# Seesaw Bar Upgrade

Field upgrade to prevent bar shat sliding out of frame

# New Parts that Need To Be Added

- 1 - 1" ID, ½" wide, Shaft Collar (item 3087)
- 1 – 1-¼" ID, ½" wide, Shaft Collar (item 2292)
- 1– Directed Machines Logo Plates (item 3058)
- 6 – 1/2"-13 x 1-1/4" Hex Head Screw (item 3545)
- 6 – 1/2"-13 locknuts (item 2734)
- 1 - Sleeve Bearing 1" Oil Embedded 1-1/4" Housing 3/4" L (item 3121)

# Tools Needed

- 1 – Rachet
- 2– ¾" wrenchs
- 1 - Torque Wrench (alternatively use a second ratchet)
- 1 - Rachet extender
- 2 – ¾" Rachet Sockets
- 1 - Car Jack
- 4 - Jack stands
- 1 - Bottle of Locktite
- 1 – 3/16" Allen Hex Key
- 1 - 3/16" Allen Wrench bit Hex Key for Rachet (alternatively use the Allen hex key)
- 1 – Rag

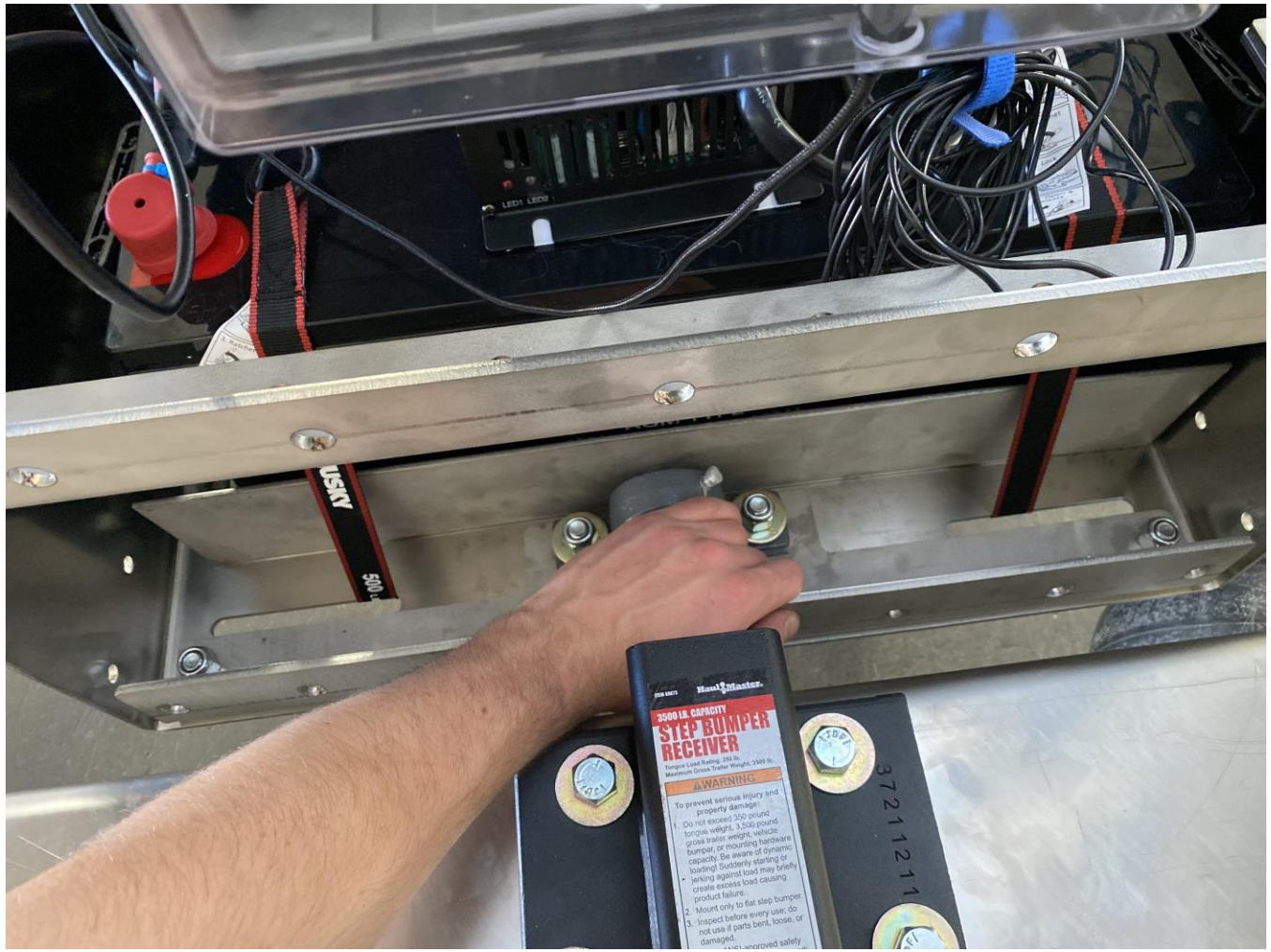
# Tools Needed

# Lifting the Robot

- Place the Car Jack under the robot, near the Seesaw Caster Side away from bolts
- Jack up the robot and place 2 jack stands under it such that the seesaw is suspended off the ground

# Remove the logo

- Remove the laser cut, sheet metal directed machines logo (part 3058) so that you can see into the chassis of the LCR.
- It should look like this when you are done.



# Starting Assembly

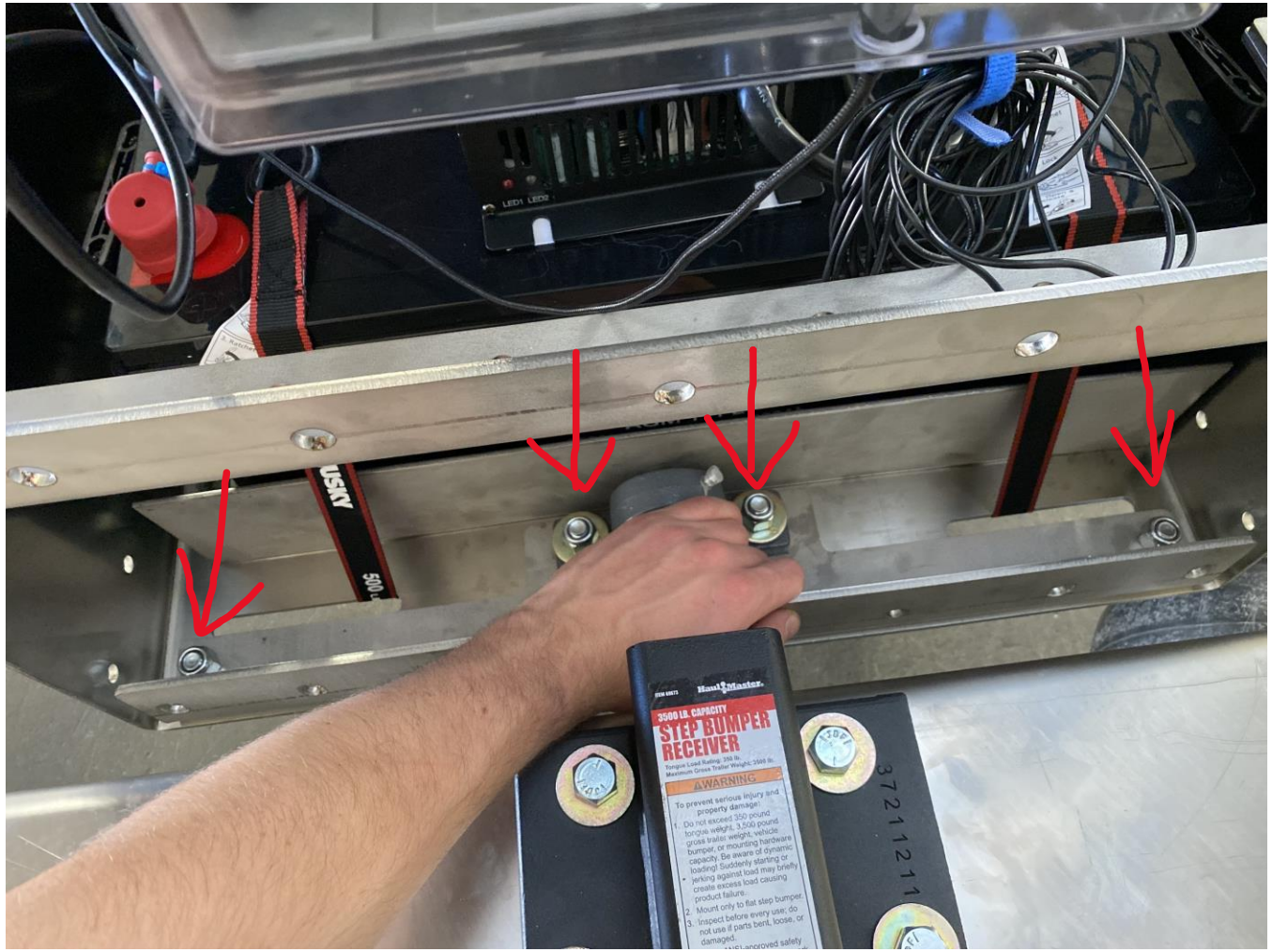
- This is how your assembly should look before making any changes.

