

SmartShop J Owner's Manual



LAGUNA

Laguna Tools
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SmartShop J Owner's Manual

Scope of This Manual

This manual provides basic operating and maintenance procedures for the SmartShop J.

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

Customer Service

For technical support, please contact Laguna Tools Customer Service by phone at 1-800-332-4094, or email customer_service@lagunatools.com. Please note the machine type in the subject line.

In the space provided, record the serial number, model number, and install date of the machine.

Serial No.	
Model No.	
Install Date:	

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DISCLAIMER

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

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1.0 General Information and Safety

1.1 Overview

SAVE THIS MANUAL. Keep this manual for the safety warnings, precautions, assembly, operating, inspection, and maintenance procedures. Read this Owner's Manual in its entirety prior to assembly or operation.

Read and understand all warnings and operation instructions before using any tool or equipment. Always follow basic safety precautions to reduce the risk of personal injury. Improper operation, maintenance, or modification of tools or equipment could result in serious injury or property damage. Laguna Tools equipment is designed for specific and limited applications. This product should not be modified nor used for any application other than its intended use.

PERSONAL SAFETY IS THE RESPONSIBILITY OF THE OPERATOR.

1.2 Safety Signs and Callouts

DANGER

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

WARNING

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

CAUTION

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

NOTE

A helpful tip from Laguna Tools technical staff.

1.3 Proposition 65 Warning of Harmful Exposure

Some dust created by sanding, sawing, grinding, drilling, machining, and other construction activities contains chemicals known to the state of California to cause cancer, birth defects, or other reproductive harm. Some examples of these chemicals are:

- Lead from lead-based paint.
- Crystalline silica from bricks, cement, and other masonry products.
- Arsenic and chromium from chemically treated lumber.



DANGER

Fire Warning

Use extreme caution when working with flammable materials such as wood or acrylic, as they are more volatile than other materials.

Keep the machine clean and follow the maintenance schedule.

Always have a fire extinguisher ready to extinguish a fire.

Never leave the machine running unattended.

The tools sold by Laguna Tools are safe when used properly, as described by the American National Safety Institute, the UL Standards of safe tool use, and the IEC standards of safe tool use. Laguna Tools is in no way responsible for injury or death that occurs while using this product.

The risk of exposure varies depending on frequency of use. To reduce exposure to these chemicals, work in a well-ventilated area and work with approved safety equipment, such as face or dust masks that are specifically designed to filter out microscopic particles. For more information go to <https://www.p65warnings.ca.gov/>.

1.4 Intended Use

This machine is designed to cut wood, acrylics, wood-fiber composites, certain plastics, and non-ferrous metals. Do not use this machine for anything other than its intended use.

1.5 Safety Information

The machine is an electrical appliance and precision machine. Please read and understand the entire owner's manual before attempting assembly or operation. Read and understand the warnings posted on the machine and in this manual. Failure to comply with all warnings may cause serious personal injury or damage to the machine.

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The machine is designed and intended for use by properly trained and experienced personnel only. Personnel who are not familiar with the correct and safe operation of the machine should not operate the machine until properly trained.

1. Never operate machinery under the influence of drugs or alcohol, when tired, or when distracted.
2. Stay alert at all times while operating the machine.
3. Always wear safety glasses and hearing protection.
4. Do not wear clothing, apparel, or jewelry that can become entangled in moving parts. Always tie back or cover long hair. Wear non-slip footwear to reduce the risk of slipping and losing control or accidentally contacting cutting tool or moving parts.
5. Never stand on the machine. Serious injury may occur if the machine is tipped or if the cutting tool is unintentionally contacted.
6. Know where the emergency stop switch is located.
7. Perform daily inspection of the machine for damaged, loose, or improperly adjusted parts or any condition that could affect safe operation. For your own safety, do not operate the machine with damaged parts.
8. Use the machine only in clean areas free from excessive moisture or flammable objects.
9. Keep the working area clean and ensure adequate lighting is available.
10. Cables and cords should be inspected regularly.
11. Do not attempt to exceed the limits of the machine.
12. Keep the machine, electrical cabinet, and cables away from excessive heat, flammable substances, and sharp objects.
13. Keep the machine, electrical cabinet, and surrounding area clear of obstructions and free from excessive moisture.
14. Safety Signs should be attached to places that are easy to spot.
15. Disconnect power to all system components when not in use, when changing accessories, and before servicing. Remove the switch keys or lock-out the machine to prevent unauthorized use and child-proof the workshop.
16. Exercise care with machine controls and around keypad to avoid unintentional start-up.
17. The machine must be level. Level the machine if the ground is uneven.

18. Ensure the keys and adjusting wrenches have been removed and all the nuts and bolts are secured.
19. Keep cutting tools clean and sharp.
20. Do not use dull, gummy, or cracked cutting tools.
21. Lubricate and change accessories when necessary.
22. Keep controls clean and dry.
23. Consult the Owner's Manual or contact Laguna Tools for recommended accessories. Using improper accessories will increase the risk of serious injury or damage.
24. Keep a copy of this manual for future reference.
25. All motion parameters have been set up by Laguna Tools. If any modifications are required, please have a qualified operator perform the changes.

1.6 Shop Environment

1. Verify the floor can bear the weight of the machine and workpieces.
2. Ensure the floor around the machine is clean and free of scrap material, oil, and grease.
3. Do not lean material against the gantry, guide rails, or table.
4. Support the weight of the dust hose attached to the dust shoe (optional) accessory to prevent the weight of the hose from dislodging the dust shoe. Ensure that there is sufficient slack in the dust collection hose to allow the spindle to cover the entire work area.
5. Position the machine away from overhead pipes and plumbing fixtures to prevent condensation from dripping on to the tables and control system components.
6. Locate the machine away from sinks, faucets, or other water supplies or storage to prevent splash-out that can damage the tables and control system components.
7. Provide adequate room between this machine and other machines in the shop to reduce the chance of accidental jarring when transporting lumber or other heavy materials through the shop and while materials are being worked on other machines.
8. Verify there is adequate space between machines to allow for the possibility the workpiece will extend over the end of the machine.
9. Ensure that the lighting your machine is placed under is sufficient to safely perform regular operation and maintenance. Any glares, shadows, or strobe lighting which may distract or prevent the operator from safely operating the machinery should be removed from the working area.

10. Store cutting tools in a dry location and prevent contact to preserve the cutting edge.

1.7 Health and Safety

1. Always wear approved personal health and safety equipment as indicated for the materials and type of operations that will be performed. These should include face, eye, respiratory, hearing, and body safety protection devices. Wear safety glasses/face shield and ear protectors (plugs or muffs) even during short periods of operation.
2. Before operating this machine: remove all hand, wrist, or neck jewelry and push sleeves up over the elbows. Do not wear loose clothing which may become caught in the machine and confine long hair. Non-slip footwear or anti-skid floor strips are recommended.
3. Use a dust mask or other safeguards to avoid inhaling dust generated from wood products. Install dust collection equipment consistent with shop ventilation practices and budget. Remove dust and debris from the floor frequently to prevent slipping. Drilling, sawing, sanding, or machining wood products generates wood dust and other substances known to the State of California to cause cancer. Wood products also emit chemicals known to the State of California to cause birth defects or other reproductive harm (California Health and Safety Code Section 56).
4. In addition to other health hazards, dust from wood and other materials is flammable. Do not operate welding, wood burning, smelting, soldering, or other high-heat tools on the machine or vicinity.
5. Do not operate this machine while tired or under the influence of drugs, alcohol, or any medications.

1.8 Electrical Safety

1. Verify the switch is in the OFF position before connecting the machine to the power supply.
2. Verify the machine is properly grounded and the circuit is protected with a fuse or circuit breaker in accordance with local codes. Install a separate circuit if necessary to limit power loss when multiple machines in the shop are operating simultaneously. If necessary, place a cover on the outlet to prevent accidental disconnection.
3. Verify all machine adjustments or maintenance with the machine unplugged from the power source.
4. Follow effective lockout procedures to reduce the risk from high voltage wires and components and prevent accidental operation.
5. Do not operate in a damp or wet location or exposed to rain, fog, or snow.

6. Keep the electrical cord away from sharp edges, heat or moving parts, and do not store materials on top of it. Position the cord so it will not become a tripping hazard.
7. While the use of an extension cord is discouraged, if it is necessary, verify the cord is in good condition, meets the current requirements, and is located so as not to present a tripping hazard.

1.9 Additional Safeguards

1. Remove and store adjusting keys and wrenches before turning on the power. If necessary for visibility, apply safety markings to adjusting wrenches and keys.
2. Install safety guards consistent with general shop safety practices. Always keep safety guards in place when the machine is in use. If removed for maintenance purposes, use extreme caution, and replace the guards immediately after completion of maintenance.
3. Check damaged parts immediately. Before further use of the machine, a guard or other part that is damaged should be carefully checked to determine that it will operate properly and perform its intended function.
4. Keep visitors a safe distance from the work area. Keep children away.
5. Control liquids in the shop to limit the possibility of spillage that can damage the machine and potentially cause damage or personal injury from electric shock or fire. Never use the table to apply or dry finishes.

