How to etch aluminum panel labels/designs with a reusable acid mix

by **sineSurfer** on August 26, 2008

Table of Contents

intro: How to etch aluminum panel labels/designs with a reusable acid mix

This tutorial will show you how to etch your own designs/labels into aluminum panels with a reusable acid mix instead of using electricity(the most common method).

It's a pretty good and cheaper alternative to profesional made panels for your home made synths, stomp boxes, etc. :)

As with any work involving dangerous materials, you'll have to be very careful and take any precautions needed if you are going to try this instructable.

If in doubt, don't do it!, and if you do it anyway and get hurt, don't blame me or this website, you have been warned ;)

WARNNG NOTES:

Acid can burn holes into your skin, wear some protective clothing, gloves, eye protection and gas mask with the appropriate filter designed for acids before handling it!

When the acid mix reacts with the aluminum it starts to produce acid vapours that of course are dangerous to your nose and lungs so by any means, DON'T breath that!

If you feel like this is too much for you to handle, you are probably right and is time to stop reading this and look some place else, otherwise let's move on:

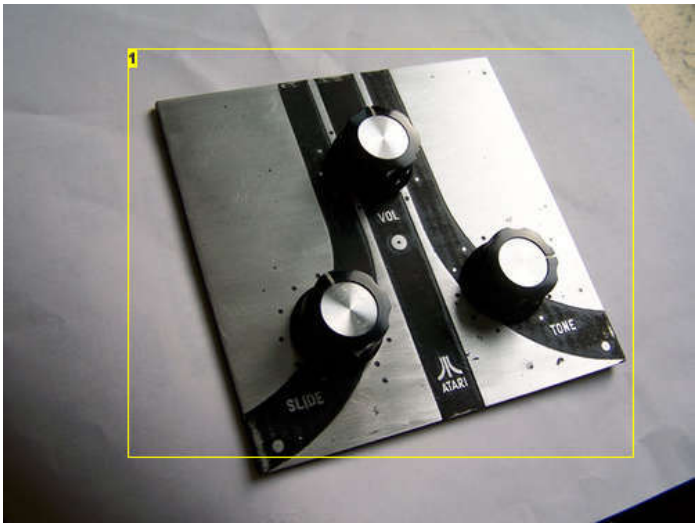


Image Notes
1. it needs some holes for the knobs and led

step 1: Materials

List of materials:

-Some aluminum panel/s

-A nice design for the etching

-Laser printer w/ black ink

-Some pnp-blue sheets

-Gloves

-Eye protection glasses

-Protective clothing

-Hydrochloric acid (same thing as as muriatic acid)

-Hydrogen peroxide (same thing as oxygenated water)

-A shallow plastic container to mix the peroxide with the acid (2:1 mix, depending on the peroxide concentration you may need to change the mix, I used 11vol. peroxide)

- Another container with water to rinse the panel.

-***Extremely well vented work area*** try this only if you have access to any open and well vented area, the process creates some probably dangerous, and bad smelling fumes, beware!!!
-running water(avoid any metal tool/surface... metal kitchen sink is a no-no, unless you like to spend some $ on repairs)

step 2: Print on pnp blue

1.- Create your design in any vector app: Illustrator, Corel Draw, Ink Scape, etc.

2.- Flip the design before printing as you would with pcb etching.

3.- Print the design on regular paper sheet(100% scale), this will work as a guide to print on the pnp sheet.

5.- Cut a piece of pnp-blue just big enough to extend a little bit from the edges of your design on the already printed paper sheet, the extra length will help to print and transfer the design to the aluminum panel.

6.- stick the pnp blue to the printed paper sheet with some tape on each corner, use just enough tape to hold the pnp in place.

7.- Set the laser printer to high quality print, again, 100% scale.

8.- Print again, you should end with something like in the image below.

Image Notes
1. can't see it here, but there is the same design printed on the paper sheet below the pnp blue
2. some tape to hold the pnp blue in place

step 3: Preparing the aluminum panel

Now that the pnp blue is ready to transfer, we need to prepare the aluminum panel, so:

1.- Cut the aluminum panel to the desired length.
2.- Use water sand paper to smooth out and remove any dirt/grease from the panel surface.
3.- Clean the panel with running water and dry with paper towels.

