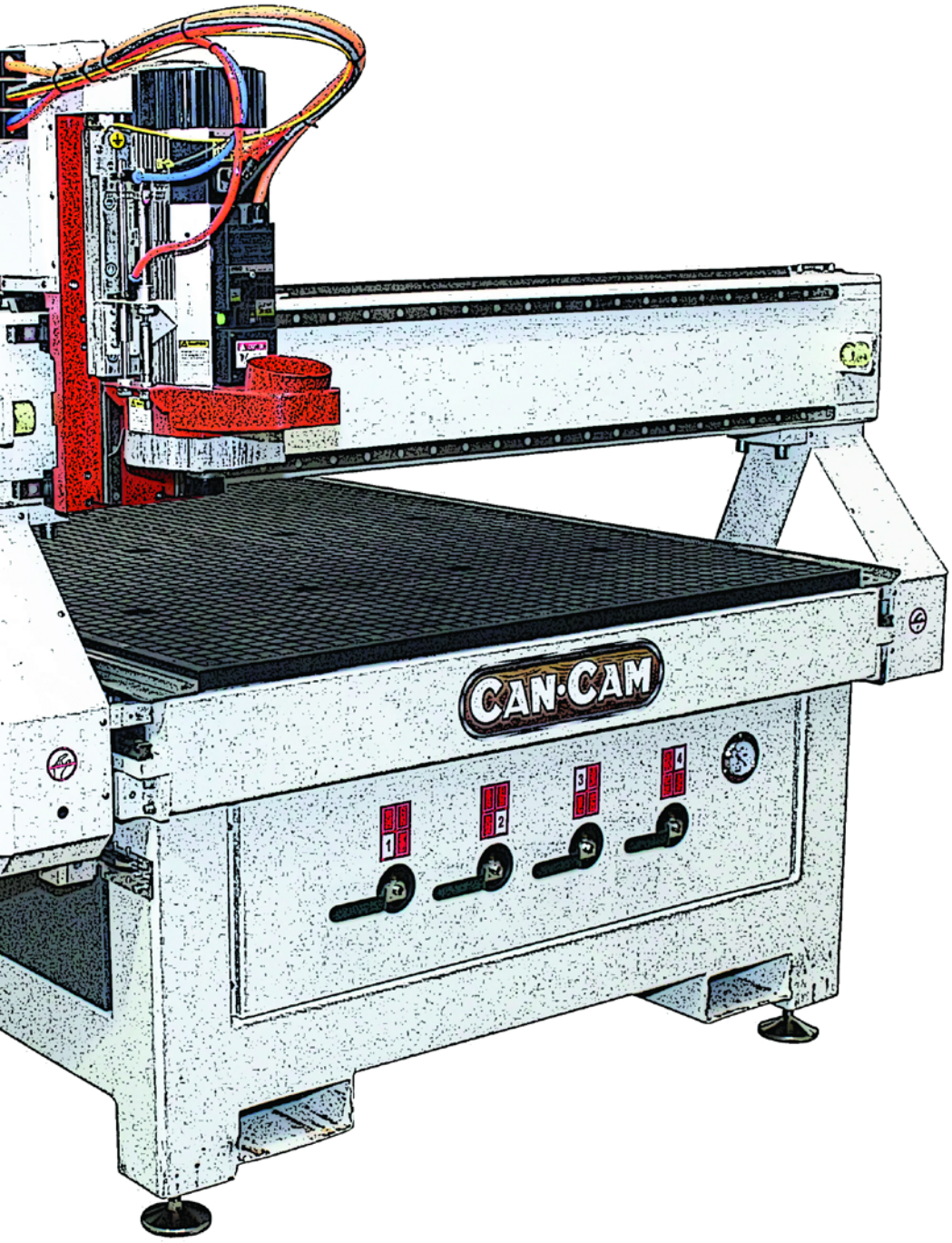
OSAI

OWNER'S OPERATION MANUAL

CNC ROUTER



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Troubleshooting

Visit www.cancam.ca for more information.

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A MESSAGE FROM CANCAM

We thank you and congratulate you for choosing CANCAM quality CNC machines. CANCAM is a Canadian owned and operated CNC machine manufacturer. Our mission is to provide our clients with quality technology that allows you to create, invent, and produce your products with confidence at an affordable cost.

This manual provides installation, operation, and safety guides, as well as maintenance procedures to keep your CANCAM machine at its best.

We suggest that everyone operating a CANCAM machine reviews this manual carefully, including all health and safety warnings and notices, ***BEFORE*** operating any equipment. Serious personal injury and/or property damage will result from improper use.

We suggest that this manual is kept nearby the machine for convenient reference by all operators.

For the digital version of this manual as well as other helpful resources, please visit our website at www.cancam.ca.

SAFETY INSTRUCTIONS

* READ THESE INSTRUCTIONS THOROUGHLY BEFORE OPERATING THIS MACHINE.
* DO NOT OPERATE MACHINE IF YOU ARE UNFAMILIAR WITH THESE SAFE OPERATING INSTRUCTIONS.
* DO NOT OPERATE MACHINE WITHOUT KNOWING WHERE THE *<E-STOP>* SWITCH IS LOCATED.

IMPROPER OR UNSAFE OPERATION OF THE MACHINE WILL RESULT IN PERSONAL INJURY, INCLUDING DEATH, AND/OR DAMAGE TO THE EQUIPMENT.

BEFORE YOU BEGIN

TRAINING & AUTHORIZATION

Only trained and authorized personnel should work on this machine. Untrained operators present a hazard to themselves, others, and the machine. Improper operation will void the warranty.

SAFETY SYMBOLS

To avoid injury to yourself and others, as well as damaging equipment, follow all safety warnings. Improper use of this machine can and will cause serious injury up to and including death. The following symbols are used throughout these instructions:

CAUTION!

Hazard MAY cause minor to moderate injury if ignored.

WARNING!

Hazard COULD cause death or serious injury if ignored.

DANGER!

Hazard WILL cause death or serious injury if ignored.

WARNING!

OPERATING THIS MACHINE WITH WORN OUT OR DAMAGED PARTS MAY CAUSE SERIOUS INJURY OR DAMAGE TO THE MACHINE.

DAMAGED PARTS

Check for damaged parts and tools **BEFORE** operating the machine. Any part or tool that is damaged should be properly repaired or replaced by authorized personnel. Do not operate the machine if any component does not appear to be functioning correctly, and immediately contact your shop supervisor.

PERSONAL PROTECTIVE EQUIPMENT

Use appropriate eye and ear protective equipment while operating the machine, including safety goggles and ear protection.

SAFETY FEATURES

Do not operate the machine unless all safety features are installed and activated, including accessible ***<E-STOP>*** switches. Never override or deactivate a safety feature.

E-STOP SWITCH

The ***<E-STOP>*** switch is the large, circular red switch located on the control panel. Pressing the ***<E-STOP>*** will instantly stop all motion of the machine. Additional switches can be installed to ensure operators have con-

venient access at all times regardless of shop layout. Each operator should be aware of all ***<E-STOP>*** locations and should ensure unobstructed access to them at all times.

ELECTRICAL PANEL

The electrical panel should be closed and the key and latches on the control cabinet should always be secured, except during installation and service.

MODIFICATIONS

DO NOT modify or alter this equipment in any way. If modifications are required, all modifications must be handled by CANCAM. Any modification or alteration of any CANCAM router could lead to personal injury and/or damage to the machine and will void your warranty.

LOCAL REGULATIONS

Consult your local safety codes and regulations before operating your CANCAM router.

SAFE OPERATING INSTRUCTIONS

WARNING!

THIS MACHINE IS AUTOMATICALLY CONTROLLED AND MAY START AT ANY TIME.

1. Keep fingers, hands, and all other objects away from the machine while the power is on. Remove any adjusting keys, wrenches, and other tools or objects before turning the machine on.

CAUTION!

2. The spindle head can drop without notice. Personnel must avoid the area directly under the spindle head.

3. Make sure to have proper fire extinguishing equipment on hand at all times and be aware of this equipment's location.

4. Only use the machine in clean, well-lit areas that are free from flammable liquids and excessive moisture.

5. The electrical power must meet the specifications in this manual. Attempting to run the machine from any other source can cause severe damage and will void the warranty.

6. Keep cables and cords away from heat, oil, and sharp edges. Do not overstretch cables or cords or run them under other objects or over work surfaces.

7. Exercise care with machine controls and around keyboard to avoid unintentional starting.

8. Use proper fixtures and clamps to secure work. **NEVER** use hands to secure work. Improperly clamped parts machined at high speeds/ feeds may be ejected and cause personal injury and/or property damage. Machining oversized or marginally clamped parts is not safe.

WARNING!

9. Do not wear loose-fitting clothing or jewelry when operating the machine. Long hair should be protected.

10. Stay alert at all times when operating the machine.

11. Always maintain proper balance and footing when working around the machine. Keep work area organized and free of obstructions.

12. Do not attempt to use the machine for purposes other than what is intended. Do not attempt to exceed limits of the machine.

DANGER!

13. Follow all safety instructions and processing instructions in the MSDS for the material being processed. Do not process toxic or flammable material. Deadly fumes can be present.

14. Maintain equipment with care. Keep cutting tools clean and sharp. Lubricate and change accessories when necessary. Cables and cords should be inspected regularly. Keep controls clean and dry.

15. Use proper precautions with dust collection systems to prevent sparks and fire hazards.

16. Ensure that tools are properly aligned to avoid tool changer damage.

17. Do not attempt to operate the machine before all of the installation instructions have been completed.

18. Disconnect power to all system components when not in use, when changing accessories, and before servicing. Never service the machine with the power connected. Do not loosen, remove, or adjust machine parts or cables while power is on.

FIRE HAZARDS

Prevent fire hazards by using proper feeds, speeds, and tooling while operating your CANCAM router. Setting feeds and speeds too low and/or using dull tools creates friction at the material. The friction generates heat, which can result in fire being drawn through the vacuum table or dust collector without warning. Certain materials, especially composite materials, increase the fire hazard from friction heating caused by dull tools.

NOTE:

The shop owner is responsible to make sure that everyone who is involved with installing and operating the machine is thoroughly acquainted with the installation, operation, and safety instructions provided with the machine *BEFORE* they perform any actual work. The ultimate responsibility for safety rests with the shop owner and the individuals who work with the machine.

Please contact CANCAM any time safety issues need to be addressed. Safety is our top priority, and we are always eager to hear about suggestions to improve the safety of our machines.

You can reach us via our website, www.cancam.ca, or call us toll-free at 1-888-510-2295. We would be glad to hear from you.

STAY SAFE!

INSTALLATION INSTRUCTIONS

* UNPACKING AND MACHINE IDENTIFICATION
* MEASURING FORKS AND FORKLIFTING MACHINE
* CORRECT COLLETING
* ELECTRICAL CONNECTIONS
* COMPRESSED AIR LINE CONNECTIONS

UNPACKING AND MACHINE IDENTIFICATIONS

NOTE:

All CANCAM machines are shipped assembled and secured to a wooden pallet.

Unpack all items that shipped with your machine. Check the items against the packing slip to be sure nothing was left out. Notify CANCAM immediately if you are missing any piece of your shipment or if any damage has occurred during the shipping process.

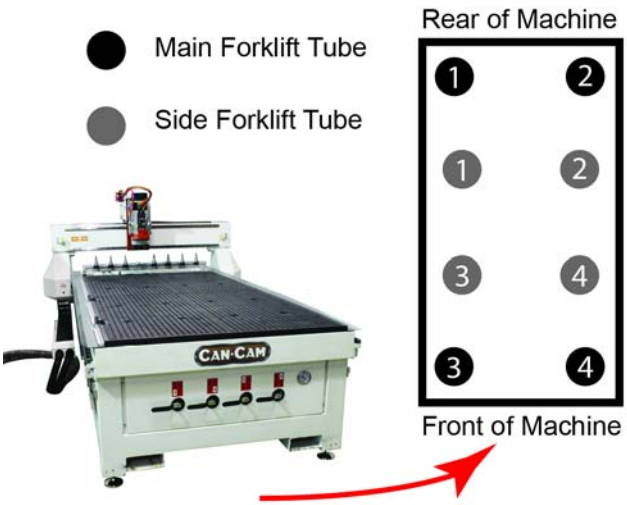


Fig 1.1 Forklift tubes.

Please note the 4 forklift Tubes on the front and rear of the machine (shown in Fig 1.1). There are 4 forklift tubes on the sides of the machine as well.

MEASURING FORKS AND FORKLIFTING MACHINE

WARNING!

DO NOT OPERATE FORKLIFT WITHOUT PROPER CERTIFICATION AND TRAINING.

