

Smartshop II Manual

SmartShop II 4'x8' - 6 HP Spindle 10HP Vacuum CNC Router
SmartShop II 4'x8' - 7.5HP Spindle 10HP Vacuum CNC Router
SmartShop II 5'X10' - 7.5HP spindle CNC Router
SmartShop II 4'x8' - 11HP HSD Spindle 10HP Vacuum CNC Router w/ATC
SmartShop II 5'x10' - 11HP HSD Spindle 10HP Vacuum CNC Router



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Model No. MCNC SS2 4X8 6 HP LIQUID COOLED
MCNC SS2 4X8 liquid ATC-0158
MCNC SS2 5X10 Liquid ATC-0158
MCNC SS2 4X8 HSD ATC-0158
MCNC SS2 5X10 HSD ATC-0158

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Safety Rules

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

Read carefully before operating the machine.

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

Limited Warranty

New machines and accessories sold by Laguna Tools carry a one-year warranty effective from the date of shipping. Machines sold through dealers must be registered with Laguna Tools within 30 days of purchase to be covered by this warranty. Laguna Tools guarantees all new machines and accessories sold to be free of manufacturers' defective workmanship, parts and materials. We will repair or replace, without charge, any parts determined by Laguna Tools, Inc. to be a manufacturer's defect. We require that the defective item/part be returned to Laguna Tools with the complaint. Any machines returned to Laguna Tools must be returned with packaging in the same manner in which it was received. If a part or blade is being returned it must have adequate packaging to ensure no damage is received during shipping. In the event the item/part is determined to be damaged due to lack of maintenance, cleaning or misuse/abuse, the customer will be responsible for the cost to replace the item/part, plus all related shipping charges. This limited warranty does not apply to natural disasters, acts of terrorism, normal wear and tear, product failure due to lack of maintenance or cleaning, damage caused by accident, neglect, lack of or inadequate dust collection, misuse/abuse or damage caused where repair or alterations have been made or attempted by others.

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

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

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

Parts, under warranty, are shipped at Laguna Tools, Inc.'s cost either by common carrier, FEDEX ground service or a similar method. Technical support to install replacement parts is primarily provided by phone, fax, e-mail or Laguna Tools Customer Support Website. The labor required to install replacement parts is the responsibility of the user.

Laguna Tools is not responsible for damage or loss caused by a freight company or other circumstances not in our control. All claims for loss or damaged goods must be notified to Laguna Tools within twenty-four hours of delivery. Please contact our Customer Service Department for more information.

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



Noise emission.

Notes concerning noise emission:

Given that there exists a relationship between noise level and exposure times, it is not 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 in other words the level of ambient noise. It is possible that exposure level limits will vary from country to country.

Specification sheet.

Note: The specification will depend on the machine that is ordered. Most machines are made to order, and therefore, the specification will vary depending on the machine you require.

Note: This manual is designed to cover the general use of SmartShop II CNC machines and some pitchers may be different to the machine that you receive. The general principles apply to the SmartShop II machine.

Receiving your machine.

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

Ensure that there is no visible damage to the packing, or the machine. You need to do this prior to the driver leaving. All damage must be noted on the delivery documents and signed by you and the delivery driver. You must then contact the seller, Laguna Tools, within 24 hours. It is probable that you will find sawdust on your SmartShop II. Laguna endeavors to test all machines prior to shipping.

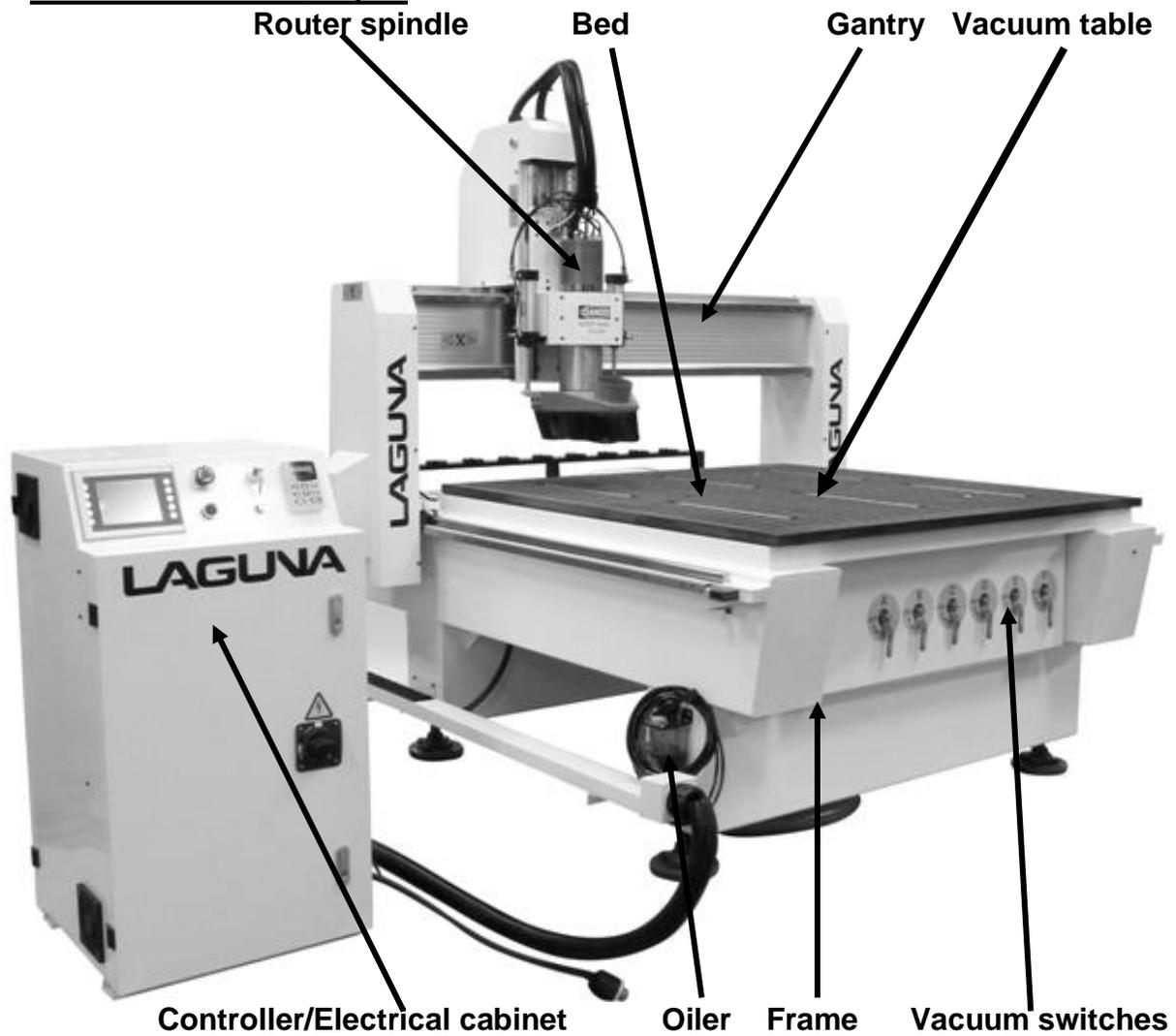
Introduction to CNC machines.

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

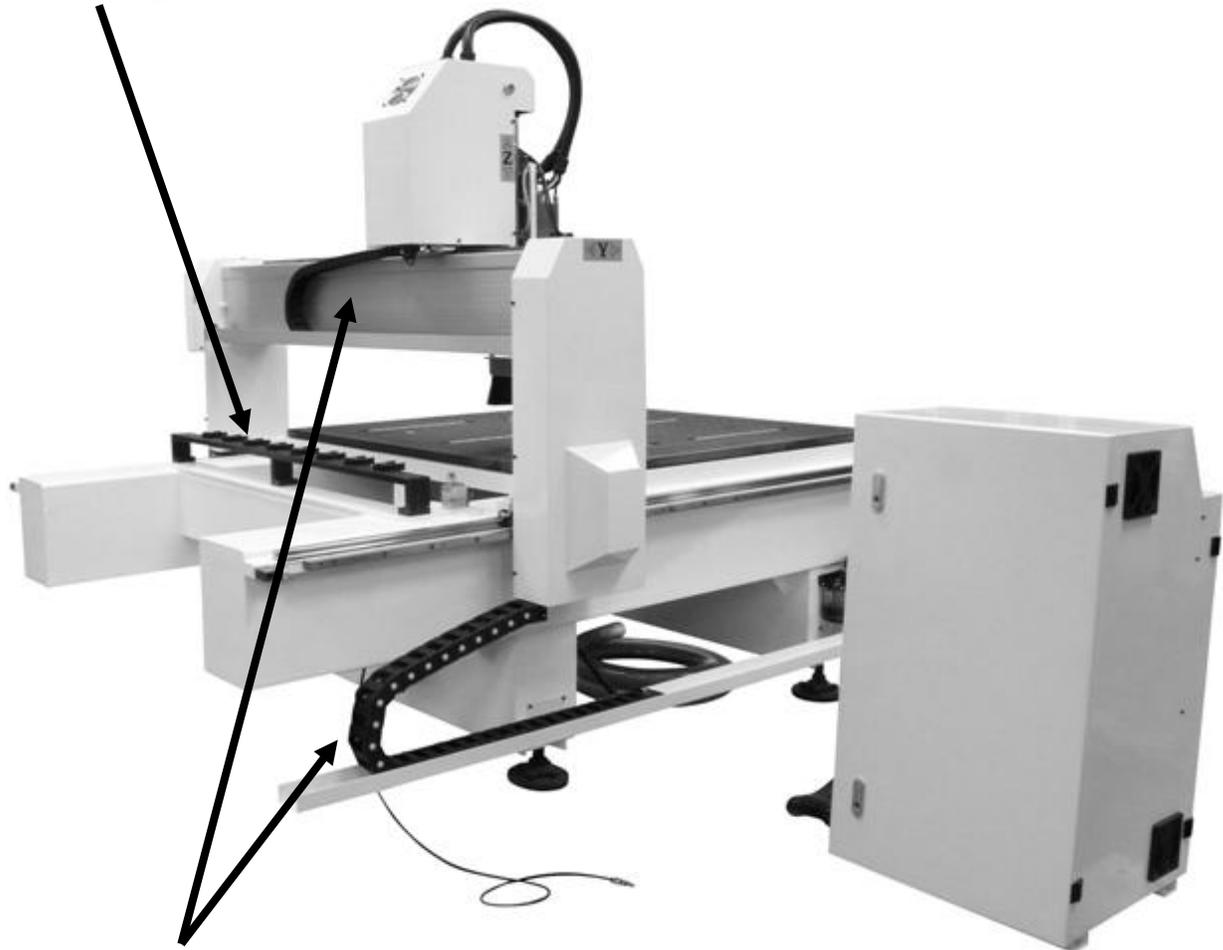
The advantage of the CNC machine is that it can, in most cases, fully machine the complete job without it being removed from the table so that you have finished parts of high accuracy that are totally repeatable.

It can also produce intricate carvings with the purchase of the relevant software. Nesting is also a valuable feature of CNC machining that saves on waste and costs. It is possible to reduce the amount of different machines in the shop, as the CNC will perform a multiple of functions and is a must for cabinet makers and serious woodworkers.

Parts of the SmartShop II.



Tool changer



Caterpillar tracks

1. Bed.

The bed of the machine consists of a heavy steel frame with a plastic top that is slotted for the vacuum function. The table has “T-Slots” in the table, which are used to clamp the job or fixtures to the bed.

2. Gantry.

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

3. Router Spindle.

The router spindle is moved along the gantry by a precision rack-and-pinion system that is controlled by the machine controller. The router spindle is moved vertically 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. Controller/Electrical cabinet.

The Controller/Electrical cabinet is located on the side of the machine enclosure and houses all the electrical components for controlling and powering the machine.

6. Caterpillar track.

The caterpillar track runs along the side of the machine and across the gantry in a trough and carries all the electrical cables and the spindle cooling tubes if water-cooled spindle is fitted.

7. Water pump.

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

8. Vacuum table.

Vacuum table has 6 zones for flexible use.

9. Tool changer.

Tool changer has 8 stations to accommodate a large range of tools.

10. Oiler.

The oiler connects to all the relevant slides on the machine and when pumped by hand will lubricate all the relevant slides.

Additional instructions for the use of the CNC 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 CNC 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 the machine.

What is supplied with your machine will depend on the specification of the machine and extras that you order.

Where to locate your machine.

Before you unpack your machine, select the area where you will use your machine. There are no hard-and-fast rules for its location, but below are a few guidelines.

1. There should be an area around the machine suitable for the length of wood that you will be machining.
2. Adequate lighting. The better the lighting, the more accurate and safely you will be able to work
3. Solid floor. You should select a solid flat floor, preferably concrete or something similar.
4. Close to power source and dust collection.

Unpack the machine.

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

1. Using the tin snips, cut the banding that is securing the machine to the pallet (if fitted).

WARNING: EXTREME CAUTION MUST BE USED BECAUSE THE BANDING WILL SPRING AND COULD CAUSE INJURY.

2. Remove the box from the CNC machine if fitted and any other packaging material. The parts ordered with the machine will be packed on or inside the machine.

Note: The machine is heavy, and if you have any doubt about the described procedure, seek professional assistance. Do not attempt any procedure that you feel is unsafe, or that you do not have the physical capability of achieving.

3. Use a forklift with sufficient lifting capacity and forks that are long enough to reach the complete width of the machine.

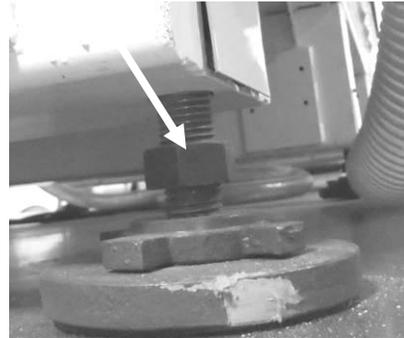
4. Remove the securing bolts that attach the machine to the pallet (if fitted).

5. Approaching the machine from the side and lift the machine on the frame, taking care that there are no cables or pipes in the area of the forks.

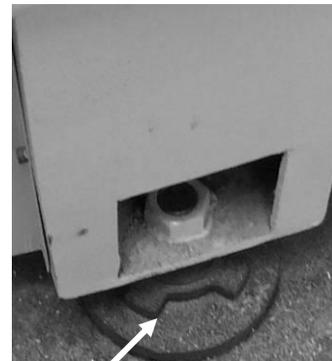
6. Move the machine to the required position and lower gently to the floor.

7. Level the machine so that all the supporting feet are taking the weight of the machine and no rocking is taking place.

Lock nut



Supporting foot



Supporting foot

Assembly and setup.

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 it attracts sawdust and dirt. The surfaces should then be coated with a 30W oil or wax and any excess removed.

