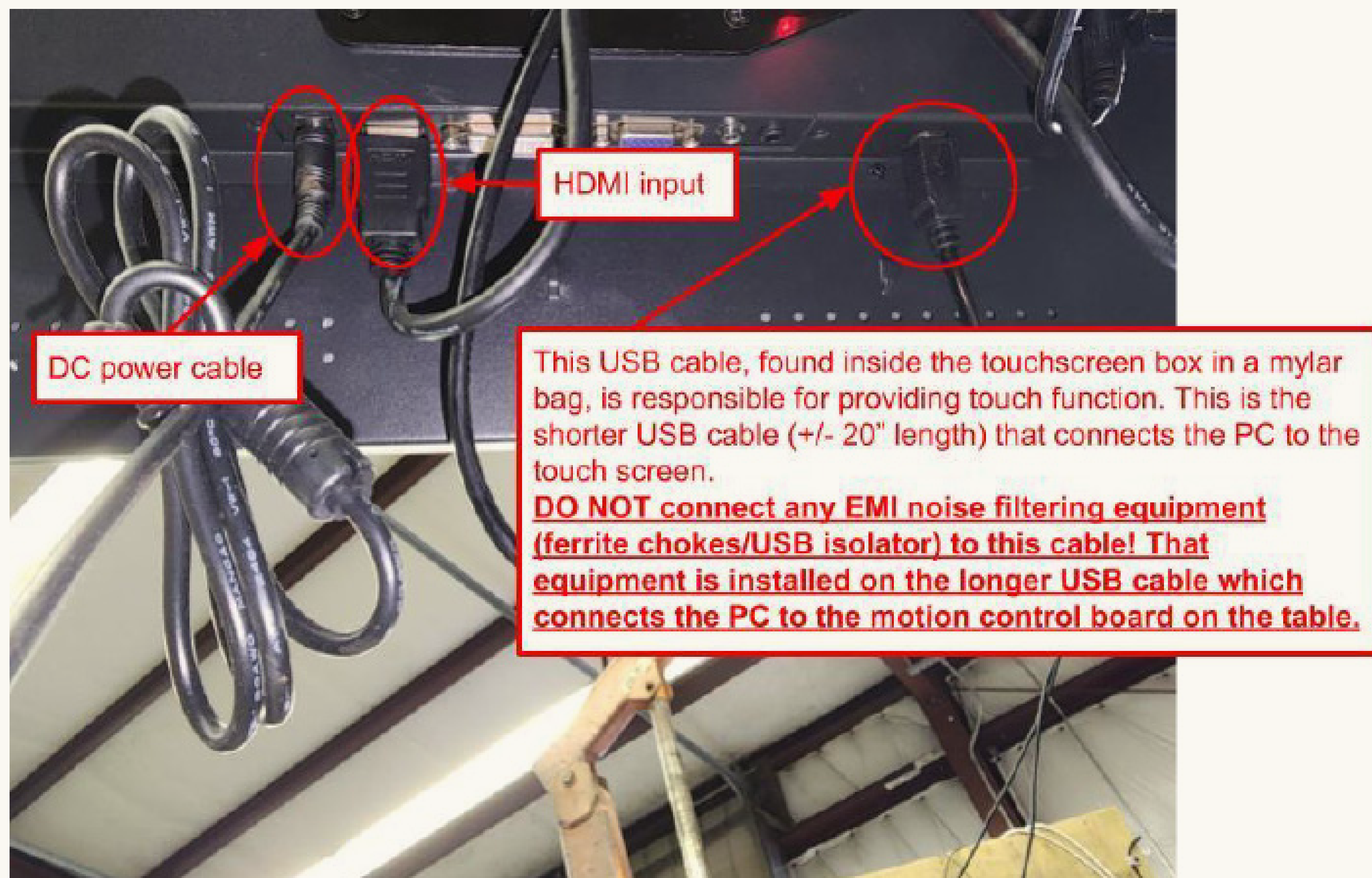




## **TOUCH FUNCTION UNRESPONSIVE**

It is likely the short USB cable has not been connected to the touch screen. There should be 3 cables inserted at the bottom of the touch screen: 1. **Power** 2. **HDMI** 3. **12" USB** cable that came inside the white box with the touch screen. Please confirm all 3 cables are connected at the bottom of the touchscreen. If the issue persists, try a different USB slot on the MC4000 then call support between 715-130CST @9362353991.



## **NO SUPPORT FOR OPEN GL. 3.0/NO VISUALIZER DISPLAY/GRAPHICS DRIVER ISSUE**

Click this link to be taken to the Intel graphics driver download page.

