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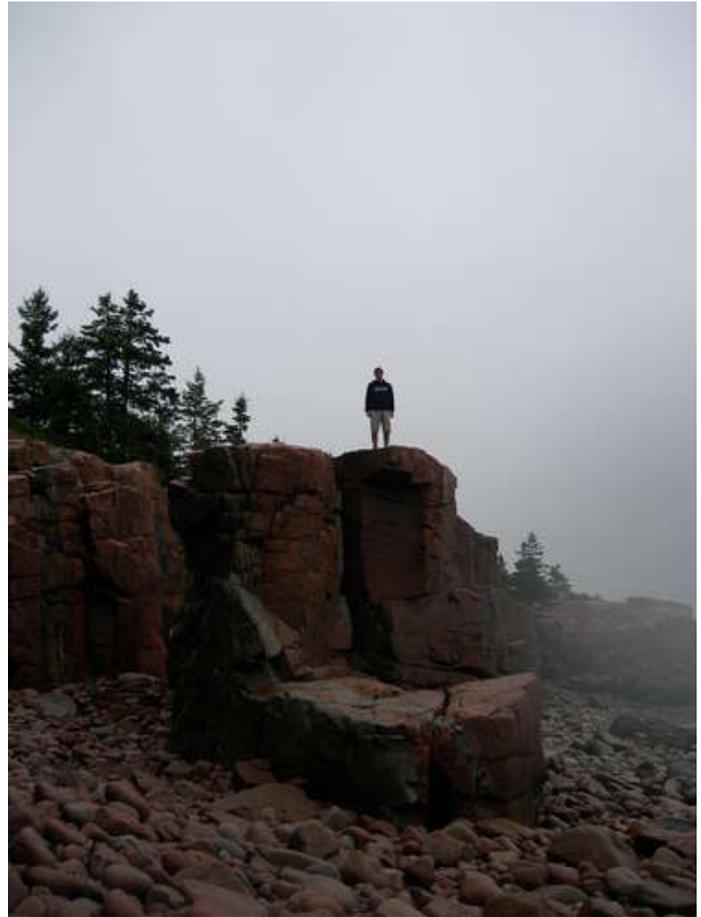
(easily) etch images in copper

by **prank** on May 20, 2006

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Intro: (easily) etch images in copper

Make a copper etching of any image. This takes about 1 hour, including image prep, transfer, and etching, and it works really well. Check it out!
http://www.artiswrong.com

step 1: Overview

I was making PCBs today (using vincent's excellent 5PCB instructable!), and they were coming out really well. I thought I might try images, and after a bit of trial and error, I got that working well, too.

This instructable will leave you with a nice copper etching of a digital image of your choice.

Along the way, you will:

Do some digital image editing and manipulation
Laser print your image onto a transparency
Iron the transparency onto a copper clad board
Chemically etch the board

Ready? Onwards!

step 2: Get yo' materials together

You'll need:
Some circuit board etchant (FeCl2)
A copper clad board the size of your image
A transparency (kinko's sells them for about $1)
A laser printer
An iron
A plastic tray larger than your board (to hold the board and etchant)

step 3: get some tunes

Before you begin your labor, you'll need (for your own safety) some smooth jams to rock out to.
Slip a favorite CD into that deck of yours, or grab one of my mixes from http://www.artiswrong.com/alex/mix

Now you're ready to get down to it!

step 4: Prepare your image

So, pick an image you'd like to etch. In general, you'll want something with high contrast, since , while grayscale will etch, greater contrast looks better. I used a sillhouette picture of me, and it turned out well.
OK, so using your favorite image editor, convert the image colors to grayscale. This will give you a better idea of what the image will look like once it's etched.
Now, scale the image so that it'll print to a fairly small area. Mine were 3"x4", and they worked out alright. I tried a full page image, and it's really hard to get the transfer to work for larger images. Try something small to start out with.

Remember that the image will be flipped (mirrored) when you transfer it, so you might want to flip the image before you print it (and definitely flip any text).

