

A Guide to Screen Printing As a Supremely Accessible Art Form

Presenting full-blown serigraphing done anywhere without expensive equipment

Recognizing the importance for large bodies of people to communicate freely amongst themselves, I've assembled this tutorial. A community's health and survival relies on the ability of its individuals to communicate with each other in unhindered and unfiltered fashions. Screen printing is a simple artform, capable of easily reaching a large audience and therefore ideal for the individual who wants to captivate their community. Finding creative ways to convey information to each other, will prove vital to the future of our local and global neighborhoods.

This guide should leave the individual feeling prepared, inspired, and fully capable of sending out their own message without requiring the support or approval of any large institution or sum of money. Communicating is easy and should happen frequently.

That being said, let's start at the beginning.

Screen printing is a process wherein ink is pushed through a stencil in a silk or polyester screen and onto a material. Actually, it doesn't have to be ink, it could be any material in a viscous, liquid form. And it doesn't have to

be silk or polyester, it could be any mesh like material able to be stretched on a frame. Basically, there are many different approaches to screen printing and any number of interesting ways to go about it. Do you want to print posters or t-shirts or use screen printed elements in combination with other media? Do you have access to a lot of equipment or are you working with a few spare dollars? Do you enjoy being meticulous and particular or do you like to just feel your way through? I can't cover all the possibilities, so in this guide I've tried to boil it all down to a single process that provides the best mixture of simplicity and effectiveness for the widest range of needs. Here's a brief overview of the approach we'll be taking:

An image is created in opaque black on a transparent vellum or plastic. That transparency is then used to expose the image into a photo emulsion layer spread onto a polyester or silk screen. The screen is then used to swipe ink through in the shape of the image onto many pieces of paper or fabric. Different layers can be prepared on different screens, and there is almost unlimited room for experimentation. On to step one.

Art preparation

Unless the goal is simply to experiment with the process of screen printing, it is usually a good idea to have your image prepared beforehand. For the sake of simplicity, I will be explaining how to print one single color image. Additional colors and layers are added by simply preparing that layer as another image on another screen and printing over top the previous layer. Before you start, decide if you're going to prepare your image entirely by hand, or scan your artwork and prepare it in Photoshop, or create it digitally and get it printed on a black and white transparency. When you have a good idea of the how, gather the appropriate materials from the following list.

Black paint pens - If you're doing this by hand you need pens or something that will make an opaque (not see-through) mark.

Mylar or Vellum - If doing it by hand these substrates will allow plenty of light through. Vellum may buckle a bit with the moisture of ink.

Scanner - Useful if any or all of your image will be done on paper or something and then simply bumped into the digital world to send to transparency.

Adobe Photoshop - or any program you can prepare your image in, if you want to work digitally.

Copy or print shop - Any place that will do black and white transparencies if you're working from a digital file. Almost all will do 8.5x11, but few will do larger.

When preparing your image it is important to understand that you are making a stencil. Whatever the image is, it needs to end up in very opaque black on a clear piece of transparency paper, vellum or mylar (Fig. 1). When this image is used to expose your screen the black areas will allow ink to go through the screen and the clear areas will not. Hold the image up to the light. No light should come through your black image, and plenty or all of the light should bleed through the paper.

Your image can contain no actual grey tones because you are in effect making a stencil. Its either black or clear. The ink will either be pushed through the screen and onto the paper or it won't. However, there are many ways to simulate grey tones with solid black areas. Halftones, and posterization are a couple effective ones that are pretty simple to work with in Adobe Photoshop (Fig. 2). If you're doing it by hand, hatching, cross-hatching or stippling can simulate grey tones. Either way, be sure that any hatch marks or halftone dots in your image are large enough to transfer onto the screen your using.

