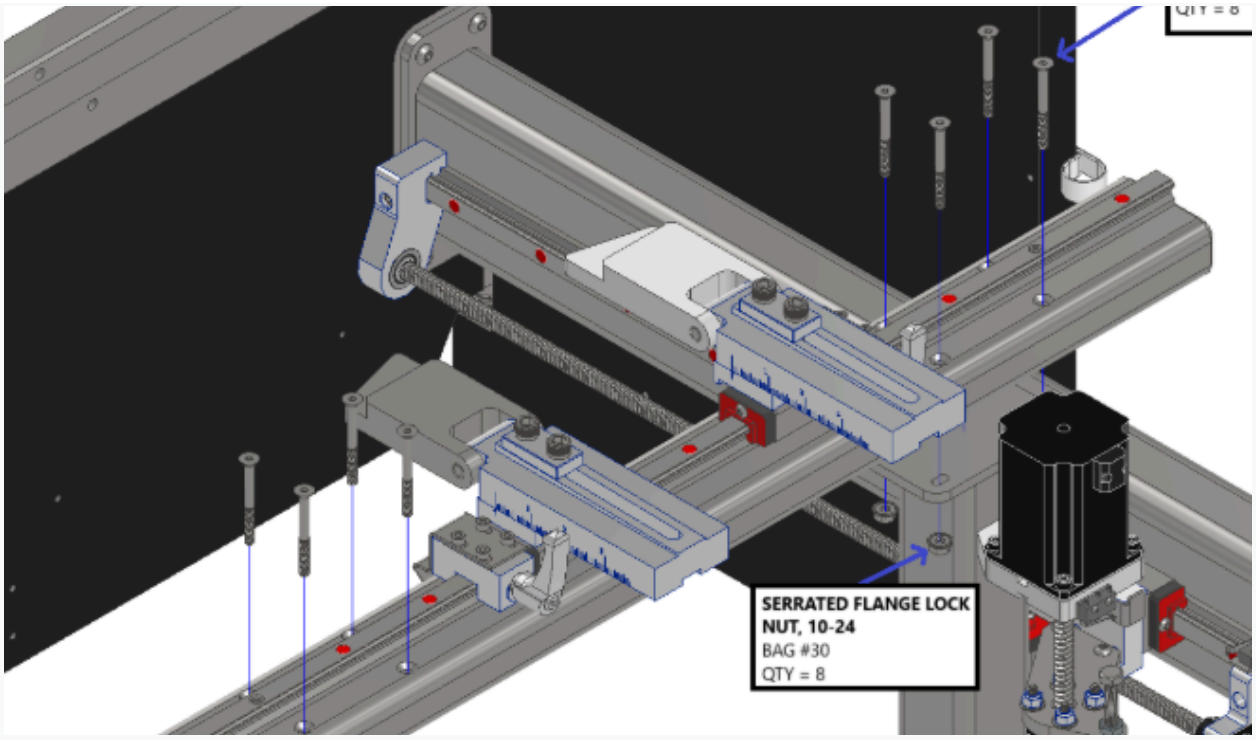
Backgauge Troubleshooting

R-Axis Movement Troubleshooting

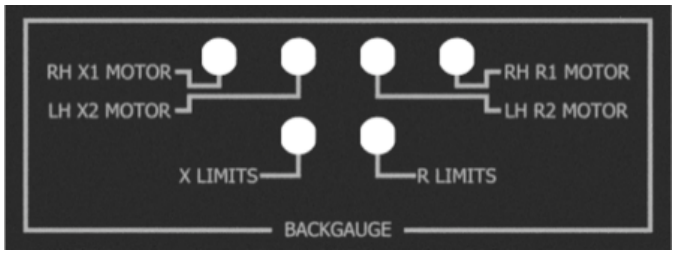
TESTING IF THE ISSUE IS ELECTRICAL OR MECHANICAL

First, run some tests to narrow down the nature of this issue.

1. Realign the backgauge on the X axis so it is in a good position to work with both R-axis assemblies.
2. Completely disconnect the gantry crossbar from the R axis assemblies by removing the attached bolts. You can leave the cross bar resting loose on top.



