



CNC Plasma Cutting System Operating Manual

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www.piranhafab.com

800-338-5471

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SAFETY

INTRODUCTION

Read this chapter on safety and the sections of vendor components manuals on safety before beginning to operate the Piranha Plasma Cutting Table.

Do not become complacent about safety or completely dependent on safety devices.

SUPERVISORS

It is very important that a safe and appropriate working environment is provided for this Piranha equipment and in compliance with applicable federal and local industry standards.

It is imperative that programmers, machine operators and maintenance personnel be trained adequately in the use and care of the equipment. These employees should receive the proper instruction in order to have a complete understanding of the operation of this machine before beginning to program, operate or service it.

Careful programming and debugging of new programs is essential for successful operation of this machine. Use program Stop Codes to stop machine motion for operator removal of parts or scrap.

Never allow operators to place any part of their body into the machine while the machine is active. Insure that all personnel understand the function and use of EMERGENCY STOP and CYCLE STOP button.

MAINTENANCE PERSONNEL

Only qualified personnel should make repairs on this equipment. Use caution and follow Piranha procedures when working on the machine. Be sure to observe the following guidelines:

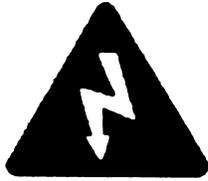
1. Before performing maintenance or repair, turn the power OFF and follow lock out/tag out (zero energy shutdown) procedures. Also, follow any lock out/tag out procedures applicable to your specific plant requirements.
2. Wear safety glasses and other personal protective equipment as required by applicable federal, local industry, and plant safety program standards.
3. Wear proper clothing. Do not wear watches, rings, jewelry, or loose-fitting clothes.
4. Read and review the manual carefully.
5. Be familiar with the operation of the machine.
6. Practice preventative maintenance. Inspect the equipment regularly and repair or replace worn components and tooling. Read the vendor components manuals for any additional preventative maintenance.
7. Always replace safety guards and other safety devices removed for service and make sure that they are fully functional before operating the equipment.
8. Never remove, jumper out or bypass a safety device to permit machine production.
9. Never place yourself in a hazardous situation to observe a problem and ask someone else to operate the machine. This could be a very dangerous and life-threatening situation.

OPERATOR

This equipment has been designed with operator safety in mind (when used under normal operating conditions). The user must always be alert to the possibility of dangerous situations. Always exercise care and caution. Report any minor problems immediately, so that they can be corrected before becoming major difficulties. Only qualified personnel should make repairs on the machine.

1. Be familiar with the machine. Read and review the Piranha and vendor component manuals carefully.
2. Be alert in regard to the significance of the various warning indicators and be conscious of the functions of pushbuttons and other controls. Use the controls properly. Review and understand the operation of the EMERGENCY STOP function and the CYCLE STOP function.
3. Never operate the equipment unless it is in good working order.
4. Wear safety glasses and other personal protective equipment as required by applicable federal, local industry and plant safety program standards.
5. Wear proper clothing. Do not wear watches, rings, jewelry or loose-fitting clothes.
6. Avoid all moving parts of the machine or workpiece when setting up or operating the equipment. *Never* reach into the machine while it is active. Use the EMERGENCY STOP or CYCLE STOP function to stop machine motion. *Never* use the machine DWELL time code for parts removal or other operator intervention activities that puts the operator in a hazardous position.
7. Recognize and avoid unsafe operating conditions.
8. Maintain a clean work area. Avoid accidents by keeping work areas clean and neat.
9. Never leave the machine in an unsafe condition.
10. Never leave a machine running unattended.
11. Never remove or bypass safety devices.
12. Report any unsafe conditions, personal injury or machine problems immediately to your appropriate supervisor(s) and safety manager(s). In case of personal injury notify Piranha Service Department giving a brief description and date reported injury occurred.
13. Never operate the machine with someone within a hazardous area.

RISK OF ELECTRIC SHOCK



DANGER

Always verify that ALL electrical supplies are isolated before undertaking any service or maintenance work. The machine may have more than one electrical supply.

Plasma cutting equipment uses high open circuit voltages to initiate the plasma arc. Normal load voltages are higher than experienced with other types of welding equipment. Extreme CAUTION must be exercised when operating or servicing this equipment.



WARNING

Plasma arc can cause injury and burns.

Verify that no person is in the proximity of the plasma torch at any time that the plasma system is switched on. Serious burn and electrical shock hazards exist, even when the plasma cutting system is not active.

PERSONAL PROTECTION

- Keep the operator's body and clothing dry.
- Do not stand, sit, or lie in/on any wet surfaces when using this equipment.
- Never work in a damp or wet area without proper insulation against electric shock.
- Disconnect main power before servicing the torch, power supply or service connections to the plasma arc system, or any part of the machine bed.
- Wear adequate personal equipment (overalls, gloves, safety boots etc.) when operating the machine.
- Remove or secure articles of clothing, such as ties and loose sleeves, which may catch or be drawn into moving machinery.

EYE PROTECTION



WARNING

The plasma arc cutting process produces rays that can burn eyes and skin. Always wear eye protection with appropriate lens shades.

Arc Current	LENS SHADE	
	AWS (USA)	ISO 4850
Up to 100A	No. 8	No. 11
100 – 200A	No. 10	No. 11 – 12
200 – 400A	No. 12	No. 13
Above 400A	No. 14	No. 14

Medical treatment facilities and a qualified first aid person should be available for immediate treatment of flash burns to the eyes and skin.

It is recommended that the cutting area be prepared in such a way as to minimize the reflection and transmission of ultra violet radiation. Walls and other surface areas should be painted in dark colors to reduce reflection. Protective screens or curtains may be installed to avoid unnecessary ultra violet transmission.

INPUT CONNECTIONS

1. A wall mounted line isolating switch, fused as required by local electrical codes, must be fitted as close as possible to the plasma arc power supply.
2. Three-phase input conductors must be sized to carry the rated current of the plasma arc power supply.
3. Primary power cable must be provided with a minimum 600v rating.



WARNING

Frequently inspect the cable for damage or cracking of the cover. Bare wiring can kill. Replace damaged cable immediately.

GROUNDING

Input Power

1. Connect the ground lead of the four-conductor / three phase input cable to the electrical system ground in the disconnect box and the ground stud provided in the plasma arc supply.
2. Be sure all ground lugs are of adequate size to carry the rated current load.
3. Make all connections tight to avoid resistance heating.

Output

1. Connect all positive output ground leads to the material grid of the work table.
2. Connect the material grid of the work table to a good earth ground.

BURN PREVENTION

High intensity ultraviolet and infrared radiation is produced by the plasma arc and is of similar intensity to typical high current welding arcs. This radiation is damaging to the eyes and skin. As the operator comes closer to the torch, the level of exposure increases rapidly.



WARNING

The operator and any other persons working in the vicinity of the arc must wear proper protective clothing and equipment.

TOXIC FUMES

Proper precautions must be exercised to prevent the exposure of others in the vicinity to toxic fumes that may be generated while plasma cutting.

Certain chlorinated solvents such as perchloroethylene and trichloroethylene will decompose under ultra violet radiation to form phosgene and other gasses. Care must be taken to avoid the use of these solvents on materials being cut with plasma arc cutting equipment. Containers of these solvents and other degreasing agents should be removed from the immediate area around the plasma arc.

Metals coated with or containing significant amounts of lead, cadmium, zinc, mercury or beryllium can produce harmful concentrations of toxic fumes when the plasma arc cuts. Adequate local exhaust ventilation must be used or the operator must be supplied with special equipment to guarantee a supply of fresh air such as a respirator or air supplied helmet.

Metals coated with materials that emit toxic fumes must not be cut unless:

1. The coating is removed prior to cutting.
2. The area is adequately ventilated.
3. The operator is supplied with fresh air breathing equipment.

AIR CONTAMINATION

The plasma cutting process generates large quantities of hot metal dust and fumes that would be hazardous if uncontrolled.

A blower pulls a vacuum through the fume extraction assembly in the bed of the machine. The blower pulls the dust-laden air through a customer supplied filter before exhausting the air to the environment.

The gases listed below either are produced normally during plasma arc cutting or can form under certain conditions.

Ozone

Ozone is produced by the reaction of the plasma arc's ultraviolet radiation with oxygen in the air. Uncontrolled, excessive levels of ozone can constitute a hazard. When there is proper venting to the outside and the machine's internal ventilation system is functioning properly, there is adequate control of ozone during torch cutting.

Nitrogen Dioxide

Nitrogen dioxide gas is produced when nitrogen and oxygen in the air pass through the electric arc. A hazard may exist if uncontrolled, excessive levels of nitrogen dioxide are formed. With proper venting to the outside, the machine's internal ventilation system is adequate to control nitrogen dioxide during torch cutting, if the system is functioning normally.

Acetyl Chloride

Acetyl chloride gases form in the air surrounding the plasma arc when the airborne vapors of chlorinated solvents or degreasers decompose upon being exposed to the ultraviolet radiation of the arc. A hazard may exist if uncontrolled, excessive levels of acetyl chlorides are formed. A pungent "sweetish" aroma similar to chlorine bleach is the first sign that these gases are being produced. Shut down the plasma arc cutting system immediately if you detect the acetyl chloride odor. Do not resume cutting until you locate and control the source of the vapors.

Various cleaning solvents and vapor degreasers contain chemicals that decompose rapidly when exposed to ultraviolet radiation.

If the solvents, cleaning solutions, or vapor degreasers used in the shop contain any of the following chemicals, *do not use them near the plasma arc cutting system*:

1. trichloroethylene
2. trichloroethane
3. perchloroethylene
4. perchloroethane
5. trifluoro-trichloroethane (fluorocarbon-113)

These chemicals also decompose into small amounts of the toxic gases phosgene and chlorine. You will notice the acetyl chloride odor long before phosgene or chlorine levels become harmful.

The vapors can decompose up to several feet away from the arc, *do not rely on the machine's internal ventilation system to control solvent vapors and their products*. Do not use or store chlorinated solvents, cleaning solutions, and vapor degreasers close to the machine, where the vapors can enter the torch-cutting area.

NOTE: It may prove advisable to provide separate ventilation for the solvent/degreaser storage area.

Metal Fumes

Metal fumes are produced when the plasma arc vaporizes the metal. A hazard may exist when uncontrolled, excessive levels of metal fumes are produced some vaporized metals form toxic gases. These metals may be in their pure metallic state, in an alloy, or in a coating such as paint or plating.

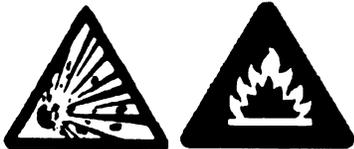
Metals that are known to produce toxic fumes include beryllium, cadmium, lead, manganese, mercury, and zinc. Beryllium products require particular care, because their fumes are highly toxic. If there is proper venting to the outside and the machine's internal ventilation system is functioning normally, there should be adequate control of metal fumes during torch cutting.

Metal Dust

Metal dust is formed as metal vaporizes during torch cutting. A hazard may exist when uncontrolled, excessive levels of metal dust are produced. If there is proper venting to the outside and the machine's internal ventilation system is functioning normally, there should be adequate control of metal dust during torch cutting. For proper ventilation, at least 90% of the worktable should be covered by the workpiece (or other sheet metal covers).

See dust collector vendor installation and operation manual for additional precautions.

FIRE PREVENTION



WARNING

Since plasma arc cutting produces hot metal, sparks, and slag, precautions must be taken to prevent fire or explosions.

All combustible materials must be removed from the immediate cutting area to at least 35 feet away. Appropriate fire extinguishing equipment must be available in the immediate cutting area.

After cutting, be sure to allow the metal to cool sufficiently before handling or before allowing contact with combustible materials.

Never plasma cut empty containers that have held toxic or potentially explosive materials. Those containers must be thoroughly cleaned according to national standards prior to cutting or welding.

Never plasma cut in an atmosphere that contains heavy concentrations of dust, flammable gas, or combustible liquids (such as petrol).

COMPRESSED GAS EQUIPMENT

Gas cylinders should be mounted securely to a wall or other stable supporting device.

Cylinders

Compressed gas cylinders must be handled and used in accordance with appropriate national safety standards.

- Never use a cylinder that is physically damaged or leaks.
- Never move or transport a cylinder without the protective valve cover in place.
- Never use a gas cylinder or its contents for any other purpose than that for which it is intended.
- Never lubricate cylinder valves with oil or grease.
- Never allow electrical contact such as welding arcs with cylinders.
- Never expose cylinders to excessive heat, sparks, slag, or open flames, which may cause rupture.
- Never use hammers, wrenches or other tools to open stuck valves. Send these cylinders back to the supplier.

Pressure Regulators

All regulators used to operate plasma equipment must be maintained in proper working condition.

Faulty equipment can cause equipment damage or operator injury. Faulty equipment must be serviced at the manufacturers designated facility by trained repair technicians.

- Never use a regulator for any other gas than that for which it is intended.
- Never use a regulator that leaks, excessively creeps, or is physically damaged in any way.
- Never attempt to lubricate a regulator with oil or grease.

HOSES

Gas hoses used for plasma arc cutting systems adhere to the following color coding:

Red Acetylene
Orange LPG
Blue Oxygen
Black Inert gases and air

Replace any hose that is damaged by physical abuse or from sparks, heat or open flame.

Lay hoses out straight to prevent kinks.

Coil excess hose and place out of the way to prevent loose connections, or other damage.

Keep hose lengths to a minimum to prevent damage, reduce pressure drop and prevent possible volume flow restriction.

Please refer to national standards for more information on hoses.

SAFETY DEVICES

Plasma arc units are provided with certain safety interlocks designed to prevent equipment damage and/or personal injury.

Never short out or in any way attempt to defeat the safety interlock devices.



WARNING

Never attempt to operate the plasma unit with any of the power supply covers not in place. This is extremely hazardous to the operator and any other person in the area. It also prevents the equipment from properly cooling critical components and could result in equipment damage.

All exposed electrical connections must be covered with the proper insulation material.

Safety devices must be regularly checked for proper operation and replaced immediately if found to be inoperative.

HOT SURFACES



WARNING

Components may remain hot for a considerable period of time.
Always wear gloves to remove components and scrap from the bed.



WARNING

During prolonged periods of cutting, parts of the machine bed may become hot to the touch.



WARNING

Moving machinery can be dangerous.

Assure that the bed is free of obstructions and no person or articles of clothing are in the proximity of moving parts when the machine is in operation. This safety precaution also applies when the machine is manually moved and when the plasma system is off.

IMPORTANT

Read this manual thoroughly before operating the machine.

Read the Torch Height Control Manual before operating the machine.

Read the CNC Control Operator Manual before operating the machine.

Sparks

Sparks form as the plasma arc torch vaporizes metal. These sparks are tiny droplets of extremely hot molten metal and are a possible fire hazard. The volume of sparks formed and the area over which they are scattered depend on several variables. These variables include the type and thickness of the material being cut, the cutting current, and the feed rate. Where practical, keep all combustible material at least 35 ft. (10.7 m) away from the plasma arc work area. Where this is not practical, protect all combustible materials with close fitting, flame proof covers or shields. Protect wooden or other combustible floors by covering them with sand or installing fire-resistant shields. Shield any wall openings, floor openings, cracks, ducts, or conveyors within 35 ft. (10.7 m) of the torch to prevent sparks from passing into adjacent areas.



WARNING

Sparks from the cutting process may ignite flammable items in the machine bed which may then be drawn into the extraction unit, possibly causing a fire.

NOTE: Be sure to use an approved facemask and approved eye protection when cleaning or servicing the dust collector.

NOTE: Plasma arc cutting systems can produce large volumes of fumes. If you exhaust fumes to the outside atmosphere, additional air pollution control devices may be in order to conform to local, state, and federal government ordinances. Air pollution control devices are the responsibility of each individual user.

Internal Ventilation System

Due to the noxious and toxic nature of many torch cutting by-products, Piranha recommends venting the machine's internal ventilation system (referred to as the "dust collector") to the outside atmosphere. This recommendation is especially important when the shop has one of the following:

1. Low ceilings and/or confined area
2. Large amount of welding and/or torch cutting near the plasma system
3. Poor cross plant ventilation

LIGHT AND RADIANT ENERGY

When it is necessary to look directly at the arc for diagnostic purposes, do so briefly. Use shade #10 welding glass (for up to 200 amps) or shade #12 (for 200 amps). During operation, use a shade not less than #8.



WARNING

Do not look directly at the arc without proper eye protection.

NOTE: During plasma arc cutting, clothing worn should conform to the instructions presented in the General Safety Requirements section of this manual.

Ultraviolet rays and other radiant energy reflected off the workpiece can produce sunburn. Therefore, when plasma arc cutting is being performed, anyone working within 25 feet (7.5M) of the arc should wear an approved, protective full-face mask, a long-sleeved shirt, gloves, and long pants.

Operations, such as edge cutting, that can cause the arc to be exposed to view should be avoided, because they can increase exposure to radiant energy.

Shield personnel at nearby workstations from accidental exposure to radiant energy by the use of non-reflective, fireproof enclosures, open at the top and at floor level to allow air to circulate freely.

The pilot arc in the plasma cutting systems is initiated and stabilized by a high-voltage signal. This signal can create electromagnetic interference.

As with any equipment that can create such interference (e.g., microwave ovens and TIG welders), people who have implanted heart pacemakers must exercise caution when working near the equipment. Piranha recommends that a person with a pacemaker who works near where plasma arc cutting is being performed should wear a Holter monitor for one day of work to record the existence of electromagnetic fields. A qualified doctor should review the recorded data with the pacemaker manufacturer to determine whether the worker can safely continue working in the area on which the study is based.

NOTE: There is no history of problems caused to pacemakers by the plasma arc cutting equipment that have been reported to Piranha.

HEAT

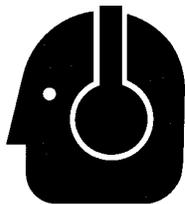
Plasma arc cutting creates a Heat-Affected Zone (HAZ) around the cut edge of the workpiece. Until the hot edges cool, the HAZ will burn an unprotected hand severely.

1. When removing produced parts or skeletons from the machine, operators should wear heat-resistant, gauntlet-type gloves.
2. The torch, cutter bars, ducting, and dust collector become hot during torch cutting. Avoid contact with these components unless you are wearing heat-resistant gloves.

NOISE

The noise levels generated during plasma arc cutting may be as high as 105 decibels. This depends on the distance from the machine, arc, plasma torch nozzle design, gas velocity, material type, and plate thickness. Piranha recommends that each user check the sound levels in his own shop under normal operating conditions.

Based on those findings, provide adequate ear protection to all personnel who must work near the machine, in accordance with applicable local, state, and federal industry standards.



WARNING

Exposure to noise from the cutting process can damage hearing. Wear appropriate ear protection when operating the machine or when working in the proximity of the machine.

NOTE: Noise levels that can cause discomfort or damage to hearing will vary greatly from one individual to another. Piranha recommends that ear protection be furnished to any worker who requests it, regardless of applicable industrial standards or tested noise levels.

ADDITIONAL SAFETY INFORMATION

The general safety information presented in this chapter does not constitute a complete list of safety instructions for any particular configuration of the Piranha Plasma Cutting Table. Warnings and other safety information related to operations described in this manual are presented in the chapters in which those operations are explained. Specific equipment being used by the customer and its particular application in the customer's factory may require supplementary safety information.

NOTE: It is the responsibility of the customer's company to make sure safety information covering the equipment being used and its particular application is available to personnel operating and maintaining the equipment and is read by them.

SAFETY STANDARDS PUBLICATIONS

It is recommended that companies using the kind of equipment covered in this manual consult the applicable Safety Standards publications available from the agencies listed below:

OSHA

Superintendent of Documents
U. S. Government Printing Office
Washington, DC 20402-9371, USA
Tel: (202) 512-2457

ANSI

American National Standards Institute
11 West 42nd Street
13th Floor
New York, NY 10036-8002, USA
Tel: (212) 642-4900
Fax: (212) 398-0023

NFPA

National Fire Protection Association
P.O. Box 9101
1 Batterymarch Park
Quincy, MA 02269-9101, USA
Tel: (617) 770-3000
1-800-344-3555
Fax: (617) 770-0700

FINAL SAFETY RECOMMENDATION

Piranha strongly urges that problems encountered in the operation and maintenance of the equipment be reported to our Field Service Department. The department is prepared to give additional information and to answer questions in regard to the equipment. When contacting the Field Service Department, please give the model number, serial number, and purchase date of the equipment.

Megafab.
P.O. Box 1206
Rockford, Illinois 61105, USA
Telephone (815) 490-0472
Fax (815) 964-3175

The preceding safety instructions are advisory, general in scope, and not necessarily complete. Specific safety information for the Piranha plasma cutting machine appears throughout this manual.

WARNING

In keeping with standard safety practices, the manufacturer recommends the use of eye protective equipment, with side shields, during the operation of this machine

SPECIFICATIONS



Machine	C404	C408	C510
X-axis Travel	49.0"	49.0"	61.0"
Y-axis Travel	49.0"	97.0"	121.0"
Approximate Dimensions (in)	82L x 92W x 60H	138L x 92W x 60H	158L x 102 x 60H
Approximate Weight (lbs)	1,500	2,000	2,500
Maximum Rapid Speed	393 inches/min		
CNC Control	Starfire		
Frame Construction	Welded Tubular Steel		
Bridge Construction	Welded Tubular Steel		
Drive Motors	X-Axis – Two Servo Motors Y-Axis – Servo Motor Torch Height Control – Stepper Motor		
Mechanical Drive System	X-Axis – Rack & Pinion (2) Y-Axis – Rack & Pinion Z-Axis – Ball Screw		
Available Plasma Torches	Hypertherm Powermax 45XP Hypertherm Powermax 65 Hypertherm Powermax 85 Hypertherm Powermax 105* Hypertherm Powermax 125* (* Requires Drop-in Water Table Option)		
Maximum Cutting Amperage	85 amps Air Plasma with downdraft 125 amps with water table option		
Torch Control	Arc Voltage with Initial Height Sensing		
Torch Protection	Pneumatic Breakaway Design		
Exhaust Fan	1200 cfm @ 3" H ₂ O		
Available Options	Pipe Cutting Attachment Drop-in Water Table		

INSTALLATION

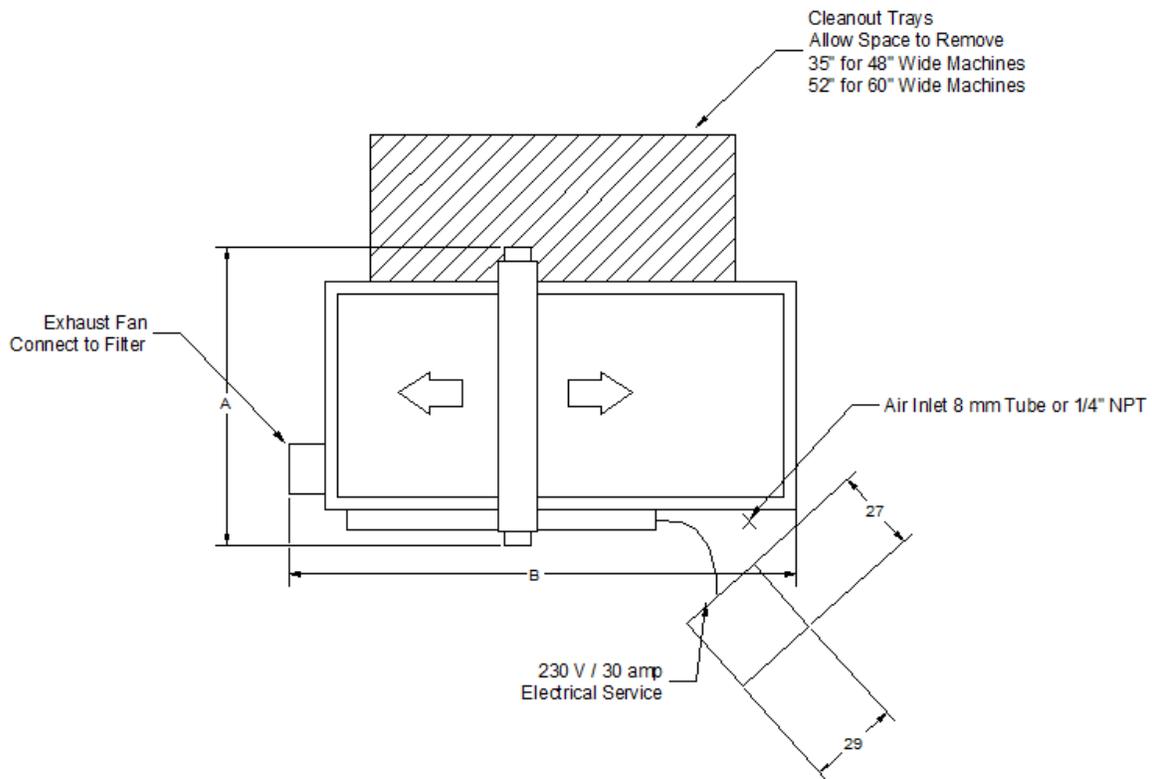
1. INTRODUCTION

Thank you for purchasing a Piranha C-Series Plasma Cutting Table. The following information will guide you from unpacking to setting up your table for your first cut. If something needs better explanation, please contact us.

2. PRIOR TO RECEIVING

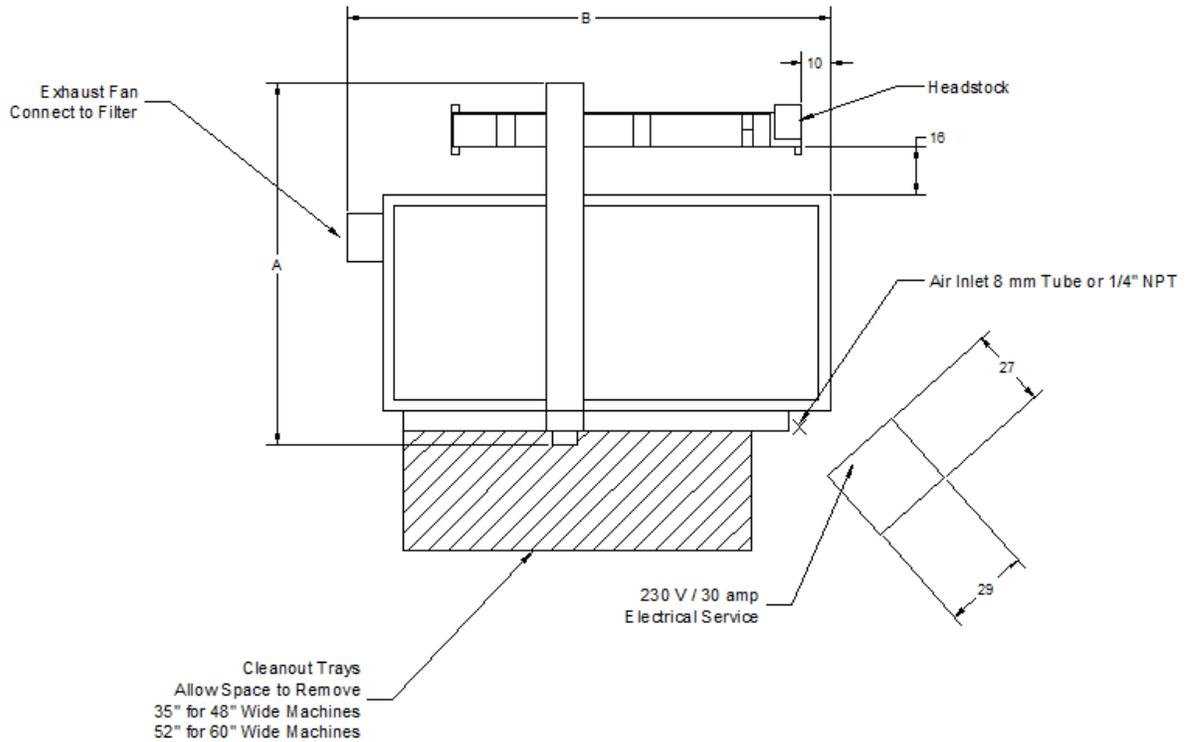
2.1. Space/Location

The following drawing shows the required space for the C-Series Plasma Cutting Table without optional Pipe Cutter



	"A"	"B"	WEIGHT
4'X4'	92"	82"	1,500 lbs
4'X8'	92"	138"	2,000 lbs
5'X10'	102"	158"	2,500 lbs

The following drawing shows the required space for the C-Series Plasma Cutting Table with optional Pipe Cutter



	"A"	"B"	MACHINE WEIGHT	PIPE CUTTER WEIGHT
4'X4'	88"	116"	1,500 lbs	800 lbs
4'X8'	144"	116"	2,000 lbs	800 lbs
5'X10'	164"	126"	2,500 lbs	800 lbs

C408 and C510 Machines with pipe cutters require shipment as an oversize (over width) load. It is not possible to ship these machines as a standard load.

NOTE: Refer to the chapter on the PIPE CUTTER for installation information specific to machines with PIPE CUTTER

2.2. Floor Condition

Piranha requires a concrete floor, in good condition, level to within +/- 0.500" (12.7mm).

2.3. Electrical Services

The electrical supply to the machine and the plasma arc cutting system must be stable, with no spikes or electrical noise (interference) from other machinery.

2.3.1. CNC Control

- A dedicated 230V / 30A single phase service is required for the CNC control.

2.3.2. Plasma System

- Refer to the specific plasma system manual for available voltages.
- Use a separate, wall mounted, fused, quick disconnect electrical box in a convenient location near the machine for the plasma system.

2.3.3. Earth Ground

The machine foundation area must have an adequate ground rod to reduce electrical noise problems. Excess electrical noise will interfere with automated control functions and plasma arc cutting performance. Proper grounding is essential for reasons of personal safety and machine operation.

NOTE: *Installation must be inspected by a qualified electrician and meet state and local regulations*

- Use 5/8" (16.0 mm) copper rod, 8 ft. long (2.5 m) minimum or per State requirements.
- Install the primary ground rod next to the main electric enclosure (within 8 feet or 2.5 meters of the plasma table).

2.4. Compressed Air & Gas

The plasma torch requires clean, dry, oil free air, i.e. it must be filtered. Poor quality air will reduce cutting speeds, produce poor cut quality and reduce torch parts life. Ensure that adequate air supply is available for stable operation. Air must be delivered at the pressure and flow rate specified.

CAUTION: Do not use any quick disconnects in the air supply line to the machine as these have small flow areas that will restrict the air flow rate to the machine.

2.4.1. Gas Supply Requirements

Gas Supply: Clean, dry, oil-free air

Air inlet pressure for machine:.....80-110 psi

Gas inlet flow rate/pressure for Hypertherm plasma systems:

<i>Powermax 45</i>	360 scfh; 6.0 scfm @ 80 psi
<i>Powermax 65</i>	400 scfh, 6.7 scfm @ 85 psi
<i>Powermax 85</i>	400 scfh, 6.7 scfm @ 85 psi
<i>Powermax 105</i>	480 scfh, 8.0 scfm @ 85 psi
<i>Powermax 125</i>	550 scfh, 9.2 scfm @ 85 psi

2.4.2. Option A: Air Dryer Unit (Piranha Part Number 230579 or equivalent)

Piranha recommends using a stand-alone air dryer unit that consists of a water-oil-separator and a post filter for the plasma system to protect your machine. Piranha offers a dryer / filter combination.

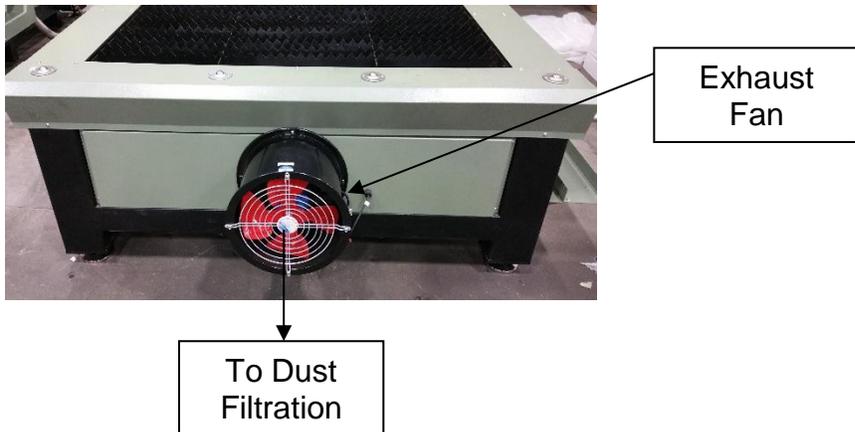
2.4.3. Option B: Three-Stage Filter System (Piranha Part Number 230634 or equivalent)

This option uses a series of three different filters to remove moisture, oil, and particulate. The filtration should be located as close to the machine as possible. An outlet valve should be installed to isolate the air supply.

Using this option requires more maintenance than the air dryer option since there are three different filters to monitor and maintain.

2.5. Fumes/Smoke Extraction Plan

The machine will come pre-installed with a 11,000 m³/h (6,500 ft³/min) exhaust fan. Customer is responsible for providing further duct-work and filtration to meet federal, state, and local codes. Proper ventilation is required for operator safety and health – refer to the SAFETY section of this manual.



A drop-in water table is available for those customers who do not wish to maintain a filter system. This water table is required for use on plasma systems greater than 85 amps (Powermax105 and Powermax125).

NOTE: When using the water table, water and slag must be disposed of in accordance with state and local codes.

2.6. Required Equipment/Tools

The following tools will be required for the installation and handling of the plasma table:

1. Metric Allen wrenches set
2. Two adjustable crescent wrenches for adjusting the leveling pads
3. Minimum of 3 ft. bubble level for leveling the machine on the floor
4. Philips screwdriver
5. Forklift with 8 ft. forks to lift or overhead crane with 20 ft. slings/chains to unload and move the machine as desired to the designated area (you may also need machinery skates)

3. AFTER RECEIVING

Upon the arrival of equipment:

1. Inspect it visually for shipping damage. If damage is found, notify both the trucker's insurance company and MegaFab.
2. Compare the actual shipment with the invoice to verify that everything ordered has been received.

3.1. Unloading

CAUTION: *Extreme care must be taken when lifting and moving the machine. Obtain the weight of the machine from Paragraph 2.1 of the Installation Manual.*

NOTE: *It is the responsibility of the customer to verify that the forklift truck and/or crane is of adequate lifting capacity, and that any maneuver is undertaken safely.*

Damage caused to the machine through incorrect or careless maneuvers is not covered under the machine warranty.

MegaFab is not responsible for personal injury to any person while this machine is transported, unloaded or installed.

- a. It is important that the machine is lifted only at the specified lifting points.
- b. Verify that the machine is balanced and stable before and during lifting/moving.
- c. Verify that no person is in a position where they may become trapped or injured.

The machine is shipped with the gantry installed and CNC control as one unit. The CNC control and the gantry will be secured off-centered on the cutting table bed.

CAUTION: *Make sure the load is always lifted about the center of gravity to prevent from any tipping and accidents.*

3.1.1. Lifting with Crane (Recommended)

1. Remove securing straps/chains attached to the truck bed.
2. Obtain two straps of 20 feet length that are rated for the weight of the load (dependent on the size of machine)

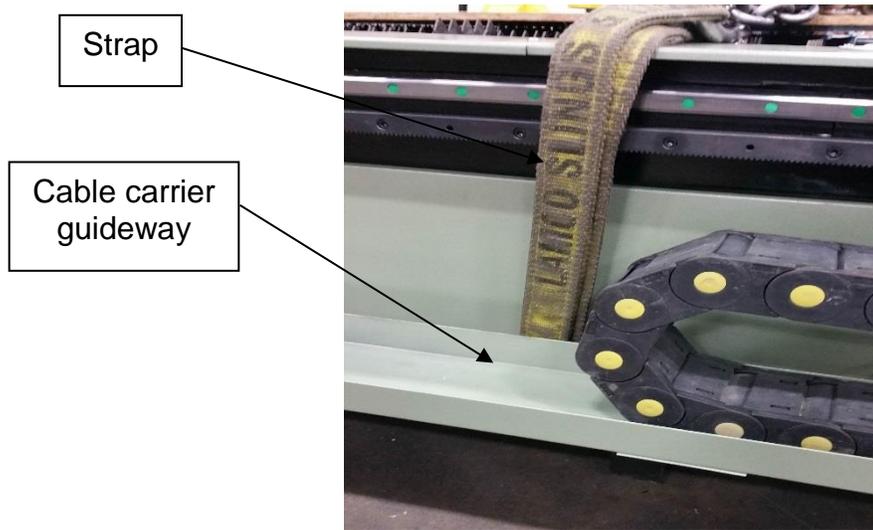
NOTE: Longer lifting straps may be required if the crane does not have hoist chains attached.

3. Slide one of the lifting strap under the machine base close to the gantry side as shown on the picture below.



4. Slide the other lifting strap under the machine base off-centered of machine length.

Note: Ensure both straps are between the cable carrier guideway and frame so lifting the machine will not cause damage to the cable carrier.



5. Take each end of the strap and put chain through them and attach the eye hook back to the hoist chains.
6. Before lifting, make sure straps are even on both sides of the machine and tight underneath the machine and up against the table leg.
7. Move crane close to the center of gravity of load.
8. Use protection (i.e cardboard/heavy blanket) if you feel any scratches or damage could result to machine components while lifting.
9. Begin to lift the machine above the truck bed and confirm that load is not tipping in either direction by doing a complete walkaround.
10. Reposition straps and crane as necessary to keep load stable and balanced.
11. Once the load is balanced and stable, lift the machine clear of the vehicle

CAUTION: Before moving the machine into position, it is essential to plan for the path of travel to ensure that no hazards exist in the path that could result in any damage.

