SMARTSHOP® I MANUAL
SMARTSHOP® I 4x8
SMARTSHOP® I 5x10

Part No. MCNC SS 1 48x96-0163
Part No. MCNC SS 1 60x120-0163

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As with all machinery there are certain hazards involved with their operation and use. Use 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 contacted your supplying distributer.

Please read the follwoing carefully and fully before operating the machine:

1.   Keep the working area clean and ensure adequate ligthing as 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 an attachment is to be fitted or removed.

5.   Never leave the machine with the power on.

6.   Do no 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	6 HP constant torque
Spindle	High frequency liquid-cooled spindle built with NSK bearings rated for 100% duty cycle
Spindle RPM	(6,000-24,000 rpm)
Rapid travel	900 in/min
Maximum cutting speed	600 in/min
Dust port diameter	4 inches
Volts	220volt single phase
Precision Helical Rack & Pinion Drive System for X and Y Axis	20mm heavy-duty HiWin HG Series linear bearings and rails on all axes
Controller	Laguna Hand Held
Gantry Clearance	6"
Machine Work Table	47 " x 97 "
Z Axis	6"
X and Y Axis	48" x 96"
Machine Foot Print	67.5 " x 120 "
Vacuum table with T-slots	Yes
Heavy -duty welded tubular steel frame	2200 lbs
Solid state limit switches	Yes
Centralized lubrication system for all axes.	Yes
10HP Regenerative Blower	Yes

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, Inc.] within 24 hours.
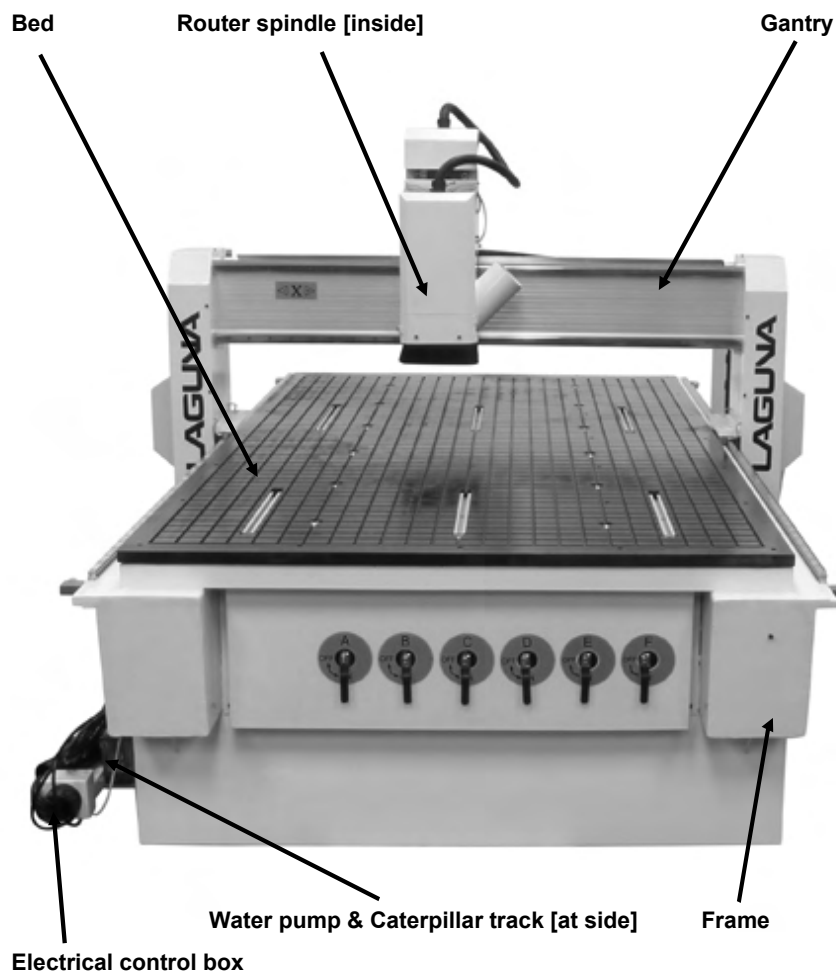
Introduction to Smartshop I

The Smartshop I 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 Smartshop I 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 Smartshop I machining that saves on waste and cost. It is possible to reduce the number of different machines in the shop as the Smartshop I will perform multiple functions and is a must for cabinet makers and serious wood workers.

Bed   Router spindle [inside]   Gantry

Water pump & Caterpillar track [at side]   Frame
Electrical control box

1.   Bed
   The bed of the machine consists of a heavy steel frame with a plastic top that is
   slotted for the vacuum function. It has "T-Slots". 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 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 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

**Additional Instructions for the Use of the Smartshop I Machine**

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 Smartshop I is under the control of the onboard machine controller, it is important that you are clear of the cutter when operating the machine.
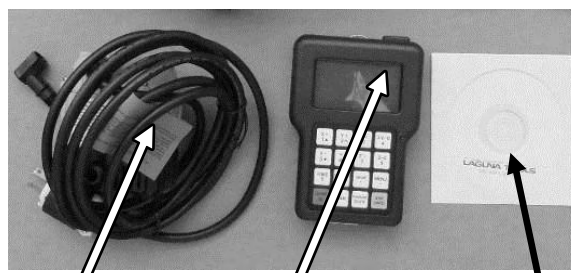
What You will Receive with Smartshop I

Note: The quantity of collets, cutters and clamps will vary from that shown, dependant on your order.

