CNC Router Model
IQ Pro with B&R Manual

LAGUNA TOOLS
2072 Alton Parkway
Irvine, California 92606
Ph: 800.234.1976
www.lagunatools.com

Model Number: MCNC IQ Pro B&R 24-36-0122

© 2018, Laguna Tools, Inc. LAGUNA® and the LAGUNA Logo® are the registered trademarks of Laguna Tools, Inc. All rights reserved.

Table of contents

	Page number
Safety Rules	**4**
Warranty	**5**
Noise emission	**6**
Specification sheet	**6**
Receiving your IQ Machine	**6**
Glossary of terms	**7**
Introduction to your IQ Machine	**9**
Parts of your IQ Machine	**9**
Where to locate your IQ Machine	**10**
Unpacking your IQ Machine	**10**
Assembly and set up	**11**
Control console functions	**16**
Getting Started	**31**
Maintenance and troubleshooting	**36**

Safety Rules

As with all machinery there are certain hazards involved with the operation and use of your machine. Using it with caution will considerably lessen the possibility of personal injury. However, if normal safety precautions are overlooked or ignored, personal injury to the operator may result. If you have any questions relating to the installation and operation, do not use the equipment until you have contacted your supplying distributor.

Read the following carefully and fully before operating the machine.

1. **Keep the working area clean and ensure adequate lighting is available.**
2. **Do not wear loose clothing, gloves, bracelets, necklaces or ornaments.**
3. **Do wear face, eye, respiratory and body protection devices as indicated for the operation or environment.**
4. **Ensure that the power is disconnected from the machine before tools are serviced or any attachment is to be fitted or removed.**
5. **Never leave the machine with the power on.**
6. **Do not use dull, gummy or cracked cutting tools.**
7. **Ensure that the keys and adjusting wrenches have been removed and all the nuts and bolts are secured.**

Limited Warranty

New machines and accessories sold by Laguna Tools carry a one-year warranty effective from the date of shipping. Machines sold through dealers must be registered with Laguna Tools within 30 days of purchase to be covered by this warranty. Laguna Tools guarantees all new machines and accessories 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. Any machines returned to Laguna Tools must be returned with packaging in the same manner in which it was received. If a part or blade is being returned it must have adequate packaging to ensure no damage is received 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.

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. machine. Warranty maybe voided upon the addition of such described tools and/or modifications, determined on a case-by-case basis.

Software purchased through Laguna Tools Inc. is not covered under this warranty and all technical support must be managed through the software provider. Software is non-refundable.

Normal user alignment, adjustment, tuning and machine settings are not covered by this warranty. It is the responsibility of the user to understand basic machinery operation, 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 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**.

Noise emission

Notes concerning noise emission:

Given that there exists a relationship between noise level and exposure times, it is not precise enough to determine the need for supplementary precautions. The factors affecting the true level of exposure to operators are clearly the amount of time exposed; the characteristics of working environment; other sources of dust and noise, etc. For example, adjacent machines may impact the level of ambient noise. It is also possible that exposure level limits will vary from country to country.

Specification sheet

Motor	3 HP 220v / 30 amp single phase
Spindle	1 or 3 Phase Industrial Induction Spindle, Liquid Cooled
Spindle RPM	5,000 – 24,000 RPM
Controller	Laguna HHC controller
Ball Screw	On all Axis
Gantry Clearance	6 inches [152mm]
Machine Work Table	24 ½ inches x 35 ½ inches [622mm x 901mm]
Machine Foot Print	60 inches x 37 inches 1524mm x 940mm]
Work Envelope	23.5in X 34.5in [597mm x 876mm]

Receiving your machine

Note: It is probable that your machine will be delivered by a third party. Before you unpack your new machine, you will first need to inspect the packing, invoice, and shipping documents supplied by the driver.

Ensure that there is no visible damage to the packing, or the machine. You must do this prior to the driver leaving. All damage must be noted on the delivery documents and signed by you and the delivery driver. You must then contact the seller, [Laguna Tools] within 24 hours.

Note: Laguna Tools, Inc. endeavors to test each machine prior to shipping and you may find sawdust in or on your machine.

Glossary of terms

ATC – Automatic Tool Changer.

Ball End Milling Cutter - A milling cutter that has a rounded cutting diameter at its end that is equal to the cutting diameter.

DXF file - Drawing exchange Format file that was created as a standard to freely exchange 2 and 3 dimensional drawings between different CAD programs. It basically represents a shape as a wire frame mesh of x, y, z coordinates (vectors).

Encoder - Typically an optical device that consists of a disk with 100 to1000 holes on its periphery. The most common is the incremental encoder that has a small LED light source on one side of the disk with a diode detector on the other to allow the disk rotation to be monitored in discrete incremental steps. Hence, a full revolution can be broken up into 100's or even 1000's of position steps.

G-Code - The standard machine tool language around the world. It generally consists of specifying the x, y, z (and a, b or c) coordinates that the machine is to move to. Such movement can be linear, circular or even special drilling operations. It is the universal language of all modern machine tools (mills, lathes, edm machines etc.).

M-code - The standard machine tool codes that are normally used to switch on the spindle, coolant or auxiliary devices. They can also be used for G-code program control such as repeating the program or ending it.

Servo Motor - A motor that is typically a brush or brushless DC type with an optical encoder attached to it. It is used in what is called a Servo Loop system where positioning information is constantly tracked by minimizing the error between the commanded and real position.

Step Motor - A motor that derives its motion by receiving input signals (pulses) in a very specific sequence. The most common type is one that rotates 1.8 degrees for each input pulse. This provides a very simple way of controlling motion very precisely with the use of common digital logic circuitry.

STL file - Stereo Lithography file format that has traditionally been associated with Stereo Lithography prototyping machines, but is now also being used to represent 3D surfaces for CNC tool path generating programs.

Tool Path - A series of vector coordinate positions that define a cutting path. This cutting path can be a simple 2D or sophisticated 3D (even 4D or more) path used to machine out the shape of a desired part.

Vector - A line that has both length and direction. It is usually specified by a starting x, y, z coordinate position and ending x, y, z coordinate position.

DRO – Digital Read Outs, shows the axis positions in the interface.

MDI – Manual Data Entry, used for entering commands manually, line by line.

CAD – Computer Aided Design, the using of computers to assist and develop design.

CAM – Computer Aided Manufacturing, the use of computers to assist in manufacturing.

CNC – Computer Numerical Control.

Command – A signal or series of signals that initiates one step or series of steps in the execution of a program.

Feed Rate – F A multi character code containing the letter F followed by digits that determine the machines rate of movement.

H.M.I - Human Machine Interface.

O.I.T – Operator Interface Terminal.

Introduction to IQ machines

The IQ is designed to give you years of safe service. Read this owner's manual in its entirety before assembly or use.

The advantage of the IQ machine is that it can, in most cases, fully machine the complete job without it being removed from the table so that you have finished parts of high accuracy that are totally repeatable.

It can, with the purchase of the relevant software, also produce intricate carvings.

Nesting is also a valuable feature of IQ machining that saves on waste and cost.

It is possible to reduce the amount of different machines in the shop as the IQ will perform multiple functions and is a must for cabinet makers and serious wood workers.

Parts of the IQ machine

1. Bed

The bed of the machine consists of a heavy steel frame and a "T-Slot" Table. The "T" slots are used to clamp the job or fixtures to the bed. The bed is covered in plastic strips. The plastic strips have **not been machined** as some movement may take place during shipping. The strips may have slight dents and marks but this is not important as they will be removed when you fly cut the surface.

2. Gantry

The gantry straddles the bed and carries the router spindle motion system. It is moved along the length of the bed by a precision ball screw system that is controlled by the machine controller.