12. Lower the machine to floor level and place it firmly on the ground at the designated area of operation.

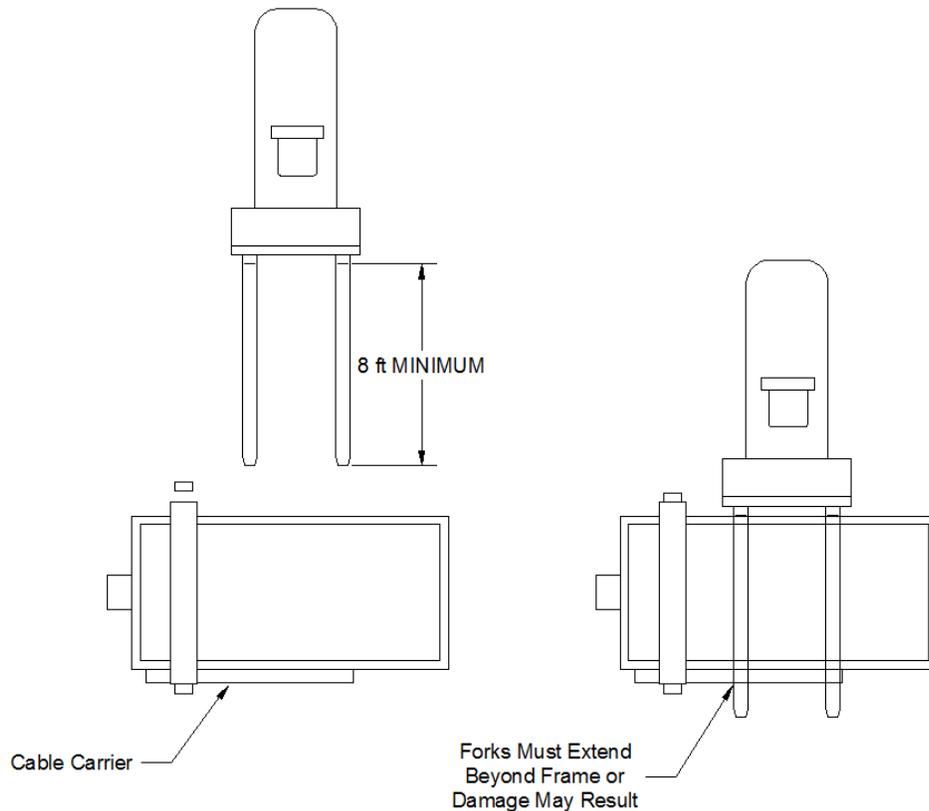
NOTE: Ensure machinery skates are placed in all four corners of the machine base, if they are used.

3.1.2. Lifting with Forklift

CAUTION: A forklift of adequate fork length (**8 ft. minimum**) is required to lift the machine otherwise the frame will get damaged.

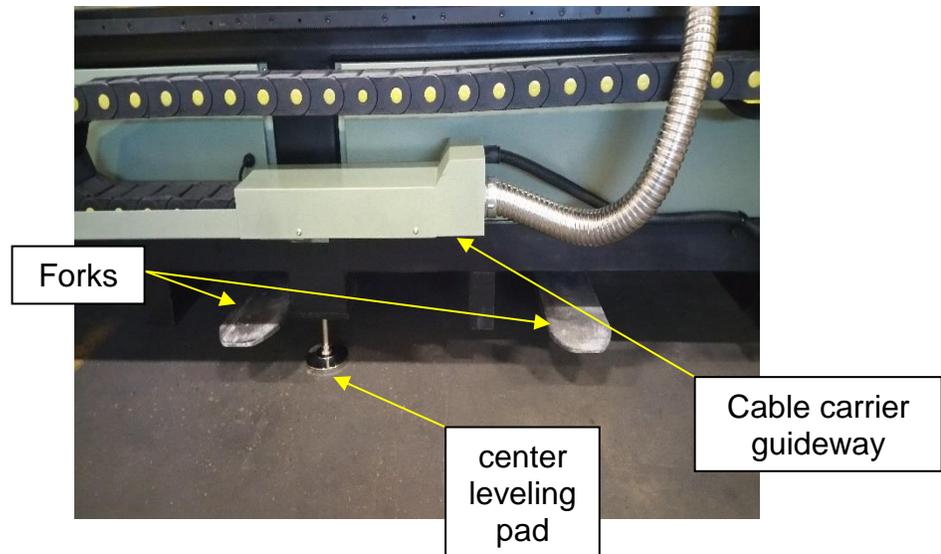
1. Remove securing straps/chains attached to the truck bed.
2. Drive the forklift to the side of the truck at the lifting points shown in the picture below.

NOTE: The forklift must not lift the machine from the cable carrier side, instead lifting must be done from opposite side to prevent damage to the track and guideway.



3. Before lifting, move the forklift close to the frame. You may want to put padding between the forklift and frame to protect the machine from any scratches or damage.

4. Ensure that forks extend all the way through the machine base to the opposite side.



5. Begin to lift the machine above the truck bed and confirm that load is not tipping in either direction.
6. Reposition forks as necessary to keep load stable and balanced, ensure load is picked up as close to the center of gravity as possible.
7. Once the load is balanced and stable, lift the machine clear of the vehicle.

CAUTION: Before moving the machine into position, it is essential to plan for the path of travel to ensure that no hazards exist in the path that could result in any damage.

8. Travel with forks close to the ground so the machine is not suspended very high in the air. This will reduce damage to the machine if accidentally dropped.



9. Install the supplied leveling pads at each corner of the machine by threading them into the bottom of the machine supports. On C408 and C510 models, two additional leveling pads are located in the center of each side.



10. Lower the machine to floor level and place it firmly on the ground at the designated area of operation.

NOTE: *Ensure machinery skates are placed in all four corners of the machine base, if they are used.*

3.2. Unpacking

1. Remove any protective packaging from the machine.
2. Remove straps that are used for securing the gantry and CNC control unit.
3. Move the Plasma unit (if applicable) from the table bed and place it on the floor
4. Lift and move the CNC control to the desired floor area

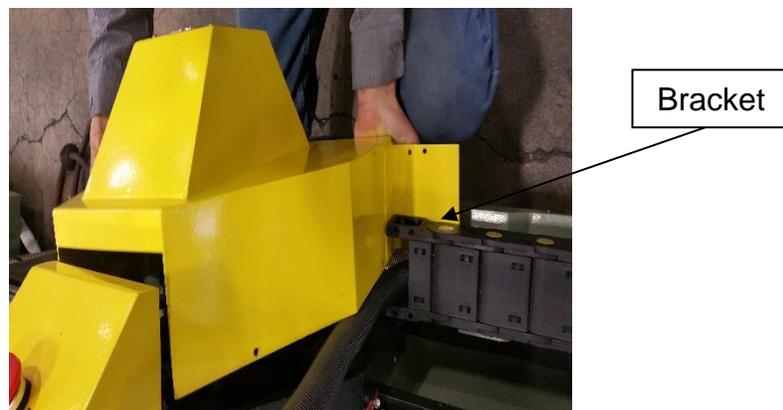
3.3. Installing Covers (5' X 10' only)

To meet the transportation regulations of load size, the motor covers are not pre-installed to the machine for shipment. The following procedure can be followed to install motor covers:

1. Locate both motor covers, 1 for each side. The picture below shows the cover for the motors. The cover for the cable carrier side has an extra bracket attached to it.



2. Take the cable carrier side cover and place it over the motor. Ensure that cables are routed under the bracket as shown in the picture below.



3. Align the side holes and Install M6 button head cap screw on each side of the 2 holes. Then align the holes on the bracket and install the M6 socket head cap screw to attach the cable carrier with the cover bracket.
4. Repeat the above procedure for the other side.

3.4. Leveling

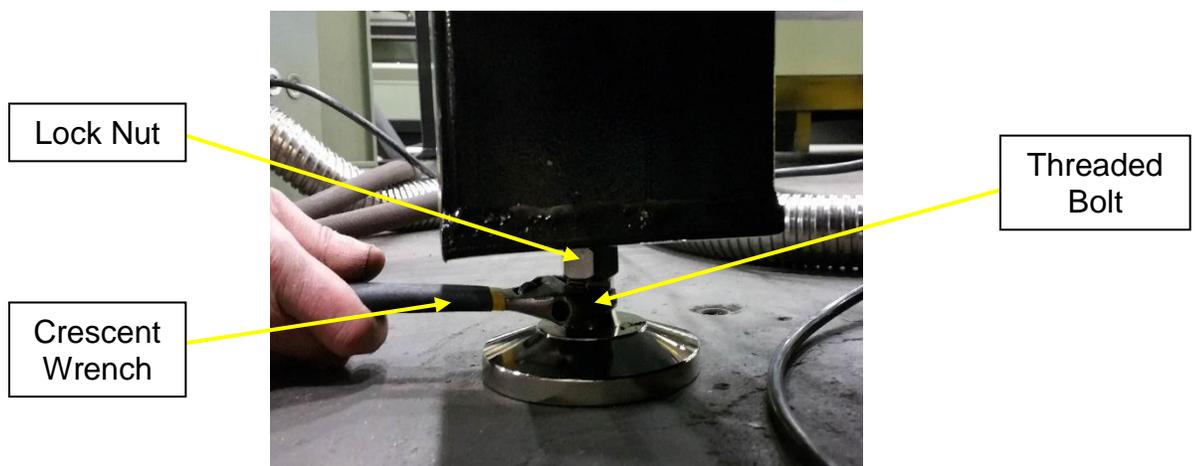
Before starting to level the machine, place your machine firmly on the ground with leveling pads already installed to the designated area where it will be seated permanently for operation.

Procedure:

1. Place level on the y-axis of the machine surface as shown in the picture below.



2. Determine the side that is higher of the two based on the water bubble.
3. Loosen the lock nut on the higher side of leveling pad and drop the height of the pad by rotating the threaded bolt with wrench until the surface is fully balanced. Tighten the lock nut slightly. (Do not fully tighten the lock nut yet)



4. Place level on the x-axis surface adjacent to the leveling pad that was just adjusted in the last step as shown in the picture.

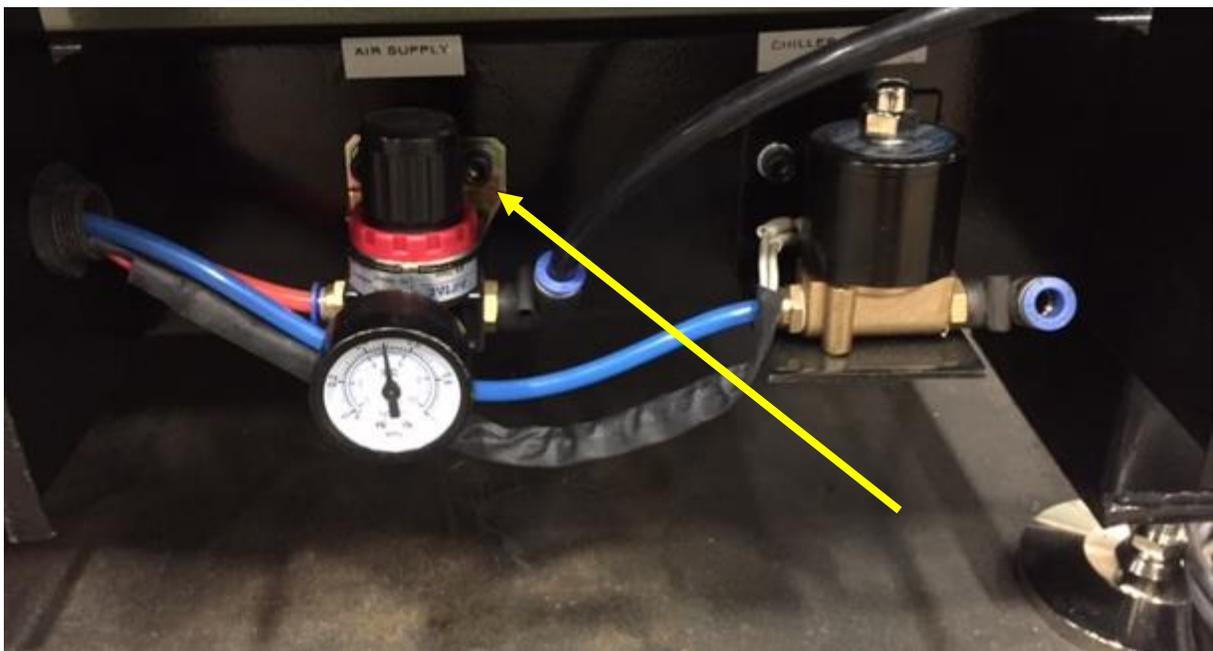


5. Adjust the pad by loosening the lock nut and rotating the threaded bolt with a wrench until the surface is fully balanced. Tighten lock nut in similar manner as before.
6. Place level on the adjacent y-axis surface parallel to the first y-axis and perpendicular to the previous x-axis.
7. Adjust the pad by loosening the lock nut and rotating the threaded bolt with a wrench until the surface is fully balanced and tighten lock nut in a similar manner to the last steps.
8. Move on to the remaining x-axis surface parallel to the first x-axis surface and place a level on it.
9. Adjust the pad by loosening the lock nut and rotating the threaded bolt with a wrench until the surface is fully balanced and tighten lock nut in a similar manner to the last steps.
10. The machine should now be leveled. Lastly, go back and place a level on each surface to verify that the machine is indeed level. Perform any adjustment needed to the corner and center pads. Ensure all leveling pads are firmly placed on the ground.
11. Once machine is fully leveled, go back and tighten all the lock nuts to lock the leveling pads.

3.5. Pneumatic Connection

3.5.1. Air to Machine

1. Install 8mm tubing into the 90-degree fitting on the end of the regulator. If 8mm tubing is not available, remove the 90-degree fitting and replace it with the supplied adapter for 1/4" NPT.
2. Set the pressure on air regulator to above 4.5 bar. Note: the pressure must be above 4 bar always or else CNC control will produce errors and machine will not function.



3.5.2. Air to Plasma Unit

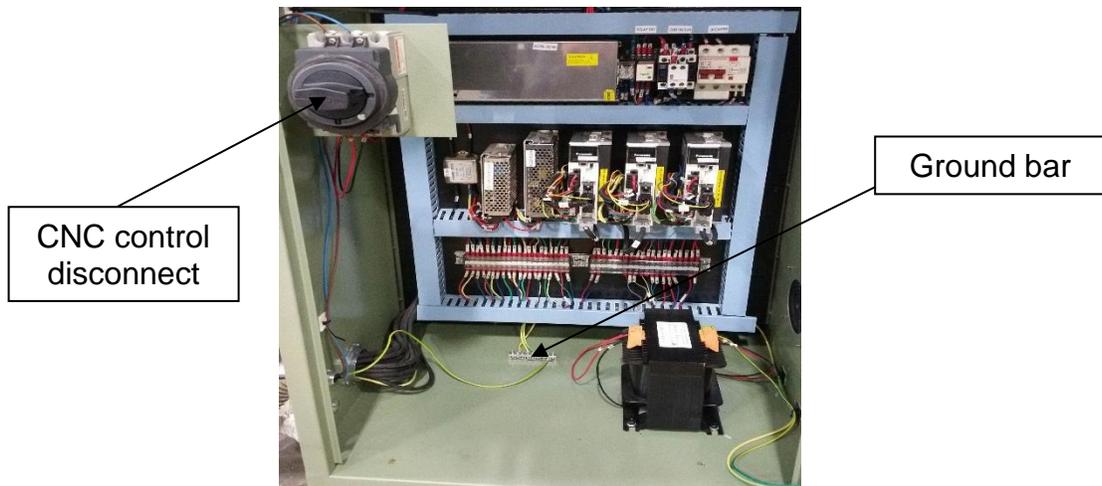
- Refer to the specific plasma system manual for connecting air to the plasma unit.

3.6. Electrical Connection

CAUTION: Do not turn on the main circuit breaker until all the wiring is complete and verified by a qualified electrician.

3.6.1. CNC control

1. Run 230V 10/3 conductor wire through the knockout of CNC control and into the enclosure. This wire should be protected in flexible or rigid conduit.
2. Connect the power and neutral lines to the terminals on the main disconnect.
3. Run the ground wire to the ground bar.
4. Run 10 gauge wire (green or green/yellow) from the ground rod to the ground bar. Connect it at both ends.



5. Connect the other end of the power cord to a dedicated 230V/30A supply line for the machine. Refer to your local Electrical Code for correct wiring instructions.
6. Shut the control door and close the latch. Turn the disconnect on and the interlock will engage.

3.6.2. Plasma Unit

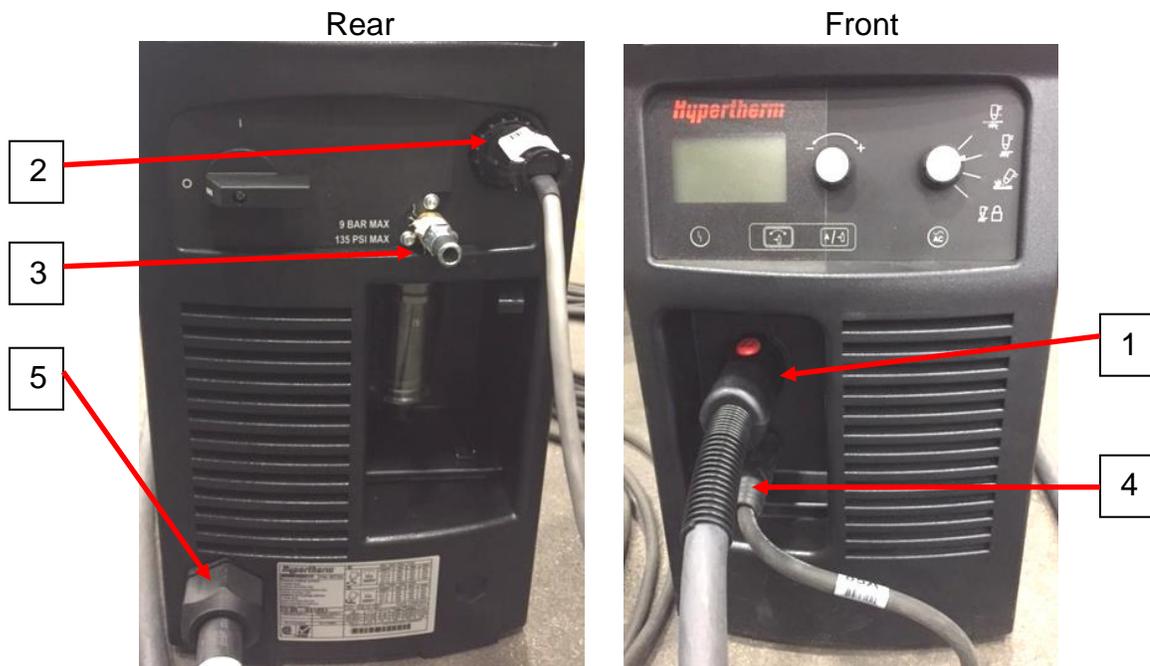
- Refer to the specific plasma system manual for the electrical connections.

3.7. Plasma Connection

IMPORTANT: READ THE INSTRUCTION MANUAL FURNISHED BY THE MANUFACTURER OF THE PLASMA ARC SYSTEM BEFORE PROCEEDING. USE A LICENSED ELECTRICIAN FOR MAKING THE FINAL POWER CONNECTION.

For units with a Hypertherm Powermax plasma system furnished by Piranha:

1. Insert the torch lead (from the cable carrier) into the front of the Hypertherm Powermax power supply
2. Insert the plug from the grey cable into the connection at the top right on the rear of the Powermax power supply.
3. Insert a compressed air line into the rear of the Powermax power supply
4. Connect the ground clamp to the front of the Powermax power supply. The other end (with the spring-loaded clamp) should be connected to one of the slats on the work table (some models may have a separate ground tang for this purpose)
5. Connect the plasma power supply to the appropriate power connection per the manufacturer's instructions using a licensed electrician.



To install a Hypertherm Powermax power supply, not purchased with the machine:

1. Requirements:
 - Hypertherm Powermax 45XP, 65, or 85 power supply with machine torch and 50 ft torch leads. A Hypertherm Powermax 105 or 125 may be used if the optional drop-in water table is purchased.
 - Hypertherm Interface Cable – 25 ft long (Piranha Part Number 230521 / Hypertherm Part Number 228351)
 - 5/8" Diameter Tube Clamp (Qty 1)
 - 1/2" Cord Grip (Qty 1)
 - Licensed Electrician for power connection
2. Insert the torch in the torch holder on the front of the gantry. Clamp the torch so that the gear rack on the torch fits between the split clamp.



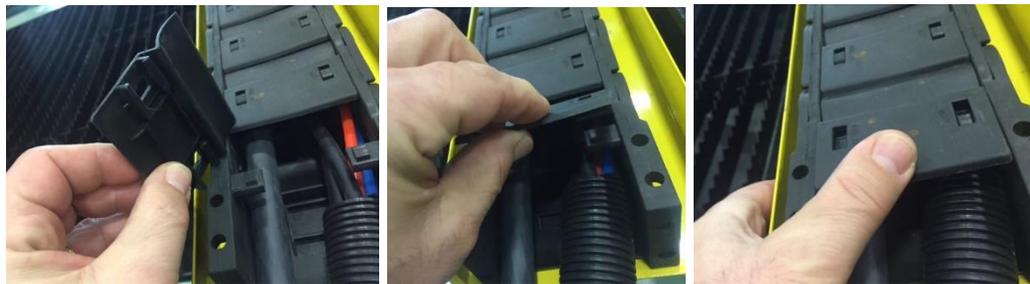
3. Provide a generous loop of the torch lead over the top of the yellow cover so that there is no restriction when the torch lowers all the way to the bottom of stroke. Piranha recommends adding a clamp to keep the torch lead from retracting into the cable carrier at this point. Use one of the screws holding the ventilation cover to mount the clamp.



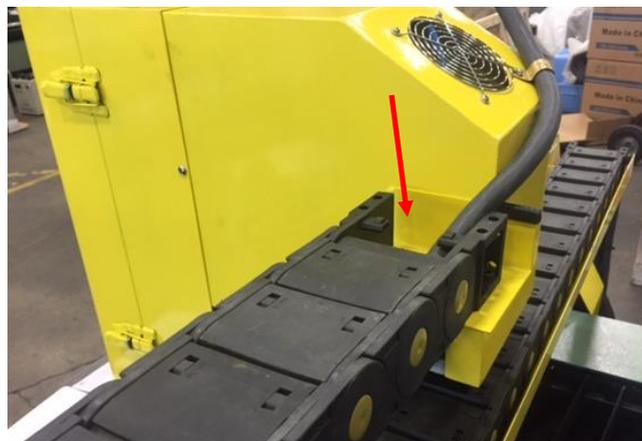
4. Expose the top side of the cable carrier by removing the plastic covers. Use a screwdriver to unsnap the plastic covers by gently prying up in the slots provided.



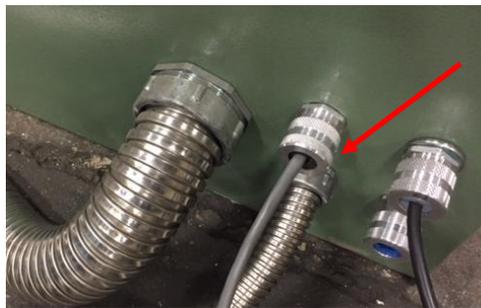
5. After running the torch leads, snap the plastic covers back in place. Take care to make sure that each cover is fully snapped in place.



Leave off the last plastic clip as the torch lead exits each cable carrier (this will give the torch lead a more generous radius as it exits the cable carrier).



6. Insert the opposite end of the torch lead (from the cable carrier) into the front of the Hypertherm Powermax power supply
7. Insert the plug end from the Hypertherm interface cable into the connection at the top right on the rear panel of the Powermax power supply.
8. With power to the machine OFF, remove one of the 7/8" knockouts on the side of the electrical cabinet. Run the other end of the grey cable into the electrical cabinet. Use a 1/2" cord grip at the entrance to the cabinet.



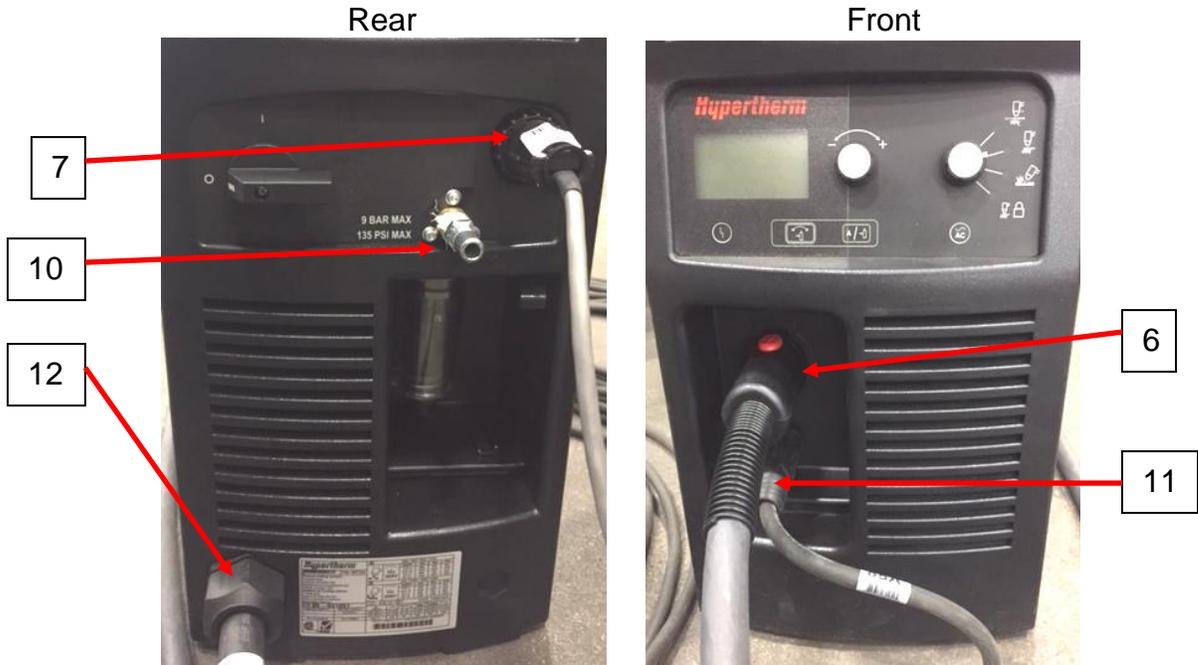
9. Inside the electrical cabinet, connect the terminals from the interface cable to the terminal strip in line with wires 33 through 36. There are three pairs of wires in the Hypertherm cable: Green/Black; White/Black; Red/Black



- Green wire to wire 33; Black wire to wire 34
- Black wire to wire 35; White wire to wire 36
- Red / Black wires are not used and each connection should be separately taped over with electrician's tape.

10. Insert a compressed air line into the rear of the Powermax power supply

11. Connect the ground clamp to the front of the Powermax power supply.
The other end (with the spring-loaded clamp) should be connected to one of the slats on the work table (some models may have a separate ground tang for this purpose)
12. Connect the plasma power supply to the appropriate power connection per the manufacturer's instructions using a licensed electrician.



3.8. Power On

Once all the cables are plugged in, the machine can now be powered on.

1. Close the door on the CNC Control Cabinet
2. Power on the circuit breaker from the supply line.
3. Turn on the CNC control disconnect (NOTE: Door must be closed or interlock will not allow power to be turned on)
4. Ensure all E-stops are out. (Two on the side of the bridge and one on the CNC control)

NOTE: It is important that all the Emergency Stop buttons are disengaged before switching on the power, otherwise errors will be produced and machine will not function.

5. Turn on the power switch



6. Press F2 on the keyboard to get into the manual mode. Once in manual mode, you should be able to jog the gantry and control movement using the arrows keys on the keyboard.

NOTE: Before running the machine, you will need to set machine zero. Refer to the MAINTENANCE section of the manual.

OPERATIONS

Prior to plasma cutting, the operator must prepare the program and machine so that the correct part is cut, the part is cut in the correct location on the raw material, and the part is of good quality. In order to do this, the operator must go through the following checklist:

- ✓ Insert the correct consumables into the plasma torch
- ✓ Set the current and gas pressure on the plasma power supply
- ✓ Load a program into the CNC control memory
- ✓ Jog the machine to the starting location
- ✓ Set the correct initial height and arc voltage on the Torch Height Controller
- ✓ Zero the torch
- ✓ Set the correct cutting speed
- ✓ Set the correct kerf offset

The following chapter will get the operator familiar with navigating the CNC control, and describes how to perform these tasks.

Note that part quality is determined by selection of proper consumables, as well as correct setup of gas flow (air), cutting speed, and height control. Failure to set these correctly will result in poor quality parts, or the inability to cut a part at all. Refer to the Operations Manual of the plasma system for cut charts which supply the correct setting for these parameters. An example of a cut chart is shown below. Make sure you refer to the cut chart for your plasma system – not the information below.

English

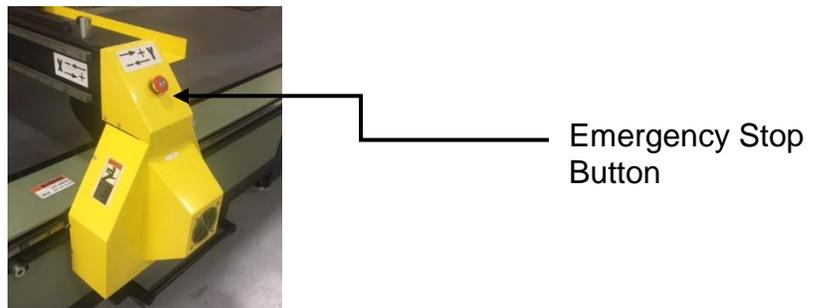
Material Thickness	Torch-to-Work Distance	Initial Pierce Height		Pierce Delay Time	Best Quality Settings		Production Settings		
		in	%		seconds	Cut Speed	Voltage	Cut Speed	Voltage
10GA	0.06	0.15	250	0.2	ipm	Volts	ipm	Volts	
3/16 in					275	122	336	120	
1/4 in				200	122	240	121		
3/8 in				130	122	164	122		
1/2 in		0.18	300	0.5	65	126	80	125	
5/8 in					36	132	48	131	
3/4 in				Edge Start	1.0	28	135	30	134
7/8 in						20	137	24	136
1 in		16	140			19	139		
					11	143	14	141	

1. OPERATOR'S PANEL

The operator's panel is separated into two segments – the keypad and the display. The keypad is there for operator input into the machine control, and the display shows data and information to the operator.



The red Emergency Stop button is located on the right-hand side of the keypad. When this button is depressed, power is removed from the motion components (motors and drives), and the plasma arc is turned off. There are two additional Emergency Stop buttons, one on either side of the gantry. They all perform the same function.



2. POWERING THE MACHINE ON AND OFF

Once the installation phase is complete, the machine can be powered on using the following procedure:

- A. Turn power on by rotating the knob on the main disconnect to the I-ON position. The knob located behind the operator's panel on the pedestal control.



- B. Make sure ALL Emergency Stop buttons are fully out. These can be pulled out by rotating the red button counter-clockwise.

NOTE: *If Emergency Stop buttons are not fully out on power up, the machine will not perform correctly. You will need to power down, pull the buttons out, and then power up again in order to get out of this condition*

- C. Press the top end of the red rocker switch (below the Emergency Stop button) until it latches in place. Power is now on, and you should see the Piranha HOME Page.



3. CNC CONTROL NAVIGATION

The CNC Control menu is located at the bottom of the screen. The blocks shown correspond to the related FUNCTION keys at the top of the Operator's keypad. In order to select the corresponding block, press the FUNCTION key (example: [F1] for AUTO in the diagram below). The ESCAPE function cancels out the active function and returns to the previous page.

The screen is not a touch screen.



The function keys, above, are the options on the main menu. The description of each is shown below:

[F1] AUTO: For cutting operations using a stored program

[F2] MANUAL: For manual operations such as jogging the machine

[F3] EDIT: Edit/Change/Save Files/Load Files

[F4] SETUP: Set or modify cutting parameters

[F5] DIAGNOSE: See the status of Input/Outputs

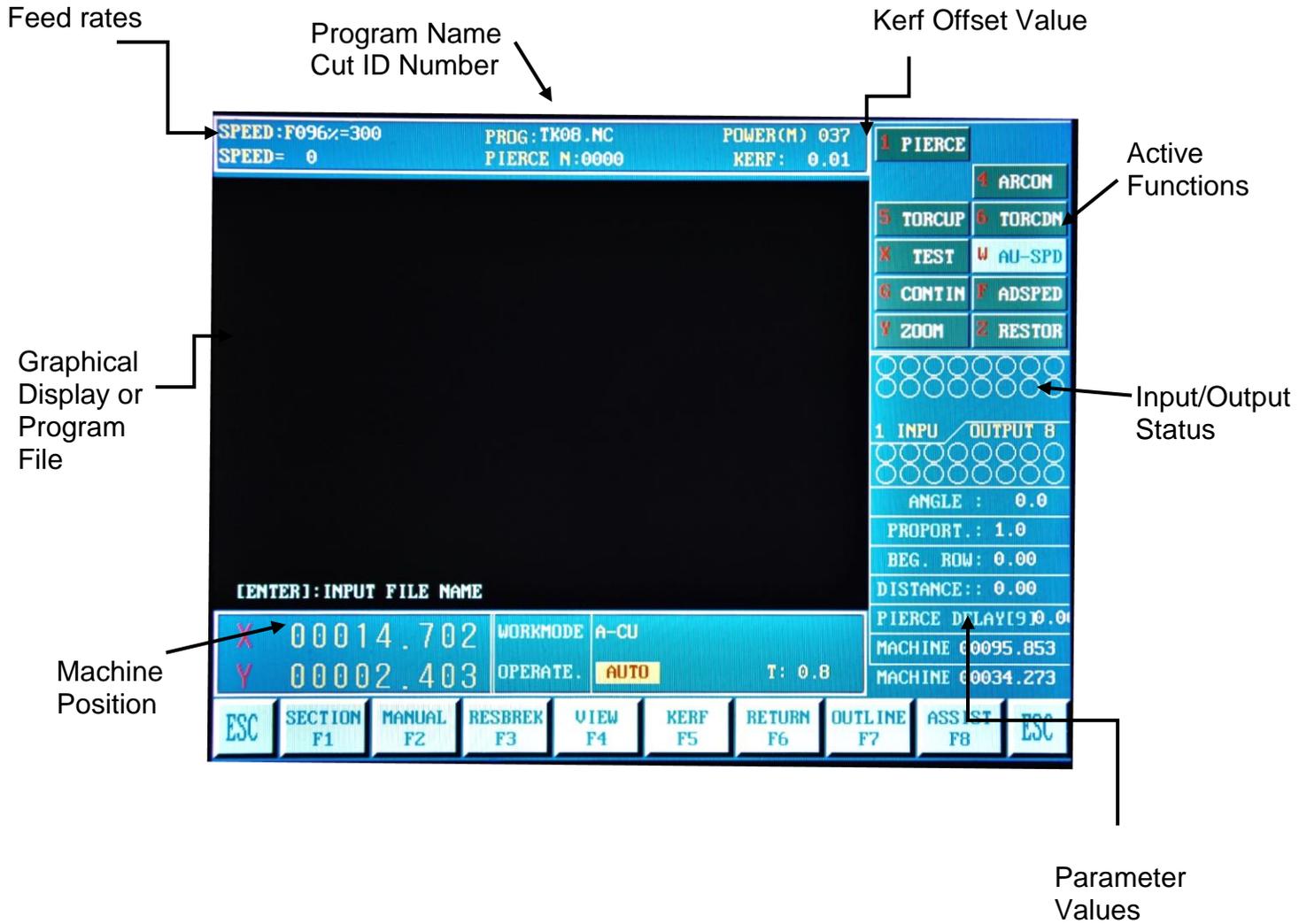
[F6] LIBRARY: Parametric shape library

[F7] NEST: Create or load shapes

[F8] DATABASE: Cut parameter database

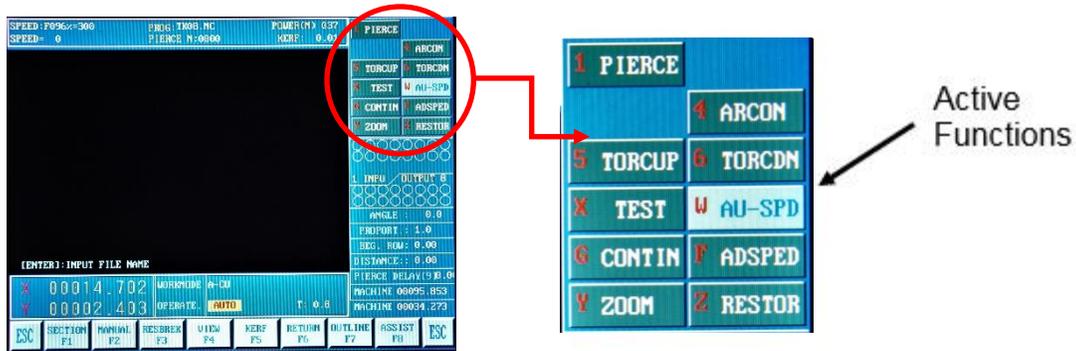
Each of the functions keys has at least one additional sub-menu below it. Navigate by pressing the appropriate function key, and return by pressing the ESC key.

The display provides a great deal of information:



4. ACTIVE FUNCTIONS

There are several active functions that can be used when the machine is in ANUAL mode:



- 1 – Pressing the ‘1’ key will initiate a torch pierce
- 4 – Pressing the ‘4’ key will toggle the arc on and off
- 5 – Pressing the ‘5’ key will jog the torch to the up position
- 6 – Pressing the ‘6’ key will jog the torch down
- X – Pressing the ‘X’ key will toggle the machine between TEST MODE and RUN MODE (see section on TEST MODE (DRY RUN))
- W – Auto Speed Mode (highlights when running at a controlled cutting speed)
- G –
- F – Adjusting Speed Mode (highlights when adjusting speed)
- Y – Two functions:
 1. When in VIEW mode, this allows the operator to zoom in to certain areas of the nest
 2. When not in VIEW mode, this allows the operator to select parameters from the DATABASE
- Z – When in VIEW mode, use the ‘Z’ key to zoom out (after using ‘Y’ to zoom in)

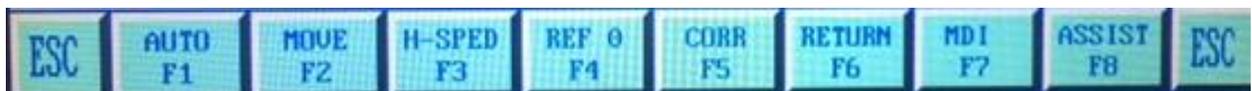
5. OPERATING THE MACHINE IN MANUAL MODE

Manual mode is used to jog the machine without running it from a program. This is commonly used to bring the machine to the operator so that consumables can be changed, or to move the machine out of the way while the operator unloads finished parts, and loads new material.

From the HOME page, select [F2] – MANUAL



When MANUAL is selected, a new menu appears:



In MANUAL mode, you can move the X and Y axes by pressing the arrow buttons on the operator keypad. Make sure that no one is near the machine gantry, and that the torch is all of the way up prior to moving the machine.



