Bar Graph Bezel Assembly Instructions

Warning: Many decals were harmed in the making of these instructions.

The decals are very fragile, so great care must be taken in both their general handling and also their application. Rubbing the surface of the decal can damage the image. The black surround has been the most fragile and the silver rectangles appear to be fairly robust. A whole batch of decals were damaged during packaging up the parts when they were placed faced down on the index cards and slid into alignment and taped down. The sliding while face down was the problem!

The Bezel kit contains:

1) Black Bezel 3D printed on AJ's new printer, with the next two pieces mounted inside
2) Thin clear Plexiglas piece laser cut to fit in the Bezel
   Some have protective tape on one side
   Most will look smoky on any side without tape due to the laser cutting process
3) Clear lenticular piece (vertical grooves on one side, flat on the other) laser cut to fit in the bezel
   Some have protective tape on the flat side
4) Small piece of window tint, may need to be applied and will need to be trimmed
   Yes, just regular window tint material. Not sure the darkness number but was eyeballed to be about the right darkness. If you want lighter or darker or just want more to play with you should be able to obtain some at any window tint shop (car or home).
5) Small decal needs to be applied, trimmed and strongly recommend protective coating
   These are very delicate – handle with lots of care. The top surface (GhostLab42 will look mirrored) is easily damaged.

Tools/supplies recommended:

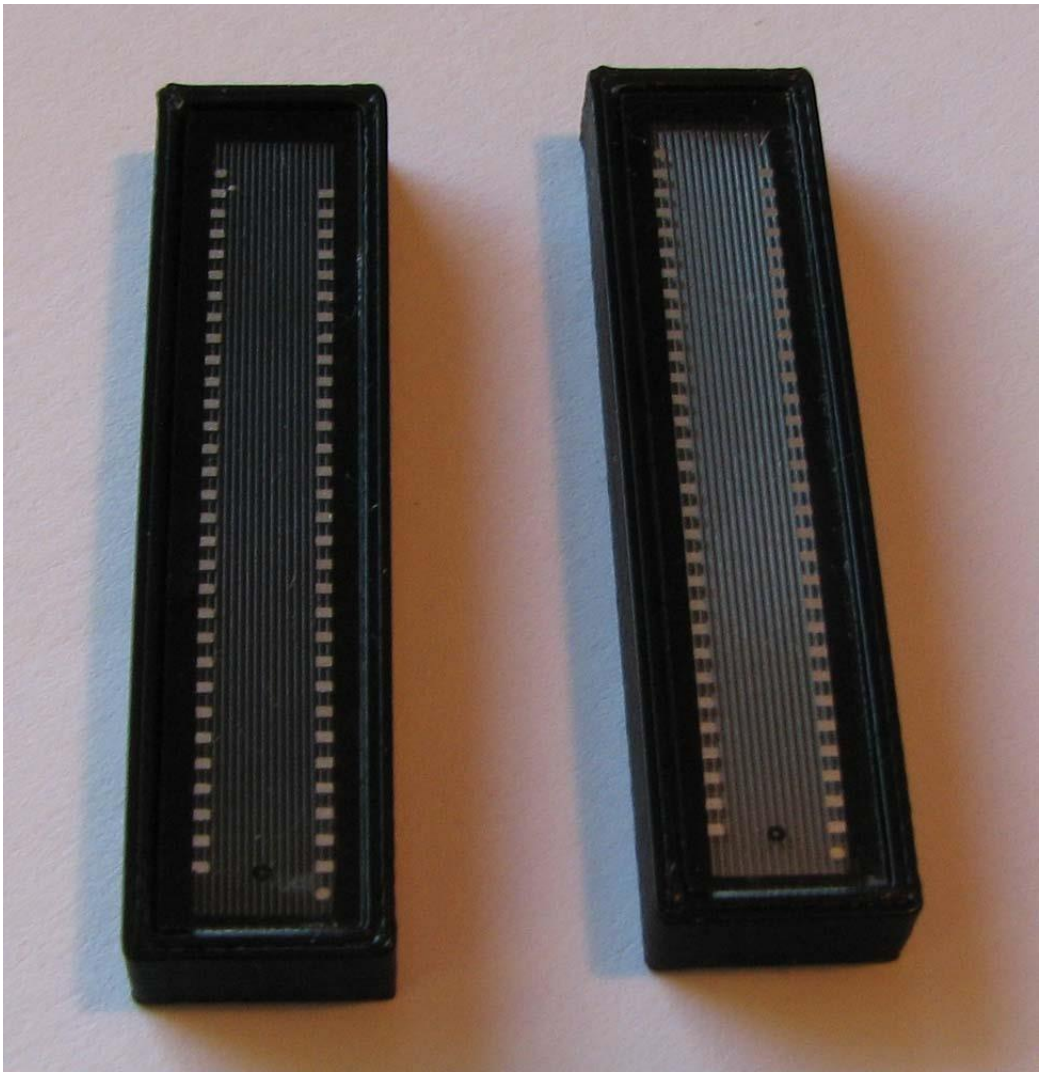
1) purified water (for releasing the decal), and a bowl
2) X-acto knife or razor blade
3) Scissors for trimming the window tint
4) 600 grit ultrafine sand paper
5) Small squeegee or credit card
6) Lint free cloth – I used a napkin and had some issues with paper particles
7) Microscale Industries, Inc. Liquid Decal Film – strongly recommended!