1.10 Maintenance

1. Disconnect the machine from power when performing any maintenance.
2. Establish a weekly and monthly maintenance checklist and follow it diligently.
3. Routine maintenance should include periodic checks for alignment of moving parts, looseness, or binding of moving parts, worn or bare wires, breakage of parts, skewed mounting, and any other conditions that may affect its operation or cause injury. Analyze breakage or damage to determine the cause and take appropriate remedial action.
4. Do not operate the machine if a component of the control system is damaged. It should be properly repaired or replaced before use.
5. Follow instructions for lubricating and changing accessories.
6. Store maintenance tools and supplies nearby, consistent with the shop maintenance practices and resources.

1.11 Operational Practice

1. Never leave the machine running unattended. Always be in close reach of the emergency stop button.
2. Turn off the power and do not leave the machine until it comes to a complete stop.
3. Avoid pinch points and entanglement hazards. Keep hands and clothing away from any moving objects, rotating/moving cutting tools, ball screws, bearings, gantries, guide rails, and any other hazards while in operation.
4. Use the right tool at the correct speed and feed rate. Do not force a tool or attachment to do a job for which it was designed. The right tool will do the job better and more safely.
5. Do not touch a cutting tool immediately after use. It will be hot and may cause skin burns. Exercise caution when handling any cutting tool and accessories. If the cutting tool is hot, keep a heat-resistant glove or oven mitt on hand for this purpose.
6. Do not lay a hot cutting tool on its side.
7. Use recommended accessories; improper accessories may be hazardous.
8. Do not use dull, gummy, or damaged cutting tools such as blades, bits, etc. Keep cutting tools clean and sharp for the best and safest performance.
9. Turn off the machine before cleaning. Use a vacuum, brush, or compressed air to remove chips or debris. Do not use bare hands.
10. Do not climb or stand on the machine. Serious personal injury and costly damage could occur if the machine tips over or any component is dislodged.
11. Remove loose items and unnecessary workpieces from the table before starting the machine.
12. Plan tool paths to make multiple passes rather than to take off a large amount of material at one time. This will reduce mechanical stress and heat on cutting tools.
13. Always secure a workpiece to the spoil bard using clamps, vacuum, or double-sided tape. If the workpiece is mounted in a jig, ensure that the fixture is securely held to the table. Never hold a workpiece down by hand while operating.
14. Inspect the material of the workpiece to detect any defects that may result in ejection of large pieces of scrap.
15. Verify the workpiece is free from nails, hardware, or other foreign objects.
16. After installing a cutting tool, verify the collet is securely tightened. An unsecured cutting tool may fly loose from the collet and cause injury. Verify that the adjusting wrenches have been removed and are secured before turning on the power.

[illegible]

2.0 Receiving Your Machine

Following delivery and before the driver has left, inspect the packing, invoice, and shipping documents. Next, ensure there is no visible damage to the packaging or the machine. All damage must be noted on the delivery documents and signed by the receiver and the delivery driver. Contact Laguna Tools Customer Service within 24 hours in case of damage. It is advisable to photograph and document any shipping damage. The original packaging is required to return damaged equipment to Laguna Tools.

NOTE

Sawdust may be found in the machine upon arrival. This is because the machine has been tested prior to shipment from the factory and/or Laguna Tools. Laguna Tools tests all machines prior to shipping, but some adjustments may have to be undertaken by the customer. These adjustments are covered in the various sections of this manual.

Most large machinery will be delivered on a tractor trailer 48 to 53 feet long. Please notify a Sales Representative with any Delivery Restrictions. The customer is required to have a forklift (6000 lbs. or larger is recommended) with 72-inch forks or fork extensions.

3.0 Definitions

4th Axis – An accessory that enables the CNC to operate as a lathe.

Axis – Direction of movement. On a three-axis machine: X (left-right), Y (front-back) & Z (up-down).

Array Work – Division of the machine work surface into square or rectangular workspaces so that the toolpath can be ran in each space to produce several identical profiles.

Ball End (Ball Nose) – A cutting tool that has a rounded cutting arc, where the arc diameter is equal to the cutting diameter.

Ball-screw – Drive system component. The ball-screw is rotated by the stepper motor and provided the means for moving the gantry and spindle along the axes.

Bed – The Bed of the CNC consists of a welded steel frame and an extruded aluminum tabletop, tongue and groove tabletop with integrated T-slots.

Breakpoint – The point in a toolpath file where a break is created. In a job file, a breakpoint will allow you to stop work and save a location to resume from later.

CAD – Computer aided design using software to assist in designs

CAM – Computer aided manufacturing using software to define toolpaths and assist in manufacturing processes.

Chip Load – Chip load is the measure of the thickness of a chip a cutter will cut.

CNC – Computer numerical control

Climb Cut – Refers to the relationship of the cutting tool rotation to the direction of feed. A climb cut deflects the cutting away from the cut, with the direction of the feed.

Collet – A metal collar that holds the cutting tool within a spindle nut.

Conventional Cut – Refers to the relationship of the cutting tool rotation to the direction of feed. A conventional cut deflects the toward the cut, against the direction of the feed.

Compression Bit – A cutting tool with a combination of up and down shear cutting edges. Typically used for cutting laminate material to prevent tear-out on both sides of the sheet.

Deflection – Tool deflection occurs when the spindle speed and feed rate exert sufficient force to deflect the cutting tool. Deflection leads to excessive wear and chatter which can shorten tool life and will leave unwanted tooling marks on the material.

Down-Shear Bit – A cutting tool whose edges carve downward on the face of the toolpath. Reduces the potential for tear-out but requires a slower feed-rate.

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Drag Knife – A cutting tool that holds a razor or knife blade used to cut and inscribe material. Used with spindle or router motors turned off, and freely spins as it follows the direction of the toolpath.

Dust Shoe – An accessory which aids in dust collection by limiting the spread of dust and debris by channeling the air flow through an attached dust collection system.

End-Mill – A cutting tool with a straight end, typically with a spiral flute(s). It creates a channel with a flat bottom perpendicular to the sides.

Feed and Speed – A combination of factors that must be set to control the work performed by the cutting tool.

Feed-rate – The speed at which the cutting tool moves along a work piece.

Flute Length – The length of the cutting portion on a router bit or cutting tool.

Flutes – The cutting edges or inserts of a router bit or cutting tool.

Finish Cut – A 3D toolpath reduces or eliminates the irregular contours left by the rough cut.

Form Bit – A bit that carves a standard profile such as a round over, ogee or similar contours.

Gantry – The frame structure that straddles the bed and carries the spindle. It moves on guide rails along the length of the bed and is driven by the ball-screw system.

Gantry Bridge – The part of the gantry that lies between the upright towers. The upper bridge carries the spindle and cooling system. The lower bridge supports the weight of the gantry and affixes directly to the Y axis ball-screw.

Gantry Upright (Towers) – Parts of the gantry that extend upward, supporting the upper gantry bridge.

G-Code – A machine language that uses axis points and commands which the machine uses to move and perform functions.

Grid – The minimal movement units of the router. The router head automatically moves to the next grid position when the directional button is toggled in either continuous or step mode.

HHC – The handheld controller component of the control system.

Hold-down – A clamp or other such device used to firmly hold a workpiece or fixture to the table. Includes clamps, double-sided tape, vacuum pods and others.

Home Position – Mechanical point set using magnetic limits switches.

Origin – User designated zero point for the work piece. From which the router will reference the positioning of all cutting.

Plunge – The distance on the Z axis that the spindle and cutting tool moves toward, into, or along the material.

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Plunge Rate – The speed of descent of the spindle on the Z axis.

Pocket Tool-path – A toolpath that creates a cavity in the horizontal surface of a work piece.

Post Processor – A software function that enables the CAD/CAM application to format G-Code enabling the control system of a CNC to follow the designated toolpaths.

Profile Tool-path – A tool paths that cuts along the profile of a set of vectors. Typically used to cut out the shape of a design.

Proximity Switch – A magnetic limit switch that is used to find the HOME position.

Restore Point – The point along a toolpath where the spindle will start to resume a toolpath following a break.

Rough Cut – A 3D toolpath where the initial cut is designed to remove unwanted material, leaving a rough contour.

Soft Limits – Limits on movement availability. Imposed by the workspace boundaries and based on controller settings and the location of HOME. An “out of soft limits error” implies that based on the positioning of the workpiece, there is not enough room to move in a designated direction.

Speed Scale – Allows for the reduction of the feed-rate at the beginning of a toolpath to reduce the stress on a cutting tool as it first contacts the material.

Spindle Speed – Rotational speed of cutting tool (RPM).

Step Down – Distance in Z-axis that the cutting tool plunges into the material.

Step-over – The amount the cutting tool moves away from the previous cutting path as it routes the new path.

Stepper Motor – DC motor that moves in very precise steps upon the receipt of “pulses”, which result in very accurate positioning and speed control.

Tool-path – User defined route which the cutter follows to machine a workpiece.

Touch-Off Puck – A device used to set the zero point (Origin) for the Z axis.

U-Disk – External data storage device that is inserted into a USB interface.

Up-Shear Bit – A cutting tool whose edges carve upward along the face of the toolpath. Increases the potential for tear-out but allows for a slightly higher feed-rate.

