National Vision Optics Lab
Order of operations manual

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Abstract

This is a manual that is meant to be used for, and should be used alongside, general training purposes. It will give general instructions how to use the machines in an Eyeglass World lab and will describe the standard method for the average job. It's not meant to be an exhaustive list of every possibility or every circumstance that you might encounter, and can be used as a resource to answer, and help remind about, the standard procedures of each machine.

The instructions are designed for the listed model numbers for each machine. Differently designed machines may be similar, but these instructions may not be perfectly applicable to newer models. Please adjust accordingly.

If you have any questions or concerns, consult your lab manager.

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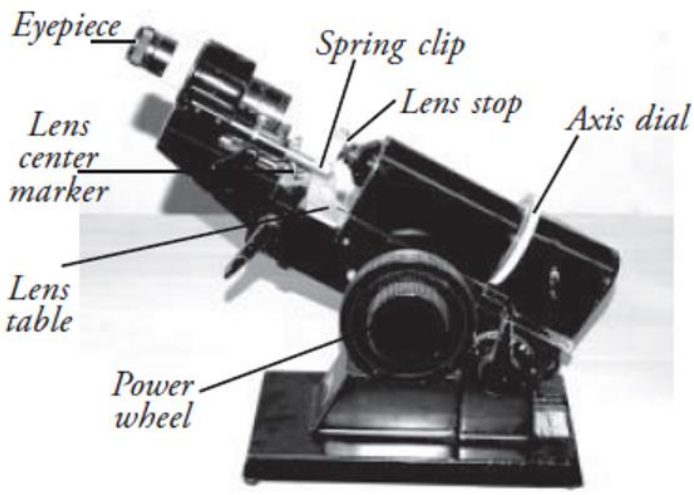
Acknowledgements

I would like to thank my coworkers, college professors, and other classmates for helping me put this together, and for their feedback during testing. I would also like to thank my family and other friends for encouragement while writing it out, and motivating me to get it done.

Instructions on using a lensometer:

-Model: Marco 101

**(refer to image for any questions on the names of the pieces of the device)*



General First steps:

**Performed when starting up the machine*

1. Turn on the device with the power switch on the main arm of the lensometer
2. Turn the eyepiece counterclockwise all the way
3. Cover the lens stop (usually with a finger)
4. Look through the eyepiece and look for the black circle
5. Turn the eyepiece clockwise slowly until the black circle is completely in focus

The next steps will depend on what the lensometer will be used for.

A) If the prescription in a pair of glasses is already known, and needs to be confirmed
B) Determining the exact angle for the axis in an uncut lens before it's put in a pair of glasses

Confirming the known prescription in a lens (lenses already set in frames):

1. Place a lens onto the lens stop, and raise the lens table to hold it up in place
2. Turn the Axis Dial to the prescription axis (this may change if the prescription is off)
3. Set the Power Wheel to the Sph of the prescription
4. Look through the eyepiece. You should see 3 clear green lines with a blurry set of three lines perpendicular to them. (If it's not in focus, adjust as needed until it is and record the new power)
5. Turn the Power Wheel by the amount listed in the Cyl of the prescription in the negative direction (Example, If the prescription is Sph -1.00 Cyl -.50, The Power Wheel will be at -1.00 from step 3, so turn it to -1.50)
6. Look through the eyepiece again, and the three other lines should be in focus now. (If not, adjust as needed again)
7. Go back and forth between the two powers, and move the lens as needed to find where the lines intersect and move the lens on the Lens Stop until that point is in the center of frame
    a. (If the lines don't look completely straight at either setting, the axis may be slightly off. If so, change the Axis dial until the lines look straighter and in focus)

8. When the center point has been found, lock it into place with the Spring Clip and adjust the Lens Table up and down as needed to secure it
9. Push the center lens marker onto the lens until it leaves 3 distinct marks (This can be used for confirming if the focal point of the lens is where the eye looks directly through it)
10. Compare findings with the prescription
11. Repeat all steps for the 2nd lens

Setting the axis in an uncut Lens:

**This step is for Single Vision only*

1. Place the uncut lens on the Lens Stop
2. Set the Axis Dial to the Axis of the prescription
3. Set the Power Wheel to the Sph of the lens
4. Look through the Eye Piece and rotate the lens until the green line seen is straight and in focus
5. Turn the Power Wheel the amount of the Cyl value in the prescription. (The 3 lines seen now should be completely in focus)
6. Move the lens while looking through the Eye Piece to get the point where the lines cross in the center of the frame
7. When the center point has been found, lock it into place with the Spring Clip and adjust the Lens Table up and down as needed to secure it
8. push the center lens marker onto the lens until it leaves 3 distinct marks
9. Remove the lens from the Lensometer

Instructions on using an optical lens tracer:

-Model: Optronics 4TX

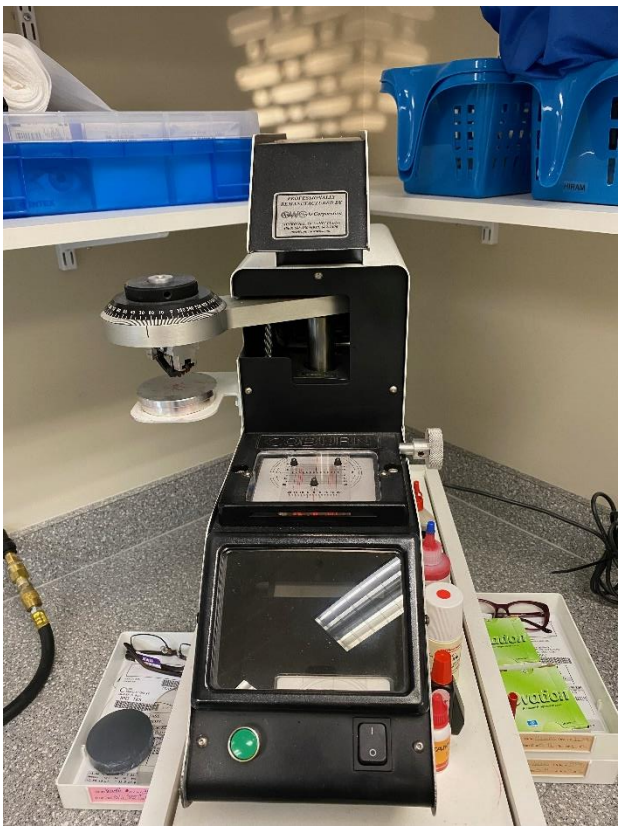
**The tracer is used to outline the frames so the lens can be cut to size. These instructions will detail how to get the trace for Rimmed and semi-rimless frames. (Wrapped frames and rimless frames are done specially with other equipment)*

Rimmed Frames:

1. Pull down on the black tab to open the clamp
2. Place the frames into the clamp and let it close on the top and bottom of the frame
3. Pull the black tab slightly to the right and fold it up, positioning it between the nose pads of the frame (This centers it to make it symmetrical)
4. Type the order number on the keypad and press enter twice
5. The Tracer should start automatically and will send the trace to your system
6. Remove the frames from the machine by pulling down on the black tab again to open the clamp

Semi-rimless Frames:

1. Place the glasses on a table or countertop about 2 inches from the edge
2. Take a sharpie and hold it against the edge of the table, then move the glasses against it to make a horizontal line on the lens (This will help make sure the trace is upright)
3. Take the Lens holder (Metal device seen in the image above) and fit the lens onto the blue part (It will stick), ensuring the line on the lens is perfectly in line with the line on the holder
4. Fit the Holder into the Tracer
5. Type in the tray number on the tracer and press enter twice, it will trace the outline of the lens
6. It will ask for the DBL, Type in the Bridge size of the frame and press enter, and it will send it to the computer

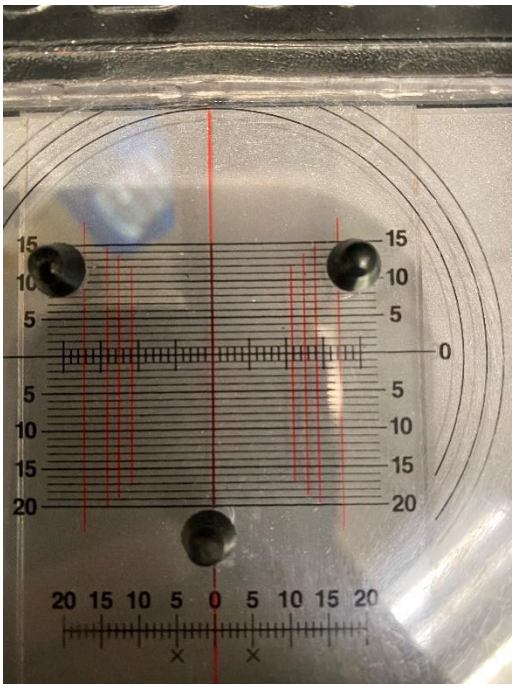


Instructions on using a Lens Blocker (Surface Lenses):