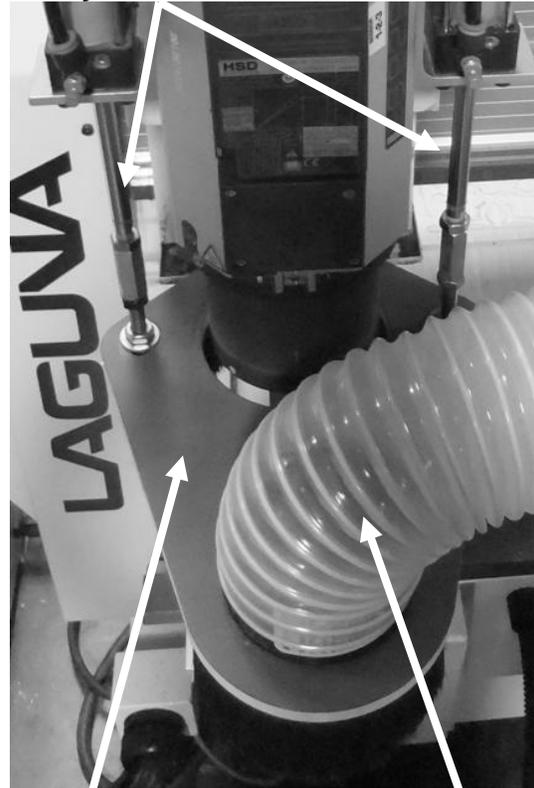
Fitting the dust hose.

1. Fit the dust shroud to the two air cylinder rods and clamp in position with the clamping nuts.
2. Fit a 4-inch (not supplied) dust hose to the dust shroud and secure with the clamp. Ensure that it is tight; it is very inconvenient to have it fall off during production.
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 be suspended from the ceiling of the shop with sufficient slack so that it will not restrict movement. It will also be out of the way and not causing a trip hazard.

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 dependent on your installation. Ensure that when installing the electrical supply to the machine that 220v three-phase is supplied. It is not possible to recommend a breaker size, as this will be dependent on the specification of the machine that you purchase.

Air cylinder rods



Dust shroud

Dust hose

Main power cable (Plug /cable not supplied)



Water pump socket (if fitted)

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

The second cable has a female electrical socket for connection to the water pump (if fitted).

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

Compressed air connection.

The machine is supplied with an air regulator. The input air regulator regulates the air pressure that is supplied to the machine.

You will require an air supply that can deliver a constant minimum pressure of 85 psi. The input air regulator will need to be adjusted to 85 psi once you have connected your air supply to the machine.

Note: No air pipe is supplied, as the length will depend on your installation.

To adjust the air pressure, pull the cap out (up) and rotate until the gauge reads the correct pressure. Once the pressure is adjusted, push the cap in.

Note: It is strongly recommended that 90 psi is supplied to the SmartShop II and that the regulator then be set to 85 psi. This will ensure that the machine always has the minimum required air pressure. The input regulator has a moisture trap that must be emptied each day.

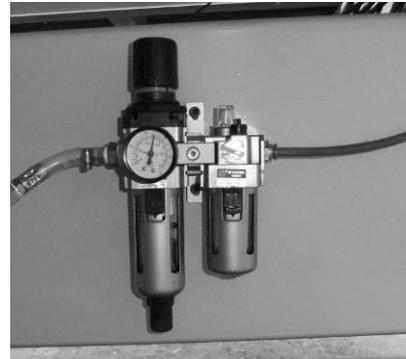
Note: It is important that the air that is supplied to the machine is clean and dry. The machine will not perform consistently if the air is wet or dirty, as any dirt and moisture will block the valves. Wet, damp or dirty air will damage your machine and cause inconsistent performance.

Note: The pneumatic system does not need any type of lubricant. Some types of lubricant can damage the machine and compromise the machine's functions.

Note: During maintenance, always disconnect the air supply.

Fitting the vacuum pump.

The machine is provided with a 2-inch hose for connection to your vacuum pump. The pipe is connected to the manifold located under the table. Connect the other end to your vacuum pump. Ensure that it is clamped securely.



Air regulator



Vacuum pipe

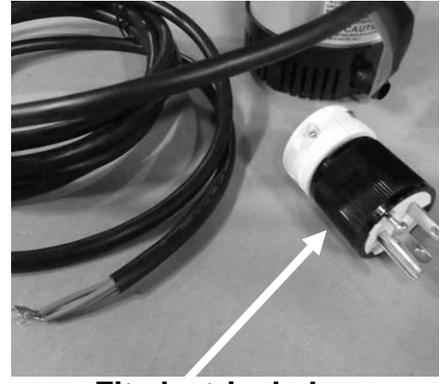
Pump



Pipe connector



Fit connector



Fit electrical plug

Connecting the water pipes to the pump (if ordered).

Note: Never run the water-cooled motor without the cooling being connected, or the motor could be damaged. It is recommended that the pump be run for at least 5 minutes after the motor has been switched off to remove any residual heat.

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

You will connect one to the water pump, and the other will be placed in the water container for the return water. It is not important which pipe is used as the return.

1. Fit the connector to the pump.

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

Fill a container about 3/4 full with clean water.

3. 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 water-cooled spindles are run without cooling, they could be damaged and fail.

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



Pump in water container

Fitting the router bit into the router head.

Note: Before changing or fitting the router bit, always disconnect the power from the machine.

1. Select a router bit and its relevant collet.
2. Fit the collet into the spindle nut. Press the collet into the spindle nut until it snaps into place.

Note: The router bit must not be fitted into the collet until the collet has been fitted into the spindle nut. With the router bit fitted into the collet, the collet cannot compress and snap into the spindle nut.

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

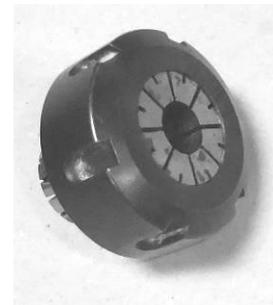
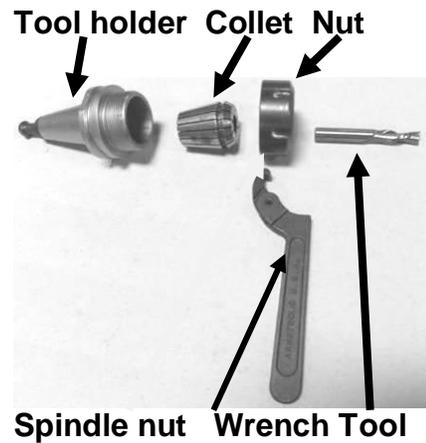
Note: To remove the collet, hold the spindle nut and press the collet on the side. The collet will compress and pop out. Do not try to remove the collet while a cutter is fitted, as the collet will not compress and pop out.

3. Fit the spindle nut and collet assembly onto the tool holder and thread by hand.
4. Press the bit into the collet, but note that the flute of the router bit must not be inside the collet and should be a minimum of 1/16" outside the collet.
5. Hold the router spindle and tighten the collet with a wrench. Do not over tighten.

Note: Use this process for all other router bits that you need to fit, but you will

have to change the collet if the shank of the router bit is a different size.

Note: Keep your collets clean and blow all dust out of the slots. Fine dust accumulates and will affect the clamping action.



Collet fitted to spindle nut



Machine Operation.

Manual tool release.

The tool holder can be released from the spindle manually by pressing the green manual release button.

Note: When the green manual release button is pressed, the clamping method is released and the tool will fall out. Place your hand so that the tool holder (not the cutter) is supported.

To manually insert a tool holder, hold the tool holder in the spindle hole while holding the green manual release button. Once the green manual release button is released, the tool holder will be pulled up into the spindle hole and clamped in position.

Note: You will notice that there is air escaping from the spindle hole. This is to blow any dust out of the spindle hole and keep it clean.

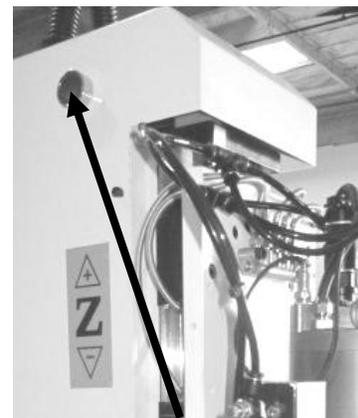
Note: Keep the tool holders clean, lubricated with Teflon.

Note: The spindle hole is susceptible to rust and must be kept clean and lubricated with a Teflon lubricant.

Note: Depending on the option/model that you purchased, the manual tool release button may be located on the gantry.



Manual release button



Manual tool release button

Types of router bits.

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

1. Straight Router Bits.

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



Router bits

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 have 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 radiused 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.

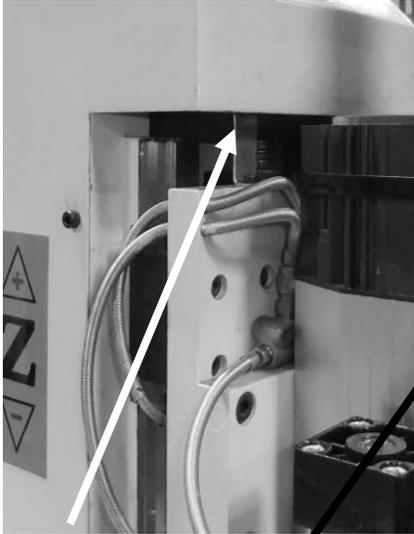
Combination Router Bits are the preferred configuration for machining veneered plywood as well as melamine-surfaced products. A variation of the bit is called the "Mortising Compression" router bit. With this bit, the up shear portion of the bit is less than 1/4" in length so that the bit can be used on 1/4" veneered plywood and for dados.

5. Form Router Bits.

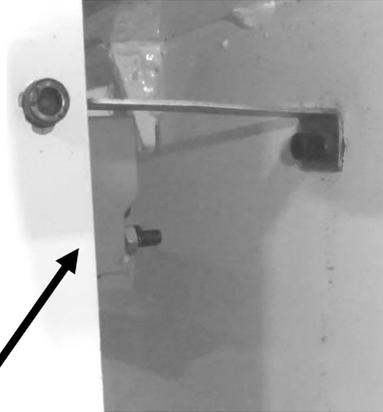
Form Router Bits typically are available in standard profiles such as round over, ogee, etc. Router bits that have a shape associated with them would be classified with this group.

Home switches.

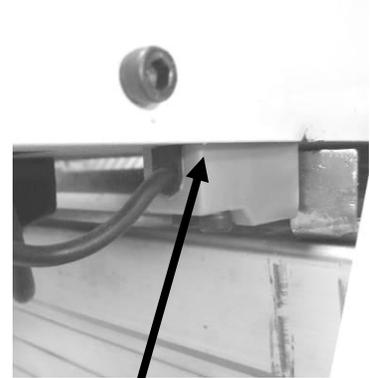
There are three switches that determine the home position of the router head. The switches are factory set, and no adjustment should be required. If adjustment is required, contact your service technician prior to conducting any adjustment.



Z axis home switch



Y axis home switch



X axis home switch



Y axis home switch



X axis home switch

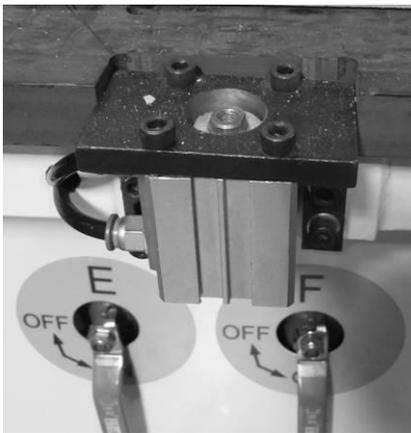
Optional location pins [optional].

The machine can be supplied with five pneumatic-activated location pins. The pins can be extended or retracted by activating the foot switch. The pins are used as a convenient way to locate a sheet onto the vacuum table.

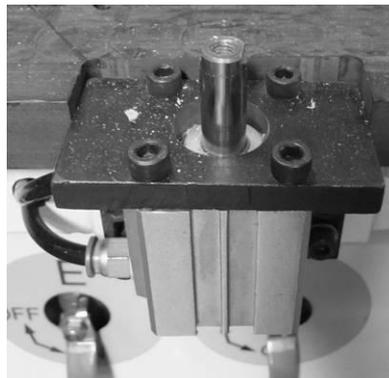


Location pins

Foot activation switch



Location pin (deactivated)



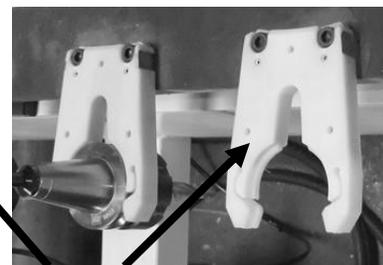
Location pin (activated)



Foot activation switch



Automatic tool contact button



Tool clips

Tool changer and automatic tool contact button.

The tool changer consists of a number of tool spindle docking stations (up to a maximum of 8, depending on what was ordered with the machine). The machine knows the location of the docking stations and will retrieve and deposit tool spindles as commanded by the program that it is running. Each time that a cutter is inserted into a tool spindle, the distance to the tip of the tool is different. The machine is provided with an automatic tool contact button that, when used, will tell the machine the exact dimension of the tip of the tool in relation to the tool spindle.

Automatic Z origin point (tool touch-off).

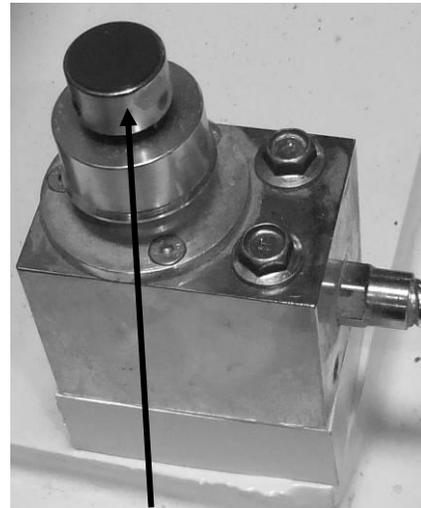
The machine is provided with an automatic tool height adjustment. To activate the automatic tool height adjustment, access the tools screen and press "execute tool touch off" button. This will cause the machine to move to the TTO position, then move down slowly. Once the cutter touches the contact button, electrical contact is made, and the cutter will move up away from the contact button. The machine now knows the height of the cutter. There is also a **manual method** that is detailed below.

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.
3. Step down in slow mode while turning the router collet by hand in the reverse direction.

As you feel pressure, stop jogging down.