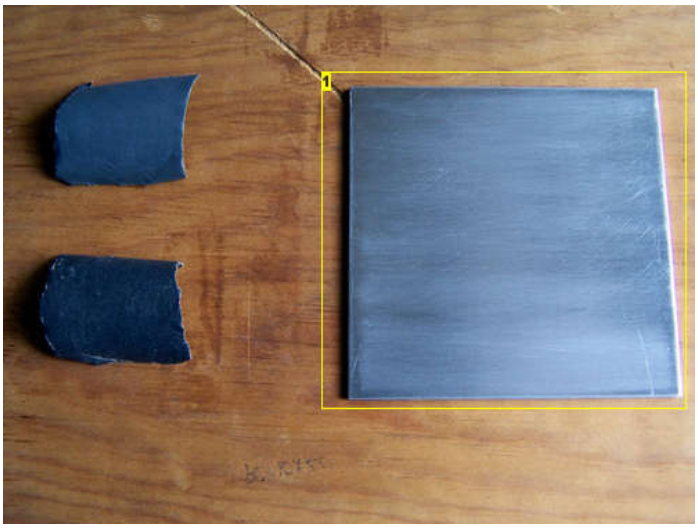


Image Notes
1. Just a rough finish only to remove dirt/grease

step 4: Transfer the design to the panel

Now we are going to transfer the design from the pnp-blue to the panel, same method as with the pcb toner transfer:

1.- Place the panel on some scratch piece of wood.

2.- Place the pnp-blue over the panel, make sure it's well aligned.

4.- Use tape to hold the pnp-blue on each side, make sure there are no air bubbles, wrinkles or deformations and the pnp-blue lies flat against the panel.

5.- Place some piece of cloth over the panel to protect the pnp-blue from the heat.

6.-Use an Iron to heat the toner on the pnp-blue, trying to cover everywhere, after a few minutes the toner will start to look darker, check from time to time to find any missing spots.

7.- When the toner looks black everywhere, the transfer is ready.

8.- Wait for the panel to cold down, then remove the tape, leave the pnp-blue in there.

9.- Now remove the pnp-blue, there may be some spots where the toner didn't transfer to the panel, we will fix that on the next step.

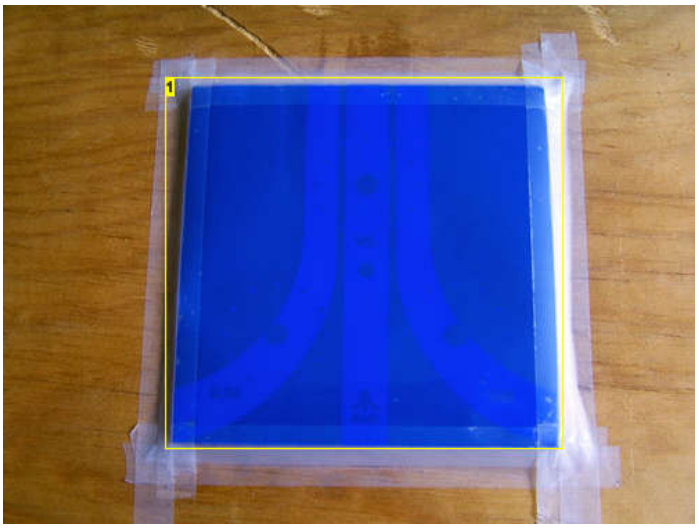


Image Notes
1. no air bubbles!

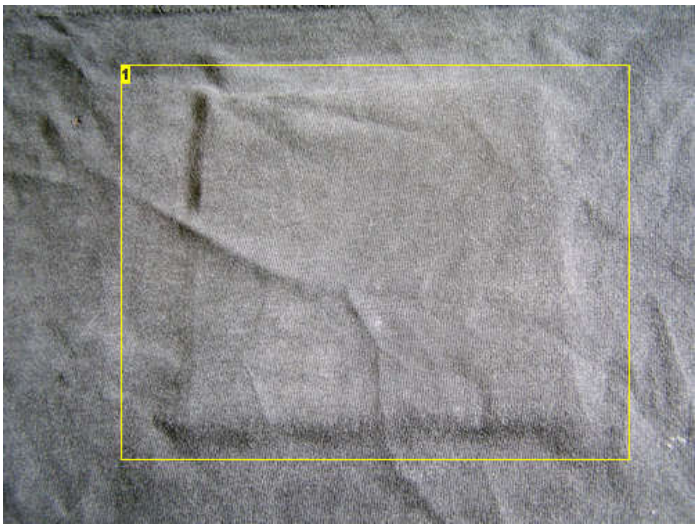


Image Notes
1. old t-shirt to protect the pbp-blue from the heat, remove it from time to time to check the transfer