# Removing the Shaft Collars

- Loosen the all bolts on these two shaft collars using the 3/16" Hex tool

# Loosing the L Bracket

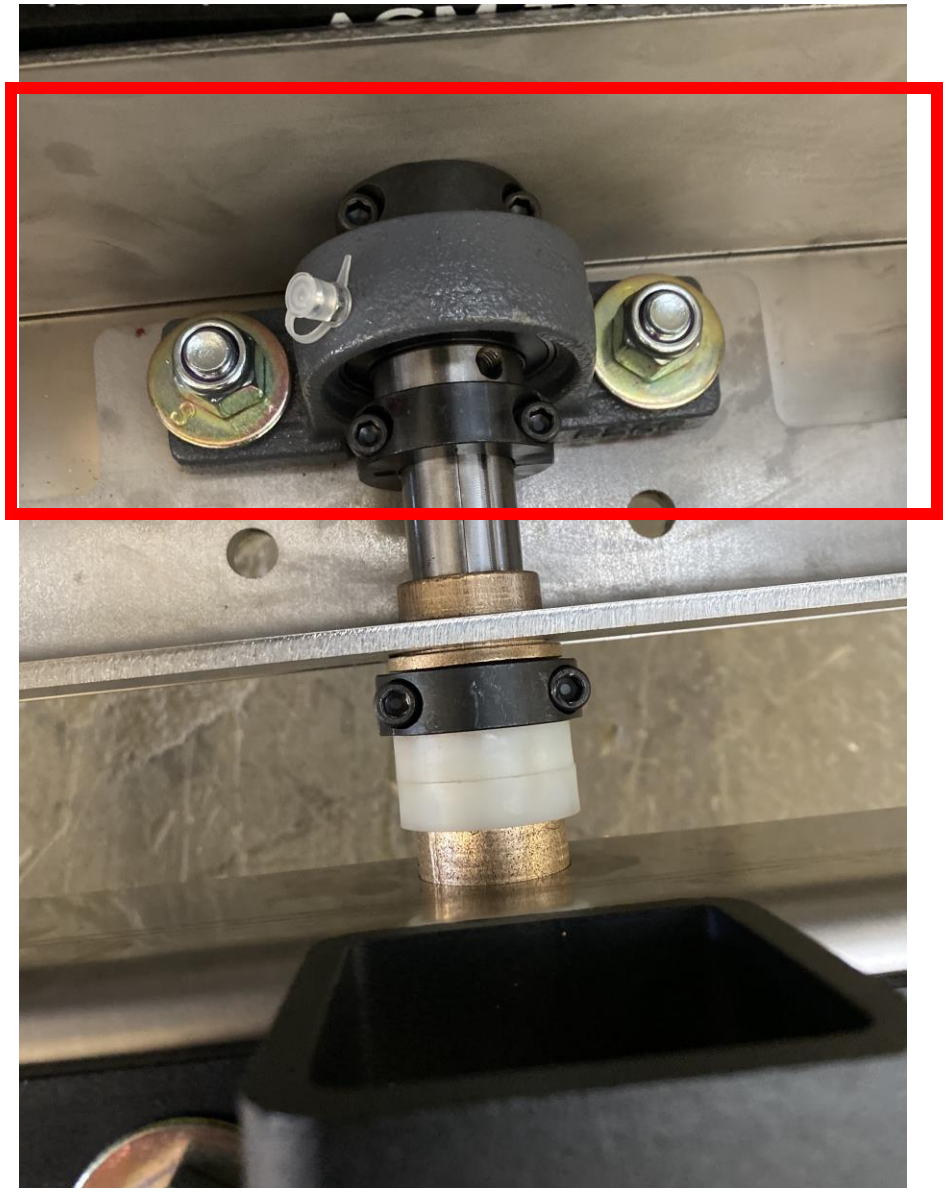
- Use the ¾" sockets to take off the 4 bolts connecting the L bracket to the frame
- Pull the seesaw assembly and L bracket away from the robot and place them on 2 jack stands or blocks such that they are suspended off the ground with the seesaw shaft sticking out horizontally