3. Run the unit up and down and look at the behavior of each R-axis assembly when they are not connected to each other.
4. Unplug the R1 and R2 motor cables in the back of the machine and swap the positions they are plugged into. R1 in the R2 slot and vice versa.

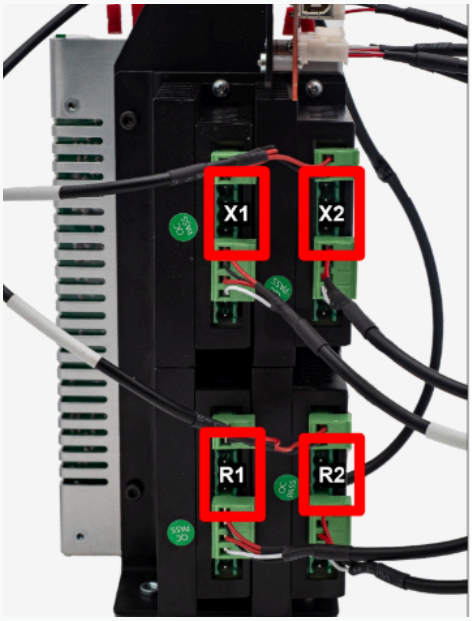


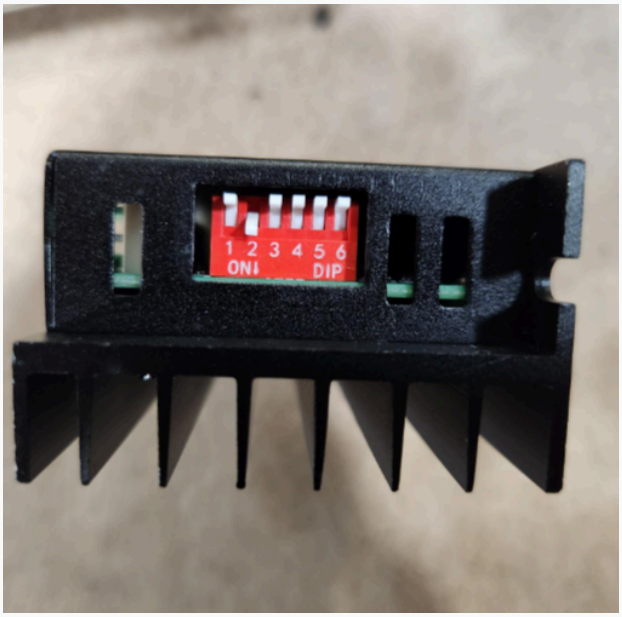
5. Run the R axis up and down and look at the behavior of the motors. If the problem switches sides, proceed with the ELECTRICAL ISSUE FIX on the next page.

ELECTRICAL ISSUE FIX

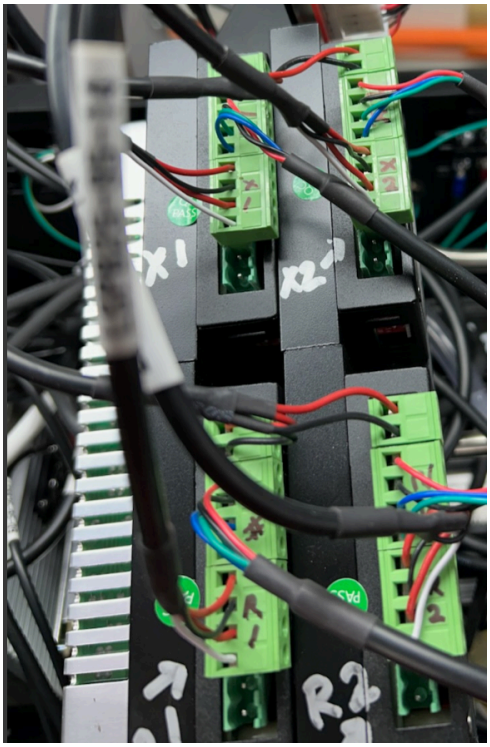
If the problem swapped which motor was failing, then the issue is electrical. There are two things you need to check:

1. That all of the green-tipped cable plugins are firmly inserted into the driver in the backgauge electronics assembly.





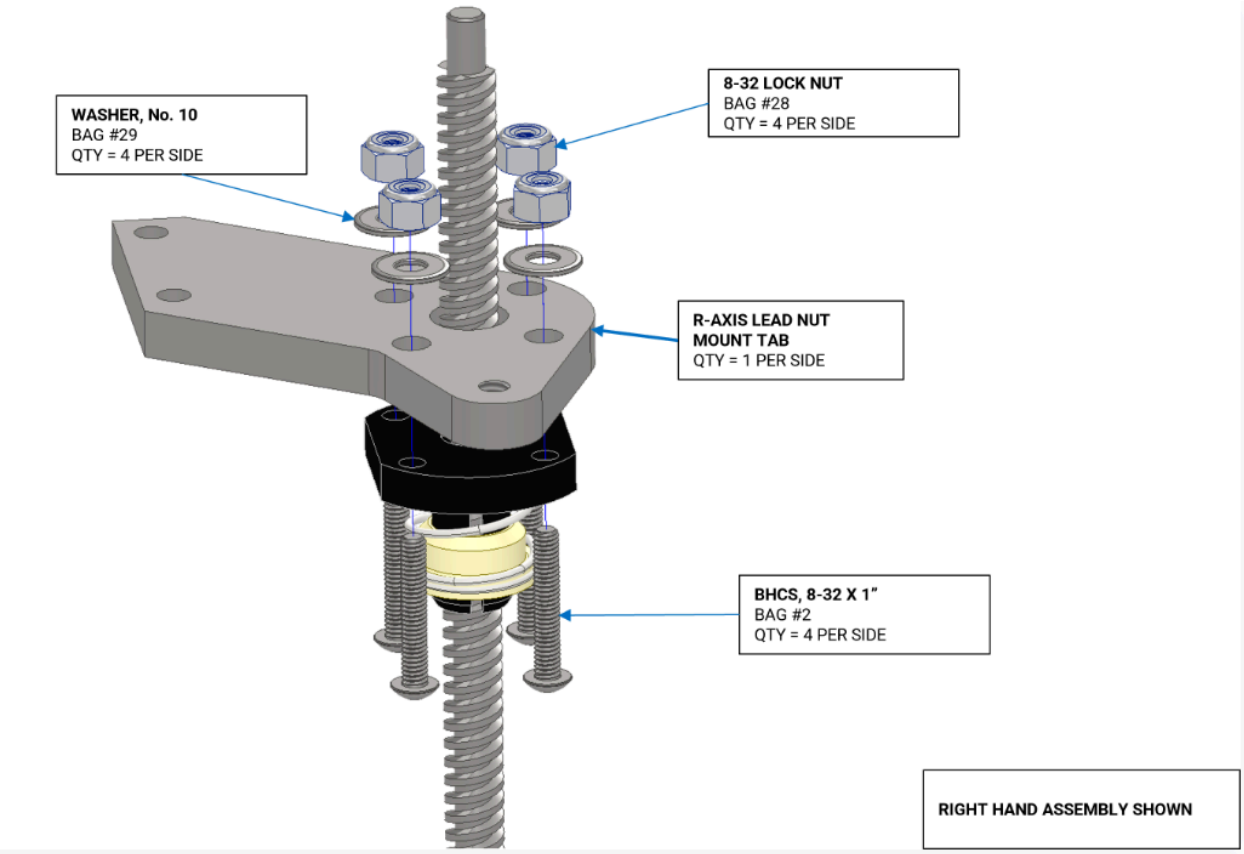
2. On each backgauge driver, check to see if the switches are in the correct position, depicted above.
3. Make sure the wires on the central green plugs are in the correct order. It should be:
   -Red, Black, Green, Blue for the top X axis drivers.
   -Red, Black, Blue, Green for the lower R axis drivers.
4. Make sure each driver connects to the appropriate motor port.



MECHANICAL ISSUE: TUNEUP FIXES

If you found that the issue was mechanical, there are a few things you could do to improve the functionality of your backgauge and prevent binding. You may want to undertake these efforts even if the issue was electrical in the first place.

1. Tighten the motor couplers. Motor slippage along the couplers is the most common failure mode.
2. Lead screw nylon lock-nut is too tight. The nut needs to be tight enough there is no air gap between the lead screw and the bearing, but not so tight that you cannot move the lead screw by hand.
3. The 4 bolts on each lead nut of the r-axis lead screw. These should remain loose enough to move the washer with some force, but not so loose that there is an air gap where the washer can rattle around.



