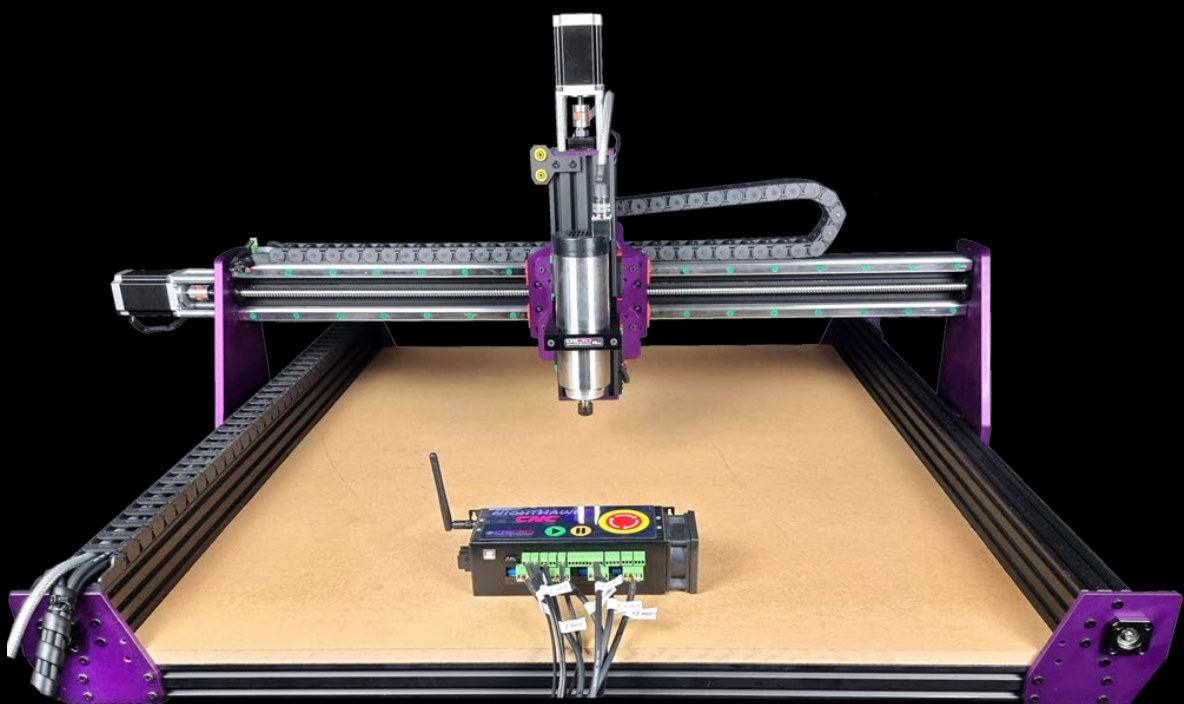# NIGHTHAWK CNC

QB2

User Manual & Maintenance Guide

Safety precautions

Like any power tool, operating and using a CNC machine can be dangerous. Diligence must be applied when operating any machine. It is recommended to wear appropriate PPE such as eye protection and earmuffs for your own safety.

NEVER leave a powered machine unattended at any time!

In the event of an issue or if something doesn't seem right, it is recommended to immediately disconnect power to the machine and unplug it from the wall power outlet. Contact our customer support team if you have any concerns about your machine.

Always ensure your machine is free and clear of any swarf, dust or other obstructions that may impact the motion of your machine. We highly recommend the use of a Dust shoe and vacuum system for keeping your machine clean and clear of swarf and dust.

Always ensure to follow the maintenance guide at the bottom of this manual after initial assembly and setup and also periodically to ensure your machine always performs to its optimal capacity.

Table of Contents

Key Things to Note

Please read this section first before proceeding

When You Receive Your Machine

Upon receiving your machine make sure to open the crate as soon as possible, even if you are still building your table. This will help prevent condensation in the crate which can lead to rust buildup on any exposed steel, including rails and ball screws!

We do what we can to prevent moisture and condensation from building up inside the packaging, however we cannot stop all moisture ingress. Opening the crate will allow any humidity to escape and will help to prevent water in the air from condensing on the exposed steel.

Please keep the crate horizontal. We have included a moisture absorption package which has the potential to spill if moved too far beyond horizontal!

We will not be held responsible for any rust buildup on a machine that has been delivered but not opened.

Nighthawk CNC Controller

Your QB2 has been delivered with a Nighthawk CNC Controller. We recommend referring to the Nighthawk user manual for in-depth instruction of its use. You can find this manual in our CNC3D Commander program or at https://www.cnc3d.com.au/nhc

Machine settings

Our trained team preconfigure every aspect of your machine prior to it being sent to you. You do not need to change any settings in your controller and **DO NOT** load any profiles onto your machine within the Profiles tab of our Commander software.

By default, we set soft limits to the maximum travel limits of your X, Y, and Z axes. Whenever you first power on you <u>MUST</u> home your machine. If your controller is ever in an Alarm state, you can reset it by clicking the "Unlock" button in Commander. If this fails to clear, click the E-stop button in Commander then the unlock button.

Tramming your spindle

It is important to ensure your spindle and endmills are perfectly perpendicular to your bed, therefore it is highly recommended to tram your spindle. This process cannot be completed before shipping due to vibrations, bumps etc. during the shipping process which may cause slight movements of the spindle.

Surfacing your bed

We do our best to ensure that your machine is perfectly square and aligned during the build process. Bed surfacing cannot be completed before shipping due to vibrations, bumps etc. during the shipping process. During transportation and movement of your machine certain parts may move position meaning that surfacing needs to occur once the machine is in its final resting location to ensure that you have a sturdy and well supported base to start using your machine.

Limit Switches

This section only applies to QB2 machines with Proximity-Type Limit Switches

These switches are solid-state with no moving parts, and therefore require no maintenance.

We have installed crash protectors near the switches on the X and Y axes to protect them in case the machine is put into a situation where it could inadvertently collide with the end of the sensor.

Z axis does not need this protection as the contactor is able to move past the end of the sensor without colliding with it.

These protectors should not interfere with the limit switches' normal operation and are a critical safety mechanism so please leave them attached.


Y1 and Y2 Crash Protectors

X Crash Protector

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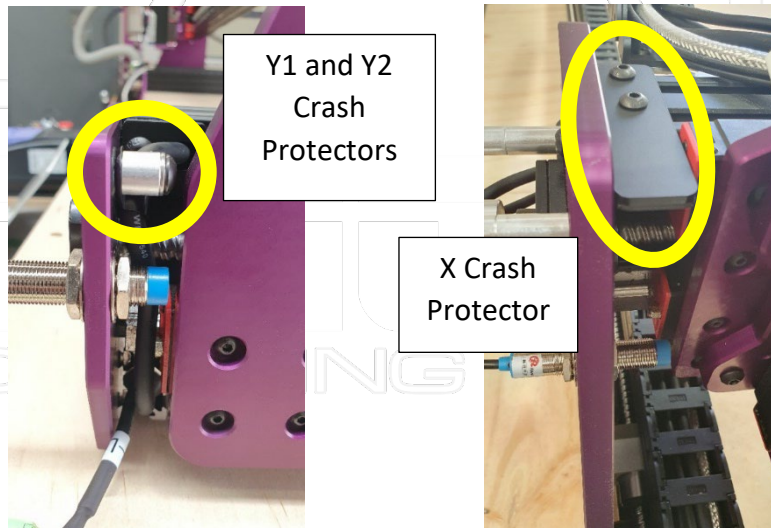
Unboxing your Machine and Setup

1. ## Welcome to your new QB2!

Please open the crate as soon as possible upon receiving it, even if your table isn't ready just yet!
This will help to prevent moisture from condensing in the crate which can lead to rust buildup on any exposed steel, including rails and ball screws!

To remove the plywood crate, you will only need to remove the screws which are painted purple, then the whole lid will slide up and off the pallet. You will also need to remove the protective plastic wrap. **Do not use a knife** as you may accidentally cut through electrical cables beneath it!. You can also carefully remove the small parts accessories box that is attached to the gantry. This will contain your endmills, VFD manual, Dust shoe and any other accessories you may have purchased with your machine. If you have purchased T-Tracks or a rotary axis, they will also be secured to the machine for transport.

When removing the accessories box pay close attention to the moisture absorber as it may have liquid built up inside. The liquid and absorption crystals contain calcium chloride which may cause damage to steel if spilled, as well as the MDF spoil board. This package is disposable in regular household rubbish.
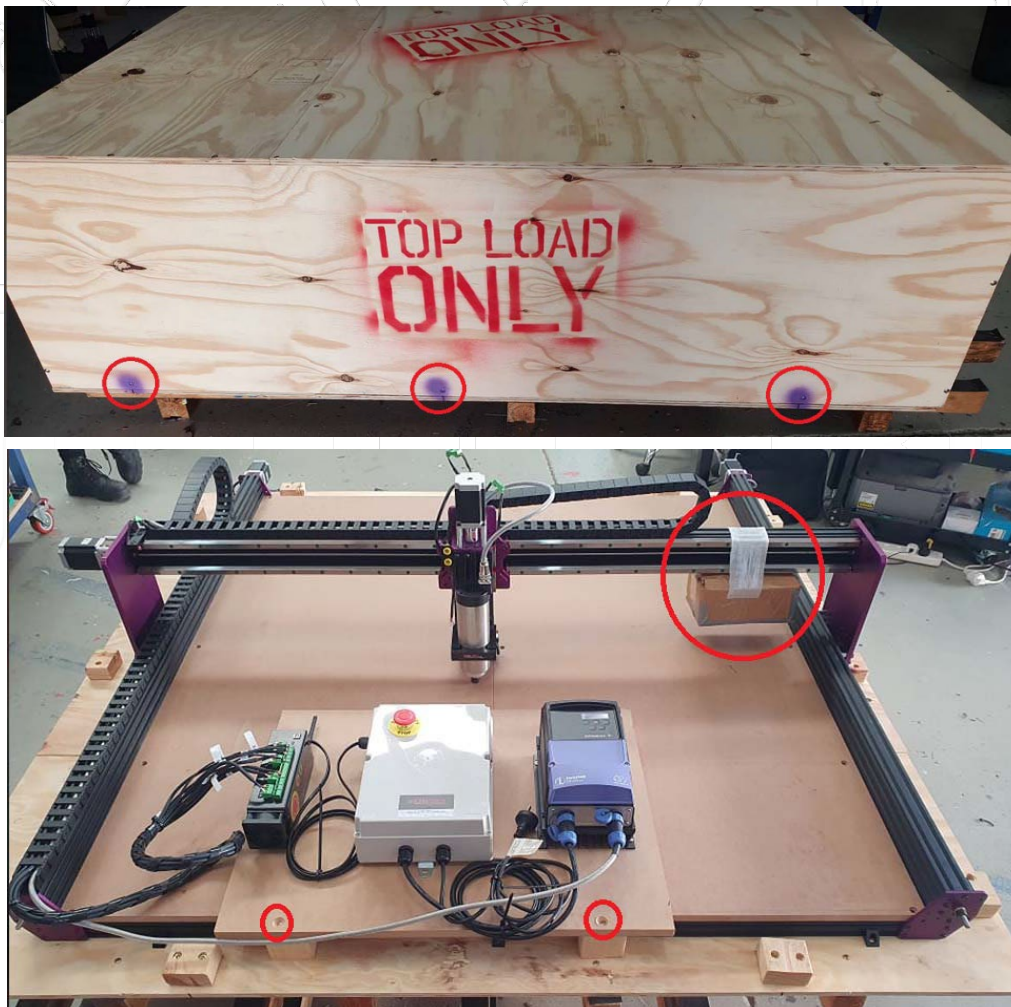
2. Once your machine is exposed you can unscrew the electronics board from the front of the pallet and slide it onto the machine's spoil board for easy transport to its home location bench or table.

