

IQ Pro Owner's Manual



LAGUNA

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Scope of This Manual

This manual outlines the basic operations, Quick Start, Multi-Tool Programs, Maintenance, and Troubleshooting for the IQ PRO Router equipped with the Rich Auto B57E Handheld Controller.

For detailed instructions and video, please go to www.lagunatools.com.

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Laguna Tools is not responsible for errors or omissions. Specifications subject to change. Machines may be shown with optional accessories.

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1.0 Introduction

The IQ Pro is designed to supply years of service. The IQ Pro performs multiple functions, thereby reducing the number of machines needed to complete projects.

Please read this Owner's Manual in entirety prior to assembly or use. Refer to the included Unpacking and Setup Manual for unpacking and assembly instructions.

1.1 General Safety

Using caution while operating the IQ machine will lessen the possibility of personal injury. For any questions relating to the installation and operation, do not use the equipment until you have contacted your supplying distributor.

Please observe the following DOs and DON'Ts while operating the IQ Pro machine.

1. **DO** wear face, eye, respiratory, and body protection devices as indicated for the operation or environment.
2. **DO** keep the working area clean and ensure adequate lighting is available.
3. **DO** ensure the power is disconnected from the machine before tools are serviced or any attachment is to be fitted or removed.
4. **DO** ensure the keys and adjusting wrenches have been removed and all the nuts and bolts are secured.
5. **DO NOT** wear loose clothing, gloves, bracelets, necklaces, or ornaments.
6. **DO NOT** use dull, gummy, or cracked cutting tools.

1.2 Safety Call-Outs

In this manual, actions or situations which require particular caution are highlighted with the following call-outs:



An imminently hazardous situation which, if not avoided, will result in death or serious injury.

 **CAUTION**

A potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **WARNING**

A potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTE

A helpful tip from our technical staff.

2.0 Machine Specifications

Spindle RPM	6,000 – 24,000
Controller	Rich Auto DSP B57E Handheld
Ball Screw	On All Axis
Gantry Clearance	10"
Machine Worktable	24: x 36" or 24" x 48"
Machine Footprint	39-1/2" x 63"
Work Envelope	24" x 36" or 24" x 48"
Weight	746 lbs.
Shipping Weight	925 lbs.
Shipping Dimension (W x L x H)	68" x 44" x65"

3.0 The IQ Pro Machine

3.1 IQ Pro Components



Figure 3-1: IQ Pro Machine Components

- | | |
|-------------------------|-----------------|
| 1. Electrical Cabinet | 5. Gantry |
| 2. Handheld Controller | 6. Vacuum Table |
| 3. Linear Bearing Rails | 7. Frame |
| 4. Router Spindle | |

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1. Electrical Control Box

The electrical control box is attached to the machine by a flexible conduit and can be located close to the machine (preferably on a shelf under the machine). The electrical control box houses all the electrical components. There is an emergency stop switch, on/off/switch, main electrical isolation switch, and spindle controller/display. There are carry handles on the sides of the box. The main power cable is located in the back of the box.

2. Handheld Controller

The B57E Handheld Controller (HHC) controls all the functions of the IQ Pro.

3. Linear Bearing Rails

Bearing rails are located on either side of the machine frame. The bearing rails guide the gantry as it travels along the frame.

4. Router Spindle

The high-precision router spindle is water-cooled. The spindle moves along three (3) axes by a precision ball screw system controlled by the handheld controller.

5. Gantry

The gantry straddles the bed and carries the router spindle motion system. It is moved along the length of the bed by the ball screw and guided by the linear bearing rails. The gantry is controlled by the handheld controller.

6. Vacuum Table

The vacuum table has holes which generate suction to hold down project material. The table features grooves to ensure that air is extracted evenly. T-Slots are also provided so that spoil boards and/or project materials can be clamped to the table.

NOTE

The better the vacuum, the more securely the material will be held in place.

7. Frame

The frame is a welded heavy steel tubular construction that supports all other parts of the machine.

8. Ball Screw (now shown)

There are three (3) ball screws; one (1) for each axis. Each ball screw is driven by a stepper motion and moves the router spindle in the X, Y, and Z directions.

9. Gantry Caterpillar Track (not shown)

The caterpillar track runs along the side of the machine in a trough and carries all the electrical cables and the spindle cooling tubes. There is second caterpillar track under the bed of the machine that carries the electrical cables for the longitudinal movement.

10. Water Pump (not shown)

The water pump coolant for the router spindle motor. Running the router spindle without the cooling pump running can lead to spindle bearing failure. The pipe connector is push fit and is used for connection of the spindle water pipe.

3.2 Accessories

The following accessories are included with the IQ Pro:

- One (1) Water Pump
- One (1) Pipe Fitting
- One (1) Handheld Controller
- One (1) Laguna Toolbox
- One (1) Spare Drive Belt
- One (1) Flash Drive
- One (1) Allen Key
- Two (2) Wrenches
- Five (5) Tool Cones
- Seven (7) Collets
- Twelve (12) Bits

4.0 Setting Up the IQ Machine

4.1 Attach an Electrical Plug to the Power Cord

A Power Cord with a NEMA L6-30 plug (not provided) must be connected to the electrical power cord in the center rear of the electrical cabinet. The 220 Volt plug must be connected only to a 220 Volt electrical outlet. Ensure the necessary plug has been acquired prior to installation. Consult a licensed electrician if necessary.



Figure 4-1: NEMA L6-30 Plug

4.2 Setup the Pail for the Liquid Cooled Spindle

1. Locate the top of the pail with two (2) holes for the water pump.
2. Place the two (2) separate clear hoses into the top of the two (2) holes. The fit will be tight in order to keep dirt out of the pail.
3. Attach the blue fitting to the water pump.
4. Place the end of the clear hose into the blue fitting on the water pump. The fitting will automatically lock to the hose. To release the hose, press down on the blue ring.



Figure 4-2: Holes for Water Pump Hoses

4.3 Setup the Water Pump for the Liquid Cooled Spindle

1. Place the water pump in the pail.
2. Pass the black electrical cord of the water pump through the slot provided on the pail.
3. Fill the pail three quarters full of water (distilled water is recommended).
4. Place the lid on the pail.
5. Insert the water pump electrical plug into a 110 volt outlet before operation.

4.4 Vacuum Pump Installation

The vacuum pump provides the suction necessary to hold projects to the vacuum table. The vacuum pump should be installed prior to operation.

1. Remove the cover from the vacuum pump power box.

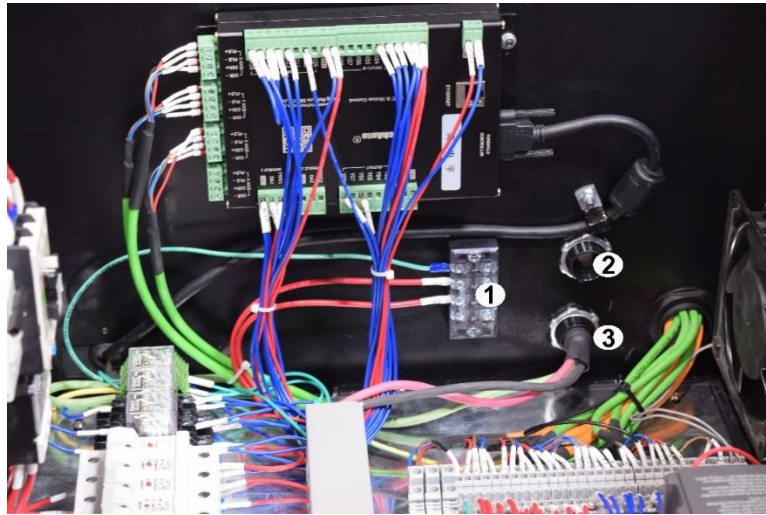
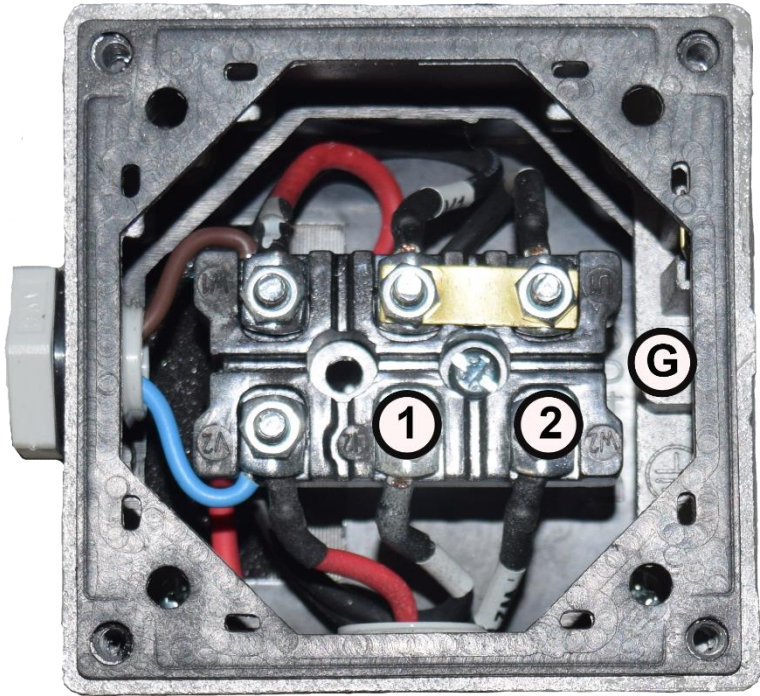