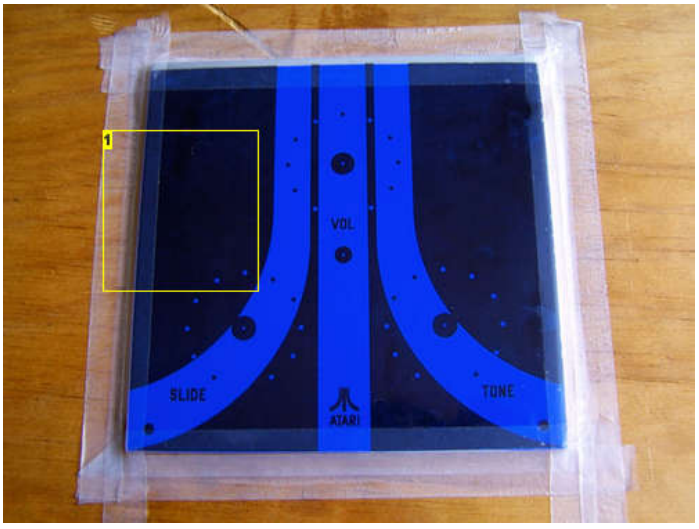


Image Notes
1. see the darker area?, that tells us this part is ready

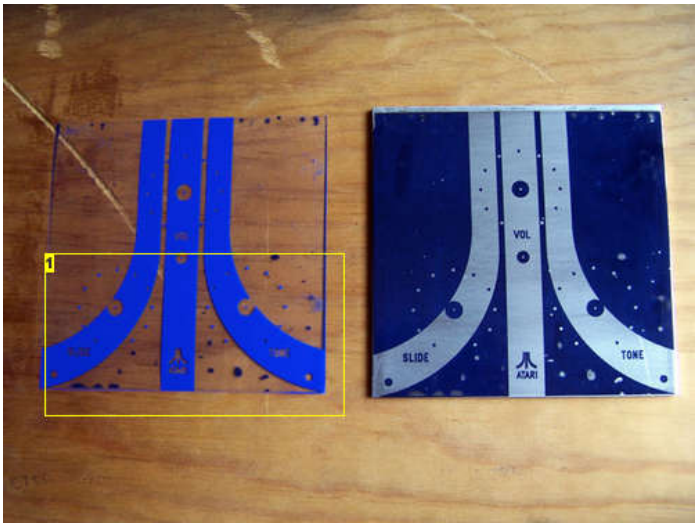


Image Notes
1. mmm, a lot of missing spots, I should clean better the panels next time

step 5: Fix the missing spots

As you can see on the image, there are some missing spots, we are going to fix those now:

1.- Take a sharpie pen(or any other indelible ink pen) and paint over the missing spots, retouch any spot 2 or 3 times to allow the ink to cover the spots and resist well the acid.

2.- Use tape to cover big areas/borders, etc.

3.- Picture #3 shows my panel, almost ready to etch.

4.- As you can see on image #4, I used the pnp-blue plastic left over to cover the back of the panel, this is important, you have to cover every part of the panel not going to be etched to prevent the acid from damaging the panel.

note: If the transfer ends up with a lot of missing spots or missaligned, you can clean the panel and start all over again, sometimes is better than fixing any mistakes.

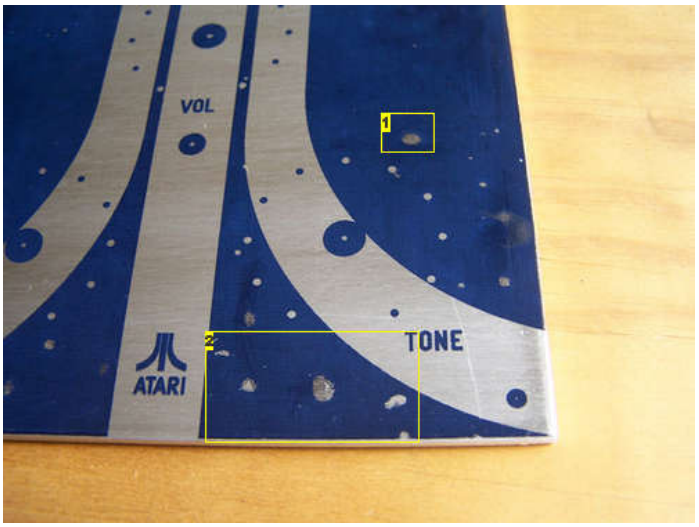


Image Notes
1. missing spot
2. some more missing spots, I guess I didn't cleaned the panel well enough :(

