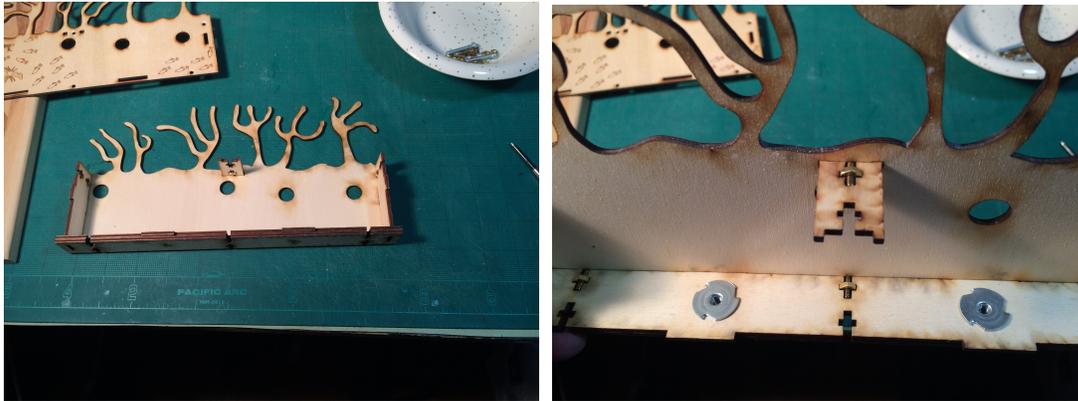


Assembly Instructions For Seahorses

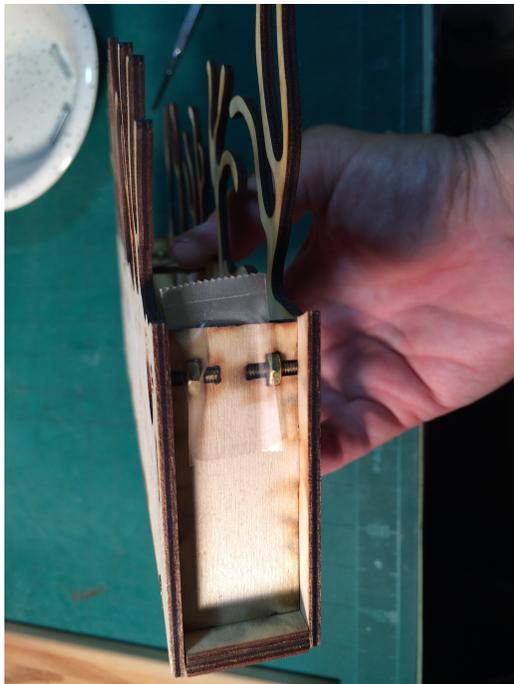


The Completed Kit

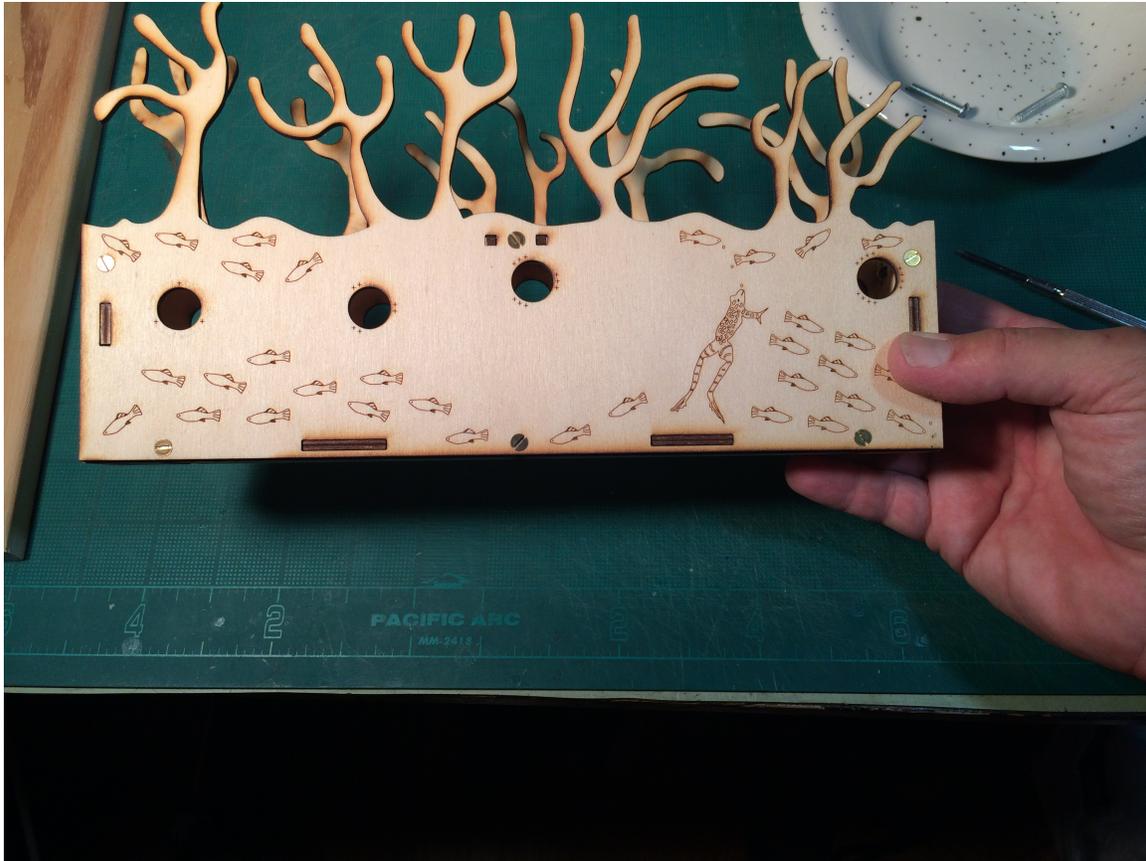
Before beginning, I have found that sprinkling talcum or baby powder over the kit during the construction does wonders for lubricating the kit and making the gears move freely. As you populate the model with the gears, if you experience any difficulty in turning the crank, DO NOT FORCE IT. Go into the bathroom and hold your model over the tub and sprinkle it with talcum powder. Allow the powder to permeate the wood and slowly work the gears back and forth until smooth motion is obtained. Then blow off the talcum powder and continue building the kit.



Attach the bottom, side, and single cross piece to one of the sides of the kit using the brass nuts and flat head screws. Make sure that the T-nuts on the bottom part are oriented as shown. Once the nuts are oriented properly they will slide into the slots and then place a flat head screw