Arrow Keys

6. ADJUSTING SPEEDS

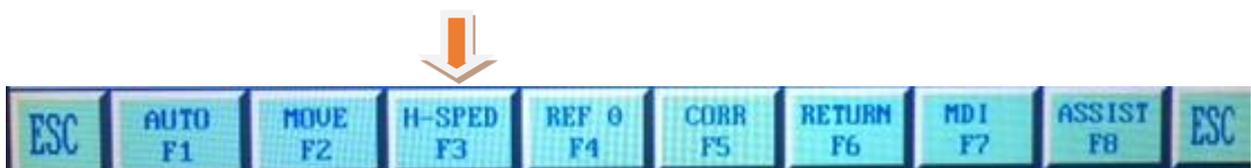
Types of speeds:

- RAPID SPEED – this is the speed that the machine uses when traversing between cuts (going from the end of one cut to the beginning of the next)
- CUTTING SPEED – this is the speed at which the machine moves when the plasma torch is cutting (refer to the plasma system manufacturer’s cut charts for cutting speed information)
- JOG SPEED – this is the speed at which the machine moves when manually moving the machine with the arrow keys

In the MANUAL menu, when H-SPED is selected, the button is highlighted with a dark blue background, and the RAPID SPEED can be adjusted as a percentage of the MAXIMUM TRAVERSE SPEED using the F+ / F- buttons.



When H-SPED is not selected, the button is no longer highlighted and the cutting speed can be adjusted as a percentage of the active cutting speed using the F+ / F- buttons.



When H-SPED is selected, the JOG SPEED is the same as the RAPID SPEED.
When H-SPED is not selected, JOG SPEED is the same as CUTTING SPEED.

7. USING THE TORCH HEIGHT CONTROL

The torch height control serves three functions:

- a. Jogs the torch up and down
- b. Locates the torch to the correct position prior to initiating the arc
- c. Maintains the proper standoff between the torch and the workpiece while cutting



The Display of the torch height control (on the left-hand side of the panel) shows the status of the height control. The buttons, switches and dials on the right-hand side are the controls for the operator to adjust and test the system. The “lights” refer to the round digital display buttons located in the “current state” display in the diagram above.

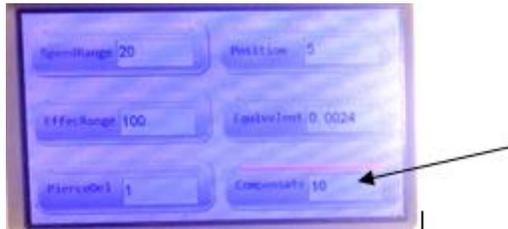
Current State Display

- Manu:** without an automatic signal from the CNC control, the light is on.
- Auto:** when receiving automatic signal from the CNC control, the light is on (this only lights up when the torch is cutting).
- Up:** when manual up, the light is on.
- Down:** when manual down, the light is on.
- Lim+:** when torch up, the motor gets to upper limit, the light is on.
- Lim-:** when torch down, the motor gets to lower limit, the light is on.
- Zero test:** press Zero Test button, the light is on.
- Arc:** when arc voltage is detected, the light is on

Prior to cutting, the operator must set the initial pierce height, pierce delay and the arc voltage which establishes the cutting height:

Setting initial height control and pierce delay:

- a. Rotate the INTERFACE/PARAMETER SHIFT dial until the following screen shows. Continue to rotate it until the orange indicator is displayed above the POSITION location.
- b. Adjust the POSITION value using the SENSITIVITY dial. The POSITION value is shown in millimeters, so you will need to convert the desired value from inches to millimeters if your cut chart shows inches. For example, if the cut chart calls for an initial pierce height of 0.200", adjust the POSITION value to 5mm. Actual height may vary slightly, and minor adjustments may need to be made to achieve the desired pierce height.
- c. Verify that COMPENSATE is set to 10.



- d. Return to the CURRENT STATE display by pressing the ZERO TEST button.



- e. Press the ZERO TEST button again to verify the initial torch height is correct (make sure there is material below the torch)

Adjusting Arc Voltage

- a. With the display showing the CURRENT STATE, rotate the HEIGHT dial until the arc voltage on the display reads the same as the desired arc voltage in the cut chart

Notes: SENSITIVITY should be set nominally to 10. Lower numbers mean that the torch will react less quickly. Higher numbers will make the torch height adjust more quickly (however this may cause vibration or oscillation in the drive).

8. SETTING PIERCE DELAY

The Pierce Delay parameter is in the SETTINGS portion of the CNC Control.

1. Determine the correct value for Pierce Delay from the Plasma OPERATION MANUAL cut charts. ADD 1.2 seconds to the value in the chart.
2. From the Main Menu, select [F4] SETUP



3. Select [F4] PLAS from the next menu



4. Change the value for PIERCE TIME to the desired value

Alternatively, the pierce delay can be changed at the AUTO [F1] screen:



Press 9 to edit the value for Pierce Delay. Type in the new value and press ENTER.

9. PREPARING THE PLASMA TORCH FOR CUTTING

Prior to making the first cut, be sure to read the OPERATION MANUAL from the supplier of the plasma cutting power source and torch. Be familiar with all safety aspects of plasma cutting including eye protection, electrical safety, heat, and respiratory protection.

When getting ready to cut a piece of material, use the CUT CHARTS found in the OPERATION MANUAL from the plasma power supply manufacturer. An example of a cut chart is shown below:

English

Material Thickness	Torch-to-Work Distance	Initial Pierce Height		Pierce Delay Time	Best Quality Settings		Production Settings	
		in	%		seconds	Cut Speed	Voltage	Cut Speed
10GA	0.06	0.15	250	0.2	275	122	336	120
3/16 in					200	122	240	121
1/4 in				130	122	164	122	
3/8 in				65	126	80	125	
1/2 in		0.18	300	0.5	36	132	48	131
5/8 in				1.0	28	135	30	134
3/4 in		Edge Start			0.2	137	24	136
7/8 in					16	140	19	139
1 in					11	143	14	141

Using this information, the operator would set up the prepare the plasma system as follows:

- Verify that the correct plasma consumables are in the torch per the instructions in the plasma system OPERATION MANUAL.
- Turn the plasma power supply ON
- Adjust the amperage on the plasma power supply to the desired amperage
- Adjust the cutting speed on the CNC control to the desired cutting speed from the table
- Set the Pierce Delay time in the CNC control per the OPERATION MANUAL
- Set the Arc Voltage setting on the height control to the appropriate voltage in the table
- Set the Initial Pierce Height on the height control to the appropriate value in the table
- Set Height Control to AUTO
- When finished, do a “Tip Touch” using the height control at the starting position of the part program

10. METHODS OF SELECTING PROGRAMS

There are three methods of selecting programs:

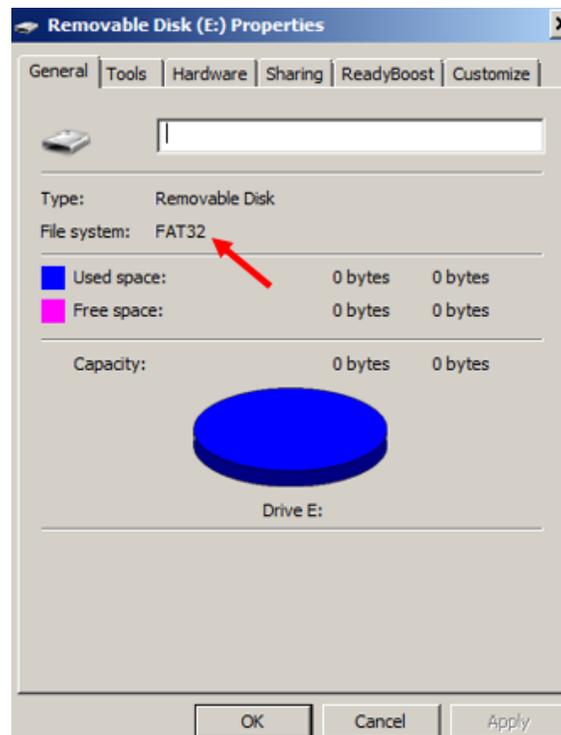
- A. Selecting a pre-programmed part or nest from the USB drive
- B. Selecting a file from CNC Control memory that has already been saved in the control
- C. Selecting a program from the Parametric Shape Library

A. SELECTING A PROGRAM FROM USB DRIVE



Insert a USB Thumb Drive into the slot on the CNC Control

IMPORTANT: The USB Thumb Drive must be formatted to FAT32 File System or the CNC Control will not read the thumb drive. To check this, insert your thumb drive into your computer's USB port, right click and select "Properties". The following screen should appear.



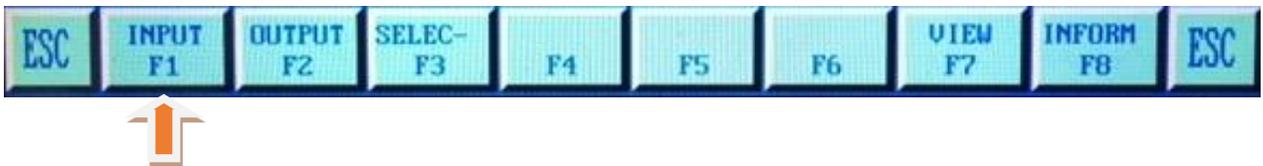
From the MAIN SCREEN, Select [F3] EDIT:



From the EDIT SCREEN, Select [F6] USB:



From the USB SCREEN, Select [F1] INPUT:



From the INPUT SCREEN, use arrow up/down to highlight program to be loaded and select [F1] COPY. Press ENTER to view the Program CODE:

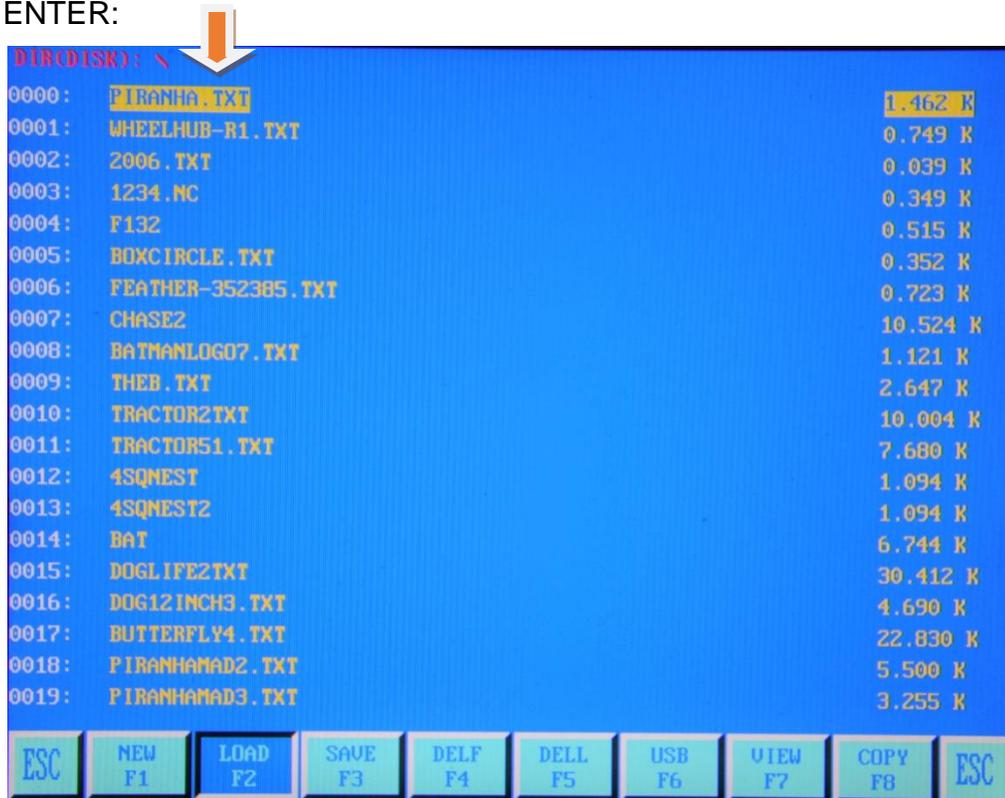


B. LOADING A PROGRAM FROM CONTROL MEMORY

From the EDIT SCREEN, Select [F2] LOAD:



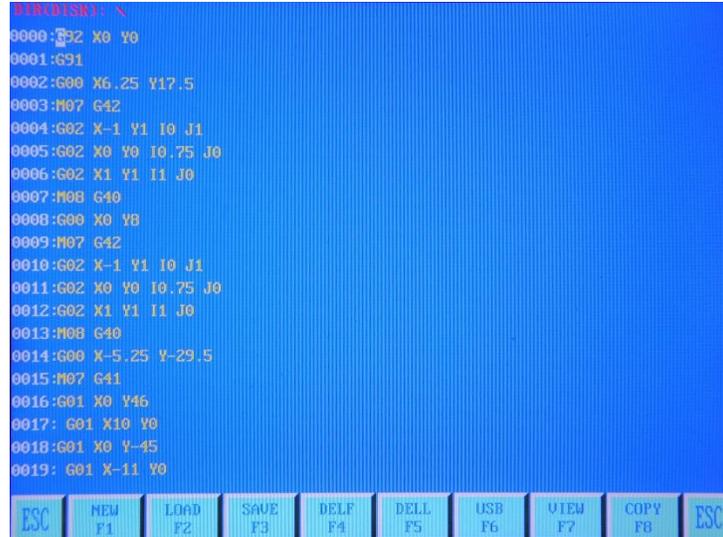
From the LOAD SCREEN, use arrow up/down to highlight program to be loaded and press ENTER:



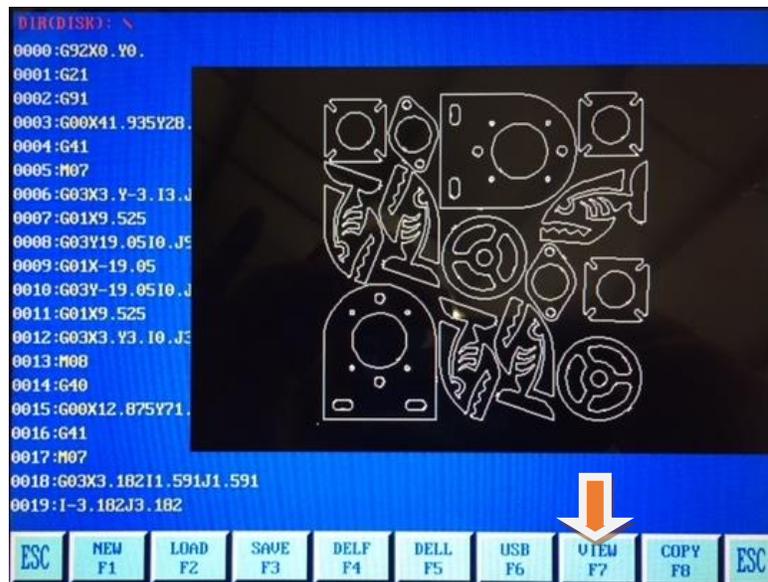
After pressing ENTER, the selected program will be loaded, and the Program Code will display:

```

DIR(DISK): N
0000:G32 X0 Y0
0001:G91
0002:G00 X6.25 Y17.5
0003:M07 G42
0004:G02 X-1 Y1 I0 J1
0005:G02 X0 Y0 I0.75 J0
0006:G02 X1 Y1 I1 J0
0007:M08 G40
0008:G00 X0 Y8
0009:M07 G42
0010:G02 X-1 Y1 I0 J1
0011:G02 X0 Y0 I0.75 J0
0012:G02 X1 Y1 I1 J0
0013:M08 G40
0014:G00 X-5.25 Y-29.5
0015:M07 G41
0016:G01 X0 Y46
0017: G01 X10 Y0
0018:G01 X0 Y-45
0019: G01 X-11 Y0
    
```



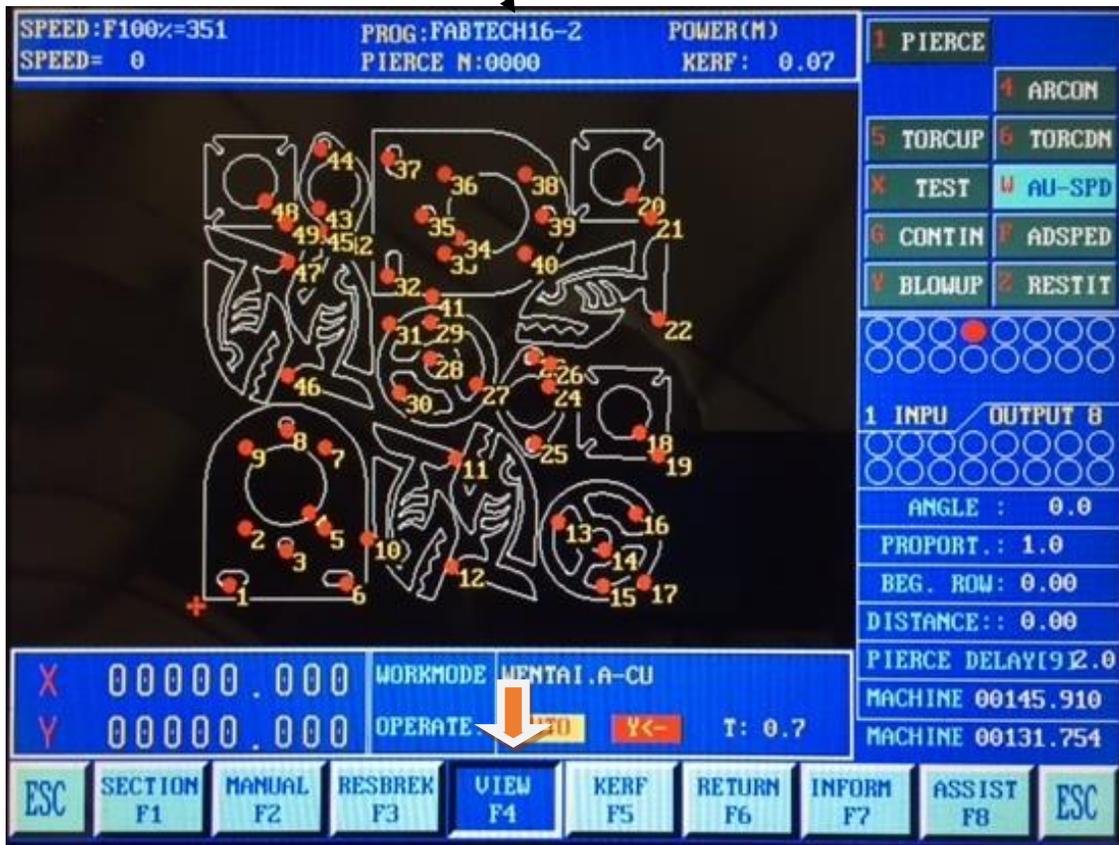
Pressing [F7] VIEW, will display a graphical representation of the program:



Once done, press ESC twice to return to the AUTO SCREEN.

From the AUTO SCREEN, pressing [F4] VIEW will display a graphical representation of the Loaded Program. The red dots with numbers show the pierce points and cut order. The red crosshairs show the program zero location (location the operator needs to set PROGRAM ZERO).

Loaded Program



C. LOADING A PROGRAM FROM THE PARAMETRIC SHAPE LIBRARY

The CNC Control has several common shapes that are used in the Metal Fabrication industry. The size of the features within each shape can be adjusted easily in order to achieve customer requirements.

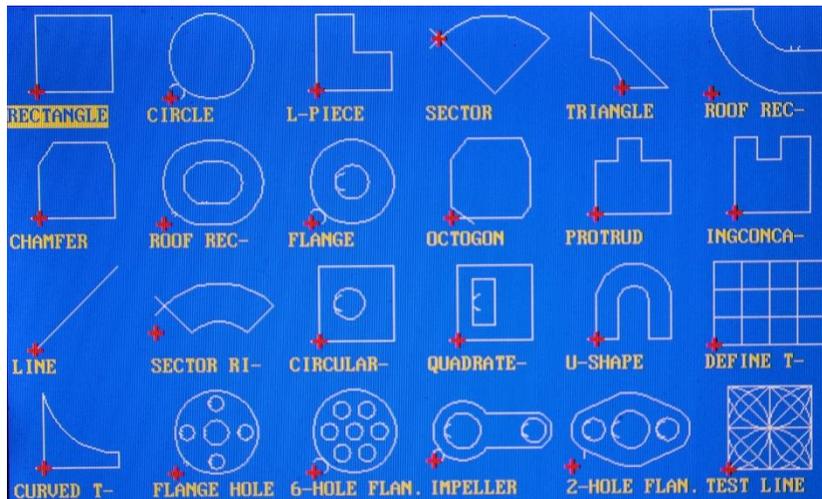
1. Choose F6 [LIBRARY]



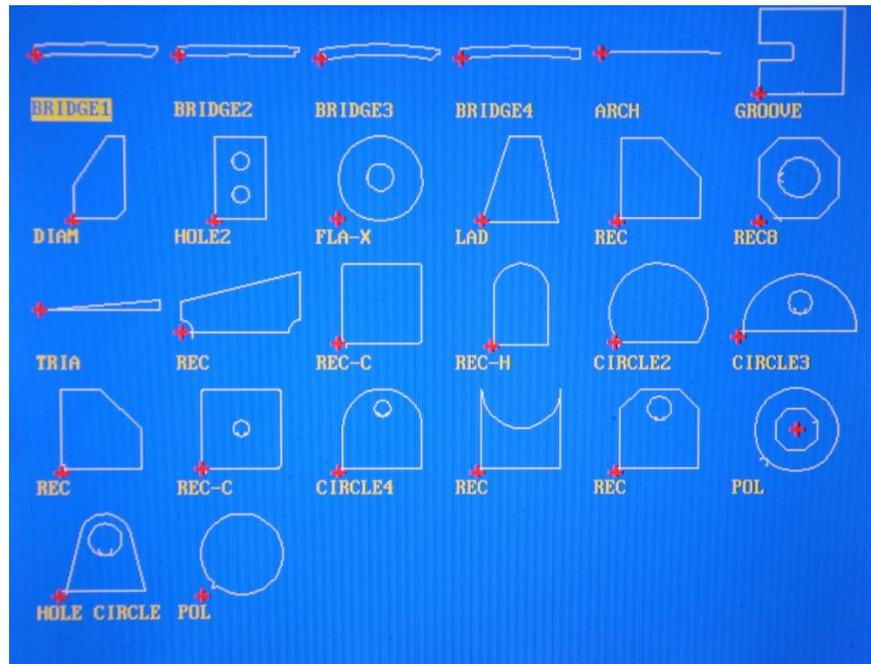
2. There are two pages of shapes to choose from:



Shapes in Library 1:



Shapes in Library 2:

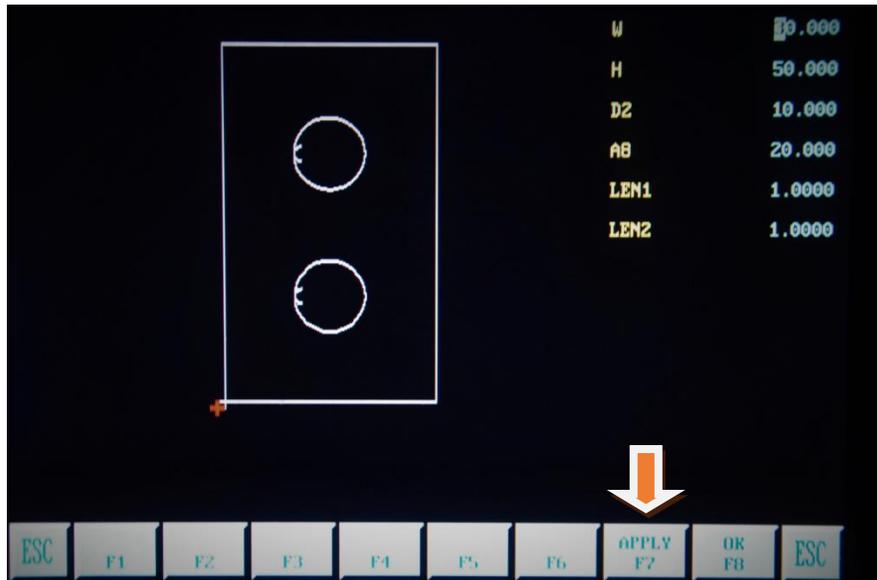


3. To select a shape, use the arrow keys to highlight the name of the shape, and press [ENTER]
4. This is the shape from HOLE2 located in Library 2. In this shape, the holes are centered on the rectangle. Parameters are as follows:

- W – Width
- H – Height
- D2 – Diameter of the two holes
- A8 – Vertical distance between the holes
- LEN1 – Lead-in Distance (initially – try 1/4" to start and adjust from there)
- LEN2 – Lead-out Distance (initially – try 1/4" to start and adjust from there)



5. Select each parameter by using the up and down arrow keys. After each parameter is changed, press the [ENTER] key. Once the changes are made, press F7 [APPLY] and the geometry will update to the new values.



6. Once you are satisfied with the geometry, press F8 [OK] and you will be directed to the HOME screen.
7. At this point, the geometry of the part has NOT been saved. While it can be run on the machine, it cannot be nested, modified, or used later. In order to save it, see the section on Editing Programs and File Management.
8. The program can now be run in AUTO mode.
9. A complete list of the shapes and parameters for the parametric shape libraries is found in [Appendix B](#).

10. SAVING AND EDITING FILES

Once a file has been loaded on the control, or created using the SHAPE LIBRARY, it is important to save the file on the control. That way, the program can be called up again in the future, and it will be still in the control in case the power is cycled off and on. This also allows the operator to use the NESTING function on the control.

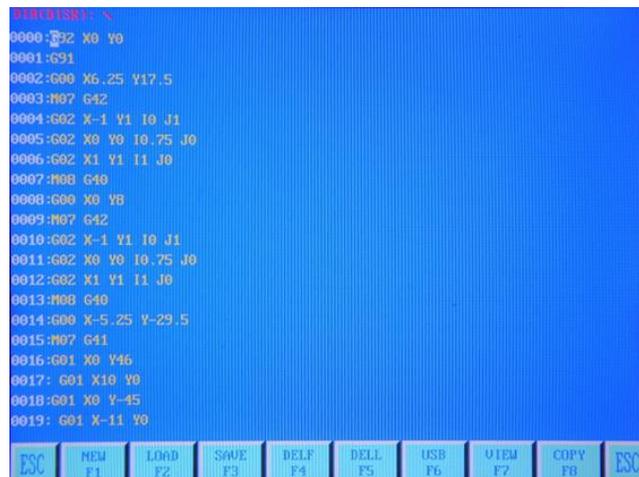
1. After a program has been selected from the USB drive, or from the Shape Library, go to the HOME screen and select F3 [EDIT]



2. The display should now show the part program. If the operator has familiarity with M code and G code programming, the program can be edited just as a normal text file can be edited on a home computer. Do not try to edit a program if you are not familiar with M code and G code programming. See the PROGRAMMING section of the manual for M codes and G codes used on this machine.

```

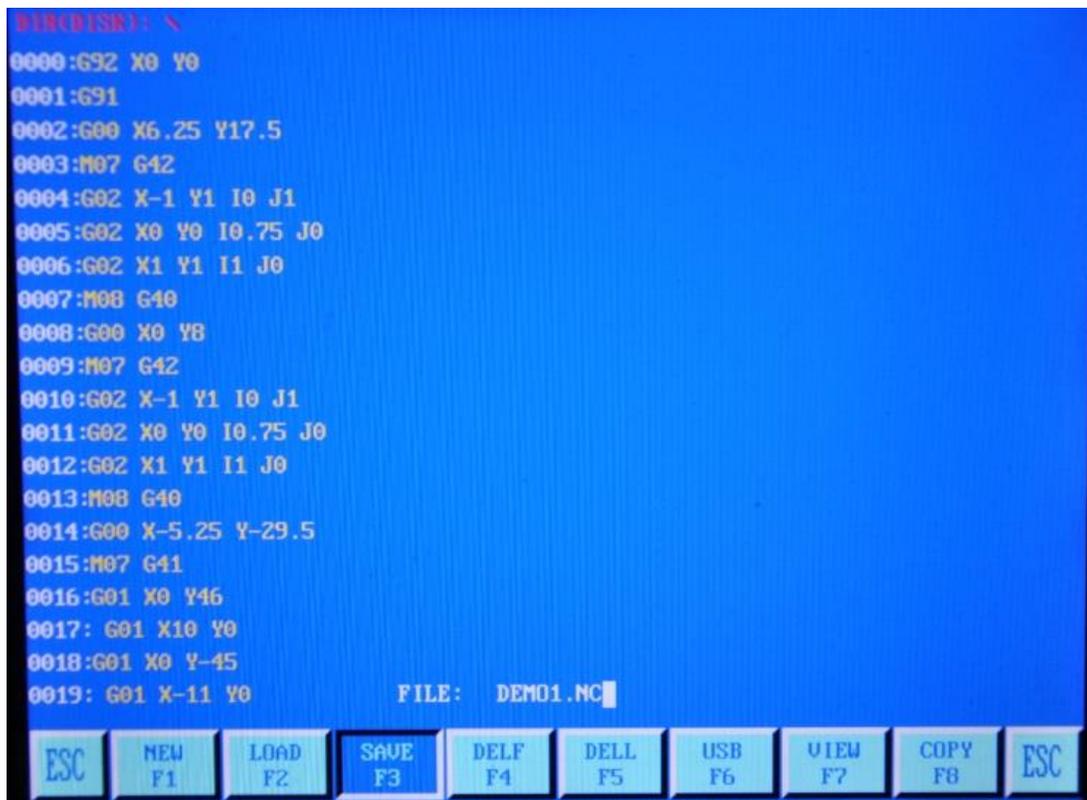
PROGRAM: X
0000:G02 X0 Y0
0001:G91
0002:G00 X6.25 Y17.5
0003:M07 G42
0004:G02 X-1 Y1 I0 J1
0005:G02 X0 Y0 I0.75 J0
0006:G02 X1 Y1 I1 J0
0007:M08 G40
0008:G00 X0 Y0
0009:M07 G42
0010:G02 X-1 Y1 I0 J1
0011:G02 X0 Y0 I0.75 J0
0012:G02 X1 Y1 I1 J0
0013:M08 G40
0014:G00 X-5.25 Y-29.5
0015:M07 G41
0016:G01 X0 Y46
0017:G01 X10 Y0
0018:G01 X0 Y-45
0019:G01 X-11 Y0
  
```



The image shows a control panel with a screen displaying a part program. The screen shows a series of G and M codes. Below the screen, the control panel buttons are visible: ESC, NEW (F1), LOAD (F2), SAVE (F3), DELF (F4), DELL (F5), USB (F6), VIEW (F7), COPY (F8), and ESC.

3. Entire lines can be deleted by pressing F5 [DELL] (DELEte Line)
4. The entire file can be deleted by pressing F4 [DELF] (DELEte File)

- The program can be saved by pressing the F3 [SAVE] button. When this happens, a text box appears and the operator can type in the desired file name and press [ENTER].



Note: Be sure that the program name is not already taken in the directory. If you type in an existing file name, the new program will overwrite the previous program.

SETTING PROGRAM ZERO

Part programs have a zero-starting point for (X0, Y0). This is identified by a red cross-hair on the screen, so the operator can see where zero is located relative to the parts cut within the program. This zero location must be set before starting the program. Program zero can be set from AUTO or MANUAL mode selections.



From MANUAL mode, position the axis at the desired program zero location and press the REF 0 button.



From AUTO mode, press the MANUAL mode button.



Position the axis at the desired program zero location and press the REF 0 button.



Press the AUTO button to return to the automatic menu.



12. SETTING KERF OFFSET

When plasma cutting, a kerf (or opening) is produced by the plasma arc. The cutting current and cutting speed, as well as the diameter of the orifice in the plasma torch nozzle determine the width of the kerf. Typically, the amount of offset will range from 0.040" (1.0 mm) to 0.060" (1.5 mm) when cutting mild steel (refer to the plasma cutting system manual for recommended kerf offsets). If the cutting path is not modified to compensate for the kerf width, the completed cut will be undersize (for external cuts) or oversize (for internal cuts) by the amount of the kerf width. The machine control compensates for the kerf width without the need to redefine the actual path. The operator must enter the desired compensation amount into the control using the following procedure.

Kerf offset can be set from Automatic operation menu.



Press the KERF button.



Enter the offset for the Kerf in the GAP EXPIATE entry area and press enter when finished.



After entering the value, it is a good idea to run a test square (approximately 4" square) and measure the size of the part. If it is undersize, then the kerf value is too small and the operator should add to it. If it is oversize, then the kerf value is too large and the operator should subtract from it.

13. AUTOMATIC OPERATION

Before starting the machine in automatic operation, the program zero must be set, the kerf offset must set, and the correct program must be selected. Please refer to SETTING PROGRAM ZERO, SETTING KERF OFFSET and SELECTING A PROGRAM sections in this manual for further information.

Set the machine to AUTO [F1] mode from the HOME screen.



Prior to cutting the part, it may be desired to test run the program without cutting. See the section on TEST MODE (DRY RUN) to test run the program.

Pressing the green CYCLE START button at this point will start the program execution.



14. STOPPING THE MACHINE

During operation, the machine can be stopped by either pressing the red CYCLE STOP button on the operator panel or by pressing one of the three EMERGENCY STOPS. The EMERGENCY STOP button immediately turns off all power to the drives and plasma torch. The Red CYCLE STOP button pauses the machine and turns off the torch.



15. BREAK POINT RESUME

After the system is paused from a CYCLE STOP, EMERGENCY STOP, or POWER OFF, the system saves the current torch position as a breakpoint. The breakpoint will remain active even if the system is turned off. If the program selected after power off is different from the program prior to power off, then the breakpoint will be lost.

To use the BREAK POINT RESUME function the control must be in AUTO mode.



Press the RESBREK button



If the current program matches the last program to run and the torch has not been moved, then pressing the green CYCLE START button will continue the program from the break point



If the torch has been moved, the following dialog will display.



Use the arrow key to select one of these options:

1. The first option is ORI PATH RET (original path return). With this selection, the system will return the torch to where it stopped cutting.
2. The second option is CUT RET, with this selection the system will pierce at its current location and move in a straight line at cut speed to the breakpoint and then continue with the programmed contour.
3. The third option is HOLE HERE, with this selection the system will pierce in its current location and shift the machine coordinates such that the breakpoint is located at the current pierce location and the program will continue the contour from this pierce location.

After selecting the correct option with the arrow key, press the ZERO TEST on the torch height control to re-establish cutting height. Then Press '1' to pierce and continue the program.

16. NESTING

The CNC control has a nesting function where parts can be automatically placed on a sheet of material for cutting. This can be used with items within the Shape Library, or with items that are programmed using the FastCAM programming system.

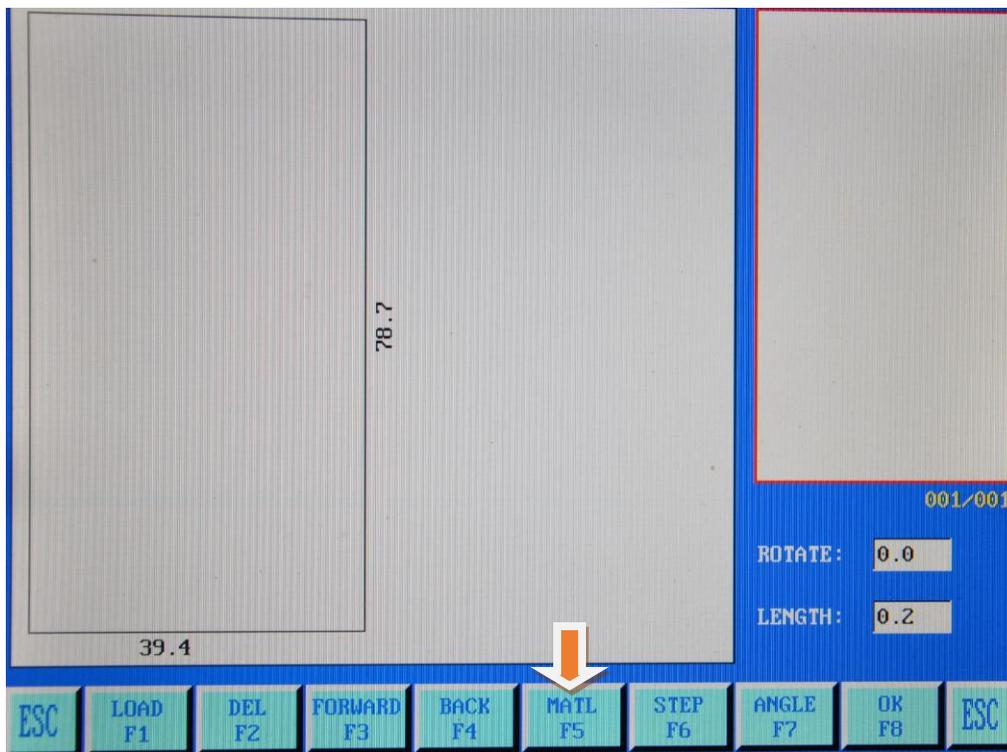
NOTE: *It is important that all individual part programs used in the nesting system return to the program zero point at the end of the program. Failure to do this will result in unusable nests.*

Use the following sequence to create nests:

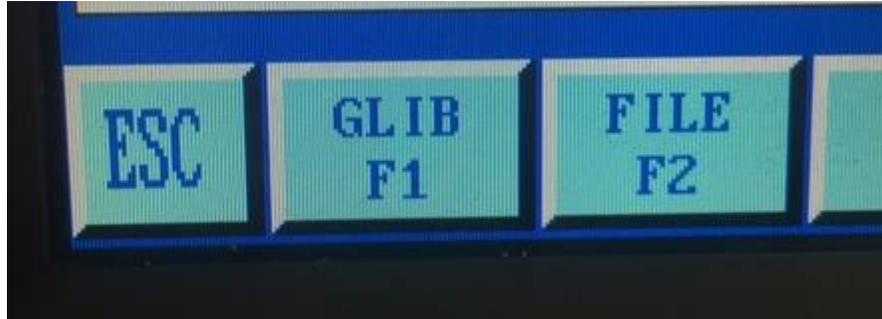
1. From the HOME page, select F7 [NEST]



2. The following screen will appear. Press the F5 [MATL] key to adjust the size of the plate.

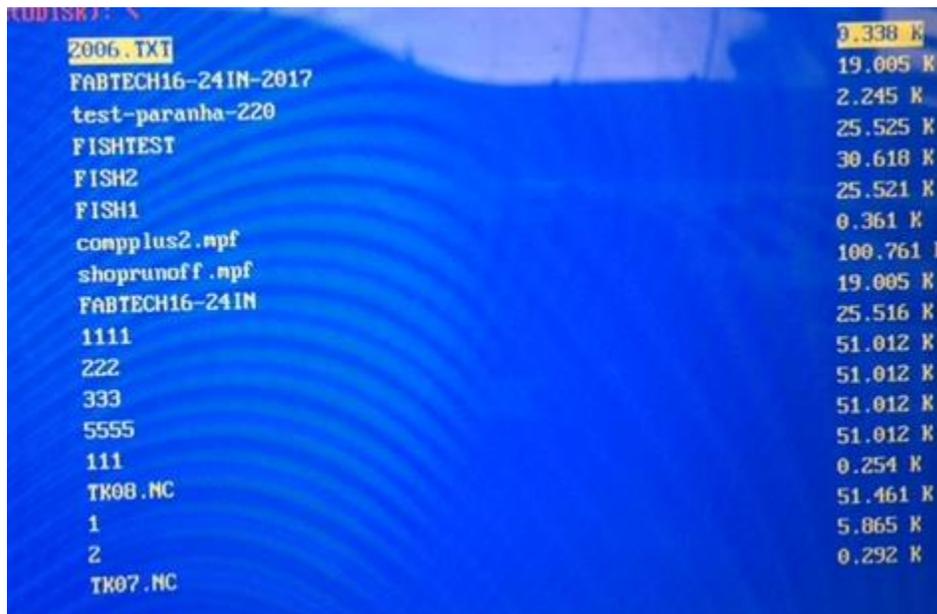


3. Select the part program you wish to nest. This can be from the Shape Library (F1), or from a File (F2).

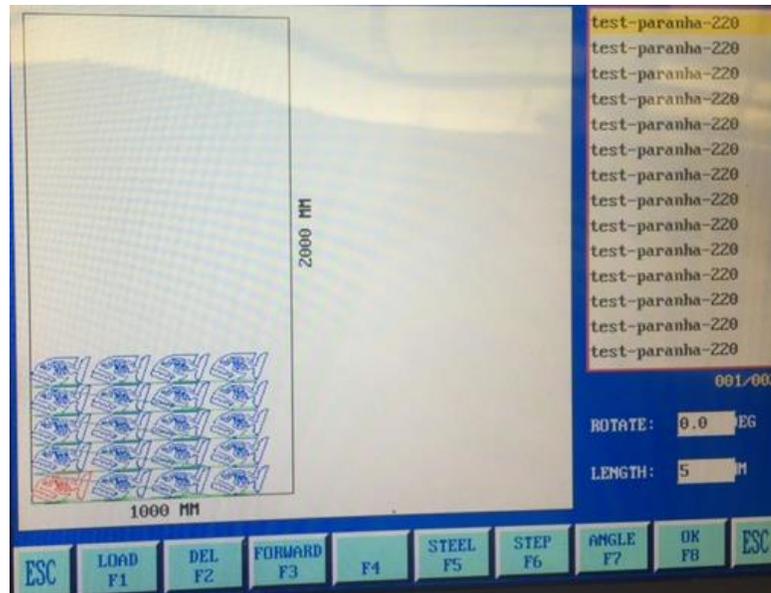


NOTE: Only files from Shape Library #1 can be entered using the F1 key. If shapes are required from Shape Library #2, you must create the shape inside Shape Library #2 and save it to a file first. Then you can nest that part by choosing F2 File (see 4 below).