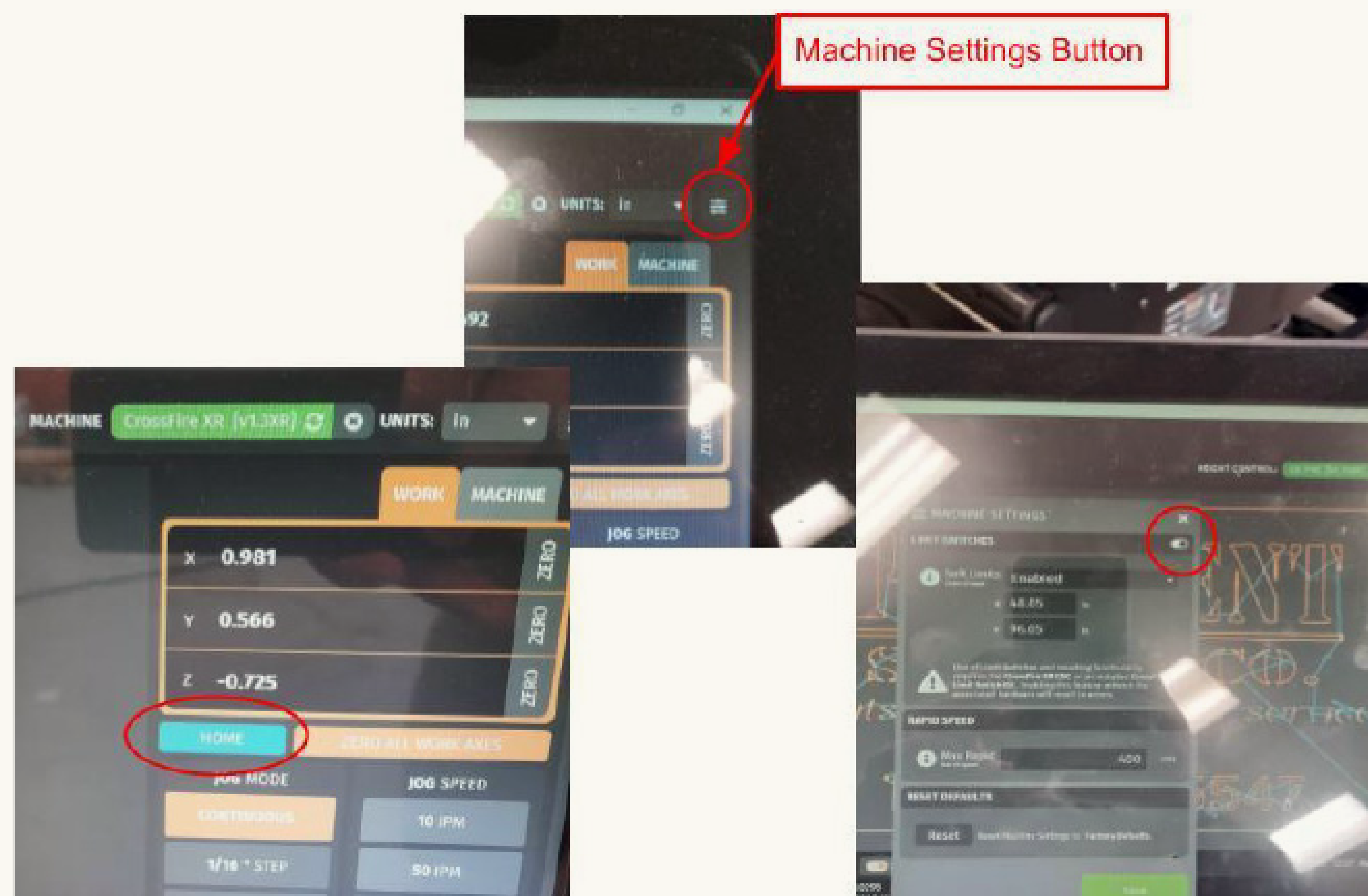
<https://www.intel.com/content/www/us/en/download/19344/30579/intel-graphics-windows-dch-drivers.html>

Download the .exe (recommended) program. Once downloaded, open the file explorer (yellow folder icon at bottom of screen) and click the downloads folder on the left-hand side of that menu to locate the install wizard (igfx\_win...). Open the file and allow permission for the installer to make changes. Then wait **AT LEAST** 60s for the install wizard to load. It is a large program and may take several moments to load. The install wizard will appear next. Simply follow the steps to run the installer. At the end, perform the optional reboot to restart your PC and complete the process. You will now see the perimeter of your table outlined in red and have a visual display of all parts loaded into FireControl.

## **HOME BUTTON MISSING/CUTTING ENVELOPE NOT DISPLAYED IN VISUALIZER**

This situation occurs if the limit switches are inadvertently turned off or disabled or simply forgotten to be turned back on. To resolve this issue, open the machine settings menu by clicking the button in the upper right-hand corner of the FC screen, just to the right of the units display.

At the very top of that menu, simply toggle on the limit switches and hit save. Then open the menu once more and enable the soft limits from the dropdown menu just below the limit switch toggle button. Then hit save. You cannot complete both of these processes at once because the limits first have to be turned on and then saved, as the soft limits are a dependent condition of the limit switches being active. That will solve your issue immediately and you will be able to home your table.



### \*\*\*SOFT LIMITS EXPLAINED

Soft limits are implemented into FireControl to prevent the carriage and gantry from crashing against the table frame where there are no mechanical limit switches installed (on the negative sides of either axis; -X, -Y). This system works by tracking the reported position of the gantry using the **MACHINE COORDINATES** (**absolute/global**) within the cutting envelope after the machine has been **successfully homed** and localized. The soft limits will restrict travel beyond the preset distances, which can be found and/or adjusted in the “**Machine Settings**” menu inside FireControl. Adjusting the soft limits beyond the physical travel limits will effectively disable them and will allow overtravel and potential crashes. Additionally, disabling the soft limits will remove the cutting envelope display (Red rectangle) from the graphic visualizer. However, programs loaded will still be displayed but without boundary limit warnings. Binding, crashing, motion loss, or loss of power to the table will result in inaccuracies in the reported position displayed in the DRO. This may incorrectly restrict motion and cause the gantry to crash. If any of the aforementioned scenarios occur, immediately home your machine to reset the **MACHINE COORDINATES**. Be sure to periodically compare the physical position of the torch to the reported position in the visual display and DRO **MACHINE COORDINATES** for accuracy.

