

My Balsa & Glass Workshop

“Fantasy Castle in the Sky” Assembly Description

10 February 2025

Well, I finally finished my Workshop Entryway Lantern project. So, now I can start working on getting things around to set up my next project which should keep my old fingers busy over the next few cold winter months.

After some thinking (burning of my old brain cells) and consulting with my youngest son Ryan, we decided to make a Stained Glass panel for my two grandchildren, August and Everly, that would fill one of the South facing windows in their bedroom. Ryan provided me with window measurements of 26”x35” and I started from there. After searching the web for “Fantasy Castle” Stained Glass patterns, I found the image in Figure 1 on Pinterest @: <https://www.pinterest.com/nanathompson01/bill-blodgett/>, which was titled “Cloud Castle.” The pattern is by Bill Blodgett, who is well known for his many beautiful and intricate Stained Glass patterns, which I have also used in earlier projects.



Figure 1 - Cloud Castle by Bill Blodgett

Using a very nice free vector graphics program called “Inkscape”, (<https://inkscape.org/>) I converted the downloaded pattern image JPG file shown in Figure 2 (which is only 11”x18” in size) into an SVG (Scalable Vector Graphics) file so I could adjust the pattern size to fit the window opening without any loss of clarity in the pattern lines.

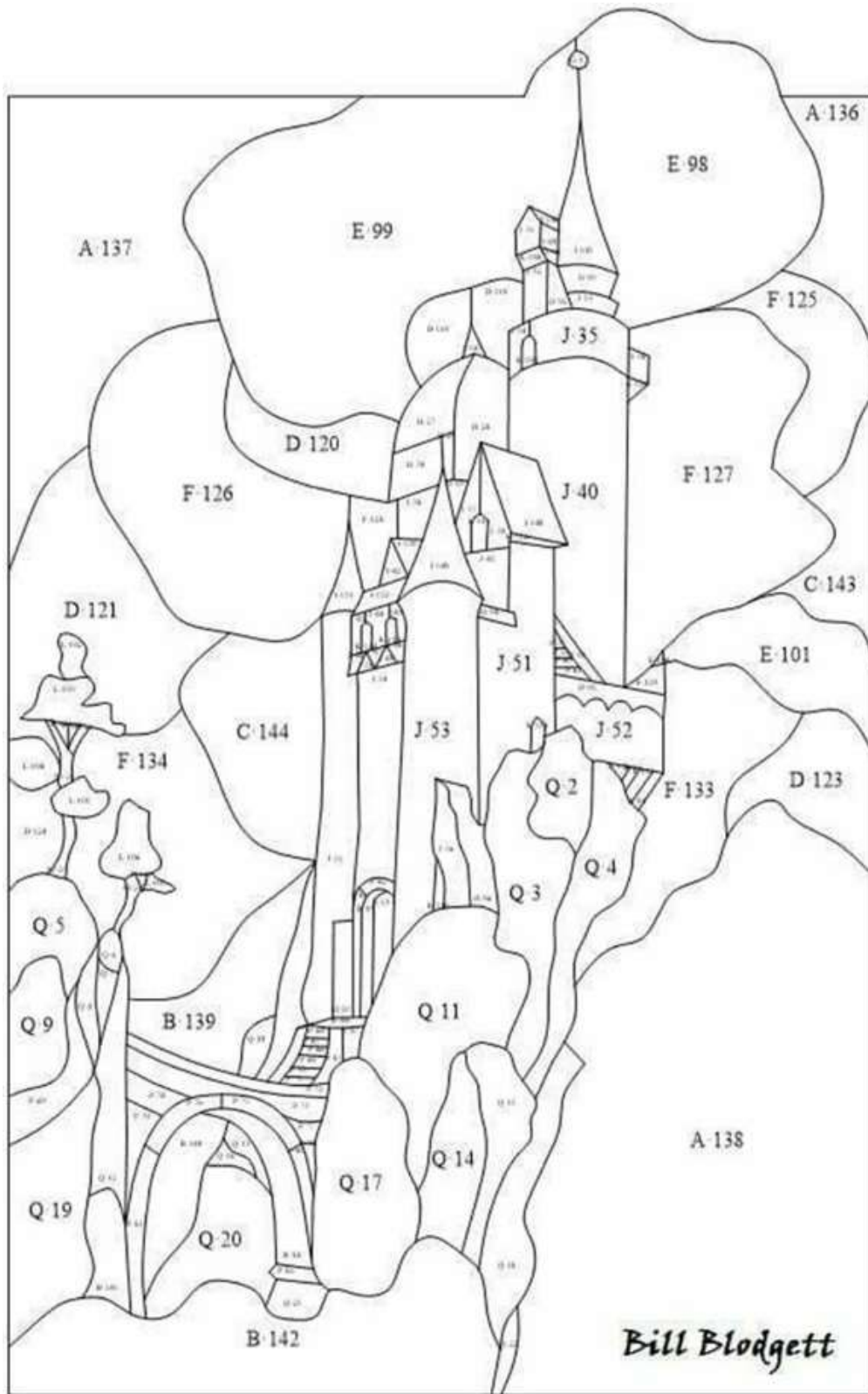


Figure 2 – Original JPG Pattern File Image

Using a simple 2-D CAD program called “Back to the Drawing Board” and available @ <https://drawingboardapp.com/>, I do some cleanup, adjustment of some existing pattern lines to simplify cutting of the glass pieces, and addition of some new lines to help balance the overall scene and the brass framing. I finally end up with the pattern shown in Figure 3 for my next project. This 26”x35” panel has a total of **190+/- individual pieces** of Stained Glass. So, I will start this new and exciting project from here.



Figure 3 - Final “Fantasy Castle in the Sky” Pattern