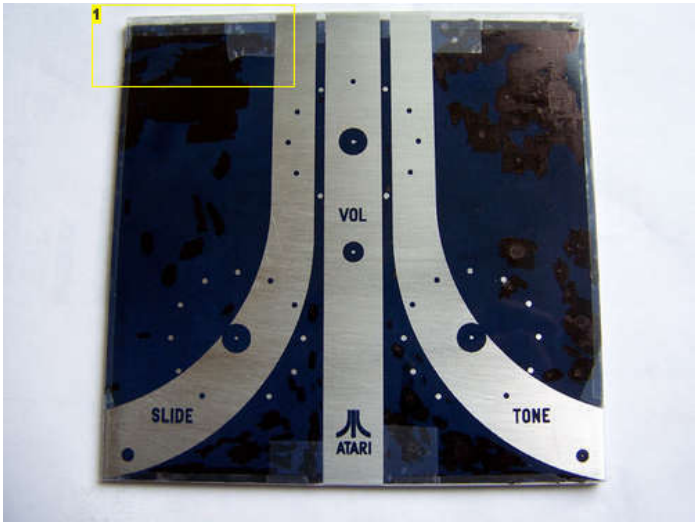


Image Notes
1. tape works fine to protect the lousy spots

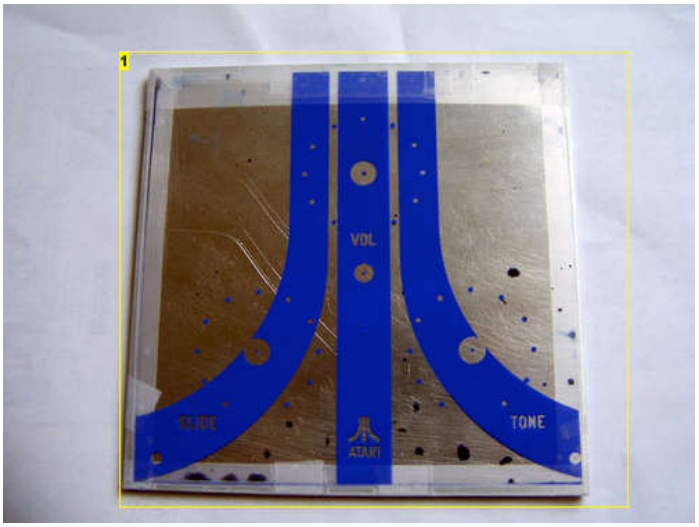


Image Notes
1. to save some tape I used the pnp-blue plastic left over

step 6: Etching the panel

WARNNG NOTES:

Acid can burn holes into your skin, wear some protective clothing, gloves, eye protection and gas mask with the appropriate filter designed for acids before handling it!

When the acid mix reacts with the aluminum it starts to produce acid vapours that of course are dangerous to your nose and lungs so by any means, DON'T breath that!

If you feel like this is too much for you to handle, you are probably right and is time to stop reading this and look some place else, otherwise let's move on:

1.- Go to a very well vented area, put on your protective clothing, gloves, eye protection and gas mask with the appropriate filter designed for acids before manipulating the acid, remember, don't do it indoors!.

2.- Use the shallow plastic container to mix the peroxide and acid in a 2:1 proportion, mix just enough to cover the panel and remember, ADD the hydrogen peroxide FIRST, then pour the acid slowly, to avoid any acid splashes.

3.- Place the panel into the container.

4.- The mix will start to react with the aluminum producing a lot of tiny bubbles, and acid vapours, DON'T breath that! , the acid will start to eat the unprotected parts of the panel.

5.- You can take out the panel and rinse it with water(another container with water will do) to check how is it going, take it back to the acid container if it needs some more time.

6.- Let it work until the groove depth left by the acid is about 0.5 mm, you can feel it touching the panel, or taking a closer look, remember to rinse the panel before any inspection, if you let it for too long, the acid will start to corrode the toner and damaging the protected areas.

7.- When the panel is ready, rinse it thoroughly with running water, remove all the tape and rinse it again.

8.- Here comes the green part, after the panel is etched, save the acid mix in a plastic bottle to reuse it another day, it will keep the strength to etch more panels.

Image Notes
1. Always wear protection

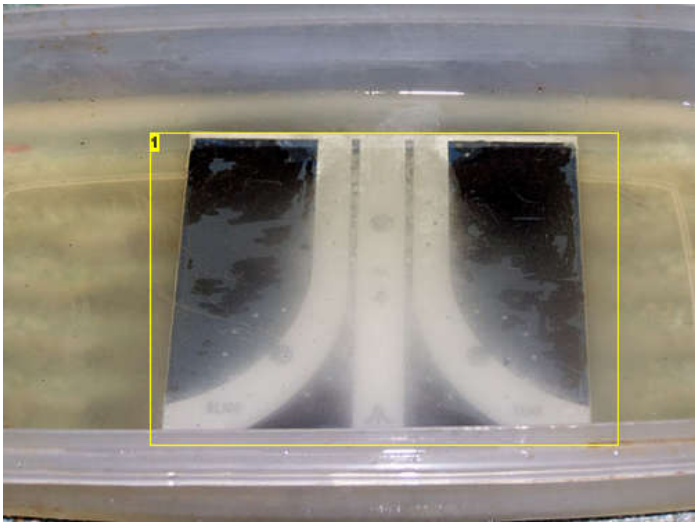


Image Notes
1. acid doing the hard work for us

Image Notes

1. it looks like this when it's done

step 7: Painting the panel

Now let's paint the grooves left by the acid:

1.- As you can see I didn't removed the toner, we'll do that later, prepare some space to be able to spray paint the panel, any automotive paint will work.