4. Select the Saved File you wish to nest and press [ENTER]:



5. You will be prompted to input the number of parts. Type in the number of parts you wish to cut and press [ENTER]. The screen will then populate the parts onto the raw material:



6. Individual parts can be modified by selecting the part with the up and down arrow keys to select the part (on the right-hand side of the screen) and edit as follows:
 - a. F2 [DEL] – Deletes a part
 - b. F3 [FORWARD] – Moves the part in the cut order
 - c. F7 [ANGLE] – Rotates the part
7. Additional (different) parts can be added by loading more parts. Use the F1 [LOAD] key to add more parts.
8. Once you are satisfied with the nest, press F8 [OK]. You will be prompted for a file name to save the nest.
9. You can now run the nest in AUTO mode.

NOTE: Nesting has the following limitations:

1. A maximum of 100 pieces / parts can be placed in a single nest
- 2.

17. TRIM CUTS

Use the following procedure to manually trim areas of the raw material (for example, trimming the used skeleton in order to save a remnant):

1. Press F2 [MANUAL]



2. Move the torch to the area you wish to begin by using the arrow keys. If you want to start on the edge of the material, move the torch above the material near the location you wish to begin. It is important that the torch is located above clean material.



3. On the Torch Height Control, switch the AUTO/MANUAL switch to MANUAL



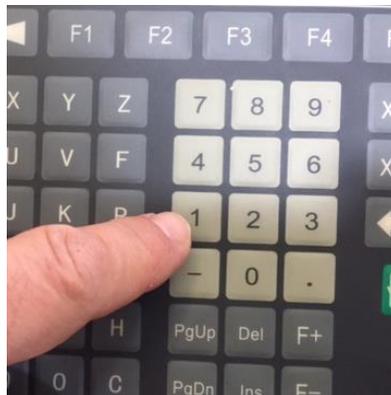
4. On the Torch Height Control, press the ZERO TEST button. The torch should contact the material and move to the initial pierce height.



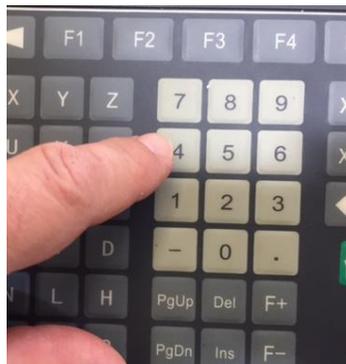
5. If edge starting, move the torch to the edge of the material you wish to pierce by using the arrow keys. Do not move too far away from the location you zeroed the torch.
6. Set the cutting speed by using the F+ / F- buttons until the desired cutting speed is shown in the upper left hand corner of the screen.



7. Press the (1) button to ignite the torch.



8. Move the torch by using the arrow keys. Only one axis (X or Y) can be moved at a time. During this process, you may wish to change the Torch Height Control back to AUTO (this must be done after cutting begins)
9. When reaching the end of the cut, press the (4) button to extinguish the arc.



18. SAVING CUT PARAMETERS

There is a Material Library located in the CNC Control. This material library allows the operator to save cut conditions (Cutting Speeds, Arc Voltage). The Cutting Speed can then be loaded for any program – the Arc Voltage is a quick reference to be used to set the Torch Height Control.

1. From the HOME screen, select F8 [DATABASE]



2. The following screen appears:

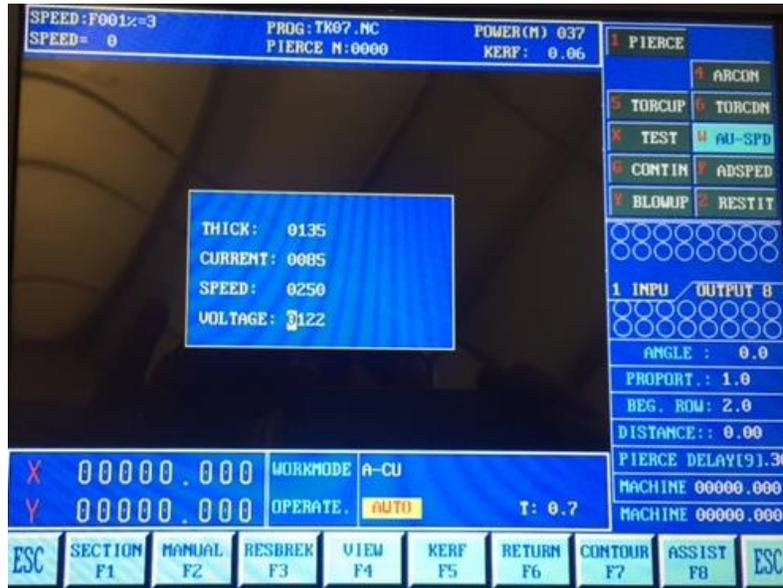
THICK	CURRENT	SPEED	VOLTAGE
000	000	00000	000
000	000	00000	000
000	000	00000	000
000	000	00000	000
000	000	00000	000
000	000	00000	000
135	085	00250	122
180	085	00185	123
250	085	00130	123
375	085	00070	126
500	085	00045	131



3. This table can be edited with a simple line editor. Navigate from left to right with the arrow keys and the [ENTER] key. Decimals are not allowed. VOLTAGE is a reference value for the operator.

NOTE: SPEED must be entered as a metric number in mm/min. To determine this value, take the cutting speed in inches/minute and multiply by 25.4

- Prior to starting the program in AUTO mode, Cutting Speed can be automatically set by using the [Y] key prior to hitting the green start button. When the [Y] key is pressed, the following screen appears:



- Enter the desired chart in the THICK line, and the remainder of the columns will populate one at a time as you press [ENTER]. Here you can make any adjustments if necessary. The cutting speed has now been automatically set.

19. TEST MODE (DRY RUN)

The TEST Mode function allows the operator to run the program without starting the torch. In AUTO mode, press the [X] button and the TEST location on the Display becomes illuminated. The operator can now press the START button and the program will run without cutting.

In TEST mode, the program defaults to maximum federate – it will not run at the programmed cutting speed.

To quit the TEST mode, press the [X] key again, and the TEST location no longer will be illuminated.



20. CONTOUR MODE

In CONTOUR MODE, the control will test run a rectangle around the entire outside of the program. This will allow the operator to see if the part program or nest will fit on the sheet of material as it is located on the machine.

To run CONTOUR from AUTO mode, press the F7 [CONTOUR] key.



PROGRAMMING

A set of FastCAM programming software is included with each machine. A disk with the installation files is shipped with the machine, along with a “dongle” which plugs into the USB port of your computer. For an additional cost, an upgrade to FastCAM Professional is available through Piranha. Please see Appendix A for setting up FastCAM.

Please see the following online documents to help understand FastCAM/FastNEST.

Getting Started Pack (Starter Pack):

<http://response.fastcam.com/knowledge-base/article/fastcam-information-starter-pack>

In addition, there is a FastCAM Community website available for common Questions and Answers (Q & A's):

<http://response.fastcam.com/>

FastCAM's How to Draw guide is located at:

<http://response.fastcam.com/knowledge-base/article/fastcam-drawing-guide>

DEMO videos on FastCAM's YouTube channel:

<https://www.youtube.com/user/FastCAMService/playlists>

Manuals for FastCAM and FastNEST

http://www.fastcam.com/download/Manual/FastNEST_ENGLISH.pdf
http://www.fastcam.com/download/Manual/FastCAM_ENGLISH.pdf

PROGRAMMING CODES

G Codes

CODE	FUNCTION
G00	Fast positioning point to point
G01	Linear cutting
G02	Circular cutting clockwise
G03	Circular cutting anti-clockwise
G04	Dwell (stop-delay)
G20	Inch
G21	Metric
G26	Back to reference point axis X
G27	Back to reference point axis Y
G28	Back to reference point axis X and Y
G40	Cancel compensation
G41	Compensation left
G42	Compensation right
G90	Absolute distance mode
G91	Incremental distance mode
G92	Reference point set-up

M Codes

CODE	FUNCTION
M00	Stop program
M02/M30	Program ended
M07/08	Plasma cutter ON/OFF

MAINTENANCE

The following maintenance items should be done on a planned basis:

MAINTENANCE ITEM	FREQUENCY
Empty Slag Pan(s)	Daily
Inspect Slats and Replace where necessary	Weekly
Wipe Linear Guides X and Y Axis <ul style="list-style-type: none"> • Dry Rag; Then Apply Light Oil 	Weekly
Lubricate X-Axis (1) and Y-Axis (2) Racks <ul style="list-style-type: none"> • Spray Moly Lubricant 	Quarterly
Wipe Torch Height Control Guide Rods <ul style="list-style-type: none"> • Remove Yellow Cover Behind Torch • Dry Rag; Then Apply Light Oil 	Quarterly
Lubricate X-Axis (4 total) and Y-Axis (2 Each Side) Bearings <ul style="list-style-type: none"> • Premium Grade lithium base, extreme pressure grease such as Shell Alvania EP-1 	Annually

In addition, the operator should take care to clean the machine and surrounding areas regularly, as needed, in order to maintain a safe work environment.

ERROR CODE LIST

ERROR CODE	Description
01H	Overflow/illegal character(s) in program
20H	Division Overflow
21H	Error Starting/ending point of arc
22H	Error radius of arc
24H	Error condition of arc
2AH	Overflow program line. No torch movement of this line
34H	Illegal Operation
40H	Emergency stop pressed
41H	Limit X+
42H	Limit X-
43H	Limit Y+
44H	Limit Y-
45H	Negative limit of software coordinates
46H	Positive limit of software coordinates

MACHINE SETUP PARAMETERS

For Starfire software version:

- 3.1-2.8.0 or later
- 3.1-2.8.0-FAT or later

The parameters in the SETUP section of the control should be set as follows:

INITIAL SETUPS			
FROM MAIN PAGE---> SETUP--->SPEED (F1)			
STARTUP		00020	
TIMING (S)		00.30	
CORNER ACCELER (S)		00.25	
HIGH SPD		00314	
LIMIT SPEED (S)		00314	
RET ORIGIN SPEED		00118	
RECEDE/FRONTAD SPEED		00118	
TESTING SPEED		00314	
SPD TRAN ANGLE		030.00	
CORNER RADIUS		000.20	
CURVE SPEED		00020	
CURVE RADIUS		000.00	
FROM MAIN PAGE---> SETUP--->SYSTEM (F2)			
NUMERATOR	X:00416	Y:00416	
DENOMINA-	X:00125	Y:00125	
MA-ORIGIN	VARIES WITH MACHINE POSITION		
REFERENCE	X:0000.00	Y:0000.00	
OFFSET	X:0000.00	Y:0000.00	
CLEARANCE	X:0000.00	Y:0000.00	
DIR-ORIGIN	X:-1	Y:-1	*1
SOFTLIMI+ (4' x 4' MACHINE)	X:000049	Y:00049	
SOFTLIMI+ (4' X 8' MACHINE)	X:000049	Y:00097	
SOFTLIMI+ (5' X 10' MACHINE)	X:000061	Y:00121	
SOFTLIMI-	X:0000.00	Y:0000.00	*2
FROM MAIN PAGE---> SETUP--->PLAS (F4)			
TORCH LOCATE TIME		000.50	
TORCHUP TIME (M70)		00.80	
TORCHDN TIME (M71)		02.00	
ARC-FEEDBACK (0/1)		0	
DETECT DELAY		00.00	
LOCATE CHECK (0/1)		0	
LOCATE CHECK (0/1)		0	

PIERCE TIME	1.100 *3
OFF DELAY	00.00
DIS. COR. OFF ARCS	0.4
SPEED OFF AHCS (MM/MIM)	00000
ANTICIP OFF AHC	0.1
ANTICIP OFF AUTO-SIG (MM)	00000
AHCS AUTO-SIG DELAY (S)	01.0
AHCS AUTO-SIG DIS (MM)	00.0
SPEED OFF AHCS (MM/MIM)	00100
ARC ON M ORDER	12
ARC OFF M ORDER	13

FROM MAIN PAGE---> SETUP--->CTRL (F5) 0-NOT CHOOSING; 1	
PLASMA(1)/FLAME(0)	1
AUTO ACC SPEED	1000
EXTEND PIERCE (0/1)	0
MA-COORDINATE	00
SELECT CYLINDER UP/DOWN (0/1)	0
CTRL-OUTSIDE (0/1)	0
WIRED-0/RF05-1/RF06-2	0
G41/G42 CHECK EFF (0/1)	1
SOFT LIMIT EFF. 1/INE.0	1
LIMIT POSI EFFECT (0/1)	1
SELECT AUTO-REFERENCE (0/1)	1
CHECK COLLIDE (0/1)	0
COLLIDE LOGIC (0/1)	0
COLLIDE PAUSE (0)/TORCHUP(1)	0
PAUSE UP TORCH (0/1)	1
NUMERATOR	00
NUMERATOR	00
NUMERATOR	01
CUTTING LINE (BREAK.MM)	NOT USED
BRIDGE CUTOFF LINE (MM)	NOT USED
SELECT GIO PLASMA/FLAME	0
DISP NAME (0/1)	0
SELE PLOT KERF LINE (0/1)	1

- *1. DIR-ORIGIN: When X:-1 Y:-1, system allows the torch to go beyond soft limit
- *2. SOFTLIMI-: How far away the main system will allow torch to go past reference zero point (e.g. X:-0001.00 y:-0002.00 means the torch can go to 1 inch along the X-direction and 2 inches along the Y- direction past the reference zero point.
- *3. PIERCE TIME: Pierce delay time changes according to the material thickness. The thicker the material sheet is, the longer this pierce tie is. This must be set to at least 1.100 or motion will start before the torch ignites

INITIAL SETTINGS – MICROSTEP TORCH HEIGHT CONTROL

Page A:	
StartSpeed: 300	AutoSpeed: 1500
TopSpeed: 3000	AutoSpeed: 600
SpeedRate: 10	Language: 1
Page B:	
SpeedRange: 20	Position: 5
EffecRange: 100	Equivalent: 0.0024
PierceDel: 0	Compensate: 10

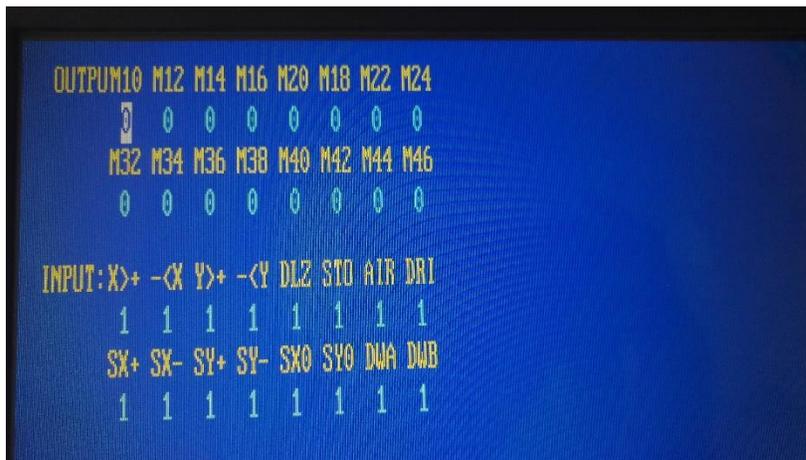
Position (in mm) changes with material thickness.

INPUTS AND OUTPUTS

From the main menu, press F5 [DIAGNOSE] to access the inputs and outputs



The following screen will appear



The following is the list of inputs and outputs that are used on the C Series Plasma Table:

OUTPUTS:

- M12 – Arc On / Water Solenoid On
- M14 – Torch Up
- M16 – Torch Down
- M38 – Torch Height Control Auto Signal

INPUTS:

- <X – Origin Proximity Switch (X Axis)
- <Y – Origin Proximity Switch (Y-Axis)
- DLZ – Arc Feedback
- STO – Emergency Stop
- AIR – Air Pressure Switch
- DRI – Drive Fault Alert

PROCEDURE - SETTING MACHINE ZERO

If the machine has lost its zero-home position, use the following procedure to re-set MACHINE ZERO. MACHINE ZERO is different than PROGRAM ZERO - this procedure should not be used to set PROGRAM ZERO.

10. Press F2 [MANUAL]



11. Press F8 [ASSIST]



12. Press F5 [MEASURE]



NOTE: As an alternative to the first three steps, you can simply jog the machine to the location you wish to set machine zero

13. Choose F4 [SETUP] from the Home Screen



14. Choose F2 [SYSTEM]



15. In the parameters, find [DIR-ORIGIN] – set X00 Y00

UNIT:MM, SECOND

NUMERATOR	X:00416	Y:00416
DENOMINA-	X:00125	Y:00125
MA-ORIGIN	X:-0027.84	Y:-0013.81
REFERENCE	X:0000.00	Y:0000.00
OFFSET	X:0000.00	Y:0000.00
CLEARANCE	X:000.00	Y:000.00
DIR-ORIGIN	X:00	Y:00
SOFTLIMI+	X:00061.0	Y:00121.0
SOFTLIMI-	X:00000.0	Y:00000.0

PARAMETER: -31000.0 < P < 31000.0

16. Press F8 [SAVE]



17. Press [ESC] until you get back to the Home Screen

18. Press F2 [MANUAL]



19. Press F8 [ASSIST]



20. Press F6 [ORIGIN]



21. Press [ESC] until you get back to the Home Screen

22. Choose F4 [SETUP] from the Home Screen



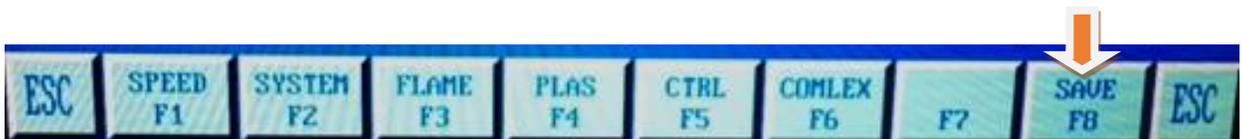
23. Choose F2 (SYSTEM)



24. In the parameters, find [DIR-ORIGIN] – set X to -1 and Y to -1



25. Press F8 [SAVE]



PROCEDURE – UPDATING CONTROL SOFTWARE FROM USB DRIVE

1. Before putting in the USB drive, push the update ARROW and turn on the power button;



2. When the screen starts to change, release the button;
3. when the screen stops changing, locate and note the version of STARFIRE control software on the screen.
4. Choose the USB for updating the control from that version;
5. Turn the power supply off, plug in the USB drive;
6. Hold the update ARROW down and turn the power on;
7. Release the button when the screen starts to change
8. You will see the blue screen with two white squares on bottom left;
9. Push F1;
10. Turn off the power with the red power button when the screen stops changing.
11. Re-start the control with the red power button

PROCEDURE – SQUARING THE MACHINE

The machine may become out of square if the bridge is pushed while power is off. This can also occur during shipping and handling – while moving the machine to its final location.

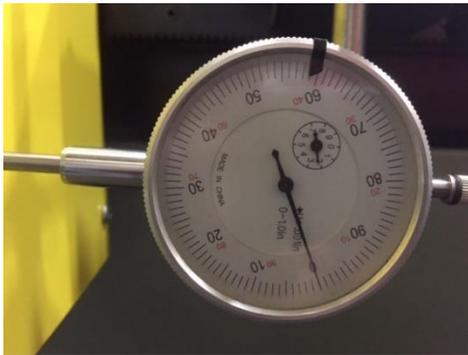
Since the bridge was squared at the factory, the bridge bolts should still be in their factory set location and should not be loosened. Instead, the machine can easily be squared again by adjusting one side of the bridge relative to the other. This can be done by removing power to one of the drive motors (while the other drive motor maintains its position) and pushing the bridge to its square position.

Tools needed: Magnetic base dial indicator; carpenter's square; feeler gauges or calipers

1. Determine how much out of square the machine is:
 - Cut a 24" x 24" square plate
 - Determine its squareness by checking it with a carpenter's square and feeler gauges (calipers can be used in lieu of feeler gauges)
 - Multiply the out of square amount by the distance between Y-axis pinions divided by the width of the square (24").
 - For 48" wide machines, the distance between pinions is 68"
 - For 60" wide machines, the distance between pinions is 80"
 - For example, if the 24" square is out of square by .010", and the distance between pinions on a 60" machine is 72", then the gantry needs to move $.010" \times (80/24) = .033"$
2. Set a dial indicator up against the gantry cover on the Y2 side of the machine (side opposite the cable carrier side)



3. Set the dial on the indicator to zero



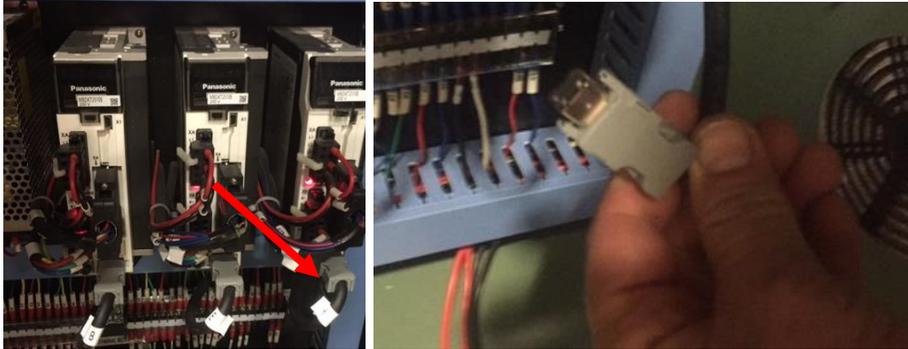
4. Turn the power switch on the CNC control off



5. Turn power off to machine (Main disconnect)



6. Unplug the motor cable from Y2 Drive (the drive on the right hand side inside the electrical enclosure). To unplug the cable, squeeze the two tabs on either side of the plug and remove it from the drive.



7. Turn power back on to machine



8. Turn CNC control on (machine must not be in E-stop condition)



9. Push the Y2 side of the gantry until the dial indicator reads the desired amount (from step 1)

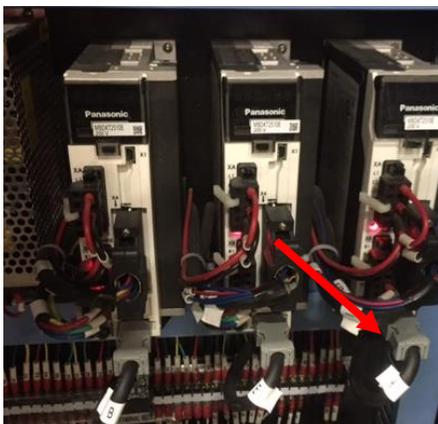
10. Turn CNC control off



11. Turn power off to machine (Main disconnect)



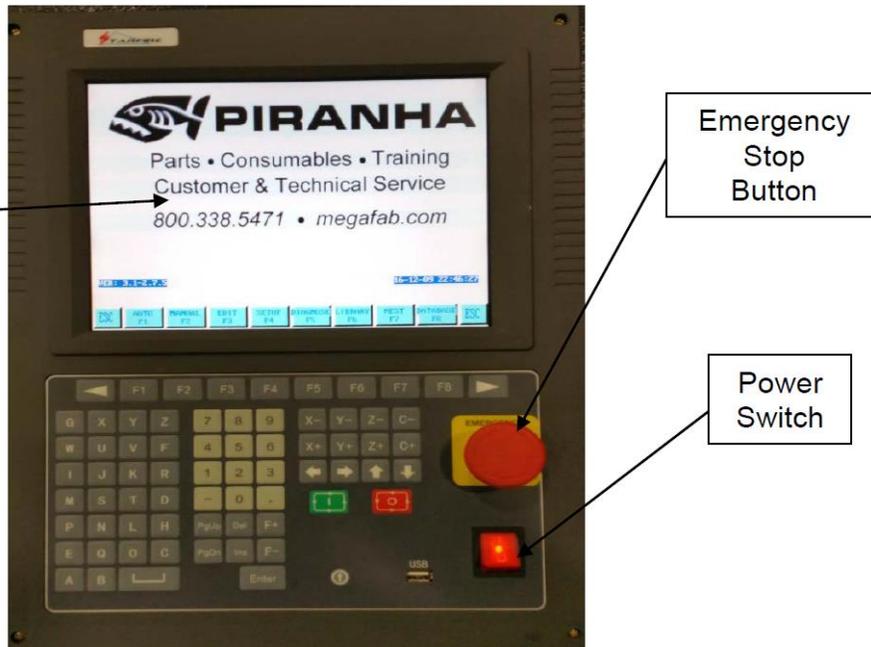
12. Plug the Y2 motor lead back into the Y2 Drive



13. Turn power back on to machine



14. Turn CNC control on (machine must not be in E-stop condition)



15. Run squareness test again (step 1)

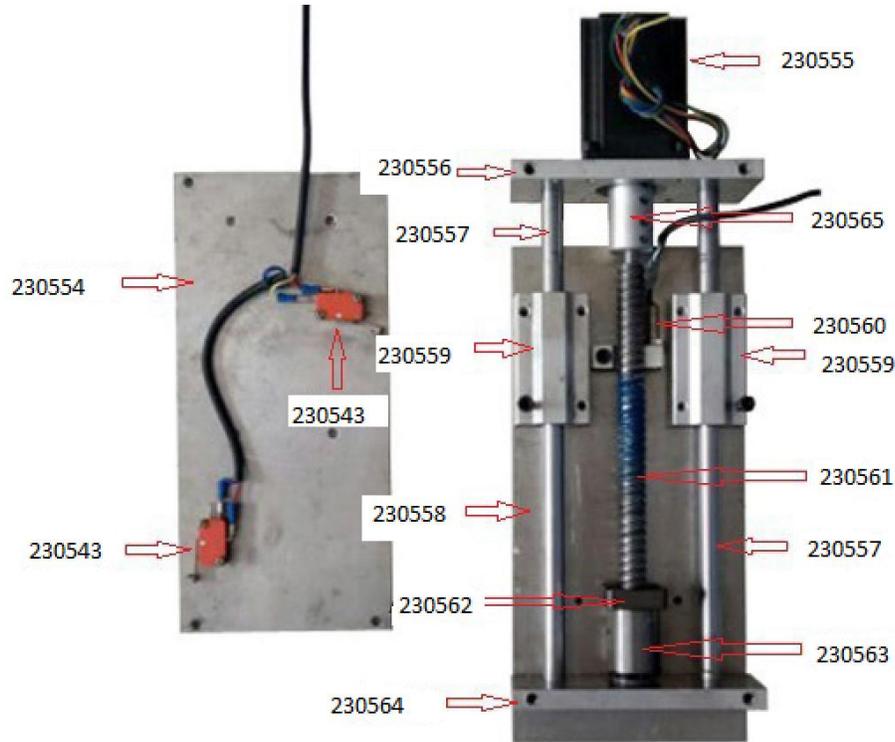
16. Repeat the procedure as necessary until the desired squareness is achieved

TROUBLESHOOTING GUIDE

1	Arc Voltage always reads zero on Arc Voltage Control	<ul style="list-style-type: none"> • Verify interface cable is wired correctly. Refer to the INSTALLATION section of the manual for correct wiring information. • Verify all wires to the Voltage Divider Card are securely terminated. Pull on wires to make sure crimped connections are secure. • Replace Voltage Divider Card • Replace Torch Height Controller
2	Waviness in plasma cut edge	<ul style="list-style-type: none"> • Make sure all table slats do not have play. Slats should be curved to make sure that tension keeps them from vibrating. • Verify that torch height control settings are set to original factory defaults. Refer to the MAINTENANCE section of the manual for default settings
3	Machine runs a short time and stops with an Air Fault	<ul style="list-style-type: none"> • Check incoming air pressure at the regulator and make sure the regulator is set to 4.5 bar.
4	Screen is on, but nothing else works	<ul style="list-style-type: none"> • Check all Emergency Stop buttons. If one is pressed, then release it, turn power off to the control, and then turn power on again.
5	Arc turns off after cutting for a few seconds	<ul style="list-style-type: none"> • Check that the ground clamp is connected properly to the machine. Clamp must be connected to bare metal, not on a painted surface.
6	Arc tries to start too high off the material	<ul style="list-style-type: none"> • Check value for COMPENSATE on the Arc Voltage Control. Value should be set to 10 • Change Initial Height setting on Arc Voltage Control. Refer to the Plasma System manual for correct setting. Refer to the MAINTENANCE section of the manual for changing the setting on the Arc Voltage Control. NOTE: Value is in MM
7	Machine moves before arc initiates	<ul style="list-style-type: none"> • Change PIERCE DELAY setting in SETTINGS / PLAS [F4]. Value should be a minimum of 1.100
8	When pushing Zero Test on the Arc Voltage Control, the torch does not touch the material before it retracts	<ul style="list-style-type: none"> • Check to make sure that the torch cable has enough play for the torch to reach the material, and that nothing is obstructing it.

PARTS MANUAL

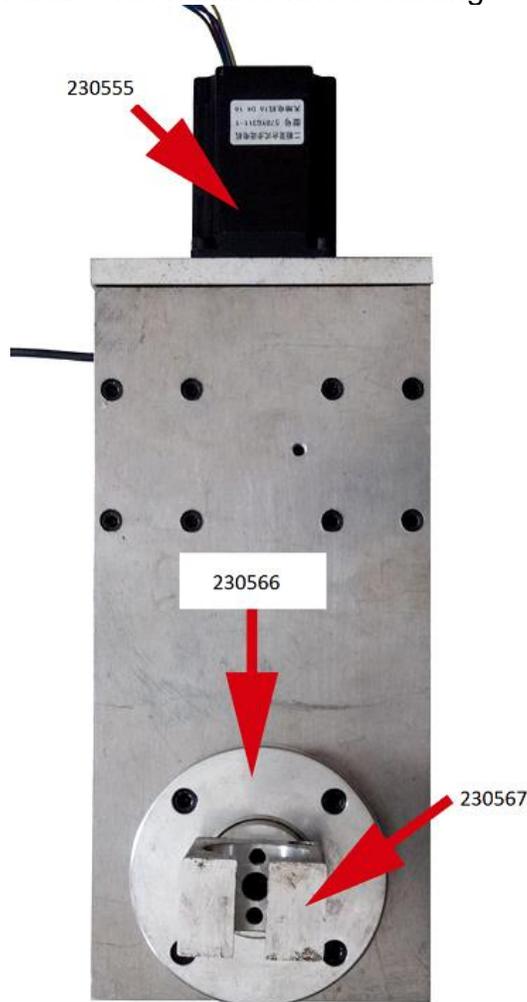
AUTOMATIC HEIGHT CONTROL ASSEMBLY



PIRANHA PART #	DESCRIPTION
230554	AHC ASSEMBLY FRONT PLATE
230543	AHC LIMIT SWITCH
230555	STEPPER MOTOR AHC
230556	TOP PLATE
230557	GUIDE ROD
230558	BACK PLATE
230559	GUIDE BLOCK
230560	PROX. SWITCH
230561	GUIDE SCREW
230562	SCREW KEEPER
230563	SCREW NUT
230564	BOTTOM PLATE
230565	MOTOR CONNECTOR
230529	ANTI-CRASH SOLENOID

AUTOMATIC HEIGHT CONTROL ASSEMBLY

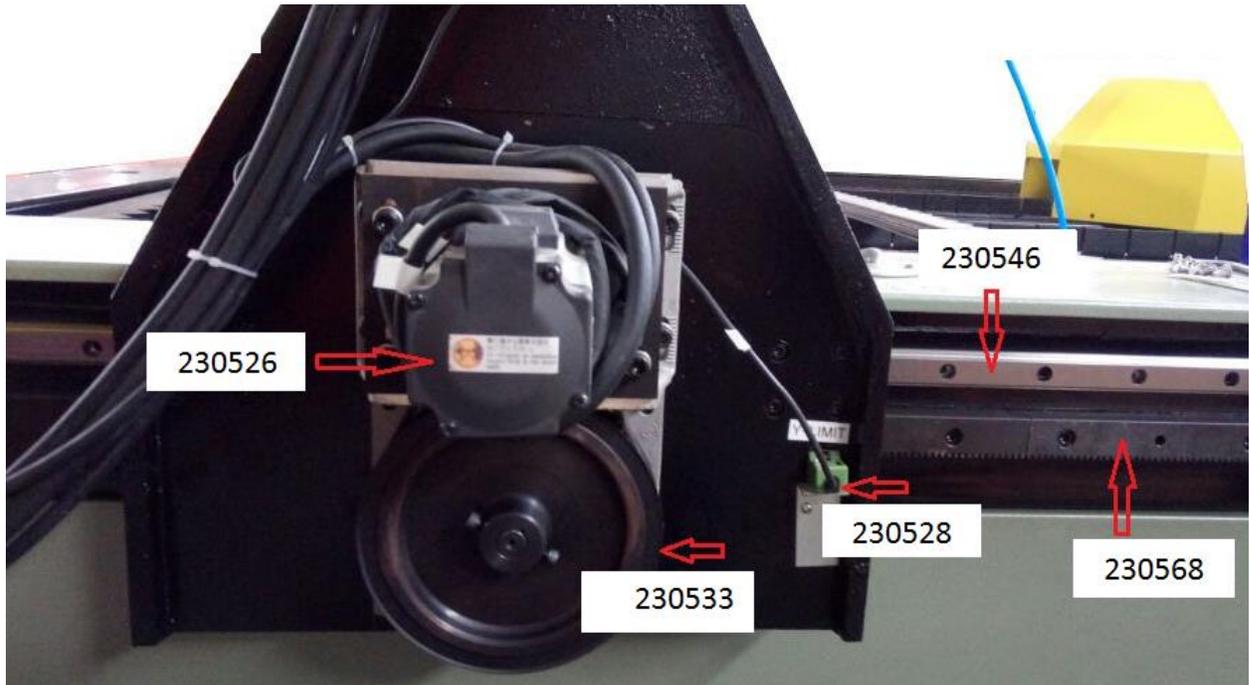
NOTE: Specify model and serial number when ordering



