Spirit User Manual

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Dear Sir or Madam,

Thank you for choosing GCC and the LaserPro Spirit. You can be assured that this machine meets all of the highest safety standards while using technological innovations shared by no other laser engraver. The Spirit is backed by GCC, a truly international company that is dedicated to helping your business grow.

We at GCC are proud to introduce the LaserPro Spirit, our most technologically advanced laser engraver to date. This easy to operate machine has been designed with quality, productivity, and safety in mind. With innovations like the QSM™, stellar quality under high speed, SmartFILE file management, and the new Linear Low Maintenance Motion System, the Spirit clearly on the cutting edge of all laser systems.

GCC understands that a creative technical background is the key to successful growth in the ever-changing information economy. We have a strong team of R&D experts who propel our company to new heights. From product development to manufacturing, our engineers are dedicated to innovation and quality.

Guiding our solid technical base is a world-class management team. At GCC, our leaders bring together marketing, technical support, research development and distribution experts to create an international network able to meet your demands. Over the years, this network has been able to span the globe. Our technical support staff is committed to provide you with impeccable service, and when your business is ready to grow, our team will also be there!

Sincerely,

Leonard Shih
President of G.C.C.

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Chapter I - Safety

1.1 Principles of a CO2 Laser

LASER is the acronym for Light Amplification by Stimulated Emission of Radiation. A CO_2 laser works by electrically stimulating the molecules within a carbon dioxide gas mixture. When focused through a lens, this highly-intense, invisible beam will vaporize many materials. Depending on the speed and intensity of the projected beam, a CO_2 laser may be used to engrave or cut through a wide variety of materials.

1.2 Safety Ratings

The LaserPro Spirit is equipped with a sealed carbon-dioxide laser that emits intense and invisible laser radiation with a wavelength of 10.6 microns in the infrared spectrum. The laser system is designated as a Class I laser device, meaning that the system is equipped with key safety features and an enclosed laser head to completely contain the laser under normal use. One of the key safety features found on the LaserPro Spirit is a Class IIIR red dot safety guidance pointer (similar to a laser-pointer presentation pen) allowing the operator to see the exact location where the laser beam will fire. Even though the LaserPro Spirit is equipped with our most powerful laser to date, proper usage and hardware safeguards make it an extremely safe machine.

1.3 The Safety Interlock System

The laser system is equipped with a safety interlock system utilizing magnetic sensors on the top and side access doors, laser-activation and door LED lights on the control panel. The magnetic sensors will deactivate the laser when either door is opened. At this time, the “door” LED light found on the control panel will illuminate, indicating an open or improperly closed door. When the laser is in operation, the “laser” LED will illuminate to inform the operator that the laser is activated. If at any time, any of the access doors are open and the “laser” LED is illuminated, **IMMEDIATELY** unplugs the laser system and contact GCC technical support for service instructions.

WARNING

- **DO NOT** operates the laser system if any component of the safety system is malfunctioning.
- **DO NOT** attempt to remove or modify any component of the safety interlock system.

1.4 Safety Labels

According to CDRH standards, all fixed or removable covers that allow access to a laser beam must have the appropriate laser warning labels attached to them. These warning labels must be clearly visible to the operator prior to removing the cover. Additional labels must be applied inside of the machine and be visible in the event the covers are removed. A label clearly

displaying the manufacturer's name, date of manufacture, description of product, model number, serial number, and compliance statement must be attached to the outside of the machine.

In compliance with CDRH standards, the required warning labels are affixed at the time of manufacture to the LaserPro Spirit in the appropriate locations. These labels are not to be modified in any way or removed for any reason. Please familiarize yourself with the specific labels and their locations on the machine. Below is a list of all the safety labels and their locations on the machine.

Product Label

This label is located at the right-back side of machine. All the product information such as Serial Number, Model Numbers, Laser Power and Electric power can be found here. Before requiring any tech support, always provide service person the information on this label.

CDRH Label

This label indicates the class level of CDRH.

Warning Label
Warning Label is written all the necessary information to be aware of in every operation.

Laser Path Warning Label
LaserPro machines are very safe under normal function. However, in case of any accident, Laser Path Warning Label will be stick on the possible laser path. When operators close to these paths should be careful of the possible injury while machine working.

Laser Path Danger label
This label indicates the laser path. Normally you can find this label inside of machine. Please be very careful of this area when you do the maintenance.

1.5 Safety Measures

- **LASER RADIATION WARNING:** Exposure to laser radiation may result in physical burns and severe eye damage. Proper use and regular maintenance of this machine is important to the safety of all people in the immediate area.

- Prior to operation, carefully read and familiarize yourself with the warning labels located on both your laser system and in this manual.

- Never leave the machine unattended during the laser cutting and engraving process. The laser may ignite combustible materials. A well-maintained fire extinguisher and operational smoke or fire detector should be kept in the vicinity of the machine.

NOTE
SmartGUARD™ is an optional fire detection alarm system developed by GCC. Contact your local GCC authorized distributor for more details for having this safety option installed onto your system.

- Enable the SmartAIR™ nozzle when engraving or cutting materials that may easily ignite, such as acrylic, wood, or paper.

- Always wear safety goggles when the laser system is in operation. Reflective materials such as mirrors, enameled brass and anodized aluminum may partially-reflect some of the invisible laser radiation. Severe eye damage may occur if appropriate safety goggles are not worn.

NOTE
Each LaserPro laser machine is shipped with a single pair of safety goggles. If additional safety goggles are required, please contact GCC directly or an authorized GCC distributor. If you wish to purchase one on your own, please make sure the safety goggles meet these requirements:

190 - 398 nm OD5+
10,600 nm OD5+
Visible Light Transmission: 92.9%

- Connect the machine to a properly grounded power outlet. Ensure the voltage of the power source is identical to the voltage of the machine.

- Do not open the laser access panel when the machine is plugged in.

- Do not attempt to modify or disassemble the laser module.

- Do not attempt to remove or modify any component of the machine's laser interlock safety system.

- Ensure the immediate work area of the machine is well-ventilated. Odors, vapors, and dust are byproducts generated during the laser engraving and cutting process. An exhaust system, vacuum cutting box, and honeycomb table are recommended. Please contact GCC or your local GCC distributor for more information.

- Do not laser heat-sensitive surfaces or materials that may generate toxic fumes, such as PVC and Teflon.

Regularly clean and maintain your machine according to our cleaning and maintenance instructions. Doing so will ensure a machine that will operate effectively and safely over a long period of time.

1.6 Operating Environment

Please follow the guidelines when considering a suitable location to set the LaserPro Spirit. Improper work environments may lead to operational malfunction and/or unsafe working conditions. The LaserPro Spirit should be placed and operated in a standard office-type environment.

- Avoid environments where the machine is exposed to high levels of dust, temperature (temperatures exceeding 30°C or 85°F) or humidity (humidity exceeding 70% or where the ambient temperature is near the dew point).
- Avoid small, enclosed areas with poor ventilation.
- Avoid areas with high levels of noise and electrical noise.
- Select a location that is large enough to accommodate the LaserPro Spirit, an exhaust system, a computer and a work or storage table.
- Select a location in which the ambient temperature remains between 15°C and 30°C (60°F to 85°F).
- Select a location in which the relative humidity remains between 30% - 40%.
- Select a location in which there is a short, direct path to the fume exhaust system.
- Set the LaserPro Spirit on a floor surface that is completely even.
- Make sure your smoke or fire detection system in the immediate area is functioning.
- Setup the machine to be apart from the wall at least 60 cm (2 feet).

NOTE
SmartGUARD™ is an optional fire detection alarm system developed by GCC. Contact your local GCC authorized distributor for more details for having this safety option installed onto your system.

Chapter II - Unpacking & Contents

2.1 Unloading and Unpacking

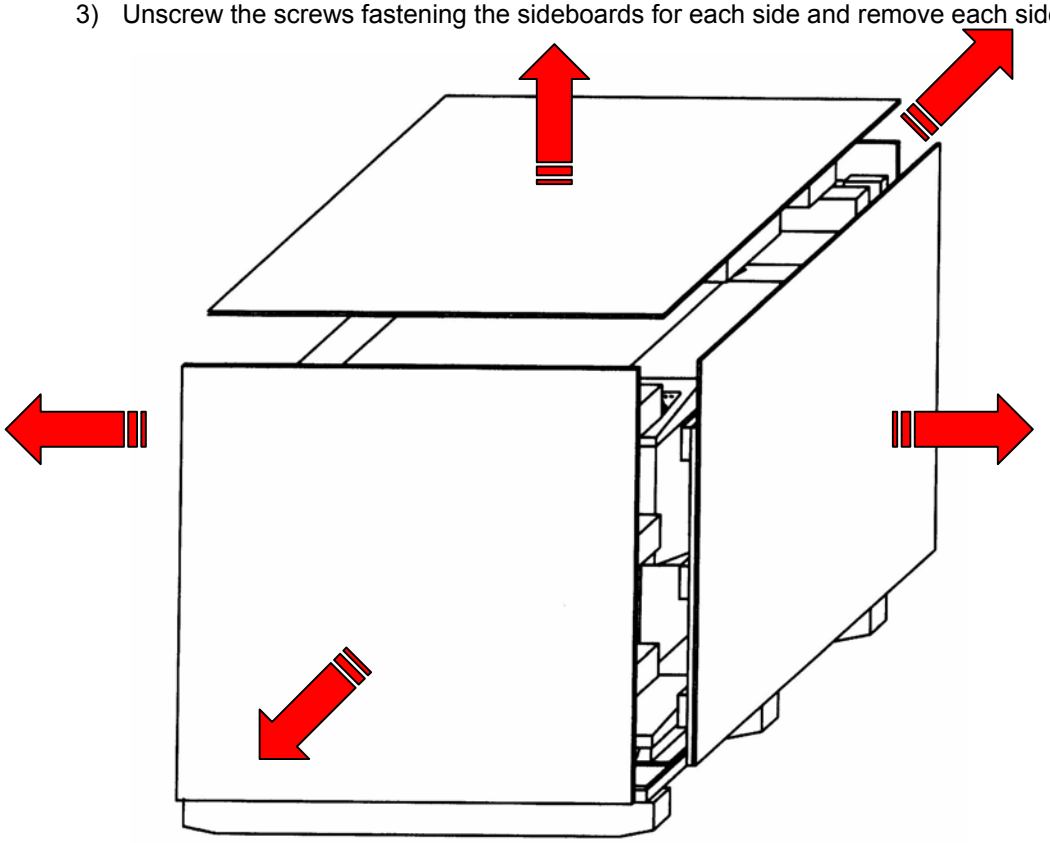
The LaserPro Spirit is shipped in one crate that contains the machine, the software, and all of the necessary accessories. The following section contains detailed step-by-step instructions for unpacking and assembly of the machine.

