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Signwarehouse Pinnacle M-Series Manual

II. INTRODUCTION

Principles of CO₂ Laser

LASER is a **L**ight **A**mplification by **S**timulated **E**mission of **R**adiation.

A CO₂ laser works by exciting the molecules of a carbon dioxide gas mixture.

To engrave, the beam is focused through a lens. The intensive beam can vaporize the surface of the material leaving an engraved image or, in some cases, cutting through the material.

Safety

Laser engravers that have the CDRH safety rating of Class 1 are required to have key safety features such as an enclosed laser beam and safety interlock mechanisms designed to protect the operator. In addition to the safety features of a Class1 machine, the M-Series has been equipped with a red guidance pointer. This red dot allows the operator to safely see the focal point of the laser beam. It also gives M-Series the improved CDRH safety rating of 3a. Although the M-Series is our most powerful laser engraver, when used correctly, it is an extremely safe machine.

• Precaution

1. Do not attempt to modify or disassemble the laser system at any time.
2. Wear appropriate safety goggles especially when engraving back of mirrors or coated metals such as enameled brass and anodized aluminum.
3. Good ventilation is required to remove odors and vaporized materials to the outside of the building or structure. An exhausted system is recommended.
4. Invisible intensive laser radiation may cause physical burns or severe eye damage. Always read the manual and caution labels carefully before operation.
5. Do not work with reflective metals, heat sensitive surfaces or other materials that may produce toxic substances, such as **PVC and Teflon**.
6. A fire extinguisher should be available on hand at any time.
7. **Never leave the machine unattended during operation.**
8. Follow the recommendations for maintaining and cleaning your laser system. Not only will this enable you to consistent engravings, it will ensure that your machine runs safely as well.

• Fire Precaution

1. When cutting materials that are easily caught on fire, such as acrylics, wood or paper, do not leave the machine unattended.
2. If cutting table, or honey comb table, is used for cutting purpose, do not leave any material underneath, as when material at top is cut through, the material at below will easily be burned due to trapped heat.
3. **DO NOT** leave the machine unattended when cutting any material.

- **Warning Label**

I. DANGER
INVISIBLE LASER RADIATION
WHEN OPEN
AND INTERLOCK FAILED OR
DEFEATED
AVOID EYE OR SKIN EXPOSURE
DIRECT OR SCATTERED
RADIATION

On the right of the top door and outside of the first mirror cover.

II. DANGER
INVISIBLE LASER RADIATION
WHEN OPEN
AND INTERLOCK FAILED OR
DEFEATED AVOID EYE OR SKIN
EXPOSURE DIRECT OR
SCATTERED RADIATION



WARNING
PLEASE WEAR GOGGLE TO OPERATE
WHILE THE DOOR OPEN

It is on the upper center of the front door.



WARNING!!
Do not use reflective metals, heat sensitive surfaces or other materials that may produce toxic substances, such as PVC and Teflon.
Any corrosion caused by working on unsuitable substances will not be covered in the warranty.

CAUTION
AVOID PLACING YOUR EYES IN
THE RED BEAM PATH

It is on the front center of the top door.

III. DANGER
INVISIBLE LASER RADIATION
WHEN OPEN
AVOID EYE OR SKIN EXPOSURE
TO DIRECT OR SCATTERED
RADIATION



WARNING
PLEASE WEAR GOGGLES TO
OPERATE WHILE THE DOOR OPEN

It is on the back panel (non-interlocked panel with screws).

Notice
Please clean the
Auto Focus
Probe each time
before turning on
the machine to
make sure the
probe is free
to move. 

On the surface of Focus Carriage

III. UNPACKING

Caution:

- The weight of the Pinnacle M-SERIES is about 137 kg (410 pounds). To prevent damage to machinery or injury to workers, please get assistance. Do not lift the equipment alone.
- Please save the original shipping crate for at least 6 months in case any warranty repair services are needed.
- Please inspect what you have received from the shipped carton by comparing with the following listed items.

Unpacking inspection

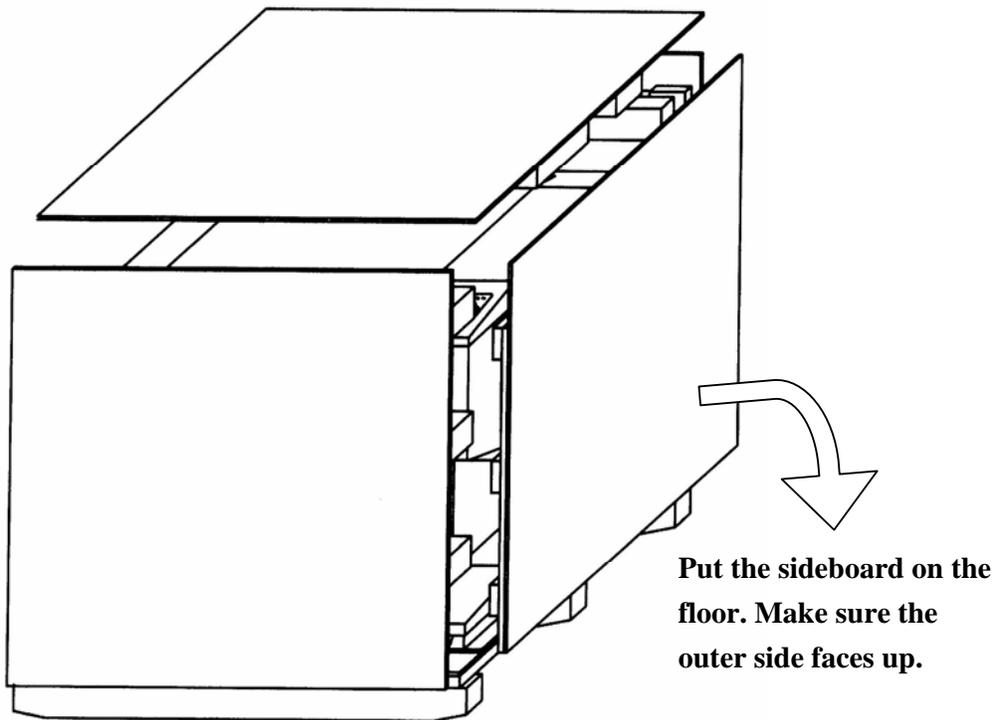
There is a box located underneath the table of your laser. Open the front access door to reveal the box.

Your package should contain the following items:

| ITEM | QUANTITY |
|---|----------|
| Cleaning Set | |
| Cotton swab | 1 pack |
| Lens cleaner | 1 bottle |
| Lens tissue (lint free) | 1 pack |
| 2" Manual Focus Gauge (blue color) | 1 |
| AC Power Cord | 1 |
| Parallel Cable | 1 |
| Pinnacle M-Series Driver (Laser Setup CD) | 1 |
| Goggles | 1 |

Unpacking Steps

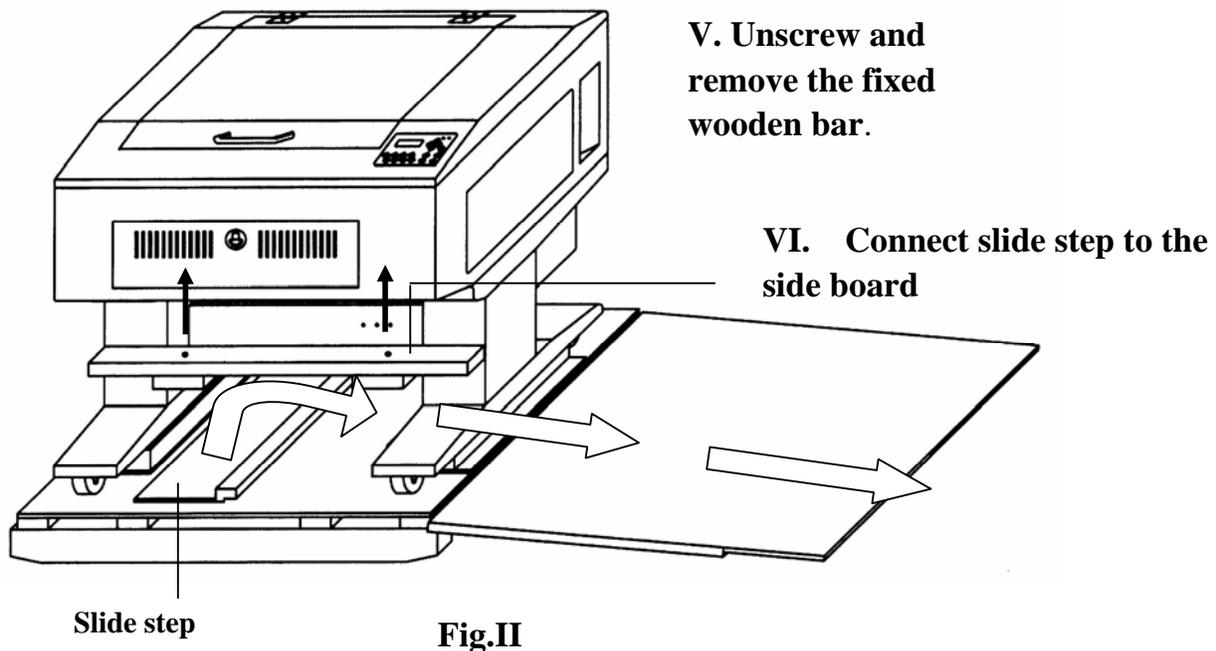
Step 1.



Put the sideboard on the floor. Make sure the outer side faces up.

Fig. I

Step 2.



V. Unscrew and remove the fixed wooden bar.

VI. Connect slide step to the side board

Slide step

Fig.II

Step 3.

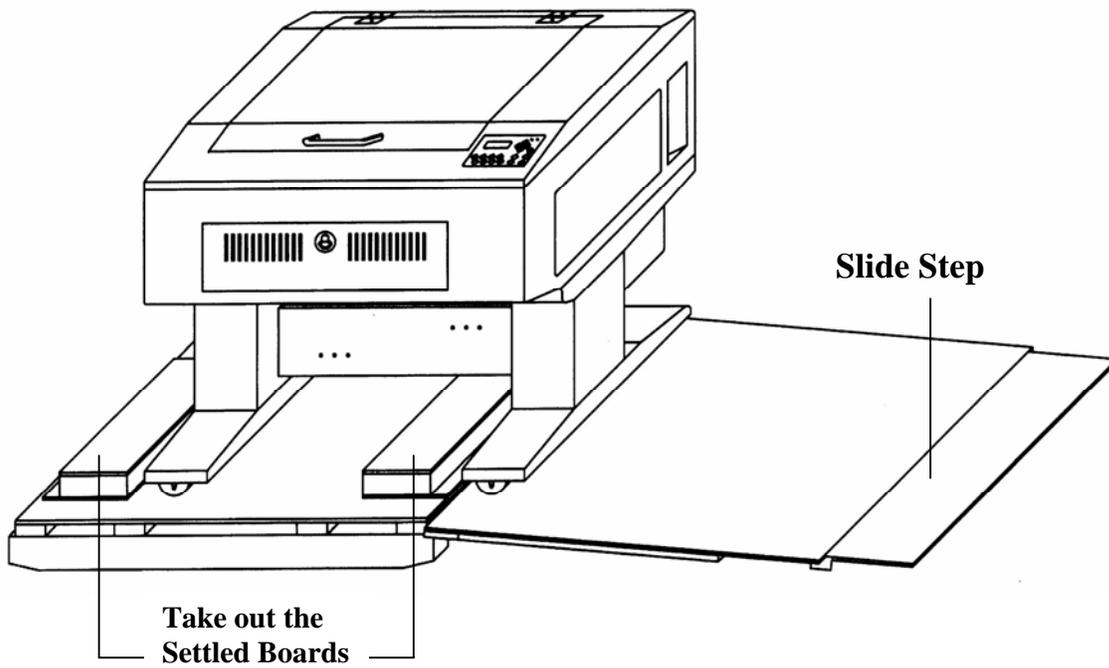


Fig. III

Step 4.

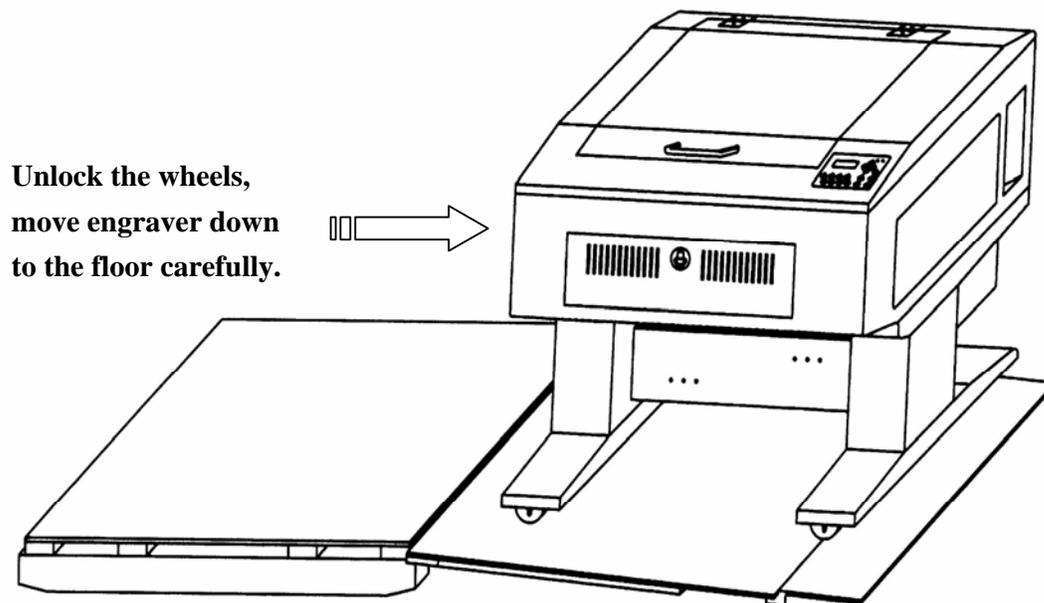


Fig. IV

IV. Basic Maintenance

Below shows list of Preventative Maintenance (PM) items.

However, it is based on a normal operation environment.

If your machine is working in a better environment, less dust and proper temperature, you can reduce the frequency.

If your machine is working in a harsh environment, then you have to increase the frequency of PM should to protect your machine.

Before Power ON

| ITEMS | DETAILS | | | CHECKS |
|--------------------|-------------------------|---------------|--------|--------------------------|
| | Sub-Item | Specification | Result | |
| Environment | ✦ Temperature | 22-27°C. | | <input type="checkbox"/> |
| | ✦ Temperature stability | ± 1°C | | <input type="checkbox"/> |
| | ✦ Humidity | 50± 5% | | <input type="checkbox"/> |
| | ✦ Clean Class | < Class-100 | | <input type="checkbox"/> |
| Surface | ✦ X-axis Assembly | | | |
| | ✦ Y-axis Assembly | | | |
| | ✦ Z-axis Assembly | | | |
| | ✦ Laser diode mirror | | | |
| | ✦ Mirror 1/2/3/4 | | | |
| | ✦ Focus lens | | | |
| Belt | ✦ X-axis belt | | | |
| | ✦ Y-axis belt | | | |
| | ✦ Z-axis belt | | | |

Before power on tests.

After Power ON

| ITEMS | DETAILS | | | CHECK (If yes) |
|-----------------------|---|--|--------|--|
| | Sub-Item | Specification | Result | |
| Input Power | | 100 or 240 VAC | | <input type="checkbox"/> |
| Initialization | <ul style="list-style-type: none"> ✦ Z-axis initialization. ✦ X-axis initialization. ✦ Y-axis initialization. ✦ Move to (0, 0). | <ul style="list-style-type: none"> Table moves down? Head moves right? Head moves to you? Head move to upper left hand corner? | | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |
| Fans | <ul style="list-style-type: none"> ✦ Fan for M/B ✦ Fans for laser tube | Do you hear fans from behind machine? | | <input type="checkbox"/> |
| Auto Focus | ✦ Move to specific distance (base on the selected focus lens) | Check by manual focus tool | | <input type="checkbox"/> |
| Output Graph | Check the quality of output graph | | | <input type="checkbox"/> |
| Running Test | Run the system continuously for more than one hour without abnormal error happen | | | <input type="checkbox"/> |

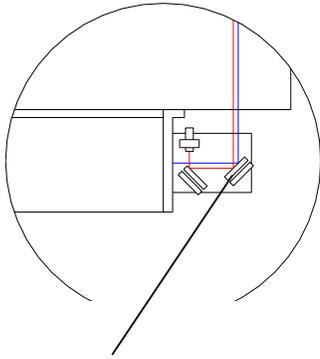
After power on tests

Maintenance Sheet

| Maintenance Item | | D | W | M | Q | S | A |
|------------------------------------|-------------------|---|---|---|---|---|---|
| Power System | Power Board | | | ✓ | ✓ | ✓ | ✓ |
| | Power Supply | | | ✓ | ✓ | ✓ | ✓ |
| Motion System | Lens Carriage | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | X-axis Bearings | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Y-axis Bearings | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Z-axis | | | ✓ | ✓ | ✓ | ✓ |
| | Rotary-axis | | | ✓ | ✓ | ✓ | ✓ |
| Laser Assembly (Inside of Machine) | | | | | | ✓ | ✓ |
| Optical System | | | | | | | |
| | Mirror 1 | | | ✓ | ✓ | ✓ | ✓ |
| | Mirror 2 | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Mirror 3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Mirror 4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Lens | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Auto Focus Pen | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Fans | | | | ✓ | ✓ | ✓ | ✓ |
| Option | Air Compressor | | | ✓ | ✓ | ✓ | ✓ |
| | Odor Reduction | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Small (3 filters) | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Large (2 filters) | | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Water Coolant | | | ✓ | ✓ | ✓ | ✓ |

D: Daily, W: Weekly, M: Monthly, Q: Quarterly, S: Semi-Annual A: Annual

Mirror 2
(Inside machine back
left hand corner)



Mirror 1
(Located at the back of the
machine down by the laser tube)

Fig 2-3

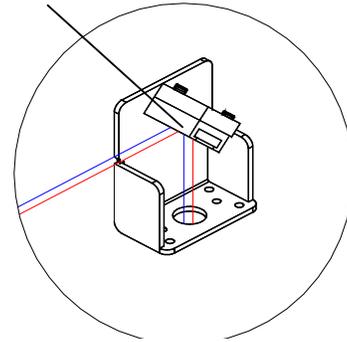


Fig 2-4

Mirror 3
(On left hand
side of rail)

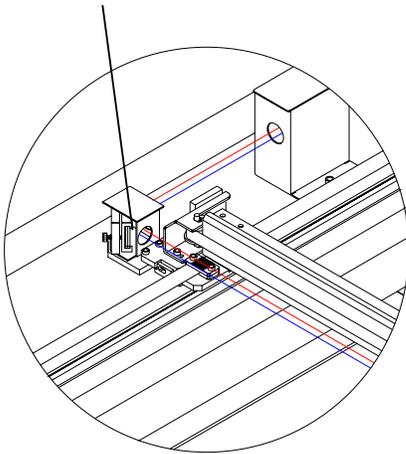
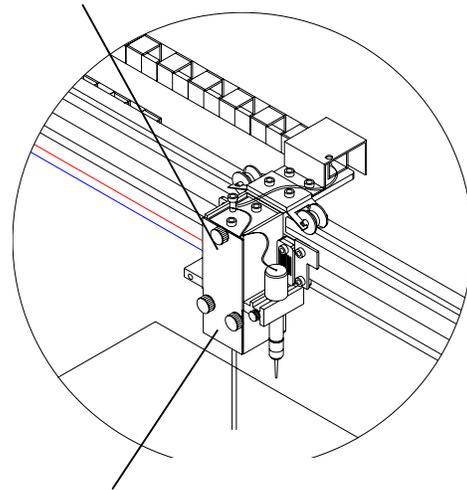


Fig 2-5

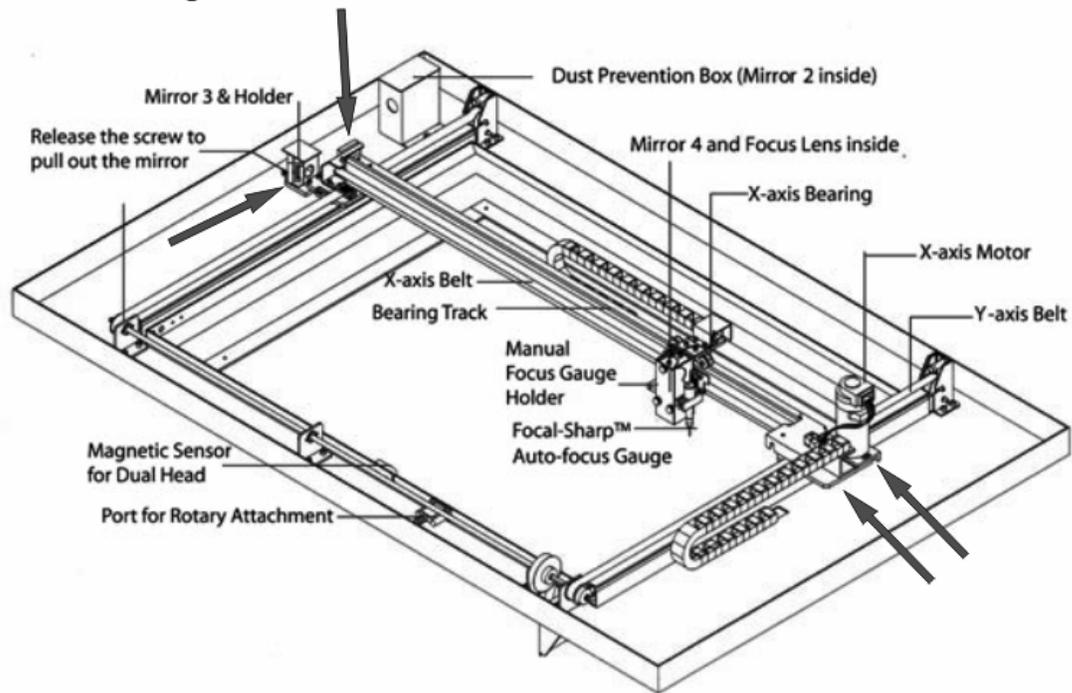
Mirror 4
(Inside tool carriage)



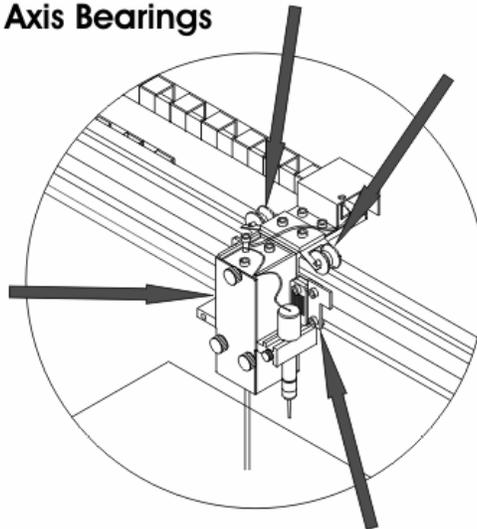
LENS
(Inside tool carriage)

Fig 2-6

Y Axis Bearings



X Axis Bearings



Lens and Manual Focus Gauge

| Focal Length | | Matched Color | |
|---------------|--------|---------------------|--|
| GAUGE | LENS | MANUAL FOCUS TOOL | |
| 1.5" Option | Purple | Blue (same as 2.0") | |
| 2.0" Standard | Blue | Blue | |
| 2.5" Option | Gold | Gold | |
| 4.0" Option | Red | Red | |

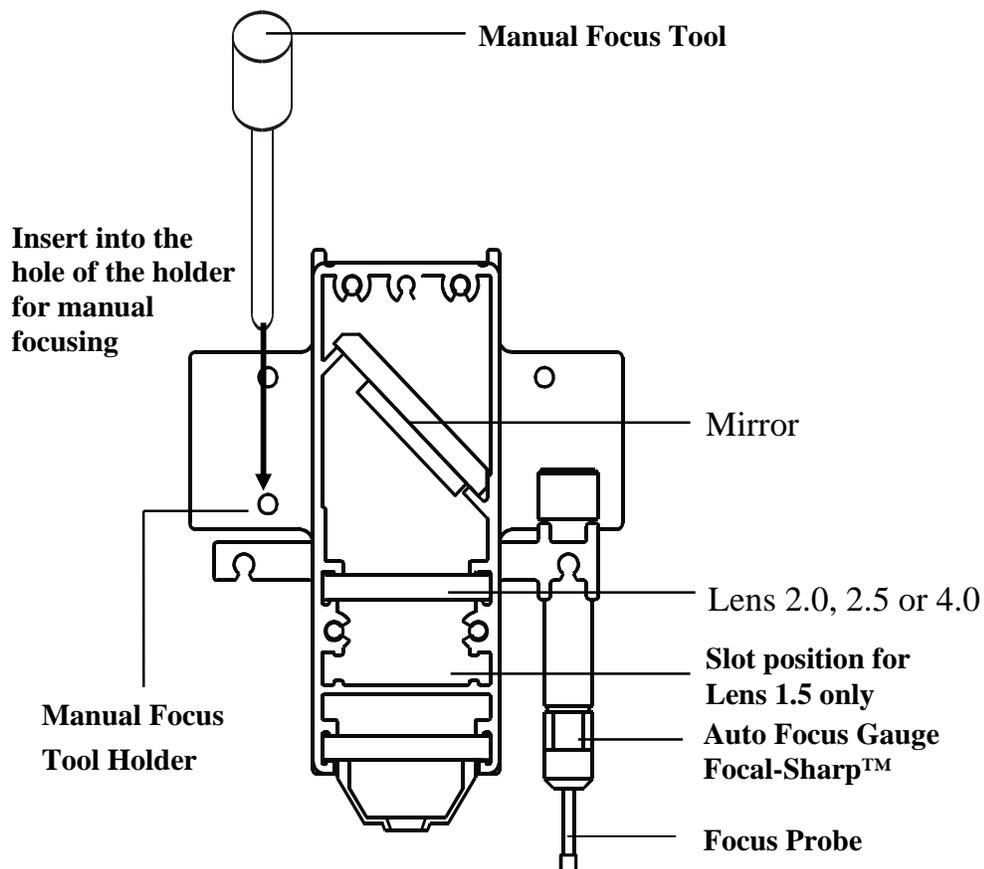


Fig. 4 Focus Carriage

Caution:

- Keeping the optics and motion system clean are essential to an excellent quality engraving and it will ensure the reliability of your engraver. Cleaning bearing tracks and all bearing daily will keep your machine in operation.
 - **Never** pour or spray any liquid directly into or on the laser system.
 - Turn off the power and unplug the system before and during cleaning.
1. **Inside the System:** Open the top door, the front door and the back door (if necessary). Vacuum to clean inside of the engraver and vent area thoroughly.
 2. **Engraving Table:** Dampen a paper towel or lint free cloth with alcohol or cleaner to clean the Engraving Table.
 3. **Motion System:** Dampen a lint free cloth to clean the rails of the Motion System. Get rid off any debris built up in the bearing tracks.
 4. **Bearings:** Hold a dampened cotton swab or lint free cloth against the bearing and moving the motion system by hand to clean each bearing.

Mirrors and Lens: Refer to Basic maintenance (pg. 10) for detailed listing of cleaning dates.

Caution:

Don't scratch out the soft coating of the mirror's surface. Excessive cleaning the mirrors and lens may cause damage and reduce their life cycle (refer to Fig. 24).

Do not touch the lens surface or mirror surface with your bare hands.

Do not press down on the mirrors or lens with any cleaning material.

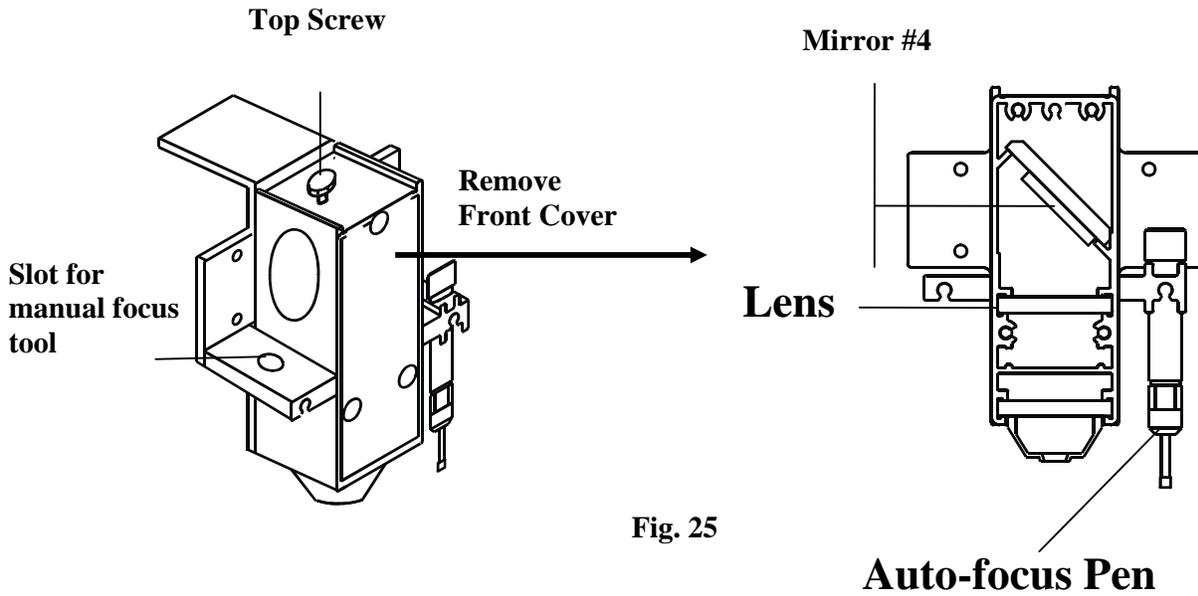
Do not blow on the lens or mirror surfaces, the humidity from your breath will flash boil when the laser hits it. This amount of heat will destroy the protective coating.

Cleaning a mirror –

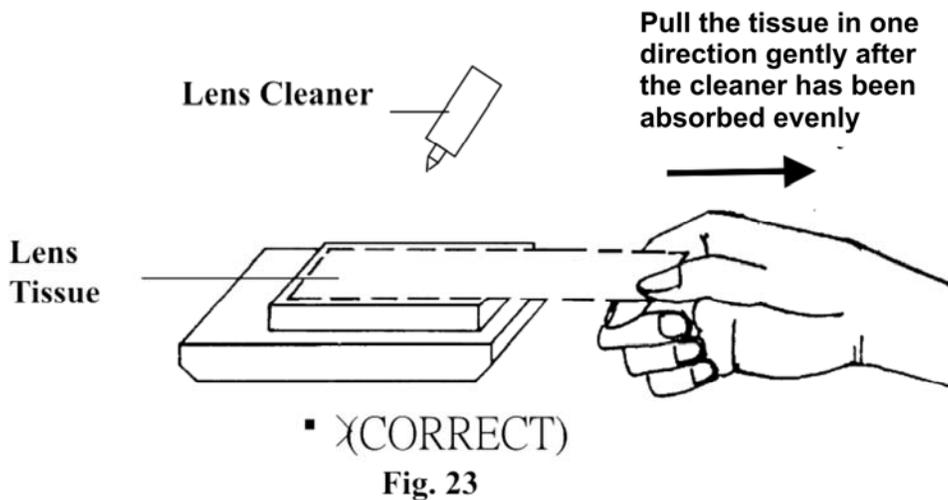
1. Unscrew the thumb screw holding the mirror in and remove mirror from its housing.
2. Put lens tissue on the mirror and drop a little lens cleaner fluid on the middle area of the tissue (please refer to Fig. 23), after the fluid has been absorbed evenly, pull the tissue **one direction** gently to clean the mirror.
3. If it doesn't come clean, put the wet spot of the tissue back on the mirror, pull in a different direction. You do not want pull over a dirty area, it may scratch the mirror. Repeat until mirror is clean
4. Let it air dry and re-install it.

Clean the focus lens –

1. Unscrew and remove the front cover of the focus carriage (head). Pull out focus lens carefully (refer to Fig. 25).
2. Flood the focus lens with lens cleanser then using a cotton swab to dry off the remaining solution gently. Flip the lens over and repeat until lens is clean.



(INCORRECT)
Fig. 24



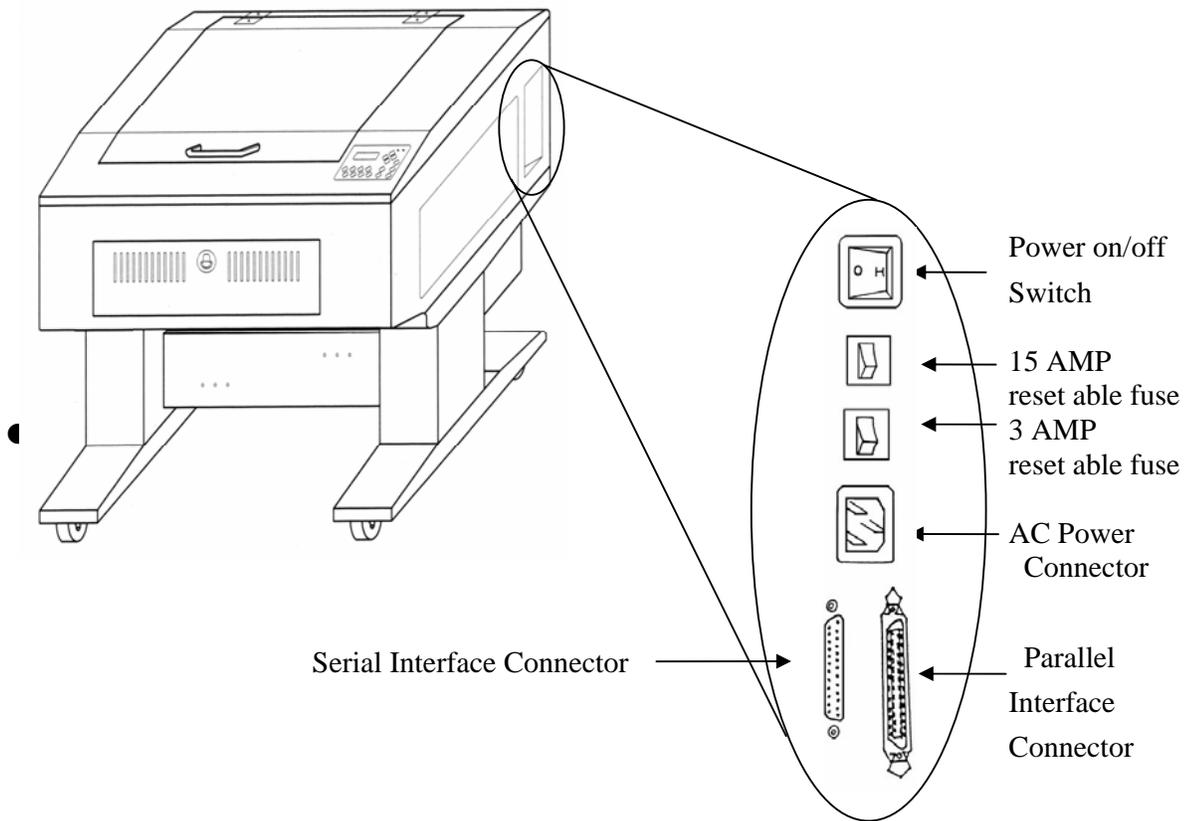
V. Connecting the Laser

Caution:

- Turn all equipment off before making any connection.
- Check the plug of the power cord to see if it matches the wall outlet. If not, please contact your dealer.

Cabling Connection:

1. Insert the power cord (male) into a grounded power outlet.
2. Plug the other end (female) into the engraver. The engraver has been design to switch from 110 ~ 240 VAC automatically (60W or higher engravers have to use 220~240 VAC only).
3. The engraver can communicate with a computer through either a parallel port (Centronics) or a serial (RS-232C).



Caution:

Never use a mechanical switch box when a second printer port is required. The electrical surges can cause damage to the computer and the engraver.

● **Serial Transmission**

If you are using IBM PC, PS/2 or their compatibles, connect a RS-232 Serial cable to the engraver (serial port) then to the serial port of the host computer. If you do not have a serial cable you can pick one up at any local Computer store or call Pinnacle Lasers Tech Support and they will send you one.

