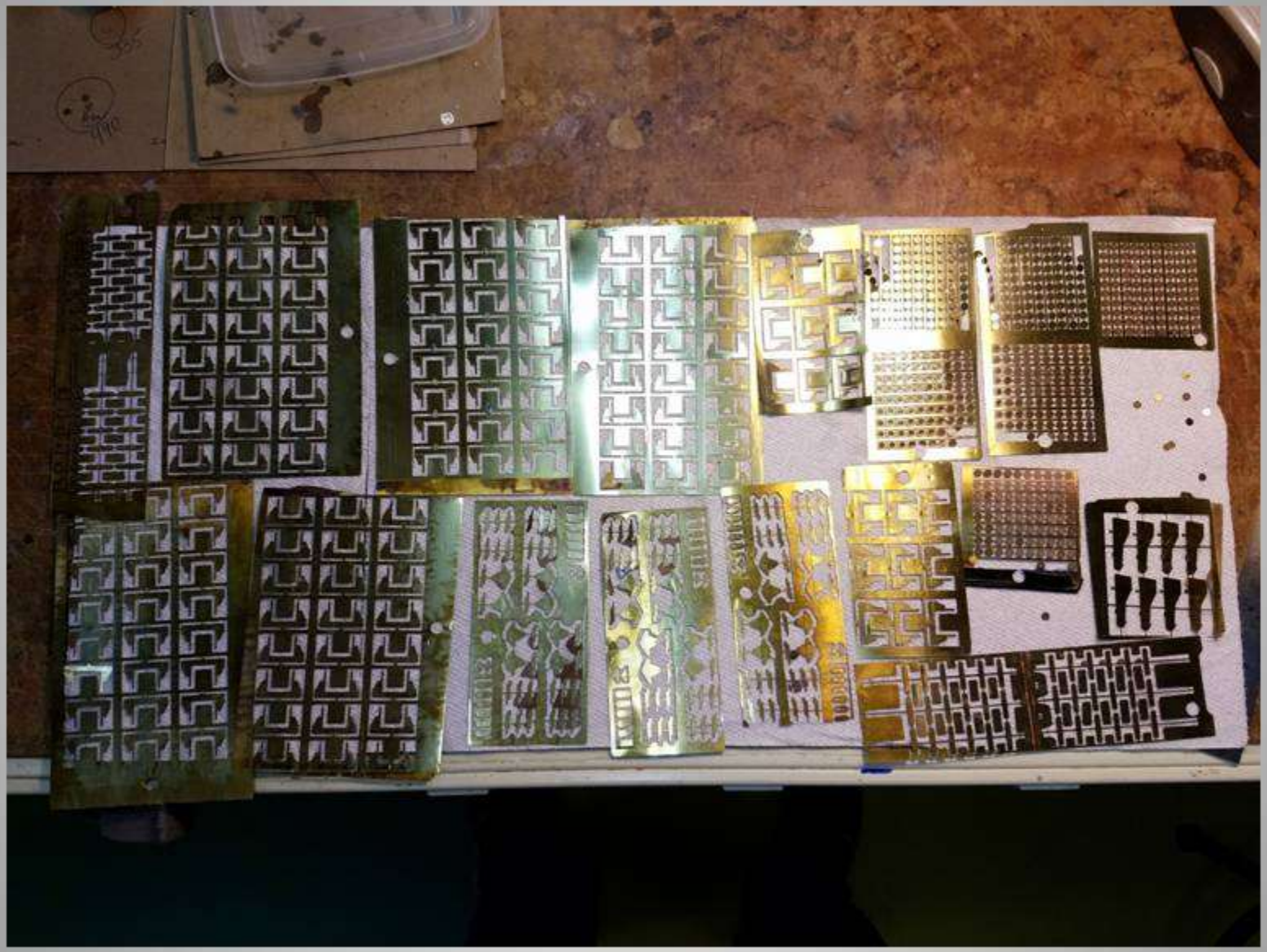


Life boat seats nearly finished etching

An advantage to Ammonium Persulfate and Sodium Persulfate are their transparency.