> ***WARNING***
> To prevent personal injury or damage to the machine, please obtain assistance when loading and unloading the shipping crate.

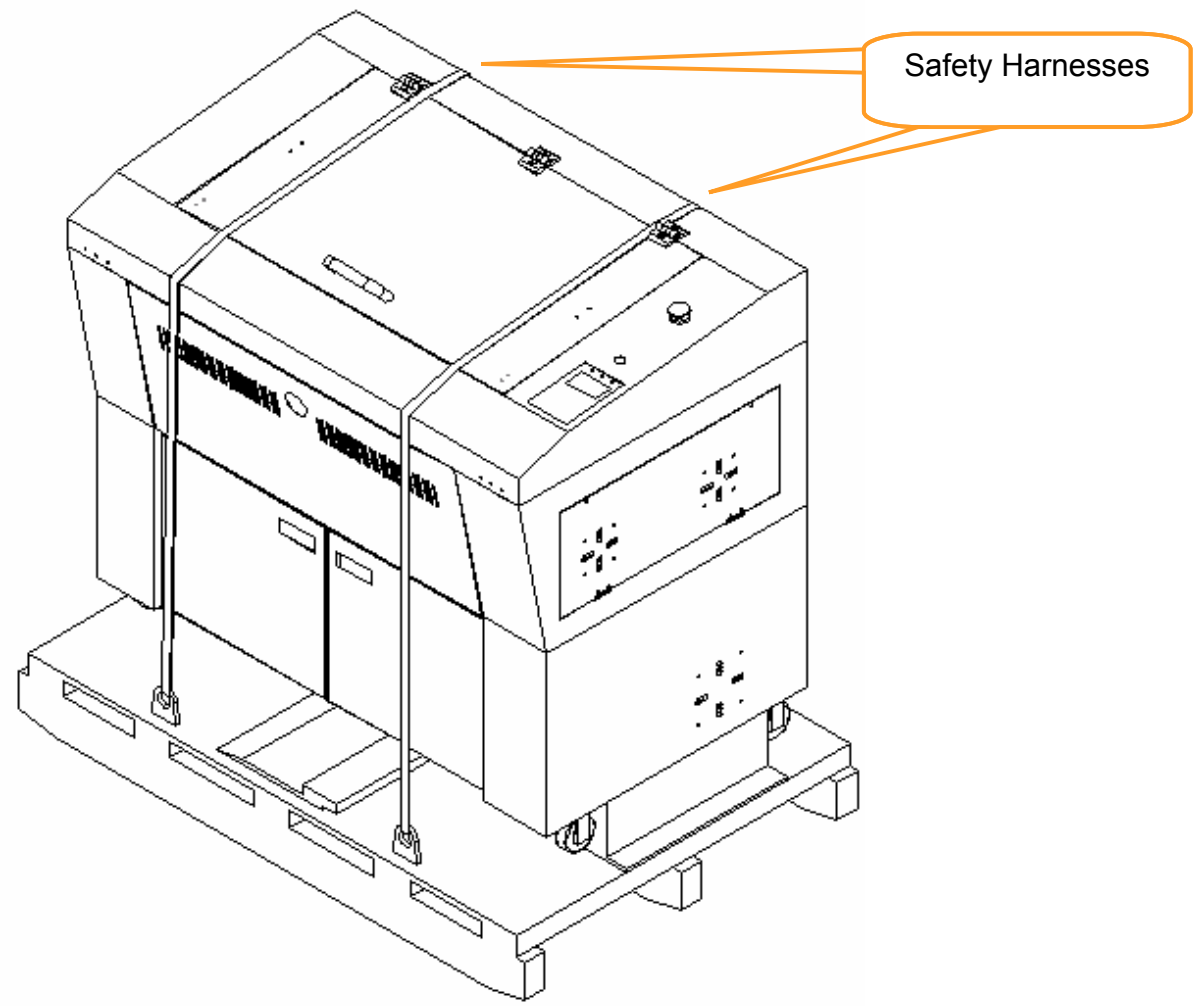
> ***NOTE***
> Please save the original shipping crate. If the machine must be returned for product servicing, it will need to be packed in its original shipping crate.

Unpack via the following steps:

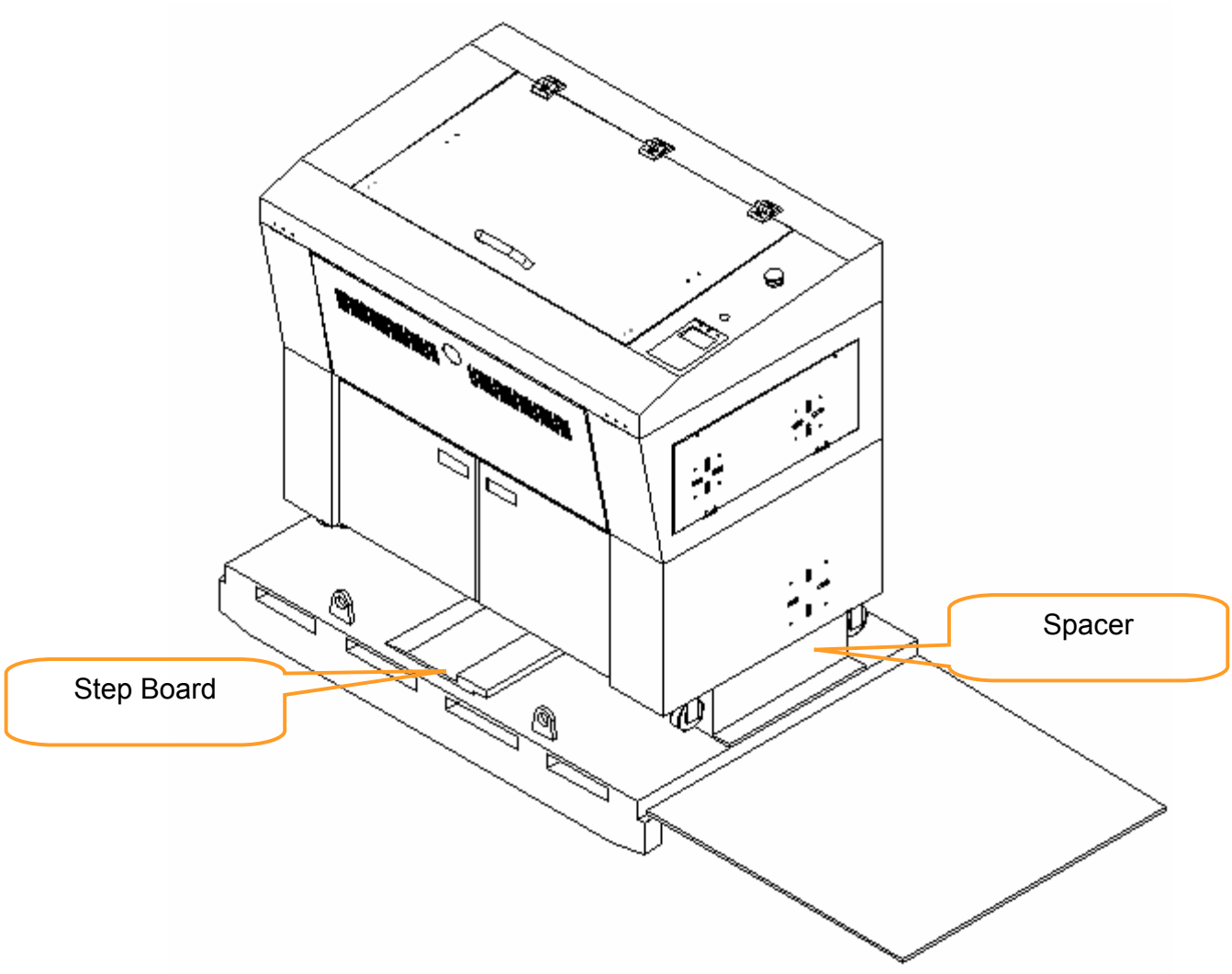
1) Move the shipping crate near the designated work area.
2) Unscrew the screws fastening the top board and remove the top board.
3) Unscrew the screws fastening the sideboards for each side and remove each sideboard.