3. Now that everything is free it is a good idea to get a friend or 3 to help move your machine on to your table. Be very careful to avoid skewing the machine while transporting it and under no circumstances should you ever lift by the ball screws. **Always ensure the ball screws are protected to avoid bending them.** They control your machines movement so keeping them nice and straight is critical to its operation.

   Some users may choose to move the entire pallet and bottom packaging onto the bench and run the machine from there. This is OK to do also. If doing this, keep the machine fastened to the pallet itself.

   If you have removed the pallet and crate baseboard from the machine it is recommended to use the 6 angle brackets; 3 on front, 3 on back (that secured your machine to the pallet originally) to secure the machine down to the new bench. Start with the 3 on the rear of the machine and check squareness of your machine. If the machine is square, then secure the front down.

4. Once your machine is in position it is time to find a spot for your electronics. To make it easy, you can mount the existing MDF board that has the electronics fixed to it to the front of your machines table. This will provide easy access to the VFD and E-stop. You can also choose to unmount the electronics from the MDF board and position them where you like if the cables will reach of course. Don't power up just yet, there's a few checks to do first.
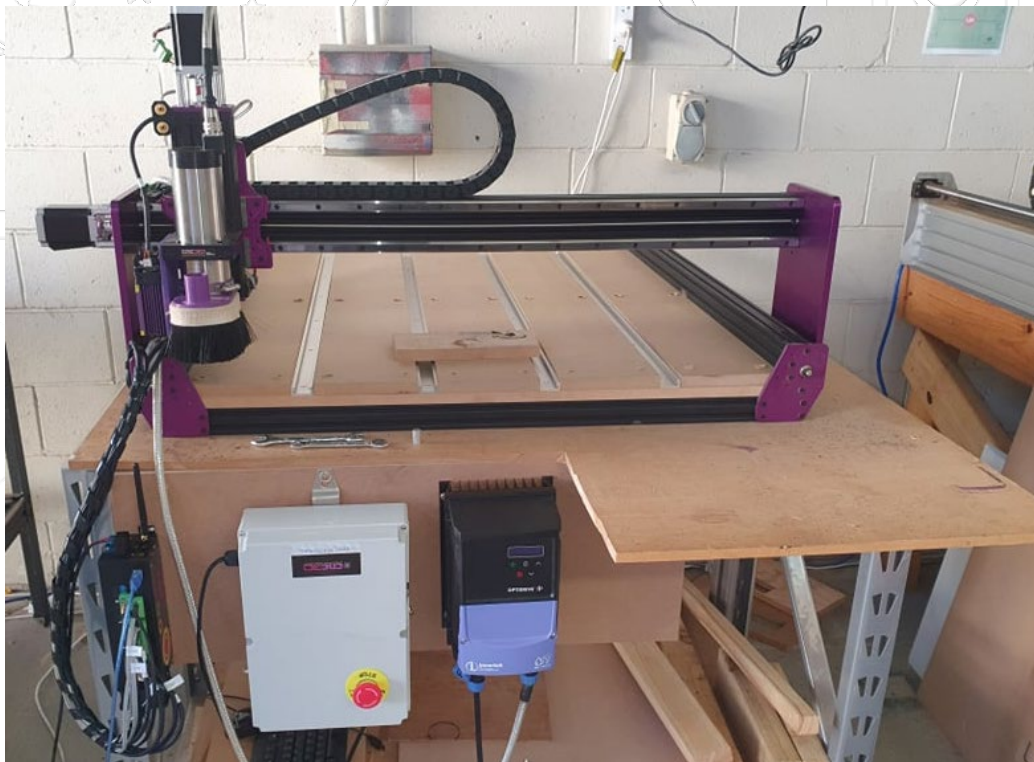
Mounting suggestion using the existing MDF electronics mounting board

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Things to check before powering on!

We're almost there! It's important to do some quick checks to ensure your machine is ready to go. Sometimes in transport things can wiggle loose. Here are some things to check.

❖ **Check all nuts and bolts on the machine.**

❖ **Check the green connectors that connect all the wires. They should be firm and secure. Try giving each wire a slight tug in each screw terminal to make sure they are secure!**

PRO TIP: You can familiarize yourself and follow the maintenance guide at the bottom of these instructions to check that everything is nice and secure after the machine has been moved into its home location.

❖ **Download and install our CNC3D Commander software if you have a Windows computer. It can be found here: https://www.cnc3d.com.au/commander**

Let's plug it in!

Take the single power plug lead and plug it directly into a wall socket. Avoid running the machine from a power board/power strip as you can quickly overload it.

Once powered on your Nighthawk controller fan will come on and so will the display on your VFD. You may also see some lights from the inside of the Nighthawk's case.

You will also need to plug in the included USB cable to the Nighthawk controller and to a nearby PC. Plug this cable directly into the PC, do not go through a USB hub/splitter.

This cable will be used for setup only and will not be used to run the machine long-term!

We highly recommend visiting the user manual for the Nighthawk Controller, either at the web address below or in the "Help" section of our Commander program:

https://www.cnc3d.com.au/nhc

Getting connected

Now that your hardware is set up, let's get control!

The first step is to connect power to your Nighthawk controller and download our Commander control software by clicking the link below or typing it into your internet browser.

https://www.cnc3d.com.au/commander

To use your QB2, you will need to have a way of communicating with it from a PC so you can give it GCODE files as well as commands like movement and of course, running your jobs!

There are multiple options that you can use to connect to your Nighthawk Controller – USB, WiFi, and Bluetooth.

USB (Not Recommended)
Your first instinct may be to use USB however this is the **least reliable way** to control and run your machine and it is heavily discouraged! While it's running the spindle will create lots of Electromagnetic Interference (EMI) and electrical noise which can cause the USB connection to drop out resulting in random job stoppages or irregular machine behaviour. We only recommend using the included USB cable for setting up wireless communications, then unplugging the cable and storing it in a drawer.

WiFi (Best Option)
The best possible way to run your Nighthawk controller is via WiFi and connecting the machine to an existing WiFi network such as a house or factory network.

The next preferable option is WiFi – Direct Access Point Mode which allows you to connect directly to the Nighthawk instead of connecting the Nighthawk to an existing network. This will be the best option if there is no WiFi in the area where your QB2 is located or if you are using a mesh network/WiFi range extenders as the Nighthawk can sometimes have trouble connecting to these networks. This works the same as connecting to a network, but the drawback is that the computer running the machine will not have access to the internet while running the machine.

Bluetooth (Backup Option)
The third option is connecting to the Nighthawk via Bluetooth from a compatible PC or Laptop (not a smartphone!) Bluetooth works the same as USB but without the physical cable, so it will minimise the risk of EMI and unpredictable machine behaviour.

Refer to the Nighthawk Controller manual for a highly in-depth guide for setting up a wireless connection. The Nighthawk user manual is available in the "Help" section of our Commander software.

You can also check out this video to learn how to set up each of these connections through our Commander software:

https://www.youtube.com/watch?v=k07Qwe4IduU

"CNC Tech-Tip: Setting up WIFI" on the CNC3D YouTube Channel

QB2 User and Maintenance Guide – Revised 28/08/2024

Initial setup steps once powered on

Our trained team preconfigure every aspect of your machine prior to it being sent to you. You do not need to change any settings in your controller and <u>DO NOT</u> load any profiles onto your machine within the Profiles tab of our Commander software.