Figure 4-3: Interior of Electrical Cabinet

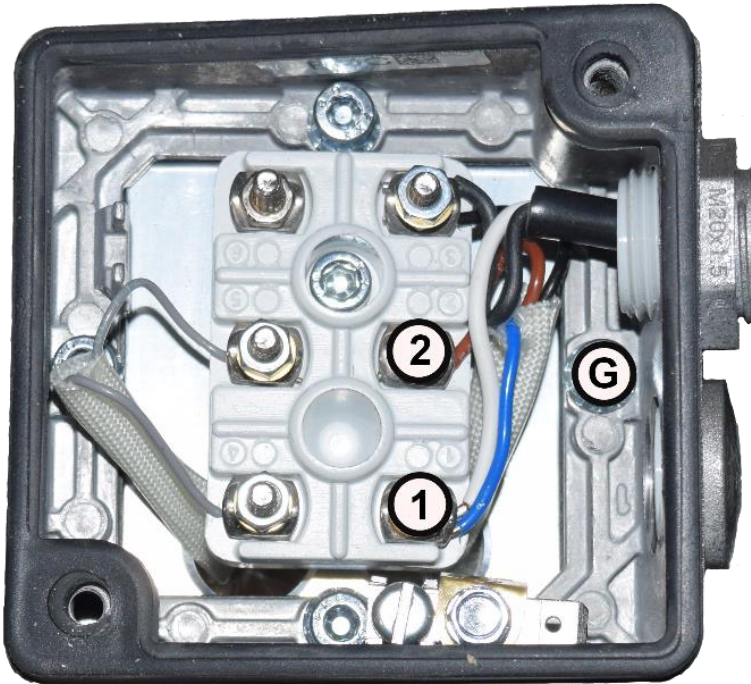
1. Vacuum Pump Terminals
2. Vacuum Pump Power Cord Port
3. Electrical Power Cord Port

2. Connect the power wires to the vacuum power terminals.
3. Connect the green ground to the ground terminal.
4. Remove the cover of the electrical cabinet.
5. Insert the vacuum power cord through the port above the electrical power cord.
6. Connect the green ground wire to the ground terminal.
7. Connect the power wires to the contactor terminals.
8. Verify all connections are correct; close the electrical cabinet and vacuum power box.
9. Connect a 32 mm hose to the vacuum pump at the back of the IQ machine. Secure with the provided clamps.



- U2 - Leg 1
- W2 - Leg 2
- G - Ground Terminal

Figure 4-4: Laguna DB-330-11 (2.5 HP) Vacuum Pump



- 1 - Leg 1
- 2 - Leg 2
- G - Ground Terminal

Figure 4-5: Becker SV200 (2.4 HP) Vacuum Pump

NOTES:

5.0 Basic Operation

5.1 Before Turning on the Power

Please review and observe these Dos and Don'ts before turning on the power to the IQ Pro:

1. **DO** verify the water level in the spindle reservoir. If operating the IQ Pro for carving work, a much larger quantity of water will be needed for the spindle-cooling reservoir.
2. **DO** lubricate the ball screws every eight (8) hours of operation. Use 30W oil or lithium white grease lubricant or equivalent to lubricate the ball screws. Wipe off any excess to reduce dirt and dust accumulation.
3. **DO** keep your collets clean from dust build-up.
4. **DO** press the E-Stop button on the control box and turn off the main power prior to changing tooling or working on the spindle. Remember to clear alarms caused by the E-Stop button on the alarm pages after the E-Stop has been removed.
5. **DO** turn off main power prior to working on or servicing the spindle water pump and or reservoir.
6. **DO NOT** ever, under any circumstances, reach over the table or obstruct the movement of the gantry while the machine is powered or running a program.

5.2 Turning on the Machine

The Emergency Stop (E-Stop) button must be released prior to turning on the power. Twist the E-Stop button clockwise until it releases outward.



Figure 5-1: IQ Pro Control Panel

- | | |
|-------------------|--------------------|
| 1. Emergency Stop | 3. Vacuum On/Off |
| 2. Control On/Off | 4. Spindle Display |

NOTE

Before you turn on the machine, remove all tools and other objects from the machine tools.

1. Verify the water reservoir is full and the water is circulating through the spindle.
2. Turn the rotary power switch (Figure 5-2) to the ON position.
3. Press the Control Power ON/OFF button on the control panel.
4. After the HHC has fully booted, the machine must be Homed before any other function is performed (see Section 5.4).



Figure 5-2: Rotary Power Switch

5.3 Fitting the Job to the Table

Safely secure materials to the cutting table by use of the provided clamp, double-sided tapes, vacuum, etc.

5.3.1 Using the Vacuum Table

The vacuum table generate suction to hold down project material. The table features grooves to ensure that air is extracted evenly. To seal a zone from leakage, press a foam rubber gasket into the outer grooves.

5.3.2 Using the T-Slots

T-Slots enable clamping spoil boards and project materials directly to the table. Clamps are provided for this purpose.

5.4 Homing the IQ Pro

Homing refers to establishing set coordinates which the machine uses as a starting point. The machine must be homed each time it is powered on.

1. When the B57E controller is powered on, the user will be prompted with the HomeTypeAtStart window (Figure 5-3).
2. The machine needs to be homed each time the machine is powered on.

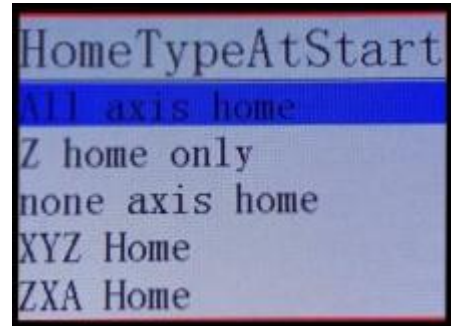


Figure 5-3: All Axis Home

- This resets your machine coordinates origin, relative to the home switches and flags.
 - The tool locations are relative to the machine origin.
3. The default selection is **All axis home**.
 - Press **REF/OK** to begin homing all axes or select another option.