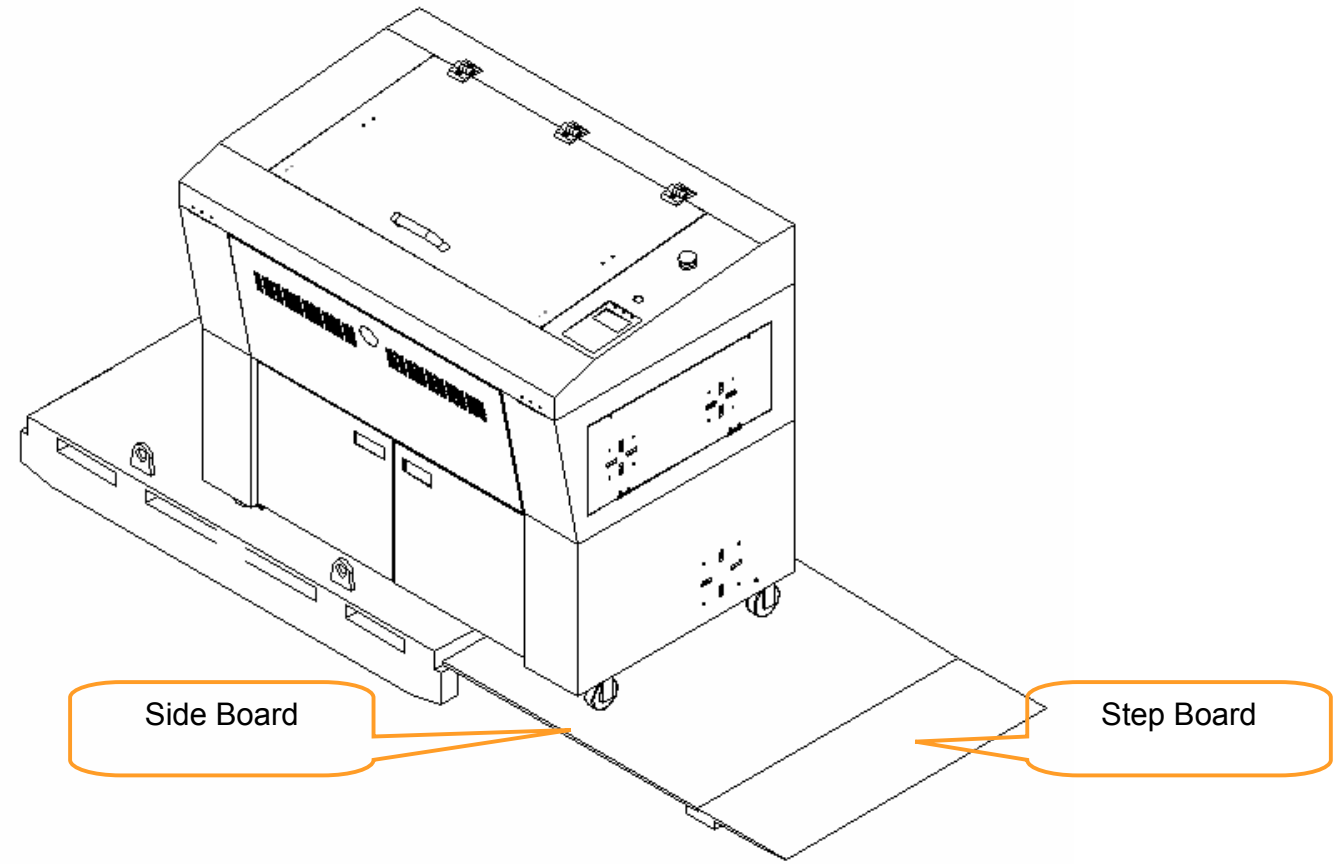
4) Unfasten and remove the two safety harnesses via the safety belt buckles on the front side.



5) Unscrew the screws holding the spacers (left and right side of the machine) and the step board (front and rear of the machine). Remove the two spacers and the step board.



6) With the removed left / right sideboard, place one against the left or right side of the shipping crate to form an incline. Place the step board against the inclined sideboard to form a complete ramp.



7) Carefully roll the machine off the shipping crate and position it into your work area.

2.2 Contents and Accessories Checklist

Please check to make sure that all of the following items are included within the shipping crate. If any of the following items are missing, immediately contact your local GCC distributor.

ITEM	QUANTITY
Cleaning Kit: Cotton swab Lens Cleaner Solution Lens Tissue	 1 1 1
Replacement Mirror	1
Hex Screw Wrench	1
Manual Focus Gauge for 1.5”, 2.0”, and 2.5” focal lens	1
AC Power Cord	6
Printer Port Cable	1
USB Port Cable	1
Installation CD (LaserPro Spirit user manual, driver, and firmware)	1
Safety Goggles	1
Engraving Samples and Material Starter Kit	1 pack

Chapter III - Mechanical Overview

Please take some time to familiarize yourself with this section regarding the mechanical overview of the LaserPro Spirit. References will be made back to the different parts of the LaserPro Spirit in later sections.

3.1 Front View

3.2 Top View

3.3 Right (Profile) View

3.4 Left (Profile) View

3.5 Rear View


SmartLID™ Operation Handles
SmartLID™ Operation Handles
Ventilation Opening
SmartEXT™ Pass-Through Door (Rear)
Laser Access Panel

Chapter IV - Setup and Installation

4.1 Machine Setup

4.1.1 Powering Up the Machine

> ***CAUTION***
> Make sure both the LaserPro Spirit and computer are turned off before connecting either to a power source.

1) Connect the male end of the power cord to a quality surge protector and then connect the surge protector into a properly grounded outlet.
2) Do the same for the computer system.
3) Connect the female end of the power cord into the machine's power cable inlet located on the right side of machine.

> ***NOTE***
> - The LaserPro Spirit has been designed to automatically switch from 100~240 VAC.
> - Make sure to supply 220V of electricity to the LaserPro Spirit with laser wattages above 60W.

4.1.2 Power Cable Connection

If the LaserPro Spirit you purchased is a 100W laser power, please have a professional technician install the power cable wiring as shown below.

Step 1 Each Spirit 100W machine is equipped with the following power cord which is marked separately with G-Ground, N-Neutral, and L-Live. Notice that the two ends of the power cord has different type of connectors, O-shape and Y-shape.

Fig. 4-1 Power Cord for 100W SPIRIT Machine

Step 2 Unscrew the laser cabinet panel in the rear side of SPIRIT.

Fig. 4-2 Unscrew the Laser Cabinet

Step 3 Unscrew the black fixing connector in the right side of Spirit.

Fig. 4-3 Location of Black Fixing Connector

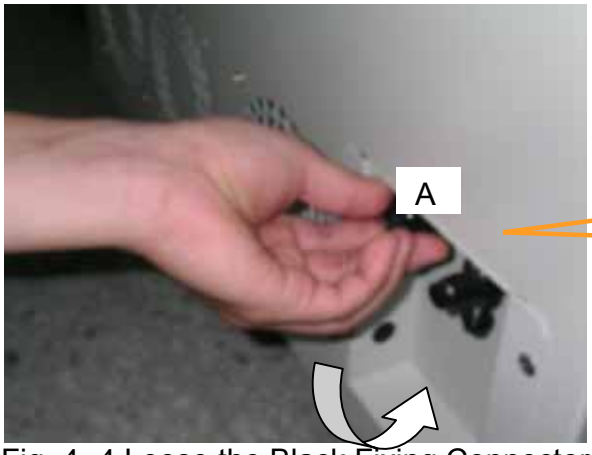


Fig. 4- 4 Loose the Black Fixing Connector

Step 4 Insert the O shaped power cord through the black wiring connector.

Fig. 4- 5 Insert the O shaped Cord to the Black Fixing Connector

Step 5 Install the Assembly C in step 4 to SPIRIT through An opening and use O ring B to fix it.

Fig. 4- 6 Install the Assembly and O ring to Spirit

Step 6 Loose the screws on the terminal connector, put the O shaped power cord and re-install the screw to fix the O shaped power cord.

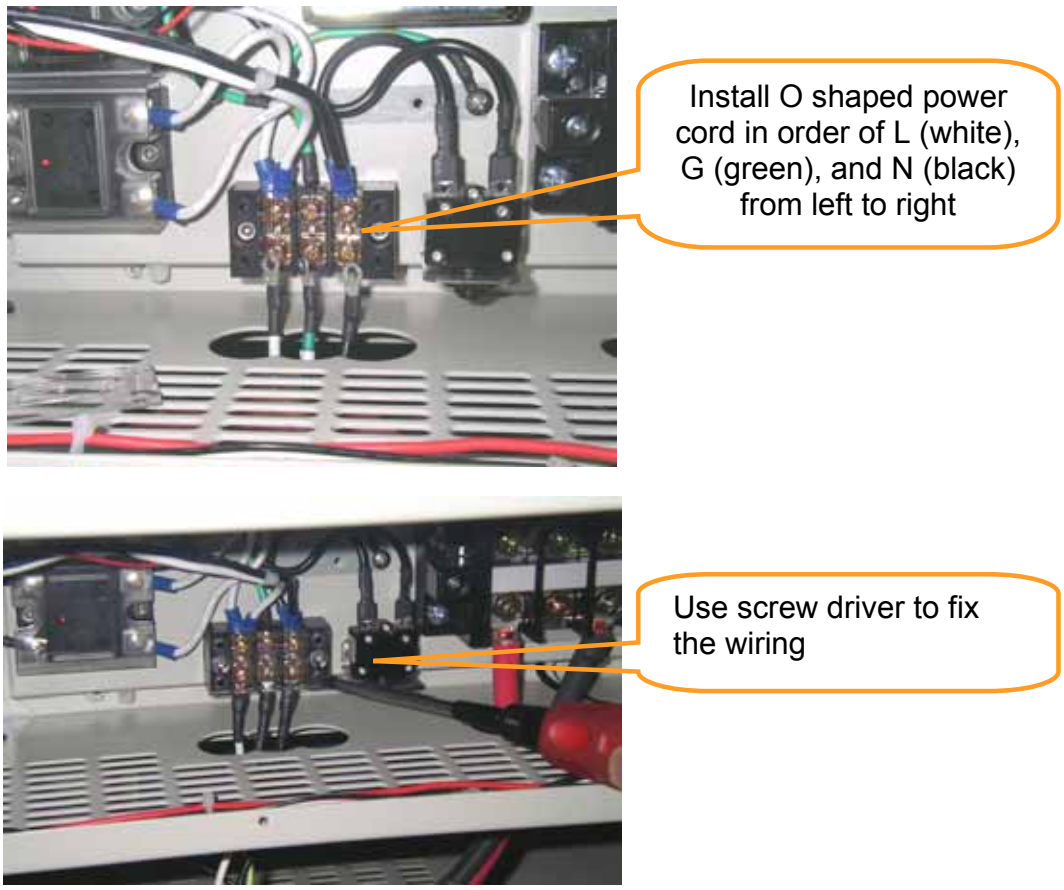


Fig. 4-7 Install the O shaped Cord to Terminal Connector

Step 7 Close the laser cabinet panel to finish the power cord installation.

Fig. 4- 8 Screw the Laser Cabinet Panel to Finish the Power Cord Installation

4.1.3 Connecting the Computer

The LaserPro Spirit can communicate with a computer through a USB Port or Parallel Printer Port connection interface. The USB Port connection offers faster file transfer rates and greater flexibility over the Parallel Printer Port connection. Regardless of the connectivity method chosen, you will need to connect the respective connection cable from the LaserPro Spirit to your computer.

USB Connectivity: Connect the included USB Port Cable to the USB Port on the right side of the LaserPro Spirit.

Printer Port Connectivity: Connect the included Printer Port Cable to the Printer Port on the right side of the LaserPro Spirit.

NOTE
If you have purchased additional Optional Accessories for the LaserPro Spirit, please refer to chapter VII for instructions on how to properly setup your optional accessories. These should be setup prior to working with your LaserPro Spirit.

4.2 Graphics Software Setup

The LaserPro Spirit is compatible with graphics software that can output HPGL commands, such as CorelDraw, Adobe Photoshop, AutoCAD, Illustrator etc.