Fig. 1

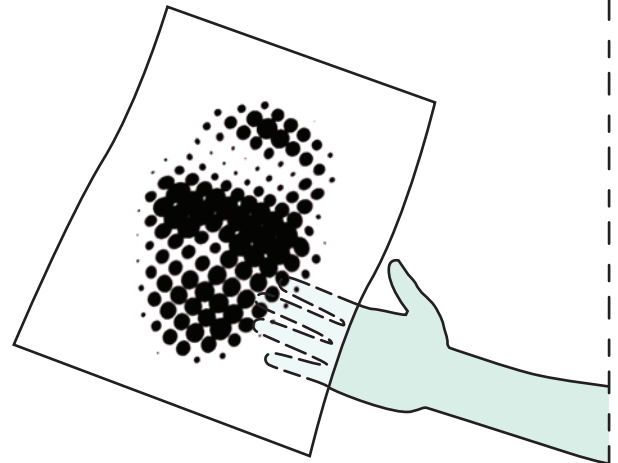
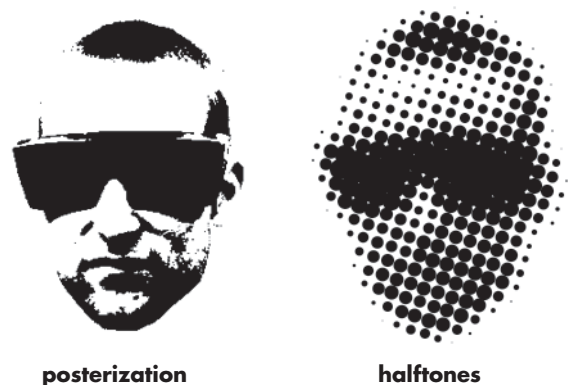


Fig. 2



Screen Preparation

Now that your image is ready, its time to get your screen ready. Screens come in a few varieties. Polyester or silk mesh can be stretched across a metal or wood frame. You can buy screens already stretched at most art stores or online or you can stretch them yourself. There are also roller frames made of bolted metal tubing that make it relatively simple to stretch your own screens. Silk is usually a lower resolution than polyester and can accumulate build up a lot faster. Whatever is easiest to get your hands on will work. You just need one a few inches larger than your image on all sides. When you have one that's in good shape, grab the following materials.

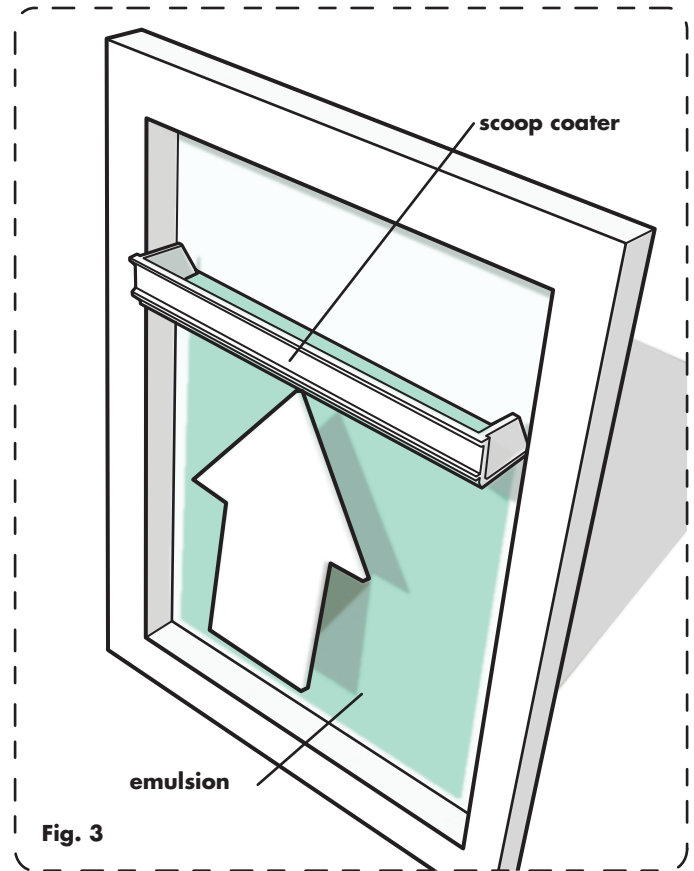
Photo Emulsion - QTX or Diazo. QTX is pink and doesn't need to be mixed and has a pretty long shelf life. Diazo is green or blue, comes in two parts and goes bad pretty quick. Sometimes it can get you a little better detail though. Both types will cure hard to your screen when exposed to bright light.

Scoop coater or Squeegee- It can be pricey, but the scoop coater makes spreading the emulsion real easy. The squeegee is do-able but pretty messy. Either one will need to be just smaller than the inside width of your frame.