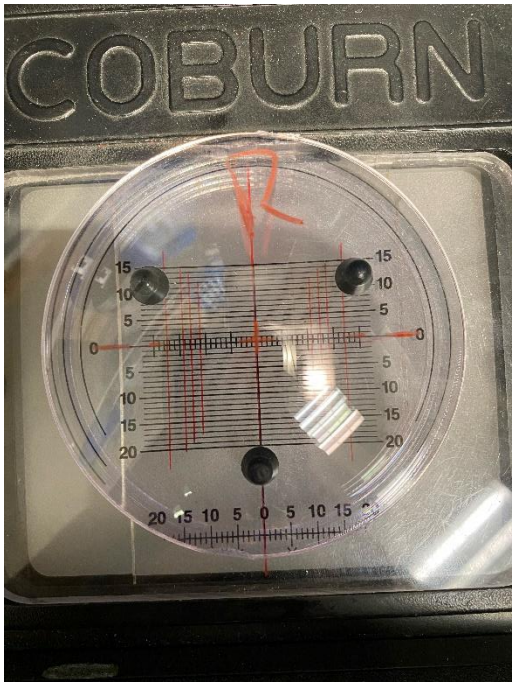
-Model: CS7

NOTE: This job will change significantly based on whether you're blocking a Single Vision, bifocal, or progressive. Go down to the section that you're working on.

Also, while using the grid (Seen right), the vertical lines are red when looking directly at them from above, but will appear black when looking at them through the screen below the stage, so keep that in mind when I refer to the vertical red lines



Single Vision Surface:



1. Place the lens on the three posts, curved side up
2. Turn the axis dial on the left side to the desired axis on the prescription
3. Look through the Screen/Lens below the stage and make sure the lens is centered in the Black circle
4. Once it's centered, Press the green button on the bottom left side of the screen and hold it down. It will stamp the lens for you. (Usually you'll hold it until it stamps about 3 times, but this may vary lab to lab)
5. Take the lens off to be covered (Next machine down)
6. Repeat steps 1-5 for the second lens

Progressive/Polarized Surface:

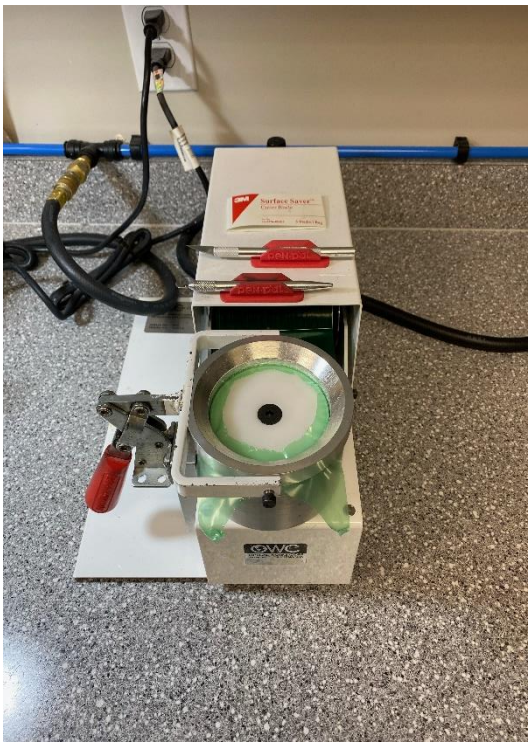
1. Check the Trace page for the Up/Down and In/Out measurements. These will indicate where the Lens needs to sit. (For the In/Out measurements, it's in relation to the lenses position with the frame. For example, In on the left lens would mean moving left, and on the right lens it would mean moving right)
2. Place the lens on the three posts curved side up with the center over the middle of the graph when looking through the Screen/Lens below the stage
3. Orient the lens so that, for Progressives, the cross is in the center as a T, aligned with the X and Y axis, and for Polarized, the dot is in the center with the lines aligned with the X axis.
4. Turn the Wheel on the right hand side of the Stage to the amount of the In/Out measurement until the moving red vertical line has moved the appropriate distance (Example, If the In is 2 on the left lens, Then you would turn it so the line moves 2 spaces to the left on the grid, and opposite for the right lens)
5. Move the center of the lens up or down on the grid based on the Up/Down Value (Example, if it's Up:3, move the lens up 3 spaces)
6. Turn the axis dial on the left side of the machine until you have the desired axis for the lens
7. Once it's centered, Press the green button on the bottom left side of the screen and hold it down. It will stamp the lens for you. (Usually you'll hold it until it stamps about 3 times, but this may vary lab to lab)
8. Take the lens off to be covered (Next machine down)
9. Repeat steps 1-7 for the second lens