Print the image onto a normal sheet of paper and see how you like it. Play around with it until you're happy. Then, move on to the next step.

You might notice that I made 4 small images. Play around with it! Try inverting the colors, or playing with the contrast/brightness settings

WARNING--You are about to put a plastic transparency into your laser printer. I've done this a bunch and haven't had any trouble (I have a HP laserjet 1200), but you should be aware that your printer has a very hot fuser and you are going to put plastic through it. I've never heard of anyone having any trouble, but I just want to mention it here. Are you done ignoring my warning? Cool--let's go on

Load a transparency into your printer's tray.
Print your image exactly as you did before. Remember which side of the transparency your ink is on. Maybe mark it. If your image has text, this isn't a big deal--you'll just put it onto the copper so that the text (which you printed backwards, remember) looks correct (like normal text).
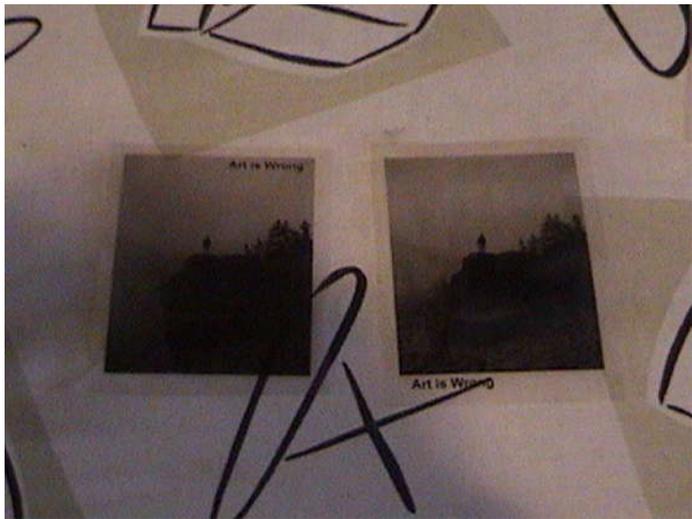
step 6: Transfer the ink onto the copper

Now you want to transfer the transparency onto your copper sheet.
First, you want to take a piece of steel wool to the copper sheet (both sides), and buff it until the entire sheet is shiny.
If your transparency is much larger than the copper sheet, you can trim it down, but leave some (.5 inch) room on the sides of the image.

Now, plug in your iron, and set it to a hot setting.
Put your copper board down on the ironing board. Position the transparency over it(ink side facing the board!). Put a piece of wax paper over the transparency.
Now, being careful not to slide the transparency around, put the iron on top of the wax paper. Press down with the iron, and iron all around the transparency . Iron for about 5 minutes--if you iron for less, the ink won't transfer well and you'll have to do it over again.

When you're done, set the iron to the side. The copper boards will be very hot!
I found that the ink will transfer best when the board cools down. You could either wait for ~10 minutes, or, if you're impatient like me, you can carry the board to a sink (remember that it's really hot!), and run some cold water over the other side of the board. This will cool the board down in about 10 seconds.

After the board is cool, peel back the transparency. Most of the ink should have transfered to the copper board. If you notice that it only partially transferred, it's OK. Leave the transparency on the board, put the wax paper on it again, and iron some more.