***note: you can remove the toner before painting the panel if you want, just use some old cloth or towel paper with nail paint remover (acetone) or thiner... but I'd say it's an extra step not really needed as you probably want to give the panel a smoother finish later with the wet sand paper, it will remove the toner too, but is up to you :)

2.- Cover every part of the panel doing several small passes, paint, let dry, paint, let dry, etc. so the paint sticks better.

3.- You should end with something like in the picture #2.

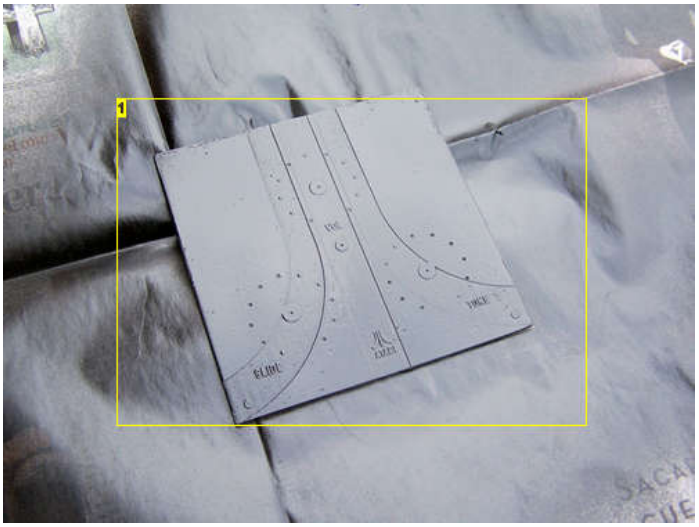


Image Notes
1. all covered with the spray paint

step 8: Finishing the panel

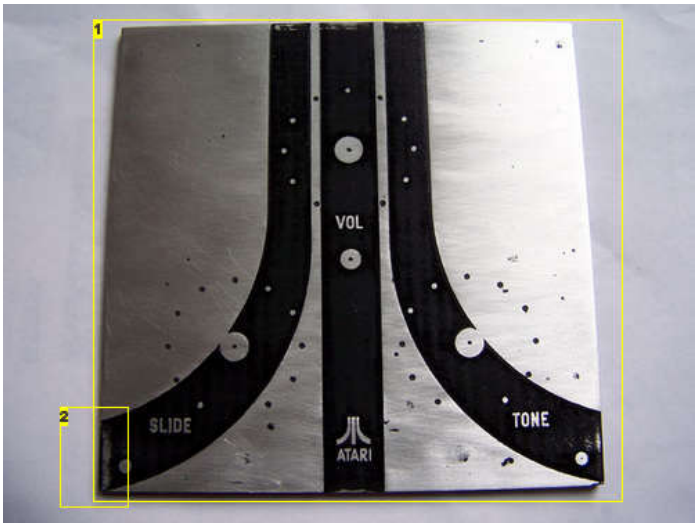
Let's finish the panel:

1.- After the paint dries, use a water sand paper with a fine grit to remove the excess paint and the toner from the panel taking care to not over doing it on the recessed parts so the paint stays there.

2.- Rinse and dry the panel and that's it for panel etching.

On picture #2 you see how the panel will look with knobs.

btw. I'd like to thank a friend, without him telling me about his experiences with the magic mix(muriatic acid+ oxigenated water) and diy PCBs I would not come up with this variation on the theme, thanks simone, aka cimo :)



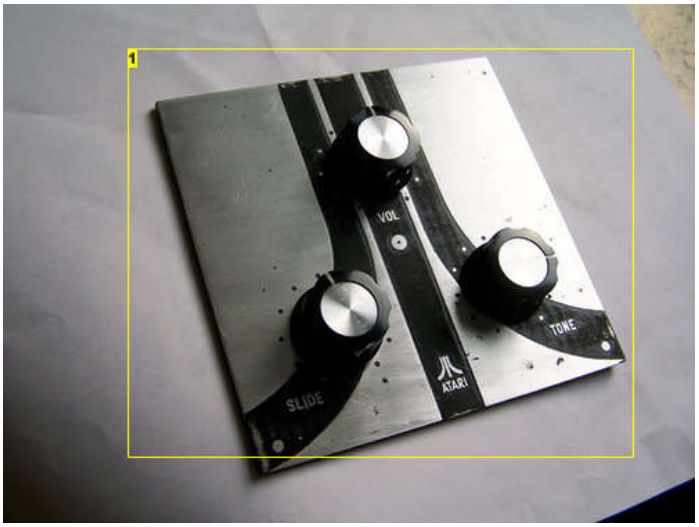


Image Notes
1. You can see some spots in there, that'll give the panel some character ;)
2. too much elbow grease

Image Notes
1. it needs some holes for the knobs and led

Related Instructables

Comments

50 comments Add Comment view all 63 comments

box_of_cereal says: Apr 22, 2009. 10:38 AM REPLY
Oh thanks!