Supported Graphic Software

- Photoshop
- CorelDraw
- Illustrator
- AutoCAD

Other software such as EngraveLab and PhotoGrav may work with the LaserPro Spirit, but these are not supported. Any software that can output to the LaserPro Print Driver should work.

NOTE
Support will not be offered, if you experience output problems with non-supported graphics software.

4.2.1 Recommended Computer Configuration

The LaserPro Spirit operates under Windows operating systems and is designed to work on a computer that meets the following minimum requirements.

Computer

- CPU Pentium 90 (or equivalent) or greater
- RAM 32MB or higher
- FDD One 3.5” 1.44 MB Floppy Disk Drive
- HDD 1.2 GB Hard Drive or greater
- SVGA 15” Super VGA Monitor

- On Board Parallel Mode (Enabled from your motherboard's BIOS):
- SPP – Preferred Mode
- ECP – Cable (Less than 1.8 meters)

Software

- The LaserPro Spirit drivers are designed for Windows 2000, XP, or newer operating systems.

4.2.2 Installation of the LaserPro USB Driver

This section is only required for users that use USB connectivity. If you use the Parallel Printer Port connectivity, then you can skip this section.

NOTE

- Do NOT connect the USB cable to the PC before you have completed both the LaserPro USB driver and LaserPro print driver installation.
- Install the LaserPro USB driver BEFORE installing the LaserPro Spirit print driver.
- This set of USB drivers are not the same as the native USB drivers for Microsoft Windows.

1) Turn on your computer and insert the LaserPro CD.
2) From the auto run menu, select **Spirit→ USB Driver** to start the LaserPro USB Driver installation.
3) The LaserPro USB Driver installation program will update your Windows USB driver. When the notification pops up, select **Yes** to continue the installation.
4) Click **Start** to the installation.

4.2.3 Installation of the LaserPro Print Driver

1) Insert the LaserPro CD.
2) From the auto run menu, select **Spirit→ LaserPro Driver** to start the LaserPro Print Driver installation.
3) When the Add Printer Wizard menu comes up, click **Next** to continue.
4) At the Local or Network Printer page, select <Local printer attached to this computer>, then click **Next** to continue.
5) At the Select a Printer Port page, select <Use the following port> and select the port that the LaserPro Spirit will be attached to, then click **Next** to continue.
6) The next screen will prompt you with a list to select the manufacturer and model of your printer. From this menu, click **Have Disk**. Another menu will now pop up for you to indicate the location of the print driver. With the LaserPro CD still in your drive, click **Browse** and point to the file located at: D:\Spirit\LaserPro driver\WIN XP\Dv3.45\GL345.inf (where D is the driver letter assigned to your CD-Rom drive) and click **OPEN** to have Spirit displayed as a valid printer.
7) Now select Spirit from the list of printers (Spirit should be the only printer displayed on the list) and click **Next** to continue.
8) If a screen comes up informing you of the detection of a previous driver and asks to keep the existing driver or use the new one, select **Replace Existing Driver** and click **Next** to continue.
9) This screen will prompt you to provide a printer name. Simply type in <Spirit> and select **Yes** or **No** if you want to use this printer as the default printer and click **Next** to continue.

NOTE
When working with the LaserPro Spirit Print Driver within your graphics software, you will need to have the Spirit set as the default printer to get proper output. If you select to not have the Spirit be the default printer, please remember to manually change this on your own from within the graphic software printer selection area or from the Windows Control Panel → Printers and Faxes section.

10) At the Printer Sharing screen, select <Do not share this printer> and click **Next** to continue.
11) Select <No> when asked if you want to print a test page and click **Next** to continue.
12) Now simply click **Finish** to complete the Add Printer Wizard.
13) Now the installation will proceed, if you get a Hardware Warning about the software you are installing for this hardware has not passed Windows Logo testing… simply click **Continue Anyway** to ignore this warning.
14) Congratulations, your printer driver has been successfully installed!
15) (This step is required only for USB connections) If you are using the Spirit's USB connection interface, then you will need to go to your Windows → Control Panel → Printer and Faxes. Right-click on the Spirit listing, and select properties. Go to the Ports menu and place a check next to GCC USB0, then click **OK**.

Chapter V - Operating the LaserPro Spirit

Once you have installed the LaserPro USB Driver (USB connectivity only), LaserPro Print Driver, and have connected the LaserPro Spirit to your computer, you will need to familiarize yourself with the LaserPro Spirit's control panel and LaserPro Print Driver. The print driver will be where you spend most of your time configuring specific laser parameters for your jobs, while the control panel will allow you to set repeat times, manipulate the file order, perform auto / manual focusing, configure the start point, and more.

5.1 Using the Hardware

5.1.1 Adjusting the LCD Display Screen's Contrast Setting

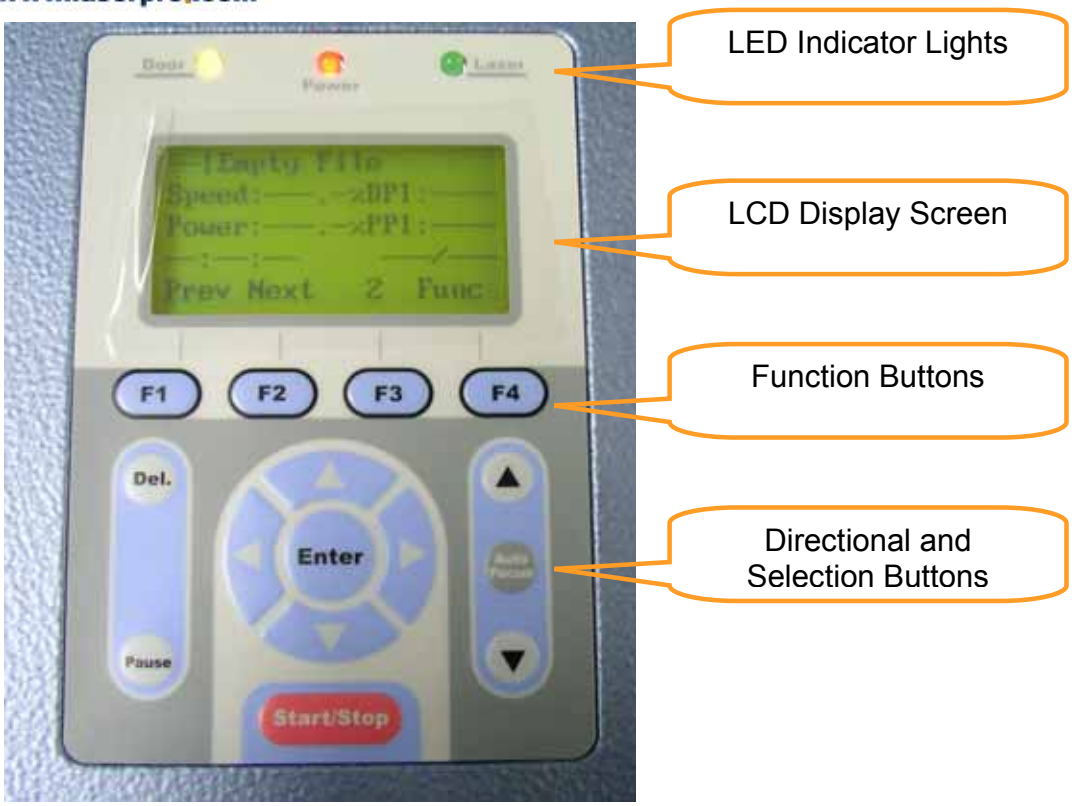
Depending on the lighting of your immediate work area, you may need to adjust the LCD display screen's contrast. You may increase or decrease the display screen's contrast via the contrast adjustment wheel found on the inside of the front cover on the bottom, right side. You can access this area by opening the top window and looking inside to the near, right side of the work area (as shown in the picture below).

* This picture was taken with the SmartLID opened to clearly show the location of the contrast adjustment wheel.

5.1.2 Graphic Control Panel Overview (Description)

The Control Panel

The control panel on the LaserPro Spirit provides easy access to all of the manual controls needed for cutting and engraving. The liquid crystal display (LCD), functional, directional and selection buttons make navigating through the machine's manual controls easy to do.



LED INDICATOR LIGHTS

Three indicator lights on the LaserPro Spirit's control panel are part of the system's safety interlock system.

- **DOOR** - The door light will illuminate when either the top lid or external pass through doors on the LaserPro Spirit are open or improperly closed.
- **POWER** - The power light will illuminate when the LaserPro Spirit is powered on.
- **LASER** - The laser light will illuminate when the laser is active and in operation.

> ***WARNING***
> - **DO NOT** attempt to remove or modify any component of the safety interlock system.
> - If at any time, any of the access doors are open and the "laser" LED is illuminated, **IMMEDIATELY** unplugs the laser system and contact GCC technical support for service instructions.
> - **DO NOT** operates the laser system if any component of the safety system is malfunctioning.

DIRECTIONAL AND SELECTION BUTTONS

Function (F1 / F2 / F3 / F4) – Four function buttons allow you to select various functions, which will change depending on what section of the menu you are in. Each function button's corresponding function will be displayed right above its respective button on the LCD display screen. Please note that in certain menus, not every function button will always be mapped to a corresponding action. In these situations, that particular button will not have a function.

Directional (△ / ▽ / ◁ /▷) - Four directional buttons allow you to navigate the selection cursor through the control panel menu and adjust the value of specific settings. In general, the △ / ▽ directional buttons cycle through the various selections, while the ◁ / ▷ directional buttons adjust the value of that particular selection.

Enter – Confirms the current selection.

Start / Stop – Allows you to start or stop engraving jobs, once those jobs have been successfully loaded onto the system.