Brass plates in a bath of Sodium Hydroxide to remove photo resist

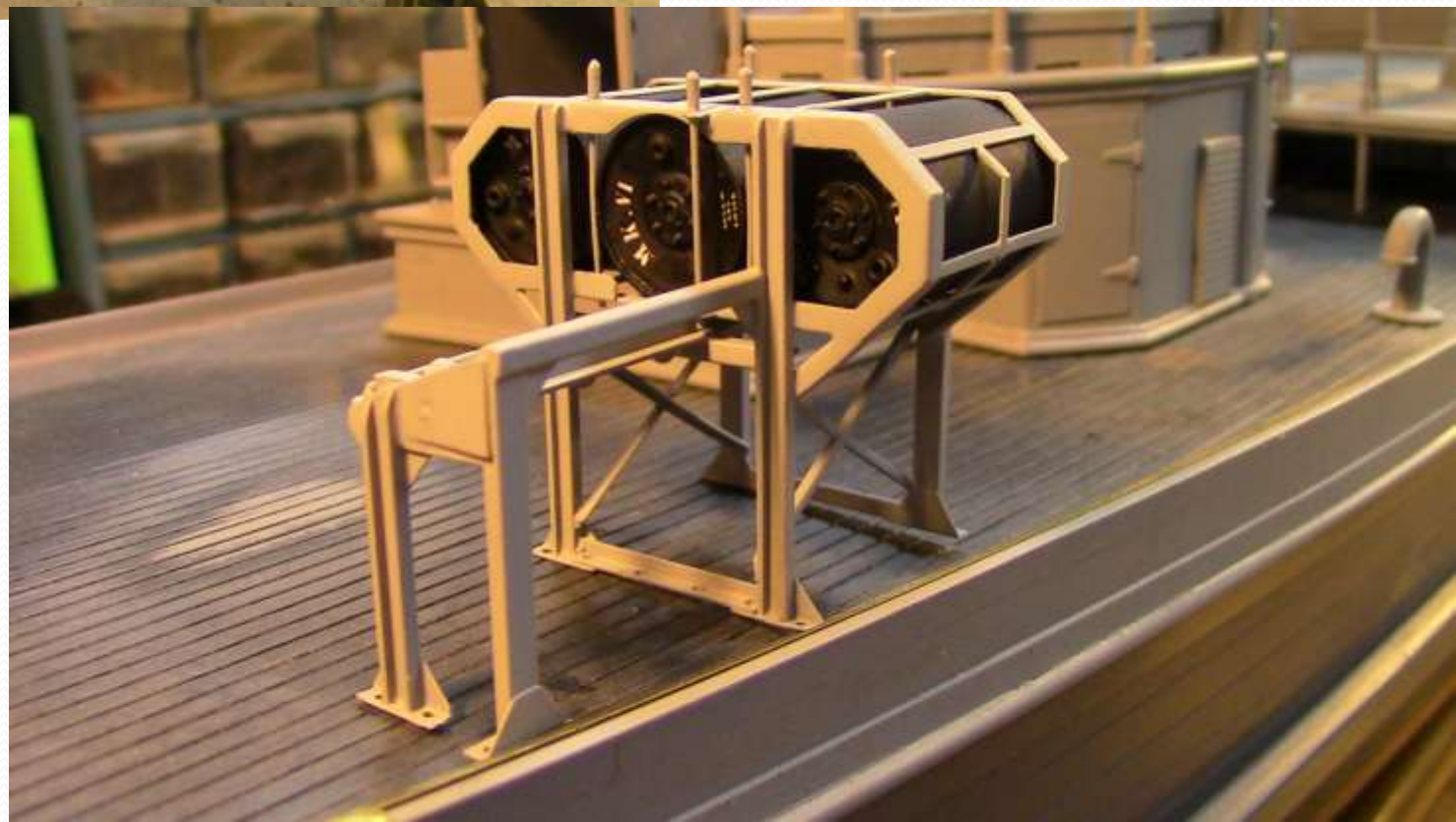


After removal of protective coating

Parts is Parts

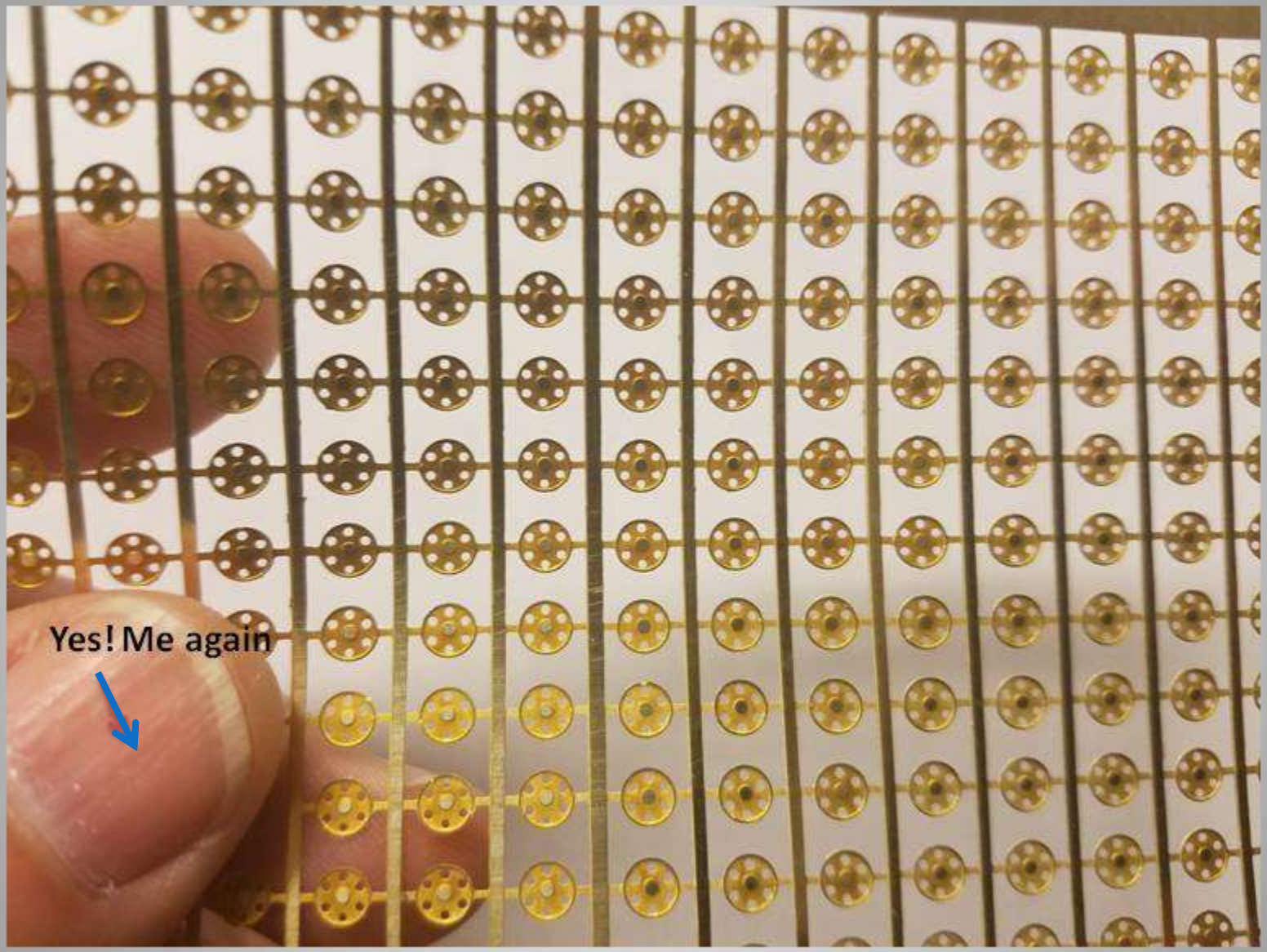