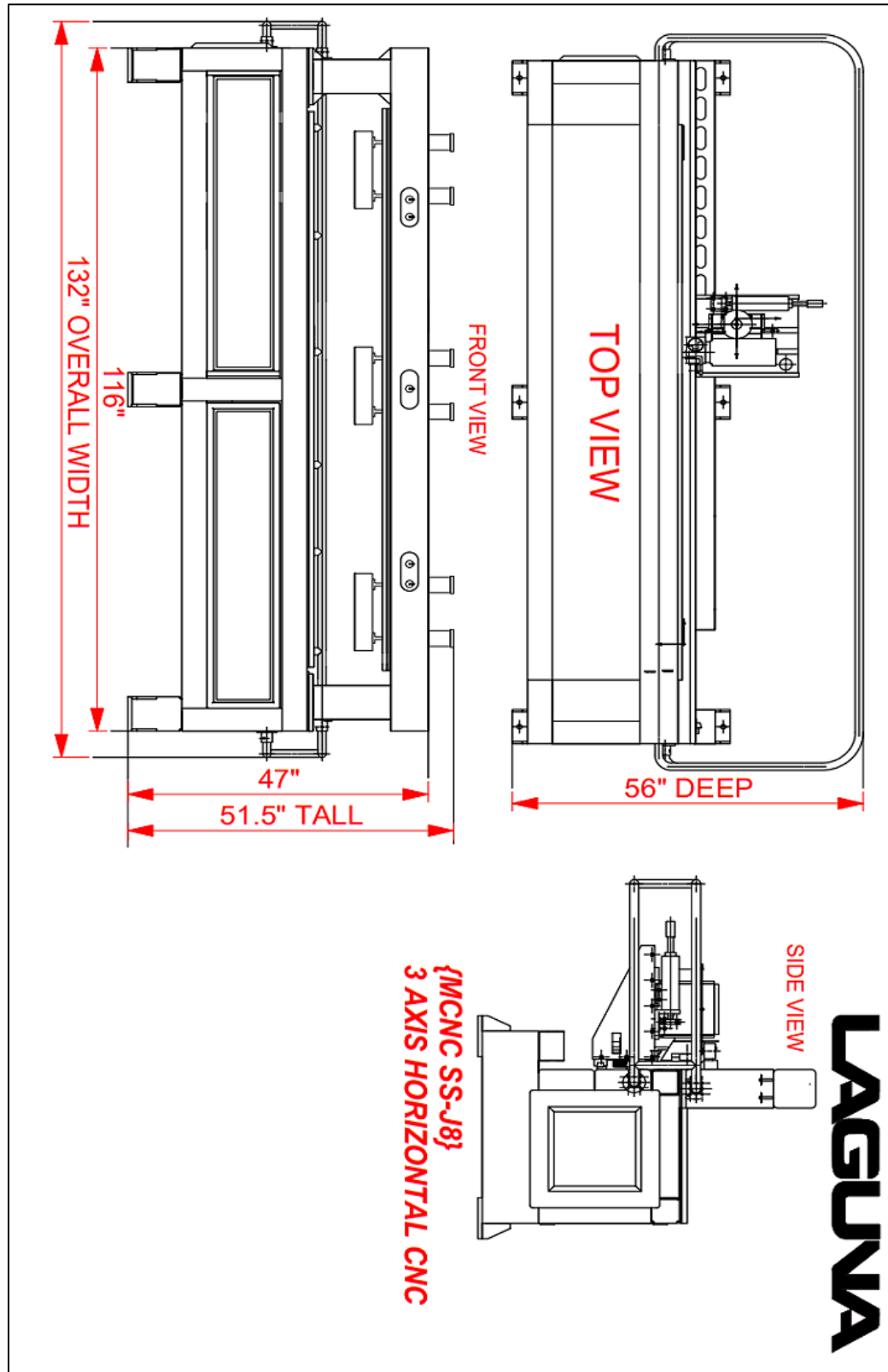
VFD – Variable Frequency Drive which controls the speed (RPM) of the spindle. Enables the fine tuning of the spindle during the operation of a toolpath.

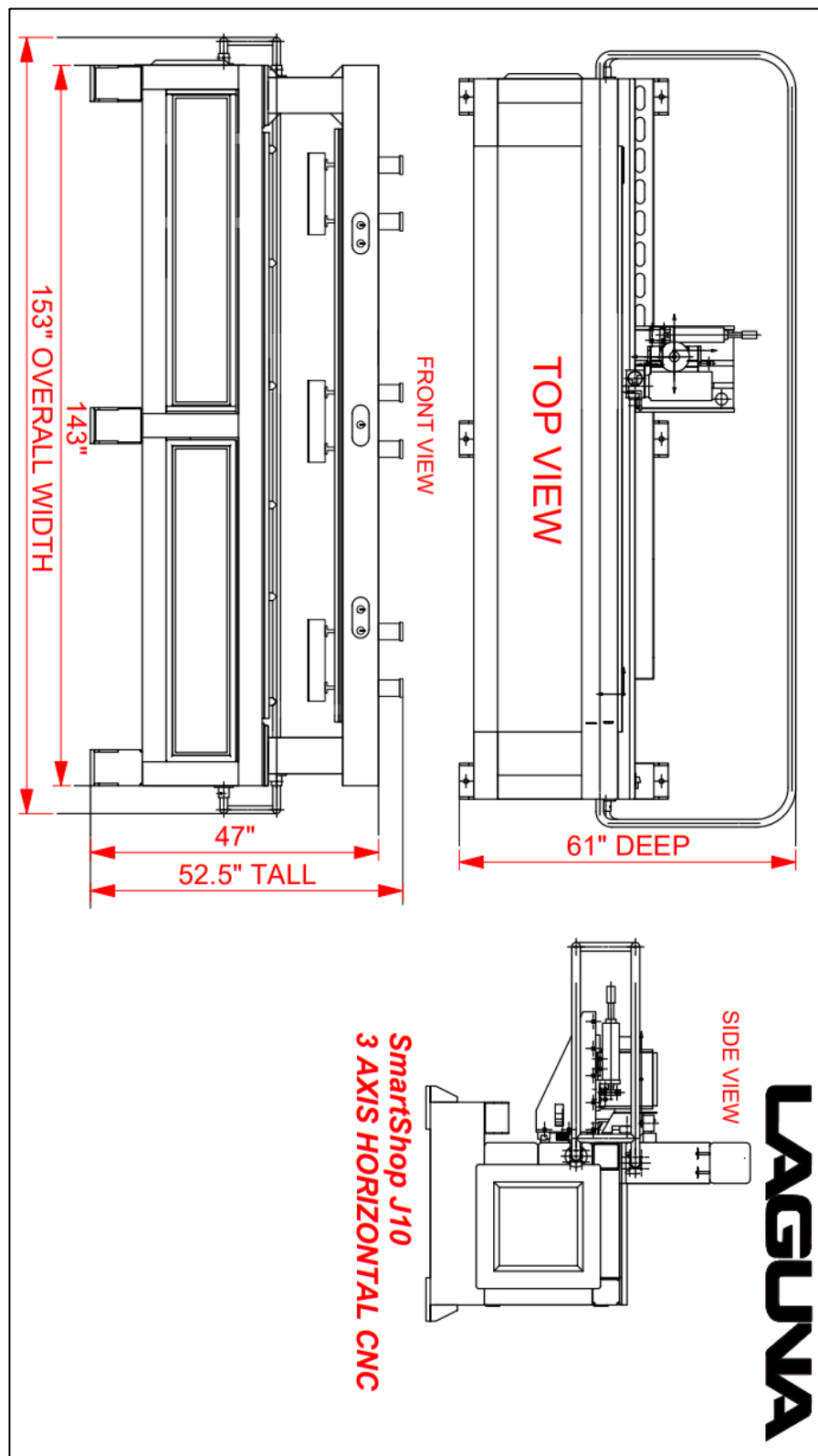
Working Envelope – The three-dimensional area that the spindle can travel within while cutting or milling.

4.0 Specifications

SPECIFICATION TABLE		
	SmartShop J8	SmartShop J10
POWER REQUIREMENTS	220V,30A,1 PH.	220V,30A,1 PH.
FOOTPRINT	132" W X 56" L X 51.5" TALL	153" W X 61" L X 52.5" TALL
WORKING AREA	4" Y * 96" X * 3" Z, TRAVEL	4" Y * 120" X * 3" Z, TRAVEL
GANTRY CLEARANCE	4" MATERIAL THICKNESS	4" MATERIAL THICKNESS
SPINDLE	4HP MT, AIR COOLED SPINDLE	4.5HP MT, AIR COOLED SPINDLE
SPINDLE RPM	6,000-24,000	6,000-24,000
RAPID TRAVEL	600 IPM	600 IPM
CENTRALIZED OIL SYSTEM	YES	YES
DUST PORT DIAMETER	4"	4"
PRECISION HELICAL RACK & PINION. DRIVE SYSTEM FOR X AND Y AXES	20MM HEAVY DUTY LINEAR BEARING,ALL AXES	20MM HEAVY DUTY LINEAR BEARING,ALL AXES
CONTROLLER	LAGUNA HAND HELD DSP CONTROLLER	LAGUNA HAND HELD DSP CONTROLLER
MDF TABLE TOP WITH TEE SLOTS	NO, PNUEMATIC CLAMPING	NO, PNUEMATIC CLAMPING
SOLID STATE HOME SWITCH'S	YES	YES
HEAVY DUTY WELDMENT TUBULAR STEEL FRAME	1200 POUNDS	2750 POUNDS
DRIVE SYSTEM	DELTA SERVO SYSTEM	DELTA SERVO SYSTEM
MATERIAL THICKNESS CAPACITY	4"	4"
SHIPPING WEIGHT	2500	3500