Dark, dry area - you'll need a place your emulsion can dry without being exposed to light.

Old credit card- or a palette knife. It helps with cleanup.

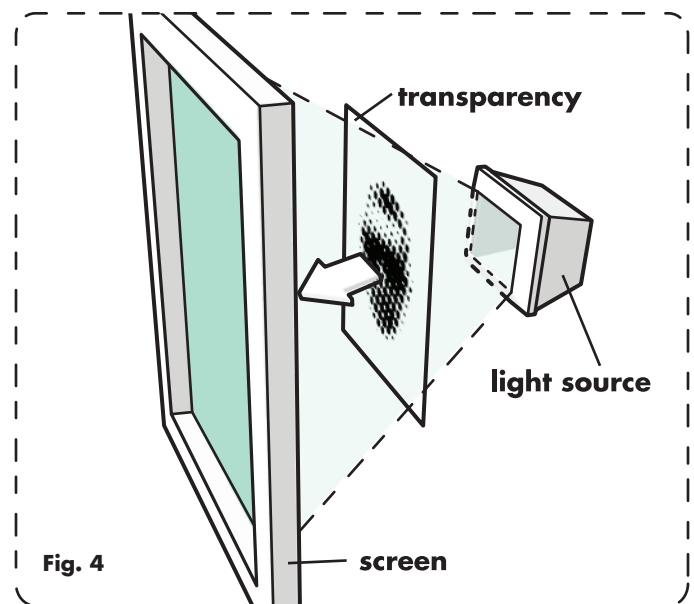
The emulsion goes in the scoop coater, or a thick bead of it goes on your squeegee. Swipe a very thin even coat on both sides of your screen. Watch out for drips or runs, they're bad. This gets easier with practice. Next, put the emulsified screen in your dark place to dry for about an hour. If it sits in the light too long it can cure before you get your image on it. Go back and put all the unused emulsion back in its container and wash off your tools.



Exposure

This step all depends on your exposure unit. At the end of the tutorial we describe a simple, effective unit you can build for next to nothing. Currently, I use a large light table that's stuffed with extra tube fluorescents, which might be more than you need at first. Industrial units incorporate a vacuum bag to adhere the image to the emulsified screen and I've heard of guys in California who just take it all outside and let the sun do it.

However your setup is put together, there's a few things that always have to happen. Your image needs to be placed directly onto the back of the outside of the screen so no light can get between it and the emulsion. The other side of the screen needs to be lined with a dark non-reflective material so no light can get in from behind. Finally, your screen needs to be placed in front of whatever your light source is for the amount of time appropriate for that source. My table runs about seven minutes, but I've used ones that were up to forty minutes. Trial and error with a constant light source is the only way you'll find your exposure time. When your screen has been exposed, all the areas that were not kept in the dark behind your image will wash out with a gentle flow of water. It might take a little special touching to get some of the problem spots of your image out. Once you are satisfied, let your screen dry out in the light.



Materials

You're almost ready to print but there's a lot to know about different inks and substrates (materials to print on) and any other materials you will need on hand. I'll discuss the ones I have experience with and what is good for what.

Inks - Any pigment suspended in a viscous liquid will work. Many types of food even work reasonably well. But if you're interested in good old reliable screen printing inks, acrylic or oil inks are your best bet. Oil based inks require mineral spirits for clean up and are kind of toxic. But they are gorgeous and velvety and can do some things acrylics can't. Acrylics come in many brands, but I use a lot of Speedball, which is the most widely available. They are relatively safe and wash up with water. You can mix them and thin them and get transparent base. The main draw back is that they can dry quickly in your screen. The best part is that all you need to get is five different colors and then you can mix any color you want. Cyanine, magenta, process yellow, black and white and your set. Speedball also makes acrylic fabric inks that work well on t-shirts or other textiles and only need be heat set with an iron to cure. Although they do have a bit of trouble with light inks on dark fabrics. If you want to try light colors on a dark fabric you're best bet is plastisol ink. It's oil based, but goes on thick and on black fabric white will show up white instead of grey. The bad part is that you'll need a heat gun to cure the ink and mineral spirits to clean up.