Clamps   **Cutters & collets**   **Memory stick**

Dust hose clamps   **Tools**
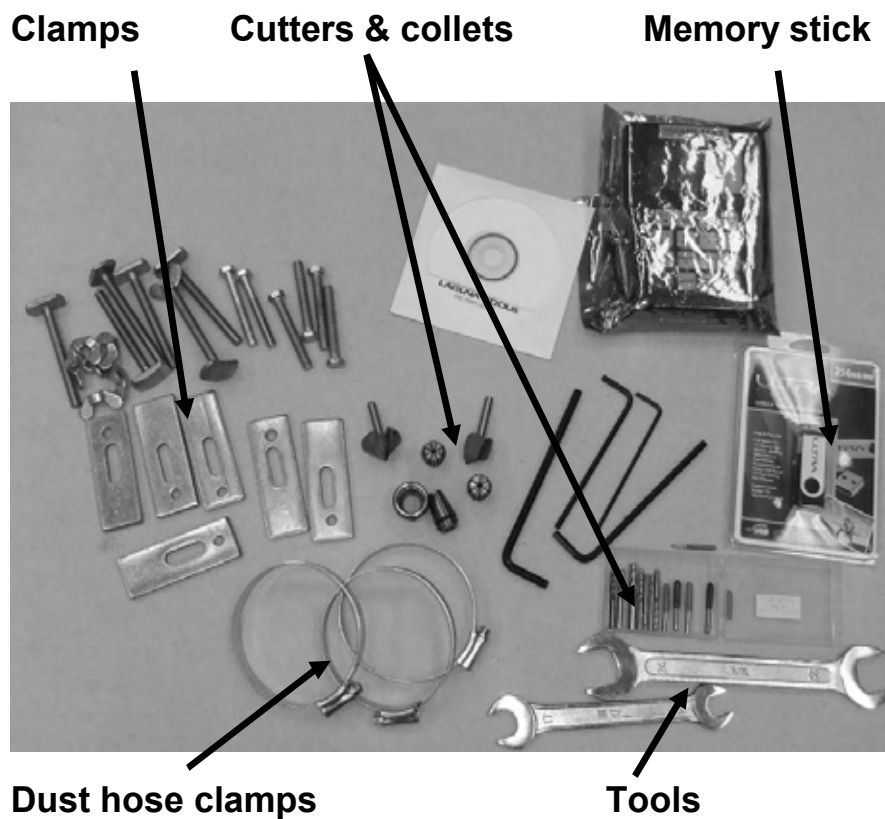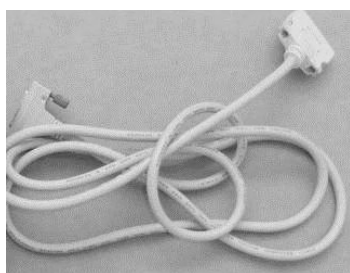
Memory stick   **Controller cable**   **Water pump**   **Controller**   **CD**

Where to Locate Your Smartshop I

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 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. Locate your machine close to the power source and dust collection.

Unpacking Your Smartshop I

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 Smartshop I [if fitted] and any other packaging material. The parts ordered with the machine will be packed on or inside the machine.

Note: The Smartshop I is heavy. 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 gently to the floor.
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

Note: Never use a memory stick with a greater capacity than 8GB. If you do, it will crash your machine computer. It is strongly suggested that you purchase additional memory sticks and mark them "Smartshop I machine use only".

Cleaning the Machine

The machine is shipped with the non painted surfaces protected from rust by a film of grease.

The grease must be removed with WD40 [or similar] as grease attracts sawdust and dirt. The surfaces should then be coated with a Teflon lubricant or similar. Teflon tends to dry and will not attract sawdust and dirt.

Assembling the Controller

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

Note: The cable has plugs at both ends that are different. The plug with the screws fits into the controller. The other plug fits into the cabinet socket. Push the cable into the cabinet socket and it will snap into position. Give the cable a light tug to ensure that the plug has snapped into position. Please handle DSP cable and connections carefully as they are very delicate.

Controller with cable fitted
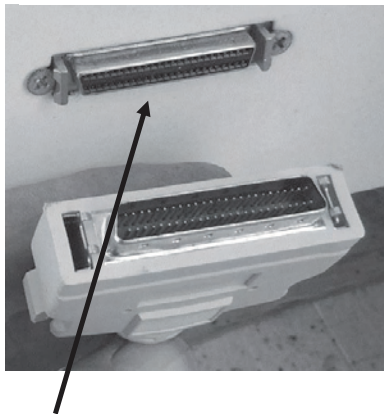
Cabinet socket
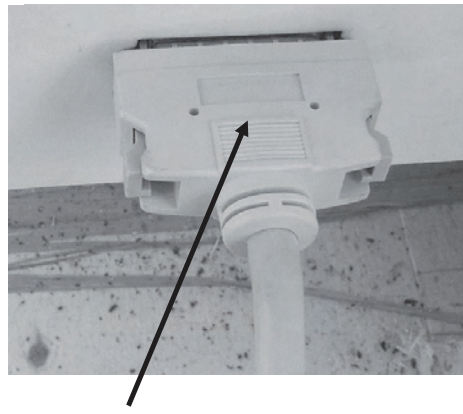
**Controller cable fitted to cabinet socket**

Controller


Memory stick

Fitting the Dust Hose

1. Fit a 4 inch dust hose [not supplied] to the dust shroud and secure with the clamp. Ensure that it is tight as it is very inconvenient to have it fall off during production.

2. Feed the dust hose over the shroud and through the dust hose support.

3. The head of the machine will move across the complete 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 is 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 cause a trip hazard.
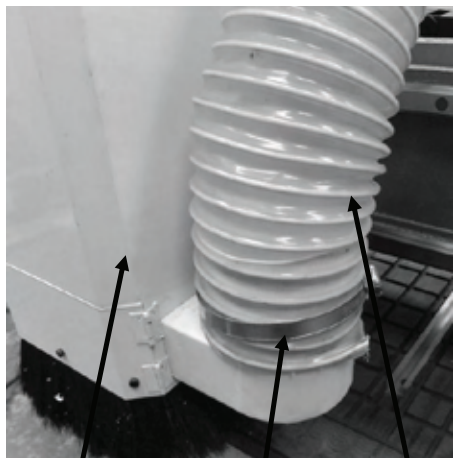
Dust shroud   **Clamp**   **Dust hose**

Dust shroud
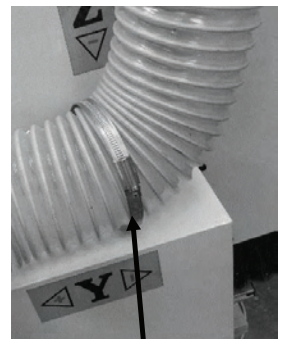
Dust hose support

Electrical Connections for the Machine

There are two electrical cables. One is the main power cable and 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.