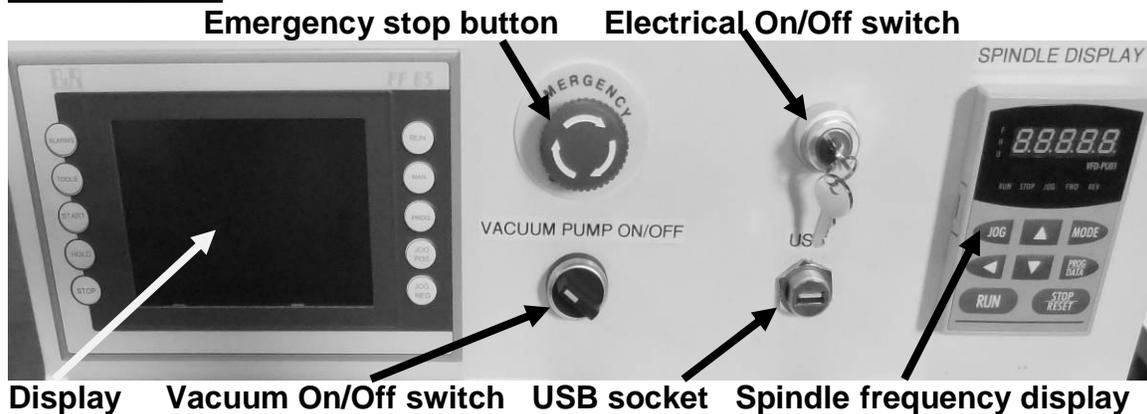
Note. Do not turn the router bit, as it is sharp and could cause injury.

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 0.0001" above the spoil board.
5. Press TOOLS button to go to the tool page, then press "TEACH TOOL LOCATION" and then press "SET TOOL DATA."
6. When touching off from the spoilboard, it is necessary to set the Z Spoil to zero. To do that, go to TOOLS>>NEXT>>press the box labelled Z spoil. enter 0.
7. Jog the router bit up or press the origin button to move the router bit up and to the origin point.



Contact button

Control panel.



The control panel houses the main interface to the machine.

1. Display.
2. Vacuum On/Off switch. This turns the vacuum on and off.
3. USB socket. This is used to input programs into the controller.
4. Emergency stop button.

To reset the emergency stop, twist clockwise and it will pop out.

5. Electrical On/Off switch.

The electrical On/Off switch connects the controller to the electrical supply and starts the processor.

Loading a program into the machine.

1. Load your program into your USB drive.
2. Fit the USB into the USB slot.
3. Press the PROG. button. This will take you to the program page.
4. Press ACCESS USB button. The "active program" box will display the name of the first program on your USB.
5. Use the arrow keys to select a file.
6. Press the copy button to copy the file.
7. Press Access Card button.
8. Use arrow keys to select a file.
9. Press RUN button to go to the run screen
10. **Ensure that you are cleared of the machine. The spindle will start to rotate and could cause injury.**
11. Press START button. The machine will start running the G code

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 clockwise, and it will pop out.

Turn the On/Off switch to turn the power on. The SmartShop II display will light up.

Press HOME MACHINE button

Make sure that the table surface is clear of obstructions.

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

Using the vacuum table.

Note. The better the vacuum that is created, the more secure 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 suite 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 insure that the air is extracted evenly across the zone. T slots are also provided to allow you to clamp jobs / spoil boards to the table should it be required.



Vacuum table

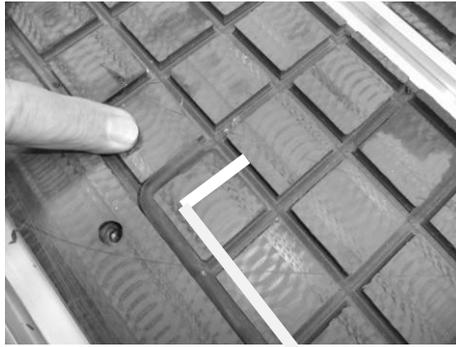


Vacuum zone on/off switches

Fitting the foam rubber gasket.

It is important that the foam rubber gasket is pressed evenly into the groove in the vacuum table around the zone that you are constructing. To ensure a good seal, it is strongly recommended that the gasket be 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 reset 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.



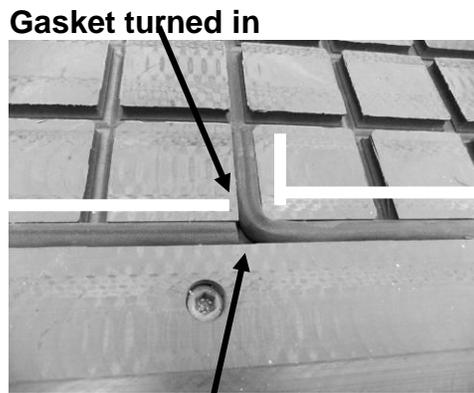
Start point foam rubber gasket turned in



Inserting foam rubber gasket



Cutting end of foam rubber gasket



Final finished joint

Note: Do not stretch the foam rubber gasket while you are fitting it into the groove 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 were 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

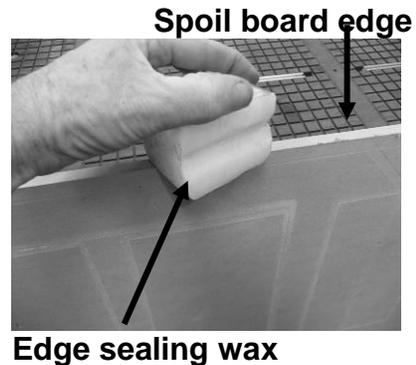


Vacuum zone

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. It is not recommended that your spoil board be thicker than 1 inch.

The MDF that you purchase will not be flat, and the machine will need to cut it to make it accurate. Accuracy in the order of a few thousandths of an inch is required, so you will have to machine the spoil board flat. After your spoil board has been skimmed many times and is 1/2-inch thick, discard and start a new spoil board. The spoil board edges are very porous and must be sealed. We recommend that a hard candle wax be 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.



Note: Even 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 or other debris 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 or vacuum cleaner.

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 side. (Remember to ensure that the table and spoil board are clean.)

Spoil board use.

Each time you set up a new job, you will cut into the spoil board by a few thousandths of an inch in the areas that 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 grooves 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 or vacuum cleaner. 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 that great. The changes will, in general, be over the complete board. There are exceptions, however. Your morning coffee can do a great deal of damage if spilled. If water or another liquid is spilt, it will be absorbed into the board and make the board grow in that area. Do not allow the board to become wet. If an accident should happen, remove the board from the machine and allow to dry. (This may take several days.) Replace the board with a new board. Once the board has completely dried, it may be possible to skim the board and reuse it, but the likelihood is that it is scrap.

Spoil board.

The spoil board must cover the complete table and sit on the flats around the table. If the spoil board does not cover all the vacuum slots, the vacuum will be lost, and your job will not be pulled down onto the spoil board.

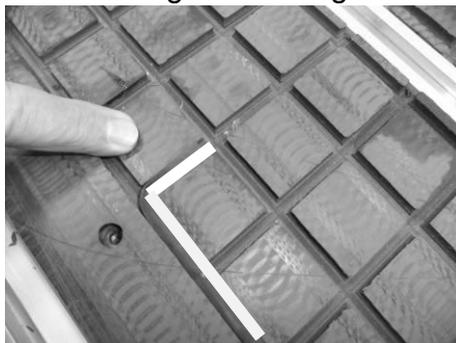
Fitting the foam rubber gasket.

It is important that the foam rubber gasket is pressed evenly into the groove in the vacuum table around the zone that you are constructing. To ensure a good seal, it is strongly recommended that the gasket be 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 reset 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.



Rubber gasket



Start point foam rubber



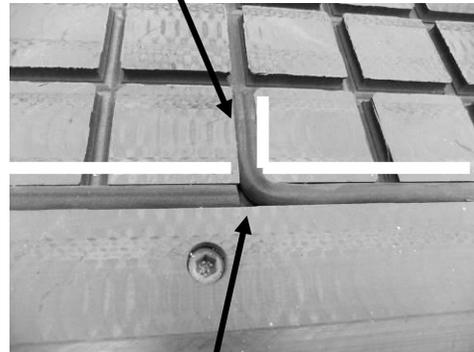
Inserting foam rubber gasket

Gasket turned in



Cutting end of foam rubber gasket

Gasket turned in



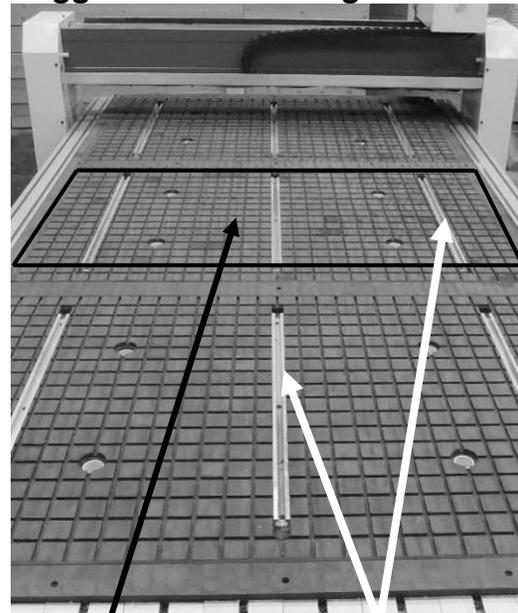
Final finished joint

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

Vacuum table T slots.

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

Suggested zone configuration

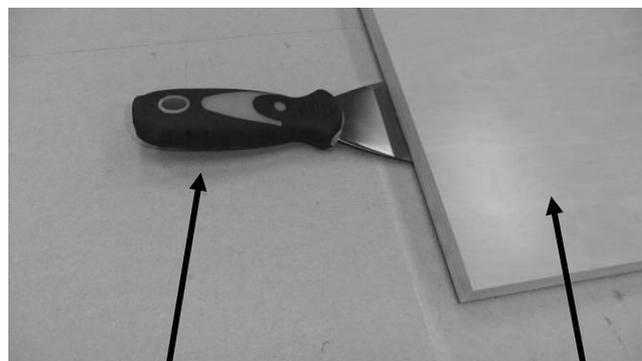


Vacuum zone

T slots

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.

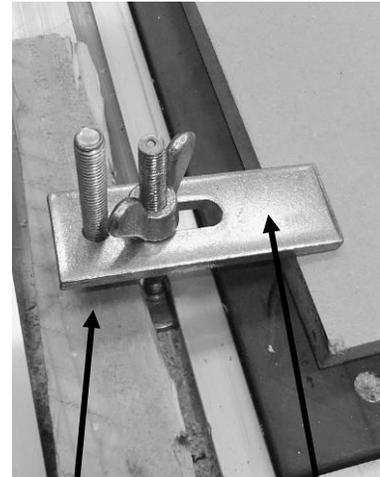


Wide blade putty knife

Job

Fitting the job to the table using the T slots.

You may find it convenient to clamp the job to the spoil board with the table clamps. This attachment method can only be used if the outside edges are not being machined. When using the clamps, place a piece of packing under the jacking bolt to protect the bed of the machine.



Packing

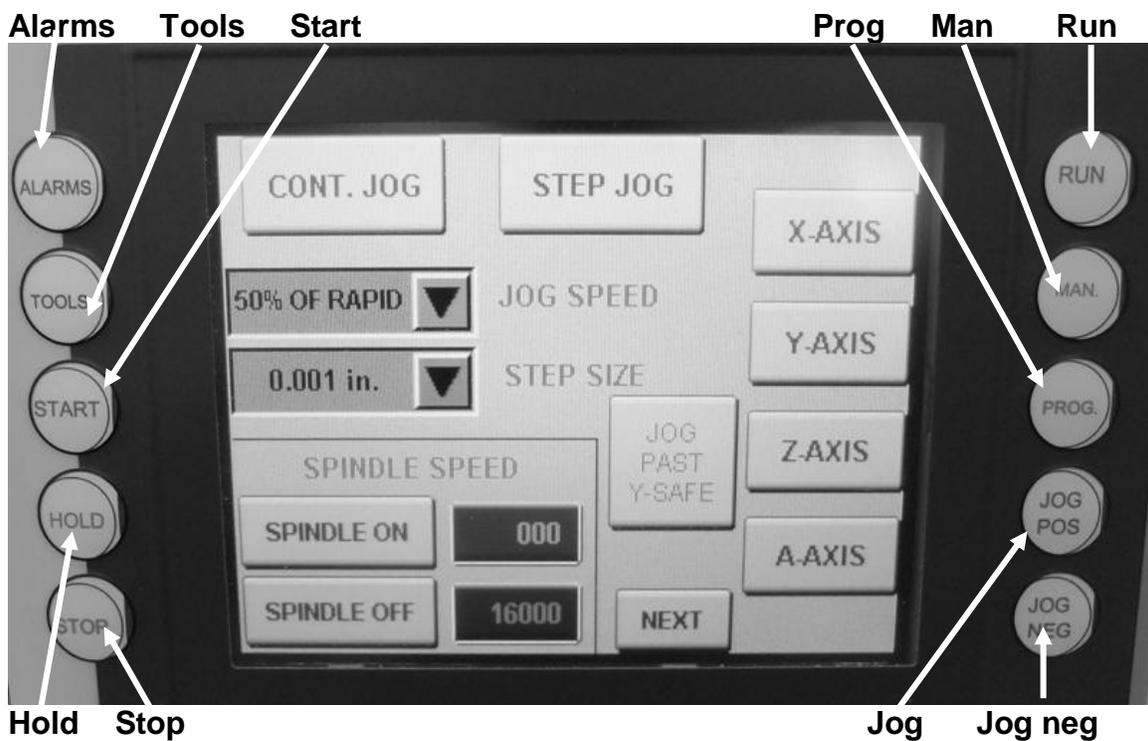
Clamp

DO'S AND DON'TS.

1. **DO** verify water level in the spindle reservoir.
2. **DO** lubricate all ball screws every 8 hours of run. Use 30w oil or lithium white grease lubricant or equivalent to lubricate the ball screws and wipe off any excess to reduce dirt and dust acumination.
3. **DO** keep your collets clean. Fine dust builds up, and they get tight.
4. When doing carving work, it is necessary to use a much larger volume of water for the spindle-cooling reservoir.
5. **DO NOT** ever under any circumstances reach over the table or obstruct the movement of the gantry while the machine is powered or running a program.
6. **ALWAYS** press in the E-STOP button on the control box and turn off main power prior to changing tooling or working on the spindle. Remember to clear alarms caused by the E-STOP button on the alarm pages after the E-STOP has been removed.
7. **ALWAYS** remove main power prior to working on or servicing the spindles, water pump or reservoir.
8. The E-STOP button **MUST** be out before turning on the main power (twist and it will pop out).