The distance between the forks is 32” while the forklift tubes are 7.25” wide and 2.5” high (shown in Fig 1.2).

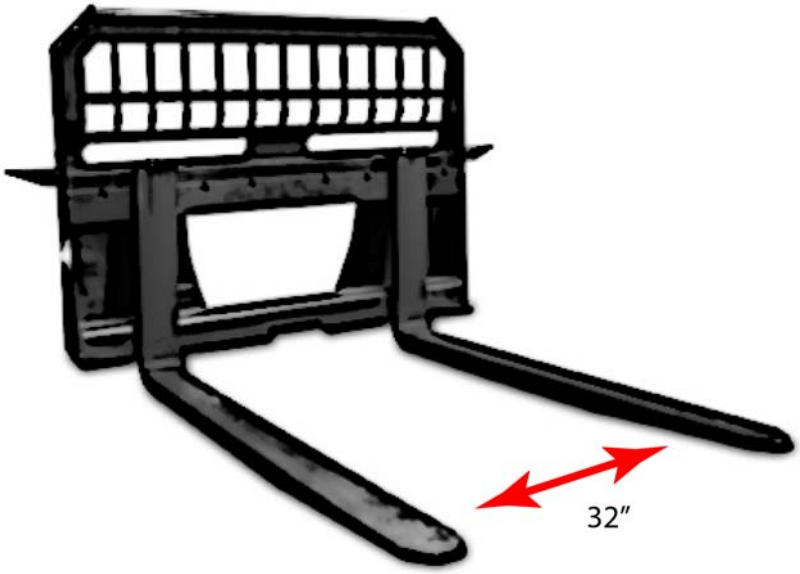


Fig 1.2 Fork distance.

Centre forks in the front of the machine and move forklift slowly when close to the machine. Take care not to damage the valves on the front of the machine (shown in Fig 1.3).

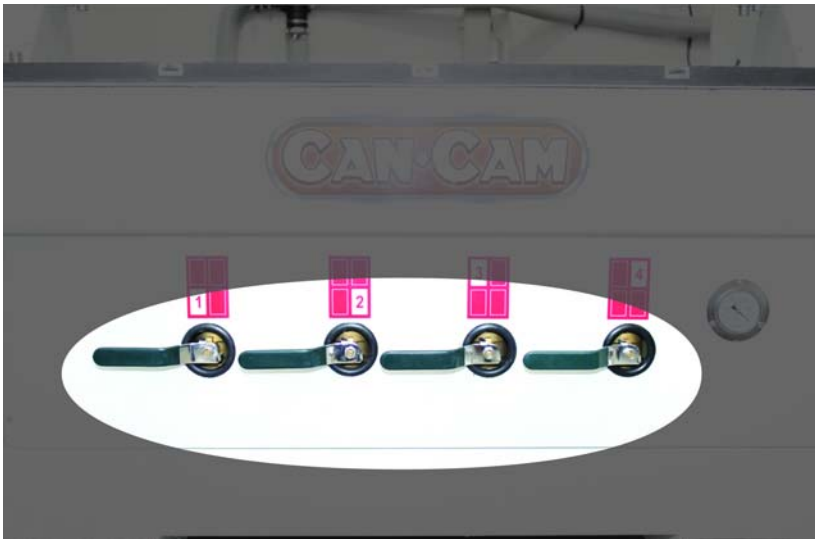


Fig 1.3 Vacuum table valves.

WARNING!

DO NOT LIFT OR MOVE MACHINE USING GANTRY. FOR SAFETY AND TO PREVENT DAMAGE TO THE MACHINE AND CABLES, ONLY LIFT MACHINE USING FORKLIFT TUBES. FORKLIFT CAPACITY MUST BE ADEQUATE TO SAFELY LIFT THE MACHINE.

NOTE:

We recommend using forklift extensions to better support the weight of the machine.

Slowly lift up your machine from the floor.

Remove the wooden pallet without placing any body parts directly beneath the lifted load.

WARNING!

RAISED LOADS MAY SUDDENLY FALL WITHOUT NOTICE. KEEP CLEAR!

CORRECT COLLETTING GUIDELINES

Read these instructions thoroughly **BEFORE** operating machine.

⚠ CAUTION!

UNBALANCED EQUIPMENT WILL DAMAGE SPINDLE.
AIR SUPPLY MUST BE FILTERED AND DRY.

CORRECT

The end of the collet should be flush with the bottom surface of the collet nut (as shown in Fig. 1.4). You will hear and feel a "SNAP" as the collet properly moves into place within the collet nut. Once assembled, "SCREW" the collet nut onto the threaded spindle end.

Fig. 1.4 Correct collet.

INCORRECT

Any gap or angle between the collet and the collet nut indicates that the assembly is incorrect (as shown in Fig. 1.5). If the collet is not flush to the end of the collet nut, correct the assembly before using.

Fig. 1.5 Incorrect collet.

CAUTION!

DO NOT PUSH THE COLLET INTO THE SPINDLE AT ANY TIME! ONLY THE PROPER ASSEMBLY SHOULD BE SCREWED ONTO THE SPINDLE.

NOTE:

FOR TOOLCHANGE AND FIXED COLLET SPINDLES:ONLY USE TOOTLHOLDERS, COLLET NUTS AND TOOLS THAT ARE BALANCED TO MEET OR EXCEED THE MAX RATED SPEED OF THE SPINDLE.

ELECTRICAL CONNECTIONS

ENSURE THAT ALL ELECTRICAL CONNECTIONS ARE CARRIED OUT BY A QUALIFIED ELECTRICIAN.

THE DESCRIPTIONS BELOW DO NOT CONTAIN ALL NECESSARY DETAILS TO CONNECT POWER LINES SAFELY.

IMPROPER ELECTRICAL CONNECTIONS WILL RESULT IN DAMAGE TO THE EQUIPMENT, FIRE, AND POTENTIALLY DEATH.

ELECTRICAL SPECIFICATIONS

This CANCAM router is powered by 208v three phase.

ATTACH KEYBOARD

Once the machine has been unpacked, attach the keyboard shelf to the front of the machine. With the shelf in place, lead the mouse and keyboard cables through the small hole in the front of the machine. Plug the cables into an available USB connection on the PC.

HOUSING CABINET

All of the machine's electronics are located in the housing cabinet. Do not open these doors when power is applied to the machine.

MAIN POWER

Refer to the manufacturer's plate for the electrical requirements of the machine. The majority of our OSAI auto tool machines run three-phase 208v. Fig 1.6 shows the terminal in the electrical cabinet where the power line should run to.

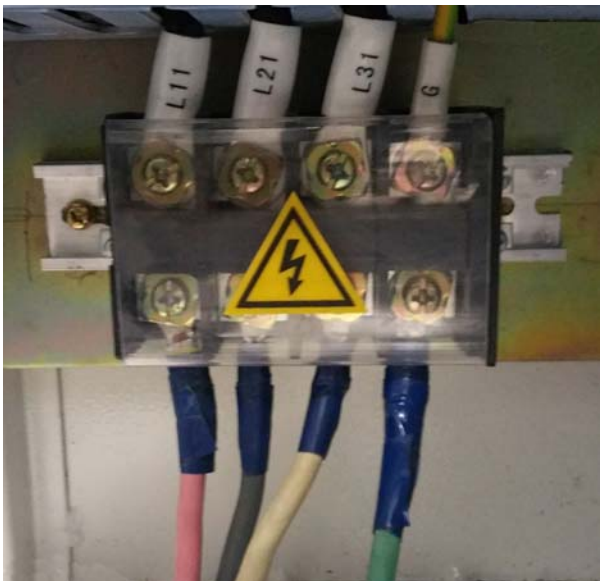


Fig. 1.6 Main power connection.

VACUUM PUMP CONNECTORS

Connect the vacuum pump with the cable provided. One end should be connected to the vacuum pump unit by removing the plate and accessing the terminal concealing line (shown in Fig 1.7).

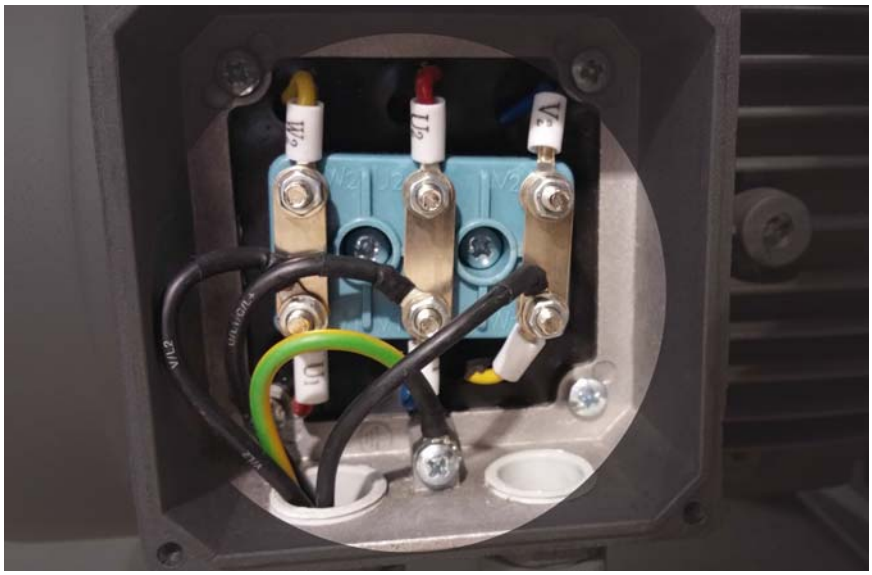


Fig. 1.7 Vacuum pump electrical connection.

The other end should be connected via the proprietary terminal on the electrical cabinet (shown in Fig. 1.8).

Fig. 1.8 Connecting vacuum pump to electric cabinet.

COMPRESSED AIR LINE CONNECTIONS

Various components on the machine require air pressure, including auto tool changer, pop-up pins, and the dust boot. For the machine to function correctly, it requires 90psi minimum of air.

AIR INPUT

Securely attach an air hose to the air input on the back of the machine (shown in Fig. 1.9).

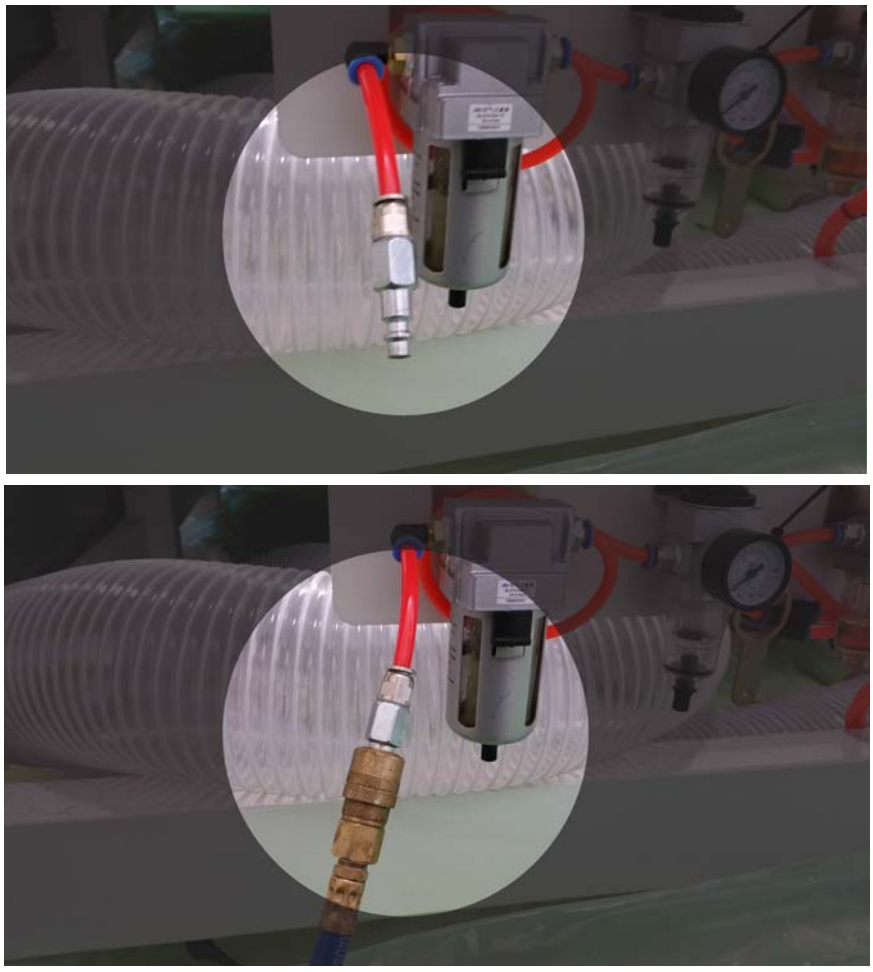


Fig. 1.9 Connecting compressed air input.