While having a good pattern is very important for any Stained Glass project, the selection of glass colors, textures, style, opacity, manufacturer, and any use of bevels are all just as important in creating the **visual experience** you want from your project. I plan to use glass colors like those used in the original image in Figure 1. I want my final panel to have a **“whimsical and fantasy” feel**. You will also need to decide if you will use the traditional “Tiffany” copper foil method, or lead came method for assembling the panel. The pattern of this project pretty much drives using the copper foil method due to its details, and the several small glass pieces.

Yes, there are many very good sources on the web to purchase your Stained Glass, but I prefer being able to hold my glass selections in my hands and view them up close with various back lighting. Doing that also allows me to place the glass selections up next to each other so I can get a feel of how they will work together in the finished panel. I am very fortunate to have an outstanding Stained Glass store not too far from me. The “Glass Angel” (<http://www.theglassangel.com/>) is located at 224 East Front Street in the downtown area of Burlington, NC. They have a **large inventory** of Stained Glass sheets as well as a full line of Stained Glass tools and supplies. You can also find a small selection of general purpose Stained Glass sheets at your local “Hobby Lobby” stores. I plan to use both sources for this project.

But, before we start purchasing glass, how about we get the full-size pattern down on the workbench so we can visualize what we are going to be working with. I took my pattern PDF file to the local UPS office and had them print out two full-size patterns for me, costing only \$18. Figure 4 shows the modified pattern on my back center workbench with a Morton Aluminum Layout Block System (<https://www.glasscrafters.com/morton.html>) placed such that the overall panel size, including the brass U-channel border, will fit snugly into the 26”x35” bedroom window.