When you see a pretty faithful representation on your board of your image, you're done. Onwards!
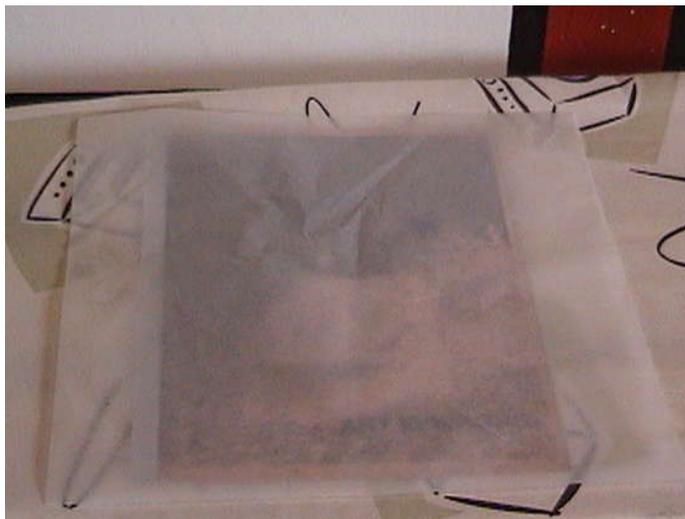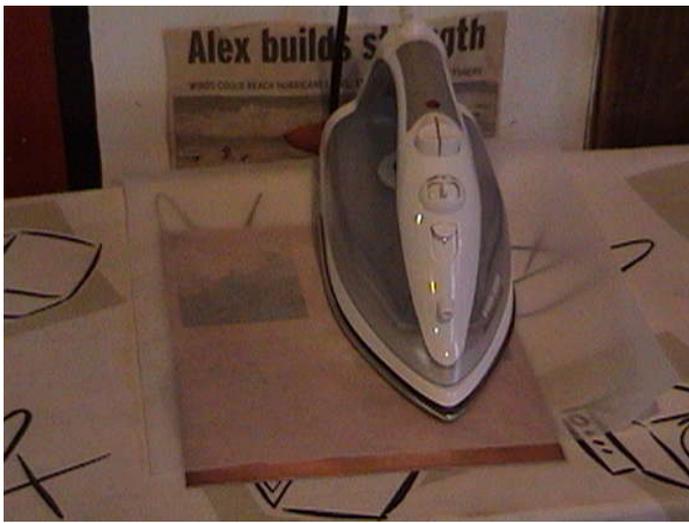
step 7: Etch-yer-sketch!

Now you'll use ferric chloride to etch away your copper and "develop" your boards

First, you should know that ferric chloride is really messy and can stain stuff (like floors!), so do this in an 'informal' setting. Ferric chloride is also acidic, so you'll want some nitrile gloves. I've had some on my skin, and it just irritates, rather than burning through my body, but it's not a nice sensation. Safety glasses might also be a good idea for the safety-conscious instructablee

So, put down a plastic pan that's larger than your copper board. You want a nice, heavy-duty plastic, on par with the lids of tupperware.
Put your copper board face down in the pan. Slowly pour ferric chloride over the board until the board is submerged.
Now, you sit back and wait. It took me about 30 minutes to fully etch my boards. Check in on your boards every so often to see how well the copper's etching.

When it's etched to your satisfaction (you should only see the black ink of your image, and the fiberglass board everywhere else), pull the board out and clean it off with water. Be sure to rinse off all the etchant. Remember that even a little bit of etchant can stain a porcelain sink, so do this somewhere 'informal' I sponged mine off first with paper towels, and that made things less messy.

Hang on to your etchant--you can do a bunch of boards before it'll stop working. When you do want to get rid of it, DON'T pour it down your drains.

MGchemicals.com offers this advice for disposing of Ferric Chloride:
1. Contact your local Hazardous Waste Disposal Company
2. The solution must not be put down the drain because of residual copper ions left in it. To make it safe for disposal, you can add sodium carbonate (washing soda) or sodium hydroxide to it to neutralize it, until the pH value goes up to between 7.0 and 8.0, testing it with indicator paper. Copper will be deposited as a sludge. Allow the sludge to settle, pour off the liquid, further dilute it with water and then it can be poured down the drain. Collect the sludge in plastic bags and dispose of it as required by your local waste authority.