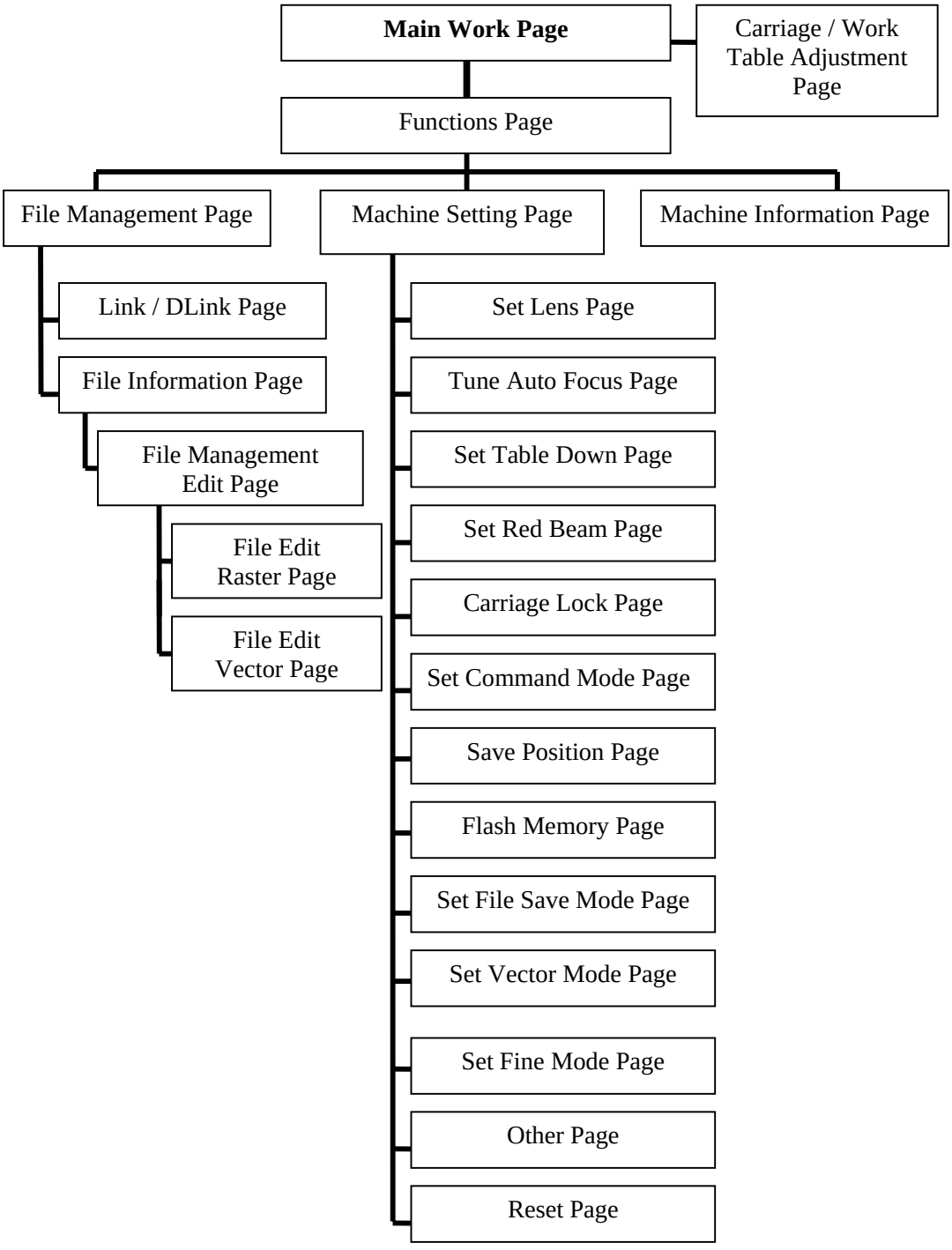
Delete - Provides quick access to delete the current job.

Pause – Pauses the current engraving process. Press again to resume the current process.

Auto Focus – After you have positioned your material and moved the laser carriage head to the area you want to engrave, press this button and the system will automatically adjust the optimal vertical focal distance for the laser.

Manual Focus (▲ / ▼) – To manually adjust the vertical focal distance between the laser head and the material, you can use the ▲ / ▼ buttons to do so. Doing so will adjust the vertical height (z-axis) of the worktable.

5.1.3 Graphic Control Panel Navigation Chart



5.1.4 Graphic Control Panel Function Pages

When the LaserPro Spirit is powered on, the machine will perform a series of safety checks and initializing routines. The LCD display screen will display the GCC copyright, LaserPro logo, and machine initialization pages before going to the main work page.

Main Work Page

The main work page is the page that the LaserPro Spirit will default to upon startup and will be the "home base" for when navigating through the various functions of the control panel. This will be the page that is displayed when you are processing your jobs. This page contains specific job information such as the current job's name, Speed, Power, PPI, DPI, processing / remaining times, and jobs loaded.

Main Work Page	
Relevant Buttons	**Function**
F1 (Prev)	Scroll through previous jobs
F2 (Next)	Scroll through next jobs
F3 (Z)	Go to Carriage / Work Table Adjustment Page
F4 (Func)	Go to Functions Page
△ / ▽ / ◁ / ▷ Directional	Go to Carriage / Work Table Adjustment Page
Start / Stop	Start / Stop the current job
Delete	Delete the current selected job
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Carriage / Work Table Adjustment Page

☼ **navigating to this page:**

Main Work Page

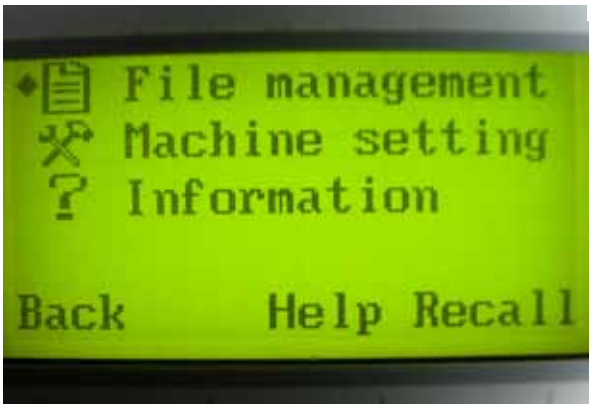
Press △, ▽, ◁, ▷, or **F3**

Carriage / Work Table Adjustment Page

The Carriage / Work Table Adjustment Page allow you to manually increase and decrease the height of the work table (Z-axis). In addition, you can manually adjust the Y-axis and X-axis of the laser carriage.

Carriage / Work Table Adjustment Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F3 (Down)	Manually decrease the height of the work table (Z-axis)
F4 (Up)	Manually increase the height of the work table (Z-axis)
△ / ▽ Directional	Manually adjust the Y-axis position of the laser carriage
◁ / ▷ Directional	Manually adjust the X-axis position of the laser carriage
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Functions Page



☼ Navigating to this page:

Main Work Page

Press **F4**

Functions Page

The Functions Page allows you to edit file management and machine settings. From this page, you will be able to access the File Management, Machine Setting, and Machine Information pages.

- **File Management Page** – this page allows you to manage the files that you have loaded onto the LaserPro Spirit.
- **Machine Setting Page** – this page allows you to access and modify a variety of your machine settings, including: Set Lens, Tune Auto Focus, Set Table Down, Set Red Beam, Carriage Lock, Set Command Mode, Save Position, Flash Memory, Set File Save Mode, Set Vector Mode, Tune Image Power, Set Laser Wattage, Set Fine Mode, Other, Reset.
- **Machine Information Page** – this page allows you to view information regarding the system such as the GCC logo, machine name, firmware version, and other information.

Functions Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F3 (Help)	Display help
F4 (Recall)	Back to previous page
△ / ▽ Directional	Scroll through the menu selections
Enter	Perform the selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

File Management Page

☼ **Navigating to this page:**

Main Work Page

↓ Press **F4**

Functions Page

↓ Select <**File Management**> from the menu

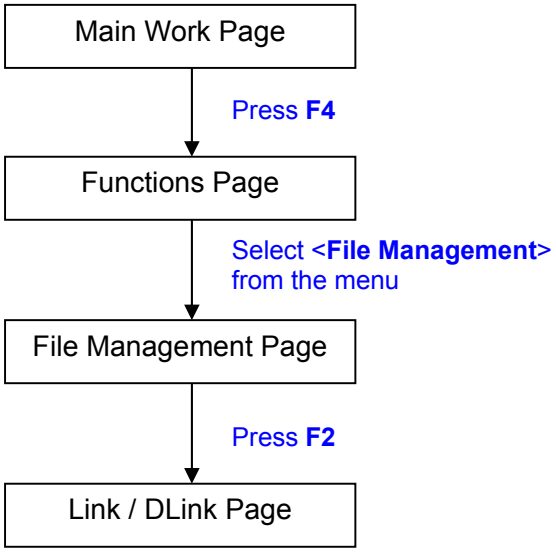
File Management Page

The File Management Page allows you to manage the files that you have loaded onto the LaserPro Spirit. You can scroll through your jobs, delete a selected job, delete all jobs, and go to the Link/DLink Page to set and arrange multiple loaded jobs into a single job queue for processing.

File Management Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F2 (Link)	Go to the Link/DLink Page
F3 (D-All)	Delete all loaded jobs
F4 (Del)	Delete the selected job
△ / ▽ Directional	Scroll through your loaded jobs
Enter	Go to the File Information Page for the selected job
Start / Stop	Go to the Main Work Page for the selected job
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Link/DLink Page

☼ **Navigating to this page:**



The Link/DLink Page allows you to set, arrange, and remove loaded jobs to and from a job queue for processing. Use the directional keys to cycle through your loaded jobs, then simply press the <F2 (Link)> key to add a file to the job queue. The job queue will be set in a sequential order based on the order you link the files. To remove a job from your job queue, press the <F4 (DLink)> key.

The first column field (before the file name) displays the job number. The sequence for your job queue is displayed in the two columns to the right of your file names. The first column to the right of your job file name displays the job number of the previous file in the job queue sequence. The second column after the file name displays that job's next file in the job queue sequence. First and last jobs in the job sequence you set will have a (---) in the first and second columns respectively. So according to the image above, the job queue sequence has been set to be processed in this order: 03:Marble.cdr → 01:Marble.cdr → 02:Marble.cdr.

Link/DLink Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F2 (Link)	Add the currently-selected job to the job queue
F4 (DLink)	Remove the currently-selected job from the job queue
△ / ▽ Directional	Scroll through your loaded jobs
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

File Information Page

☼ **Navigating to this page:**

Main Work Page

↓ Press **F4**

Functions Page

↓ Select <**File Management**> from the menu

File Management Page

↓ Select a job file and press **Enter**

File Information Page

The File Information Page allows you to view the speed, power, DPI, and PPI settings of the selected job. In addition, you will be able to go to the File Management Edit Page from this menu to change raster / vector speed and power settings for the selected job.