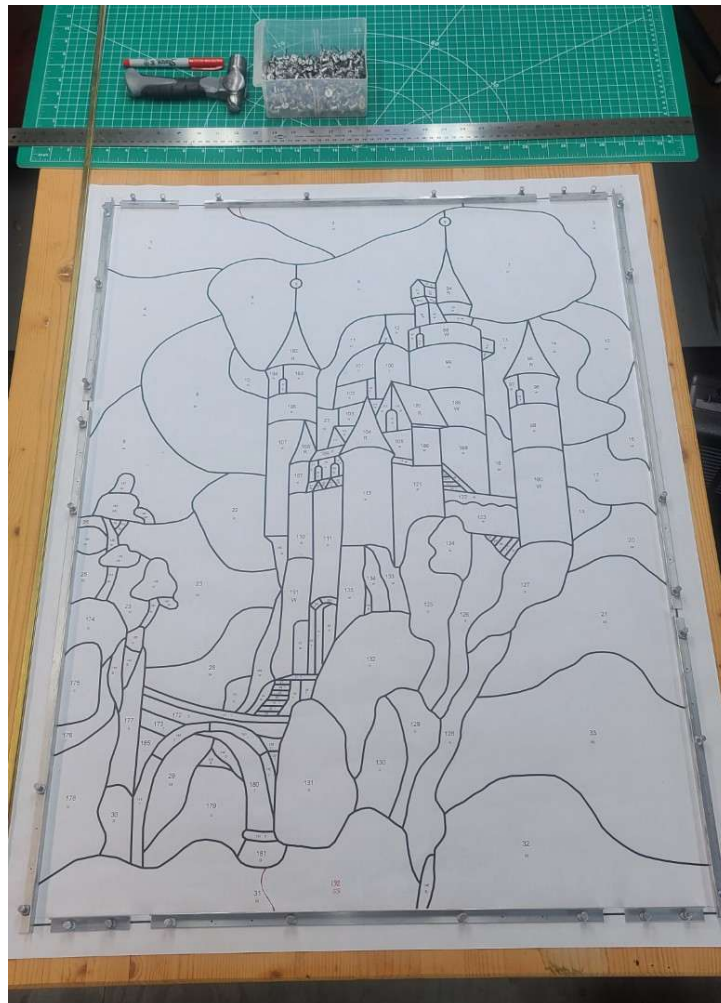


Figure 4 - Full Size Pattern on Workbench

Once I saw the full-size pattern, not only was it larger than I had imagined (**this will be my second largest panel project**), but I also found a couple items that required adjustment. There are two pieces in the pattern that are over 12" in size. Since most Stained Glass is sold as 12"x12" pieces, it is best to try and keep the pattern pieces within that length, otherwise you drive having to go to a glass source that supplies larger sized sheets, which I can obtain from "The Glass Angle". Anyway, I modified pieces #1 and #2 (at the top) and split piece #31 (at the bottom) so that I now have all pattern pieces within the 12" limit.

Next, I looked through my stock of glass sheets to see what I might already have available to use in this new project. I found a couple partial sheets that I have had for a long time and would add "unique" colors to several of the clouds. To verify the specific pattern pieces will fit within those sheets, I trace quick copies of those pattern pieces using a small LED light table, cut the patterns out, and place them on the selected sheets. The next two Figures below show this check with the glass sheets lying on my custom handmade large light table.