4.1 Dimensional Drawing



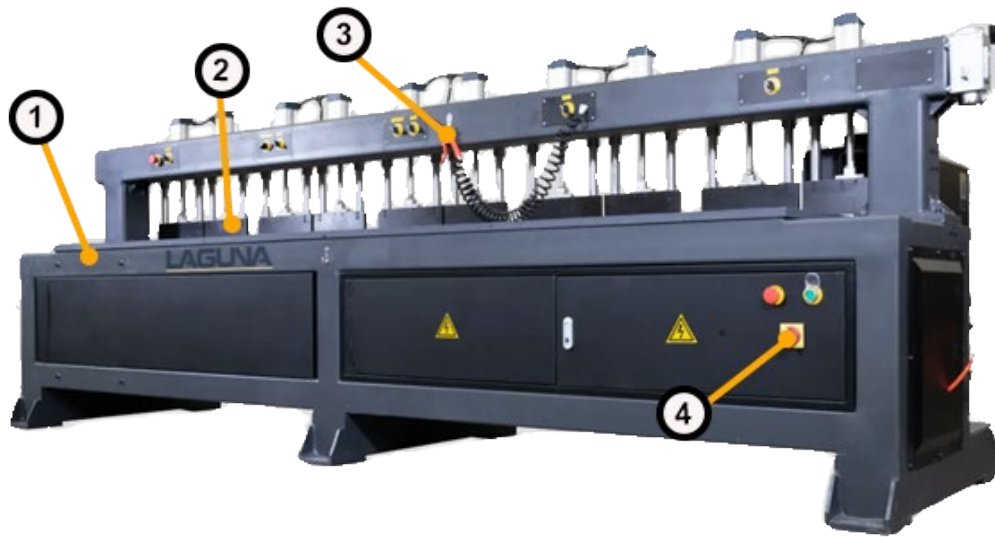


5.0 SmartShop J Overview

The newest model in the SmartShop lineup, the J is able to precisely and consistently route several types of standard joints. From classic mortise and tenon joinery to lockset and hinge mortising, the J comes with a 4.5HP air-cooled spindle, Delta Servo Motors and Drivers, a central lubrication system, pneumatic positioning pop-up pins, and a DSP handheld control system.

5.1 Features

- Strengthened Steel Structure
- 4.5HP Air Cooling Spindle
- 5HP Delta Inverter
- DSP Control System
- 750w Delta Servo Motor And Driver
- Bakelite Table
- Lubrication System
- Pneumatic Pop-Up Pins
- UL Cable And Electric Component



1. **Frame** – The main structure that supports and stabilizes the CNC machine.
2. **Hold Down Bars** – Bars that secure the workpiece to the machine table during operation.
3. **Air Blower**– Blows air to clear debris.
4. **Main Power Switch** – Turns the machine's main electrical power on or off.

5.2 Applications

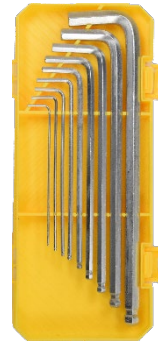
- Classic Mortise and Tenon
- Floating Mortise and Tenon
- Finger Joints
- Louvered Grooves
- Lockset Mortising
- Hinge Mortising
- Drilling
- Doweling

5.3 Package Contents

1x-SmartShop J
Machine



1x-Allen
Wrench Set



4x-Tool Cones with
1/2" collets installed



6x-Leveling
Feet



Collets (1/2",
10mm, 8mm, 6mm,



1x-Spare Tool
Clip



1x-Handheld
Controller



1x-Spanner
Wrench



6.0 Machine Placement

When unpacking your machine, separate all enclosed items from the packing materials and inspect them for damage. Ensure that there is no visible damage to either the packaging or the machine BEFORE the driver leaves. Save all packaging materials until you are satisfied with the machine and/or have resolved any issues concerning any missing or damaged items.

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. We test machines prior to shipping to customers, but movement can take place during transportation. Some adjustments may have to be undertaken by the customer. These adjustments are covered in the various sections of this manual.

6.1 Introduction to CNC Machines

The CNC is designed to provide years of safe service. Read this owner's manual in its entirety before 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 machine 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.

6.2 Placement

Select the area where you will use our machine. Guidelines for properly placing your machine follow:

1. There should be sufficient area at the front of the machine to allow you to work comfortably.
2. There should be sufficient area at the back of the machine to allow access for adjustments and maintenance to be conducted.
3. Adequate lighting – The better the lighting the more accurately and safely you will be able to work.

4. Solid floor – You should select a solid flat floor, preferably one made of concrete or something similar.
5. Locate it close to a power source and dust collection.
6. Allow an area for the storage of blanks, finished products, and tools.

6.3 Locating Your Machine

The physical environment where you locate your machine is important for safe assembly and operation of your machine. Before removing your machine from the packaging, consider the weight load, electrical installation requirements, lighting, dust collection, and space allocation available for the machine and accompanying materials. Locate your machine in a dry environment.

6.4 Space Allocation/Dust Collection

Consider the largest size and length of wood or other materials which will be processed through your machine. Leave ample space around the machine for the operator to handle both the equipment and the materials being cut. Leave enough space around the machine to open or remove doors/covers as required by the maintenance described in the owner's manual. Allow enough space for proper dust collection from your machine. For optimal operation, ensure that your machine is located in a dry environment free from excessive moisture, extreme weather conditions, hazardous chemicals, or airborne abrasives.

6.5 Electrical Requirements

Place your machine near an existing power source with the appropriate voltage required to operate your machine. Ensure that all power cords are protected from traffic, moisture, chemicals, or other hazards. For your safety, have a qualified electrician to assess your electrical needs and grounding. We DO NOT recommend that you use an extension cord to supply power to your machine. **A QUALIFIED ELECTRICIAN IS REQUIRED TO INSTALL ELECTRICAL COMPONENTS.**

6.6 Lighting

Ensure that the lighting your machine is placed under is sufficient to safely perform regular operation and maintenance. Any glares, shadows, or strobe lighting which may distract or prevent the operator from safely operating the machinery should be removed from the working area.

6.7 Machine Weight/Load

Ensure that the surface where your machine is located can bear the full weight of your machine as well as any additional equipment which may be placed on the machine. Also consider the weight of the operator and any materials which may be stored around the machine when selecting a location for your machine.

6.8 Unpacking Your Machine

To unpack your machine, you will need:

- Tin snips
- Knife
- Drill with a Phillips head attachment
- Prybar or crowbar
- Forklift that is capable of lifting 6000 pounds

1. Remove all parts and accessories from the machine.
2. Using the tin snips, cut the banding that is securing the machine to the pallet (if fitted).
3. Remove any supporting wood 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. 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 to achieve.

1. Remove the securing bolts that attach the machine to the pallet (if fitted).
2. Use a forklift with sufficient lifting capacity and forks that are long enough to extend the complete width of the machine.

NOTE

Obtain a 6000 lbs. forklift with six (6) foot fork extensions.

3. Approaching the machine from the side, lift the machine on the frame taking care that there are no cable or pipes around the forks.
4. Move the machine to the required position and lower gently to the floor.
5. Ensure that the machine is placed in a designated area that is dry and has ample room.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

7.0 Assembly and Setup

7.1 Leveling the Machine

1. Use a forklift, pallet jack, or 2-ton floor jack to slightly lift the machine off the ground.
2. Thread the feet into the hole(s).
3. Slowly lower the machine onto the metal feet.
4. Tighten the nut clockwise with a crescent wrench. Do not overtighten.
5. Place a level on top of the machine and verify it is level.
6. Use a crescent wrench to turn the nut clockwise/counterclockwise to make any leveling adjustments.
7. Verify that the machine is level and adjust as needed.

7.2 Electrical Connection for the Machine



A qualified electrician must carry out the electrical installation.

A cable is not supplied; the proper cable will depend on local wiring codes and the electrical supply. When installing, ensure the power supplied to the machine is 220v (220 Volts) single phase , 30 Amps.

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

1. Access the front panel of the electrical cabinet.
2. Locate the two (2) cable ports on the right side of the electrical cabinet.
3. Insert the power cord through the port nearest to the front of the cabinet.
4. Connect the power cables to the main disconnect.
5. Connect the green ground cable to the ground lug.

7.3 Compressed Air Requirements

This machine requires compressed air for the air blower, hold down bars, and pneumatic pop up pins. 85-100 PSI of clean, dry air is required. There is an orange hose hanging out of the side of the machine that is used for air connection.

NOTE

It is recommended to attach an air dryer to the compressed air system to help reduce moisture in the lines.

Moisture in the lines can cause damage to the machine and reduce the supplied air quality.

7.4 Assembling the Controller

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



Figure 7-1: Handheld Controller

- | | |
|------------------------|---------------------|
| 1. 50-Pin Serial Cable | 3. Keypad |
| 2. USB Cable Port | 4. Operating Screen |
| 5. USB Port | |

NOTE

A USB Drive fits into a slot on the top of the handheld controller.

7.5 Fitting the Router Bit into the Router Head

NOTE

Before changing or fitting the router bit always verify the Emergency Stop button is engaged and the router bit has come to a full stop.

NOTE

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

1. Select a router bit and the 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.



Figure 7-2: Collet



Figure 7-3: Spindle Nut



Figure 7-4: Spindle Nut with Collet

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.

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 inch outside the collet. Hold the router spindle with the supplied wrench and tighten the collet with a second wrench. Do not overtighten.

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.

7.6 Controller Button Functions

NOTE

There is a comprehensive manual for the handheld controller. Below is a list of the main key functions. The controller may vary from the handheld controller shown below.