Substrates - You can print on anything. The flatter the better. If you want to try paper, any printmaking paper will work but its expensive. For large runs a quality 80 to 100 pound cover works great. I like French Paper. You can order as much or as little as you need and its great paper and pretty cheap. Lots of good colors, too. If you want to try t-shirts look for a wholesaler online. Keep in mind when you purchase any material, especially in bulk, you are supporting that manufacturer's business habits, good or bad.

Squeegee - You need one that will fit inside your screen but is wider than your image. There are a few different types, some are softer and some are harder and some have squared or round edges. The basic screen printing squeegee, however, will get just about any screen printing job done and is a good place to start. You'll find one at most art stores

Miscellaneous - Two inch wide masking tape will seal of any unwanted ways for ink to get through your screen. Its vital to block out the edges where you're emulsion doesn't quite reach the frame. Its also great for a lot of other things; the screen printers duct tape.

Old credit cards. These plastic rectangles are easy to collect and are natural palette knives, mini spatulas, register tabs and ink scrapers.

Old rags or paper towels.

Snacks.

Printing

This is the step where all the action is, and certainly skillful execution here will improve your final results. However, don't bother attempting this step until everything is properly prepared. You will save time and frustration if you are confident that your screen is in good shape, your colors are mixed and ready to go, and everything you will need is within arm's reach.

You'll need to gather the following materials and have them within reach of the printing table, but out of the way of the actual printing area. If the table is large enough, then the side not to be covered by screen and substrate is a perfect location. Otherwise, a small table to the side will do. You need to be able to reach these things at any given time throughout the process.

Squeegee - a little larger than the width of your image.

Ink - the desired color already mixed and ready to pour on the screen.

Tape - 2" wide, masking.

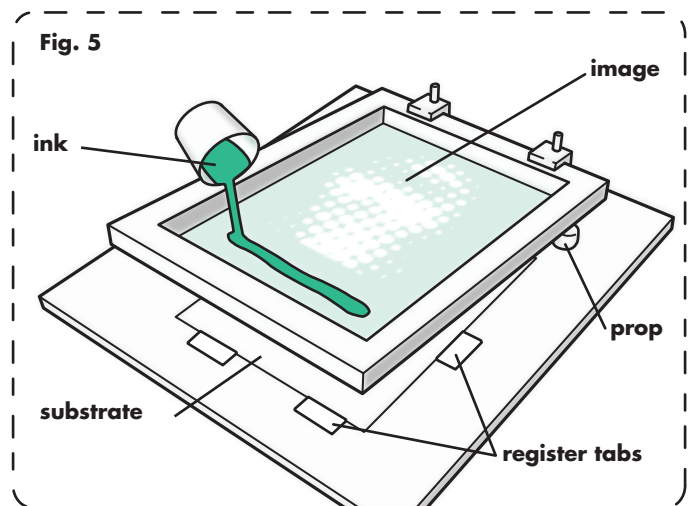
Substrate - all of the material (paper or cloth or whatever) that is to be printed on. Stack this as close to the printing area as possible, ready to slide each one in after the previous is swiped and removed.

Damp cloth - to help keep hands free of ink preventing stray, colored fingerprints all over the artwork.

Old plastic credit cards - fun to collect and great for spreading ink, registering substrate, spatulating, scraping up ink, and a million other things.

Prop - about two inch high piece of material to hold the screen up while changing substrate. An eight ounce jar of screenprinting ink works alright.

Drying rack or area - Don't have a rack? Who does? A few empty table tops or deep shelves will do. Anything clean with enough surface space to lay out your substrate while wet. If you're doing a large number print run don't worry. Go in a row and after about ten to fifteen pieces, acrylic ink will be dry enough that you can start stacking over top of the first one.



Ready, Go:

When your workspace is prepped, clamp the screen in the hinge clamps on the printing table so the image is facing you right side up and the screen mesh is flat on the printing surface. Tape off the screen so that ink will only transfer through the unemulsified mesh of your image, and not the edges of the screen or any other unemulsified area.

Place your first piece of substrate under the screen and onto the printing table and carefully position it so your image in the screen falls exactly where you want it to.

When the substrate is in position turn on the vacuum, holding the substrate in place and lift up the screen out of the way. Careful not to jostle the substrate, tape two credit cards along its top or bottom and one of its two sides. Turn off the vacuum and remove the substrate. You are now registered. Each subsequent piece of substrate will slide up against the plastic cards making sure your image is placed identically on each one.