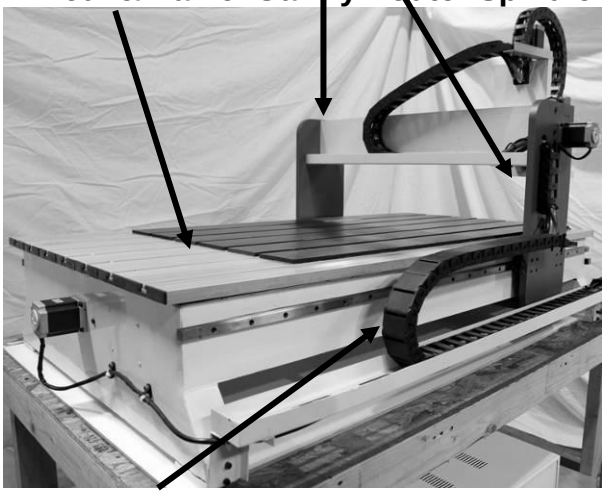
3. Router Spindle

The router spindle is moved along the gantry by a precision ball screw system that is controlled by the machine controller.

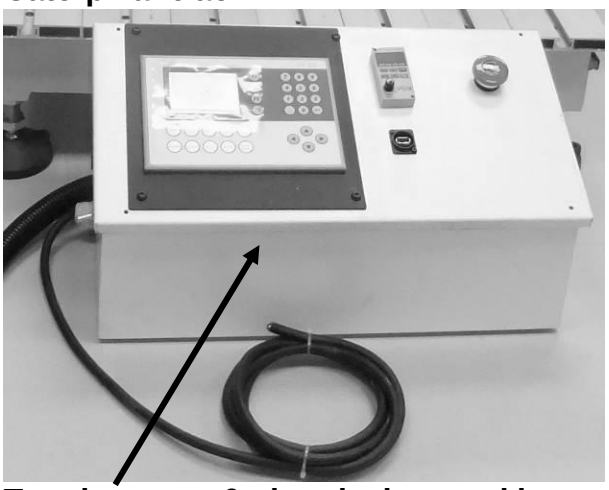
4. Frame

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

Bed & frame Gantry Router Spindle



Caterpillar track



Touch screen & electrical control box

5. Touch screen & electrical control box
The touch screen controls all the functions of the IQ. The electrical control box is located under the touch screen.
6. Caterpillar track
The caterpillar track runs along the side of the machine in a trough and carries all the electrical cables and the spindle cooling tubes [if optional water cooled spindle has been purchased].
7. Water pump [if optional water cooled spindle purchased]
The water pump provides coolant for the router spindle motor. Running the router spindle without the cooling pump running can lead to spindle bearing failure.

Additional instructions for the use of the IQ

Like all machines, there is danger associated with the machine. Injury is frequently caused by lack of knowledge or familiarity. Use this machine with respect. If normal safety precautions are overlooked or ignored, serious personal injury may occur. As the IQ is under the control of the onboard machine controller, it is important that you are clear of the cutter when operating the machine.

Where to locate your Machine

The IQ is table mounted **[TABLE NOT SUPPLIED]**. The table must be of a robust construction as the IQ is heavy and need to be adequately supported.

Before you unpack your machine, select the area where you will use your machine. There are no hard and fast rules for its location but here are a few guidelines:
1. There should be an area around the machine suitable for the length of wood that you will be machining.
2. Adequate lighting: the better the lighting, the more accurately and safely you will be able to work.
3. Solid floor: you should select a solid flat floor, preferably concrete or something similar.
4. Situate the machine close to the power source and dust collection.

Unpacking the machine

To unpack your machine you will need tin snips, a knife and a wrench.

1. Using the tin snips, cut the banding that is securing the machine to the pallet [if fitted].
WARNING: EXTREME CAUTION MUST BE USED AS THE BANDING WILL SPRING AND COULD CAUSE INJURY.
2. Remove the box from the IQ machine [if fitted] and any other packaging material. The parts ordered with the machine will be packed on or inside the machine.
Note: The machine is heavy, and if you have any doubt about the

described procedure, seek professional assistance. Do not attempt any procedure that you feel is unsafe, or that you do not have the physical capability of achieving.
3. Use a fork lift with sufficient lifting capacity and forks that are long enough to reach the complete width of the machine.
4. Remove the securing bolts that attach the machine to the pallet [if fitted].
5. Approaching the machine from the side, lift the machine on the frame taking care that there are no cables or pipes in the area of the forks.
6. Move the machine to the required position and lower it gently to the support table.
7. Level the machine so that all the supporting feet are taking the weight of the machine and no rocking is taking place.

Assembly & set up

Assembling the controller

The IQ comes fully assembled with the exception of the water pump [optional], dust hood and connecting the electrical supply.

Supporting the IQ

It is suggested that the machine is mounted on a strong table You might find that it is an advantage to mount the IQ on rubber pads [not supplied] to act as anti vibration mounts. This will be dependent on your set up.

Electrical connections for the machine

The main power cable has no plug fitted as it will be dependant on your installation. Ensure that when installing the electrical supply to the machine that 220v single phase is supplied.
It is recommended that you use a 20 amp breaker.

Note: When wiring the machine to your electrical system, keep your cable as short as possible. The cable should not be allowed to run along the floor, as this will cause a trip hazard.

Note: A qualified electrician must carry out the electrical installation.

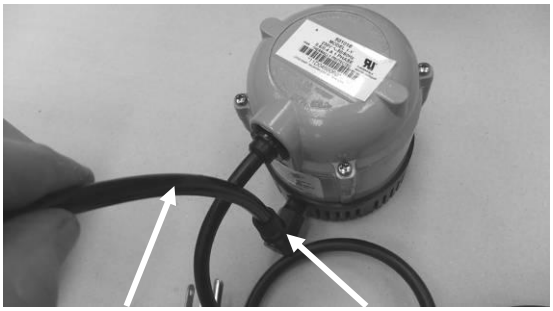
Water cooled spindles [optional]

Water cooled spindles [optional] will be provided with a 110volt spindle cooling pump. It is suggested that you power the submersible pump with a GFI protected cord or outlet. The submersible pump needs to be submerged in a minimum 5 gallon reservoir of water [the bigger the water tank the better]. The pump **MUST** be running prior to switching on the spindle. Never run the spindle without cooling, or the spindle will be damaged or destroyed. (WITHOUT WATER FLOWING THROUGH THE SPINDLE THE SPINDLE WILL OVERHEAT AND FAIL).

Connecting the water pipes to the machine

There are two water tubes that come out of the caterpillar track. These are used to provide cooling for the liquid-cooled router spindle.

Note: Never run the motor without the cooling being connected or the motor could be damaged.



Coolant pipe **90 Deg pipe fitting**

You will connect one tube to the water pump and the other will be placed in the water container for the return water.

It is not important which pipe is used as the return.

Fit the 90 degree connector to the pump.

Connect one of the pipes to the water pump by pushing it into the 90 deg connector. Lightly pull on the pipe to ensure that it is connected correctly.

Fill a container about ¾ full with clean water.

Pump in water container

Note: You will need to provide a coolant tank with a minimum capacity of 5 gallons. If the shop temperature is high, the tank size will need to be larger. If your shop is likely to be subject to freezing temperatures antifreeze must be added to the cooling water.

Lower the water pump into the container ensuring that it is the correct way up [water inlet lowest] and place the water return pipe into the container.

The logical position for the water container is just behind the control box close to the caterpillar track. Ensure that it is close to the machine as you do not want to kick the container and spill the water.

Once the assembly is complete and the water pump electrical connection has been made, [plug the pump into the machine water pump socket] lift the water return pipe up and check that the water is flowing.