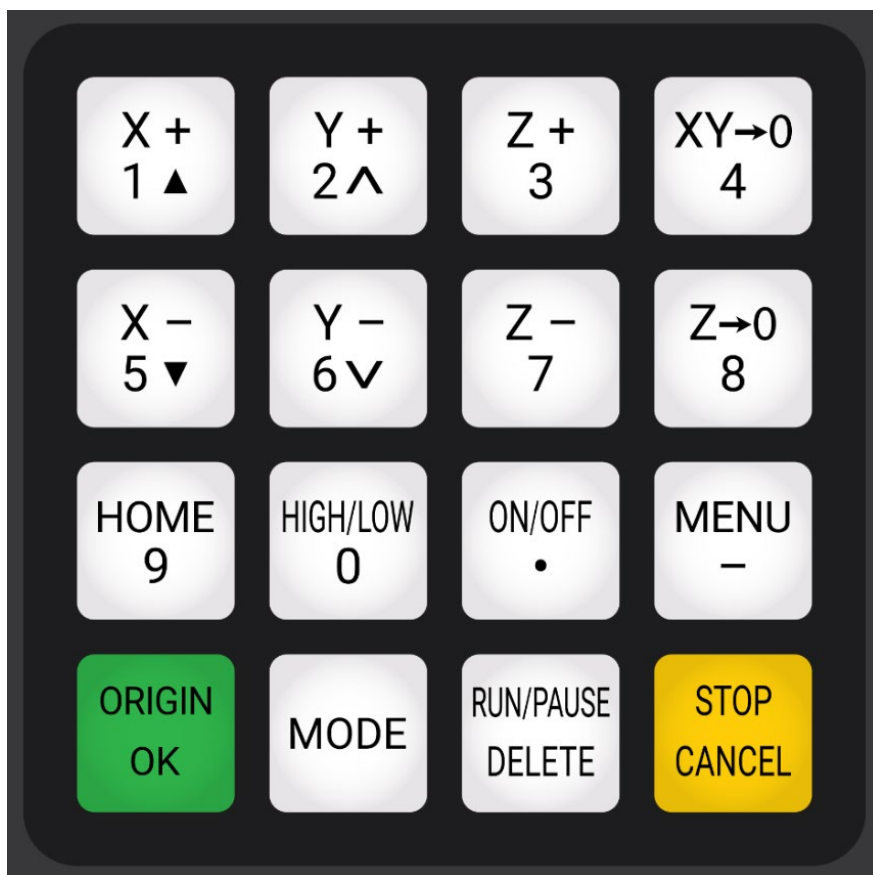


Figure 7-5: A11E Handheld Controller Keypad

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) away from the workpiece

X Y - 0/4 - Sets the 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) towards the workpiece.

Z-0/8 - Sets 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 – High or slow speed selection in manual mode. Change work coordinate and mechanical coordinate during processing.

ON/OFF/● – Starts/Stops the Spindle

MENU/— – Enters menu setting. Check information during processing.

ORIGIN/OK - Use to accept commands (ON); Origin causes machine to go to the machine origin.

MODE - Toggles between the three (3) jogging modes: Continuous, Step, or Distance.

RUN/PAUSE DELETE - Used to load a program from either the USB drive or internal memory, to pause a program during operation, or delete a program file.

STOP/CANCEL - Stops a running program or cancels commands.

7.7 Control Button Combinations

Pressing two buttons will simultaneously perform the following functions:

MENU/— + (0-9): Switch the coordinate system (0 for the mechanical coordinate system, 1-9 for the work coordinate system.

RUN/PAUSE DELETE + (1-8): Start the breakpoint processing. Choose a number form 1-8.

RUN/PAUSE DELETE + HIGH/LOW/0 : Start advanced processing.

ON/OFF/● + HOME/9: Repeat last time processing.

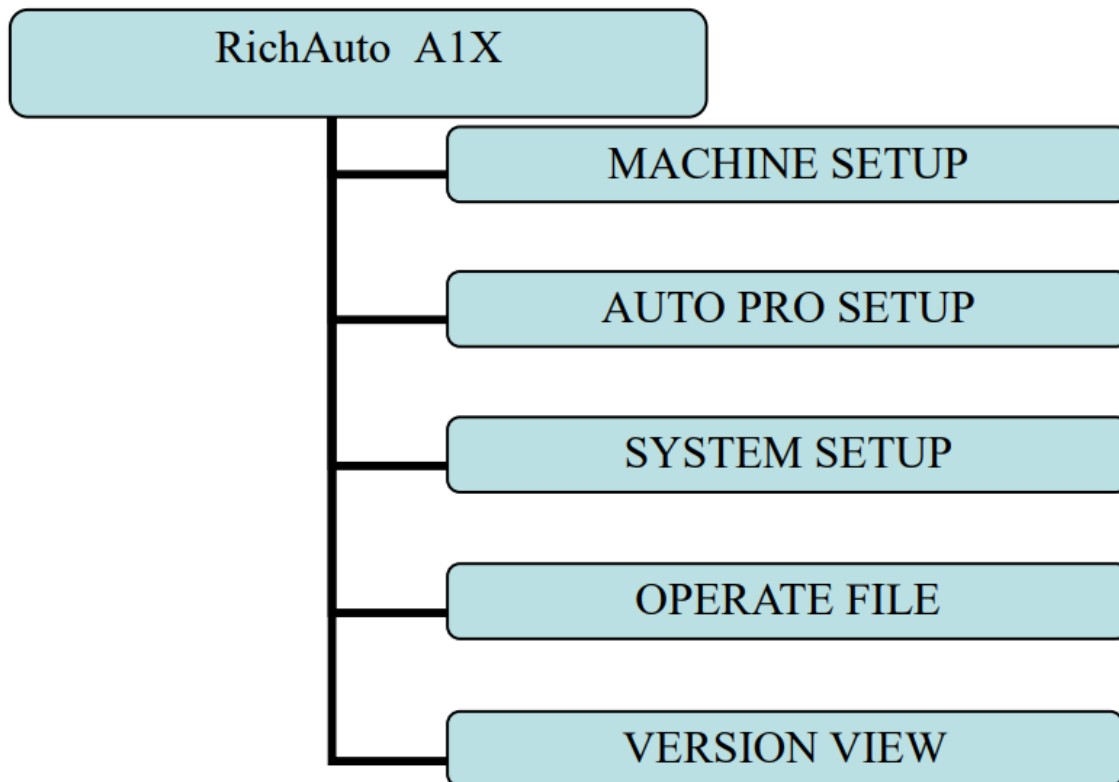
MODE + Z-0/8 : Set Stop position

MENU/— + ORIGIN/OK: System Upgrade

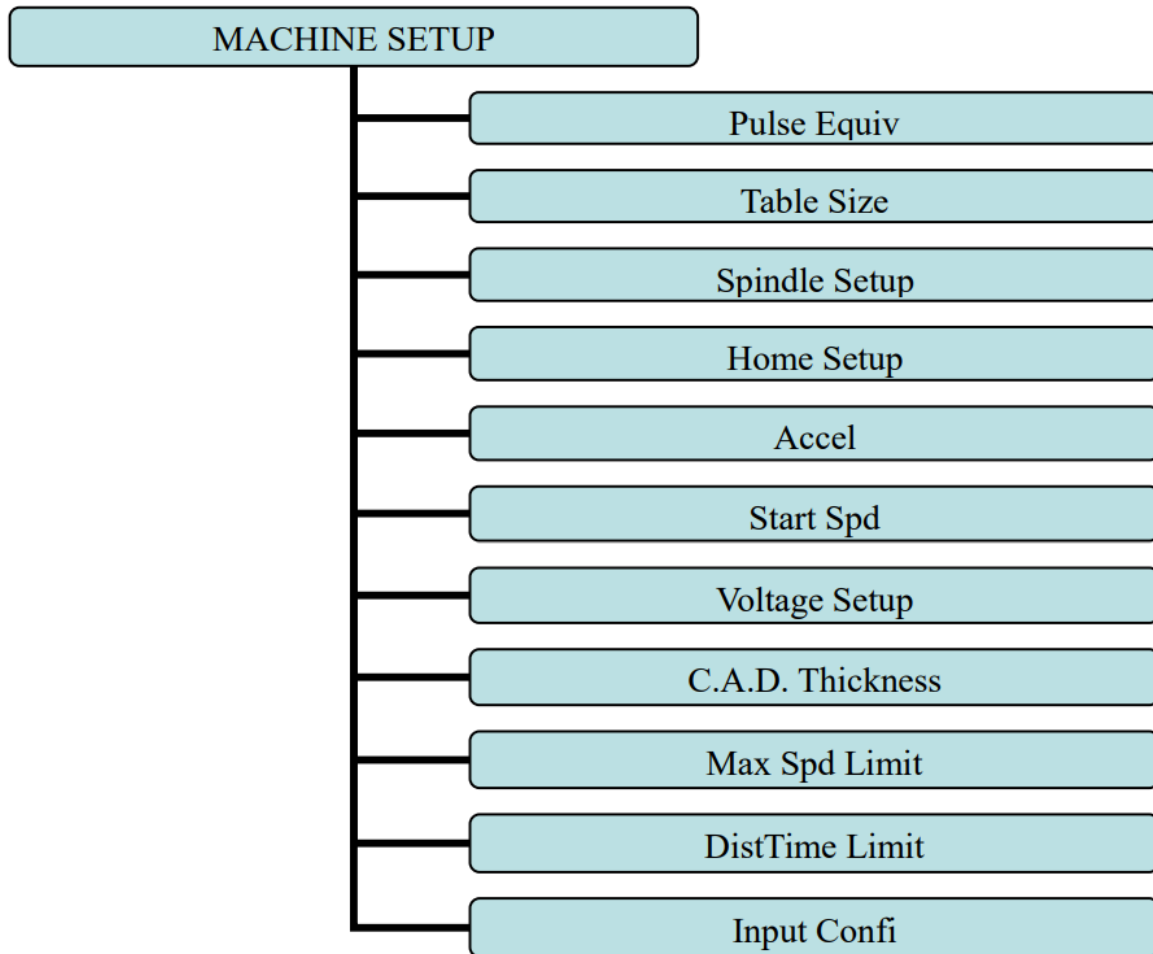
MENU/— + MODE: Operate machine by entering coordinates parameters

ORIGIN/OK + STOP/CANCEL: Quit Buttons check

7.8 Menu Path



7.9 Machine Setup Path



8.0 Operation

8.1 Operation Overview

This overview is a general summary of how the machine works.