# Removing Parts

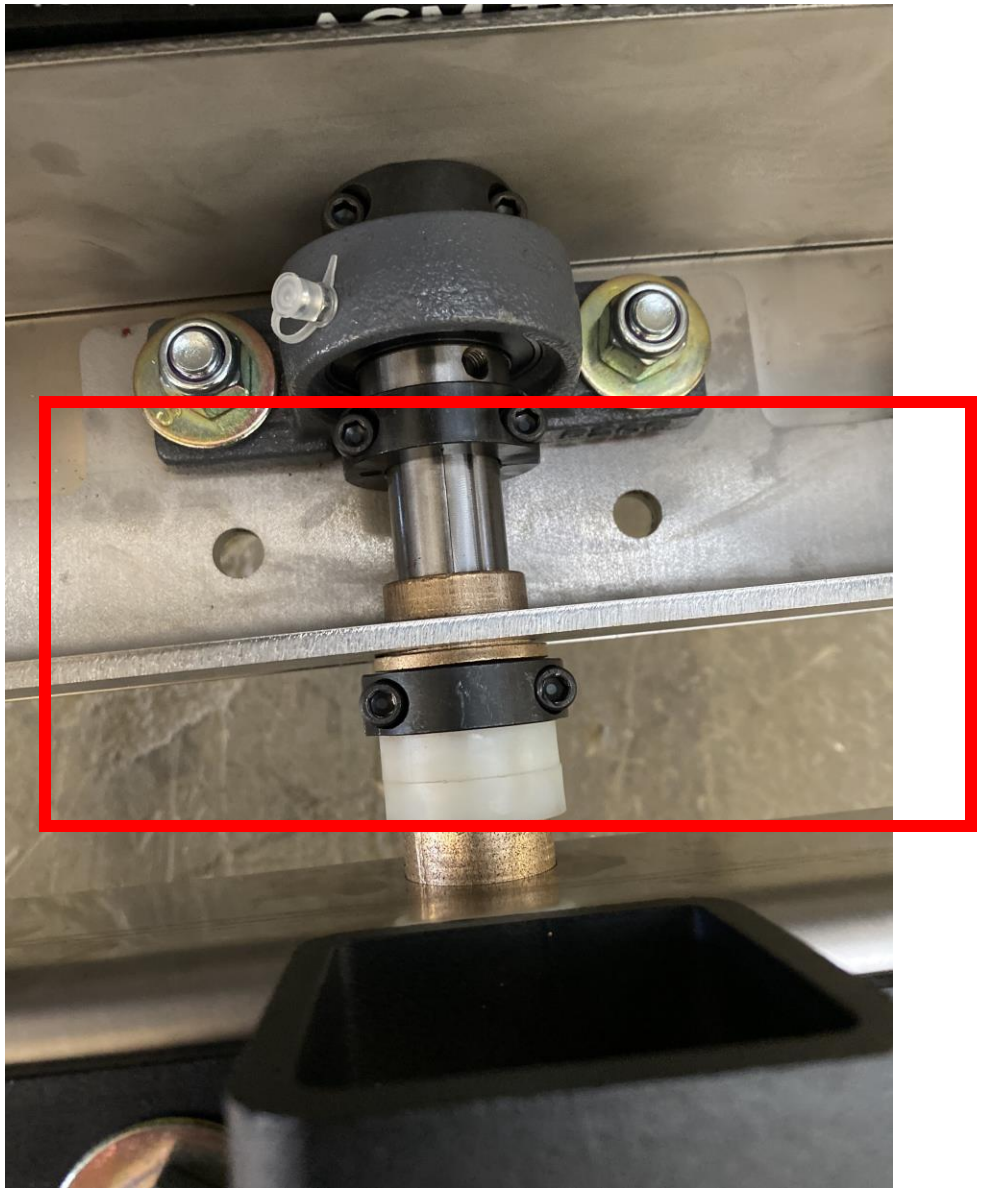
- Remove the two loose 1" shaft collars as well as the bearing from the shaft, in the red box.