through the hole in the front of the panel. Tighten the screw. You may have to adjust the nut a little to get the screw to catch. Once a few threads go in you are golden.



Before attempting to put the other side on, temporarily tape in place the six nuts you will need to complete the assembly. Keep the tape below the edge of the wood parts so it does not interfere with the assembly.



After you tape the nuts into position, place the other sidepiece into position, aligning all the tabs with their respective slots, and put in the screws. Be careful not to let the screwdriver slip out of the screw's slot, otherwise you may scratch the engraving. After you secure all six screws remove the tape holding the nuts.

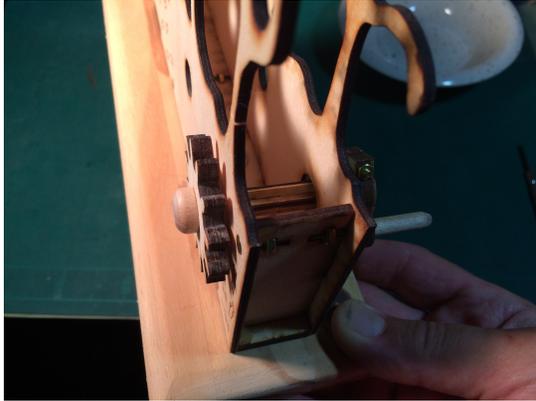


Bottom of base



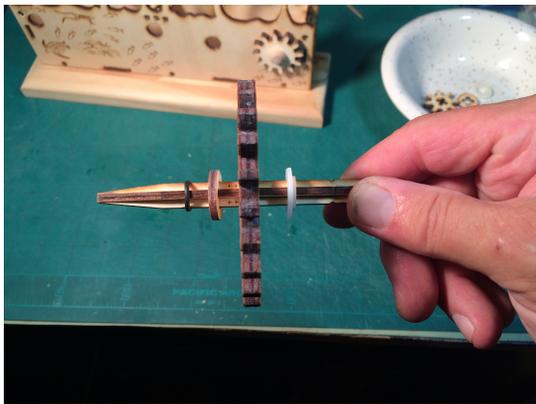
Frame attached to base

Attach the frame to the base using the 8-32 screws. Place them up through the bottom of the base, into the counter bored holes, and tighten them into the T-nuts with a screwdriver.