### **RESTRICTED MOTION**

The first thing to ascertain when encountering issues with motion is to determine whether the problem is associated with tension and alignment, slipping somewhere along the drive train, or simply a restriction implemented by the FireControl software because your system needs to

localize by homing. Here are a few simple checks you can perform to help expedite the troubleshooting process.

### **MACHINE TRAVEL LIMIT REACHED**

This is a function implemented by the **soft limits** feature in FireControl. It serves to protect against collisions resulting from overtravel in the X & Y axes. Another helpful function is it provides a real-time display of the torch position in space on the table. The reported position of the torch is given in global, or machine coordinates. This feature will also alert the user if a loaded program extends beyond the travel limits. Because this system utilizes the global (machine) reported coordinates to localize, for it to function properly the table must be homed initially to establish its initial position or if its position is ever lost or impeded due to binding/slipping.

### **IDENTIFYING ISSUES PERTAINING TO BINDING**

If the system **will jog at any speed 200IPM or under**, we know that the issue is related to **tension or misalignment** of some kind. Proceed to the appropriate section of this guide for how to resolve this issue.

If the system will not operate at any speed, the issue is most likely the result of slipping along the drive train system. Check the hex nuts securing both pulleys, the belt tension (too tight is worse than too loose), and the set screws securing the motor shaft coupler.

### **BALL SCREW TENSION X & Y**

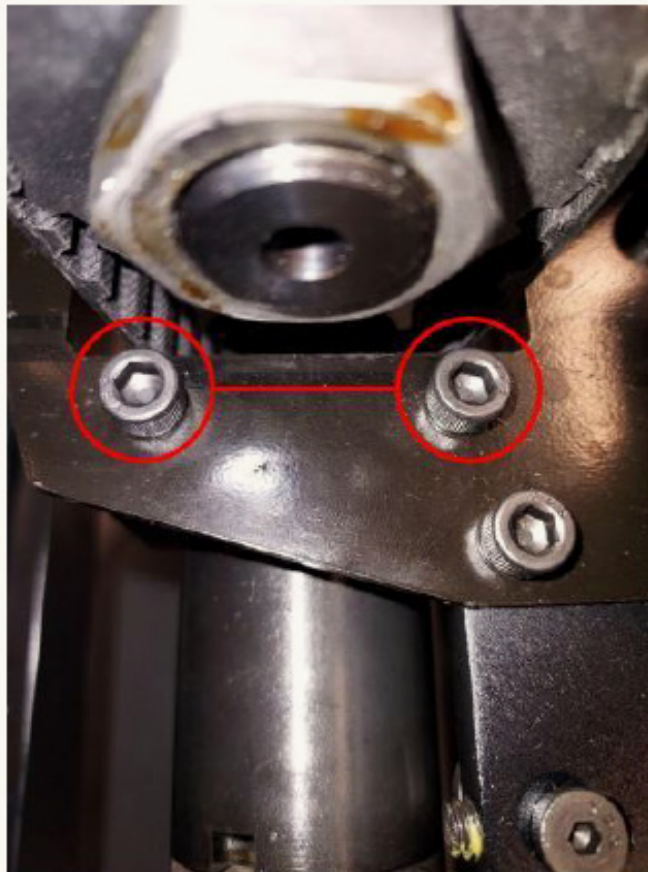
Another common issue is improperly tensioned ballscrews. To perform this simple check, grab a 3/16" hex key and position yourself at the tensioning end of the respective ball screw you are working on. All tensioning must be done from the positive ends of either axis (+Y, home position, +X, Y2 side) Make sure the gantry/carriage is positioned at least 6" from where you are working to allow for adequate clearance. Insert the hex key into the 1" cap screw securing the ball screw with one hand and grasp the ball screw firmly with the other. Tension the screw a half turn. The ball screw in your hand should be getting tighter. If it is spinning in your hand there is an issue. Rotation means that the tensioning cap screw has bottomed out and can no longer add any tension to the system. **Under these conditions you can expect there to be binding while jogging above 200IPM.** To remedy this, an additional 1" washer is used to take up enough space so that the threaded cap screw can pull the ball screw tighter.



To do this, loosen the large hex nut securing the rod end bearing mount, then remove the 1" tensioning cap screw. Remove the rod end bearing mount and double up the 1" washer on the outside face. Then carefully reassemble the system and tension and align according to the assembly guide specifications. <https://youtu.be/rcFi07eejpo>

## **X - AXIS BINDING**

This condition isn't generally the result of issues with the assembly process. In most instances there is minor misalignment in the X-axis ballnut hub that can be resolved very simply. Start by jogging your X/Z carriage to the Y2 side of the table at whatever speed can be managed so it can be easily reached and worked on. Locate the 2 cap screws securing the ballnut hub below.



The screws are located directly underneath the X-motor pulley where the belt goes through the mount. Using a 3/16" allen key, crack and leave both cap screws 1 full turn loose. Next, jog the carriage towards the Y1 side 18-24". Set your jog speed back to 400IPM and function test the motion. If the issue is resolved simply hand tighten the cap screws. The hub will be secured by the tension in the ballscrew as well so there is no risk of it coming loose. If the problem persists proceed to the following step.

