

A Beginner's Guide to Silkscreen Printing

Follow this seven-step guide to help take your custom projects to the next level.

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If you're looking to give your kits and custom projects a sharper appearance, I recommend trying silkscreen printing. It can produce professional-grade results, even on smaller projects. It offers versatile design possibilities, and is fairly affordable to do.

EZScreenPrint®, an online store for do-it-yourself screen-printing products, offers a few different kits, as well as a full list of supplies. I purchased their basic starter kit (www.ezscreenprint.com/products/diy-basic-screen-printing-starter-kit) for \$46.99.

This article will walk you through using this kit to enhance your projects with silkscreen printing.

Step 1: Create Your Design

For my project, I wanted to print a design onto a chassis for a transceiver kit that I was building. The chassis had bare aluminum metal on the front and back, which was perfect for my silkscreen application.

First, I outlined the front and back of the chassis to get its dimensions. I kept the drawing in a 1:1 ratio on my computer screen for better visualization. Next, I created my design. For this step, you can use text, drawings, graphics, clipart, etc. However, if you use text, I recommend choosing a font size of at least 12 points, as the clarity of the lettering suffers if it's smaller than that. Software programs like *Microsoft Word* or *PowerPoint* work well for creating the design. I used a free-trial version of *CorelDRAW*, and I found it to be very intuitive. I don't recommend using *Microsoft Paint*, as it doesn't print well.

After creating your design, set your printer quality to "Best" or "Heavy Ink," and print it on plain white paper to test how your design will print. It's imperative that it prints clearly and opaquely with crisp edges, even in the smallest details. I used an at-home HP inkjet

Materials and Tools

- EZScreenPrint Basic Starter kit
- Inkjet or laser printer
- Jacquard Screen Printing Ink (www.jacquardproducts.com)
- Small art palette knife (or something similar)
- Four 2-inch C-clamps
- ¼-inch square wooden dowel



The EZScreenPrint Basic Starter Kit includes an exposure board unit, two EZScreen Stencils, two small EZScreen Stencil test pieces, two transparency sheets, a plastic canvas, a squeegee, a washout brush, and instructions. [Photo courtesy of www.ezscreenprint.com]

- ¼ × 1½-inch wooden dowel
- Power drill
- Screwdriver
- Drywall screws
- Wood glue
- Gloves
- 320-grit sandpaper sponge (optional)
- Spray paint (optional)
- Water-based polyurethane spray (optional)

I chose Jacquard Screen Printing Ink because it can easily be cleaned up with soap and water. [Photo courtesy of www.jacquardproducts.com]



printer (you can also use a laser printer), and I didn't have any issues with the opaqueness or sharpness of my image.

If your printer test was successful, you can now print your design on one of the transparency sheets that came with the kit. If you choose to use a transparency material other than what the kit provides, be aware that the silkscreen in the kit is UV-sensitized, and some plastics and glass may block UV radiation.

Step 2: Prepare Your Silkscreen for Exposure

All work during this step must be done in a dimly lit room so that the photosensitive silkscreen isn't exposed. I worked in a darkened room with a flash-light, and I covered the bulb to control the light level. The kit manufacturer says that a yellow bug light bulb (60 W or less) could be used. Don't use fluorescent bulbs, as they emit more UV light than incandescent bulbs do.

I didn't need the entire 8½ × 11-inch sheet of silkscreen for my project, so I cut it in half (while inside my low-light environment). I made sure to leave at least a ¼-inch space around my design for mounting the silkscreen to a wooden frame.



Figure 1 — When preparing your silkscreen for exposure, place the shiny side of your screen face down against your artwork. Your artwork should be facing up, on top of your clear acrylic exposure board unit.

Place your artwork, facing up, on top of the clear acrylic exposure board unit provided by the kit. Next, take the silkscreen out of the light-shielding bag and remove and dispose of the clear protective backing. Place the shiny side face down against your artwork, making sure it's centered (see Figure 1). Then put the felt side of the black exposure board unit on top of the silkscreen, and secure it around the perimeter with the clips supplied in the kit (make sure the clips don't cover any part of your design during the UV exposure).

