

# Swift Series Manual



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Model Numbers: MCNC Swift 48 X 96-0233  
MCNC Swift 60 X 120-0233  
MCNC Swift 48 X 48  
1000-0233



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### **Safety Rules**

**As with all machinery there are certain hazards involved with the operation and use of this 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 relative to the about its installation and operation, do not use the equipment until you have contacted your supplying distributor.**

**Read carefully before operating the machine.**

- 1. Keep the working area clean and be sure adequate lighting is available.**
- 2. Do not wear loose clothing, gloves, bracelets, necklaces or ornaments.**
- 3. Wear face, eye, respiratory and body protection devices as indicated for the operation or environment.**
- 4. Be sure that the power is disconnected from the machine before tools are serviced or an 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. Be sure 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 possible to precisely determine the need for supplementary precautions. The factors affecting the true level of exposure to operators are clearly the amount of time exposed and the characteristics of the working environment, such as other sources of dust and noise, etc., for example, adjacent machines - in other words, the level of ambient noise. It is possible that exposure level limits will vary from country to country.

## Specification sheet

	<b>Swift 48" X 48"</b>	<b>Swift 48" X 96"</b>	<b>Swift 60" X 120"</b>
<b>Motor</b>	3 hp very quiet spindle	3 hp very quiet spindle	3 hp very quiet spindle
<b>Spindle</b>	1 or 3 Phase Industrial Induction Spindle, Liquid-Cooled	1 or 3 Phase Industrial Induction Spindle, Liquid-Cooled	1 or 3 Phase Industrial Induction Spindle, Liquid-Cooled
<b>Spindle RPM</b>	6,000 - 24,000	6,000 - 24,000	6,000 - 24,000
<b>Controller</b>	Rich Auto DSP controller	Rich Auto DSP controller	Rich Auto DSP controller
<b>Dust chute diameter</b>	4 inches	4 inches	4 inches
<b>Volts</b>	220V single phase / 30 amp	220V single phase / 30 amp	220V single phase / 30 amp
<b>Gantry Clearance</b>	8 inches	8 inches	8 inches
<b>Machine Work Table</b>	T-Slot	T-Slot	T-Slot
<b>Z Axis</b>	Precision Ball Screw	Precision Ball Screw	Precision Ball Screw
<b>X and Y Axes</b>	Rack & pinion	Rack & pinion	Rack & pinion
<b>Machine Foot Print</b>	73"w x 80"l x 55"h	67"w x 120"l x 58"h	
<b>Work Envelope</b>	48" X 48"	48" X 96"	60" X 120"

## 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 need to first inspect the packing, invoice and shipping documents supplied by the driver.

Insure that there is no visible damage to the packing or the machine. You need to 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) as soon as practical. If damage is found after delivery, contact the seller as soon as is practical.

**Note.** It is probable that you will find sawdust within your machine. This is because the machine has been tested prior to shipment from the factory and / or Laguna Tools. Laguna Tools endeavours to test machines prior to shipping to customers as movement can take place during transportation. It must be noted that additional machine movement can take place between Laguna Tools and the end user and some adjustments may have to be undertaken by the customer. These adjustments are covered in the various sections of this manual.

## Introduction to CNC machines

The CNC 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 CNC 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.

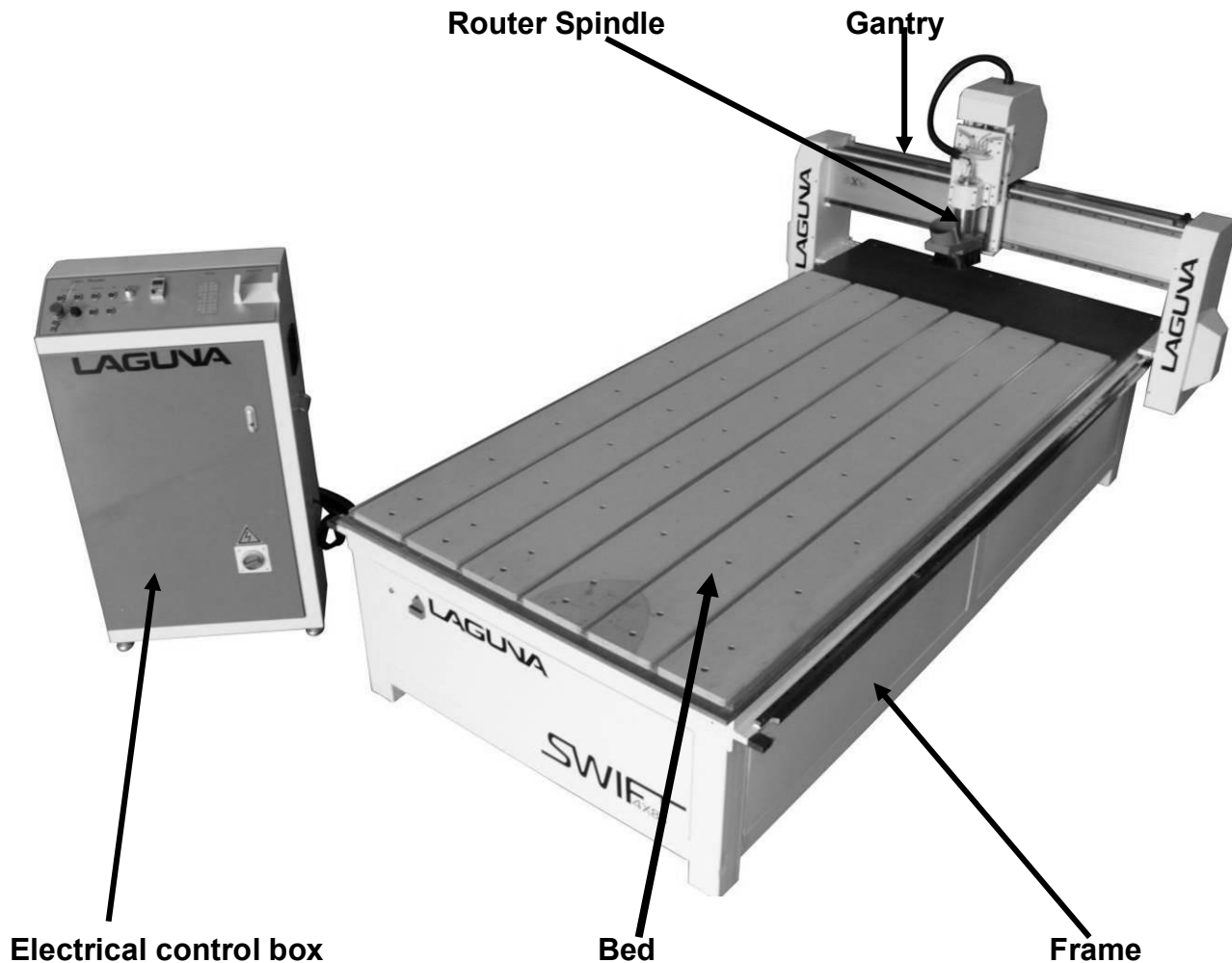
It can also produce intricate carvings with the purchase of the relevant software.

Nesting is also a valuable feature of CNC machining that saves on waste and costs.

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

## Parts of the CNC machine

The CNC machine consists of a number of major parts, which are discussed in this manual. Take the time to read this section and become familiar with the 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.

### 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 rack and pinion system that is controlled by the machine controller.