PIRANHA PART #	DESCRIPTION
230566	ANTI-CRASH ASSEMBLY
230567	TORCH HOLDER
230555	STEPPER MOTOR AHC

Y-AXIS DRIVE ASSEMBLY

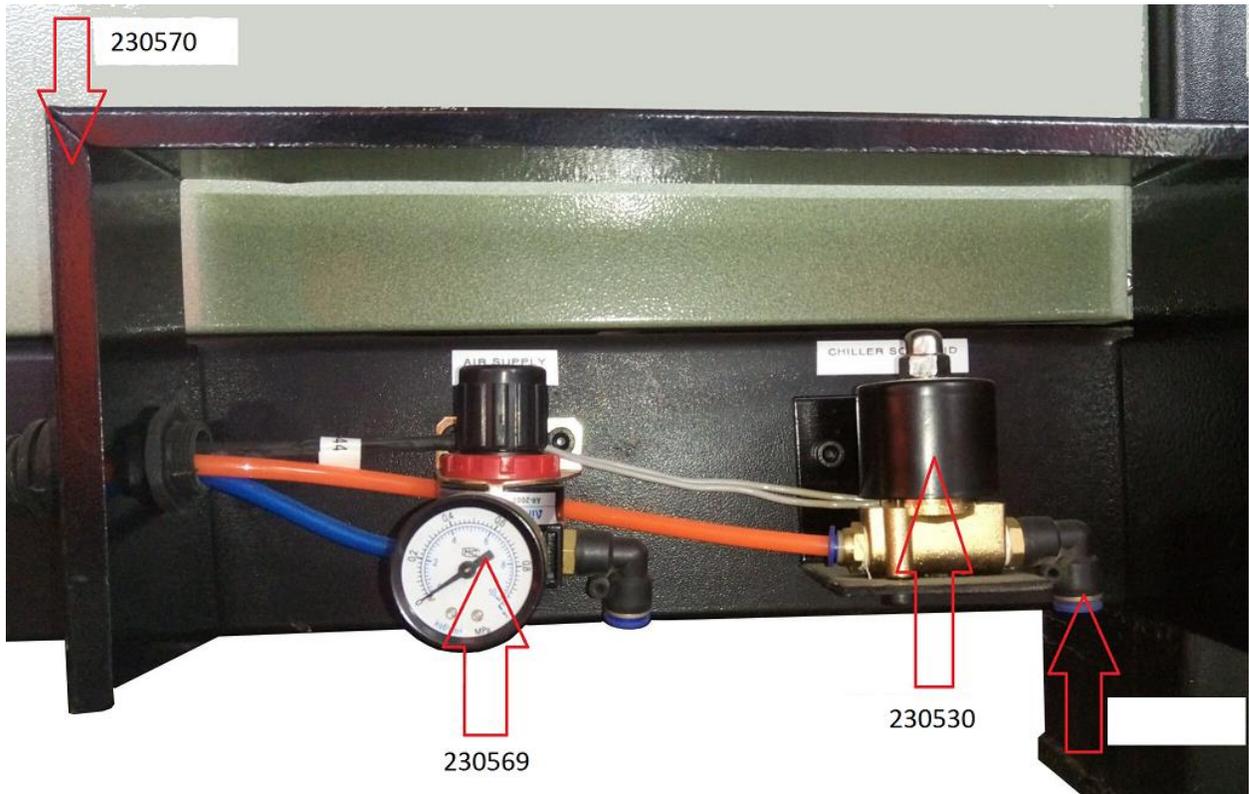
NOTE: Specify model and serial number when ordering



PIRANHA PART #	DESCRIPTION
230528	PROXIMITY SWITCH
230568	MACHINE RACK
230546	LINEAR GUIDE
230544	BEARING BLOCK (NOT SHOWN)
230533	DRIVE BELT
230526	PANSONIC SERVO MOTOR 400W

AIR AND WATER INLET

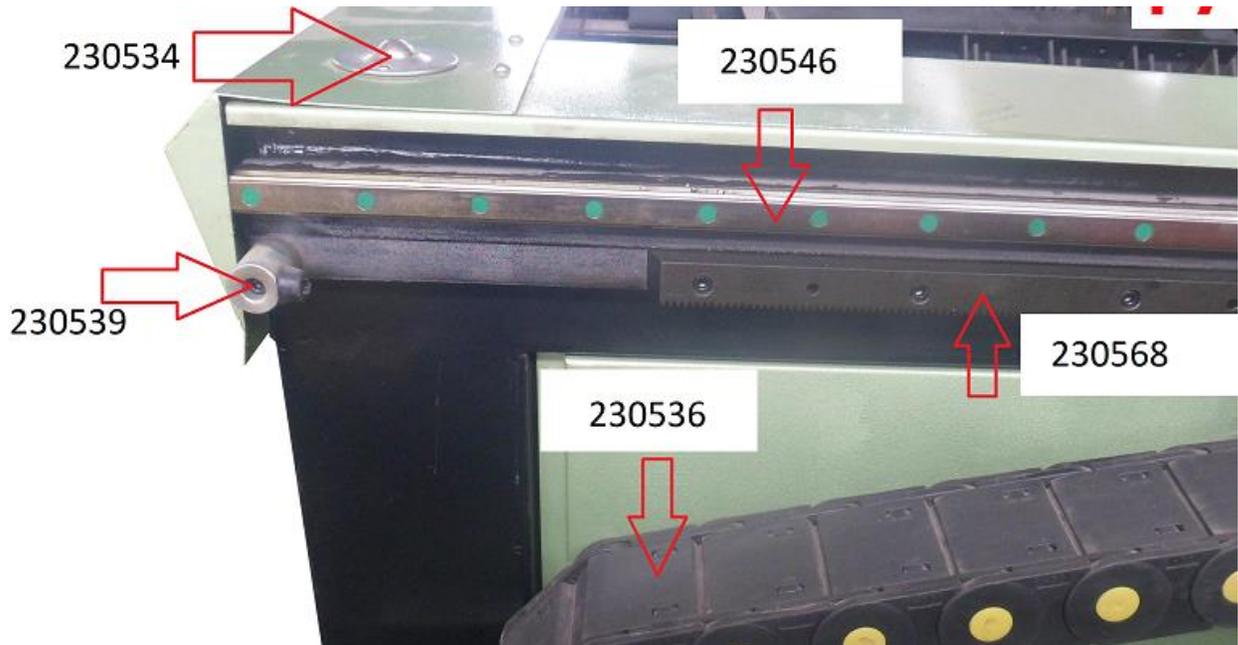
NOTE: Specify model and serial number when ordering



PIRANHA PART #	DESCRIPTION
230569	AIR REGULATOR
230530	WATER CHILLER SOLENOID
	6MM 90 DEG. TUBING CONNECTOR
230570	AIR VALVE AND SOLENOID COVER
	6 MM TUBING

X-AXIS DRIVE ASSEMBLY

NOTE: Specify model and serial number when ordering



PIRANHA PART #	DESCRIPTION
230534	MATERIAL BALL ROLLER
230539	HARD LIMIT STOP
230536	CABLE TRACK (PER METER)
230568	MACHINE RACK
230546	LINEAR GUIDE
230544	BEARING BLOCK (NOT SHOWN)
230601	MOTOR PINION ASSEMBLY (NOT SHOWN)
230603	EXTENDED GREASE FITTING (NOT SHOWN)

ELECTRICAL CABINET

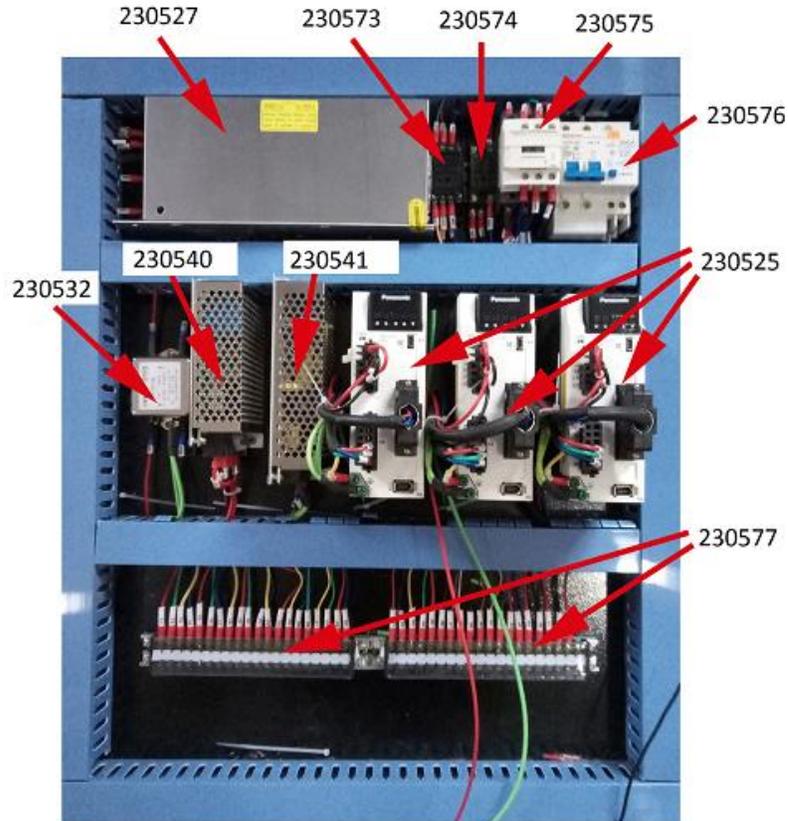
NOTE: Specify model and serial number when ordering



PIRANHA PART #	DESCRIPTION
230551	MICROSTEP ARC HEIGHT CONTROL
230571	GREEN PUSHBUTTON, LIGHTED
230572	STARFIRE 10.4" CONTROL PANEL

ELECTRICAL CABINET

NOTE: Specify model and serial number when ordering



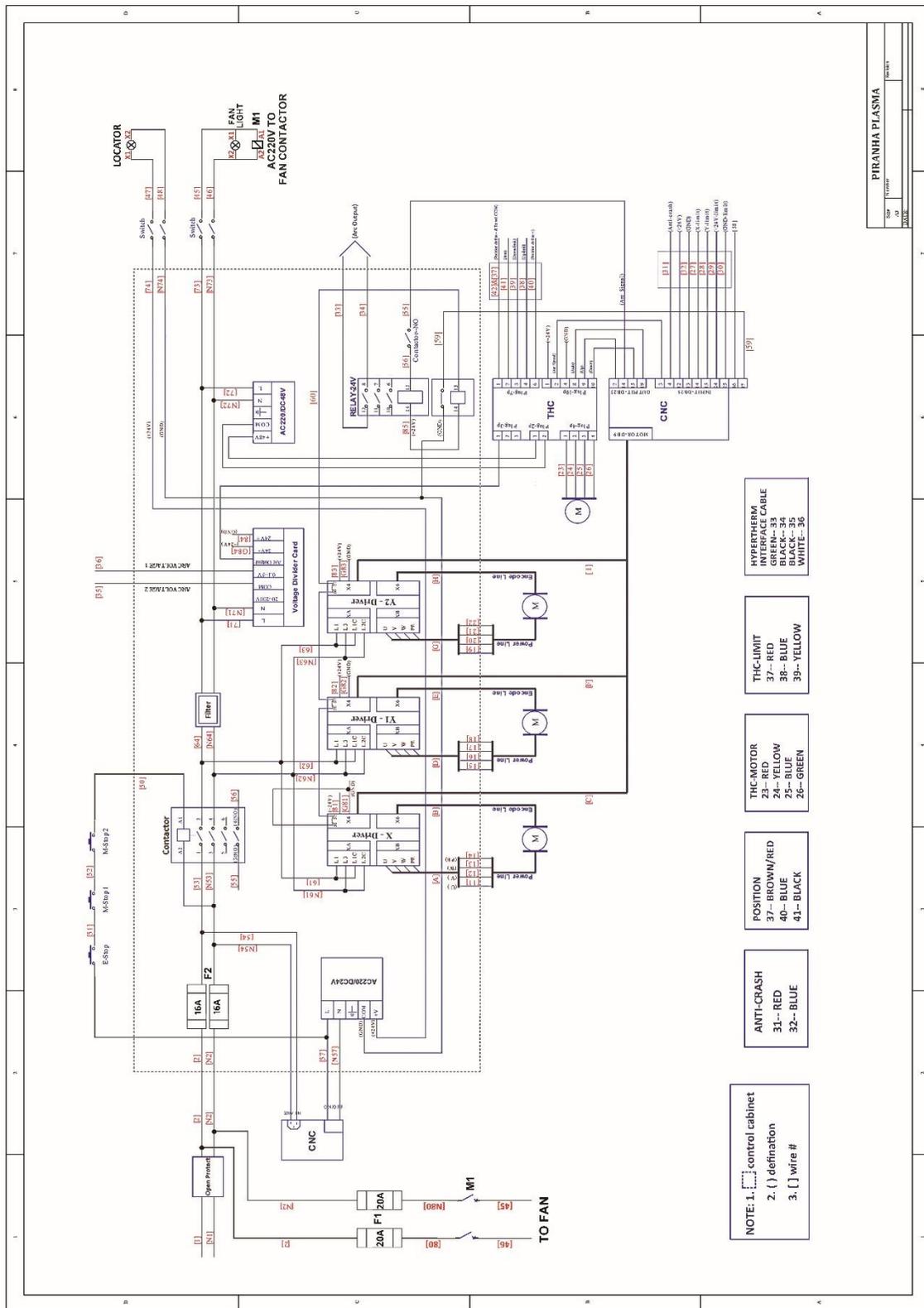
PIRANHA PART #	DESCRIPTION
230527	AC220/DC48V
230573	24V DRIVE FAULT RELAY
230574	24V CONTROL RELAY
230575	MAIN CONTACTOR
230576	MAIN BREAKER
230577	TERMINAL BLOCK
230532	FILTER
230540	VOLTAGE DIVIDER CARD
230541	AC220/DC24V
230525	PANASONIC DRIVE
230609	MAIN DISCONNECT (NOT SHOWN)

MISCELLANEOUS PARTS

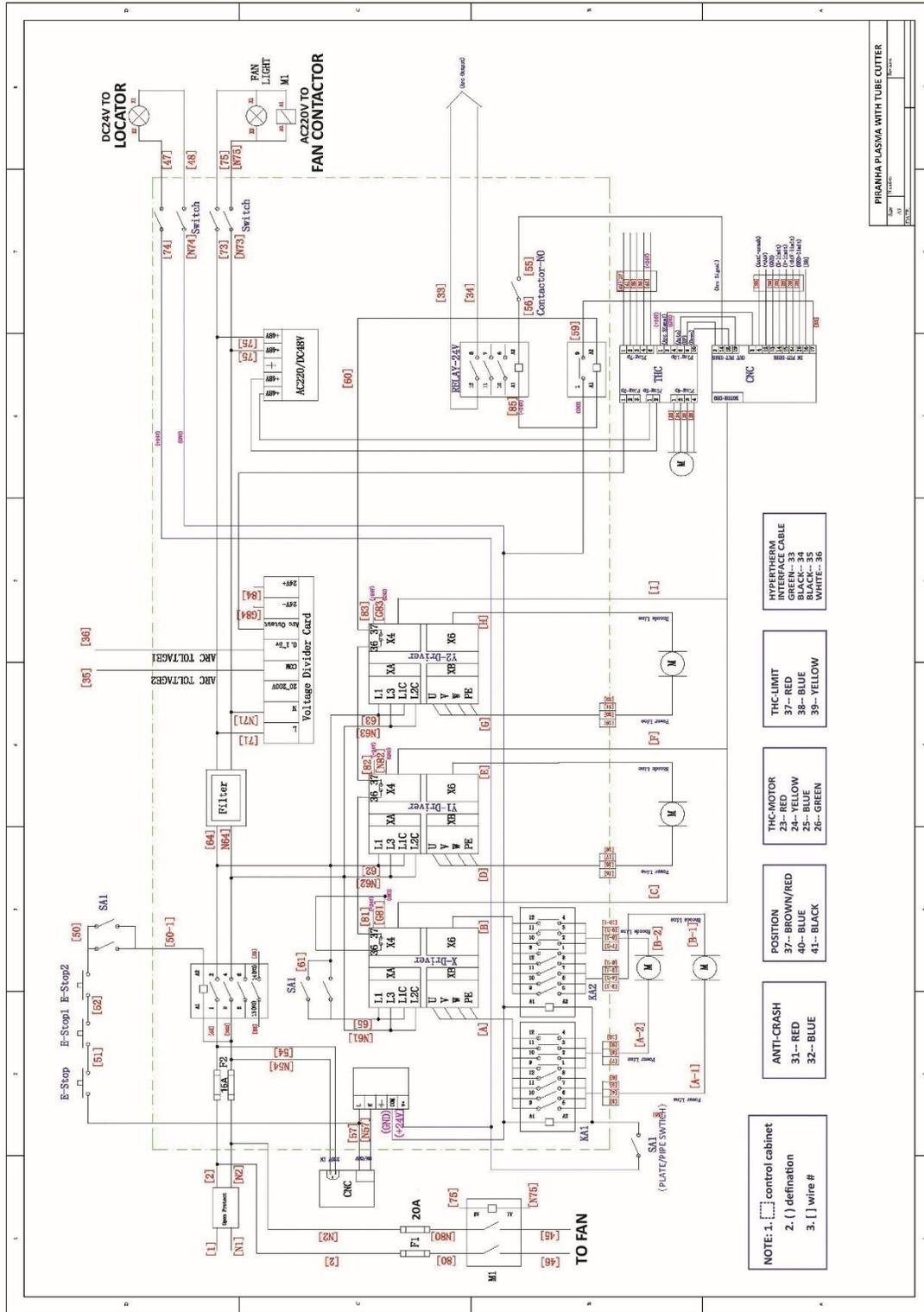
NOTE: Specify model and serial number when ordering

PIRANHA PART #	DESCRIPTION
230602	LEVELING FOOT
230535	FAN GUARD
230604	SLAG DRAWER (C-404 & C-408)
230605	SLAG DRAWER (C-510)
230606	SLAG DRAWER WHEEL

ELECTRICAL DIAGRAM (MACHINES WITHOUT PIPE CUTTER)



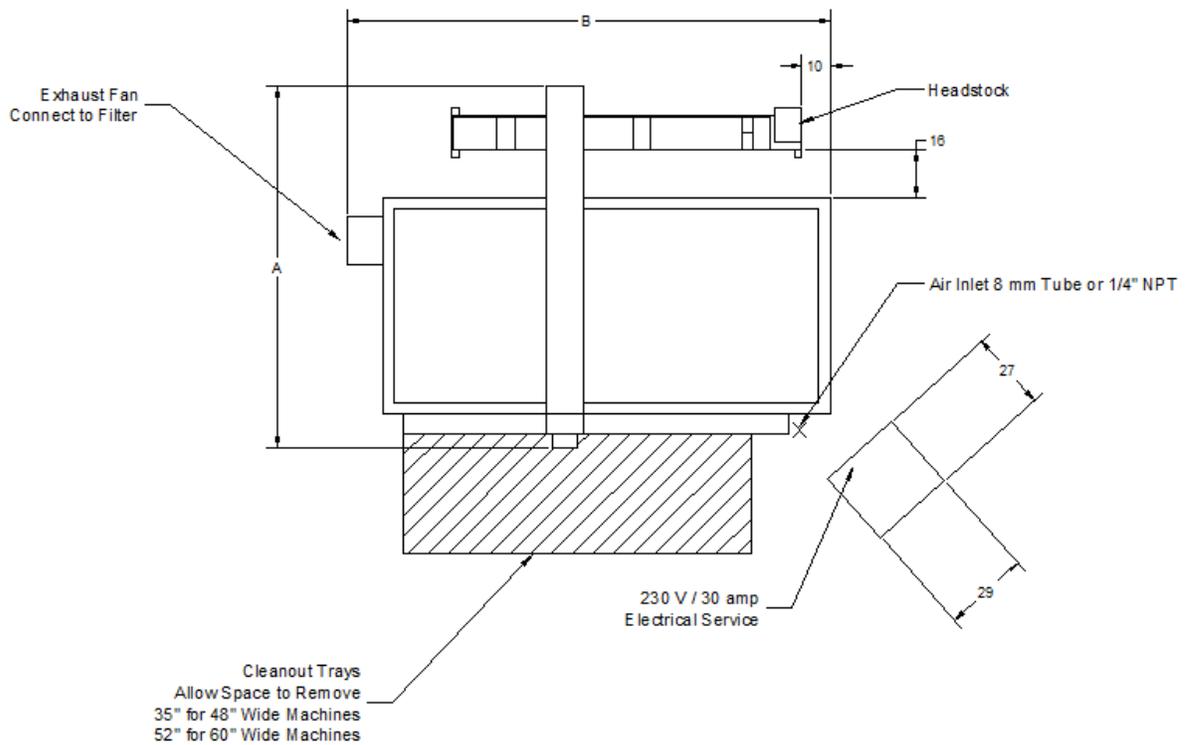
ELECTRICAL DIAGRAM (MACHINES WITH PIPE CUTTER)



PIPE CUTTING ATTACHMENT (OPTIONAL EQUIPMENT)

The Pipe Cutting Attachment is an option on new machines. It must be ordered with the machine – it cannot be retrofit onto an existing product. The pipe cutting attachment can cut round pipe and tube from 2” through 11.5” diameter.

The location of the pipe cutting attachment is shown below – the headstock must be located at the control end of the machine.



	"A"	"B"	MACHINE WEIGHT	PIPE CUTTER WEIGHT
4'X4'	88"	116"	1,500 lbs.	800 lbs.
4'X8'	144"	116"	2,000 lbs.	800 lbs.
5'X10'	164"	126"	2,500 lbs.	800 lbs.

C408 and C510 Machines with pipe cutters require shipment as an oversize (over width) load. It is not possible to ship these machines as a standard load.

Components:

Pipe/Plate Selector Switch



Headstock



Headstock Wrench



Pipe Supports



Pipe Cutter Base



1. AFTER RECEIVING

Upon the arrival of equipment:

- a. Inspect it visually for shipping damage. If damage is found, notify both the trucker's insurance company and MegaFab.
- b. Compare the actual shipment with the invoice to verify that everything ordered has been received.

2. UNLOADING

CAUTION: *Extreme care must be taken when lifting and moving the machine. Obtain the weight of the machine from Paragraph 2.1 of the Installation Manual.*

NOTE: *It is the responsibility of the customer to verify that the forklift truck and/or crane is of adequate lifting capacity, and that any maneuver is undertaken safely.*

Damage caused to the machine through incorrect or careless maneuvers is not covered under the machine warranty.

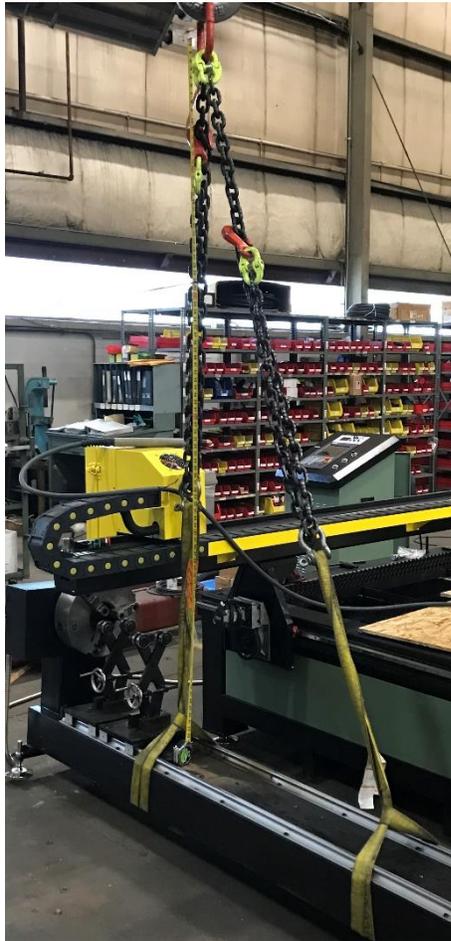
MegaFab is not responsible for personal injury to any person while this machine is transported, unloaded or installed.

- a. It is important that the pipe cutting attachment is lifted only at the specified lifting points.
- b. Verify that the pipe cutting attachment is balanced and stable before and during lifting/moving.
- c. Verify that no person is in a position where they may become trapped or injured.

CAUTION: *Make sure the load is always lifted about the center of gravity to prevent from any tipping and accidents.*

Lifting with Crane (Recommended)

- a. Remove securing straps/chains attached to the truck bed.
- b. Obtain two straps of not less than 6 feet (1829mm) with the second being 6" (152mm) longer than the first. The below picture shows the strap layout. The load lift is approximately 800 lbs.



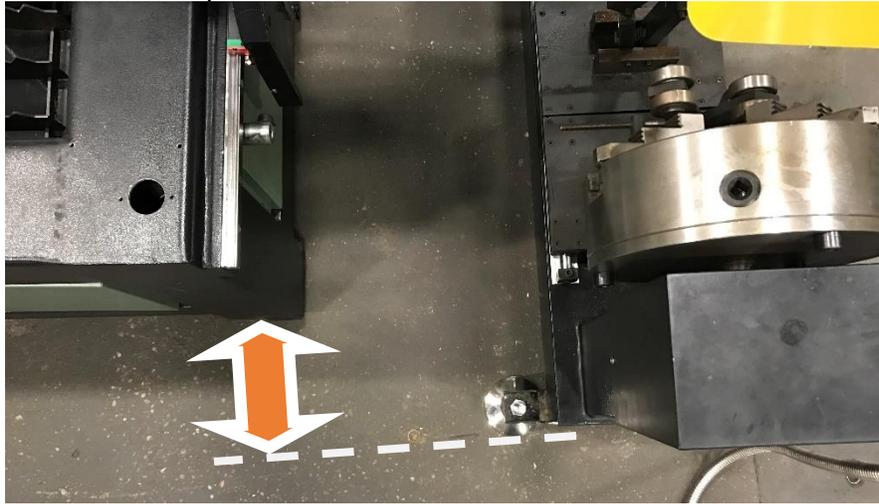
- c. The first strap should be located 31" (787mm) from the of the chuck end of the pipe cutter attachment.



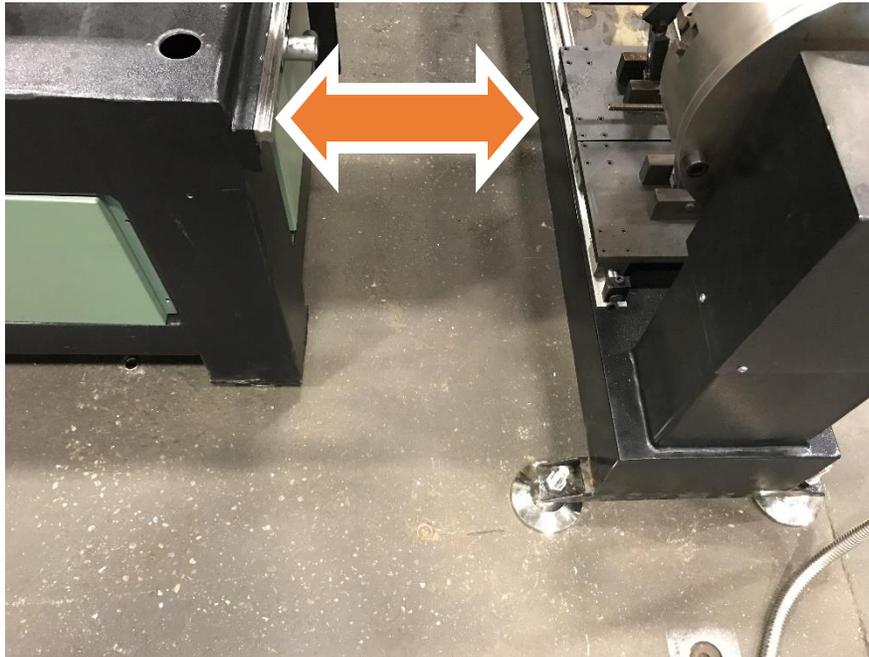
- d. The second strap should be located 74" (1880mm) from the of the chuck end of the pipe cutter attachment. The second strap should be approximately 6" longer than the first strap to pick the pipe cutter attachment up level.



- e. The end of the pipe cutter attachment is aligned to be 9.8" (250mm) from the end of the plasma table as shown.



- f. The pipe cutting attachment is set parallel to the plasma table at a spacing of 16" (406mm) from surface of the plasma table Y axis way to the inside edge of the pipe cutting attachment.

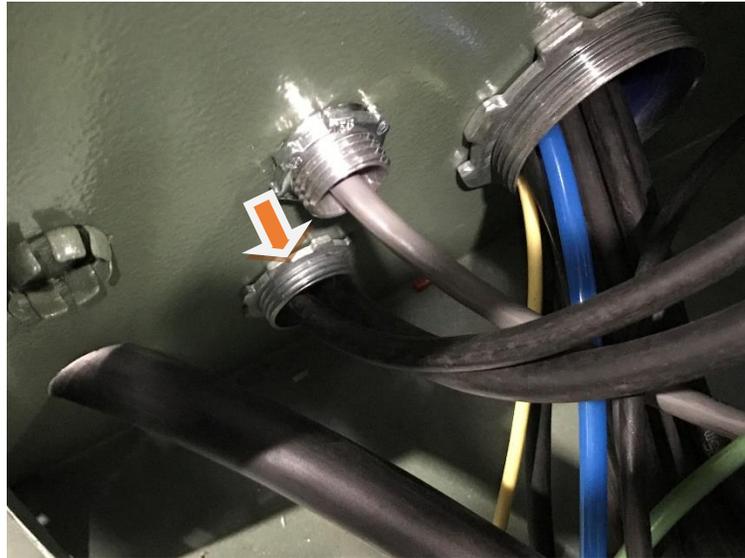


- g. The pipe cutting attachment must be leveled (using the four leveling pads) so that the height of the center of the chuck is 1.00" below the slat height of the table. The pipe cutting attachment must be leveled with the four leveling pads.



- h. Next, fasten the metal conduit from the pipe cutting attachment to the electrical box.



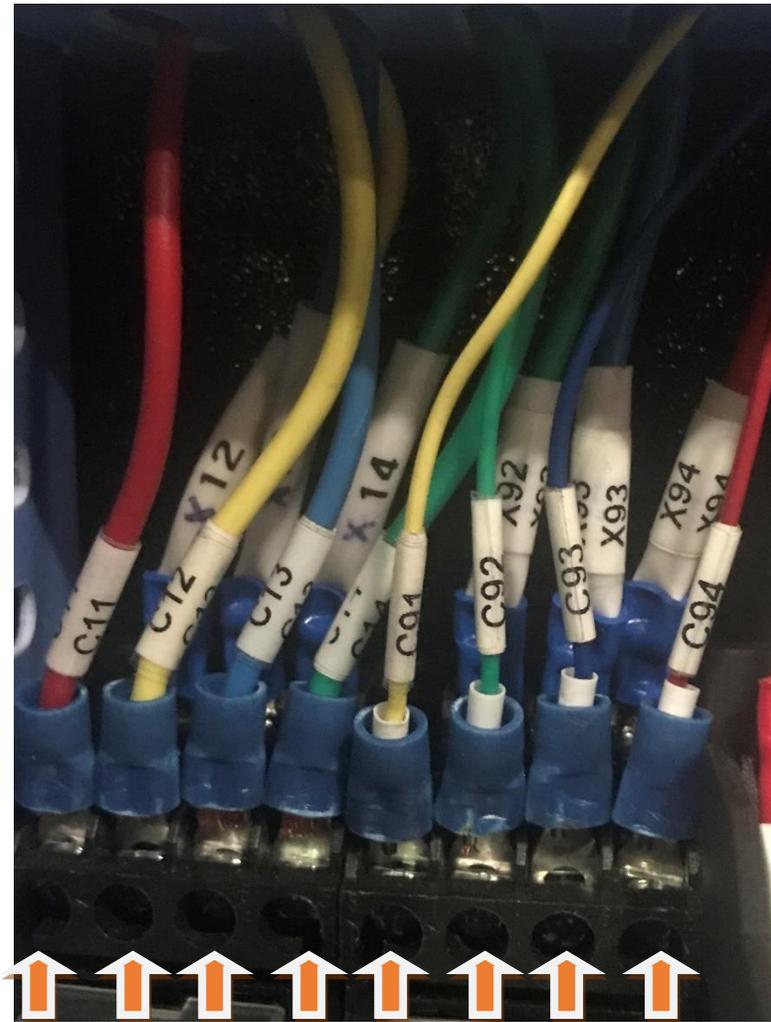


- i. Next connect the cables to the relays as shown, there are 8 connections. **Important** – Relay's may be in reverse order so it is important to go by wire numbers on relay

- Wire C11 will connect to terminal without wire behind it
- Wire C12 will connect to terminal in front of wire X12
- Wire C13 will connect to terminal in front of wire X13
- Wire C14 will connect to terminal in front of wire X14

- Wire C91 will connect to terminal without wire behind it
- Wire C92 will connect to terminal in front of wire X92
- Wire C93 will connect to terminal in front of wire X93
- Wire C94 will connect to terminal in front of wire X94





SWITCHING FROM PLATE-CUTTING TO PIPE-CUTTING

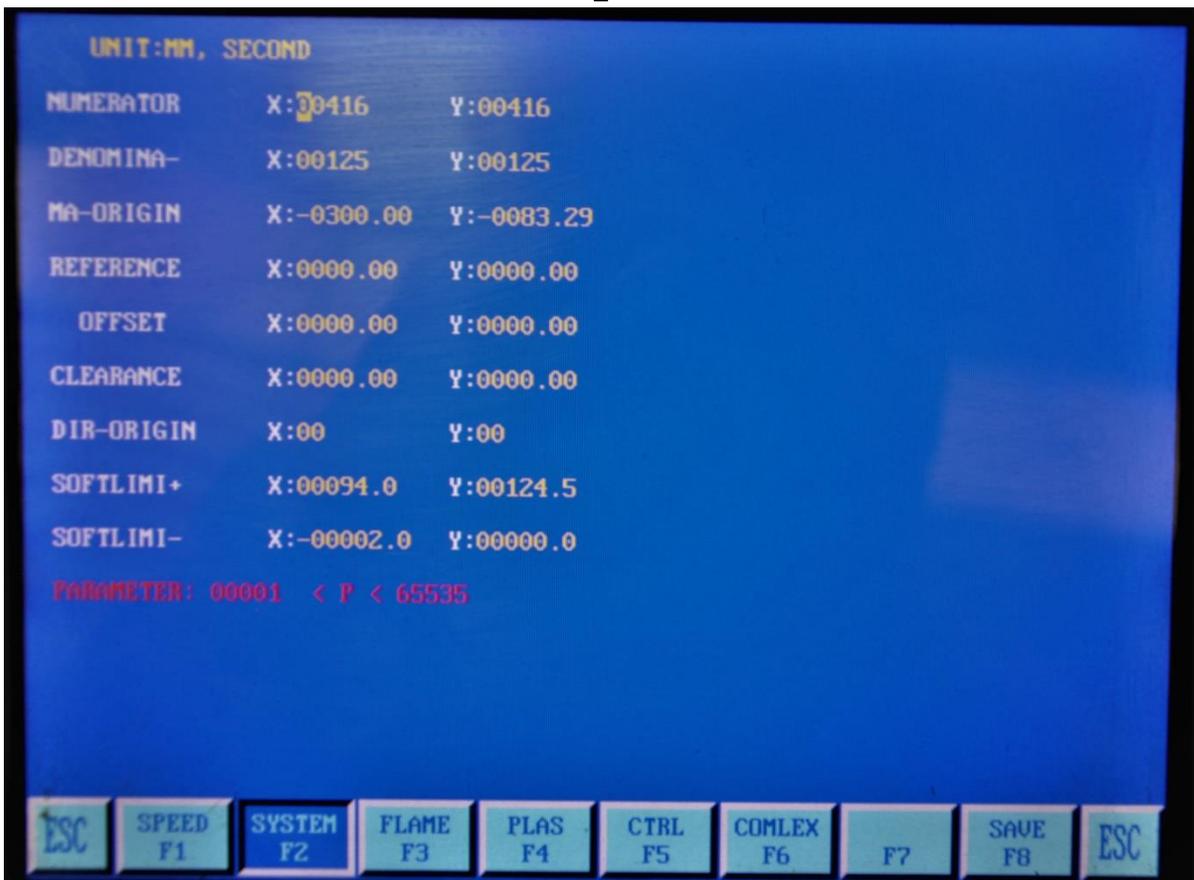
1. Change the X-axis limit to allow the torch to move over the center of the pipe:
 - a. From the HOME screen, push F4 [SETUP]



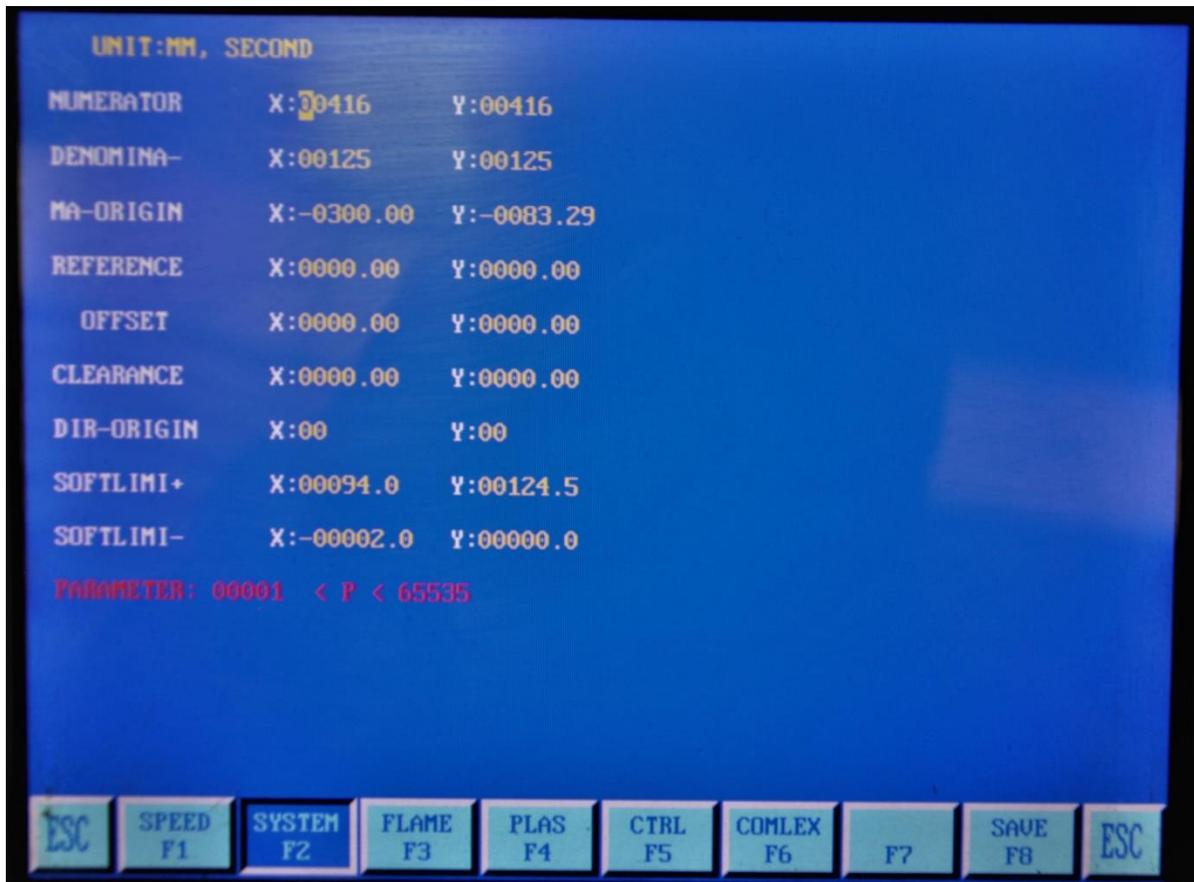
- b. Then press F2 [SYSTEM] to see the following screen



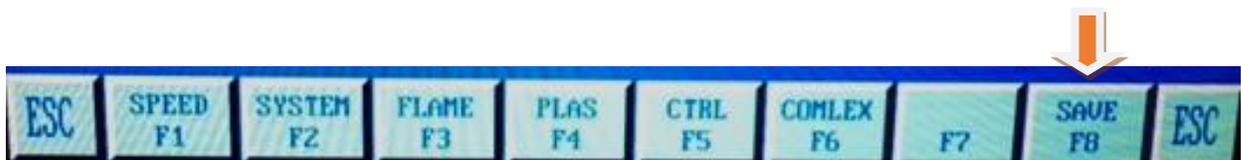
Z



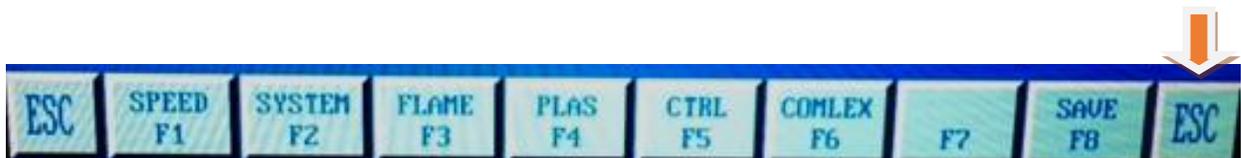
c. Change the X-Axis SOFTLIMI+ value to 94.0



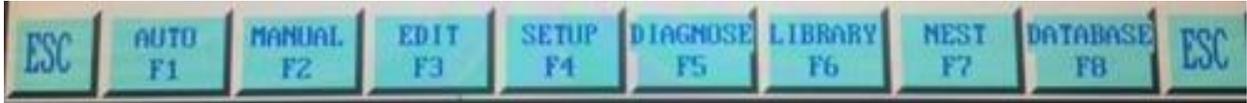
d. Then Press the F8 [SAVE] to store the change



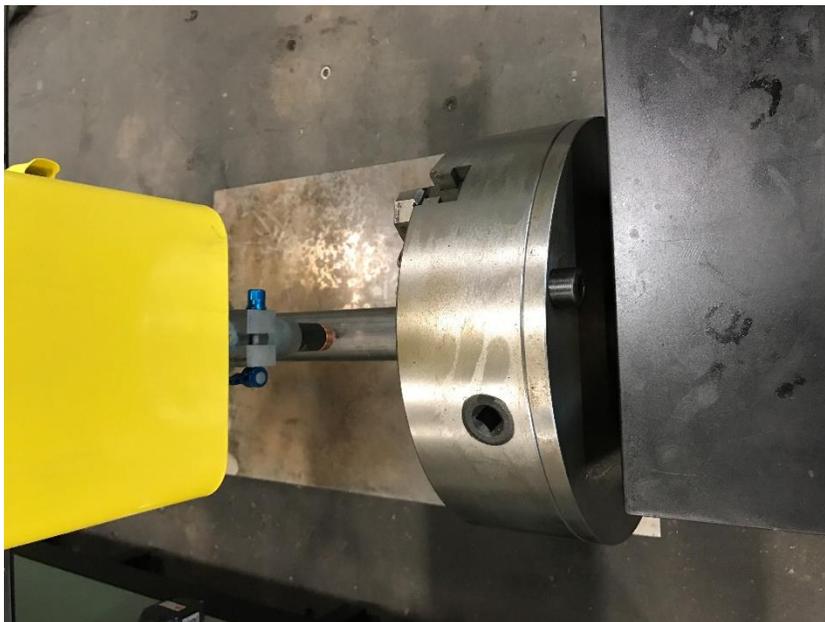
e. Press [ESC] next to go back to home screen



f. Press F2 [MANUAL] to go to manual move screen



g. Move the torch in the X-axis until the torch is directly above the center of the pipe.