4. If you are still seeing binding on the X axis direction, you can slightly loosen the 4 bolts holding the X-axis lead screw nut to the cross bracket assembly - not so tight that there is an air gap. This may help prevent binding in the x-axis direction.
5. Grease the lead screw.

6. Loosen and tighten bolts to ensure the alignment is not causing binding in any areas. If something is straining, then loosening the bolt holding it in place will let it slide to a better alignment, where you can then tighten it again. The best places to loosen/retighten the bolts in order:
    1. The 8 bolts that hold the x-axis tubes to the ram. In chapter 6 of the assembly guide, you need to loosen them, attach the gantry, bring the gantry to the back of the machine to get a full square, then tighten those 8 bolts.
    2. The R axis motor mount/bearing mount bolts.
    3. The 8 bolts that attach the gantry to the r-axis.

Homing Process Troubleshooting

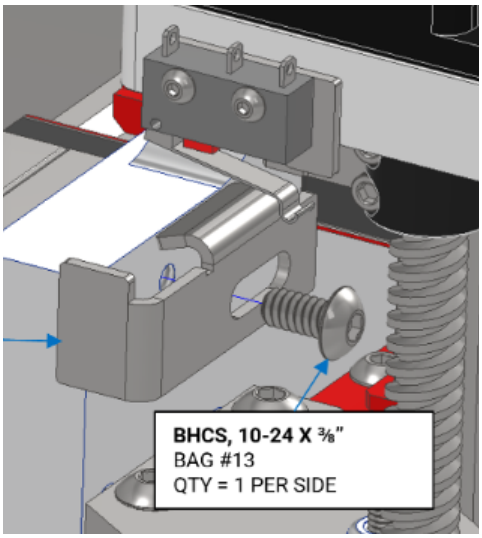
The homing process involves:

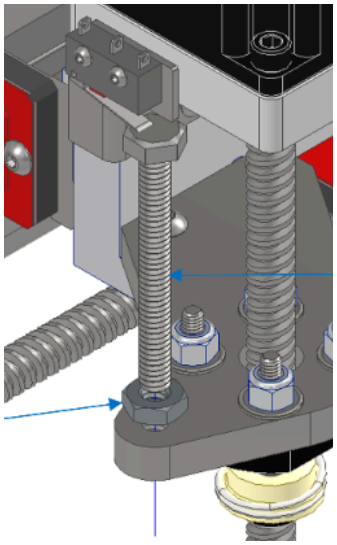
1. Both motors in the X axis activate to push the gantry away from the user until one side hits a limit switch.
2. That limit switch's motor stops while the other side keeps running until the limit switch is hit.
3. Once both limit switches are hit, the machine should be back in alignment. It pulls back to disengage the limit switches.
4. It moves forwards once again to trigger both limit switches. This time it only stops once both limit switches have been triggered.
5. It finally pulls back and ends the homing process for that axis.

If your machine is ramming, then there are a few possibilities. To figure out what is failing, follow the following steps:

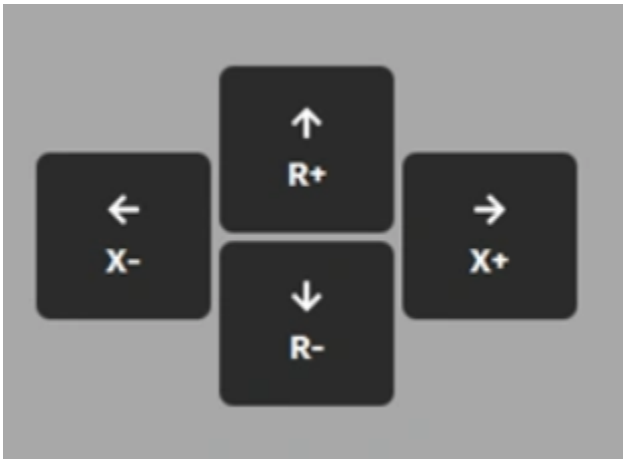
1. Run the machine slowly to the back of the machine or downwards until a limit switch is triggered. Check the icon lights on the lower left of the backgauge control screen to see which limit switch was triggered.

   a. If the wrong axis is triggered (ie. you are moving the vertical R axis and you trigger the X axis limit switch), then your limit switch cables are mixed up.
   b. If the bearings ram into the motor mounts instead of triggering either limit switch, then the limit switch triggers are not extended. You need to extend the limit switch trigger tabs to fix this.