The first step is to pop the clear Plexiglas and lenticular parts out of the black bezel. Just use your finger on push from the bottom side. They are shipped already located in the bezel where you will want them to be when we are all finished: the Plexiglas on top, the lenticular underneath with the lens ridges touching the bottom of the clear Plexiglas.

Lenticular and Window Tint

You have a couple of choices for the window tint: just cut it to the correct size (easiest), or mount it to the back (flat) side of the lenticular material.

It is really just personal preference and application difficulty. Unless you have a couple of them side-by-side the difference may be hard to spot. Applying the window tint to the lenticular material makes the background look a bit darker. Here is a photo of each:



The completed bezel on the left has the window tint applied directly to the back of the lenticular material and the bezel on the right has the lenticular material just sitting on top of the window tint, the window tint is not directly attached to the lenticular material.

I originally thought that the window tint needed to be attached to the lenticular material since the spacing between the lenticular material and the tint could make the display look blotchy. If you attach

the window tint and there are any air bubbles or any small particles they are very distracting and make the display look old or damaged (maybe you want that?). I was surprised when I decided to just try trimming a piece of window tint, leaving on the sticky side cover, and it looks great!

Prepare the Lenticular Material

If the lenticular material has protective tape on the back, remove that. Some hazing or particles may be on either side of the lenticular material. Water and gentle rubbing will usually remove any contaminations. You may need to use a small amount of mild dishwashing soap for some more stubborn stuff. Do not use an abrasive cleanser and many cleaners may attack the lenticular plastic material so do not use things like goop-off or the material may be ruined.

Option 1: Just trim the window tint piece

Do not peel off the window tint protective backing!

I used the clear Plexiglas piece as a template and a pair of sharp scissors to trim down the tint material to the correct size. Keeping it possibly a bit larger since it is easier to remove than add material – actually I don't have a clue how you would add material…

Test fit the trimmed piece of tint in the bezel and trim as needed. You want the window tint to be able to lie flat in the top cavity of the bezel; it should not be warped or caused to buckle when sitting in the bezel. Of course if you trim too much it could sag more than desired. If you are using this for the 28 segment Bar Graph display some sagging may not be an issue since it clips onto the display face and will be held securely in place. If used on top of some discrete LEDs, sagging may be of more concern.