### 3. Router Spindle.

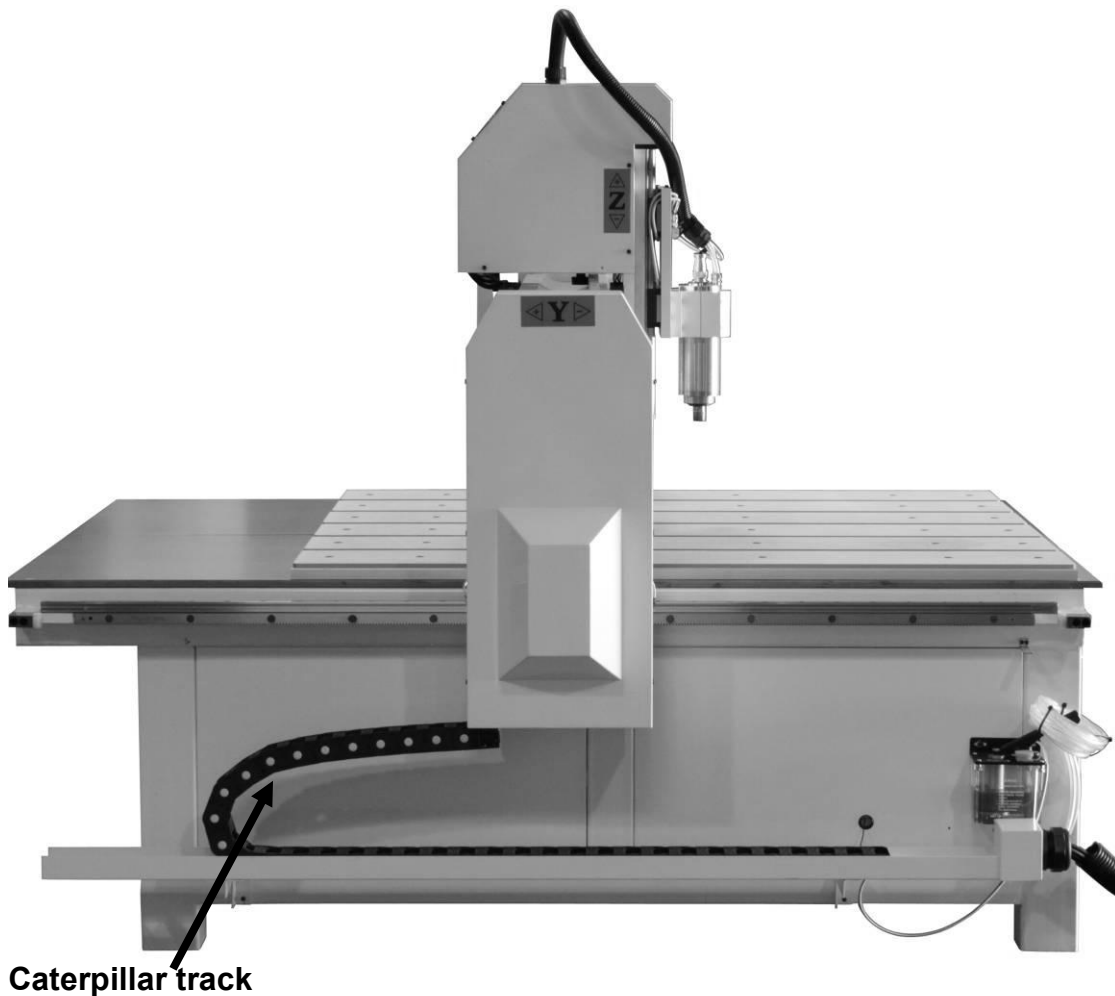
The router spindle is moved along the gantry by a precision rack and pinion system that is controlled by the machine controller.

### 4. Frame.

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

### 5. Electrical control box.

The electrical control box is located on the side of the machine in a dust-free enclosure.



### 6. Caterpillar track.

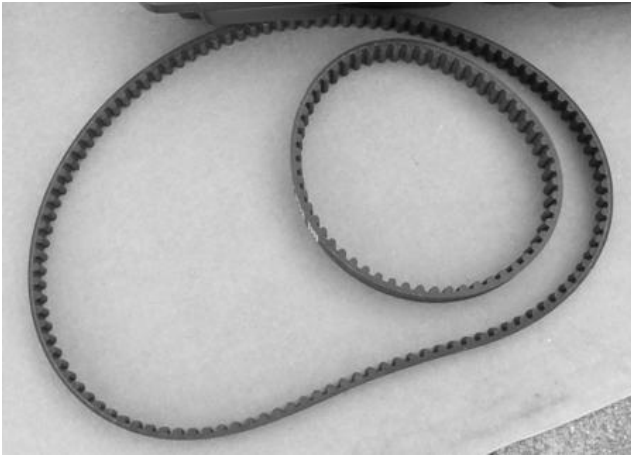
The caterpillar track runs along the side of the machine in a trough and carries all the electrical cables and the spindle cooling tubes.

## 7. Water pump

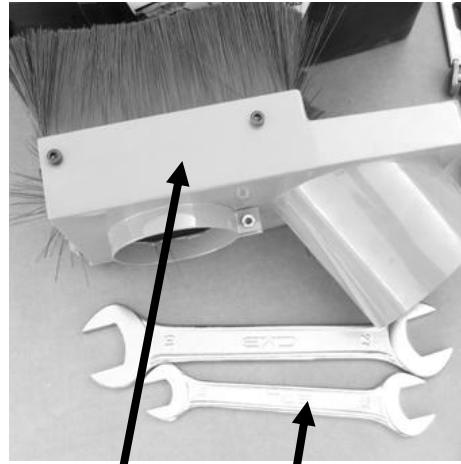
The water pump provides coolant for the router spindle motor. Running the router spindle without the cooling pump running can lead to spindle bearing failure.