File Information Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F4 (Edit)	Go to the File Management Edit Page for the selected job
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

File Management Edit Page

☼ Navigating to this page:

Main Work Page
↓ Press **F4**
Functions Page
↓ Select <**File Management**> from the menu
File Management Page
↓ Select a job file and press **Enter**
File Information Page
↓ Press **F4**
File Management Edit Page

The File Management Edit Page allows choosing to modify your raster or vector settings for the selected job, as well as setting the number of times to repeatedly process the selected job (Repeat Num).

File Management Edit Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
△ / ▽ Directional	Scroll through the menu selections
◁ / ▷ Directional	Cycle through the available selections
Enter	Perform the selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

File Edit Raster Page

☼ **Navigating to this page:**

Main Work Page
↓ Press **F4**
Functions Page
↓ Select <**File Management**> from the menu
File Management Page
↓ Select a job file and press **Enter**
File Information Page
↓ Press **F4**
File Management Edit Page
↓ Select <**Raster Setting**> from the menu
File Edit Raster Page

The File Edit Raster Page allows you to edit the raster power and speed settings, as well as enable or disable SmartACT for the selected job. These settings correspond to the same settings found on the LaserPro Spirit print driver. This page allows you to easily adjust these values to make immediate adjustments while processing your loaded jobs, even when you have disconnected your computer from the LaserPro Spirit.

- Raster Power: 0.0% - 100%
- Raster Speed: 0.0% - 100%
- SmartACT: YES / NO

File Edit Raster Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
△ / ▽ Directional	Scroll through the menu selections
◁ / ▷ Directional	Adjust the value for that selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

File Edit Vector Page

☼ **Navigating to this page:**

Main Work Page
↓ Press **F4**
Functions Page
↓ Select <**File Management**> from the menu
File Management Page
↓ Select a job file and press **Enter**
File Information Page
↓ Press **F4**
File Management Edit Page
↓ Select <**Vector Setting**> from the menu
File Edit Vector Page

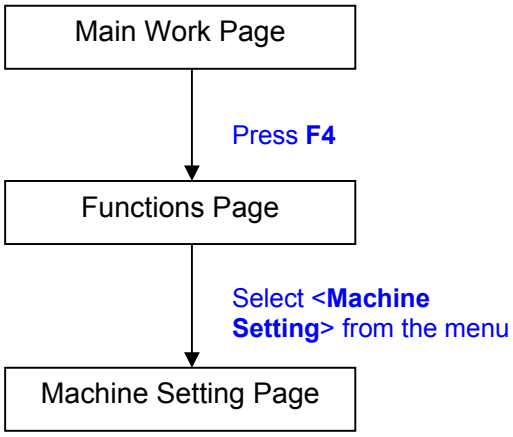
The File Edit Vector Page allows you to edit the vector pen, vector power, vector speed, and vector PPI, and power ramp settings for the selected job. These settings correspond to the same settings found on the LaserPro Spirit print driver. This page allows you to easily adjust these values to make immediate adjustments while processing your loaded jobs, even when you have disconnected your computer from the LaserPro Spirit.

- Vector Pen: 1 - 16
- Vector Power: 0.0% - 100%
- Vector Speed: 0.0% 100%
- Vector PPI: 30 - 1524
- Power Ramp: YES / NO

File Edit Vector Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
△ / ▽ Directional	Scroll through the menu selections
◁ / ▷ Directional	Adjust the value for that selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Machine Setting Page

☼ **Navigating to this page:**



The Machine Setting Page allows you to access and modify a variety of your machine settings, including: Set Lens, Tune Auto Focus, Set Table Down, Set Red Beam, Carriage Lock, Set Command Mode, Save Position, Flash Memory, Set File Save Mode, Set Vector Mode, Tune Image Power, Set Laser Wattage, Set Fine Mode, Other, Reset.

Machine Setting Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
△ / ▽ Directional	Scroll through the menu selections
Enter	Perform the selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Set Lens Page

☼ Navigating to this page:

Main Work Page

Press **F4**

Functions Page

Select <**Machine Setting**> from the menu

Machine Setting Page

Select <**Set Lens**> from the menu

Set Lens Page

The Set Lens Page allows you to modify the lens setting after you have changed to a different focal lens. Remember to save your settings after you have made the proper changes. Now by pressing the Auto Focus button, the LaserPro Spirit will auto focus properly using the new lens. The LaserPro Spirit's default setting is <2.0">

- Lens: 1.5" / 2.0" / 2.5" / 4.0"

Set Lens Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◁ / ▷ Directional	Cycle through selections
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Tune Auto Focus Page

☼ Navigating to this page:

Main Work Page

↓ Press **F4**

Functions Page

↓ Select <**Machine Setting**> from the menu

Machine Setting Page

↓ Select <**Tune Auto Focus**> from the menu

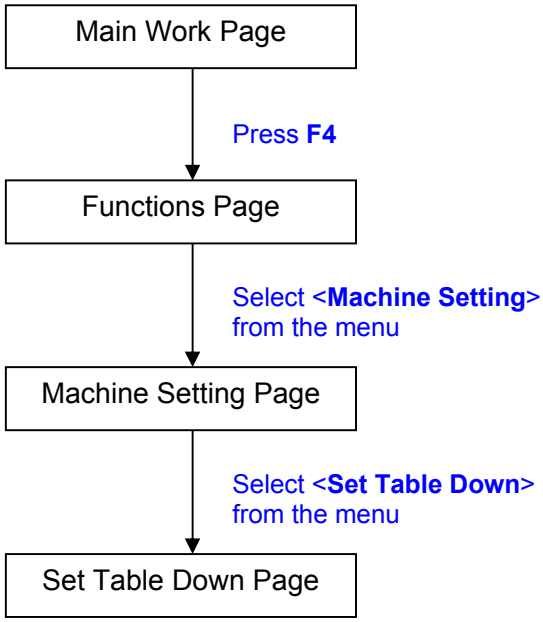
Tune Auto Focus Page

The Tune Auto Focus Page allows you to manually set the default auto focus distance / vertical height of the worktable (Z-axis) for when the Auto Focus button is pushed.

Tune Auto Focus Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
△ / ▽ Directional	Manually adjust the height of the work table (Z-axis)
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Set Table Down Page

☼ **Navigating to this page:**



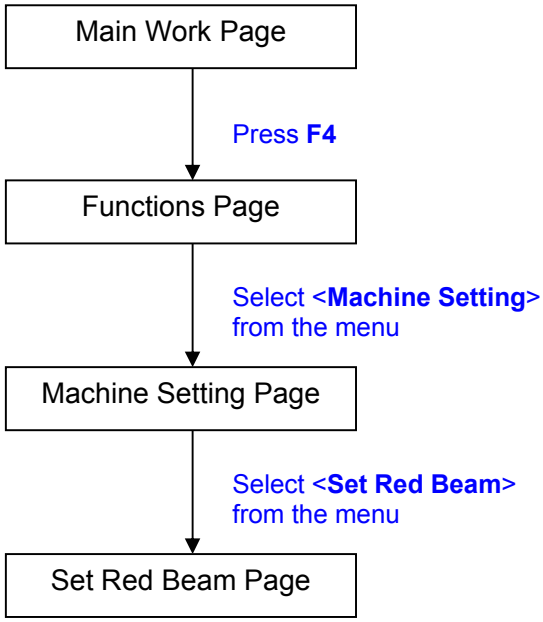
The Set Table Down Page allows you to select whether or not the LaserPro Spirit displays a warning prompt at startup. If the Table Down selection is set to <YES>, the LaserPro Spirit will display a "Table will move down and remove objects on table" warning prompt on startup. Pressing the Enter key at this point will confirm the prompt to move the work table to its lowest position. If the Table Down is set to <NO>, then the LaserPro Spirit will not display this warning prompt at system startup.

- Table Down: YES / NO
- Distance: 0 - 165 mm

Set Table Down Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
△ / ▽ Directional	Scroll through the menu selections
◁ / ▷ Directional	Adjust the value for that selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Set Red Beam Page

☼ **Navigating to this page:**



The Set Beam Page allows you to turn on or off the red dot laser pointer on the laser carriage. Enabling this function will indicate the exact area the engraving laser will fire upon.

- Red Beam YES / NO

Set Red Beam Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◁ / ▷ Directional	Cycle Red Beam between YES / NO
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Carriage Lock Page

☼ **Navigating to this page:**

Main Work Page
↓ Press **F4**
Functions Page
↓ Select <**Machine Setting**> from the menu
Machine Setting Page
↓ Select <**Carriage Lock**> from the menu
Carriage Lock Page

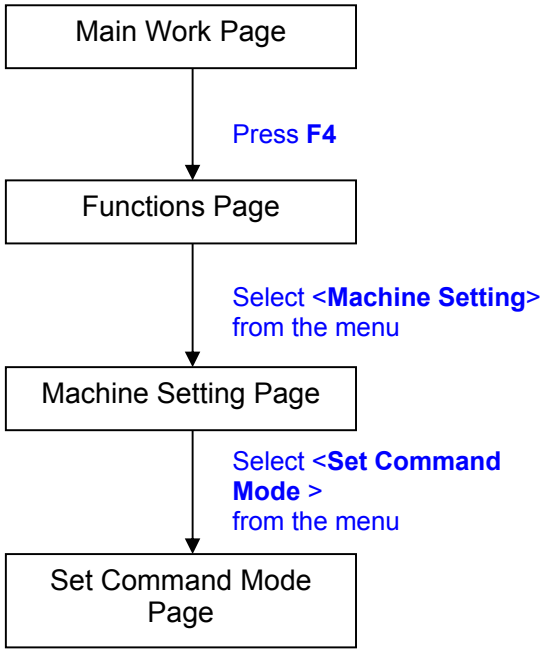
The Carriage Lock Page allows you to set whether the laser carriage is locked or free. If the Carriage Free setting is set to <YES>, then you will be able to manually move the laser carriage along the X and Y axis by hand with the top door open. Whereas setting the Carriage Free to <NO> will lock the laser carriage and movement or positioning can only be done by the control panel.

- Carriage Free YES / NO

Carriage Lock Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◁ / ▷ Directional	Cycle Carriage Free between YES / NO
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Set Command Mode Page

☼ Navigating to this page:



The Set Command Mode Page allows you to configure vector settings when outputting in Default or HPGL mode. Default mode is the standard Windows print driver recognized by the most popular graphic software programs such as CorelDraw, Photoshop, Illustrator, etc. Whereas, HPGL mode is a less common output format generated from some RIP applications (signage industry). Regardless of which format you will be working with, both output formats are supported.