12-tooth gear, nylon flanged washer flanged washer, 3 cross washers, handle

Find the bag containing shaft 1 (there should be a single cross mark on it) and empty its contents into a bowl. Slide **shaft 1** through the **12-tooth gear** and then slide a **nylon flanged washer** behind it. Then slide the shaft through hole 1. Rotate the model to the other side and place in order: **a nylon flanged washer—three cross washers—the handle**. Tighten the small screw with a screwdriver. You can hold the nut by hand if it starts to slip. **Don't over tighten.**

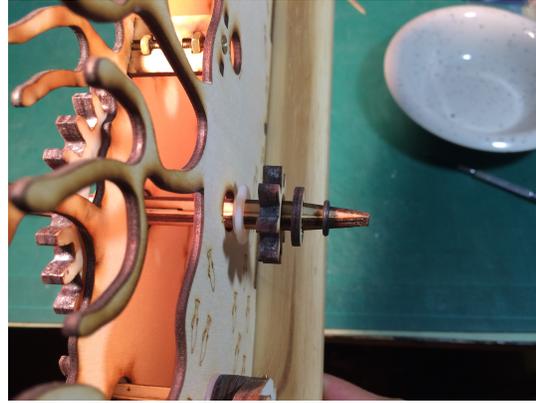


Shaft 2, Slide on the O-ring, cross-washer, 24-tooth gear, nylon flanged washer.

Locate shaft 2 and slide an **O-ring** onto one end stopping at the notch in the shaft. Make sure that the O-ring engages all four notches. Slide on in this order a **cross-washer**, the **24-tooth gear**, a **flanged nylon washer**.



Slide shaft 2 into hole 2



flanged washer, 8T gear, cross-washer, O-ring

Slide shaft 2 into hole 2, making sure the 24-tooth gear meshes with the 12-tooth gear and that the flanged nylon washer seats itself against the side plate. Rotate the model around to the other side and while holding the backside in place, slide a **nylon flanged washer, the 8-tooth gear, a cross-washer** and then the **O-ring**. Make sure everything is seated properly and that the O-ring is engaged in the notches in shaft 2.



Shaft 3, crank, 24T gear, flanged washer



Slide into place, make sure gears mesh

Locate shaft 3 and slide a **crank** on to its end. Make sure the top of the shaft is flush with the crank's face. Tighten the small screw with a screwdriver. If the nut on the other side rotates simply hold it with your fingers, no need to use a pliers. Slide the **24-tooth gear** up against the crank then slide on a **nylon flanged washer**. Then slide shaft 3 into the frame into hole 3. Make sure the two gears mesh.

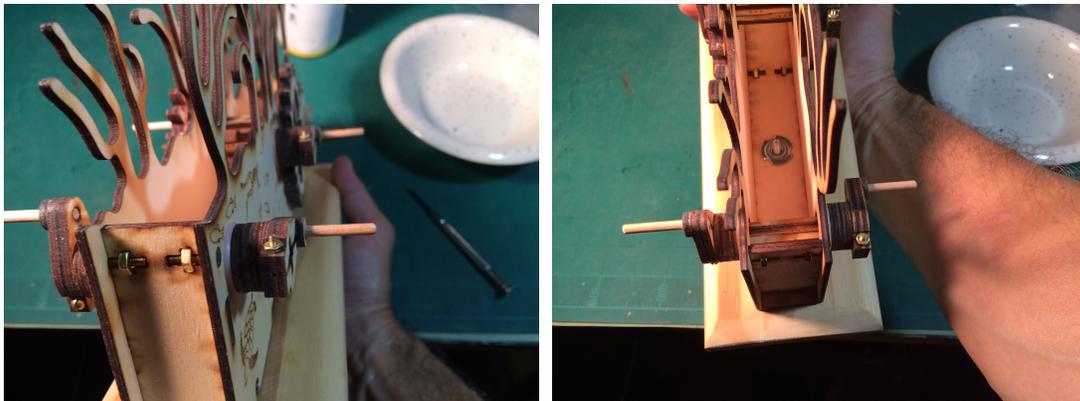


Shaft 3: nylon flanged washer, 3 cross-washers, crank.