- **Every shaft collar that needs to be loosened should remain loose until the end of the assembly.**



# Removing Parts pt 2

- Then remove the bronze flange bearing, L bracket, the 1" shaft collar, and plastic spacers seen in the red box.
- **Every shaft collar that needs to be loosened should remain loose until the end of the assembly.**



# Loosen the new shaft collars.

- **Every shaft collar that needs to be loosened should remain loose until the end of the assembly.**

- Loosen the new 1" and 1-¼" shaft collars.

# Slide everything back on

- **Every shaft collar that needs to be loosened should remain loose until the end of the assembly.**

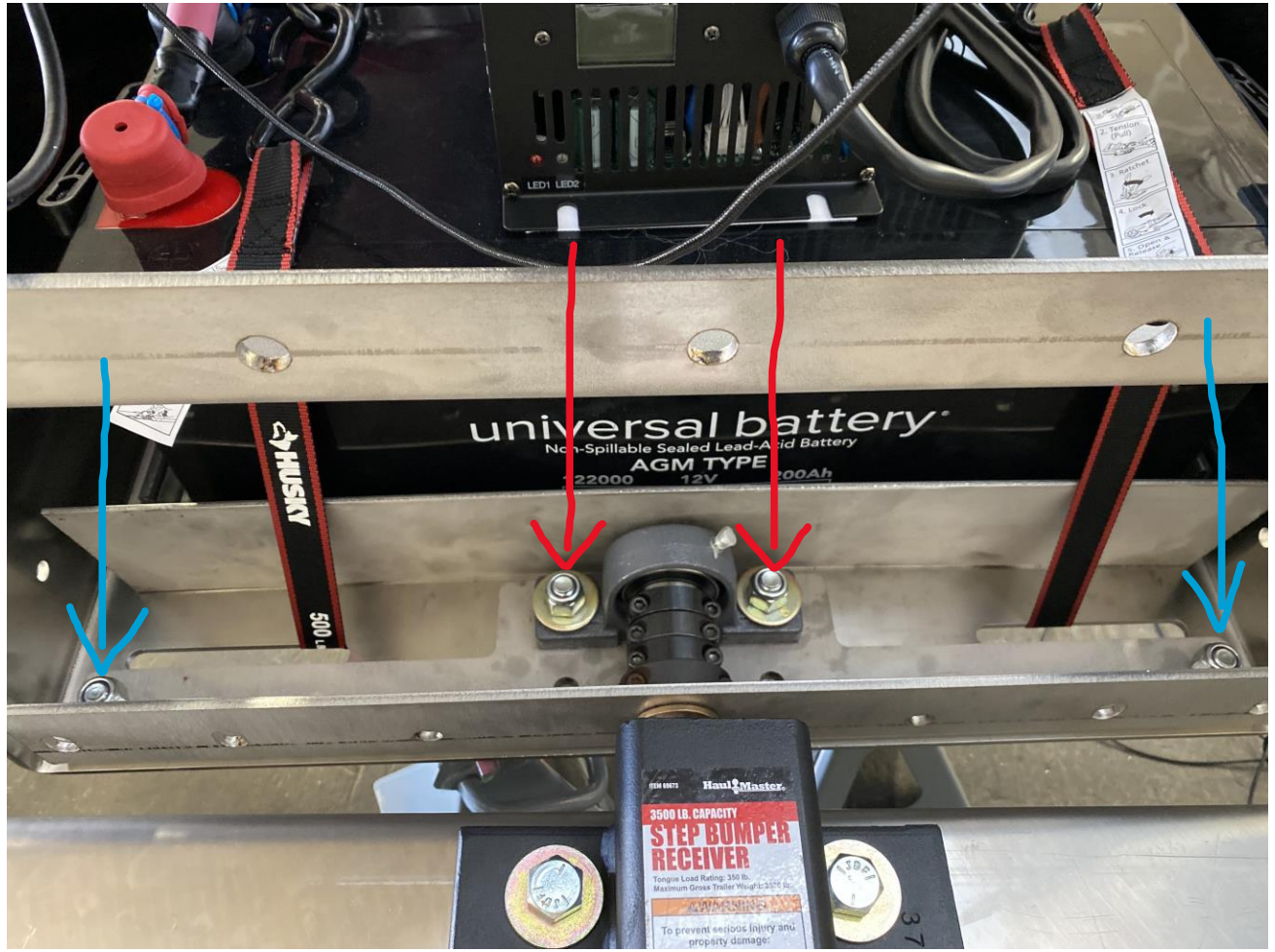
- Slide everything back onto the shaft in the following order: bronze sleeve bearing, 1x 1" shaft collar, bronze sleeve bearing, 1 ¼" shaft collar, 3x 1" shaft collar, pillow block bearing
- It should match the picture here.

# Remounting the Seesaw

- Place the seesaw and L bracket back on the frame
- Insert the long bolts (taken from here) back through the frame, L bracket, and bearing block, facing up, slide a washer onto the bolt and loosely thread it into the locknut
- Insert the short bolts (taken from here) back through the frame and L bracket, facing up, then thread the remaining lock nuts onto the bolts.

# Torquing the Bolts

- Tighten down the short bolts to 57lb-ft using the torque wrench, ratchet, and the ¾ sockets. Or use to rachets and tighten down very tight
- Align the Seesaw bar parallel to the L bracket, then tighten down the long bolts the to 57lb-ft
- (blue first, red second)



# Preparing Shaft Collars and Alignement

- Turn the shaft collars so that the allen key receiver is facing down
- Apply Locktite to all the loose Shaft Collars
- Gently but firmly push the Seesaw assembly intoward the frame