Where the heck can you find pannels like that?
I've looked in almost every hardware store around where I live and I can't find anything thicker than 1 mm.

sineSurfer says: Apr 22, 2009. 11:33 AM REPLY
good question, you can buy aluminum here:

www.onlinemetals.com

search for aluminum sheet, I think the panels I get are 6061, but not sure about that, I get them locally.

box_of_cereal says: Apr 16, 2009. 7:43 PM REPLY
This is totally awesome!

How thick should the panel be?

sineSurfer says: Apr 16, 2009. 8:23 PM REPLY
It all depends on the size of the panel, but 2mm will be good for almost everything, I just made another panel for a custom synth, 18" x 6" with 28 holes for pots, switches, lcd and leds, is almost like a mini moog synth panel size:)

It bends a little bit, nothing too serious, but after placing it in a wood enclosure it will hold on firmly.

ehmbee says: Apr 2, 2009. 6:08 PM REPLY
Nice 'ible!-I can think of, oh, about 150 things i can use this for right now. The applications for my cars and bikes alone are numerous. Thanks.

sineSurfer says: Apr 2, 2009. 8:28 PM REPLY
cool, don't forget to show us some pictures ;)

ehmbee says: Apr 11, 2009. 8:22 AM REPLY
No problem! I'm thinking that labeled light switch plates is a good start, and labeling my doorbell as a "Self Destruct Mechanism" with "DO NOT PRESS" at the bottom....should keep the salesmen away.

ryukyu says: Apr 9, 2009. 10:13 AM REPLY
Nice work!

This may be a dumb question, but it the pictures in step 7 the paint is grayish, but the final product has a black finish. Was the paint in step 7 in fact primer and then you finished with a top coat of black?

Also I could see why you would want to leave the toner on to serve as a mask for the paint, but isn't it difficult to take off just the toner and not the paint when cleaning up the board?

sineSurfer says: Apr 9, 2009. 1:08 PM REPLY
Hi, the paint looks gray because of the light but is black, I found there is no need to use primer as the etched surfaces are rough enough for the paint to stick fine.

About cleaning the toner first, I think is an extra step not needed, as you'll have to remove the paint later anyway, see:

On the etched surfaces the paint sits deeper, when using the wet sand paper you are actually just removing the upper parts, toner + paint, i'd say why do this twice?

not sure if I could explain it fine, but that's the idea ;)

BS Kustomz says: Apr 9, 2009. 12:44 PM **REPLY**

using a good wax and grease remover wouldnt hurt either
available at your local hardware store for about $5

BS Kustomz says: Apr 9, 2009. 12:40 PM **REPLY**

i would like to add that if left uncoverd a container of muriatic acid will put a nice layer of rust on any bare ferris metal in the area over night

as well as the fact that when combined the acid and the aluminum create hydrogen gas so please good ventalation

rglater says: Apr 6, 2009. 4:41 PM **REPLY**

This process is an updating of the etching process that has been done for centuries and a very nice updating. As to safety issues i used to say "there are no old print makers" at least not any of the Macho Men that ignored basic safety. (Smoking over an acid bath, pouring water into the acid not the other way round...)

The movie "Goya's Ghosts" has a short segment near the beginning showing him making an etching. It shows the approach used then and is actually fairly instructive, wax and asphaltum are stillused and give a nice Hand Made feel to anything you etch.

Gabh an latha,
Richard

sineSurfer says: Apr 6, 2009. 9:33 PM **REPLY**

"Goya's Ghosts" , good catch Richard, I saw it too and I remember thinking right away: "mmm, that could work to do some panels" but then forgot about it, or maybe not... as I managed to connect the dots after hearing about the "magic mix" as a friend and I call it.

And I bet a similar tech is still used nowadays on some stuff, the metal plate holding the buttons found on the Otis brand elevators in the building I work look suspiciously similar to my results.

Take a look a the photo for a more recent panel, it's flawless :)

fudg says: Mar 26, 2009. 6:59 AM **REPLY**

you could always use asphaltum instead of the pnp-blue sheets. this way you can actually etch a hand drawn image if you wanted to.

also, it would be easier to cover up mistakes with asphaltum if the pnp-blue sheets didn't work properly.

smokehill says: Apr 2, 2009. 7:06 PM **REPLY**

Haven't heard of this stuff for years -- is it still available somewhere?

Some time back I was trying to research how some early Marine Corps dogtags had the thumbprint etched on the back. My Dad's was the only one I had ever seen, from 1941.

Eventually I found out that the USMC did this by painting asphaltum on the back, pushing the thumb into it, and giving it a quick acid bath. Apparently right after Pearl Harbor they cut out that step in the dogtag process to move men thru quicker, and never went back.