5.5 Basic Button Functions

1. The Rich Auto motion control system uses 1-button and 2-button combination functions.
2. Only the most used button functions are covered in this section.
3. The B57E Handheld Controller (HHC) features the following buttons (from top left):

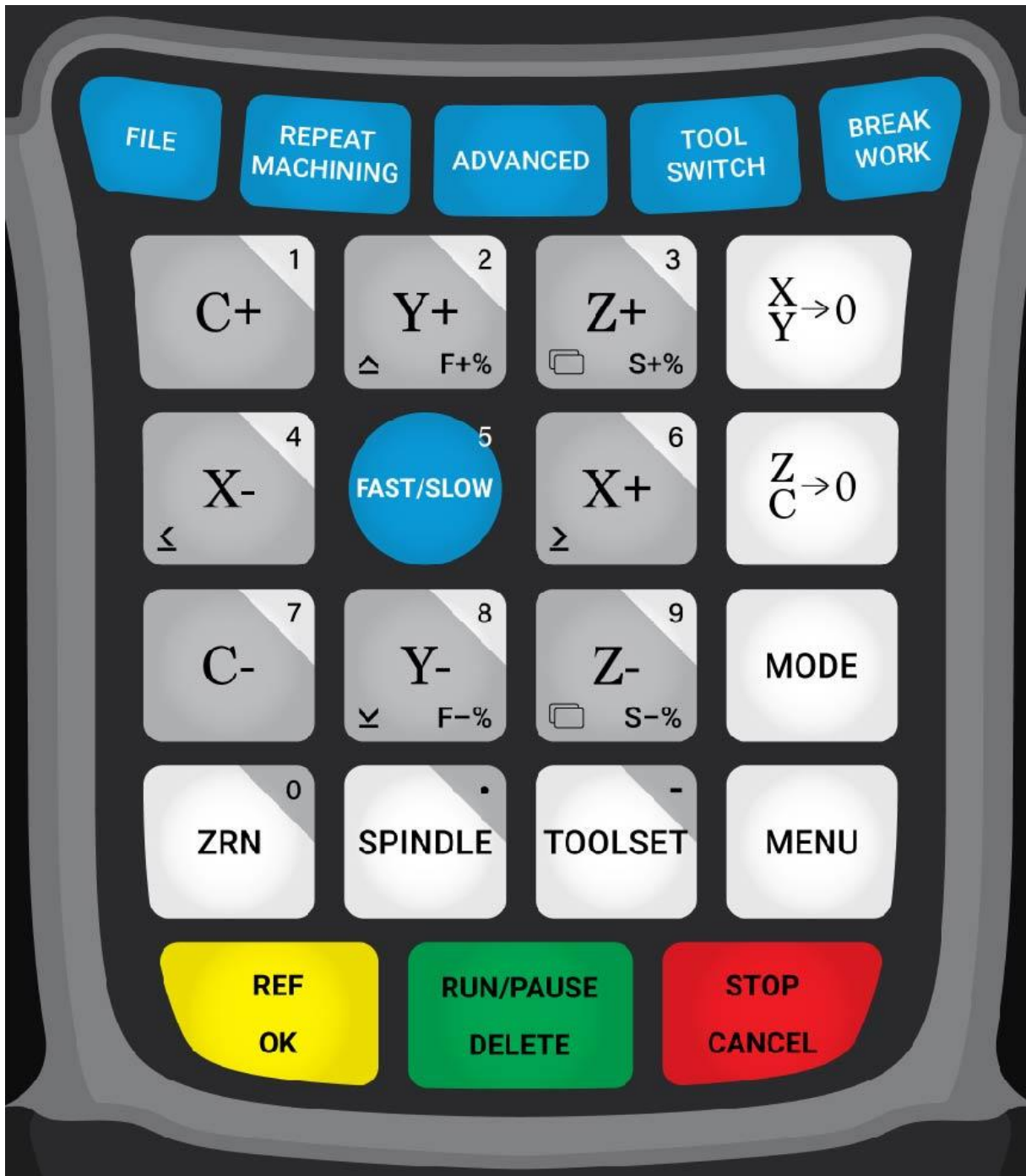


Figure 5-4: B57E HHC Keypad

FILE – Loads a job file

REPEAT MACHINING – Repeat last program

ADVANCED – Opens the Advanced Function menu

TOOL CHANGE – Opens the Tool Change menu

BREAK WORK - Saves the stop points

1 -9 (C+ to Z-) – Functions as both the numerical keys and the Jog Spindle Controls

X/Y → 0 – Set X and Y work origin

FAST/SLOW – Switches between fast and slow jog speeds

ZC → 0 – Set Z work origin

MODE – Switches between continuous, step, and distance jog modes

ZRN – Home the machine

SPINDLE – Turns the spindle ON and OFF

TOOLSET + MENU – Executes a tool touch with the current tool

REF/OK – OK for selection; Return to work origin

RUN/PAUSE/DELETE – RUN starts a job file; PAUSE pauses a running job; DELETE deletes input data

STOP/CANCEL – STOP stops as a running program; CANCEL cancels inputs and operations

5.6 Changing Tools

A tool can be inserted or removed two (2) ways:

1. Manually – Using the tool release button on the side of tool head.
2. Automatically – Using the Tool Switch button.
 - a. Press **ToolSwitch** button
 - b. Use up and down arrow **Y** buttons to highlight tool selection.
 - c. Press **REF/OK** button.

6.0 Quick Start Section

This section provides a workflow from turning on the machine to starting your program.

This walkthrough assumes only Tool 1 is used:

1. Power on machine (Section 4.2).
2. Home machine (Section 4.4).
3. Verify the machine is connected to an air supply.
 - a. The tool changer needs **6-7 bar or 87 psi-100 psi**.
 - b. Use the pressure regulator on the back of the machine to adjust air pressure.
4. Plug in the water pump and verify water is flowing through the spindle (only applicable to machines equipped with liquid cooled spindles).
5. Setup a tool cone (Figure 6-2) with the router bit you intend to use.
 - a. Use the manual tool release button located on the tool head to load the tool cone into the spindle.
 - b. It is pertinent that the spindle releases and engages the tool cone repeatedly. This quick check will prevent an error condition.
6. Transfer your G-Code program onto a USB and transfer to the controller's internal memory.

When running a program directly from a USB, memory transfer is less reliable. It is recommended to store the program in the controller's internal memory.

 - a. **MENU** → *Menu Function User Interface* → **REF/OK**.
 - b. *Machine Configuration* → **REF/OK**.
 - c. Select *Copy File* press **REF/OK**.
 - d. Select the *UDisk File* you want to copy press **REF/OK**.
 - e. Press **STOP/CANCEL** a few times to return to the controller home screen.
7. Load Program into viewer.
 - a. Press **FILE** → *Internal File* → **REF/OK**.



Figure 6.1: Pressure Regulator



Figure 6.2: Assembled Tool Cone

- b. Select your program → **REF/OK**.
8. Mount work piece to the tabletop.
 - a. This can be done with supplied table clamps (Figure 5-3).
 - b. There are multiple ways to secure the work piece. Find the method which works best for your application before continuing.
 - c. Always consider clearance between the router bit and table clamps. When the machine changes tools it will need to travel to the back of the machine during program execution.



Figure 6-3: Assembled T-Slot Clamp

- a. Workpiece 1 should be selected.
 - b. To change to workpiece 1, Hold **MENU** → press **C+ / 1** button.
9. Verify coordinate system.
 - a. Workpiece 1 should be selected.
 - b. To change to workpiece 1, Hold **MENU** → press **C+ / 1** button.
10. Verify which tool cone is currently in the spindle and compare to the **CurSpindle** parameter on the controller run screen. If current tool number is not tool 1, then switch tools using tool switch function.
11. Jog the spindle to the XY origin point. This is determined when the CNC program is created.
 - a. If you are using Vectric's V-Carve software, it is called the XY datum position.
 - b. Once the spindle is in position press the **XY→ 0** button to set the XY origin point.
 - c. On the controller, you will see the X and Y axis coordinates go to zero.

For multi-tool programs go to Section 6.

- a. Set jog speed to low and carefully move the spindle down towards the top of the material until the desired Z zero position is obtained. It may be helpful to use a sheet of paper by sliding it back and forth under the bit, while jogging the Z-Axis down. When the paper is snagged by the bit, it is within a paper thickness (0.1 mm) of the material.
 - b. Press the **ZC →** button.
 - c. On the controller, you will see the Z-Axis coordinate go to zero.
12. Set the Z origin point (Manually).
 - a. Set jog speed to low and carefully move the spindle down towards the top of the material until the desired Z zero position is obtained. It may be helpful to use a sheet of paper by sliding it back and forth under the bit, while jogging the Z-Axis down. When the paper is snagged by the bit, it is within a paper thickness (0.1 mm) of the material.
 - b. Press the **ZC →** button.
 - c. On the controller, you will see the Z-Axis coordinate go to zero.
13. Press **REF/OK** button. This will retract the spindle to a safe starting location.