NOTE:

If your shop hose does not fit the adapter supplied, the adapter can be removed and a suitable one attached.

The threading on the machine is standard 3/8 female. A male threaded 3/8 fitting to attach to your factory air hose can be purchased at most hardware stores.

Turn on individual sections of the vacuum table by turning the manifold handles in the front of the machine (as shown in Fig. 1.10).

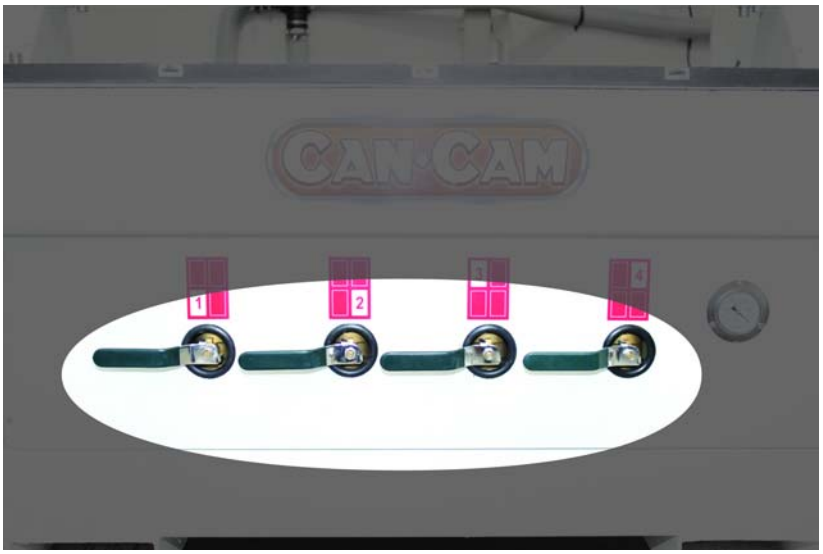


Fig. 1.10 Vacuum table valves.

Vacuum on and off functions are controlled by the OSAI controller and can only be turned on from the computer screen.To test the motor, press the reset button on the starter box once all connections are made.

RUNNING THE PUMP/BLOWER CONTINUOUSLY IN THE WRONG DIRECTION WILL DAMAGE THE VANES.

Briefly start motion and check rotation (arrow on casing). Exchange phases if rotation is incorrect.

YOU'RE READY TO START!

MACHINE START-UP

* POWER ON
* SOFTWARE START-UP

POWER ON

Turn the ***<MAIN POWER>*** switch on the electrical cabinet to the "ON" position (as shown in Fig. 2.1).

Fig. 2.1 Main power switch.

NOTE:

An electrician should have attached three-phase 220 volt power to this switch during installation.

The red light on the front of the machine will light up (as shown in Fig. 2.2). This light indicates that 220 volts is available to the machine.

Fig. 2.2 System power light.

Press the green ***<POWER ON>*** button to send power to the cabinet and machine. The green light indicates that the cabinet and machine are receiving power (as shown in Fig. 2.3).

Fig. 2.3 Machine power light.

Press the ***<OSAI POWER>*** button (second blue button) to send power to the controller (as shown in Fig. 2.4).

Fig 2.4 PC power light.

Press the *<PC POWER>* button (first blue button) to send power to the PC. The screen will turn on (as shown in Fig. 2.5).

Fig. 2.5 PC booting.

SOFTWARE START-UP

BOOT CONTROLLER SOFTWARE

Once the computer has started, the Boot Controller software will start automatically. If it does not, double-click on the *<BOOT CONTROLLER>* icon on the desktop.

If the Boot Controller does not start after a minute and the message "CNC is waiting for a BOOT mode directive" appears on the screen, then click on the *<MODE>* icon (the green gear in the top left of the screen) and select *<NORMAL>* BOOT mode.

NOTE:

If the machine is starting from a fresh PC boot, then Normal mode will automatically be selected.

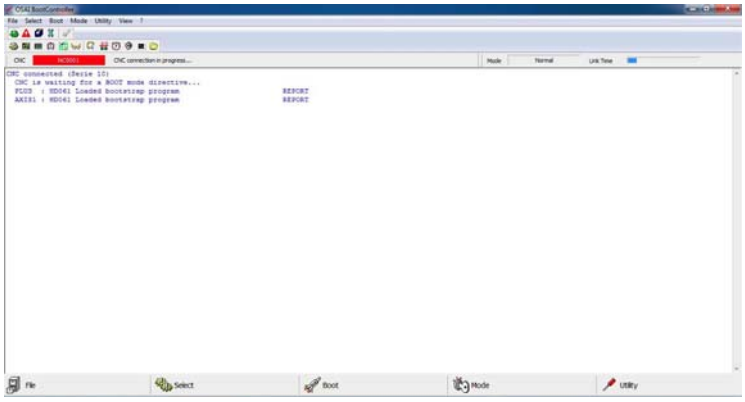


Fig. 2.5 Boot controller loaded and connecting to machine.

INTERFACE STARTS

The interface screen will now open (as shown in Fig. 2.6).

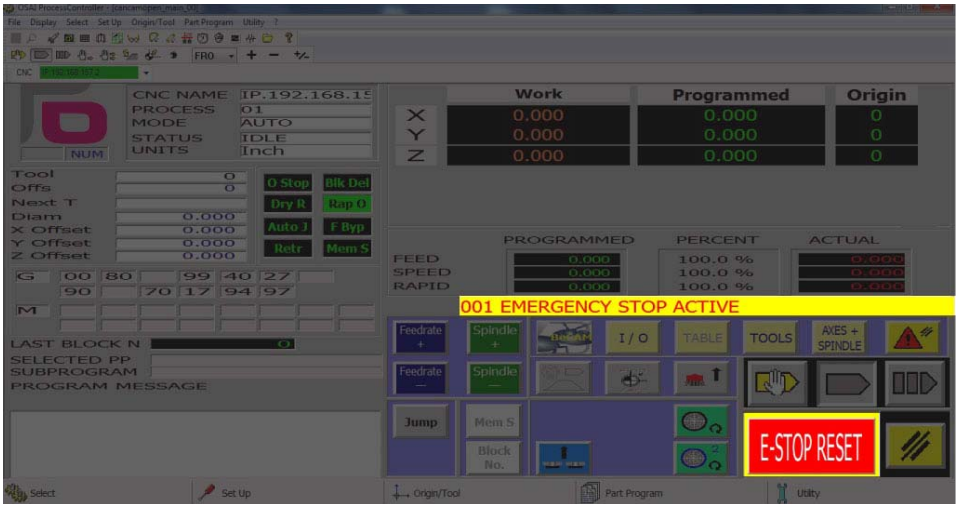


Fig 2.6 Interface Loaded

CLEAR E-STOP FAULT

There will be a warning message saying "001 Emergency Stop Active." Release the ***<E-STOP>*** switch (as shown in Fig. 2.7) by turning it clock-wise and click on the ***<E-STOP RESET>*** button to remove this warning.

Fig. 2.7 Turn E-STOP and click "E-Stop Reset" to clear E-Stop fault.

AXES NOT REFERENCED FAULT

The "011 AXES NOT REFERENCED" error will appear (as shown in Fig. 2.8).

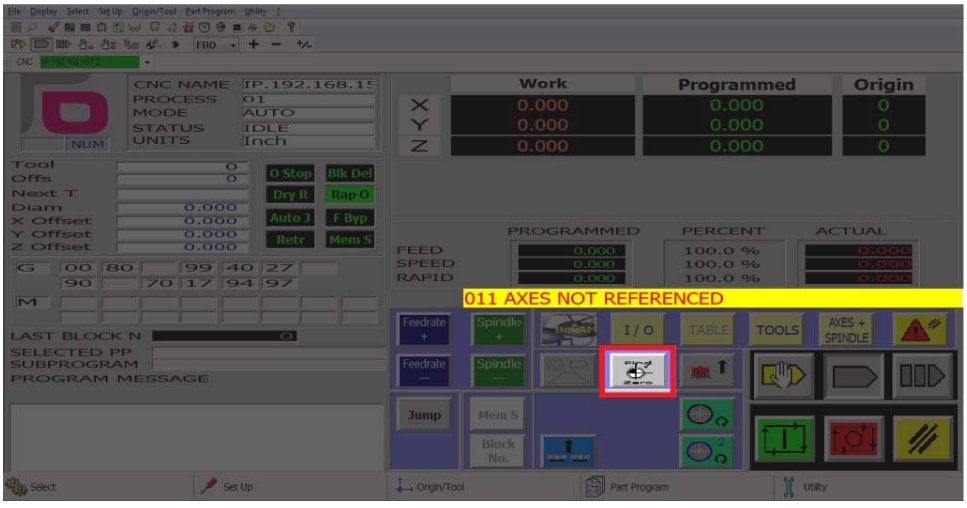


Fig. 2.8 AXES NOT REFERENCED error message.

START-UP

Click on ***<FIND ZERO>*** button and all the axes will move to their home position. Once each axis has been homed to mechanical zero, will appear beside the coordinate window for that axis.

If any errors remain on the screen (e.g., "LOW AIR PRESSURE"), rectify the problem and click on ***<RESET>*** to remove the message. If errors persist, contact CANCAM for assistance.

The machine is now ready to be used (as shown in Fig. 2.9).

Fig. 2.9 Machine ready.

NOTE:

Pressing ***<FIND ZERO>*** will move the machine to the front left corner of the table.

This must be done every time the machine boots up. Once the machine is in the HOME position, it has a reference point from which it can pick up tools and locate offsets.

SCREEN FUNCTIONALITY

* MAIN SCREEN
* TOOLS SCREEN
* AXES + SPINDLE SCREEN

MAIN SCREEN

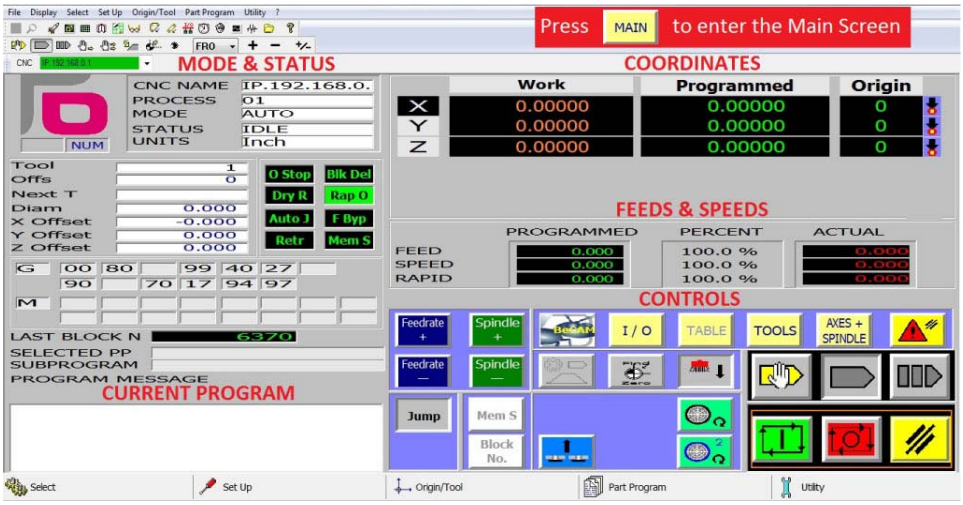


Fig. 3.1 Main Screen

MODE & STATUS

Describes the current mode and status of the machine.

COORDINATES

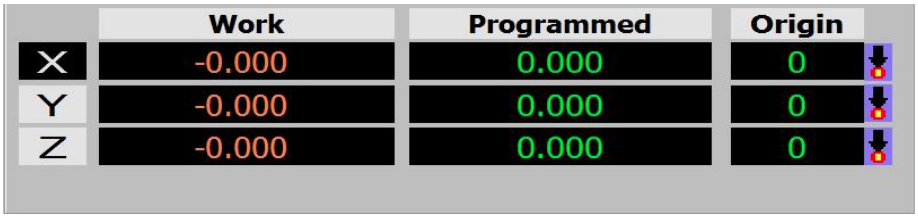


Fig. 3.1.1 Coordinates Display

This area displays the location of the machine. If the "ORIGIN" is zero, the numbers displayed are the distance from the Home position. If there is an "ORIGIN" active, the numbers displayed are the distance from that origin zero position. Press ***<CTRL>*** + ***<B>*** on the keyboard to change the coordinate system between Work/Machine/Absolute/To Go/Error.