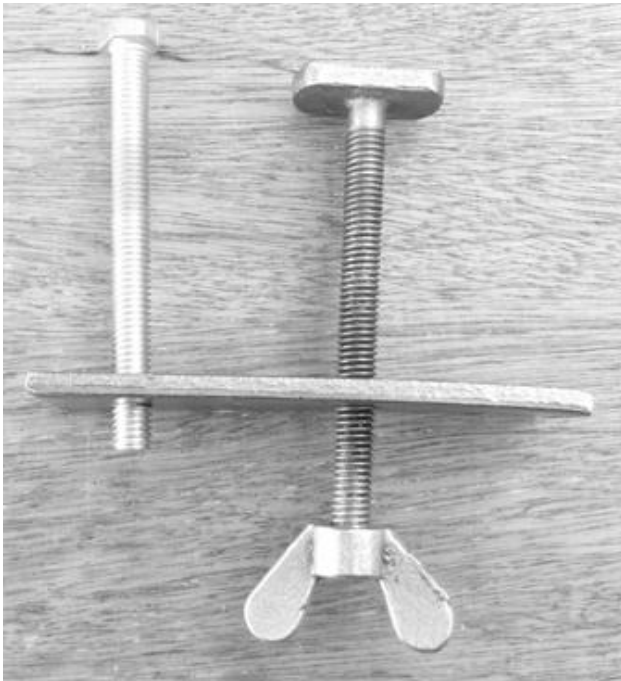
**Pump in water container**



**Spare drive belts**



**Dust hood      Wrenches**



**Table clamps qty 8**



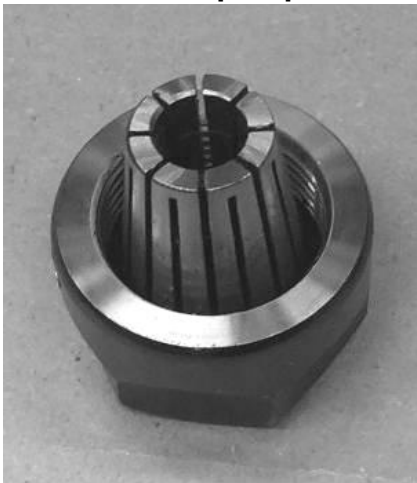
**Coolant container**



**Water pump**



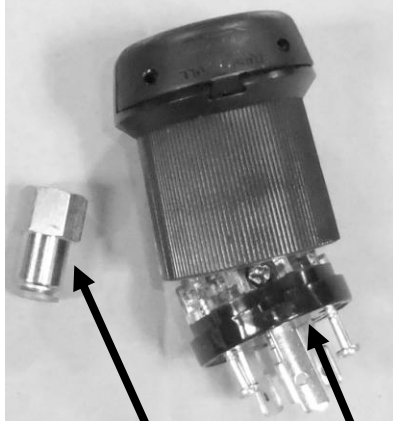
**Hand-held controller**



**Collet nut with collet fitted**

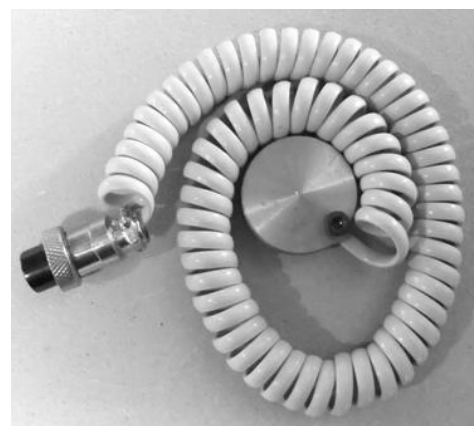


**Memory stick (Max 8G)**



**Pipe fitting**

**Plug**



**Touch-off puck**

## Where to locate your machine

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 below are a few guidelines.

1. There should be an area around the machine suitable for the length of material 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. Close to power source and dust collection.

## Unpacking your 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 BECAUSE THE BANDING WILL SPRING AND COULD CAUSE INJURY.**

2. Remove the box from the CNC 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 extend 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 gently to the floor.

## Assembly & setup

### Assembling the controller

Fit the cable to the controller and ensure that the screws are finger tight.

**Note.** When using a memory stick, it fits into a slot on the top of the hand-held controller and must not exceed 8G in capacity.



Memory stick slot (max 8G)

### Attaching screws



Controller attached to cable

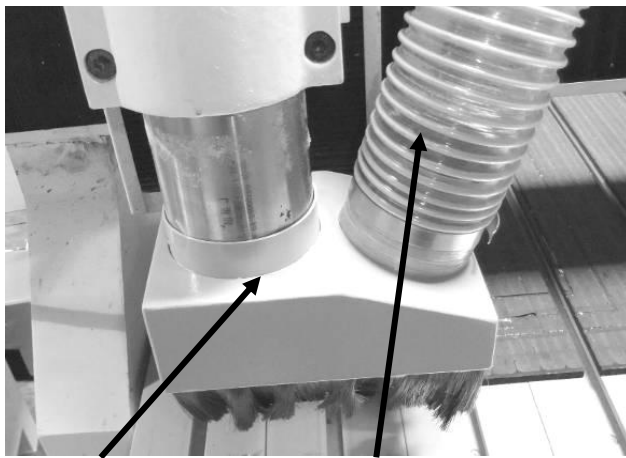
### Fitting the dust hose

1. Fit the dust hose to the dust shroud and secure with a clamp. Ensure that it is tight as it is very inconvenient to have it fall off during production.

2. Fit the shroud to the router head. Adjust the shroud so that the brushes are even with the tip of the router bits that you will be using. If it is too low the brushes may drag on the job being cut and could be cut by the router bit. If it is too high and is not in contact with the job suction may not be optimal. Once adjusted, clamp with the clamping Allen screw.

3. The head of the machine will move all the way across the table and the dust hose will follow the head. If there is insufficient slack, the hose may break or damage the dust shroud. It is suggested that the hose be suspended from the ceiling of your shop with sufficient slack so that it will not restrict movement. It will also be out of the way and not causing a trip hazard.





Dust shroud

Dust hose



Dust shroud in different position



Water pump electrical socket

### Electrical connection for the machine

No cable is supplied as this will depend on the local wiring codes and your electrical supply. Insure that when installing the electrical supply to the machine that 220v single phase is supplied.

It is recommended that you use a 30 amp breaker.  
Wire to Terminal L1 & L2. Terminal L3 is not used.

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

There is a cable that has a female electrical socket for connection to the water pump.

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

Power / earth terminals



Main power isolation switch



Main power switch

## Connecting the water pipe to the pump

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.**

You will connect one to the water pump and place the other in the water container for the return water.

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

Fit the connector to the pump.

Connect one of the pipes to the water pump by pushing into the connector.

Lightly pull on the pipe to ensure that it is connected correctly.

Fill a container about  $\frac{3}{4}$  full with clean water.

**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 have to be larger. If your shop is likely to be subject to freezing temperatures antifreeze must be added to the cooling water.

Connect the electrical plug to the pump cable.

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

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.**

Electrical plug



Pipe Connector

Pump

Electrical cable



Pump in water container



## Fitting the touch off puck

The touch off puck plugs into the front of the machine and is stored in the puck holder.

## Fitting the router bit into the router head

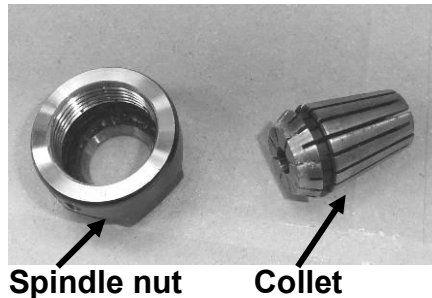
**Note:** Before changing or fitting the router bit always disconnect the power to the machine.

**Note.** Collets & spindle collet hole 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 hole are not clean, the router bit may not run true and this will affect the performance of your machine.

1. Select a 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.

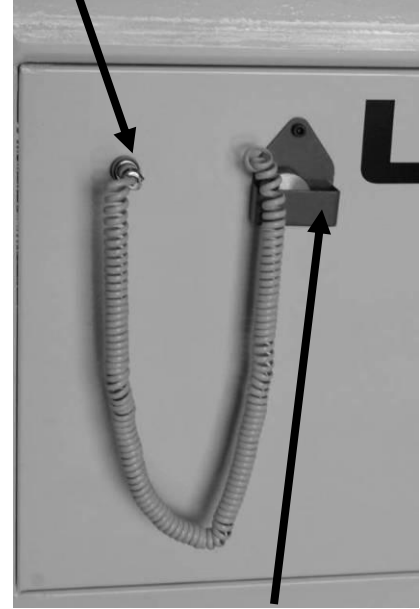
**Note.** The router bit must not be fitted into the collet until the collet has been fitted into the spindle nut. With the router bit fitted into the collet the collet cannot compress and snap into the spindle nut. The face of the collet and the face of the spindle nut will be close to flush.



Collet fitted to spindle nut

**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 to remove the collet while a cutter is fitted as the collet will not compress and pop out.

Touch off puck plug



Touch off puck holder

**3.** Fit the spindle nut and collet assembly onto the spindle thread by hand.

**4.** Press the bit into the collet but note that 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 you will have to change the collet if the shank of the router bit is a different size.



**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.).

### **1. Straight Router Bits**

These are the standard router bits that are commonly used with handheld routers and are usually 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 actually 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 product. A variation of the bit is called the "Mortising



**Router bits**

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

### Controller button functions

**Note.** There is a comprehensive manual for the hand-held controller. Below is a list of the main key functions.

**Note.** The controller may vary from that shown.

#### Keypad Functions (from upper left to bottom right)

**X+ / 1** = Moves the gantry in the X direction away from the home end of the bed.

**Y+ / 2** = Moves the gantry in the Y direction away from the home end of the bed.

**Z+ / 3** = Moves the router head in the Z [Up direction] away from the table surface.

**XY-0 / 4** = Sets machine “Origin”.

**X- / 5** = Moves the gantry in the X direction towards the home end of the bed.

**Y- / 6** = Moves the router head in the Y direction towards the home end of the bed.

**Z- / 7** = Moves the router head in the Z (Down direction) towards the table surface.

**Z-0 / 8** = Used set the tool to the “Zero” surface (tool “touch-off”.)

**HOME / 9**= Causes the machine to move to the “Home” position, first in the Z axis, followed by X and then Y. (Home is a mechanically determined position using mechanical switches/sensors.)