*** Serial Port settings on computer need to resemble. ***

| | |
|-----------------|-------|
| Bits per second | 57600 |
| Data Bits | 8 |
| Parity | None |
| Stop Bits | 1 |
| Flow Control | None |

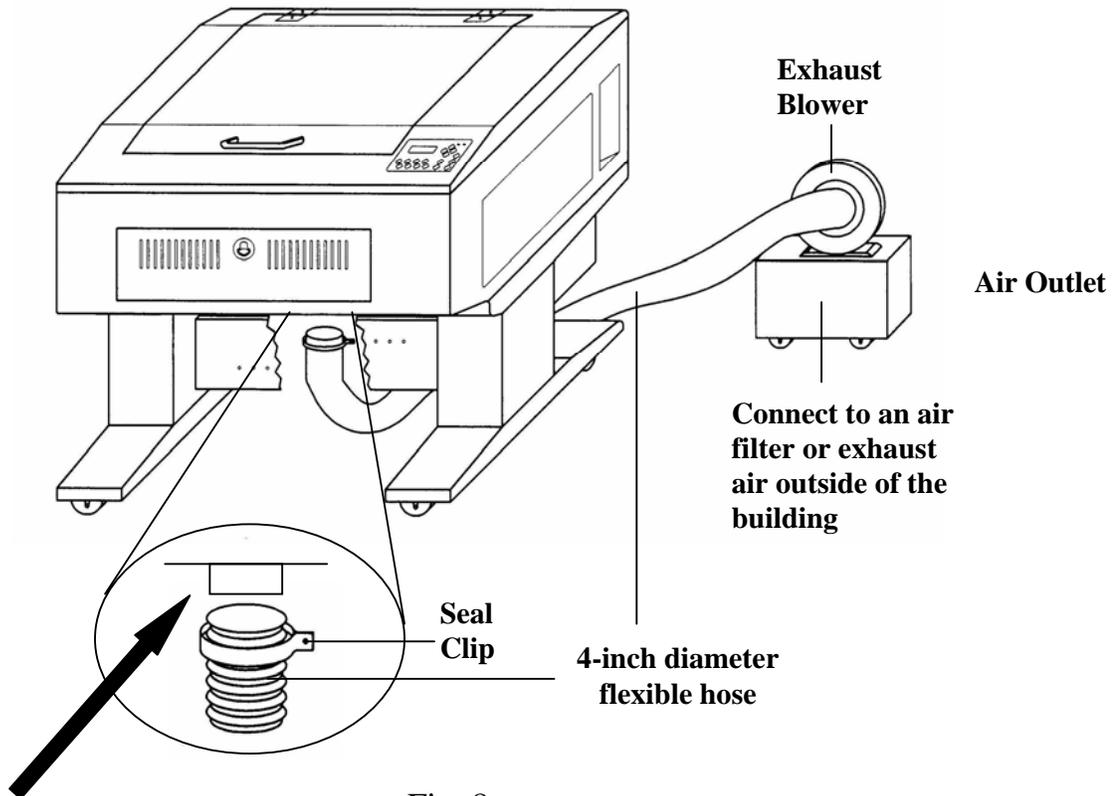
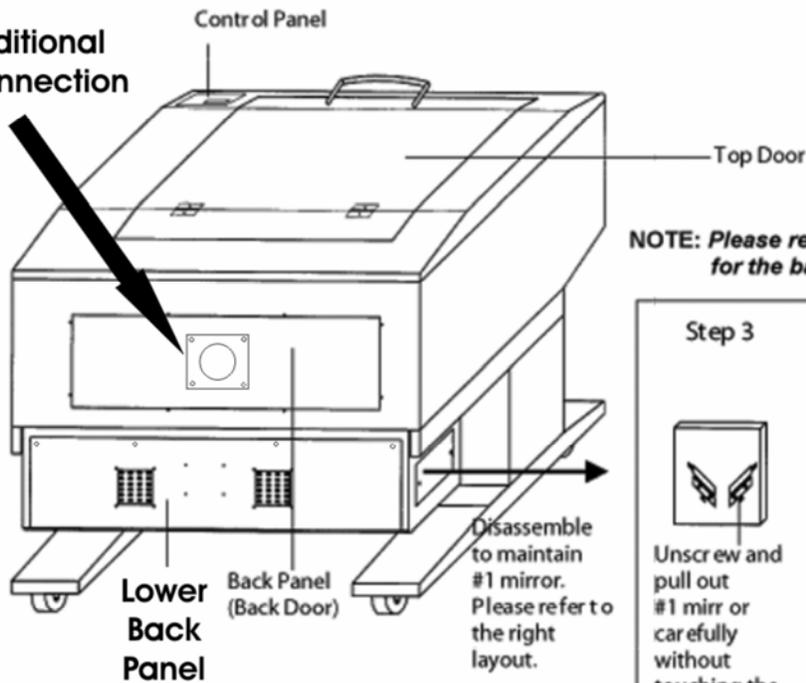


Fig. 8

This connection can be relocated to the back of the machine for improved circulation.

Back View

Additional Connection



NOTE: Please refer to Fig. 23 and follow the instruction for the basic maintenance of mirror.

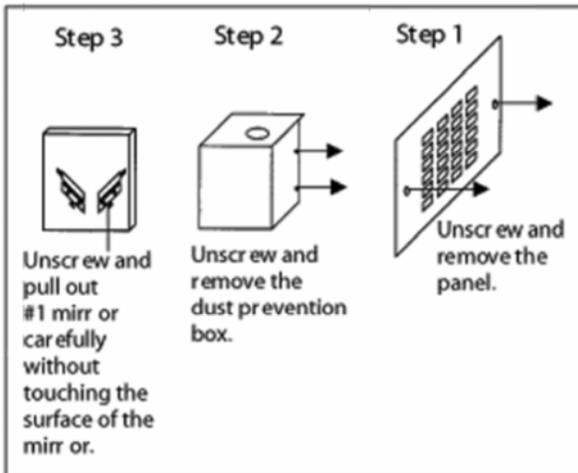


Fig. 2

Front View

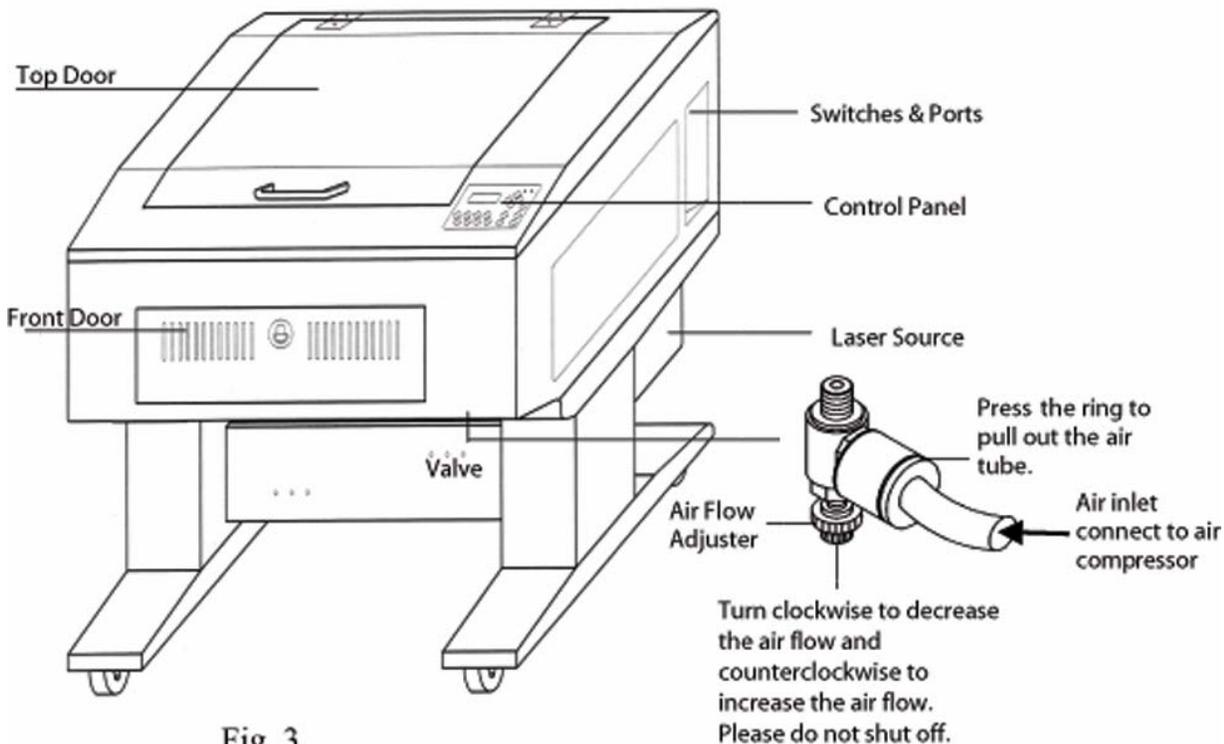
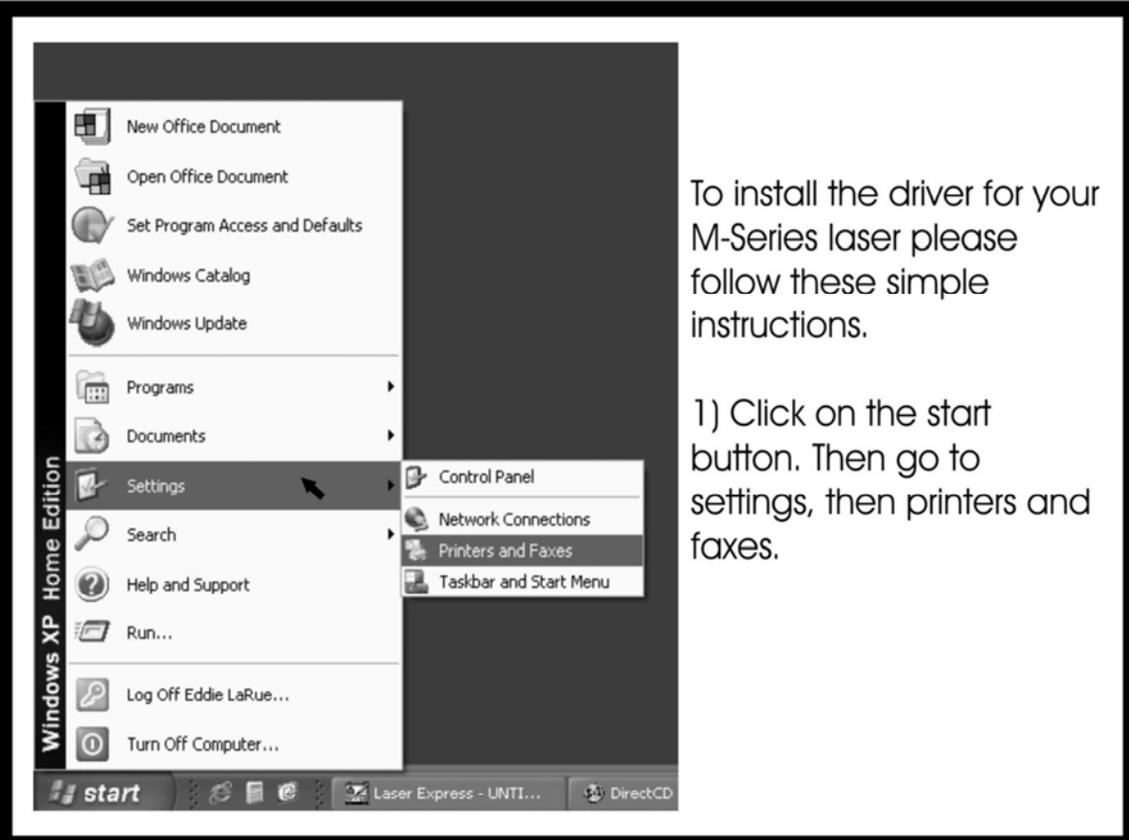


Fig. 3

VI. Driver Install / Setup

1. Put your Laser Setup CD into your computer.
2. Select the M-Series Laser and watch a video that shows you how to install the driver or you can follow the instructions in the next couple of pages.



To install the driver for your M-Series laser please follow these simple instructions.

1) Click on the start button. Then go to settings, then printers and faxes.



2) Next click on "Add a Printer"



3) Follow the add printer wizard's instructions for installing your laser driver.



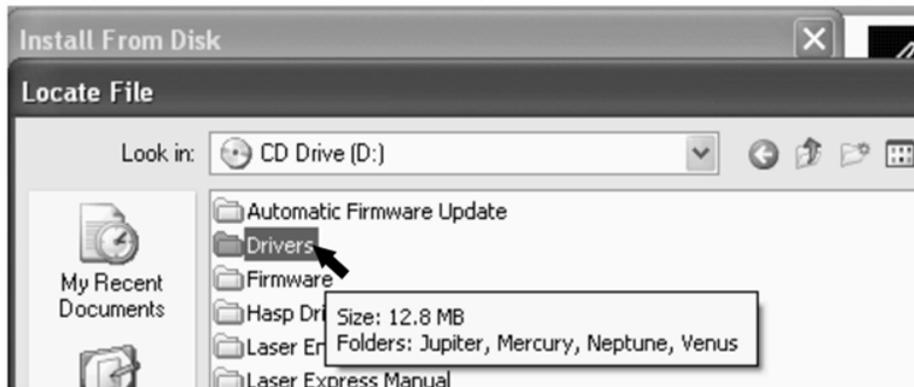
4) When the above screen appears. Please select "Have Disk" and insert your **Laser Setup** disk into the CD drive



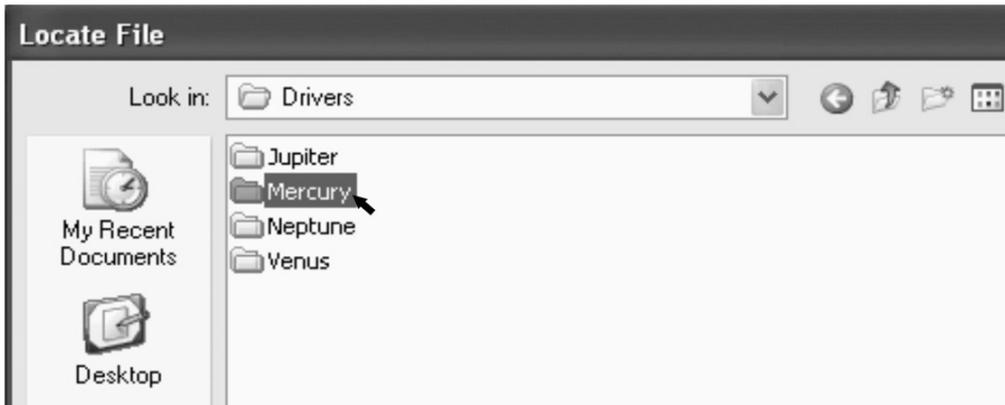
5) Next click browse



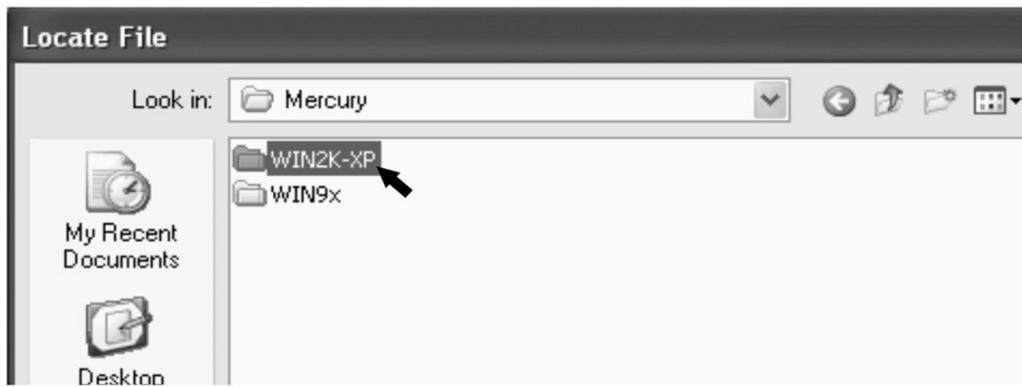
6) Then select the CD Rom drive



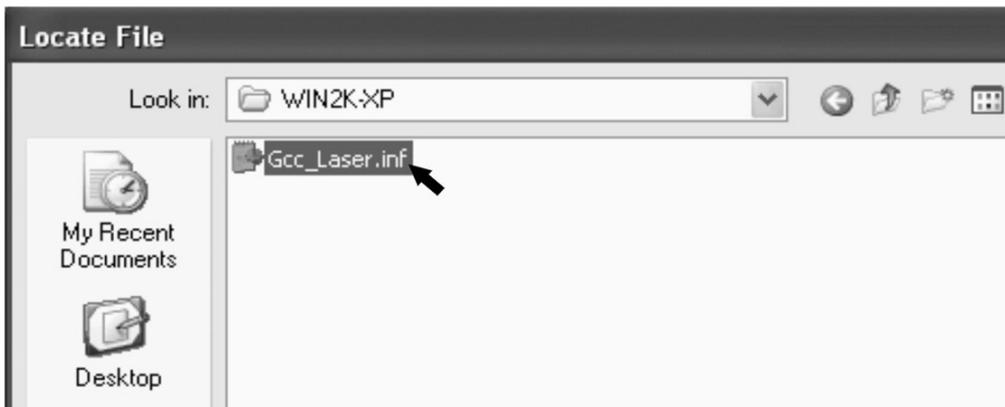
7) Next double click on the drivers folder



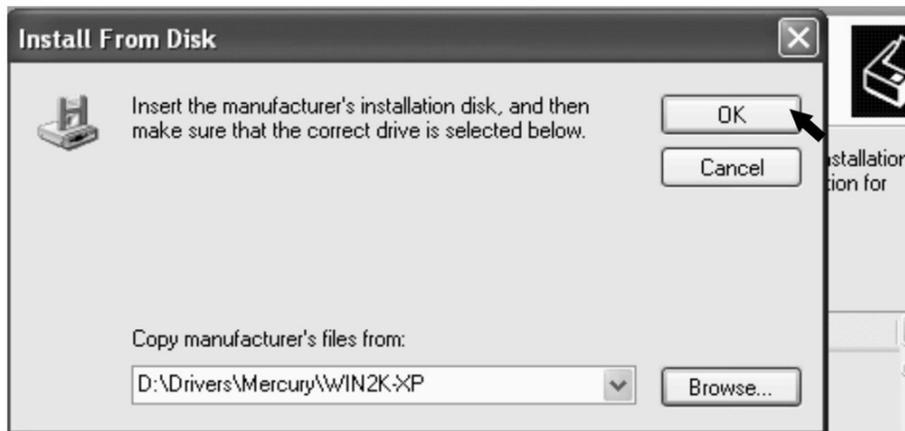
8) Next double click on the correct machine



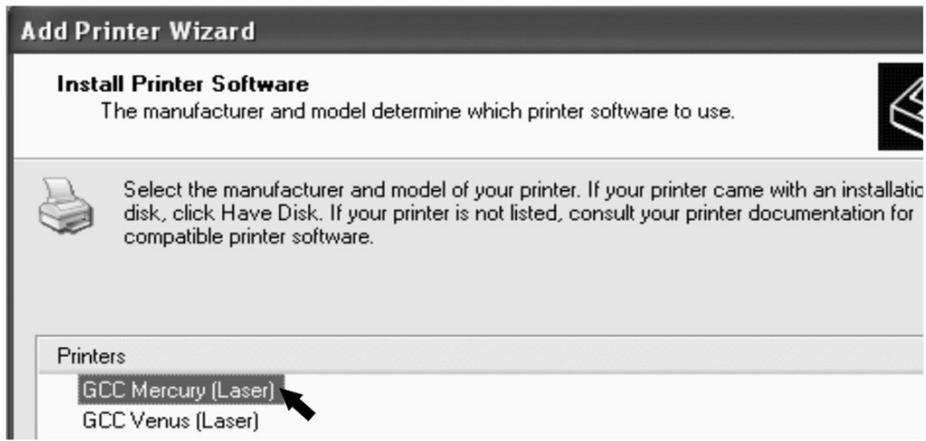
9) Then double click on your operating system type



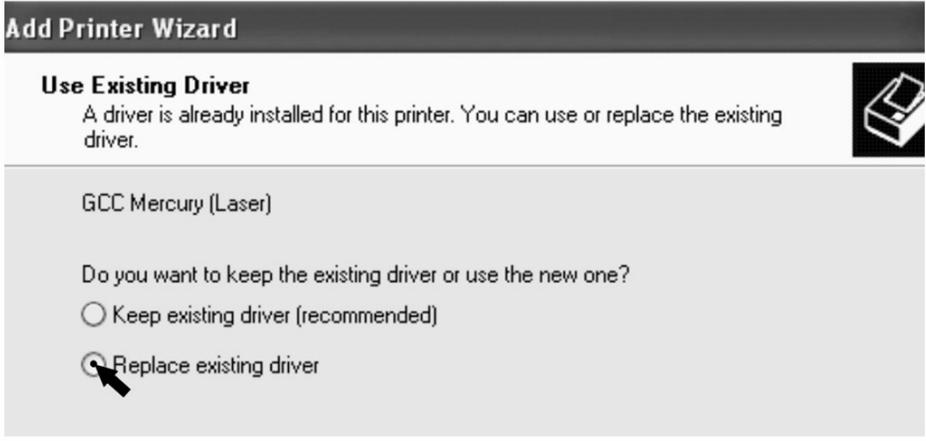
10) Then double click on the Gcc_Laser.inf file



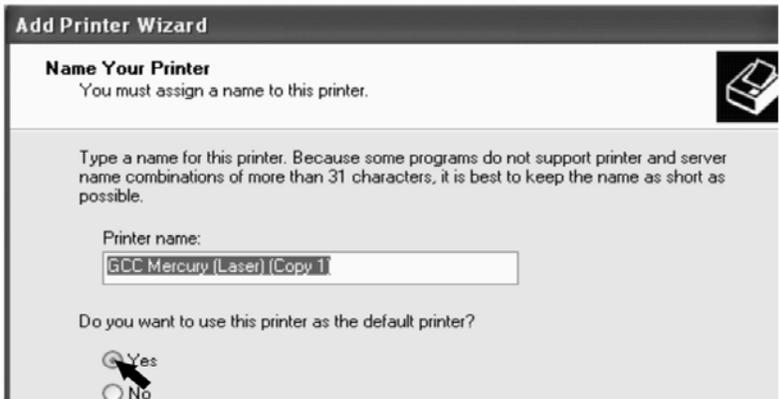
11) Now at the Install screen, click "ok"



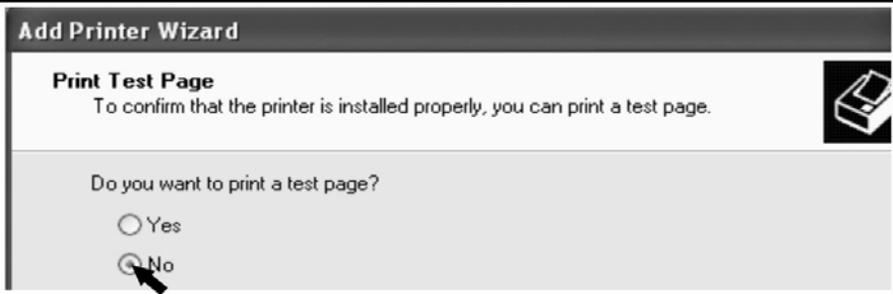
12) Next choose the machine model



13) Click on - "Replace existing driver"



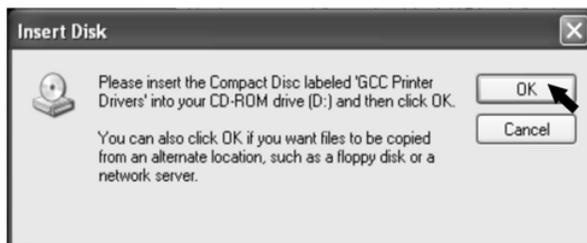
14) Then choose for default



15) Next click "no" to print a test page



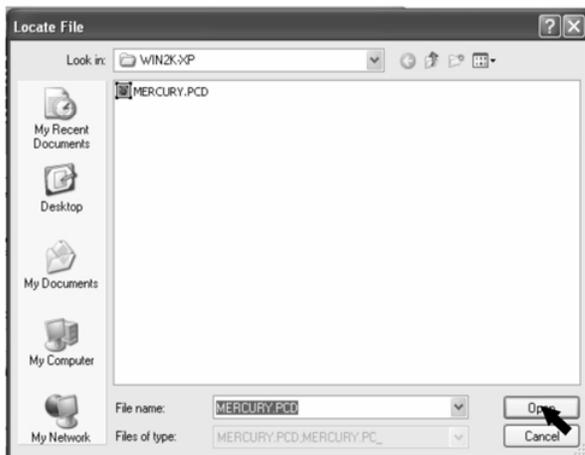
16) Then click "finish"



17) When prompted to insert the "GCC Print Driver" please select "OK".



18) Then select "Browse"



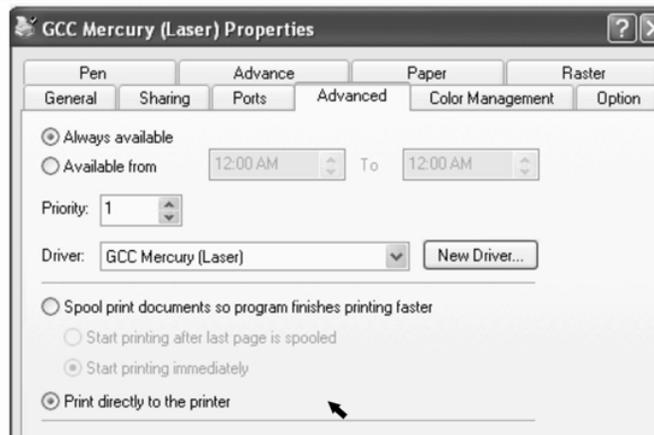
19) Then click "Open"



20) Next select "OK"



21) Next right click on the GCC Mercury icon. Then click on properties. Then click the "Advanced" tab.



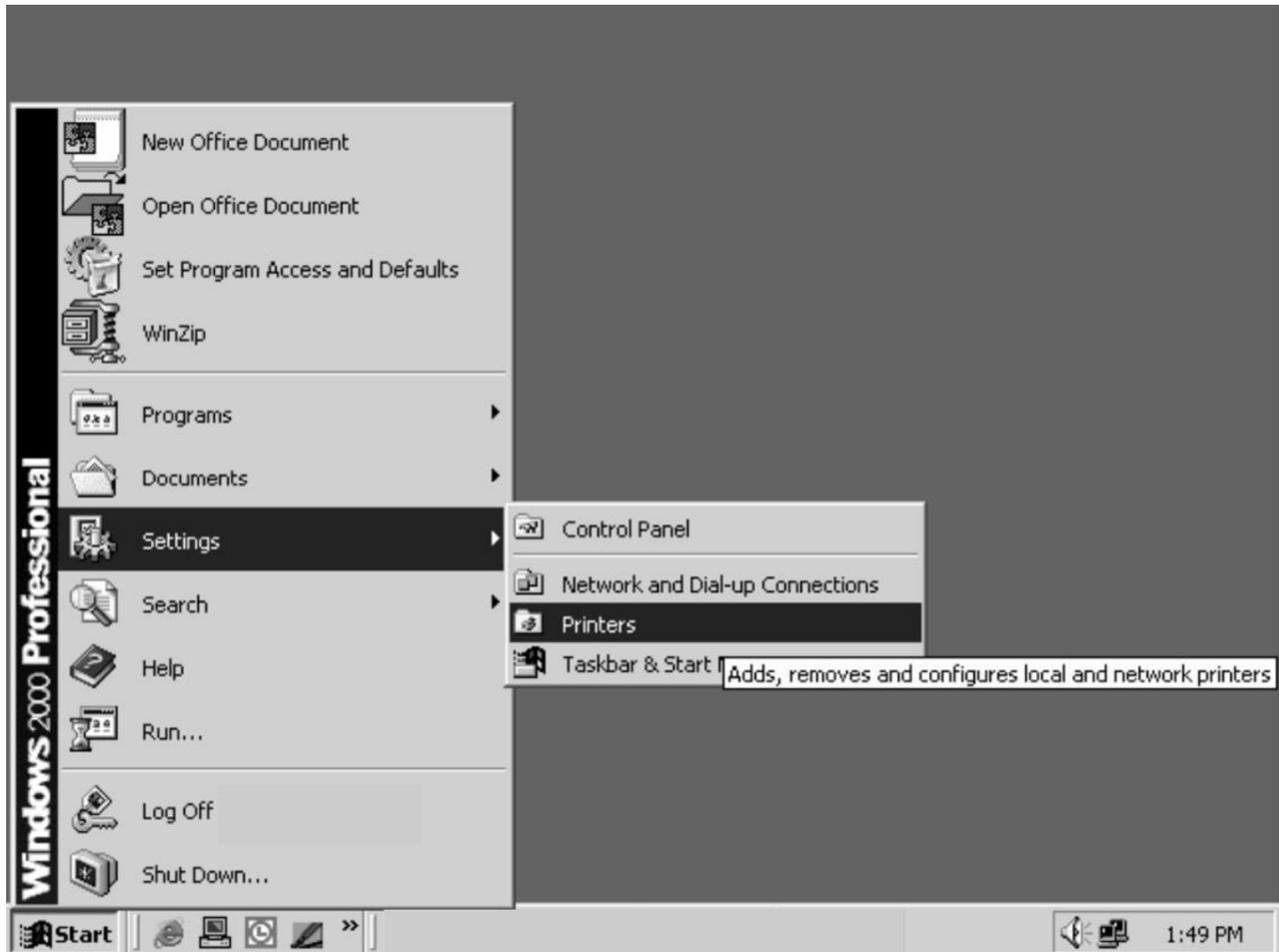
22) Then choose "print directly to the printer". Finally, click "ok" and start the software install.

DRIVER SETUP

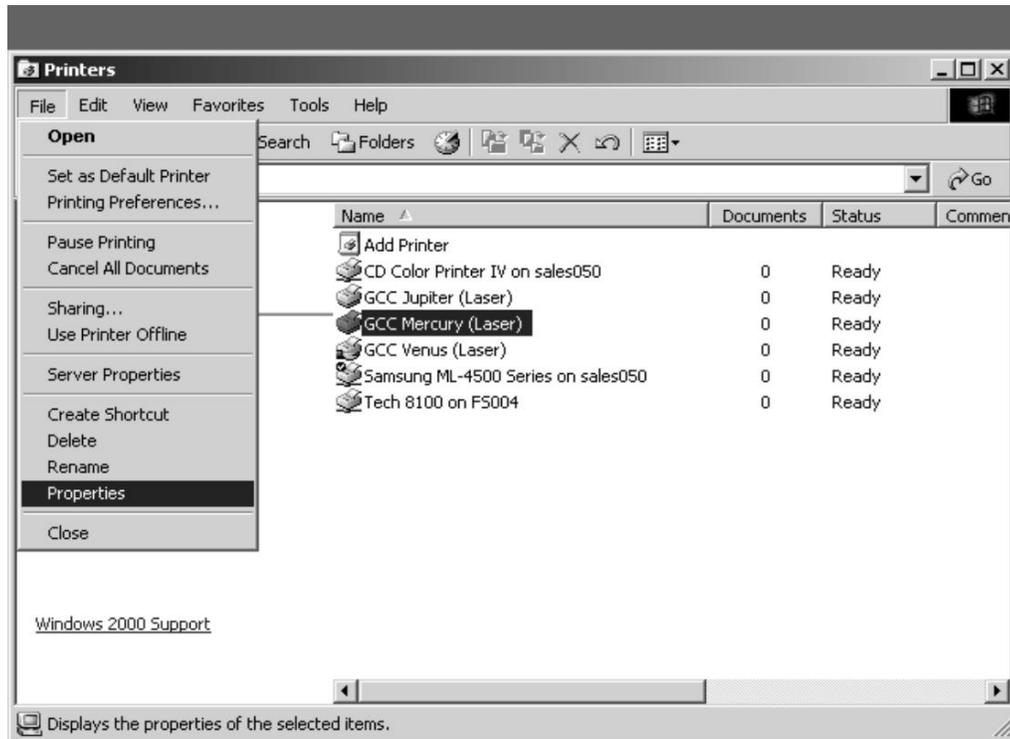
(Windows 2000 & XP only)

1. For Windows 2000/XP you will need to set the driver to print directly to printer.

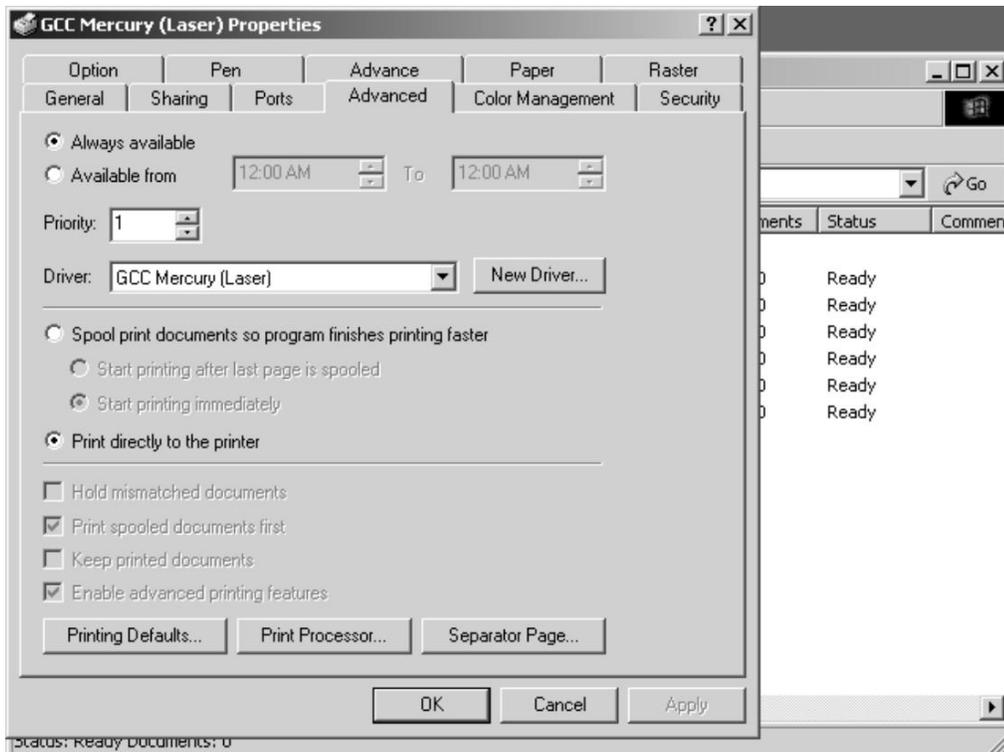
Click your start button, then settings, then printers.



2. Select your Mercury driver. Then click File then Properties.



3. On the Advanced (pasted tense) tab, there is an option print directly to printer. Select it, click apply then ok.



Other Software Setup

If you are using EngreveLab E6.1, skip this page and follow the next couple of pages.
If you are using any other software, use the following settings.

1. Set your page size up to 25 in Wide and 18 in High. (Page size must always be this size).
2. Landscape.
3. Your 0,0 (X , Y) has to be in the upper left hand corner.
4. To set a vector cutting line, it has to be a hairline outline.

VII. E6 Software Requirements/Setup

***Note:** You must first meet the requirements of your Operating system in addition to the requirements of our software.

Computer: Your PC must be able to run Window 98SE or newer. Windows 95, 98 1st Edition, and NT do not support USB. We recommend the specification of you PC be better work as below: *

Recommended: Windows XP

| | |
|------|---------------------|
| CPU | Pentium III 1.0 GHz |
| DRAM | 512 MB RAM |
| FDD | One CD Rom Drive |
| HDD | 10 GB Hard Drive |
| SVGA | Super VGA Monitor |

1 USB port dedicated to the software dongle.

** On Board Parallel Mode (Setup from PC BIOS):
ECP—Preferred Mode

I. ECP— Printer Cable length not more than 8 feet.

II. Scanner

Flat Bed

Minimum resolution: 300 DPI

Twain 32 Compatible (Most newer scanner are).

III. Software

GCC driver (designed under Window 98SE or higher level)

Windows Window 98SE or higher

Engravelab V5.0 or higher

Core DRAW Version 9.0 or higher (can be used but is not supported by Pinnacle Laser Tech Support)

Or Any graphics program that can output HPGL commands

VII. EngraveLab 6 Software Setup

Page Setup

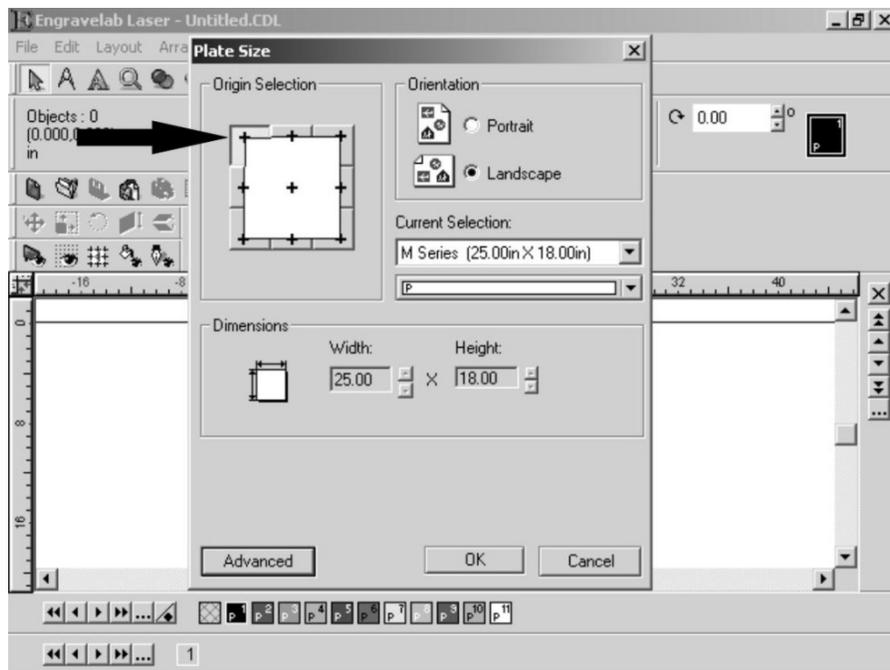
Laser Express (EngraveLab) page size settings:

Step1: Layout > Plate Size > Advanced > Create and Add new plate size.