It's strongly recommended that you test your UV exposure time by using one of the small stencil test pieces from the kit. The UV source itself can be the sun on a clear day (not cloudy or overcast), or a powerful UV lamp or UV LED light.

I used the sun on an autumn day and left the test piece exposed on a chair for 6 minutes (see Figure 2) due to low UV levels at that time of year in Michigan. If I were making this project in the summer, it would require only about 1 minute of exposure time.



Figure 2 — I exposed my silkscreen design in the sun on a clear day for 6 minutes. Exposure time will vary based on the technique you choose (UV lamp or the sun).

Step 3: Wash and Dry Your Stencil

After your project has been exposed, bring it to a dimly lit room that has a sink or shallow container (I used an old photography development tray, as shown in Figure 3) filled with warm water. Remove the silkscreen from the exposure board unit and submerge it in the water, letting it soak for 15 minutes.

After 15 minutes, you should see a ghost image of your design (soaking your silkscreen for a longer amount of time won't damage your image). Next, place your silkscreen stencil on the plastic canvas from the kit and rinse both sides under warm, gently running water to remove any excess residue. If you hold your stencil up to a dim light and still see some residue, use the soft-bristle brush from the kit to gently scrub it away (be careful on the soft-emulsion side of the material).

Place your completed stencil (with the green emulsion side facing up) on paper towels and blot it dry. Then move it to fresh, dry paper towels to fully dry under a light source for more than 10 minutes, so that the stencil emulsion can harden. Once it's completely dry, your silkscreen stencil will be ready to mount on a wooden frame for printing.

Step 4: Mount Your Stencil to Your Frame

Using a 3/4-inch square wooden dowel, I built a frame to hold my stencil. I cut the sides long enough to maintain a 3/4-inch minimum spacing between the stencil and the inside edge of the wooden frame. I connected the pieces using wood glue and then clamped them together to dry.

Once your frame is dry, you can mount your stencil. While holding the stencil tight and flat, I used construction staples to secure it to my frame (see Figure 4).



Figure 3 — After your project has been exposed, bring it back to your dimly lit room. Remove the silkscreen from the exposure board unit and submerge it in warm water for 15 minutes. A ghost image of your design should appear.



Figure 4 — Hold your stencil tight and flat to mount it to your frame, and secure it using construction staples.



Figure 5 — I needed to build a printing fixture to hold my stencil above my chassis because it was taller than 1 inch. I did this using wooden dowels, wood glue, and inexpensive drywall screws.

Step 5: Build Your Printing Fixture

If the item you wish to print on is taller than 1 inch, you'll need to build a fixture to hold your stencil. The fixture needs to hold the stencil frame (without covering any of your design), as well as be tall enough to fit over the item you're printing onto.

Cut four pieces from the remainder of your $\frac{3}{4}$ -inch square wooden dowel to serve as the legs of the fixture. Their length will be dependent on the size of the item you're printing onto. Add 1 inch to the overall measurement. For example, if your surface is 4 inches high, then you'll need to cut each leg to be 5 inches long. You'll also need to cut two additional pieces to support your stencil assembly, which will be used in Step 7, to go along the sides of the printing fixture and be adjustable in height by using C-clamps.

Next, you'll need to create the side base pieces of your fixture using a $1\frac{1}{2} \times \frac{3}{4}$ -inch wooden dowel. Cut these pieces to a length that allows them to hold the four legs upright, as well as hold the stencil frame tightly between the four fixture legs. I used wood glue and inexpensive drywall screws to hold everything together (see Figure 5).

Step 6: Prepare for Printing

You'll want to make sure that the surface you're printing onto is clean. Because my surface was a bare aluminum chassis, I lightly sanded it using a 320-grit sanding sponge to help the paint stick to the surface, before wiping it clean. Be sure to wear gloves when cleaning your surface, to avoid contaminating it after it's been cleaned.

Because my chassis was bare, I painted it black prior to printing my design on it. I used a flat enamel spray paint that only required a couple of thin coats of paint.