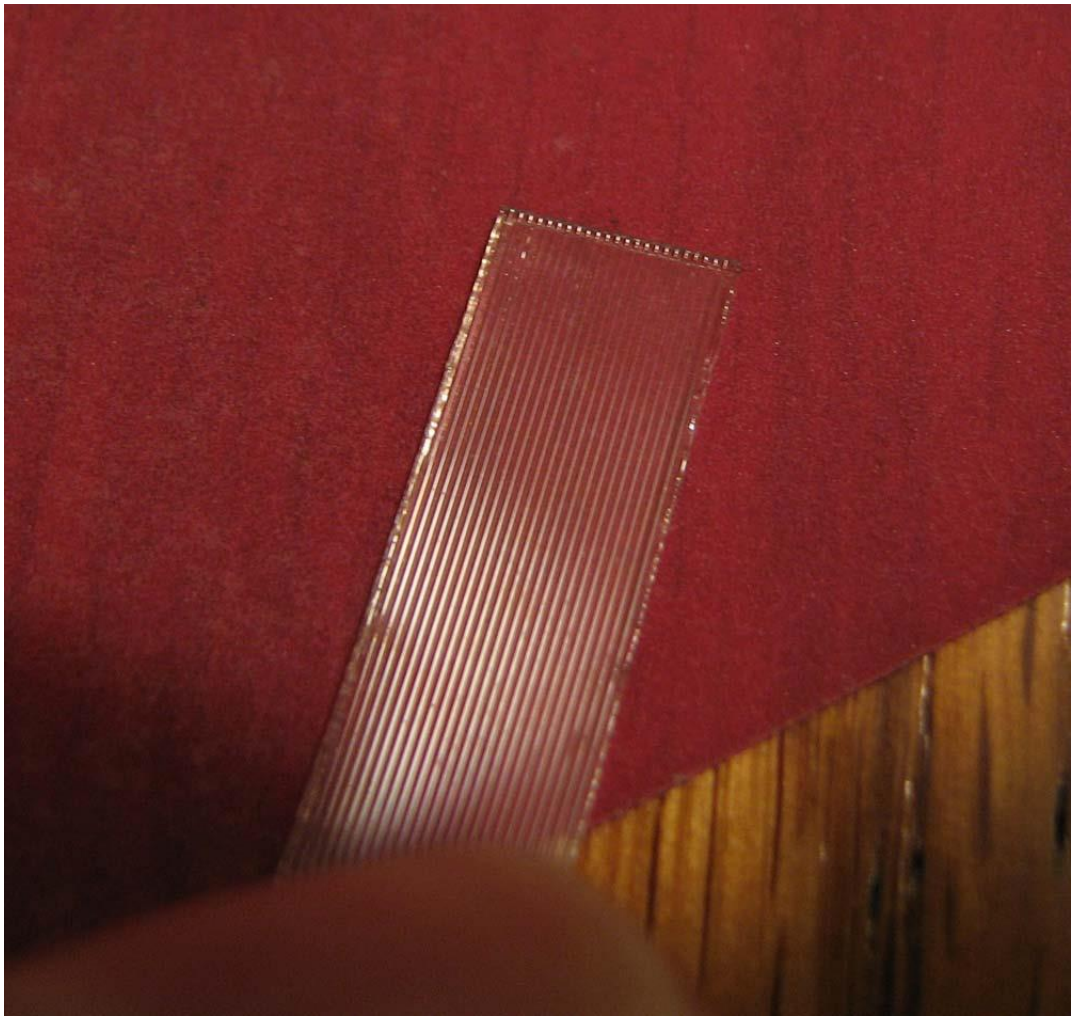
After placing the window tint in the bezel (whichever side looks best facing up), place the lenticular material on top of the window tint piece. The flat side should be on the bottom, touching the window tint and the side with the vertical grooves is on the top side facing where we are going to be placing the clear Plexiglas piece.

Option 2: Apply the window tint to the back of the lenticular material

It was much easier for me to trim the window tint with a razor blade after it was applied, but it should be possible to trim first and then apply it to the lenticular material.

The laser cutting process tends to melt the edges of the material and makes slight ridges around the edge. These ridges can interfere with the window tint sticking and cause small air gaps around the edge of the piece. This mostly gets covered by the black surrounding ring of the decal, but it may be large enough to show up in your finished bezel.

Using 600grit sand paper, sand the back of the lenticular material until it is flat. This is to remove the ridges caused by the laser cutter around the edges of the piece. Do not sand the side with ridges or it will look awful. Only sand up and down the length of the piece so that any tiny scratches made will be in the same direction as the lenses and will not be detectable.



Here you can see that the ridges are on the top and the back is being sanded on the Red 600-grit sand “paper”. I placed the sand paper on a flat surface and then gently rubbed the lenticular plastic piece up and down length-wise.