If you're at a university, just contact your Environmental and Health Safety Office, and they'll be happy to collect it and dispose of it properly.
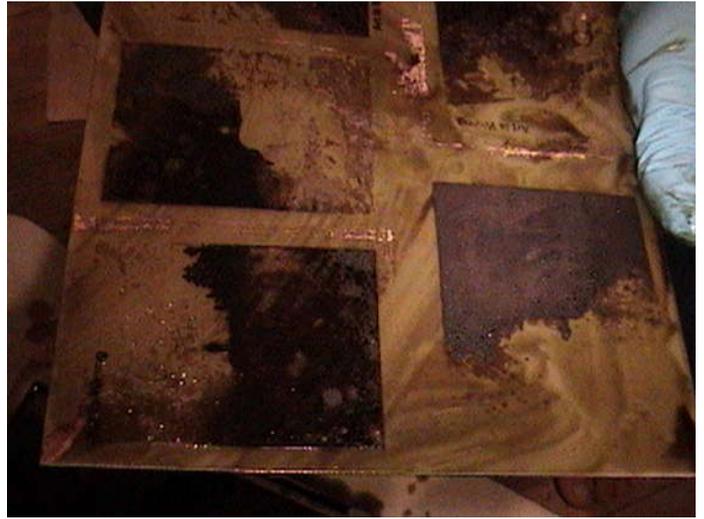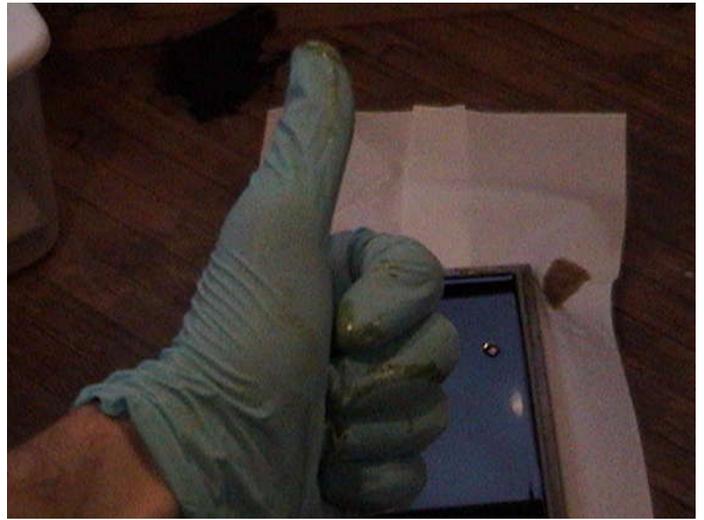
step 8: Finish up

Take some steel wool and go over your board. The blank ink should come off easily and you'll have shiny copper underneath. With any luck, your boards should come out nicely. If your board was larger than your image, you can trim it down with a paper cutter (although the fiberglass board will dull the blade)

step 9: **Cheese-it!**

Cool, you're done!
Enjoy your cool etchings. I'm making two-sided etchings to use as my business cards. Now go out and do some cool stuff!

-al
http://www.artiswrong.com

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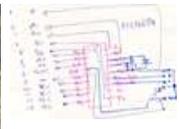**Make pictures with Acid Etching** by bofthem

Stop using Ferric Chloride etchant! (A better etching solution.) by The Real Elliot

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Comments

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nekoheehee says: Feb 9, 2009. 1:57 PM **REPLY**
I suggest using glossy paper or even pages from a magazine. after its printed on the paper you use a hot iron and iron the ink onto the metal. soak the metal and paper in water until the paper gets mushy and carefully rub it away. if your careful the toner will be left on the metal. it works for me every time :)

August Grey says: Sep 24, 2009. 8:19 PM **REPLY**
I used magazine paper today and didn't have a very smooth transfer. I spent about 5 minutes moving the iron in circles, but the paper didn't adhere to the copper and my toner transferred very faintly. Is there something I missed?

madpeoplejen says: May 24, 2006. 8:25 PM **REPLY**
You can also use this method to print on paper. It's sort of similar to the lithograph and/or screenprinting processes. Instead of reversing your image/text though, you would leave it flipped so that when you ink up your copper plate and print off of that, your image will come out correctly.