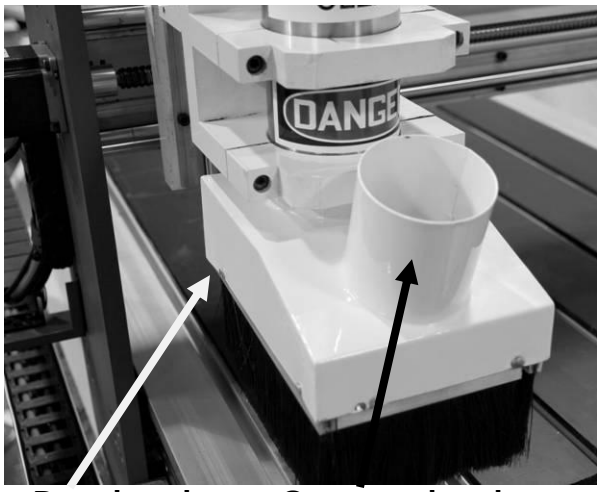
Place the lid onto the container to keep dust and dirt out of the container.

Check the container periodically as the water will evaporate.

Note: If the spindle is run without cooling, it could be damaged and fail.

Fitting the dust hood

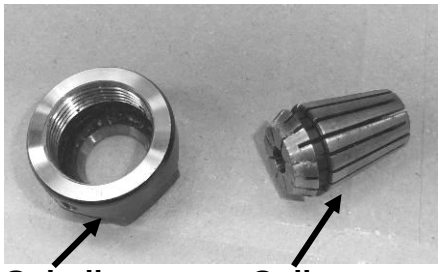
Connect the dust hood to the spindle and tighten the clamping screw.
Connect the dust extraction hose [not supplied] to the dust hood



Dust hood **Connect dust hose**

Fitting the router bit into the router head

Note: Before changing or fitting the router bit always disconnect the power to the machine.
Note: Collets & spindle collet holes must be cleaned regularly. Ensure that the slots in the collet are free of sawdust as sawdust builds up and will stop the collet compressing. If the collets or spindle holes are not clean, the router bit may not run true and this will affect the performance of your machine.



Spindle nut **Collet**

1. Select a pointed router bit and its relevant collet.
2. Fit the collet into the spindle nut. Press the collet into the spindle nut until it snaps into place.
Note: The router bit must not be fitted into the collet until the collet has been fitted into the spindle nut. With the router bit fitted into the collet the collet cannot compress and snap into the spindle nut.
The face of the collet and the face of the spindle nut will be close to flush.
Note: To remove the collet hold the spindle nut and press the collet on the side. The collet will compress and pop out. Do not try and remove the collet while a cutter is fitted as the collet will not compress and pop out.
3. Fit the spindle nut and collet assembly onto the spindle thread by hand.
4. Press the bit into the collet but note, the flute of the router bit must not be inside the collet and should be a minimum of 1/16 " outside the collet. Hold the router spindle with the supplied wrench and tighten the collet with a second wrench. Do not over tighten.
Note: Use this process for all other router bits that you need to fit, but note, you will have to change the collet if the shank of the router bit is a different size.

Collet fitted to spindle nut

Tightening the spindle nut

Types of router bits

There are five basic types of router bits: straight, up shear, down shear, combination [also called compression], and form tools [round over, ogee, etc.].

Router bits

1. Straight Router Bits

These are the standard router bits that are commonly used with handheld routers and are readily available at home centers.

2. Up Shear Router Bits

These bits have flutes that are spiraled upward [a standard twist drill is an example of this type of bit]. This bit design removes the chips from the kerf but has a tendency to chip the top surface, especially veneers or melamine surfaces.

Ball Nose Router Bits are a variation of the up shear bit design but have a radiuses end. These bits are typically used for 3D surfacing applications.

3. Down Shear Router Bits

These bits are similar to the up shear but with an opposite spiral that tends to pack the chips into the kerf. These bits prevent chipping the material surface, especially with veneers or melamine surfaces.

4. Combination [Compression] Router Bits

These bits combine the advantages of both up shear and down shear designs. The top section of the tool is down shear to prevent chipping the top surface of the material and the lower part of the bit is up shear to prevent chipping the bottom surface of the material.

Combination Router Bits are the preferred configuration for machining veneered plywood as well as melamine surfaced products. A variation of the bit is called the "Mortising Compression" router bit. With this bit, the up shear portion of the bit is less than ¼" in length so that the bit can be used on ¼" veneered plywood and for dados.

5. Form Router Bits

Form Router Bits typically are available in standard profiles such as round over, ogee, etc. Router bits that have a shape associated with them would be classified with this group.

Cleaning the IQ

Clean off any protection grease with WD40 or something similar. Re-lubricate the IQ with a Teflon based lubricant or wax. The machine has steel parts that if not protected will rust. Teflon has a tendency to dry and has fewer tendencies to accumulate dust and dirt.
Use TRI-FLOW TEFLON lubricant or equivalent to lubricate the ball screws, wipe off any excess to reduce dirt and dust acumination.

DO'S AND DON'TS

1. DO verify water level in the spindle reservoir, for water cooled spindles.

2. DO lubricate all ball screws every 8 hours of run, use a thin spray lubricant with Teflon like TRI-FLOW or equivalent.

3. DO keep your collets clean, fine dust builds up and they get tight.

4. When doing carving work it is necessary to use a much larger volume of water for the spindle cooling reservoir.

5. 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.

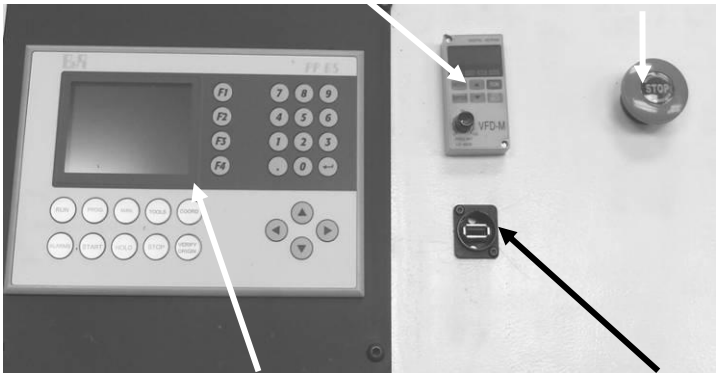
6. ALWAYS press in the E-stop button on the control console and turn off main power prior to changing tooling or working on the spindle. Remember to clear alarms caused by the e-stop button on the alarm pages after the e-stop has been removed.

7. ALWAYS remove main power prior to working on, or servicing the spindles water pump and or reservoir.

8. The (E-STOP) button MUST be out before turning on the main power [Twist and it will pop out].

Control console functions

Spindle speed controller **Emergency stop button**



Touch screen controller **Memory stick socket**

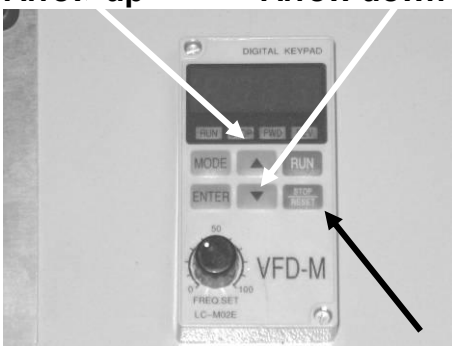
Power cable

Main power cable is located on the left side of the enclosure.
SPINDLE CONTROL is used to change spindle speeds.
E-STOP is for EMERGENCY STOPPING ONLY [Twist and it will pop out to reset].
DO NOT use E-STOP as a cycle stop. HOLD and STOP are on the touch screen.