Step2: In the name portion, type in ‘M-Series.’ Type 25.00 in the Width box and 18.00 in the Height box. Click Add New Plate. Change Current Selection to M Series.

Step3: Make sure to select the upper-left hand corner in the origin selection (as shown below).

Step4: Ensure the **Landscape** option is checked.



Step5: Click OK to complete the *page size* setting. Now your blank size should reflect the same size as the M-Series table.

Note : In some instances, the laser’s LCD panel shows a message of “Graph was clipped” or the laser engraver is engraving at some strange location in an unpredictable way. The result engraved artwork is scrapped.

This is caused by your software’s page size being wrong or having images sit on edge of paper. Confirm that the page size is right and image is inside plate area. Resend image to laser.

Raster vs. Vector

There are two different functions the laser can perform. Raster Engraving and Vector cutting.

Raster Engraving is when the laser performs a printer-like function, where the head of the laser goes back and forth, engraving out an image. Usually illustrated by the color black. In any graphics program, if an object has a fill, it will raster engrave. In EngraveLab if you have text or a square, when you left click on a color it will change the color of the fill. Changing the fill of an object allows you to set different speed/power settings for each object. Any Scanned images are completely Raster Images. They can only be engraved.

Rasterized image file types include .bmp .jpg .psd .tif

(Grayscale is a Raster Engraving feature, see 3D mode under the Printing section)

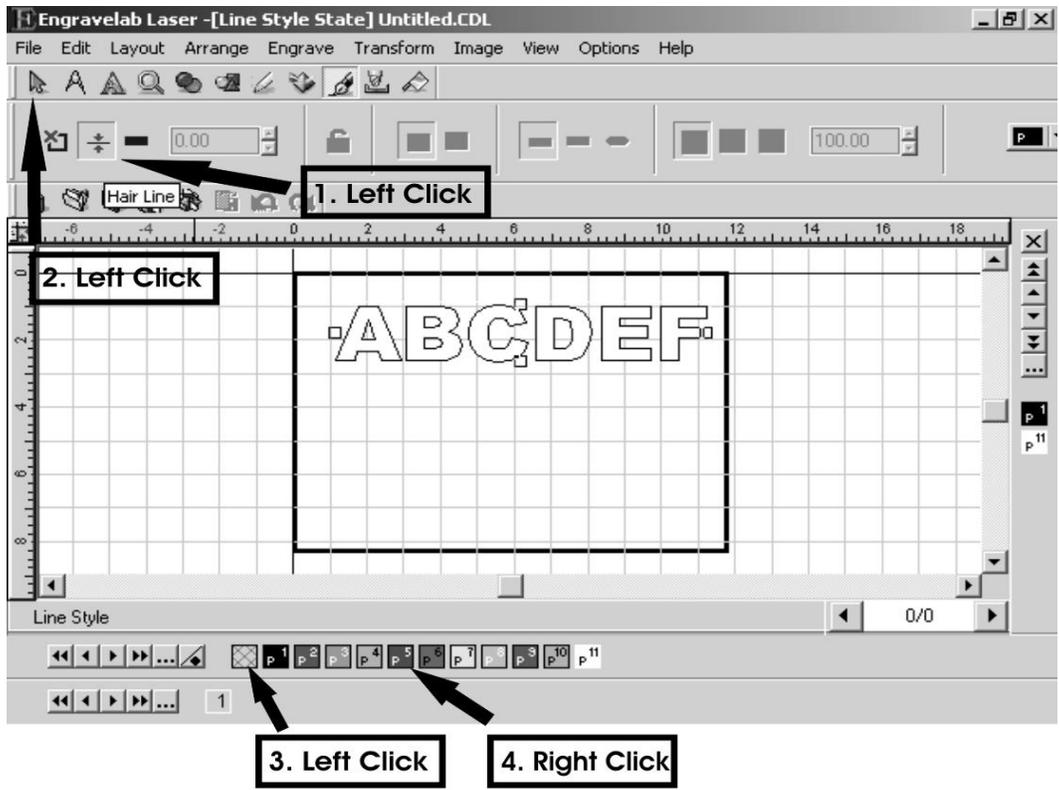
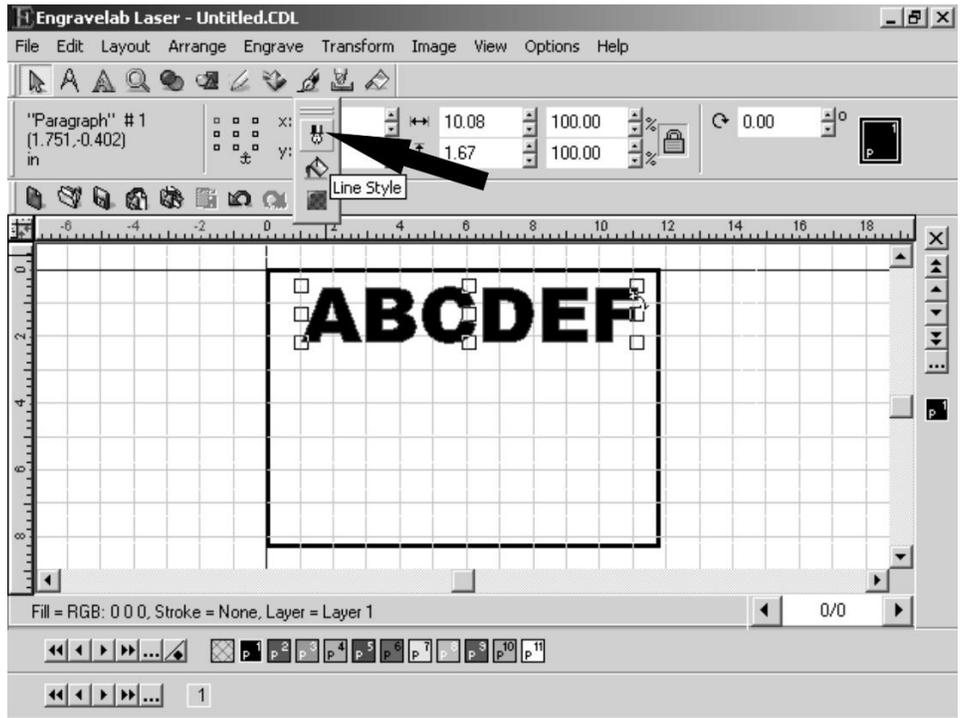
Vector Cutting is when the laser follows the hair line outline of an object and cuts an object out. Usually illustrated by the color red. Only vectorized images have the ability to be given an hair line outline and be able to be cut out. Vectorized images have the ability to be either Raster Engraved or Vector Cut. If you give a vectorized image a fill it will engrave. If you give it a hairline outline, it can cut. If you give a vectorized image a fill and a hairline outline, it will raster engrave first and then vector cut.

Vectorized image file types include .ai .eps .dxf .dwg .plt .prn

Vector Cutting

If laser engraver will NOT vector cut, it is because the width of the text's outline is not set to its thinnest width (Hairline). The MS-Windows® driver determines raster/vector cutting based on the outline width of an object. To achieve a vector cutting, please set the text or object's fill to invisible and its outline to its thinnest width (Hairline) in Laser Express (EngraveLab). *Steps Below:*

1. Select the text or object you wish to vector cut.
2. Click on your Stroke/Fill tool.
3. Click on Line Style. Make it Hairline.
4. Change the text's or object's fill color to invisible (if you do not want it to raster engrave) by left clicking on the invisible color of Laser Express Color Palette located on the bottom left of the screen.
5. Change the text or object's outline color by right clicking on the desired color on the Laser Express color palette. (Red is the color mostly used for vector cutting). You will do this so you can assign a different power and speed setting, black for raster engraving and red for vector cutting.

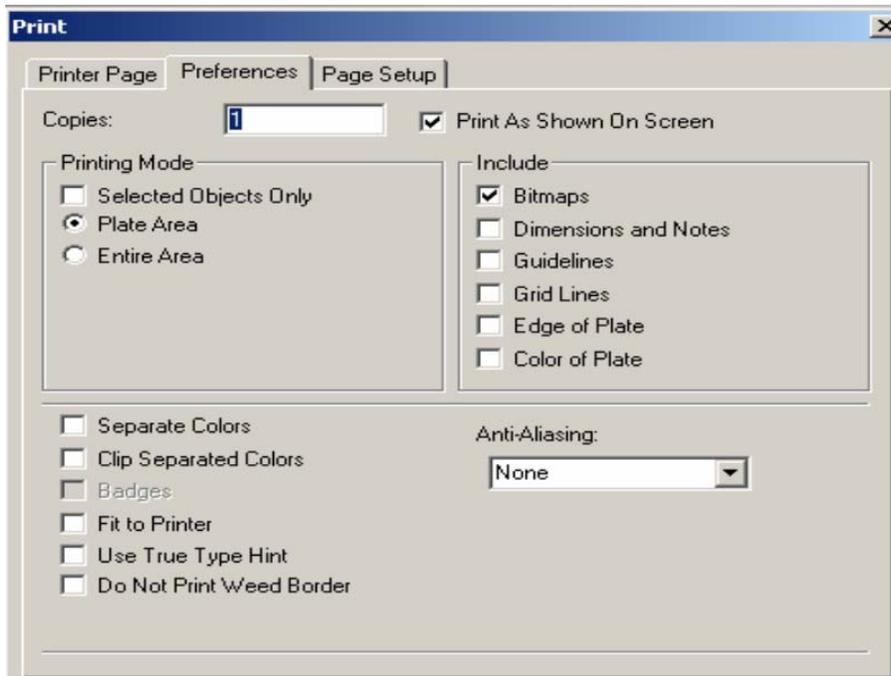


Notice: If the width of the line to be cut is not set at Hairline, the laser will not do a vector cut. If it is set to thick line, it will raster engrave the line the thickness you set. If neither a fill or an hairline outline are on the image the laser will immediately move to the upper right hand corner as if the file is finished.

Printing

After completely editing your job choose **File**, then **Print**, then click **Preferences Tab**.

Make sure 3 things are selected. Plate Area, Bitmaps and Print as shown on screen. IF these 3 things are not selected the laser will not engrave in the right spot and will not engrave the image correctly.



Now go back to the Printer Page tab

Select the Mercury Laser.

Click **Setup**.

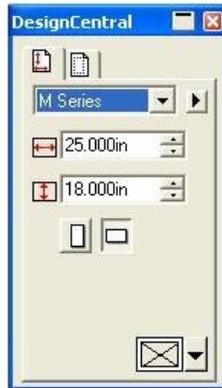
IIX. Laser Master 2 Software Setup

Page Setup

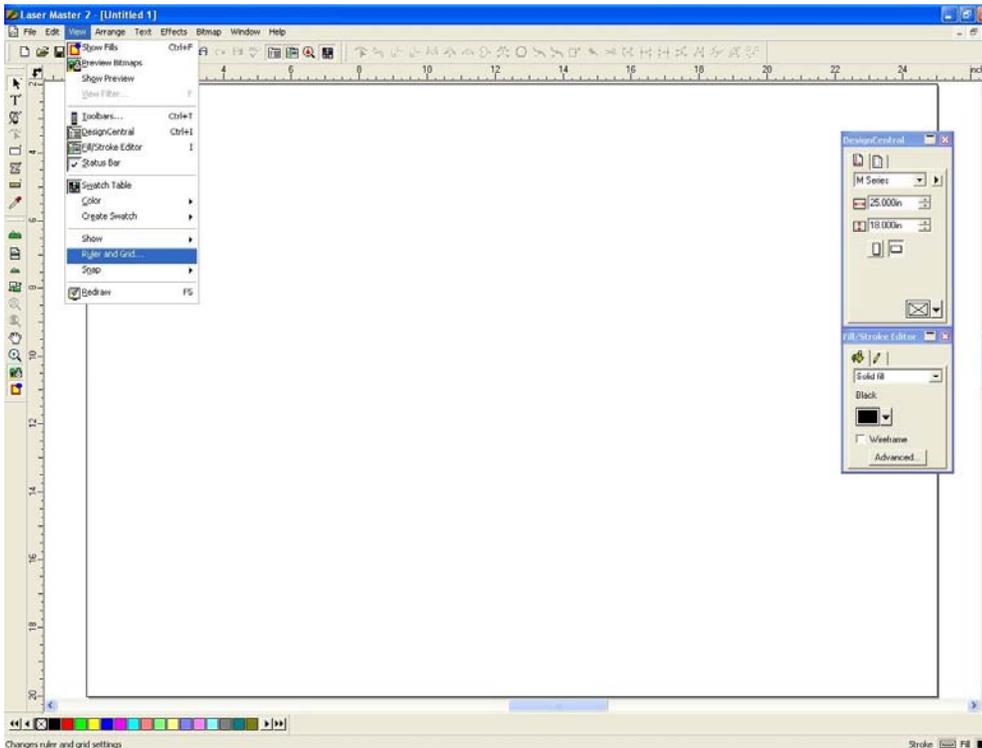
Laser Master 2 page size settings:

Step1: In your Design Central (click View and Design Central to open).

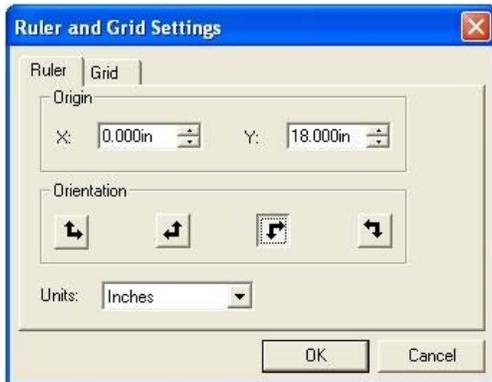
Change the Width to 25.0 and the Height to 18.0. Make sure Landscape is selected



Step2: Click View then Rulers and Grid.



Step3: Click the 3rd one from the Left (Upper Left Corner) and the Y measurement should change to 18.000in. Then Click OK.



Note : In some instances, the laser's LCD panel shows a message of "Graph was clipped" or the laser engraver is engraving at some strange location in an unpredictable way. The result engraved artwork is scrapped.

This is caused by your software's page size being wrong or having images sit on edge of paper. Confirm that the page size is right and image is inside plate area. Resend image to laser.

Raster vs. Vector

There are two different functions the laser can perform. Raster Engraving and Vector cutting.

Raster Engraving is when the laser performs a printer-like function, where the head of the laser goes back and forth, engraving out an image. Usually illustrated by the color black. In any graphics program, if an object has a fill, it will raster engrave. In Laser Master 2 if you have text or a square, when you left click on a color it will change the color of the fill. Changing the fill of an object allows you to set different speed/power settings for each object. Any Scanned images are completely Raster Images. They can only be engraved.

Rasterized image file types include .bmp .jpg .psd .tif

(Grayscale is a Raster Engraving feature, see 3D mode under the Printing section)

Vector Cutting is when the laser follows the hair line outline of an object and cuts an object out. Usually illustrated by the color red. Only vectorized images have the ability to be given an hair line outline and be able to be cut out. Vectorized images have the ability to be either Raster Engraved or Vector Cut. If you give a vectorized image a fill it will engrave. If you give it a hairline outline, it can cut. If you give a vectorized image a fill and a hairline outline, it will raster engrave first and then vector cut.

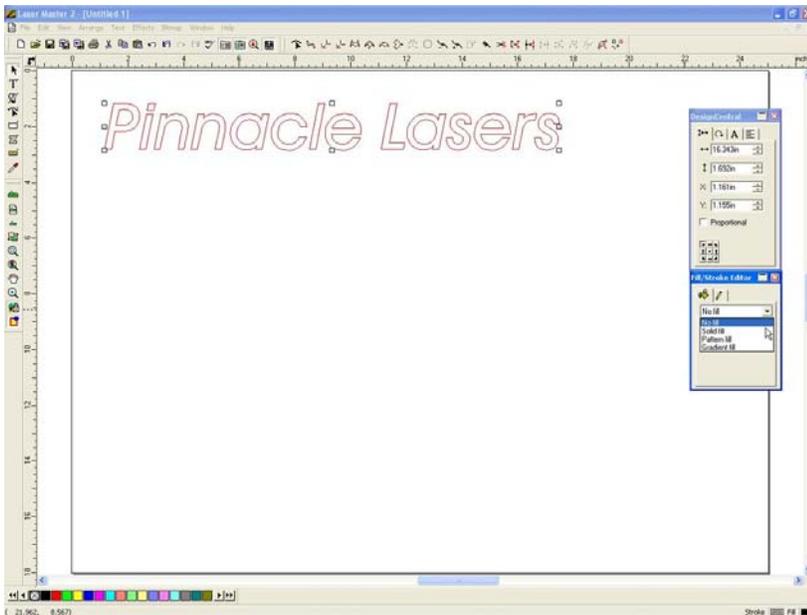
Vectorized image file types include .ai .eps .dxf .dwg .plt .prn

Vector Cutting

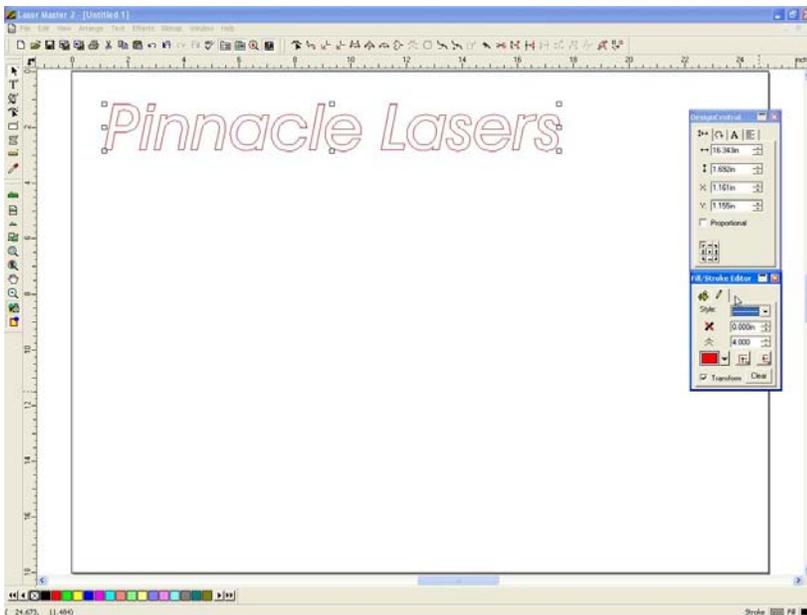
If laser engraver will NOT vector cut, it is because the width of the text's outline is not set to its thinnest width (Hairline). The MS-Windows® driver determines raster/vector cutting based on the outline width of an object. To achieve a vector cutting, please set the text or object's fill to invisible and its outline to its thinnest width (Hairline) in Laser Maser 2.

Steps Below:

1. Select the text or object you wish to vector cut.
2. In the Stroke and Fill Editor box (View, Fill Stroke Editor to bring up).
3. On the Fill Tab change the fill to No Fill.



4. On the Stroke tab (the pencil) make it look like this. Style will be straight line (first option in drop down box), stroke width will be 0.000 and the color will be red.

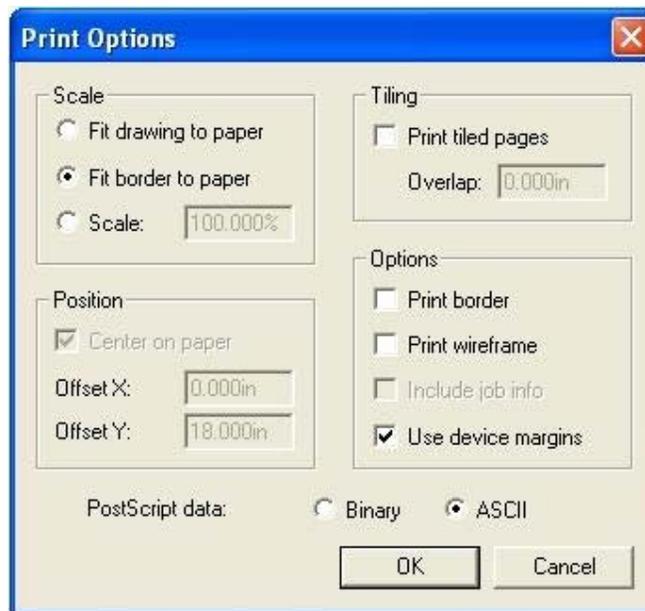


Notice: If the width of the line to be cut is not set at Hairline 0.000, the laser will not do a vector cut. If it is set to thick line, it will raster engrave the line the thickness you set. If neither a fill or an hairline outline are on the image the laser will immediately move to the upper right hand corner as if the file is finished.

Printing

After completely editing your job choose **File**, then **Print**, then click **Options**.

Make sure 3 things are selected. Fit Border to Paper, Use Device Margins, ASCII. If these 3 things are not selected the laser will not engrave in the right spot and will not engrave the image correctly.



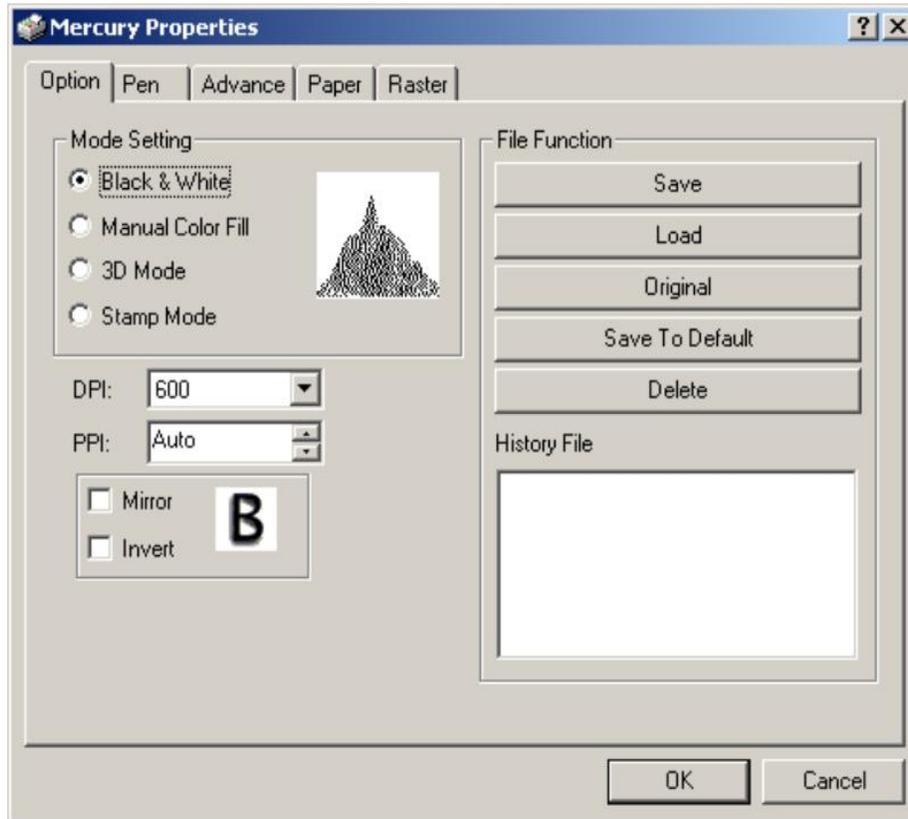
Now click ok.

Select the Mercury Laser.

Click Properties.

IX. Drive Description

The OPTION Tab



Black and White Mode

This is the mode you will use for most engraving. It notices 3 colors Black (Raster), Red (Vector) and White (0% power and 0% speed). If you have a full color image it will be engraved by grayscale. (also see [3-D Mode](#))

Manual Color Fill

This option only works with Vectorized images that are set to colors that are in the driver palette. If you have a Green filled square, a blue filled triangle, a yellow filled star and a purple filled circle, you will be able to set a different power/speed setting for each color to achieve 4 different depths. Again, this option will only work with vectorized images. It is a very specific mode setting and probably will not be used to often if ever.

3-D Mode

The 3-D image will be represented by the grayscale being used to engrave. (The Darker gray will be deeper; the lighter gray will be more to the foreground). When you want to get a 3D image, you will need to change your full color image to Grayscale. Grayscale is black, white and the 254 different grays in between there. Black being whatever power and speed you set, White being 0% Power and 0% Speed (default) and each gray depending on its make up. If you look at any color of gray you see that it is made up of a % of black and a % of white. When you use Grayscale to get a 3D image, the software will automatically assign a gray to each color (determined by darkness or lightness). Then you set the power and speed setting for black, for the deepest depth of the image you want to achieve. When the laser comes to a gray, lets say it is 75% black and 25% white, the laser will automatically use 75% of whatever power you set for black on that gray. The speed will stay the same. This will give you up to 256 different depths you can achieve (254 grays, black and white).

3-D mode will help your engraving come out better. In the same aspect, it is not a miracle worker. If you image only has 3 different shades of gray, clicking the 3-D mode will not make it 3-D.

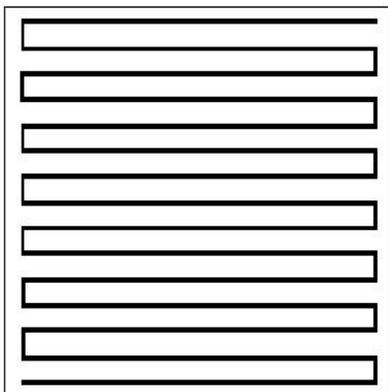
Stamp mode

The image will be engraved with a shoulder according to the parameters set under the stamp tab. See Stamp tab for settings and a better description.

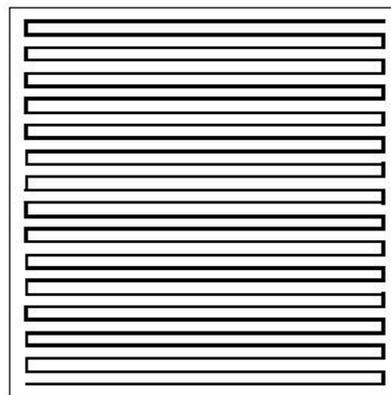
DPI

D.P.I is the number of passes the laser makes per square inch. This setting affects the raster part of your image. If you are using 50% power and 100% speed with 500 DPI, when you change to 1000 DPI. It is like putting 100% power and 100% speed in that same one inch.

**This is 500 Dpi.
X amount of passes.**



**This is 1000 Dpi.
2X amount of passes.**



**2X passes = 2X time to
process the job**

P.P.I.

P.P.I. stands for pulse per inch. This only affects Vector cutting. By changing the amount of times the laser fires per inch, the distribution of energy is changed. The range is 30 to 1500 PPI or you can choose auto mode. When choosing auto mode, the system will assign the proper PPI value automatically corresponding with the DPI. In order to maintain the quality of raster graphics, if you set the PPI value lower than the DPI value, the M-Series will adjust the PPI value at least equal to the DPI value.

Mirror

Clicking in this box will reverse the image horizontally. You will use this option when engraving on Acrylic, Glass, back of a mirror or any material you want to view the engraving from the front of the material.

Invert

Clicking in this box will reverse image. Black will become white, white becomes black. Along with the grays, a darker gray (75% black and 25% white) will be reversed, 25% black and 75% white. It will become a lighter gray.

This function is useful if you are engraving on a material that is opposite of all others like marble. Marble is a black material that turns white when it engraves. Most materials are light and become darker when engraved. This function is disabled under the Manual color fill mode.

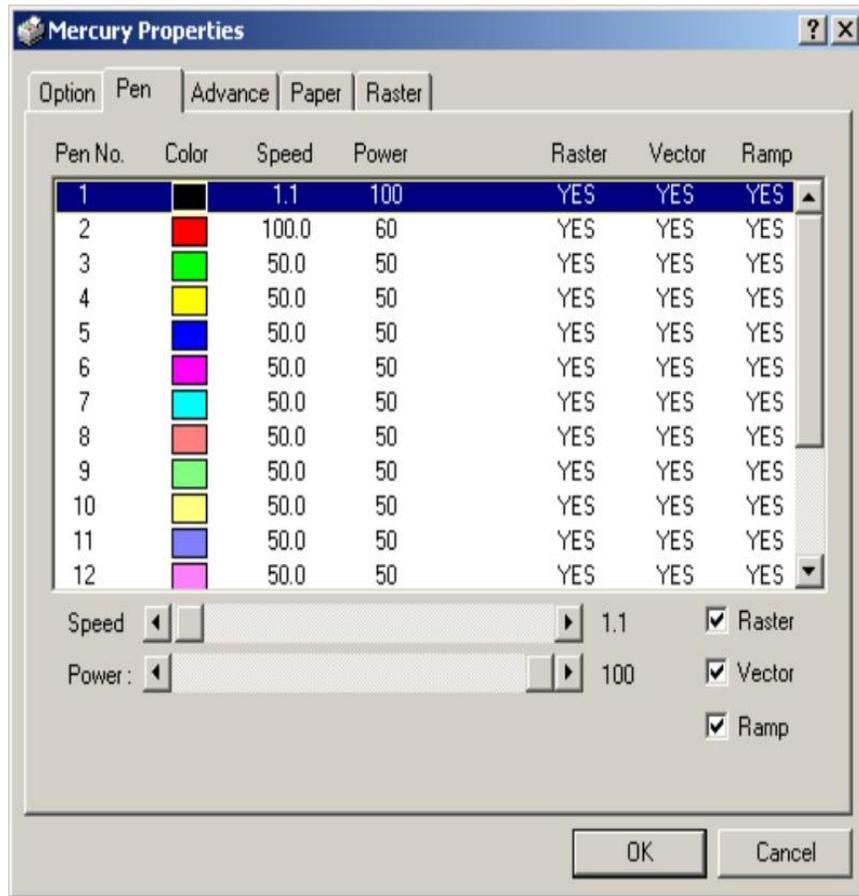
File Function

You can save an unlimited amount of sets of parameters. The parameters are usually named for the material for which they are set. Once you find a known good set of settings for a material, save them and recall them later with this option. The set of parameters will include all the settings in the driver, under every tab. Up to 10 file parameters can be saved in the History Setting box. To recall a parameter in “History Files”, double click the file name. To save a set of parameters just use the Save option. To recall any other saved parameter sets (that are not in the history box), use the load option. To reload the default settings, use the Original option. To save as default settings that you use all the time, use the Save to Default option. If you find a set of parameters that are outdate or not used anymore, you can use the delete option to destroy that set of parameters.

Click on the PEN Tab

Speed and Power setting will be used according to the material.

Refer to Power / Speed settings part of the manual for your particular laser.



Ramp or Ramping

Ramping is a vector cutting feature. When the laser is vector cutting on one axis (a straight line) and it goes into a curve (it begins to move on two axis's) if it carries the same speed through the curve, it will not cut all the way through. Ramping finds a happy median and cuts evenly on one axis as well as on two axis's. Most materials like ramping. You will run into some materials i.e. really cheap plastic which will be destroyed if it slows down on a curve. You will need to disable this option while cutting such materials. Before, Ramping was either enabled or disabled for all colors on the laser itself, this driver allows you to enable/disable it for different pens.

Click on the ADVANCE tab

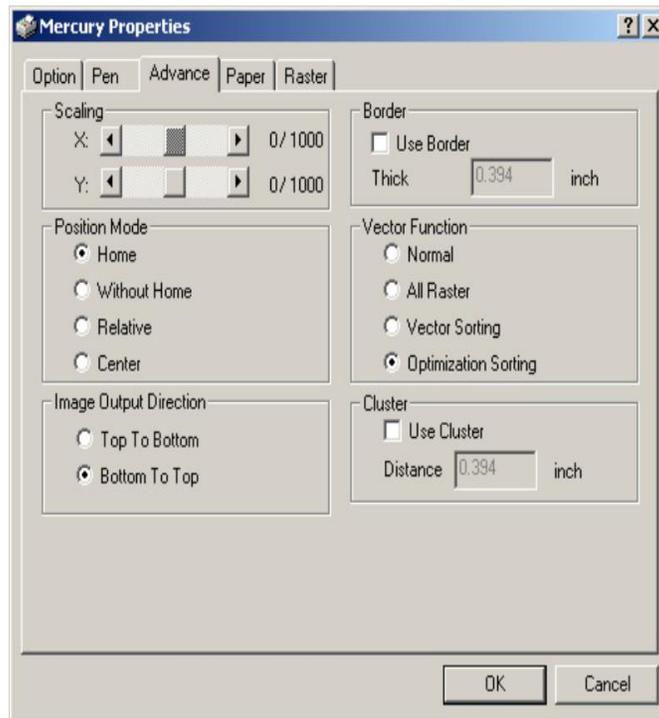


Fig. 10

Scaling

Scaling can be used to adjust the size of the output. Scale can be adjusted up to 50/1000. A positive value will enlarge the output; a negative will reduce the output size. You can adjust the X or the Y axis separately. Most of the time, it will stay at 0/1000. Any sizing changes will need to be made in the software. This will avoid any further problems with not putting it back to the default setting.

Position Mode

Home – Where your image is on your design screen is where it is going to engrave/cut on the laser and returns to the upper right hand position after the job is finished.

Without Home – Does the same application as Home but when finished it stops in the lower right hand corner of the image. Useful when engraving on the inside of a bowl. If it was in home position, the laser head would try and drag the bowl to the upper right hand corner. Possibly breaking the bowl. This option will engrave and leave the head stationary so you can lower the table and move the bowl.

Relative – You can place the red beam pointer at the exact location on the worktable that you want the images to start engraving. The red beam will mimic the 0,0 inside your software. If your image is right next to the 0,0, the laser will begin engraving at that location. If your image is 1 inch down and 1 inch over, the image will engrave that far away from the red beam on the table. This is also known as a soft home position.

Center – If you are engraving a round object, you can place the red beam in the middle of the circle piece, select the center option and have the laser start engraving off that position instead of the home position.

Image Output Direction

This is a useful feature that allows you to determine which direction the laser engraves, from top to bottom or bottom to top. The main usage of this option is for engraving laserable plastics. If you engrave from top to bottom, the air assist will blow the debris from the engraving into the newly exposed bottom color. This is very bad if you have a Red plastic on a white plastic. The red dust melts back into the hot white plastic, which makes pink. Any other time it is just a personal preference which way the laser engraves.

Border

You can add border at image edge for a better output. As for Fig.15, you can specify the border X and Y. If you chose the "Cluster" and want to have border, the border X and Y must be less than the "Distance" D you specified.

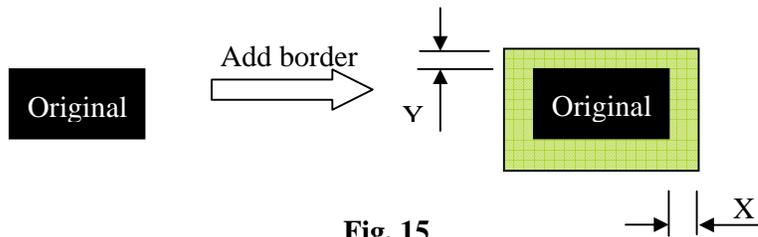


Fig. 15

Vector Function

The laser will ALWAYS engrave everything first then vector cut all objects. Choosing one of these will determine how it vector cuts everything.

Normal

The machine will randomly cut all the pieces, no rhyme or reason.

All Raster

All your images can be output as a raster image, even if they are vector lines. You will probably never use this option.

Vector Sorting

The engraver will cut your image insides first, then outside items. This feature may not always work correctly with some images.

Optimization Sorting

Optimization sorting will do the same as vector sorting with the exception that it will cut it on an image by image basis, saving time.

Cluster

In order to reduce the working time, the output movement can be clustered. Normally it will engrave 2 single images instead of 1 large image.

The “Distance” is set in the driver and is equals D.

The distance between image A & image B is X (refer to Fig. 16).

If you don't use “Cluster” and X less than or equal to D, the output movement will be route A. All the way across the entire area in one pass.

If you choose the “Cluster function” and X is greater then D, the output movement will be route B. It will engrave 2 separate images instead of 1 large image.

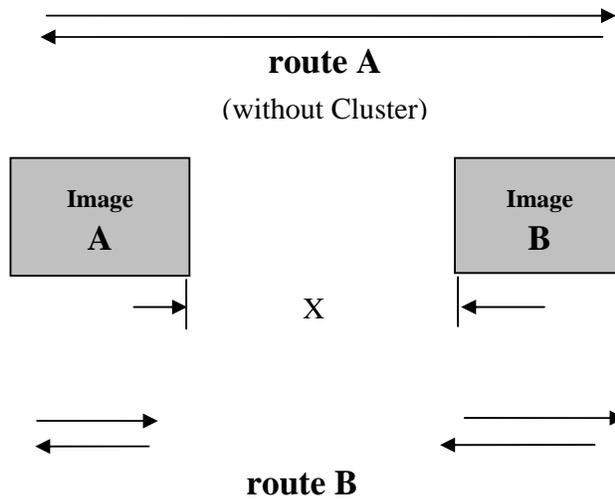


Fig. 16

Click on the PAPER Tab

The Paper tab shows the work area and units currently being used in the driver, you will never change this. (Unless recommended by tech support) Software page must match this at all time.