If you get a popup asking if you have a new machine or if your machine is already set up, please select "My Machine is Already Set Up" as we have done it for you in the factory.
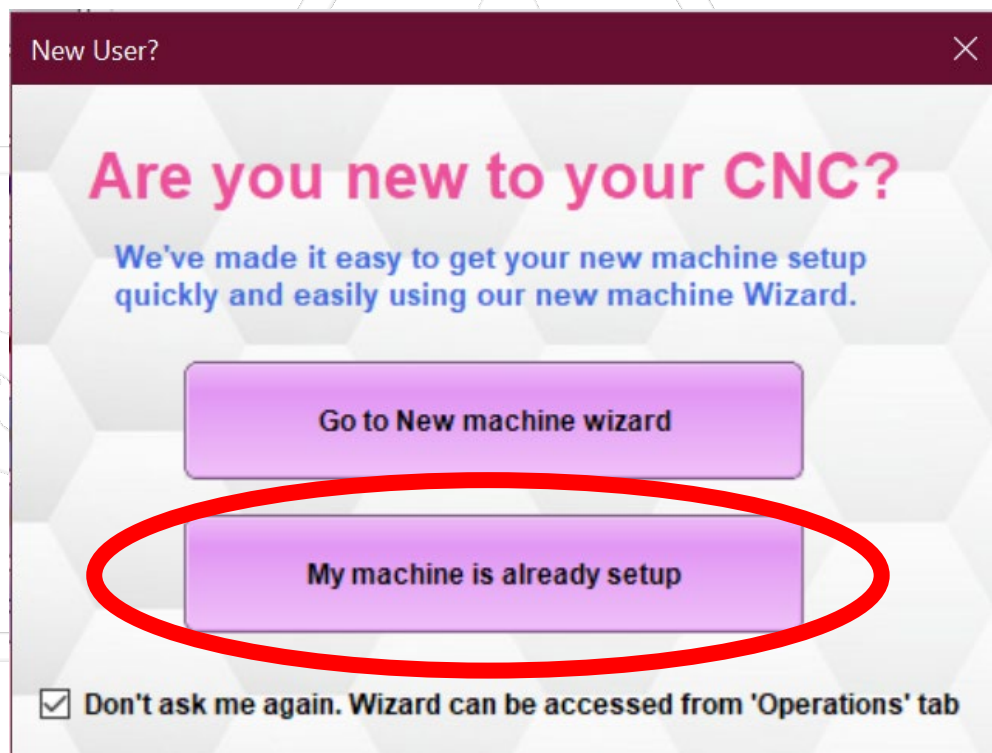

If you select "New Machine Wizard" Commander will attempt to overwrite some of the critical settings like maximum travels and axis directions and can cause your machine to crash!

Commissioning Checks

Before continuing through this manual, make sure you have set up your preferred connection method in the step above as you will be using it from now on!

It is a good idea to make sure your new machine is still running smoothly after its journey to get to you.

Once powered on and connected to Commander, you will see a flashing Alarm icon in the bottom-left of the screen. This is entirely normal, and you will see it every time you power the machine on; it simply means the machine hasn't been homed yet.
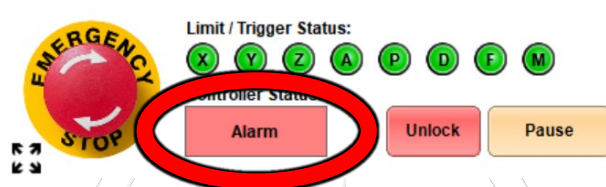
Alarm will flash every time you turn on the machine

Homing Cycle

Homing is the process the machine uses to find out where it is in physical space, and it will need to be done *every time you power on the machine*.

To tell the machine to home, click the 'Home Machine' button in Commander. When pressed, the cutting head will move to the Top-Front-Left corner of the machine and trigger the limit switches.

If something doesn't seem right with the machine while it is moving, immediately press the E-stop button on your control box or via our Commander software.

'Home Machine' button location in Commander. You can find it immediately beneath the large numbers on the left side of the program

3-axis QB2-V2 machines will be set up by default for dual-Y homing, so both sides of your gantry will move independently during the homing cycle ensuring it is always square.

4-axis machines and some older machines will not have a second limit switch on the Y2 side of the machine and will therefore not be able to perform dual-Y homing.

Gantry Squaring

Regardless of which model QB2 you have, it is a good idea to check the squareness of your gantry after the first homing cycle to make sure nothing was bumped during shipping and your machine is ready to start working!

Refer to Page 24 of this manual for instruction on how to measure gantry squareness and correct it if needed.

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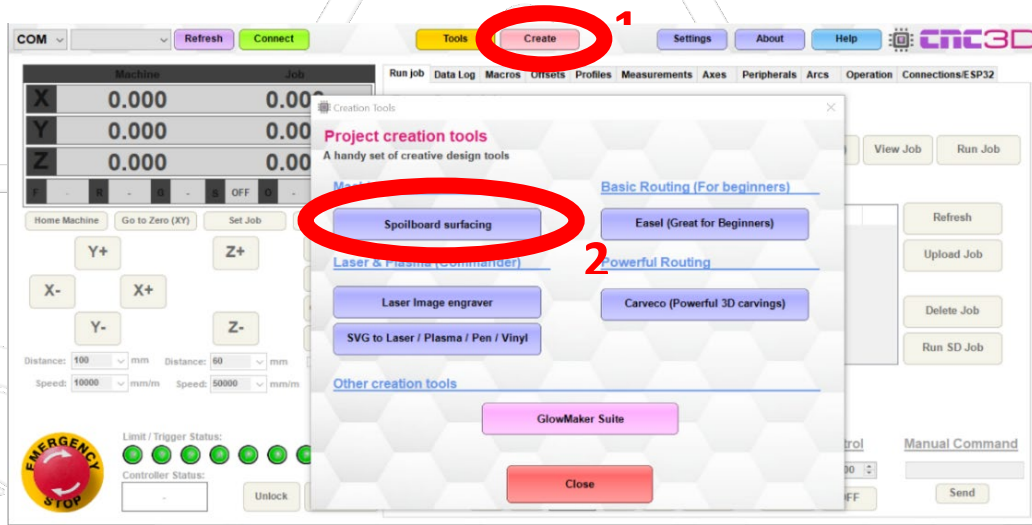
Surfacing your spoil board

It is highly recommended to surface the top of your spoil board.

Please Note: If you are installing T-tracks on top of your pre-installed MDF bed, install the tracks and the slats between them <u>before</u> surfacing the top layer. The pre-installed MDF bed should remain flat and smooth for your T-tracks to rest on.

Surfacing the entire working area means that your tool will always be perpendicular to your cutting tool.

To do this, follow the steps below for making a rectangle the size of your actual working area.

First, connect to your Nighthawk controller and home the machine to clear the alarm. Next step is to open the Create window and select Spoil board Surfacing.

In the Spoil board Surfacing Generator window that has opened, there is a highlighted box with a Max Size button. When you click this button, it will insert a number into Width (X) and Length (Y). These numbers are mathematically calculated based on numbers that are saved on your Nighthawk controller and will be unique to your machine. You should not need to make any more adjustments to any of these settings.
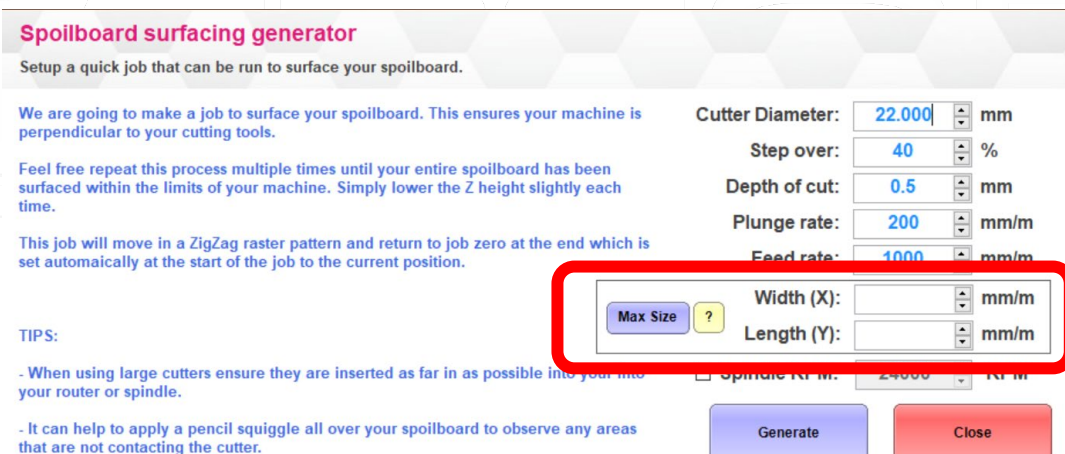
When all your numbers have been entered, click Generate and save the file that it creates then close the Spoil Board Surfacing Generator and the Create window.

Running the Job

To do this you will need to home your machine. Once homed, loosen off your collet nut on your spindle and insert a 6mm collet and the 22mm surfacing bit provided with your QB2 CNC (Spindle Option Only). Please ensure the surfacing bit is inserted quite high into the collet but not all the way in. Once in, tighten the collet nut up.

Pro Tip: Extreme force is not required to tighten your collet nut. Just make sure it is secure. Overtightening the collet can damage the collet or even break the endmill.

If you ordered one, attach your dust shoe and vacuum hose at this time as well.

Use a marker to squiggle some lines all over your spoil board. This will allow you to tell if the surface has been machined or not. See photo below of areas that were missed on our first pass trying to surface the spoil board.


Using the jogging buttons in Commander, move the spindle 50mm in the X+ and Y+ directions so that it is sitting above the machine bed.

Lie a piece of scrap paper on the bed directly under the cutter and lower the tool down using the Z- button until it is just touching the paper. When you can no longer move the paper around under the tool, then the tool is at its maximum downward travel.

Pro Tip: Reduce your downward travel distance as you get closer to the surface to ensure the machine does not crash into the spoil board.

QB2 User and Maintenance Guide – Revised 28/08/2024
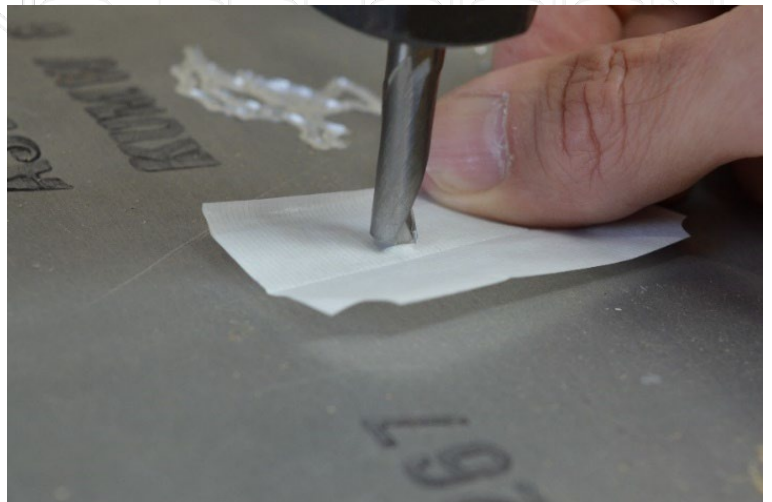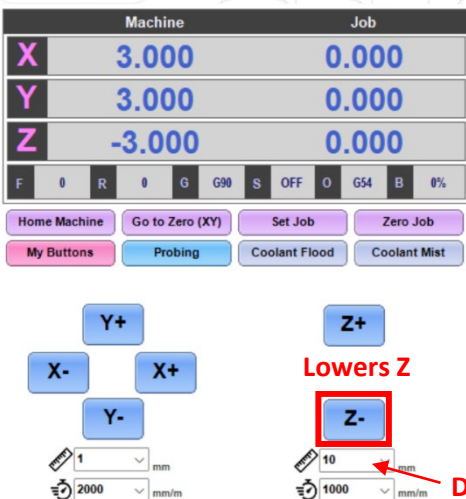
When you're happy that the tool is touching the top of your spoil board, look for the Z number in "Job Coordinates". You will need to double-click this number **twice** to set it to zero.