2. Keep pushing the backgauge down/back further towards the other limit switch you have not triggered slowly until it triggers. Verify the limit switches are both reading as triggered in the readout on the bendcontrol screen.
    a. If the machine bottoms out, you need to extend the limit switch trigger tab to fix this so both limit switches can trigger.
3. Make sure the backgauge is moving in the correct direction. R+ should make the machine go up. R- should make the machine go down. X- should make the machine go towards the operator. X+ should make the machine go away from the operator. If this is not the case, fix that by making sure the backgauge wiring is correct in the ELECTRICAL ISSUE FIX section of this troubleshooting guide.



4. Home the machine again after making sure items 1-3 in the above list are correct. If the machine still rams the hardstop instead of stopping at the limit switch, then it is likely that the limit switch is stopping the wrong motor. To fix this, swap the motor wires where they are plugged into the back of the machine. Ie- swap R1 with R2 or X1 with X2.

SUMMARY OF LIKELY FAILURE MODES:

1. The motor wires are swapped then the limit switch will stop the wrong motor in step 1. Swapping the motor wires fixes this. **This is the most common failure mode.**
2. If the limit switch triggers are not extended, then the bearings will ram into the motor mounts instead of triggering either limit switch during step 1. Extending the limit switch triggers fixes this.
3. You have your R axis and X axis motors mixed up entirely. The R axis should be moving the backgauge up and down. The X axis moves the unit towards you and away from you.
4. The Limit switch cables are mixed up. You can test this by triggering a limit switch and watching which icon lights up in the limit switch status report bar (shown below).

Using the Backgauge

Initial Squaring

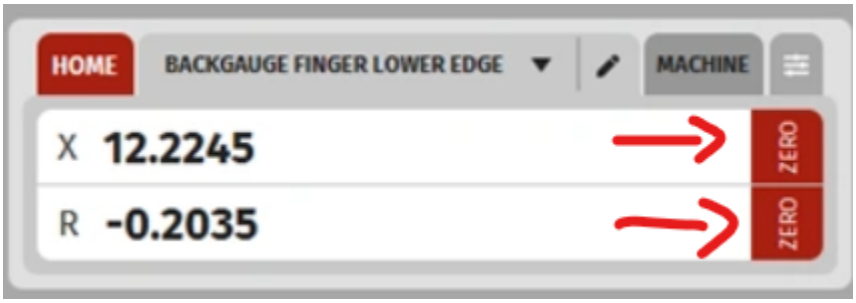
Once you have your backgauge homing and jogging correctly, you will want to square it.

1. Square the machine with the front again by moving one finger to touch off on the die, unplugging the other motor, and manually moving the other finger so it touches off and aligns as well.
2. Move the machine to the back, near the limit switches.
3. Slowly move the backgauge back until one X axis limit switch triggers, then slowly downwards until one R axis limit switch triggers.
4. Adjust the X axis limit switch trigger brackets and the R axis limit switch trigger screws until the limit switches that have not clicked yet, do.
5. Re-home the machine.

Calibration

Once you have your backgauge squared up, you will want to calibrate a centerline.

1. Home the machine.
2. Jog the backgauge to a reference line using one of two methods:
    a. Eyeball the centerline of the die you are using, and bring the fingers just above the die and on the centerline. Then hit Zero on the coordinate positions to mark that point as the origin point for your reference frame.
    b. Touch off the finger tips on the die, then type into the X axis coordinate half the value of the die's width. (ex, 1.181" for the 4-way die), and then jog the machine upwards to your desired basline vertical position and hit Zero on the coordinate position.



Usage

Once you have calibrated a reference frame for your backgauge, you can use that reference frame in a BEND program using the ‘Add Backgauge Move’ function on the Create Bend Tab. The function has 4 inputs:

1. Which reference frame you are using. (Make sure you select the reference frame with the same name as the one you calibrated).
2. The X position from the reference frame centerline you calibrated.
3. The R position from the reference frame centerline you calibrated.
4. The Jog speed.