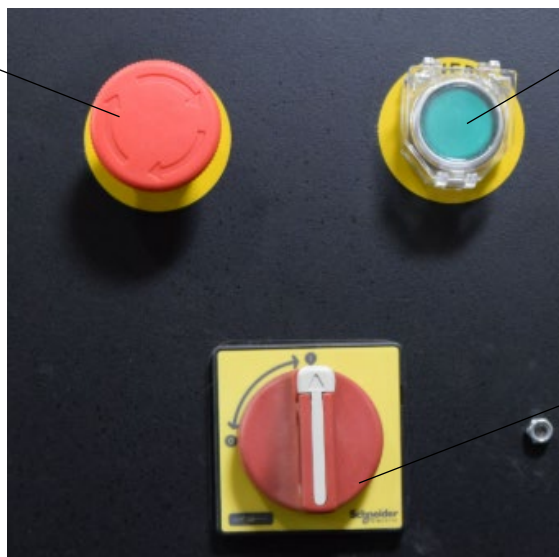
1. Have a design file on a USB with the correct parameters and dimensions.
2. Ensure correct tooling is selected and installed.
3. Turn on the machine.
4. Home the machine
5. Put the workpiece on the machine.
6. Turn on the pop up pins and align the workpiece.
7. Clamp the workpiece down with the hold down bars
8. Put the USB into the controller.
9. Upload the file to the USB.
10. Home the Spindle
11. Set the origin and any offset
12. Ensure all parameters are correct
13. Press the Green go button and step away from the machine while it cuts.

8.2 Turning On the Machine

Before the machine is turned on, remove all tools and other objects from the worktable.

1. Release the Emergency Stop by twisting clockwise until it pops out.
2. Turn the Main Power Switch clockwise to the ON position.
3. Press the green Power On button

**Emergency
Stop**



**Power
Button**

**Main Power
Switch**

Pressing the green button will also power the controller and the display will light up. The controller screen will display *Go to Home?*. Verify the table surface is clear of obstructions and press the green **ORIGIN/OK** button.

4. The router head will move to the Home position on the table. **KEEP ALL BODY PARTS AWAY FROM THE MACHINE!**

NOTE

Home is a mechanical position that is a constant and is determined by switches on each of the three (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 about 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.

8.3 Moving the Router Head

There are three (3) different methods to move the router head:

1. **Continuous Mode** – Press the **MODE** button until *Continuous* is displayed. The display will show (on 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+, 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 0.5 mm in high setting and 0.1 mm 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.
 - a. Press the **MODE** button until *Distance* is displayed.
 - b. Type in *100* and press **OK**.
4. **Pressing the X+** - button will now move the router 100 mm in the X+ axis. The router head also moves 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 100 mm in the selected direction.

8.4 Emergency Stop

In case of any emergency, press the red emergency stop button. There is one button on bottom of the machine near the main power switch, and there is one on the top bar of the machine.

8.5 Jogging Speed

Select between a low or high speed. Pressing the **HIGH LOW / 0** button toggles between the two (2) speeds. The high-speed jog setting is approximately four (4) times the speed of the low-speed jog setting.

8.6 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.

Ensure 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 designating 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 position of the router head as it changes will

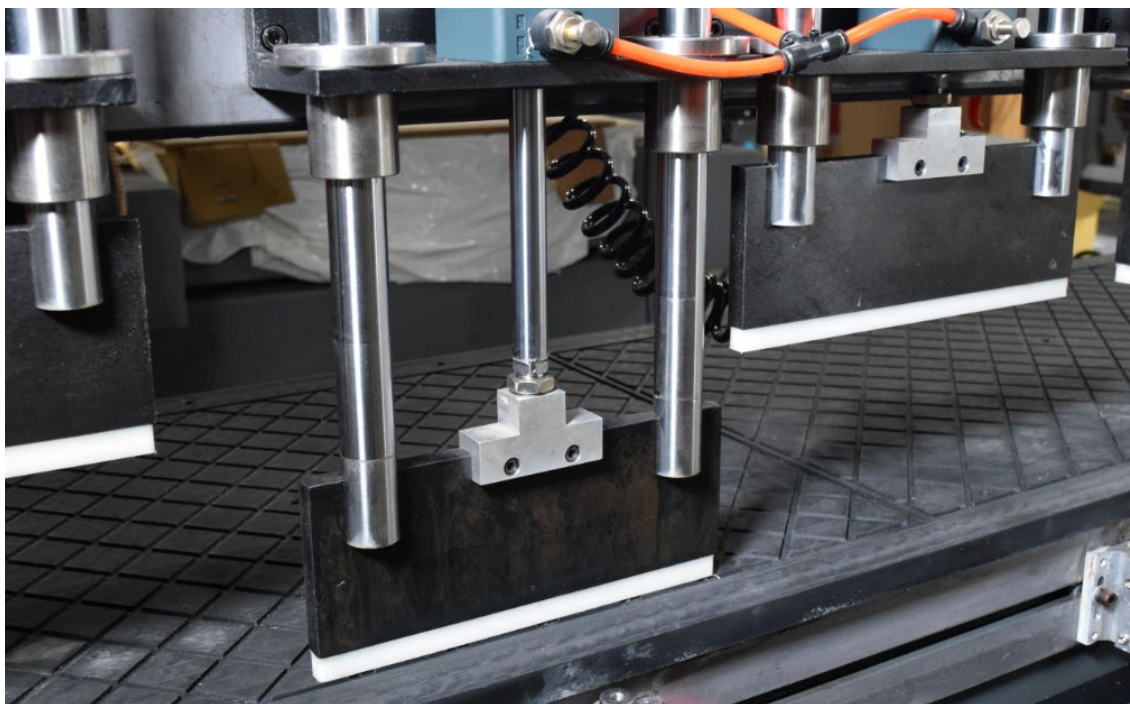
be shown at the bottom of the display. Move the router spindle to the home position by pressing the **HOME** button.

2. Move the router head to the max 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 1300 mm (51.181 in) x 1300 mm (51.181 in). Work envelopes vary by machine model.
5. Machining can only be performed if the tool path center lines 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 fill 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.

8.7 Hold Down Bars

The table has ten hold down bars to enable jobs to be held down on the table. To enable the hold down bars, switch the zone from OFF to ON.



8.8 Control Switches



This zone has the emergency stop and the switch controls the two hold down bars that are below it.



The master press control switch activates/deactivates all hold down bars. The press 2 switch controls the two hold down bars that are below it.



The positioning switch controls the pop up pins that help with alignment. The press 3 switch controls the two hold down bars that are below it.



The press 4 switch controls the two hold down bars that are below it.



The press 5 switch controls the two hold down bars that are below it.

8.9 Tool Touch Off (TTO)

A tool touch off creates a point of reference for position of the tool and workpiece. A tool touch off tells the machine where the tool tip is in relation to workpiece. A TTO must be performed before cutting a workpiece.

1. Place the workpiece on the table.
2. Fit a flat bottom router bit to the spindle.
3. Jog (Z) the tip of the tool so that it is just touches the of the table using the *Continuous* mode.
4. Step down in slow mode (0.1 mm or 0.004 inches each time the button is pressed) while turning the router **collet** by hand in the reverse direction. When you feel pressure, stop jogging against the workpiece.

DANGER

DO NOT turn the router bit by hand as it is sharp and could cause injury.

5. Select the distance mode and enter 0.0254 mm (0.0001 inches). 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 inches
6. Once the router bit is at zero press the **Z-0/8** button to set the zero point.
7. Jog the router bit away from the workpiece or press the origin button to move the router bit up and to the origin point.

8.10 Manual Z Origin Point (Z Zero Point)

A Z origin point (Z zero point) is a position that is set as a starting point for all cutting operations. Setting an Z origin point is similar to setting a TTO. The Z origin point is independent from the XY Origin point.

1. Place the workpiece on the table.
2. Jog the router bit to the desired position. (It is recommended to set an Z origin point that corresponds to the coordinates on your design file where $Z=0$?)
3. Jog (Z) the tip of the tool so that it barely touches the workpiece using the *Continuous* mode.
4. Step down in slow mode (0.1 mm or 0.004 inches each time the button is pressed) while turning the router **collet** by hand in the reverse direction. When you feel pressure, stop jogging against the workpiece.



DO NOT turn the router bit by hand as it is sharp and could cause injury.