Spindle speed control

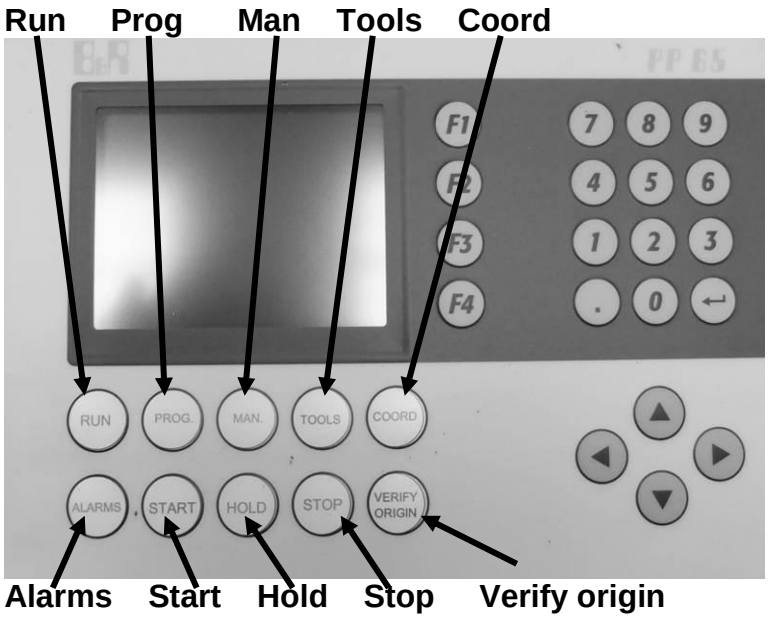
Only three buttons are operator accessible, ARROW UP, ARROW DOWN, and STOP KEY
ARROW UP key is used to raise the spindle speed.
ARROW DOWN Key is used to lower the spindle speed.
The stop key is available to stop spindle during a program activation.
Display reads in hertz, 200hz = 12,000, 300hz = 18,000, 400hz = 24,000.

Arrow up **Arrow down**



Stop

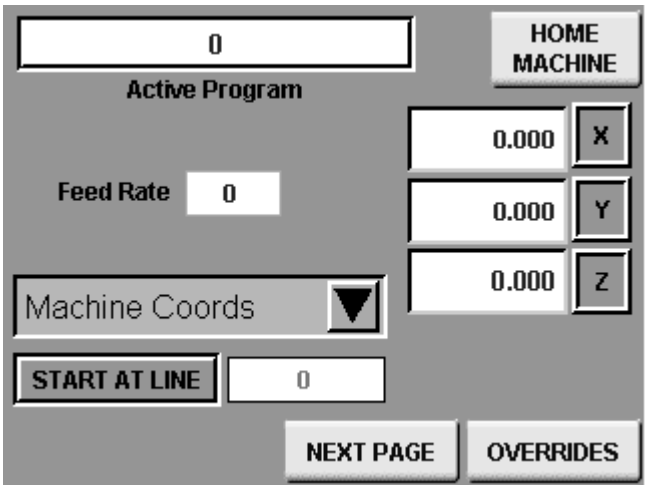
Touch screen controller



Run This button is a page jump to the first Run (home) screen.
Prog This button is a page jump to the first Program screen.
Man This button is a page jump to the first Manual screen.
Tools This is a page jump to the first Tool Screen.
Coord This is a page jump to the first Coordinate screen.
Alarms This is a page jump to the first Alarm Screen.
Start This button is for starting the program shown in the active Program screen.
Hold This button is used to pause a running program. To release, hold/ press the start button while on the RUN SCREEN and the program will continue.
Stop This button Stops the active program.
Verify Origin This button is used to verify the X and Y G54 Zero Point Offsets. Where you placed your X and Y origin previously in setting the Zero Point Offset is retained so you can run multiple parts with the same starting point for X and Y.
Arrow Fwd This button jogs the selected Axis in the positive direction.
Arrow Back This button jogs the selected Axis in the negative direction.

Note: If the screen or buttons are gray they are not usable.

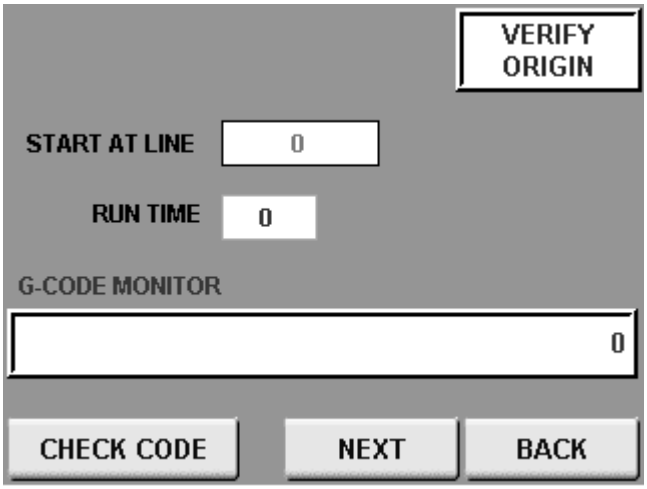
Screens overview



Run screen

1) (HOME MACHINE) Homing the machine is the first step every time power is applied. No functions or actions can occur until homing is complete and successful.
2) (Active Program) field shows the current program loaded for running.
3) (Feed Rate) indicates the programmed feed rate.
4) (Start at Line Number) allows the operator to start a program from a specific line number. this can be used if a long carving has to be stopped and restarted.
5) (Machine Coords) is a drop down menu to select which dimension set is shown in the X, Y, Z, and A axis DRO's. The displayed references are for Machine Coordinates, Zero Point Offset (G54), and relative coordinates.
6) X = Across the table.
7) Y = Along the table.
8) Z = Spindle up / down.
9) A = Spindle rotation [used for lathes and fourth?? axis machine].
10) (OVERRIDES) button is for a page jump to the overrides available while the program is in run. RUN OR RUNNING??
11) (NEXT) button is for a page jump to the second RUN screen.

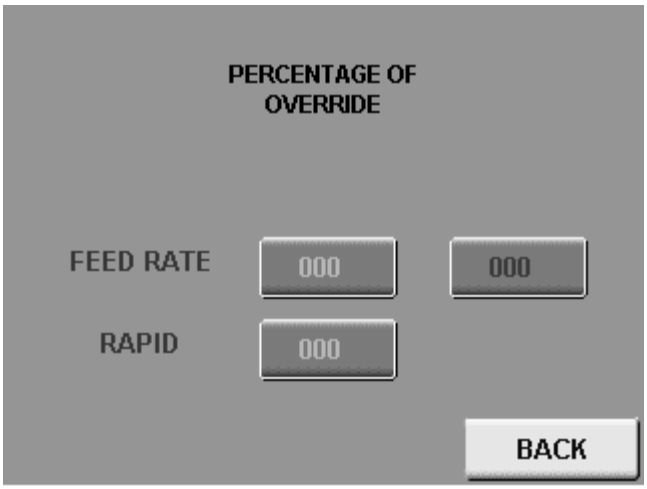
NOTE: The START button only works when on the RUN screen.



Run 2 screen

Note: Green numbers in a field indicate an Input field. Press the green number and a 10 key numerical entry will pop up for entry of the required value.
Note: Red numbers in a field indicate that it cannot be changed.

1) (SET TOOL NO.) This field is used to instruct the control which tool you have manually inserted.
2) (Start at Tool) allows the operator to start a program for a specific tool in a multiple tool program.
3) (RUN TIME) Displays the program's run time.
4) (G-CODE MONITOR) Shows the current line of code as it is running.
5) (Verify Origin) This button will move the X and Y axis to the G54 set in the Zero Point Reference [sets new zero reference point].
6) (CHECK CODE) This function is used for checking the code is correct to run within the parameters of your machine. This adds a delay to the start of a program but ensures that it will run correctly.