A brass etched part ready to be folded

All folded and painted.



Brass parts ready to be assembled


10
20
30



Pulley components…

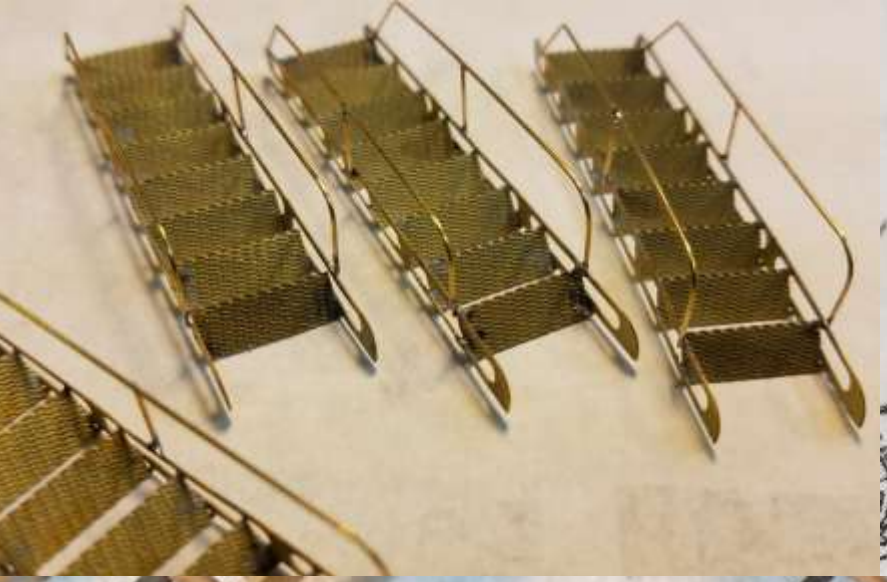
Brass for the life boat laid out for inventory