Keep checking for the edges on the backside and only sand until they are removed. Your fingernails are good ridge detectors – just slide from the center to the edge and see if there is anything along the edge to catch on.

Once the lenticular material has a very flat back surface it is time to wash it again to remove any loose debris generated by the sanding.

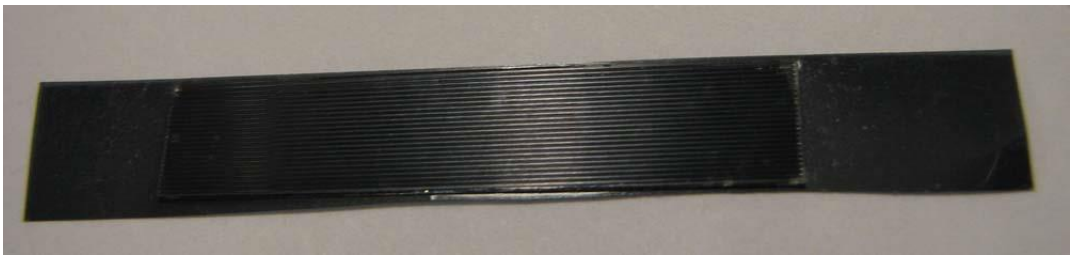
Now on to the application of the decal. Some people do this dry, some use just filtered water and some use slightly soapy water to allow a bit more ability to move the piece. I just used dome water. This step really needs a lint and hair free zone. I did some of this on napkins (I was using water) and kept getting lint trapped between the tint and the lenticular piece.

The window tint does have a clear backing that needs to be removed, and any dust dirt will be looking for the sticky surface so you want to wait until you are ready to apply it. Not sure the best way to separate but I have had good luck with a razor blade or knife:

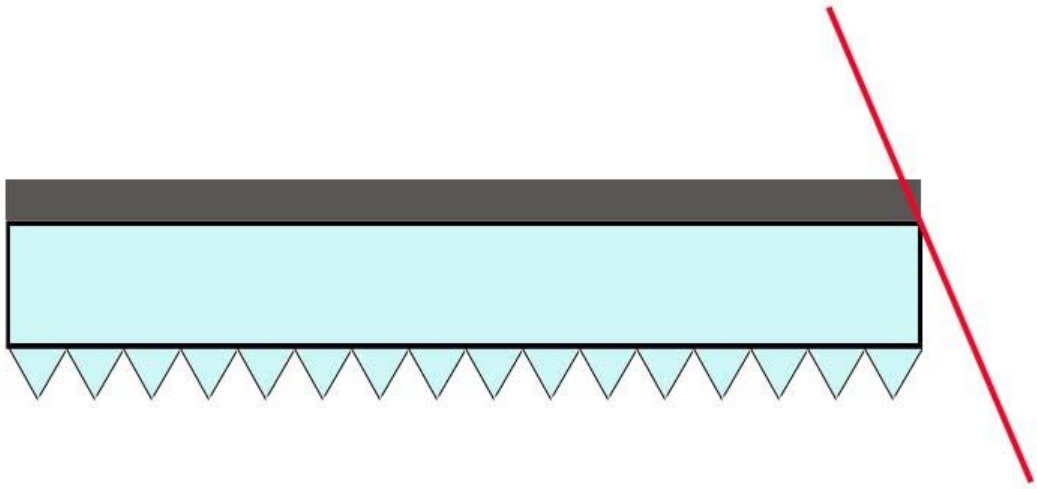
Don’t do this on napkins like shown above unless you like lint…

I then just dipped the lenticular piece in water and held it with the ridges face down and smooth side face up. Dipped the tint in the water held only at one end so I didn’t contaminate the sticky side that will be in contact with the lenticular material, then placed the sticky side of the widow tint on the lenticular material starting at one end and slowly applying the rest of the way along the length of the lenticular material trying to not trap any air bubbles along the way. U then sat the piece on a flat surface and used a credit card to “squeegee” any water out from between the lenticular material and the tint. This is no real adjustment possible after you first start applying the material if it is dry or with water. Maybe some slightly soapy water would have worked better?