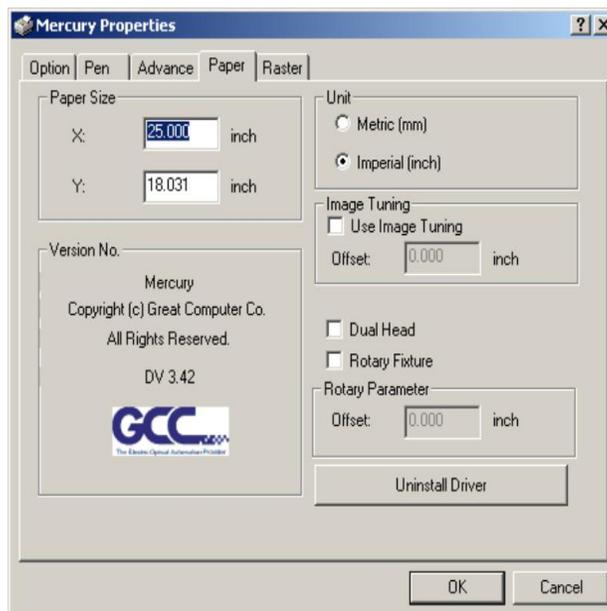
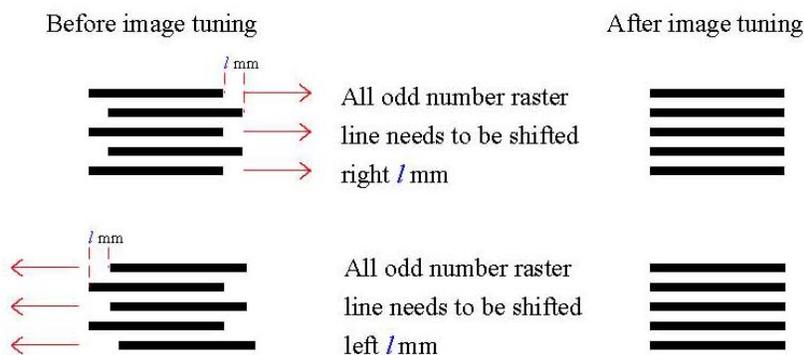


Image Tuning

Is a function is to improve Burr (rough engraved edge) problem, when following engraving quality problem occurs, the “Image Tuning” can be used to improve it.

Here is how it works

- 1) If the engraved image’s edge can only be aligned by shifting odd number order line toward the **right** by 1 mm, the Offset value of Image Tuning should be + 1 mm.
- 2) If the engraved image’s edge can only be aligned by shifting odd number order line toward the **left** by 1 mm, the Offset value of Image Tuning should be -1 mm.

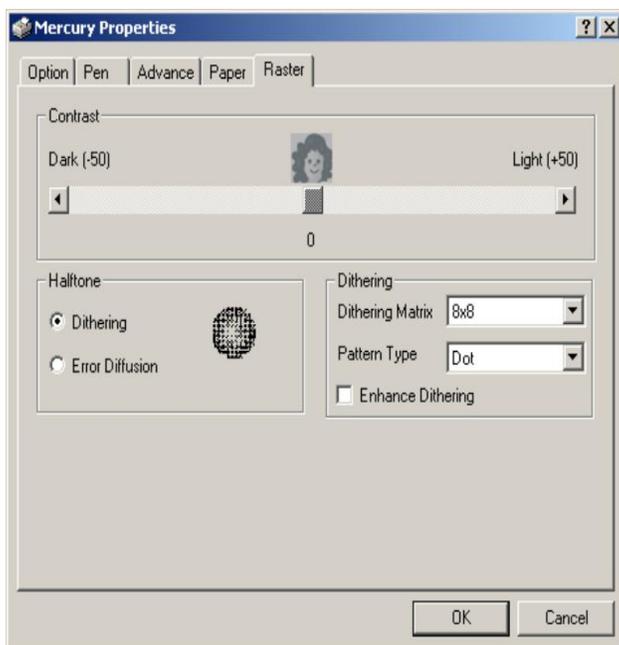


Rotary Fixture

This will be explained in the Rotary Attachment section of this manual starting on Pg. 54.

Click on the RASTER Tab

ONLY found when Black and White Mode is selected on the Option Tab



Contrast

The difference between the dark and light areas of an image. The lower the number value, the more closely the shades will resemble each other. The higher the number, the more the shades will stand out from each other. Any adjustments to contrast need to be made in the software. The picture represented does not show you an accurate display of what will happen to your image.

Dithering

Dithering is used in computer graphics to create additional colors and shades from an existing palette by interspersing pixels of different colors to create a new color.

When Lasering areas of grey are created by varying the proportion of black and white pixels laying on top of each other.

The higher the resolution of the display, the smoother the dithered color will appear to the eye.

Dithering is used to create patterns for use as backgrounds, fills and shading, as well as for creating halftones for printing. When used for lasering is it very sensitive to material properties.

Error Diffusion

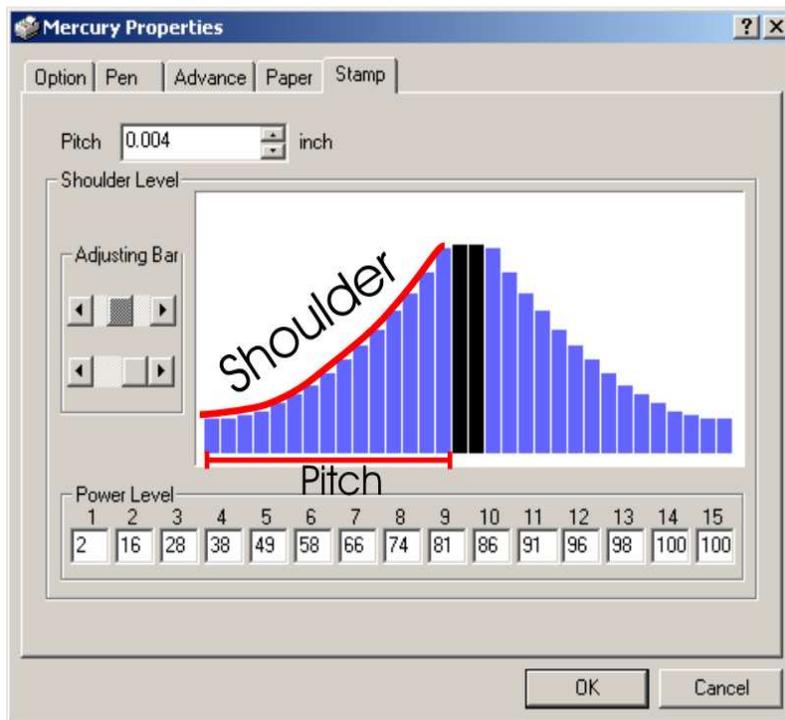
In actuality, error diffusion is a random dot-placement strategy (or dithering method), spreading out the inherent failing until it is indistinguishable to the unaided eye.

Dithering and **Error Diffusion** are widely used Large Format Printing features. If you would like to learn more about them, you can do an internet search and find tons of information about each of these features. We are giving you the basic knowledge of what each of these options are.

If you are unsure the defaults are the contrast is 0, Halftone is Dithering, and Dithering 8x8 and dot.

Click on the STAMP Tab

ONLY found when Stamp Mode is selected on the Option Tab



This function is used to adjust the power distribution of the slope shoulder to improve the shape of the stamps vertical profile.

The black bars in the center represent the surface of each letter, while the blue bars represent the shoulder. Pitch is the distance from the side of the letter is to the stopping point of the shoulder.

Adjust the power level value by moving the adjusting bar or by manually changing the boxes across the bottom to edit the shape of the shoulder.

Adjusting the top bar to the left gives you a concave shoulder. Adjusting the top bar to the right gives you more of a convex shoulder. Concave shoulders are good for script or really thin fonts. While concave shoulders are good when wanting to make your letters appear thicker/wider than they were originally.

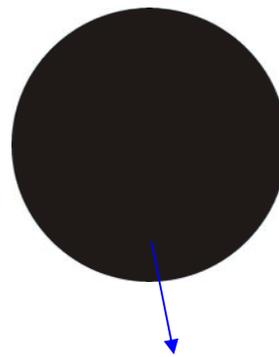
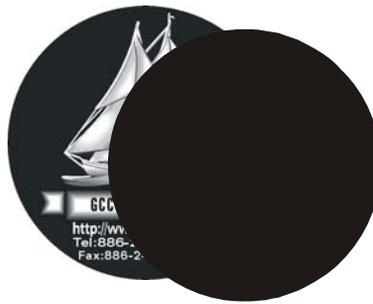
Adjusting the bottom bar is another adjustment to your pitch. Moving it the left shortens the length of the shoulder.

X. 3D Engraving Tips

When doing 3D sample on Pinnacle M-Series, acrylic, MDF or wood are ideal materials for the purpose. If you use a 2D material like Laserable plastics or Glass, your 3D effect will be minimal.

The perfect image for 3D is like those shown below. When image is ready, choose 3D Effect as the output mode in the driver. Sometimes, some material shows better effect if you run the job with 2nd pass with laser out-of-focus. Especially with acrylic, the 2nd pass will smooth out the surface.

For engraving wood, as it burns easily and leaves blackened surface after the 1st pass, it is necessary to run the 2nd pass to remove the burned surface. To do that, simply fill the image with black color as the mask (see below) and Run the black mask image with PWR 100% and SPD100%. (Based on a 25Watt Machine).



Create a black image for polishing.



XI. Power and Speed Settings

| Wattage: M-12W | | |
|--------------------------------------|--------------------------------|----------------------------------|
| Material | Speed and Power Setting | Max Thickness for Cutting |
| Acrylic (Engraving) | SP-100% PO-40% | |
| Acrylic (Cutting) | SP-0.4% PO-100% | 1/4" in |
| Back of Mirror | SP-60% PO-100% | Engrave Only |
| Bear Metal w/ Ferro | N/A | N/A |
| Ceramic Tile | SP-100% PO-100% | Engrave Only |
| Coated Brass | SP-100% PO-60% | Engrave Only |
| Crystal | SP-100% PO-60% | Engrave Only |
| Glass | SP-100% PO-80% | Engrave Only |
| Hardwood (Engraving) | SP-100% PO-60% | |
| Hardwood (Cutting) | SP-0.4% PO-100% | 1/8" in |
| Imitation Leather | SP-100% PO-55% | Engrave Only |
| Laserable Plastic (Engraving) | SP-100% PO-75% | |
| Laserable Plastic (Cutting) | SP-2.5% PO-100% | 1/4" in |
| Leather | SP-100% PO-35% | Engrave Only |
| Marble | SP-100% PO-100% | Engrave Only |
| Mat Board | SP-50% PO-100% | Engrave Only |
| MDF (Engraving) | SP-100% PO-80% | |
| MDF (Cutting) | SP-1.2% PO-100% | 1/4 in |
| Rubber Stamp (Engraving) | SP-50% PO-100% | |
| Rubber Stamp (Cutting) | SP-0.8% PO-100% | 1/8" in |
| Sign Foam | SP-100% PO-80% | Engrave Only |
| Softwood (Engraving) | SP-100% PO-45% | |
| Softwood (Cutting) | SP-0.7% PO-100% | 1/4" in |

** NOTE: All these power and speed settings are good starting points. Power and speed settings will be dependant on different materials. (Different manufacturers, thicknesses and other variables will cause the power and speed settings to differ slightly)

| Wattage : M-25W | | | | | | |
|-------------------------------|---------------------|---------------|---------------|---------------------------|----------|-----------|
| Material | Type of Engraving | Speed Setting | Power Setting | Max Thickness for Cutting | DPI | PPI |
| Acrylic (Engraving) | Text & Simple logos | 100% | 55% | | 600 | Auto |
| | Photographs | 100% | 40% | | 600-1000 | Auto |
| Acrylic (Cutting) | | 1.8% | 100% | 1/4" in | | 1400-1500 |
| Back of Mirror | | 100% | 80% | Engrave Only | 500 | Auto |
| Bare Metal w/ Cermark | | 18% | 100% | Engrave Only | 600 | Auto |
| Ceramic Tile | Text & Simple logos | 75% | 100% | Engrave Only | 500 | Auto |
| | Photographs | 100% | 80% | Engrave Only | 600-1000 | Auto |
| Coated Brass | | 100% | 35% | Engrave Only | 500 | Auto |
| Crystal | | 100% | 55% | Engrave Only | 500 | Auto |
| Glass | | 100% | 40% | Engrave Only | 500 | Auto |
| Hardwood (Engraving) | Text & Simple logos | 80% | 100% | | 500 | Auto |
| | Photographs | 100% | 55% | | 600-1000 | |
| Hardwood (Cutting) | | 0.4% | 100% | 1/4" in | | 200-300 |
| Imitation Leather | | 100% | 45% | Engrave Only | 500 | Auto |
| Laserable Plastic (Engraving) | | 100% | 50% | | 600 | Auto |
| Laserable Plastic (Cutting) | | 2.7% | 95% | 1/4" in | | 200-300 |
| Leather | | 100% | 25% | Engrave Only | 500 | Auto |
| Marble | Text & Simple logos | 100% | 80% | Engrave Only | 500 | Auto |
| | Photographs | 100% | 20-35% | Engrave Only | 600-1000 | Auto |
| Mat Board | | 80% | 100% | Engrave Only | 500 | Auto |
| MDF (Engraving) | | 100% | 65% | | 500 | Auto |
| MDF (Cutting) | | 2.2% | 100% | 1/4 in | | 200-300 |
| Rubber Stamp (Engraving) | | 35% | 100% | | 1000 | Auto |
| Rubber Stamp (Cutting) | | 3.0% | 100% | 1/4" in | | Auto |
| Sign Foam | | 100% | 65% | Engrave Only | 500 | Auto |
| Softwood (Engraving) | Text & Simple logos | 100% | 80% | | 500 | Auto |
| | Photographs | 100% | 40-55% | | 600-100 | Auto |
| Softwood (Cutting) | | 2.4% | 100% | 1/4" in | | 200-300 |
| Onyx | Text & Simple logos | 100% | 65% | Engrave Only | 500 | Auto |
| | Photographs | 100% | 40% | Engrave Only | 600-1000 | Auto |
| Granite | Text & Simple logos | 100% | 75% | Engrave Only | | |
| Brick | Text & Simple logos | 30% | 100% | Engrave Only | 500 | Auto |
| Card Stock | Text & Simple logos | 30% | 100% | Cutting Only | 500 | 200-300 |

| | | | | | | |
|--------------------------|---------------------|------|------|--------------|----------|------|
| Anodized Aluminum | Text & Simple logos | 100% | 55% | Engrave Only | 500 | Auto |
| | Photographs | 100% | 30% | Engrave Only | 600-1000 | Auto |
| Laser Foils | Text & Simple logos | 15% | 100% | Cutting only | 500 | Auto |
| Denim | Text & Simple logos | 100% | 25% | Engrave Only | 300 | Auto |

** NOTE: All these power and speed settings are good starting points. Power and speed settings will be dependant on different materials. (Different manufacturers, thicknesses and other variables will cause the power and speed settings to differ slightly)

| Wattage : M-40W | | | | | | |
|--------------------------------------|--------------------------|----------------------|----------------------|----------------------------------|------------|------------|
| Material | Type of Engraving | Speed Setting | Power Setting | Max Thickness for Cutting | DPI | PPI |
| Acrylic (Engraving) | Text & Simple logos | 100% | 30% | | 600 | Auto |
| | Photographs | 100% | 17% | | 600-1000 | Auto |
| Acrylic (Cutting) | | 1.5% | 100% | 3/8 in | | 1400-1500 |
| Back of Mirror | | 100% | 50% | Engrave Only | 500 | Auto |
| Bare Metal w/ Cermark | | 25% | 100% | Engrave Only | 600 | Auto |
| Ceramic Tile | Text & Simple logos | 100% | 90% | Engrave Only | 500 | Auto |
| | Photographs | 100% | 50% | Engrave Only | 600-1000 | Auto |
| Coated Brass | | 100% | 25% | Engrave Only | 500 | Auto |
| Crystal | | 100% | 40% | Engrave Only | 500 | Auto |
| Glass | | 100% | 25% | Engrave Only | 500 | Auto |
| Hardwood (Engraving) | Text & Simple logos | 100% | 90% | | 500 | Auto |
| | Photographs | 100% | 30% | | 600-1000 | |
| Hardwood (Cutting) | | 1.0% | 100% | 3/8 in | | 200-300 |
| Imitation Leather | | 100% | 30% | Engrave Only | 500 | Auto |
| Laserable Plastic (Engraving) | | 100% | 35% | | 600 | Auto |
| Laserable Plastic (Cutting) | | 5.8% | 100% | 1/4 in | | 200-300 |
| Leather | | 100% | 20% | Engrave Only | 500 | Auto |
| Marble | Text & Simple logos | 100% | 60% | Engrave Only | 500 | Auto |
| | Photographs | 100% | 10-15% | Engrave Only | 600-1000 | Auto |
| Mat Board | | 100% | 80% | Engrave Only | 500 | Auto |
| MDF (Engraving) | | 100% | 50% | | 500 | Auto |
| MDF (Cutting) | | 2.0% | 100% | 3/8 in | | 200-300 |
| Rubber Stamp (Engraving) | | 65% | 100% | | 1000 | Auto |

| | | | | | | |
|-------------------------------|---------------------|------|--------|--------------|----------|---------|
| Rubber Stamp (Cutting) | | 6.0% | 100% | 1/4 in | | Auto |
| Sign Foam | | 100% | 65% | Engrave Only | 500 | Auto |
| Softwood (Engraving) | Text & Simple logos | 100% | 65% | | 500 | Auto |
| | Photographs | 100% | 25-30% | | 600-100 | Auto |
| Softwood (Cutting) | | 2.0% | 100% | 1/2 in | | 200-300 |
| Onyx | Text & Simple logos | 100% | 50% | Engrave Only | 500 | Auto |
| | Photographs | 100% | 25% | Engrave Only | 600-1000 | Auto |
| Granite | Text & Simple logos | 100% | 60% | Engrave Only | | |
| Brick | Text & Simple logos | 45% | 100% | Engrave Only | 500 | Auto |
| Card Stock | Text & Simple logos | 50% | 100% | Cutting Only | 500 | 200-300 |
| Anodized Aluminum | Text & Simple logos | 100% | 35% | Engrave Only | 500 | Auto |
| | Photographs | 100% | 10-15% | Engrave Only | 600-1000 | Auto |
| Laser Foils | Text & Simple logos | 25% | 100% | Cutting only | 500 | Auto |
| Denim | Text & Simple logos | 100% | 10-15% | Engrave Only | 300 | Auto |

** NOTE: All these power and speed settings are good starting points. Power and speed settings will be dependant on different materials. (Different manufacturers, thicknesses and other variables will cause the power and speed settings to differ slightly)

| Wattage: M-60W | | |
|--------------------------------------|--------------------------------|----------------------------------|
| Material | Speed and Power Setting | Max Thickness for Cutting |
| Acrylic (Engraving) | SP-100% PO-40% | |
| Acrylic (Cutting) | SP-0.7% PO-100% | 3/4" in |
| Back of Mirror | SP-100% PO-65% | Engrave Only |
| Bear Metal w/ Ferro | SP-75% PO-100% | Engrave Only |
| Ceramic Tile | SP-100% PO-75% | Engrave Only |
| Coated Brass | SP-100% PO-15% | Engrave Only |
| Crystal | SP-100% PO-18% | Engrave Only |
| Glass | SP-100% PO-50% | Engrave Only |
| Hardwood (Engraving) | SP-100% PO-50% | |
| Hardwood (Cutting) | SP-0.9% PO-100% | 3/8" in |
| Imitation Leather | SP-100% PO-35% | Engrave Only |
| Laserable Plastic (Engraving) | SP-100% PO-50% | |
| Laserable Plastic (Cutting) | SP-2.9% PO-95% | 3/8" in |
| Leather | SP-100% PO-20% | Engrave Only |
| Marble | SP-100% PO-65% | Engrave Only |
| Mat Board | SP-80% PO-100% | Engrave Only |

| | | |
|---------------------------------|-----------------|--------------|
| MDF (Engraving) | SP-100% PO-50% | |
| MDF (Cutting) | SP-3.0% PO-100% | 3/8" in |
| Rubber Stamp (Engraving) | SP-80% PO-100% | |
| Rubber Stamp (Cutting) | SP-2.7% PO-100% | 5/16" in |
| Sign Foam | SP-100% PO-50% | Engrave Only |
| Softwood (Engraving) | SP-100% PO-40% | |
| Softwood (Cutting) | SP-1.9% PO-100% | 1/2" in |

** NOTE: All these power and speed settings are good starting points. Power and speed settings will be dependant on different materials. (Different manufacturers, thicknesses and other variables will cause the power and speed settings to differ slightly)

| Wattage: M-75W | | |
|--------------------------------------|--------------------------------|----------------------------------|
| Material | Speed and Power Setting | Max Thickness for Cutting |
| Acrylic (Engraving) | SP-100% PO-35% | |
| Acrylic (Cutting) | SP-0.9% PO-100% | 1/2" in |
| Back of Mirror | SP-100% PO-55% | Engrave Only |
| Bear Metal w/ Ferro | SP-80% PO-100% | Engrave Only |
| Ceramic Tile | SP-100% PO-65% | Engrave Only |
| Coated Brass | SP-100% PO-10% | Engrave Only |
| Crystal | SP-100% PO-15% | Engrave Only |
| Glass | SP-100% PO-40% | Engrave Only |
| Hardwood (Engraving) | SP-100% PO-40% | |
| Hardwood (Cutting) | SP-1.5% PO-100% | 3/8" in |
| Imitation Leather | SP-100% PO-30% | Engrave Only |
| Laserable Plastic (Engraving) | SP-100% PO-45% | |
| Laserable Plastic (Cutting) | SP-3.0% PO-95% | 3/8" in |
| Leather | SP-100% PO-15% | Engrave Only |
| Marble | SP-100% PO-55% | Engrave Only |
| Mat Board | SP-90% PO-80% | Engrave Only |
| MDF (Engraving) | SP-100% PO-45% | |
| MDF (Cutting) | SP-4.0% PO-100% | 3/8" in |
| Rubber Stamp (Engraving) | SP-85% PO-100% | |
| Rubber Stamp (Cutting) | SP-3.0% PO-100% | 1/4" in |
| Sign Foam | SP-100% PO-40% | Engrave Only |
| Softwood (Engraving) | SP-100% PO-30% | |
| Softwood (Cutting) | SP-2.5% PO-100% | 1/2" in |

**** NOTE:** All these power and speed settings are good starting points. Power and speed settings will be dependant on different materials. (Different manufacturers, thicknesses and other variables will cause the power and speed settings to differ slightly)

| Wattage: M-100W | | |
|--------------------------------------|--------------------------------|----------------------------------|
| Material | Speed and Power Setting | Max Thickness for Cutting |
| Acrylic (Engraving) | SP-100% PO-30% | |
| Acrylic (Cutting) | SP-0.5% PO-100% | 7/8" in |
| Back of Mirror | SP-100% PO-35% | Engrave Only |
| Bear Metal w/ Ferro | SP-95% PO-100% | Engrave Only |
| Ceramic Tile | SP-100% PO-55% | Engrave Only |
| Coated Brass | SP-100% PO-8% | Engrave Only |
| Crystal | SP-100% PO-10% | Engrave Only |
| Glass | SP-100% PO-30% | Engrave Only |
| Hardwood (Engraving) | SP-100% PO-35% | |
| Hardwood (Cutting) | SP-1.9% PO-100% | 3/8" in |
| Imitation Leather | SP-100% PO-25% | Engrave Only |
| Laserable Plastic (Engraving) | SP-100% PO-35% | |
| Laserable Plastic (Cutting) | SP-4.0% PO-100% | 3/8" in |
| Leather | SP-100% PO-10% | Engrave Only |
| Marble | SP-100% PO-35% | Engrave Only |
| Mat Board | SP-100% PO-80% | Engrave Only |
| MDF (Engraving) | SP-100% PO-35% | |
| MDF (Cutting) | SP-4.0% PO-100% | 3/8" in |
| Rubber Stamp (Engraving) | SP-90% PO-100% | |
| Rubber Stamp (Cutting) | SP-5.0% PO-100% | 5/16" in |
| Sign Foam | SP-100% PO-30% | Engrave Only |
| Softwood (Engraving) | SP-100% PO-20% | |
| Softwood (Cutting) | SP-2.9% PO-100% | 5/8" in |

**** NOTE:** All these power and speed settings are good starting points. Power and speed settings will be dependant on different materials. (Different manufacturers, thicknesses and other variables will cause the power and speed settings to differ slightly)

XII. EngraveLab Rotary Attachment Setup

- 1) Turn off the laser.
- 2) Place the rotary attachment onto the engraving table. Ensure the two screw holes on right side of rotary attachment match the two corresponding holes on the table. The mark on the left side lines up to the 24cm (9.45 inch) position of on the ruler, then tighten the screws supplied.
- 3) Plug the cable of the rotary attachment into the port in the middle front of the engraver (refer to Fig. 5).
- 4) Turn on the power and the engraving table moves down to the lowest position automatically.

IV. TOP VIEW

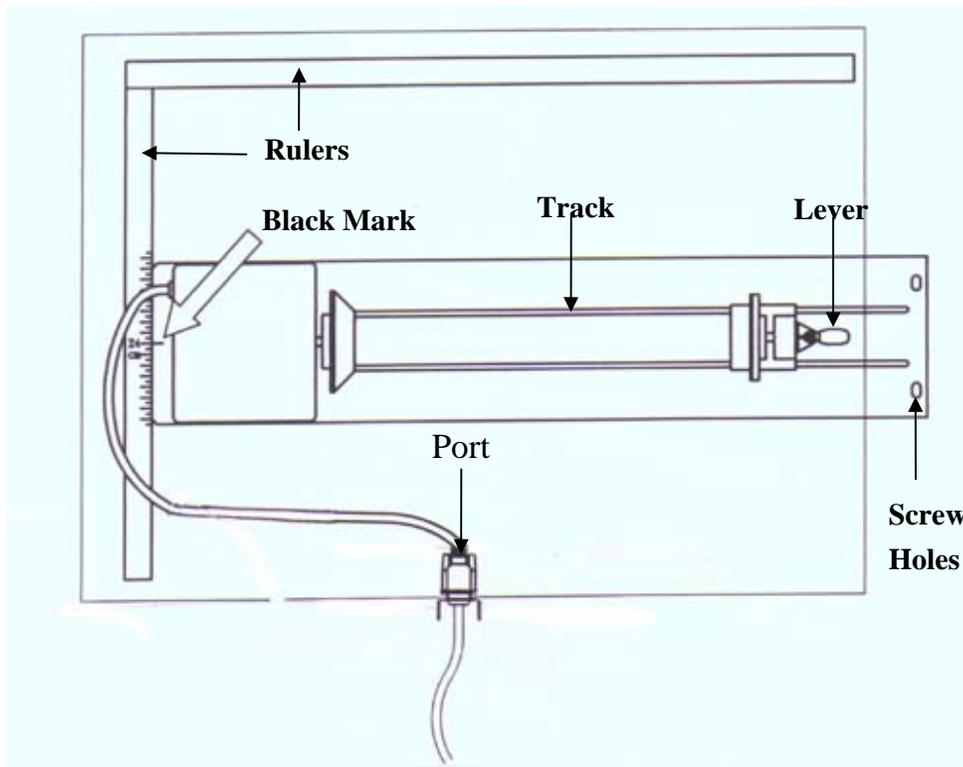


Fig. 5

Operation:

NOTE:

The maximum length of the engraving object is 17.322 inch (450 mm).

The maximum diameter of the padded rubber wheel is 3.70 in (94 mm).

The maximum diameter of the loaded object is 7.09 in (180mm) and the limited loading weight is 15.4 Lb (7 Kg).

1. Measure and write down the diameter of the engraving object.
2. If you engrave objects with a diameter that is smaller than 3.00 inch's please use the 2.5 inch or 4 inch lens to prevent collision between carriage and rotary attachment device. If the diameter is 0.001 to 0.92 inch's use the 4 in lens. If the diameter is between 0.92 and 3.0 inch the 2.5 inch lens will be needed.
3. Lift the lever, load the engraving object, slide the adjustable end to the bottom of the object firmly, then lower the lever of the fixture to secure it in place shown as in Fig 6.

V. SIDE VIEW

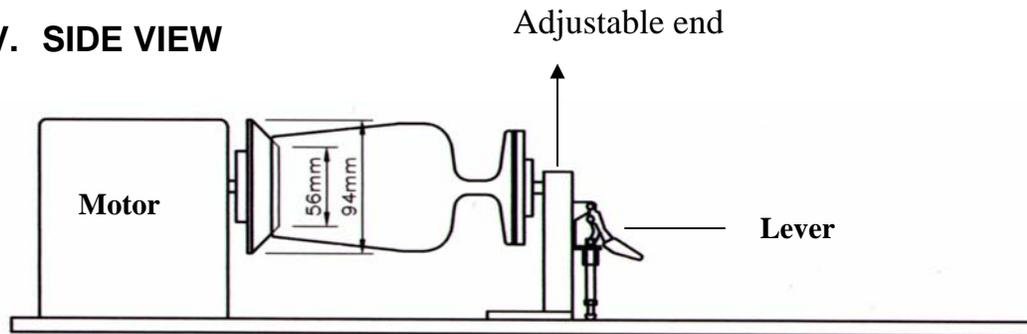
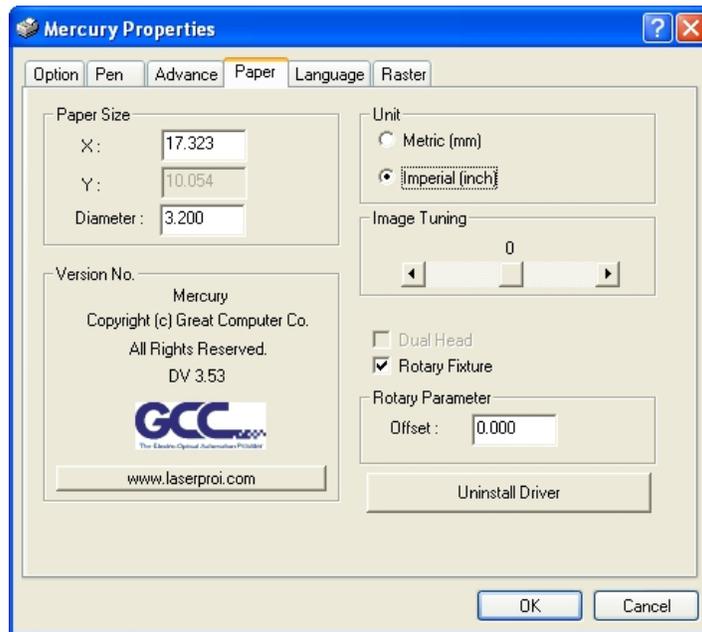
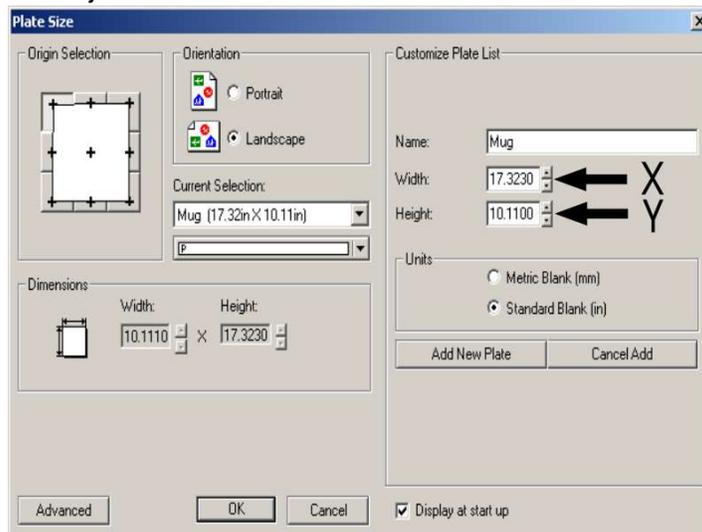


Fig. 6

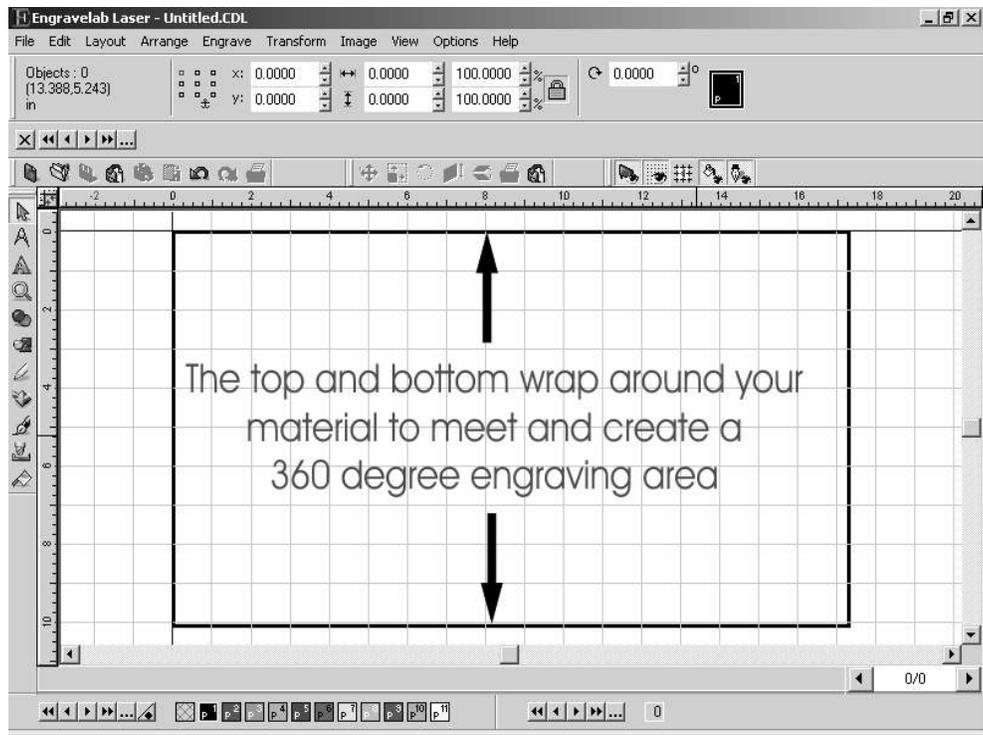
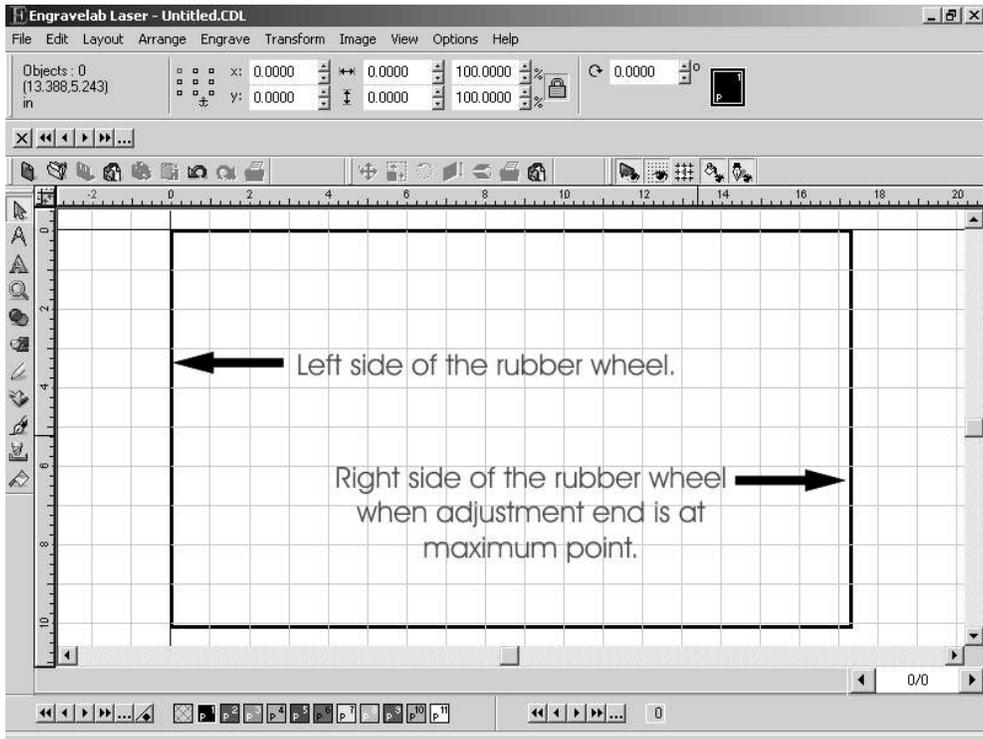
4. Focus the laser. (Manual focus is suggested)
5. The following is an example of engraving process by using EngraveLab.
6. After importing or creating an image, click on File then Print.
7. Make sure your Mercury is selected.
8. Then click Setup then Paper.
9. Click Rotary Fixture, then type in the diameter value based on Fig. 6.
10. Write down the X and Y values given for paper size (these are your new height and width of your paper size in your software).