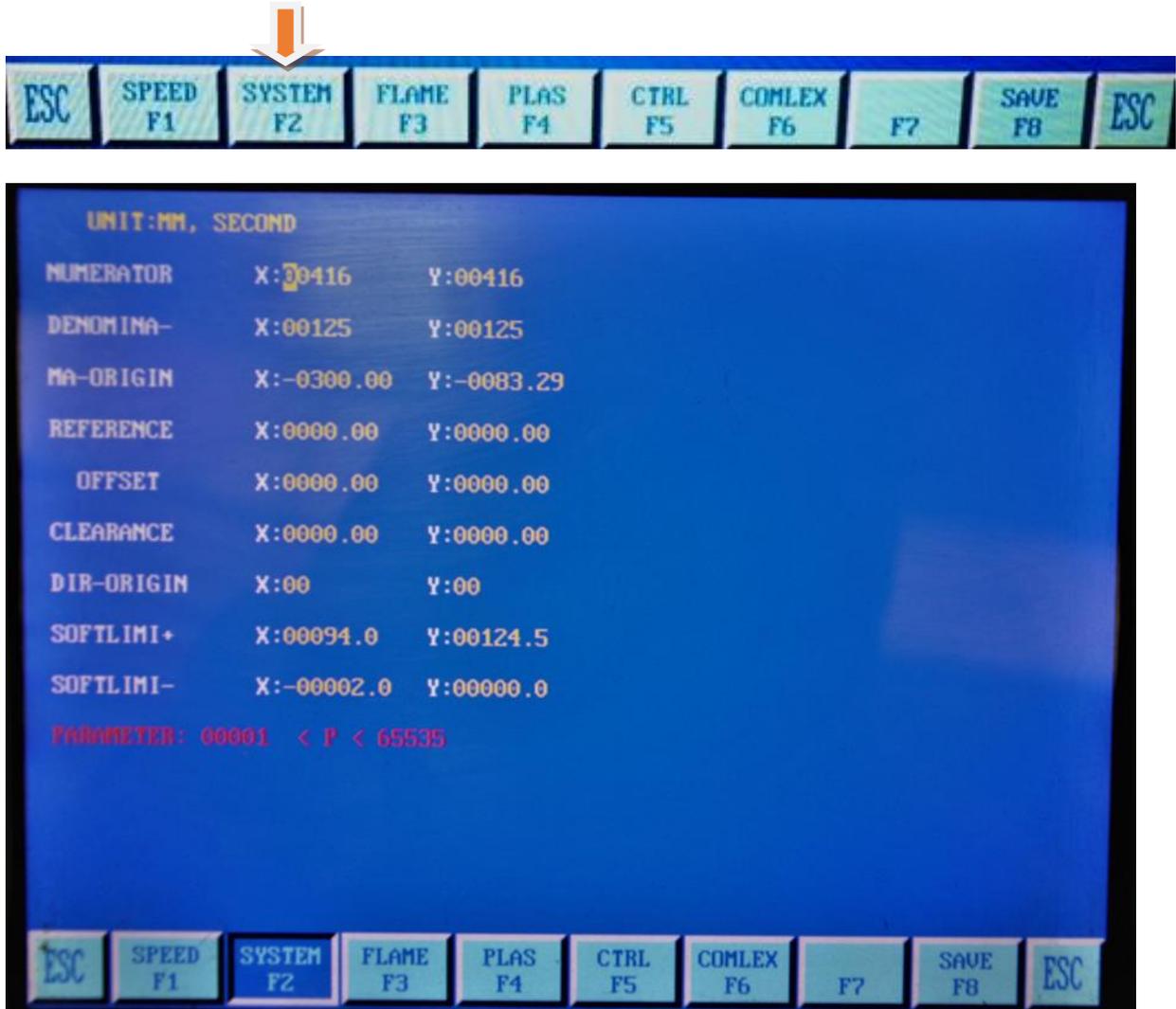
h. Press the [ESC] button to go to home screen



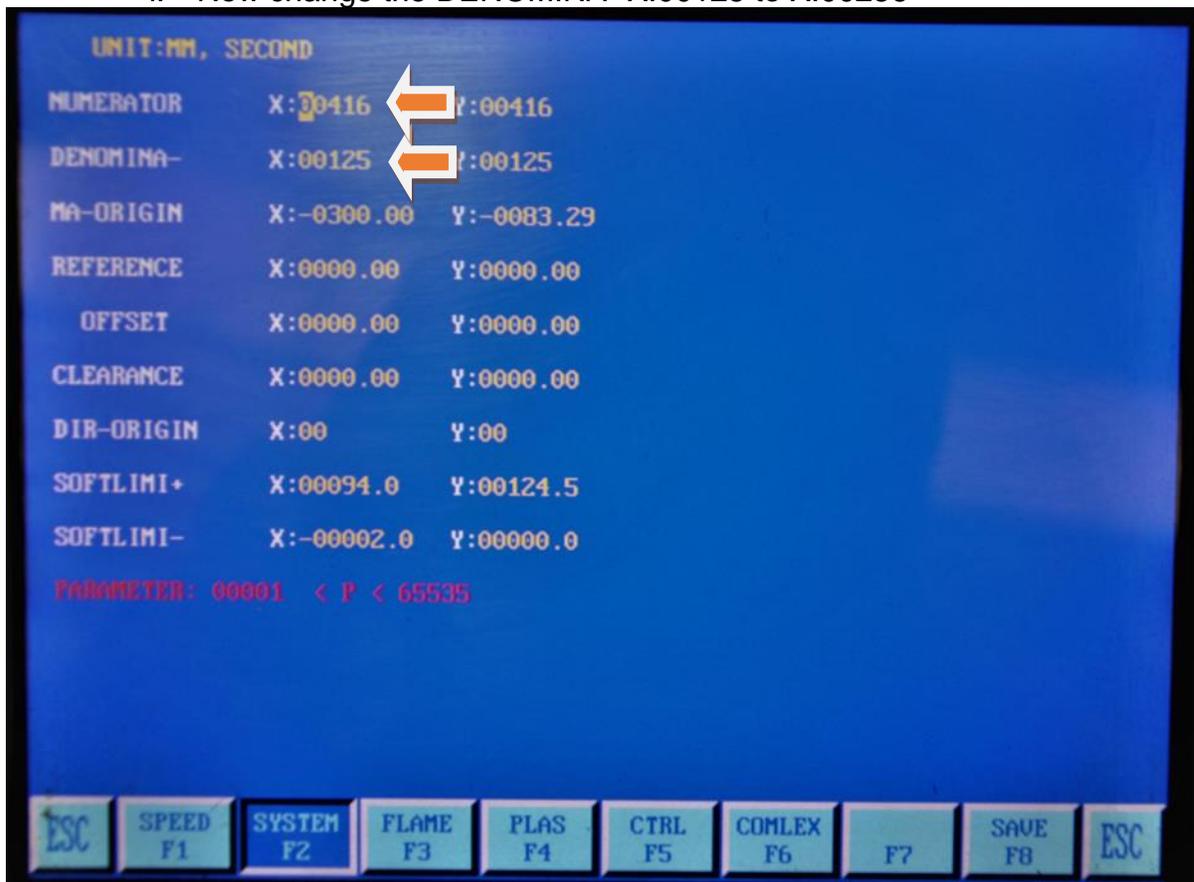
i. Press F4 [SETUP] button from the home screen



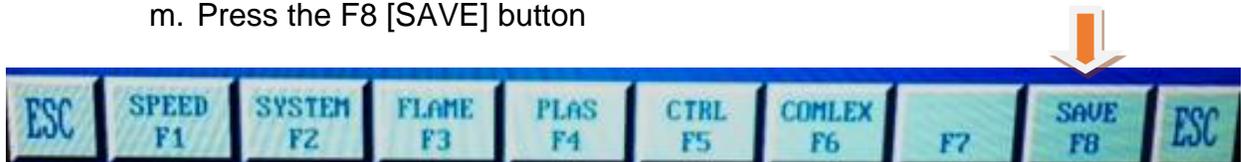
j. Then press F2 [SYSTEM] to see the following



- k. Now change NUMERATOR X:00416 using the following formula
 - i. Pipe Diameter * 3.14 * 25.4
 - 1. Example for 2-inch diameter pipe
 - 2. $2 * 3.14 * 25.4 = 159.512$ round up to 160
 - 3. Enter for NUMERATOR X:00160
- l. Now change the DENOMINA- X:00125 to X:00256



- m. Press the F8 [SAVE] button



- n. Turn off the power to the CNC Control using the Red Power Button



- o. Move the Pipe/Plate Selector Switch to "PIPE"



- p. Turn on power to the CNC Control using the Red Power Button



- q. Connect the plasma cutter ground clamp to the end of the pipe



- r. The pipe cutter attachment is now ready to use

PROGRAMMING THE PIPE CUTTER

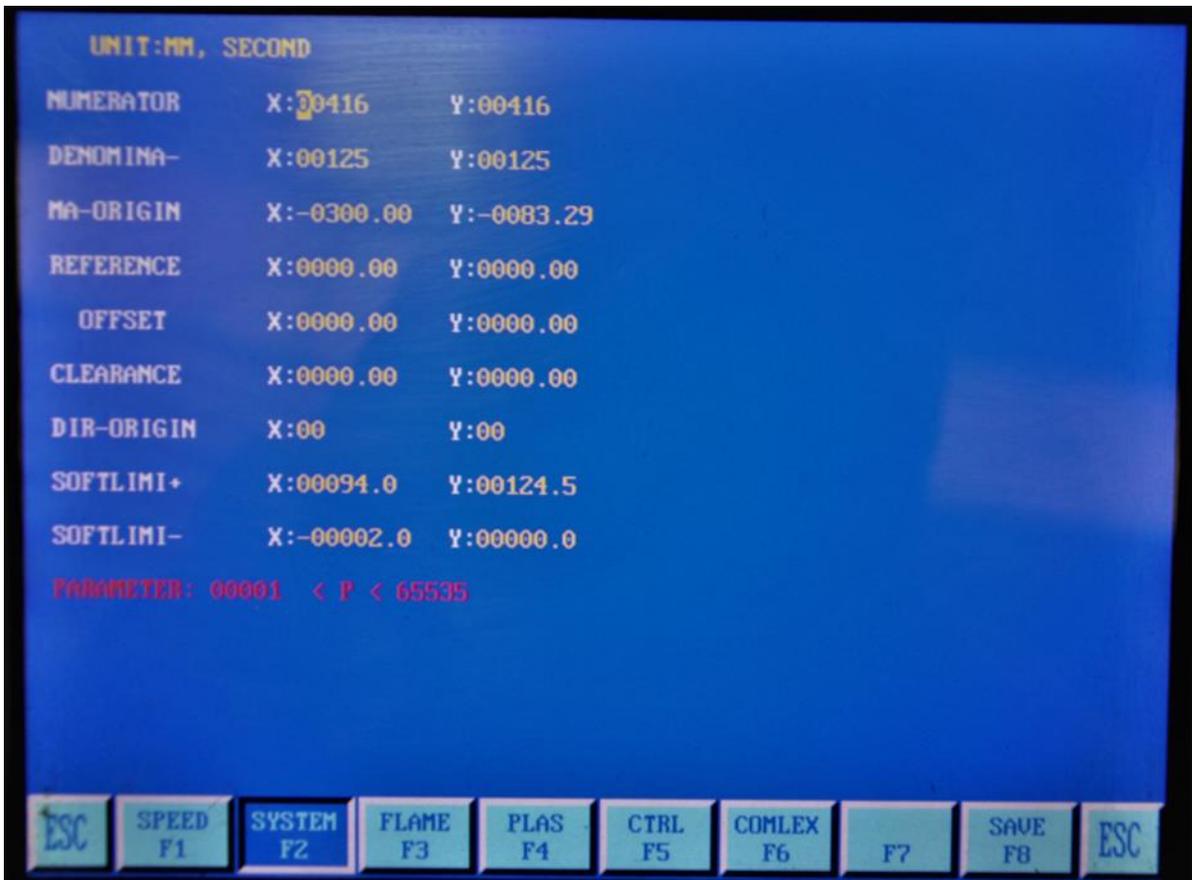
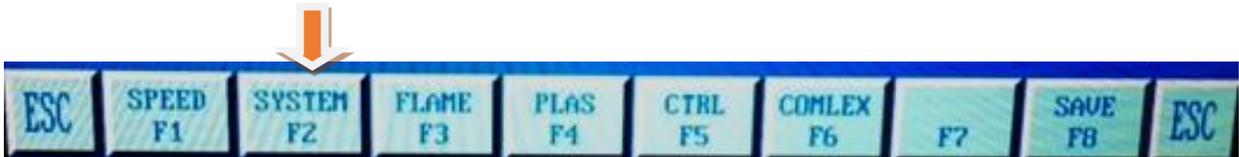
When programming the pipe cutter, the programs are generated as if the pipe is unfolded in the flat condition. For example, if the pipe is 4" outside diameter, then the overall circumference of the pipe is $4 \times \pi = 4 \times 3.14 = 12.56$ inches. When programming a 4" O.D. pipe, the programmer should assume a flat sheet with a width of 12.56 inches.

SWITCHING FROM PIPE-CUTTING TO PLATE-CUTTING

1. Change the X-axis limit to allow the torch to move over the center of the pipe:
 - a. From the HOME screen, push F4 [SETUP]



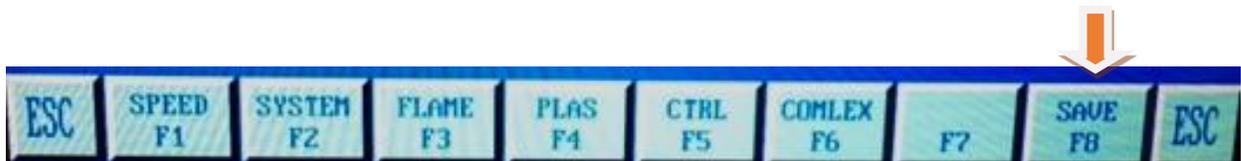
- b. Then press F2 [SYSTEM] to see the following screen



- c. Change the following values
 - i. NUMERATOR X:00416
 - ii. DENOMINA- X:00125
 - iii. SOFTLIMI+ X:00061.0



- d. Then Press the F8 [SAVE] to store the change



- e. Turn off the power to the CNC Control using the Red Power Button



- f. Move the Pipe/Plate Selector Switch to "PLATE"



- g. Turn on power to the CNC Control using the Red Power Button



- h. Connect the plasma cutter ground clamp plasma table bed

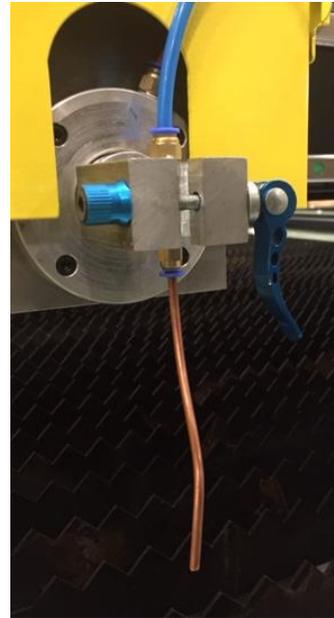


- i. Move torch back over the cutting bed
 - i. The X < + software overtravel alarm will be on the screen but X can move in the minus direction of the table. This alarm will clear once the torch position is less than the normal plate cutting width (61" for C510 machines; 49" for C404 and C408 machines)
- j. The plasma table is now ready to use.

WATER MIST CHILLER (OPTIONAL EQUIPMENT)

The Water Mist Chiller provides additional cooling of the work piece that may, in some cases, reduce warpage - especially in thinner material.

This option consists of a water chiller, solenoid valve, and spray tube. The chiller must be connected to a separate 120 volt single phase wall outlet.



CONNECTIONS:

1. The inlet and outlet of the chiller must be connected together using 12 mm tubing on both ends of the supplied tee fitting. Connect the outlet of the tee fitting to the water solenoid located next to the incoming air regulator on the machine using 8 mm tubing. **DO NOT CONNECT THE INLET OF THE CHILLER TO A WATER SUPPLY.**



To Water Solenoid

2. Bend the copper tubing so that the end of the tubing aims slightly below the nozzle of the torch.
3. Fill the water reservoir from the fill port on top of the chiller.
4. The chiller is now ready to use.

In order to use the chiller:

1. Turn the power switch on



2. Press the lighted WATER CHILLER pushbutton on the CNC control so that it lights up.



The chiller will now spray as the plasma torch is cutting.

To disengage the chiller feature, simply turn the power switch off and press the pushbutton so that it no longer lights up.

APPENDIX A – FastCAM SETUP

The Piranha C-series Plasma Table comes standard with a set of FastCAM software. This software comes in a plastic case and consists of:

1. A disk containing the FastCAM Software
2. A dongle (this is a device that looks like a USB Flash Drive, but it functions as a license key to unlock the software. The FastCAM software cannot run without the dongle in place in the computer's USB port)
3. Installation and Startup Instructions

The FastCAM license allows the user to run FastCAM on one computer at a time. In order to run FastCAM, the dongle must be in place in the computer's USB port.

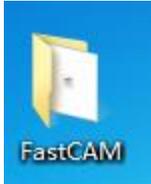


NOTE: Do not misplace the dongle. If the dongle is misplaced, a replacement dongle will be required at the cost of the entire FastCAM software package.



How to set up FastCAM :

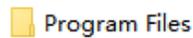
Run the CD, choose **ENGLISH**, then choose **START**, and follow the instruction to finish installation; When you finish Fastcam installation, you will see a file holder FastCAM on your desktop:

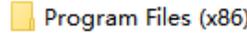


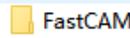
A. How to install and setup for imperial?

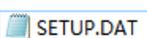
How to change the unit from metric to imperial (MM to INCH):

1. Go to your system disc (disc C:) and find Fastcam file holder:

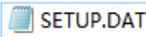
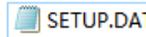


In disc C you find  , then double click Program Files (x86)

2. Then you will find file holder  , open this file holder;

3. Find the file  , open this file, change **UNITS,0,0,0** on the 6th row to **UNITS,1,1,0** ;

4. save.

(If your system do not allow you to change the file, you can copy the file to other disc or USB, make changes and save the file, then delete the old  , copy the new  from other disc or USB.)

B. How to import part drawing?

1. Double click **FastCAM** file holder;

2. Double click **FastNEST**;

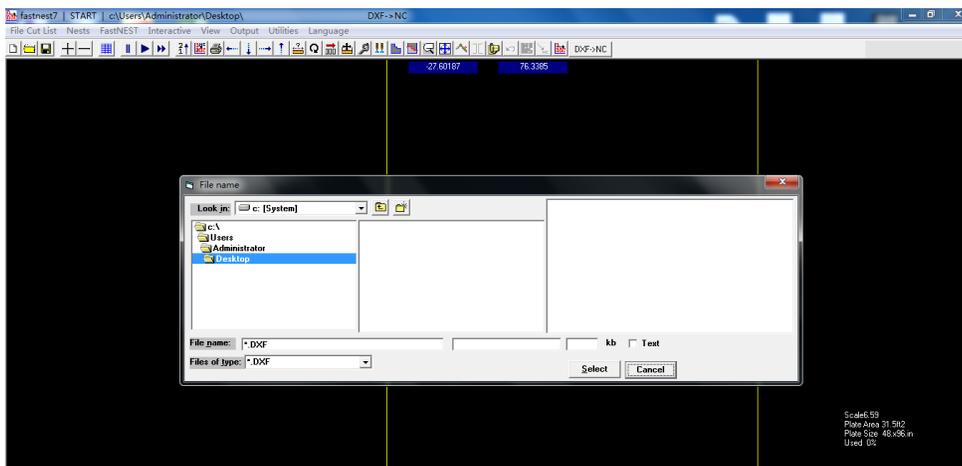
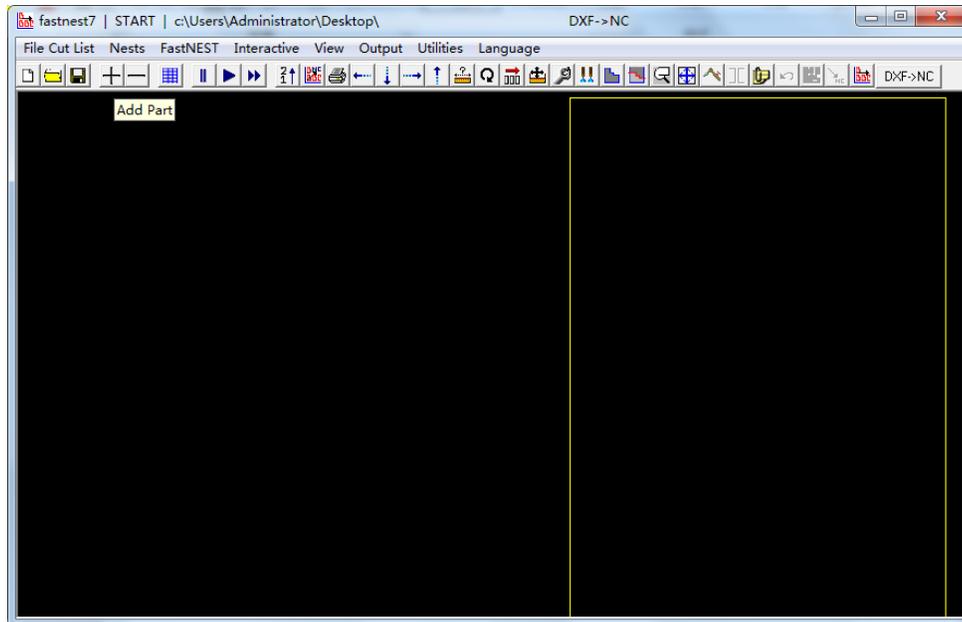
3. You will see black background with a yellow square on it, you also will see tool bar on top;



4. Click the 4th symbol from left on the tool bar  to add part;

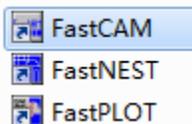
5. Then a page come out for you to choose the part file from your computer to add to **FastNEST**; (With **FastCAM** software, we can only nest or import a part of NC, DXF, IGES or CAM file.)

Also, if you are a new user of **FastCAM** software, you need to finish **INITIAL FASTCAM SETUPS** (attached with **this file**) before you start to nest/import a part drawing.



C. How to edit a part drawing?

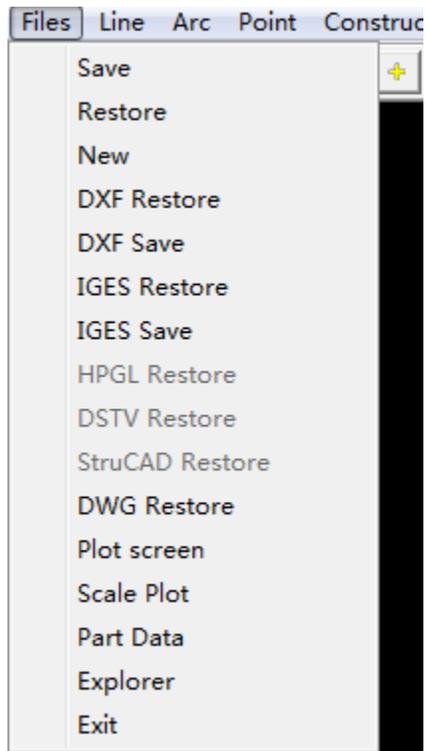
1. Open FastCAM holder, open FastCAM;



2. The tool bar on top:



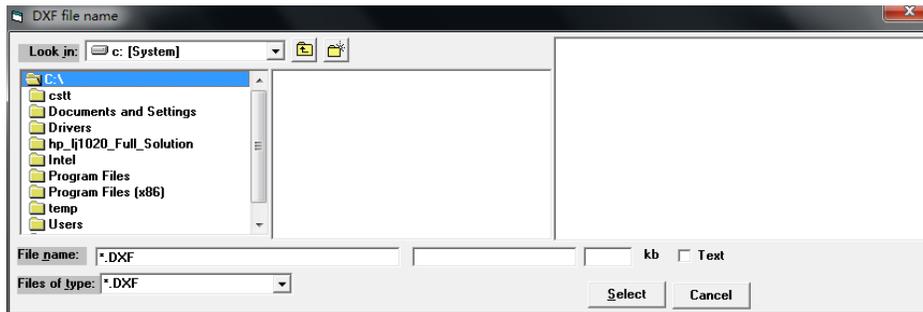
3. Click **Files**, choose **Restore** to read *.CAM, **DXF Restore** for *.DXF;



4. Choose the functions you need and **Enter**:



- Find the part drawing under certain path in your computer;



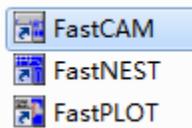
- Use the tool bar on top to erase or add lines/circles/rectangles.

D. How to create a part? (How to use FastCAM to draw a part)

We will draw a 4” square with 1” diameter round hole.

To create a part drawing with FastCAM:

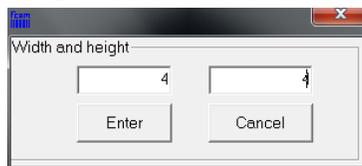
- Open FastCAM holder, open FastCAM;



- The tool bar on top:

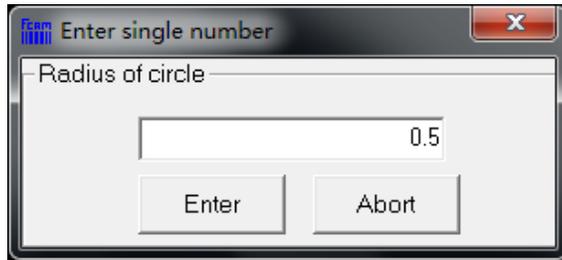


- Click on  on the tool bar to draw a box/square:
a page comes out, where you input the **Width & Height** of the square, then **Enter**;

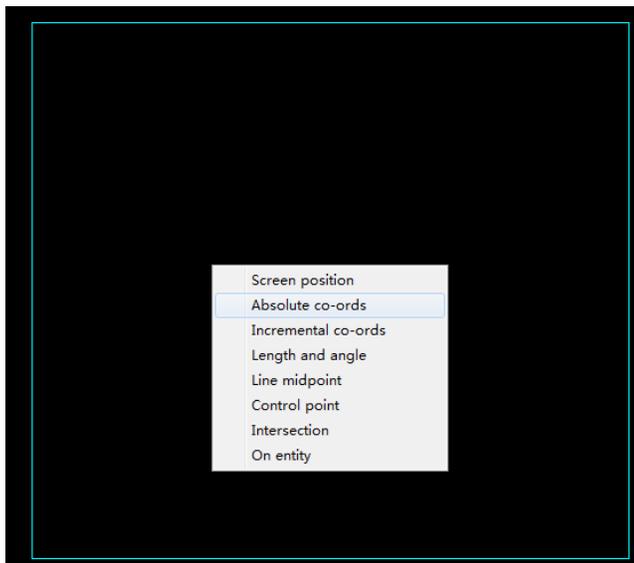


- Click  on the tool bar to draw a circle:

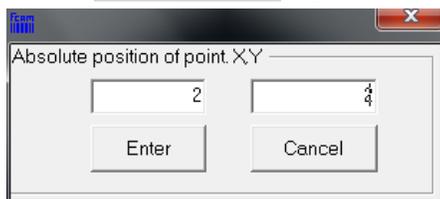
i. input the **Radius of Circle** and **Enter**;



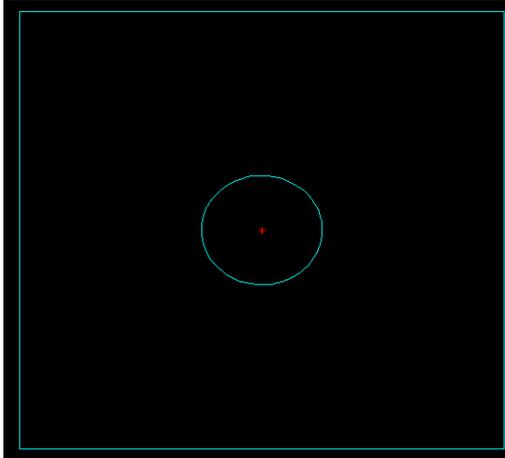
ii. Your mouse become a white cross, click the **right button** of mouse,



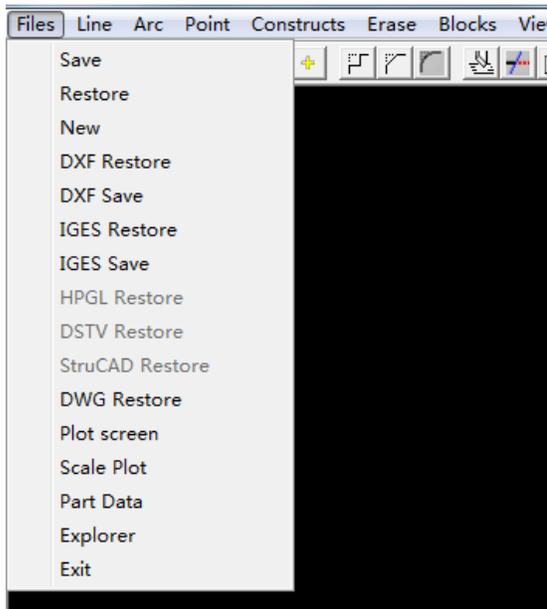
iii. choose **Absolute co-ords**, input the absolute co-ordinates of circle center, then **Enter**;



5. When you click  and close the sub-page (push ESC if necessary), you will see a 4" square with a 1" round hole right in the middle;



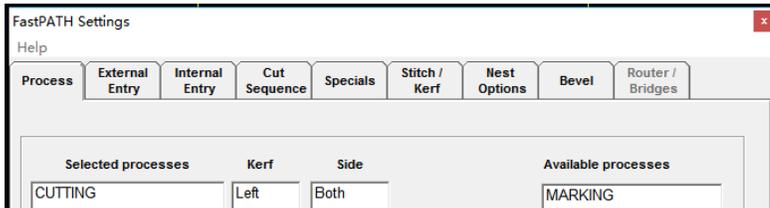
6. Push **Files** on the top left of the tool bar, choose **Save** to save the part in a ***.CAM** file; or **DXF Save** to save the part in a ***.DXF** file. Then follow the instruction, name the part drawing and save it to certain path on your computer or USB.



E. How to set up lead-in/out?

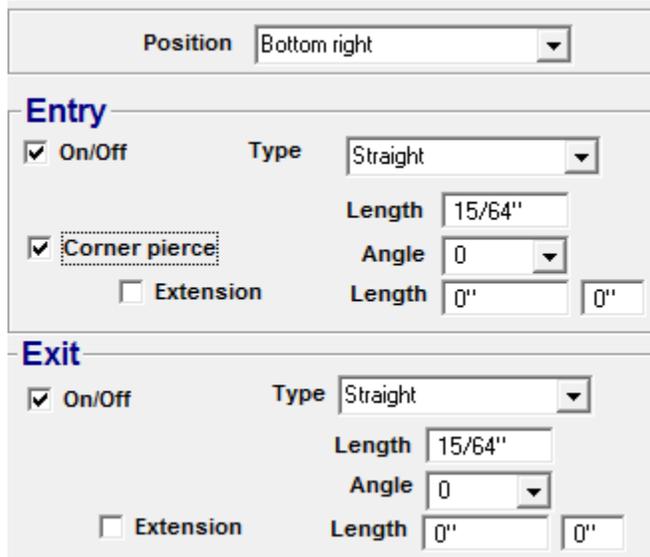
Set the lead in and lead out (the lead-in and lead-out will change according to the thickness and density of the material , once you finish setting lead-in and lead-out, you will not need to change the settings unless the thickness or density of the material, or the torch you use changes):

1. Open **FastNEST**, click  on the right of the tool bar on top;
2. click , you will see **FastPATH Settings** page comes out;
3. under "Process" on top left, choose "CUTTING---LEFT---BOTH";

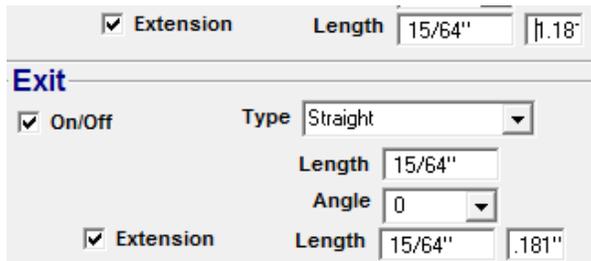
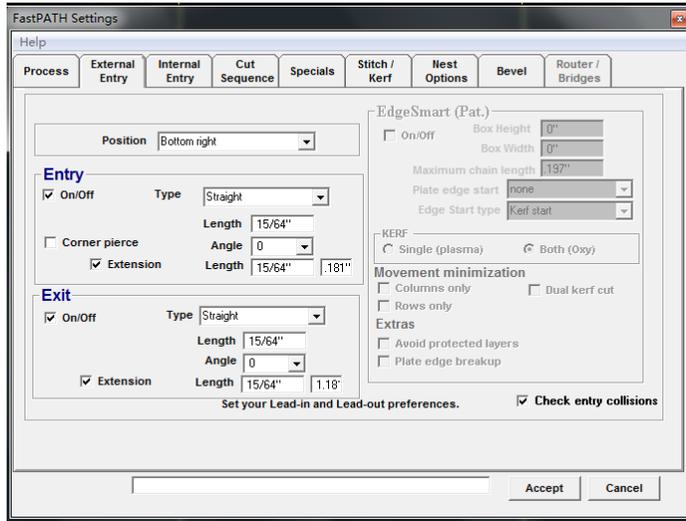


4. under "**External Entry**", set the "**Entry**" and "**Exit**" according to your need, "Entry" is lead-in and "Exit" is the lead-out. Normally, the length of lead-in/out should be $\geq 2 \times$ material thickness, for small thickness material, the length of lead-in/out also need to be bigger than the kerf width. If the external outline of the part only has straight lines, you can choose **Straight** in entry/exit type; if the external outline of the part only has curves, or has both straight lines and curves, you can choose **Half Circle** or **Quarter Circle** in entry/exit type.