Here is the piece set aside to dry:



I let it dry for a day, though not sure it needed that much time. I then trimmed the tint with a razor blade. The blade did not easily cut the lenticular material, so it worked well to just remove the widow tint. Cut with the blade flat along the edge of the lenticular material but angled so you trim the top edge of the tint, and not the bottom edge of the lenticular material. The blade is indicated below in Red:



Now flip the piece over and place the lenticular piece in the bezel with the window tint on the bottom and the vertical ridges facing up. It should just press into the top and fit snugly in the black bezel.

Decal on Plexiglas

Again a disclaimer on these decals – they are very fragile and will need some touchup and protection after it has been applied. But it looks great so will be worth the effort!

The decals do have two silver rectangles that were supposed to be gold. It turns out that to get "gold" they print yellow on top of the silver. Since what you are seeing is on the back side and won't show through, all of the rectangles will appear silver. I tried!

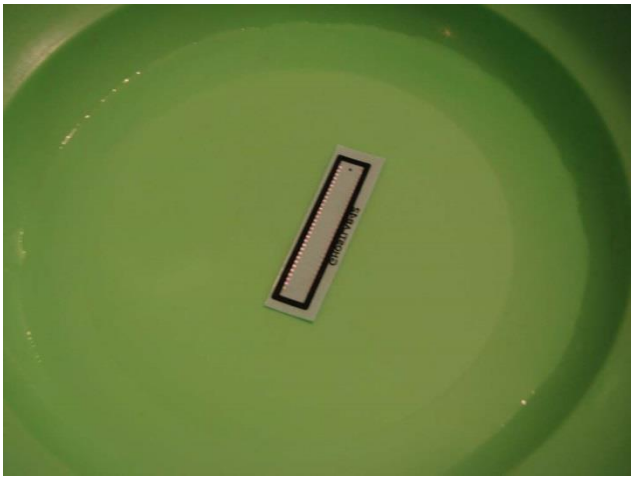
Clean the Plexiglas

If the clear Plexiglas material has protective tape on the back, remove that. Some hazing or particles may be on either side of this piece. Water and gentle rubbing will usually remove any contaminations. You may need to use a small amount of mild dishwashing soap for some more stubborn stuff. Do not use an abrasive cleanser and many cleaners may attack the Plexiglas material so do not use things like goop-off or the material may be ruined.

With a clean clear piece of Plexiglas, you need to figure out which side to apply the decal to. Like the lenticular piece, laser cutting leaves one side with a ridge from the melted material. We want the flat side that has the ridge to be the top of the piece and the side that is completely flat without a ridge to be the bottom side that we will apply the decal to. This allows the decal to adhere best to the Plexiglas. If you put the decal on the other side, the black surround may have air bubbles and look more damaged. Do not sand the Plexiglas like you may have the lenticular material as any scratches are tough to hide.