I believe it's called intaglio. The copper plates last awhile and is fairly easy to ink up, print, and then clean. I forgot what kind of ink works best but you apply it with a squeegee (is there a technical / artist term for one of these?) or a piece of cardboard, use a piece of mesh/tulle/netting to wipe it off, and then run it through a printing press.

Trust_in_Dust says: Apr 3, 2007. 10:00 AM **REPLY**

actually what you're describing is more akin to block printing, and probably wouldn't work very well with a thin copper etched PCB. in block printing, a brayer is used to roll the ink on to raised surfaces, not a squeegee which is used in silkscreening.

intaglio is when you etch away the positive lines of your image in a zinc or copper plate, apply a thick oil-based ink to the whole plate and then carefully rub away the ink left on the smooth surface of the plate with newspapers and cheesecloth until the ink remains only in the depressions. the plate is then run through an intaglio press which pushes the ink on to paper creating a slight raised line, just like with paper money.

also, lithography is completely different from any of the above mentioned printing processes, and requires a long complicated sensitization of limestone blocks with chemicals that make some surfaces water-loving and some water-repellent.

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madpeoplejen says: Apr 3, 2007. 11:28 AM **REPLY**

actually, i pretty much described intaglio the same way you did, but whatever. i've studied printmaking and am familiar with the blockprinting, intaglio, and litho processes, i'm just not currently active with it.

Trust_in_Dust says: Apr 3, 2007. 11:57 AM **REPLY**

i just wanted to clarify that someone trying to ink up and print a plate similar to the one shown here using intaglio methods would not have much success. nor would they have much success using block printing methods.

not to mention that someone trying to put a PCB through pretty much any kind of printing press heavy enough to print intaglio would most likely crush it beyond further use.

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superboywing says: Jul 29, 2009. 12:02 AM **REPLY**

Solution: Don't etch on PCBs. Go out and buy copper plates intended for use on an Intaglio Press. Instead of using Ferric Chloride, another Instructable suggests using Copper Chloride in an aqueous Hydrochloric Acid solution. I will be trying this to prepare my plates, and heading to a print shop to rent some studio time to see how well it works.

---

unbunny says: Jul 2, 2009. 6:33 PM **REPLY**

Are you using WAXed paper, or just parchment paper? Seems that the iron would melt the wax and make a smokey waxy mess...

---

prank says: Jul 2, 2009. 9:51 PM **REPLY**

it's normal waxed paper. No mess a-tall. It makes sense--you can put waxed paper in the oven and it doesn't kerplode.

---

oneempowered says: Jul 16, 2009. 1:33 PM **REPLY**

Wax paper will smoke in the oven or when being ironed.
What you want to use is called parchment paper in the US. It is most commonly used for baking.

---

syrax says: Jun 25, 2009. 5:10 AM **REPLY**

it's not the best solution :) i make this similar but .... when convert image to B/W i save it in WBMP in photoshop, this give me a very small Black and White pixels NO GRAYSCALE , after that just convert this WBMP to normal BMP and it's ready to "print" .
When you use grayscale it's hard to etch

Regards from Bulgaria

---

tnielsenhayden says: Jun 12, 2009. 11:38 AM **REPLY**

If you've just put the wrong kind of transparency or mailing labels through your printer or copier, and you now have hot goo adhering to the internal works, run a bunch of sheets of paper through as fast as you can. If you're lucky, the hot goo will stick to the paper and so be removed from the machinery. If it doesn't work, you're not out much.

If you've overinked a mimeograph or small offset press, this same trick will clean out the excess ink. Keep a stack of misprinted pages (a.k.a. waster sheets) on hand so you don't use clean paper. Waster sheets can be reused multiple times. You just have to let the ink dry between uses.

---

disturbedreaper says: Jun 2, 2009. 5:28 PM **REPLY**

does any1 know if thiss will etch any other types of metal just wondering
maybe i can make somthing cool

---

bulbusbolocks says:

Apr 18, 2009. 7:12 PM **REPLY**

Er, yes, I once ruined a laser printer by putting the wrong kind of transparency through it. Make sure you use transparencies specifically intended for laser printers. Standard transparencies will almost certainly melt and spread goop all over the internals of your printer.