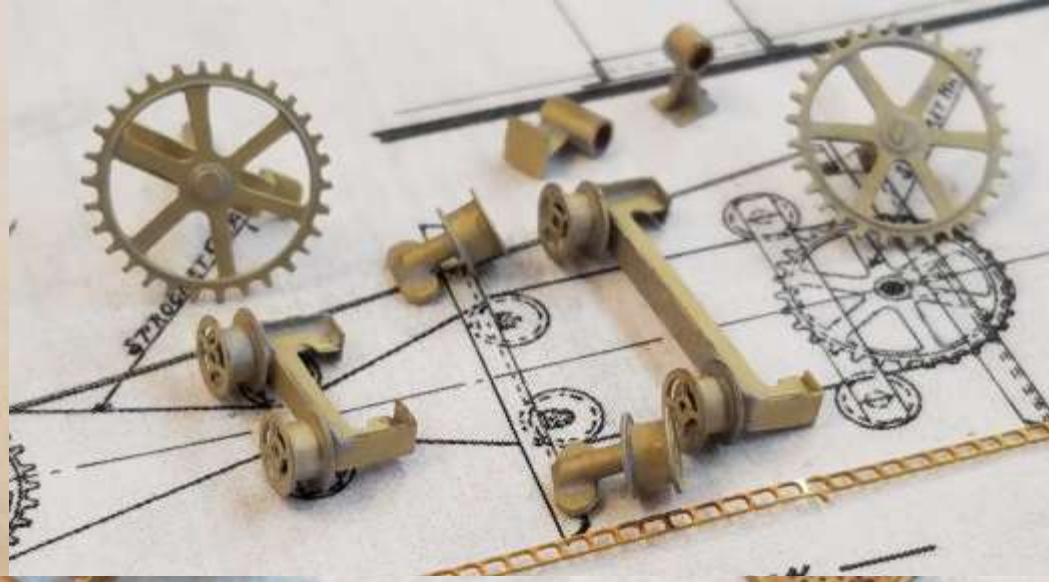
So, now that you know how to make the parts, let's see what to do with them.