5. Select the distance mode and enter 0.0254 mm (0.0001 inches). 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 inches
6. Once the router bit is at zero press the **Z-0/8** button to set the origin.
7. Jog the router bit away from the workpiece or press the origin button to move the router bit to the origin point.

8.11 Resetting the Origin Point (XY)

1. Bring the router head to the origin point by pressing the **ORIGIN OK** button.
2. Move the router bit by pressing **Z-** and **Z+** so that it is barely touching the workpiece.

NOTE

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 desired position of the workpiece in the X-axis.
4. Jog the point over so that it lines up with the desired position of the workpiece 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.

8.12 Spindle Speed Control

Only three (3) 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.

8.13 Loading a Program into the Machine

NOTE

The USB slot is on top of the controller.

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. The contents of the USB drive will be shown on the screen.
5. Use the arrow keys to select the file to load into the controller.

6. Press **OK** button.
7. Once the code/program has been downloaded the machine will start to operate.

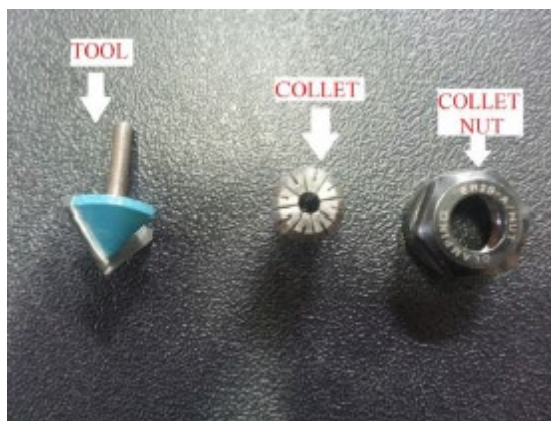
NOTE

Ensure all personnel 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 table the distance that you set in the design software. Laguna suggests 1.6 mm (1/16 inches) and cut the outline of the job. This will give the location of the part on the table.

8.14 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, 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:



Step one in assembling the tools together is to snap the collet into the collet nut. Firmly press the collet into the spindle nut until a “snap” sound is heard. The collet will have a little wiggle room but will not come out unless some force is applied.



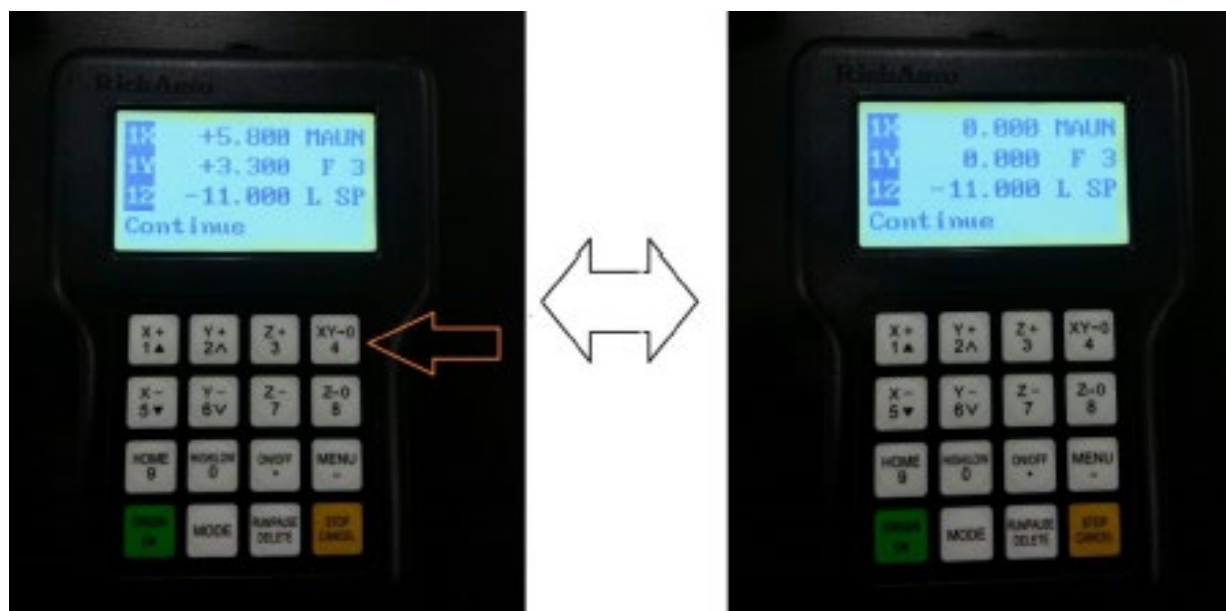
The next step is to start the collet and nut threading onto the spindle as shown (Start threading before loading tool to help prevent a possible cross thread)



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.

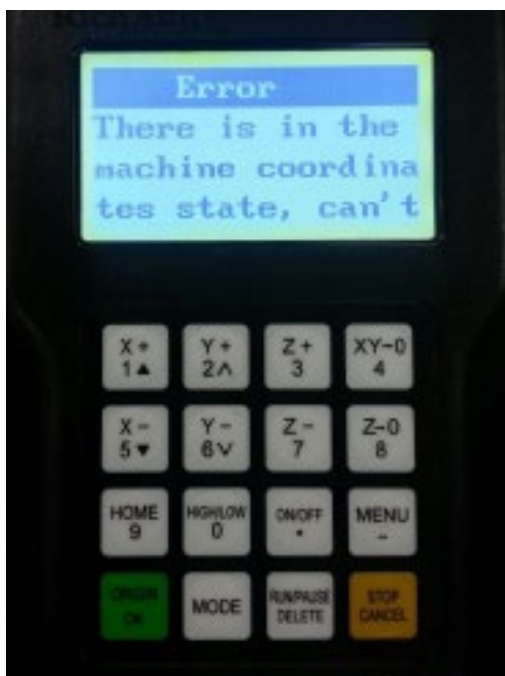
3. Teach origin (XY→0)
 - a. The next step in the process is to verify that you have the proper origin (X+Y axes only). The origin is a changeable number which is the programs Zero (Not to be confused with home, which is a mechanical zero that cannot be changed)
 - i. The first step to setting the X,Y 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)

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-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)

2. Tool Lengths

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- a. Teaching tool lengths will allow the machine to know how far down until the tool is touching the top of table (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/table (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 table 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.
3. 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
4. Turn on dust collector
5. 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)

9.0 How to Cut a Workpiece

Before beginning, Laguna Tools recommends that the operator become familiar with the safety checks, maintenance checks, controller for operation of the machine, setting up a job, and processing a file.

1. Ensure machine is connected to power and compressed air.
2. Ensure proper eye and hearing protection and other PPE is worn.
3. Do not wear clothing, apparel, or jewelry that can become entangled in moving parts.
Always tie back or cover long hair. Wear non-slip footwear to reduce the risk of slipping and losing control or accidentally contacting cutting tool or moving parts.
4. Make sure that you have a USB drive with your design file uploaded onto it.
 - a. Ensure that the correct parameters are set for the workpiece. (Ex: height, width, thickness, etc)
5. Verify the machine stand leveling feet (if available) have been lowered to prevent the machine from moving.
6. Insert your desired tooling into the spindle.
7. Turn on the machine by rotating the power switch to the right. The controller display should light, displaying the loading screen. The emergency stop button may need to be released if it has been used.
8. Move the spindle to a safe height and distance that is above and away from the workpiece.
9. Home the machine by pressing **HOME/9**.
 - a. This operation must be performed before any other function.
10. Activate the pop up pins and align the workpiece.
11. Place the workpiece where the home position is and ensure that the workpiece is securely held to the table using the hold down bars.
12. Perform a Tool touch off (TTO).
 - a. Reference section 9.9 for help performing a tool touch off.
13. If you do not want to cut starting from the home position, you will need to set your origin point to the desired position. Refer to section 9.10 for help on setting the origin point.
14. After the tool touch off is complete, insert your USB drive to USB port on the controller.
Wait about 20 seconds for the USB drive to be read.



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15. Press the button **RUN/PAUSE DELETE**. The display will show *U disc*.
16. Press the **OK** button. The contents of the USB drive will be shown on the screen.
17. Use the arrow keys to select the file to load into the controller.
18. Press **OK** button.
19. Once the code/program has been downloaded the machine will start to operate.

NOTE

Ensure all personnel are clear of the machine as the spindle will start to turn and could cause injury.

20. Press **RUN/PAUSE DELETE** to pause a cutting operation.



DANGER

THE SPINDLE WILL STILL SPIN! DO NOT GET NEAR THE SPINDLE!

21. Press **STOP/CANCEL** to completely stop a cutting operation. This stop the spindle and move it to a safe distance
22. The router will just cut the surface of the workpiece the distance that you set in the design software. Laguna suggests 1.6 mm (1/16 inches) and cut the outline of the job. This will

10.0 Setting a Breakpoint

Like the Pause button function, a Breakpoint or Stop can also be used. In this case, the Breakpoint operation can be used for extended periods including saving the location and returning to finish a job even days later after restarting the machine.

To create a Breakpoint:

1. Press the **RUN/PAUSE DELETE** or **STOP/CANCEL** button during an operation.
 - a. Pressing a 2nd time will cancel the Save Break function and the position will be lost.
 - b. When the Save Break prompt appears, press OK.
2. The display will show the available locations (1-8).
 - a. Previously stored Breakpoints can be overwritten.
 - b. Use the X+/- buttons to scroll through the list.
 - c. Use the OK button to select the desired location.