# ALIGNMENT

## *Check #1 Ballnut resistance inspection*

Alignment issues will only be present near the ends of either axis. If you **encounter binding outside of 12" from the travel limits** on either axis alignment is not the issue.. Make sure the gantry is located on the side that needs alignment. Please see the alignment video for clarification. <https://youtu.be/rcFi07eejpo> After homing your machine to ensure the gantry is properly squared to the frame, disconnect from FC by clicking here,



then power off the enclosure. Making sure to disconnect before powering off will prevent the computer from rebooting. From the home position, jog in the negative Y-direction approximately 2-3" to allow adequate space to inspect. If there are no issues jogging on the X-axis use this system as your reference. With 2 fingers gently rotate the ballnut and observe the smoothness with which it spins. This is what the other axes should feel like. Inspect the remaining 2 ball nuts for any resistance in the system. If any is present make sure that your felt washers are not overly compressed and causing friction in the system. If the felts look good and resistance is present there is likely an alignment issue. Simply break loose the hex nut securing the rod end bearing mount and release the tension in the screw. Doing so will allow the system to realign the ball screw. Then simply re-tension and secure the hex nut.

## HOMING FAILURE

*If the gantry fails to home properly one of these scenarios is likely occurring:*

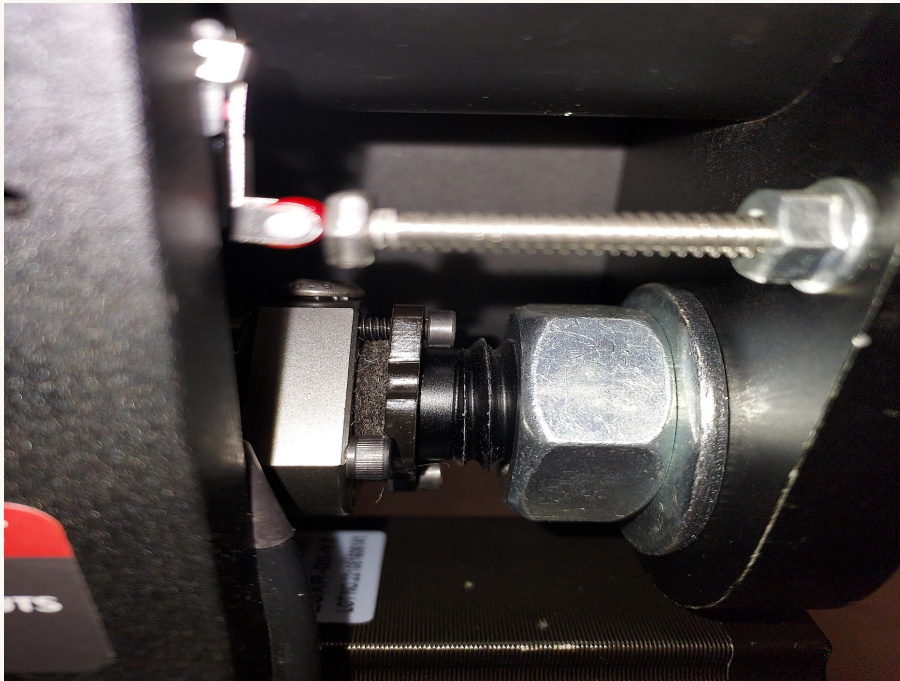
### **1. X is failing to trigger**

Make sure that the carriage isn't hitting the hardstop prior to engaging the limit switch. If this is occurring use a pair of pliers to bend the bracket out an  $\frac{1}{8}$ " to allow adequate space for it to trigger.

### **2. Improper limit switch stop position**

The most likely scenario is that the limit switches are simply not set properly. To ensure that they are, jog the gantry to within a few inches of the home position, then power off the enclosure. Using a  $\frac{3}{8}$ " open-ended wrench, loosen the jam nut securing the limit switch stop and back it out

approximately half an inch (away from engaging the limit switch). Then position yourself in the center of the gantry at the rear of the machine and pull evenly across the beam until both ballnuts on the Y-axis are seated against the black aluminum rod end bearing mounts as shown.



Confirm both sides are contacting to ensure the gantry is square to the frame. Next, extend the limit switch stops towards the limit switch. Continue extending until the switch clicks, then continue extending just slightly further until there is approximately 1/32" between the metal arm of the switch and the plastic body of the switch. This will ensure that the limit switch will engage fully before reaching its travel limit while also guaranteeing that there can never be overtravel which could result in the damaging of the switch. Rehome the machine. If trouble persists, continue on.

### **3. Transposition of X & Y2 limit switches**

Once you have confirmed that your stops are set properly, check to make certain that the limit switches are installed in the correct positions. The Y1 switch is too short in length to be installed incorrectly. However, the X and Y2 are similar enough in length that they can be transposed if not scrutinized meticulously. The X limit switch **MUST** be installed on top of the gantry tube per the assembly manual instructions. To check the position, make sure the gantry is clear of all the limit switches so that the status lights on the torch guard cover are green. Jog the Z carriage over to the left stopping approximately an inch or so from the limit switch. Then set the jog speed to 10 IPM to avoid any potential damage to the switch and slowly jog the carriage over until the X-limit switch is triggered and the lights turn red. In FC, along the bottom of the screen locate the machine alarms. Since we have triggered the switch in the X-position the corresponding alarm should be registered in FC and the "X" should be illuminated red.