Main power cable

Water pump socket

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.

The second cable has a female electrical socket for connection to the water pump.

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

Fitting the Vacuum Pump

The machine is provided with a 2 inch hose for connection to your vacuum pump. The hose connects to the vacuum manifold located under the table at the end of the Smartshop I were the vacuum switches are located. When connecting the hose ensure that it is fitted tightly as you do not want to loose vacuum due to poor connection. The other end of the hose fits onto the vacuum pump.

Connecting the Water Pipes to the Pump

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

Note: Never run the spindle without the cooling being connected or the spindle could be damaged.
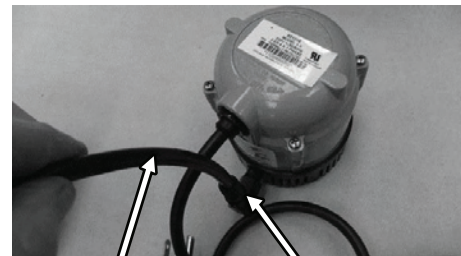
Coolant pipe   **90 Deg pipe fitting**

NEVER handle pump in water with power on, always disconnect power before handling.

You will connect one pipe to the water pump and the other pipe 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.

Pump in water container

Fill a container about ¾ full with clean 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.

Note: If your shop is subject to freezing temperatures antifreeze must be added to the cooling water.

Note: No water container is supplied. You will need a container with a minimum of 5 gallons capacity. If your shop is subject to high ambient temperatures a larger water container may be required.

Note: If water is not flowing or is slow, reverse the hoses on the pump and flow should regain, sometimes the system will create an air bubble during shipping causing vapor lock.

Fitting the router bit into the router head

Note: Before changing or fitting the router bit always disconnect the power to the 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.
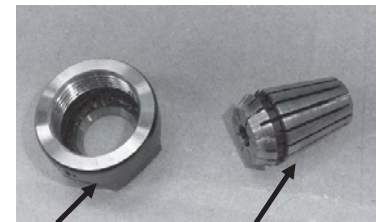
Note: The router bit must not be fitted into the collet until the collet has been fitted into the spindle nut. With the router bit fitted into the collet, the collet can not compress and snap into the spindle nut.

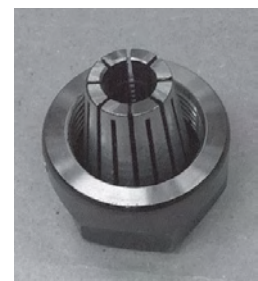The face of the collet and the face of the spindle nut will be close to flush.

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 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.

Tightening the spindle nut

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.

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 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 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

Controller Button Functions

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 = Is used to 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 return 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 may vary from that shown

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 green start button, this 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?"
Ensure 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 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]. Should this be Y+?
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 indicates the dimensional relationship of the machine from the machine's "Origin".

Emergency stop button
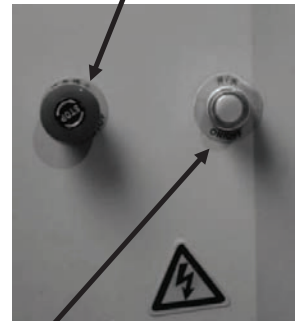
Start button

LAGUNA

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 continuously 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 the X, or Y button is pressed it will move the router head by 0.5mm in the 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 the position into the controller that you want the router spindle to move to.
     As an example: If you want to move the router spindle 100mm 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 moves the set distance in the X+, X-, Y+ and Y- depending on which buttonis 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.

To Move the Router Head

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.

Ensure that the controller display is indicating the Machine Coordinates. Those numbers correspond to the machine Home position 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 pressing the mode button until "Continuous" is displayed. The display will show the position of the router head as it changes 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 X+ button until the router spindle stops and 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 Smartshop I machine, the work envelope will be 1300mm x 2500mm [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 over travel 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.
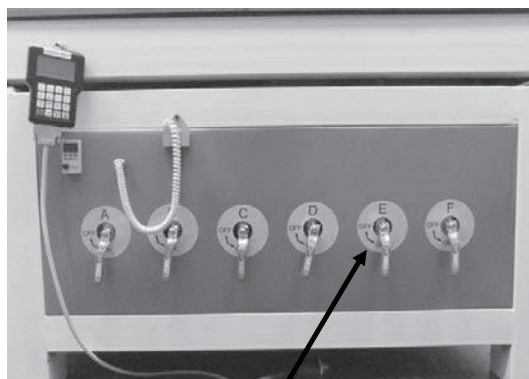
Using the Vacuum Table

Note: The better the vacuum created, the more securely the parts will be held in place. Follow the below instructions to obtain optimum results.
The vacuum table has 6 zones and you can set the configuration to suit the type of work that you will be producing. Each zone is controlled by a switch that is located at the front of the machine. The table has two holes in each zone that extract the air and generate the vacuum. The table has grooves that ensurethe air is extracted evenly across the zone. To seal the zone from leakage, a foam rubber gasket is pressed into the outer grooves. This gasket sits slightly proud of the table and is compressed by the spoil board [sometimes called sacrificial board] as the vacuum is applied. T slots are also provided to allow you to clamp jobs / spoil boards to the table should it be required.
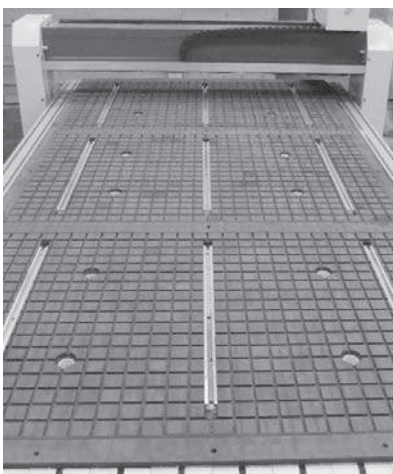
Vacuum zone on / off switches