**HIGH/LOW / 0** = Toggles jogging speeds between High and Low ranges.

**ON/OFF / .** = Turns the Router Spindle On and Off.

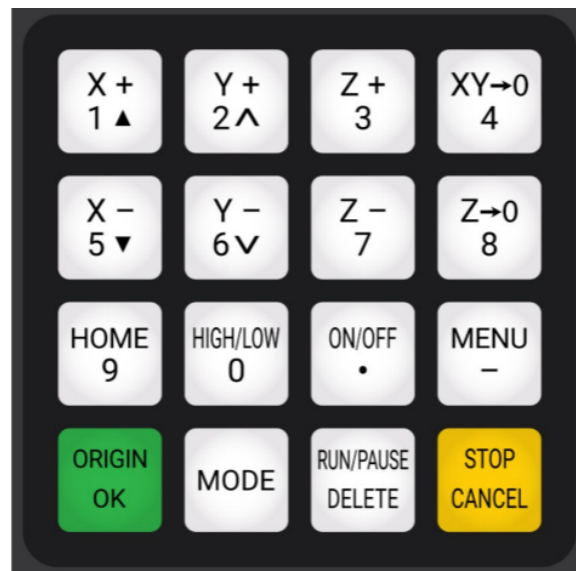
**MENU / \_** = Provides access to various setup features.

**ORIGIN /OK** = Use to accept commands (“On”.) Origin causes machine to the machines “Origin”.

**MODE** = Toggles between the three jogging modes: Continuous, Step or Distance.

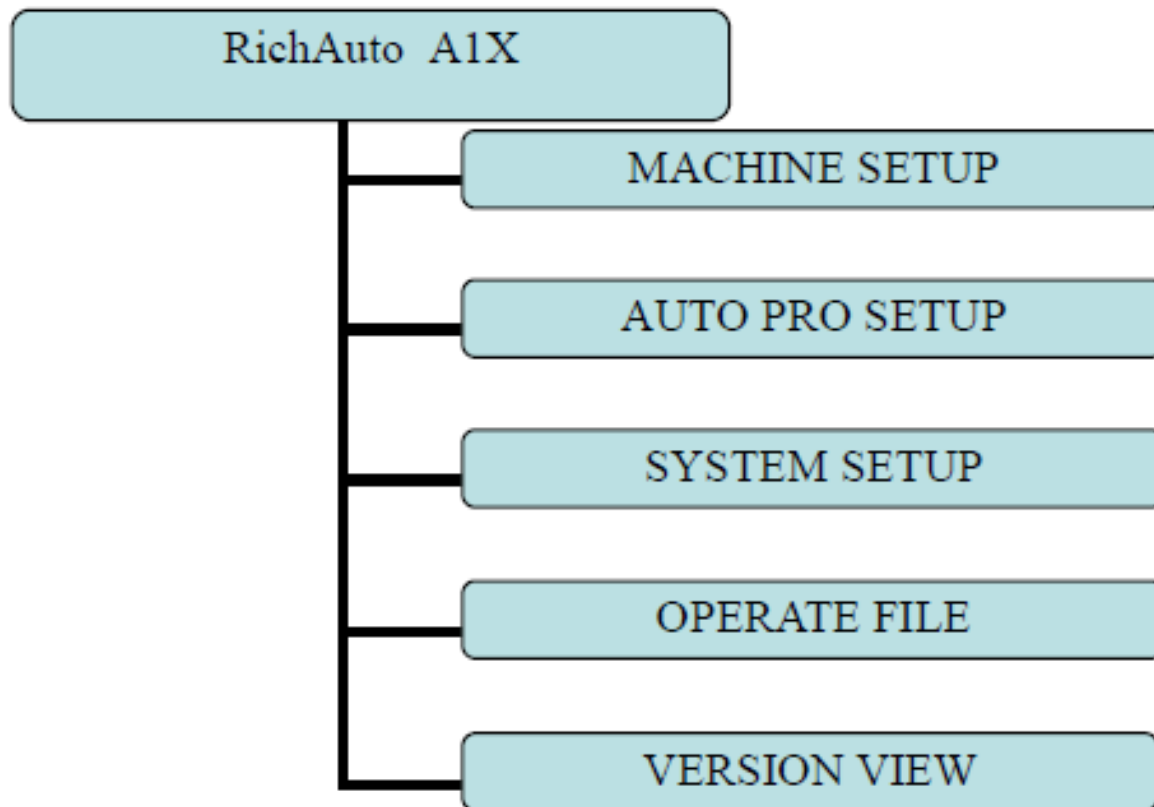
**“RUN/ PAUSE / DELETE”** = Used to load a program from either the USB drive or internal memory. While the program is running, causes the Operation to “Pause”.

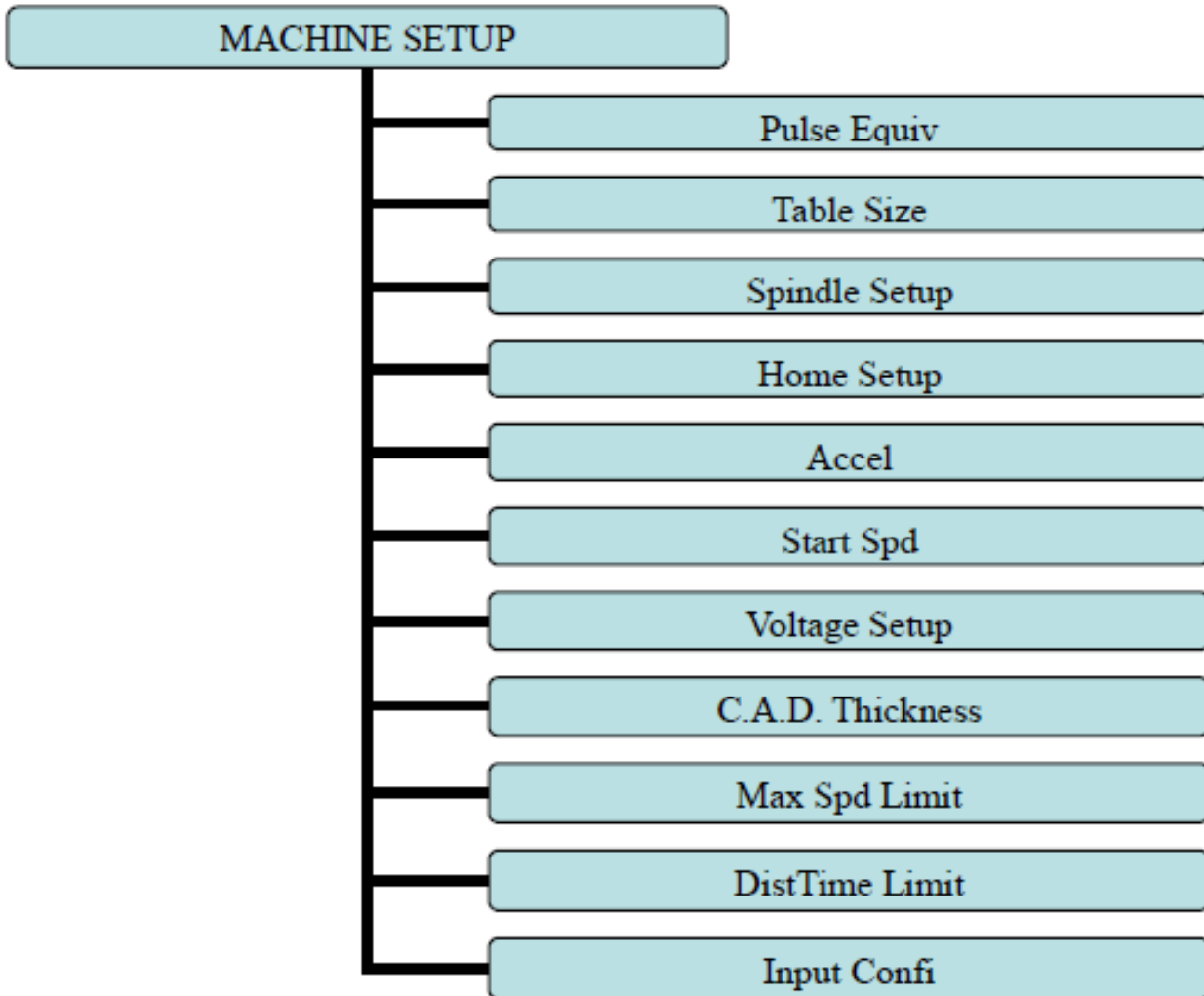
**STOP / CANCEL** = Stops a running program. Also used to cancel commands.