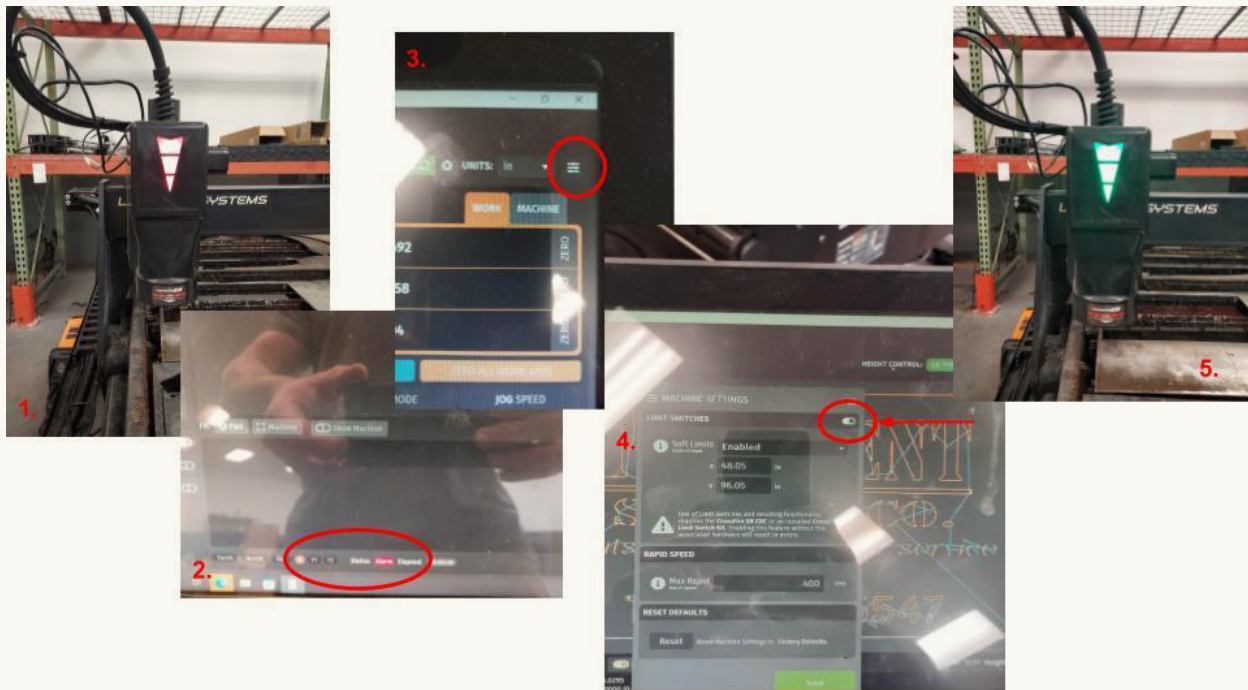
### **4. Transposition of Y1 & Y2 motor cables**

If after completing the first 2 checks you are still experiencing issues with homing there is one final potential cause for this issue. In very rare instances the Y1 and Y2 motor cables can be transposed and wired to the incorrect drivers. It is also possible that the cables may have been

mislabeled during assembly or simply plugged into the wrong port on the enclosure. Perform a simple check by removing the Y2 motor cable from the enclosure and setting your jog speed to 10IPM in FC. Grab your wireless jog pendant and go position yourself near the Y1 upright so that you can see the ballnut on that side. With the Y2 motor cable removed, while jogging in the Y-axis, only the Y1 motor should be turning and rotating the corresponding ballnut. If you do not see the Y1 ballnut rotate then your cables are reversed and need to be swapped.

## **HARD LIMIT TRIGGERED**

In the event a hard limit is triggered and the gantry is locked out and immobilized there is a simple solution that does not require it to be moved off the limit switch manually. Simply open up the machine settings menu, toggle off the limits temporarily and hit save. Clear the machine from the limit switch by jogging either in the +X or -Y direction. If you're uncertain about which switch has been triggered you can see which alarm has been thrown at the bottom of the screen in FireControl. The triggered switch will be illuminated red in the alarm section at the bottom of the screen.



Once the alarm has been cleared reopen the menu and toggle the limits back on and save. You will notice by default your soft limits are disabled when you turn off the limits. With them disabled your table display will be removed from the visualizer. Soft limits provide a visual display of your position on your table and are helpful when loading a program. They will also prevent your torch from attempting to move outside the travel limits. You will want to re-enable them in the same menu by clicking "enable" from the drop down menu. **You cannot toggle on the limits and re-enable soft limits at the same time. The limits must be toggled on and saved before the soft limits can be enabled.** It is wise to rehome your machine after performing this procedure to ensure global positional accuracy (Machine Coordinates).