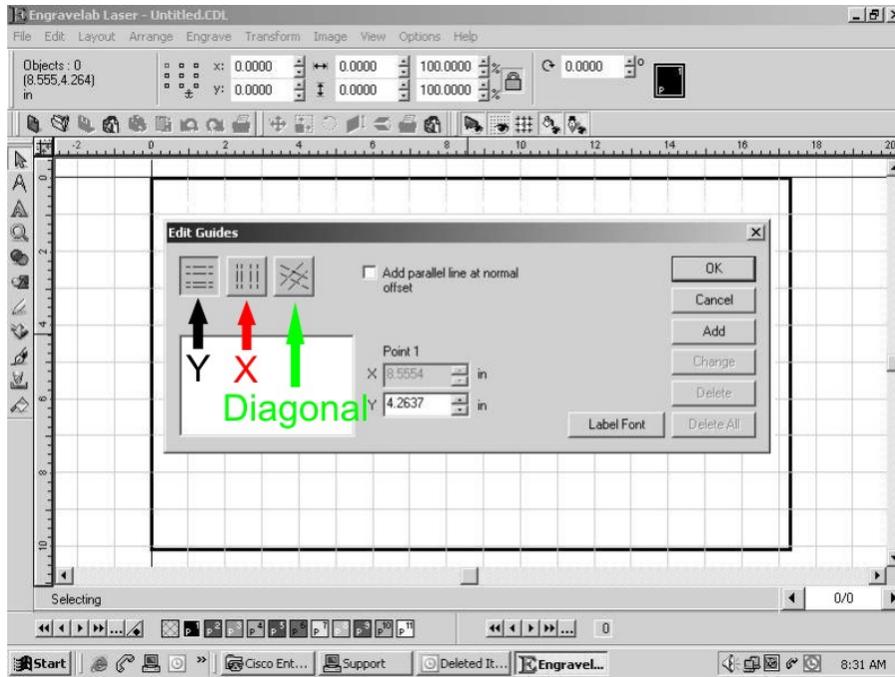
11. After getting the proper paper sizes click OK.
12. Then click Cancel in the Print dialog box.
13. Next, go to Layout > Plate Size > Advanced > New.
14. In the name portion, type in the name of the product being engraved. (i.e. Mug).
15. Input the X value (17.322) in the 'width' box. It will always be 17.322 because that is the longest piece of material you can have in your rotary attachment.
16. Input the Y value in the 'height' box. The Y measurement will constantly change because the circumference of each object is different.



17. Click Add New plate.
18. Change your Current Selection to the new plate size you just made, then OK in the blank size dialog box. Now your blank size should reflect the circumference of the object to be engraved.



19. You will right click on your design plate to bring up your Edit Guides Box. In the upper left hand corner there will be 3 different types of guides you can select Y, X and Diagonal.



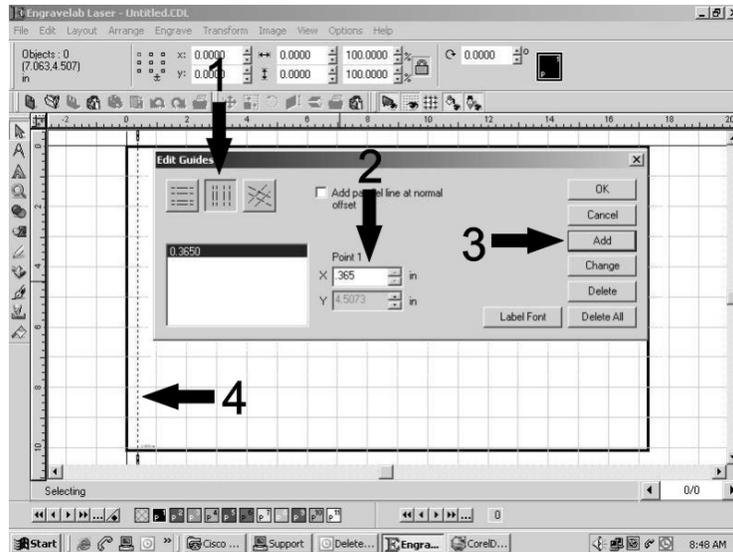
20. Use your arrows keys on your laser to move the laser head over to the beginning of your object or the beginning of your engraving area. You will see the red dot on the object.



21. You will see on the display of your laser, it will give you an X grid coordinate.



22. Select the X guides now (1). Input that number into your X box (2) and hit the add button (3). This will put a blue dotted line on your design plate showing you where the beginning of your object or engraving area is (4).



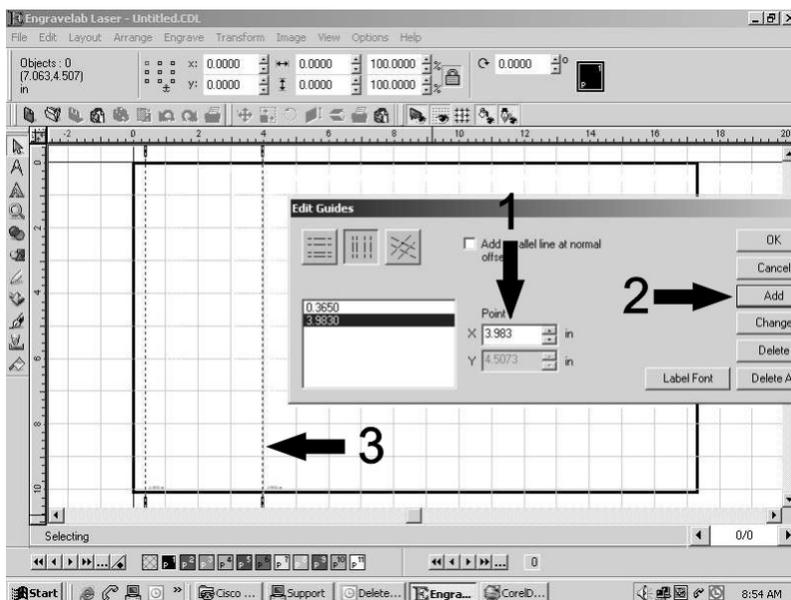
23. Use your arrows keys on your laser to move the laser head over to the end of your object ore the end of the engraving area. You will see the red dot on the object.



24. You will see on the display of your laser, it will give you another X grid coordinate.



25. Input that into your X box (1) and hit the add button (2). This will put a blue dotted line on your design plate showing you where the beginning of your object is (3).



26. The area between the two dotted lines will show you where you need to place your image to have it engrave on your object.

NOTE : You can also do this for Y guides to show you where a label or a handle is on that object. You would just select the Y guides box then move the rotary attachment forwards and backwards (using the up and down arrow keys). Get the Y measurement and input it Y guides box. Then click add and a new horizontal line will show you where that particular spot is on your laser.

XIII. Laser Master 2 Rotary Attachment Setup

- 1) Turn off the laser.
- 2) Place the rotary attachment onto the engraving table. Ensure the two screw holes on right side of rotary attachment match the two corresponding holes on the table. The mark on the left side lines up to the 9.45 inch (24cm) position of on the ruler, then tighten the screws supplied.
- 3) Plug the cable of the rotary attachment into the port in the middle front of the engraver (refer to Fig.5)
- 4) Turn on the power and the engraving table moves down to the lowest position automatically.

VI. TOP VIEW

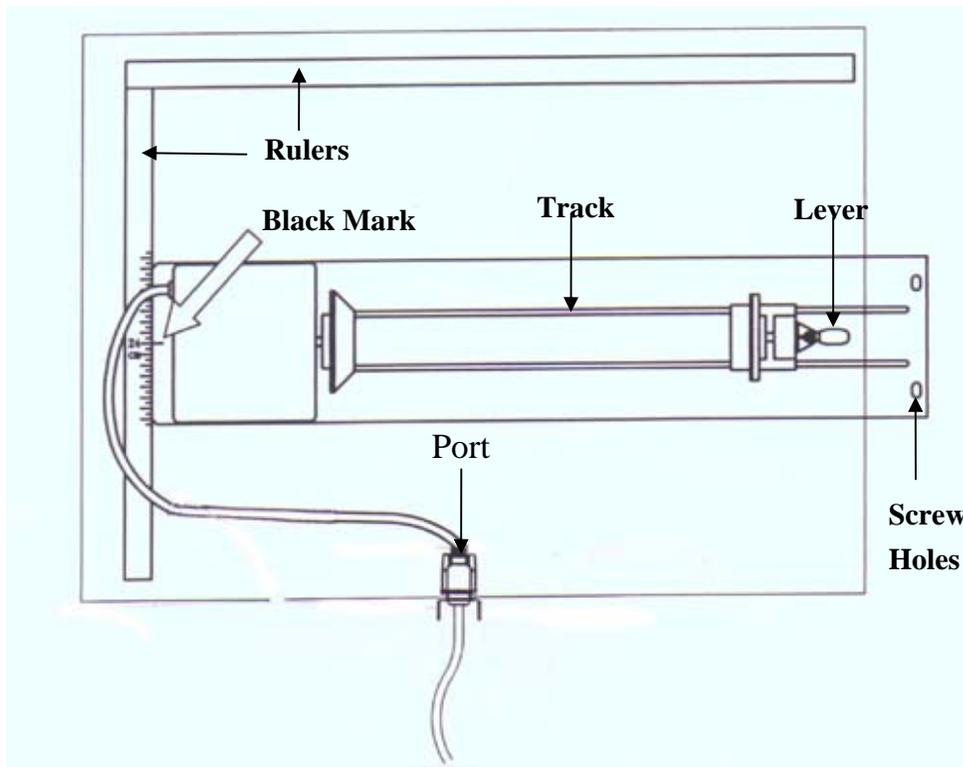


Fig. 5

Operation:

NOTE:

The maximum length of the engraving object is 17.322 inch (450 mm).

The maximum diameter of the padded rubber wheel is 3.70 in (94 mm).

The maximum diameter of the loaded object is 7.09 in (180mm) and the limited loading weight is 15.4 Lb (7 Kg).

1. Measure and write down the diameter of the engraving object.
2. If you engrave objects with a diameter that is smaller than 3.00 inch's please use the 2.5 inch or 4 inch lens to prevent collision between carriage and rotary attachment device. If the diameter is 0.001 to 0.92 inch's use the 4 in lens. If the diameter is between 0.92 and 3.0 inch the 2.5 inch lens will be needed.
3. Lift the lever, load the engraving object, slide the adjustable end to the bottom of the object firmly, then lower the lever of the fixture to secure it in place shown as in Fig 6.

VII. SIDE VIEW

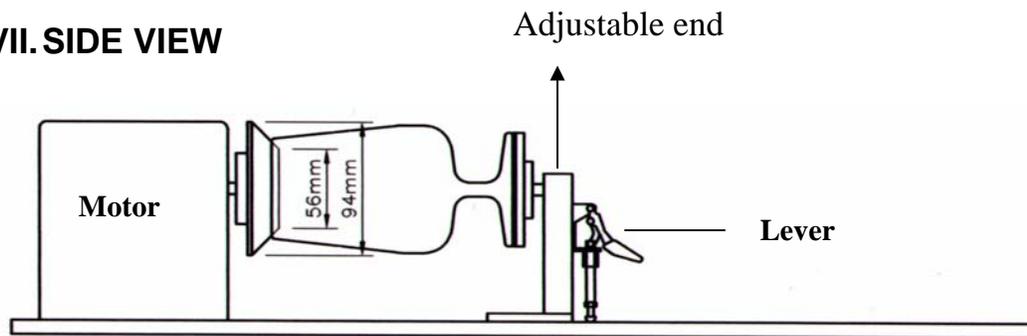
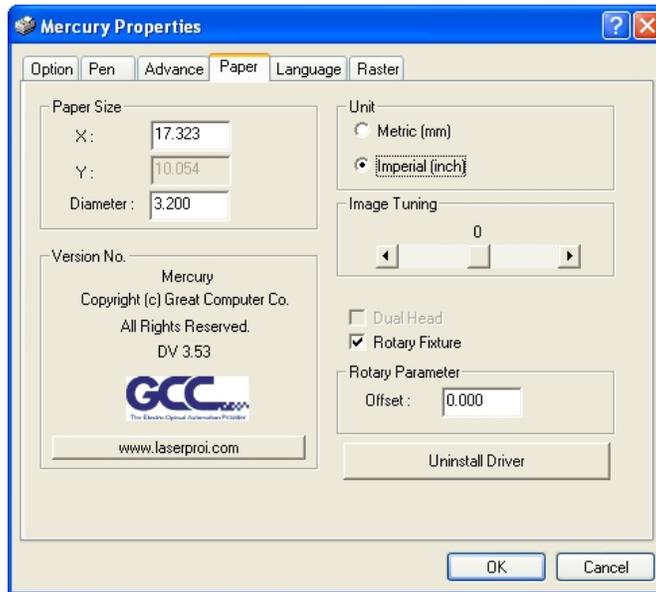
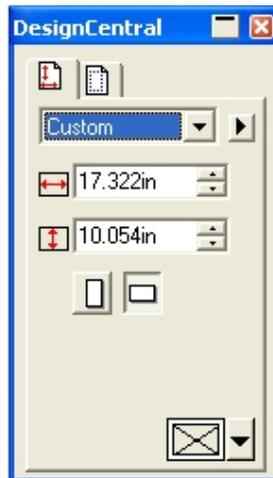


Fig. 6

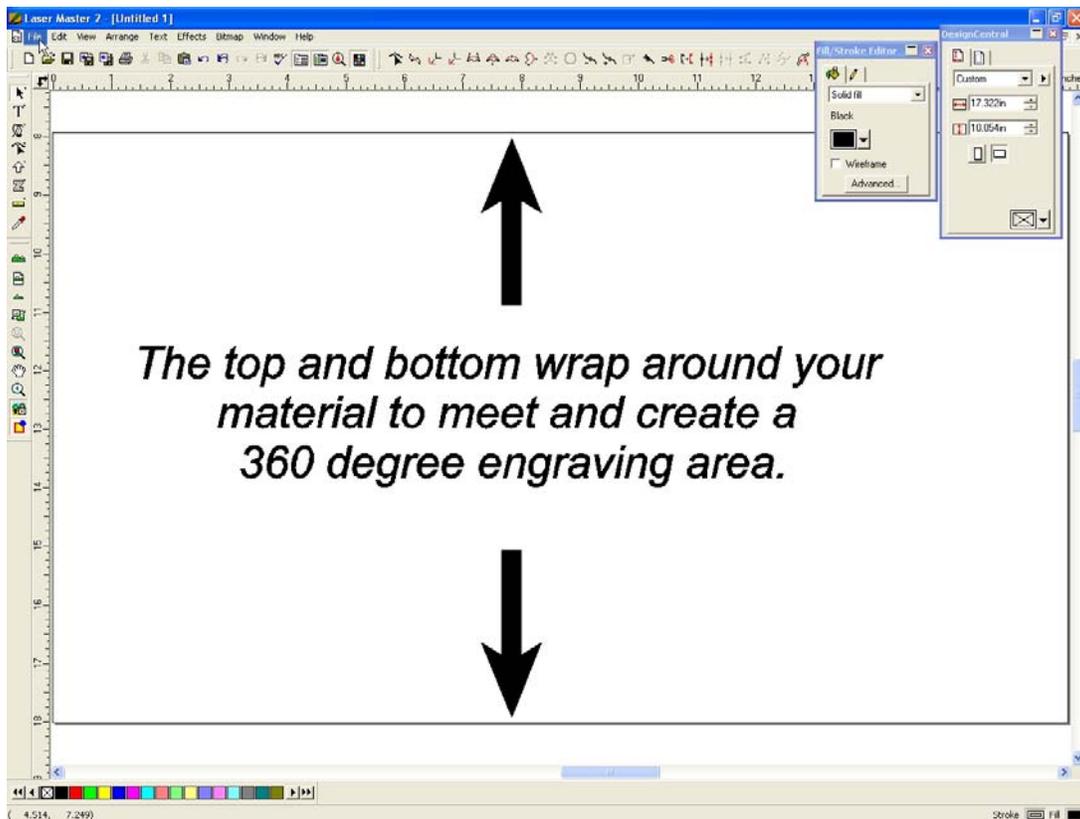
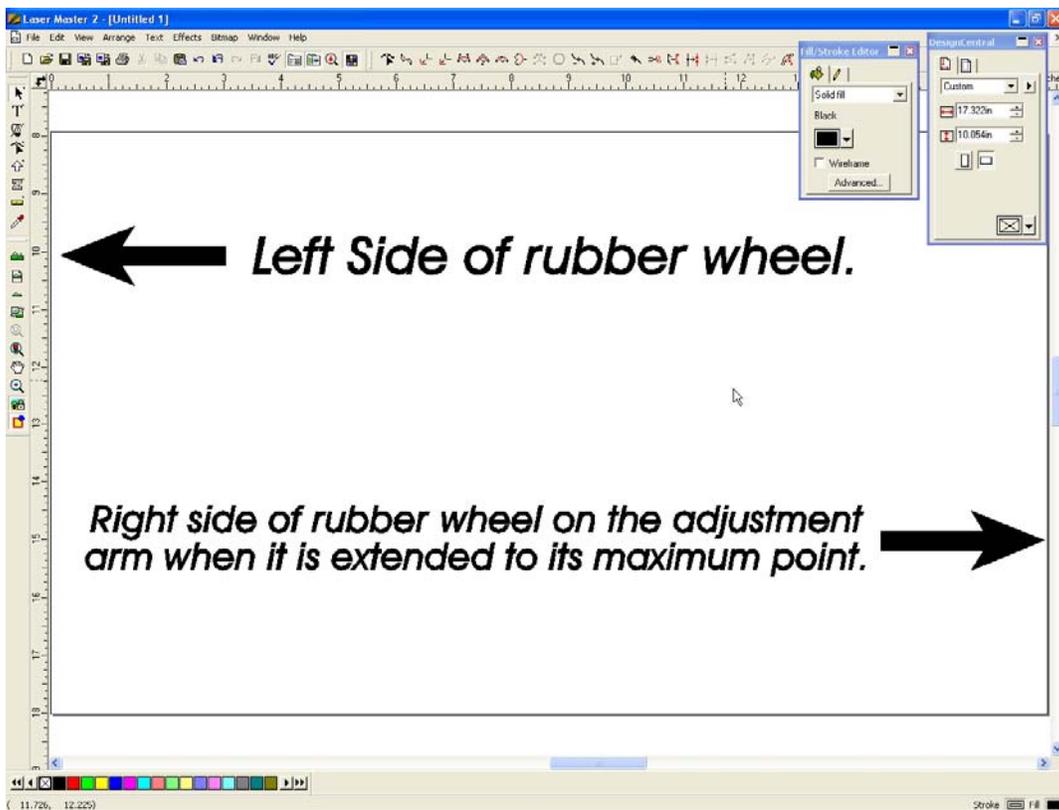
4. Focus the laser. (Manual focus is suggested)
5. The following is an example of engraving process by using Laser Master 2.
6. After importing or creating an image, click on File then Print.
7. Make sure your Mercury is selected.
8. Then click Properties then Paper.
9. Click Rotary Fixture, then type in the diameter.
10. Write down the X and Y values given for paper size (these are your new height and width of your paper size in your software).



11. After getting the proper paper sizes click OK.
12. Then click Cancel in the Print dialog box.
13. Deselect the image or object in your Laser Master 2.
14. In your Design Central. Change your page width to the X measurement and the height will be the Y measurement.
15. Input the X value (17.322) in the 'width' box. It will always be 17.322 because that is the longest piece of material you can have in your rotary attachment.
16. Input the Y value in the 'height' box. The Y measurement will constantly change because the circumference of each object is different.



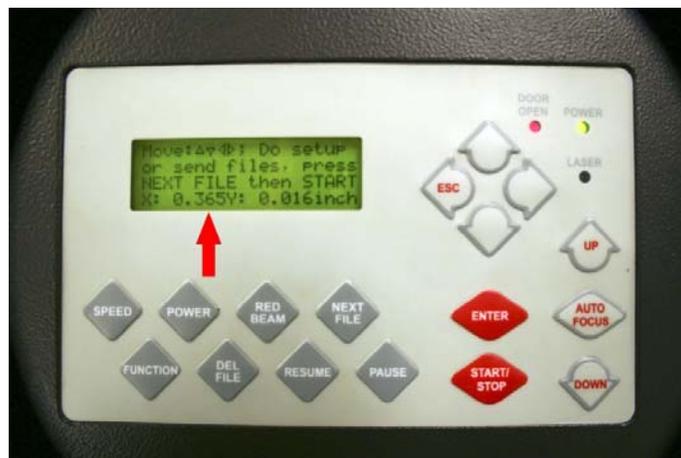
17. As soon as you type the numbers in your page size should change.
18. Click View, then Ruler and Grid. Change the Y measurement to match the Y measurement in your Design Central.



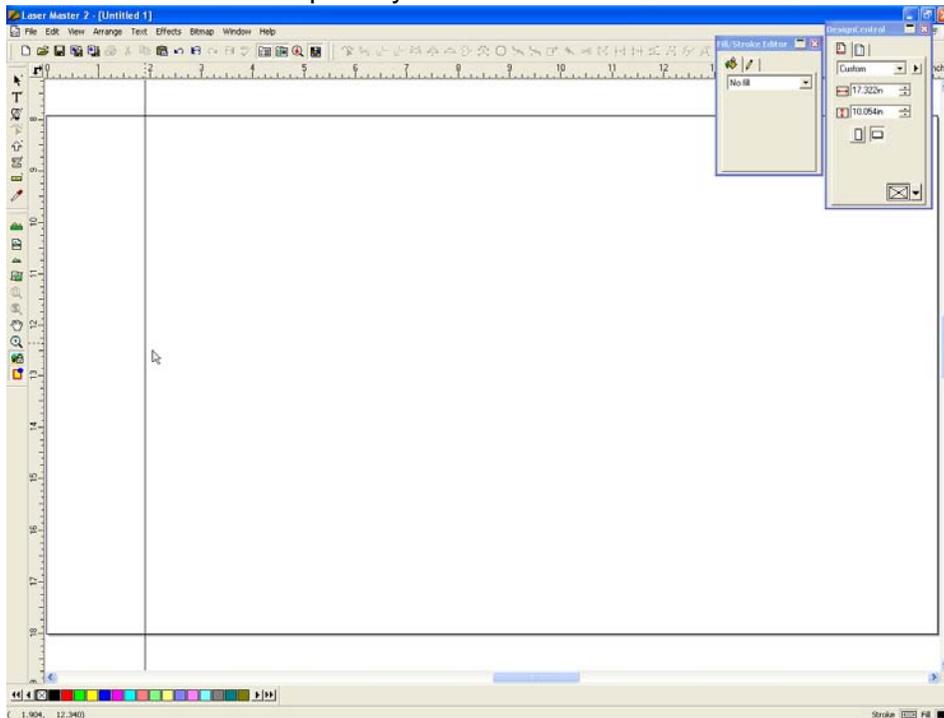
19. Use your arrows keys on your laser to move the laser head over to the beginning of your object or the beginning of your engraving area. You will see the red dot on the object.



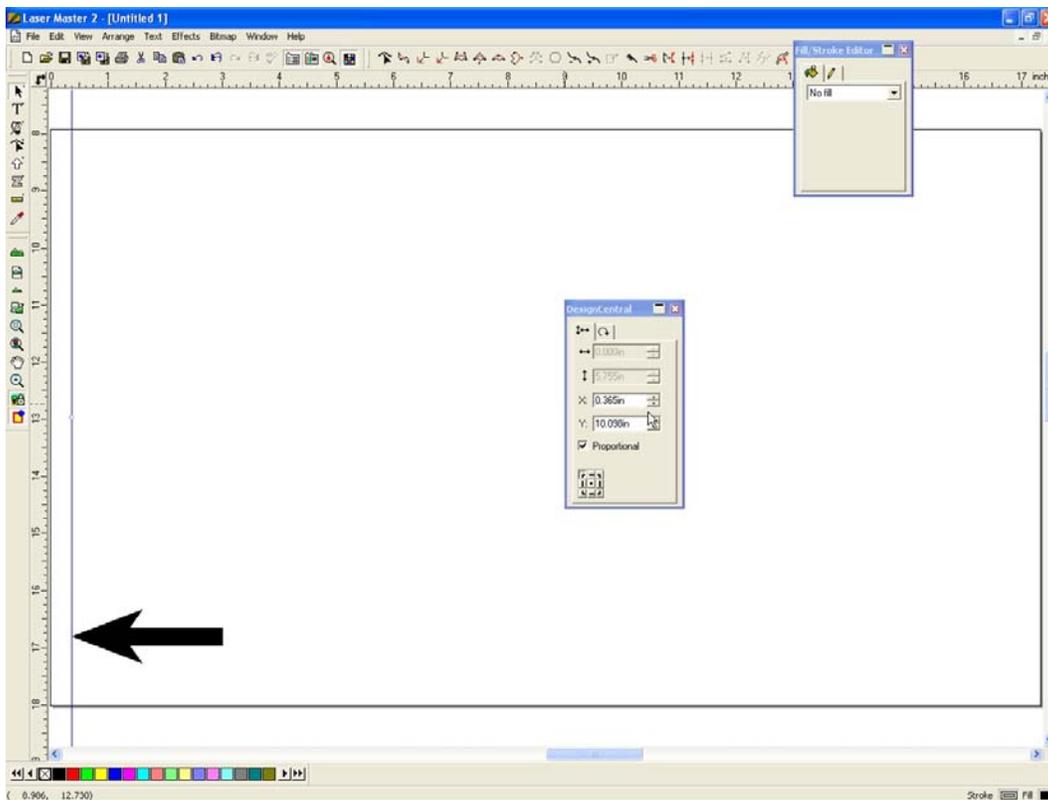
20. You will see on the display of your laser, it will give you an X grid coordinate.



21. You will need to click and hold down on the ruler. When you pull it on the screen you will have a black line. You can drop it anywhere.



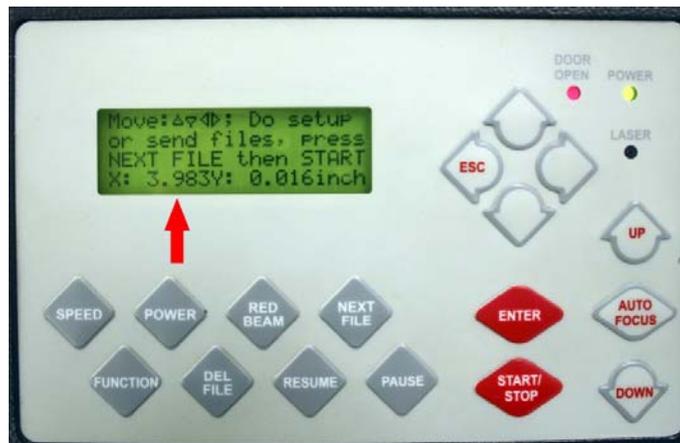
22. Select the guide, in the design central you will now have a place where you can input the X measurement you got off the laser. This will show you where the red dot is at right now in your software.



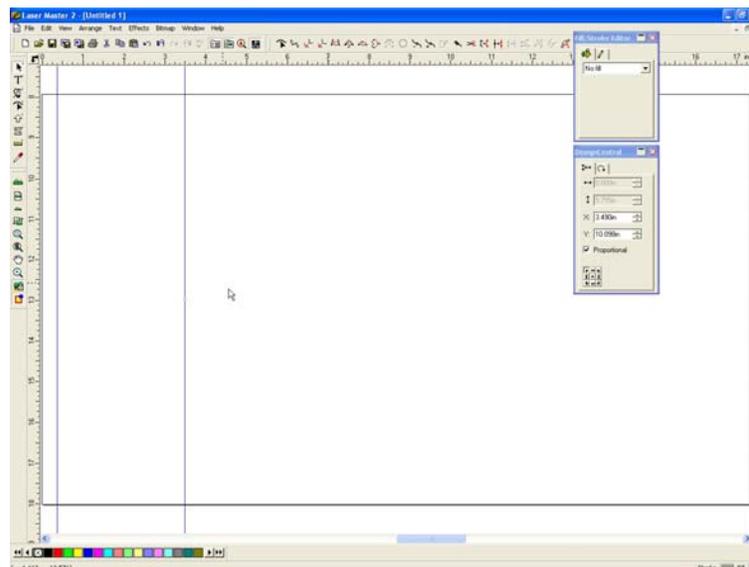
23. Use your arrows keys on your laser to move the laser head over to the end of your object or the end of the engraving area. You will see the red dot on the object.



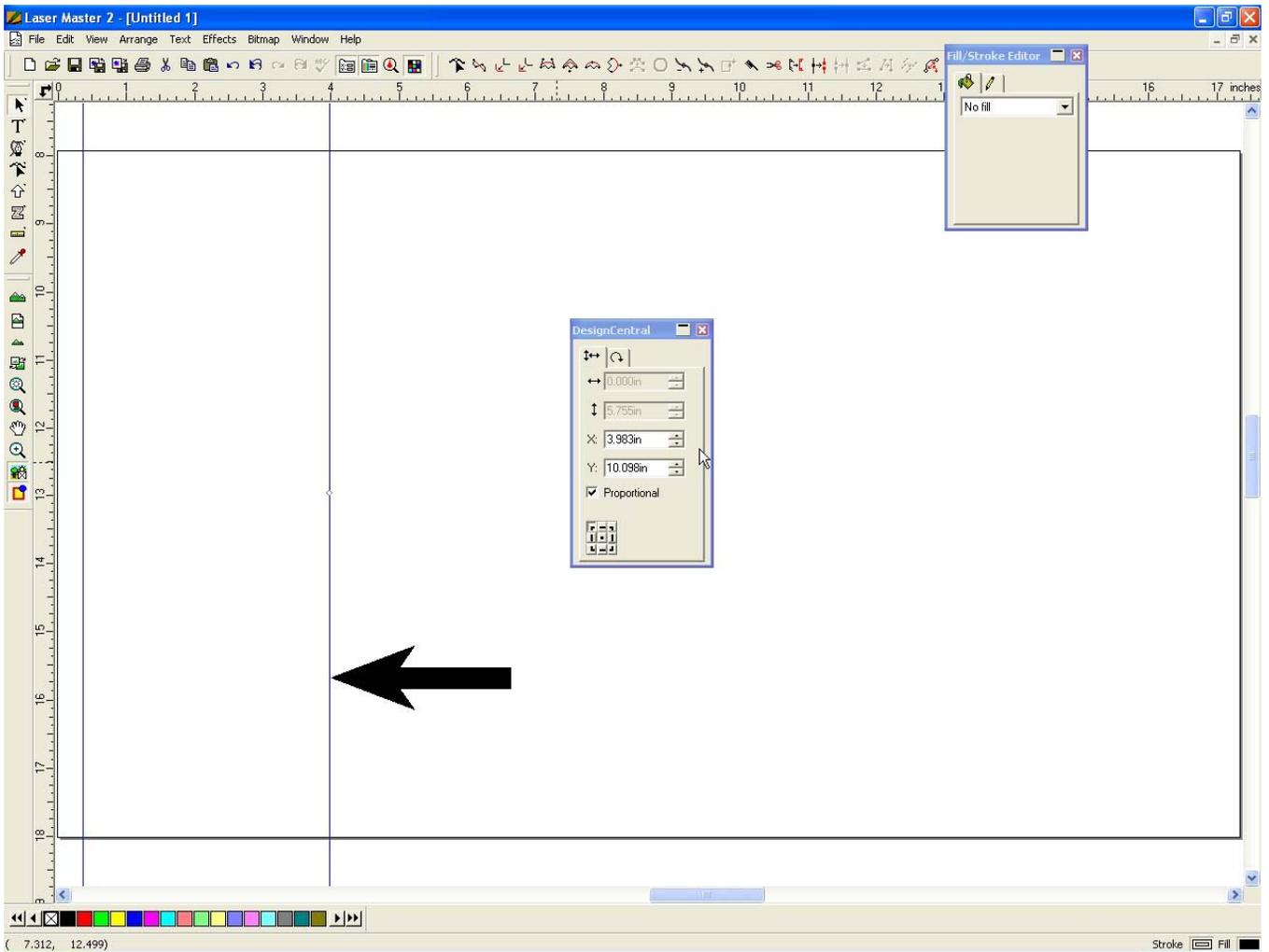
24. You will see on the display of your laser, it will give you another X grid coordinate.



25. Pull another guide onto your design screen and drop it anywhere.



26. Select the guide. In your design central you will be able to input the second measurement you got off the machine.



27. The area between the two lines will show you where you need to place your image to have it engrave on your object in the rotary attachment.

NOTE : You can also do this for Y guides to show you where a label or a handle is on that object. You would just click and hold down on the top ruler and pull down then move the rotary attachment forwards and backwards (using the up and down arrow keys). Get the Y measurement and input it Y measurement in your Design Central.

XIV. Control Panel Operation

START/STOP

When you turn on the power, the engraver is under “**STOP**” mode and all function keys can be operated. Your M-Series Laser engraver is ready to receive a file. The LCD shows:

| | | |
|--------|---|-------|
| File: | | |
| Speed: | % | 00:00 |
| Power: | % | STOP |
| DPI: | | |

Upon the receipt of a complete file, the LCD will show the following message. When you press the **START/STOP** key, the engraver will start engraving or cutting.

| | | |
|-----------|-----------|-------|
| File: # 1 | file name | |
| Speed: | 70 % | 00:00 |
| Power: | 40 % | STOP |
| DPI: | 500 | |

If you push the Next file button or
If no file has been received, the message will display:

| |
|--|
| Wait until at least one complete file is received, then press START to start a job |
|--|

ENTER

Use this key to accept and store your selection.

AUTO FOCUS

This key can only be operated under “**STOP**” condition. Pressing this key will move the work table up until the engraving object touches the tip of the auto focus pin, the table will then move down and be focused automatically.

NOTE: “0.0 mm” is the Z-axis home position of the worktable.

When the worktable is above this position the value is negative while below this position the value is positive. This value will be displayed in the lower right hand corner of your display.

| |
|---|
| <p>TIP: <u>To stop the upward motion of auto focus,</u> press either the UP or DOWN TABLE arrow key.</p> |
|---|

TABLE ARROW KEYS

UP table arrow – After initializing, press this key to move the worktable up.

DOWN table arrow – After initializing, press this key to move the worktable down.

ESC (Escape) (also the ◀ left arrow key)

Will exit the current menu and return you to the main menu.

ARROW KEYS (◀▶▲▼)

- ◀ (Left arrow key) will move the head of the laser left it is also your **ESC** key
- ▶ (Right arrow key) will move the head of the laser right. This will also help you navigate through the Function menu.
- ▲ (Up arrow key) will move the head of the laser towards the back of the machine.
- ▼ (Down arrow key) will move the head of the laser towards the front of the machine.

Note : When you use any of the arrow keys it will lock the laser head in place and give you an exact X,Y grid coordinate of where the red beam is. To unlock it simply push the function key and you will enter the function menu. Doing this will release the head. Then hit the Next File button to return to the list of files on the laser.

NEXT FILE

This key is only works under **Multiple file** mode only. If there is a file in the laser, when you press this key the LCD shows:

| | |
|------------------|--------------------|
| File: # x | file name |
| Speed: xx | % 00:00 |
| Power: xx | % PPI: xxxx |
| DPI: xxx | xxxxx k |

The “**xxxxx**”k number in the lower right corner expresses the kilobytes of memory available in the buffer. **File: #X** reflects the current file number. Pressing **NEXT FILE** will display the next file in the buffer and will cycle through to file 1 when it has displayed the last file in the buffer. Once the buffer has received 100 files, the LCD shows:

| |
|---|
| More than 100 files are not allowed. Please delete some files and send again. |
|---|

If a file is being received and exceeds available memory, the LCD shows.

| |
|---|
| Not a complete file due to out of memory. Please delete some and send again |
|---|

RED BEAM

This button turns the red beam on and off. The red beam is **NOT** the same as the laser. The laser is actually invisible, the red beam is used in conjunction with relative mode.

SPEED

Used in conjunction with the **Pause/Resume** key to change speed during cutting or engraving.

POWER

Used in conjunction with the **Pause/Resume** key to change power during cutting or engraving.

PAUSE

Pause is used to temporarily pause the job during cutting or engraving. You have to use the resume key when using this function. If you push the start/stop button the laser will restart the job with original settings.

RESUME

Resume continues the job after pausing with any new settings that were made.

Note: Power and speed settings are permanently set to the file when the file gets to the laser. You will have to start the job then use the Pause button to adjust either, power or speed. As soon as you hit start/stop again the file will revert back to the original power/speed settings.

DEL FILE

Use this key to delete the currently displayed file.
After pressing this key, the LCD displays:

Delete current file?
Sure: Press again
No: **Esc**

Press DEL FILE again to delete the file and the LCD will display:

Now deleting current
file Please wait

FUNCTION

After you press the function key there are 12 options that will be cycled through.
To cycle through them use the Right arrow key.

1. Set memory buffer.

To change the file mode on your M-Series, press the function key until the control panel screen shows:

Set memory buffer?
Yes: **ENTER**
End operation: **Esc**
Z init/AF position? ►

Press the enter key one time then use the ▲ or ▼ arrow keys to choose Single File or Multiple/100 Files. Press Enter to lock this setting in. Your M-Series has been changed to the file mode you have chosen.

Multiple /100 Files **
Ok: **ENTER**
Change: ▲ or ▼

NOTE :

Single File mode, when the file gets to the laser it will automatically begin the job. No matter if you have the machine auto focused or even any material in there. You also have to delete the job from the laser before sending another. If you do not you will be errors on the computer saying the Laser is full.

Multiple file mode is what 99% of customers use. The file will be stored in a list of files and can be recalled, started and stopped at your convenience.

Use your Right arrow ► to go to the next menu.

2. Z init/AF position.

To prevent the lens carriage from hitting the engraving object during initializing, the worktable will move down about 3 inches automatically when you power on the equipment.

As long as you have not pressed the **AUTO FOCUS** key, you can go to this option, press enter and move the worktable back to the position it was in before initialization.

Therefore, you can move the table to the last auto focus position instead of the original Z position by using this function.

If you use the **AUTO FOCUS** key, that will be saved in the memory.

Note: Most people don't use this option. They just do an auto focus and begin again.

Use your Right arrow ► to go to the next menu.

3. Delete all files.

All files in the buffer will be deleted by using this function.

This function is not available under Single file mode.

