Auto Bender

User's Manual

TABLE OF CONTENTS

Chapter 1

Introduction, Requirements & Safety

1. **Introduction**
2. **Systems Logic**
3. **Requirements**
4. **Safety**
5. **Caution Labels**

1. Introduction

Everyone at CLN of South Florida, Inc. would like to thank you for purchasing the CLN Brand bending machine. We understand that you had a choice and you picked ours. Before you get started, there are a few things that we need to go over. First thing, read this manual and pay close attention to the safety segment.

2. System Logic

The main purpose of the Bend program is to translate a DXF file. The program tells the machine how to bend the return based on the information in the file. The program moves through the file one control point at a time, making complicated calculations as it travels from one point to the next.

- When the job is uploaded to your machine and you select the letter you wish to process, then "Run Tool" the first thing the computer will do is look for the Homing Switch.
- If the material is under the switch, the switch is closed and lets the machine know that there is material in the machine.
- The next thing the machine will do is find the lead edge of the material. It does this by backing the material out of the machine until the material has cleared the Homing Switch causing the switch to open.
- Then the machine will slowly move the material forward and close the switch, thus letting the computer know exactly where the material is in the machine.
- The next thing the computer looks for is the distance from home to start (Start is the lead edge of the break bend die) and makes that move.
- Next the computer looks at what Tab Setting we have set up in the program. If we have a leading tab the machine will move the material forward ¾" and then engage the bending ram. If you have a trailing tab then the machine will just start to process the letter.
- The drive system uses a step motor with an auxiliary encoder. If the material slips while being pushed through the machine then there will be an error. The encoder keeps track of this and makes sure that the error is corrected automatically.

3. Requirements

A. Compressed Air
Air compressor with a minimum capacity of 3 CFM at 80 PSI

B. Electricity
110 V 10 Amp 60 HZ
230 V 7 Amp 50 HZ

C. Information
Software capable of producing DXF files see “File Preparation”

D. Space
Maintain an area 4 feet all the way around the machine

4. Safety

Your Responsibilities Are:

As an operator of the CLN machine, you are responsible to follow all safety procedures. Any person who operates or does any maintenance on this machine must be aware of all safety procedures.

Personal Safety Precautions:

1. Do not wear any loose fitting clothing such as scarves or hanging jewelry.
2. Do not put hands in or on any moving parts at any time.
3. Do not operate machinery while under the influence of alcohol, drugs or any other substance that may impair or alter your judgment.
4. Always wear gloves when handling sharp materials.
5. Always wear eye and hearing protection when operating equipment.
6. Do not operate the machine without all of the covers in place.
7. Keep hands, head and body out of the way of moving parts.
8. When performing maintenance work on the machine always unplug the incoming electric power and disconnect the compressed air supply. Make sure the air is completely drained out of the system.
9. Be sure to stay clear of moving parts when turning on the air supply, the tools may unexpectedly move during the initial connection.

Opening the Side Covers

When opening the side covers, you must first unplug the machines electricity, disconnect the compressed air line and completely drain the sir out of the system. **If you do not disconnect the electric power and the compressed air line and drain the system you will put yourself at serious risk causing permanent damage to yourself or death.**

Follow the safety rules at all times. Under no circumstance should equipment be used for anything other than what it is designed to do. Any person who operates or does maintenance on this equipment should be aware of all safety and operating procedures. It is extremely important that this equipment is handled with care! Distractions such as horseplay, carelessness, loud noises and sudden movements can result in unsafe conditions, therefore should be avoided at all times when operating equipment.

It is important to always keep the work area clean! Oil, water or debris on the floor or around the work area can cause unsafe conditions. Always keep the work area free of hazardous obstructions. Return tools and other items used during operation to their proper storage when finished.

The CLN Bender is equipped with very sharp cutting mechanisms and should be handled with care. Failure to follow safety precautions could result in serious injury.

When installing equipment parts, the person handling the installation must read and understand all the operation schematics prior to connecting the machine to the local power source. Connecting the wrong voltage will void the warranty and cause serious injury or death. Place all switches in the off position before connecting power. Always turn off the machine, when left unattended.

5. Caution Labels

Understand owner's manual before operating this equipment

Read the owner's manual completely before using this machine, if you are confused about anything. Stop and get help from the manufacturer.

Pinch Point

This label means there is an extreme danger of your hand or fingers being cut off.

Electric Shock

Electric shock is possible with any machine. Only authorized certified personnel should service the machine.

Chapter 2

Machine Setup

1. **Location**
2. **Assembly**
3. **Electric Power**
4. **Compressed Air**
5. **Ethernet connection**

1. Location

1. Maintain an area 4 feet all the way around the machine for maintenance, service and general operation.

2. Assembly

- Thread in the leveling feet into the legs of the machine, there will be threads cut into the bottom of the leg. Do not put them in the hole used for shipping.

- Bolt the Monitor Arm to the left side of the machine, then the Monitor to the Monitor Arm, set the Keyboard in place along with the Mouse. Plug in the Keyboard and Mouse to the Computer. Plug the Power Cable and the Video Cable into the back of the Monitor.
- Bolt the Feed in Table to the rear of the machine and make sure the edge of the table is flush with the frame of the machine.
- Slide the Catch Table Height Adjustment Assembly over the Catch Table Main Support rod. Now, bolt the Catch Table Supports to the Catch Table Height Adjustment Assembly. Next bolt the Table to the Catch Table Supports. Lastly, bolt the Rear Table Supports to rear of the Table.
    - Install the Air Filter Regulator to the machine and push the air hose into the push connect fitting located on the Air Filter Regulator.

3. Electric Power

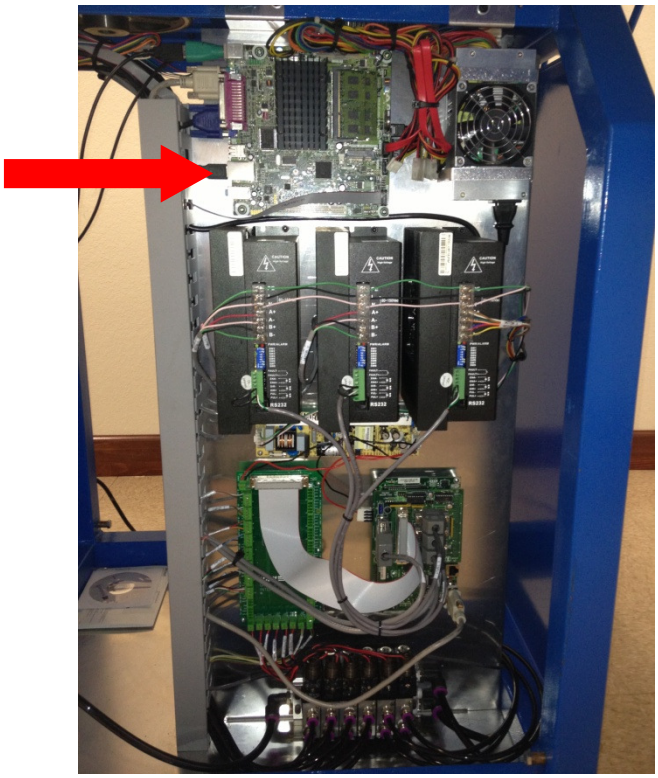
Plug the main power cord into the AC power module located on the right side of the machine. (See requirements B. electricity) Make absolutely sure that there is no AC voltage coming out of the Neutral side of the power outlet. There are two fuses located inside the power module for the machines internal protection.

4. Compressed Air

The machine uses compressed air to power cylinders that are needed to operate tools in the machine. Connect air supply to regulator on the machine, set gauge at 80 PSI. Your machine is now under pressure.

5. Ethernet connection

Observe all safety precautions when doing this next step (Read Chapter 1 Section 4).
Connecting to other computers by using the internal inherent connection is your responsibility.
Remove the side access door for access to the computer.

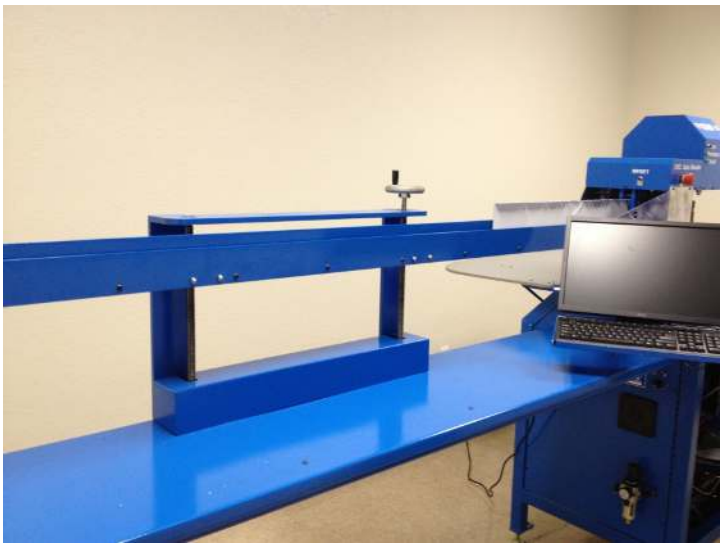


Chapter 3

System Overview

A. Feed in table

The feed in table manages the return as it is drawn into the machine. The hand crank adjusts the height of the track.

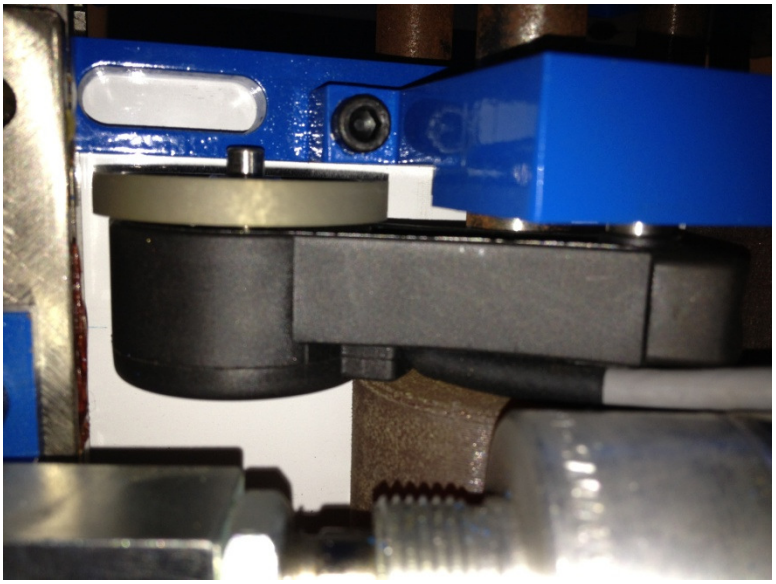


B. Drive Rollers

The drive rollers simply move the material through the machine. There are two sets, all are powered there is one master and three slaves connected with a timing belt. The timing belt is located under the top cover. The drive motor is located under the machine; it is connected to the master roller with a gear.