## **SMARTV AND NOMINAL VOLTAGE EXPLAINED**

Generally speaking, nominal voltage is best suited for thin materials that tend to spring back/deflect when depressed. **SMARTV** and the **IHS** (initial height sensor) work in conjunction to establish your pierce and cut heights. The **IHS** localizes and sets Z-zero when the torch makes contact with the material. The lead nut with the lower **IHS** contact on the Z-axis lead screw continues to travel downward while the torch and top **IHS** contact are suspended by the material. When this happens the 2 contacts separate and the connection between them is lost, thus establishing the material height, or Z-zero. From there, the torch retracts the pierce height written into the GCode. The torch is then commanded to fire for the duration mandated by the program (pierce delay). After the arc is transferred and a voltage is detected (**Arc OK** alarm) the torch moves to the programmed cut height. At this point the program feed has begun and the **SMARTV** system has become activated (**H1 command**) and will record 50 voltage measurements across the first 1/4" of travel and average them to establish and set the **nominal voltage** for that segment of the cut. This process will repeat at every pierce point in the program and the nominal voltage may vary slightly from position to position depending upon the relative flatness of the material across the recordings. Therefore **SMARTV** may not be the best choice for materials with very uneven surfaces or that are dramatically warped. Setting the **nominal voltage** in the **THC** settings will override any preprogrammed cut height as the **THC** will adjust the height accordingly to stay within the threshold at the preset voltage. For a short video on how to find and set the **nominal voltage** click the following link.

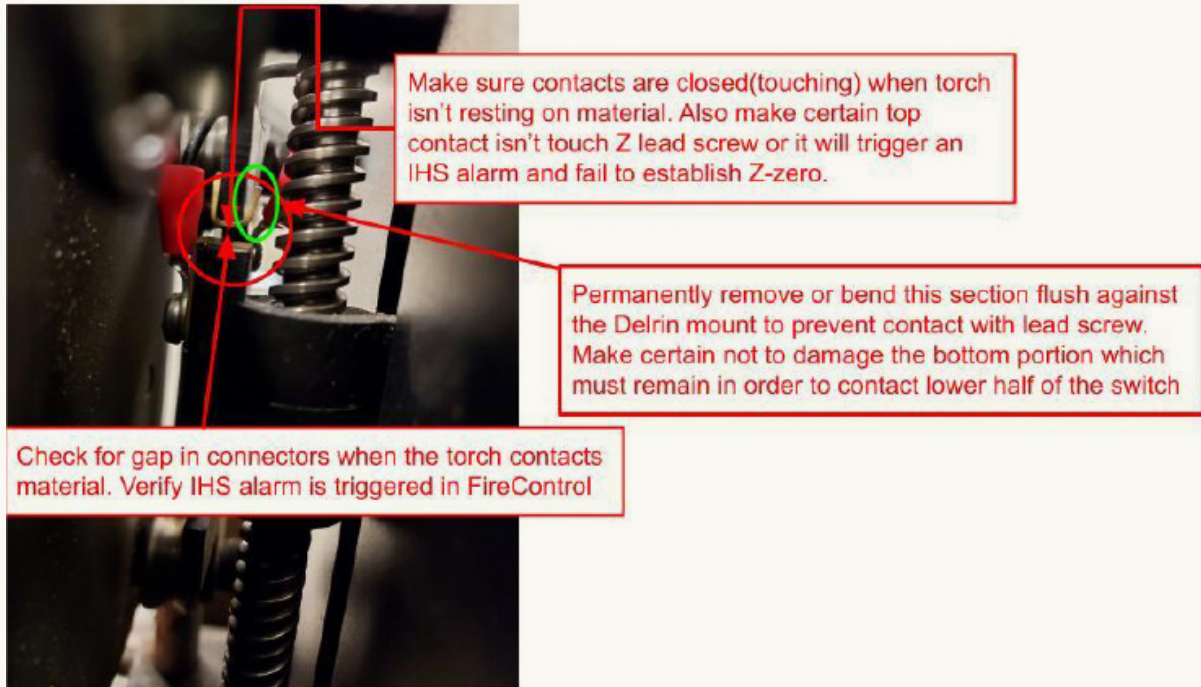
[https://drive.google.com/file/d/1JMIpp1XzgwBNllubR5YJR3N\\_dpglPQ3k/view?usp=sharing](https://drive.google.com/file/d/1JMIpp1XzgwBNllubR5YJR3N_dpglPQ3k/view?usp=sharing)

\*\*\*Please remember that the **nominal voltage** will be different at different materials and/or gauges/thicknesses and will need to be reestablished.

## **IHS FAIL(Non-Zero resting THC voltage/ Failure to establish Z-Zero/ Torch not contacting material)**

If FireControl is unable to establish Z-zero due to an IHS fail it is likely that the IHS switch has been compromised and needs corrective action. This can happen if the Z axis is accidentally maxed out in the +Z direction. When this occurs the upper IHS contact can snag between the motor shaft coupler that connects the Z lead screw and is often bent towards the lead screw. If the switch makes contact with the screw it will ground and register in FC as an open circuit preventing FireControl from establishing Z-zero. It can also cause the THC to read a non-zero voltage while at rest or trigger a misfire warning alarm in FC due to a perceived voltage spike. Because of how voltage is interpreted by FireControl, even a minute extraneous voltage input from the 5V switch leaching into the frame will cause a massive spike.

To permanently correct this, use tin snips or a sharp pair of metal-cutting scissors to nip off the tab that is bent towards the screw. Make certain not to damage the bottom portion of the brass tab which needs to make contact with the lower half of the switch in order to function. If you are unable to remove the tab, you can use two flat-blade screwdrivers to bend the tab back flush against the black Delrin mount it is attached to, parallel with the torch slide and away from the lead screw.