Rotate the model to the other side and place on the shaft: a **nylon flanged washer**, **three cross-washers**, and the other **crank**.

Make sure this crank is rotated 90 degrees relative to the crank on the other side. (see video if necessary)

Remove any excessive slop in the shaft by gently pushing the crank up against the frame, next tighten the screw on the crank. Remember to keep things looser than tighter when building this kit. You don't want excessive sloppiness in the fit but too tight is definitely to be avoided.



Shaft 4: 2 cross-washers on left side and 3 cross-washers on right side.

Place a **crank** on to the end of shaft 4 and tighten the small screw. Place **two cross washers** on the shaft, and a **nylon flanged washer** and slide it into the model on the side that has the handle (left side on photo). On the other side, (right side on photo) place a **nylon flanged washer**, **three cross washers**, and then the **crank**. Make sure the cranks agree with the positions of the previous step. In other words if the two cranks on the back side are pointing up then the two cranks on the front side should be facing in like directions to each other but 90 degrees offset from the rear ones.



Parts needed for next step.



Control horns with various offset square holes

Gather the parts shown here. Note that the square hole in the control horns is offset from the vertical. Some are rotated 30 degrees some 45 degrees. There are several extra control horns in the kit. If you want to orient all your seahorses so they are facing the same direction, use the six control horns that are aligned straight. Otherwise I suggest facing the seahorses in random angles (see video).



Take a **seahorse figure** and slide a **small wooden washer** up to the stop. Then insert the bottom of the seahorse stick into the wooden block. Follow that up with a **small wooden washer, a control horn, a small wooden washer, an O-ring**. Slide the O-ring on with your fingers. Populate the other two location with seahorses using the same construction technique.

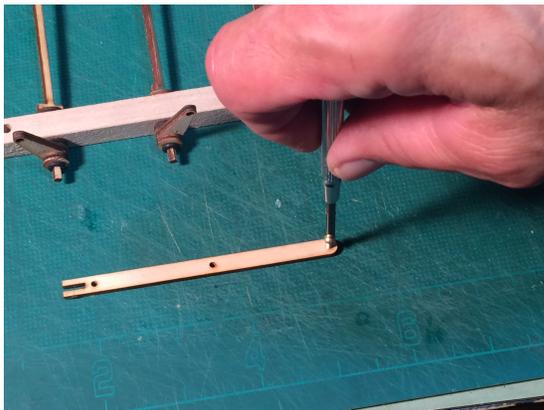


Bottom view of control horn

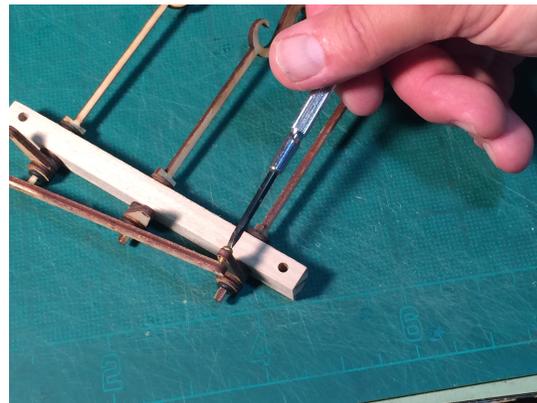


Fully populated block

If you orient all the control horns so that they are facing you, the positions of the seahorses is now similar to what they will be during part of the cycle of the mechanism. They will basically swivel back and forth from this position. If you are unhappy with the way it looks, reorient some of the figures by taking off the control horn and rotating the seahorse figure and placing the horn back on. Play with it until you like the way it looks. I prefer them to be facing in all sorts of random directions.