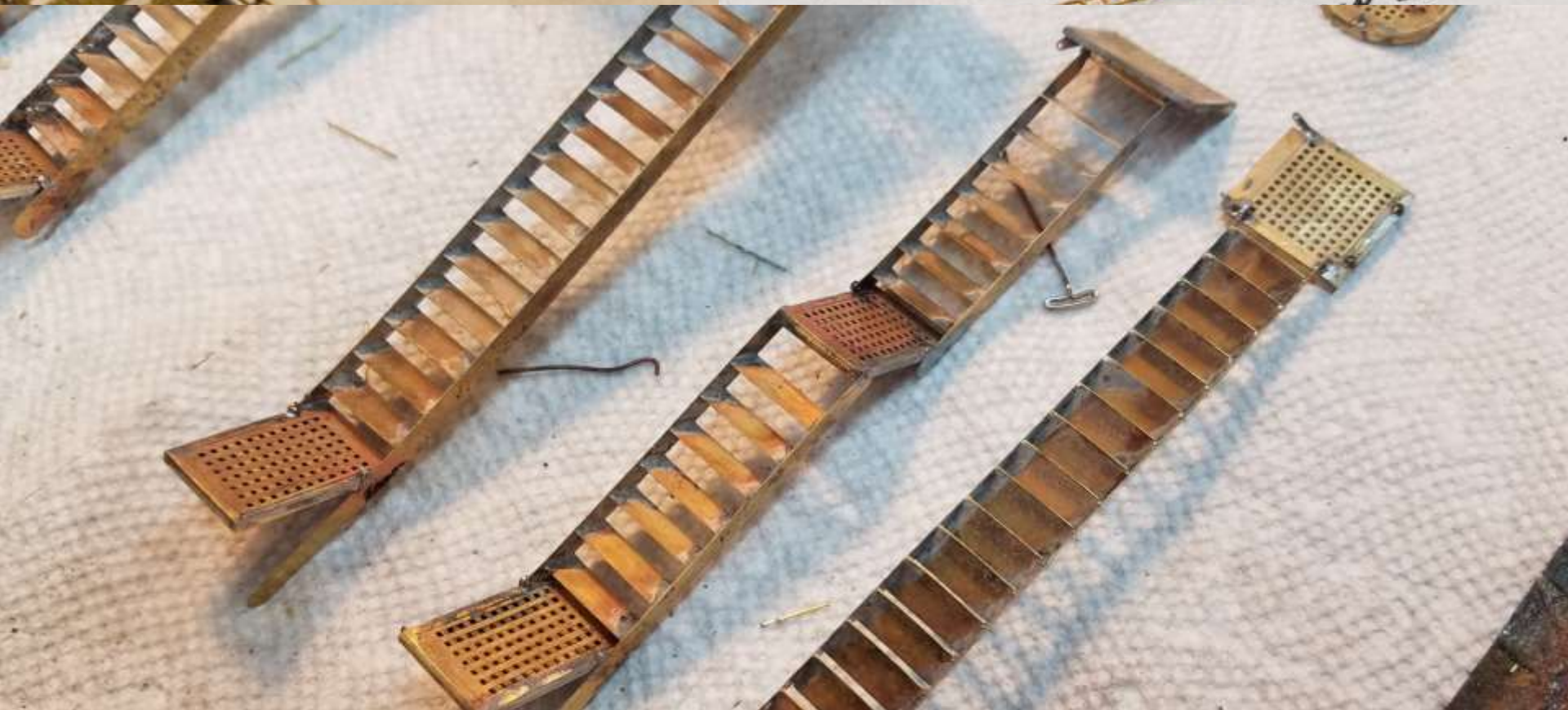
I distinctly heard you ask!

What can I make

If anyone needs to escape … now is your only chance!