Run overrides screen

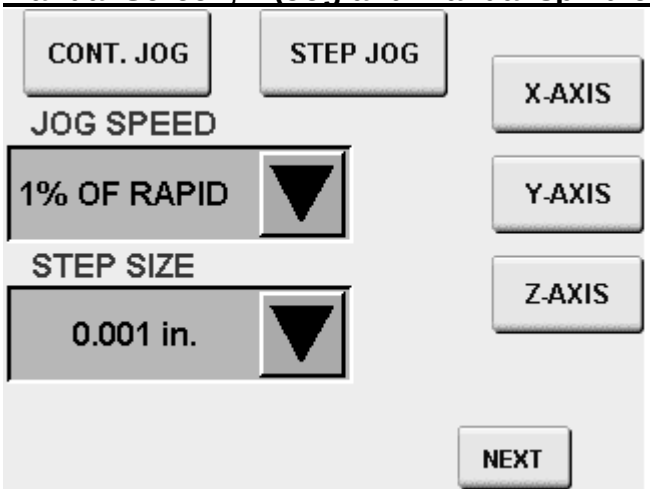
The green numbers are fields that can be used for entering a percentage above and below the programmed rates of feed and speed.

The red numbered fields show the current rates of feed and speed.

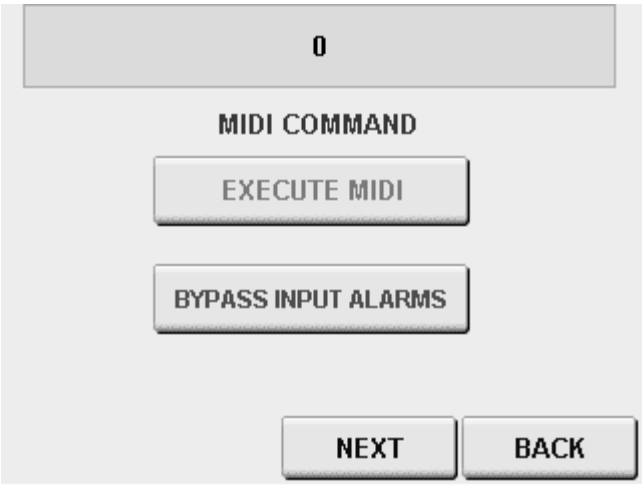
The Field (FEED RATE) is used to speed up or slow down the feed rate by a percentage. This can be done while the program is in run condition.

The Field (RAPID) is used to restrict the machine's feed rate by a percentage when a G0 (Rapid Move) is called for in a program.

Manual Screen, 1 (Jog and manual spindle control)



1) (CONT. JOG) When pressed selects a continuous Jog Mode based on the percentage of full speed chosen under (JOG SPEED).
2) (STEP JOG) When pressed selects a step jog mode based on the resolution chosen (moves just the step size and then stops].
3) (X-AXIS, Y-AXIS, and Z-AXIS) Buttons are used to select the Axis you wish to Jog.
4) The (NEXT) button is used to jump to the second manual screen for MIDI functions.



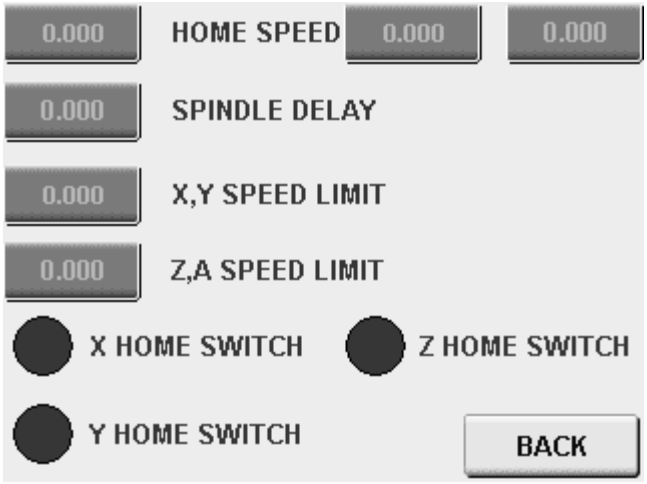
Manual 2 Screen

1) This screen is used for MIDI functions - this is when an operator needs to run a single line of G code at a time. This can do Manual tool changes and move any axis to a specific location in the table.

Press on the Pink command window and an Alpha / Numeric pad will pop up for MIDI string entry.

With the string entered, press (EXECUTE MIDI) to run.

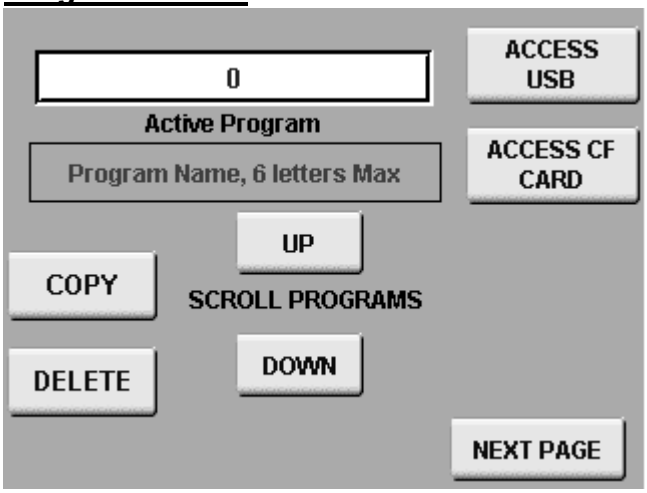
Note: Bypass input alarms are for technician use only.



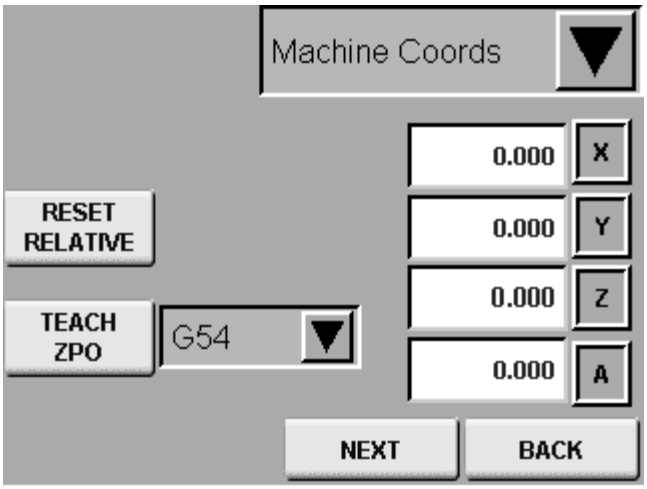
Manual 3 screen

1) The top three fields are for setting the Home speeds, from left to right they are X, Y, and Z.
2) (SPINDLE DELAY) is the time the program waits for the spindle to get to the selected speed before cutting begins.
3) (X, Y, SPEED LIMIT) is the top speed the controller will rapid at when 100% of feed rate is required.
4) (Z, A, SPEED LIMIT) is the top speed the controller will rapid at when 100% of feed rate is required.
5) The lower indicators are used to verify that the individual home switches are functioning correctly. You can flag the home switches with something ferrous and activation will show on the corresponding light on the screen.