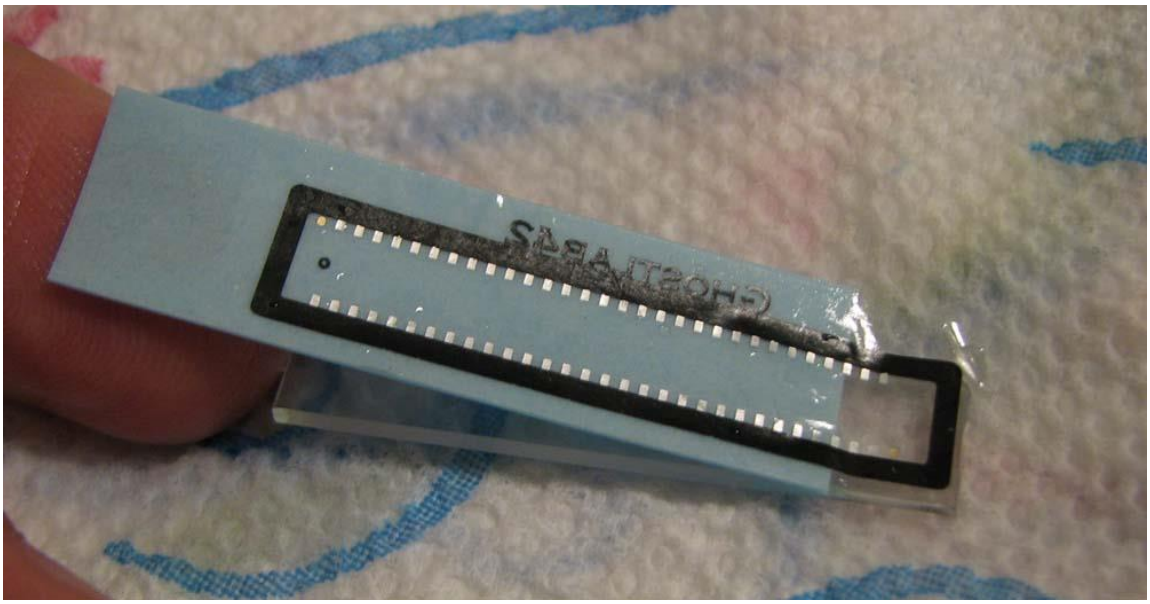
Wet the Decal

Now for the gentle application of the fragile decal. Soak in filtered room temperature water for about 30 seconds and the decal should be able to easily slide of the light blue backing paper. DO not slide it off yet or it can more easily tear or fold on to itself. If it does it can still be used. Folds are easiest undone by placing the decal back in the water. Tears are dealt with by good alignment of the parts when applying them to the Plexiglas.



Apply the decal:

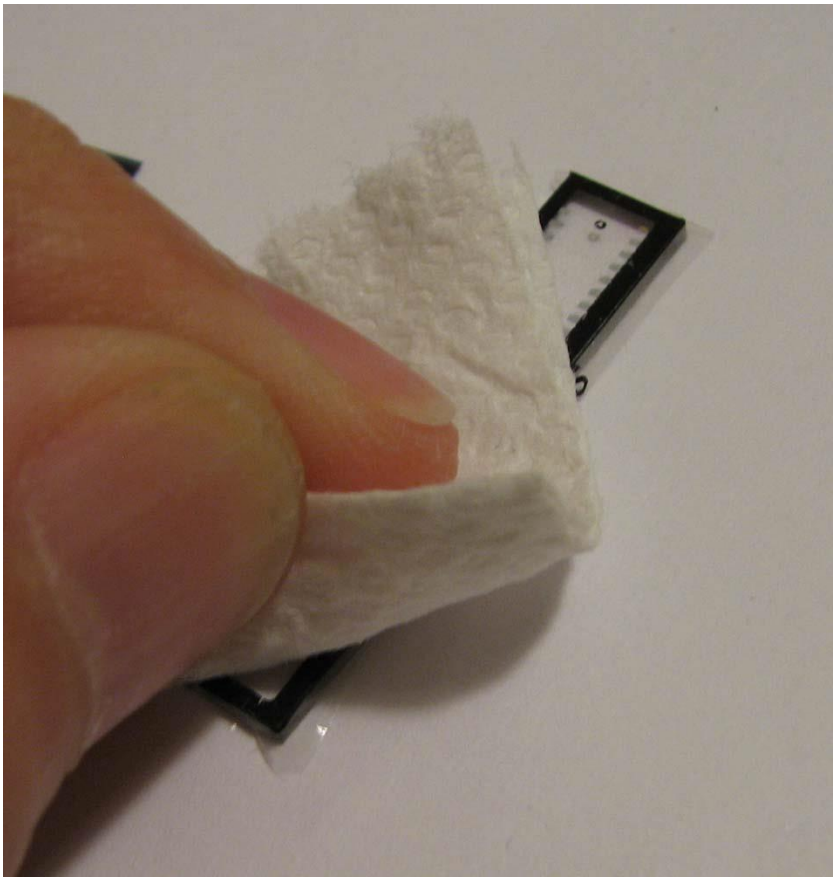
Now to apply the decal, get the Plexiglas wet and make sure the flat side without ridges is face up. Then start sliding the decal off of its backing paper and align the end up on the edge of the Plexiglas. Do not rub and try not to press too much so the decal can still be somewhat positioned on the Plexiglas.