## **NONZERO LIVE VOLTAGE READING WHILE PLASMA IS IDLE/VOLTAGE SPIKING TRIGGERING MISFIRE/ARC VOLTAGE LOST ERROR**

Although uncommon, it can occur that voltage leeches into the frame of the XR from one of the auxiliary electrical systems via grounding and is picked up by the THC. Because of the way the THC voltage is interpreted by the software, even small electrical currents will be detected and translated as artificially inflated voltage readings. The most common source of this is the IHS switch. For detailed information on how that phenomenon occurs please reference the section above titled "IHS Fail". To determine which system is malfunctioning simply disconnect the cables from the following systems one by one until the LIVE Voltage returns to zero while at rest. The systems are listed in order of likelihood and should be checked in this order.

IHS cable

- **Solution**-Check switch for grounding against the Z-axis lead screw and correct as outlined in above section. Then check for loose or damaged wires and check blade connectors to the IHS wiring harness

Limit switch cable

- **Solution**- If possible, identify the faulty switch by individually holding close each switch and checking LIVE Voltage (**obviously the cable must be reconnected during this process**). If the faulty switch can be identified, remove and replace it. If it cannot be identified, call support for a replacement wiring harness.
  - With the Limits cable removed the software will trigger a Hard Limit alarm and lock out any XY motion. You cannot load a program in a lockout state. To continue operating your table, disable the limit switches in the Machine Settings menu, see "Hard Limit" section above for instructions,

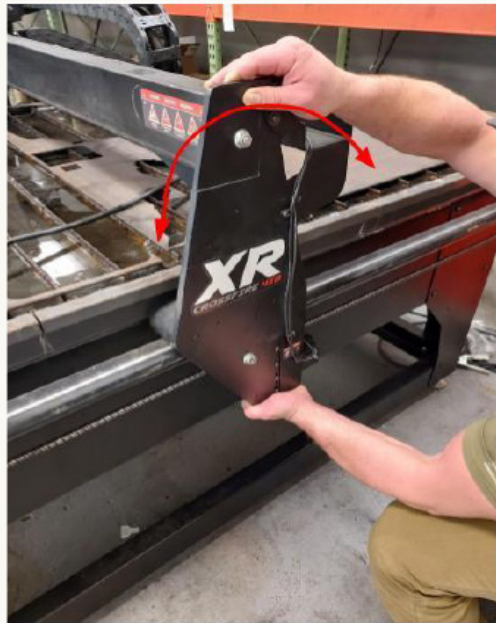
and hit save. You will not be able to home or square the gantry with the limits disabled

Motor cables

- **Solution-**An easy identifying marker for a faulty motor is fluctuation in the **LIVE Voltage while jogging**. Attempt to identify on which axis the fluctuation occurs by checking the voltage reading while jogging along each axis. The **X-axis is far easier to identify because it is not a dual axis system**. If the issue is present on the Y-axis, please call support for additional instructions.

## **MAINTENANCE**

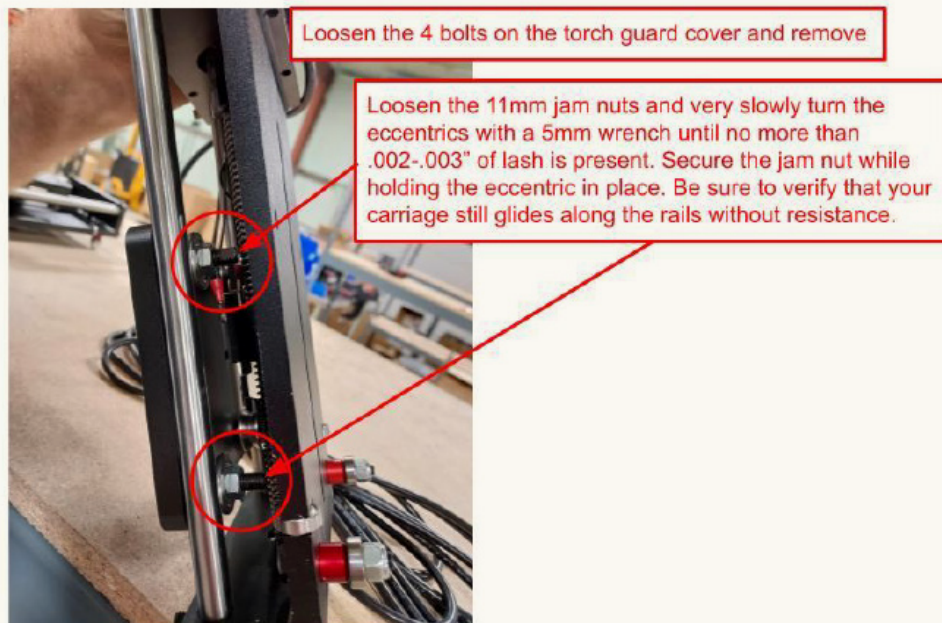
Ensure that the 3 ballnuts are properly lubricated by adding lithium grease to them at the designated fill point. The frequency will vary depending upon use but every 2-3 months is recommended. Also check the felt washers periodically and saturate with oil and replace annually or as needed. Additionally, check for rocking in the uprights by grasping the top and base and attempting to rotate about the X axis.



Check each side at the front, center and rear of the Y -axis rails and adjust the lower V-roller as necessary so that it is in constant contact with the rails. Do not overtighten, simply adjust until the roller makes contact with the rail. Lastly, check for lash in the X/Z carriage by gently grasping the torch body and rocking along the Y axis.