Program screen

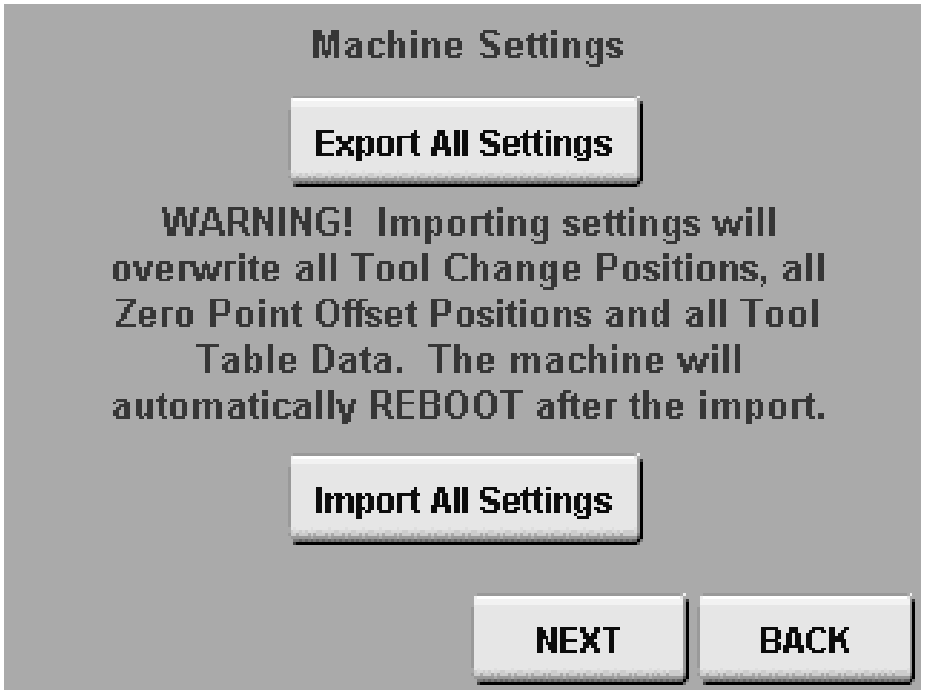


1) (Active Program) Field displays the current program selection.
2) (ACCESS USB) Opens the inserted USB with stored programs.
3) (ACCESS CF CARD) Opens the list of stored programs on the controller's CF card.
4) (COPY) Button moves a program from the USB to the CF card on the controller.
5) (DELETE) Button is used for deleting programs from either of the locations of stored programs.
6) (UP) / (DOWN) Buttons are used for scrolling through the stored programs in the location selected.



Coords screen

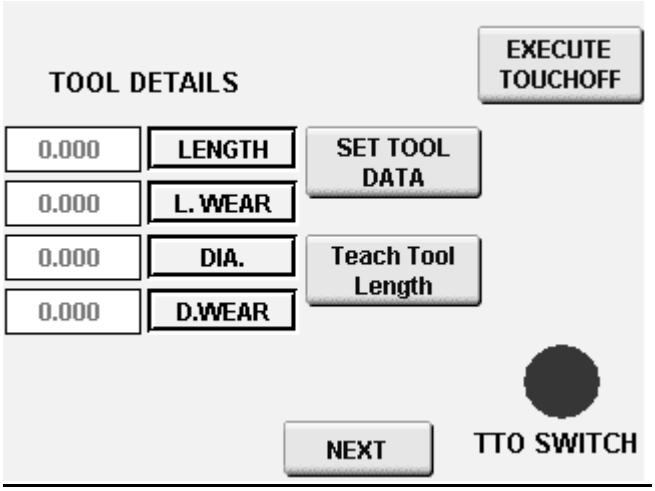
1) (Machine Coords) is a drop down menu to select which dimension set is shown in the X, Y, Z, and A axis DRO's. The displayed references are for Machine Coordinates, Zero Point Offset (G54), and relative coordinates.
2) (RESET RELATIVE) Is a built-in tape measure. By pressing the RESET REATIVE button you will zero the X and Y axis DRO under relative coordinates display. You can then jog from there to get precise measurement when needed. This function does not affect machine or zero point offset locations.
3) (TEACH ZPO) Teach Zero Point Offset is used to set the Work offsets the program will reference during run, (G54 is generally the front left corner of the spoil board). Jog to the front left corner in X and Y and press the (TEACH ZPO) button.
4) The Next button will jump to the Export and Import settings screen.



Coords 2 screen

This screen is used for creating and backing up the machine settings such as calibration and all user fields. Insert a USB memory stick and press Export all settings, this will create a (machine settings. xml) file for the customer to save in a safe location.
This is also used when recovering the controller or installing an upgrade. Whenever the operating system Flash card is removed all settings are lost until restored using the machine settings file and the import settings function.

Tool Details screen



This screen is used to set-up the tool rack by picking up each tool and performing a tool touch-off routine - to measure the length for the controller to reference during a program run.

1) (EXECUTE TOUCH OFF) Button starts a tool touch off routine to measure the tool to the puck attached to the machine. By pressing this button the Z axis will start to move downward to make contact with the touch off puck to measure to the top of your material. The measurement will add the thickness of the puck in (Z PUCK) field thus giving the operator an exact measurement of Z Zero.

2) (Teach Tool Length) Is used to manually perform a tool touch off. Jog down to the area you wish to call Z Zero and press the Teach button to set. Z Zero is based on how you set up the material in the CAM software.

3) (Length Wear) This field is used to manually adjust the tool length for special applications or for fixing code that is just not cutting deep enough.

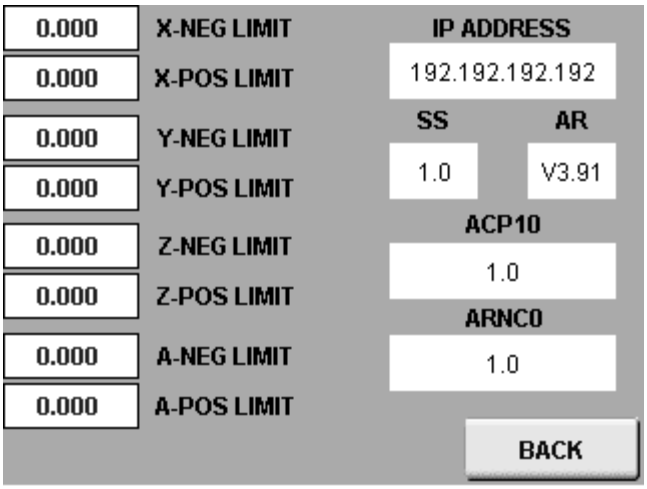
NOTE: The tool length can be adjusted by the (ZSPOIL) Dimension field found on the next screen.

Tools 2 screen

Note: Only one field on this page pertains to daily operation, (Zspoil). All other fields are for set-up and technical support of the controller and will be covered in the advanced section of the manual.

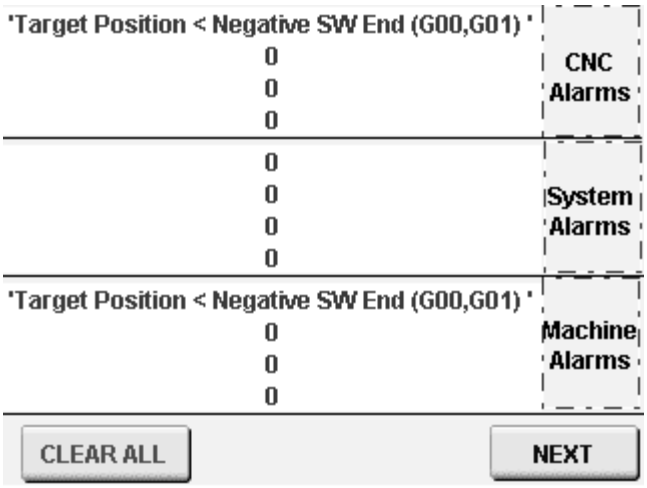
1. (Zspoil) Is a user field that is required when using a spoil board to tell the tool table the actual position of Z Zero of each tool. After fly cutting both sides, the operator needs to input the thickness of the spoil board using precision callipers so the tool length can be adjusted accordingly.