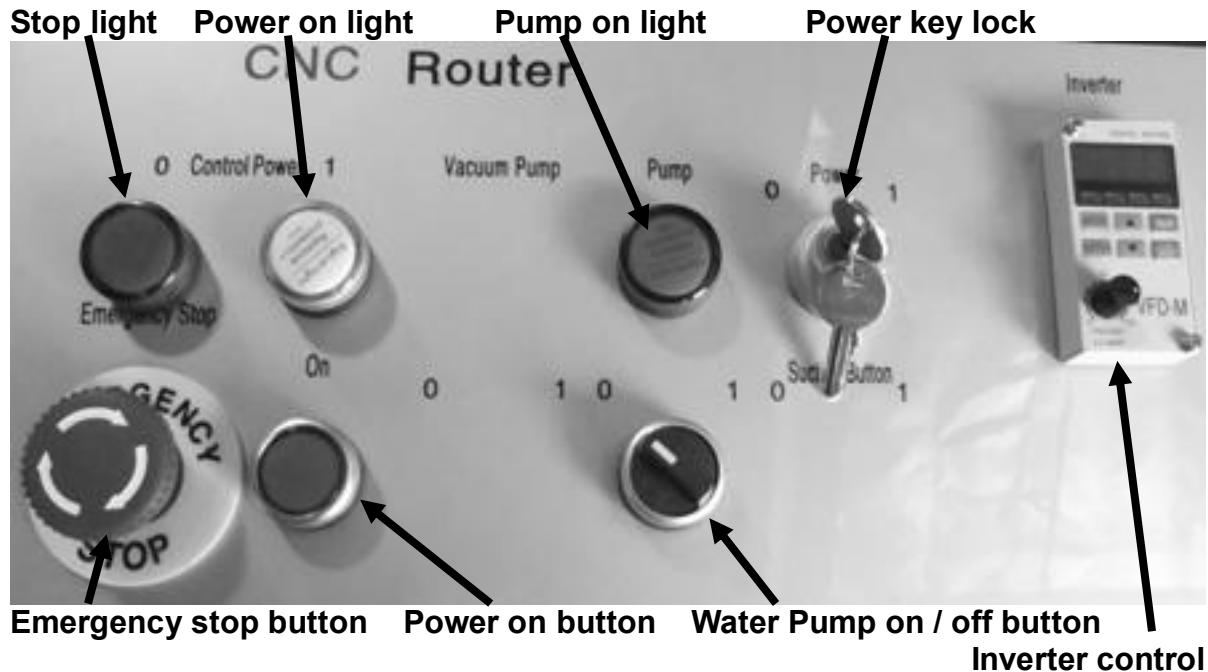
**Controller**  
**Note The controller may vary from that shown**

## Menu Path





## Control panel functions



- 1. Stop light.**  
Light displaying that the power is off.
- 2. Power on light.**  
Light displaying that the power is on.
- 3. Pump on light.**  
Light displaying that the pump is on.
- 4. Power lock key.**  
This isolates the machine and no functions can be operated when the key is in the off position.  
It is recommended that when the machine is left unattended that the key if moved in the "0" position and removed. This will stop unauthorized use of the machine.
- 5. Emergency stop button.**  
The emergency stop button locks when pressed. To reset, twist clockwise.
- 6. Power on button.**  
This button activates the machine and switches the power on.
- 7. Inverter controller.**  
The inverter controller is used to manually adjust the spindle speed.

## Turning on the machine

**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.**

Press the start button that will turn power on to the machine. Pressing the green button will also power the controller and the display will light up.

The screen will display "Go to Home?"

Make sure that the table surface is clear of obstructions and press the green Origin/OK button.

The router head will move to the home position on the table.

**Note:** "Home" is a mechanical position that is a constant that is determined by switches on each of the 3 axes.

X+= Across (from left-to-right when standing in front of the machine).

Y+ = Length (from front-to-back when standing in front of the machine).

Z+= vertical (up).

By pressing HIGH LOW / 0 and MENU / - the display will change to AX=0, AY=0, and AZ=0.

When the X, Y and Z have an A in front, this denotes that the dimensions displayed are in reference to the machine's home position. When the X, Y, and Z values are displayed with a number (1-9) this indicated the dimensional relationship of the machine from the machine "Origin."



**Hand-held controller**

## To move the router head

There are 3 different methods of moving the router head.

**1. Continuous mode.** Press the mode button until Continuous is displayed. The display will show (bottom row of the screen) the changing location of the router head as it moves location. By holding X+ button down, the machine will move constantly until the button is released. This is the same for X-, Y+, Y-, Z+ and Z-. The "High/Low" button determines the speed of the jogging moves.

**2. Step mode.** Press the mode button until step is displayed. With step selected, each time X, or Y button is pressed it will move the router head by 0.5mm in high setting and 0.1mm in the low setting.

**3. Distance mode.** Press the mode button a third time and Distance is displayed. This allows you to input a position into the controller that you want the router spindle to move to. As an example, if you want to move the router spindle 100 mm from the home position in the X and / or Y axis:

1. Press the mode button until Distance is displayed.

2. Type in 100 and press OK

3. Pressing the X+= button will now move the router 100mm in the X+ axis.

The router head also move the set distance in the X+, X-, Y+ and Y- depending on the button that is pressed.

To move the router head in the Z axis, press the Z+= / 3 [ UP] or the Z- / 7 button [DOWN].

By pressing any of the other X, Y or Z + or – buttons the router head will move 100mm in the selected direction.

### Jogging speed

You can select between a Low or High speed. By pressing the HIGH LOW / 0 button you can toggle between the two speeds. The High speed jog setting is approximately 4 times the speed of Low speed jog setting.



## Setting the work envelope

The Work Envelope is a volume that defines the movement limits of the router spindle. The X0, Y0 corner of the work envelope is determined by the machine's Home Position. The X+ and Y+ limits of the work envelope are determined by the "Table Size: Settings (MENU/MACHINE SETUP/TABLE SIZE) and provide the "soft limits" for the machine. The Table Size settings prevent the possibility of the spindle assembly/gantry from being jogged into the machine's frame.

Insure that the controller display is indicating the "Machine Coordinates". Those numbers correspond to the machine Home position that is determined by physical limit switches. Machine Coordinates are indicated on the screen by the designation "AX"", "AY", or "AZ". If the Machine Coordinates are not being displayed, depressing the HIGH/LOW and MENU buttons together will toggle between the machine coordinates and ORIGIN coordinates. (e.g. 1-9.)



**1.** Select Low Speed by pressing the HIGH LOW / 0 button. Select Continuous by press the mode button until "Continuous" is displayed. The position of the router head as it changes will be shown at the bottom of the display.

Move the router spindle to the home position by pressing the Home button.

**2.** Move the router head to the max X position by pressing the X+ button until the router spindle stops. Note the displayed AX= value.

**3.** Press the Y+ button and hold until the router gantry stops moving, note the displayed AY value.

**4.** Typically on the Laguna Swift 4 x 4 CNC machine the work envelope will be 1300mm [51.181 in] x 1300mm [51.181 in] (work envelopes vary by machine model).