If you press ENTER while the following is displayed, you will be asked to press ENTER again to confirm your choice.

Use your Right arrow ► to go to the next menu.

Delete all files?
Ok: **ENTER**
End operation: **Esc**
Select lens? : ►

4. Select lens.

The following are the four different lenses available for use on the Pinnacle M-SERIES:

| Focal Length | | Resolution | Cutting capability |
|--------------|----------|------------|--------------------|
| 1.5" | Optional | High | Thin |
| 2.0" | Standard | | |
| 2.5" | Optional | | |
| 4.0" | Optional | Low | Thick |

The larger the lens, the longer the focal length and the bigger the beam diameter size.

The high-resolution lens (1.5") is designed for precision engraving, while the low-resolution lens (4.0") is mostly used for cutting due to its lower beam divergence which results in a straighter cut in thick materials.

By using a higher resolution lens you will have a longer engraving time.

The large spot size of the low-resolution lens spreads the laser's heat over a larger area, can help minimize melting on certain kinds of plastics.

After you have physically changed your lens, you must "change" the lens in the M-Series. Press ENTER while in the FUNCTION mode and the following screen is displayed.

```

Select lens?
Yes: ENTER
End operation: Esc
Select unit? : ▶
    
```

Use the ▲ or ▼ keys to select the appropriate lens length, then press ENTER to store it.

```

2.0 inch (38.1mm)**
Ok: ENTER
Change: ▲ or ▼
    
```

After changing lens, press **AUTO FOCUS** and the new focal length will be saved automatically.

Use your Right arrow ▶ to go to the next menu.

5. Set power ramp?

If the power ramp is set to Enable and the cutting speed is 3% or above, under vector mode, the power control is enabled. If the power ramp is set to Disable, the power control is disabled. It is recommended the M-Series be operated with power ramp ENABLED.

```

Set power ramp?
Yes: ENTER
End operation: ESC
Select unit? : ▶
    
```

Press ENTER to change the power ramp setting.

Use the ▲ or ▼ keys to change the power ramp setting.

Use the ENTER key to accept your power ramp settings.

Pre Use your Right arrow ► to go to the next menu.

Enable **
Ok: **ENTER**
Change: ▲ or ▼

OR

Disable
Ok: **ENTER**
Change: ▲ or ▼

6. Select unit?

Set your M-Series to operate in Metric or English units.

Select ENTER then use the ▲ or ▼ keys to change between metric and English measurements

Use the ENTER key to accept your settings.

Use your Right arrow ► to go to the next menu.

Standard (in)**
Ok: **ENTER**
Change: ▲ or ▼

or

English (inch)
Ok: **ENTER**
Change: ▲ or ▼

7. Set End Of File (EOF) alarm?

When it is enabled the M-Series will beep when it has finished engraving each file.

Select ENTER then use the ▲ or ▼ keys to change between enabled and disabled EOF.

Set EOF alarm?
Ok: **ENTER**
End operation: **Esc**
Tune Auto focusing? : ►

Use the ENTER key to accept your settings.

Enable**
Ok: **ENTER**
Change: ▲ or ▼

Disable
Ok: **ENTER**
Change: ▲ or ▼

8. Tune (Auto focusing)

This option allows you to recalibrate the auto focus. Do an auto focus on the machine, put the manual focus tool into the carriage. If the manual focus tool doesn't touch the material come back to this menu.

Tune (Auto focusing)?
Ok: **ENTER**
End operation: **Esc**
Select set up #1-16? : ►

After pressing the ENTER key, press the up table and down table arrows to move the material until it touches. Press the **Enter** key to lock this setting in for your new auto focus.

Press **arrow** up/down key to tune focusing position then press **ENTER**

Do an auto focus and check with manual focus tool.

Use your Right arrow ► to go to the next menu.

9. Select Set Up #1-16.

You can assign 16 different colors for speed and power to achieve a variety of cutting effects. This function works when your software package can output HPGL plot without using the M-Series print driver.

Most of the time, these settings will be controlled by your M-Series driver. You will set the power/speed settings before you send the job to the laser.

After you press ENTER, you can cycle through pens to change each pens power and speed.

Select setup #1-16?
Yes: **ENTER**
End operation: **ESC**
Select baud rate? : ►

Press **POWER** key to change Power

Setup # 1 **
+ : ▲ - : ▼
Ok: **ENTER**
End operation: **ESC**

Press **SPEED** key to change speed

POWER: **xxx%**
+ : Δ - : ∇
End operation: **ESC**

Use your Right arrow **▶** to go to the next menu.

10. Select baud rate.

This setting is for a Serial port connection.

The Baud rate determines the speed of data transmission used to communicate with the computer.

The available settings are: 9600, 19200, 38400, 57600, and 115200

The default on the laser is: 57600.

You should make your serial port on your computer match this.

After you press ENTER, then use the **▲** or **▼** keys to change between the different baud rates.

Select baud rate?
Yes: **ENTER**
End operation: **Esc**
Data bit/parity? : **▶**

57600 bps **
Ok: **ENTER**
Change: **▲** or **▼**

Press ENTER to set the new baud rate.

xxxxxx bps
Ok: **ENTER**
Change: **▲** or **▼**

Use your Right arrow **▶** to go to the next menu.

11. Set data bit/parity.

This setting is for a Serial port connection.

Data bits refer to the size of one block of data and **parity** is used to check if data was received correctly or not. The **data/parity** option is used to adjust the byte format and parity type in order to communicate with the host computer.

After you press ENTER, you can cycle through data/parity options to select your choice.

Default setting is 8 bits No parity.

Press ENTER again when the correct data/parity options shows on the control panel.

Use your Right arrow ► to go to the next menu.

12. Select language?

Select ENTER then use the ▲ or ▼ keys to select your language.

Use the ENTER key to accept your settings.

Set data bit/parity?
Ok: **ENTER**
End operation: **Esc**
Select language? : ►

8 bits no parity **
Ok: **ENTER**
Change: ▲ or ▼

8 bits even parity
Ok: **ENTER**
Change: ▲ or ▼

Select language?
Yes: **ENTER**
End operation: **ESC**

English **
Ok: **ENTER**
Change: ▲ or ▼

XV. FAQ's / Q & A

1. What materials can be processed by a CO₂ laser?

Virtually any materials that does not have a heat resistant coating such as acrylic, wood, fabrics, glass, leather, marble, stone, rubber stamps, paper products, coated metals, plastics (especially micro plastic developed by IPI, Spectrum and Rowmark etc.) other hard-surface materials blended with polyester and fibers (Corian™, Fountainhead™, and Avonite™ etc.) or laserable simulated products of stone, wood and metal etc.

Bare metals can not get a good engraving result by using CO₂ laser. However, a **special kind of spray** has been developed that allows CO₂ laser to mark on the bare metals such as stainless steel, aluminum etc. This spray or paste is known as Cermark or Ferro. Do not engrave or cut materials which are heat sensitive or toxic substances can be produced (**e.g. PVC and Teflon**).

2. What is the life cycle of the laser source?

The life cycle of laser source is around 20,000 hours, however it can be re-filled and should be done by your dealer, Pinnacle Lasers.

3. What is the main purpose of air assist system?

The air assist system can provide a much better engraving & cutting effect, as it will blow away vaporized particles away from the lens and decreases the chance of fire due to overheating by overloading the material with air.

4. What does the cutting table do?

The vector-cutting table or honeycomb table, is especially useful for vector cutting application. The space between materials and working table, gapped by cutting table, allows heat and smoke to be disbursed and vented out which may otherwise cause bad cutting effect. It also allows sufficient area between the material and the table, allowing the laser to go out of focus and not mark the table.

5. What is the maximum engraving speed of Pinnacle M-Series?

The maximum engraving speed of Pinnacle M-Series is 1066 mm/sec (42 inch/sec).

6. How to engrave an extremely long working piece?

The back door (or panel) of Pinnacle M-Series can be removed by removing all the screws. For better ventilation and safe purpose, this special design is to prevent the back door being opened without notice during operating. However, you have to use magnetic devices to short the connector of the magnetic switches on both side of the front door while opening for engraving extremely long work-piece. When doing so, make sure that you wear safety goggles to operate the machine.

7. What softwares can be used with the Pinnacle Lasers?

Any software that uses HPGL language such as EngraveLab, Laser Express Pro, Corel draw (we suggest 9.0 or higher), Auto Cad, Photo Grave, Adobe Illustrator and Adobe Photoshop.

8. What should I upgrade my Laser's Firmware?

It is best that you do not attempt to upgrade your lasers firmware, unless recommended by Pinnacles Tech Support.

9. What do I need to be able to engrave on metal?

In order to engrave on bare metal, you need a Pinnacle Laser with a minimum of 25 watts and Cermark or Ferro metal marking spray.

10. What is the proper temperature for my Pinnacle Laser to operate properly?

It is recommended that you keep your environment temperature between 70-80 degrees Fahrenheit.

11. What is the recommended PSI for the Pinnacle Lasers?

The recommended PSI on an air compressor for the Pinnacle Lasers is between 18-20psi.

12. What is the life cycle of the Pinnacle Laser source?

Pinnacle uses the industry standard, proven and reliable Synrad Laser Tubes. The Laser tubes are rated to operate up to 20,000 hours. (10 years)

13. Can the laser tube be refilled/recharged?

YES. Once the laser tube has reached the end of its life, a simple and inexpensive gas refill will restore it to full power.

14. What safety compliance is the Pinnacle Lasers under?

The Pinnacle Lasers are under the 3a class. Pinnacle is FCC (ID# L04GRC-LASER) and CE (EMC) approved. CDRH (Center of Devices and Radiological Health).

15. What operating systems can the Pinnacle Driver be used under?

The Pinnacle Driver can run under Windows 98/ME/2K/XP. However it does not support any Mac OS at this time.

16. What memory configurations are available for the pinnacle Lasers?

16MB is standard. Pinnacle series of laser engravers can use either 16MB or 64MB (32x2) SIMM modules and is upgradeable to 64MB max. Multiple file mode allows the buffer to hold up to 100 files. Contact Pinnacle Tech Support for exact Specifications.

17. What type of materials do I want to stay away from when engraving?

It is highly recommended that you do not engrave ANY PVC or Teflon based material because it will release a toxic gas.

18. What is the warranty on my Pinnacle Laser and the Accessories?

On all Pinnacle Laser Engravers : 3 years.

Chillers and Odor Reduction Units and Air Compressors : 1 year.

Consumable items, such as Optical Lenses & Mirrors : 90 days.

XVI. Troubleshooting

Laser Related Problem

You can contact Tech Support if these troubleshooting steps don't fix the problem. The number is 1-800-966-1783.

No Laser Output

1. Make sure all doors are closed.
2. Check the "Door open" light on laser control panel it must be OFF.
 - a. If the door light stays on, we need to find out which sensor isn't being read. There are 4 sets of magnets on this machine. Two sets on the top lid of the machine and two sets located on the door in the front of the machine.
 - b. Make sure all magnets are secure.
 - c. Make sure all wires coming to the magnets are fine, no frays and no breaks.
 - d. Contact Tech Support if any parts are damaged or not working properly.
3. Open the back bottom cover of the machine.
4. There will be a power board on that panel. It will have a red post and a black post on the left hand side of the board.
5. Test the DC Voltage on that board.
 - a. 40 Watt or lower should read 30-32 Volts.
 - b. 50 Watt or higher should read 48 Volts.
 - c. Contact Tech Support if the voltage reading is right.
6. If you have a Synrad tube, it will be black in color. On left hand side, there will be 2 LED's. One Green which should illuminate all the time and One Red, it would only illuminate when the laser is firing.
 - a. If not illuminated properly contact tech support.
7. If you have a Dios Tube it will be silver in color and there is no indication lights.
8. Contact Tech Support for any other assistance.

Laser Stops After a Period of Cutting Job

1. Laser tube maybe overheated due to poor ventilation. Move laser way from wall at least 6 to 8 inches. Add a cooling fan at the back of the laser or cooling the ambient temperature. Keep temperature in room between 72 - 80 degree's Fahrenheit.

Weak Laser Output

1. Make sure the laser is focused correctly. Use Manual Focus tool to see if auto focus is putting material at right distance away from lens.
2. Check if all optics are properly cleaned. Dirty or damaged lens and mirrors do not allow the laser to work at optimal performance levels.

3. Make sure the machine is aligned. Draw 4 vector squares, one in each corner of your machine. The cut should be consistent and not slanted.
 - a. If the cuts are not consistent or slanted a beam alignment is needed.
 - b. You can go to Laserpin.com, on the Tech support tab, select M-Series, under the Imaging Info section you can watch a video on how to align the laser. If you still can not get it aligned contact Pinnacle Laser Tech Support.
4. If the optics are surely not the problem, and laser drops to more or less half of the original power level, especially for 25 and 30W laser, change laser tube. Contact Tech Support for further instructions.

System Related Problems

System Fails at Initialization

System could not complete the initialization procedure, and the display may be blank, or system keeps trying to start up. Note malfunction code and restart machine. If restarting the machine doesn't fix it, replace the part mentioned. If replacing the part doesn't fix the error replace the main board.

Flashing Power LED

1. The X-motor may be malfunction, and short-circuiting. Measure the impedance between pin 1 & 3 of X-motor's driver chip (L6203), which provides PWM (Power Width Modulation, the power signal) to motor. The ideal resistance should be from 2Ω ~ 20Ω . If the resistance is 0Ω , there could be a short circuit in X-motor. Change X-motor.
2. If problem persists, change main board.

"X-motor Error" Message

1. Power off the machine, move lens carriage left and right by hand to see if it moves freely. Make sure there is not a clicking sound coming from the X motor area. The X motor is attached to the rail on the right hand side. A clicking sound represents a damaged motor shaft, motor failure is definite if not replaced. The error may be due to carriage's rollers or rail surface are worn or blocked by dirt on the rail. Clean the rail and bearings and try again. X-motor's transmission belt is over tightened and impairs the motor's mobility.
2. If system keeps showing "X-motor Error" message after clearing the above-mentioned possibilities, check if the flat cable is not connected correctly or defective.
3. If nothing is wrong with the flat cable, change X-motor's PCB (the small circuit board that you connect the flat cable to).
4. Change X-motor, if the PCB is fine, an open circuit in X-motor could create such problem.
5. Change main board, if X-motor if fine.

“Y-motor Error” Message

1. Power off the machine, move the rail back and forth by hand see if it moves freely. The error may be caused by rails bearings or rails surfaces are worn or blocked by dirt on either sides of Y-rail. Or the Y-motor’s transmission belts may be over tightened and can impair the motor’s mobility.
2. If “Y-motor Error” message keeps popping up, after clearing the above-mentioned possibilities, check if Y-motor’s cables are connected correctly or defective.
3. Change Y-motor, if its cables are fine.
4. Change main board, if Y-motor is proved to be fine.

“Graphic Was Clipped...” Message

1. Page size not being 25 in wide and 18 in height.
2. 0,0 not being in the upper left hand corner of your document.
3. The size of your images extending paste the 25 in by 18 in area.
4. The location of graphic image being on 0 of the X axis or 0 of the Y axis. Move the image away from the side, so it isn’t sitting on the line.
5. A bad contact or faulty DRAM could cause such error. Reseat the Ram on the main board.
6. If the message appears randomly but frequently even image object is smaller or within the legal boarder, check the RAM module.
 - a. Enter the Diagnostic mode of the machine. Turn off machine, Hold start/stop and Pause button. Turn on.
 - b. Display will read “Check X motor Sensor”. Hit the right arrow button 3 times or until you see “Check DRAM”.
 - c. Hit the Enter Key.
 - d. Display will read RAM malfunction if ram is defective.
 - e. Display will flash RAM ok, and go to the next option if it is ok.
 - f. Contact Tech Support for replacement RAM if needed.

“Command Error, Use GCC driver or HP Pen Plotter Command” Message

1. Make sure the driver used is for Mercury from GCC. If not go to Laserpin.com and download newest driver. The LaserPro Driver will NOT work with the Mercury laser.
2. Uninstall current driver and reinstall it.
3. If problem still persist, contact Tech Support for a more through uninstall.

Incorrect Working Area, or Homing at Wrong Position.

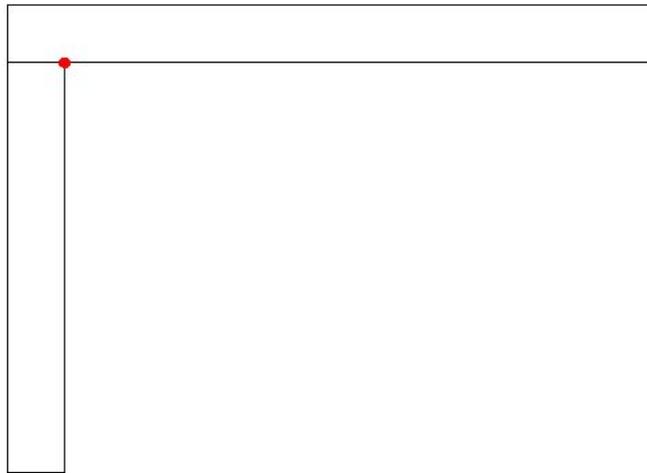
The problem is often seen after changing the main board. In fact, it is not a problem at all. The new main board is without any data stored in the EEPROM’s (where initialization data is kept) as to where the boundary of working area is.

NOTE: The laser head will NOT move the 0,0 position after initializing. It will actually move 1 in over to the left and about 1/8 up from 0,0. The head moves to that location so you can put material in the machine and not hit your material on the head of the laser.

To correct it or change it you need to set an origin point to the system.

The procedure is as follow:

1. Take your Vector cutting table or Honeycomb table out of your machine.
2. First you turn your laser off.
3. Second you will hold the Start/Stop & Enter.
4. After the machine initializes the display will read “Run Test Plot?”
5. You will manually focus the laser. Using the manual focus tool, you will use the UP table arrow key to bring the table up to touch the bottom of the manual focus tool.
6. Once focused, remove your manual focus tool, then push the RIGHT arrow key.
7. The screen will say “Adjust Origin?”.
8. Press Enter.
9. You will use the arrow keys (Right, Left, Up and Down) to move the red beam to this point.



10. You will need to have the red beam 1/3 on the top ruler, 1/3 on the Left ruler and 1/3 on the table.
11. Then you get the red beam there, Hit Enter.
12. The screen on the laser will say STOP.
13. You will need to restart your laser and you are ready to engrave.

Auto Focus Pin is Not Functioning

1. Make sure auto-focus pin moves freely if not clean the probe with alcohol and a lint free rag. Continue cleaning it until it does. If it still continues to stick contact Tech Support for replacement.
2. Check the cable of focus pin, there might be a bad contact or breakage.

3. Contact Tech Support for replacement cable.

Table Can Not Move Up And Down

1. Auto focus Pen is stuck in the up position. Clean auto focus pen and try again.
2. Open front door of laser, ensure the Z-Motor belt is not tangled and is riding on its system smoothly.
3. Replace Z-Motor.
4. Change main board, if Z-motor still does not work.

Weak Laser at Right Side of Working Table

1. Laser beam path may be off alignment, as longer distance the laser beam travels, the more serious the laser power lost. If this is the case, laser power drop at the lower right hand corner will be more obvious. Realign the laser.
2. You can go to Laserpin.com, on the Tech support tab, select M-Series, under the Imaging Info section you can watch a video on how to align the laser. If you still can not get it aligned contact Pinnacle Laser Tech Support.

Unleveled Working Table

When table is not leveled to the motion system frame, laser's focal point will not fall uniformly at the same level across the to-be-engraved object; thus, you will always find one particular area has weaker laser.

1. Use your manual focus tool to determine which area of the table is lower or higher than the rest.
2. Open front door of the laser.
3. Remove the Z motor belt covers.
4. Take the C clip off the tension pulley of the Z motor belt system. Remove the tension pulley. This will loosen the belt. This will allow you to adjust each screw arm holding the table individually.
5. Adjust any screw arm need to make the table level.
6. Replace the tension pulley.
7. Test the table levelness again. If it is ok, put C clip and covers back on.

Wiggling Vertical Engraved Line

1. Dust or engraving residues could coat the surface of X-rail or rollers on lens carriage. Clean both X-rail and all rollers per maintenance chart.

2. There are 4 rollers on the lens carriage, 2 underneath X-rail and 2 on top, they could be worn. Change the all rollers if cleaning them doesn't fix it.

Wavy Vector Cutting Line

1. See if software resolution set to low, changing it can improve the problem.
2. Tune Y-motor and X-motor's belt tension (all should be 5kg). Too tight or too loose can cause this problem.

Blurry Red Beam or Fail Red Pointer

1. Check the red beam mirror. Clean it. Replace if necessary.
2. Change red pointer diode, if damaged or not working
 - a. It is necessary to realign the red beam with laser after changing the Red diode.

Image breaks and shifted

1. Make sure PC's printer port mode is set to Standard or SPP or Normal mode. EPP or ECP mode may cause data lost and shift partial image to other location.
2. Check if DRAM is causing problem by doing diagnostic test. Often a defective DRAM will cause the problem appear in the same location repeatedly.
3. If graphics shift is not due to the unsuitable printer port mode, and appears randomly, the problem is possibly caused by signal interference. If this is the case, change the signal cable, or try with another PC. It is advised to link the PC and Pinnacle M-Series to the same ground. Separate grounds are subject to signal noise. If Laser is sharing the power source with high power equipment, such as an electric drill or saw, change it to its own power source.

Image distorted or drifted toward one direction

When graphics are distorted or drifting gradually toward the right and/or left, it indicates something is wrong in X-motor system.

Check if the lens carriage to see if the belt tension is too loose. Tighten belt if it is.

Check your mirrors. Mirror #3 is usually not held into place tightly. Tighten it.

Check the X motor itself. There is a screw that holds the head on the motor shaft. Tighten the screw. Test again.

If belt tension is fine and x motor head is secure, change X-motor.

Rotary Attachment Does Not Operate Correctly

1. Check to see if anything is wrong with Rotary Attachment's cable. There are two, one on Rotary Attachment itself to the port and the one from main board to the port.

2. The motor for Rotary Attachment's motor could be faulty. Contact tech support for further assistance.

Smoke Can Not Be Vented Properly

Some material produce smoke or odor easily. Wood, for instance, can produce lots of smoke and wood dust, which can easily clog Odor Reduction Unit's filter. When that happens, smoke will not be vented outside and your optics are likely to be covered by a lot of burned dust. This burned dust can cause damage to the mirrors if not fixed. Open your odor reduction unit and clean the 3 filters. If you have a grizzly blower there are no filters, you have some material blocking the flow of air.

Output Is Not Precise

Make sure the Scaling under Paper tab in your Pinnacle M-Series Driver is set to 0/1000. Contact Tech Support for any other issues.

XVII. Specifications

Pinnacle™ M-Series

| M-Series | M-12 | M-25 | M-40 | M-60 | M-75 | M-100 |
|---|---|---------|---------|---------|---------|----------|
| Laser Source | 12 watt | 25 watt | 40 watt | 60 watt | 75 watt | 100 watt |
| | Sealed CO ₂ Laser | | | | | |
| Work Area | 25" x 18" (635mm x 457 mm) | | | | | |
| Max. Working Piece (W x D x Thickness) (back/front door closed) | 31.5" x 22.4" x 6.5" (800 mm x 570 mm x 165 mm) | | | | | |
| Max. Working Piece (W x D x Thickness) (back/front door opened) | 26.8" x unlimited x 6.5" (680 mm x unlimited x 165 mm) | | | | | |
| Table Size | 31" x 20.9" (790 mm x 530 mm) | | | | | |
| Overall Dimensions (W x D x W) | 44.3" x 28.3" x 39.6" (1125 mm x 720 mm x 1005 mm) | | | | | |
| Drive | DC Servo Control | | | | | |
| Speed Control | Adjustable from 0.01 to 42 inch/sec with up to 16 colors linked speed setting per job | | | | | |
| Power Control | Adjustable from 0~100% and 16 colors linked power setting per job | | | | | |
| Z Axis Moving | Automatic (Auto Focus) | | | | | |
| Resolution (DPI) | 1000, 600, 500, 300, 250, 200 | | | | | |
| Computer Interface | Print port (LPT) and/or Serial Port (Comm) for PC | | | | | |
| Memory Buffer | 16 MB standard upgradable to 64 MB with SIMM modules (Multiple file mode saves up to 100 files) | | | | | |
| Display Panel | 4-line LCD display showing current file name, total working time, laser power, engraving speed, file loaded into memory buffer, setup and diagnostic menus. | | | | | |
| Power | 100~240V, AC Auto Switch | | | | | |
| | 10 Amp | 15 Amp | | | 20 Amp | |
| Cooling | Air-cooled | | | | | |
| <i>Above specifications are subject to change without prior notice.</i> | | | | | | |

Optional Items: Odor Reduction System, Compressor for Air Assist, Rotary Attachment

VIII. Machine Reference / Advance Maintenance

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- 3-1 System Diagram
- 3-2 Wiring Diagram (12~30Watt)
- 3-3 Wiring Diagram (50Watt)
- 3-4 Wiring Diagram (100Watt)
- 3-5 (12~30Watt) Laser Tube Wiring Diagram
- 3-6 (50Watt) Laser Tube Diagram
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- 3-8 Main board
- 3-9 Power Board
- 3-10 X-Motor PCB And Wiring PCB
- 3-11 Connectivity for Macintosh

Section 4 System Diagnostics

- 4-1 Hidden Diagnostic Procedure

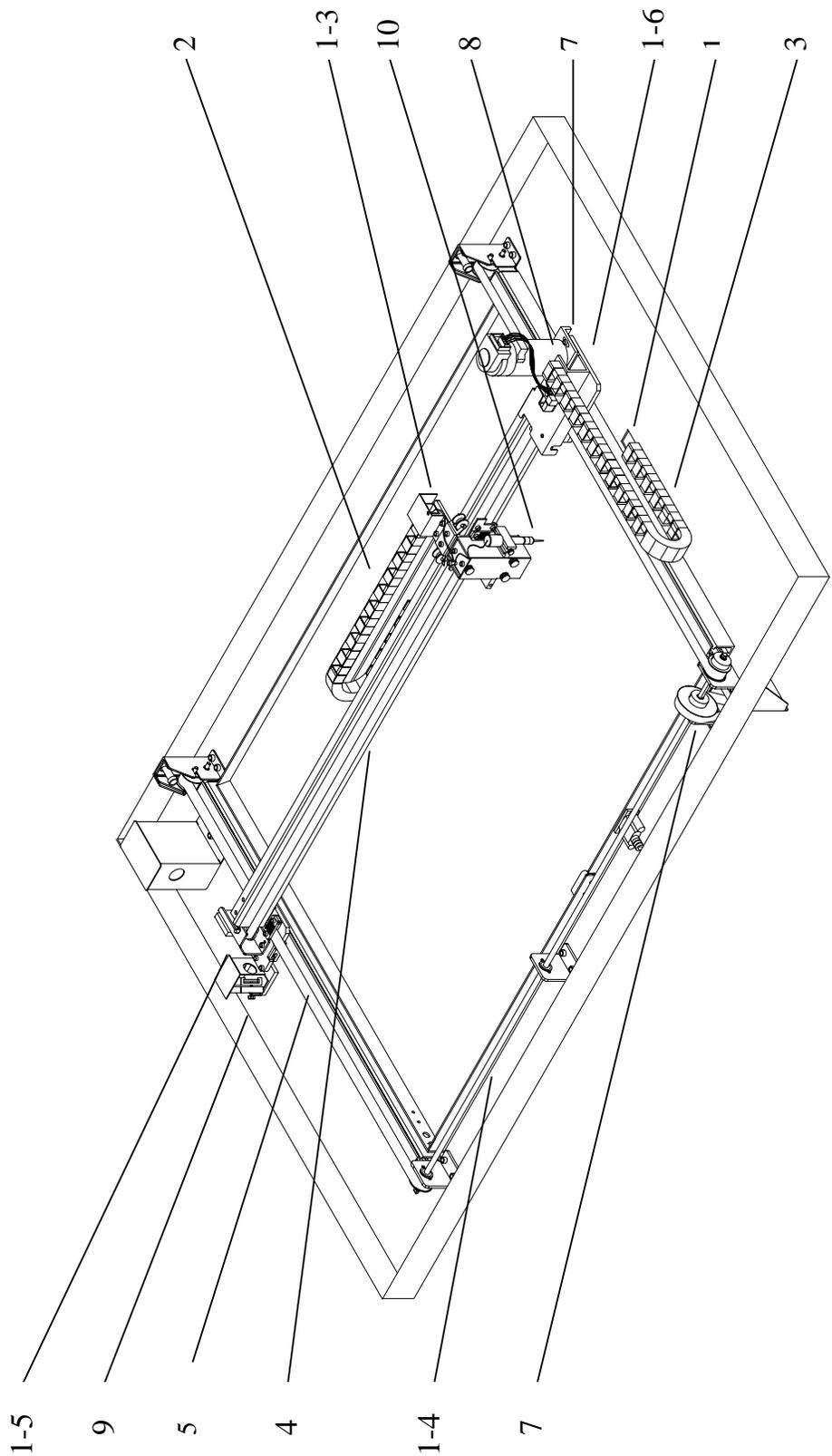
4-2 Further Diagnostic

4-3 Diagnosing the X-motor

4-4 Diagnosing the Laser Diode

4-5 Diagnosing the Laser Tube

1-2 Assembly Drawing



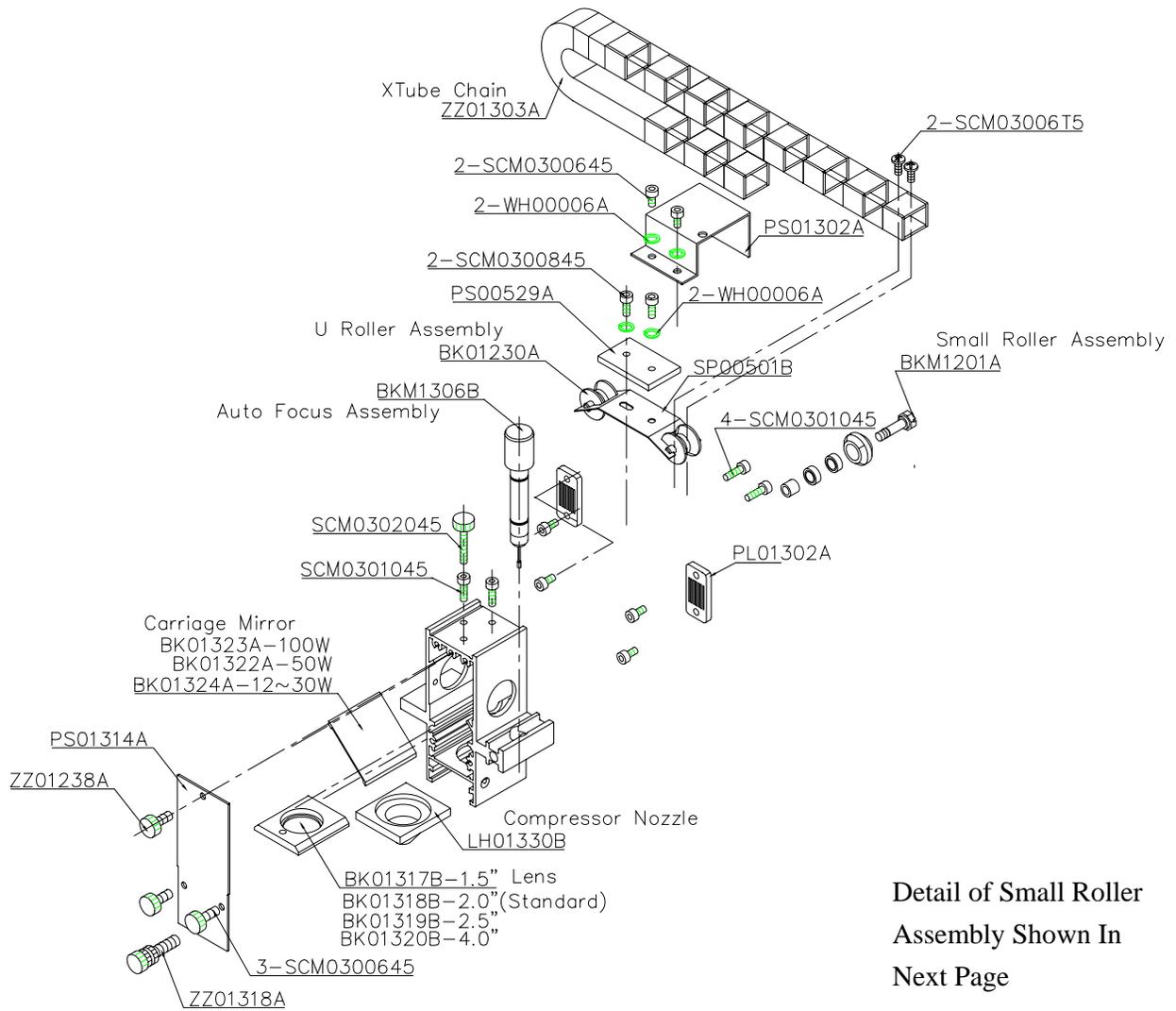
1-2.1 Motion System

The Motion System is driven by DC servomotor, which includes X and Y motor, X motor driver Lens Carriage motive to left and right direction by X-belt, Y motor driver X-rail to front and back by two Y-belts at the same time.

The motion system provides exactly position to guide the laser beam to engrave on the material. The laser beam comes from laser tube and is reflected by 4 mirrors and it can be adjusted by prism mounts until it pass's through the Lens.

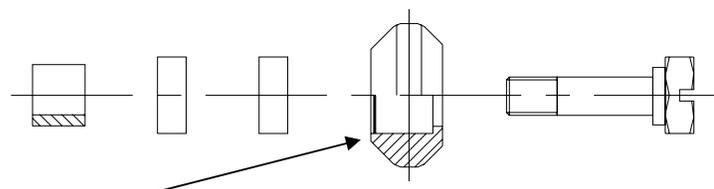
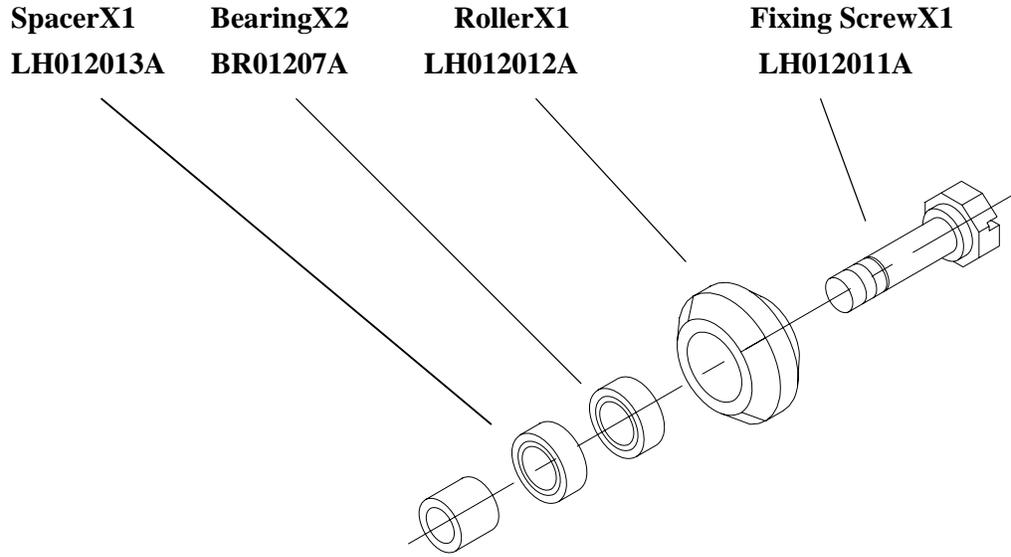
It is very important to keep the Motion System clean. If you have dust or particle covering the surface of the rail or the bearings, that will cause a poor engraving quality.