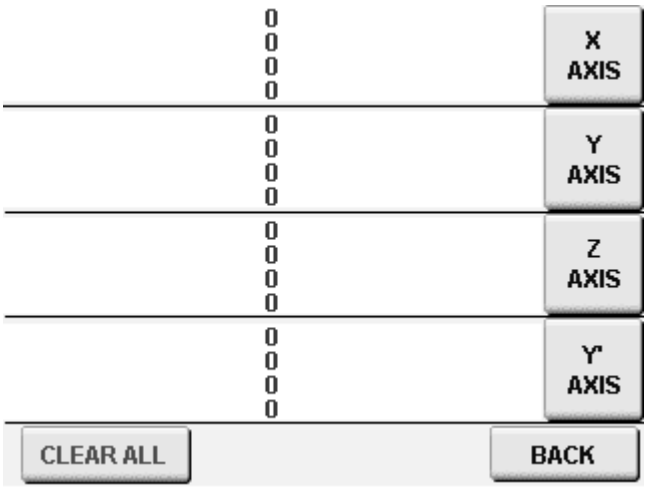
2. (Z PUCK) You must enter the thickness of the puck used for automatic tool touch off routine. This dimension is added to the tool length providing an accurate measurement of tool to work piece for Z Zero.



Coords 3 screen (coord's set-up)

1. The left side fields are for setting the positive and negative limits of each axis's travel.
2. The right side of the screen is used to set-up a home network for file transfers and remote control via VNC from another computer on the network.





Alarm screen 1 and 2

Note: Whenever something is wrong with the machine or the operator has tried to operate outside the machines parameters there will be a message on one of these alarm screens. The first screen represents CNC, System, and Machine faults. The second screen represents Axis errors.
If the error cannot be reset with the (CLEAR ALL) button, then contact Laguna Tools Customer service department for assistance.

Getting Started

Note: Before you turn on the machine remove all tools and other objects from the machine table.

Release the emergency stop by twisting clock wise and it will pop out.

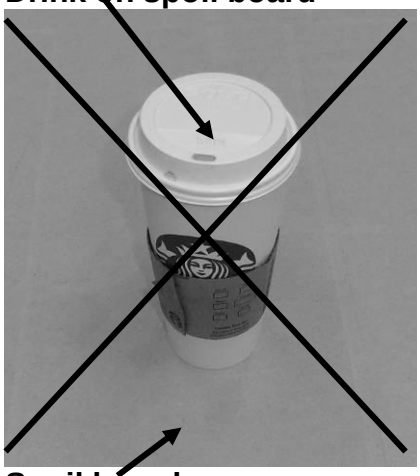
1. Have 220volts, 20 amps, of 1 phase power wired to the machine.
2. If using a water cooled spindle make sure the water reservoir is full and the submersible pump is circulating water through the spindle.
3. Make sure the E-stop button is released, (twist to release) before turning the power on.
4. Power machine.
5. After the touch screen has fully booted it is required that the machine be homed before any other function is allowed.
Note: All measurements and actions are based on the home switch locations. Homing gives the machine a starting point reference.

Note: Some of the photographs in the following section of the manual are not the IQ machine but the principle that they show is the same for all IQ/CNC machines.

Precautions regarding spoil boards

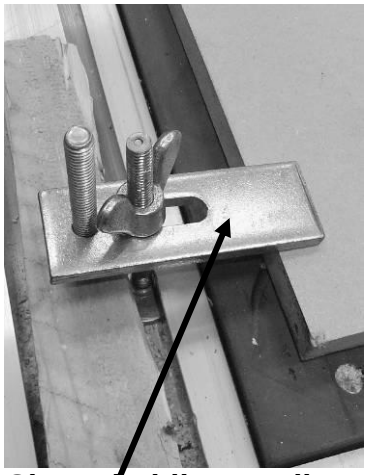
The spoil board is porous when the melamine has been cut through, and will absorb moisture. As moisture is absorbed the dimensions of the board will change. In general this will not be a problem as the changes from day to day are not significant. Also the changes will, in general, be over the complete board. There are however exceptions. Your morning coffee can do a great deal of damage if spilt. If water etc. is spilt, it will be absorbed into the board and make the board grow in that area. Do not allow the board to become wet. If an accident should happen, remove the board from the machine and allow to dry. This may take several days. Replace the board with a new board. Once the board has completely dried it may possible to skim the board and re-use it, but the likelihood is that it is scrap.

Drink on spoil board



Spoil board

Fitting a spoil board

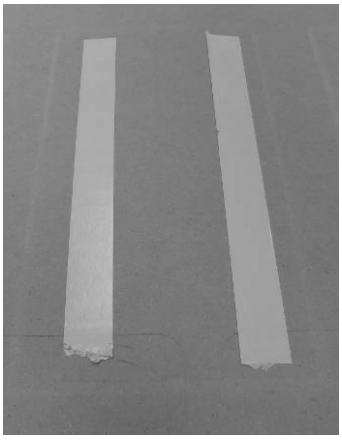


Clamp holding spoil board

The machine is supplied with sacrificial plastic strips on the bed. The strips are designed so that they will not damage the cutter should it come in contact with them.
The plastic strips have **not been machined** as some movement may take place during shipping. The strips may have slight dents and marks but this is not important as they will be removed when you fly cut the surface. Only cut 1/6" of an inch should you decide to fly cut the sacrificial board.
A second option is to fit a spoil board and then fly cut the spoil board. The down side is that this will detract from the maximum height that the machine can accommodate, but this should not be a problem as the cutter length and job thickness is usually far less than the gantry clearance.
It is recommended that the plastic sacrificial strips are not machined and that a sacrificial board is attached to the plastic strips with double sided tape and fly cut. The board can be re fly cut as it becomes damaged and once it has become too thin it can be discarded and replaced with a new board.

Fitting a job to the spoil board

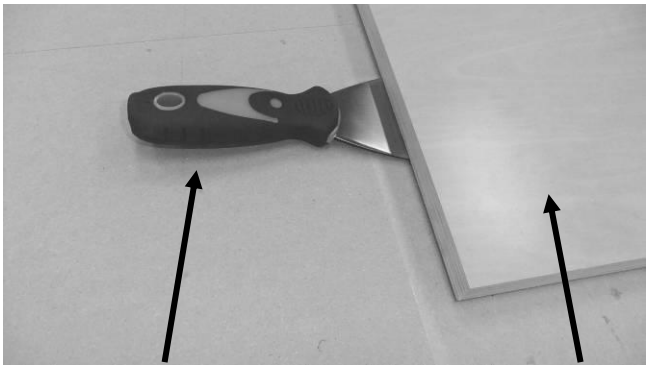
You can use double sided tape to attach the job to the spoil board. If you are using double sided tape, ensure that the spoil board and the job are clean and do not have sawdust or chips as this will affect the ability of the tape to hold the job securely. Only use the smallest amount of double sided tape as it will make it easer to remove the job once machined.



Double sided tape inside job outline

Removing the job from the spoil board

Lever the job off the spoil board with a wide blade putty knife or something similar.

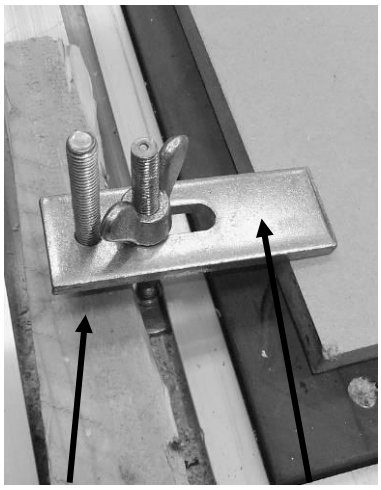


Wide blade putty knife **Job**

Fitting the job to the table using the T slots

You may find it convenient to clamp the job to the spoil board with the table clamps. This attachment method can only be used if the outside edges are not being machined.

When using the clamps, place a piece of packing under the jacking bolt to protect the bed of the machine.