FEEDS & SPEEDS

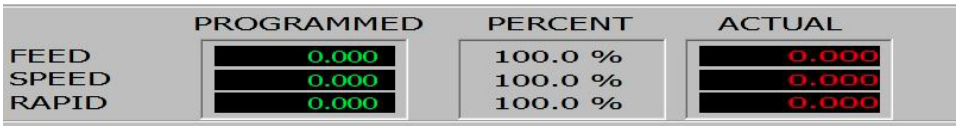


Fig. 3.1.2 Feeds & Speeds Display

Describes the current feed (cutting motion), speed (spindle rotation), and rapid (non-cutting motion) as well as the programmed and override variable for each value.

TOOL PREVIEW

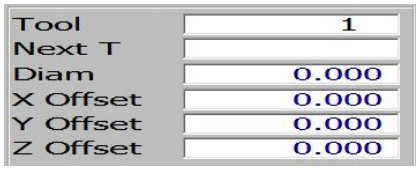


Fig. 3.1.3 Tool Preview Display

The Tool Preview section displays the current tool number, tool offsets, and tool diameter (as shown in Fig. 3.1.3).

PROGRAM MESSAGE

Displays any program message or selected subprogram.

CURRENT PROGRAM

Displays current program G-Code.

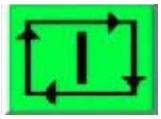
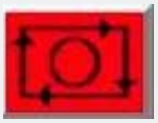
CONTROLS

Provides buttons for various functions including:

Table 1: Main Screen Button Functions

ICON	NAME	FUNCTION
	<FEEDRATE +>	INCREASE FEEDRATE
	<FEEDRATE ->	DECREASE FEEDRATE.
	<SPINDLE +>	INCREASE SPINDLE SPEED.
	<SPINDLE ->	DECREASE SPINDLE SPEED.
	<FIND ZERO>	MOVE TO MACHINE HOME.
	<SHROUD UP/DOWN>	LIFT/DROP DUST SHROUD.
	<VACUUM PUMP>	ACTIVATE/DEACTIVATE VACUUM PUMP.

Table 1: Main Screen Button Functions

Icon	Name	Function
	<PIN UP/DOWN>	Raise/lower pins.
	<AUTOMATIC MODE>	Activate automatic mode.
	<MDI MODE>	Activate MDI mode, for entering manual G-code.
	<BLOCK-BY-BLOCK>	Activate Block-by-Block mode.
	*<RUN>*	Run machine.
	*<STOP>*	Stop machine.
	<RESET>	Reset errors.
	<PLC RESET>	Reset PLC.

TOOLS SCREEN

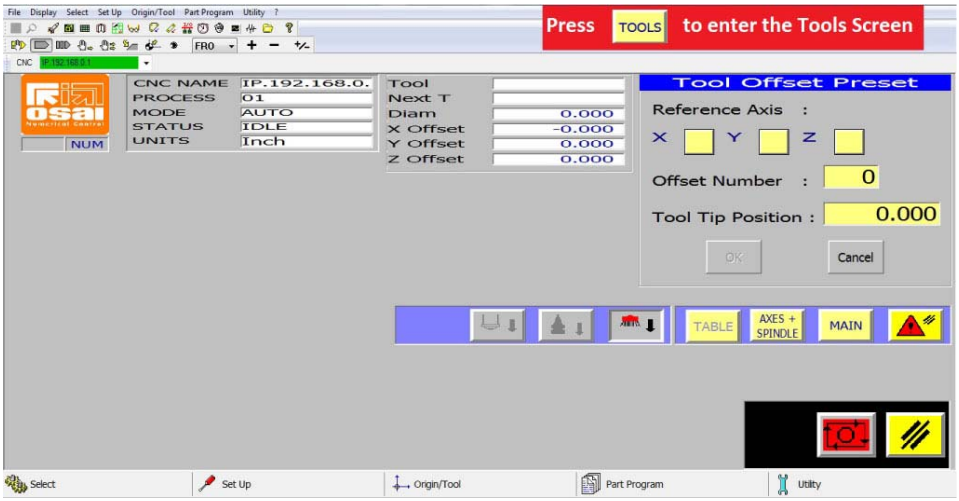


Fig. 3.2 Tools Screen

Table 2: Tools Screen Button Functions

ICON	NAME	FUNCTION
	<HOLDER RELEASE>	RELEASE TOOL HOLDER FOR MANUAL TOOL CHANGE.
	<SPINDLE STOP>	STOP SPINDLE ROTATION.
	<TOOL CHANGER CW>	ROTATE TOOL CHANGER CLOCKWISE.
	<TOOL CHANGER CCW>	ROTATE TOOL CHANGER COUNTER-CLOCKWISE.

AXES + SPINDLE SCREEN

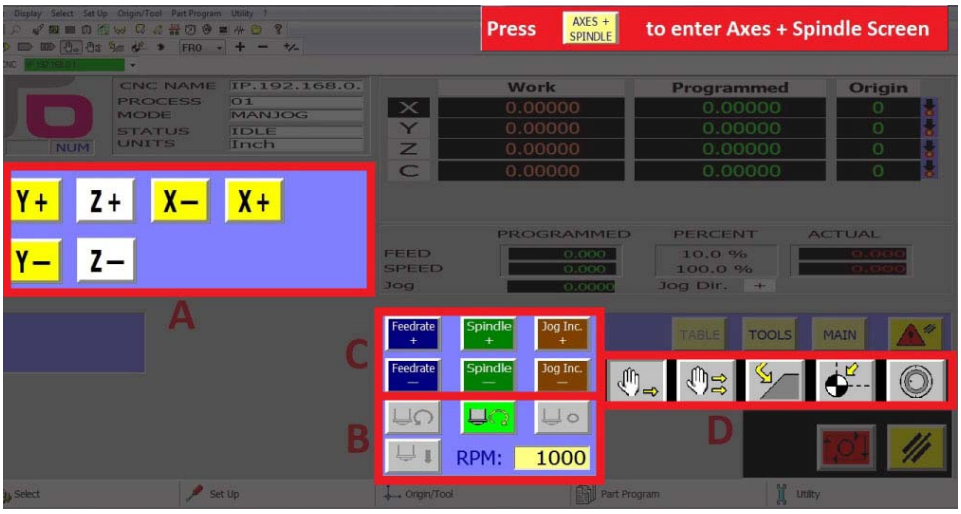


Fig. 3.3 Axes + Spindle Screen

A: MANUAL AXES CONTROL

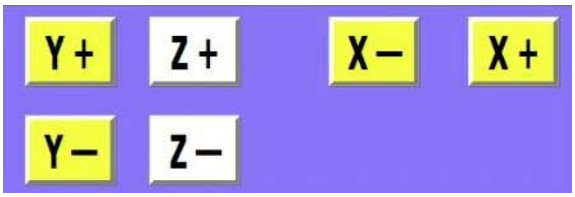


Fig. 3.3.1 Manual Axes Control

Each of these buttons represents one direction on one of the machine's axes. Pressing one of them will move the machine along that axis in the specified direction according to the current jog rate and mode of the machine. If the machine is setup with additional axes, more buttons will display here to give the user control over those axes as well.

B: MANUAL SPINDLE CONTROL

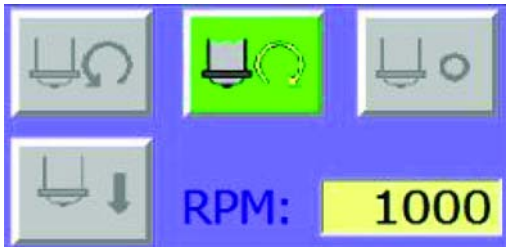


Fig. 3.3.2

These buttons control the spindle, including starting/stopping the spindle, changing between clockwise and counter-clockwise rotations, and adjusting the spindle's RPM.

C: FEED, SPEED, & JOG INCREMENT

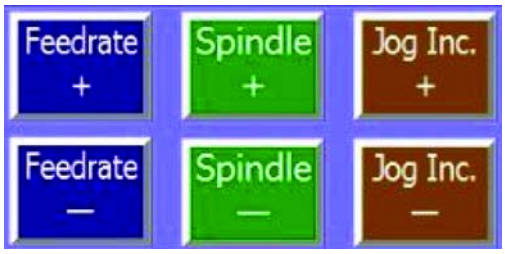
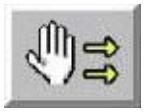
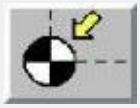


Fig. 3.3.3

The feed and speed buttons work here similarly to how they work on the Main Screen, by increasing or decreasing the feedrate and spindle speed respectively. The ***<JOG INC +>*** and ***<JOG INC ->*** buttons adjust the minimum distance moved for each press of an axis command.

D: JOGGING MODES

Table 3: Jogging Mode Button Functions

ICON	NAME	FUNCTION
	<AUTO JOG>	Activate Auto Jog Mode, with machine moving continuously by the jog increment.
	*<INC JOG>*	Activate Incremental Jog Mode, with machine moving one jog increment at a time.
	*<HOME>*	Automatically return machine to workpiece origin.
	<HANDWHEEL>	Activate Handwheel Mode, with machine receiving commands from the handwheel pendant.

OPERATING INSTRUCTIONS

* JOGGING THE MACHINE
* LOADING A G-CODE FILE
* SETTING WORKPIECE ORIGIN
* LEARNING TOOL LENGTHS
* TABLE EDITOR
* RUNNING A PROGRAM
* MACHINE SHUT DOWN

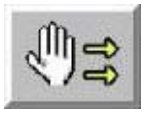
JOGGING THE MACHINE

HANDWHEEL MODE:

The machine is controlled by the handwheel pendant on the side of the machine.

AUTO JOG MODE:

The machine is controlled by placing the mouse over an axis directional button on the screen and left clicking. Speed is controlled by the Jog Increment buttons.



INCREMENTAL JOG MODE:

Similar to Auto Jog, however with every mouse click the machine only moves a distance determined by the Jog Increment buttons.

NOTE:

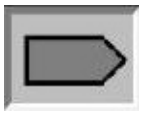
A mode MUST be selected in order for the machine to move.

Increase or decrease the jog speed by pressing the ***<FEEDRATE +>*** or ***<FEEDRATE ->*** button. Speed is shown in % of maximum speed. Actual speed is displayed when the machine is running.

Increase or decrease the jog increment by pressing the ***<JOG INC +>*** or ***<JOG INC ->*** button. Increment size in mm will be shown.

NOTE:

You cannot change tools or save origins while in manual or Handwheel jog modes. Place machine in the desired position and then select auto mode to save origins or change tools.



MDI MODE:

MDI mode stands for Manual Data Input. Activate this mode by clicking the ***<MDI>*** button on the Main Screen.

When MDI mode is selected, a text box will appear (shown in Fig. 4.1). G-Code commands can be entered into this box manually using all CAPS. Clicking ***<CONFIRM>*** and then ***<RUN>*** will run the command.

NOTE:

The G-Code entered in MDI mode MUST be in all CAPS.

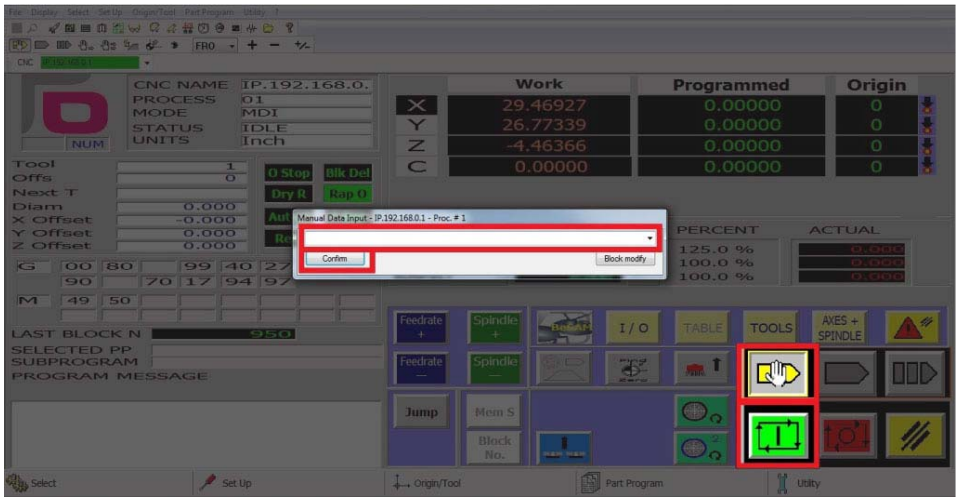


Fig 4.1 MMDI prompt.

LOADING A G-CODE FILE

To load a G-Code program to the controller, have a .CNC file ready on a USB drive. Insert the USB into the main USB port located on the system power buttons panel (shown in Fig 4.2).

Fig 4.2 USB port.

To activate the file, click ***<PART PROGRAM>*** at the top of the Control Screen. Select "Part Program Management" from the drop-down menu (shown in Fig. 4.3).