Double-click on this number twice to set it to zero
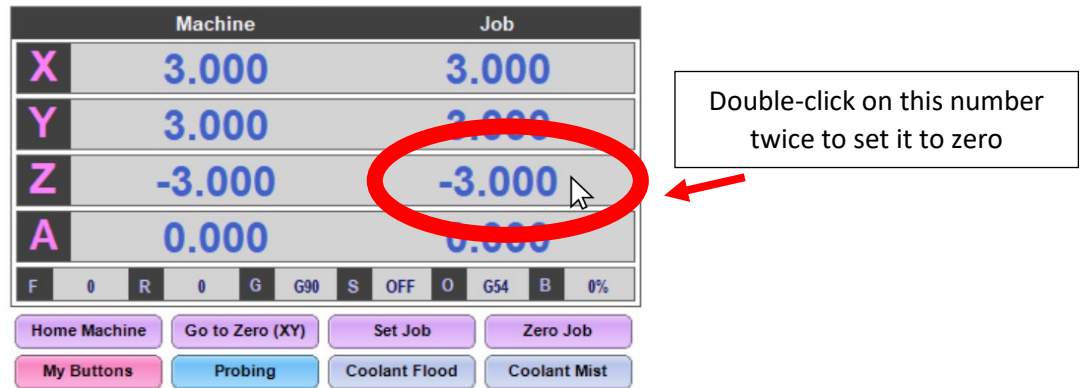
Home your machine. When your machine has finished homing, use the Z- button to move your Z axis down until the Z number in "Job Coordinates" is 0.

Job Coordinates

Use Z- until job coordinate Z reads 0
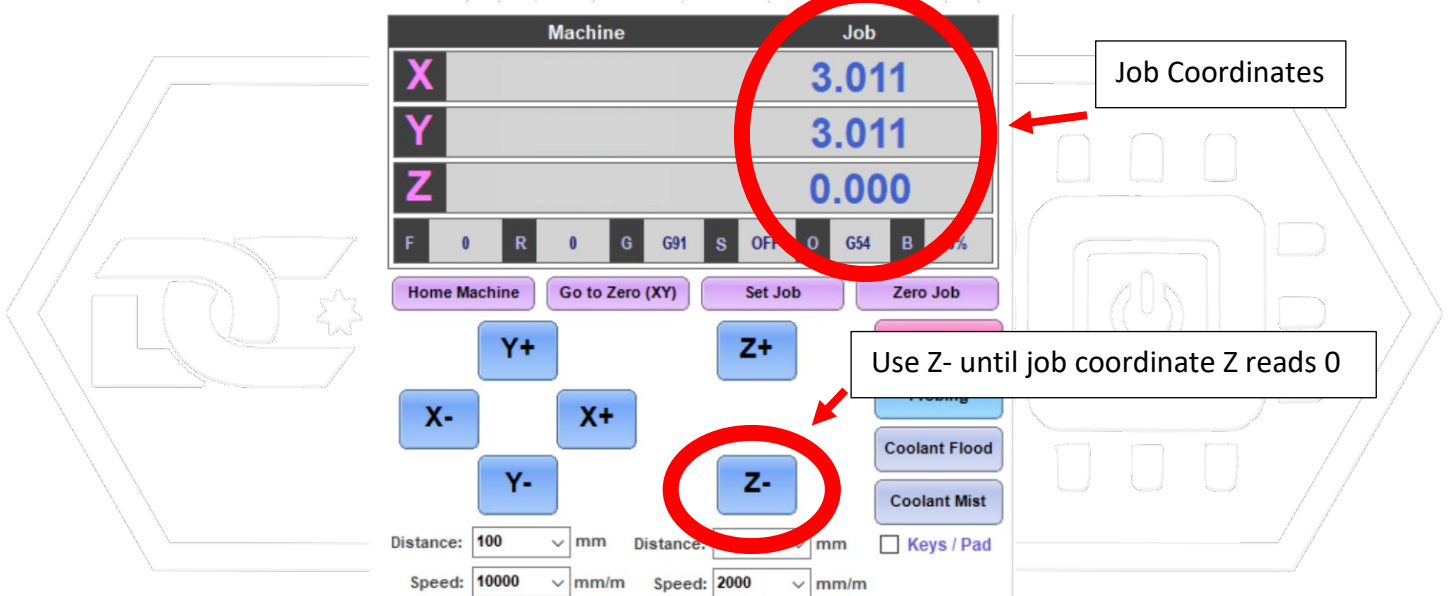
When your Job Z number reads 0, click 'Zero Job' and now all Job coordinates will be set to 0. You can ignore the Machine coordinates. This is now the position where your job will start.
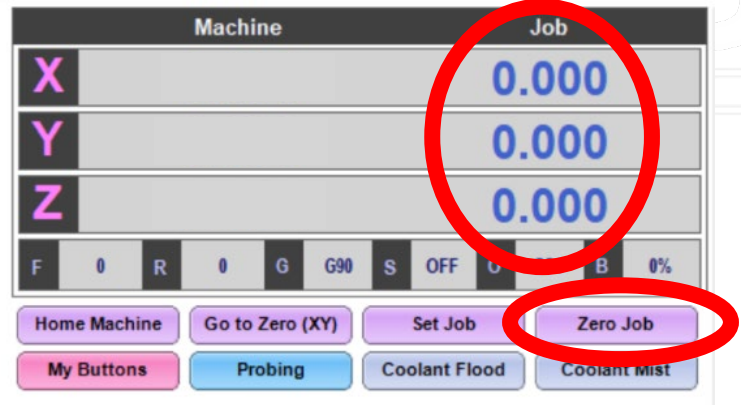

## From here it's time to upload the job and get it started!

There are two different methods depending on how you are connected to your Nighthawk. If you are connected via Bluetooth then please skip ahead to the next page.

If you are connected to your Nighthawk via WiFi (Direct or Existing Network)

Back in our Commander software, Click the "Zero job" button. Next, click on the "Upload Job" button, navigate to the location of the job file you just saved and select the correct job one, then click "Open". This will save the job to the SD card in the Nighthawk Controller. When the upload is successful there will be a popup box to confirm. Click OK to close.
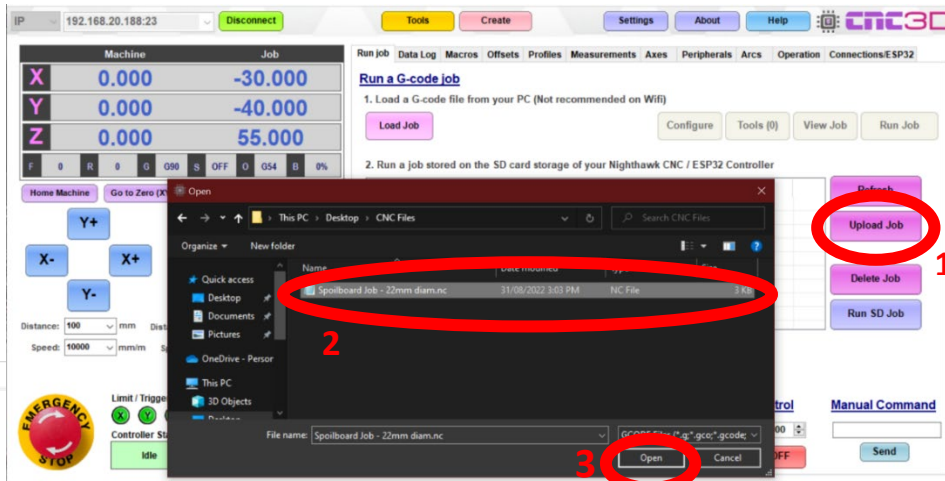
You're now ready to run the job! Attach your vacuum hose to the dust shoe (if fitted) turn on the extraction system, then turn on the spindle by pressing the Green button on the VFD. From there, all you need to do is highlight the spoil board job in the list and click "Run SD Job".
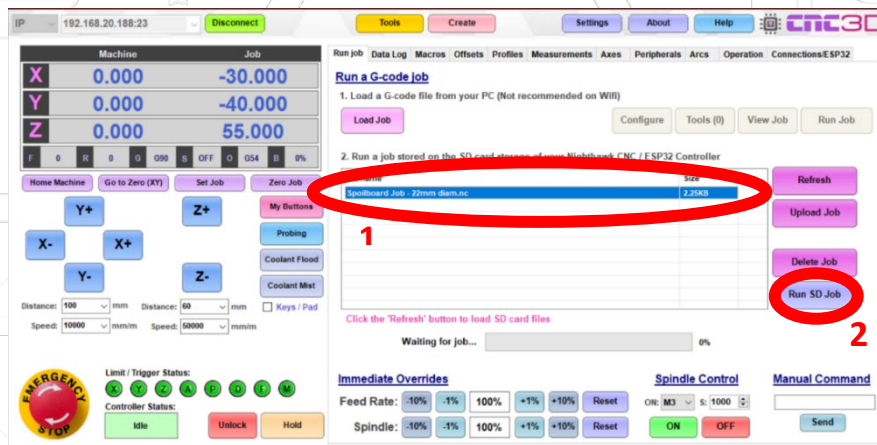
This will start the process of surfacing your spoil board. It may take a long time to complete this job. If something doesn't seem right, immediately hit the E-stop button on your power box or via our Commander software.