Bifocal Surface:

1. Check the Trace page for the Up/Down and In/Out measurements. These will indicate where the Lens needs to sit. (For the In/Out measurements, it's in relation to the lenses position with the frame. For example, In on the left lens would mean moving left, and on the right lens it would mean moving right)
2. Place the lens on the three posts curved side up with the top line of the bifocal over the X axis of the graph when looking through the Screen/Lens below the stage
3. Turn the Wheel on the right hand side of the Stage to the amount of the In/Out measurement until the moving red vertical line has moved the appropriate distance (Example, If the In is 2 on the left lens, Then you would turn it so the line moves 2 spaces to the left on the grid, and opposite for the right lens)
4. Move the center of the lens up or down on the grid based on the Up/Down Value (Example, if it's Up:3, move the lens up 3 spaces)
5. Make sure the edges of the bifocal area are oriented with the left and right edges right over the appropriate red vertical lines on either side (There are multiple lines on each side for various sized bifocals, so it should line up with one of them. If it doesn't, realign the lens)
6. Once it's centered, Press the green button on the bottom left side of the screen and hold it down. It will stamp the lens for you. (Usually you'll hold it until it stamps about 3 times, but this may vary lab to lab)
7. Take the lens off to be covered (Next machine down)
8. Repeat steps 1-7 for the second lens

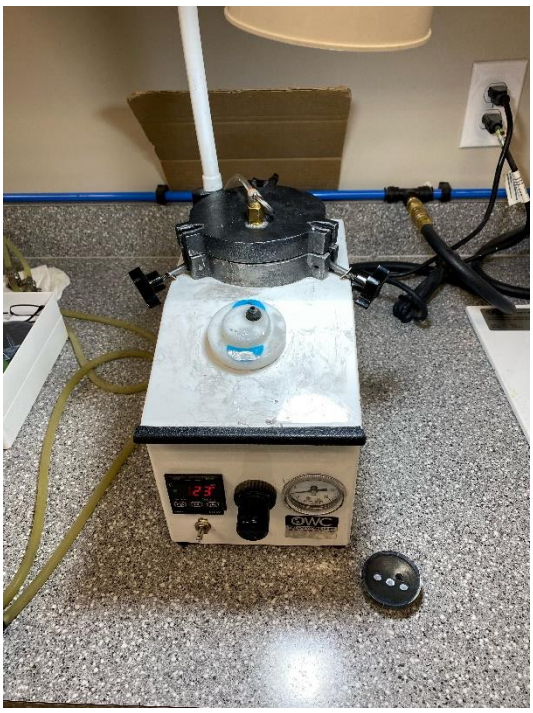
Instructions on Using the Taper:

-Model: WSS-CL



1. Place the
2. curved part of the lens onto the machine face up (This is the part that's already curved properly, the back is what's going to be surfaced down)
3. Flip the switch on the right side to lower the lens down into the machine
4. Pull the lever on the left up.
5. Pull the green tape towards yourself until you have enough to cover the lens
6. Smooth the tape over the opening to make sure it's on securely and press the lever back down to secure it in place. (This will pull on the tape and make it a bit more secure)
7. Flip the switch on the right side again to lift it back up into the tape
8. Use a knife and cut the tape around the lens to pull it out

Instructions on using the Alloy Machine:



**NOTE: The alloy used in the machine melts at a relatively low temperature (123 degrees Fahrenheit) It won't burn skin unless the machine is used wrong. If you get it on your clothes, don't wipe it off immediately. Wait a moment for it to cool and it will be easy to take off*