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hammock_hero says:

Nov 22, 2008. 6:49 PM **REPLY**

Awesome Instructable
One of the reasons I signed up on the Make site was to ask you, I'm doing a science experiment for my grade 10 science class, and I was wondering where you purchased you copper plate? I bought some 1/4 copper couplings and was going to cut and flatten them.
Also, did you place anything on the back of the sheet so the freak acid won't eat into it? or if I just missed reading that part.
Thank you for making this Instructable
Caret

---

prank says:

Nov 22, 2008. 7:08 PM **REPLY**

So, it wasn't actually copper plate--it's copper-clad fiberglass you use to etch circuit boards, so one side is a copper coating and another side is fiberglass. You can buy it, pretty cheaply, if you search for 'FR4' copper board, or you can even get it at radio shack.

good luck with your science experiments
--me

---

hammock_hero says:

Nov 22, 2008. 8:14 PM **REPLY**

Alright thanks, I'll go looking for that tomorrow. I've never really etched anything but I got interested in it from some of the altoid tins I saw and decided why not make something cool while getting marks for it.
I may need you to answer a few questions if I run into any trouble.
Thanks again
--Myself

---

glassgardener says:

Nov 9, 2008. 6:55 PM **REPLY**

I loved your tutorial, I'm wanting to etch some small decorative items to put in my stained glass art. Can I continue to leave the peice I'm etching in the acid and actually make small intricate trims that are not plates? but little decorative trims? Thanks!!!! glassgardener

---

Carlos Marmo says:

Oct 30, 2008. 3:24 PM **REPLY**

Wonderful work!

Congratulations!

Evan says:

Jun 1, 2006. 11:46 AM **REPLY**

Will this work with plain copper sheeting (like the kind you can get at hobby or home improvement stores)? I really want to etch some of Da Vinci's notebooks onto copper sheets about 4"x24", and I think this would be a good process to do so, but I wasn't sure.

Kryptonite says:

Sep 30, 2008. 6:10 AM **REPLY**

Yeah u cud do that, but make sure u use some seriously gud tape, so that u can cover the back up so the back doesnt get etched.

---

prank says:

Jun 6, 2006. 8:20 AM **REPLY**

So, copper sheeting is pure copper, so the etchant will eat away the entire board. The stuff I'm using has a layer of fiberglass with a thin copper layer on either side.
BUT---now that I think about it, it may actually work with a copper sheet. Try printing the negative of your image, transferring it, and then letting it etch. I think if you let it etch for a long time, it will turn out poorly, since the etchant will get underneath your resist as it etches down, and your resolution will go to crap. Try using very thin copper sheet and checking it constantly.

(now I'm all excited!) You might also want to coat the entire backside of the sheet with resist, so it only etches from one direction. Alternatively, you could put the mirror of the frontside image onto the backside, and have it etch away from both directions at once--This method _might_ be able to actually etch holes in 1/32" copper sheet, which would be cool beyond belief (imagine all your letters actually being holes in copper!)

Things to keep in mind--the boards I etched were FR4, which means that the copper thickness is .0014". If you use, say, 1/16" copper, you're taking away about 22 times more copper. You may need to swap out the FeCl2 halfway though if the etching slows down, or add fresh stuff. Also, I worry a lot about the sidewalls etching away. I guess the only way to do it is to try! I'll race you!

---

kecl says:

Jan 31, 2008. 6:01 PM **REPLY**

I have done copper etching on sheet copper using a permanent marker to mark what I don't want etched and ferric chloride from Radio Shack. It works well but I am running out of ferric chloride. I came to this hopping for a alternative to ferric chloride. Do you have one?