I assumed it was some sort of petroleum product but had never run across it before (or since).

shamanwhitewolf says: Apr 5, 2009. 10:11 AM **REPLY**

A quick Google and I found some here: http://www.dickblick.com/products/asphaltum-liquid/#description I don't know this company, I'm just pointing to one possible source.

Apparently, asphaltum is also referred to as bitumen, though other reading seems to give differing definitions of the two.

I like your idea of using asphaltum (or possibly several other inexpensive paint-on products). You could print and cut out you pattern on regular paper, then use that as your painting guide.

sineSurfer says: Apr 5, 2009. 12:12 PM **REPLY**

If you aim at more artsy stuff, you could use colored wax too, cover the whole panel with wax, remove the parts you want etched with a needle or something like that. Easy to get(any candle will do) and resists the acid bath fine, but forget about precise drawings :)

shamanwhitewolf says: Apr 5, 2009. 10:21 AM **REPLY**

Very cool Instructable.

I'm confused on part of this... You discuss printing once on paper, then again on the PNP-blue and taping together, but never mention the paper again.

If I get it right, you're taping a piece of the PNP-Blue to the paper to help it run through the printer, then removing the paper (discarding it) and continuing the work with the PNP-Blue. Is this correct?

sineSurfer says: Apr 5, 2009. 11:32 AM **REPLY**

"you're taping a piece of the PNP-Blue to the paper to help it run through the printer, then removing the paper (discarding it) "

Correct, that way you don't waste pnp blue, toner is cheaper than pnp blue here in my country :)

shamanwhitewolf says: Apr 5, 2009. 12:11 PM **REPLY**

Gotcha. Thanks for clarifying. I'll have to give this a try. And paper and toner are cheaper than PNP here, too. :)

t.rohner says: Apr 3, 2009. 11:13 AM **REPLY**

Cool ible
i used to etch pcb's with this mixture. You are right, when you say "use a well ventilated place". Because the fumes you create is chlorine gas. They used to kill each other with it in WW1. The gas combines with the humidity (water) in your lungs and respiratory tract and forms hydrochloric acid. You definitely don't want that to happen.
Maybe it's a good idea to wear gloves in the final part of the sanding and application of the resist. pnp or whatever you take. I would degrease it with isopropanol or some other degreasing agent, before applying the resist. From then on, never touch it with bare hands because of the oils on your skin.
I used to do it that way with my pcb's and they were crisp even in very fine lines. I used a photo resist, because there was no such things as a laser printer at that time. (maybe a laser filmsetter, but that in conjunction with a computer would have been more than 100 grand back then)
Now i would just spray some acid resisting varnish on it and laser the parts to etch away in my laser engraver/cutter.(it's a 45W CO2 laser, so it doesn't cut or engrave metals directly) But it can shoot away the color of the anodization on aluminum.

teckla73501 says: Apr 3, 2009. 7:33 AM **REPLY**

I have an old etched aluminum tray that my grandmother made 50+ years ago. Its starting to fade. Is there any way I can update or redo the etching? I really love it, but it is really faded.

smitty says: Apr 2, 2009. 7:52 PM **REPLY**

I think you meant to say "peroxide" instead of "water" under step 6, when mentioning the 2:1 mixing ratio.

sineSurfer says: Apr 2, 2009. 8:24 PM **REPLY**

I thought I had that one fixed, fixed now :)

skullm says: Apr 2, 2009. 4:03 PM **REPLY**

I hear somewhere you can use glossy photo paper, like when etching circuit boards. would this work?

sineSurfer says: Apr 2, 2009. 4:24 PM **REPLY**

Not as accurate as with the pnp blue, but it can work, let me explain:

Once I tried with this paper used to hold stickers (kind of semi transparent paper with wax coating) for a pcb transfer, the transfer went really smooth... but is hard to see if the toner is sticking fine everywhere.

With the pnp blue sheets you can clearly see when the toner is transfered as the toner turns darker when it sticks good into the aluminum

scriptster says: Apr 2, 2009. 8:08 AM **REPLY**

Guys, I'm missing the important bit of info: what's a "pnp blue"? Is it a transfer paper of sorts?

ColorfulNumbers says: Apr 2, 2009. 9:20 AM **REPLY**

That refers to "Press-N-Peel Blue," a product for transferring a resist onto metal. It's used for making circuit boards

It comes in sheets. You print your design onto the Press-N-Peel using a laser printer or copier (but not an inkjet), then transfer your pattern from the Press-N-Peel to the metal using a clothes iron. If you place the metal into acid, any surface not covered by the resist gets etched away, but the protected metal remains.

Details on the manufacturer's website here.

teeps says: Apr 2, 2009. 6:51 AM **REPLY**

Hey, great instructable. I feel like I could go do with this without too much guess work. Thanks!