- Mode: Default / HPGL
- Vector Pen: 1 - 16
- Vector Speed: 0.0% - 100%
- Vector PPI: 0.0% - 100%
- Power Ramp: YES / NO

Set Command Mode Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
△ / ▽ Directional	Scroll through the menu selections
◁ / ▷ Directional	Adjust the value for that selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Save Position Function

☼ Navigating to this page:

Main Work Page

Press **F4**

Functions Page

Select <**Machine Setting**> from the menu

Machine Setting Page

Select <**Save Position** > from the menu

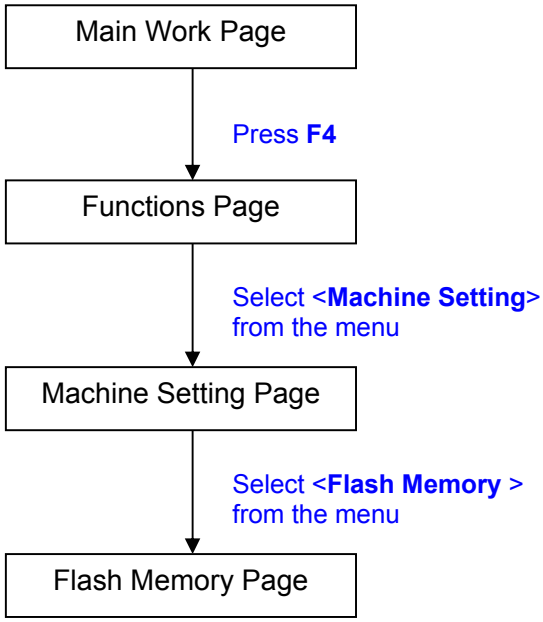
The Save Position Function allows you to save the current X-axis and Y-axis positions of the laser carriage and sets this position to be the origin for subsequent jobs.

TIP

This is an excellent function to use when you are processing identical items or engraving relatively smaller objects positioned away from the default start position (top left) of the work table.

Flash Memory Page

☼ **Navigating to this page:**



The Flash Memory Page allows you to read and write data with the optional SmartMEMORY module installed. Selecting <Write Flash Memory> will copy all current jobs on the LaserPro Spirit to the SmartMEMORY module. Selecting <Read Flash Memory> will copy all job files from the SmartMEMORY module to the LaserPro Spirit.

Flash Memory Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
△ / ▽ Directional	Scroll through the menu selections
Enter	Perform the selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Set File Save Mode Page

☼ **Navigating to this page:**

Main Work Page

↓ Press **F4**

Functions Page

↓ Select <**Machine Setting**> from the menu

Machine Setting Page

↓ Select <**Set File Save Mode** > from the menu

Set File Save Mode Page

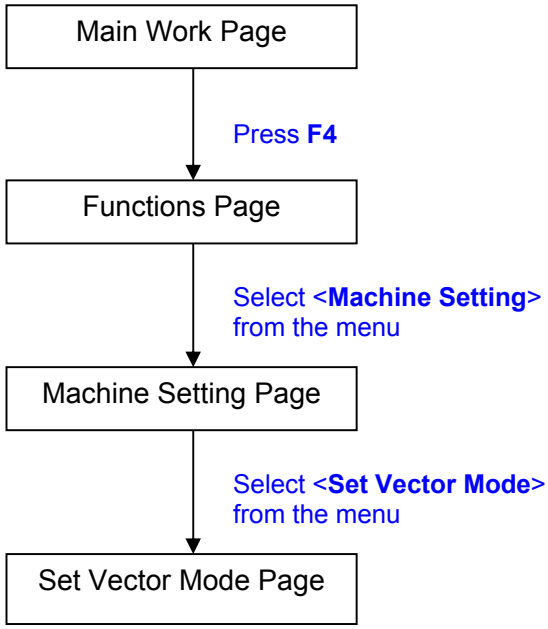
The Set File Save Mode Page allows you to set whether or not the LaserPro Spirit automatically deletes each job file after processing. Setting File Save to <NO> will automatically and immediately delete each job file from the LaserPro Spirit after the engraving or cutting process. Setting File Save to <YES> will retain all job files on the LaserPro Spirit, even after each job has been processed.

- File Save: YES / NO

Set File Save Mode Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◁ / ▷ Directional	Cycle File Save between YES / NO
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Set Vector Mode Page

☼ **Navigating to this page:**



The Set Vector Mode Page allows you to adjust and balance vector mode's quality and speed settings based on your specific job. Speedy Vector Mode offers the highest output speed, sacrificing quality. Whereas Quality Vector Mode offers the highest quality, sacrificing output speed. Keep in mind that speed and quality are usually at a tradeoff. The system's default is Fine Vector mode, sacrificing some speed for higher quality. The LaserPro Spirit's default setting is <Fine Vector>.

- Modes: Quality Vector, Fine Vector, Coarse Vector, Speedy Vector
  [*Slower speeds / higher quality ---------- Faster speeds / lower quality*]

Set Vector Mode Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◁ / ▷ Directional	Cycle Set Vector Mode between QUALITY VECTOR / FINE VECTOR / COARSE VECTOR / SPEEDY VECTOR
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Set Fine Mode Page

☼ Navigating to this page:

Main Work Page
↓ Press **F4**
Functions Page
↓ Select <**Machine Setting**> from the menu
Machine Setting Page
↓ Select <**Set Fine Mode**> from the menu
Set Fine Mode Page

The Set Fine Mode Page allows you to choose whether to engrave with more precision (quality) at the expense of speed, or vice-versa. With Fine Mode set to <YES> will provide higher quality output, but slower processing speeds. With Fine Mode set to <NO> will provide faster processing speeds at lower quality output.

- Fine Mode: YES / NO

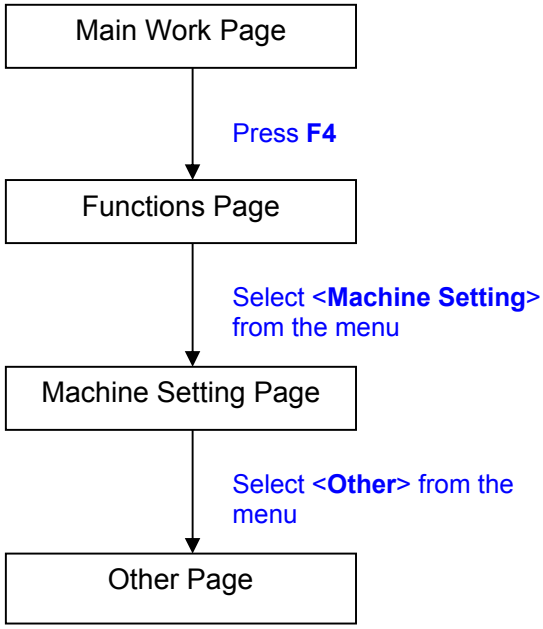
TIP

The Fine Mode setting modifies the acceleration and deceleration of the X / Y rails, therefore enabling or disabling Fine Mode will be most evident when engraving small, fine, intricate designs (such as engraving small circle patterns). We recommend you set Fine Mode to YES when engraving such designs. When cutting, the Fine Mode setting should always be set to NO, as this does not benefit vector cutting operations, but rather slows the processing speeds down.

Set Fine Mode Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
◁ / ▷ Directional	Cycle Fine Mode between YES / NO
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Other Page

☼ **Navigating to this page:**



The Other Page allows you to change various settings relating to the control panel. The Language setting will allow changing available languages displayed by the control panel. The Unit setting will allow you to chance whether the units displayed by the control panel is in the metric or imperial system. The EOF (end of file) Alarm setting will enable or disable an audible notification when your jobs are complete. The Air Delay setting allows you to specify the delay in seconds of the SmartAIR air-assist after the point of laser firing.

- Language: ENGLISH (others dependent on Firmware)
- Unit: METRIC / ENGLISH
- EOF Alarm: YES / NO
- Air Delay: 1-100 seconds

Depending on the material you are engraving with, your laser settings, and the desired results, please experiment with the air delay to achieve your desired results.

Other Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
F4 (Save)	Save your current settings
△ / ▽ Directional	Scroll through the menu selections
◁ / ▷ Directional	Adjust the value for that selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Reset Page

☼ **Navigating to this page:**

Main Work Page

Press **F4**

Functions Page

Select <**Machine Setting**> from the menu

Machine Setting Page

Select <**Reset**> from the menu

Reset Page

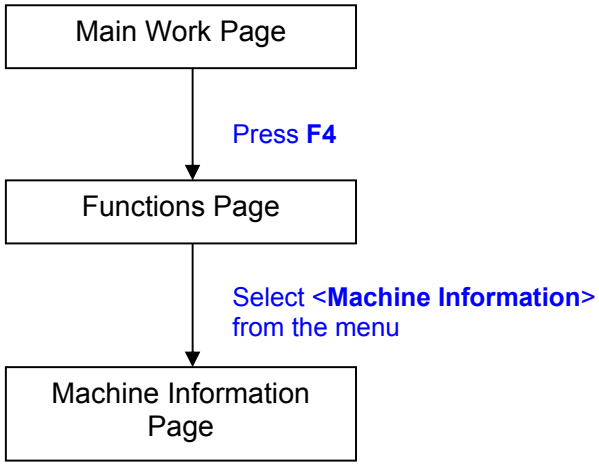
The Reset Page allows you to reset all changes made to the LaserPro Spirit's Machine Settings Page to their default settings. This does not affect the settings saved to an image file on the computer. The User Reset setting will set all settings back to the default. After any firmware updates, you must use the System Reset setting (your previous settings are saved).

- User Reset (will pop up a confirmation, press Enter to confirm and continue)
- System Reset (will pop up a confirmation, press Enter to confirm and continue)

Reset Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
△ / ▽ Directional	Scroll through the menu selections
Enter	Perform the selection
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

Machine Information Page

☼ **Navigating to this page:**



The Machine Information Page allows you to view information regarding the system such as the GCC logo, machine name, firmware version, and other information.