Vacuum table

Fitting the Foam Rubber Gasket
It is important that the foam rubber gasket is pressed evenly into the grove in the vacuum table around the zone that you are constructing. To ensure a good seal, it is strongly recommended that the gasket is turned in at the beginning [as shown]. The gasket has a tendency to stretch while fitting and over time it may relax and shorten. The extra length of gasket allows you to re-set it and make the seal again. If the initial turn is not put in place, there is no margin for error and you may have to discard a complete length just for being one inch short.
It is recommended that you initially create 3 zones, each one completely across the table. You can change the configuration at a later stage.
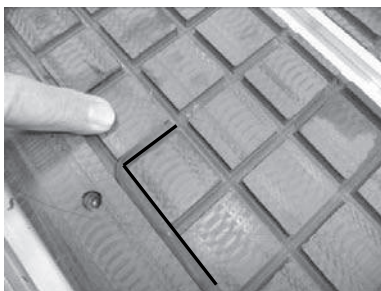
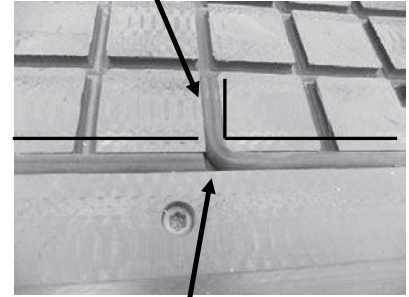**Start point foam rubber gasket turned in**

Inserting foam rubber gasket

Cutting end of foam rubber gasket

Gasket turned in

Final finished joint

Note: Do not stretch the foam rubber gasket while you are fitting it into the grove in the vacuum table.

Spoil Board Material and Precautions

The spoil board has two functions.

1. To protect the vacuum table from the cutters. You will set the depth of your cutter a few thousandths of an inch deeper than the job thickness.

    If there was no spoil board this would mean that you would be cutting into the vacuum table.

2. To transfer the vacuum from the table to the job. This means that the spoil board has to be porous to allow air to be sucked from the underside of the job.
    We have found that low cost MDF is the best material for this function.

Suggested zone configuration
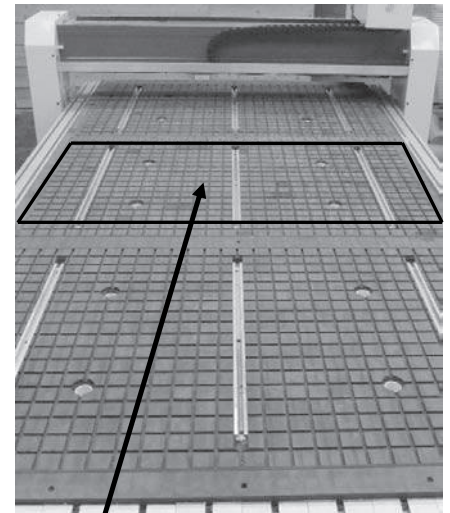
Vacuum zone

Spoil Board Preparation

When you purchase your MDF spoil board it should be no thinner than 3/4 inch. Contrary to what you might think, the thicker the MDF the better the suction that is created. However, it is not recommended that your spoil board is thicker than 1 inch.

The MDF that you purchase will not be flat and the machine will be cutting to accuracy in the order of a few thousandths of an inch so you will have to machine the spoil board flat. After your spoil board has been skimmed many times and is ½ inch thick discard it and start a new spoil board. The spoil board edges are very porous and must be sealed. We recommend that a hard candle wax is used as it contains no water. Never use a water based product to seal the edges of the board as this will make the board grow and it will be unsuitable as a spoil board

Spoil board edge

Edge sealing wax

Note: Some glues contain water and can affect the edges of the spoil board.
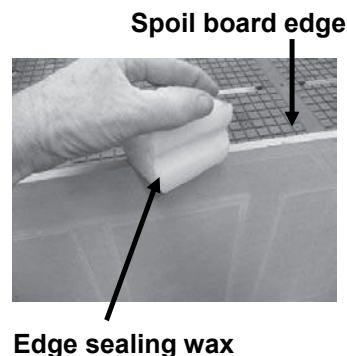
Note: Do not confuse flatness with bow. If the board is bowed the vacuum may not pull the board down and you will lose vacuum. Never use a bowed board as a spoil board.

1.   Cut your spoil board to the size of the bed of the machine.

2.   Place on the vacuum table. Prior to placing the spoil board onto the vacuum table, ensure that the table is perfectly clean, free from sawdust and dirt. If there is sawdust etc. on the table, it will change the height of the spoil board and it will not be flat. It is strongly recommended that you do not wipe or brush the table clean, but use a hand held blower. Do not use a vacuum cleaner as it may suck the foam seal out of the grove and damage it.

Note: It takes at least 2 people to load a spoil board. You must never put the edge of the board on the vacuum table and push it across. This will snag on the foam rubber gasket and rip it with the result that you will loose the vacuum seal and have to replace the seal.
Only lift the board into place and lower it onto the vacuum table in the correct position.

3.   Turn on the Vacuum.

4.   Fly cut the total surface of the spoil board.

Note: Only remove the minimum to achieve a flat surface over the complete surface. You will have to skim the surface several times during the life of the spoil board to clean it up and you should get into the habit of only skimming the minimum off the surface.

5.   Once one face is flat, remove the vacuum, turn the spoil board over and repeat the process for the other

Spoil Board Use:

Each time you set a new job up you will cut into the spoil board by a few thousandths of an inch in the areas where the cutter passes through the job. When doing repeat jobs always position the job in the same position so that you are not cutting new groves in the spoil board. This will greatly extend the life of the board and save time and money.