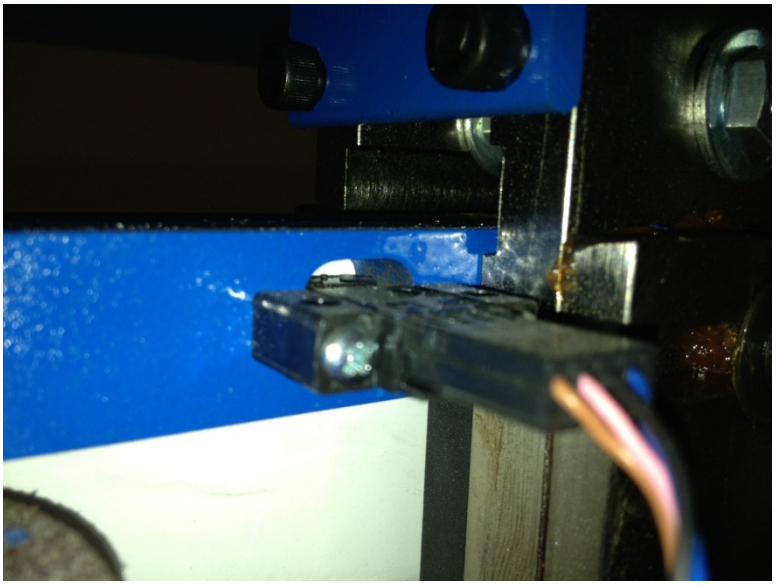
C. Encoder

When the stepper motor feeds material through the machine, the encoder keeps track of all the measurements. If there is a discrepancy the encoder tells the motor to make a correction. The encoder is located just after the rollers and before the homing cell.



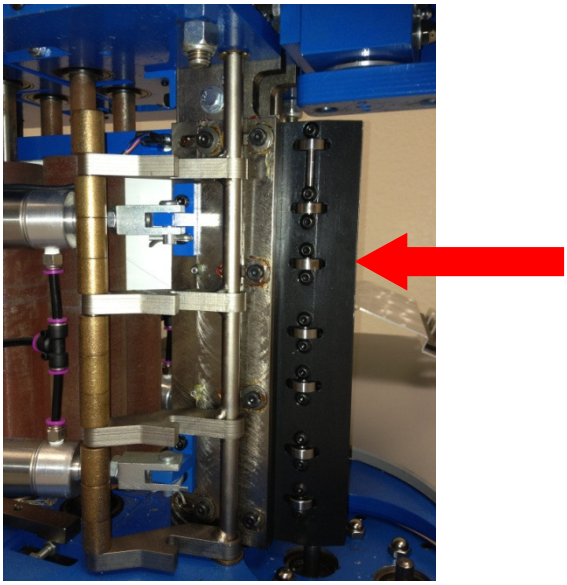
D. Homing Cell

This is a photo electric switch located in the top guide just after the encoder. It projects a beam of light and when the return moves past it the light bounces back to a receiver in the switch, which sends a signal back to the controller in the machine.



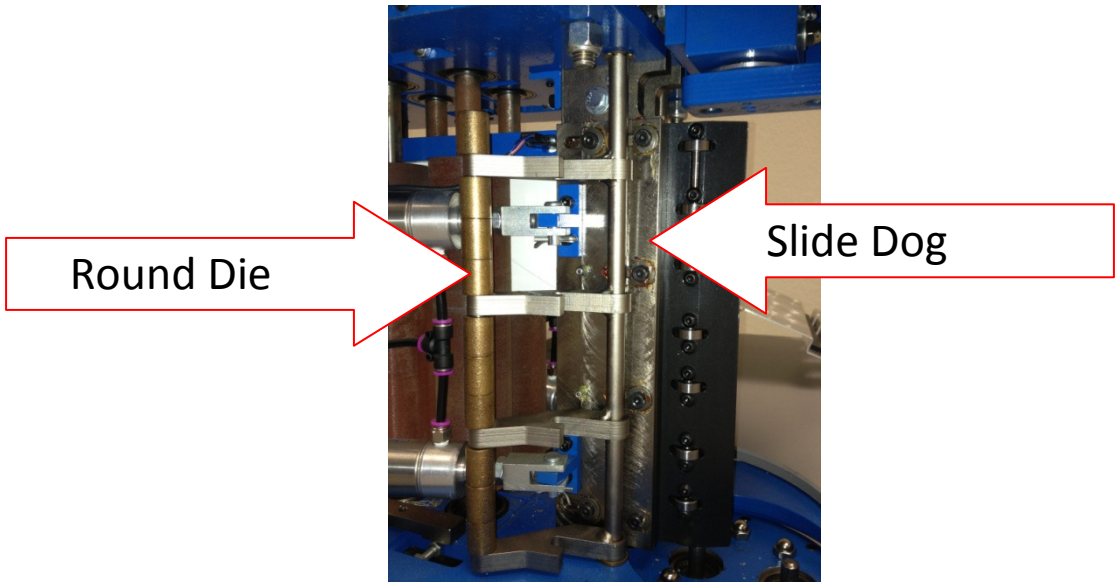
E. Sharp Bending Dies

The sharp bending dies are bolted in the machine and do not move. This is where all of the break bends are bent.



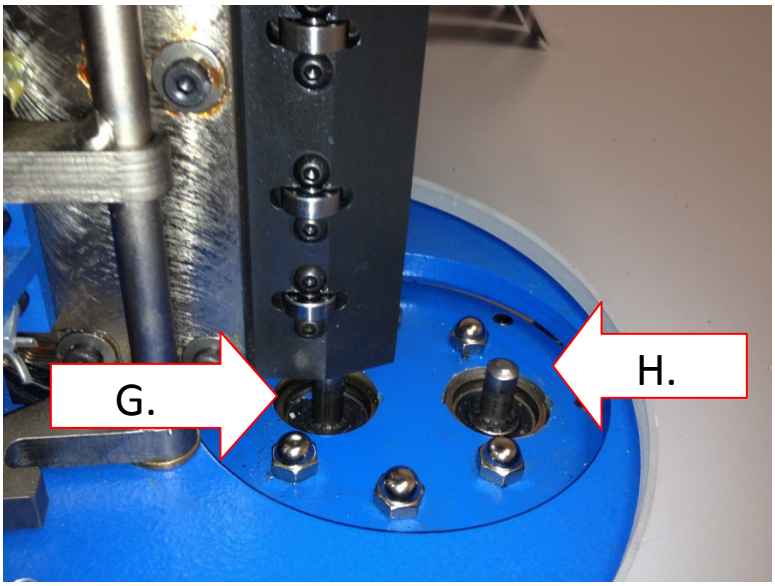
F. Round Die and Locking Slide Dog

The round dies swing into place when a round bend is required. Once the round die is in place the locking slide dog slides into teeth on the round die arm and locks the round die in place.

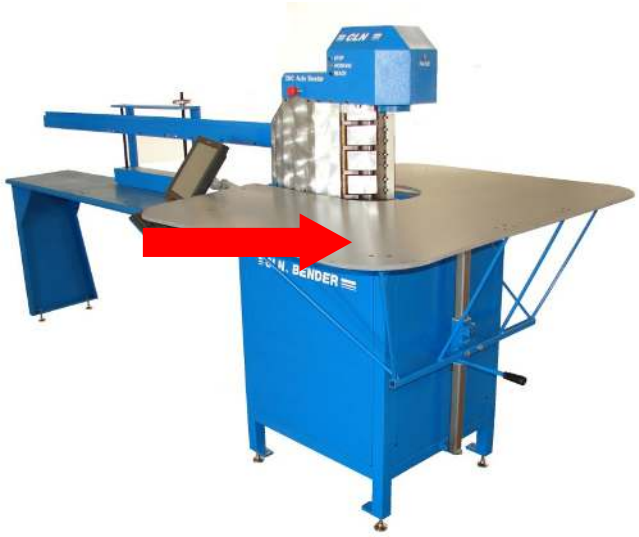


G. Round Break Bend Roller
This tool is used in conjunction with the break bend dies. It is located closest to the center of the rotating carriage.

H. Round Radius Bend Roller
This tool is used in conjunction with the round dies. It is located further from the center of the rotating carriage.

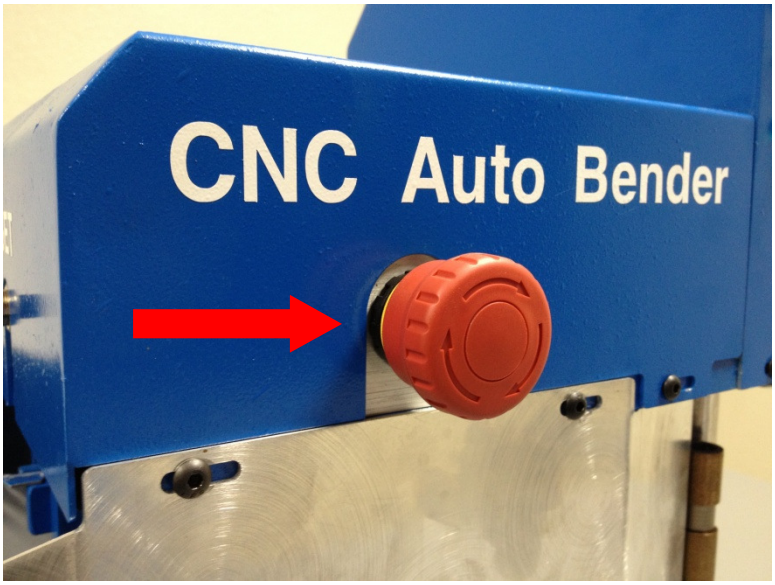


I. Catch Table
The purpose of the catch table is so that the material that is already bent can slide back and forth while the machine is bending up the rest of the letter. There is a handle located below the table that allows you to adjust the height. In the rear of the table there are two table locks that support the rear of the table.



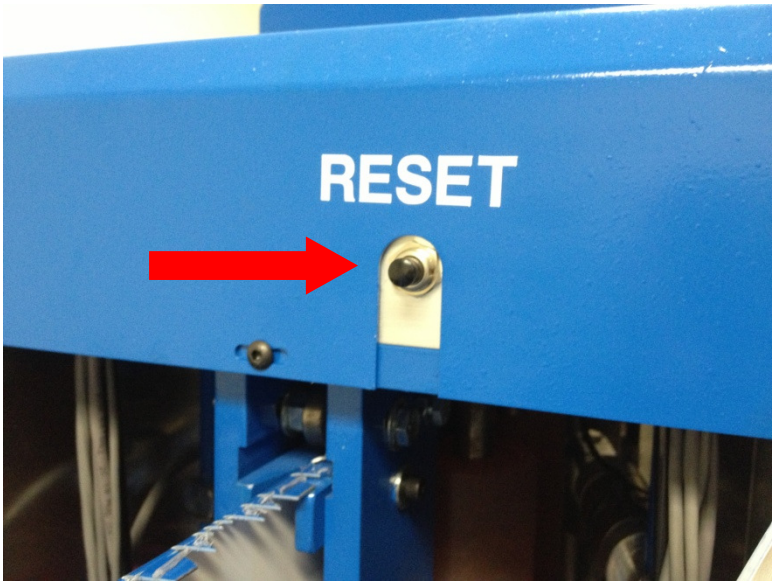
J. Emergency Stop switch

The purpose of the emergency stop switch is to shut down all power to the machine in the event of a dangerous situation. There are two on the Auto Bender one on each side. To release the switch pull it out or twist.