**5.** Machining can only be performed if the tool path centerlines fall within the work envelope.

If an error message is displayed while trying to execute a program indicating an oveltravel error in one of the Axes, executing the program would require that a tool path fall outside of the machine's Work Envelope. PLEASE NOTE THAT THE SELECTION OF THE "ORIGIN" ALSO EFFECTS PLACEMENT OF THE PROGRAM WITHIN THE WORK ENVELOPE.

## Using a spoil board on the machine table

### Spoil board preparation

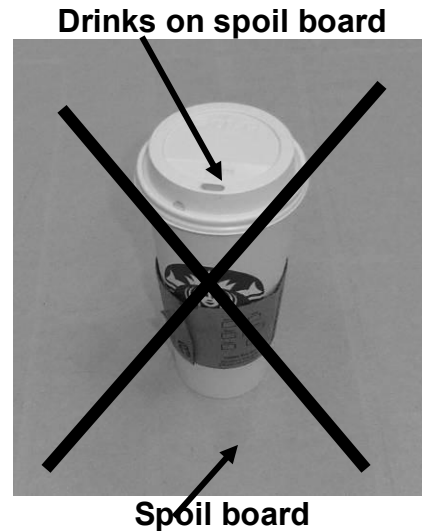
**Note.** Do not confuse flatness with bow. If the board is bowed it may not stick down. Never use a bowed board as a spoil board.

The machine is supplied with pre-machined spoil boards that can be protected by covering with an additional spoil board/s. You may want to cover the spoil boards with a complete sheet but this will remove access to the T slots. This can be used when your work is attached to the machine with double-sided tape.

**Note.** The use of an additional spoil board will reduce the gantry clearance.

A popular method to fixture parts onto the Laguna Swift CNC table is to use a spoil board attached to the machine table with double-sided tape (3M). The spoil board should be a flat smooth material such as ½" thick, melamine-covered particle board or other smooth material. The parts to be machined can also be attached to the melamine surface with double-stick tape. Ideally, the spoil board should be positioned in the center of the machine's work envelope if possible to provide the greatest flexibility. Using the design program that you have purchased for your machine, draw the work envelope that corresponds to your machine (1300mm [51.181 in] x 1300mm [51.181 in] for the Laguna Swift 4 x 4). The lower-left corner of the work envelope is actually the machine's home position (X0, Y0 in the drawing). Then draw the spoil board, i.e. a 48" X 48" square, and locate it in the center of the work envelope. Note the dimension that the corner of the square is from the home position. This will provide you the exact location of the spoil board's lower left corner. An easy way to set this position is to fit a pointed bit into the router spindle and jog the router spindle to the corner position based on the coordinates determined in the drawing and align the spoil board with this position.

(This procedure will also give you practice in jogging the router spindle to a required position.)



## 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 that great. 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 swell 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 be possible to skim the board and re-use it, but the likelihood is that it is scrap.

## Moving the router head to the spoil board corner position

1. With the router head in the home position, drop the router bit to just above the spoil board top face as described earlier, [Z axis].

2. Use the distance command as described earlier [press mode, toggle through to distance] to set the X and Y position to 40.38mm.

3. Press X+

4. Once the router head has stopped moving press Y+.

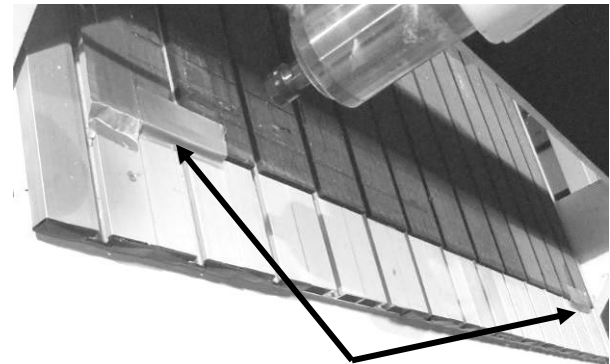
5. The point of the router bit is now located over the point that the corner of the spoil board should be.

6. You may need to move the router bit lower so that it is closer to the top surface of the spoil board by pressing the Z- button.

7. Press the top right hand button XY-0 / 4. This will set the origin and the machine has a new datum point and will be the X=0 / Y=0 in your design program.

8. Move the spoil board so that the corner of the spoil board is directly under the point of the router bit.

9. Place tape around the corner of the spoil board on the bed of the machine. This will give



**Spoil board reference tape**

you a position to place the "double-sided" tape that will be used to attach the spoil board the bed of the machine.

**10.** Move the router head in the X direction with the continues function so that it is approximately at the end of the spoil board.

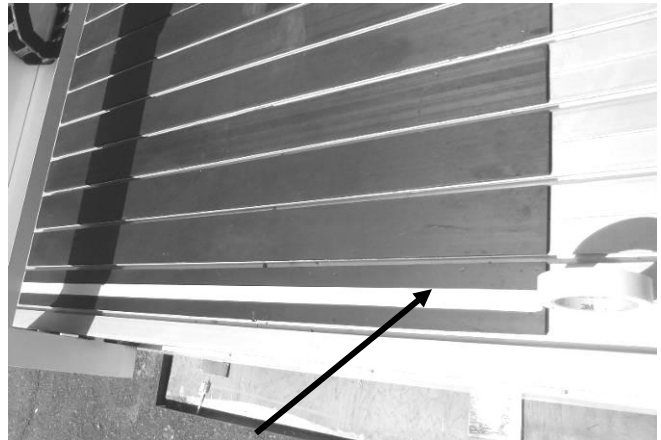
**11.** Move the spoil board so that it lines up with the point of the router bit.

**12.** Place tape on the bed of the machine at the edge of the spoil board.

**13.** Move the router head to the end of the machine furthest X and Y position. The router head will be out of the way and allow you to have access to the bed of the machine.

**14.** Remove the spoil board.

**15.** Clean the bed of the machine so that there is no dust or wood chips. Apply double-sided tape to the bed of the machine using the tape that you have just applied as reference. You need to apply three or four strips of double-sided tape to the bed of the machine with sufficient length so that the spoil board is attached along its complete length.



**Spoil board double-sided tape**

**16.** Clean the spoil board so that the surface will adhere to the double-sided tape.

**17.** Remove the backing from the double-sided tape.

**18.** Using 2 people, lift the spoil board over the table and lower it so the reference tape that you applied to the bed of the machine aligns with the corner and edge of the spoil board.

**19.** Lower and press down so that the double-sided tape sticks to the spoil board. Do not worry if the spoil board is not perfectly aligned with the tape as you will have to reset the home position.

Although it is not the recommended method, the clamps can also be used to clamp the spoil board to the bed of the machine. When using the clamps, place a piece of packing under the jacking bolt to protect the bed of the machine.

## Re setting the origin point

1. Bring the router head to the origin point by pressing origin button.
2. Lower the router bit by pressing Z= so that it is just above the spoil board.  
Note the position of the tip of the router bit point. You will probably find the origin point will have to be adjusted.
3. Jog the point over so that it lines up with the edge of the spoil board in the X axis.
4. Jog the point over so that it lines up with the edge of the spoil board in the Y axis.
5. Reset the origin point by pressing the top right hand button XY-0 / 4. This will set the origin and the machine has a new datum point.

## Setting the Z origin point (tool touch off)

The machine needs to know when the router bit is just touching the top of the spoil board. When you fit the router bit into the collet, the tip of the router bit will be at a different height above the spoil board and will have to be zeroed.

1. Fit a flat bottom router bit to the spindle.
2. Jog (Z) the tip of the tool down so that it is just above the top of the spoil board using the continues button.
3. Step down in slow mode (0.1mm 0.004" each time the button is pressed) while turning the router collet by hand in the reverse direction. When you feel pressure stop jogging down.