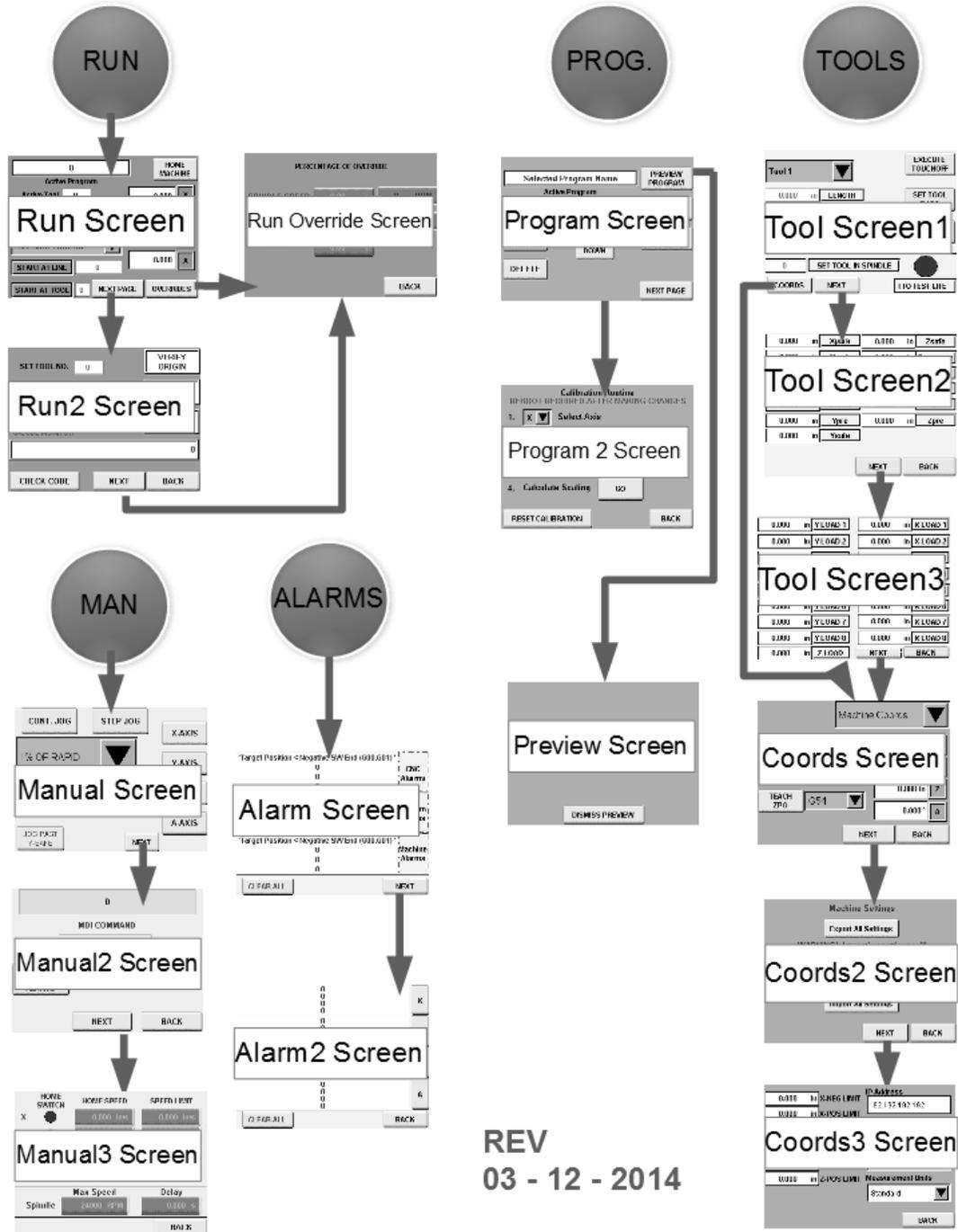
Membrane Button Descriptions.

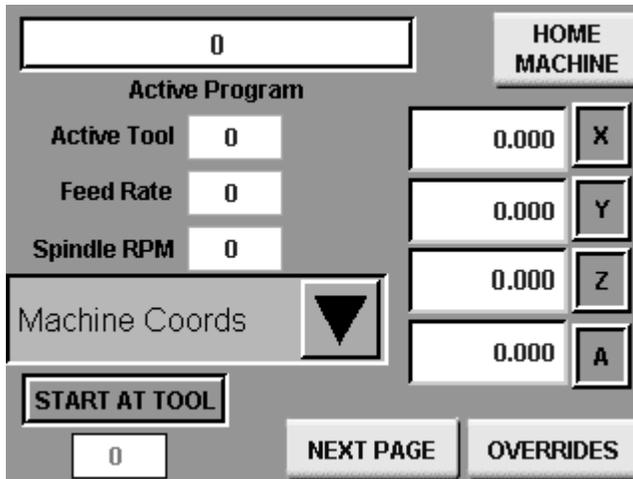
- Alarms.** This is a page jump to the first Alarm Screen.
- Tools.** This is a page jump to the first Tool Screen.
- Start.** This button is for starting the program shown in the active Program screen.
- Hold.** This button is used to pause a running program. To release Hold, press the start button, and the program will continue.
- Stop.** This button Stops the active program.
- Run.** This button is a page jump to the first Run (home) screen.
- Man.** This button is a page jump to the first Manual screen
- Prog.** This button is a page jump to the first Program screen
- Jog Pos.** This button jogs the selected Axis in the positive direction.
- Jog Neg.** This button jogs the selected Axis in the negative direction.



SCREEN OVERVIEW.

Smart Shop II





RUN screen.

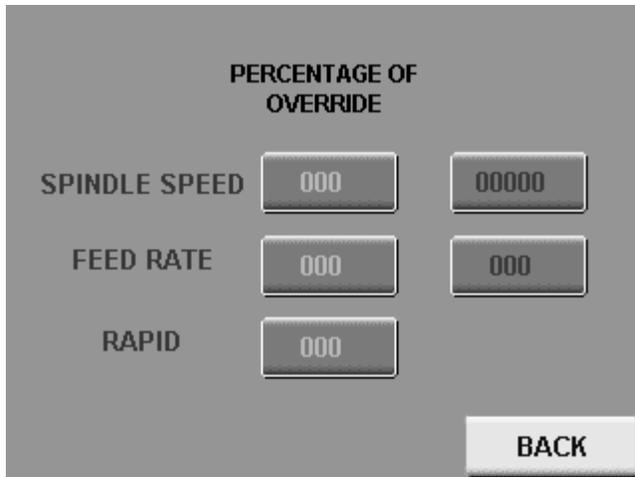
- 1) Homing the machine is the first step every time power is applied. No functions or actions can occur until homing is complete and successful.
- 2) (Active Program) field shows the current program loaded for run.
- 3) (Feed Rate) and (Spindle RPM) indicate the programmed rate and speed.
- 4) (Start at Tool) allows the operator to start a program from a specific tool in a multiple tool program.
- 5) (Machine Coords) is a drop-down menu to select which dimension set is shown in the X, Y, Z, and A axis DROs. The displayed references are for Machine Coordinates, Zero Point Offset (G54), and relative coordinates.
- 6) (OVERRIDES) button is for a page jump to the overrides available while the program is in run.
- 7) (NEXT) button is for a page jump to the second Run screen.

SET TOOL NO.	<input type="text" value="0"/>	VERIFY ORIGIN
START AT TOOL	<input type="text" value="0"/>	DUSTHOOD UP/DOWN
RUN TIME	<input type="text" value="0"/>	PARK TOOL
G-CODE MONITOR		
<input type="text" value=""/>		<input type="text" value="0"/>
CHECK CODE	NEXT	BACK

RUN2 screen.

NOTE: Green numbers in a field indicate an Input field. Press the green number, and a 10-key numerical entry will pop up for entry of the required value.

- 1) (SET TOOL NO.) This field is used for Instructing the control which tool you manually inserted.
- 2) (START AT TOOL) allows the operator to start a program from a specific tool in a multiple tool program.
- 3) (RUN TIME) Displays the programs run time.
- 4) (G-CODE MONITOR) Shows the current line of code as it is ran.
- 5) (VERIFY ORIGIN) This button will move the X and Y axes to the G54 set in the Zero Point Reference.
- 6) (DUST HOOD UP/DOWN) Manually raises and lowers the spindles dust hood.
- 7) (PARK TOOL) This button will put the Tool in the spindle away for shutting the machine down at the end of the day.
- 8) (CHECK CODE) This function is used for checking that the code is correct to run within the parameters of your machine. This adds a delay to the starting of a program but ensures that it will run correctly.

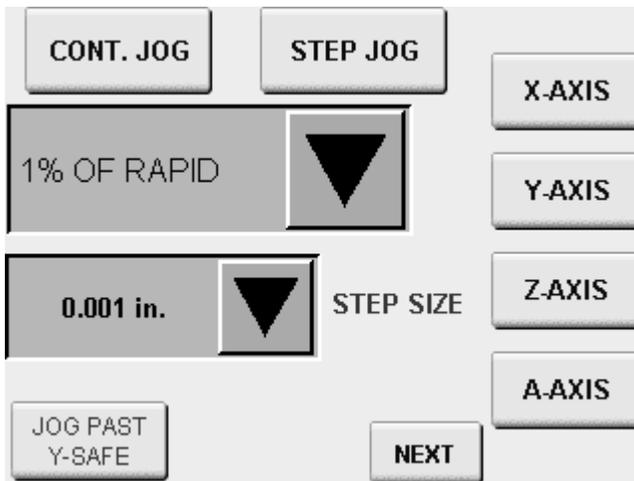


RUN OVERRIDES screen.

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

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

The field (RAPID) is used to restrict the machines feed rate by a percentage when a G0 (Rapid Move) is called in a program.



Manual Screen, 1 (Jog and manual spindle control).

- 1) (CONT. JOG) When pressed, selects a continuous jog mode based on the percentage of full speed chosen under (JOG SPEED).
- 2) (STEP JOG) When pressed, selects a step jog mode based on the resolution chosen under (STEP SIZE).
- 3) (X-AXIS, Y-AXIS, Z-AXIS, AND A-AXIS) Buttons are used to select the axis you wish to jog.
- 4) (JOG PAST Y-SAFE) Button allows the operator to jog past the Y-safe dimension, i.e., just before the tool rack.
- 5) The (NEXT) button is used to jump to the second manual screen for MIDI functions.



Manual 2 Screen.

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

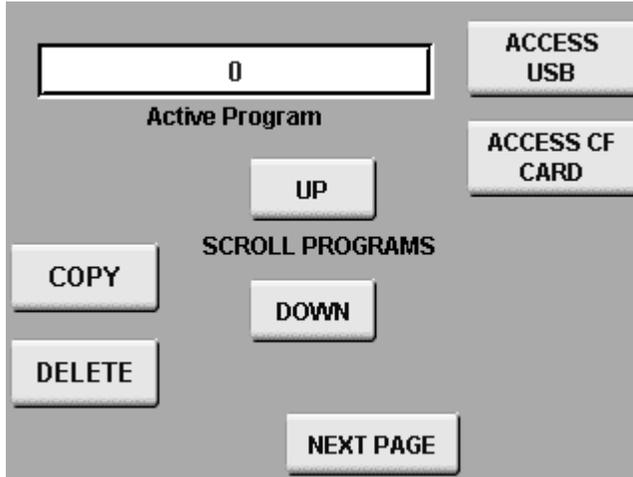
Press on the pink command window, and an alpha-numeric pad will pop up for MIDI string entry.

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

0.000	HOME SPEED	0.000	0.000
0.000	SPINDLE DELAY		
0.000	X,Y SPEED LIMIT		
0.000	Z,A SPEED LIMIT		
<input type="checkbox"/>	X HOME SWITCH	<input type="checkbox"/>	Z HOME SWITCH
<input type="checkbox"/>	Y HOME SWITCH		
			BACK

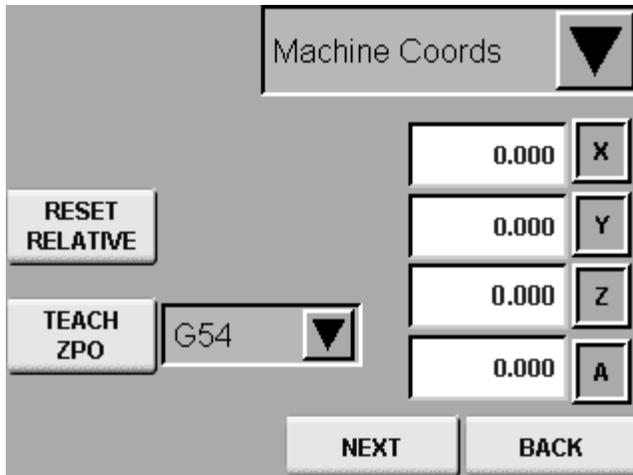
MANUAL3 SCREEN.

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



PROGRAM screen.

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



COORD'S screen.

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



COORDS2 Screen.

- 1) This screen is used for exporting all user and factory machine settings in a machine settings .xml file for backup. This is needed if the flash card (operating system) is replaced or upgraded.

Simply insert a USB memory stick and press export. A file called “machine settings” will be generated. It is suggested you save this file securely so a rebuild or upgrade can be done quickly without resetting up the machine and its saved locations. Tool touch-off data is the only information not backed up, but once the tool touch-off is automated, it is easily repeated.

Tool 1 ▼		EXECUTE TOUCHOFF
0.000	LENGTH	SET TOOL DATA
0.000	L.WEAR	
0.000	DIA.	Teach Tool Length
0.000	D.WEAR	
<hr/>		
0	SET TOOL IN SPINDLE	
NEXT		

TOOLS Screen.

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

- 1) The green drop-down menu is used to select a tool for touch-off or to access and modify numbers within the tool table for a specific tool.
- 2) (EXECUTE TOUCHOFF) Button starts a tool touch-off routine to measure the tool selected. Choose the tool from the drop-down menu. If a different tool is in spindle than you selected for touch-off, then the machine will make a tool change eform the touch-off for the tool selected.
- 3) Press Teach Tool Length, then press SET TOOL DATA to set the tool length manually.
- 4) (Length Wear) This field is used to manually adjust the tool length for special applications or for fixing code that is just not cutting deep enough.
- 5) (Set Tool in Spindle) This field is to tell the machine the tool in spindle if you have manually swapped tooling to and from spindle.

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

0.000	Xpark	0.000	Zsafe
0.000	Ypark	0.000	Zmeasure
		0.000	Xtrigger
0.000	Zspoil	0.000	Ytrigger
0.000	Zhome	0.000	Zswitch
0.000	Ypre	0.000	Zpre
0.000	Ysafe		
		<input type="button" value="NEXT"/> <input type="button" value="BACK"/>	

Tools 2 screen.

NOTE: Only one field on this page pertains to daily operation, (Z spoil). All other fields are for setup and technical support of the controller and will be covered in the advanced section of the manual.

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

<input type="text" value="0.000"/>	X-NEG LIMIT	IP ADDRESS	
<input type="text" value="0.000"/>	X-POS LIMIT	<input type="text" value="192.192.192.192"/>	
<input type="text" value="0.000"/>	Y-NEG LIMIT	SS	AR
<input type="text" value="0.000"/>	Y-POS LIMIT	<input type="text" value="1.0"/>	<input type="text" value="V3.91"/>
<input type="text" value="0.000"/>	Z-NEG LIMIT	ACP10	
<input type="text" value="0.000"/>	Z-POS LIMIT	<input type="text" value="1.0"/>	
<input type="text" value="0.000"/>	A-NEG LIMIT	ARNCO	
<input type="text" value="0.000"/>	A-POS LIMIT	<input type="text" value="1.0"/>	
			<input type="button" value="BACK"/>

COORD'S 3 Screen (coord's set-up).