28.martine says: Apr 1, 2009. 1:09 PM **REPLY**

the paint of the knobs of my stove vanisched after cleaning i think i'm going to make rings where the knobs can go over. it's a rvs realy expensive stove byed second hand so no warenty. Sorry for my poor english

sineSurfer says: Apr 1, 2009. 8:44 PM **REPLY**

beware, if the metal is too thin the etching may get all the way thru, that would be bad.

tim080772 says: Mar 20, 2009. 3:04 AM **REPLY**

I noticed in the items needed list Hydrochloric Acid and Hydrogen Peroxide, but I can only see the Acid being used in step 6, not the Peroxide.

Could you clarify this?

Looking forward to doing this!

sineSurfer says: Mar 21, 2009. 1:24 PM **REPLY**

Hi Tim, sorry for the confusion, yes, it is Hydrogen Peroxide instead of water on step 6, fixed now ;)

testeng says: Mar 31, 2009. 8:20 PM **REPLY**

Hi sine, Nice Work!
Great article - I was confused on only one item, the mixture ratio of 2:1.
Is it two parts Peroxide or two parts Acid?

sineSurfer says: Mar 31, 2009. 9:55 PM **REPLY**

two parts Peroxide and one part acid, if the mix seems to be too weak, add some more peroxide, as the oxygen activates the reaction ;)

Nerdz says: Mar 20, 2009. 9:25 AM **REPLY**

" 2.- Use the shallow plastic container to mix the acid and water in a 2:1
proportion, mix just enough to cover the panel and remember, ADD the water FIRST, then pour the acid slowly, to avoid any acid splashes."

By water he means Hydrogen peroxide. The H2O2 serves to oxidize the Aluminum first, since Al is resistant to acid.

Uncle Kudzu says: Mar 24, 2009. 7:26 PM **REPLY**

sineSurfer, i hate to be so dense, but which step removed the toner/resist? thanks!

i found a nice piece of aluminum today and i might just try your method for a clock face.

sineSurfer says: Mar 24, 2009. 9:06 PM **REPLY**

no problem, I just edited steps 7 and 8 to clarify the toner removal.

Good look with your attempt!

NobodyInParticular says: Mar 24, 2009. 10:41 AM **REPLY**

I know a weak citric acid solution (tomato sauce) can dissolve aluminum foil. So would a paste of citric acid powder and water be suitable for etching an aluminum plate?

sineSurfer says: Mar 24, 2009. 9:03 PM **REPLY**

mmm, may be worth to try it ;)

bustedit says: Mar 24, 2009. 7:28 AM **REPLY**

Atari Punk Console?? or stomp box w Atari graffix for fun?

sineSurfer says: Mar 24, 2009. 9:14 AM **REPLY**

yep, this one is for an Atari Punk Console :)

bustedit says: Mar 24, 2009. 11:08 AM **REPLY**

i have all the bits, but never pieced it together. any pointers?

sineSurfer says: Mar 24, 2009. 4:53 PM **REPLY**

for the Atari Punk?, I think I built it following this:

http://www.electro-music.com/forum/viewtopic.php?t=12644&postorder=asc&highlight=atari+punk&start=15

tried several times before getting it to work though

alex-sharetskiy says: Mar 23, 2009. 8:47 PM **REPLY**

step 2

the picture-box-comment-thing p'n'p blue?

sineSurfer says: Mar 24, 2009. 9:19 AM **REPLY**

Hi, if you are asking where to get some pnp blue sheets, you can check here:

http://www.techniks.com/

http://www.thompsonenamel.com/products/supplements/resist.htm

I bet there are some other places too.

glenn.craver says: Mar 22, 2009. 11:21 PM **REPLY**

Yeah, that sounds pretty cool to. I'll need to try both.
But hey, who can resist working with (best Dexter voice) CHEMICALS?!
Science!
Thanks for the Instructable! I've been wanting something to do with this spare bit of hydrochloric acid I had left over from an electroplating job.

Uncle Kudzu says: Mar 22, 2009. 8:11 PM **REPLY**

wow! this is interesting!

so, is the blue part the toner that's left behind? and the toner acts as a resist to the acid?

i have made laser toner transfers to paper and wood using solvent on the back of the transfer to make the toner release. this seems similar in a way. i'd like to try this for a metal clock face.

sineSurfer says: Mar 22, 2009. 9:22 PM **REPLY**

Hi Uncle Kudzu, yes, behind the blue stuff is the toner, it just helps to transfer the toner easier, and yes, the toner blocks the acid from eating the aluminum

solmstea says: Mar 22, 2009. 6:40 PM **REPLY**

Very nice instructable! I have used just regular overhead projection transparencies rather than PNP Blue; it might be a bit cheaper. We just heated the metal up from the bottom with a torch and pressed on the transparencies with a rag. Sounds like pretty much the same process.

view all 63 comments