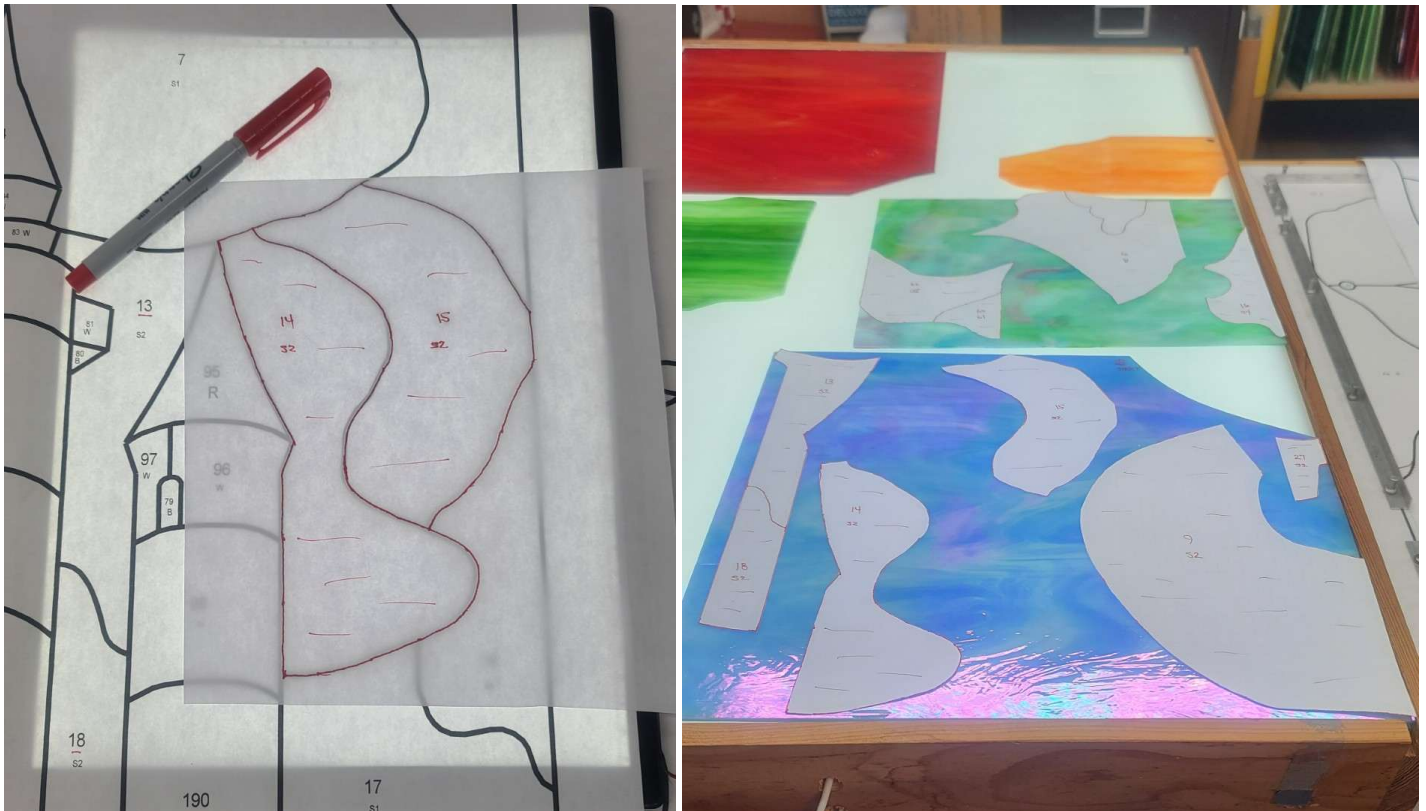


Figure 5 & 6 - Pattern Tracing and Fit Checks

After going through my glass stock, I made a list of the various colors and amount of glass sheets that would be needed to complete the project, then off to the Stained Glass stores. Having everything needed, I start the panel by printing out some pattern templates that will keep me busy for a few days.

Note – To make my permanent pattern templates, I crop a given area of the full-size pattern PDF file such that it will fit within an 8.5"x11" sheet of paper, and then I print that area using 80# stock paper. This gives me a nice stiff pattern, which I keep on file after the panel is finished.

Next, I cut out each of the pattern pieces using a pair of foil pattern shears (<https://www.glasscrafters.com/pattern-shears-foiling.html>), starting at the upper left corner of the panel. Each pattern piece is then traced on a specific sheet of Stained Glass, which I then hand cut that piece from the sheet using my TOYO TC-21 Custom Grip Supercutter (<https://www.anythinginstainedglass.com/tools/toyo-glass-cutters.html>). Due to the tight "inside" curves on some of the pattern pieces (as seen in the right image above), I will have to break out my old Gryphon Omni Diamond Wire Saw

(<https://www.anythinginstainedglass.com/tools/gryphonOmni2WireSaw.html>), which I have not used for several years. Each glass piece is then ground until I just remove the pattern line drawn on the glass piece. For this I use a Gryphon Convertible Grinder (<https://www.glasscrafters.com/convertible-glass-grinder-gryphon-twister.html>) with a 1" or 3/4" Standard 100/120 Grit Cylindrical Bit, and for the tight inside curves and corners, I use a 1/4" or 1/8" Standard Grit Grinding Pin (<https://www.anythinginstainedglass.com/tools/grinderTwofers.html>).

After I have the glass piece ground to the pattern line, I place it over the panel pattern on the workbench to verify its fit, grind some more if needed, and once satisfied with the fit, I then apply copper foil to all the edges using 3/16" 1.25mil copper backed foil (<https://www.glasscrafters.com/solder-supplies.html>). This method of assembly is also called a "Tiffany" style panel. While there are many different types of "Table Foiling Machines" and "Handy Foilers" for sale out there, *and I've tried them*, I find myself coming back to using just my fingers and a careful eye to properly align the foil along the edges to produce the same width foil lines on each side of a glass piece. I found this method is faster especially when working with small or highly curved glass pieces. Remember to also "burnish" all the foiled edges to ensure you have a nice squared copper foil edge that is firmly sealed against the glass. I use a hardwood dowel tapered on one end to do my copper foil burnishing. After foiling, I place each piece back over the workbench pattern and secure in place using metal push pins from my Morton Aluminum Layout Block System. Then, I move on to the next pattern piece and repeat the process all over again.

As I work my way through the **190+/-** pattern pieces, I may find that a small change is required to help fit a pattern piece within the glass sheet so that I am not wasting a lot of stained glass. Such was the case for pattern piece #3 in the upper right corner, which I ended up turning into two pieces. Figure 7 below shows my progress of working through the pattern pieces. You can also see several of the heavy 80# pattern templates. This stage of the build takes the most time *and patience*.



Figure 7 – Cut, Ground, & Foiled Glass Pieces Placed Over Pattern

I continue to make progress through the many pattern pieces, working my way down the right side of the panel and then across the panel. Pieces are held in place using Morton Aluminum Layout Block System push pins. In Figure 8 below, you see my progress with approximately 50% of the pattern pieces finished and placed over the pattern. Now for the remaining 50%.