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

'Target Position < Negative SW End (G00,G01) '		CNC Alarms
0		
0		
0		
0		System Alarms
0		
0		
0		
'Target Position < Negative SW End (G00,G01) '		Machine Alarms
0		
0		
0		
CLEAR ALL		NEXT
0		X AXIS
0		
0		
0		
0		Y AXIS
0		
0		
0		
0		Z AXIS
0		
0		
0		
0		Y' AXIS
0		
0		
0		
CLEAR ALL		BACK

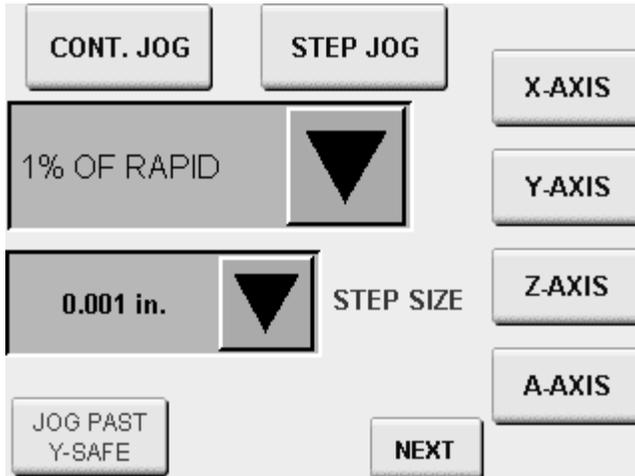
Alarm Screen 1 and 2.

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

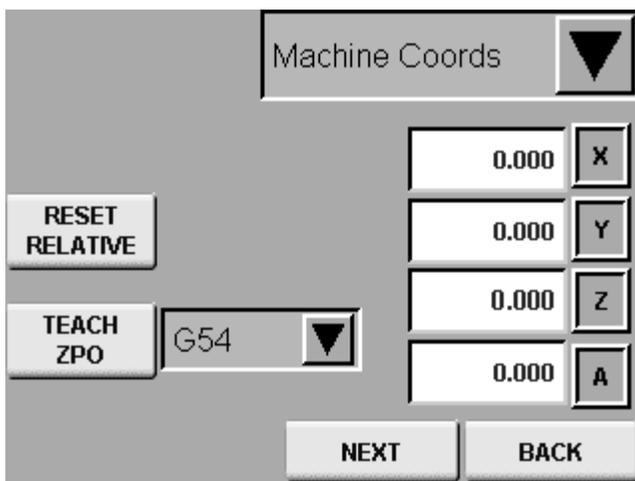
Getting Started.

Preparing for sheet processing:

- 1) Place a 3/4" or 1"-thick MDF spoil board with sealed edges (either edge band or seal with a rubbing wax) centered on your table.
- 2) Insert a small tool into the spindle manually.
- 3) Press the (MAN) membrane switch to access the manual control screen.



- 4) Press (CONT. JOG) button to select continuous jog.
- 5) Using drop-down menu for (JOG SPEED) to select the speed you are comfortable jogging at.
- 6) Select the axis you wish to move.
- 7) Use the (JOG POS.) and (JOG NEG.) membrane buttons to jog the spindle over to the front left corner of the spoil board.
- 8) Press (Tool, Membrane switch) and press (next) 3 times until you are on the (COORDS) screen.



- 9) With the spindle over the front left corner of the spoil board and (G54) selected, press (Teach ZPO) (zero point offset) to select the front left of the spoil board as the work offset (X and Y Zero)(origin) for your software's starting point when running code.
- 10) Press (PROG) membrane switch to jump to the Program screen.
- 11) Manually insert your fly cutter for facing the spoil board. Press the manual tool release near the spindle and hold the cone into the spindle opening and release the tool release button; you will feel the tool holder get drawn upward as it is locked into place.
- 12) Press the (TOOLS) membrane switch to access the first tooling screen.

Tool 1 ▼		EXECUTE TOUCHOFF
0.000	LENGTH	SET TOOL DATA
0.000	L.WEAR	
0.000	DIA.	Teach Tool Length
0.000	D.WEAR	
<hr/>		
0	SET TOOL IN SPINDLE	
NEXT		

- 13) Using the drop-down menu, select tool #8 and input the number 8 in the green field (Set Tool In Spindle). This will set up the system for touching off the spoil board cutter to Z zero later in these instructions.
- 14) Press (NEXT) to access the second tooling screen.

0.000	Xpark	0.000	Zsafe
0.000	Ypark	0.000	Zmeasure
		0.000	Xtrigger
0.000	Zspoil	0.000	Ytrigger
0.000	Zhome	0.000	Zswitch
0.000	Ypre	0.000	Zpre
0.000	Ysafe		
NEXT BACK			

- 15)** While on this screen, please verify there is a Zero in the field for (ZSPOIL) so that the tool touch-off is not adjusted incorrectly.
- 16)** Press the (MAN) membrane switch to access the manual control screen.
- 17)** Turn on the vacuum pump in order to draw the spoil board flat to the machine's table.
- 18)** Using the jog functions, lower the Z axis to the top of the spoil board until it just touches the top of the MDF sheet.
- 19)** Press (TOOLS) membrane switch to access the tool table screen.
- 20)** Verify that tool 8 is selected in the tools drop-down menu.
- 21)** Press (Teach Tool Length) to teach the system the tool position at the top of the spoil board.
- 22)** Press (Set Tool Data) to write the dimension to the controller.
- 23)** Tool setup is now complete for the fly cut program. Press the (RUN) membrane switch to continue.

Machine and System are ready for the program run as described below:

- 24)** Press (RUN) membrane switch to access the RUN screen.
- 25)** Verify tool 8 is listed as ACTIVE tool in the active tool field.
- 26)** Make sure the vacuum and dust collection is on.
- 27)** Keep all personnel clear of the machine.
- 28)** Press (START) membrane switch to begin the fly cut program.
- 29)** Once the fly cut program has completed, vacuum and blow off all the dust from the machine and spoil board.
- 30)** Flip the MDF sheet and repeat steps above to fly cut the flipped side so both surfaces are flat and free from resin to increase vacuum flow.
- 31)** With the spoil board fully prepared, lift one corner of the spoil board and measure with dial calipers to get a measurement to 3 decimal places.
- 32)** Go to the second Tools screen and input the dimension (thickness) of the spoil board into the field (ZSPOIL). This dimension is used to adjust the tool length so that the top of the spoil board becomes a known location for the program to reference as work coordinates.

TOOL TOUCH-OFF PROCEEDURE.

This is the next step in setting up an Automatic Tool Changing machine once the Spoil board is prepared and in place.

- 1) Go to the (TOOLS) screen.
- 2) Select the tool you wish to measure with the drop-down selector in the upper left of the screen.

The screenshot shows a control panel for tool touch-off. At the top left is a dropdown menu labeled 'Tool 1' with a downward arrow. To its right is a button labeled 'EXECUTE TOUCHOFF'. Below these are four rows of input fields, each with a '0.000' value and a label: 'LENGTH', 'L.WEAR', 'DIA.', and 'D.WEAR'. To the right of these fields are two buttons: 'SET TOOL DATA' and 'Teach Tool Length'. At the bottom left is a field with '0' and a button labeled 'SET TOOL IN SPINDLE'. At the bottom center is a button labeled 'NEXT'.

3) With the correct tool selected, press (EXECUTE TOUCHOFF). The machine will then put the tool away if one is in the spindle and pick up the tool you requested to measure. The measuring is performed by moving X and Y over the tool switch, and slowly lowering Z axis until the switch is made. The machine now knows the length of the tool and thus Z Zero is now the top of the phenolic table.

- 4) Measure the spoil board and enter the thickness into (Z spoil) field on the second tool's screen.

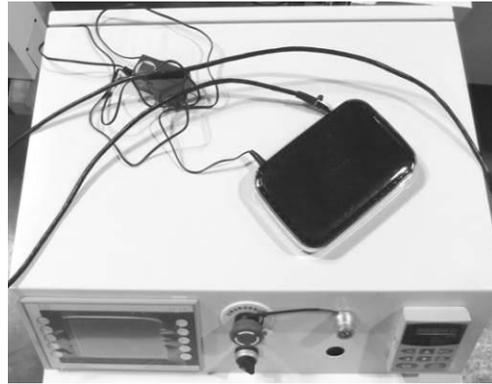
The screenshot shows a control panel for the second tool. It features two columns of input fields, each with a '0.000' value and a label: 'Xpark', 'Ypark', 'Zspoil', 'Zhome', 'Ypre', 'Ysafe' in the first column; and 'Zsafe', 'Zmeasure', 'Xtrigger', 'Ytrigger', 'Zswitch', 'Zpre' in the second column. At the bottom are two buttons labeled 'NEXT' and 'BACK'.

With the spoil board thickness entered into (ZSPOIL), Z Zero is now the top of the spoil board, and your machine is ready for panel processing.

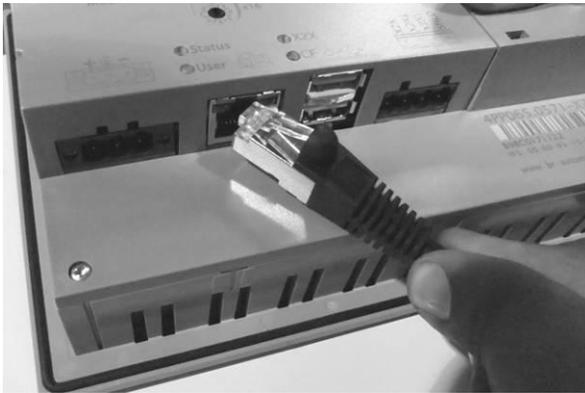
Ethernet connection.



1. Control panel



2. Network hub



3. Ethernet cable



4. Ethernet cable connected to screen



5. Screen seen from inside of control cabinet

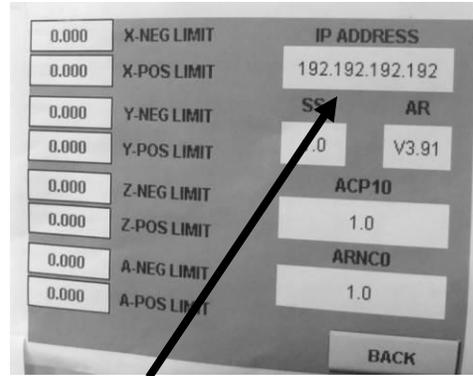


6. Ethernet cable connected to network hub

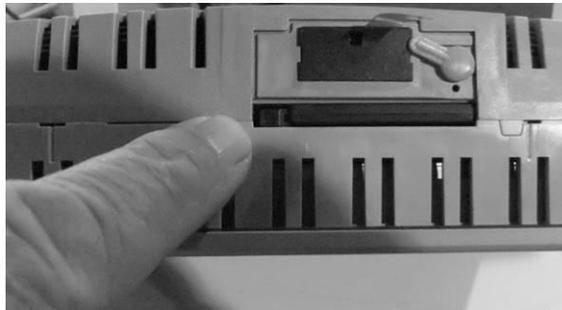


7. Network hub

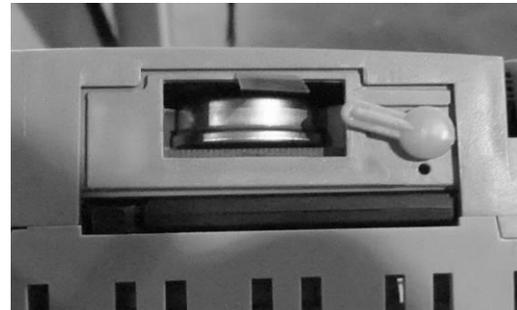
You need FILE ZILLA software to be able to transfer files.
Real VNC viewer 4 to view machines on your computer



Store IP address in safe place



Control panel battery compartment



Battery cover removed

Control panel back up battery.

To replace the control panel has a backup battery.

1. Remove the control panel from the electrical control cabinet.
2. Release the battery cover and remove.
3. Pull the tab and remove the battery. Note the +_ position of the battery.
4. Replace the battery, ensuring that it is inserted in the correct orientation.
5. Replace the battery cover and refit the control cabinet.

M code.

M-Function	Sync / Async	In Use	Description
0	Sync	Yes	Predefined: Programmed Stop
1	Sync	Yes	Predefined: Optional Stop
2	Sync	Yes	Predefined: End of Main Program / Subprogram
3	Sync	Yes	Spindle On
4	Sync	No	
5	Sync	Yes	Spindle Off
6	Sync	Yes	Tool Changer - executes subprogram brtc.cnc
7	Sync	No	
8	Sync	Yes	Dust Hood Up On
9	Sync	Yes	Dust Hood Up Off
10	Sync	Yes	Open Grip On
11	Sync	Yes	Open Grip Off with check for tool in spindle
12	Sync	Yes	Open Grip Off with no check for tool in spindle
20	Sync	No	Turns on mister output
21	Sync	No	Turns off mister output
29	Sync	Yes	Predefined: End of Main Program / Subprogram
30	Sync	Yes	Predefined: End of Main Program / Subprogram, turns off Digital Outputs
31	Sync	Yes	DO_SPINDLE_RET = 1, DO_DRILL_MOTOR_EN = 1
M-Function	Sync / Async	In Use	Description
32	Sync	Yes	DO_DRILL_MOTOR_EN = 0, DO_DRILL[1-10]_EXT = 0, DO_SPINDLE_RET = 0, DO_SPINDLE_EXT = 1
33	Sync	Yes	DO_DRILL_[1-10]_EXT = 1 (based on TFunctionValue)
34	Sync	Yes	DO_SPINDLE_RET=1, DO_SPINDLE_EXT=0
35	Sync	Yes	DO_DRILL_[1-10]_EXT = 0
50	Sync	Yes	Engages the Tangential Tool for Tangential Machines,
51	Sync	Yes	Engages Slide Drills on SS2_MT_3SLIDES Machine with Z-Offset

52	Sync	No	Disable Z-Safe Position Offset and Disengage Slide Drills
100	Sync	Yes	Rotates rack to empty position (tool in spindle)
101	Sync	Yes	Extends tool rack
102	Sync	Yes	Rotates rack to new tool position
103	Sync	Yes	Retracts rack
200	Sync	Yes	A Axis free run - MoveVelocity command
201	Sync	Yes	Stop A Axis
202	Sync	No	
203	Sync	Yes	Plasma - DO_START_ARC = 1
400	Sync	Yes	Tangent Axis - move Z-Axis Offset to TanSafe position for tool
401	Sync	Yes	Disable Z-Safe Position (return Z-offset to 0)
500	Sync	Yes	HMI_IF.Input.Command.RequestDisabledMode = 1
550	Async	Yes	Invalid Tool Alarm
600	Async	Yes	ARC_SAMPLE delay
700	Async	Yes	Vision System

G code.