When the job completes, press the red button on the VFD to turn off the spindle.

Please Note: Using the E-stop on your Nighthawk controller or via our Commander software will only stop your machine moving but will not stop your spindle. If you want to stop both the spindle and machine quickly, press the mechanical E-stop on your control box.

You may need to turn the Nighthawk off and back on after using the E-stop button in Commander or on top of the controller. The E-stop causes the controller to reset as it's the fastest way to stop machine motion. If turned off, you will need to disconnect in Commander, then connect again once powered back on.

Connected to your Nighthawk via USB (Not Recommended) or Bluetooth

Back in our Commander software, Click the "Zero job" button. Then click on Load Job and select the file you saved out of the surfacing wizard. Once loaded, hit the green run button on your VFD and wait until the spindle is up to speed. Once at speed, turn on your vacuum extraction (if attached) and hit the 'Run Job' button. See sequence here:

This will start the process of surfacing your spoil board. It may take a long time to complete this process. If something doesn't seem right, immediately press the E-stop button on your control box or via our Commander software.

When the job completes, press the red button on the VFD to turn off the spindle.

Please Note: Using the E-stop on your Nighthawk controller or via our Commander software will only stop your machine moving but will not stop your spindle. If you want to stop both the spindle and machine quickly, we recommend using the mechanical E-stop on your control box.

When on Bluetooth you may need to turn the Nighthawk off and back on after using the E-stop button in Commander or on top of the controller. The E-stop causes the controller to reset as it's the fastest way to stop machine motion. If turned off, you will need to disconnect in Commander, then connect again once powered back on.

SOME GREAT NEWS!

The process you have just followed is how every job will be run!

You will be running all future jobs like this.

Saving this handy spoil board job will make it easy next time you want to freshen up your surface OR after you replace your spoil board.
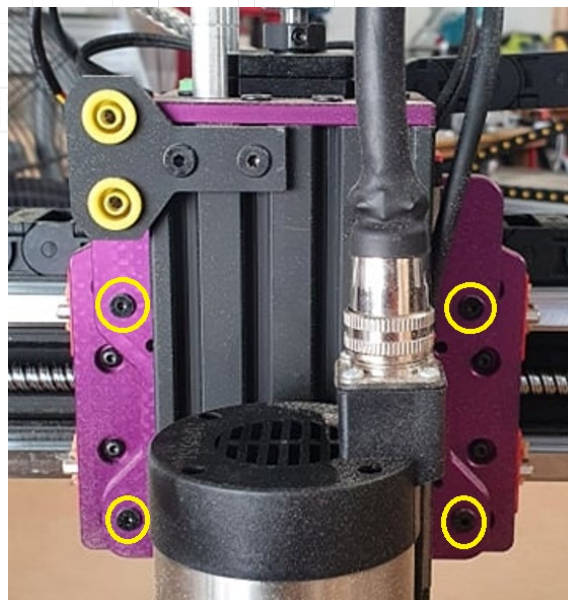
Tramming your spindle

You may notice after surfacing you have some ridges in your spoil board. This is due to the spindle needing some minor adjustments to be truly "flat" with your spoil board.

During assembly of your machine our team align your spindle and bracket using engineering squares. This is fine for general tramming, but extra tramming steps can be performed to ensure you have smooth bottom results with larger cutting tools. The best way to test your tramming is to use the new Spoil board surfacing wizard in Commander's Creation Tool section to make a 100x100mm rectangle and insert your supplied 22mm surfacing bit and 6mm collet.

Tramming Side to Side

Your Z axis plate has 4 bolts that hold it to your X axis plate. These bolts can be loosened off to allow you to tilt the angle of your spindle for tramming. There is a centre locating pin between these plates to make this process easy. It is recommended to loosen off 3 of the bolts while keeping one bolt slightly tight to allow some control when tramming. The 4 bolts are located here:

Tramming Front to back

Over time, we innovate and improve on our machine designs to make things like tramming your spindle an easier and much more user-friendly process. One of these improvements is the addition of a "shoulder bolt" on the gantry riser plates. There will be some machines that have these bolts and some that do not so ensure you are following the correct tramming procedure for your machine.

If your gantry has a shoulder bolt

Shoulder bolts have a washer on the bolt as seen below in BLUE. *If you have no washer and all your bolts are identical then you need to follow the below guide for "NO shoulder bolt". This bolt could be either in the top hole or the bottom hole.*

If you need to adjust your tramming front to back then you need to look at adjusting the gantry angle.
To do this, you will first need to *slightly* loosen off the shoulder bolt highlighted below in BLUE. Once loose, loosen all the bolts highlighted in YELLOW below.

Repeat this process on the other side of the machine in the exact same pattern as the first side. This will allow you to "tilt" the gantry front to back. Make slight adjustments at a time to both sides and re-secure the BLUE bolt first, then the YELLOW bolts. Check if it is trammed correctly by cutting into your test piece. Repeat these adjustments until the test piece seems to surface quite flat with no ridges showing up as it skims the surface.

If your gantry has NO shoulder bolt

If you need to adjust your tramming front to back then we need to look at adjusting the gantry angle.

To do this, first loosen off the 2 bolts that secure your ball screw. These are highlighted below in **BLUE**. Once these are loose, loosen all bearing block bolts highlighted in **YELLOW** below. With the **RED** bolt, only slightly loosen it. It needs to keep the gantry plate in a fixed position.
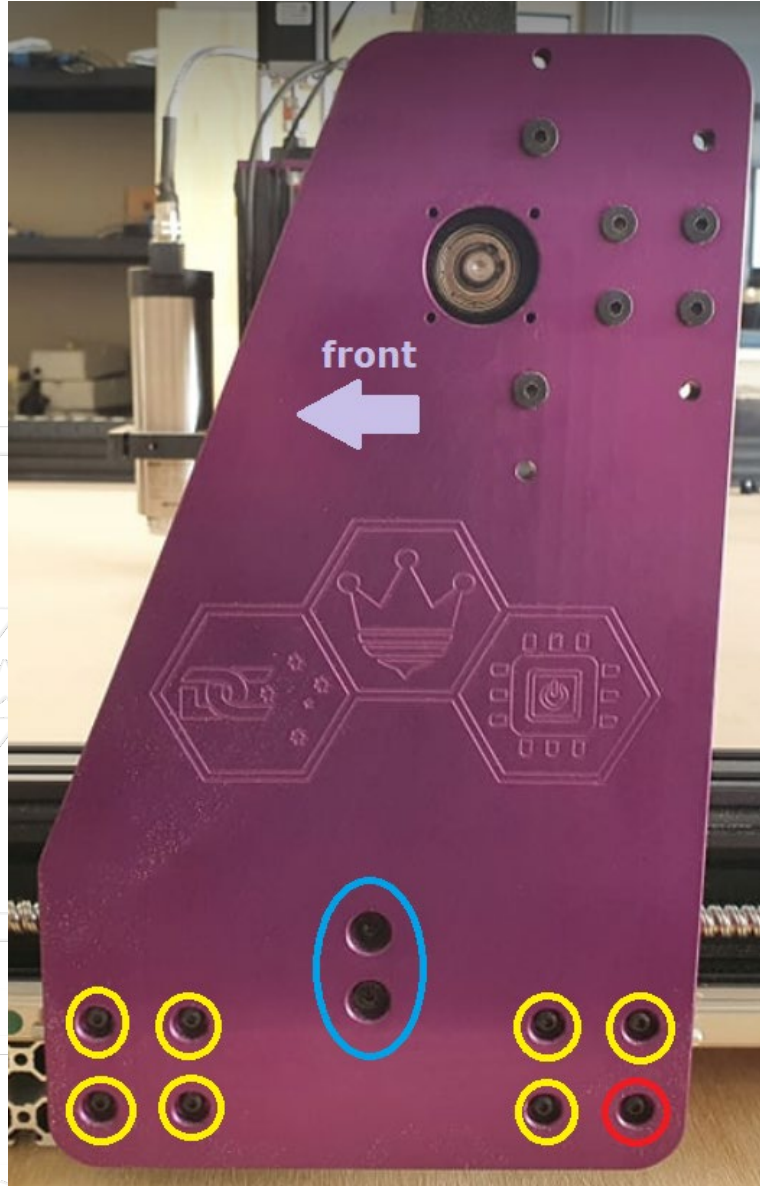

Repeat this process on the other side of the machine in the exact same pattern as the original side. This will allow you to "tilt" the gantry front to back. Make slight adjustments at a time to both sides and re-secure the **RED** bolt first, then the **YELLOW**, then finally the **BLUE** bolts. Check if it is trammed correctly by cutting into your test piece. Repeat these adjustments until the test piece seems to surface quite flat with no ridges showing up as it skims the surface.

To look up more advanced methods of spindle tramming a quick YouTube search for "spindle tramming" should return a variety of results.

Repeat the process of surfacing your spoil board again until you are happy with the bottom finish of your spoil board.

Fine-Tuning the Stepper Motors

Your QB2 will be pre-configured before leaving the factory and will be tuned to a high degree of accuracy that will be perfect for most users.

This step is completely optional and may not be necessary at all if you are primarily working with timbers or other materials that don't need the highest levels of precision e.g. foams, rubber etc.

Stepper motors rely on *steps* or *pulses* from the controller to turn, and each step will turn the stepper motor 1.8 degrees. Each step is divided up into *micro-steps*. Your QB2 is pre-configured to 1/8th micro-stepping which means the stepper motor needs to receive 8 pulses from the controller to move a full step of 1.8 degrees, and 1600 pulses to turn a full 360-degree revolution.

All of this means you can fine-tune how many *pulses* the motor needs to receive to move the attached axis 1mm, and by getting this number as accurate as possible you will increase the dimensional accuracy of the machine.