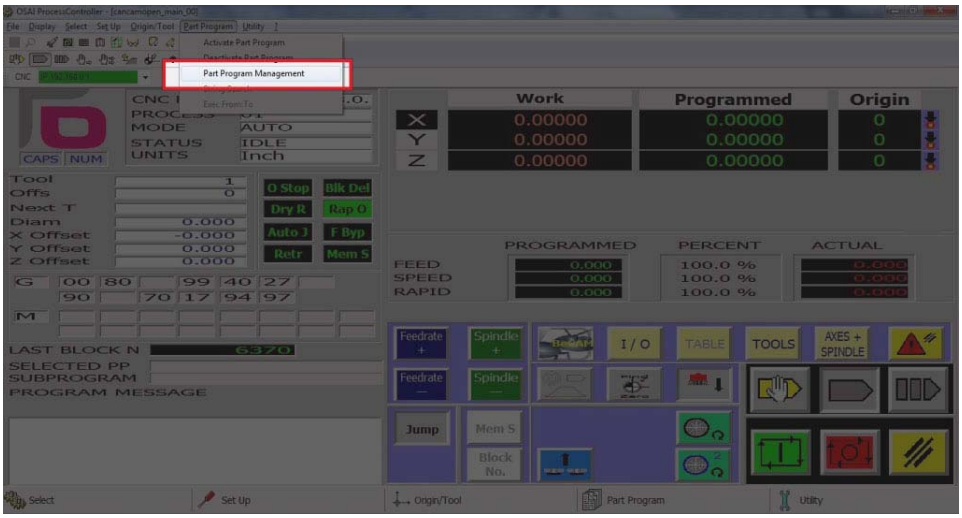


Fig 4.3 Accessing Part Program Management

The Part Program Management window will appear (shown in Fig. 4.4). In the left panel, select the correct folder the program is in. Click on "USB" if the program is in the USB drive. If the part program is saved in the "PROGRAMS" folder, then select that folder. The contents of each path will appear in the right-hand panel.

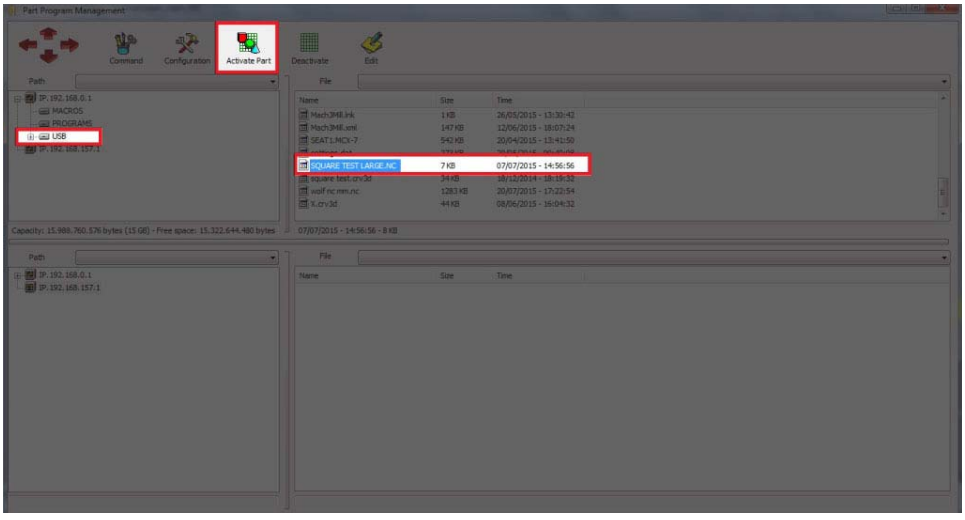


Fig 4.4 Part Program Management Window

Select the desired program and click on the ***<ACTIVATE PART>*** button on the top of the screen. The active program can be deactivated and edited as well by clicking the ***<DEACTIVATE>*** or ***<EDIT>*** buttons respectively.

If the G-Code is loaded properly, the main screen will display the code in the Program Window (shown in Fig 4.5).

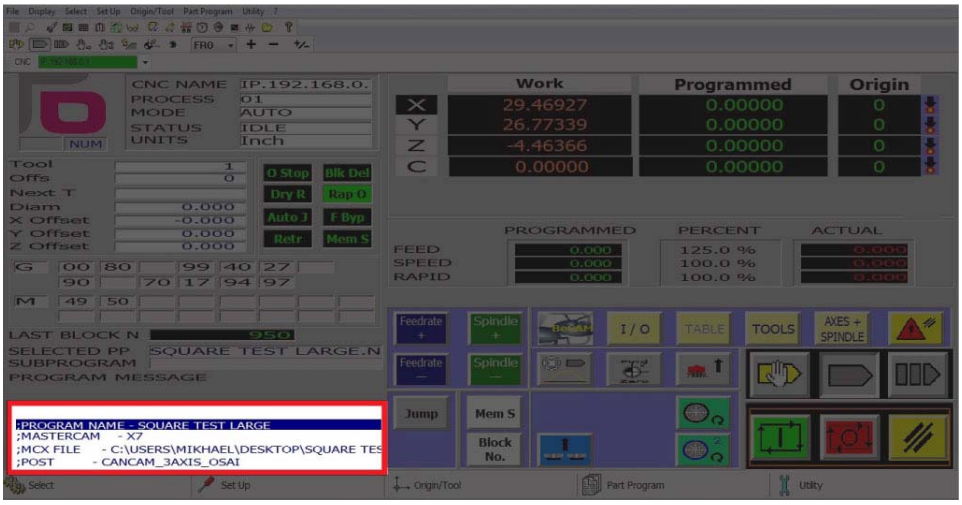


Fig. 4.5 G-Code loaded properly.

RUNNING A G-CODE FILE

Once the G-Code program is loaded into the controller (see above instructions for details), we need to set up the work coordinate and the tool offsets used in the machining program.

SETTING WORKPIECE ORIGIN

In your CAM software, there is an origin where X,Y, and Z all equal 0. We need to establish where this point will be within the machine coordinate system so the controller can map the commands from the G-Code onto the machine coordinates to generate actual movements that will produce the desired effect.

To set the Workpiece Origin, jog the spindle to the point on the table that you want to establish as the workpiece origin. See the section above for details on jogging the machine.

Click ***<ORIGIN/TOOL>*** at the top of the screen and select "Origin Preset" (as shown in Fig. 4.6).

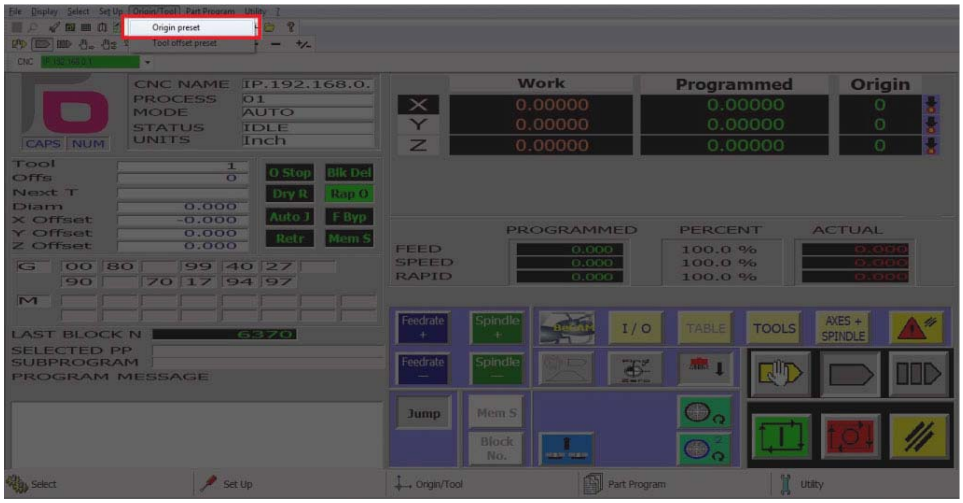


Fig. 4.6 Accessing origin presets.

The Origin Preset window will appear. Input Origin Number "1" and type in "0" for both the X- and Y-axes (as shown in Fig. 4.7). Then click ***<OK>*** to confirm the origin.

NOTE:

DO NOT enter "0" for the Z value since a tool offset will be taken into account later.

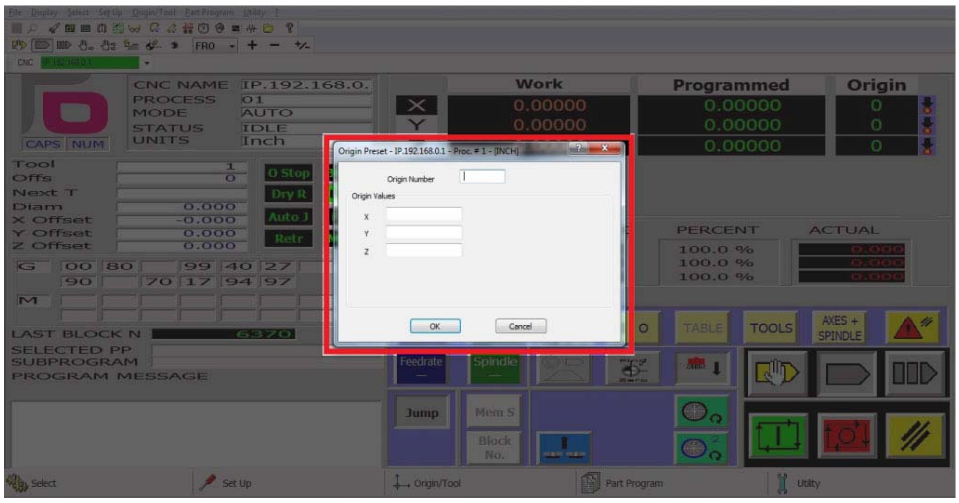


Fig. 4.5 Origin Preset window.

To verify that the origin has been taken into account, enter MDI mode by pressing the button highlighted in Fig. 4.6.

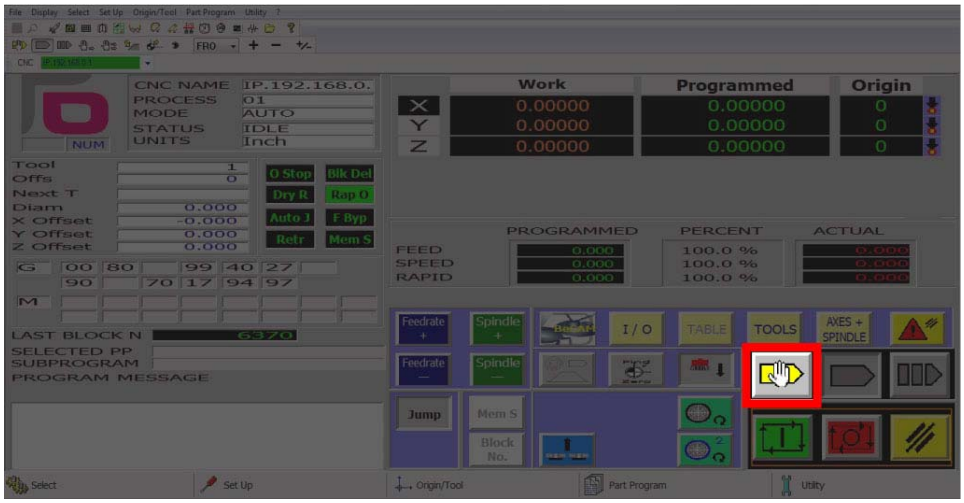


Fig 4.6 Verifying Workpiece Origin

The MDI window will appear. We can manually enter G-Code into this window and execute it. To activate the origin, enter the code "(UAO,1)" and press ***<CONFIRM>*** then ***<RUN>***. The values under the origin column in

the coordinate window should have a value of “1” for X, Y, Z and the work coordinates should be changed as well. If the machine has moved from its point of origin, simply enter the code “X0 Y0” and press ***<CONFIRM>*** then ***<RUN>*** to have the machine move back to the point of origin.

LEARNING TOOL OFFSETS

Setting the Workpiece Origin allows the machine to operate within the X and Y axes, but it still needs the length of each tool to know where on the Z-axis it will be cutting.

TOOL CHANGE

Select the tool using the ***<MDI>*** function and typing “M06TXX” where XX is the tool number you want to call up. Click ***<CONFIRM>*** and then click ***<RUN>*** to perform the tool change.

CAUTION!

IF THE MACHINE TRIES TO RETURN A TOOL TO AN OCCUPIED TOOL LOCATION, IT CAN CAUSE DAMAGE TO THE TOOL STANDS.

SETTING TOOL OFFSET

Using the ***<MDI>*** function again, enter “M401TXX” where XX is the tool number you want to set the offset for (as shown in Fig. 4.7). Click ***<CONFIRM>*** and then click ***<RUN>*** to touch-off the tool.