14. Put on your safety glasses and run the program.

- a. In case of an emergency or machine failure you can hit the E-STOP button on the control cabinet. In most cases the stop/cancel button on the HHC is a preferred stopping method.
- b. Press the **RUN/PAUSE/DELETE** button to start the program.
- c. Accept the default runtime parameters by pressing **REF/OK**.

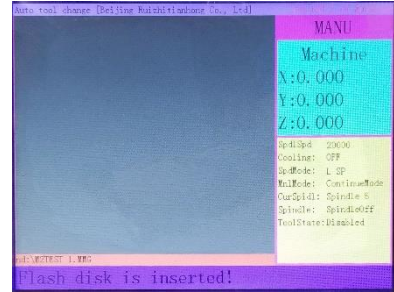


Figure 6-4: Control Screen

15. While the program is running, the Feed Rate can be adjusted by pressing the **Y+** or **Y-** buttons:

- a. **Y+** will increase the feed rate by 10%.
- b. **Y-** will decrease the speed by 10%.
- c. The max speed is determined by the program file.

16. Program End - At the end of a program the spindle will stop and the Z-Axis retract to a safe clearance height.

7.0 Multiple Tool Program

There are preliminary steps that need to be done before running a multi-tool program:

1. Prepare the machine (Sections 5.2).
2. Prepare all tool cones for the job and place into the corresponding tool holders.
3. Run procedure to calculate tool offsets (Section 6.1).
4. Set XY work origin (Section 7.2).
5. Set Z work origin (Section 7.3).
6. Run program (Section 5.11).



Figure 7-1: Tool Rack and Touch Off Puck

7.1 Setting Tool Offsets

1. Place the designated tools, determined at the time of program creation, into the corresponding tool holders on the machine.
2. Change to Workpiece 1 and Tool 1 (Section 3.5).
 - a. Verify Workpiece 1.
 - b. Verify **CureSpindle: Spindle 1** and Tool 1 is in the spindle.
 - c. Manually jog the spindle into a safe location by the tool rack. The machine will return to the starting position after changing tools.
3. Press and hold **MENU** button → press **TOOLSET** button → release both buttons.
 - a. The spindle will move over the tool touch off switch from its current position.
 - b. Rapid to a preset Z value (ToolSettingZ).
 - c. At a slower feed rate, it will lower until the switch is triggered, then retract.
4. Once Tool 1 has touched off, Switch to Tool 2, using the Tool Switch button.
5. Press and hold the **MENU** button → press **TOOLSET** button → release both buttons.
6. Once Tool 2 has touched off, Switch to Tool 3, using the Tool Switch button.
7. Press and hold the **MENU** button → press **TOOLSET** button → release both buttons.
8. Switch back to Tool 1 using the Tool Switch button.
9. Offsets are now calculated.

7.2 Setting XY Work Origin

Jog the spindle to the XY origin point. This origin is determined when the program is created.

1. If you are using Vectric's V-Carve software, the Origin is called the XY datum position.
2. Once the spindle is in position press the **XY → 0** button to set the XY origin point.
3. On the controller, you will see the X and Y axis coordinates go to zero.

7.3 Setting Z Work Origin

Set the Z origin (Manually).

1. Set the jog speed to low and carefully move the spindle down towards the top of the material until the desired Z zero position is obtained. It may be helpful to use a sheet of paper by sliding it back and forth under the router bit, while jogging the Z-Axis down. Once the paper is snagged by the bit it is within a paper thickness (0.1 mm).
2. Press the **ZC → 0** button.
3. On the controller, you will see the Z-Axis coordinate go to zero.

7.4 Run Program

1. Copy the G-Code program to a USB and transfer to the controller's internal memory. When running a program directly from a USB, memory transfer is less reliable. Laguna Tools recommends storing the program in the controller's internal memory.
 - a. **MENU → Menu Function User Interface → REF/OK.**
 - b. *Machine Configuration* → **REF/OK.**
 - c. Scroll down to *Operate File* then press **REF/OK.**
 - d. Select *Copy File* press **REF/OK.**
 - e. Select the *UDisk File* you want to copy press **REF/OK.**
 - f. Press **STOP/CANCEL** until the controller returns to the home screen.
2. Load Program into viewer.

Press **FILE → Internal File → REF/OK → select your program → REF/OK.**

7.5 Understanding Work Coordinate Systems

1. Machine Coordinates (Workpiece 0).
 - a. The origin is based off the home switches.
 - b. Tool positions and TTO switch location are set relative to machine coordinates.
 - c. Press **MENU + ZRN/0** to switch to Workpiece 0.
2. Hold down the **MENU + 1-0 buttons** to move between work coordinate systems.
3. In the picture to the right the active work coordinate system is Workpiece 2.
4. Transitioning between Workpieces will in turn, transition between X, Y, and Z offsets made in each Workpiece.

7.6 Tool Cone Setup

1. Select a router bit and its corresponding collet.

NOTE

Collets and spindle nut must be cleaned regularly. Ensure that the slots in the collets are free of sawdust.

2. Press the collet into the spindle nut until it snaps into place.
3. Thread on the collet assembly onto the tool cone.
4. Insert the router bit into the collet.
5. Use the provided wrenches to tighten the spindle nut.

7.7 Resetting Tool Locations – Homing the Machine

This will reset the controller's machine coordinates relative to the position of the home switches and flags.

1. Verify the controller is in machine coordinates (Workpiece 0). If not, press **MENU + ZRN/0** to change to machine coordinates.

2. Put an empty tool cone into the spindle using the manual tool release button.
3. Using the handheld controller's jog control, carefully guide the cone into the tool rack.
 - Step Jog Mode can be used for smaller and precise increments.
4. Record the X, Y, and Z position. Verify that these are in machine coordinates.
5. Carefully jog the tool out of the tool rack.
6. Navigate to the ATC stored locations, by following the below steps:
 - a. **MENU** → *Menu Function User Interface* → **REF/OK**.
 - b. *Machine Setup* → **REF/OK**.
 - c. Scroll down to *ATC setup* → **REF/OK**.
 - d. Scroll up to *ATC position* → **REF/OK**.
 - e. Press **STOP/CANCEL** to clear the warning.
 - f. Select an ATC position.
 - g. Select the X, Y, or Z position and press the **RUN/PAUSE/DELETE** button to edit.
 - h. Use the numeric buttons to enter in the new tool position and press **ORIGIN/OK** to save.
 - i. Repeat this process for each X, Y, Z coordinate for tools 1, 2, and 3.
 - j. Verify your work.
 - Test the tool change without a tool cone.
 - Test the tool change with a tool cone without a router bit.

7.8 Setting the Tool Touch Off (TTO) Location

1. After homing the machine, press **Menu** and **ZRN** simultaneously.
2. Jog the machine until it is centered over the TTO location about four (4) inches.
3. Write down the coordinates of X, Y, and Z.
4. Go to **Menu > Menu Function User Interface > Machine Setup > Toolset Setup > C.A.D. Position**.
5. Press **STOP/CANCEL** twice to display coordinates.
6. Edit and replace the coordinates with the **RUN/PAUSE/DELETE** button.
7. Press **OK** to save.