1-3 Lens Carriage Assembly



Detail of Small Roller Assembly Shown In Next Page

Small Roller Assembly



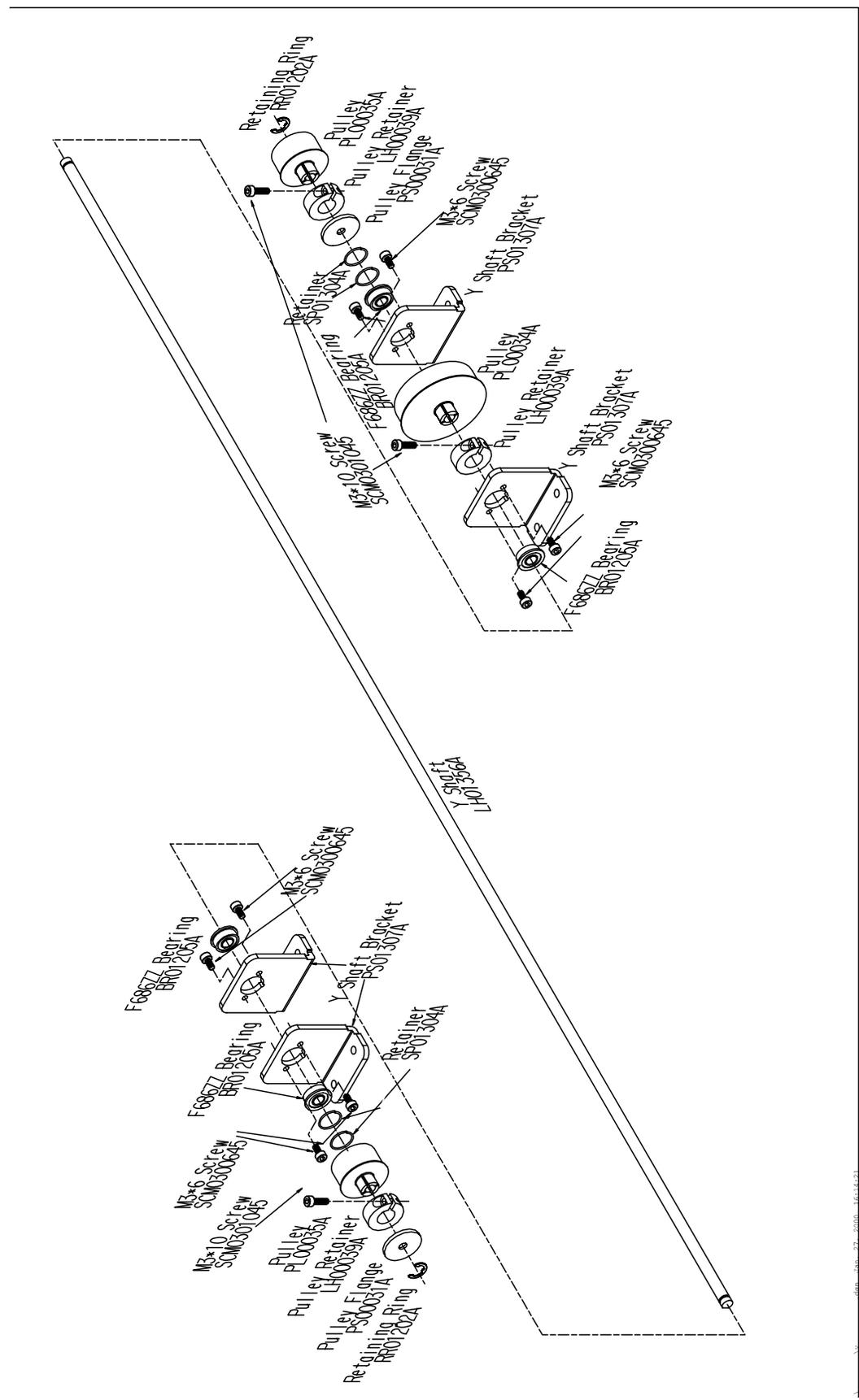
Section View

This is not a symmetrical roller, please pay attention to it's orientation.

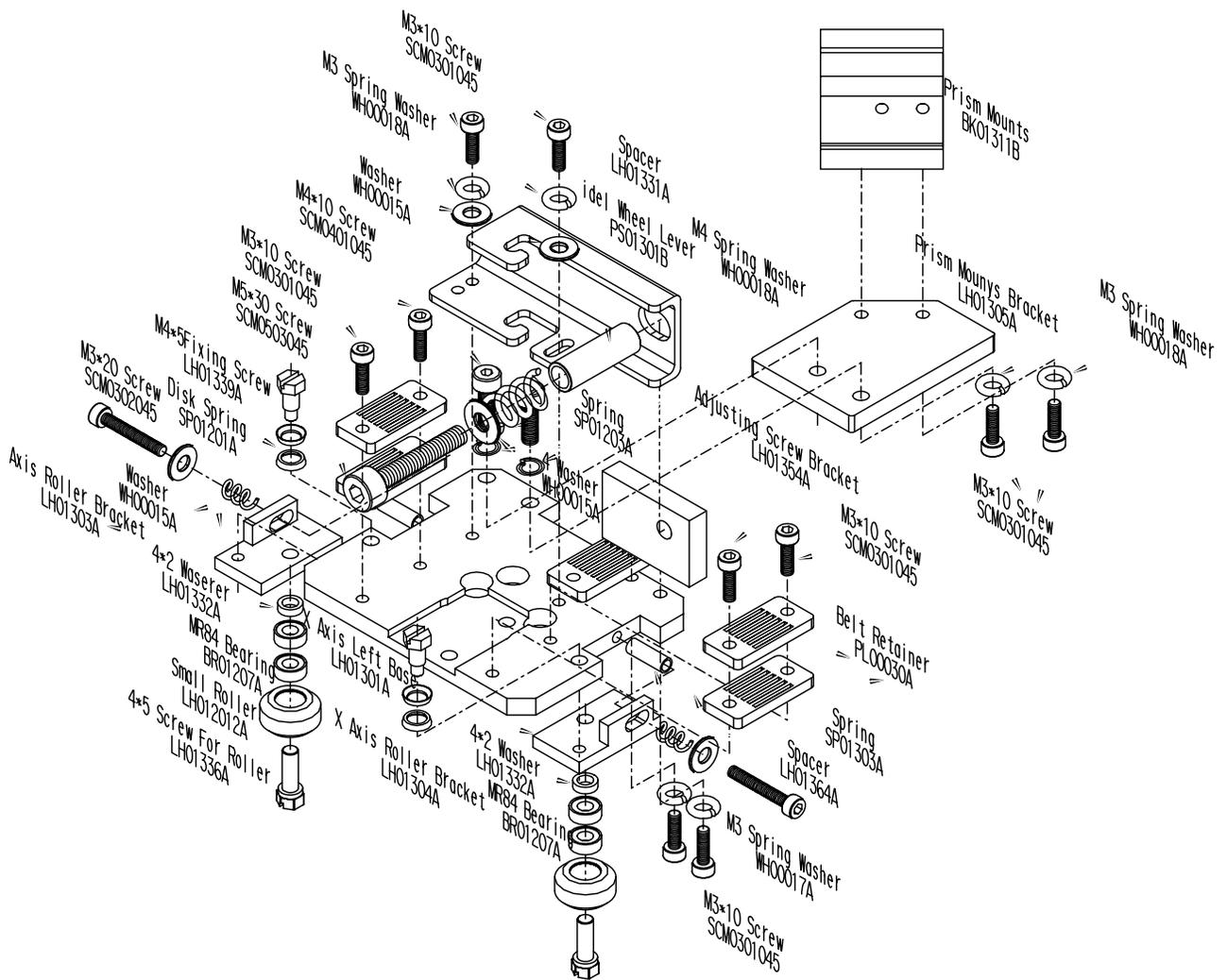
1-3.1 Lens Carriage

The Lens Carriage has a mirror and lens in, which will reflect and focus the beam onto the material. The 2.0" lens is shipped with the machine. We also offer a 1.5", 2.5", 4.0" lenses, which can be bought depending on your application.

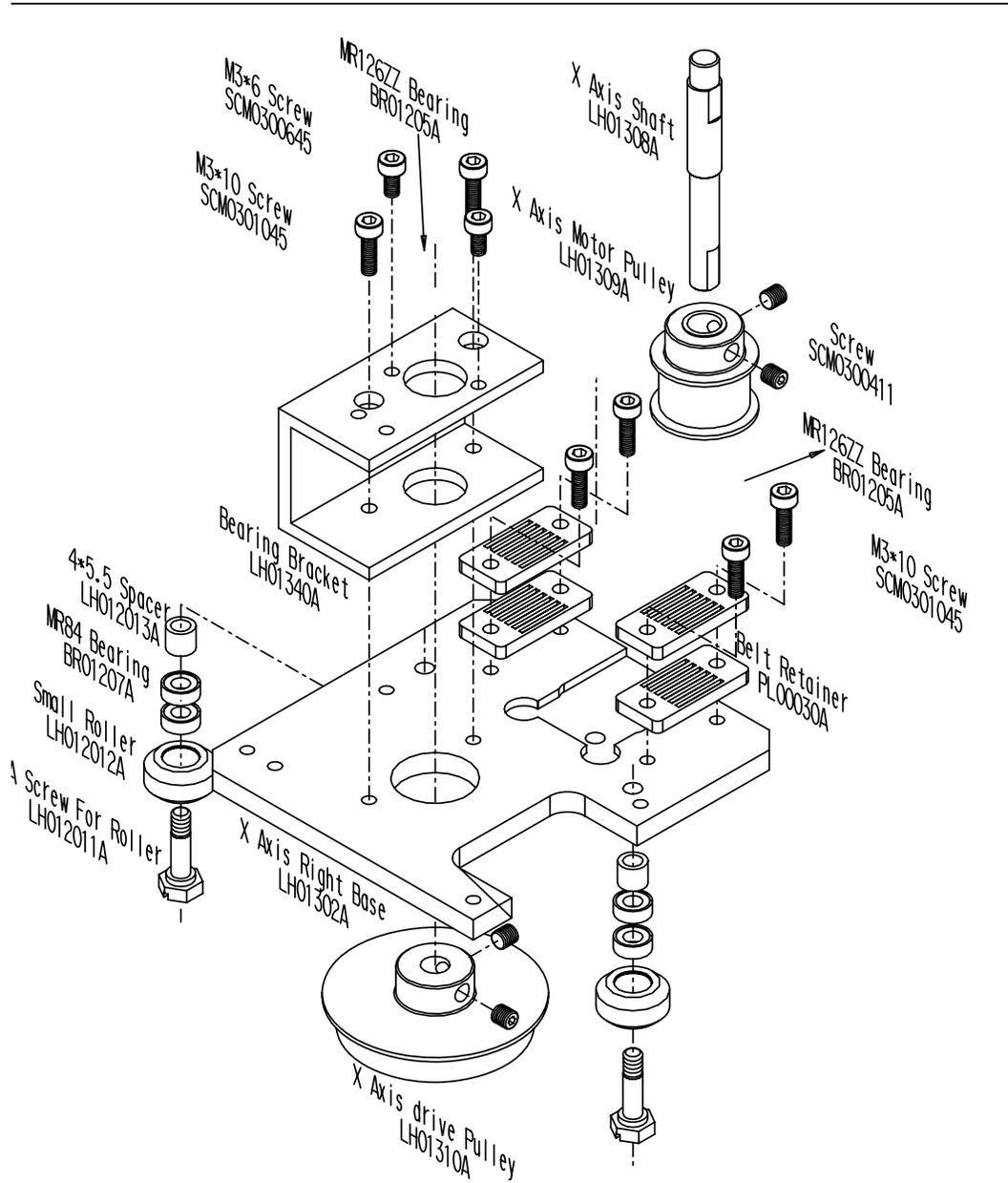
1-4 Y-Axis Assembly



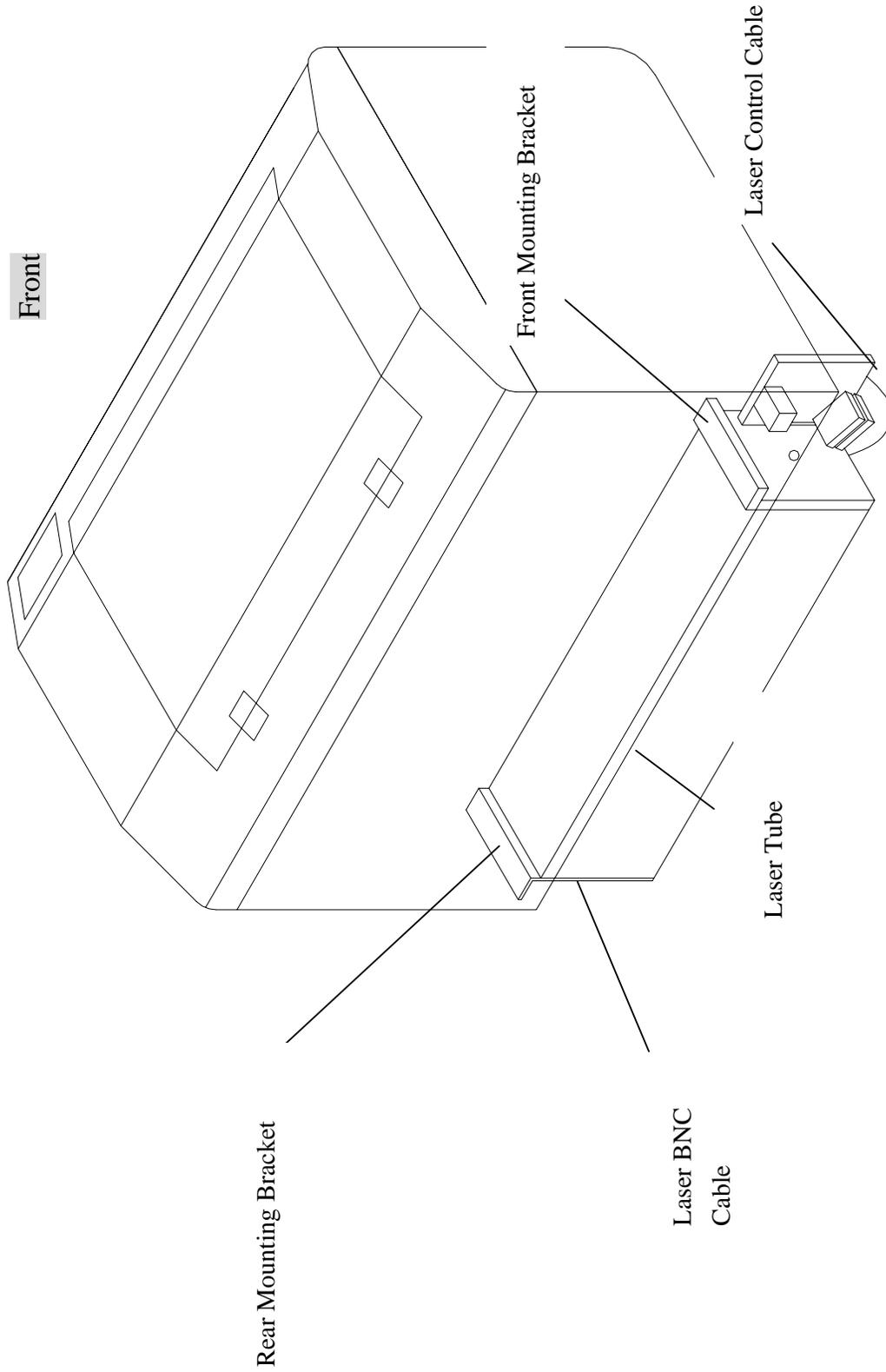
1-5 X-Rail Left Bearing Assembly



1-6 X-Rail Right Bearing Assembly



1-8 Laser Tube Assembly



1-8.1 Laser Tube and Basic Maintenance

Laser tube is a precise and delicate device; if it needs to be removed for service purpose, please handle it with extra care.

In general, laser tube does not require any other general maintenance beside dusting it. If you find a lose of laser power or not outputting at all, and have ensured all optics are clean, the laser tube may be needed to be removed for repair.

One important maintenance tip is that the output lens on laser tube. It is situated on the right side of the tube. It can be reached through the bracket hole. It may be covered by dust after a long period of usage. Dust or debris will impair laser's output level significantly.

Therefore, we strongly recommend cleaning the laser lens tube on regular basis.

To clean the laser tube lens, drop optics solution on cotton bud and rub the lens gently.

On the other end of the tube, there are two LEDs, one is green and one is red.

The green LED indicates the power input of DC32V to the laser tube.

The red one shows the status of laser firing and is interlocks controlled by top and front door.

If laser is not firing, and green LED is not on, there is a problem in the DC power source.

When in standby status with all doors closed, the red LED will half illuminate. If any of the doors is opened or switch cable is broken, the red LED will extinguish.

When doors are closed and a firing signal presents, the red LED will fully light up.

Before you disassemble the laser tube for service;

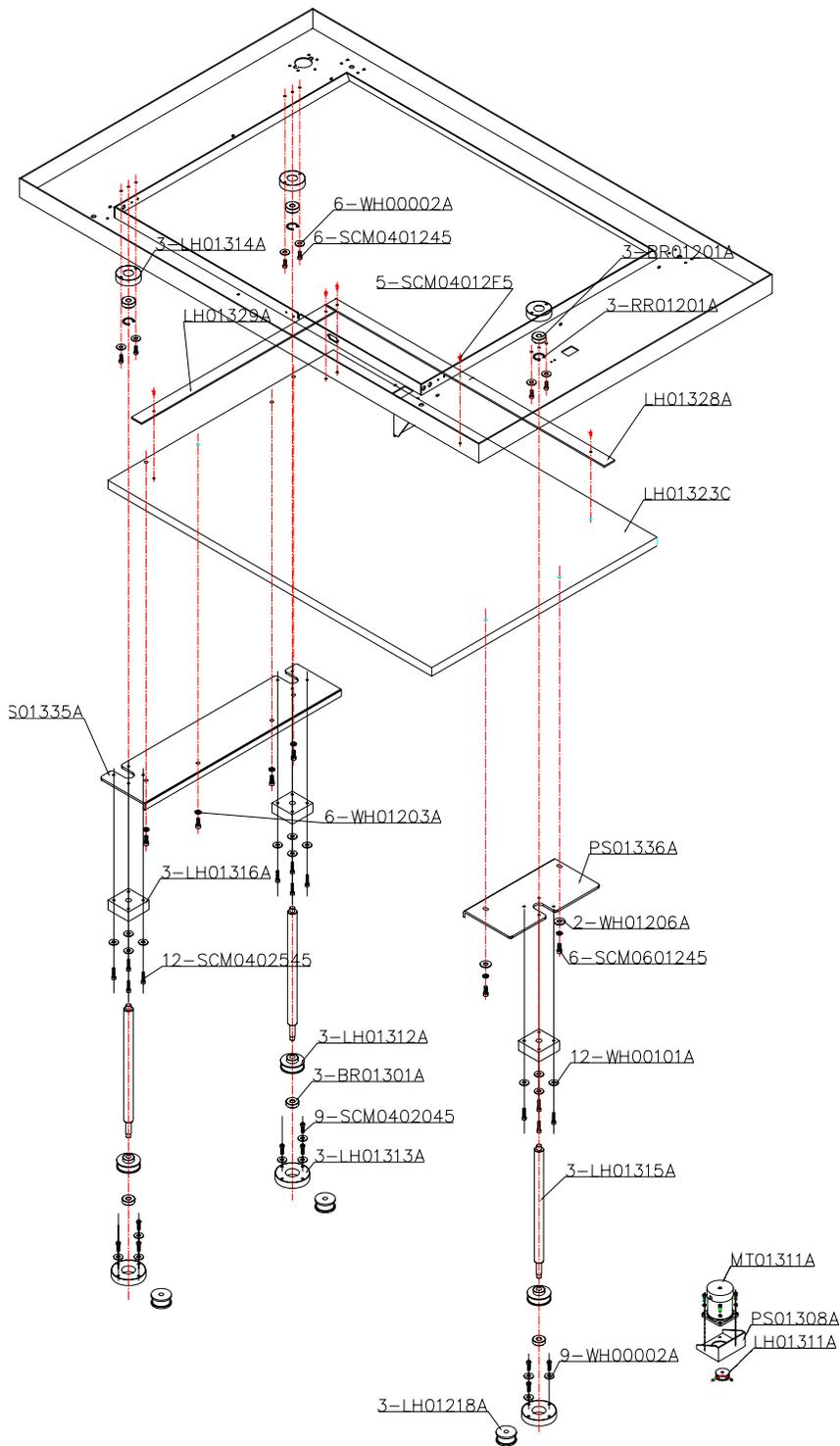
Unplug the machine from the wall.

Unplug all of its cables, including the BNC cable, at the rear and the black and red power cables from power supply.

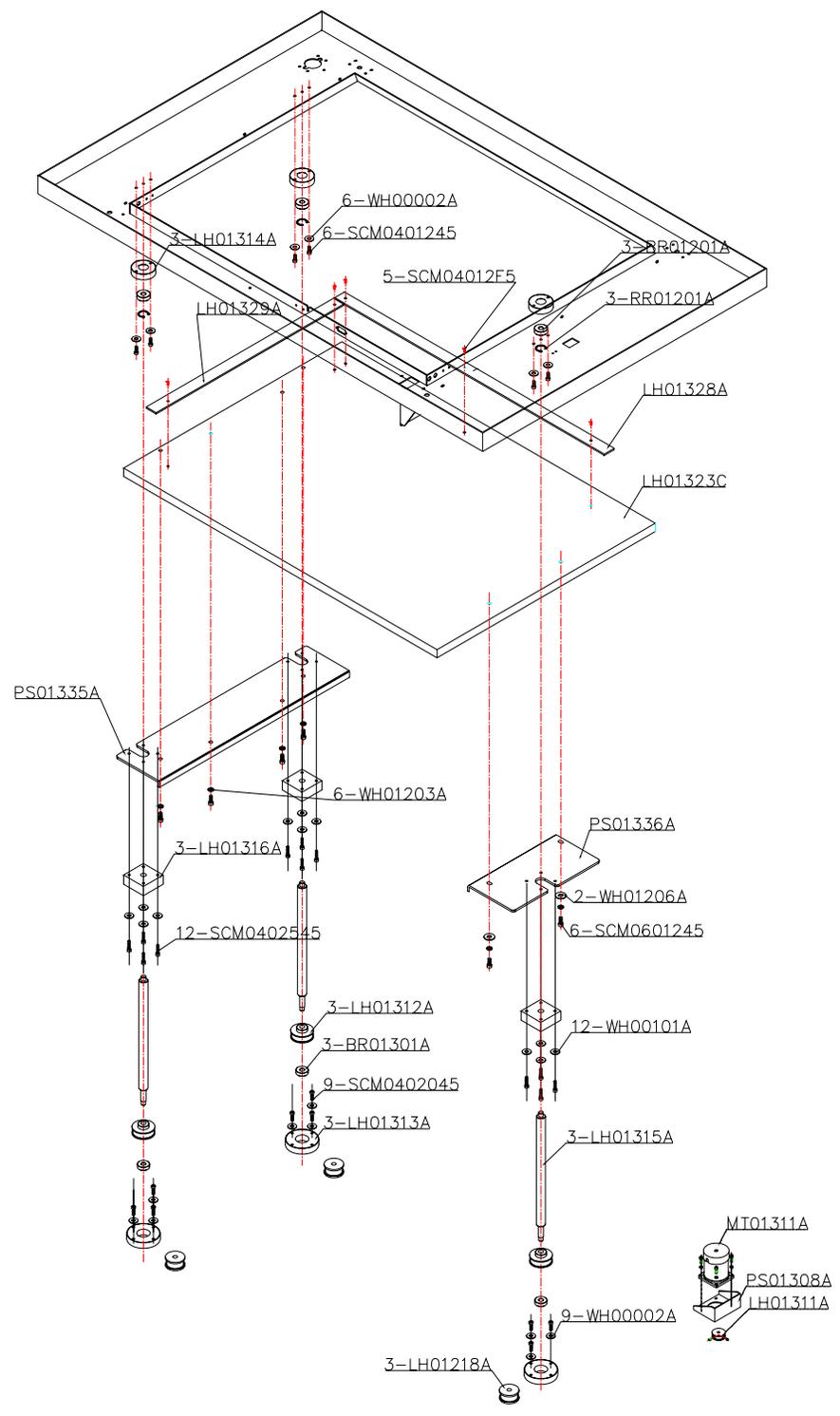
If the firing protection cable is disconnected, laser will fire even doors are opened.

When returning the tube make sure it is properly packed with original supplier's packing box. Do **NOT** include the front and rear mounting brackets, as they are not needed for service purposes. They will be needed to mount the laser back to the laser housing.

1-9 Z Axis Working Table Assembly



1-9 Z Axis Working Table



1-9.1 Z Axis Working Table and Adjustment

How to detect and adjust working table parallel to the Motion System Frame?

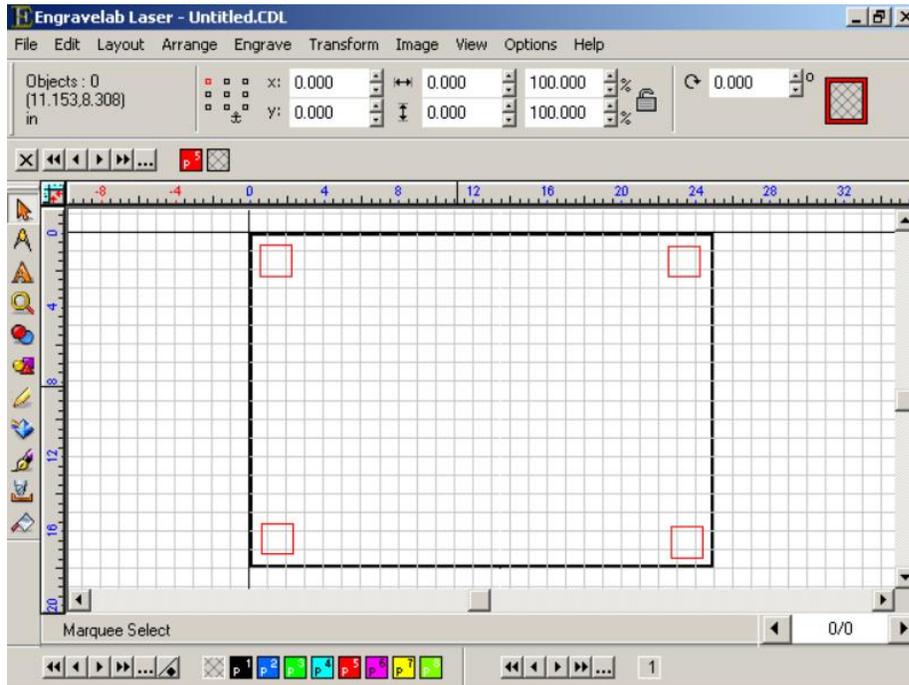
When table is not leveled to the motion system frame, laser's focal point will not fall uniformly at the same level across the to-be-engraved object; thus, you will always find one particular area has weaker laser.

1. Use your manual focus tool to determine which area of the table is lower or higher than the rest.
2. Open front door of the laser.
3. Remove the Z motor belt covers.
4. Take the C clip off the tension pulley of the Z motor belt system. Remove the tension pulley. This will loosen the belt. This will allow you to adjust each screw arm holding the table individually.
5. Adjust any screw arm need to make the table level.
6. Replace the tension pulley.
7. Test the table levelness again. If it is ok, put C clip and covers back on.

2-1 Optical Alignment

Is my Laser out of alignment?

1. First we need to draw 4 squares in your software.
2. Make them Vector (Cut) squares.
3. Place them in each corner of your drawing screen.



4. Make sure you have a piece of material that fits in this area and lays flat.
5. The pieces should have the same amount of burn equally in all four corners.
6. All 4 squares should have square edges not slanted.

If the all the squares do not cut out if they cut unevenly we need to do a minor beam alignment.

MINOR BEAM ALIGNMENT

IMPORTANT - PUT LASER LID UP: Anytime you are not firing the laser the lid of the laser should be up. When the lid of the laser is up the laser will not fire. While you are adjusting the mirrors you will not be firing the laser, make sure the lid is UP.

To do a minor beam alignment, you are going to need the following items.

- 1 90° ratcheting screwdriver (If you have a Sears near by you can purchase one for under \$2)
- 1 roll of masking tape
- 1 regular flat tipped screwdriver
- 1 regular Phillips head screwdriver

To find out how out of alignment the laser is:

- Turn off Laser.
- Hold the start/stop button and pause button and turn on the machine.
Hold it for 10 seconds then release.
- On your display it should read, "To start hardware test, use Function key."
- Push the Function key.
- On the display it should say Check X Axis Sensor; press your Right arrow key until you get to the menu option that says Check Laser Source.
- Once there you will hit the Enter key.
- You will adjust your power level from 50% to 10% with the down arrow.
- Once at 10% power, you move the head of your laser to the bottom right hand corner of the table. This puts the head at the furthest point, when it gets aligned here it will be aligned for the whole table.
- Place a strip of masking tape over the hole on the left hand side of the head where the laser beam and red beam pass through. This will allow you to see the red beam on the masking tape.
- Then we need to close the lid of your laser.
- Push the Enter button to fire the laser until you see the masking being marked by the laser. Usually you will see smoke - when you do, stop pushing the Enter button.
- Raise the lid of your laser. You will see where your red beam is and there will be a burnt spot showing you where the laser is hitting.

To align the laser:

- Once you can see the red beam and the burn spot, we need to line them up together. To do this you will need to adjust your Red Beam mirror.
- The Red Beam mirror is the square mirror located to the left of mirror #1 down by the laser tube.
- There are 5 screws located on the back of the red beam mirror. The allen head screw is NOT to be touched at all. You will use the 90° ratcheting screwdriver to make the adjustments to the flat tipped screws. If you are using a regular flat tipped screwdriver, you will have a lot of difficulty getting in there and adjusting the screws.
- It really helps if you have another person there who can tell you if you are getting closer or not.

- You will adjust one screw at a time, about 1/8th of a turn. Start turning it 1/8 of a turn clockwise. Then ask the other person if you are getting the red beam closer to the burn mark or not. If it is, do another 1/8 turn clockwise. If not, go 1/8 of a turn counter-clockwise and then another 1/8 of a turn counter-clockwise. See if that helps, if it doesn't, move it back 1/8 of a turn clockwise. Then adjust one of the other screws.
- Follow this procedure for each of the screws until the red beam is in the center of the burn mark.
- Now that the red beam and the laser are aligned together at the head, if we adjust any of the mirrors it will move both the laser and the red beam together.

We will now need to adjust Mirror #3 one on the left hand side of the rail.

- To access this, you will lift the top of your machine.
- There will be 8 screws located on the INSIDE of your machine – 2 on the back of the machine, 2 on the right side, 2 on the left side and 2 on the front wall.
- You will move the top of the laser over so you can access mirror #3. It is on the left side of the rail.
- Adjust mirror #3 like you did the red beam mirror. There will be 2 allen head screws you will NOT mess with. There will be 3 flat tipped screws – adjust those.
- When you adjust this mirror, it will move both the red beam and the laser at the same time.
- Put a new piece of masking tape over the hole on the left hand side of the laser head. Adjust mirror #3 until the red beam is right in the center of the hole on the left side of the head. The more centered it is the more aligned it is.
- Once it is adjusted, put the top back on the machine.
- Shut the lid.
- Fire the laser again, by pushing the enter key until the tape burns and smokes.
- Make sure the red beam and the laser are in the same place right in the center of that whole. If they are not together and right in the center of the hole, follow the procedure again.
- Once the red beam and the burn mark are in the center of the hole on the left hand side of the head of the laser it will be aligned.
- You can redo the 4 Square cut test. The squares should cut evenly. If it doesn't follow major beam alignment section after this one.

MAJOR BEAM ALIGNMENT

1. Turn off the laser.
2. Remove the side cover and prism mount for mirror 1.
3. Put a piece of target paper 3 M away from the machine.
4. Hold Start/Stop and Pause button. Turn on the laser. Use your right arrow to select “check laser source” in the Diagnostic Process. Set the power to 10% on 25W machine, (adjust accordingly for you particular wattage of machine).
5. Press Enter till the target has a small burnt spot on it.
6. Adjust red beam mirror or red beam diode until red beam and burn spot are in same spot.
7. When this process is finished please re-assembly the cover over mirror 1

Front

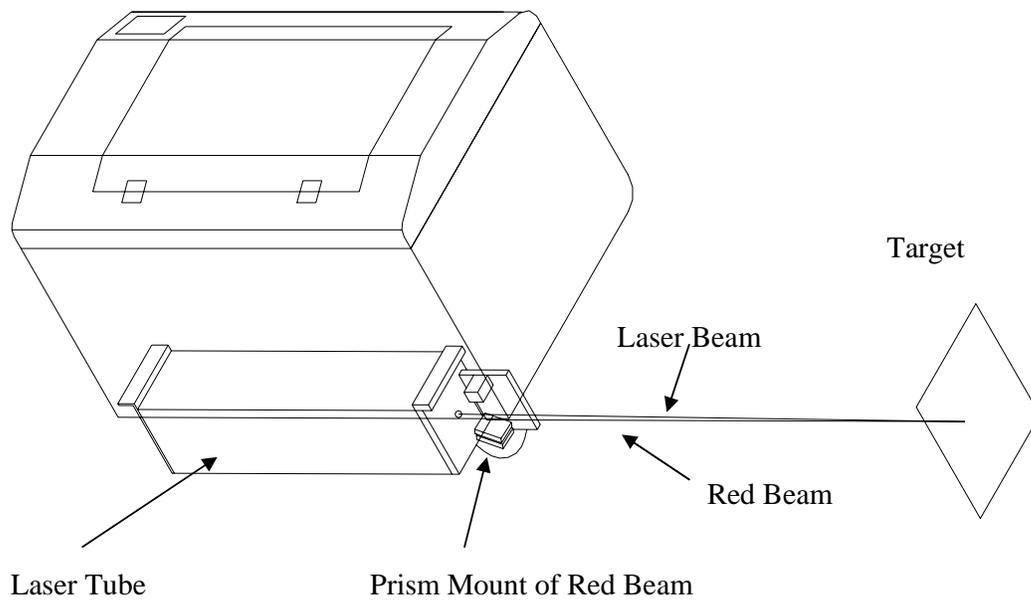


Fig 2-2

2-3 Beam Path to the X, Y Motion System

How to re-Align the laser beam from mirror 1 to X, Y Motion System

1. Stick a piece of masking tap on the backside of the Hole between mirror 1 and mirror 2. (Fig 2-4)
2. To press ENTER till the paper has a small burnt spot.
3. If the burn spot is not in the center of the Hole (Fig 2-4) please adjust Mirror 1 (Fig 2-3) until it is in the center.
4. Re-do the step1~3 until the laser beam will be shoot in the center of the paper (Fig 2-4).

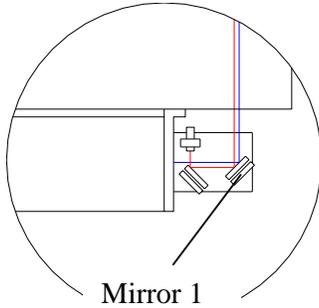


Fig 2-3

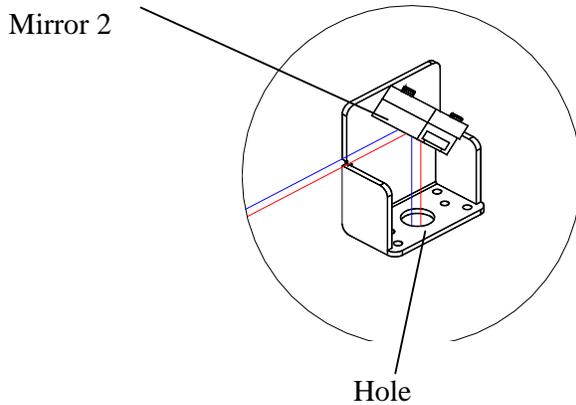


Fig 2-4

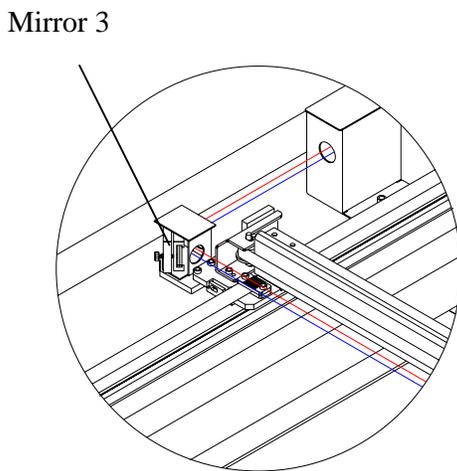


Fig 2-5

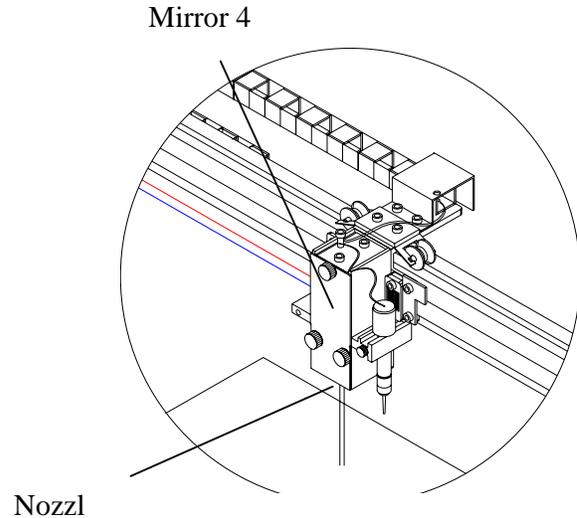


Fig 2-6

2-4 Laser Beam Adjusts on X, Y Motion System and Lens Carriage

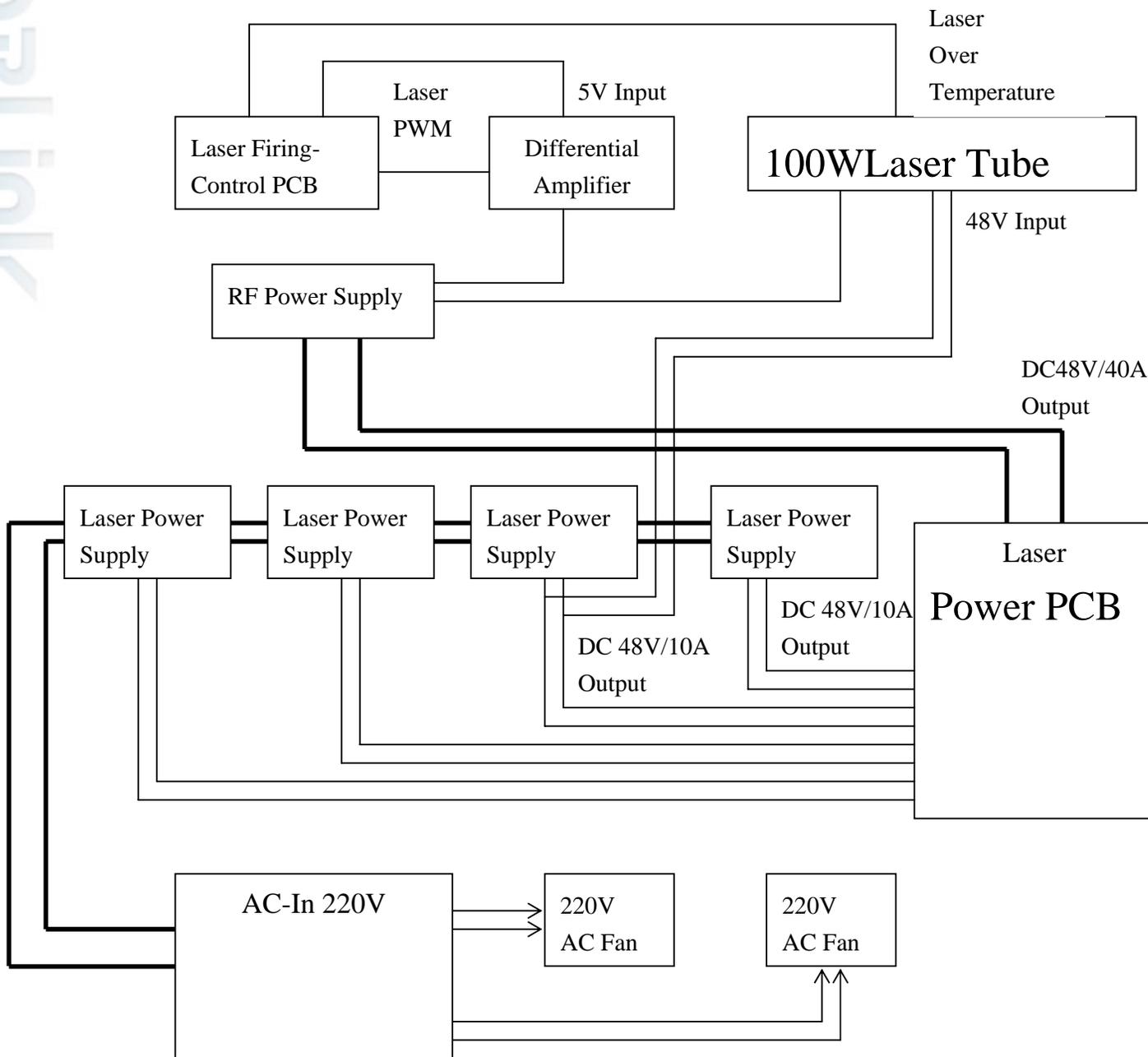
How to adjust Laser Beam parallel with Y-Axis

1. Stick a piece of masking tape in front of the Hole of the Mirror 3 (Fig2-9).
2. Move the X-Axis Rail to rear of the X-Y Motion System. (Fig 2-7)
3. Press ENTER key until the masking tape has a small burn mark on it.
4. Move the X-Axis Rail in front of the X, Y Motion System. (Fig 2-8)
5. Again press ENTER key until the masking tape has a small burn mark on it.
6. Adjust Mirror 2 using the red beam to make one burn mark meet the other.
7. Repeat steps 1~5 till the two points join together.
8. When that is accomplished, it means the Laser Beam parallel with Y-Axis.