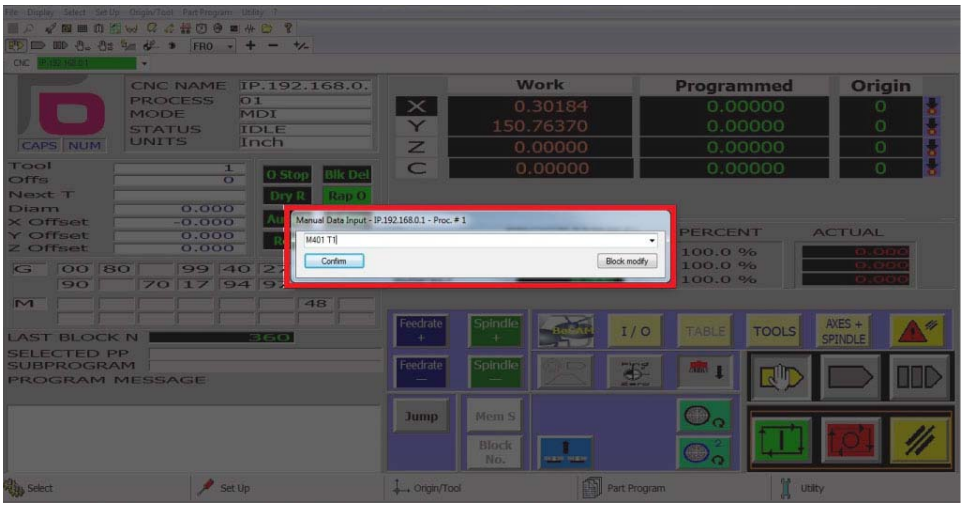


Fig. 4.7 Tool offset using the MDI function.

The tool will go to the tool setter position and touch off the tool setter. After the tool touch-off cycle, the screen will appear as shown in Fig. 4.8.

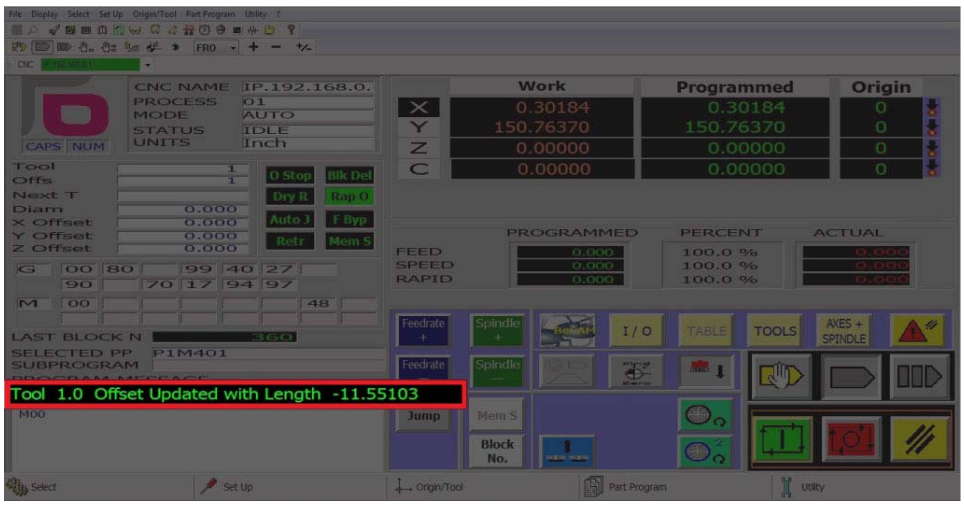


Fig. 4.8 Tool offset successful.

NOTE:

You can check the tool offsets by selecting the Offset table from the Table Editor similar to the Origin table.

TABLE EDITOR

Origin presets can be checked in the Table Editor by clicking the table icon on the top left corner in the toolbar (shown in Fig. 4.9 and Fig. 4.10).

Fig 4.9 Accessing Table Editor

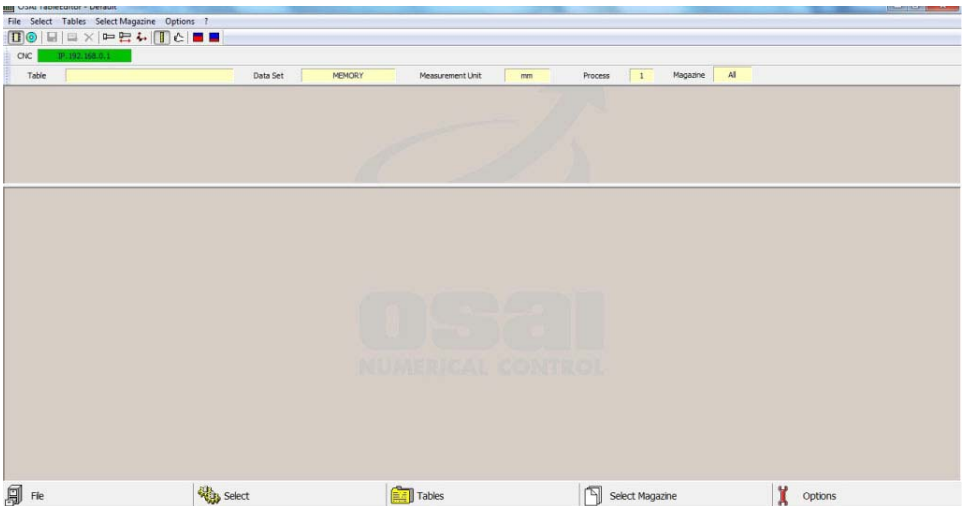


Fig 4.10 Table Editor window.

Click the Origin icon in toolbar and the Origin Table will open allowing you to confirm and/or change origins (shown in Fig. 4.11). Or, select “Origin” from the “Tables” menu option.The values in the table represent the distance the origin was set in reference to the mechanical home position.

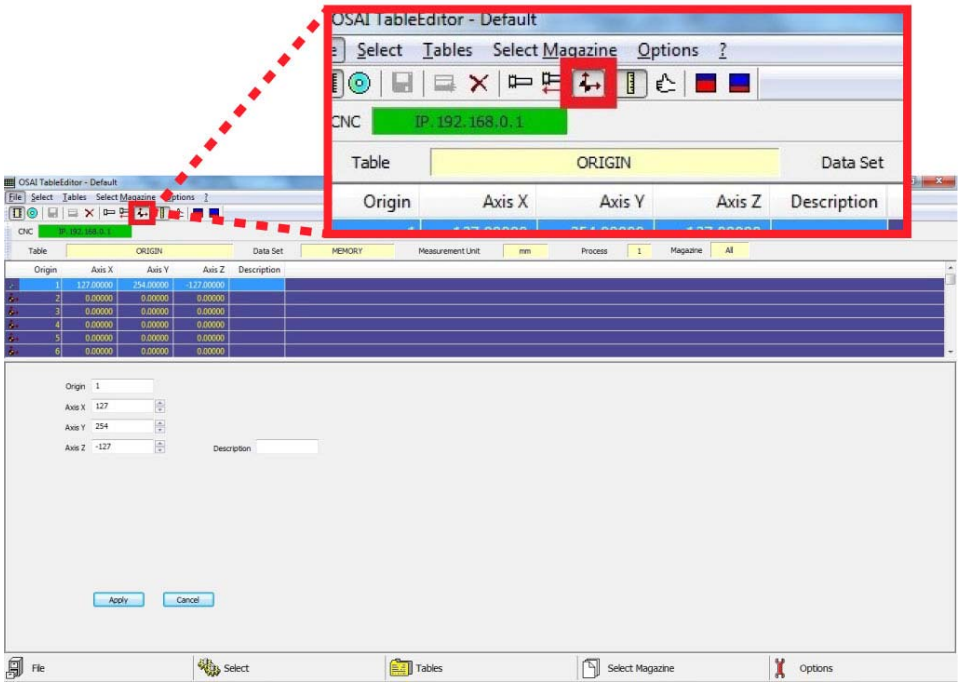


Fig. 4.11 Table Editor: Origins

To access the Tool Offsets Table, click the Tool Offsets icon in the tool bar (shown in Fig. 4.12). The value represents the distance the tool is from its highest point to the top of the table.

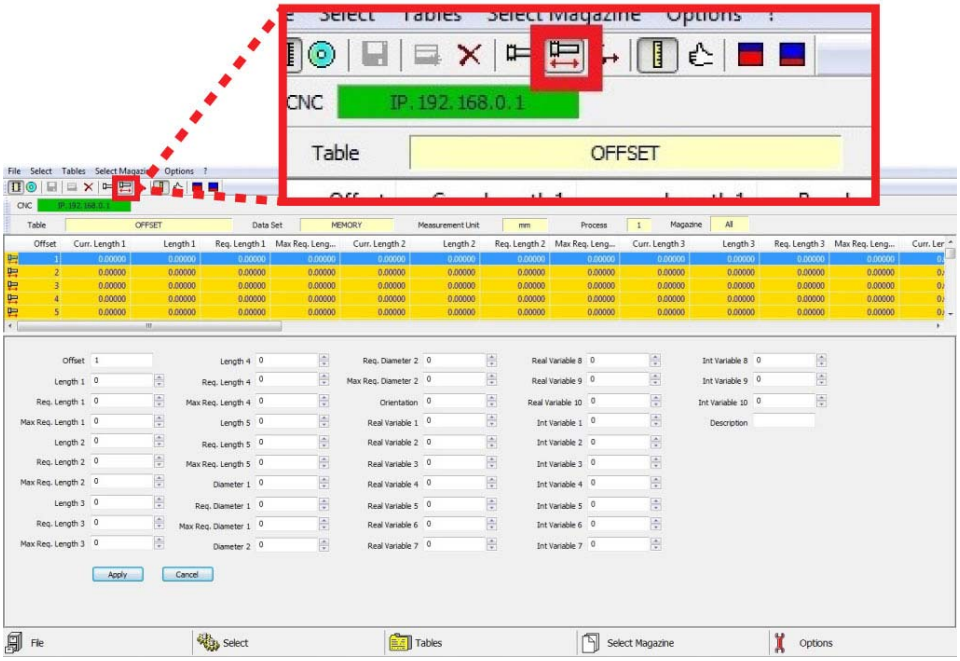


Fig. 4.12 Table Editor: Tool Offsets

RUNNING THE PROGRAM

Ensure that the Origin and the Tool offsets are set as described above.

Check ***<AUTO>*** to run in continuous mode.

Click ***<RUN>*** to run the file (shown in Fig. 4.13).

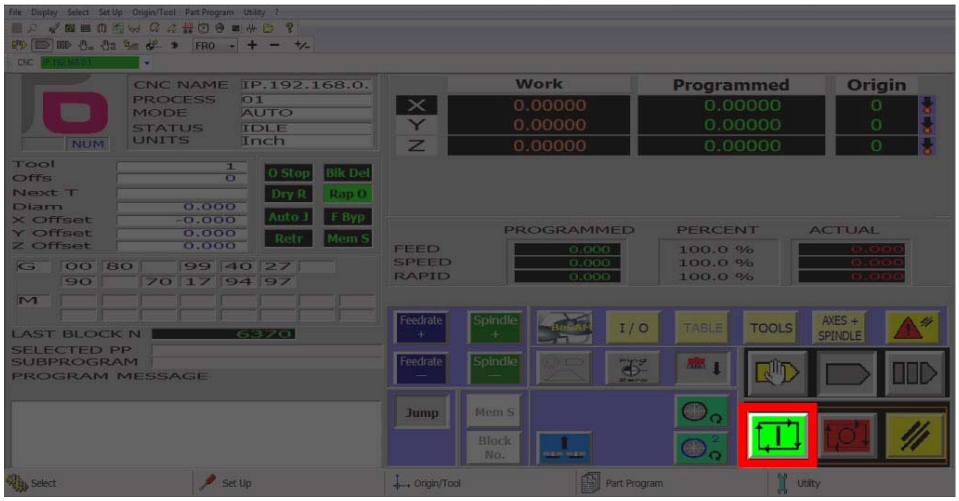


Fig. 4.13 Program start.

SHUTTING DOWN THE MACHINE

To shut down the machine, go back to the OSAI Boot controller window. Select “Boot” from the menu at the top of the screen and select “Shut Down.” Then select “Shut Down” from the drop down menu and click *<OK>* and wait until the “It is now safe to turn off the system” message appears.

Next, shut down the computer and then shut off the controller power supply by pushing the OSAI Power button. Then push the Power off button on the front of the panel.

Finally, turn off the Main Power switch on the cabinet door.

The machine is now shut down.