7.9 Machine Orientation and V-Carve Set-Up

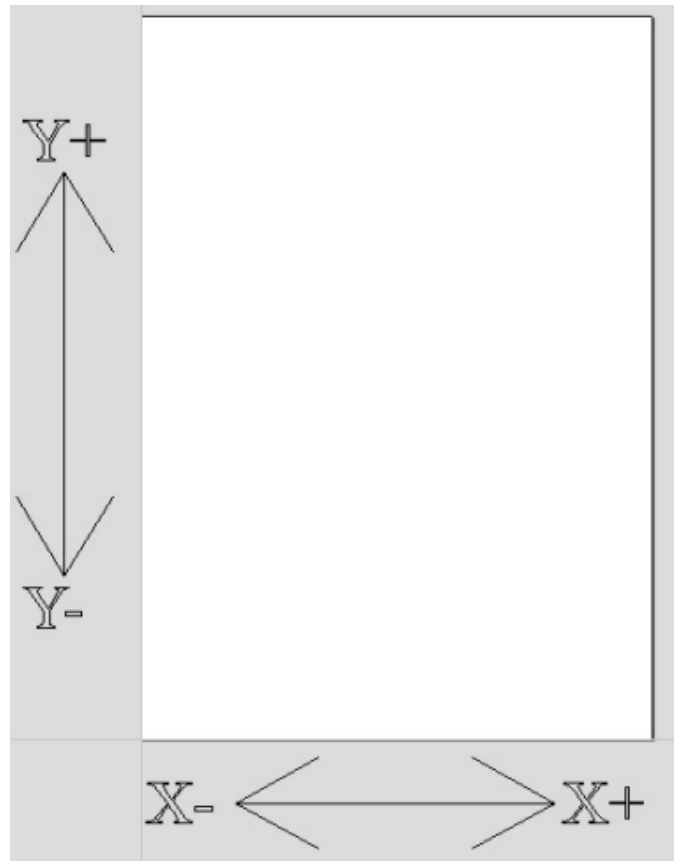
This information will assist with properly setting up programs in the CAM packages. This guide is based on V-Carve, however, most principles will transfer to any program.

7.9.1 Machine Axes and Orientation

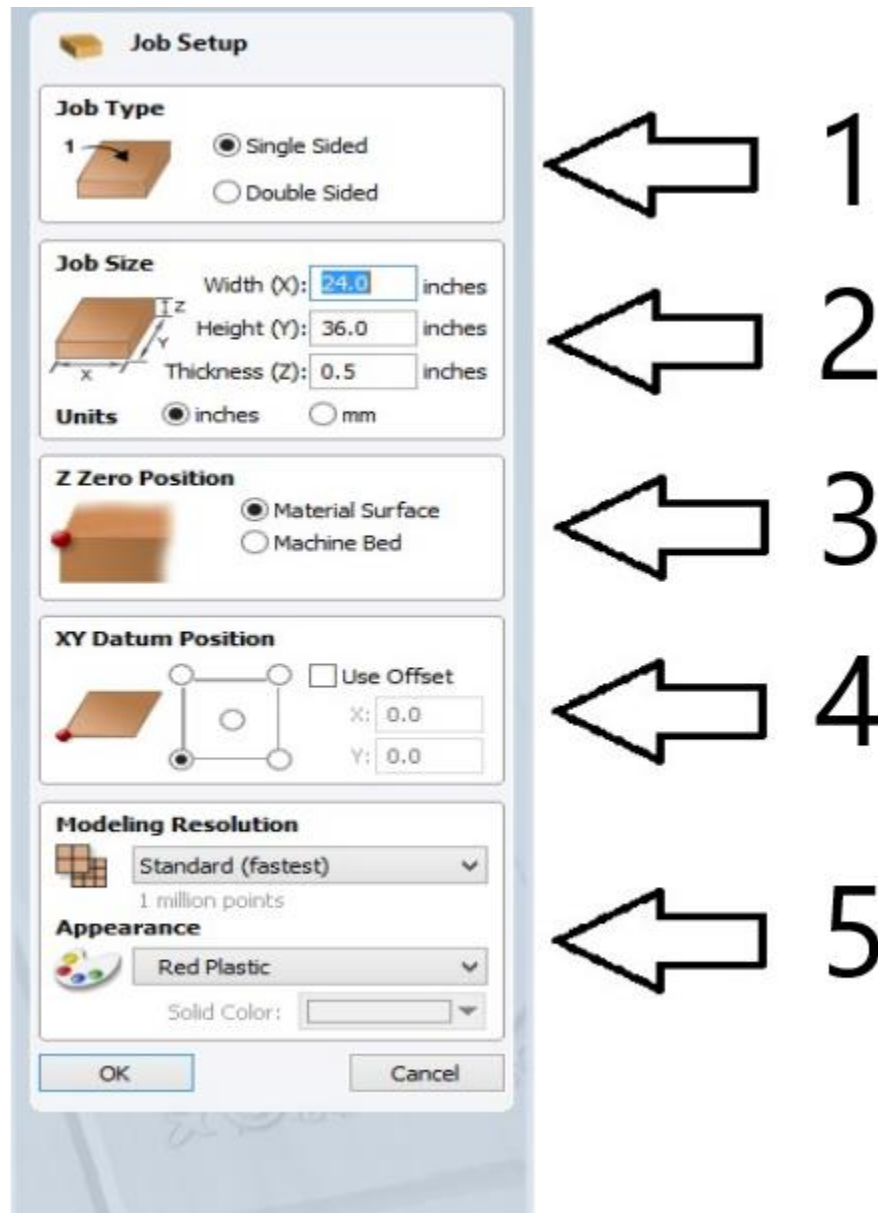
On all standard Laguna Tools IQ CNC routers, there are three (3) axes on the machine. These three (3) axes are X, Y, and Z. Each separate axis has a negative and positive direction to it.

- X-axis: Left to right if standing at front of CNC looking at the spindle plate
- Y-axis: Front to back if standing at front of CNC looking at the spindle plate
- Z-axis: Up and down if standing at front of CNC looking at the spindle plate

In V-Carve, the program file should have X and Y axes as follows in diagram (the Z-Axis would correlate to the material thickness in V-Carve).



7.9.2 V-Carve Material Set-up

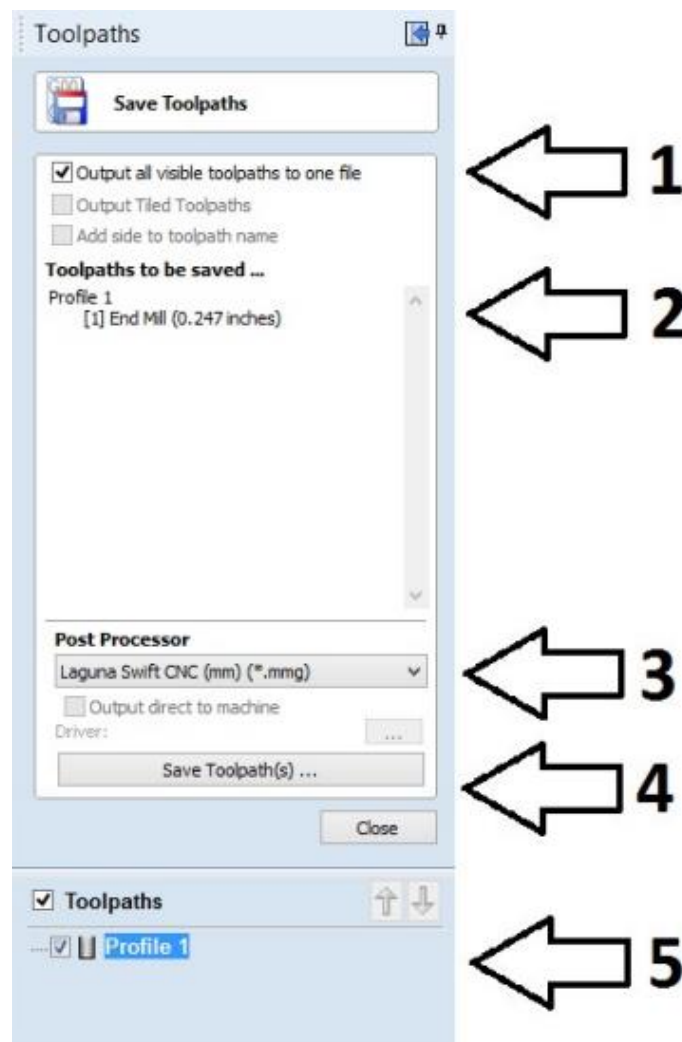


1. **Job Type** - Whether the piece has machining tool paths on just one side or both sides. Normally, this will be set to single sided.
2. **Job Size** - The size of the material in use. Verify the dimensions are accurate.
 - Thickness of material should always be measured with digital calipers to verify accuracy of depth of cuts
 - Units may be in inches or millimeters

3. **Z Zero Position** - Basis for the height of the tool. On the IQ, the machine is configured to use a Z zero at *Material Surface* as that is referring to the top of the part you are machining and all tool heights are based off the surface.
4. **XY Datum Position** - The XY start point (XY- 0) that you will assign before running the program.
5. Purely in reference to the visual of model the software will create and will not affect the code being sent to the machine.