Prior to placing a job on the spoil board, clean with a hand held blower.

Dirt under the job will reduce the vacuum and in extreme cases the job will move and be a reject, or worse, fly off the spoil board.

Ensure that the job has no large burrs on the edges as this will also reduce the vacuum.

In general keeping everything clean is the key to achieving good repeatable results.

Precautions Regarding Spoil Boards

The spoil board is porous 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 wet board has completely dried it may possible to skim the board and re-use it, but the likelihood is that it is scrap.

Drinks on spoil board

Spoil board
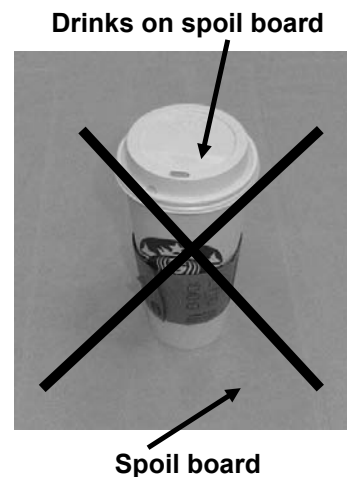
Vacuum Table T Slots

The vacuum table has nine T slots to enable fixtures and jobs to be clamped directly to the table. Clamps are provided but it must be noted, the table must be protected with a packer when using jacking bolts. If the jacking bolts come into contact with the plastic of the table, the plastic will be damaged. The packer must be as large as possible to spread the load on the plastic of the table.

T slots are also provided at the end and sides of the table and can be used for clamping jobs and fixtures.


T slots

LAGUNA

Automatic Z Origin Point [tool touch off]

The machine is provided with an automatic tool height adjustment. Place the contact button on the clean spoil board directly under the cutter. To activate the automatic tool height adjustment press Menu & On/Off key at the same time on the control pad. This will cause the cutter to move slowly down. Once the cutter touches the contact button, electrical contact is made and the cutter will move up and away from the contact button. The machine now knows the height of the cutter.

There is also a manual method that is detailed below:

Cutter

Contact button

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" (CONTINUOUS???) 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.
   As you feel pressure, stop jogging down.
   Note: Do not turn the router bit (BY HAND???)as 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.
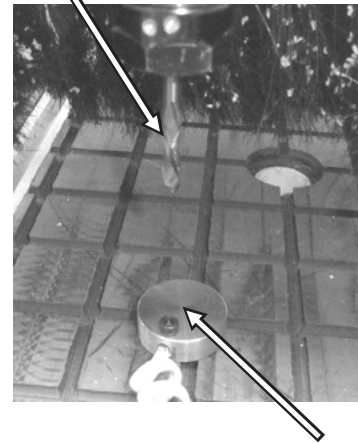
Setting the Spoil Board on the Vacuum Table for Production

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 where 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 now has a new datum point which 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 and adjust the spoil board position so that it is parallel with the edges of the vacuum table. Vacuum can now be applied to the spoil board.

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 and 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 now has a new datum point.
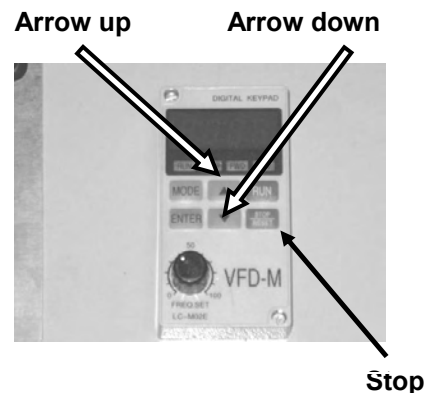
Spindle Speed Control
Only three buttons are operator accessible: ARROW UP, ARROW DOWN, and STOP KEY.
ARROW UP key is used to raise the spindle speed.
ARROW DOWN Key is used to lower the spindle speed.

The stop key is available to stop the spindle during a program activation.
Display reads in hertz, 200hz = 12,000, 300hz = 18,000, 400hz = 24,000

Arrow up   **Arrow down**

Stop

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. This will load onto the screen what is in the USB drive.
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.

Removing the Job from the Spoil Board

The job has a tendency to stick to the spoil board and it is suggested that you use a wide blade putty knife to lift the 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.
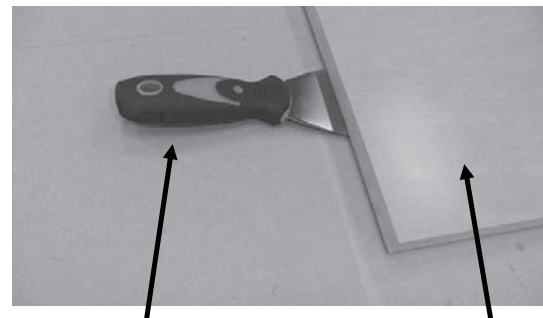
Wide blade putty knife   **Job**
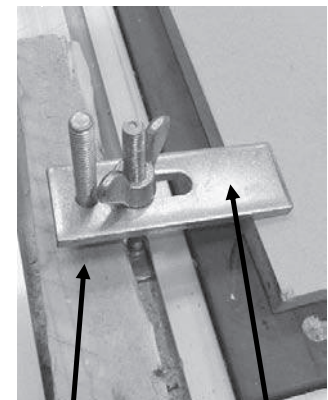
Packing   **Clamp**

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 likelihood of rust forming.
2.   Check cutter teeth for chips and dullness.
3.   Generally inspect the machine for damage and loose or worn parts.

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.

Oiling the Machine
The machine is provided with a central oiler. Do not over lubricate the machine as excess oil attracts dirt and sawdust.

It is recommended that one pump of the oiler once a month will be sufficient to keep your machine lubricated. When the oil tank needs filling, top up with a good quality SAE 30 weight oil.