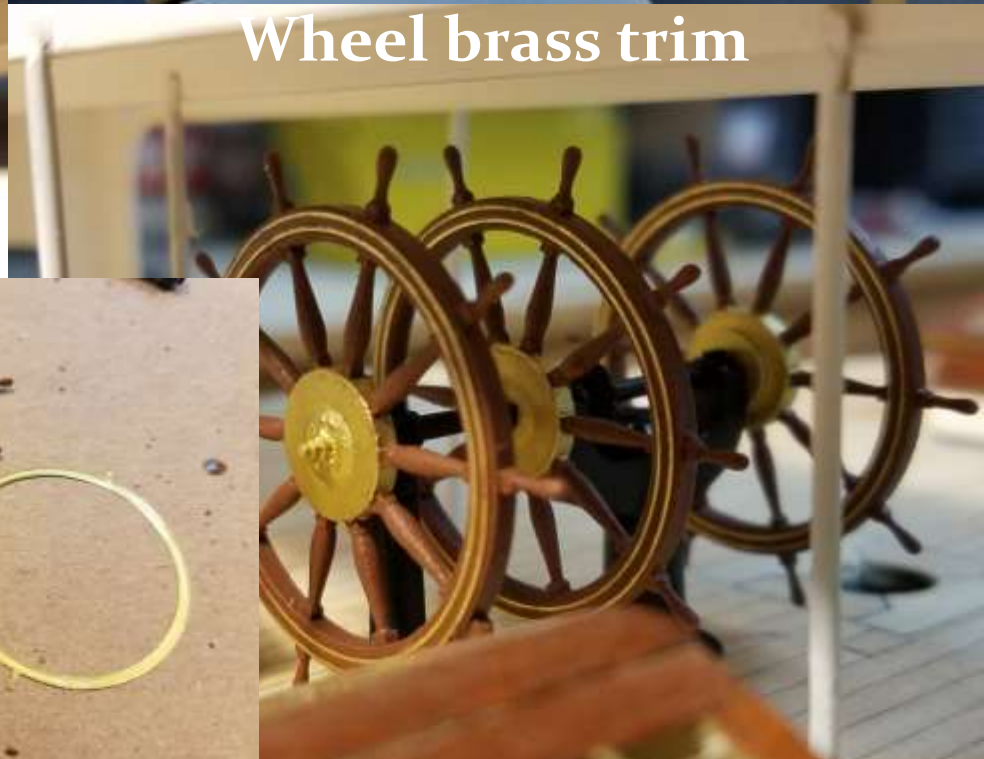


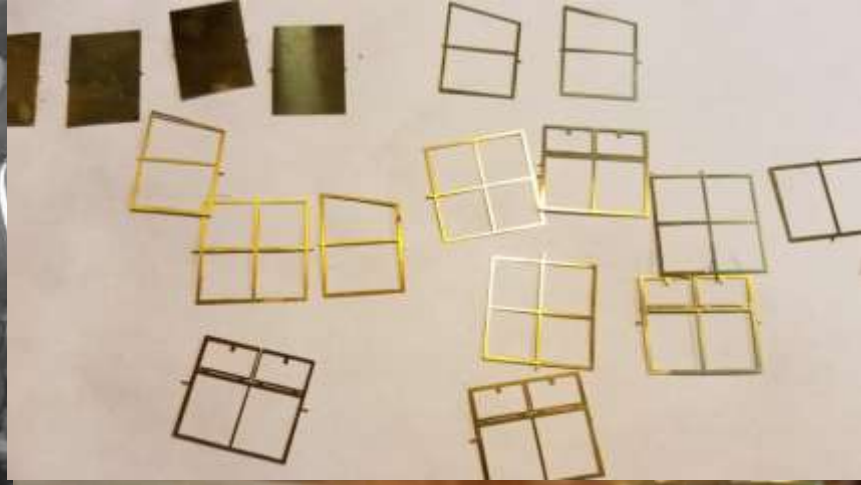




Steering gear train

Wheel brass trim



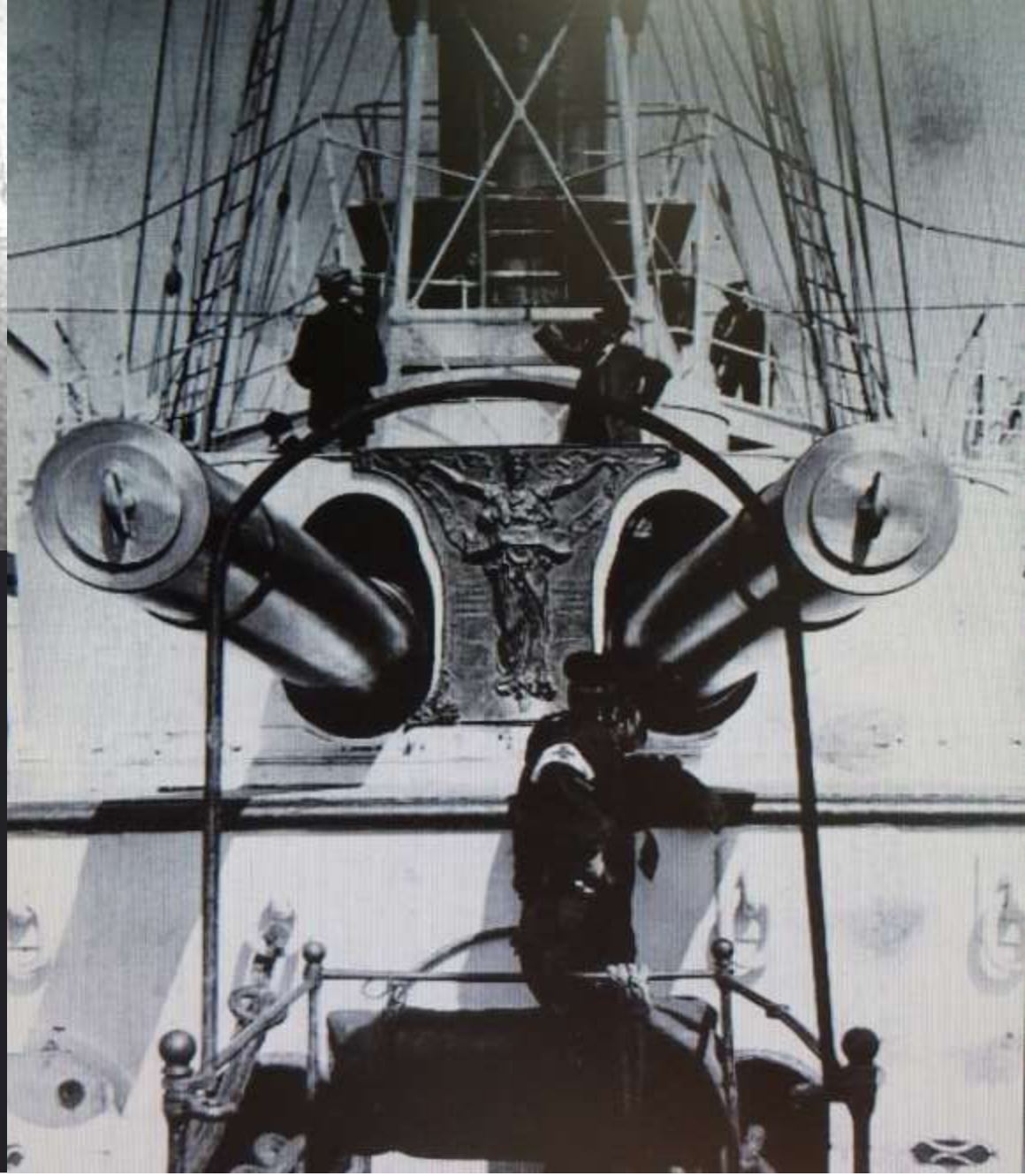


Vegetable lockers

Forward turret

Decal overlaid on etched brass

Ship's emblem in 3D and "painted"



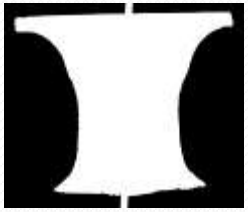
Special effects combing etching with decals

Step 1 Take photo of bronze plaque onboard USS Olympia.

Step 2 Isolate image and square up image. Then save for making decal to overlay on etched brass.