Kryptonite says:

Sep 30, 2008. 6:13 AM **REPLY**

http://www.instructables.com/id/Stop-using-Ferric-Chloride-etchant!--A-better-etc/
The Real Elliot has made an instructable on a gud alternative.

zachninme says:

Dec 1, 2006. 7:16 PM **REPLY**

Also, use acetone (nail polish remover), to remove the ink. This way you don't scuff up the image :-)

Arcan3 says:

Jun 9, 2006. 12:45 PM **REPLY**

Theres probably no need to change the solution... btw... something all you guys forgot to mention (i think) is that you have to move the tray or bucket so new solution comes in contact with the surface... most people just leave there sitting.. this is not as good since the solution touching the copper depletes itself and without movement theres no way to move new solution on the surface to be etched...

---

magicpocket says:

Feb 11, 2008. 2:52 PM **REPLY**

Coolness itself, I combined with with the grl's how to go postal and made this http://www.westoleyourlogo.com/

Kryptonite says:

Sep 30, 2008. 6:08 AM **REPLY**

If that is ur website then i tink it sick as. all the stuff written on there is so true, and the etching with the lyrics is a seiously nice job.

Kryptonite says:

Sep 30, 2008. 5:58 AM **REPLY**

I've been looking at etching 'ables all evening and this wud be one of the better ones. Ferric chloride is alright, but this instructable by The Real Elliot shows a much better option. You did screw your etching up, but on that picture it adds a really nice effect, i think if u did it perfectly clean then the effect would have been nowhere near as cool. For all those people out there that have an inkjet printer instead of laser printer, this instructable shows how to etch using that.

I'm thinking about adding an 'able that collects information from a whole bunch of etching 'ables, and i'll pick out the best methods.
If i do do that I'll make sure to pm every 1 that made the ideas and ask to put it in mine, so dont worry prank
BTW nice instructable

Zephryllis says:

Feb 29, 2008. 7:58 AM **REPLY**

Just a note to anyone planning on printing from the plates. As long as you're hand printing or using anything but a heavy-duty press (intalgio presses are fine), roofing copper is a great medium to work with. It's cheap and you can get it from most hardware stores in different sizes. Just be sure to clean it thoroughly with something like Bon Ami several times as they aren't as clean as plates bought from art stores. Also, if you want the smoothest surface, take a palm sander to it in circular motions followed by steel wool. Then clean again!

---

pixelrider says:

Feb 13, 2008. 1:04 PM **REPLY**

Why printing on transparency? You could just use "glossy" paper from color magazines. And FeCl3 is dirty - use B327 ;) Going further: ok, print it on transparent medium, cover copper with Positiv20, lay on it your "photo" and use UV light for a couple of minutes. After that use NaOH, clean with water, and finally use B327 or FeCl3 ;) [this way you should achieve more accurate etch]

---

jordandesign says:

Feb 8, 2008. 11:42 AM **REPLY**

What do you mix granulated ferric chloride with to
make it liquid. Water?

---

jojopyro says:

Jan 8, 2008. 2:49 PM **REPLY**

just a thought... if paper survives laser printers fine, why won't plastic?

---

prank says:

Jan 8, 2008. 3:16 PM **REPLY**

The worry is the fuser in a laser printer--there's this big hot fuser at the end of the printer that melts the toner onto the paper, and the risk is that the fuser melts the transparency. Fortunately, it doesn't seem to (toner melts really easily, and it looks like it's either not hot enough or the plastic moves too quickly to melt)

Tbvck says:

Dec 21, 2007. 10:29 PM **REPLY**

I like your etch.I was just looking at it another way..the copper part could be like the land in a coastal map, where as the etched image could be the ocean.Can you see it?

---

prank says:

Dec 21, 2007. 11:25 PM **REPLY**

It looks like it'd be swampy.

I want to live on an island shaped like me!