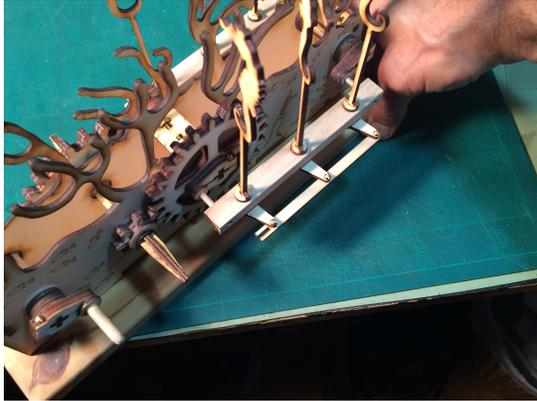


Pre-thread the three holes in this link



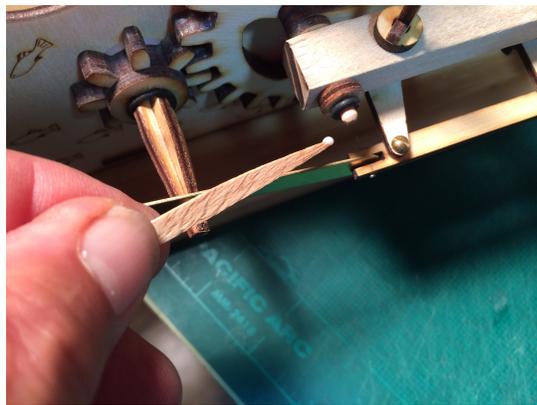
Screw link into control horns Keep loose.

Find the link shown above and using one of the small screws carefully pre-thread each of three holes by screwing in the screw and then un-screwing it. Then carefully attach the link to the control horns by screwing in a screw. **Make sure NOT to tighten the screw all the way. Leave a bit of a gap between the two parts so that it can swivel.**



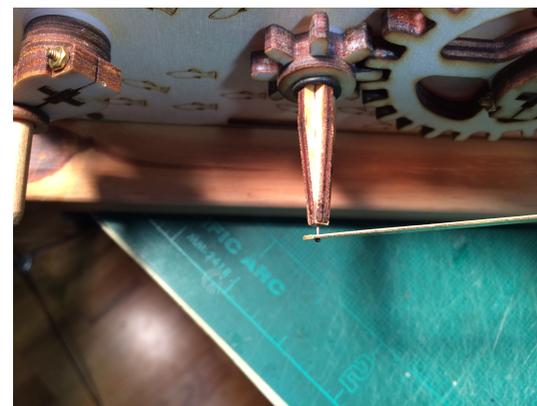
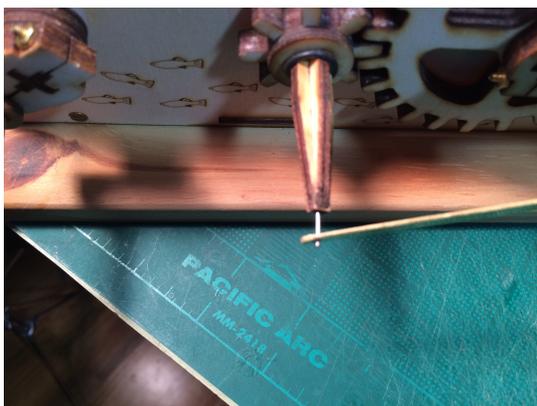
Slide block onto pins, slot in link faces shaft 2. Small washer and O-ring over pins.

Slide the assembly onto the two cranks. Make sure the slot in the link is facing toward shaft 2 (the tapered shaft). When you assemble the other side, make sure that the slot in the other link faces shaft 2 as well. Slide a small washer and then an O-ring over the pins on both sides of the block.



Thread pin through the wooden link and hole in brass link. Dot back with glue.

Locate the brass link and slide one of the metal pins through the wooden link and thread it through the brass link. Using a toothpick, apply a tiny dot of glue behind the pin to prevent it from working its way out.



Place the other metal pin through the other hole in the brass link and then thread it into shaft 2. With about a $\frac{1}{4}$ " or 6mm of the pin sticking out, place another dot of glue at the pin/shaft intersection. Carefully slide the pin in but leave a small gap as shown in the photo on the right. If glue gets in there tear off a piece of paper and slide it in the gap to pull out extra glue.

Repeat this procedure on the other side. Make sure the slot in the wooden link faces shaft 2.

This completes the kit.



Crank your kit and look at the action. If it's tight, make sure to use the talcum powder. If it's still tight, check each shaft to see if perhaps any were squeezed too tightly during assembly and may need to be loosen up a bit.

Changes you can make:

As mentioned already, you can alter the orientation of the seahorses by rotating or even changing the control horns.

You can shorten some of the seahorses so they are swimming at different heights. Simply cut the stick shorter. Make sure there is enough shaft to stick below the block. Since you will lose the stop on the stick you may have to glue the small wooden washer in place to prevent it from slipping.