Figure 8 - Approximately 50% Through the Pattern

As I continued to work on more glass pieces, I kept looking at the size of the panel and started to become concerned about the length of the free span across the panel. When using the copper foil, or “Tiffany” method, once you start getting a panel that has more than three square feet without any additional support, there is a risk that the panel could “flex/bow” because of the weight of a large panel placing stress on the thin lead joints. Well, we have approximately six square feet in this panel. To address this issue, I decided to add reinforcement horizontally across the panel, as close to halfway down from the top as I could. The reinforcement can’t stop halfway across; it must go from edge to edge for strength.

There are several ways to reinforce a stained glass panel, and three of them are shown in the image below. I use “Re-Strip” from Cascade Metals. Re-Strip is a rigid ribbon like strip of 10 mil thick copper that is placed between glass pieces as hidden structural reinforcement. The ribbon measures 5/32" wide by 10 mil thick and is available in 25’ or 100’ rolls at your stained glass supply store, or Amazon.



Placement isn’t too difficult if you remember these rules: 1) The strongest reinforcement runs the shortest distance from edge to edge. 2) Reinforce perpendicular to a lead line that might fold. Parallel lines and borders are good examples. 3) If it’s a tall narrow panel, go horizontally across with the reinforcing. If wide and short, go vertical.

Re-Strip does sit a little higher above the glass, but this is hidden once you solder the copper seams. Pins are used to hold the Re-Strip in place. You can use masking tape across the top of the glass instead of pins to stop it from popping up. Use bent nosed pliers to bend the Re-Strip around corners. Figure 9 shows installation of Re-Strip in my panel. My concern is has now been addressed.

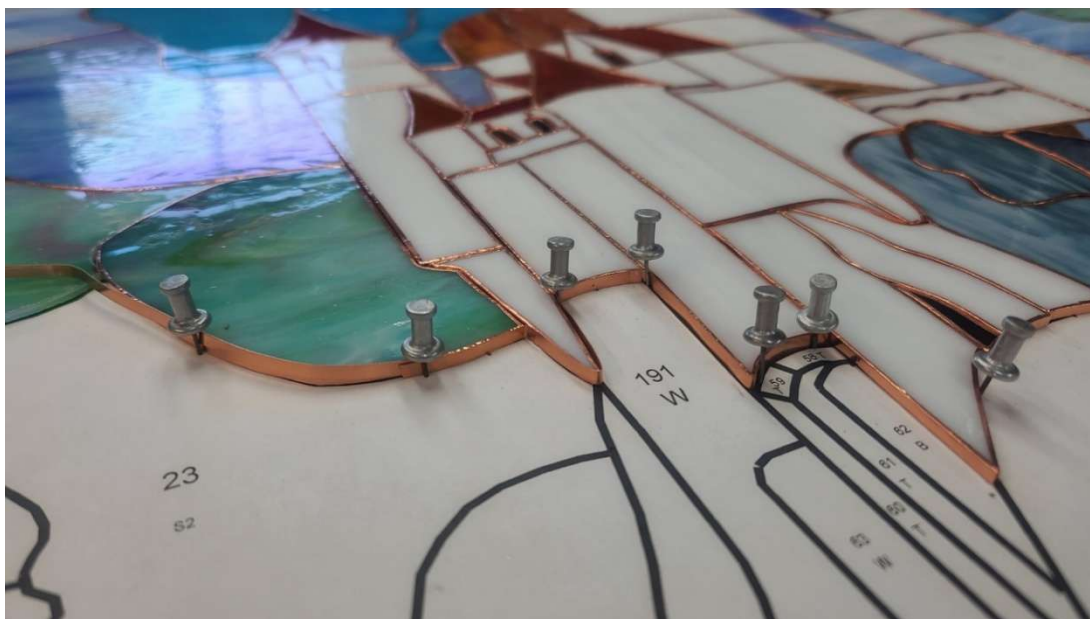


Figure 9 - Installation of Re-Strip Across Panel



Figure 10 - Continue to Work Off Pattern Pieces

I continued to keep chipping away at the various pattern pieces, cutting, grinding, fitting, and then copper foiling. After several more trips to my workshop, I was finally able to place the last piece of Stained Glass down over the pattern. Figure 11 below shows you the entire panel which is now ready for the next stage of assembly. I think she is coming together very nicely.