1. Go to the fridge and find a Base for each lens (Give them a few minutes to warm up before going to the next step)
2. Make sure there is liquid alloy inside the tank of the machine and turn it on to let it warm up the alloy (It should always be set to the right temperature)
3. Place the Metal ring over the circular stand on the machine
4. Place the warmed Base into the ring with the three dots approximately horizontal, with the 4th hole over the nozzle (Try turning it a bit to either side to make sure it's in place
5. Place the covered side of the lens over the center of the base
6. Orient it so the stamped red lines are lined up with the notches on the base (Seen right)
7. Press the button on the left hand side of the machine a few times quickly to pump the alloy into the base while holding the lens down with your thumb to secure it in place as it dries (For a progressive lens, hold the lens at the T and let it fill a bit first, then press the lens down as you fill it more to keep the alloy spraying out to a minimum. If a little comes out, that's no big deal)
8. Take it off the stand, but still on the ring, and set it on the counter to cool a bit more
9. Take it off the ring to be surfaced
10. Repeat steps 1-9 for the second lens

Instructions on using a Lens Surfacer:

Using the Edger to surface a lens:

1. Type in the Order number into the Edger and press ready twice.
2. Place the right lens into the Edger, there is a receptacle on the left side of the machine to hold it. The Block will fit onto 3 pegs that will hold it in place. Rotate it until it fits in place (For single vision lenses it can be inserted either way, but for bifocal or progressive lenses make sure the add power is placed on the bottom side)
3. Close the machine and press the start button
4. The Edger will cut the lens automatically, wait for it to finish
5. After it's finished cutting, take the lens out.
6. Press ready again, and it will to set to the left lens
7. Repeat step 2-5 for the left lens

Using the lens edger to cut a Styrofoam Lap:

**This is done if there are no Laps in the right size*

1. Take the Styrofoam Lap (precut) and fit the block onto the back (you may need a bit of force)
2. Lock it into place with an Alan Wrench
3. Type the Order number into the machine
4. Click ready once for the right lens (If it's the left lens, press ready one more time), click the up arrow once, then ready once until you see the prescription ready to cut on the right side.
5. Place the Lap into the holder on the left side and close the machine
6. Press the chuck button to lock it into place
7. Close the machine and press start
8. Once the Lap is cut down, take the Lap out of the machine. (To get back to the job screen, press setup)

Instructions on using a Lens Grinder and Polisher:

-Model: 505RB

**NOTE: The machines are identical, and in some labs both jobs may even be done on the same machine. However, they will be explained separately for the purpose of this manual. In some cases, the water may splash out of the machine, so having towels on hand to cover the compartment may be helpful*

Grinder:

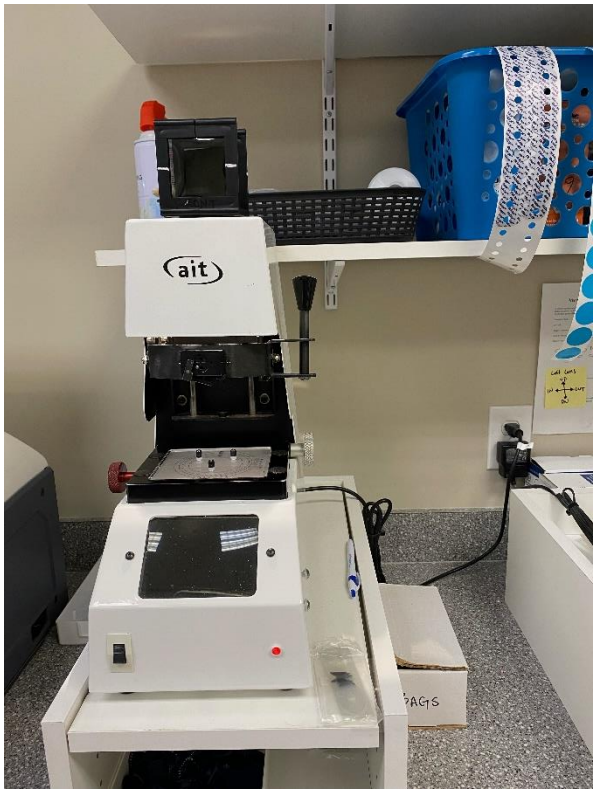
1. Find the Lap based on the Base and Cross values for each lens
2. Take the brown stickers (Sandpaper) and place them onto the curved surface of the lap.
3. Place the laps onto the receptacles on the machine, facing outwards and secure them in place with the lever on the bottom.
4. Place the lens onto the metal bar over the appropriate lap and secure it in place by pulling down on the switch brass bar on the front panel (You should feel it lock in place)
5. Repeat steps 2-4 for the second lens
6. Flip the pump switch to manual to make sure the water is pumping directly onto the laps
7. Start the machine using the cycle switch on the right side of the front panel labeled start/stop
8. Flip the pump switch to auto
9. The machine will stop automatically after a cycle. Remove the lap and lens
10. Peel off the sandpaper with a knife
11. Dry off the lens and lap with the compressed air or a towel (Make sure it's really dry. If it's not, the polisher will come off in the next machine)