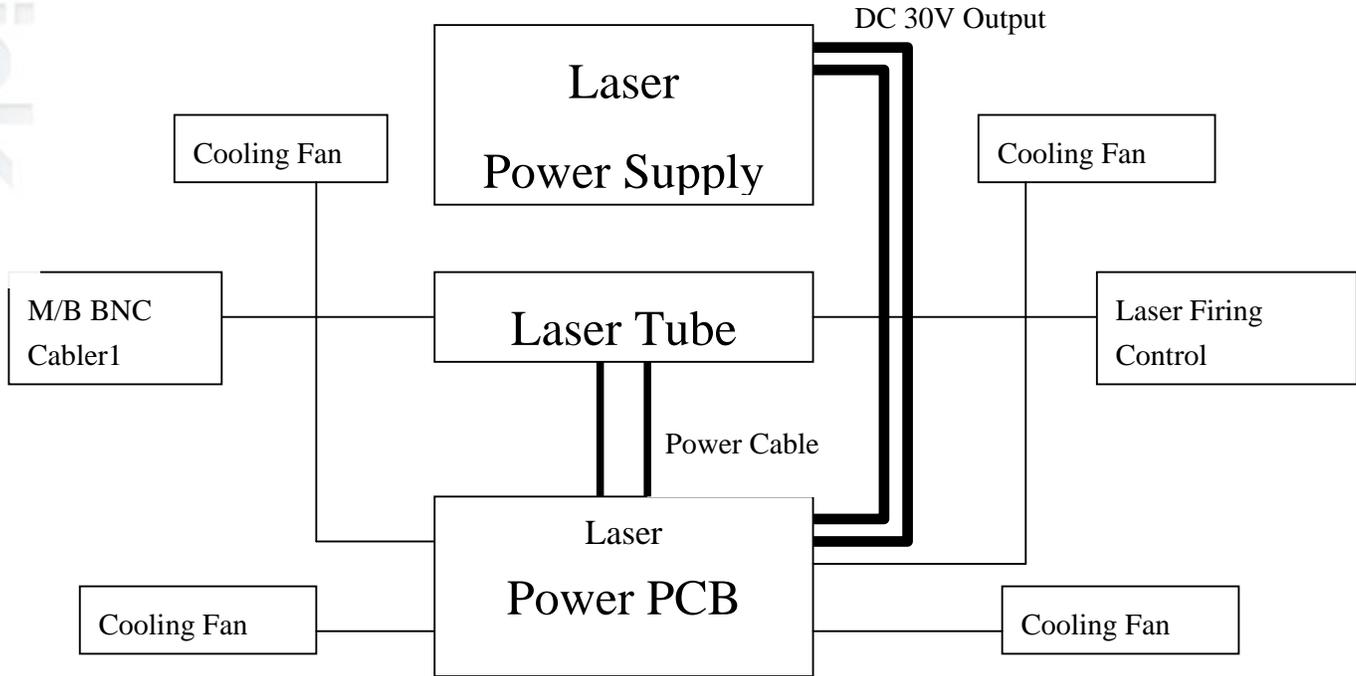
How to adjust Laser Beam to each corner of the X, Y Motion System.

1. Stick a piece of masking tape in front of the Mirror 4, (On the top of the Lens Carriage)
2. Move the Carriage to the P1 position. (Fig2-1)
3. Press ENTER key until the masking tape has a small burn mark on it.
4. Move the Carriage to the P2 position. (Fig2-1)
5. Press ENTER key until the masking tape has a small burn mark on it.
6. Adjust Mirror 3 using the red beam to make one burn mark meet the other.
7. Repeat steps 2~6 until the burnt spot comes close to each when in P1 and P4.
8. Put a piece of tape on the bottom nozzle of the laser head.
10. Move the Lens Carriage to P1, Replace Mirror 4 with a piece of plastic.
11. Press Enter key.
12. You will be able to see the position of the burning point from the piece of plastic.
13. Re-do the process from P1~P4, if the burning point P1~P4 is close to each other and in the center of the nozzle, then the procedure is done.
14. If the burning point is not in the center, start over.
15. Do this until the burn mark is in the center of the nozzle in all 4 regions of the laser, P1~P4.

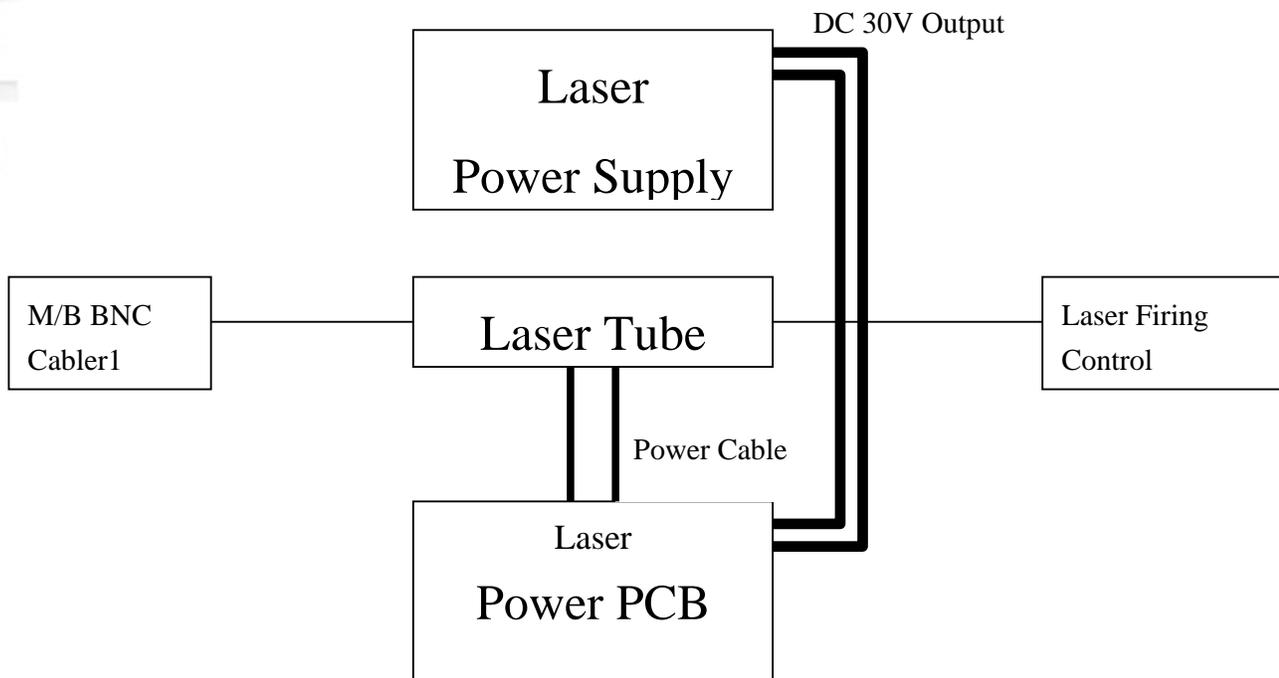
100W Laser Tube Wiring Diagram



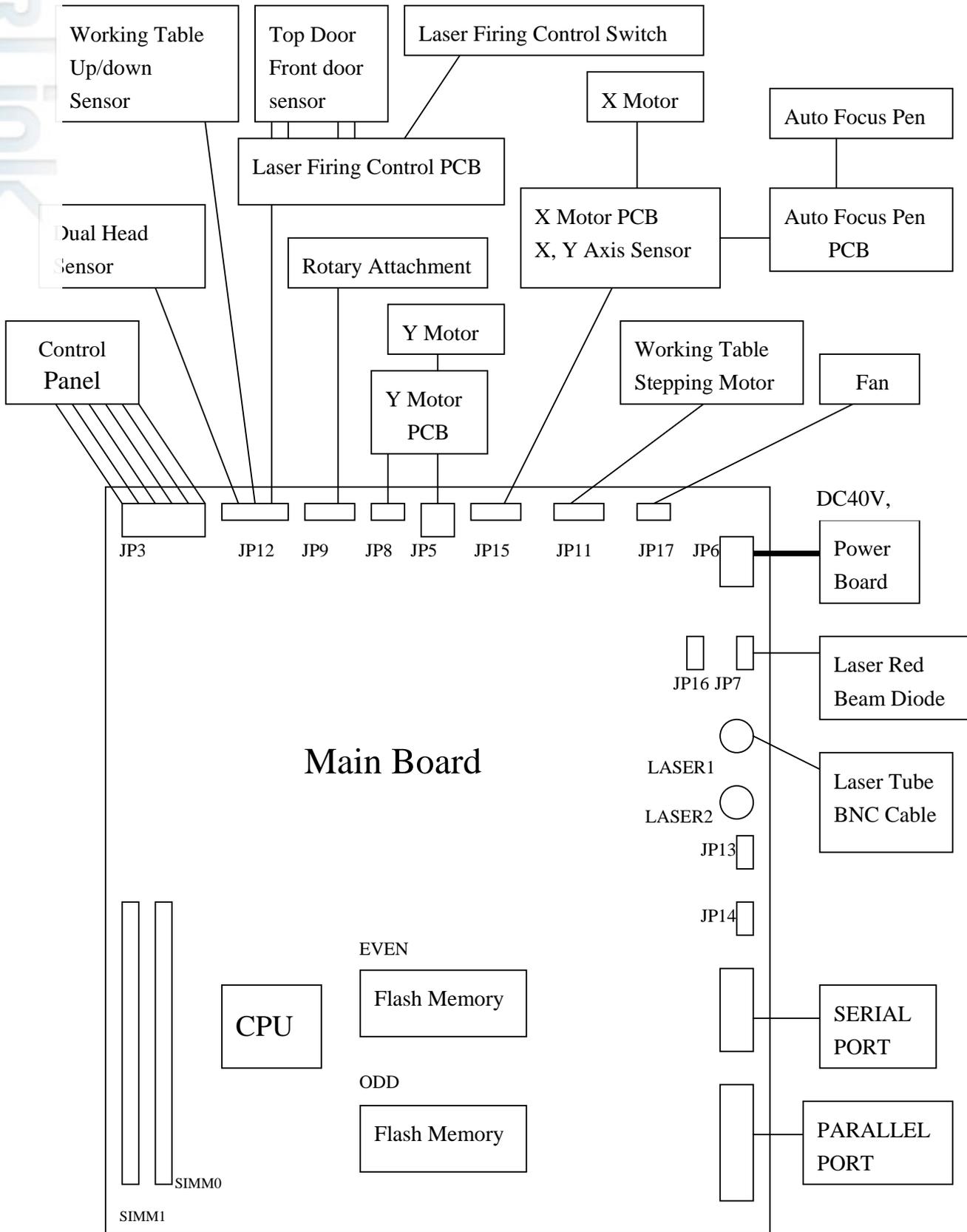
12~30W Laser Tube Wiring Diagram



50W Laser Tube Wiring Diagram

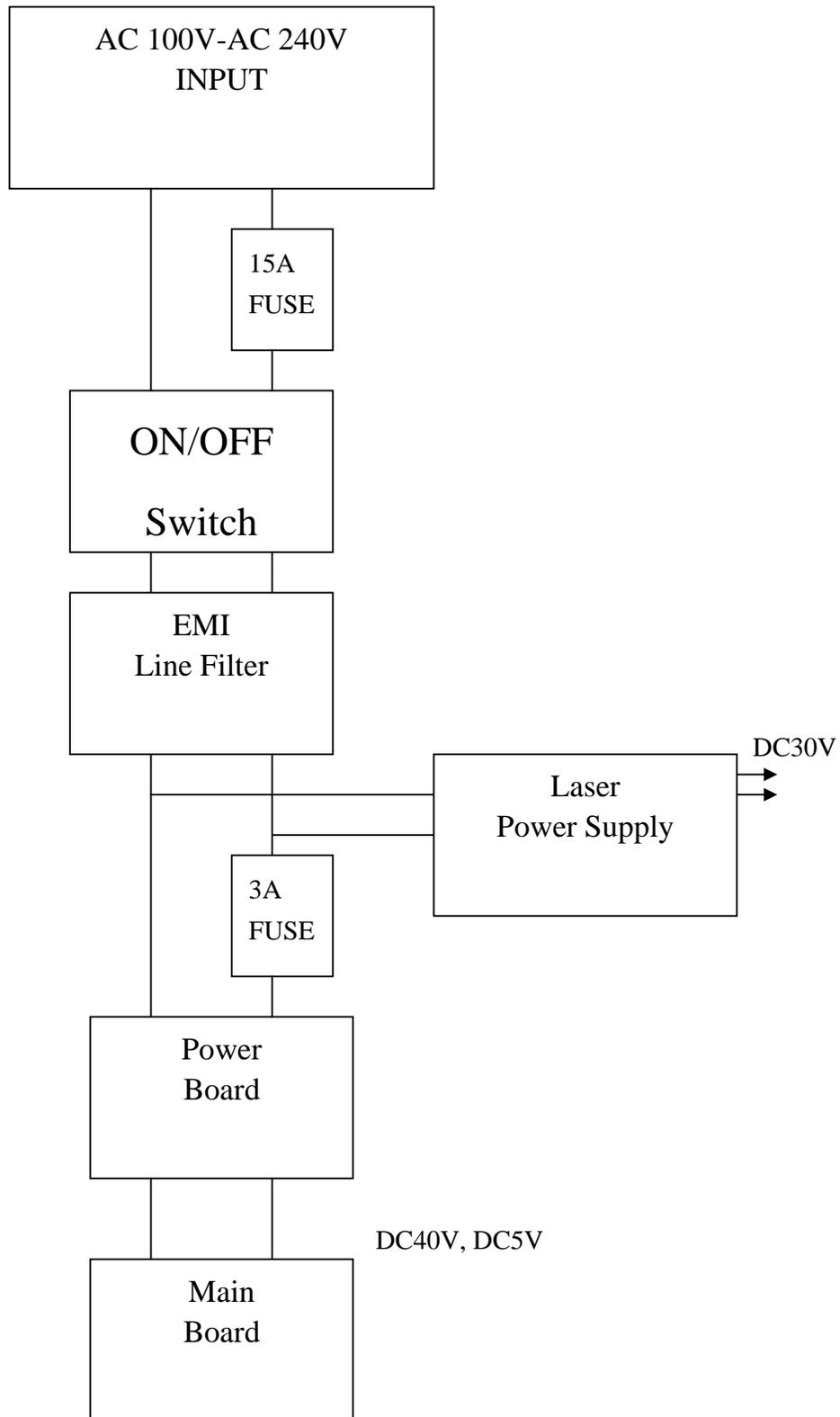


Mercury Main Board Wiring Diagram



Power Cable Layout Diagram

4-2



Section 4 System Diagnostics

4-1 The Hidden Diagnostic Procedure

IX. Section 4-1 The Hidden Diagnostic Procedure

The Hidden Diagnostic Procedure

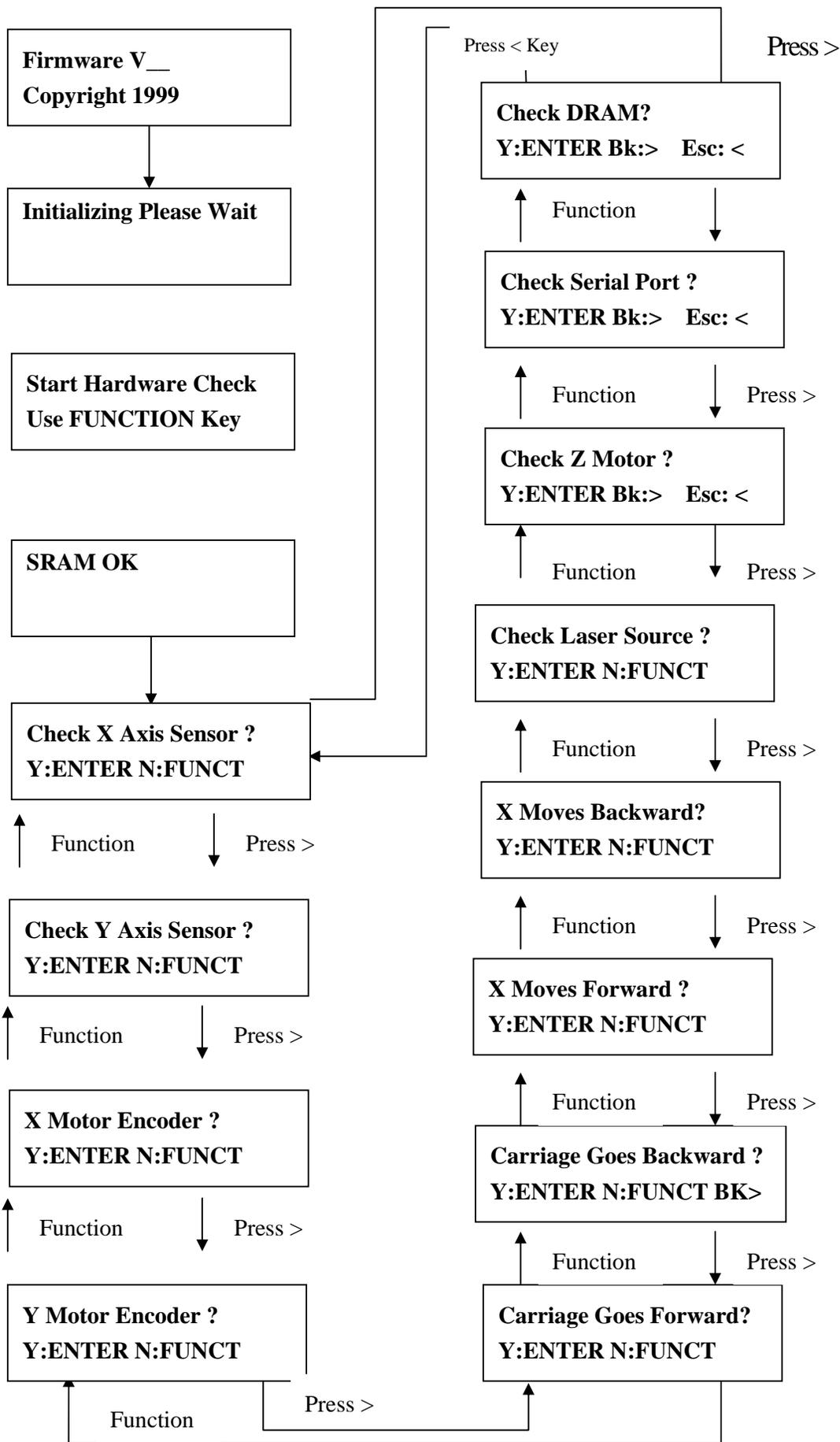
In this section, you will be guided through an embedded Diagnostic Procedure. It is a very useful tool, which will assist you to quickly verify and locate the fault when a malfunction occurs.

To access to this procedure, you simply power on the machine while pressing **Start/Stop** & **Pause** keys simultaneously till this text appears on the display.

“To start hardware function, use function key”

Push Function to enter the diagnostic procedure, the following items can be checked:

1. SRAM
2. X-axis sensor
3. Y-axis sensor
4. X-motor encoder
5. Y-motor encoder
6. X-motor's motion ability
7. Y-motor's motion ability
8. Z-motor's motion ability
9. Laser Source (useful for laser beam alignment)
10. Serial Port
11. DRAM



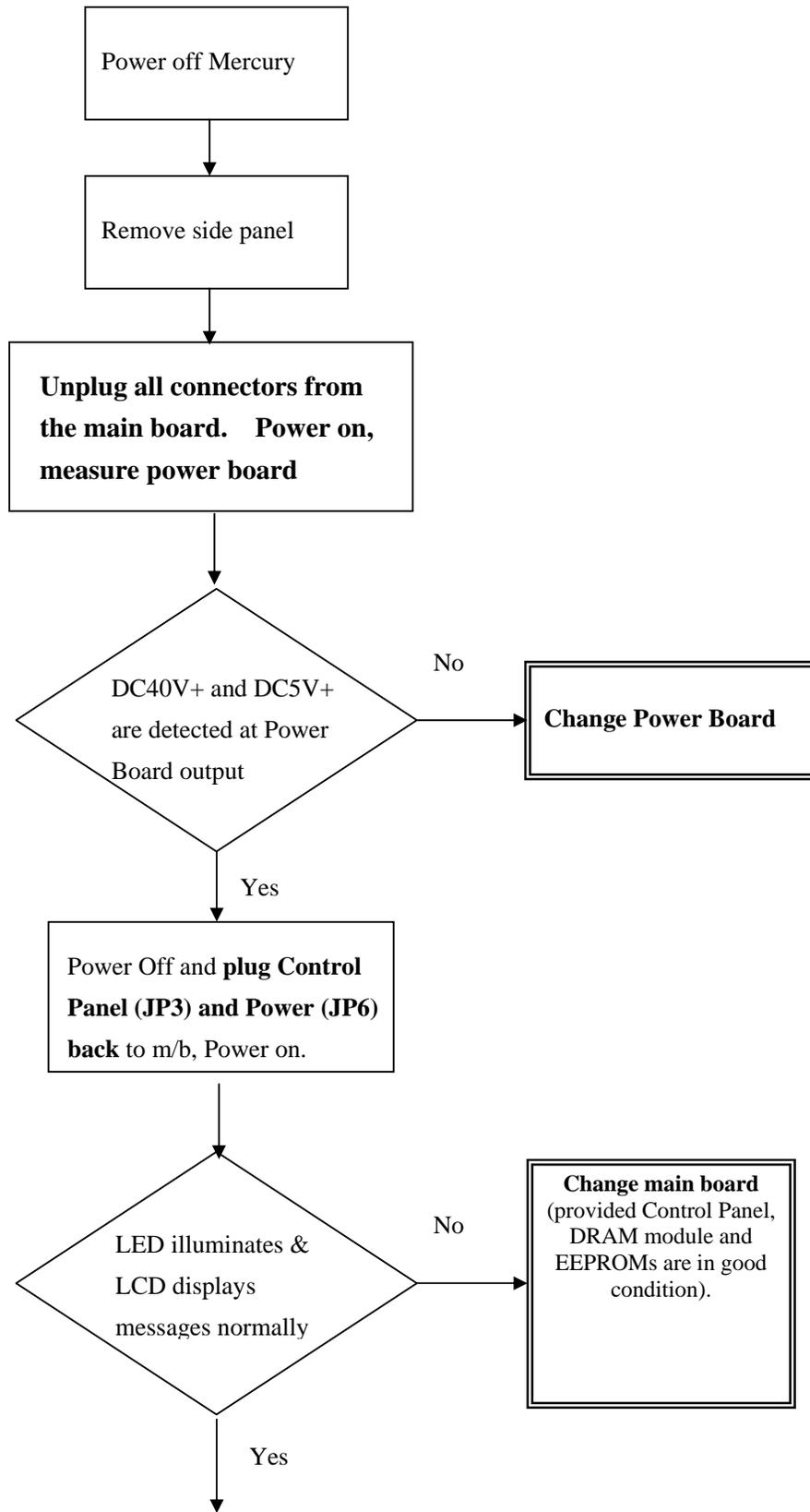
Section 5-2 Electrical Diagnostics

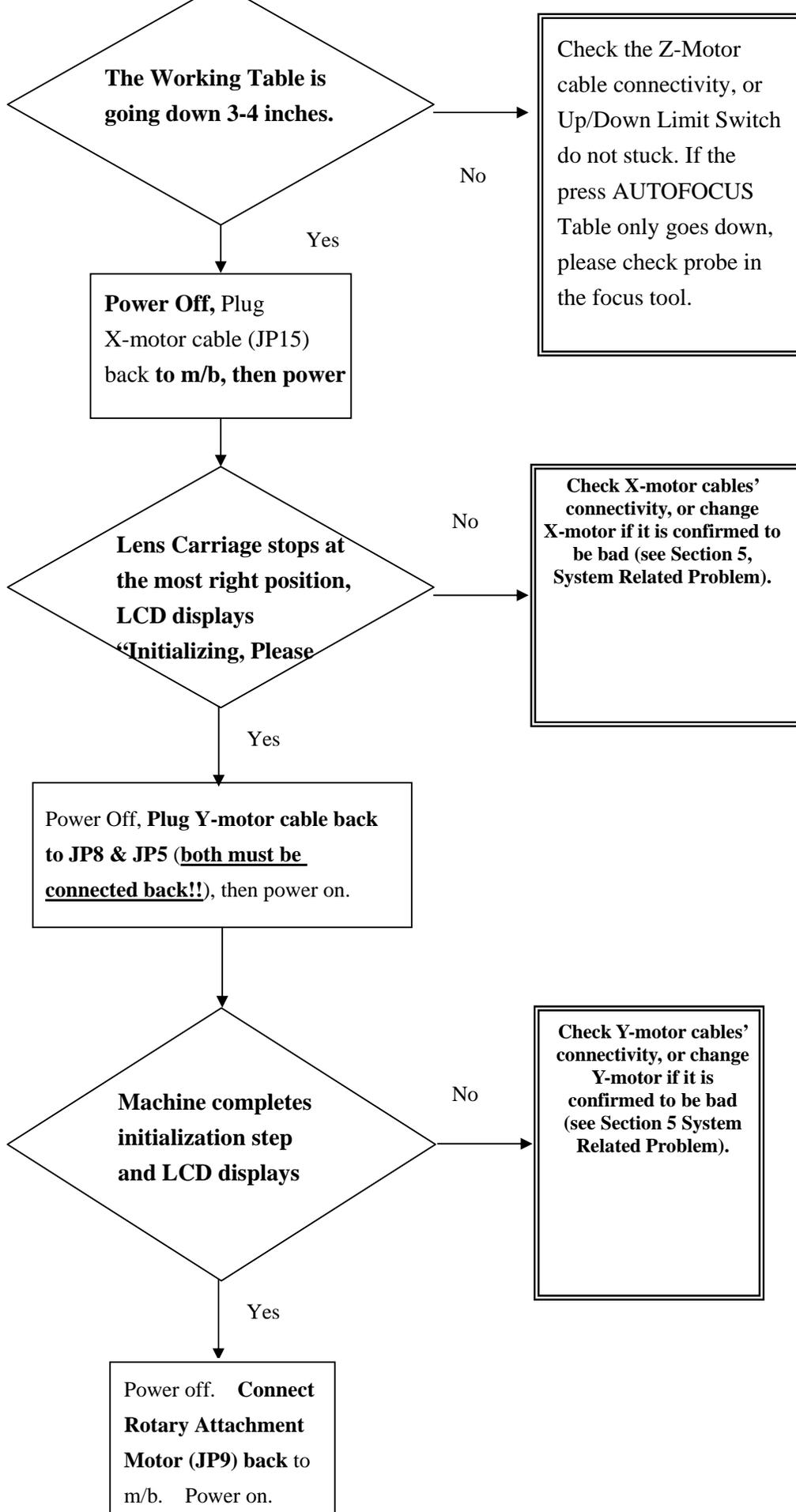
This section provides means to enhance system diagnostics for electronic parts.

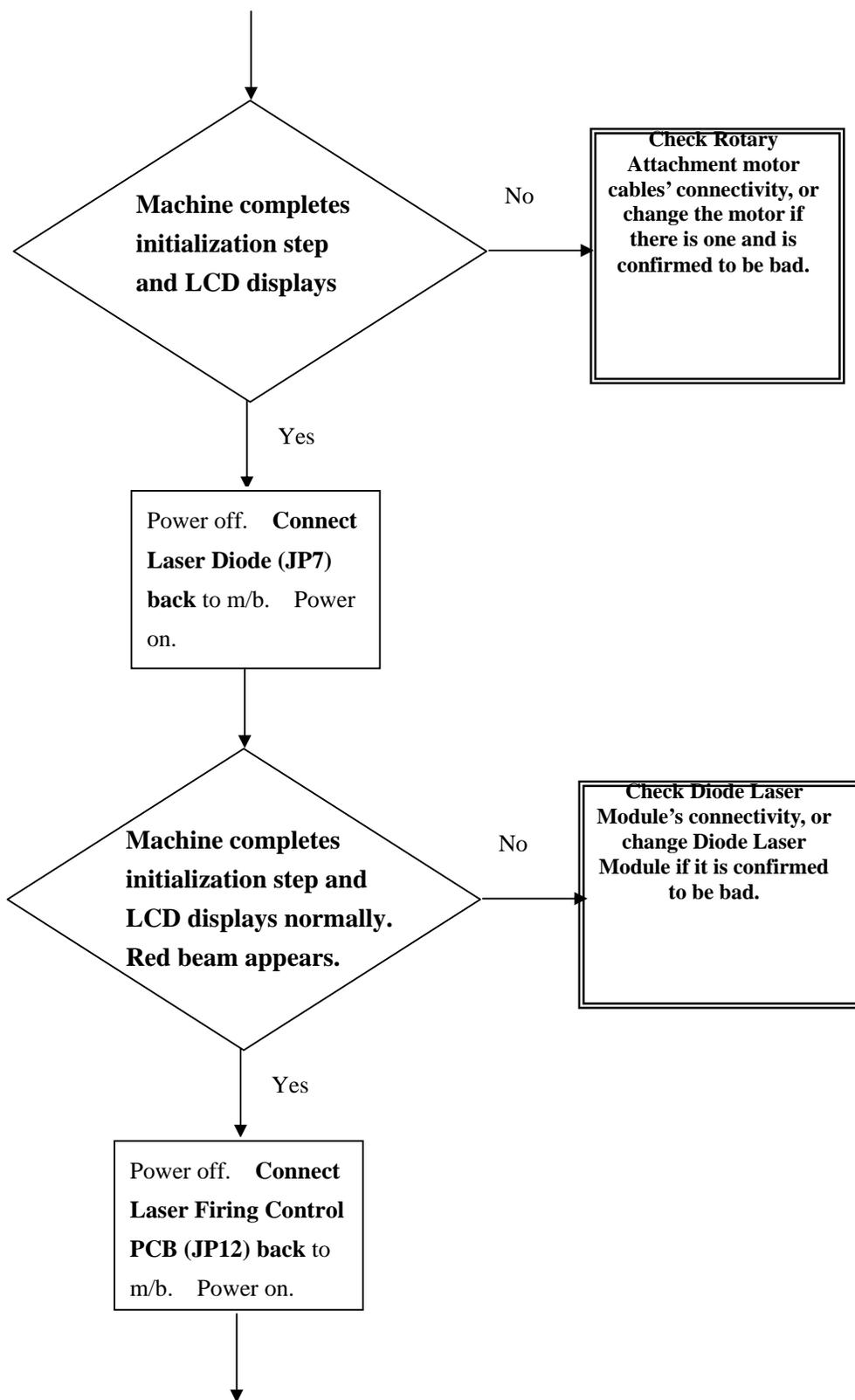
If there is an abnormality in system function, and you can not access the Hidden Diagnostic Procedure, such as a short circuit in system that will not let the machine start up, the following diagnostic chart will assist you step by step.

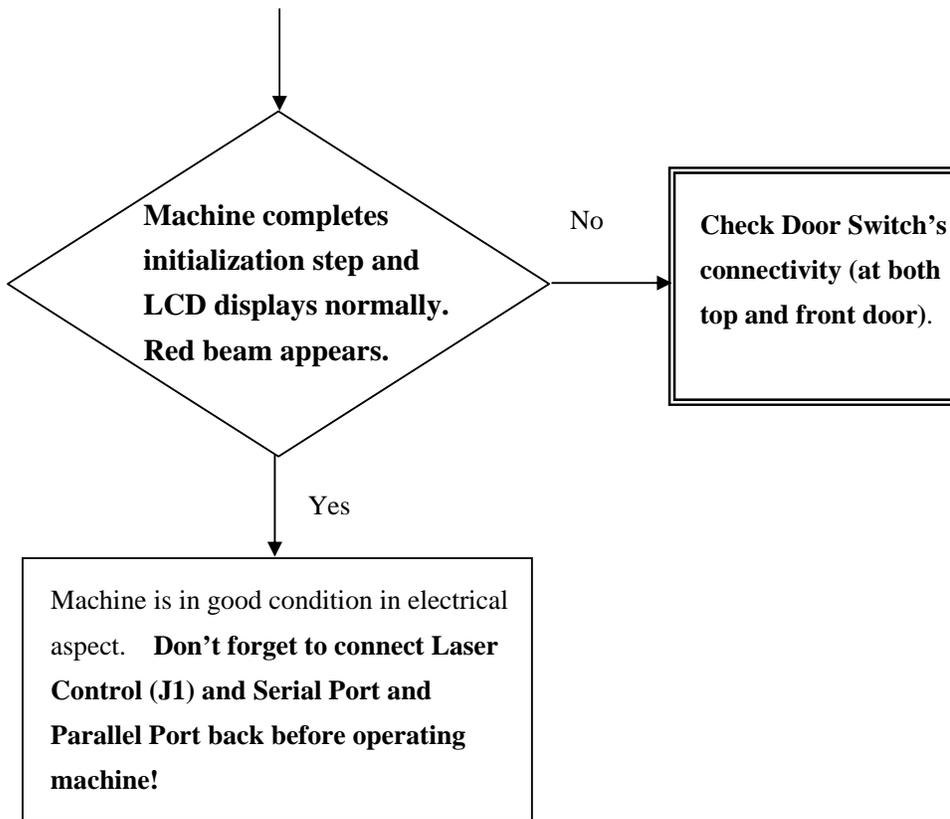
However, it is strongly recommended that only a qualified technician be allowed to carry out this test.

Electronic Parts Diagnostic Flowchart









XIX. Dual Head Install

Step 1 : Turn off the system.

Step2 : Put the dual head carriage onto the X-axis belt-bearing track.



Step3 : Cut 25mm (1 inch) off the air assist tube on the original lens carriage.

Step4 : Connect the air assist tube of the dual head with that of original carriage by "T" connector.



“ T “
Connector

Metal
Frame

Step5 : Screw the metal frame which is attached to the right side of dual head to the original lens carriage.

Step6 : Turn on the power to test whether the dual head is installed properly. During

initiation, the system will detect the dual head carriage when it moves the lens carriage to front-right side, so it would not crash the dual head carriage when move the origin position.

Note

1. Keep the screws on the lens carriage after taking off the dual head.
2. Put the black cap on the “T” connector after taking off the dual head to prevent airflow leaking.
3. Please choose dual head item from Paper option of printer properties before outputting a graph with dual head carriage.