Central oiler

Jacking the Table Level
The machine is provided with table jacking points. The jacking points come factory set and should not need adjustment. Do not adjust the jacking points until you have contacted Laguna Tools, Inc. customer service.
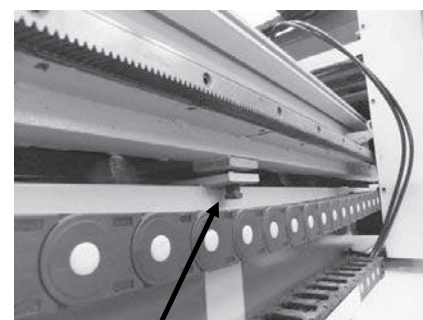
Table jacking point

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.

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.

B&R G-Code Functions

Overview

G-Function	M	S	Group	Description
G00	x		1	Rapid interpolation
G01	x		1	Linear interpolation
G02	x		1	Circular interpolation - clockwise
G03	x		1	Circular interpolation - counter clockwise
G04		x		Dwell time in seconds
G05	x		1	Direct programming of the polar axes in the clockwise direction (starting with V0.207)
G06	x		1	Direct programming of the polar axes in the counter - clockwise direction (starting with V0.207)
G10	x		14	Programmed path speed on the tool center point
G11	x		14	Programmed path speed on the workpiece contour
G12	x			Path speed at transition arcs
G16	x		19	Orientation of the tool axis (starting with V0.270)
G17	x		2	XY plane selection
G18	x		2	ZX plane selection
G19	x		2	YZ plane selection
G17 Q	x		2	CAM wrapping
G18 Q	x		2	
G19 Q	x		2	
G20	x		3	Deactivate mirroring
G21	x		3	Y axis mirroring
G22	x		3	X axis mirroring
G23	x		3	X and Y axis mirroring
G25	x		11	Tangential transition arcs
G36	x		17	CDC: Replace arc with straight line - DEACTIVATE
G37	x		17	CDC: Replace arc with straight line - ACTIVATE
G38	x		18	CDC: Allow contour violations at small path sections - DEACTIVATE
G39	x		18	CDC: Allow contour violations at small path sections - ACTIVATE
G40	x		5	Deactivate the CDC
G41	x		5	CDC left
G42	x		5	CDC right
G53	x		6	Deactivate the zero point offset
G54	x		6	Zero point offset 1
G55	x		6	Zero point offset 2
G56	x		6	Zero point offset 3
G57	x		6	Zero point offset 4
G58	x		6	Zero point offset 5
G59	x		6	Zero point offset 6
G60		x		Accuracy hold
G70	x			Units switch (Programming in Inch)
G71	x			Units switch (Programming in mm)
G90	x		8	Absolute position coordinates
G91	x		8	Relative position coordinates
G92	x			Programmed zero point offset with coordinate system rotation
G93	x			Feed Rate Definition (inverse time feed rate definition)
G94	x			Feed Rate Definition (feed per minute)
G100	x			Full transformation
G101	x			
G102	x		1	Circle Interpolation in General Orientation

Code				Description
G103 G104	x x			CDC: Radius - dependent feed adjustment at convex path sections (starting with V0.201) CDC: Radius - dependent feed adjustment at concave path sections (starting with V0.201)
G105	x			Setting the " v_jump" Parameter (starting with V0.198)
G106	x			Setting the " a_jump" Parameter (starting with V0.198)
G107	x			Axis limit switch (starting with V0.190)
G108	x		12	Set Path Acceleration
G109	x		13	Set Path Deceleration
G110	x		12,13	Set Path Acceleration and Path Deceleration
G111 G112	x x			Block transition with speed dip (starting with V0.240) Block transition without speed dip (starting with V0.240)
G113		x		Reduction of path speed at tangential path section transitions
G114 G115	x x			Optimized circular acceleration ratio Standard acceleration ratio
G126	x		11	Rounding edges
G130 G131	x x		20 20	Compensation in the direction of the machine coordinate system (starting with V0.270) Compensation in the direction of the programmed system (starting with V0.270)
G132 G133	x x		4 4	CDC with linear transitions (starting with V0.200) CDC with arc transitions (starting with V0.200)
G134 G135	x x		4 4	Intersection path calculation - DEACTIVATE (starting with V0.194) Intersection path calculation - ACTIVATE (starting with V0.194)
G137 G138 G139	x x x		9 9 9	Activate/deactivate CDC indirectly with transition block Activate/deactivate CDC directly Activate/deactivate CDC indirectly
G140 G141	x x		15 15	Deactivate tangential axis automatically (starting with V0.130) Activate tangential axis automatically (starting with V0.130)
G144 G145	x x			Continuous alignment of automatic tangential axes Standard alignment of automatic tangential axes
G153		x		Position coordinates in the machine coordinate system
G159=0 - 199	x		6	Expanded zero point offset
G161 G162	x x		10 10	Absolute coordinates for center of circle Relative coordinates for center of circle
G170		x		Decoder synchronization
G171		x		Immediate processing of NC blocks
G172		x		Decoder/Path Synchronization
G180		x		Connecting path elements
G192	x			Rotate/Shift Coordinate System (Mounting correction)
G193 G194	x x			Activate mode "Linear Feed Characteristic" Deactivate mode "Linear Feed Characteristic"
G195 G196	x x			Switch On RTCP Switch Off RTCP
G200 G201		x x		Position latch Position latch with following halt
G211	x			Activate "blended move mode"
G217 G218 G219		x x x		Mapping
G220 G221 G222		x x x		Output signal before the end of the path section Activate prediction for G220 Signal function with specification of the remaining path distance