ADVANCED INSTRUCTIONS

* RESUMING FROM BREAKPOINT
* MDI COMMANDS
* KEYBOARD SHORTCUTS
* SETUP PARAMETERS
* BACKING UP THE PLC/AMP

RESUMING FROM BREAKPOINT

There are many points during machining when the process needs to be stopped (e.g., broken tools). If the ***<RESET>*** button was pressed while running a file, the program will reset to the beginning. There are a few ways to resume from the breakpoint, including the Memory Search, Block-to-Block, and Block Selection functions.

MEMORY SEARCH

The Memory Search function finds the last reset point in the file currently activated. If the ***<RESET>*** button is pressed while running a file, Memory Search can continue from the most recent line executed.

Press the ***<MEM S>*** button and it will prompt you to set the machine to ***<AUTO MODE>*** and then start the cycle by pressing the ***<RUN>*** button (shown in Fig. 5.1).

Fig. 5.1 Starting Memory Search function.

Once the ***<RUN>*** button is pressed, the program will jump to the line that was last executed. The controller will then prompt you to turn off memory search by pressing the ***<MEM S>*** button again (shown in Fig. 5.2).

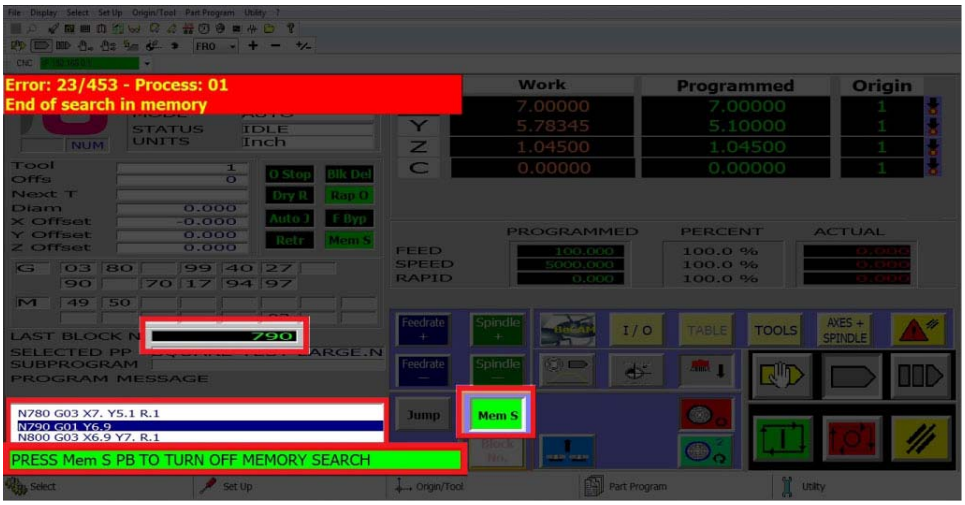


Fig. 5.2 Ending Memory Search function.

Follow the prompts and select the ***<RUN>*** button to execute the stored auxiliary functions, followed by clicking the ***<STOP>*** button to exit the hold state (shown in Fig. 5.3 and Fig. 5.4)

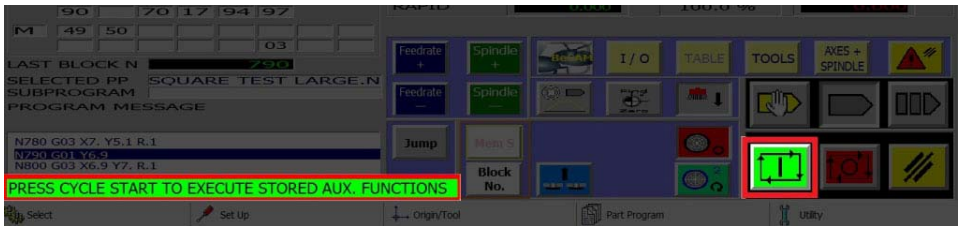


Fig. 5.3 Executing stored auxiliary functions.

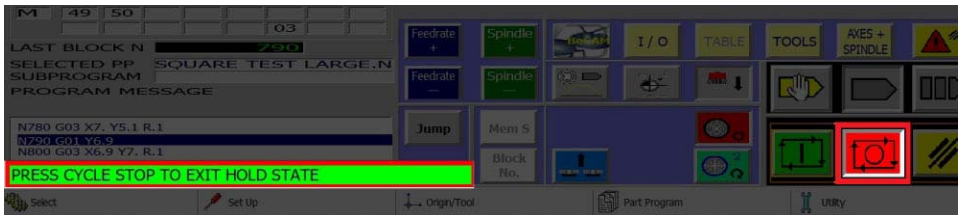


Fig. 5.4 Exiting hold state.

Once the hold state is exited, the axes must be aligned to the profile before machining can resume. As soon as the ***<STOP>*** button is released, the controller will switch from the Main Screen to the Axes and Spindle Screen.

If the ***<JOG RETURN>*** button is NOT already selected, make sure that it is selected. Once ***<JOG RETURN>*** is turned on, return the X and Y axes to the profile by pressing either the ***<X->*** or ***<X+>*** button and ***<Y->*** or ***<Y+>*** button (it does not matter which one is chosen). The axes will return to the profile and the ***<STOP>*** button can be released again to disable the feed rate hold (shown in Fig. 5.5).

Fig. 5.5 Returning axes to profile.

Once the conditions are met, the program can resume by pressing the ***<RUN>*** button (shown in Fig. 5.6).

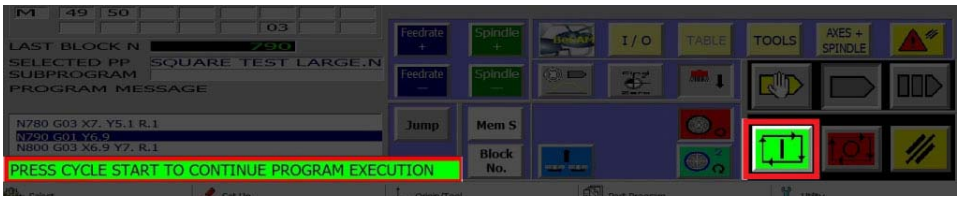


Fig. 5.6 Continuing program execution.

BLOCK SELECTION FUNCTION

To use the Block Selection function, press the ***<BLOCK NO.>*** button located underneath the ***<MEM S>*** button. A window will appear that allows us to select the starting point and/or end point to run in the program (shown in Fig. 5.7). The number of inserted parameters determines the execution mode (as shown in table below).

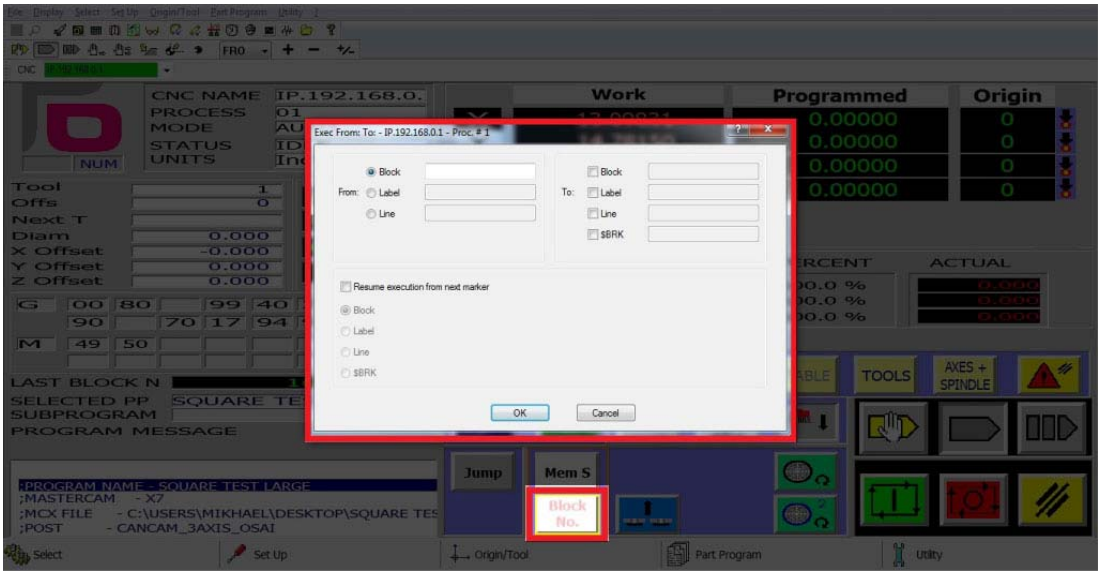


Fig. 5.7 Block Selection window.

FROM	TO	MODALITY
Specified	Specified	Executes the specified portion of the part program.
Specified	Not Specified	Executes the part program from the specified block to the end.
Not Specified	Specified	Executes the part program from the current line to the specified line.
Not Specified	Not Specified	Executes the part program from the current line to the end.

BLOCK-TO-BLOCK FUNCTION

The ***<BLOCK-TO-BLOCK>*** function will allow a particular section of a G-Code file to be run. For this function to operate, the G-Code file must have line numbers in the following manner:

```
N100 G0X35Y10

N101 G1X35Y0
```

When ***<BLOCK-TO-BLOCK>*** is clicked, the user will be asked to enter the Starting Block Number and the Ending Block Number.

Once the blocks are selected, click ***<OK>***.

Pressing ***<RUN>*** will run the section of the G-Code file selected.

NOTE:

Running a file from ***<BLOCK-TO-BLOCK>*** will ignore all other parts of the file. This means that a Spindle On Command, Tool Change and Origin must be called at the start of the block if a part is to be cut. This information can be manually entered in a text editor.

COMMON MDI COMMANDS

COMMAND	FUNCTION
M06 T__	Tool change for the tool number entered (e.g., M06 T1 changes to Tool 1).
M401 T__	Tool calibration for the tool number entered (e.g., M401 T1 calibrates Tool 1).
(UA0,1)	Activates Origin 1.
X__	Moves machine to specified X coordinate.
Y__	Moves machine to specified Y coordinate.
Z__	Moves machine to specified Z coordinate.

KEYBOARD SHORTCUTS

TOGGLE COORDINATE SYSTEM VIEWS

CTRL + B toggles among coordinate system views (shown in Fig. 5.8).

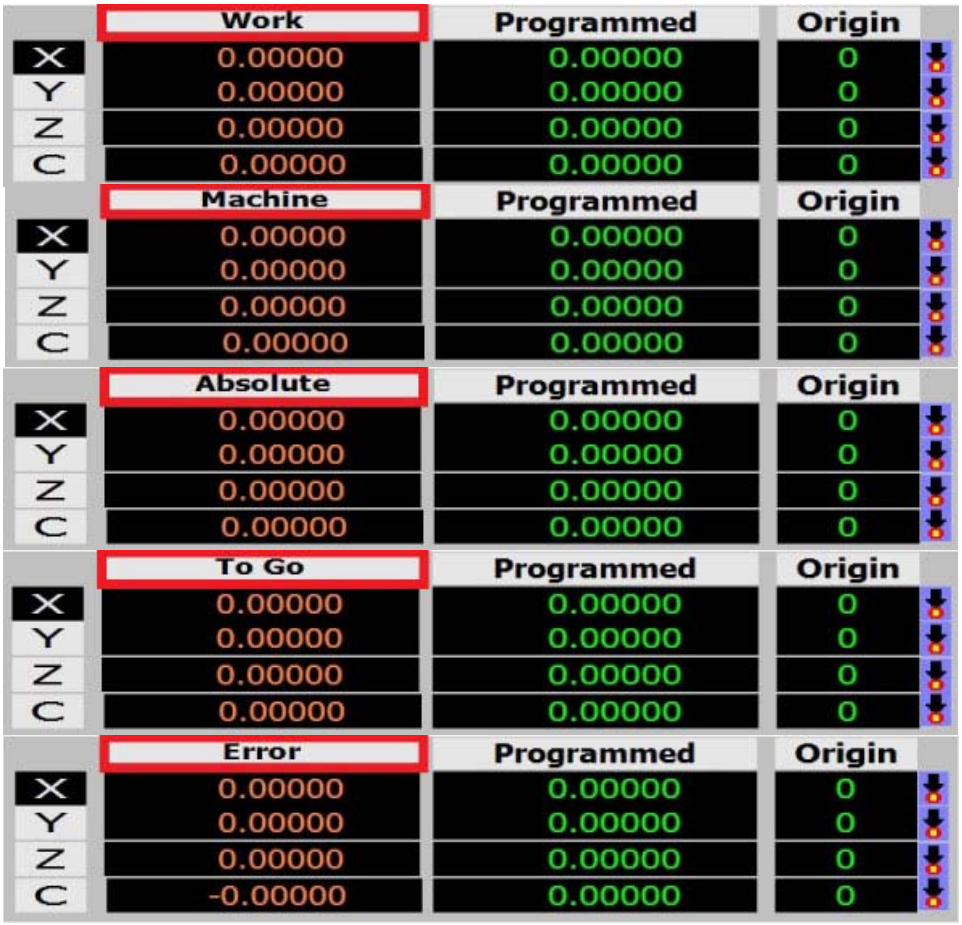


Fig. 5.8 Toggling coordinate system views.