---

clay10 says:

Nov 13, 2007. 5:34 PM **REPLY**

will a ink jet printer work for the transparency? if not how about if i print out the image i want on the inkjet then photo copy it on to a transparency? thaks allot really keen on trying this>

---

prank says: Nov 14, 2007. 1:22 AM **REPLY**

As I understand it, an inkjet won't work. Laser printers have this plastic-y toner that you melt onto the copper board with an iron. The ink from an inkjet doesn't do this.
Printing your image with an inkjet and then photocopying onto a transparency should work, though

---

aldomeng says: Nov 6, 2007. 11:20 AM **REPLY**

Great instructable!!
Would it be possible to print the etched image on paper using the board?
And is it possible to etch a normal copper board this way?
Thanks!

---

prank says: Nov 7, 2007. 8:18 AM **REPLY**

I'm not sure what you mean by printing the etched image on paper. If you're thinking of making a stamp, it could possibly work, but my guess is that ink won't stick well to the copper surface.
If a normal copper board is just a solid sheet of copper (no fiberglass), then yeah, you can etch it--the etchant doesn't care if there's fiberglass inside the board. You just have to think about a couple things--First of all, I wouldn't use very thick copper. Once the etchant gets past the resist layer on the surface, it's actually etching in three dimensions, so it eats away at the edges of the copper as well as the surface. Also, if you ever have a continuous line in your image that goes from one side of the board to the other, that will etch away and your board will be in two pieces. Same goes for 'islands' in your image. Basically, all the consideration you'd have to do when prepping an image for a stencil, you have to do here.
Also, keep in mind that your board will be etched from the top AND bottom. There are a couple ways to take this into account. If you put your image on the top and just let the bottom get etched away, it might theoretically by OK, since the bottom is all getting etched at the same rate, so your result will be a little thinner, but your design will show through. I think in reality, though, different parts of the bottom will etch at different rates and you'll get these (possibly cool) varying thicknesses throughout your finished board. I think the right way to do it is to put a mirror image of your design on the back, making damn sure that you have the front and back patterns aligned, and then etch. That oughta work OK.
If you don't need cuts to go all the way through--you just want a relief image, than it's easy. Just coat the entire back with resist. It doesn't have to be an iron-on thing, even sharpie works pretty well.e

---

prank says: Nov 7, 2007. 8:24 AM **REPLY**

actually, I take it back. on the last page of this instructable, there are some comments about intaglio, which is making prints using similar etched metal boards. I was thinking that water-based ink tends to bead up on the metal, but they say you use oil-based ink, which I'm assuming doesn't

---

OzLandish says: Nov 6, 2007. 8:55 AM **REPLY**

Transparencies for laser printers should be fine. I've never had any problem. Toner itself is primarily made of plastic. Also, BEWARE...the toner used in late model Brother laser printers will not work.

---

jr rwigemera says: Jul 3, 2007. 10:16 AM **REPLY**

hello, this sounds good ,but have some infos I need.I am based in Belgium & main language being french. The products needed to realize this might be difficlt to translate. Could you may be give me brands of those chemicals. Now it seems like you are using red copper,the yellow one being an alloy,would it function as well ? Please advise

---

piper1234 says: Nov 5, 2007. 12:43 PM **REPLY**

al you need is cooper and ferric chloride or nitric acid, half acid half water, always pour the acid in to water

---

howboutitbru says: Sep 5, 2007. 6:58 PM **REPLY**

ballin

---

egreen767 says: Aug 30, 2007. 8:45 PM **REPLY**

COOLO!!!!

---

pooboy says: Jul 19, 2007. 9:05 PM **REPLY**

awsome!

AT says: Jun 26, 2007. 1:04 PM **REPLY**

That! Is very cool!

Trust_in_Dust says: Apr 3, 2007. 10:10 AM **REPLY**

a REALLY good idea here would be to use your image editing software to halftone your image as is done in silkscreening.

this converts it to tiny dots and makes your image the ultimate in high-contrast since every dot is black, while still allowing you to acheive excellent detail.

just make sure your halftone pattern isn't so tiny that you can't even see the dots, this sort of defies its purpose.

---

spinach_dip says:
An oft-overlooked step in any process. Well said, well said.

view all 88 comments