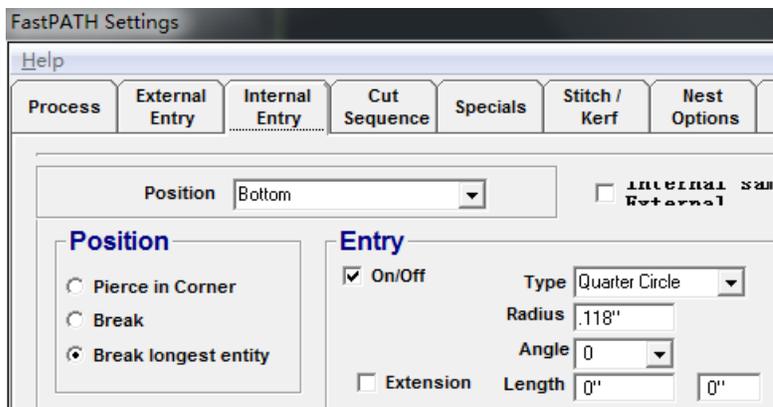
Please also check **Corner pierce**.



5. If you want to choose **Extension** in "External Entry" settings to achieve higher precision, make sure you choose **Extension** on both "Entry" and "Exit". Normally, the length of extension is same as the length of entry/exit, and the blank to the right of the length of extension is the angle of extension line to entry/exit line, our default number is 1.181, which means 30 degrees;



6. set your **Internal Entry** in the same way as you setting up your **External Entry**. (If the internal cuts are all straight lines, choose **Pierce in Corner**; otherwise choose **Break longest entity**;

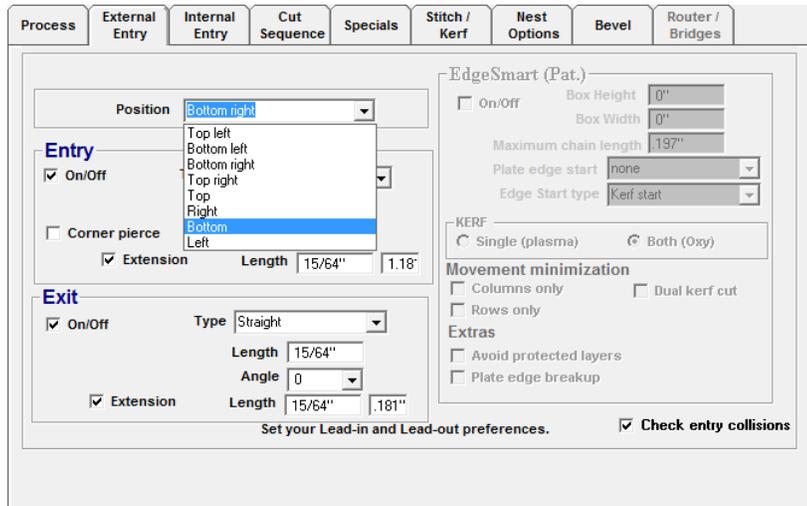


7. when you finish all the FastPath settings, click  to save.

F. How to select/move lead-in/out location?

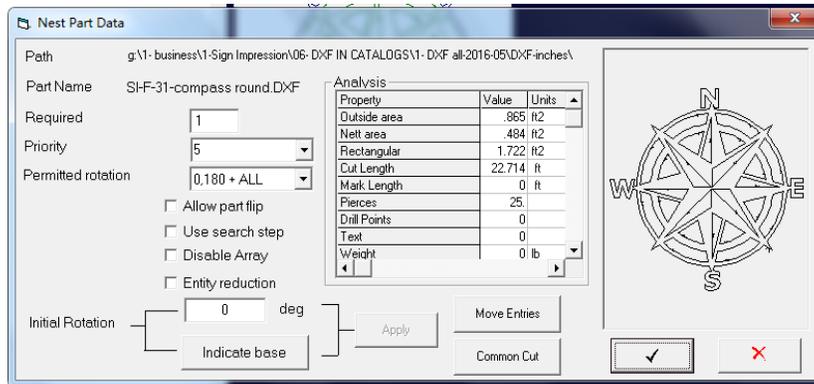
1. Select general lead-in/out location:

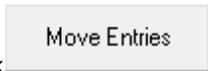
- i. Open **FastNEST**, click  on the right of the tool bar on top;
- ii. click , you will see **FastPATH Settings** page comes out;
- iii on top left, in Position, you can select the general location of lead-in/out:

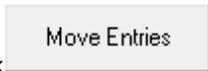


2. Move lead-in/out when you import part drawings:

When you import a part drawing, you will see the following page, you can find  on the middle bottom;





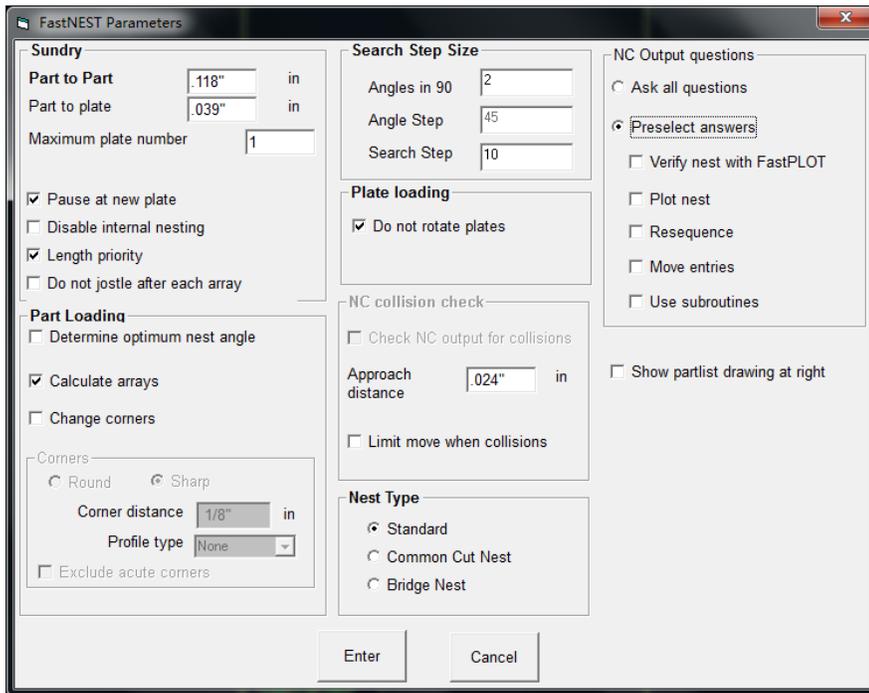
ii. click  once, click the middle spot of the lead-in/out, both lead-in and out change color, then click at the spot where you want to move existing lead-in/out to (if only lead-in or lead-out change color, then you need to click twice to move existing lead-in/out the new spot);

iii. if you are satisfied with the new lead-in/out position, click  on the top left, and then you can resume nesting; If you want to cancel editing the lead-in/out position, click .



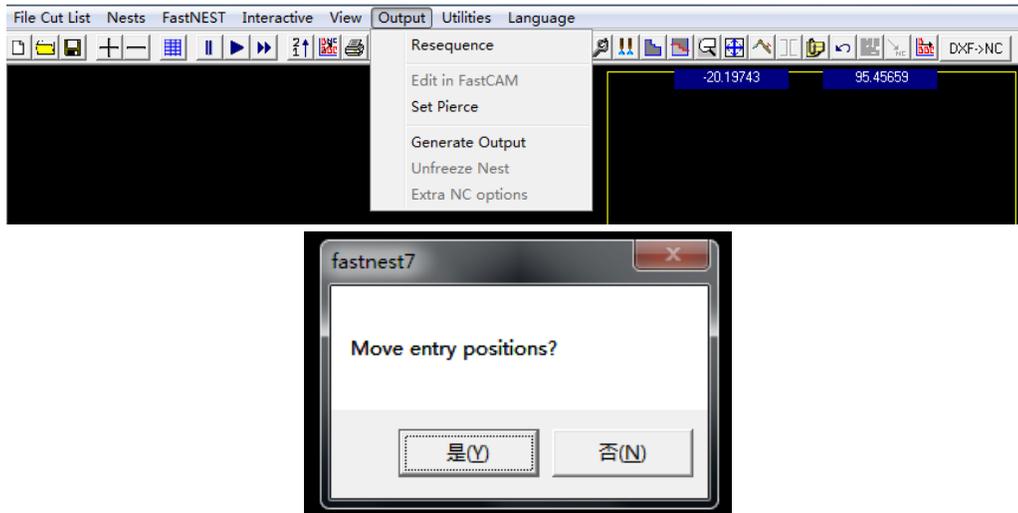
3. Move lead-in/out when you generate output:

i. When you open **FastNEST**, Click  in the middle part of the tool bar on top the page, you will see the following page comes up to set up **FastNEST Parameters**:

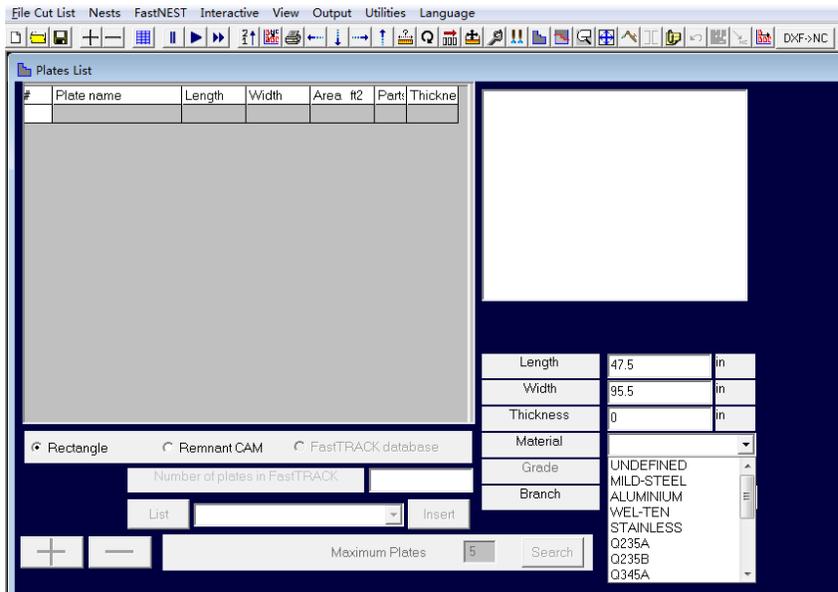


ii. On the right of the page, you can choose from **Presect answers** the questions you want to be asked every time when you generate output, check **move entries**;

iii. Then when you have finished add part drawings, click **Output**, then **Generate Output**, then there is a page asking **Move entry position?** click **(Y)**. Then you can move the entries by following the steps of ii and iii of step 2 here above, when you click , you can rename your NC output you just generated.



G. How to select sheet size, type and shape?



1. open **FastCAM** file holder and open **FastNEST**;

2. click  on the tool bar on top,



3. on the page you can input the sheet **Length** (the X-AXIS direction), and the sheet **Width** (the Y-AXIS direction);

4. on the same page, you can select sheet **Thickness** and **Material** type too;

5. In the picture right under the topic “G. How to select sheet size?”, if you choose **Remnant CAM** instead of **Rectangle**, then click , you can choose from your computer the remnant sheet you saved from nesting before. (Check “K. How to use remnant material sheet” on the end of this file.)

H. How to select material type/thickness?

Please refer to the answer of question G above.

****(optional) How to add more MATERIAL to your FastCAM:

1. Go to your system disc (disc C:) and find Fastcam file holder:

In disc C you find  Program Files  Program Files (x86), then double click Program Files (x86)

2. Then you will find file holder  FastCAM, open this file holder;

3. Open  Material.dat ;

4. (optional) Delete the rows of the material you will not use;

5. copy one row, for example the row of Q235A, past this row to the bottom of this file;

6. change the Q235A to the material type you want to add, and change the density 7850 to the density of new material type (kg per cubical meters), save.

If your system do not allow you to change the file, copy the file to other disc or USB, make changes and save

the file, then delete the old file, paste the new  Material.dat file back.

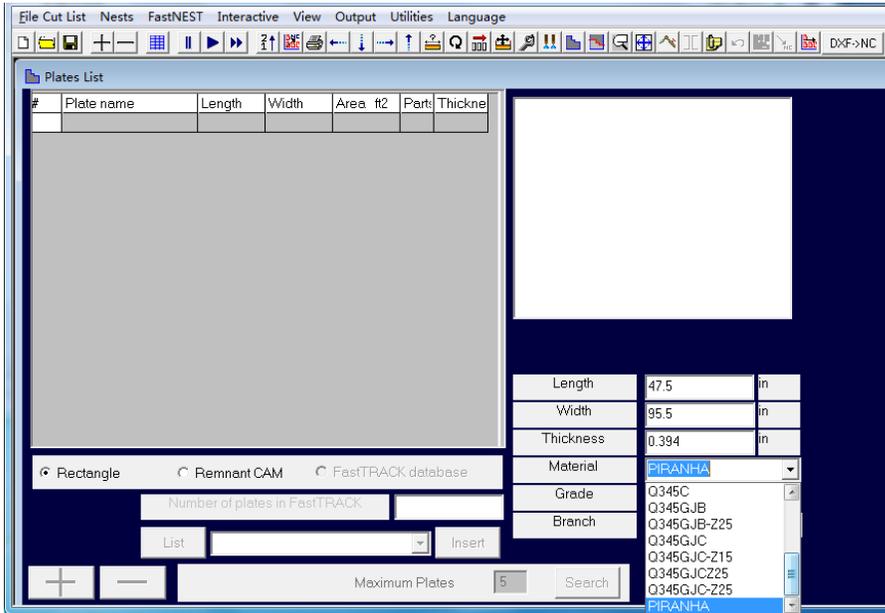
```

Stainless, 304L, 8177, 3. 90, S34L
Stainless, 316, 8177, 3. 90, S316
Stainless, 316L, 8177, 3. 90, S36L
Stainless, 310, 8177, 3. 90, S310
Stainless, 321, 8177, 3. 90, S321
Stainless, Duplex 2205, 8000, 3. 90, DPX
Q235A, , 7850, 3, 90, Q235A
Q235B, , 7850, 3, 90, Q235B
Q345A, , 7850, 3, 90, Q345A
Q345B, , 7850, 3, 90, Q345B
Q345C, , 7850, 3, 90, Q345C
Q345GJB, , 7850, 3, 90, Q345GJB
Q345GJB-Z25, , 7850, 3, 90, Q345GJB-Z25
Q345GJC, , 7850, 3, 90, Q345GJC
Q345GJC-Z15, , 7850, 3, 90, Q345GJC-Z15
Q345GJCZ25, , 7850, 3, 90, Q345GJCZ25
Q345GJC-Z25, , 7850, 3, 90, Q345GJC-Z25
Q235A, , 7850, 3, 90, Q235A
    
```

```

Stainless, 321, 8177, 3. 90, S321
Stainless, Duplex 2205, 8000, 3. 90, DPX
Q235A, , 7850, 3, 90, Q235A
Q235B, , 7850, 3, 90, Q235B
Q345A, , 7850, 3, 90, Q345A
Q345B, , 7850, 3, 90, Q345B
Q345C, , 7850, 3, 90, Q345C
Q345GJB, , 7850, 3, 90, Q345GJB
Q345GJB-Z25, , 7850, 3, 90, Q345GJB-Z25
Q345GJC, , 7850, 3, 90, Q345GJC
Q345GJC-Z15, , 7850, 3, 90, Q345GJC-Z15
Q345GJCZ25, , 7850, 3, 90, Q345GJCZ25
Q345GJC-Z25, , 7850, 3, 90, Q345GJC-Z25
Piranha, , 9999, 3, 90, Piranha
    
```

第 30 行, 第 1 列

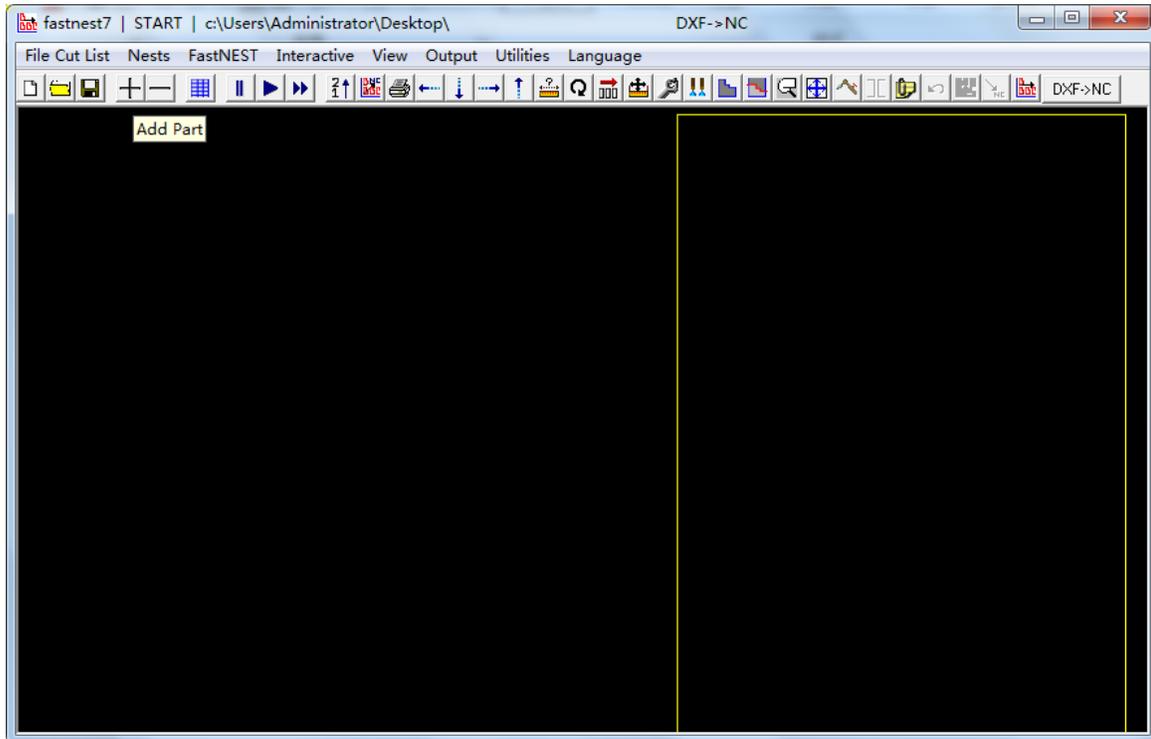


I. How to create part program(NC file/.TXT file)?

*Please refer to the file “**3-PLASMA -create a part program to cut**” for the complete operation.

1. Double click **FastCAM** file holder, then double click **FastNEST**;
2. Finish all the initial setup by following the steps in the file **3-CREAT A NESTING PROGRAM** attached together with this file;

3. On top of the page, find , click to import/add a part;



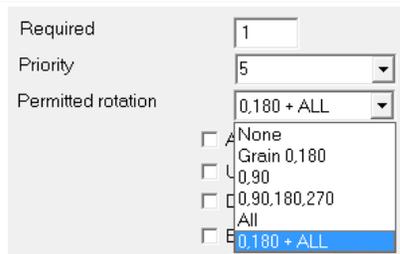
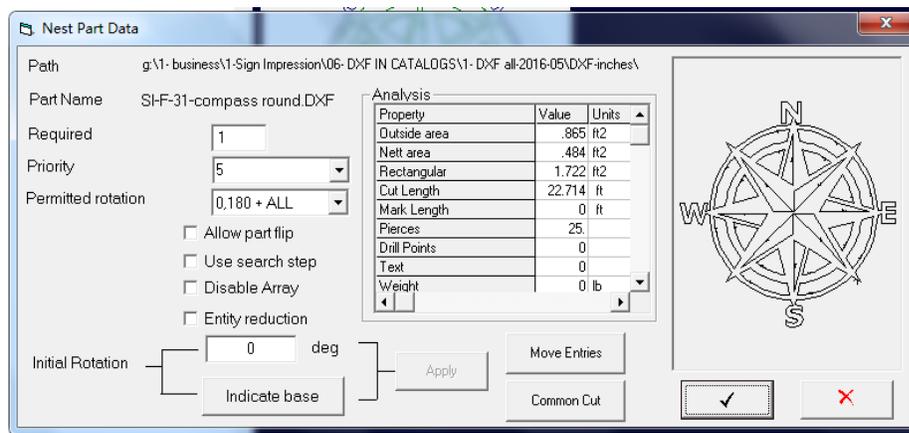
4. A page of Nest Part Data comes up, you can input the **Require** quantity of this part, the **Priority** level of this part and **Permitted Rotation**:

- i. Require quantity means how many pieces you need;
- ii. **Priority** levels are decided by emergency levels parts. For example:

If you need to nest a whole sheet of Part A, you do not need to change/set **Priority** levels, you only need to input a large **Require** number, which is bigger than the rough estimated number you may get from the whole sheet. Then FastCAM will automatically calculate and nest as many Part A to this sheet as possible;

If you need to nest multiple parts A, B and C to the same sheet, and you definitely need Part A as soon as possible, you need part B in 2 days and Part C in 2 weeks, you can input **Priority** levels to part A, B and C. FastCAM will nest the part in order of **Priority** level from high to low

iii. **Permitted Rotation** will help users to make the most use of material.



5. Repeat step 4 until you have added all the parts or there is no space on the sheet;

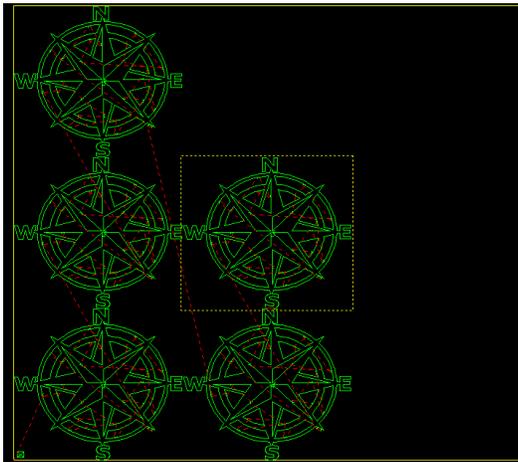
6. You review all the parts imported by clicking **Parts List** which is  on the tool bar; click the name of the part and Delete, you can delete the part from the list;

#	Part name	Req	Pri	Rot	Cut	Wid	Ht	Prv
1	SI-A-05-Fire Rescue.dxf	1	5	0,180 + ALL	1	5.722	15.75	0
2	SI-J-01-soccer-girl.dxf	12	5	0,180 + ALL	12	14.75	7.089	0
3	SI-A-08-USN.dxf	2	5	0,90,180,270	2	0.857	5.747	0

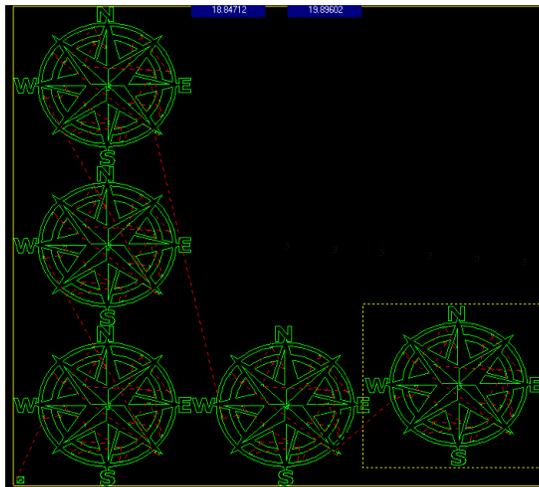
7. When you finish, click  on the tool bar, FastCAM will renest all the parts from beginning in the order of **Priority** level.



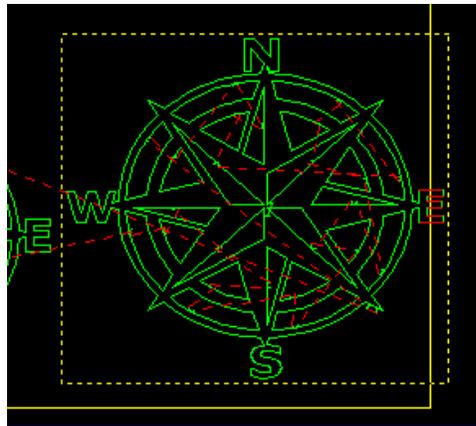
8. You can nest the part manually, the yellow frame is your material sheet, after you import/add part, you will be able to see the part inside the yellow frame. For example:

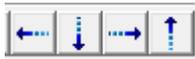


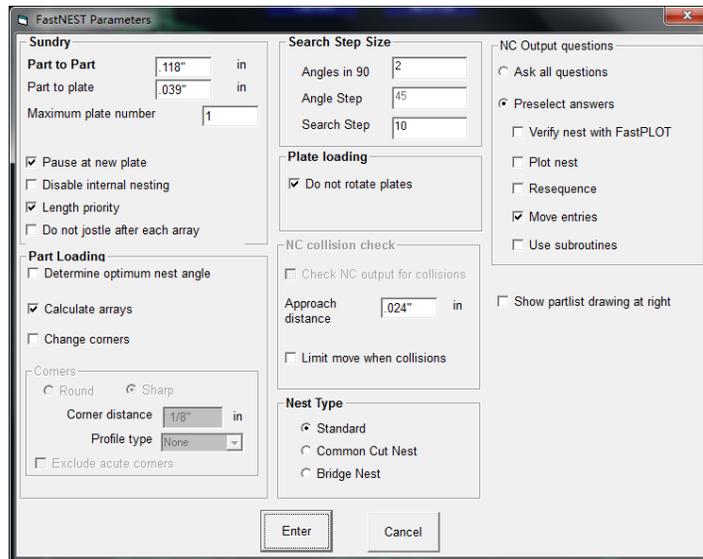
i. Click one the part you want to move with left button of mouse, keep holding left it and do not let it go until the part move the better new spot;



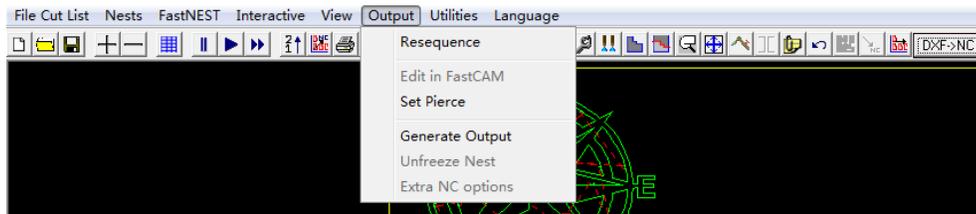
ii. The broken yellow line shows the part you are moving with your mouse, if the part is over the edge of is too close to another part, the color will change to red (like the letter E in the picture below);



iii. Click the arrows  on the tool bar, the part inside broken yellow lines will move to left/down/right/up as much as the limit goes. (the **Part to Part** and **Part to Plate** distances can be set in **FastNEST Parameters** , you can find the page by clicking  on the tool bar.



9. When you finish nesting, click **Output**, then **Generate Output**;



10. Input your **Nest Data** and **Accept**;

Nest Data

Nest Name: N85

Job:

Material: Material

Thickness: 25/64" in

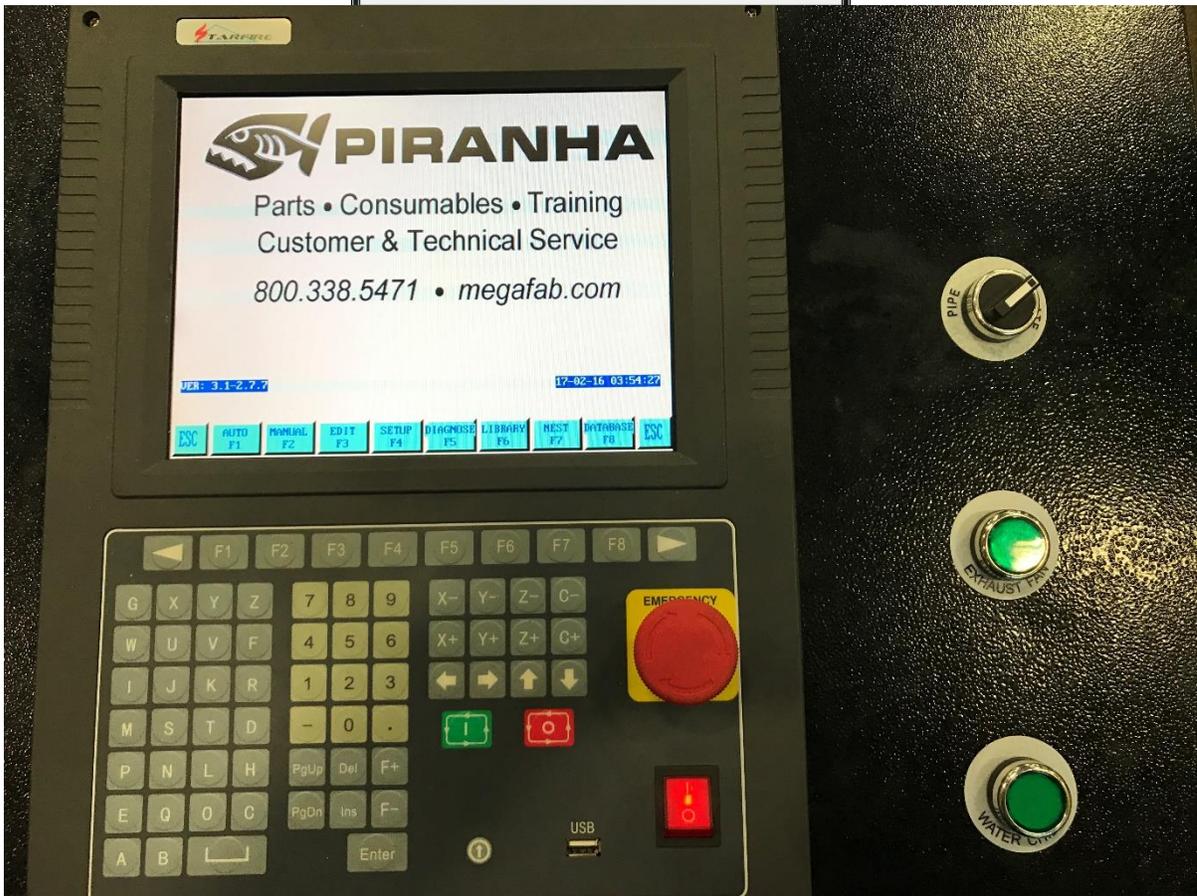
Density: 0 lb/ft3

Programmer:

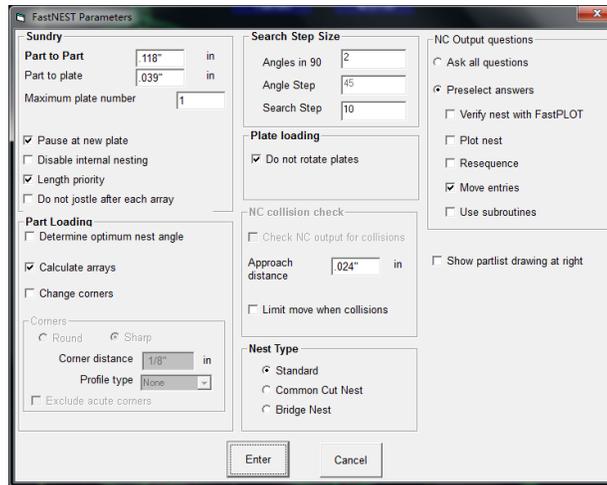
Customer:

Notes:

Accept Cancel



11. Then the software will ask you all the questions which you choose on the left right side of **FastNEST Parameters** page (you can find the page by clicking  on the tool bar.)

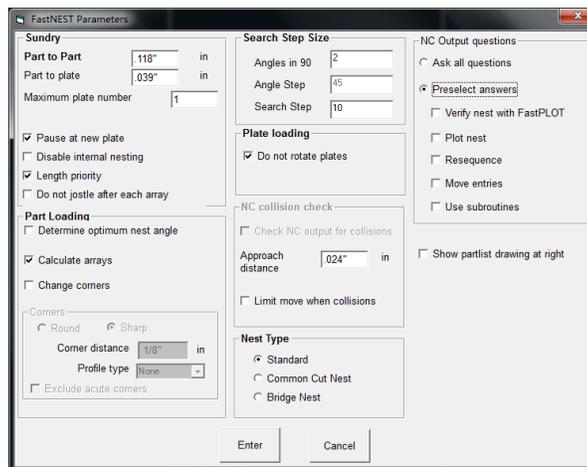


12. Then you will see a page comes up on which you can rename the nesting file(.TXT file), save and copy that .TXT file to your USB, bright your USB to your **PARANA** plasma machine, you are ready to start cutting.

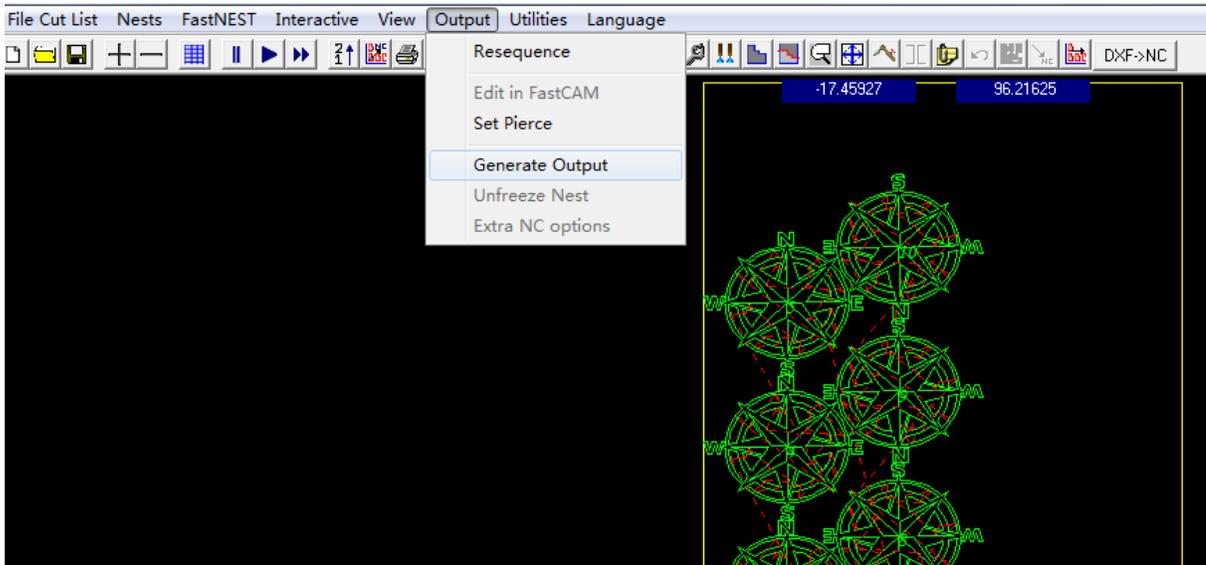
J. How to edit part sequence?

You can change cutting sequence when you generate output

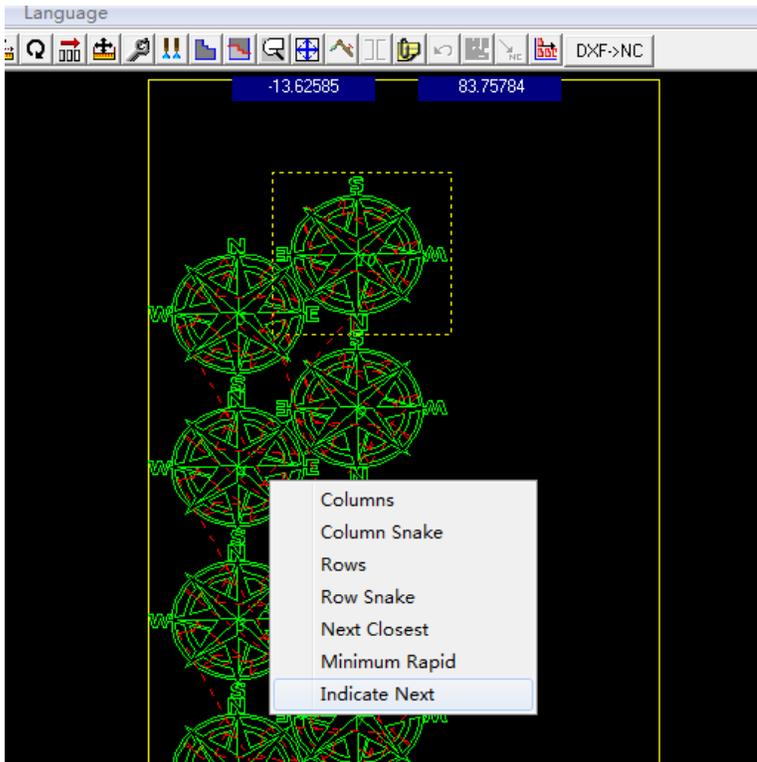
1. When you open **FastNEST**, Click  on tool bar on top the page, you will see the following page comes up to set up **FastNEST Parameters**:



2. On the right, in **Preselect answers**, check **Resequence**, then every time when you generate output, you will be able to edit part cutting sequence;



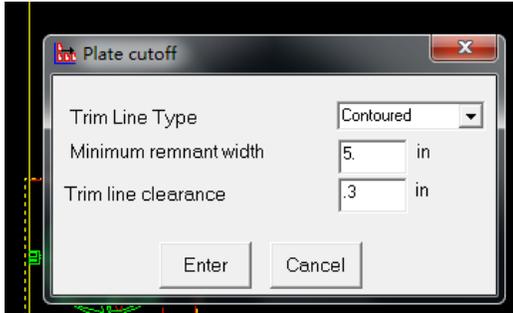
3. you can choose certain sequence or indicate the sequence by clicking the parts in the sequence you prefer:



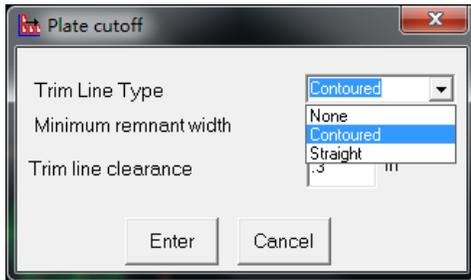
K. How to use remnant material sheet?

To make the best use of your material sheet especially larger size ones, it is very important to save the remnant material sheet for the future cutting.