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

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G103	x		CDC: Radius-dependent feed adjustment at convex path sections (starting with V0.201)
G104	x		CDC: Radius-dependent feed adjustment at concave path sections (starting with V0.201)
G105	x		Setting the "v_ump" Parameter (starting with V0.198)
G106	x		Setting the "a_ump" 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	x		Block transition with speed dip (starting with V0.240)
G112	x		Block transition without speed dip (starting with V0.240)
G113		x	Reduction of path speed at tangential path section transitions
G114	x		Optimized circular acceleration ratio
G115	x		Standard acceleration ratio
G126	x	11	Rounding edges
G130	x	20	Compensation in the direction of the machine coordinate system (starting with V0.270)
G131	x	20	Compensation in the direction of the programmed system (starting with V0.270)
G132	x	4	CDC with linear transitions (starting with V0.200)
G133	x	4	CDC with arc transitions (starting with V0.200)
G134	x	4	Intersection path calculation - DEACTIVATE (starting with V0.194)
G135	x	4	Intersection path calculation - ACTIVATE (starting with V0.194)
G137	x	9	Activate/deactivate CDC indirectly with transition block
G138	x	9	Activate/deactivate CDC directly
G139	x	9	Activate/deactivate CDC indirectly
G140	x	15	Deactivate tangential axis automatically (starting with V0.130)
G141	x	15	Activate tangential axis automatically (starting with V0.130)
G144	x		Continuous alignment of automatic tangential axes
G145	x		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	x	10	Absolute coordinates for center of circle
G162	x	10	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	x		Activate mode "Linear Feed Characteristic"
G194	x		Deactivate mode "Linear Feed Characteristic"
G195	x		Switch On RTCP
G196	x		Switch Off RTCP
G200		x	Position latch
G201		x	Position latch with following halt
G211	x		Activate "blended move mode"
G217		x	Mapping
G218		x	
G219		x	
G220		x	Output signal before the end of the path section
G221		x	Activate prediction for G220
G222		x	Signal function with specification of the remaining path distance

g_functions.html

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

Maintenance.

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

Lubrication.

You must regularly (minimum every 12 hours) lubricate the bearing surfaces and the ball screws. Use a thin Lithium spray or a 30wt oil lubricant. Spray daily and wipe off the excess.

Daily checks.

1. Clean the machine and lubricate unpainted surfaces with a 30wt oil lubricant. Wipe off any excess and buff with a dry polishing cloth. This will reduce the likelihood of rust forming.
2. Check cutter teeth for chips and dullness.
3. Generally inspect the machine for damage and loose or worn parts.
4. Collets 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.



Collet fitted to spindle nut

Weekly checks.

1. Clean the cutters.
2. Check cutter teeth for chips and dullness.
3. Generally inspect the machine for damage and loose or worn parts.
4. Check the dust extraction for blockages, as any large bits could cause blockages.
5. Replace the water every week if your machine has a water-cooled spindle.
6. Rotate the water pipes every week, inlet to outlet and reverse for the other pipe if your machine has a water-cooled spindle. This will clean out any dirt or other debris that is accumulating inside the cooling system.
7. Check that all the electrical connectors are fitted correctly and are not loose.
8. Check that all the motor couplers are connected and that the screws are tight.

Position of home switches.

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

Oiling the machine.

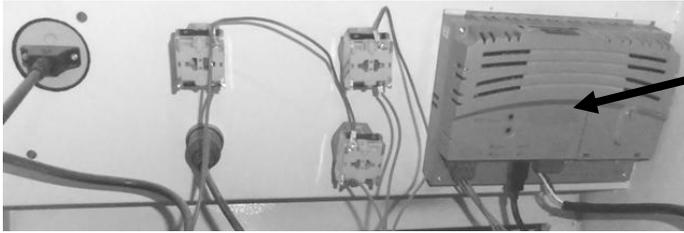
The machine is provided with a central oiler. Do not over-lubricate the machine, as the excess oil attracts dirt and sawdust.

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 30wt oil.

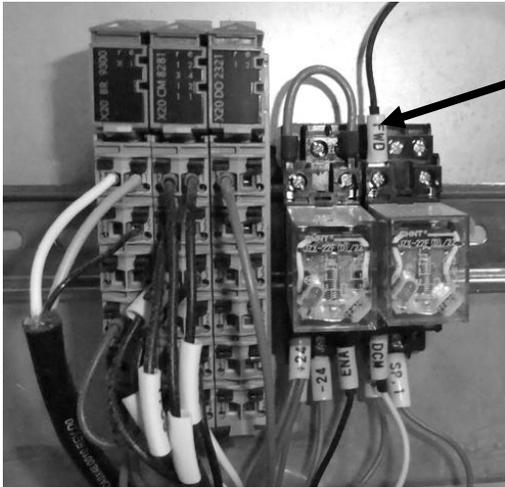


Central oiler

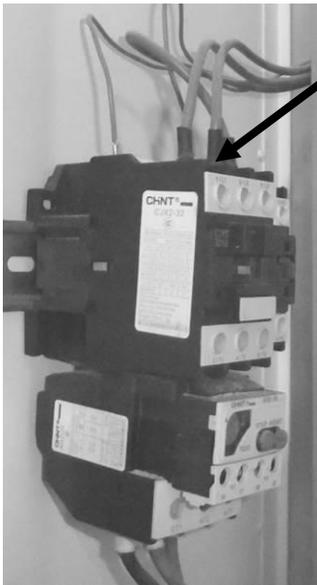
Components inside the electrical control box.



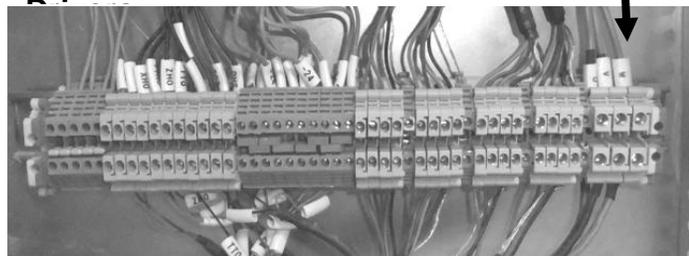
B & R controller



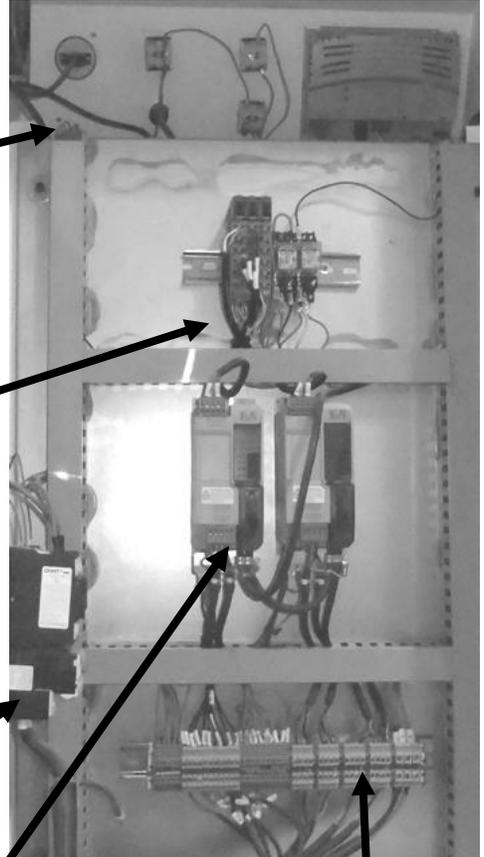
PLC rack

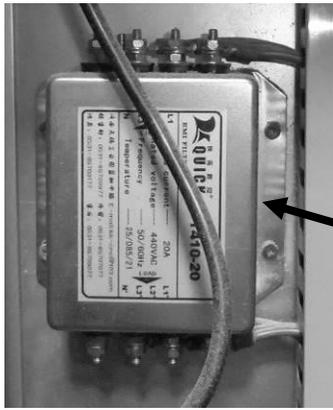


Main Breaker

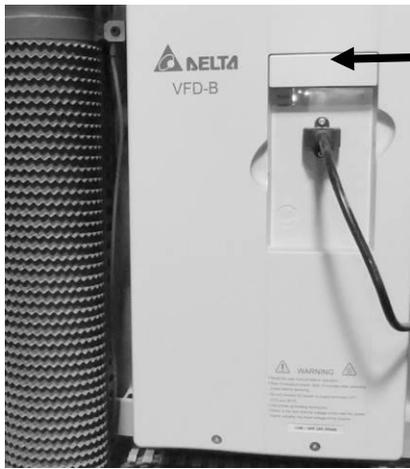


Termination block





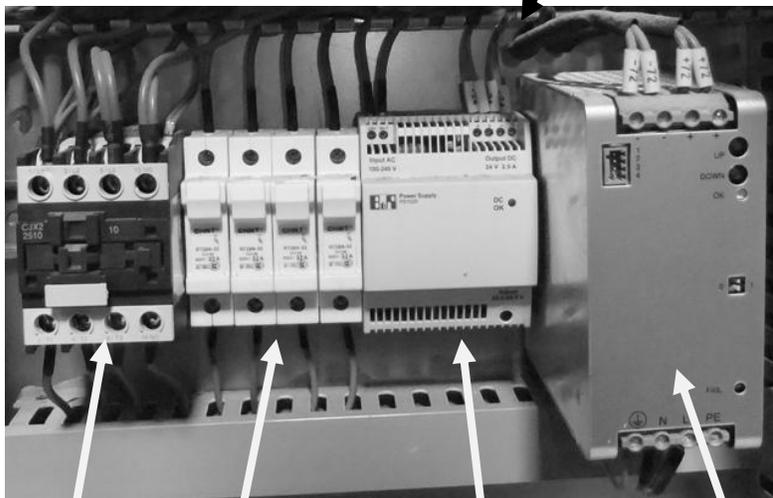
EMI filter



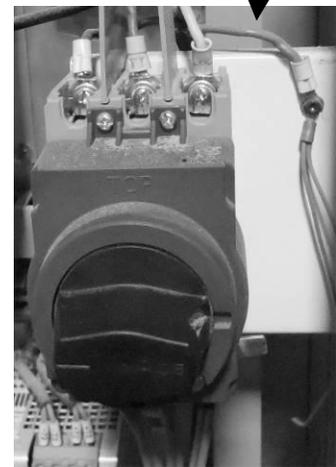
**VFD
[Variable frequency drive]**



Front electrical panel



Breaker Fuses 24V power supply 72V p.s.



Main Isolation switch

Troubleshooting.

Machine will not start.

1. Check that the start switch is being pressed full in.
2. **Check that the red emergency 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 that 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.

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 spindle.
3. Spindle run without coolant. Replace the motor (if water cooled).
4. Check that the voltage supplied to the VFD is 220V.

Motor overheats.

Typical reasons are dull cutting tools, no water in the coolant tank, blockage in the coolant pipe and excessive ambient temperature (if water cooled).

Squeaking noise.

1. Check the bearings.
2. Check pulleys and belt for correct tension.

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.
3. Cutter feeds and spindle speed are not correct (too fast). Adjust the feeds and speeds.
4. Incorrect tooling. Fit the correct tooling.

Machine vibrates.

1. Machine not level. Re-level the machine, ensuring that it has no movement.
2. Tooling bent or not inserted into the tool holder correctly. Replace bent tooling or re-fit tooling correctly.

Machine will not home.

1. Are the home position sensors connected, damaged or out of adjustment?
2. Are the parameters in the controller correct?
3. After completing the job, press OK button and check if the router head returns to the home position?

Jobs are machined inconsistently.

1. Check that the motor drive belt is tight and not damaged. If damaged, replace.

2. Check if the drive couplings are tight or damaged. If loose, tighten; if damaged, replace.
3. Check if the slider bearings are fixed tight or damaged. If loose, tighten; if damaged, replace.
4. Bit is not the correct size for program. Fit the correct bit size.

Inaccurate position of router head.

1. Check that the drive screw and the bearing rails are clean and lubricated.
2. **Check** if the gantry/router head movement is too fast.
3. Check that all the bearings and motor fixing bolts are tight.
4. Check the input voltage is correct; it must be 220V.
5. Check that there are no obstructions on the gantry.

The controller screen is blank or dull or flickers.

1. Check if a fuse has blown.
2. The cable is damaged. Replace the damaged part.
3. The power supply is damaged. Replace the power supply.
4. The controller is damaged. Replace the controller.
5. The supply voltage is not within specification.

Note: The power must only be 24V.

The gantry or router head will not function.

1. Controller cable loose.
2. Drive wires loose or damaged.
3. Controller damaged.
4. E-stop is not in the out position. Re-set the E stop.

The cutting depth is inconsistent.

1. Check that the spoil boards are flat and clean prior to fitting the job.
2. Check if there is excessive play in the Z-axis ball screw drive mechanism.
3. Check that the bit is tight in the spindle collet.
4. The spoil board is under 1/2" thick. Replace the spoil board.
5. Correct vacuum zones are not switched on. Switch on the correct zones.

The controller display shows that the spindle is not rotating and vice versa.

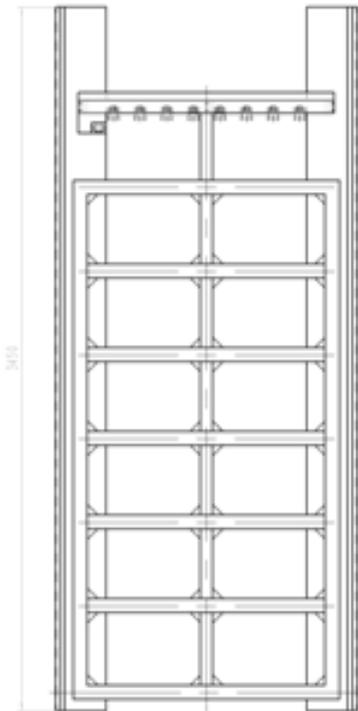
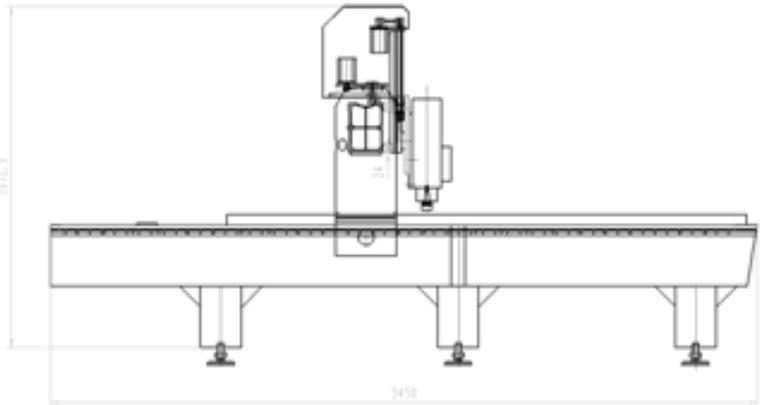
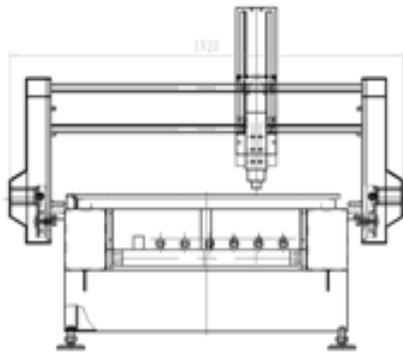
1. Check the wiring for loose or broken wires.
2. The spindle settings on the VFD are incorrect.