Polisher:

1. Take the pink Stickers (Polisher) and place them onto the curved surface of the lap.
2. Place the laps onto the receptacles on the machine, facing outwards and secure them in place with the lever on the bottom.
3. Place the lens onto the metal bar over the appropriate lap and secure it in place by pulling down on the switch brass bar on the front panel (You should feel it lock in place)
4. Repeat steps 2-4 for the second lens
5. Flip the pump switch to manual to make sure the water is pumping directly onto the laps
6. Start the machine using the cycle switch on the right side of the front panel labeled start/stop
7. Flip the pump switch to auto
8. The machine will stop automatically after a cycle. Remove the lap and lens
9. Peel off the sandpaper with a knife
10. You can put the lap in the sink afterwards. Put the lens in the deblocker (The metal cylinder) with the base inside
11. Hit it on the counter to detach the Base
12. Afterwards, take the green tape off the lens to be given scratch coating treatment, or to the blocker to be edged

Instructions on using a Lens Blocker (finished Lenses):

-Model: AIT



1. Place the Marked lens on the 3 posts to hold it in place with the center mark over the middle of the grid (A top-down view of the grid is reflected on the box below the lens)
2. Place a block into the notch on the top of the blocker.
3. Take Bluedge sticker (Usually stored near the blocker) and put the sticky part on the plastic block
4. Peel the shown part of the Bluedge sticker off to expose the other sticky side (for an AR lens, place an AR sticker over the top of it, otherwise it won't hold the lens)
5. Look at the trace information and find the In/Out and Up/Down values for each lens. (These will tell you how high, and how far to the side you'll be moving the lens in the next step, with In and Out being based on which lens you're using)
6. A) Single Vision: Move the center dot along the grid based on the value on the trace information. (Example, if it's In: 2 Up:3 for the right lens, move the lens Right 2 spaces and Up 3 spaces. For the left lens, do the same thing, except switch the left and right directions, or In:2 Up:3 goes left 2 and up 3)
   B) Progressive/Bifocal: Center the lens on the grid (The T on the X and Y axes for Progressive, The top of the bifocal on the X axis) and turn the wheels on the left and right sides of the stage to move the horizontal and vertical lines along the grid based ont the values on the trace information (Example, if it's In: 2 Up:3 for the right lens, move the lens Right 2 spaces and Up 3 spaces. For the left lens, do the same thing, except switch the left and right directions, or In:2 Up:3 goes left 2 and up 3)
7. Pull the lever on the right towards you and down. This will bring the block down onto the lens and attach the block to it. (For AR lenses, it might take a bit more force to make it stick) If it lifts off the posts, and stays in place, then it can move to the edger.
8. Repeat steps 1-7 for the second lens

Instructions on using a Lens Edger (finished lenses):

-Model: 7EX

1. Type the tray number into the edger. The trace will pull up on the screen
2. Hold the lens up to the trace. (This is to make sure the cut lens will fit within the trace and not be cut off short)
3. Confirm the settings are accurate to the job being done, such as the left and right lens. (There's a setting for block setting that will usually be set to 0 for an uncut lens. If it's precut and needs to be downsized, start as .1 to adjust it a little at a time)
4. Fit the blocked part of the lens into the machine, there's a receptacle to place it
5. Once it's in, hold the blue button. This will lock it into place for the cut. Release when it's secure
6. Press the green start button. It will cut automatically based on the trace
7. Hold the blue button again to dislodge the lens and remove it by hand