Place a piece of newsprint or scrap paper under the screen, and pour a generous bead of ink onto the screen, below your image.

With the screen raised slightly above the table, grab your squeegee and swipe the ink over your image towards the top of your screen. The ink is now pre-loaded into the screen mesh and ready to transfer to your substrate, but first you want to test it on the newsprint.

Turn on the vacuum and lower your pre-loaded screen onto the newsprint. Take that squeegee and with ample pressure swipe it down across your image, transferring ink to the newsprint.

Slightly raise the screen and again preload the ink into the mesh by swiping up across the image. This prevents the ink from drying in the exposed mesh of your image and keeps the ink flowing easily for a clear crisp image every time.

Turn off the vacuum and lay the ink covered squeegee across the top bar of the screen and out of the ink. Lift up your screen and prop it near the hinge clamps under the top bar. Gaze briefly in awe of your image magically transferred to the newsprint in all of its glory and wonder. But be quick, acrylic ink dries fast in a screen!

Remove the newsprint and place in the drying area. If your image did not show up completely, try another piece of newsprint. If you love what you got the first time, then its time to move on to your substrate.

Slide the substrate into contact with the plastic cards you taped down, lower your screen and swipe your squeegee down over your image.

Raise screen slightly, reload the ink, prop up the screen, place your printed substrate in the drying area, and slide in the next piece of substrate. Swipe it, reload it, replace it, party.

Keep going until you run out of substrate.

Take that plastic card and scrape your ink back into the container, its still good. Unclamp your screen and take it to the washout area. Rinse down both sides until all traces of ink are removed. Simple Green (or any degreaser) helps a lot. Wash off your squeegee and card and cloth and let everything dry.

Fig. 6

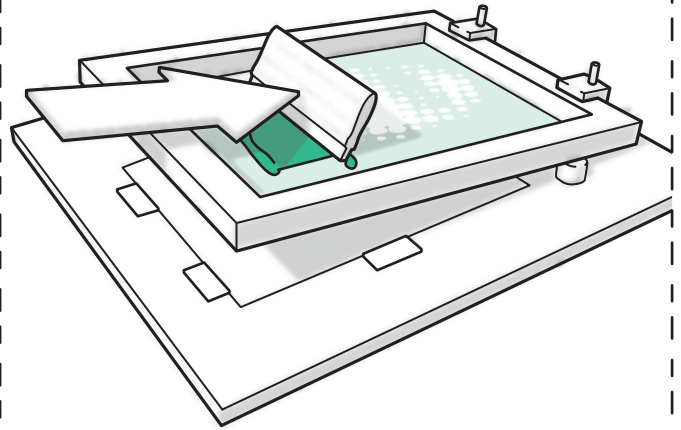
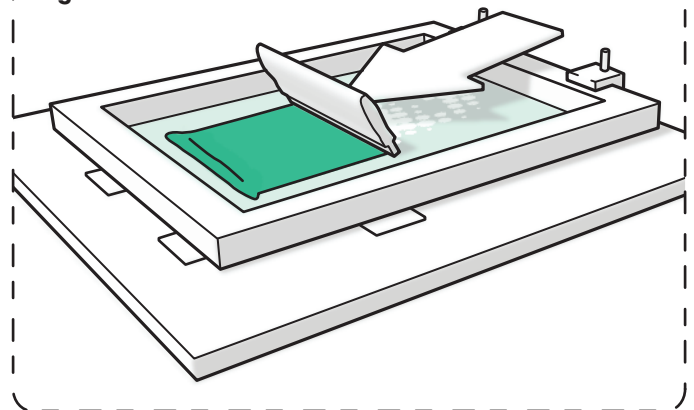


Fig. 7



Screen Recovery

If you're done with the image on your screen, and you are ready for a new image, then its time for screen recovery. If taken care of properly, screens can be reused countless times. You'll need the following:

Wash out area - Any place you can set your screen and spray a pressure washer at it. Preferably one with a drain.

Pressure washer - You need it. Buy one, borrow one, or sell some comics on craigslist for quarters and go to the car wash.

Stiff nylon scrub brush - One that fits comfortably in your palm, because screen recovery is all about comfort.