7.9.3 Saving Code to Run on the Machine

After creating a V-Carve drawing and toolpaths, save the file. Click the **Save Toolpaths** icon under the tooling tab. The created file is referred to as the G-Code. The G-Code will have a file extension of .mmg (not .crv or .crv3d).



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1. **Save Toolpaths** - When saving your toolpath on the IQ, verify the box next to *Output all visible toolpaths to one file* is checked to save multiple tool paths using the same exact tool into one (1) file.
2. **Toolpaths to be Saved** - A list of all tool paths that will be saved into the G-Code for the machine. The toolpaths will run in this order (always cut parts out free at the very end) and the numbers in brackets refer to its tool # position in the rack at the machine.
3. **Post Processor** – The Post Processor in use for the handheld controller.
4. **Save Toolpath(s)** - The button you press to save all the tool paths into one G-Code file.
5. **Toolpaths** - The list of all your toolpaths and the check boxes to activate them to be saved to the code. All toolpaths checked will be saved into the code. Save only the toolpaths proper for the current program. If multiple tools are in use, each file must be saved as its own separate toolpath (if two-sided, save the correct toolpaths for each side being cut).

8.0 Maintenance

Regular maintenance of the IQ Pro will ensure optimal performance. Please follow these maintenance routines.

8.1 Lubrication

Regularly lubricate the bearing surfaces and the ball screws (every twelve (12) hours at a minimum). Use a thin lithium spray or 30W oil lubricant. Spray daily and wipe away the excess.

8.2 Daily Checks

1. Clean the machine and lubricate unpainted surfaces with 30W oil lubricant. The linear guides and ballscrews should be lubricated with lithium grease. Wipe away any excess and buff with a dry polishing cloth. This will reduce the likelihood of rust forming.
2. Inspect the machine for damaged, loose, or worn parts. Verify there are no loose wires, bolts, etc.
3. Check the dust collection hose and hood for blockage or possible breakage.
4. Check cutter teeth for chips and dullness or general wear. Collets are a consumable item that should be cleaned regularly for optimal usage to prevent slippage while cutting.
5. Collets and spindle collet holes must be cleaned regularly. Ensure that the slots in the collets are free of sawdust, as sawdust builds up and will stop the collet from compressing. If the collet or spindle holes are not clean, the router bit may not run true, and this will affect the performance of your machine.
6. Verify the water pump is functioning properly to ensure cooling of the spindle while in operation.

8.3 Weekly Checks

1. Inspect lubrication of bearing surfaces (linear guides and ballscrews) and reapply where needed. Wipe away any excess and buff with a dry polishing cloth.
2. Clean the cutters.
3. Check cutter teeth for chips and dullness.

4. Inspect the machine for damage and loose or worn parts.
5. Check the dust extraction for blockages.
6. Replace the water in the pump bucket and verify it is clean. Use only distilled water. In colder climates, a mixture of water and anti-freeze can be used. If exposed to freezing temperatures, all water must be sprayed out of the lines. Frozen water will expand and might destroy the seals and spindle.
7. Rotate the water lines every week (Inlet to outlet and reverse for the other pipe). This will clean out any dirt or other debris that is accumulating inside the cooling system.
8. Check that all electrical connectors are fitted correctly and are not loose.
9. Check that all the motor couplers are connected and that the screws are tight.

8.4 Position of Stop Switches

The stop switches are activated by proximity to steel items and can be tested by placing a screwdriver or something similar on the activation face (top). When activated, the LED should light. If the LED does not come on, the switch or wiring is faulty.

X-Axis is activated by the vertical axis cover.

Y-Axis is activated by a steel flag located on the end of the frame (under the bed).

Z-Axis is activated by a steel flag located on the router support plate.

8.5 Universal Joints

The ball screws are coupled to the motor shafts with a universal joint. The joints should be checked periodically to check that they are tight and not damaged. If loose, tighten the clamping screws. Replace if damaged.

8.6 Ball Screw Adjustment

The ball screws are factory set and no adjustment should be required. If the ball screws need adjustment, the C wrench nut needs to be adjusted.

1. Bend the locking tag washer out of the slot in the nut.
2. Tighten the nut so that it is snug.

3. Bend the relevant locking tab into the nut slot.

8.7 Fuses

The electrical functions of the machine are protected by fuses. To access the fuse, pull the fuse holder up. Once the fuse has been verified that it has not blown, ensure that the fuse holder is pushed down and is fully home.

NOTE

Never access the inside of the electrical box with the mains connected.

9.0 Troubleshooting

9.1 IQ Machine

Issue	Suggested Action
Machine will not start	<ol style="list-style-type: none"> 1. Verify the start switch is firmly and fully pressed. 2. Verify the Emergency Switch is fully released. 3. Verify the electrical power cord is plugged into the power outlet. 4. Verify the electrical supply is on. Reset the breaker if necessary. 5. Disconnect power from the machine and verify the wiring to the plug is correct. Verify the rubber insulation is stripped properly and not causing a bad connection. Verify all the screws are tight.
Machine will not stop	<p>This is a very rare occurrence, as the machine is designed to failsafe. If it should occur and you cannot fix the fault, seek professional assistance. The machine must be disconnected from the power and not powered back on until the fault has been rectified.</p> <ol style="list-style-type: none"> 1. The Internal breaker is faulty. 2. Replace the breaker.
Motor tries to start but will not turn	<ol style="list-style-type: none"> 1. With the power disconnected from the machine, try to turn the spindle by hand. If the spindle will not turn, check for possible jamming. 2. Motor faulty. Replace the spindle. 3. Spindle operated without coolant. Replace the motor. 4. Check the voltage supplied to the VFD is 220V.
Motor overheats	<p>Overheating is typically caused by dull cutting tools, no water in the coolant tank, blockage in the coolant pipe, or excessive ambient temperature.</p>
Squeaking noise	<p>Check the bearings.</p>

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Issue	Suggested Action
Spindle slows down during a cut	<ol style="list-style-type: none"> 1. Dull cutting tools. Replace the tool or have it resharpened. 2. Feeding the wood too fast. Slow down the feed rate. 3. Cutter feeds and spindle speed are not correct. Adjust the feeds and speeds.
Machine will not home	<ol style="list-style-type: none"> 1. Verify the home position sensors are undamaged, properly adjusted, and connected. 2. Verify the parameters in the handheld controller are correct. 3. After the completion of a project, press the OK button and verify the router head returns to the home position.
Jobs are machined inconsistently	<ol style="list-style-type: none"> 1. Verify the motor drive belt is tight and not damaged. Replace, if damaged. 2. Verify the drive couplings are tight and undamaged. Tighten loose couplings. Replace damaged couplings. 3. Verify the slider bearings are fixed tight and undamaged. Tighten loose bearings. Replace damaged bearings.
Inaccurate position of router head	<ol style="list-style-type: none"> 1. Verify the drive screws and the bearing rails are clean and lubricated. 2. If the gantry/router head movement is too fast: <ol style="list-style-type: none"> a. Verify that the machine is correctly grounded and there is no static or electrical interference. b. Verify all the bearings and motor-fixing bolts are tight. c. Verify the input voltage is correct; it must be 220V.

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Issue	Suggested Action
The gantry or router head will not function	<ol style="list-style-type: none"> 1. Verify the handheld controller cable is properly connected. 2. Verify the drive wires are not loose or damaged. 3. Verify the handheld controller is not damaged 4. Examine the drive circuit board for damage. Replace the circuit board if damaged.
The cutting depth is inconsistent	<ol style="list-style-type: none"> 1. Verify there is no excessive play in the Z-axis ball screw drive mechanism. Verify the bit is tight in the spindle collet.