G234	x			Activation Change without transition lines
G235	x			Activation Change with transition lines
G240	x		16	Non - periodic tangential axis (starting with V0.151)
G241	x		16	Periodic tangential axis (starting with V0.151)
G292	x			Rotate/Shift Coordinate System
G300	x			Chord error monitoring (starting with V0.201)
G300	x			Chord Error Monitoring: Variations for polar coordinate motor (starting with V0.201)
G320	x			Workspace Boundaries Definition and Monitoring Activation
G320.1	x			Workspace Boundaries Monitoring Deactivation
G320.2	x			Switch on workspace monitoring and self - collision detection
G320.3	x			Switch off workspace monitoring and self - collision detection
G320.4	x			Diameter of the Robot Arms
G320.5	x			Protected Block Definition
G320.6	x			Protected Block Activation
G320.7	x			Protected Block Deactivation
G320.8	x			Protected Half - Space Definition
G320.9	x			Protected Half - Space Activation
G321	x			Protected Half - Space Deactivation
G395	x			TCP frame
G396	x			TCP axes orientation by frame on
G397	x			TCP axes orientation by frame off
G398	x			Calculation method of TCP axes orientation closer to actual TCP orientation
G399	x			Calculation method of TCP axes orientation closer to programmed TCP orientation
G701	x			Resume MP logging
G702	x			Pause MP logging
G801	x			Start of a C2 Spline
G802	x			End of a C2 Spline

M ...   **Modal valid**
Valid until the G   - function is deactivated by another from the same group
S ...   **Block valid**
Only valid in the block in which the G   - function is programmed

Hand-Held Controller Manual

Part No. A11E

Dear Woodworker:

Thank you for your purchase and welcome to the Laguna Tools group of discriminating woodworkers. I understand that you have a choice of where to purchase your machines and appreciate the confidence you have in our products.

Every machine sold by Laguna Tools has been carefully designed and well thought through from a woodworkers perspective. I cut on our bandsaws, lathes, tablesaws, combination machines, and CNC Routers. Through my hands-on experience, I work hard to make our machines better. I strive to give you machines that inspire you to create works of art. Machines that are a joy to run and work on. Machines that encourage your performance.

Today, we offer high-performance machines with innovative solutions that meet the needs of woodworkers and their ever-evolving craft.

I started Laguna Tools as a woodworker, I still am.

Thank you again for becoming a Laguna Tools customer.

Torben Helshoj
President and Founder - Laguna Tools
Imagination, Innovation and Invention at work.

Table of Contents

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 woodworking machines sold by Laguna Tools carry a one-year warranty from the date of shipping. Laguna Tools guarantees all new machines sold to be free of manufacturers' defective workmanship, parts, and materials.

We will repair or replace, without charge, any parts determined by Laguna Tools, Inc. to have a manufacturer's defect. We require the defective item/part to be returned to Laguna Tools, Inc. In the event the item/part is determined to have been damaged due to lack of maintenance, cleaning or misuse/abuse, the customer will be responsible for the cost of replacement of 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 when repair or alterations have been made or attempted by others.

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

Normal user alignment, adjustment, tuning and machine settings are not covered by this warranty. It is the responsibility of the user to understand basic woodworking machinery settings and procedures and to properly maintain the equipment in accordance with the standards provided by the manufacturer.

Parts under warranty are shipped at Laguna Tools, Inc.'s cost either by common carrier, FedEx ground service or similar method.

Technical support to install replacement parts is primarily provided by phone, fax, or e-mail. 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.

Only new machines sold to the original owner are covered by this warranty. For warranty repair information, call 1-800-332-4094.

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*** The product covered by this manual is subject to change with out notice due to a constant improvement program.

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 General

Max USB 2.0 maximum capacity	8GB
Weight	0.6 lb [0.3 kg]
Size	4.3/8"x 61/2" x 1 1/4" [111mm x 165mm x 32mm]

Receiving Your Machine

Note: It is probable that your machine will be delivered by a third party. Before you unpack your 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. It is advisable to photograph any shipping damage to support an insurance claim.

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 Hand-held Controller

The hand held controller 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, with the purchase of the relevant software, also produce intricate carvings. Nesting is also a valuable feature of CNC machining that saves on waste and cost. It is possible to reduce the amount of different machines in the shop as the CNC will perform multiple functions and is a must for serious wood workers.

Parts of the Hand-held Controller

Key pad   **Display**

The hand held controller has the following parts.

Key Pad
This is used to input data into the HHC and to select the various functions.

Display
This communicates with the operator.

Cable Interface
The main interface cable and USB printer cable connect into these sockets.

USB Socket
The USB socket is used to plug the memory stick into for downloading programs.

Cable interface   **USB interface**
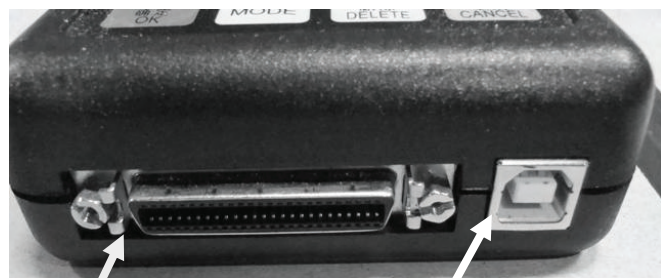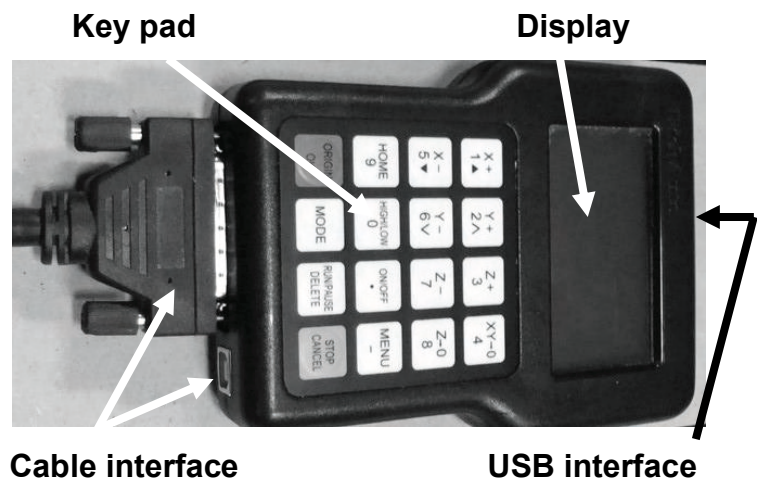
Connection port

USB printer cable port

Assembling the Hand-held Controller

Note: Never use a memory stick with a greater capacity than 8GB. If you do it will crash your machine computer. It is strongly suggested that you purchase additional memory sticks and mark them CNC machine use only.