Before resuming from a Breakpoint, a HOME operation needs to have been performed if the machine was just restarted.

3. When ready to resume working from the stored Breakpoint, press RUN/PAUSE + (1-8) together. The saved location number (1-8) should be the number used.
 - a. The controller will display the same Save Break locations seen before.
 - b. Use the X+/- buttons to highlight the desired file and press OK to select.
 - c. The current G-Code position for that break will be displayed. The G-Code lines can be scrolled through at this point and break resumed anywhere in the list.
 - d. If that G-Code position is acceptable, press OK.
 - e. The display will have moved on to the file parameters that appear before all file operations. Once these are approved the file will begin at the saved location.

11.0 Changing Collets and Tooling

Remove all tooling from the spindle at the end of the day. Do not leave any tooling in the spindle overnight. This includes tool cones, collets, router bits, etc.

Leaving any tooling in the spindle overnight can cause the tooling to get dirty, stuck, rust, and cause damage to the spindle.

Tools needed

- 17mm wrench
- 13mm wrench
- ER-11 Collet
- Spindle nut
- Router bit

NOTE

Disconnect the power to the machine before changing or fitting the router bit.

1. Select the desired spindle nut, router bit, and a collet of correct size.



Figure 10-1: Collet



Figure 10-2: Collet



Figure 10-3: Spindle Nut with Collet

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2. Fit the collet into the spindle nut and press it 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 in the collet, the collet cannot compress and snap into the spindle nut.

3. Hand thread the spindle nut onto the spindle



4. Place the bit into the collet, but **note that the flute (cutting edge) of the router bit must not be inside the collet and should be a minimum of 1/16 " outside the collet.**



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5. Hold the router spindle with the 13mm wrench and tighten the spindle nut with the 17mm wrench. Do not overtighten.



To remove the collet:

1. Remove the router bit if there is one in the collet.
 - a. Allow the bit to cool down if it's hot.
2. Hold the router spindle with the 13mm wrench and loosen the spindle nut with the 17mm wrench.
3. Remove the spindle nut from the spindle.
4. Hold the spindle nut in place and squeeze the collet inward. (the collet will compress)
5. Pull the collet out of the spindle nut. (it might take a lot of force)
 - a. If the collet does not come out, a pair of pliers may be needed to grasp the collet.
 - b. If the collet does not come out, place a punch on the backside of the collet and use a hammer to lightly punch the collet out.

NOTE

Keep collets clean and blow out dust to maintain clamping ability and cut quality.

12.0 Maintenance and Troubleshooting

As with any machine, conducting regular maintenance will ensure optimal performance.

Failure to follow maintenance procedures will void the warranty.

NOTE

If you are operating within a Quality System Certified Facility (ISO/QS 9000, TS-16949, etc.), be advised to incorporate the daily and weekly maintenance checks into the preventative maintenance protocol of the facilities Quality System.

12.1 Controller Settings

The controller settings are calibrated and set to the correct values in production. These processes are documented in this manual in the event it becomes necessary to recalibrate and reset the values.

12.2 Daily Checks

1. Clean the machine and lubricate unpainted surfaces with 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. Collets and spindle collet holes must be cleaned regularly. Ensure that the slots in the collets are free of sawdust, as sawdust builds up and will stop the collet from compressing. If the collet or spindle holes are not clean, the router bit may not run true, and this will affect the performance of your machine.
4. Do not leave any tooling in the spindle overnight. This includes tool cones, collets, router bits, etc.
 - a. Leaving any tooling in the spindle overnight can cause the tooling to get dirty, stuck, rust, and cause damage to the spindle.
5. Check the dust collection hose and hood for blockage or possible breakage.
6. Inspect the overall machine for damage and loose or worn parts.

12.3 Weekly Checks

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

12.4 Oiling the Machine

If equipped with a manual oiler, pump the oiler 2-3 times every 8 hours of use.

If equipped with an automatic oiler, the oil will disperse automatically as needed.

Do not over lubricate the machine, as excess oil attracts dirt and sawdust. Keep your machine lubricated as needed; more lubrication may be required depending on frequency of machine use.

When the oil tank is low, fill with a high-quality SAE 30 weight oil.



Figure 11-1: Manual Oiler



Figure 11-2: Automatic Oiler

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

13.0 Troubleshooting

Problem	Possible Solution
Machine will not start	1. Verify the start switch is being pressed full in. 2. Verify the red stop switch is fully out. 3. Verify the electrical power cord is plugged into the power outlet. 4. Verify the electrical supply is on (reset the breaker). 5. With the power disconnected from the machine, check the wiring to the plug is correct. 6. Verify the rubber insulation is stripped enough and is not causing a bad connection. Verify all the screws are tight.
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 never run until the fault has been rectified. Internal breaker faulty; replace the breaker.
Motor tries to start but will not start	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.

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Problem	Possible Solution
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 restarted. 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	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	Machine not level on the floor. Re-level the machine ensuring that it has no movement.
Unable to change feedrate	1. Click Menu 2. Select autopro setup 3. Select G-codes setup 4. Select "Read F Code" 5. Press the run/pause button 6. Navigate to "Read F" 7. Press OK

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Screen Flickers	1. Insufficient Power Supply 2. Unstable Power Source 3. Power Chip is broken on controlller
Cannot Set Working Origin	1. You may get into the mechanical coordinate system. Press the Button "menu" + "1" to back to the first work coordinate system. 2. Broken Controller Buttons
The file size does not match the size of the actual set Analyses and Solutions:	1. Pulse equivalent is wrong. 2. You did not select the right tool.
The screen displays "beyond limit" when processing.	1. System cannot confirm actual position. Return the machine to its zero position before starting operations. 2. Working origin set incorrectly; reserved range is less than the actual file size. Check the file size and adjust the working origin to ensure sufficient reserved range 3. File contains incorrect working origin settings. Verify the file path and re-export the file with the correct working origin.

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Z-Axis (Spindle) moves in and out too fast during processing.	1. Working speed beyond the fastest speed of Z-Axis. " Machine setup " - " Max speed limit ", set the speed to the safe speed. 2. Coupling is losing or transmission slippages. Re-adjustment the connecting parts.
Z-Axis not correct. Depth varies when repeating the same file after returning to origin.	1. Uneven Surface or Loose Workpiece Fix: Re-mill the cutting edge and secure the object properly. 2. Faulty Z-Axis Origin Switch. Replace with a high-precision switch. 3. Faulty Z-Axis Origin Switch Replace with a high-precision switch.
Machine does not stop at origin	1. Double press the menu button 2. Faulty Z-Axis Origin Switch. Replace with a high-precision switch. 3. The set origin is out of detection range. Adjust the position of the workpiece. 4. Origin detection switch wiring is loose. Tighten the wire or replace 5. Interface board is broken
Machine moves in reverse when going to the origin	1. Origin detection switch type does not match the set level. Modify the level.

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Faults displayed on screen	1. Origin detection switch damaged. Replace
Abnormally processing work file	1. Design was not uploaded correctly. 2. There is interference with the workpiece, spindle, or electrical connections. Remove any trash and other objects that may obstruct operation. Check electrical connection.
Axes only moves one direction	1. Something wrong with the lines connect the interface board with the motor driver. Check the connection. 2. Interface board is damaged. Replace the interface board. 3. The motor driver is damaged. Replace the driver.
Axes does not move at all.	1. Pulse and Direction Lines Reversed. Rewire correctly. 2. 5V Common Anode Disconnected. Check and reconnect. 3. Damaged Motor Driver. Replace if motor only runs after manual power-on. 4. Faulty Interface Board Chip. Replace board; no pulse signal output.

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Screen not displaying	5. Cord not connected correctly. Make sure it is connected.' 6. Cord is damaged. Replace cord. 7. Power supply is poor. Make sure effieeine power supply is equipped. 8. External damage to the controller, Ex: dropping the controller causing damage to it.
Screen displays "spindle on" but spindle is off	9. Incorrect wiring. Wire correctly.

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15.0 Warranties

Dealer Machinery Warranty

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

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

CNC Limited Warranty

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

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

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

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

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

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

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No Modifications Allowed or Sold

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

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

Laguna Tools Warranty

WARRANTY & REGISTRATION

Thank You!

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

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

Laguna Tools®
Imagination, Innovation, and Invention at Work

Warranty & Registration

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

Laguna Tools® Customer Service
744 Refuge Way, Grand Prairie, Texas 75050, USA
1-800-234-1976
www.lagunatools.com/why/customer-service/
8AM. To 5PM PSF. Monday through Friday

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

Laguna Tools® Warranty Service
744 Refuge Way, Grand Prairie, Texas 75050, USA
1-800-234-1976
www.lagunatools.com/policies/warranty
8AM to 5PM PST, Monday through Friday

Registration

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



Who is Covered

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

What is Covered

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

Warranty Limitations

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

Length of Warranty

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

Table A-1 Warranty Lengths

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

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

Shipping Damage

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

How to Receive Support

To file a warranty claim, please contact the warranty department at 1-800-234-1976. To receive customer service or technical support, please contact the customer service department at 1-800-332-4094. Parts, under warranty, are shipped at the expense of Laguna Tools® either by common carrier, FedEx ground services, or similar method. Technical support to install replacement parts is primarily provided by phone, fax, email, or the Laguna Tools® Customer Service Support Website.





Laguna Tools, Inc.

744 Refuge Way, Suite 200

Grand Prairie, TX 75050

1-800-234-1976

www.lagunatools.com

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