**For technical support contact Laguna Tools at
1-800-234-1976**

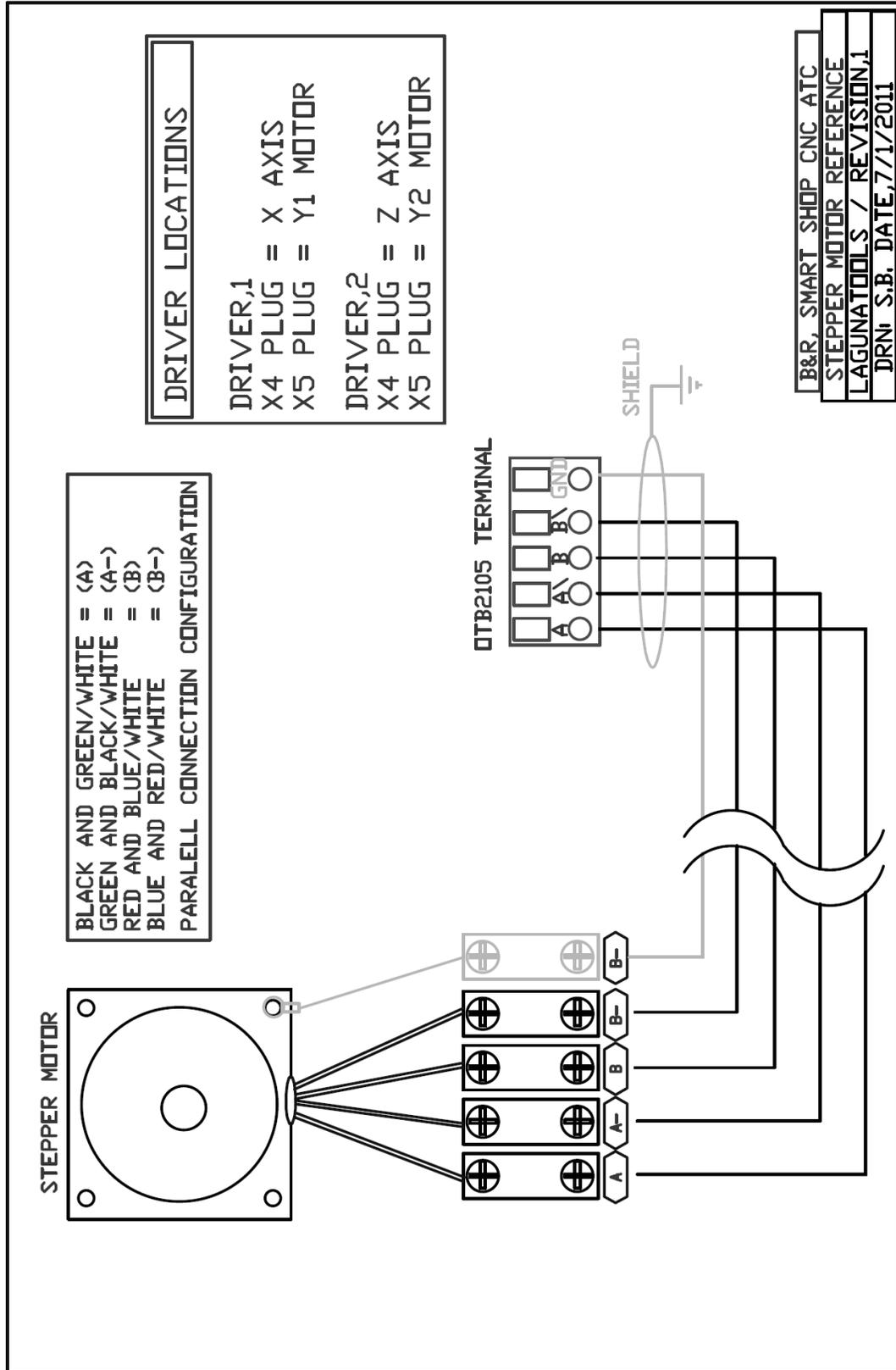
or

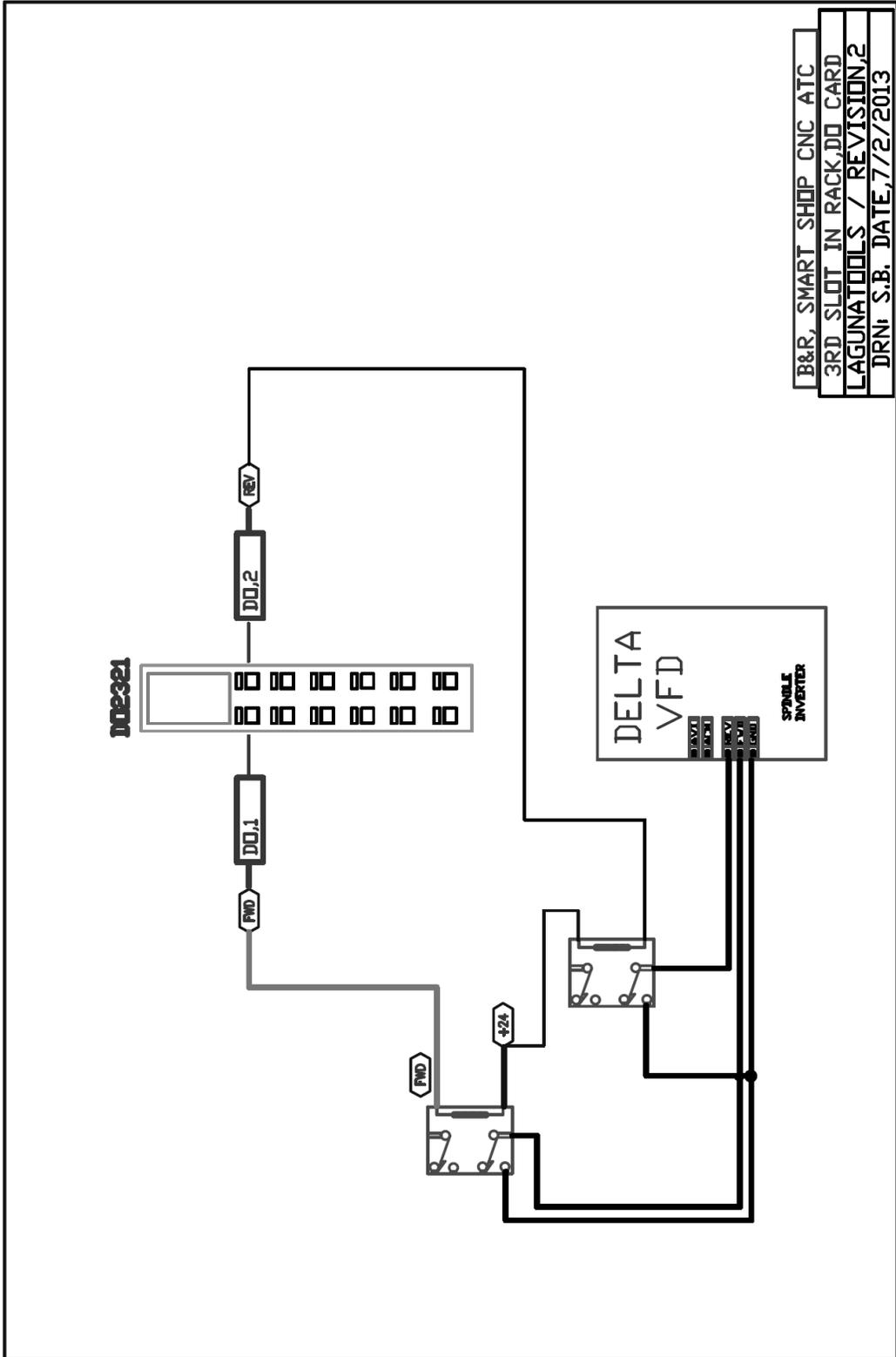
**email Laguna Tools Customer Service at
customerservices@lagunatools.com
Please input machine type in subject line.**

Machine drawing.

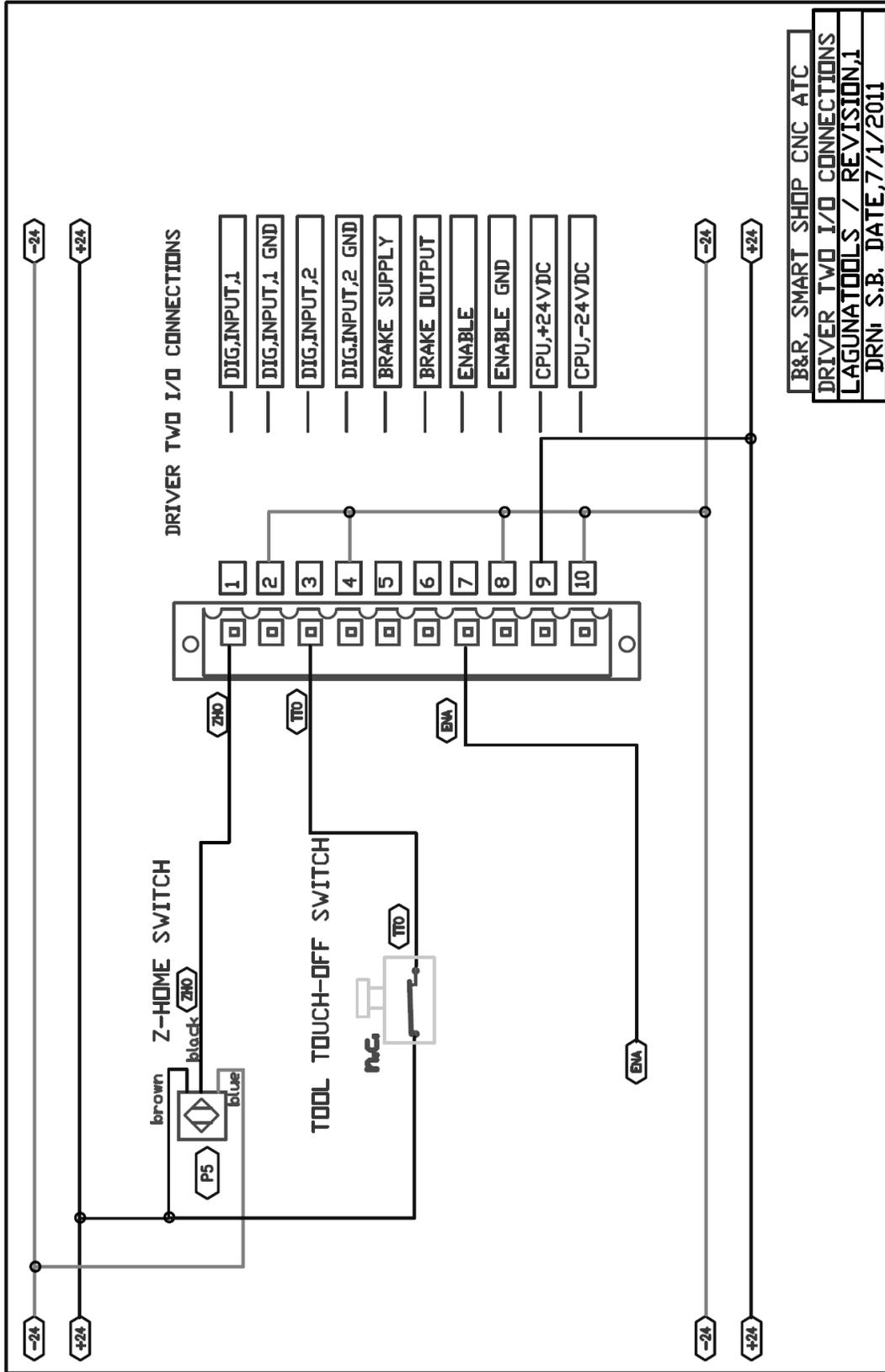


Note: The wiring may vary from the following drawings dependent on the options that you ordered