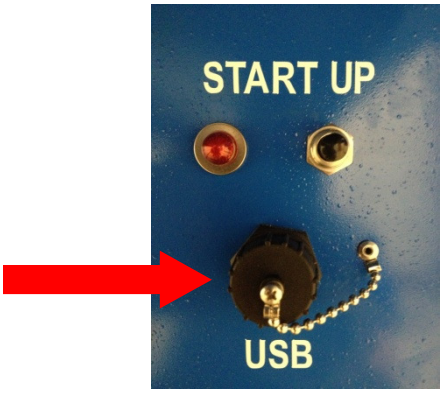
K. Reset Button

The reset button resets the controller that runs the machine. It causes the controller to start over to a power up condition



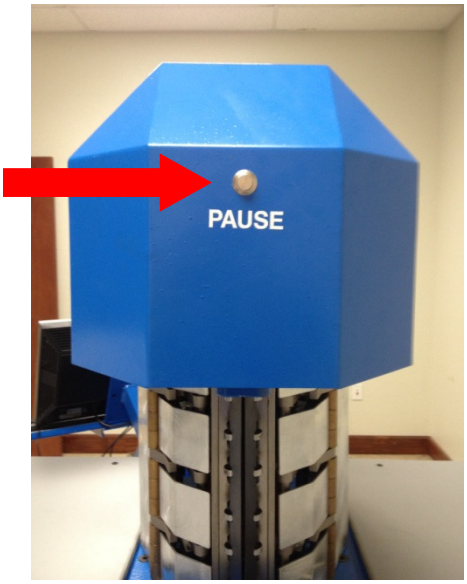
L. USB Port

The computer has a USB port. It is a convenient way to transfer data directly to the machines hard drive. You can also plug in a keyboard that has a USB connection on it.



M. Pause Button

The pause button only stops motion for the rotation of the bending rams and the material feed. When pause is pushes the ready light on the machine will blink. You must push it again to resume motion and the green light will stop blinking.



N. Stop Button
The stop button stops all motion on the machine and it retracts the tools to their normal position, and closes the BEN program. This feature is useful for when the operator wants to stop bending the strip of material and start over.

O. Working Light
The working light indicates that the machine is busy working or it wants you to push material into the machine or pull it out. A solid yellow indicates working and a blinking indicates it want you to push or pull the material. Blinking also means the machine is in a home routine. See LED Light definitions, in the trouble shooting section of the manual for a complete description.

P. Ready Light
The ready light indicates that the machine is ready for the BEN program to start and indicates the state of the pause button. See LED Light definitions, in the trouble shooting section of the manual for a complete description.

Chapter 4

DXF File Generation

A DXF file is used to record X and Y coordinates. Some programs export better than others. Our CLN program uses the information in the file to calculate the letter or shape that you need to process. If the DXF file is not consistent and predictable you will have problems.

You have to think about this machine as if it was a router table. If you tell your router table to cut a 12-inch letter, with the proper tool path the letter will measure 12 inches. Your router table just did what you told it to do. It is no different than sending a DXF file to the BEN software.

File Direction

The best way to explain File Direction is to compare it to your router table, it is the direction that the router bit cuts as it goes around the letter. It is not the tool path distance that is called the offset it would be the direction of the tool path. For normal use the outside of a letter needs to travel clockwise and the inside goes counterclockwise. This can be tested by clicking rotate start point +, the start point should toggle clockwise around the outside of a letter and counterclockwise around an inside of a letter. If you have the File Direction in a counterclockwise direction you will make the letter in reverse. The direction is generated by the DXF module of the cad program that you are using.

Artwork Problems

If there is three or four control points all bunched together in the same place, the program may give false directional dimple and or wrong notch, but it won't shorten the total length. There is a control point filter in the program but it doesn't catch everything. What you need to remember, is that the system will do what you tell it through the DXF file. "Garbage in garbage out"

NOTE: See the CLN step by step art work set-up procedure guide hand book.

Chapter 5

Machine Start up Procedure

1. **Power Up**
2. **Loading Material In The Machine**

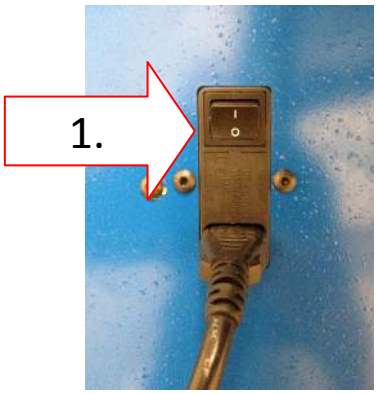
1. Power Up

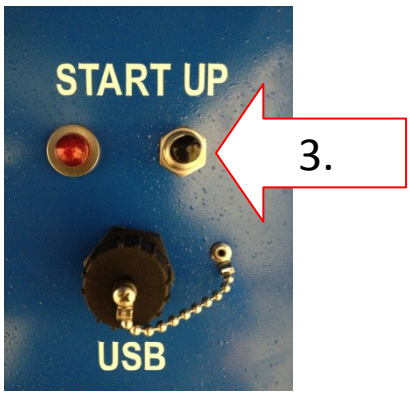
A. Compressed air

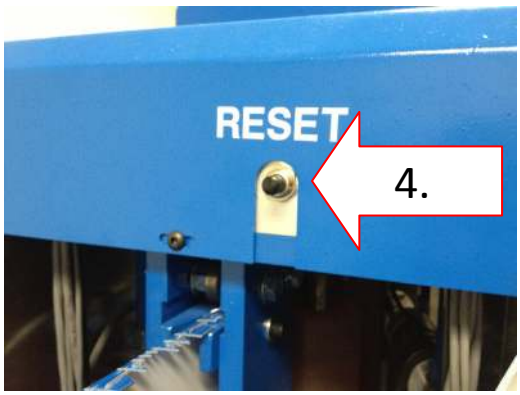
Turn on compressed air supply

B. Electricity

Turn on main Power switch (1), and then pull out the red Emergency stop button (2). Turn on computer and monitor if they have not already turned on (3). Wait until the computer becomes stable. Press Reset on the rear of the machine (4). Now start the BEN program. If the program starts with no error message you now are powered up and the machine is ready.

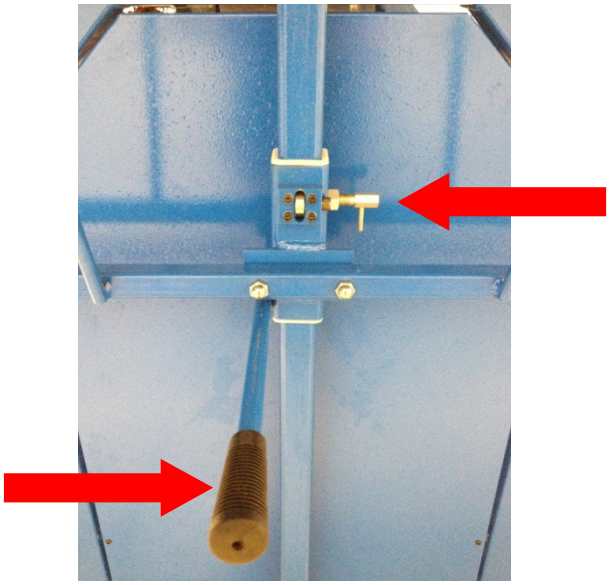


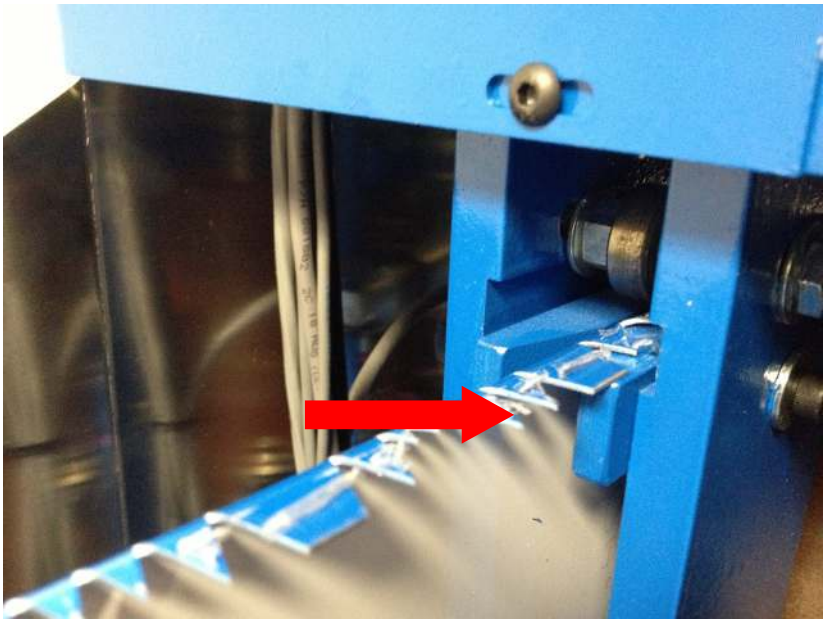




2. Loading Material in the Machine

1. Set the catch table height by releasing the rear supports then grab the table height control handle with one hand and then release the pin with the other hand. Set the table so that the top of the table is just under the strip of metal. Engage the pin on the handle and then Engage the Rear Supports.
2. Place the strip in the track with the flange facing you and push it toward the machine. Adjust the track so that the flange is just above the top guide. Push the strip into the machine until it touches the drive rollers.





Chapter 6

CLN Operator Software
The purpose of the CLN software is to give the operator a way to view the artwork that was sent via a DXF and convert it so that the machine can process the information correctly. From the CLN Software you can only alter the start point and split the letter into two parts, but that's it. It has nothing to do with artwork generation or modification. The CLN Software is only a DXF translator.

Break Bends

- A break bend is two lines meeting together with one point. The program calculates the two adjacent lines and provides an angle.

- If the angle is greater than 15 degrees then the machine will engage the break bend ram and bend the calculated angle however it will not bend past 170 Degrees. Because the bending ram will hit he die.

- If it is less than 15 degrees then the machine will skip over it, because less than 15 degrees is a minuscule amount and is most likely to be a condition of bad art work and it is a waste of time.