We have made this an easy process with a setup wizard in Commander. You can find it in the "Measurements" tab after connecting to your Nighthawk. There is a separate wizard for the XY, Z and A axes.
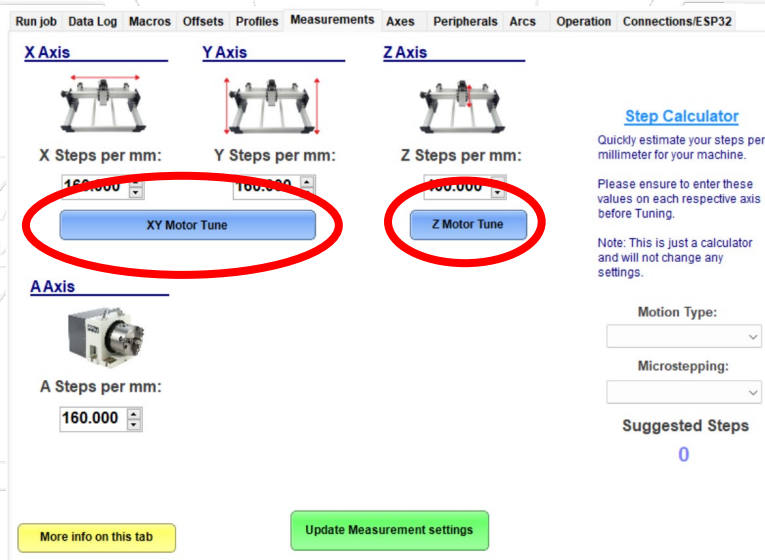
Your machine is now correctly set up and ready to go!

It's time to start making things!

Getting Started With Your Laser

LASER SAFETY WARNING!

DANGER

Laser Radiation Class 4.

Avoid eye or skin exposure to direct or scattered radiation.

Laser protective eyewear required.

Always ensure you are wearing laser safety goggles and other appropriate PPE when using any high-powered lasers. Please ensure the laser is pointing away from people and sensitive materials.

Remember when plugging in or unplugging any wiring INCLUDING the white laser connector, it is vital to ensure the machine is NOT turned on. So called "hot-swapping" can cause irreparable damage to the laser or the Nighthawk Controller!

1.   Raise your spindle high enough so that you can fit the laser to the side of the Right-hand side of your spindle bracket. Use the 2 bolts provided to secure it to the bracket. We always recommend fitting it to the right-hand side so you can still safely home when the laser is attached. **POWER OFF YOUR MACHINE** then connect the white laser plug to the top of the laser.

2.   Once firmly attached you can power up the machine and connect to it in Commander remembering that you will need to re-home it before being able to jog any axis. Use the alloy spacer provided with your laser to set the correct focal point of the laser. To do this, position the spacer under the laser head and carefully lower your Z axis until the brass laser head is just clearing the alloy spacer. Take care not to damage the laser by crashing into the spacer!
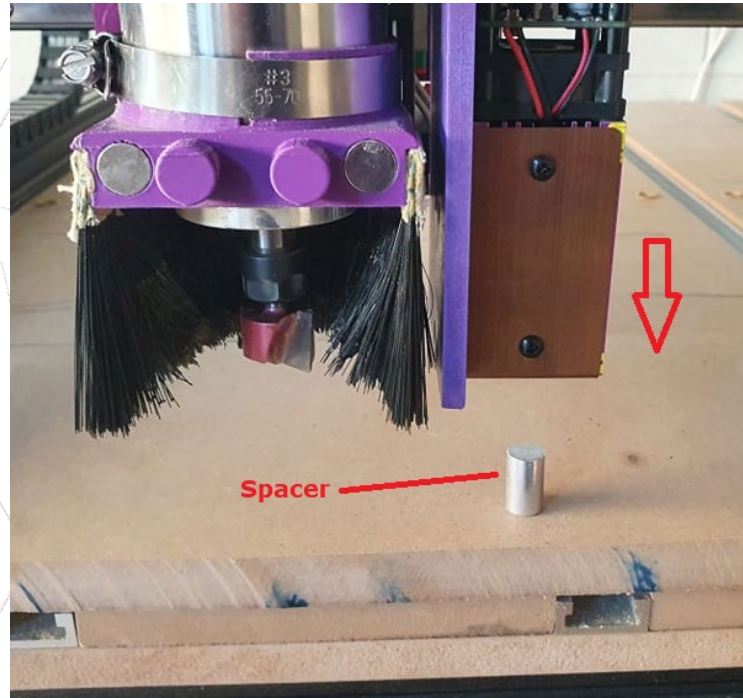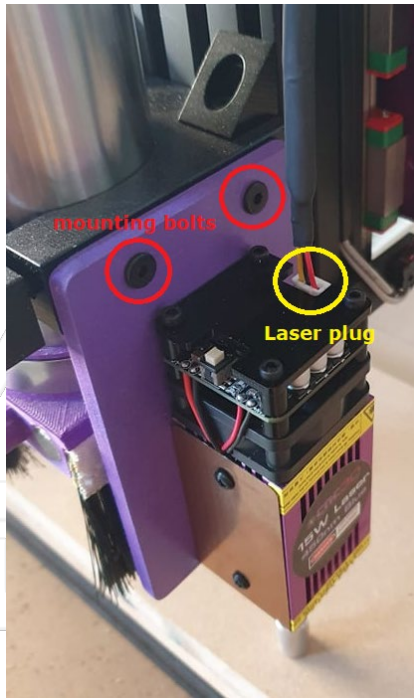
We recommend following our video guide here for using your laser:

https://www.youtube.com/watch?v=8Syf86xmeZs&t

"Setting up and using a Laser on GRBL" on the CNC3D YouTube Channel

Pro Tip: Always remove your laser when using your spindle and never leave your machine unattended when using it. Also ensure you have adequate extraction to your work area as laser jobs can produce harmful fumes when operating.

QB2 CNC Maintenance guide

We recommend visiting this guide immediately after positioning your machine and setting it up. We also recommend periodically visit this guide to ensure smooth operation and a long service life of your machine or if something isn't quite right such as cuts not coming out as expected or Z axis depth inconsistent.

1. **Check ALL the nuts and bolts on your machine.**

   Visit all the nuts and bolts on your machine. You will need a 2mm, 2.5mm, 3mm and 4mm Allen keys and a small flat blade screwdriver to check every connection. Test each bolt and tighten them if they are loose. This includes the green connectors that join the wires together on your limit switches and stepper motors.
   Pro Tip: When tightening any Allen key bolts, only use a solid Allen key and NOT any ball end side or you run the risk of stripping the bolt heads.

2. **Check to make sure your gantry is square.**

   It is important to ensure your machine frame stays square. Using a set of callipers or a ruler, make sure both sides of the machine are an equal distance from the front.

   To do this, home the machine, then measure from the gantry riser plate to the front plate. Repeat the same process on the other side of the machine and record the results.
   If one side is more than 1mm out from the other side, you need to manually turn the motor on one side of the machine until it is within 1mm of the other side. Make sure to only turn the motor from the motor coupler, never the ballscrew. *You will likely need to power off the machine to allow you to turn the motor by hand.*

   It's recommended to only adjust the right side (Y2) and use the left side (Y1) as the reference.
   You can look at repeating this simple process daily or every 1-2 weeks. The more frequently it is performed, the better your machine will operate.

   See image example on next page.

   3-axis QB2 machines received after April 2022 are set up for dual axis homing on the Y axis. It is recommended to occasionally check your gantry squareness after homing and making some slight adjustments to the position of your limit switches if your gantry is not completely square. Ideally, a squareness of less than 1mm is recommended.
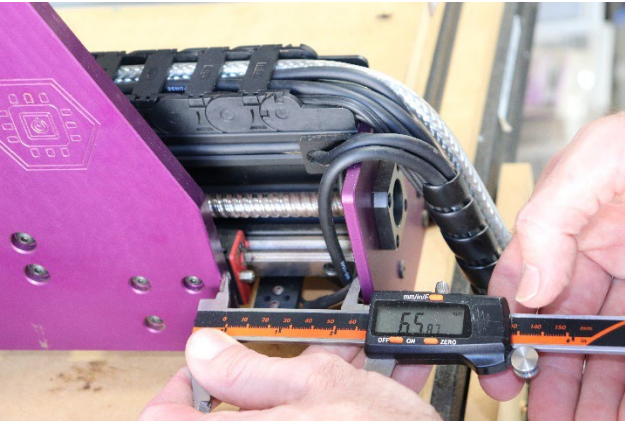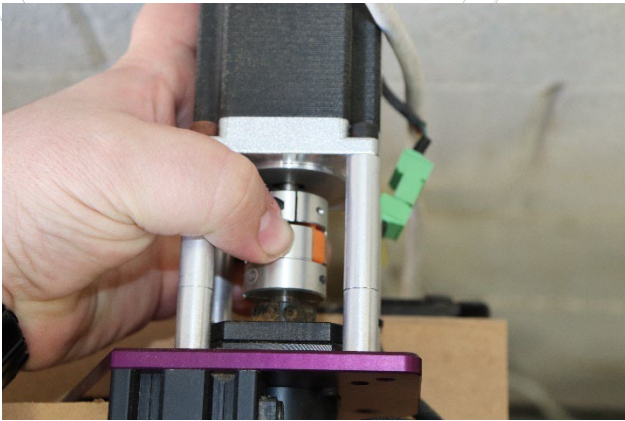
Step 1: Measure Left (Y1) Side
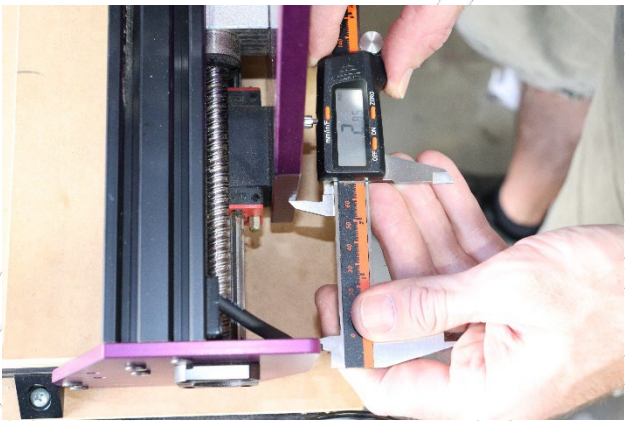
Step 2: Measure Right (Y2) side and determine difference

Step 3: Power off and manually twist motor coupler to bring Y2 into line with Y1

3. Checking connectors

Before doing any maintenance involving wires including checking connections and screw terminals, make sure to POWER OFF the machine. Not doing so risks causing irreparable damage to the Nighthawk Controller!