**Note.** Do not turn the router bit by hand, it is sharp and could cause injury.

4. Select the distance mode and enter 0.0254mm [0.0001"] Press Z+ (UP) and rotate the cutter in the reverse direction until the cutter is free to move and there is no drag. The cutter is now within 0.001" above the spoil board.
5. Once the router bit is at zero, press the Z-0 / 8 button to set the zero point.
6. Jog the router bit up or press the origin button to move the router bit up and to the origin point.

## Loading a program into the machine

The controller has a USB slot located to the top.

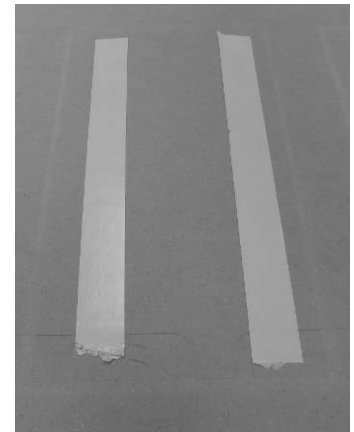
1. Load your program into your USB drive.
2. Fit the USB into the USB slot in the controller.
3. Press the button RUN PAUSE/ DELETE. The display will show U disc.
4. Press the OK button. What is in the USB drive will be shown on the screen.
5. Use the arrow keys to select the file that you need to load into the controller.
6. Select, then press OK button.
7. Once the code / program has been downloaded the machine will start to operate.

**Note.** Ensure that you are clear of the machine as the spindle will start to turn and could cause injury.

8. The router will just cut the surface of the spoil board the distance that you set in the design software, (We suggest 1.6mm [1/16"]) and cut the outline of the job. This will give you the location of the part on the spoil 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 saw dust 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 easier to remove the job once machined.



**Double-sided tape  
inside job outline**



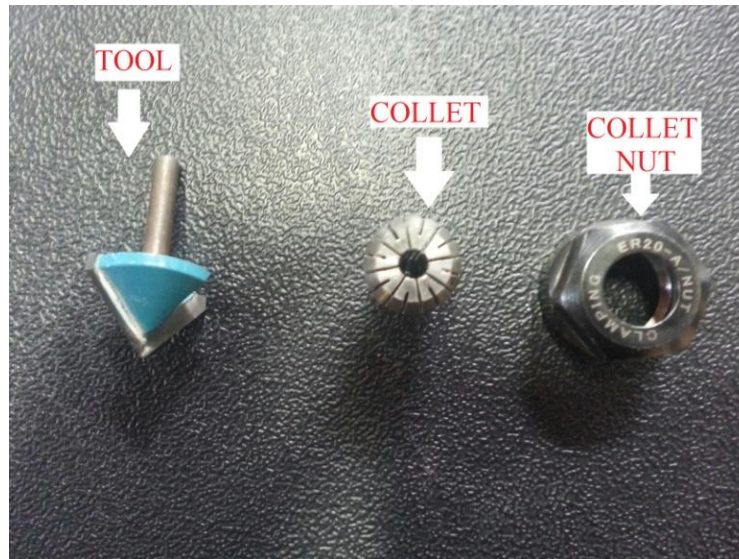
## Steps to follow before running a program

### 1. Secure materials to tables

- a. Safely secure materials down to top of table by use of clamps, double sided tape, vacuum, etc...

### 2. Load tool into spindle

- a. The first step to loading a tool is to identify the parts involved and assemble them correctly. The following is a picture of the main parts:



- b. Step one in assembling the tools together is to snap the collet into the collet nut. It

should snap in bigger end into the nut as shown and will have a little wiggle, but will not come out unless some force is applied.



- c. The next step is to start the collet and nut threading onto the spindle as shown (Start threading before loading tool to help prevent a possible cross thread)



- d. Now you can start to load the tool into the collet and keep tightening the collet nut by hand. You can now use the wrenches to tighten up the tool, using the small wrench on the flats above the threading and the big wrench on the collet nut, tighten the tool in place.

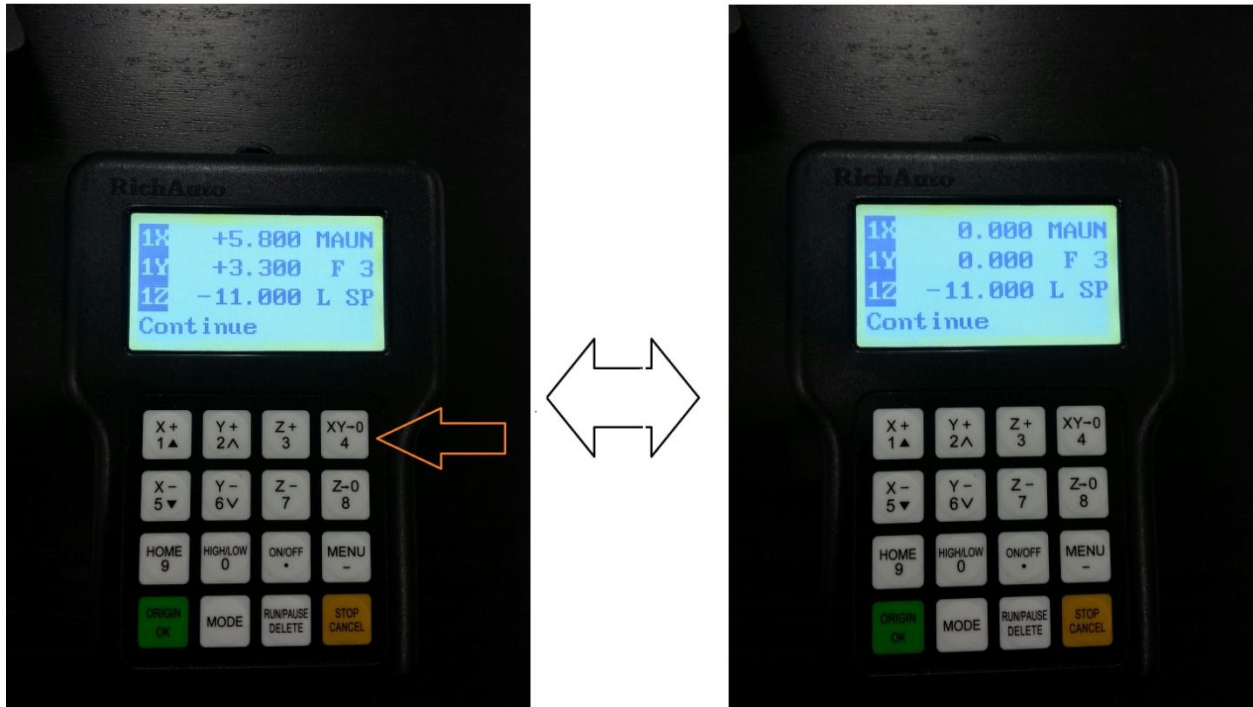


### 3. Teach origin (XY→0)

- a. The next step in the process is to verify that you have the proper origin (X +Y axes only). The origin is a changeable number which is the programs Zero (Not to be confused with home, which is a mechanical zero that cannot be changed)
  - i. The first step to setting the X,Y origin is to jog the machine to the lower left corner (Or wherever your program origin is located) and center the tool bit over where you want it to be