Radius Bends
When the program reads a radius it calculates the size of the radius. It then tells the machine to engage the round die, move the material forward to the round die location then engage the round bending roller. Then rotate the bending roller to the correct angle and feed the material through the two round dies to form the radius. If the radius is less than 1-1/2 the machine will bump it around the round die. After every bend the machine makes sure that the material did not slip, if it did then the machine will automatically correct itself by using the encoder.

Curfing loss
Curfing loss occurs when the router cuts the letter back the router bit can't cut a sharp corner down in the crotch of letters like W or V. This routine calculates what the router bit can't cut and compensates for it by subtracting out the difference from the two lines that create a negative angle. The setting is in *tools setup* it is called *Router Bit size*.

Program Definitions
File > Open: Brings you into an open screen so you can open DXF files.
File > Exit: Closes the program.
Tools > Clear: This function is used to clear the material out of the machine. It will move the material forward until the photocell is cleared.

Tools > Setup: This is where you can make changes to the BEN program. These are **computer related settings**. These settings are unique to your machine. These settings are stored in Setup.dat and if an update is sent to you these settings will not change as long as Setup.dat is not disturbed. So make a copy of the whole Auto Bender folder ASAP and put it somewhere safe.

Dialog box definitions:

- **Comport:** Communication port, enter the port number that is assigned to the RS 232 comport. Valid ports are 1 through 4.

- **Router bit size:** When the router cuts the back out, the bit can't get down in the crotch of some letters, like W or V. We calculate that difference and subtract it out from each side of the crotch. Insert the router bit size that you used to cut the backs out with. The program will automatically do the calculations for you.

- **X Offset:** Positing of graphics (setting used to match monitors resolutions for left and right)

- **Y Offset:** Positing of graphics (setting used to match monitors resolutions for left and right)
- **Closed Figure: 1=YES 0=NO** this setting allows an open path to be sent to the machine. If you have this value set to 1, and you send an open DXF file into the CLN program, you will notice when you open the program the CLN Software will have drawn a straight line to close the letter for you. If you have this value set to 0, when you open the DXF file your letter will remain open.

Tools > Tool Data: This is where you can make changes to the BEN program. These are **machine related settings**. These settings are unique to your machine. These settings are stored in Tool.dat and if an update is sent to you these settings will not change as long as Setup.dat is not disturbed. So make a copy of the whole Auto Bender folder ASAP and put it somewhere safe.

Dialog box definitions:

- **Steps per inch:** (Not used) converts step motor steps, to inches.
- **Steps per degree:** Converts step motor steps, to degrees.
- **Home to start:** The distance from the home cell to the edge of the break bend dies. This adjusts the start of the letter.
- **Interference distance:** This is the distance the material will move out when the program thinks there may be a collision.
- **Bump-bend angle:** This is the amount of bend that the machine will do when the radius is less than 1-1/2.
- **Bump feed distance:** This is the feed distance between bumps when the radius is less than 1-1/2.
- **Break bend tool chance:** The location that the round break bend tool moves up and down.
- **Radius bend tool chance:** The location that the round radius bend tool moves up and down.
- **Distance from break to round:** This is the distance from the break bend dies to the round dies.

Tools > Material data: These are **material related settings**. The Auto Bender is capable of handling a multiple sizes of materials. When bending metal material there is a certain degrees of spring in the material so to achieve the correct angle the machine has to over bend the material. Different material and thickness will require slightly different over bend specifications. You can teach the machine to remember different types of material by adjusting the values below. The values are arbitrary increasing or decreasing by 2 is a good rule of thumb for the bend offsets and for the bend factors change by .01. The factory set the .040 category the rest will be very close however you may need to adjust them. These settings are unique to your machine. These settings are stored in Material.dat and if an update is sent to you these settings will not change as long as Material.dat is not disturbed. It is a good idea to make a copy of the whole Auto Bender folder ASAP and put it somewhere safe.

Material Data Definitions:

Negative break bend offset: This is the distance from tool change position to the edge of the material for the break bend roller for negative break bends. Increasing this value will make the machine bend more.

Positive break bend offset: This is the distance from tool change position to the edge of the material for the break bend roller for positive break bends. Increasing this value will make the machine bend more.

Negative radius bend offset: This is the distance from tool change position to the edge of the material for the radius bend roller for negative radius bends. Increasing this value will make the machine bend more.

Positive radius bend offset: This is the distance from tool change position to the edge of the material for the radius bend roller for positive radius bends. Increasing this value will make the machine bend more.

Negative bend factor: This value will shorten the negative radius bends. Because the encoder wheel is mounted on the positive side of the material, the negative side of the material will grow slightly while the machine is bending the return. The amount that the material will grow is based on the thickness of the material. .063 will need to be reduced more than .032. Actually .040 and smaller needs no reduction because the amount that the material grows is not noticeable at all. This value is important for .063 materials, for reverse channel letters when you are trying to get the return to fit on the inside of the letter face. If every location on the letter is good, except a negative radius between two break bends, then reducing this value will shorten the return between the two break bends.
Note: Typically happens on the inside of an upper case “C” The outside of the “C” is controlled by the outline from the cad program.

Negative break bend factor: This value will shorten two negative break bends that are back to back. Because the encoder wheel is mounted on the positive side of the material, the negative side of the material will grow slightly while the machine is bending the return. The amount that the material will grow is based on the thickness of the material. .063 will need to be reduced more than .032. Actually .040 and smaller needs no reduction because the amount that the material grows is not noticeable at all. This value is important for .063 materials, for reverse channel letters when you are trying to get the return to fit on the inside of the letter face. If every location on the letter is good, except the distance between two negative break bends, then reducing this value will shorten the return between the two negative break bends. If there is a radius between the two break bends then refer to “Negative bend factor”.
Note: Typically happens on the inside of an upper case “H” The outside of the “H” is controlled by the outline from the cad program.

************.032************
Negative break bend offset: Typically set to 12. Range -50 to 50
Positive break bend offset: Typically set to 12. Range -50 to 50
Negative radius bend offset: Typically set to 12. Range -50 to 50
Positive radius bend offset: Typically set to 12. Range -50 to 50
Negative bend factor Typically set to 1. Range 0 to 1
Negative break bend factor: Typically set to 1. Range 0 to 1
************.040************
Negative break bend offset: Typically set to 10. Range -50 to 50
Positive break bend offset: Typically set to 10. Range -50 to 50
Negative radius bend offset: Typically set to 10. Range -50 to 50
Positive radius bend offset: Typically set to 10. Range -50 to 50
Negative bend factor Typically set to 1. Range 0 to 1
Negative break bend factor: Typically set to 1. Range 0 to 1
************.050************
Negative break bend offset: Typically set to 8. Range -50 to 50
Positive break bend offset: Typically set to 8. Range -50 to 50
Negative radius bend offset: Typically set to 8. Range -50 to 50
Positive radius bend offset: Typically set to 8. Range -50 to 50
Negative bend factor Typically set to .99 Range 0 to 1
Negative break bend factor: Typically set to .99 Range 0 to 1
************.063************
Negative break bend offset: Typically set to 6. Range -50 to 50
Positive break bend offset: Typically set to 6. Range -50 to 50
Negative radius bend offset: Typically set to 6. Range -50 to 50
Positive radius bend offset: Typically set to 6. Range -50 to 50
Negative bend factor Typically set to .99 Range 0 to 1
Negative break bend factor: Typically set to .99 Range 0 to 1
**********.063 Deep**********
Negative break bend offset: Typically set to 6. Range -50 to 50
Positive break bend offset: Typically set to 6. Range -50 to 50
Negative radius bend offset: Typically set to 6. Range -50 to 50
Positive radius bend offset: Typically set to 6. Range -50 to 50
Negative bend factor Typically set to .99 Range 0 to 1
Negative break bend factor: Typically set to .99 Range 0 to 1

.063 Deep uses the bump bend routine for all of the radiuses, useful for very stiff material or .063 materials that is between 6 to 12 inches.

Tools > Feed: Moves the material with the aid of the encoder.

Tools > Uncalibrated Feed: Moves the material without the aid of the encoder.

Options > Divide character: Separates a character into only two sections, the feature turns off after each time you touch run tool or you do anything to the program, even clicking on the screen will turn it off. If dividing the letter into more than two sections is needed, than you can this in your CAD program and send it as an open path.

Options > Segment length on: If you want to look at the breakdown of the letter by dimensions you can do so by clicking Segment Length On, then Image Length. It will open in note pad on your computer and display the values. This displays the dimensions accumulatively and segmented. These dimensions can be used to trouble shoot your machine. If the return, does not match these dimensions the machine is at fault, if it does, it proves the DXF file is incorrect.

Options > Segment length off: This is the default setting for the image length, for when you want to look at the overall image length without looking at dimensions.

Options > Image Length: Calculates the total length around letter, it does not include the tab or bender output distance. This feature is what works along with Segments on /off.

Options > Job Length: Calculates the total length of everything on the screen, it does not include the tab or tabs, or bender output distance.

Options > Job Image Length: Calculates the total length of every letter on the screen independently, it does not include the tab or tabs, or bender output distance.

Options > Continuous Job: Processes the whole job continuously. Set the start points where you want them. Click Continuous Job and then click Run Tool. The images on the screen will be processed in the order that they were exported. They will automatically highlight themselves so the operator knows what letter s being processed.

Options > Repeat Image Count: Processes one letter multiple times. Click the up or down button in the dialog box to the desired number of letters that you want to process. Then click Run Tool, the number of letters that you selected will be processed.

Options > Change Tab: Allows you to alter the tab location. There are four tab selections. Lead Tab, which is needed for a letter with a top right starting position. Trailing Tab, this is needed for a top left starting position. Both Tabs, is for tabs on each side of the return, and No Tabs for no tab on the letter.

Options > View Log: This is a record of the machines output functions and the material that was run through it. It also has a timer code that is set at the factory. This code will not be cleared until the machine is paid for in full.

Options > Change Material: This feature allows you to run different thickness of material through the machine without having to recalibrate the machine. Just select the thickness of material that you are going to bend and your selection will appear in the top right corner of the screen. Your settings that are located in the material data will automatically be downloaded to the machine.

Image > Control Points On: Turns on the ability to view the control points.

Image > Control Points Off: Turns off the ability to view the control points.

Image > Select Next: Selects the next letter in the file.

Image > Start Point Plus: Moves the start point around letter clockwise. Start point alteration cannot be saved in the CLN program. If you want to save the start point location, than you have to do it in the CAD program before you export it.

Image > Start Point Neg.: Moves the start point around letter counterclockwise. Start point alteration cannot be saved in the CLN program. If you want to save the start point location, than you have to do it in the CAD program before you export it.

Help > About: Information about the program.