Check every green connector and its screw terminals with a small flat head screwdriver and ensure they are tight and secure. Give each individual wire a firm tug to make sure they will not pull out of the connector.

Your machine may have either of the connector types in these photos depending on the date your machine was built
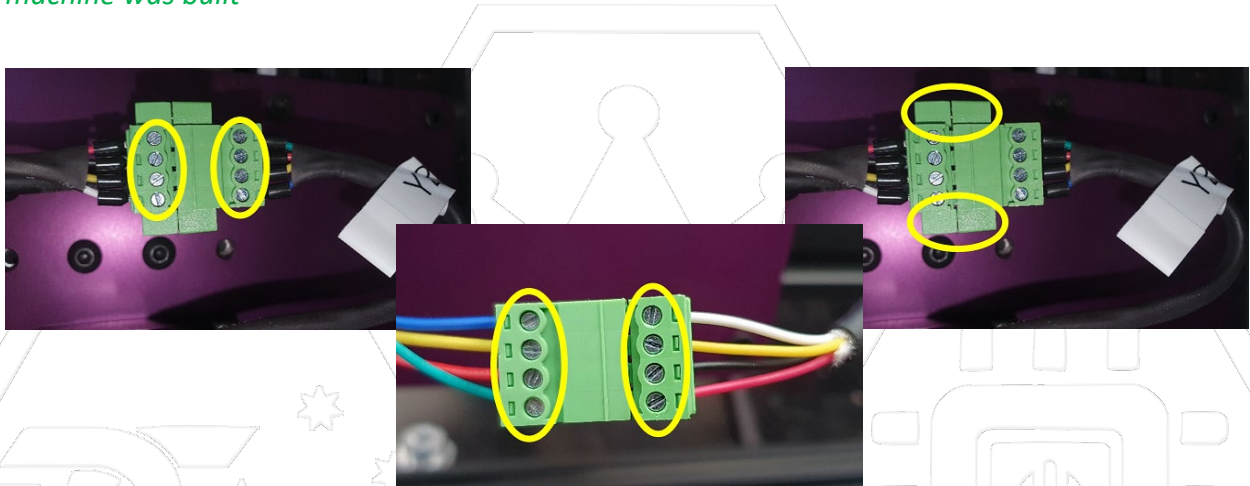
4. Lubricating your rails and ball screws

PLEASE NOTE: This process is <u>NOT</u> required for new machines; we have already lubricated things perfectly for you in our factory before shipping.

To keep your linear motion system in great condition you will need to keep the linear rails and ball screws rust free and lubricated.

The recommended method is to use a grease gun and inject the grease into the nipples provided on your linear bearings. You can also apply a line of grease to the ballscrew, and it will be picked up into the bearing mechanism as the machine moves along.

A mini grease gun works well. They are available in our online store at CNC3D.com.au

See this video on how to lubricate using a mini grease gun:

https://www.youtube.com/watch?v=ccsnIOzvoWI&t
"CNC Tech Tip - Greasing HGR15 rails" on the CNC3D YouTube Channel

We use a general purpose NLGI 2 Lithium-based machine grease to lubricate the machines before they are shipped. When selecting a grease, ensure it is compatible with Lithium-based greases with no additives such as molybdenum!

As a <u>temporary</u> solution, you can apply a fine coating of lithium grease aerosol on the rails and ball screws and run the machine back and forward a few times to spread the lubricant on the rails/ball screws. This will coat the surface and keep them running smoothly until you can source a proper grease and grease gun. **This is not a permanent solution and will likely not provide adequate lubrication long-term.**

When using the grease gun ensure that no more than 1 or 2 pumps is used, or you run the risk of blowing out the seals on the bearing blocks. This should be performed no more than once per month with daily use of your machine.

The photos below show where the grease nipples are located and how you can lubricate them.
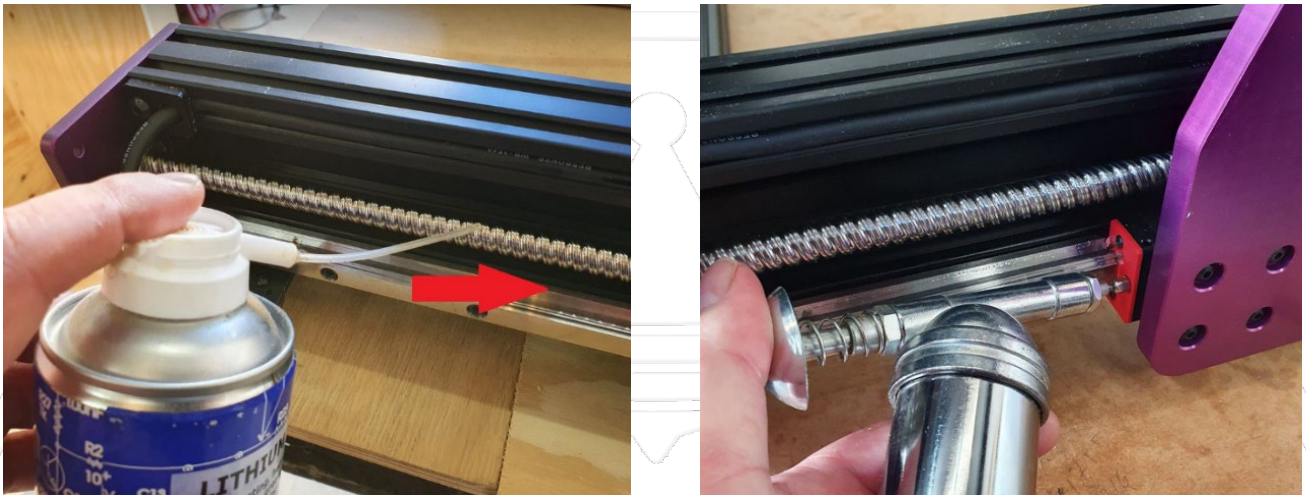
5. Checking and cleaning Limit Switches

QB2 with Mechanical Roller-Type Switches

Over time dust and other debris can infiltrate the mechanical limit switches on your machine causing them to not trigger reliably. It is good practice to occasionally clean out the black plastic housing with low-pressure compressed air, paying particular attention to the Z-limit switch as it is very close to the cutting action and is exposed to more of the resulting debris.
Do not use high-pressure compressed air as you could damage the internal mechanism inside the switch.

QB2 with Inductive Proximity-Type Switches

The QB2-V2 has ip66 rated inductive limit switches on all axes. These switches are sealed against dust and moisture ingress and are therefore impervious to the dust created by cutting timbers and plastics. However due to how they sense metals they may be interfered with by any metal swarf that falls on them so be sure to clean them off after cutting any metals. Compressed air does the job very well, however, make sure metal shavings do not fall into any electrical connections on the machine.

Please power off the machine before using compressed air after cutting any metals in case metal shavings find their way into any exposed electrical contacts.

You have now completed your machine maintenance!

We recommend visiting this guide periodically. Our Commander software will remind you every 3 months however doing it more frequently will ensure your machine is always in tip top condition.

For more information or if you require support with your machine, please reach out to our friendly support team via email at solutions@cnc3d.com.au, via Facebook or via phone at
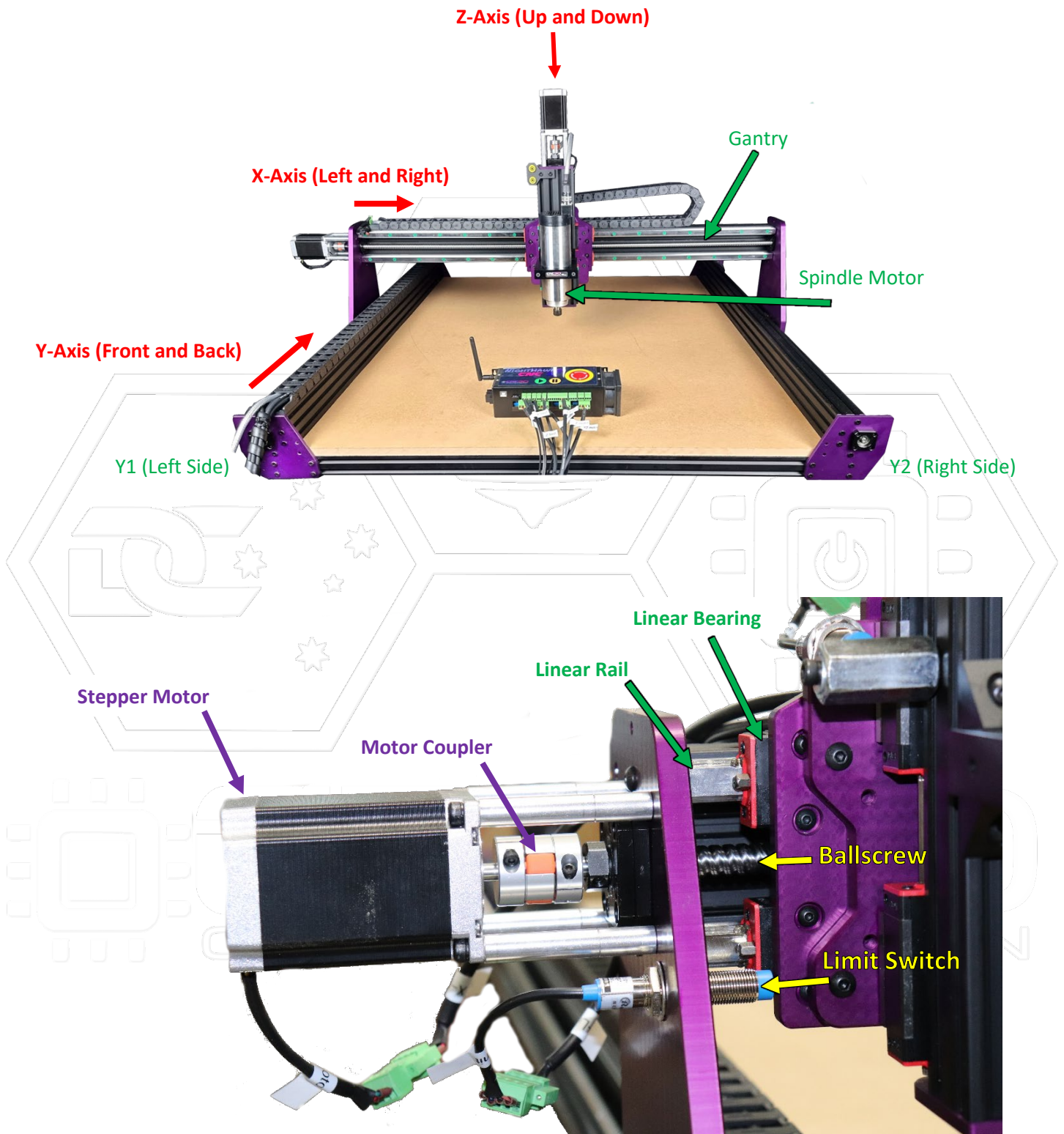
+617 5522 0619

You can also join our friendly user group on Facebook and collaborate with thousands of our other users.

https://www.facebook.com/groups/cnc3dplayground

Machine Layout

If you ever need to get help with your machine it's useful to know the names of the parts you're working on to prevent miscommunication. We've listed the most common parts here for your information.