Step 7: Print Your Design

First, place your printing fixture over the item. Next, place a 0.040-inch spacer (0.040 to 0.050 inches is acceptable), such as a piece of thin glass, over your item (see Figure 6). The spacer will help to keep the printing nice and sharp by preventing the ink from smearing. Then place your silkscreen stencil over the spacer.

Next, you'll need to set the stencil to the correct height above your printed surface by using the two additional wooden dowel pieces that were cut for the sides of your printing fixture in Step 5. Using C-clamps, clamp them to the inside of the fixture support legs to hold the stencil frame to the correct height (when the stencil is level and just barely



Figure 6 — Using a thin glass spacer between the item you're printing onto and your silkscreen design, will help prevent the ink from smudging.

touching the spacer). With the spacing properly set, carefully lift the entire printing fixture (with the stencil) to remove the spacer.

Once the spacer is removed, place your fixture and stencil back over the item you're printing onto, and carefully align your item to the stencil so that it prints onto the desired location. If you didn't need to build a printing fixture because the item you're printing onto was shorter than 1 inch (such as a panel), place your stencil above your printing surface and make sure it doesn't move while printing.

Next, use a small palette knife or something similar to spread the silkscreen ink (I purchased Jacquard Screen Printing Ink from www.dickblick.com) on one end of your stencil, but not directly on your artwork. Add enough ink to spread over the entire length of your design.

While holding the squeegee from your EZScreenPrint kit at a 45° angle, use light pressure to spread the ink over your stencil design. Spread the ink over the design once more from the opposite direction. Next, carefully lift the entire printing fixture straight up, so you don't smear your freshly printed work (see Figure 7).

If you encounter any problems, wash the ink off of your stencil with water and try again. Once you're

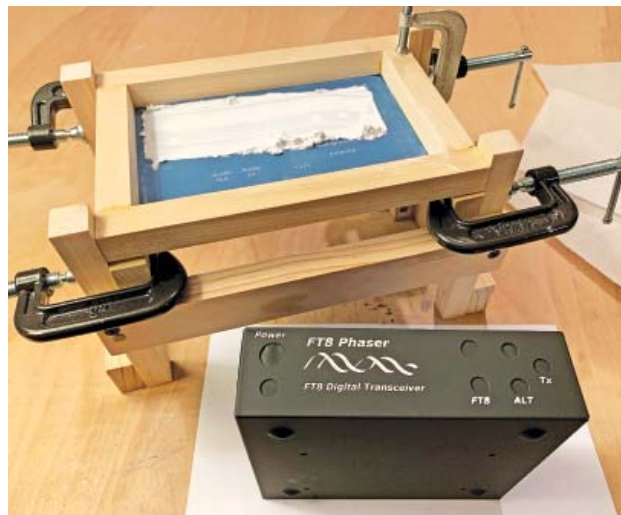


Figure 7 — I used light pressure to spread the ink over my stencil design from both directions. When I was done, I carefully lifted the fixture to remove my freshly printed project.

satisfied with your printing, clean up with water and place your item in a warm location until it's completely dry. Once mine was dry, I lightly sprayed it with a water-based polyurethane to give it a semi-gloss appearance and further protect my printing.

All photos by the author.

Doug Smith, N8HI, was first licensed in 1972 as a Novice, earned his Advanced-class license in 1975, and earned his Amateur Extra-class license in 1988. He is retired after working 42 years in electronics aviation at Lear Siegler Incorporated and GE Aviation Systems (formerly Smiths Aerospace) working on gyroscopes and microelectronics, and was a test technician on military and civilian aircraft. He has been an ARRL Member for over 40 years, and his amateur radio interests are digital modes and amateur satellites. Doug also enjoys woodworking and riding his recumbent bicycle on the many trails where he lives in Grand Rapids, Michigan. He can be reached at drsmith784@comcast.net.

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Feedback

The article, "The Beverage Antenna, 100 Years Later," by Ward Silver, N0AX, and Frank Donovan, W3LPL, from the November 2021 issue of *QST* contained an error in Figure 4. The max gain of the antenna was written as 8.52 dBi, but it should be -8.52 dBi. *QST* regrets the error.