

Nighthawk Dual Y Homing

Second Y limit switch installation and Dual Axis Homing setup

For all Nighthawk controllers running firmware 2.6 or newer

Dual Y homing lets your machine automatically square its Y axis every time it homes. With a second limit switch fitted, the machine touches off BOTH sides of the gantry when homing, then squares itself. No more manually pushing the gantry against the front rail to square it up.

There is no firmware update or special firmware needed. Dual Y support is built into every Nighthawk running firmware 2.6 or newer. You only need to do two things: wire in a second Y limit switch, and turn Dual Y on in CNC3D Commander.

What you will need:

- A second limit switch, the same type as your existing Y switch (mechanical or PNP inductive)
- A small flat head screwdriver for the green connector terminals
- CNC3D Commander installed and able to connect to your machine

Already have your second Y switch mounted and wired into the A limit port? Skip straight to Part 2 on page 3.

Part 1: Mounting and wiring the second Y limit switch

Step 1: Mount the switch. Mount your new limit switch on the OPPOSITE side of the machine to your existing Y limit switch, at the SAME end of Y travel. Mount it exactly like your existing switches, facing the same way, so both sides of the gantry hit their switches at the same point.

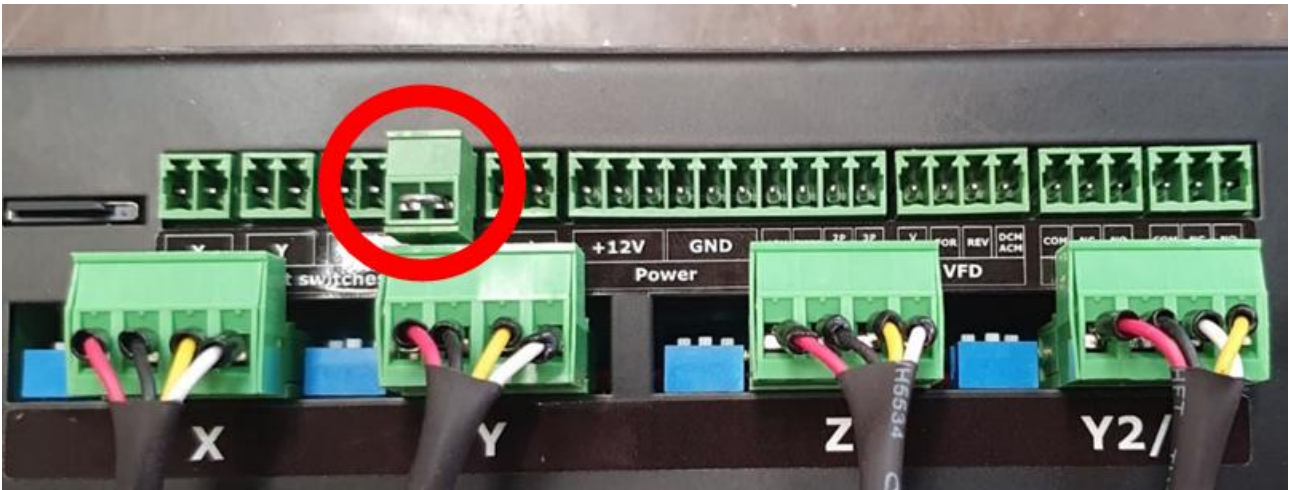
Take your time lining it up: the positions of these two switches ARE your square. If one switch sits further along the machine than the other, the gantry will home slightly out of square every time. Measure both switch positions from the end of the rails and get them as even as you can.

Step 2: Find the A limit port. Look at the front of your Nighthawk. The limit switch connectors are the green plugs labelled X, Y, Z and A. The A port is the one your new switch plugs into. When Dual Y is enabled, A becomes the second Y limit (Y2).



The A limit port is in the Limit switches group on the front label.