Shortcut Keys
Next: Selects the next letter in the file.
Start Point Plus: Moves the start point around letter clockwise.
Start Point Neg.: Moves the start point around letter counterclockwise.
Zoom Plus: Zooms in on the objects on the screen.
Zoom Neg.: Zooms out on the objects on the screen.
Run Tool: Begins processing the letter or letters that you selected.

Chapter 7

Calibrations

1. **Material Feed**
2. **Tool timing**
3. **Mechanical Adjustments**

1. Material feed

The drive system uses a step motor with an auxiliary encoder. If the material slips while being pushed through the machine then there will be an error. The encoder keeps track of this and makes sure that the error is corrected automatically. Here's how it works, let's say the step motor moves the material 100 inches. The encoder keeps track of this move, if the material does not move correctly the first time, then the encoder tells the step motor to make a correction until the encoder agrees with 100 inches. Making adjustments to the step motor will eliminate any extra moves. Making adjustments to the encoder will make the material measure correctly.

Is Calibration Needed?

Put a strip of material in the machine; feed it until it is just clear of the break bend dies. Put a mark on the material, and make sure that you are holding the pen straight. Then feed the material 48 inches. Put another mark on the material, clear the material and then measure the distance. Get help with this step, hold the tape flat and straight, also burn one inch on the tape so you can be as precise as possible. If this distance is wrong then the machine needs to be calibrated.

When doing a calibration test, look for two things, error corrections that the encoder picked up and the overall length. If you did not see any error corrections and the material moved exactly 48" then there is no need for adjustment. If the machine did not move correctly then follow these steps.

Setup 2.dat

You need to know how to use **Setup 2.dat**. Setup 2.dat is where adjustments can be made to the machine. It is a file that opens in note pad go to **C: \ > Auto Bender > Setup 2.Dat** Double click on it. Be careful not to accidently change anything. If you are not sure about a change, than close without saving changes and start over.

We highly recommend that you make a back up file of the Auto Bender folder it will have your current unique settings. So if your computer malfunctions you will have the most current set of settings for your machine.

How to calibrate the machines encoder

1. Load material into the machine, click **Tools > Feed,** and type 9 in the command box, click OK and feed the material past the break bend dies about 2 inches.

2. Use a sharp pencil and draw a line on the material against the break bend dies. Now click **Tools > Feed,** and type 48 in the command box, click OK, the material will feed out, then put a second mark on the material next to the break bend dies. Click Tools > Clear and put the material back in the feed in track. Get help with this next step, measure the distance that the material moved, hold a tape measure flat and straight, also burn one inch on the tape. If it is not 48 inches then put a mark on the material at 48 inches, then measure the actual move distance and go to step 3.

3. Close the CLN Software
Go to the Windows Explorer then go to **C: \ > Auto Bender > Setup 2.Dat** Double click on setup2.dat it will open in note pad. Change the **CPI** #XXXX.X

This is a formula that will help you calculate the error.
Commanded Move / Actual Move * Current CPI = New CPI Value

- Commanded Move is the value you entered in the program.
- Actual Move is what the material traveled.
- Current CPI is the value in setup2.dat.
- The new CPI number gets entered in the current CPI number.

Note: Making the CPI number larger will make the material move further.

After you change the CPI number, close the **Setup 2.Dat** and save the changes. **You must close the BEN program and reopen it**. The information in the setup2.dat file is downloaded to the controller when the BEN program is restarted.

4. Retest and go back to steps 1 and 2.

Once you have calibrated the machines encoder now run the same test, but this time use **Uncalibrated Feed,** instead of **Feed,** to move the material through the machine. The steps are exactly the same as calibrating the encoder. The differences are the command that moves the material and the value that you alter for the resolutions. Follow the steps in, **How to calibrate the machines step motor.**

How to calibrate the machines step motor

1. Load material into the machine, click **Tools > Feed,** and type 9 in the command box, click OK and feed the material past the break bend dies about 2 inches.

2. Use a sharp pencil and draw a line on the material against the break bend dies. Now click **Tools > Uncalibrated Feed,** and type 48 in the command box, click OK, the material will feed out, then put a second mark on the material next to the break bend dies. Click Tools > Clear and put the material back in the feed in track. Get help with this next step, measure the distance that the material moved, hold a tape measure flat and straight, also burn one inch on the tape to be as precise as possible. If it is not 48 inches then put a mark on the material at 48 inches, then measure the actual move distance and go to step 3.

3. Close the CLN Software
Go to the Windows Explorer then go to **C: \ > Auto Bender > Setup 2.Dat** Double click on setup2.dat it will open in note pad. Change the **SPCNT** #XXXX.X

This is a formula that will help you calculate the error.
Commanded Move / Actual Move * Current SPCNT = New SPCNT Value

- Commanded Move is the value you entered in the program.
- Actual Move is what the material traveled.
- Current SPCNT is the value in setup2.dat.
- The new SPCNT number gets entered in the current SPCNT number.

Note: Making the SPCNT number larger will make the material move further.

After you change the SCPNT number, close the **Setup 2.Dat** and save the changes. **You must close the BEN program and reopen it**. The information in the setup2.dat file is downloaded to the controller when the BEN program is restarted.

4. Retest and go back to steps 1 and 2

2. Tool timing

Tool timing is the time it takes for the tools to make one complete cycle. There are two timing settings. The first timing setting is for how long it takes for the tool to fully extend. The second timing setting is for how long it takes for the tool to retract before the machine begins feeding again. These settings may need some adjustment, due to a restricted airflow to the machine or your air compressor can't keep up with the machines factory settings.

Pneumatic flow controller

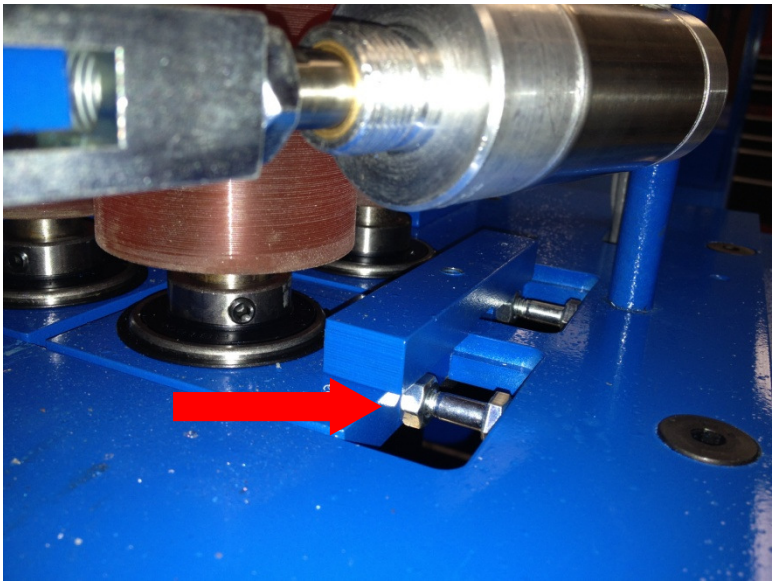
To adjust the tool timing on the Auto Bender, locate the flow controllers. A flow controller is a metering device that regulates the air that is being exhausted out of the cylinder. It is how the speed of the cylinder is controlled. There are 2 on each cylinder. To adjust the flow controllers you must loosen the jam nut and turn the center screw until the cylinder speed is satisfactory then retighten the jam nut.

3. Mechanical adjustments

Observe all safety precautions when doing mechanical adjustments (Read Chapter 1 Section 4).

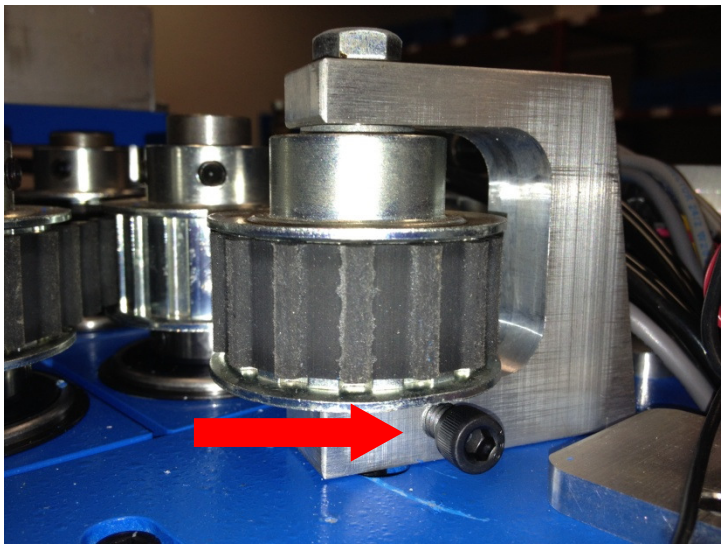
Drive Roller Tension

1. Loosen the 4 clamps that hold the bearing slides in place.
2. Use a 7/16 wrench and loosen the 8 jam nuts on the bearing slides.
3. Turn the jack bolt to adjust the bearing slides until the rollers are centered in between the top guide and just touch each other.
4. Turn the jack bolt an additional ¼ turn counterclockwise then retighten the jam nut.



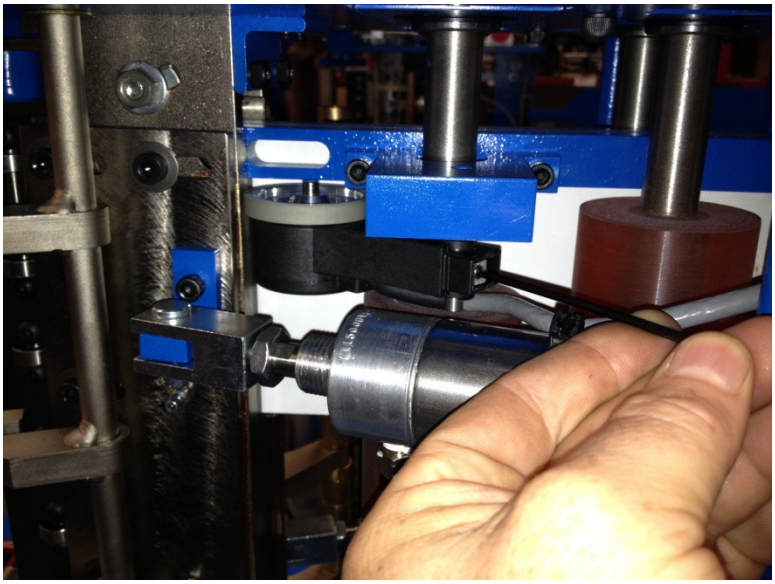
Drive Roller Timing Belt Tension

1. Disconnect the air and drain the system, unplug the electricity. Remove the top cover.
2. Use a 9/16 wrench and loosen the belt tension pulley bracket.
3. Use an Allen wrench and turn the jack bolt until the belt is tight then retighten the belt tension bracket. Be sure that the belt does not touch any wires or rub on anything, also make sure that the teeth on the belt are seated in the teeth of the pulley.