9.2 Handheld Controller

Issue	Suggested Action
The screen is blank, dull, or flickers	<ol style="list-style-type: none"> 1. Verify the cable to the handheld controller is fitted correctly and the clamping screws are tight. 2. Verify the connectors on the interface printed circuit board are fitted correctly and all the screws are tight. 3. Verify the fuse is not blown. 4. If the 50-pin interface is damaged, replace the damaged part. 5. If the power supply is damaged, replace the power supply. 6. If the handheld controller is damaged, replace the handheld controller. 7. Verify the supply voltage is within specification.
The display indicates that the spindle is on, but the spindle is not rotating or vice versa	<ol style="list-style-type: none"> 1. Verify there are no loose or broken wires among the wiring. 2. Verify the spindle settings on the handheld controller are correct.

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Issue	Suggested Action
The screen is frozen Loading on start-up	<p>May be caused by a corrupted operating system (OS).</p> <ol style="list-style-type: none"> 1. Hold down a button on power-up to enter emergency mode. 2. Reload the OS via updating.
The screen is green on start-up	<p>This is a catastrophic failure. Return the controller to Rich Auto for repair.</p>
Work origin of X and Y cannot be set	<p>Press MENU and 0 to return to the starting coordinate system.</p> <p>If the button does not appear functional, verify the button are working:</p> <ol style="list-style-type: none"> 1. Press MENU. 2. Select <i>System set-up</i>. 3. Select <i>Button check</i>.
Soft limit error	<p>Verify the origin is correctly set for the current code.</p> <p>To verify the origin:</p> <ol style="list-style-type: none"> 1. Press ORIGIN. 2. Select <i>O.K.</i> <p>Verify the table size is set correctly:</p> <ol style="list-style-type: none"> 1. Press MENU. 2. Select <i>Table size</i>. <p>Verify the pulse is set correctly. Calibrate the controller:</p> <ol style="list-style-type: none"> 1. Press MENU. 2. Select <i>Machine Set-up</i>. 3. Scroll down to the <i>Pulse Equiv</i>. 4. All three (3) axes are 320.

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Issue	Suggested Action
Button not responding	<p>Verify the buttons are operational:</p> <ol style="list-style-type: none"> 1. Press MENU. 2. Select <i>System Set-up</i>. 3. Select <i>Buttons check</i>.
DSP screen does not light when power is on	<ol style="list-style-type: none"> 1. Verify the cable connections are good. 2. Verify the controller card is powered by the 24 VDC.
Z-axis drops suddenly	<p>The working speed of Z is too fast.</p> <ol style="list-style-type: none"> 1. Verify the Max speed in the machine setup. 2. Verify the coupling between the Z-axis and the ball screw is not loose. 3. Check wiring between the control card and stepper driver is not damaged. 4. Check wiring between the stepper motor and the driver is not damaged.
Z-axis depth varies on previously run program	<p>The Z-Axis home switch flag has been moved and the homing Z-Axis changes from its previous reading.</p> <p>Electrical noise can cause a false home signal. Verify the motor shields are connected on one end only.</p>
Machine does not stop on the home switches	<p>Verify the home switch signals are recognized by the controller.</p> <ol style="list-style-type: none"> 1. Double click the MENU to view the input status of the home switches. 2. Place metal on the home switch and note if the 1, 2, or 3 arrows on the screen change. <p>Verify the home switch LED is lit when it is flagged with metal.</p> <p>The distance from the flag may have moved preventing the switch from recognizing it.</p> <p>Verify the 50-pin cable between card and controller is fully seated and in good repair.</p>

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Issue	Suggested Action
Home switch LED does not light	Verify there is + and – 24vdc at the switch. If power is present, the switch has failed.
Machine moves in the opposite direction when homing	<p>The home switch is damaged and shorting the output.</p> <p>Home switch wiring to the control card is damaged.</p> <p>Electrical noise is giving a false signal to the card. Verify the shields of the steppers are landed on once end only.</p> <p>Metal is on the home switch causing a false signal.</p> <p>Control card is damaged.</p>
Z-axis does not stop during tool touch off with puck	<p>Communication cable is damaged and shorting signals.</p> <p>The puck's wired connection has failed. Since this is handled often the connections can come apart stopping the signal to the card.</p> <p>Verify the ground/common connection (-24vdc) at the spindle is good.</p> <p>Verify the home switch signals are being known to the controller.</p> <ol style="list-style-type: none"> 1. Double click the MENU button to see the input status of the home switches 2. Place metal on the home switch and note if 1, 2, or 3 arrows on the screen change state.
Screen is dim after power-up but bright when plugged in	<p>Check the 24vdc is correctly measured at the card.</p> <p>The 50-pin cable could be damaged.</p>
Screen is not lit on PC or on machine	<p>The DSP has received a physical shock. This can damage the crystal processor. Replace the DSP.</p> <p>The DSP was exposed to high voltage. Replace the DSP.</p>

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Issue	Suggested Action
DSP readouts change but there is no machine movement	<p>Verify correct power to the lead shine stepper drivers. Green LEDs should be lit on the driver. A red LED indicates the driver is faulted. No LED light indicates no power.</p> <p>If there is only one motor not moving, move the connection to another driver. If this motor does not move, a driver issue is indicated.</p> <p>Verify the cable is fully connected at the handheld controller and the controller card.</p> <p>Verify the mechanical connection to the axis in question is in good condition.</p> <p>The controller card could have failed if all other points have been met</p>
Axis motion in only one direction	<p>Check connections between the driver in question and the controller card.</p> <p>Check connections from the driver to the stepper motor.</p> <p>Verify there is 5vdc at the pulse and direction connections at the driver. Measure from the 5vdc to -24vdc for a reference.</p>
Screen displays spindle on when it is off and vice versa	<p>The output state for the spindle is set incorrectly and needs to be adjusted.</p>
Tool change freezes at the start of the process	<p>Dust hood not retracting.</p>
Dust hood does not raise during a tool change	<p>Check air pressure is 80 – 90 PSI.</p> <p>Verify proper output to the solenoid that raises the hood:</p> <ol style="list-style-type: none"> 1. Press MENU. 2. Select <i>input/output control</i>. 3. Scroll to <i>output 6</i>. 4. Press RUN/PAUSE/DELETE. <p>This will manually activate the rise of the dust hood. If nothing occurs, then proceed with verifying the wiring (check the common at the solenoid and verify the output voltage is received).</p>

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Issue	Suggested Action
Tool change frozen	<p>This occurs when the sensor on the dust hood lifting cylinders does not recognize the hood is retracted. Verify the sensor signal:</p> <ol style="list-style-type: none"> 1. Press MENU. 2. Select <i>input/output control</i>. 3. Check if input #15 changes state. <p>If no signal is received verify the sensor on the air cylinder is flush to the body and is in the retracted position. Manually retract the dust hood and move the sensor until its LED lights. The light indicates the sensing magnet on the piston.</p> <p>Verify wiring to the position switch is correct and undamaged.</p> <p>If all above is verified, replace the position sensor switch.</p>
Machine does not touch TTO switch on tool touch off	<p>The TTO switch is stuck in the down position, or the input state may be incorrect.</p> <p>Go to I/O voltage settings set-up and change state of input #4.</p> <p>The TTO switch is shorted.</p>
Tool crashes into TTO switch during touch off	<p>TTO switch has a broken connection to the controller.</p> <p>Verify the sensor signal:</p> <ol style="list-style-type: none"> 1. Press MENU. 2. Select <i>input/output control</i>. 3. Check if input #4 changes state. <p>With wiring verified and no state change, replace the switch.</p>

NOTES:

10.0 Warranties

Dealer Machinery Warranty

New woodworking machines sold by Laguna Tools carry a two-year warranty effective from the date of dealer invoice to customer/end-user. Machines sold through dealers must be registered with Laguna Tools within thirty (30) days of purchase to be covered by this warranty. Laguna Tools guarantees all new machines sold to be free of manufacturers' defective workmanship, parts, and materials. We will repair or replace, without charge, any parts determined by Laguna Tools, Inc. to be a manufacturer's defect. We require that the defective item/part be returned to Laguna Tools with the complaint. The end-user must request a Return Material Authorization (RMA) number from Customer Service. Include the RMA number with any and all returned parts/components requesting warranty coverage*. Any machines returned to Laguna Tools must be returned with packaging in the same manner in which it was received. A part or blade is being returned must have adequate packaging to ensure it is not damaged during shipping. In the event the item/part is determined to be damaged due to lack of maintenance, cleaning, or misuse/abuse, the customer will be responsible for the cost to replace the item/part, plus all related shipping charges. This limited warranty does not apply to natural disasters, acts of terrorism, normal wear and tear, product failure due to lack of maintenance or cleaning, damage caused by accident, neglect, lack of or inadequate dust collection, misuse/abuse or damage caused where repair or alterations have been made or attempted by others.