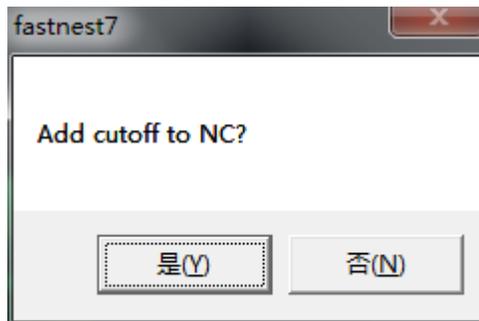
1. After adding all the parts, click  on the tool bar on top, a **Plate cutoff** page will come up;



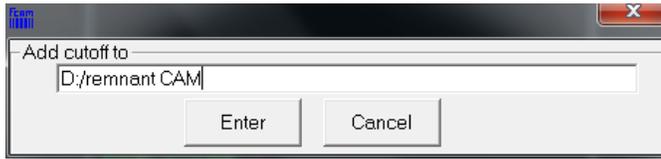
2. On **Plate cutoff** page:
 - i. **Trim Line Type**, normally, we choose **Contoured**;



- ii. **Minimum remnant width** = the smallest width/length of sheet you can use;
 - iii. **Trim line clearance** means how close you want the outline of remnant sheet to the parts you will cut. Normally we set it the same as **Part to Part** distance.
3. Click **Enter** to save all the settings;
 4. Click **Output** and **Generate Output**, once you save NC(.TXT) file, a small page comes out;

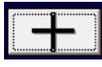


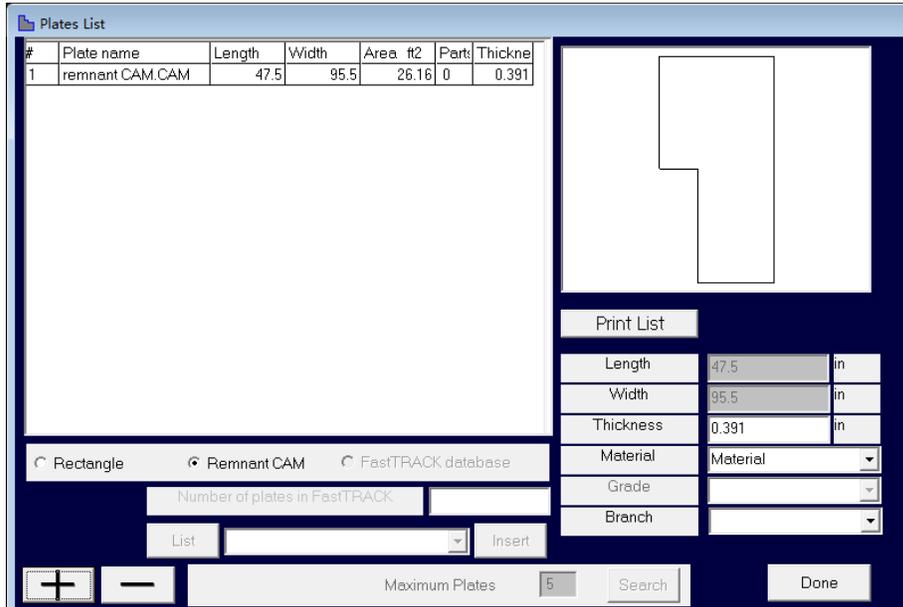
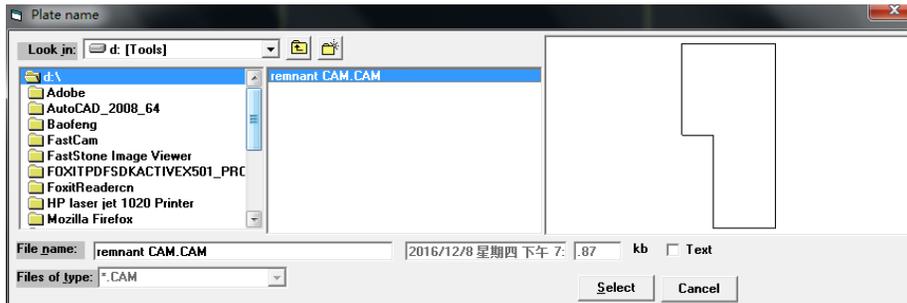
5. Choose **(Y)**, and input file path where you want to save all the Remnant CAM files, or simply click **Enter**;



6. To use the remnant sheet:

i. click , then choose **Remnant CAM**;

ii. click , go to the same file path to find the **remnant CAM**, click **Select**, then click **Done**;

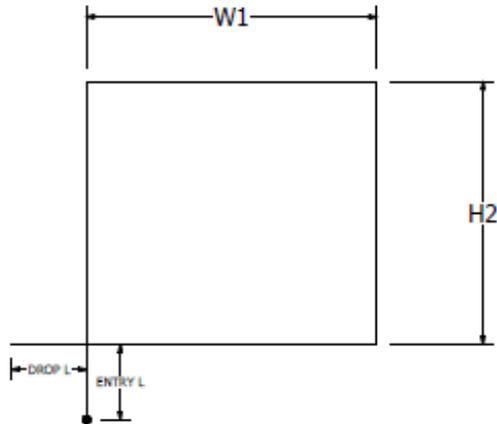


APPENDIX B – PARAMETRIC SHAPE LIBRARIES

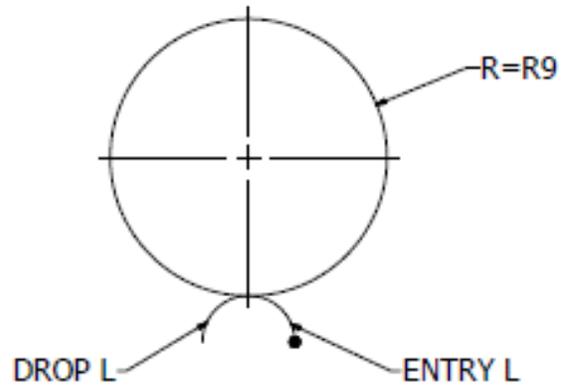
The following table shows all of the available parametric shapes, with their customizable values labeled. See pg. (XX) for instruction on how to cut a single part, or create a nested program using the parametric library.

Library 1

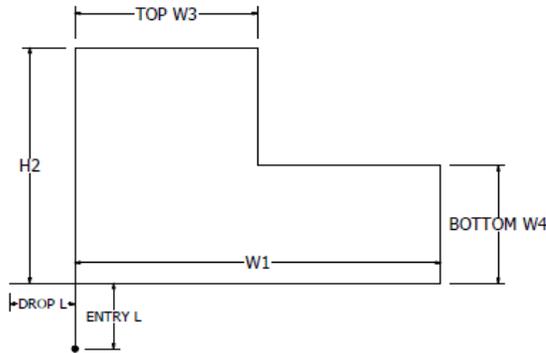
1. Rectangle



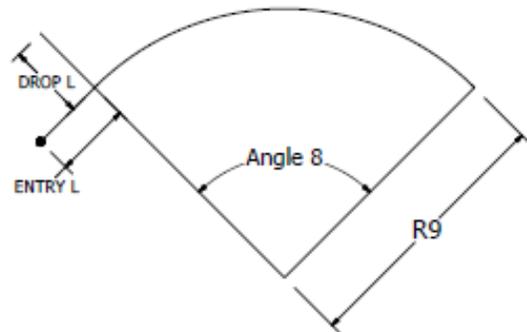
2.Circle



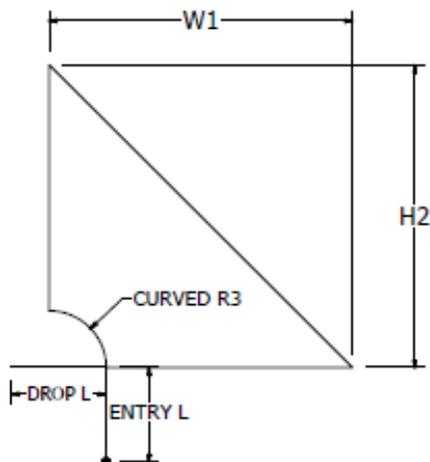
3. L-Piece



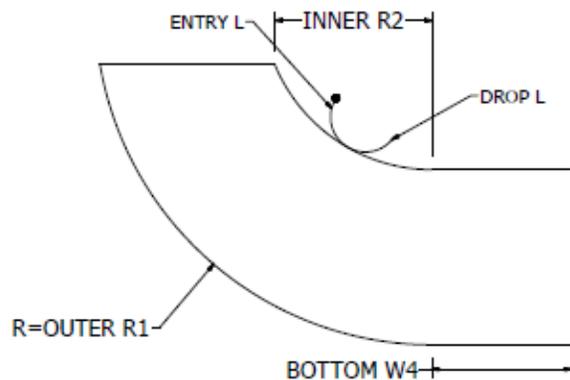
4. Sector



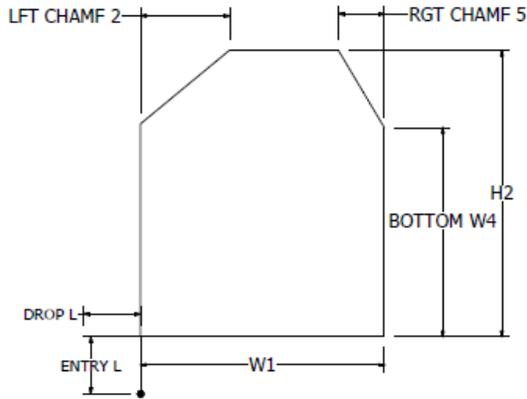
5. Triangle



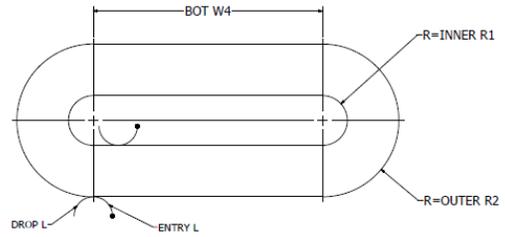
6. Roof Rec (1)



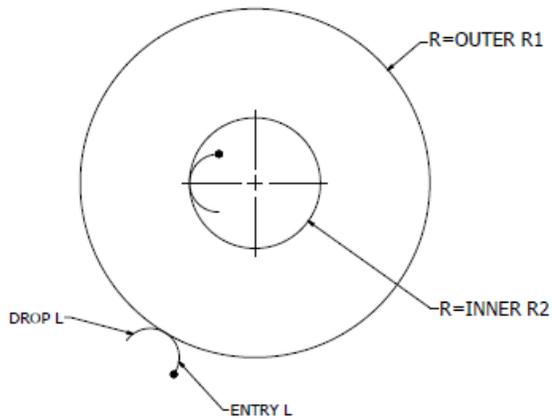
7. Chamfer



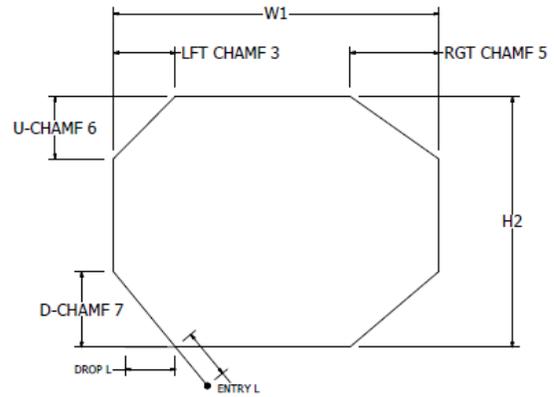
8. Roof Rec (2)



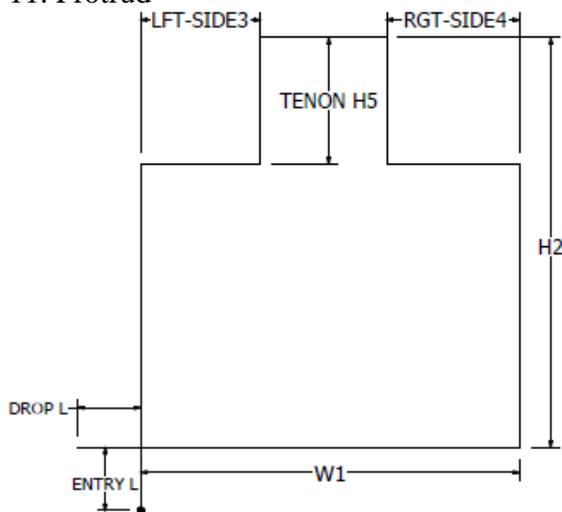
9. Flange (Single-Hole)



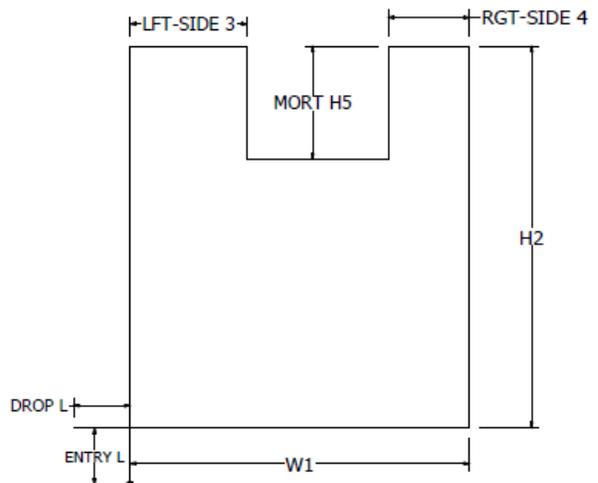
10. Octagon



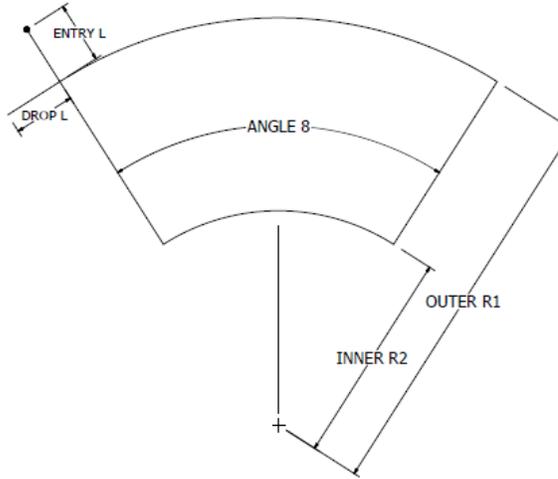
11. Protrud



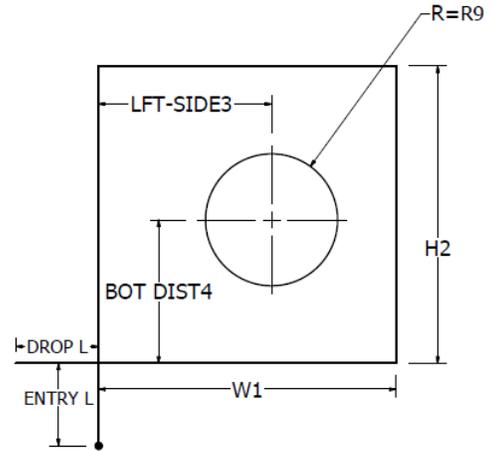
12. Ingconca-



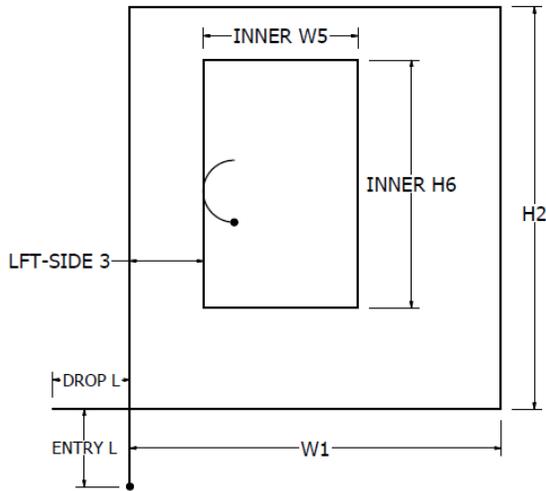
13. Sector Ri-



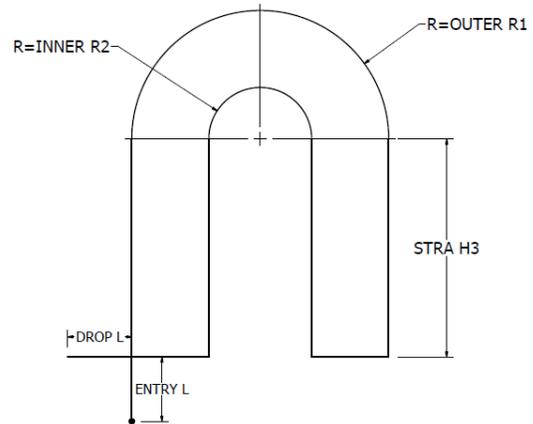
14. Circular



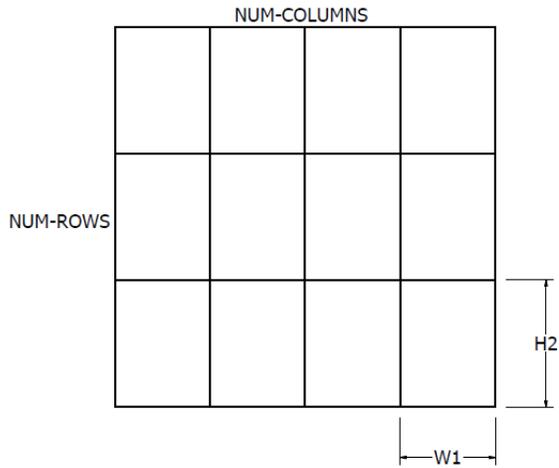
15. Quadrate



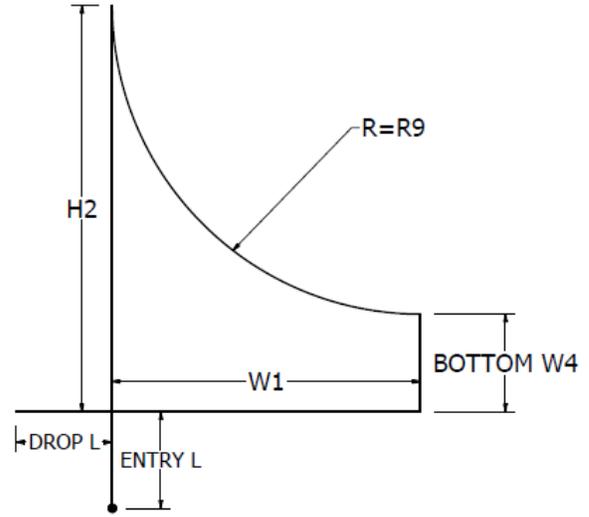
16. U-Shape



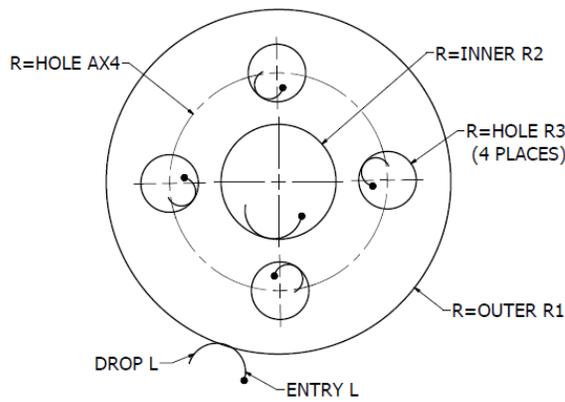
17. Define T



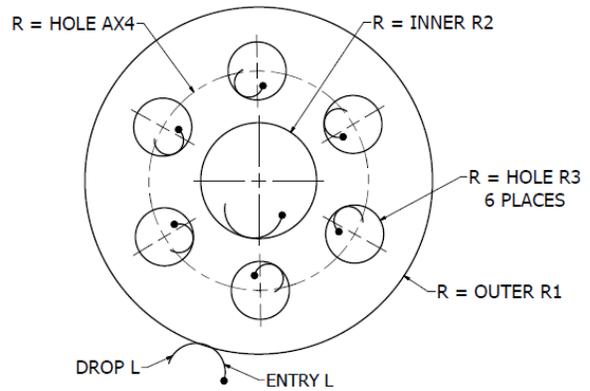
18. Curved T-



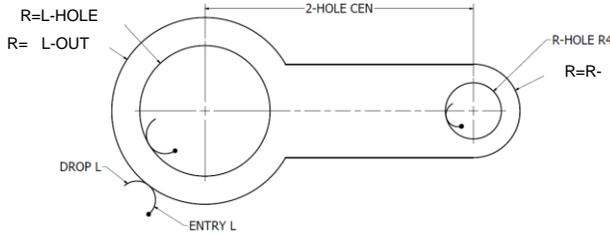
19. Flange Hole (4-Hole Flange)



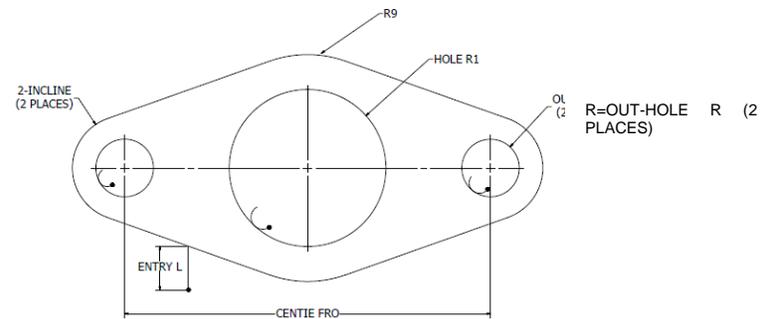
20. 6-hole Flange



21. Impeller



22. 2-Hole Flange



Library 2

1. Bridge1

Do not use

2. Bridge2

Do not use

3. Bridge3

Do not use

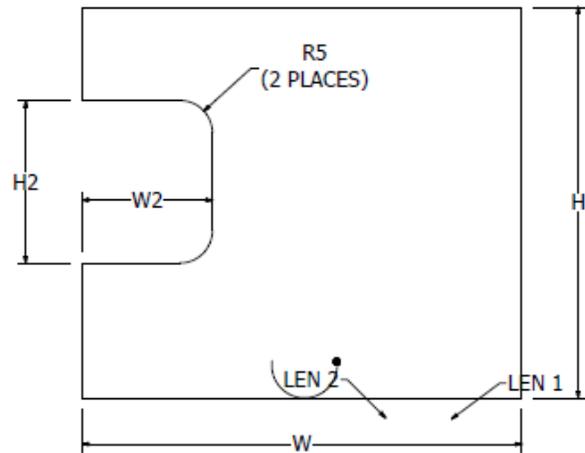
4. Bridge4

Do not use

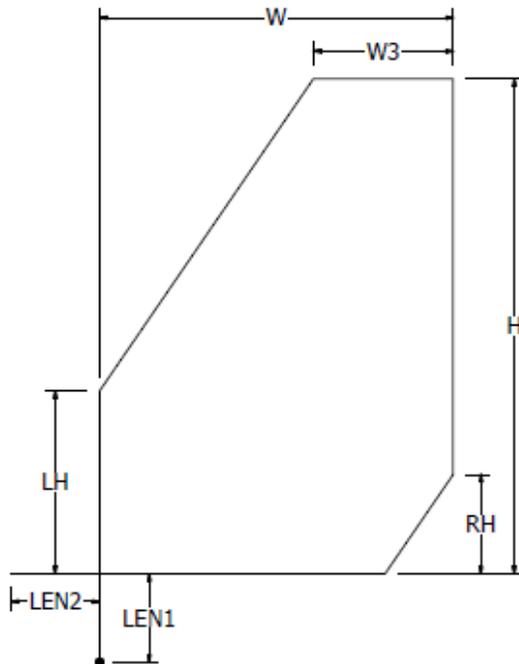
5. Arch

Do not use

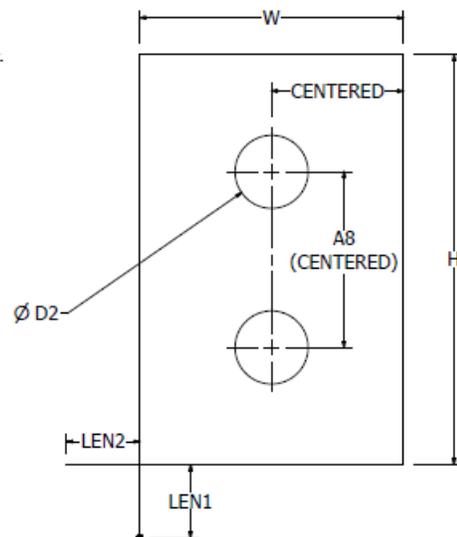
6. Groove



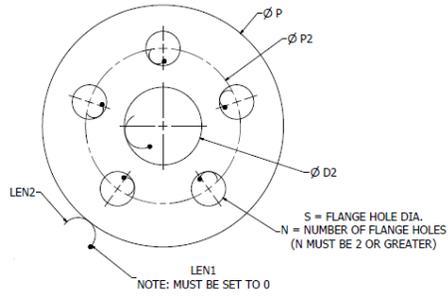
7. Diam



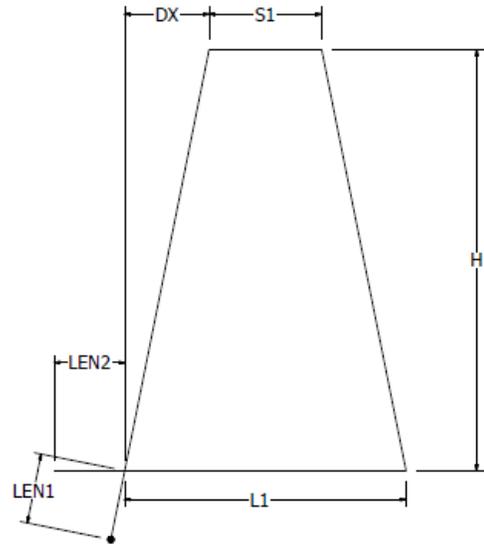
8. Hole2



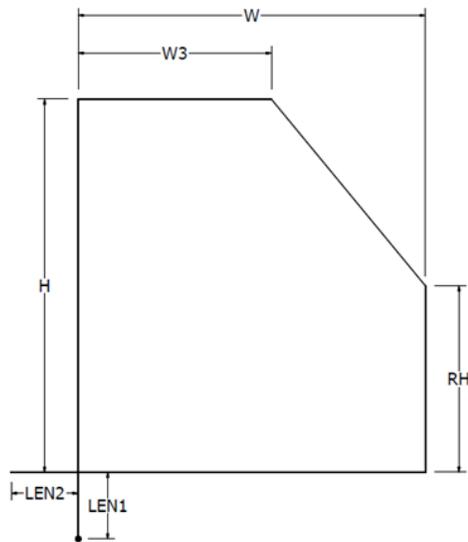
9. Fla-X



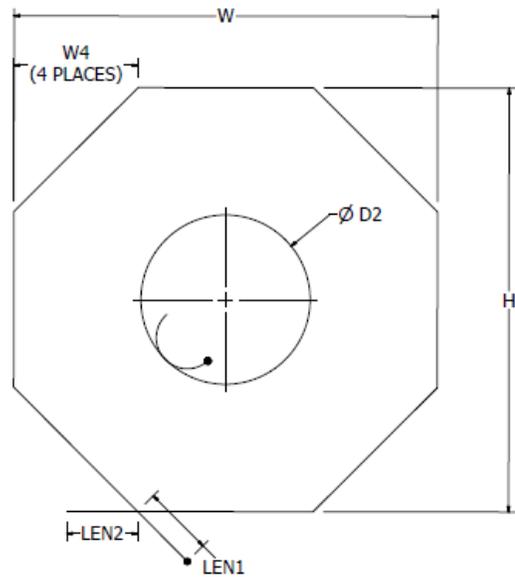
10. Lad



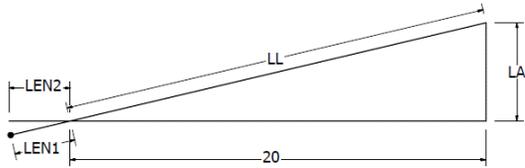
11. Rec



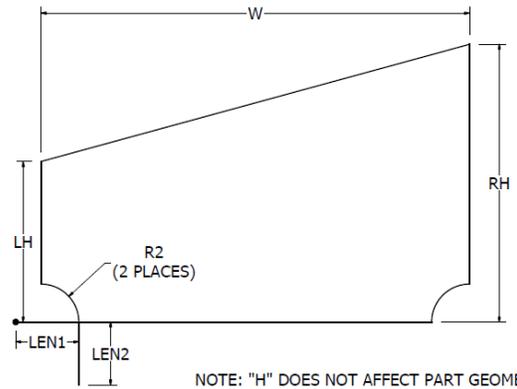
12. Rec8



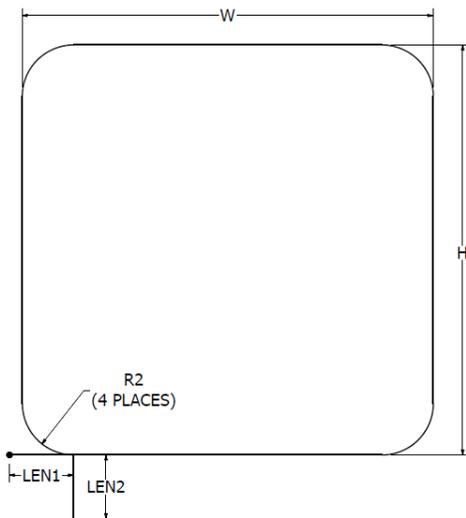
13. Tria



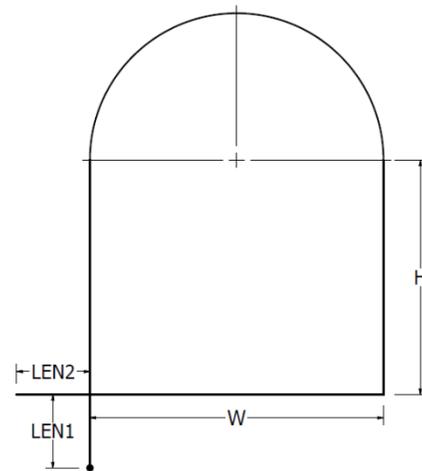
14. Rec



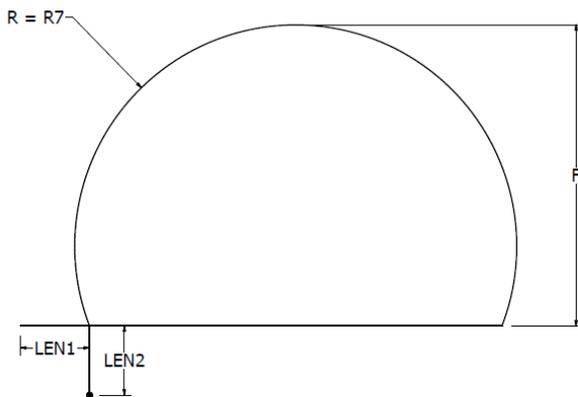
15. Rec-c



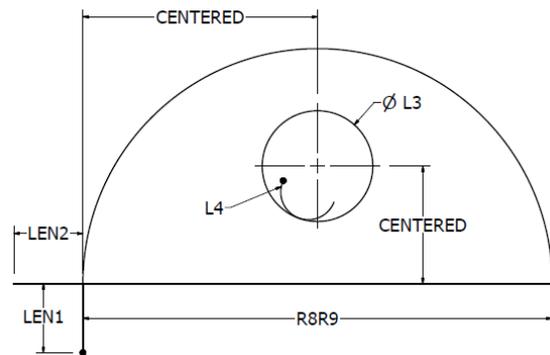
16. Rec-H



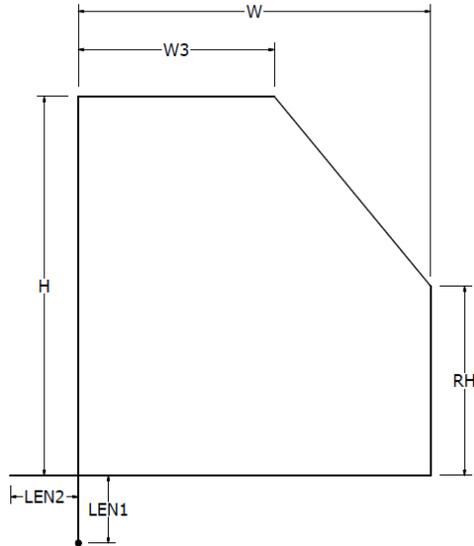
17. Circle2



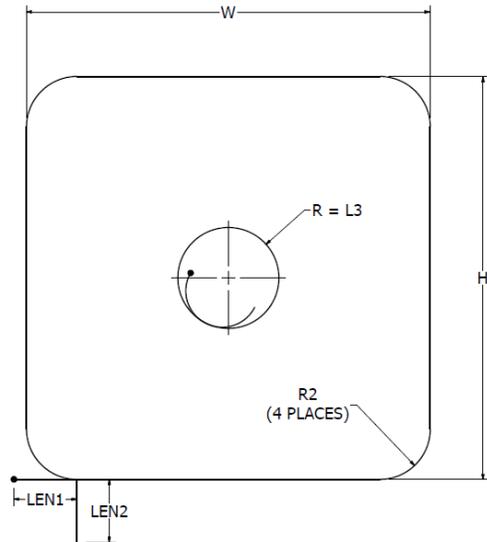
18. Circle3



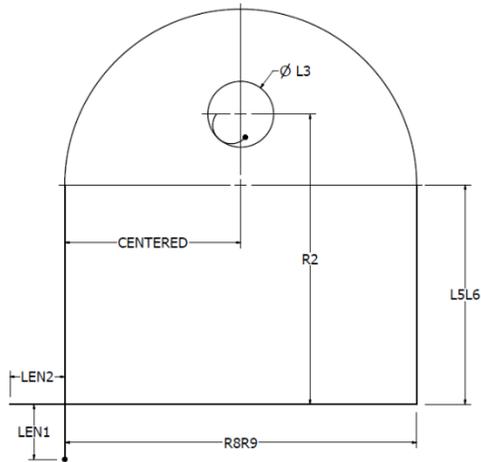
19. Rec



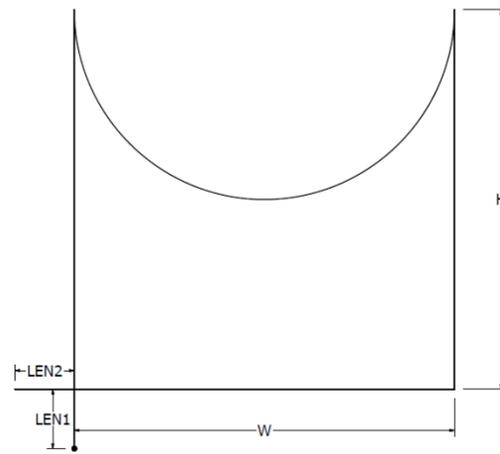
20. Rec-c



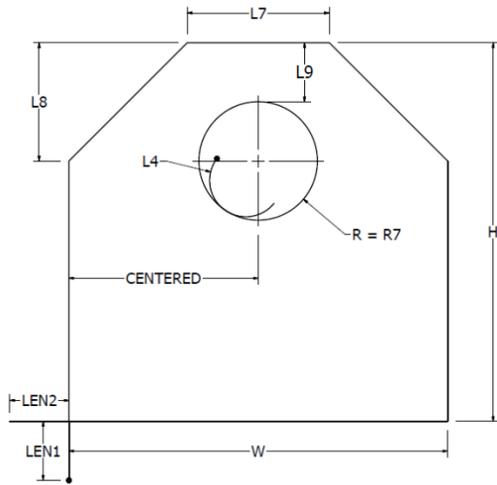
21. Circle4



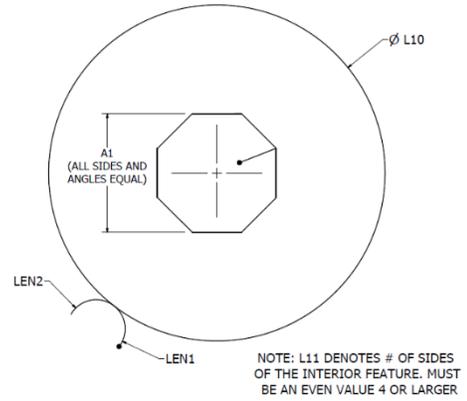
22. Rec



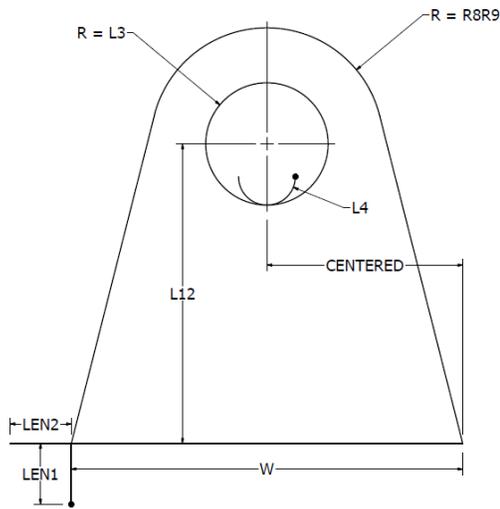
23. Rec



24. Pol



25. Hole Circle



26. Pol

Do not use

APPENDIX C - REVISIONS TO THE MANUAL

- 3/10/2017 (INSTALLATION) CHANGED HYPERTHERM INTERFACE CABLE PART NUMBER
- 3/10/2017 (INSTALLATION) ADDED NOTE ON SETTING MACHINE ZERO AFTER INSTALLATION
- 4/11/2017 ADDED INFORMATION ON FASTCAM LICENSE AND DONGLE
- 4/13/2017 Added information on COMPENSATE to the Operations and Troubleshooting section
- 4/13/2017 Removed Pierce Delay information from ARC VOLTAGE CONTROL and added it to SETTINGS
- 4/13/2017 Added note on setting SPEED in mm/min in DATABASE
- 4/25/2017 Added RESQUARING Procedure in MAINTENANCE section
- 6/1/2017 Added information on Powermax 105 and 125
- 6/1/2017 New Electrical Schematic
- 6/1/2017 Added alternate procedure for setting pierce delay
- 6/1/2017 Added inputs and outputs to MAINTENANCE section
- 6/1/2017 Changed parameter settings
- 6/1/2017 Changed recommended AHC settings for COMPENSATE and SENSITIVITY
- 1/25/2018 Changed 3-stage filter part number
- 5/24/2018 Clarified Nesting and Shape Library #2
- 5/24/2018 Clarified connection of the ground rod to the grounding bar
- 5/31/2018 Updated Travel Limits on X-Axis when switching to Pipe Cutter
- 9/14/2018 Added Parametric Shape Library Appendix
- 9/14/2018 Added Configuration Requirements for USB Thumb Drives