TOGGLE FILE TOOLBAR

CTRL + M toggles access to the File Toolbar (shown in Fig. 5.9).

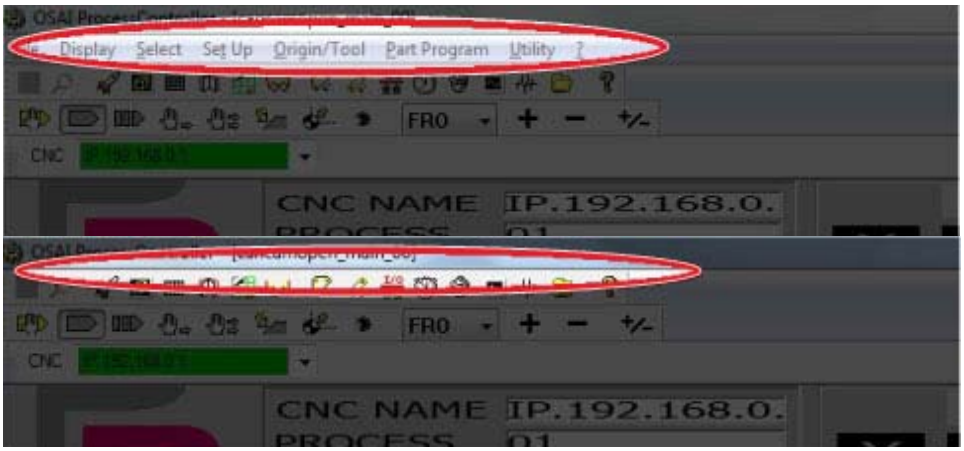


Fig 5.9 Toggling File Toolbar.

SETUP PARAMETERS

Certain parameters for a G-Code file can be changed from the Set-Up window in the interface. Any changes here are cleared when ***<RESET>*** is pressed in the Main Screen.

Click on ***<SETUP>*** and the drop down menu will appear.

<MANUAL> Set-Up will allow the user to change the Jog step size. Checking ***<AUTO>*** will mean the machine will jog the full step size when the jog arrow is pressed once.

Checking ***<MANUAL>*** will mean the machine will only jog while the arrow is held down. When it reaches the step size, it will stop and the user will have to release the button and press again.

All the other options on this window are disabled.

DYNAMIC PARAMETERS

Dynamic Parameters will allow adjustment in canned drilling cycles.

See the OSAI G-Code manual for more details on canned cycles.

DYNAMIC LIMITS

Dynamic Limits will affect the smoothness of the machine.

See the OSAI Amp manual for more details on these values.

PROGRAM SETUP

Program setup will allow adjustments to the G-Code file.

<BLOCK DELETE> will delete a highlighted part of a G-Code file.

<FEED RATE BYPASS> will override the programmed feedrates and use the percentage feed on the Main Screen.

<DISABLE PROGRAM SCROLL> will stop every line of G-Code from appearing on the screen.

<OPTIONAL STOP> will disable any M01 commands in the G-Code file.

<RAPID OVERRIDE CONTROL> will allow speed to be overridden when the file is running.

PROBE SETUP

Probe Setup controls the way the tool offsets are learned. Do NOT adjust.

SET ACCURACY

Set Accuracy will adjust the arc tolerance for circles and curves in the file.

See the OSAI Amp and OSAI G-Code manuals for more information on Probe Setup and Set Accuracy.

BACKING UP PARAMETERS

The parameters of the Amp and PLC should be backed up before any adjustments are made to them.

To do this, restart the controller in Setup Mode:

Select ***<BOOT>*** and then ***<RESTART>***

Select “Setup” from the mode menu.

Then click on the ***<SECURITY>*** Icon to enter the Security Window.

Click on ***<BACK-UP>*** to select the backup option

Click on ***<BROWSE>*** and select or create a suitable folder to save the backup. Enter a suitable file name for the backup, and click ***<SAVE>***.

Check the box beside ***<ALL THE CONTROL>*** and click ***<START>*** to begin the backup. Once complete, close the Security Window, and reboot the controller in Normal Mode.

To restore a saved backup, just reboot in Setup Mode again and select

Click ***<RESTORE>*** to load the saved settings.

MACHINE LUBRICATION

* LUBRICATING THE X-Y RACK AND PINION
* LUBRICATING THE X-Y-Z RAILS
* LUBRICATING THE Z BALLSCREW
* RECOMMENDED LUBRICANTS

LUBRICATING THE X-Y RACK AND PINION

Lubrication is important with rack and pinion gearing systems to reduce friction and prevent unnecessary wear. A thin film of grease should always be present on the contacting tooth flanks to minimize metal to metal contact.

NOTE:

Lithium grease lubrication is recommended over oil, as oil lubrication will flow away from tooth flanks.

The racks should be cleaned with a de-greasing agent and fresh clean grease should be applied. Use a small brush to coat both racks on the side of the Y-axis and the single rack across the X-axis. We recommend that this procedure is completed at regular intervals of every 80 hours of machine usage.

LUBRICATING THE X-Y-Z RAILS

The rail carriage bearings are sealed and protected with wipers. The rails should be lightly oiled to allow smooth operation.

Avoid a buildup of debris on the rails by blowing them off with air, or wiping them down with a clean rag.

The rails do not need to be lubricated as often as the rack—once a month should be sufficient.

LUBRICATING Z BALLSCREW

The Z-axis uses a ballscrew and ballnut instead of a rack and pinion setup. The ballnut has a nipple for applying lubrication to the mechanism (as shown in Fig 5.1. Lithium grease is pumped into the lubrication point with the application gun provided with the machine.

Fig. 5.1 Z-axis ballscrew grease nipple

RECOMMENDED LUBRICANTS

LITHIUM BASED GREASE:

Alvania Grease No. 2(Shell) or Equivalent.

OIL:

Vactra No. 2s(mobile) Tonner Oil or Equivalent.

AVOID A BUILD UP OF DEBRIS ON MOVING PARTS. REGULARLY CLEAN OFF ANY DEBRIS TO AVOID DAMAGING THE MACHINE.

APPENDIX

* ERROR MESSAGES/FAULT FINDING
* MACHINE FREEZES
* SYNTAX ERRORS

Table 1: Error Messages/Fault Finding

ERROR MSG	PROBLEM	SOLUTION
001 EMERGENCY STOP ACTIVE	<E-STOP> is pushed in	Release <E-STOP>, and click <RESET> on screen.
011 AXES NOT REFERENCED	Machine has not been homed.	Press <HOME ALL> on screen.
013 MPG ENABLED	Handwheel is active.	Click on <AUTO> or <AUTO JOG> to deactivate hand-wheel.
010 CAUTION! OVERTRAVEL LIMIT ACTIVE	G-Code file will go beyond the table size if run.	Adjust working origin, or redo G-Code file to cor-rect size.
042 AXIS ON OVERTRAVEL LIMIT	The over travel limit switch has been trig-gered.	Slowly jog machine away from end of gantry. Check limit switches for debris.
034 AXIS DRIVES FAULT	One of the axis amps shut down.	Cycle power ON and OFF to reset amp. Check cables going to Amp.

Table 1: Error Messages/Fault Finding

ERROR MSG	PROBLEM	SOLUTION
041 SPINDLE INVERTER 1 FAULT	Spindle had a fault and shut down.	Cycle power ON and OFF to reset amp. check cables going to Amp.
041 SPINDLE NC101 PROCESS 1 POSITIVE OVER TRAVEL	The G-Code file is trying to run beyond the table size.	Adjust Origin, Or, redo G-Code file.
NC030 CIRCLE IS NOT CONGRUENT. DYNAMIC MODE NOT CONGRUENT.	G-Code file has an incorrect arc.	Arcs must be absolute i's and j's, or created using R. Select one of these options in the CAM post processor.
NC123 BAD CYCLE MODE	Tried to press ‹CYCLE START› to run file.	‹HOLD› is active, press ‹HOLD› to release, select ‹AUTO›, and press ‹RUN›.

MACHINE FREEZES

Machine Freezes during Tool change, or when it tries to do a tool change in a G-Code file.

This error can occur if the pneumatic sensor on the dust shroud is faulty. To check this, press ***<SHROUD UP>*** on the Main Screen. Look at the sensor on the piston. It should be red when the shroud is up.

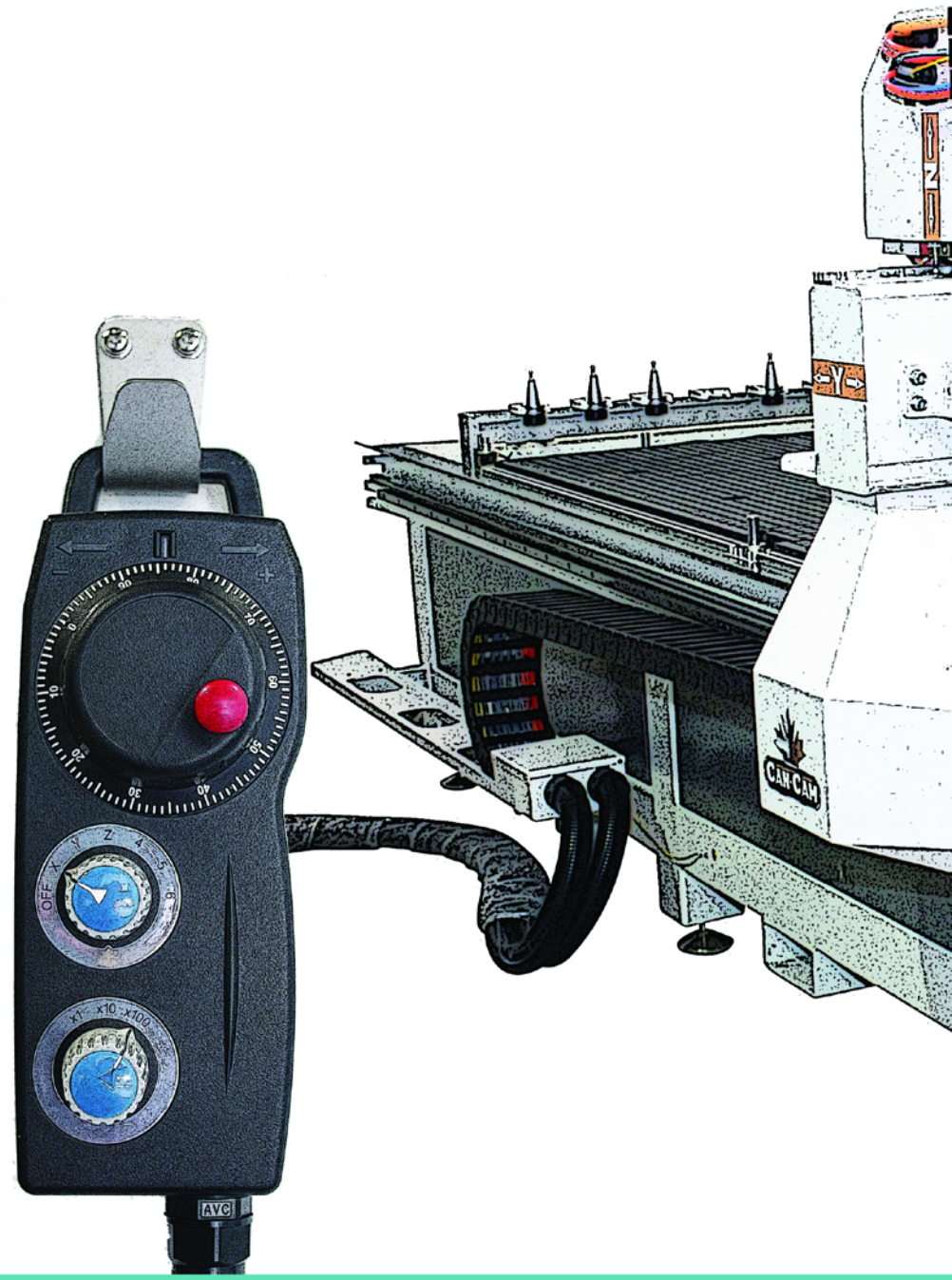
If the sensor is not red, move the sensor around the cylinder until the light comes on. If the light will not come on, the sensor will need to be replaced.

SYNTAX ERROR

Syntax Error when loading a G-Code file.

There is an unrecognized command in the G-Code file. Use the correct post in the CAM package and output the file again.

NOTES



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