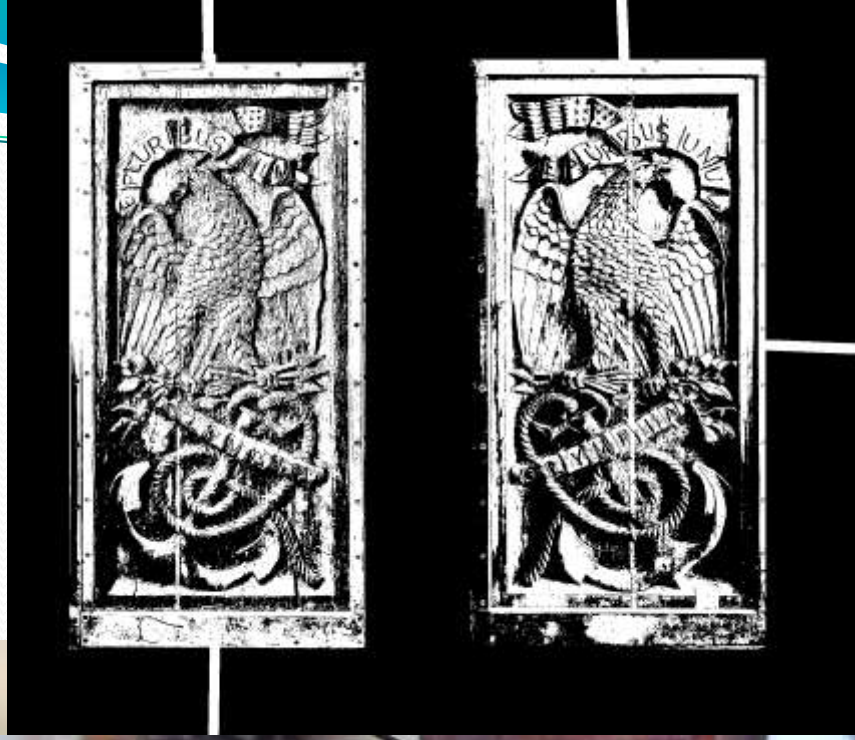
Step 3 Isolate and remove lower layer of image to create multiple levels for 3D effect.

Step 4 Remove color and posterize image to maximum contrast. The etching process can only deal with black and white with no greyscale. This will become the front negative.



Step 5 Eliminate all details from step 2 image to make the back negative.

Once the decal is applied over the corresponding etched brass, the effect is compelling.



Is it real...
or is it
Memorex?


...and here we
are today!

The End