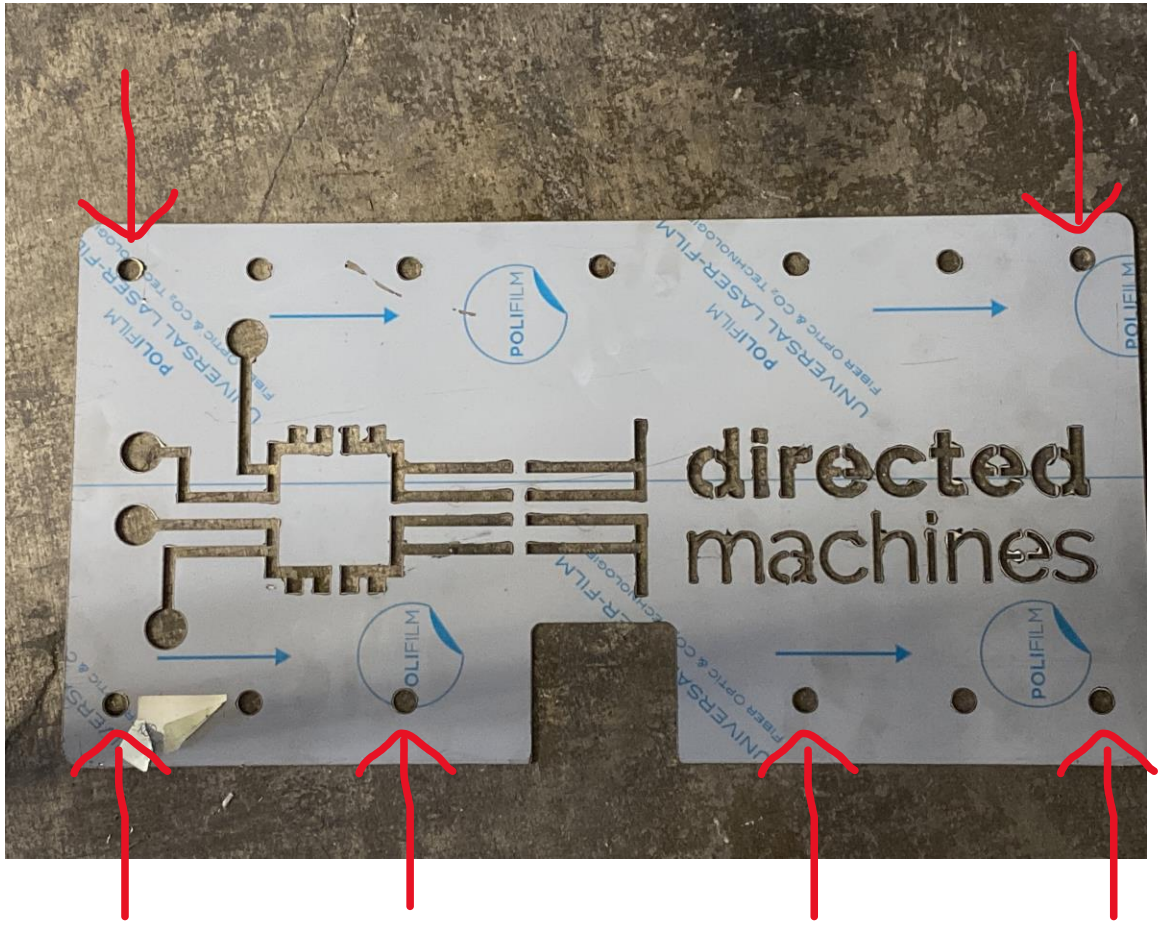
# Torquing the Shaft Collars

- When tightening the shaft collars, always tighten both sides/bolts down evenly, do not tighten one down all the way on one side and then try to tighten the other side
- Press and hold all of the loose shaft collars toward the L bracket while tightening with their bolts facing up (picture on next slide)
- Tighten the 1-¼" shaft collar using an allen key until it is firm. It should be tight but should still be able to turn with some effort
- Tighten the 1" shaftcollars to 15lb-ft, using the 3/16" Allen Wrench bit Hex Key and the torque wrench (or tighten it down with the allen key as hard as you can)

All the shaft collars should have Loctite and be torqued down. They will look like this when complete.

# Add the Directed Machines Logo Plates

- Take out the existing logo plate bolts using the rachet torque wrench, and ¾" sockets
- Stack the new plate as well as the old plate in the same spot where the old plate sat
- Put the new 1-¼" bolts in the indicated holes from the outside of the frame pointing in
- Thread the locknuts onto the bolt and tighten to 57lb-ft




***Note, you will have to swivel the seesaw to reach bottom bolts. It is recommended to wear gloves and long sleeves during this step.**

# Clean up

- Use the car jack to raise the robot above the jack stands
- Remove the jack stands
- Lower the car jack until it is not supporting the robot

# You are Done :)