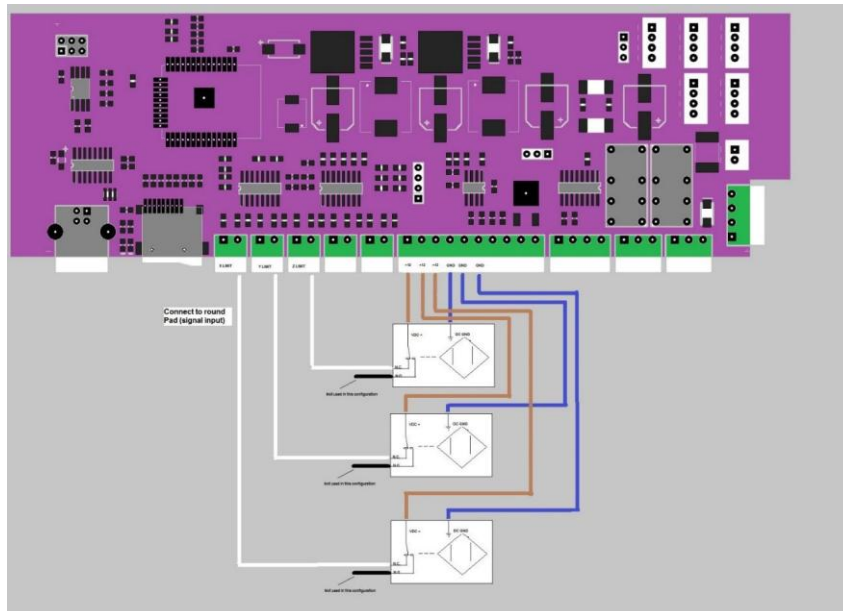
Step 3: Remove the jumper if there is one. Some Nighthawks ship with a short piece of wire bridging the two A limit holes. It is there to stop the unused A limit from false triggering. Your controller may or may not have one. If it does, unscrew the terminals, pull the wire out and keep it somewhere safe.



Step 4: Connect a MECHANICAL switch. Run the two wires from your new switch into the two A limit holes and screw them down firmly. There is no polarity, either wire can go into either hole. Bare wire ends or bootlace crimps are recommended for a safe and secure fit. If your switch has three terminals, use the same two terminals as your existing Y switch (COM plus NC, or COM plus NO).

Step 5: Connect an INDUCTIVE (proximity) switch. Skip this step if you are using a mechanical switch. The Nighthawk is designed to work with PNP proximity switches and they are the only supported type. **NPN proximity switches will not work.** Normally Closed (NC) is the recommended type, as any break in the circuit will trigger the limit, which is safer. Wire the switch like this:

- **Brown:** goes to +12v on the 10 pin power plug
- **Blue:** goes to GND on the 10 pin power plug
- **White:** goes to the A limit port, RIGHT side hole
- **Black:** not used in this configuration



Proximity wiring from the Nighthawk manual. Your new Y2 switch wires the same way, white wire into the A limit port.

Please note: all limit and probe signals are read in REVERSE by the Nighthawk. This protects the board from short circuits and does not change how your switch operates. It just means that if your switches are physically NC, you select NO as the Limit Switch type in the Peripherals tab of Commander, and the other way around. Your existing switches already work, so leave that setting alone.

Both Y switches MUST match. The new switch and your existing Y switch must be the same type and wired the same way. If one is Normally Open they both must be Normally Open. If one is Normally Closed they both must be Normally Closed. If they do not match, Dual Y homing will not work correctly.

Part 2: Enabling Dual Y homing in CNC3D Commander

Step 1: Connect to your machine. Power up the Nighthawk, open CNC3D Commander and connect. If Commander pops up offering you a firmware update, click Yes and let it finish, then reconnect. Dual Y needs firmware 2.6 or newer and Commander will always offer you the newest version automatically.

Step 2: Clear the alarm. After connecting you may see a flashing Alarm next to the Emergency Stop button because the machine has not been homed. Click the Emergency Stop button, then click Unlock to clear it.