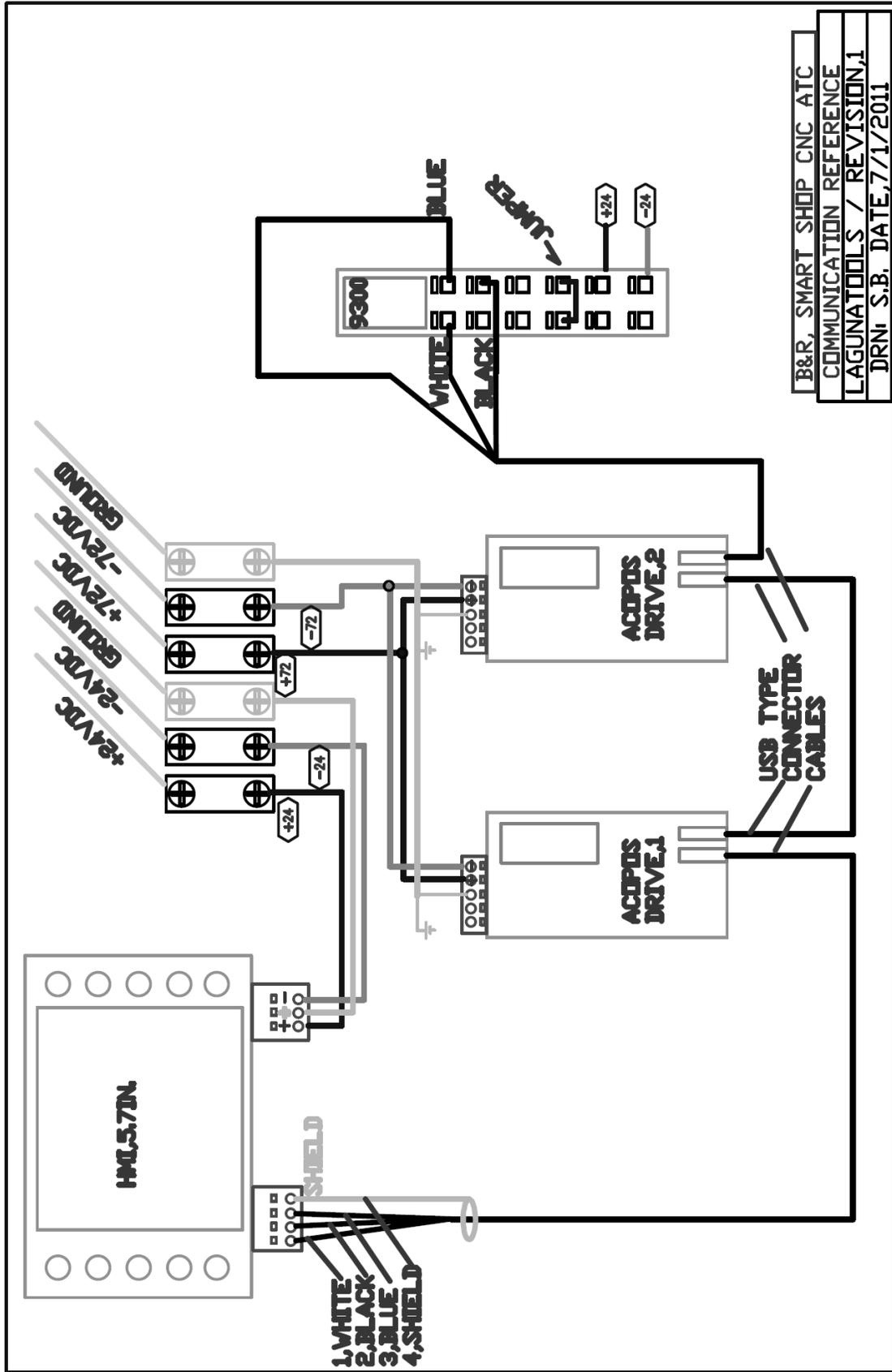




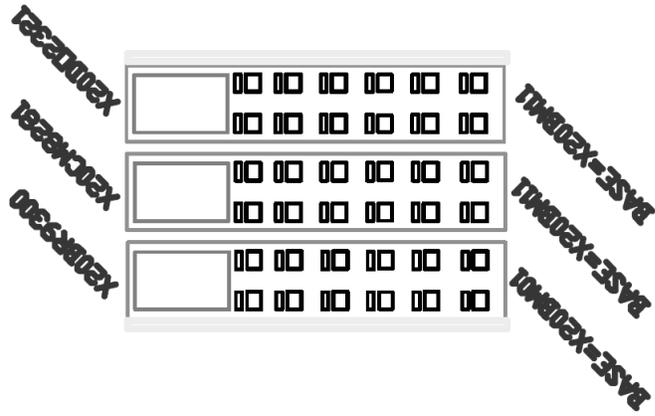
B&R, SMART SHOP CNC ATC
 3RD SLOT IN RACK, DO CARD
 LAGUNATOOLS / REVISION, 2
 DRN: S.B. DATE, 7/2/2013



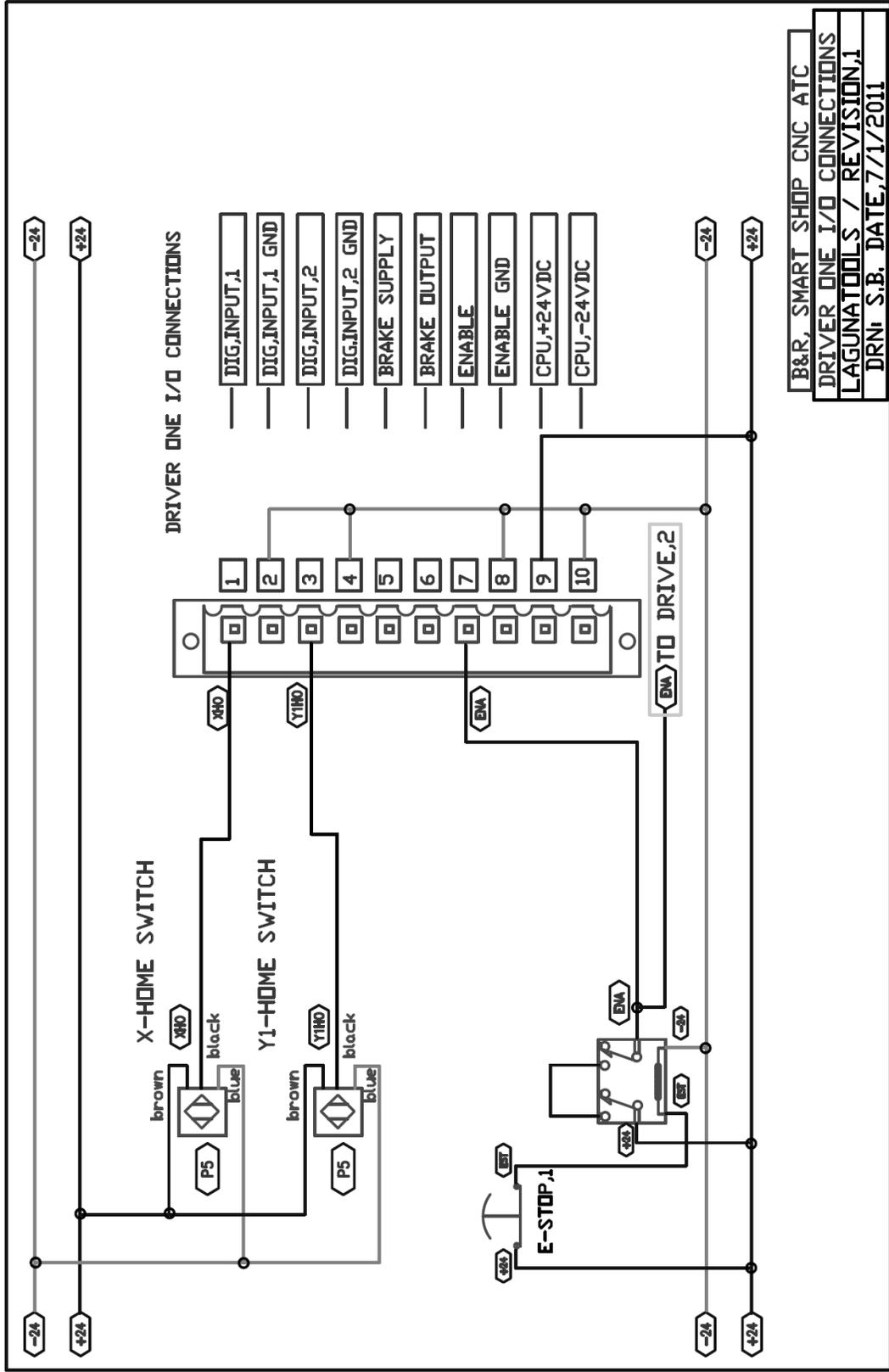
B&R, SMART SHOP CNC ATC
 DRIVER TWD I/O CONNECTIONS
 LAGUNATOOLS / REVISION,1
 DRN! S.B. DATE,7/1/2011



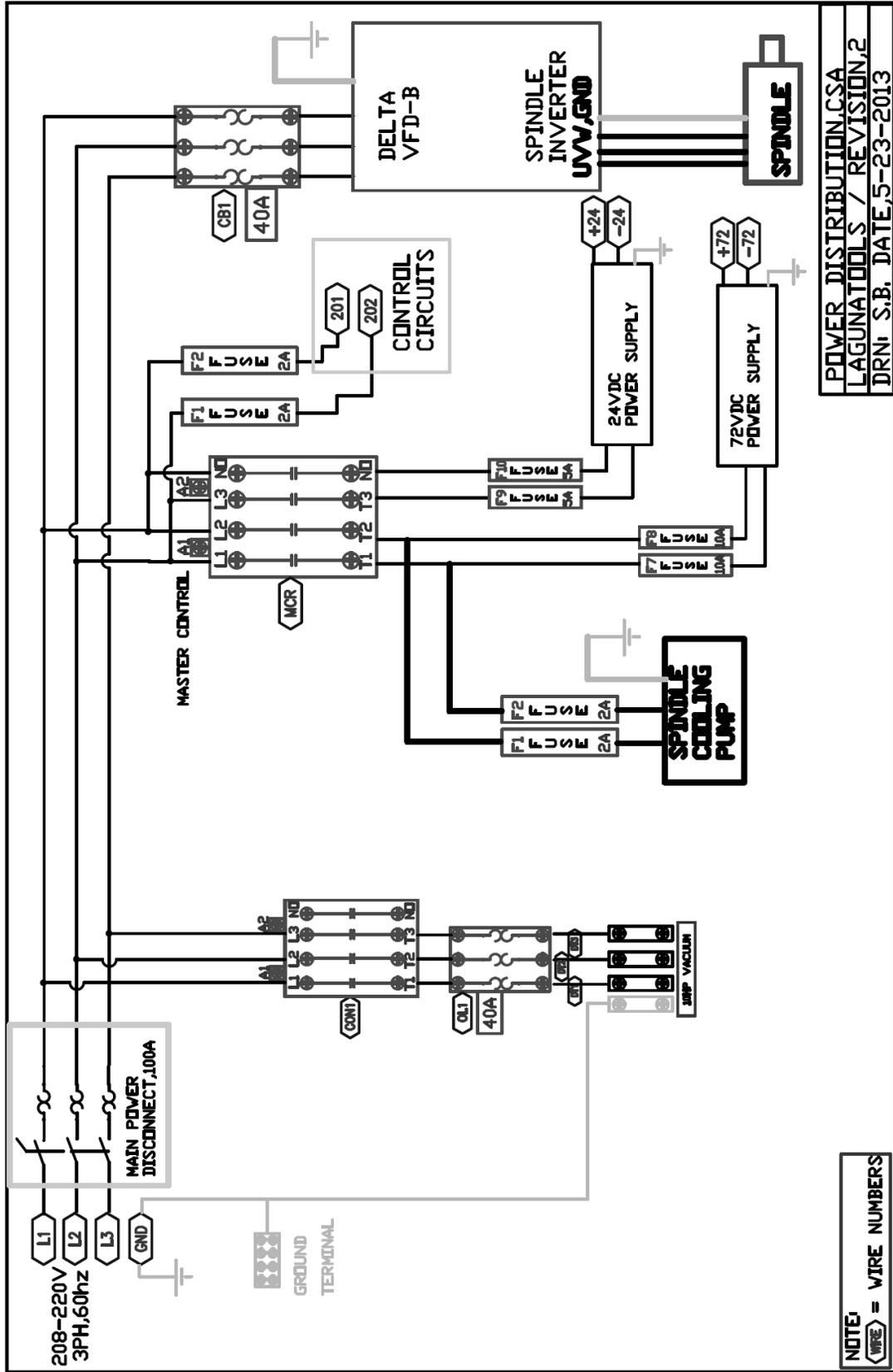
NOTE:
USE X20T312 TERMINAL BLOCK
FOR EACH I/O CARD.

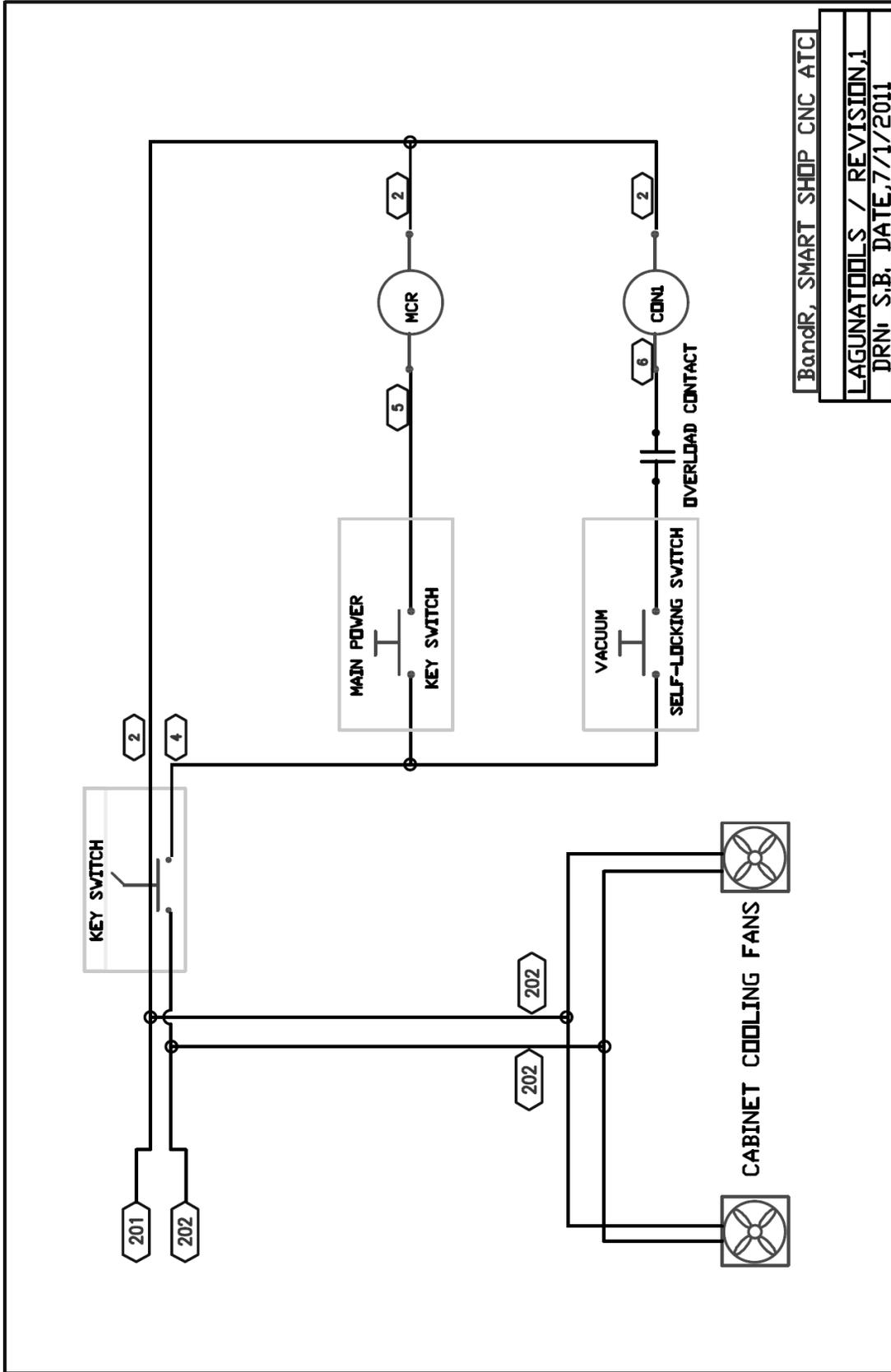


B&R, SMART SHOP CNC ATC
PLC RACK ASSEMBLY
LAGUNATools / REVISION,1
DRN: S.B. DATE,7/1/2011



B&R, SMART SHOP CNC ATC
 DRIVER ONE I/O CONNECTIONS
 LAGUNATOOLS / REVISION,1
 DRN: S.B. DATE,7/1/2011





Bandr, SMART SHOP CNC ATC
 LAGUNATOLS / REVISION,1
 DRN: S.B. DATE,7/1/2011

LAGUNA

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