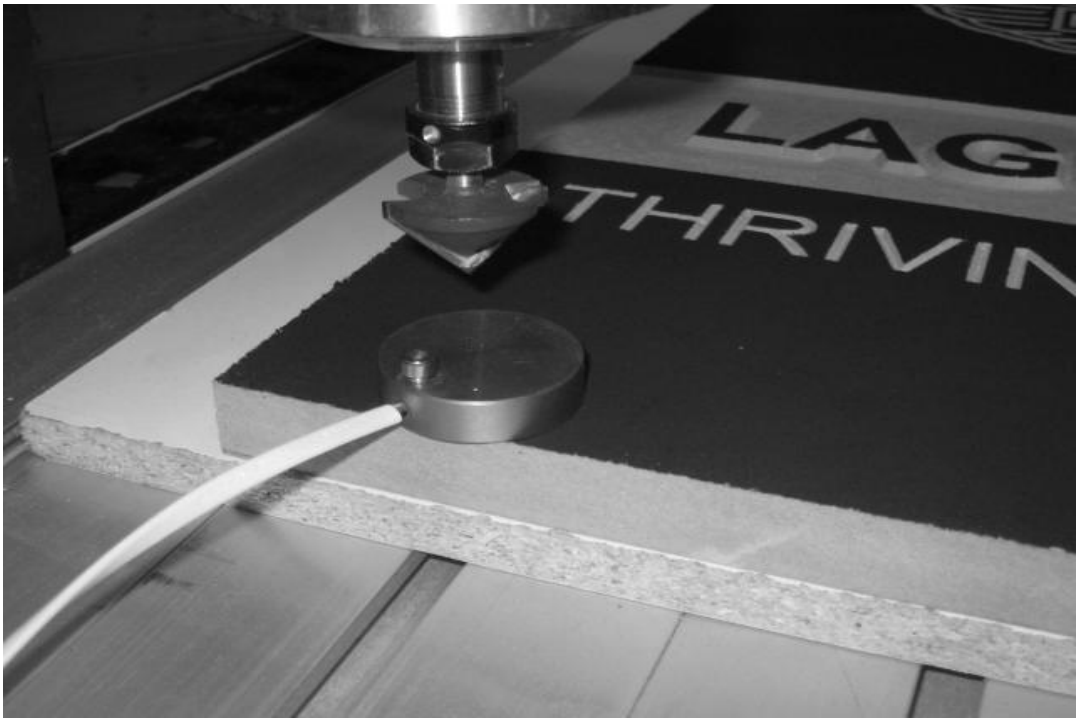


Packing **Clamp**

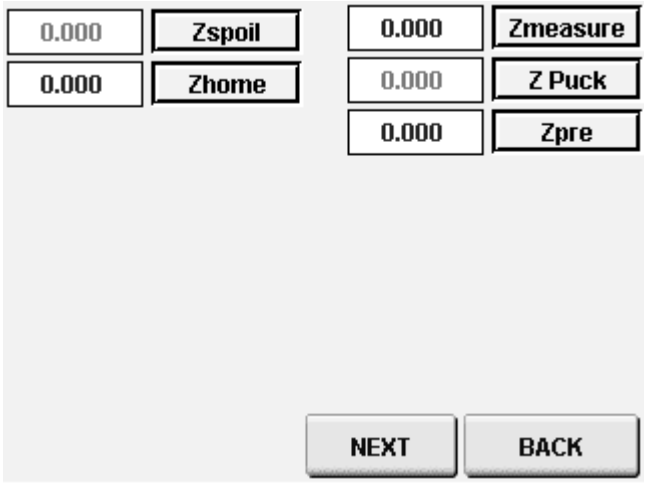
TOOL TOUCH OFF PROCEDURE

The IQ needs to know the position of the tip of the tool. The IQ comes with a built-in procedure to find this dimension automatically. As the tip of the tool touches the puck [a conductive pad connected to the IQ] it makes the circuit complete and learns this dimension. It then adds the dimension of the puck and the tool tip position is stored.

1. Jog the x and y axis to the location you wish to touch off to.
2. Place the puck under the spindle with tool installed.

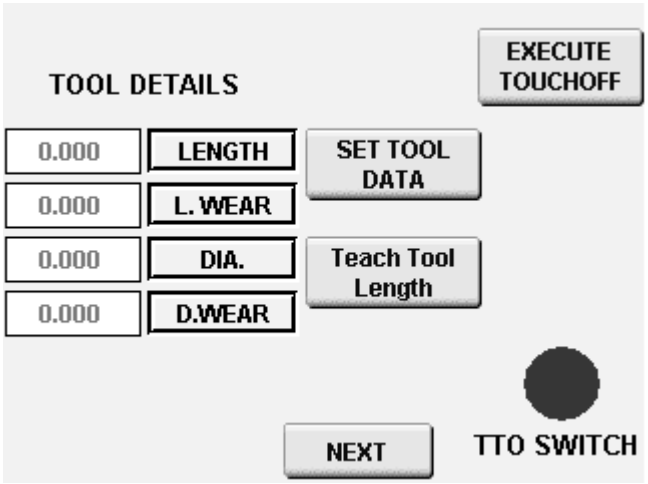


3. Go to the second (TOOLS SCREEN) and make sure the thickness of the puck is inputted correctly into the (Z PUCK) field. You can use any conductive material as a puck. If you wish to change it out, that is fine.



4. Go to the (TOOLS PAGE) AND PRESS (EXECUTE TOUCH OFF)

The spindle will slowly move downwards until it contacts the puck. It will then retract and write the dimension to the controller.



Maintenance

As with any machine, to ensure optimal performance you must conduct regular maintenance.

Lubrication

You must regularly lubricate the bearing surfaces and the ball screws. Use a thin Lithium spray or a Teflon based spray lubrication. Spray daily and wipe off the excess.

Daily checks

1. Clean the machine and lubricate unpainted surfaces with a Teflon lubricant. Wipe off any excess and buff with a dry polishing cloth. This will reduce the likelihood of rust forming.
2. Check cutter teeth for chips and dullness.
3. Generally inspect the machine for damage and loose or worn parts.
4. Collets & 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 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.

Collet fitted to spindle nut

Weekly checks

1. Clean the cutters.
2. Check cutter teeth for chips and dullness.
3. Generally inspect the machine for damage and loose or worn parts.
4. Check the dust extraction for blockages as any large bits could cause blockages.

Troubleshooting

Machine will not start

1. Check that the start switch is being pressed full in.
2. Check that the red stop switch is fully out.
3. Check that the electrical power cord is plugged into the power outlet.
4. Check that the electrical supply is on [reset the breaker].
5. With the power disconnected from the machine, check the wiring to the plug is correct. Check that the rubber insulation is stripped enough and is not causing a bad connection. Check that all the screws are tight.

The machine will not stop

This is a very rare occurrence as the machine is designed to fail-safe. If it should occur and you cannot fix the fault, seek professional assistance. The machine must be disconnected from the power and never run until the fault has been rectified.
1. Internal breaker faulty. Replace the breaker.

Motor tries to start but will not turn

1. With the power disconnected from the machine, try to turn the spindle by hand. If the spindle will not turn, check the reason for the jamming.
2. Motor faulty. Replace the motor.
3. Spindle run without coolant. Replace the motor.

Motor overheats

The motor is designed to run hot, but should it overheat it has an internal thermal overload protector that will shut it down until the motor has cooled and then it will reset automatically. If the motor overheats wait until it has cooled and restart. If the motor shuts down consistently check for the reason. Typical reasons are dull cutting tools, no water in the coolant tank, blockage in the coolant pipe and excessive ambient temperature.

Squeaking noise

1. Check the bearings.

Spindle slows down during a cut

1. Dull cutting tools. Replace the tool or have it re-sharpened.
2. Feeding the wood too fast. Slow down the feed rate.

Machine vibrates

1. Machine not level on the floor. Re-level the machine ensuring that it has no movement.

LAGUNA

2072 Alton Parkway. Irvine, CA 92606
Ph: 800.234.1976 | www.lagunatools.com

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

© 2018, Laguna Tools, Inc. LAGUNA® and the LAGUNA Logo® are the registered trademarks of Laguna Tools, Inc. All rights reserved.