Encoder Tension

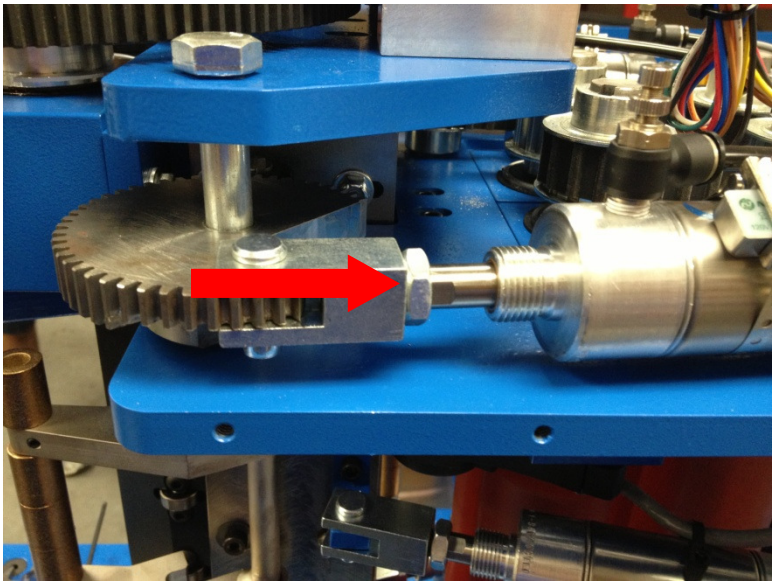
1. Remove the rubber cap with your fingers.
2. Insert a 3/32 hex L key into the setscrew on the spring adjustment collar. Using the hex key for leverage, rotate the collar around the pivot shaft in the direction necessary to increase the spring force that holds the measuring wheel against the surface to be measured. While maintaining pressure, tighten the setscrew very securely to avoid loss of spring pressure. (A torque of 15-18 in-lbs is recommended, however a torque wrench is not required as long as the setscrew is good and tight.) You should be able to lift the wheel 1/8 to ¼ of an inch above the material.



Round Die Mechanical Adjustment

It is not likely that you will have to make a mechanical adjustment to the round dies. However, it is possible that you will need to adjust the input switch on the round die cylinder. (See next segment)

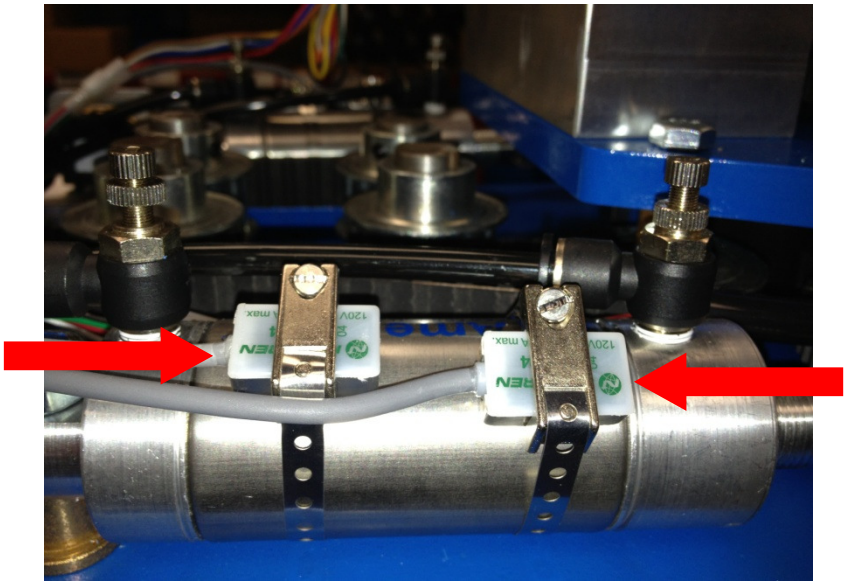
1. Disconnect the air and drain the system, unplug the electricity. Remove the top cover and side deflectors. Push booth round dies back into place then reconnect the air with caution. The tools might unexpectedly move upon the initial reconnection of air.
2. Operate the round die by the manual over ride located on the valve.
3. Locate the piston that operates the round die. Loosen the jam nut that is holding the rod clevis from turning.
4. Adjust the rod until the round die bottoms out against the locking dog and retract position, then retighten the jam nut.
5. Disengage the round die from the manual override.
6. Reinstall the covers and reconnect the air supply.



Round Die Input Switch Adjustment

The machine moves the round die cylinders in and out via the air valve. But what tells the machine that the tool is in place is the input switch that is mounted on the cylinder. If the machine turns on the valve and the cylinder extends but doesn't make it to the switch within 2 seconds or it does and the switch is installed higher than the cylinder can travel then machine assumes it bumped into the material. Now it thinks it has to fix itself, it disengages the tool, feeds out 2-1/2 inches or the distance that is set in *Interference distance,* and engages the tool again. It will do this until the material has completely ran out of the machine or it receives the input signal.

1. Disconnect the air and drain the system, unplug the electricity. Remove the top rear cover. You will need the deflectors on for this adjustment.
2. Locate the cylinder that operates the round die and the input switches. There will be 2 switches on each cylinder.
3. Move the round die by hand while watching the LED on the input switch, the LED should come on when the round die is about a ¼" away from its fully engaged position and ½" before its fully disengaged position.
4. Make adjustments to the switch until they are set correctly. Be careful not to over tighten the band on the switch.
5. Reinstall the covers and reconnect the air supply.



Installing the Round Bending Rams

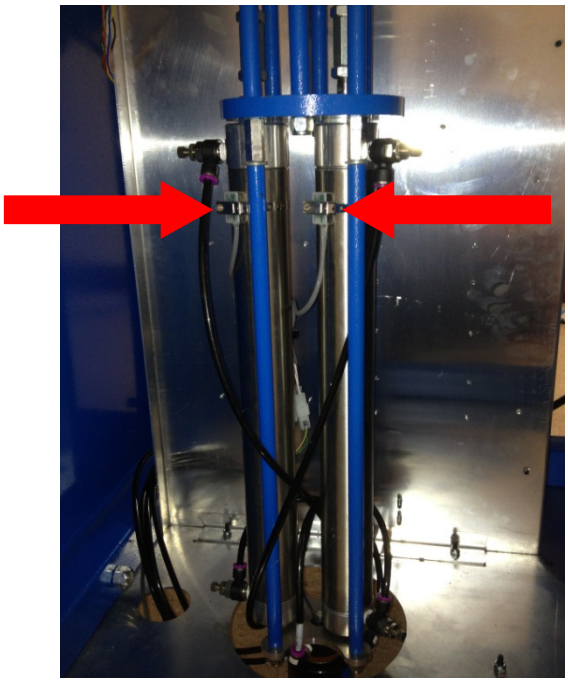
The bottom of the ram has a cone shape disk, which must sit in the capture race when fully extended. The air piston needs to bottom out on the race not the stroke of the piston or, the top capture spindle. The top is just for guiding the ram back and forth. There is a series of jam nuts and coupling nuts that we use for this adjustment.

1. Disconnect the air and drain the system, unplug the electricity.
2. Setting the capture disk location on the center pin. Thread the disk and one jam nut on the center pin. Stick the pin up through the lower capture race hole and adjust the disk until it is about 3/8" up in the top capture spindle, then remove it and tighten the jam nut in a bench vice.
3. Slide the bending ram over the center pin. Push the assembly up through the lower capture race hole until it is seated in the capture race. By using shim washers adjust the height of the bending ram. It should be flush with the top of the break bend dies or slightly under them.
4. Thread on another jam nut, then a coupling nut onto the center pin. Thread a jam nut on the air cylinder. Next thread the coupling nut along with the center pin on the rod of the air cylinder. Rotate the bending unit until the center pin is under the break bend dies, set the center pin 1/16 of an inch under the dies, (this is for clearance when the bending unit rotates). Then retighten all nuts.
5. Rotate the bending unit, make sure the ram that you are adjusting is out front, and then turn the top rotator until they line up, try to get them as close as you can. Then tap on the retaining ring on the center pin. A 9/16" deep well socket and a soft hammer works well.
6. Reconnect the air with caution, the tools might unexpectedly move upon the initial reconnection of air.
7. Operate the ram by the manual override located on the valve. Test to make sure the tool moves up and down correctly.

Bending Ram Input Switch Adjustment

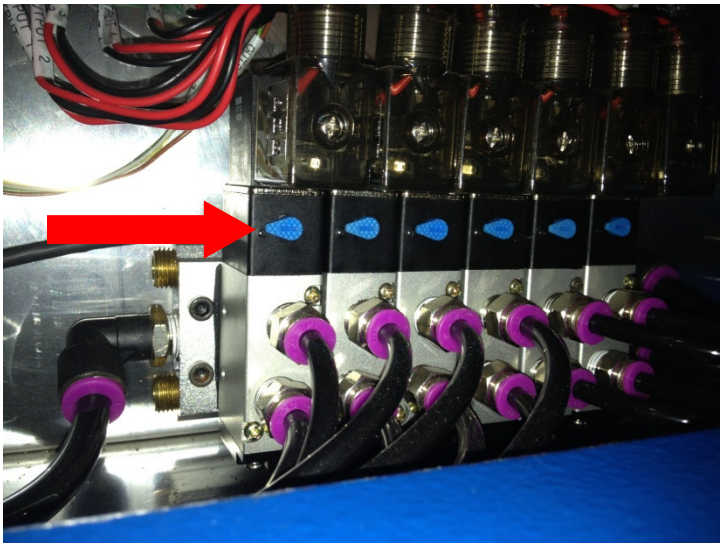
The machine moves the bending rams up and down using air cylinders. However what tells the machine that the tool is fully engaged is the input switch that is mounted on the top of the air cylinder. If the machine turns on the valve, and the cylinder extends all the way, but doesn't make it to the switch within 2 seconds or it does and the switch is installed higher than the cylinder can travel then machine assumes it bumped into the material. Now it thinks it has to fix itself. So what happens next is the tool comes down and then the material feeds out 2-1/2 inches or the distance that is set in *Interference distance.* The machine will try to engage the tool again. It will do this until the material has completely run out of the machine or it gets it's the input switch.

1. Remove the left lower cover and locate the cylinder and the input switch that is causing the problem.
2. To test to see if the switch is even working, take a magnet and wave it by the switch and see if the LED light comes on. If the LED light come on, then manually over ride the tool by pushing the manual override button on the air valve that controls the tool. "It's either number 5 or 6." Make sure the center pin is engage in the top spindle correctly. Loosen the band and slide the switch up or down on the cylinder until the LED light comes on, then retighten the switch. Be careful not to over tighten the band on the switch.
3. Release the manual override on the valve.
4. Reinstall the cover.