Stencil Remover - If you've got QTX photo-emulsion on your screen, you need Stencil Remover No. 5. If its Diazo emulsion, look for Diazo remover. Be sure you've got the right remover for the right emulsion, and read and heed the labels.

Degreaser - Try simple green. Its friendlier than most and best if you don't dilute it.

Alright, take your screen and remove any tape left over from the printing process.

Wet it down and apply a pea-sized amount of stencil remover to each side, working it in with the scrub brush. Be sure to spread the remover to all of the emulsion.

About a minute and a half of scrubbing and you can blast it with the pressure washer. It should melt right off, but some little spots will undoubtedly need more attention than others. When you think your screen is clean, hold it up to the light to find more granules of ink and emulsion to blast away at with the pressure washer. When you're finally satisfied, hit it with a bit of degreaser and rinse. Let it dry and its ready for another go 'round.

Build your own printing table

Basically its just a sealed box with a grid of small holes drilled in the top, some hinge clamps and a vacuum attached underneath. You can give it legs, making it a table, or just sit it on another surface. Keep in mind it needs to resist sliding around while you're swiping ink back and forth. It can be small or large. It only has to be larger than whatever you expect to print. Here's your material list for the basic printing table:

2x4's - Enough length to cover the perimeter of your printing surface. It will be the sides of the box. Make sure they're very straight.

Finished plywood or MDF - Enough to cover the area of the printing surface, twice. It will be the top and bottom. I recommend at least 5/8 " thick, or even 3/4" depending on the size of your box. It needs to be thick enough to resist caving in when a vacuum is trying to suck it inside out. If you're planning to go more than 18" wide, I'd plan to put an extra 2x4 in the middle inside the box to prevent this from happening.

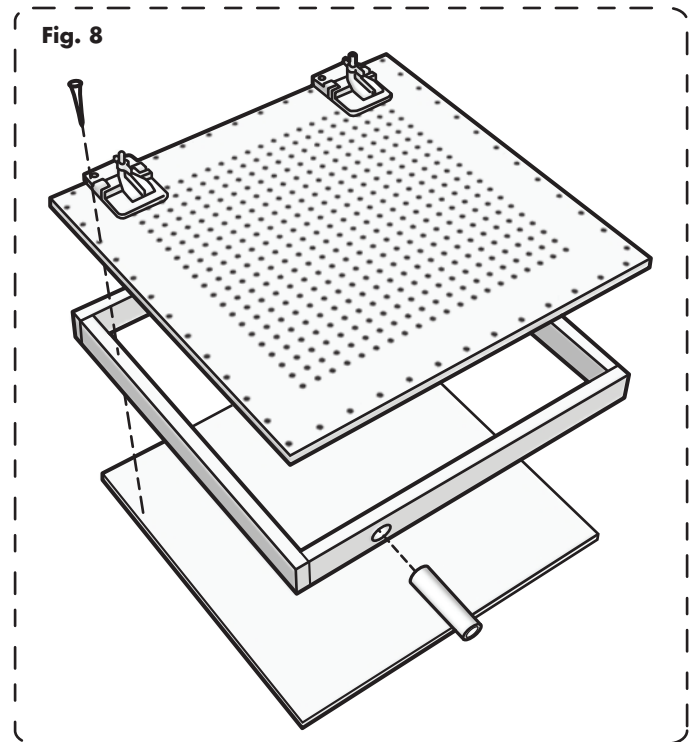
Hinge clamps - Buy a real set of screen printing hinge clamps. Its worth it. You'll find 'em on the web.

Silicone caulking - To seal up the joints and make a vacuum tight seal every time.

Screws, drill, and 1/16" to 1/8" drill bit - to assemble your box and for all those holes.

Vacuum - Any with a hose, look for easy on/off switch.

6 to 8" of 2" flexible tubing - This is to be able to plug a vacuum hose into.



Ok, assemble your box, screw it together and seal it with the silicone. Let it dry. In a grid pattern drill small holes about an inch apart in the top face of the box. Drill one two inch hole in the side (try to avoid the screws) for the vacuum tube. Force in the vacuum tube. Heating it with a heat gun or steeping in very hot water will make it malleable enough to force in the hole. Attach your hinge clamps along the top edge. Plug in a vacuum and awesome. Its a good idea to sand out any rough edges, especially along the top. You don't want a splinter of wood to puncture your screen.