* The issue of an RMA number is for reference only; it DOES NOT indicate acceptance of the warranty claim.

CNC Limited Warranty

New CNC machines sold by Laguna Tools carry a one-year warranty effective from the date of shipping. Laguna Tools guarantees all new machines sold to be free of manufacturers' defective workmanship, parts, and materials. We will repair or replace, without charge, any parts determined by Laguna Tools, Inc. to be a manufacturer's defect. If the defective item/part is determined to be damaged due to lack of maintenance, cleaning or misuse/abuse, the customer will be responsible for the cost to replace the item/part, plus all related shipping charges. This limited warranty does not apply to natural disasters, acts of terrorism, normal wear and tear, product failure due to lack of maintenance or cleaning, damage caused by accident, neglect, lack of or inadequate dust collection, misuse/abuse or damage caused where repair or alterations have been made or attempted by others.

Laguna Tools, Inc. is not responsible for additional tools or modifications sold or performed (other than from/by Laguna Tools, Inc.) on any Laguna Tools, Inc. woodworking machine. Warranty may be voided upon the addition of such described tools and/or modifications, determined on a case-by-case basis.

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Software purchased through Laguna Tools, Inc., is not covered under this warranty and all technical support must be managed through the software provider. Normal user alignment, adjustment, tuning, and machine settings are not covered by this warranty. It is the responsibility of the user to understand basic woodworking machinery settings and procedures and to properly maintain the equipment in accordance with the standards provided by the manufacturer.

Parts under warranty are shipped at Laguna Tools, Inc.'s cost either by common carrier, FEDEX ground service, or a similar method. Technical support to install replacement parts is primarily provided by phone, fax, e-mail or Laguna Tools Customer Support Website. The labor required to install replacement parts is the responsibility of the user. Laguna Tools is not responsible for damage or loss caused by a freight company or other circumstances not in our control. All claims for loss or damaged goods must be notified to Laguna Tools within twenty-four (24) hours of delivery.

Please contact our Customer Service Department for more information. Only NEW machines sold to the original owner are covered by this warranty.

For warranty repair information, call 1-800-332-4094.

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No Modifications Allowed or Sold

Laguna Tools, Inc. is not responsible for additional tools or modifications sold or performed (other than from/by Laguna Tools, Inc.) on any Laguna Tools, Inc. woodworking machine. Warranty may be voided upon the addition of such described tools and/or modifications, determined on a case-by-case basis. Normal user alignment, adjustment, tuning, and machine settings are not covered by this warranty. It is the responsibility of the user to understand basic woodworking machinery settings and procedures and to properly maintain the equipment in accordance with the standards provided by the manufacturer. Parts, under warranty, are shipped at Laguna Tools, Inc.'s cost either by common carrier, FEDEX ground service or a similar method. Technical support to install replacement parts is primarily provided by phone, fax, e-mail, or Laguna Tools Customer Support Website. The labor required to install replacement parts is the responsibility of the user. Laguna Tools is not responsible for damage or loss caused by a freight company or other circumstances not in our control. All claims for loss or damaged goods must be notified to Laguna Tools within twenty-four (24) hours of delivery. Please contact our Customer Service Department for more information. Only new machines sold to the original owner are covered by this warranty.

For warranty repair information call 1-800-332-4094.

Laguna Tools Warranty

WARRANTY & REGISTRATION

THANK YOU!

Welcome to the Laguna Tools® group of discriminating woodworkers. We understand that you have a choice of where to purchase your machines and appreciate the confidence you have in the Laguna Tools® brand.

Through hands-on experience, Laguna Tools® is constantly working hard to make innovative, precision products. Products that inspire you to create works of art, are a joy to operate, and encourage your best work.

Laguna Tools®
Imagination, Innovation, and Invention at Work

WARRANTY & REGISTRATION

Every product sold is warranted to be free of manufacturers' defective workmanship, parts, and materials. For any questions about this product, the intended use or what it was designed for, customer service, or replacement parts, please contact our customer service department:

Laguna Tools® Customer Service
2072 Alton Parkway, Irvine, California 92606, USA
1-800-332-4049
customerservice@lagunatools.com
www.lagunatools.com/why/customer-service/
8AM. to 5PM PST, Monday through Friday

For warranty claims or to report damage upon receiving – please reach out to our warranty department:

Laguna Tools® Warranty Service
2072 Alton Parkway, Irvine, California 92606, USA
1-949-474-1200
customerservice@lagunatools.com
www.lagunatools.com/rpolicies/warranty
8AM to 5PM PST, Monday through Friday

REGISTRATION

To prevent voiding this warranty, all products sold must be registered within thirty (30) days of receiving the product. Registering the product will enable the original purchaser to receive notifications about important product changes, receive customer service, and be able to file a warranty claim against defective workmanship, parts, or materials.



WHO IS COVERED

The applicable warranty covers only the initial purchaser of the product from the date of receiving the product. To file such claims, the original purchaser must present the original receipt as proof of purchase.

WHAT IS COVERED

The warranty covers any defects in the workmanship of all parts and materials that make up the machine unless otherwise specified. Any part, determined by Laguna Tools®, to have a defect will be repaired or replaced (and shipped), without charge. The defective item/part must be returned to Laguna Tools® with the complaint and proof of purchase in the original packaging that it was received in. In the event the item/part is determined to be not covered by this warranty, the customer will be responsible for the cost to replace the item/part and all related shipping charges.

WARRANTY LIMITATIONS

This limited warranty does not apply to natural disasters, acts of terrorism, normal wear and tear, product failure due to lack of maintenance or cleaning, damage caused by accident, neglect, or lack-of inadequate dust collection. The warranty may be voided against proof of misuse/abuse, damage caused where repair or alterations have been made or attempted by others, using the product for purposes other than those described as intended use (unless with consent by Laguna Tools®), modification to the product, or use with an accessory that was not designed for the product. It is the responsibility of the user to understand basic woodworking machinery settings and procedures and to properly maintain the equipment in accordance with the standards provided in this manual.

LENGTH OF WARRANTY

All new machines and optional accessories sold through an authorized dealer carry a two-year warranty effective the date of receiving the product. Machines sold for either commercial or industrial use have a one-year warranty. Wearable parts like throat plates, bandsaw guides, etc., have a ninety-day warranty.

Table A-1 Warranty Lengths

2 Year – New Machines Sold Through an Authorized Dealer
2 Year – Accessories Sold as Machine Options (excluding blades)
1 Year – Machines Sold for Commercial or Industrial Use
1 Year – Blades and Accessories outside of Machine Options
90 Days – Wearable Parts

Aside from being free of defects upon receiving, consumable parts, like cutters and abrasives, are not covered by this warranty unless otherwise stated by Laguna Tools®. These parts are designed to be used at the expense of the operator and are available for replacement or inventory purchase. The determination of a consumable part will be made on a case-by-case basis by Laguna Tools®.

SHIPPING DAMAGE

Laguna Tools® is not responsible for damage or loss caused by a freight company or other circumstances not in the direct control of Laguna Tools®. All shipping-related claims for loss or damage goods must be made to Laguna Tools within twenty-four hours of delivery.

HOW TO RECEIVE SUPPORT

To file a warranty-claim please contact the warranty department at 1-949-474-1200. To receive customer service or technical support please contact the customer service department at 1-800-332-4094. Parts, under warranty, are shipped at the expense of Laguna Tools® either by common carrier, FedEx ground services or similar method. Technical support to install replacement parts is primarily provided by phone, fax, email, or the Laguna Tools Customer Support Website.



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LAGUNA

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