Valve manifold and stations

Most of the tools, in the machine are controlled by compressed air. The controller will send an electrical signal to the coil, at that time the LED in the coil connector will light up, letting you know that the electrical signal is present. The coil operates a small valve called the operator valve the operator valve is what controls the pilot valve. The pilot valve shifts back and forth allowing compressed air to operate the tool. There is a manual over ride button on each valve, pressing it will manually operate the air valve and bypass the coil. Sometimes a station may hang up because of sitting for a long time. Pressing these buttons will clear out the containments that are causing the valve to stick.



Chapter 8

Maintenance

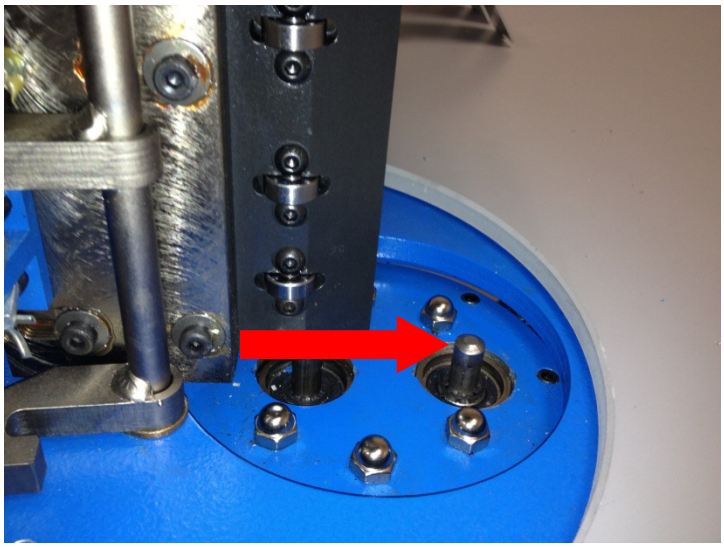
1. **Weekly**
2. **Monthly**
3. **Six Months**

1. Weekly

1. Wipe the machine tools down with light weight oil such as WD-40.
2. Drain water separator.

2. Monthly

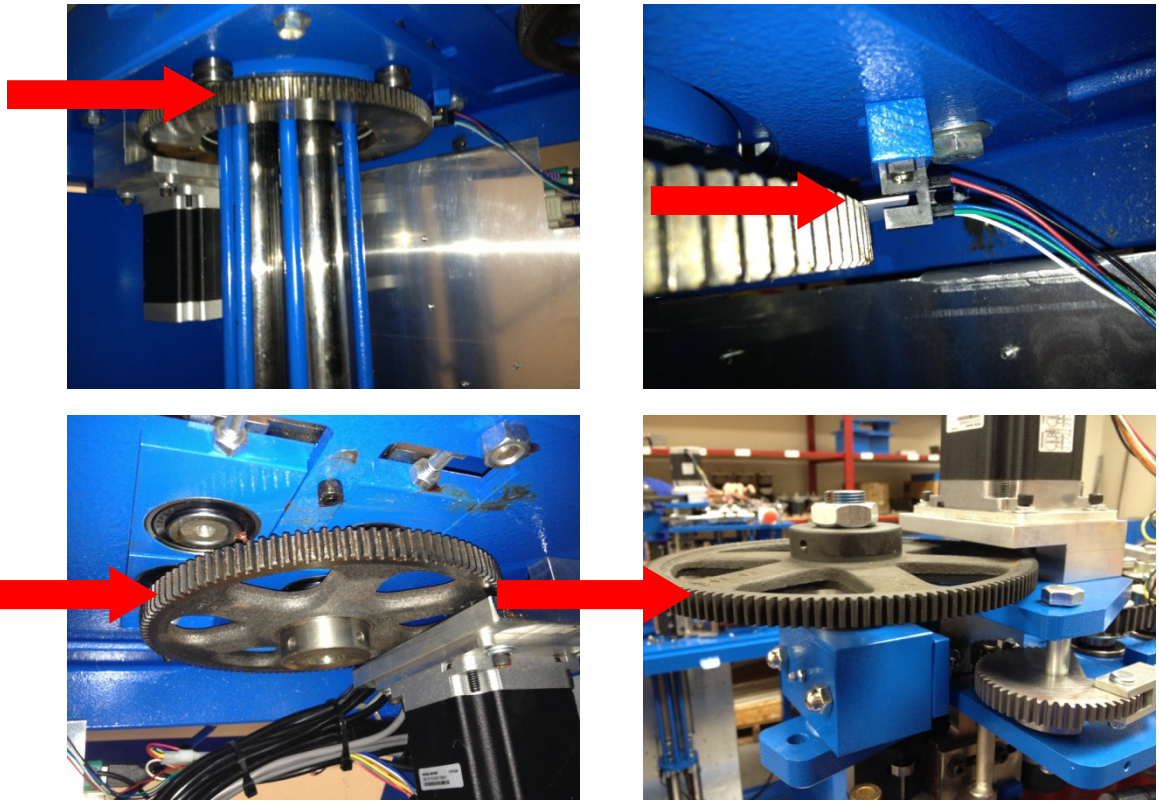
1. Clean the fan filter.
2. Grease the center capture pin with a brush.



3. Six Months

Observe all safety precautions when doing this next step (Read Chapter 1 Section 4).

1. Disconnect the compressed airline and the electricity by unplugging the electric cord from the machine. Open the side door and apply a light coat of grease with a brush to the drive gear, and the lower rotator gear. **Be careful not to put too much on the lower rotator gear, you will block the flag sensor.** Also apply grease to the upper rotator gear this unit's flag is far away from the gear so you don't have to be so careful with this one.



2. While the cover is off, check all connections air and electrical. Look the machine over for any suspicious potential problems. If you see something that doesn't look right call the factory at 561-996-5900 for technical assistance.

Chapter 9
Troubleshooting

Problem: The first bend lines up with the notch, but progressively get worse until it is completely off the notch.
Answer:

- The DXF file is not the same one that you used in the notcher, check the image length in both machines and make sure that they match exactly.
- Measure the return and compare it to the image length. The Notcher could be out of calibration.
- Run a calibration test on booth machines. You may need to recalibrate the machine. Or the encoder is slipping; adjust the spring tension on the encoder arm.
- Check the router bit size setting, the Curfing could be off.

Problem: The first bend is off and the rest is off the same amount.
Answer:

- The machine is not starting the letter correctly. In the 2010 Notcher check the distance from home to 30 degree Notcher. If you are running lead tab it should measure ¾ of an inch. Look for a damaged limit switch.
- Check the home to start in the Auto Bender program. When the machine processes a letter pause it when it gets to the edge of the break bend dies and see if it's flush with them. If not adjust Home to Start.

Problem: The artwork appears scrambled on the screen or a domain error message appears.
Answer:

- Look for control points on top of each other or points that form a loop.
- The size of the file is to large keep it under 50KB.

Problem: The file is not on the screen or is partially on the screen.
Answer:

- The artwork needs to be moved so that the lower X and Y corner is at zero or just a little bit above and to the right of zero.

Problem: The machine ran the letter straight through the machine without stopping once.
Answer:

- The machine did not see the home switch. The home switch in the Auto Bender is a photo electric sensor. It sends a beam of light out and when the strip of metal passes in from of it the light is reflected back and closes the switch. Remove the left deflector and clean the lens with a cue tip.

Problem: The machine found the edge of the material, then ran the letter straight through the machine 2-1/2 inches at a time. Or it engages and disengages a tool in between moves.
Answer:

- The machine is stuck in its collision protection routine it is trying to fix itself. However there is no bent material in the way, this means a tool is not engaging, or it is engaging and the input switch is not being made. Check the air pressure. Open the access door and try to locate what valve the machine is trying to operate. Locate the input switch that is not being made. Test the input switch with a magnet.

Problem: The Auto Benders green ready light does not come on.
Answer:

- Before trying to start the Bend program the ready light must be on. After **pressing reset**, the machine goes through a self test it looks for inputs to be in the correct order. If it fails then you will see the lights blinking or the machine will continue to home the bending rams. If the machine passes its entire test then it turns on the green light. Before going any further make sure it is not homing the bending rams, listen for any noise coming from the machine. If there is no light, or no noise coming from the machine then try the following.
- Check for 24V at the break out board.
- Check the Galil board for any LED lights, that will tell you that the controller in on.
- Power down and replace the 37 pin connector from the Galil board and the break out board. If your machine has a gray flat ribbon cable then replace it with a store bought molded cable. Do not try to making the cable yourself. In the past this has proven to be a problem. Use this cable (L-Com part number CSMN37MM-1)

Problem: The machine is scratching the return as it runs through the machine. Make sure it is a definite scratch and not a scuff mark mill finish shows scuff marks very easily.
Answer:

- A burr could be causing this. Pinpoint the exact location of the scratching in the machine. Inspect the return to help find the spot in the machine. Then apply 80 grit sandpaper to a piece of .063 aluminum, stick it between the break bend dies and sand down the burr that is causing the scratches. **Be careful not to bump the encoder, sand in and out not up and down.**
- Adjust the die bearing. Along the die there are 7 ball bearings. Remove the 2 screws and pull out the bearing that is closest to the problem. There is an axle pressed through the bearing. Press the axle out and carefully grind a flat along one side of the axle. Press the axle back into the bearing and reinstall the assembly with the flat toward the center of the machine, use 2 small shims between the axle and the underneath side of the screw head. This will position the bearing deeper in the die and will keep the return off of the inside of the die. Do not over tighten the 1/4 20 screws replace the screws if they look damaged.

Problem: The Auto Bender makes sharp bends that line up with the notches on straight letters perfectly, but does not line up with the notch when it bends a radius first. Like the letter "S"
Answer:

- The problem lies in the radius portion of the letter. Run a calibration test on booth machines. If they pass then, run a letter check to see if the letter length is the same as the "image length" in the CLN program. If they do not match, then the machine is not doing what it is commanded to do. Also check the Auto Bender Program make sure the "image length" value matches the 2010 Notcher program, if not then check all common settings like bit diameter, and in the bend program set all bend factors to 1 for the type of material you are running. If all of that checks out to be okay then try the following.
- When the 2010 Notcher notches the material it is causing the encoder to vibrate on the material and thus causing the material lengths to be inaccurate. Try slight tension on the straightener this will take the vibration out of the material.
- Check the encoder tension it should only be able to lift up 3/16 to a 1/4 of an inch.
- The acceleration rate in the Auto Bender or the Notcher is set to fast, and the encoder is slipping on the material as the machine stops and starts. This is possible if the material is oily.

Problem: The Auto Bender pulls the strip in the machine and just stops.
Answer:

- Check the green light, if it is blinking the machine is paused. Release the pause button.

Problem: The bending ram does not go down fast enough and the tool rotates and bumps into the sharp bend die.
Answer:

- Adjust the lower flow controller on the cylinder to make the cylinder go down faster. The machine has no confirmation that the tool is all the way down before it starts to rotate. It just waits for a few seconds and continues on. Watch the machines timing and adjust the flow controller accordingly.
- The air cylinder is passing air through it this means the seals in the cylinder are bad and the cylinder needs to be replaced. The cylinder will act like a spring because air is on both sides of the piston.