Build your own exposure table

If your using any kind of photo emulsion - QTX or Diazo - you'll need some kind exposure unit to set your image into the emulsified screen. This is the simplest design we can fathom and it can be very effective after a bit of tweaking and fine tuning. It's also extremely inexpensive. The size of the unit you're going to build depends on the size of your screen. Take the inside and outside measurements of the frame of your screen and the gather the following materials:

Very flat, sturdy board - We've used masonite, mdf, and even drywall in the past. Basically, it needs to be absolutely flat, smooth, black on the top side, and cut to fit inside the frame of your screen.

Tempered glass - a piece just larger than your screen. With any luck you could score this for free or at a thrift store.

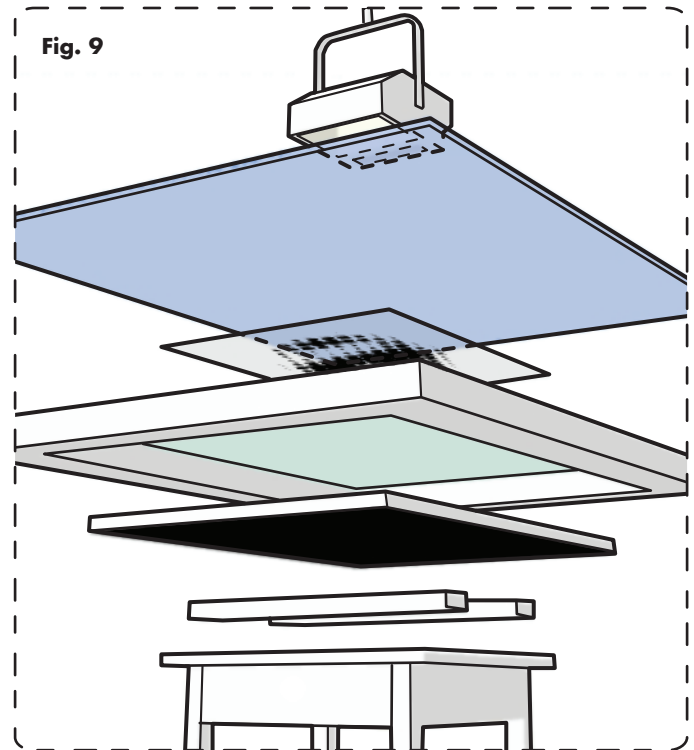
Lamps - Clamp lamps or halogen or work lights. The more the merrier. You want a lot of even light to cast over your screen.

Table Top - You want a sturdy one that won't get bumped or disturbed while exposing.

You pretty much just stack everything and hang the lights over it. Here's the order, it's important:

- 1** A table or place that won't move.
- 2** A few books or something to raise the mdf/drywall/ whatever off the table enough that your screen can hang over the edges.
- 3** Your mdf/drywall/whatever cut to fit inside your screen and painted black so as to not reflect light behind your image.
- 4** Your emulsified and dried screen, screen side up so the frame slides around the mdf/drywall/whatever.
- 5** The transparency or stencil, face down, i.e. so any text reads backwards.
- 6** The tempered glass.
- 7** Finally, the lights. These need to be far enough away so that they spread even light, but as close as possible to get a strong bright source and a quicker exposure.

This kind of unit is pretty easy to put together, but it will take some trial and error to perfect its use. It will take a few experimental rounds to find the right exposure time (how long to leave your lights on over your screen). It could be anywhere between seven and fifty minutes depending on the bulbs, how many, and their distance from your screen. The other important thing to remember is to try and get a leak proof seal between your glass, stencil, screen, and black surface. You want it completely air tight so no light can bounce in and expose the emulsion behind the black of your image. Be patient and careful and you'll get amazing results.



To conclude

Give this a couple of tries and you'll have the whole process more or less under control. Screen printing is pretty simple and you'll find yourself making it your own as you figure out tricks and methods that work for you. If you need more assistance, the web and the library are great resources. Of course, don't hesitate to send questions, feedback, or just info about how you're communicating with the people around you. My address is spencer@team8design.com. Good luck.

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