The above is the start of the applying the decal. Slowly pull the backing paper away as the decal falls onto the Plexiglas. You may have to apply some pressure to the end to hold the decal in place. Do this on lint free cloth and not napkins like I did above. It worked out fine, but better safe than linty.

Align and gently dab the decal:

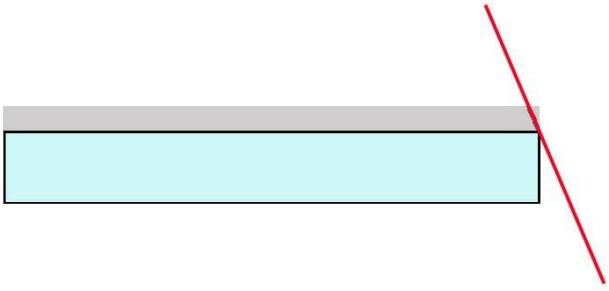
Next you want to apply some pressure to the decal, but NO RUBBING! It is now fairly lint safe so I used a piece of napkin and just dabbed and rolled along the surface being very careful to not scrape, slide along or rub the surface.



The decal will fold over around the edges this is OK. Let it dry for 24 hours. It may be dry much sooner than this, but that is how long I waited.

Trim the decal

You can trim the decal with a razor blade like for the lenticular material (flat edge along the side of the Plexiglas and angled to only trim top of the decal) either before or after the protective coating. I have done both and they both worked well. And I had some nicks in the black surround both ways…



Protect the decal

Even completely dried I have had some decals look crystal clear and some look rather cloudy or cloudy/splotchy. Not sure what determines that, but all ended up clear after a protective coating was applied.

I tried the MICRO SET solution and it didn't really have much effect, though it was recommended online. What worked out really well for me was the companion product "Liquid Decal Film".

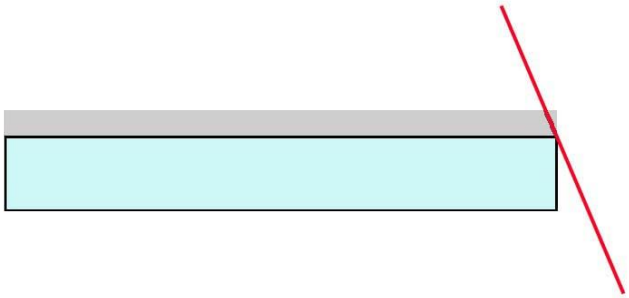
There must be several comparable products, but this is what I used and it is great.

The decals are fragile enough if you do not put a protective coating on them I do not know if they will rub off in time inside the bar graph bezel. They may be fine, but coating the fragile side makes a lot of sense. Some decals do have tiny cracks in the black surround lines and that can be fixed with just a black Sharpie, or possibly some black paint. I have touched up the decals before and after the sealant, the Sharpie ink may dissolve a bit so after is definitely safer!

After the decal is dried (and trimmed if you want), apply a uniform thin layer of the Liquid Decal film. It is somewhat self-leveling so it is not too difficult to apply with a small detail paintbrush. Try not to glop the stuff all over and then let the Plexiglas slide into the spillage – I did that on one and it is tough to remove from the other surface of your Plexiglas and you really only want it covering the decal. I also tried it on the top surface of the Plexiglas to hide some scratches and it was not a pretty look…

Set it aside to dry for another few hours.

Trim the decal (again?)
Next trim the decal with a razor blade like for the lenticular material (flat edge along the side of the Plexiglas and angled to only trim top of the decal, not the Plexiglas) if you haven't done so already.



Mount in the Bezel
Your Plexiglas cover piece is now ready to snap into place over the top of the Lenticular material. The decal side should be on the bottom, touching the ridges of the lenticular material.

On mine, the pieces offer a pretty snug fit, so glue may not be needed. If you want you can apply some glue (I built one with a tiny amount of Gel Super Glue that is not runny) applied with a toothpick in very small amounts and only to the inside corners of the bezel after the tint/lenticular piece has been placed in the bezel. Then place the decal side down Plexiglas piece into the bezel. Too much glue and it could ooze under/over/around the Plexiglas piece, so apply the glue sparingly.

Now your bezel is finished – you can sit back and admire the beauty of your work!