Z-Axis (Up and Down)

X-Axis (Left and Right)

Gantry

Spindle Motor

Y-Axis (Front and Back)

Y1 (Left Side)

Y2 (Right Side)

Linear Bearing

Linear Rail

Stepper Motor

Motor Coupler

Ballscrew

Limit Switch

Troubleshooting

## Nighthawk not being recognised by PC when using USB

- Must be on a Windows computer or Laptop (not Mac or Linux unless using a Windows emulator)
- Try using another USB port on the computer
- Make sure there is no USB hub or splitter in the cable
- Check Nighthawk is receiving power. Fan should be spinning or red light visible on the card
- Check page 43 of the Nighthawk user manual for information on installing the USB driver for your computer

Limit switches flashing red

- If only one limit is flashing, check the wiring for any loose or broken connections along the corresponding circuit.
- If Y *and* A are flashing and you DO NOT have a second limit switch on Y2, check the front of the Nighthawk for a jumper across the A limit switch connection. If there is no jumper, bridge it out with a piece of wire in the green connector. *See below for an example.*
- If only A is flashing and you DO NOT have a second limit switch on Y2, check the front of the Nighthawk for a jumper across the A limit switch. If there is no jumper, bridge it out with a piece of wire in the green connector. *See below for an example*. If you have ONLY A flashing, your machine will likely run just fine without needing to bridge the connector.
- If Y *and* A are flashing and you *do* have a second limit switch on Y2, check your wiring for any loose or broken connections on the Y2/A limit switch circuit.
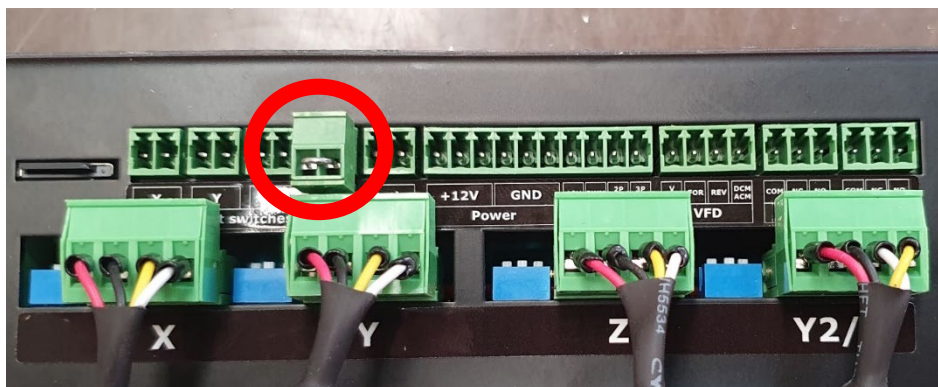

'A' limit switch location circled in red with a bridging wire installed

WiFi connection timing out when attempting to connect

- Check you have selected IP and are entering the correct IP address into the "Connect" box
- Make sure your computer and Nighthawk are both on the same WiFi network
- Check your network password and SSID (Network name) are correct and do not contain any special characters
- Check page 33 of the Nighthawk user manual for information on using the WiFi Setup Wizard in Commander as you may need to re-do your WiFi setup.
- Watch the video here: **https://www.youtube.com/watch?v=k07Qwe4IduU**

GCODE Motion Target Exceeds Machine Travel (Alarm 2)

- Check that your machine has been homed after being turned on
- Check your machine's maximum travel settings in the "Peripherals" tab
- Check the machine has not been asked to travel to a position outside of its maximum travel parameters, either by the user or by the job.
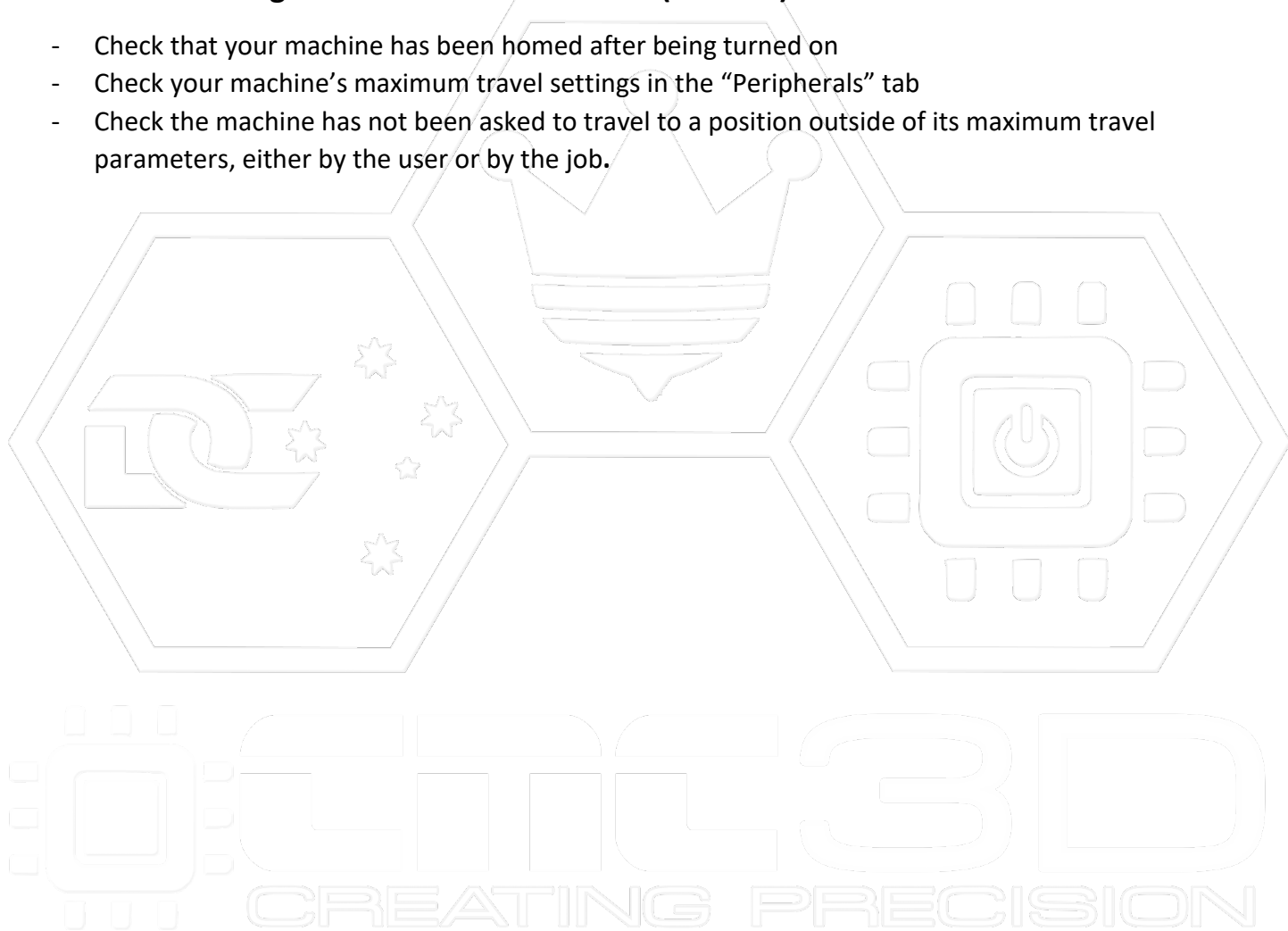
Additional Resources

Below is a list of other resources we recommend for further information on your machine use, specific guides/manuals for parts or general tips and tricks for your machine or software usage.

Nighthawk Information
User Manual / USB Driver

cnc3d.com.au/nhc

CNC3D Commander
Download / Information / Guides

cnc3d.com.au/commander

CNC3D TV
"How-To" Videos / Video Guides

cnc3d.com.au/cnc3dtv
youtube.com/@cnc3d

Post Processors
For Common CAD/CAM Software

cnc3d.com.au/postp

Tool Libraries
Tool Lists for Common CAD/CAM Software

cnc3d.com.au/tool-libraries

Facebook User Group
Show Off and Chat!

facebook.com/groups/cnc3dplayground

Support FAQ
Common Questions and Answers

cnc3d.com.au/forum/support-faqs

Getting Help

We have set up an FAQ page to answer the most common support questions we get asked. If you have a support question this is the best place to start as your question may have already been answered!

Visit our Support FAQ Forum!

cnc3d.com.au/forum/support-faqs

Reach out to our friendly Support team

Phone: +617 5522 0619 (9am-5pm AEST)

Email: solutions@cnc3d.com.au

Website: https://www.cnc3d.com.au OR via our Chat.

Facebook: https://www.facebook.com/cnc3dau

Our FB Community: https://www.facebook.com/groups/cnc3dplayground

We are always looking for feedback! If you have any suggestions regarding how we can re-word our manuals or support pages to make them easier to understand please let us know using the links above!