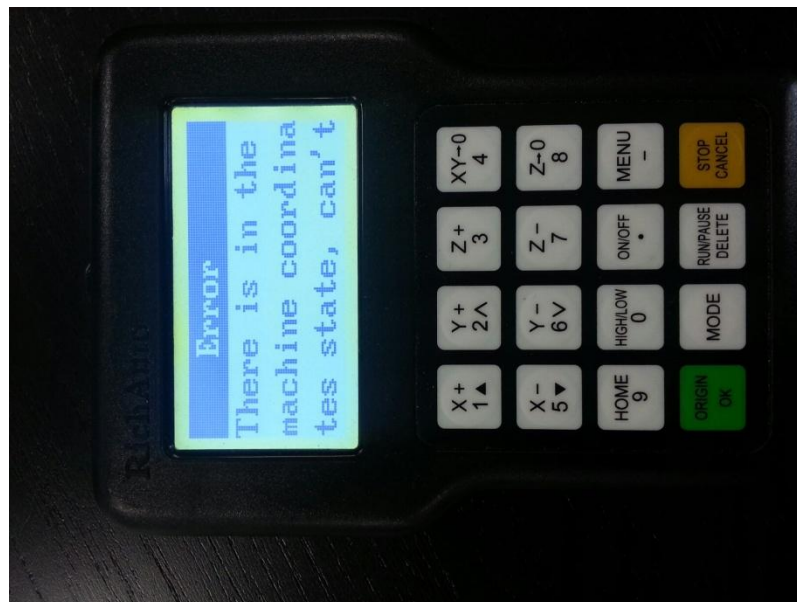


- ii. Once you are located where you want to be to set the origin, you have to press the number 4 key (XY→0)



### **-WARNING-**

*If you receive the following error:*



*Then you are in the absolute coordinates page, (AX, AY, AZ) To get out of this page, press the green origin/ok button to get back to the coordinates page, and then hold Menu and the 1 key and release both together to go back to the origin 1 page (1X,1Y,1Z) and you will be able to set an origin (1-9 are 9 different origins, the 0 key brings you to absolute coordinates)*

#### **4. Tool Lengths**

- a. Teaching tool lengths will allow the machine to know how far down until the tool is touching the top of spoil board (or top of material if that's how the program is set up for)
  - i. To do this we have to use the controller and jog the Z axis down to the material. Jog it down until it is just above the material and then slow it down or step jog until you are just touching the material/spoil board (Can use a piece of paper to go between the top and the bit and lower until paper can longer move free)
  - ii. Once you have the bit directly on top of the spoil board or part, you will press the 8 key to teach the machine the Z 0.
  - iii. Now the machine will know how far down to go for the cutting. Make sure you touch off to the appropriate area, based off what you program.

#### **5. Copy program to controller**

- a. When running your programs, it is highly recommended to not run them directly off the USB as the file may corrupt or skip while reading, it is best to copy them directly to avoid any errors.
  - i. Put the USB into the HHC.
  - ii. Press Menu and by using the X-/5 key, go down until you are highlighted on Operate File. Then press the green origin/ok button.
  - iii. You should immediately find yourself highlighted on Copy File, and press the origin/ok button.
  - iv. Push the origin/ok button again to select U-disk file (USB device)
  - v. Using the 1 and 5 keys, move through the files, and press ok on the file you want to copy over.
  - vi. You can now press cancel until you get to the 1X,1Y,1Z page

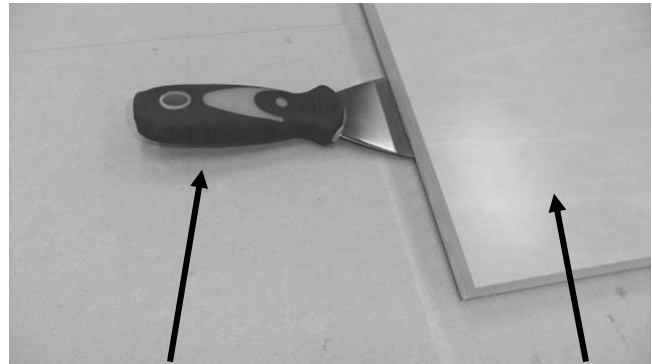
#### **6. Turn on dust collector**

#### **7. Run the program**

- a. To run the program, press the Run/Pause delete button
- b. Using the 5 key, scroll down to Internal file and press the origin/ok button
- c. Using the 5 key, look for your file and press the origin/ok button. Press ok again, and the program should start. (The controller will run a code check and let you know if it will error out by traveling too far on a certain axis, adjust location of part and origin, and try to run again)

## Removing the job from the spoil board

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

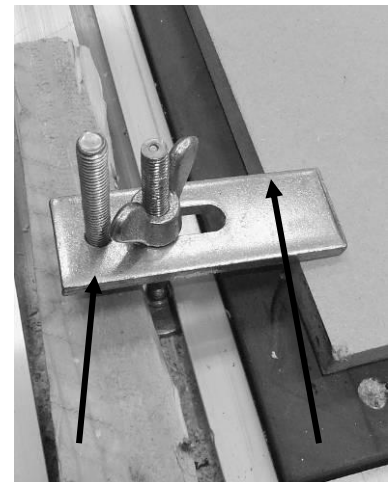


Wide blade putty knife

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. However, note that 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

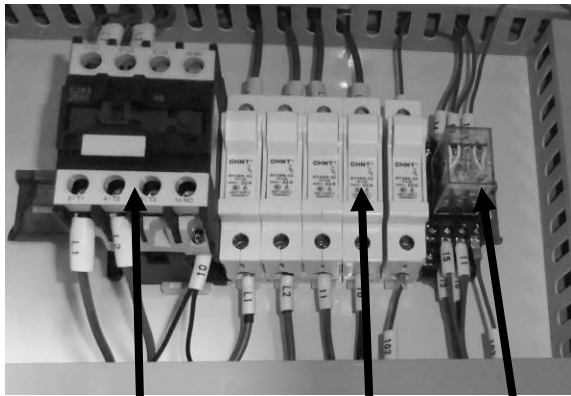
**Control cabinet**

**Spindle inverter**

**24 volt power supply**



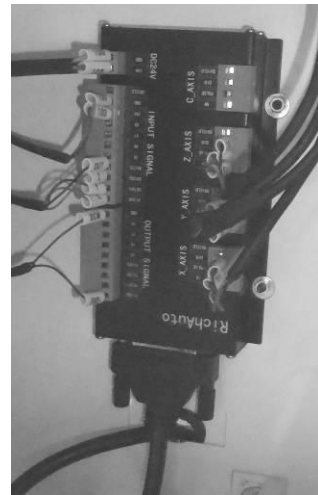
**Control cabinet**



**Circuit breaker**

**Fuses**

**Relay**

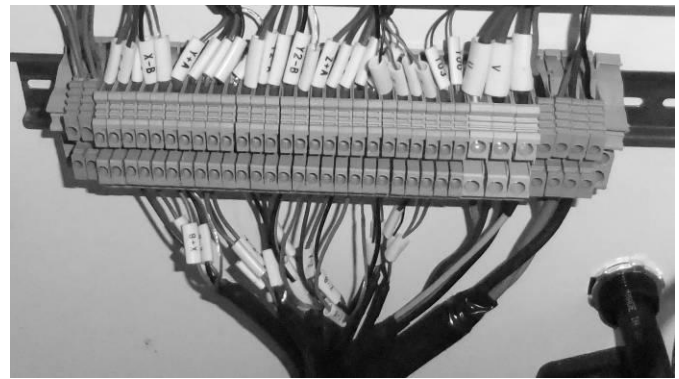


**Hand-held controller control board**



**Electrical filter**

**Spindle inverter**



**Terminal strip**

**Motor drivers**



**80 Volt power supplies    Terminal strip    Main power disconnect**

## Maintenance

### Maintenance

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

### 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 likely-hood of rust forming.
2. Check cutter teeth for chips and dullness.
3. Generally inspect the machine for damage and loose or warn parts.
4. The collets and spindle collet hole must be cleaned regularly. Ensure that the slots in the collets are free of sawdust as sawdust builds up and will prevent the collet from compressing. If the collet or spindle hole is not clean, the router bit may not run true and this will affect the performance of your machine.
5. Pump the oiler.



**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 and any large bits that could cause blockages.



## Trouble shooting

### **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 cords are not loose and are 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 your installation. 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 be fail-safe. If it should occur and you cannot fix the fault, seek professional assistance. The machine must be disconnected from the power and not run again 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**

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