Fit the cable to the controller and ensure that the screws are finger tight. The USB printer cable port is used to connect the controller direct into your computer.

Note: The connection port socket and plug only fit one way so ensure that the plug is the correct way up prior to assembling.

Connection cable   **Hand held controller**

Memory stick socket

Note: Controller may vary form that shown.

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.
ONOFF/. = 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.

Note: Before you turn on the machine remove all tools and other objects from the machine table.
Switch on the main isolation switch.
Release the emergency stop by twisting clock wise and it will pop out.
Press the green start button that will turn power on to the machine.
Pressing the green button will also power the hand held 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".

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. Pressing 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 100mm 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 [Factory Set]

Note: This comes factory set and should not need adjustment.
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". I 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 display will show the position of the router head as it changes 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 X+ button until the router spindle stops and 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 IQ CNC machine the work envelope is 24½" x 35½"
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 over travel 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.

Resetting 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 and 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.

Automatic Z Origin Point [tool touch off]

The machine is provided with an automatic tool height adjustment. Place the contact button on the clean spoil board directly under the cutter.
To activate the automatic tool height adjustment press Menu and On/Off at the same time on the control pad. This will cause the cutter to move slowly down. Once the cutter touches the contact button, electrical contact is made and the cutter will move up and away from the contact button. The machine now knows the height of the cutter. You can also place the contact button on the top of the job being cut to set the cutter to the top height of the job. This is a handy function when you are engraving or carving with the top face of the job has been set as datum in your program.

Manual Z Origin Point [tool touch off]

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 CONTINUOUS 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. As you feel pressure, stop jogging down.
   Note: Do not turn the router bit by hand, as it is sharp and could cause injury. Only turn the collet.
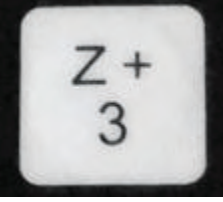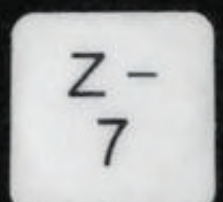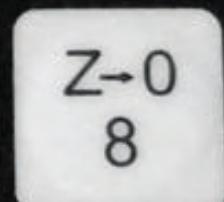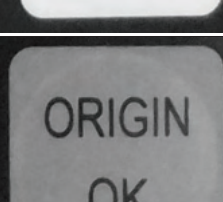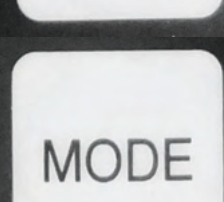
4. Select the distance mode and enter 0.0254mm [0.0001"] Press Z+ [UP] and rotate the cutter in the reverse direction until the cutter is free to move and there is no drag. The cutter is now within 0.001" above the spoil board.
5. Once the router bit is at Zero press the Z-0 / 8 button to set the zero point.
6. Jog the router bit up or press the origin button to move the router bit up and to the origin point.
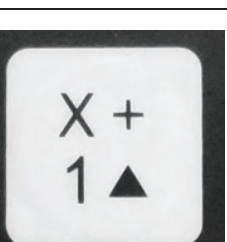
HHC Key Pad

X + 1 ▲	= Jog "Positive X" = Scroll "Up" = Key "Number 1"	Y + 2 ∧	= Jog "Positive Y" = Accelerate "Feed Rate" = Key Number "2"
Z + 3	= Jog "Positive Z" = Increase "Spindle Speed" = Key Number "3"	XY→0 4	= Set "Origin Point" = Key Number "4"
X − 5 ▼	= Jog "Negative X" = Scroll "Down" = Key Number "5"	Y − 6 ∨	= Jog "Negative Y" = Decelerate "Feed Rate" = Key Number "6"
Z − 7	= Jog "Negative Z" = Decrease "Spindle speed" Key Number "7"	Z→0 8	= Set "Z Origin" = Key Number "8"
HOME 9	= Move to "Home" = Key Number "9"	HIGH/LOW 0	= Select "High/Low "When Jogging Manually = Key Number "0"
ON/OFF •	= Manual Spindle = start "On/Off" = "Decimal point"	MENU −	= Open "Menu" = "Minus Key"
ORIGIN OK	= Move to "Origin point" = " OK" " Yes" " Enter"	MODE	= Jogging Mode" Continuous, Step, Distance" = Display " Speed ,Time or Line" During a run
RUN/PAUSE DELETE	= Select Programs = "Pause" While running = Select and modify values	STOP CANCEL	= Parameter adjustment "High/Low" Speed = Stop Program = "Exit", Cancel", "Back"

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Double Key Functions

MENU −	**+** X + 1 ▲	= Switch "Origin Points" 1-9 Note: When menu and a number are pressed this will take the router to the relevant origin point
RUN/PAUSE DELETE	**+** HIGH/LOW 0	= Advance Work Menu
MENU −	**+** MODE	= Move to Coordinates
RUN/PAUSE DELETE	**+** X + 1 ▲	= Start program from a saved point
MENU −	**+** ON/OFF •	= Activate C.A.D. [Cutter Adjust Device] Automatic Tool Touch Off

RUN/PAUSE DELETE **+** HOME 9		= **Run Last Array Work**
MODE **+** MENU _		= **Go to Coordinates**
MODE **+** Z→0 8		= **Set Park Position**
RUN/PAUSE DELETE **+** STOP CANCEL		= **Last Work Information**
MENU _ **+** HIGH/LOW 0		= **The Absolute Origin Point** **The Absolute Origin = Home Position** **Note: The Home position cannot ever be changed as it is controlled by the micro switches.**

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. This will load onto the screen what is in the USB drive.
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 down loaded 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.

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 of 1 phase power wired to the machine.
2. 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.

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