Figure 11 - All the Pattern Pieces Finally in Place

With all that finished it is now time to start the next step, which is to solder all the copper foil joints. I broke out my trusty Hako FX-601 110V Temp-Control Soldering Iron (<https://www.glasscrafters.com/hakko-adjustable-temp-control-iron.html>) along with the soldering tip cleaning pad, a bottle of Stellar Tech “Classic 100” Gel Flux (<https://www.franklinartglass.com/product/classic-100-gel-flux-8-oz/>) along with a small stiff bristle paint brush, and a roll of Amerway Inc. 60/40 Sapphire solder (<https://www.anythinginstainedglass.com/metals/solder.html>).

Starting at the top of the panel, I use the small stiff bristle brush to apply the gel flux to the copper foil joints within a specific area. Try to minimize getting flux on the glass surfaces. **Do not flux the entire panel at one time.** Work in smaller areas to ensure the flux keeps the copper foil clean (no oxidation) until the solder is applied. After that area is soldered, move on to another area and repeat the process. **Remember to not run the rounded solder bead completely to the outer edges.** Leave enough space for the brass frame to wrap around the outside edges. If you are not going to complete the entire side of the panel in one sitting (which I never do), then take the time to clean the newly soldered joints using a soapy water solution, or some Kwik-Clean Flux & Patina Cleaner (<https://www.franklinartglass.com/product/kwik-clean-flux-patina-cleaner-16-oz/>) to remove any remaining flux.

With all the copper foil joints soldered on the front side, I clean all flux off the panel and then flip the panel over. To do this without breaking loose the copper foil joints, I first slip a sheet of 1/8” plywood under the paper

pattern sheet, then cover the top side of the panel with a sheet of heavy paper followed by another sheet of plywood. With the panel now supported on both sides by plywood sheets I can flip it over. I remove the plywood sheets and start soldering of all the foil joints on the backside of the panel.

When the backside of the panel has been completely soldered and cleaned, it's time to install the brass channel framing. I carefully measure the length of each panel side and make the required 45 degree corner cuts for each piece of brass channel. These are slipped over the edge of the glass panel and soldered at each corner and at each copper foil joint that runs out to the panel edges. Now the panel can be handled without having to use the plywood sheets. Figure 12 below shows the panel for the first time lighted from the backside, and ready for the next step which is application of black patina to all solder joints.



Figure 12 - Panel Joints Soldered & Brass Channel Frame Installed

To color the solder joints black I used Novacan Black Patina For Lead and Solder (<https://www.delphiglass.com/soldering-supplies/flux-finishing-chemicals/novacan-black-patina-for-lead-and-solder-8-oz>). As you will find in your web searches for patina application, there are many ways to apply patina to your panels. I've tried them all and have found the best method for me is to use a long wooden cotton swab. You can purchase 200 of these from Amazon for \$5. This method allows this old man's hands to control the patina application just to the solder joint and not all over the glass surface. **Getting patina on the glass surface can discolor you stained glass if it is not cleaned off quickly.** Pour a small amount of patina into a glass bowl to dip the swab into. *Don't work directly out of the bottle of patina because you will contaminate the entire bottle contents.* The chemical reaction between the lead and patina quickly turns the lead black, and you don't have to let the patina sit for an extended period. Just as I did for soldering, I work in a smaller area of the panel, apply the patina, and then clean that area using the Kwik-Clean Flux & Patina Cleaner. Where the panel solder joints connect to the brass frame, I patina the solder on the frame using Super Brite Copper Patina for Solder. I feel this helps to make those solder connections blend into the brass framing better. After one side of the panel is finished, flip the panel over and patina all the solder joints on that side. Should you decide to use a zinc frame versus the brass that I used, you can also patina the zinc frame using Black Patina for Zinc (<https://www.delphiglass.com/soldering-supplies/flux-finishing-chemicals/black-patina-for-zinc-8-oz>). Do not use the patina for lead on the zinc framing, it will **NOT** turn out well.

The final step is to clean both sides of the panel to remove all patina and then wax and polish the entire panel. With that done, I wrapped the panel in some cushion material, put her in the bed of my pickup, and we headed out to my son's home in Mont Airy, NC. Figure 13 below shows the finished panel placed in the grandkid's bedroom window. I think she tuned out really nice, and this panel will become another heirloom for the family to enjoy for many years to come.



Figure 13 - Finished Panel in My Grandchildren's Bedroom Window



Figure 14 - Finished Panel in My Grandchildren's Bedroom Window