Problem: Open path files are being closed or parts of the letter are missing in the BEN program.
Answer:

- Go to Tools > Set up and change the Closed Figure value "1=YES 0=NO" This setting allows an open path to be sent to the machine. If you have this value set to 1, and you send an open DXF file into the CLN program, you will notice when you open the program the CLN Software will have drawn a straight line to close the letter for you. If you have this value set to 0, when you open the DXF file your letter will remain open.

Problem: Bending heads won't stop spinning after the machine is reset or the program connects to the machine.
Answer:

- The machine is trying to home the bending rams. This is how the machine knows where the bending rams are in relation with the machine. If they are spinning continuously then it means that the problem is the home sensor. The sensor is a slotted switch that detects any solid object passing through it. First try to clean the sensor then check the connections from the sensor to the break out board. If the bending rams are moving back and forth it is an input switch problem not a home switch problem.

Problem: The green LED did not come on and the bending heads won't stop homing after the machine is reset or the program connects to the machine.
Answer:

- If the LED does not flash telling you what inputs are out then it will get stuck in its home routine. This is how the machine tells you that something is wrong with its inputs.
- The machine did a self test and it did not pass the input test. Check to see if the stop button stuck, try unplugging it and press reset.
- Replace the 37 pin cable from the breakout board to the Galil.

Problem: The machine is missing radiuses bends.
Answer:

- What's happing is the radiuses are very large. Large enough that the machine has skipped over them and the radiuses that it did bend are possibly right on the line of being skipped. All of the radiuses together forum the complete bend however the machine only process one at a time. It looks at the present bend and decides that it is not small enough to do anything with and skips it. Skipping is important because it speeds up the bending process, the machine can't bend a 10 foot radius .1 long. It is basically a type of an internal filter. If it did not skip it would sit there and try to make miniscule bends and very small moves to the letter. It's just not practical to do this so reduce the control points and it will take care of this problem. It will also make the machine work faster. Refer to the setup procedure manual for more information about reducing control points.

Problem: Air is leaking from the exhaust ports on the manifold.
Answer:

- It could be a sticky air valve, try manually operating the valve by pushing in the blue button a few times. If you have an older machine then you will have a red screw, turn it with a screwdriver back and forth a few times. That may clear any foreign objects that build up in the valve. Go to valve manifold and stations in the system overview section of this manual.
- Air could be blowing through a cylinder or through a valve and traveling out the exhaust port. Unplug the return air line at the manifold and see if air is coming out of the hose that goes to the cylinder or if air is coming from the valve. If air is coming out of the hose then replace the cylinder. If air is coming out of the valve then replace the valve.

Problem: Air is leaking around the air connections.

Answer:

- Disconnect the house air supply. Unplug the air line by pushing in the ring around the connector and pull out the line. Cut off about an inch off of the end of the air line and reconnecting the line back into the air connector.
- Replace the connector.

LED Light definitions:

Green light on = Ready

Green light blink = Paused

Yellow light blink = Material feeding in or out

Yellow and green blink when the ben.exe starts = program connecting to controller.

Yellow and green blink 7 quick times = input 7 is not closed or positive round die is not all the way back.

Yellow and green blink 8 quick times = input 8 is not closed or negative round die is not all the way back.

Error Messages: Error Initializing Comport left mouse click and close program.
This message means that the CLN program can't access the computer's comport. If you receive an error message you must press reset on the machine before trying to start the program again.

- Check for another open program that is using the same com port. Also the BEN program could be running. Do a Ctrl Alt Delete and open the Task Manager click on Processes, click on BEN.EXE then click End Processes. When Windows starts, the first thing it does is reach out and looks for any devices that are plugged into the computer. When that happens, Windows leaves a little bit of computer language behind we call it junk, and then we start the BEN software we send a command to the controller along with the junk left behind from Windows. This causes the BEN program to hang up. To prevent this from happening just press reset on the machine before starting the program. Pressing reset on the machine only needs to be done once after the machine is powered up.

- Go to Tools Setup, and change the comport setting in the program. The program will only work on com 1 through 4. This is a common problem when you change computers. If you are using a USB comport adapter make sure you load the adapters driver. This problem has nothing to do with the machine it is between the computer and the program.

Error Message: Error commutating with controller left mouse click and close program.

This message means that the controller is not responding correctly to the commands that the CLN program is sending it, however it means that the comport setting are correct.

- Open back cover and locate the 9 pin RS232 cable from the computer to the control broad and check the connections.

- Replace the 9 pin RS232 cable from the computer to the control broad.

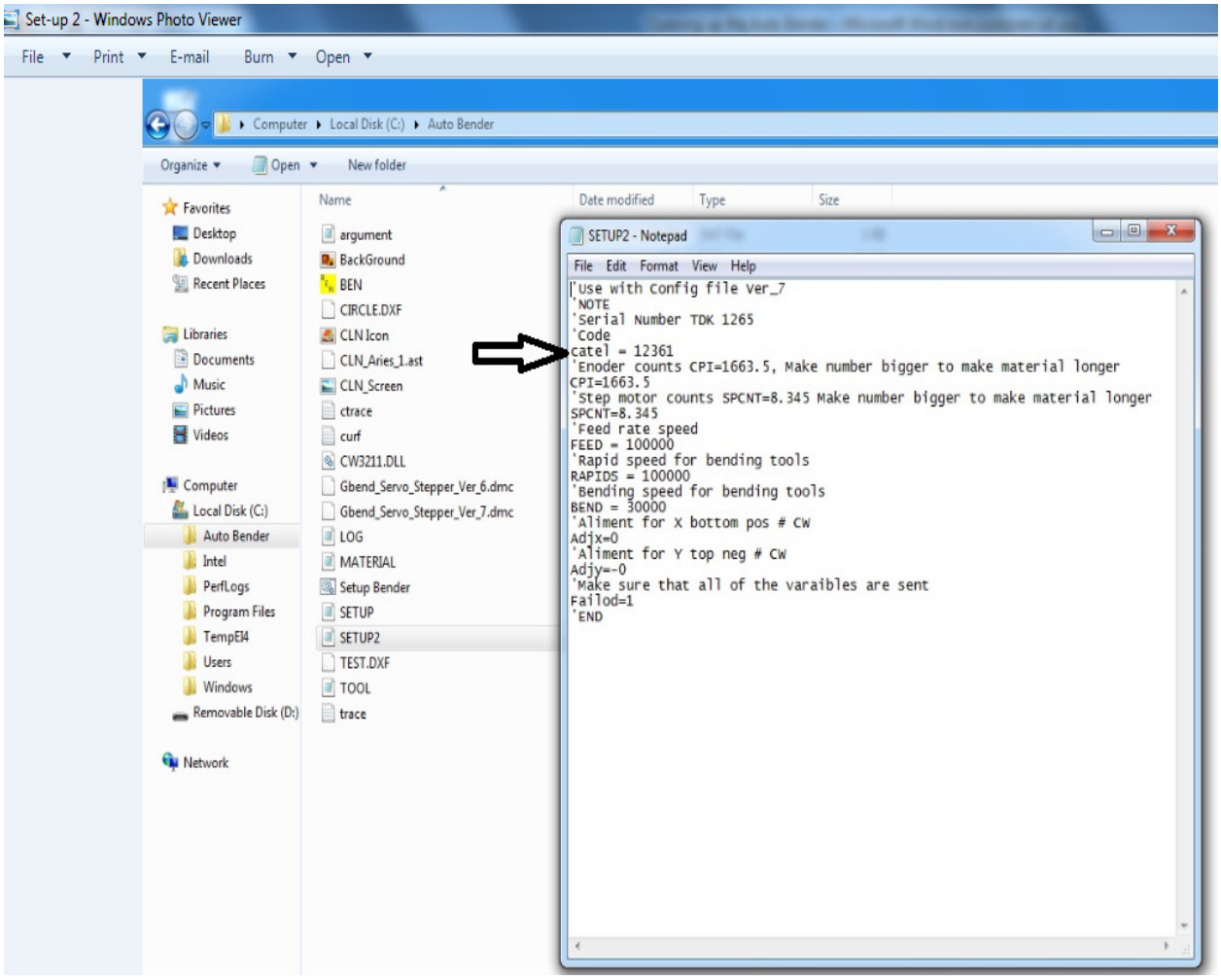
- Make sure that the controller is powered up. Check for LED lights on the board.

Error Message: Update Registration Code left mouse click and close program.

This message means that the machine is under a finance agreement, and the machine is not paid in full. It will work for 4 months under one code, after that all you will see is this message. To change the code click on setup 2.DAT located in the folder that the program is located in. The file will open in note pad make the changes and then save and exit. The changes will take affect when you reopen the CLN program.

1. Call the finance department, and have the machines serial number ready.

2. If it is paid in full call CLN of South Florida Inc. and have the machines serial number ready they will issue a permanent code.



Error Message: Warning the machine detected that the clock is being tampered with.
If the date in the computer is manually turned back, as little as one day, and the program tries to connect to the machine, the program will not work.
If the date is set forward, the program will work, however you cannot set the clock back from that point.

1. If you receive this message then set the date back to the correct date.

2. If you own the machine outright then you will have a permanent code, and you will never see this message.

Technical support
If you need further assistance call 561-996-5900. Please be prepared to explain exactly what is not working property. Gather as many details on the problem as you can, so that the technician can help you more efficiently.

Remote in service
Connect the machines computer to the internet and then start the Cross Loop program, and then contact CLN of South Florida Inc. at 561-996-5900. A technician will need to remote into the machine to diagnose the problem. Be prepared to have a phone at the machine.

Chapter 10

Glossary

Return: The sidewall of a channel letter or the strip of metal that the gets processed in the machine.
Material: The sidewall of a channel letter or the strip of metal that the gets processed in the machine.
Coiled Stock: The sidewall of a channel letter or the strip of metal that the gets processed in the machine.
Segment: Segment is one dimension of many.
Accumulative: Accumulative is all of the dimensions added up.
Calibrate: Way of making measurements true and exact.
Step motor: Type of motor, which turns by incremental movements, called steps.
Encoder: The encoder is a device used for measuring.
Controller: Circuit board that stores data that is used to operate and control other devices.

Chapter 11

Factory Machine Settings

1. **Tools \ Setup**
2. **Tools \ Tool Data**
3. **Tools \ Material Data**
4. **Setup2.dat**

Factory Machine Settings

When your machine was built it was fully functional in our factory. At that time we took a screen shot of the calibration settings, and inserted them into the bottom of the manual. In the event you lose your settings or your computer goes down, CLN will send you the programs that runs the machine but can only get close to you calibration settings. So keep these factory settings somewhere safe also make a copy of the Auto Bender folder and save it somewhere safe.