DO NOT HOME YOUR MACHINE YET

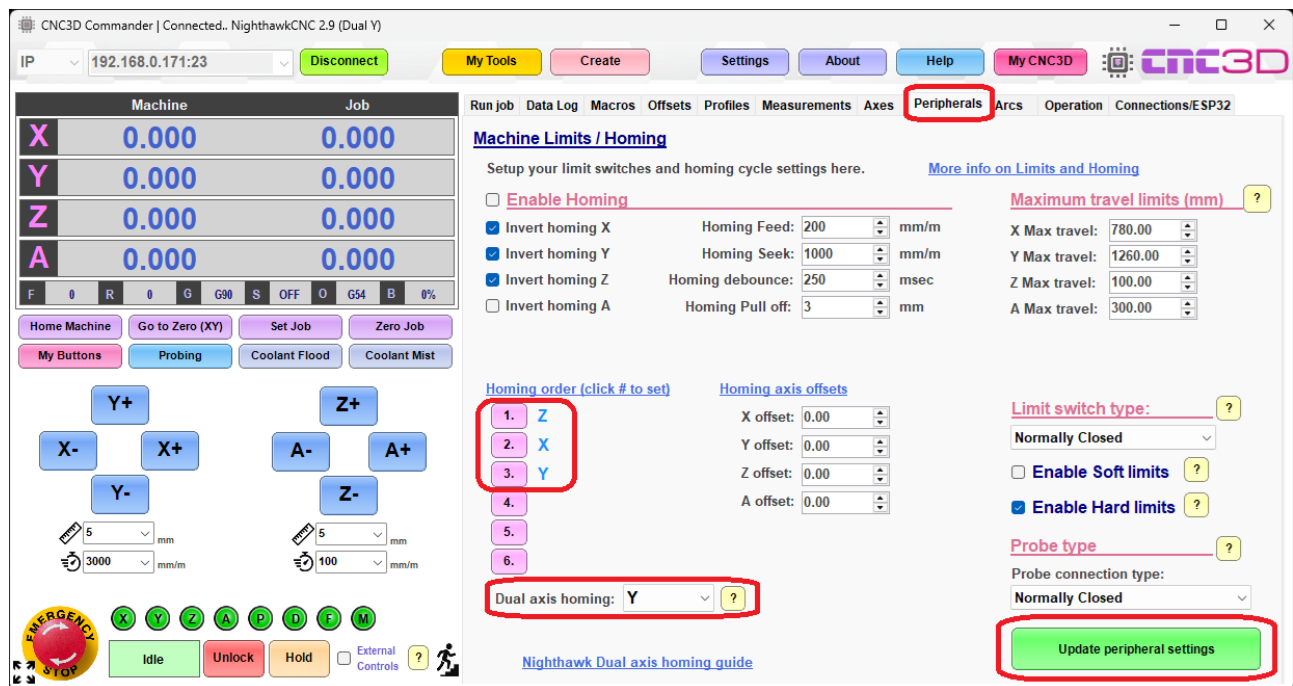
Step 3: Open the Peripherals tab. Click the Peripherals tab in Commander.

Step 4: Set the homing order. Find the Homing Order section in the middle of the page. Click each pink number and set the order to 1: Z, then 2: X, then 3: Y, so every axis homes on its own line, one at a time.

This part is critical: the Dual Y axis MUST be on its own line in the homing order. It cannot share a line with another axis. If your order says 2: X, Y together on one line, Y will NOT dual home and will only touch off one side of the machine.

Step 5: Turn on Dual Y. Find the drop down menu next to Dual axis homing and select Y.

Step 6: Apply the settings. Click the big green Update peripheral settings button in the bottom right of Commander. Commander will ask you to confirm, apply the new settings, and then restart the controller for you. When the message tells you the controller is rebooting, give it a few seconds to start back up and then reconnect. There is no need to power cycle anything.



Step 7: Home the machine. With your hand near the Emergency Stop just in case, home the machine. The gantry will now touch off BOTH sides of the Y axis and square itself. That is it, you are done!

Be ready to hit the Emergency Stop if the machine does not behave the way you expect or does not stop on the limit switches!

Part 3: How Dual Axis Homing works and the rules

From firmware 2.6 onwards, dual axis homing behaviour depends entirely on how it is configured in the Peripherals tab and how your homing order is set.

When Dual axis homing is OFF: the controller runs in standard mode. X, Y, Z and A all work as independent axes and nothing is paired or slaved. This is the mode to use if you run a rotary or other 4th axis on the A output.

When Dual axis homing is set to an axis (X, Y or Z): the A output becomes a slave of that axis, and that axis homes from both sides using its own limit switch plus the A limit switch. For a standard gantry machine that axis is Y, which is why this guide sets everything up as Dual Y.

The rules for reliable dual homing:

- The dual axis must be on its OWN line in the homing order, never sharing a line with another axis. On a shared line it will only home from one side.
- Both limit switches must behave identically. The main axis limit and the A limit must be in the exact same state at all times. Both Normally Open, or both Normally Closed.
- Every limit switch must be clear, meaning not triggered, before a homing cycle starts. A switch that is already pressed when homing begins can make the axis fail to home or behave unpredictably.

Quick troubleshooting

- **Y only touches one side:** Check the homing order. The dual axis is almost certainly sharing a line with another axis, put it on its own line.
- **All limits flashing red:** Toggle the Limit Switch type on the Peripherals tab between NO and NC. Remember the Nighthawk reads these signals in reverse.
- **Inductive switch never triggers:** Check the switch is PNP, NPN switches will not work. Check the white trigger wire is in the RIGHT side hole of the A limit port.
- **Machine homes out of square:** The switch positions set your square. Re-measure both Y switch mounting positions and adjust until they are even.

If you run into any difficulties with this guide or would like some more information, reach out to us at CNC3D.com.au!