Check at each end of the gantry tube as well as the center and tighten the bearings set while tramping as needed. If there is solid contact between the bearings and the gantry tube and lash is still present, remove the torch guard cover and adjust the V-rollers along the right side of the Z-slide.



Do not overtighten. Gently lift the torch in the slide and be sure that the slide will still lower along the rails under its own weight.

## **REPLACING BROKEN/DAMAGED LIMIT SWITCHES**

If the limit switches are damaged while homing the stops were never set properly and/or require an adjustment. When done correctly it is impossible for the gantry to overtravel and break the switch. Please refer to the "Homing Failure" section of the attached guide and make certain to

get the stops set correctly to avoid any similar future issues. We upgraded the limit switch harness in the last 6 or 7 months (as of 05/09/23) which now feature quick disconnect switches. If you have the old style that requires you to cut and resolder the switches back on, the quickest option is to go to Amazon.com and order a 10 pack for \$5.99. They usually arrive next day.

[https://www.amazon.com/HiLetgo-KW12-3-Roller-Switch-Normally/dp/B07X142VGC/ref=sr\\_1\\_3?crd=IEO888OR24RY&keywords=micro+limit+switch&qid=1683638898&sprefix=micro+limit+switch%2Caps%2C126&sr=8-3](https://www.amazon.com/HiLetgo-KW12-3-Roller-Switch-Normally/dp/B07X142VGC/ref=sr_1_3?crd=IEO888OR24RY&keywords=micro+limit+switch&qid=1683638898&sprefix=micro+limit+switch%2Caps%2C126&sr=8-3)

If you have the new style and don't want to wait, you can still order the Amazon switches and simply solder them onto the blade connectors. At least you can disconnect them from the harness and have adequate space to work. The process should take no more than 5 minutes to complete.

Just remember, under NO circumstance, can the ballnuts be allowed to come off the screws. If you have to disassemble the **rear rail mount** to access the limit switches make sure to unfasten the ballscrew at both ends so that it moves along with the gantry to avoid pushing the gantry off the back side.

## **MC4000 MASTER RESET**

>Shut off PC

>>Press and hold F9, then power on PC, continue holding F9 until boot up screen

>>>Troubleshoot

>>>>Remove Everything

>>>>>Local Reinstall

>>>>>>Just remove my files

>>>>>>>Reset

When setting up the MC4000 this time do it offline (do not connect to the internet). Save FireControl, the THC driver, and the graphics driver installer to a flash drive and use that to load them onto the PC this time. All of those files will be in the MC4000 downloads folder. Additionally, while setting up, opt out of EVERY Windows feature, function, or service. Do not agree to ANYTHING. None of it is necessary, none of it is useful, and any features added will only hinder the primary function of the MC4000, to run FireControl.

## **EVERLAST 82i RAW VOLTAGE ISSUES**

When wiring Everlast models for torch height control, you **MUST** bypass the CNC port connection and **connect directly** to the **raw voltage terminal posts** on the cutter's control board. Failure to do so will result in an unreliably low cutting voltage output and will affect THC performance and reliability. Use the provided Red/Black CAT III cables with banana connectors that came in the LS-THC subassembly box and solder/crimp on appropriately-sized ring terminals to slide over the raw voltage terminal posts on the board.

## **HYPERTHERM 45XP TORCH FIRE AND THC WIRING GUIDES**

### **Torch Fire:**

<https://forum.langmuirsystems.com/uploads/db6772/original/1X/6ec9d49ecc49bfcc2b1358723e829219e8b6cedc.jpg>

### **Raw Voltage THC:**

<https://forum.langmuirsystems.com/t/wiring-for-base-hypertherm-45xp-no-cpc-port/8020>

## **Hypertherm 45XP tool library set up**

Download/save the tool library by clicking the following link to my Google drive:

<https://drive.google.com/drive/folders/1N4OOGZ9NP4T-mtMjgMrsnoOPV1H9o5pa?usp=sharing>

Do not try to open the file.

Open SheetCAM and click:

File>Open tool set

Find the tool library in your downloads folder and open. Then check the first 3 boxes, all pertaining to plasma cutting:

- Depth
- Feed rate
- Plunge rate

The tools will load into SheetCAM with Hypertherm's recommended settings.

## **PRIVATE REMOTE SUPPORT**

As an independent contractor, I am available for private remote support sessions after my normal office hours during the week between 430-730CST and on Saturdays 8am-1pmCST. My rate is \$100/hr or a flat rate of \$225 for UP TO 3 hours of support if needed. If you are looking to learn CAD the flat rate option may be your best bet, as it is a bit more involved. However, since all plasma cutting is done on a 2-dimensional plane you don't have to be an expert CAD drafter to be successful with plasma. A typical session lasts around 90 minutes and in that time I can take users with no prior experience and guide them, step by step, through the workflow process while explaining the "why," not just the "how." I do this so users can better understand what it is they are doing and grasp the fundamental concepts instead of just attempting to repeat a process without ever understanding how certain design factors can impact the quality of the cut. The session will not end until you are confident in your ability to successfully design, program and cut your own custom parts. If you are interested in these services please contact me to schedule a date and time. Once we schedule a date and time I will require a \$50 deposit to reserve that time and I will send over all the required software download links and information on how to set up the remote support session. To avoid paying for time spent setting up your computer, please be sure to have all programs and software pre installed before beginning the session. If you have questions getting set up please call beforehand. Thank you.