Machine Information Page	
Relevant Buttons	**Function**
F1 (Back)	Back to previous page
△ / ▽ Directional	Scroll through pages
Start / Stop	Back to Main Work Page
Auto Focus	Initiate the auto focus function
▲ / ▼ Manual Focus Buttons	Manually adjust the height of the work table (Z-axis)

5.2 The LaserPro Spirit Print Driver

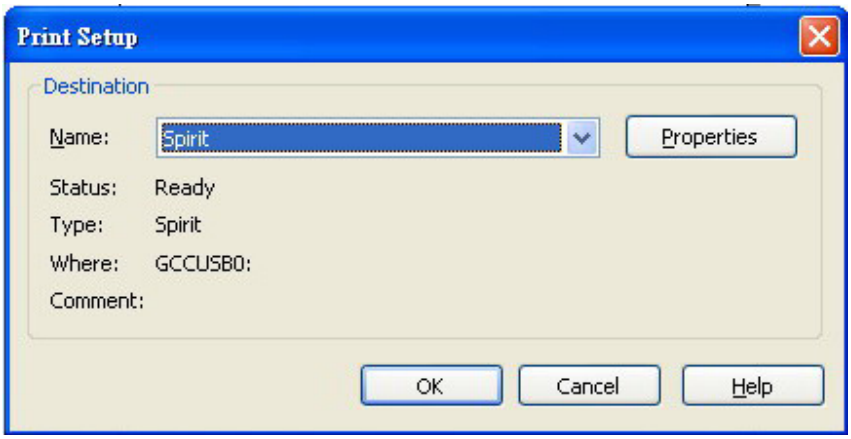
With the LaserPro Spirit print driver successfully installed, you will need to adjust the printer and page size default settings before you can begin editing and completing jobs. By doing so, you will be setting the work area in your graphics software to match the LaserPro Spirit's worktable area.

> ***NOTE***
> Please make sure Spirit is set to the default printer before proceeding to the page and layout setup.

Ensure that the LaserPro Spirit has been selected as the DEFAULT PRINTER. You can do so by going into your Windows Control Panel → Printers and Faxes.

If LaserPro Spirit is not selected as DEFAULT PRINTER, you may set it up through the graphics software as well. The following is taking Corel Draw as example of how to set up LaserPro Spirit as the Printer.

1) From the primary menu, click FILE → PRINT SETUP.
2) From the navigation bar Name, click Spirit → OK



5.2.1 Page Setup and Orientation

The first thing you must do before working with the LaserPro Spirit Print Driver will be to make sure the page and layout settings are properly configured within your graphics software. You will need to access and edit the Page Setup or Layout page of your graphics software to set your graphics software's page layout to match the LaserPro Spirit's work table's dimensions and orientation.

From your graphic software's Page Setup page:

- Set the page orientation in the graphics software to Landscape mode.
- Set page size horizontal length to 812 mm (31.968 inches) and vertical height to 460 mm (18.110 inches).

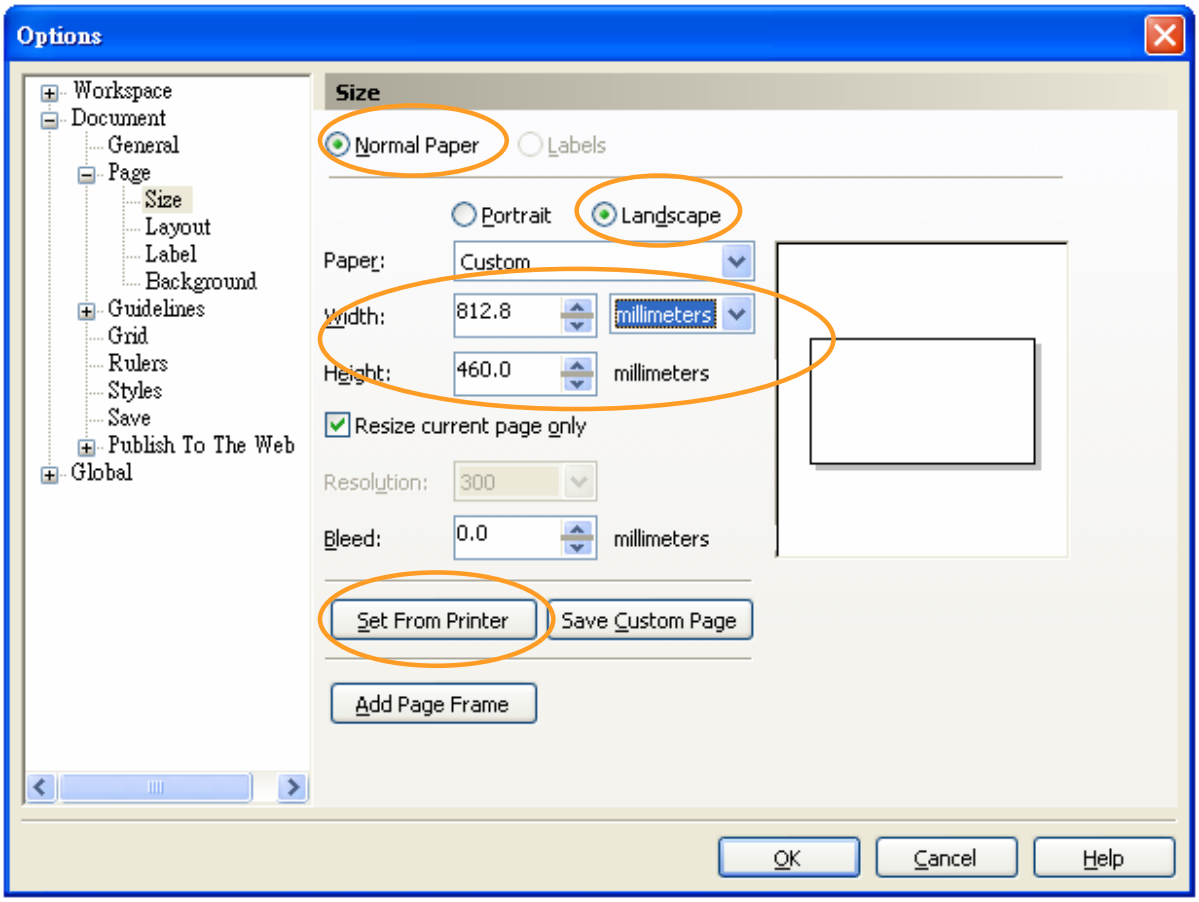
Corel Draw Example (Page Setup and Orientation)

The following is an example of how to set the Page Setup and Orientation in the graphics software. CorelDraw is the designated graphics software used for this example. For other graphics software, you will need to access the corresponding Page Setup page.

3) From the primary menu, click LAYOUT → PAGE SETUP.
4) From the navigation bar on the left, click DOCUMENT → PAGE → SIZE.
5) Ensure that NORMAL PAPER and LANDSCAPE are selected.
6) Ensure the Paper Width and Height dimensions match the LaserPro Spirit's work table dimensions of 812 mm (31.968 inches) and 460 mm (18.110 inches).
7) Click OK to complete the paper size adjustment.

TIP

Instead of manually selecting the Landscape and setting the Paper Width and Height, you can simply click the Set From Printer function and CorelDraw will automatically set the proper orientation and dimensions based on LaserPro Spirit's work table. (You MUST have the Spirit set as the default printer prior to doing this.)



5.2.2 Color Management

LaserPro driver uses pen color settings to control laser engraver engraving and cutting parameters. In addition to having your Page Setup and Orientation properly set in your graphics software, you will also need to make sure Color Management is DISABLED prior to working with the LaserPro Spirit Print Driver. If you do not properly

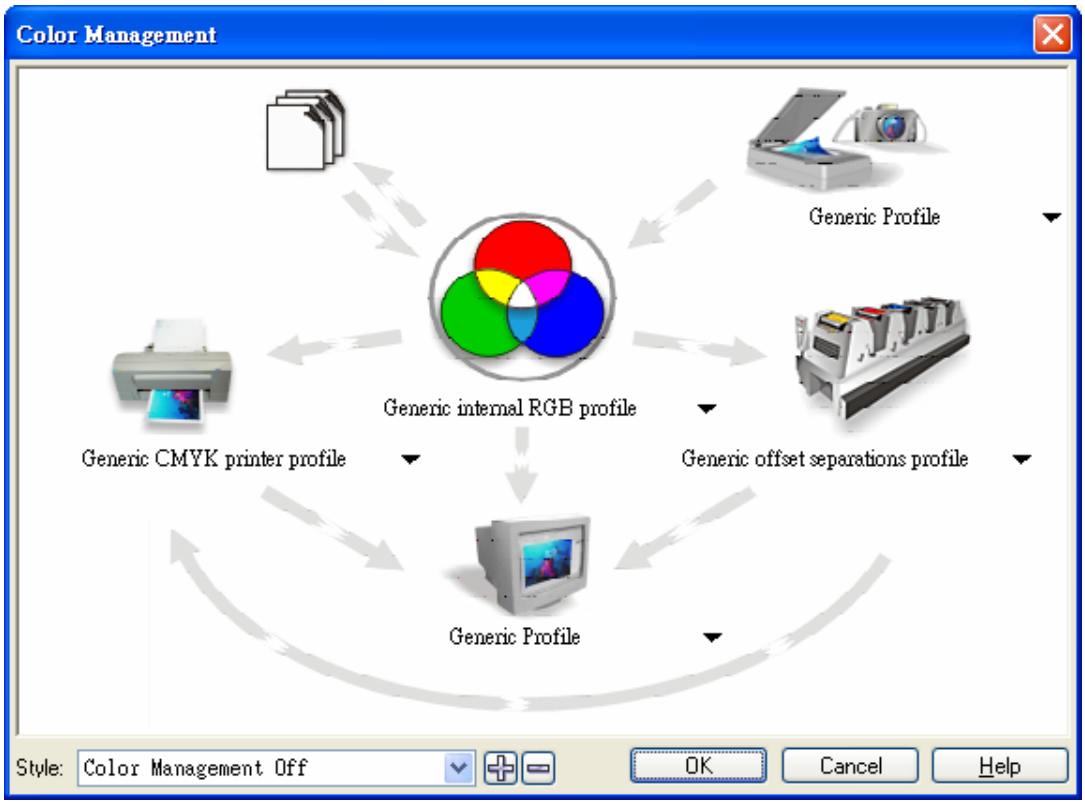
From your graphic software's Color Management page:

- Disable Color Management or set Color Management to Off.

Corel Draw Example (Color Management)

The following is an example of how to properly disable Color Management in the graphics software. CorelDraw is the designated graphics software used for this example. For other graphics software, you will need to access the corresponding Color Management page.

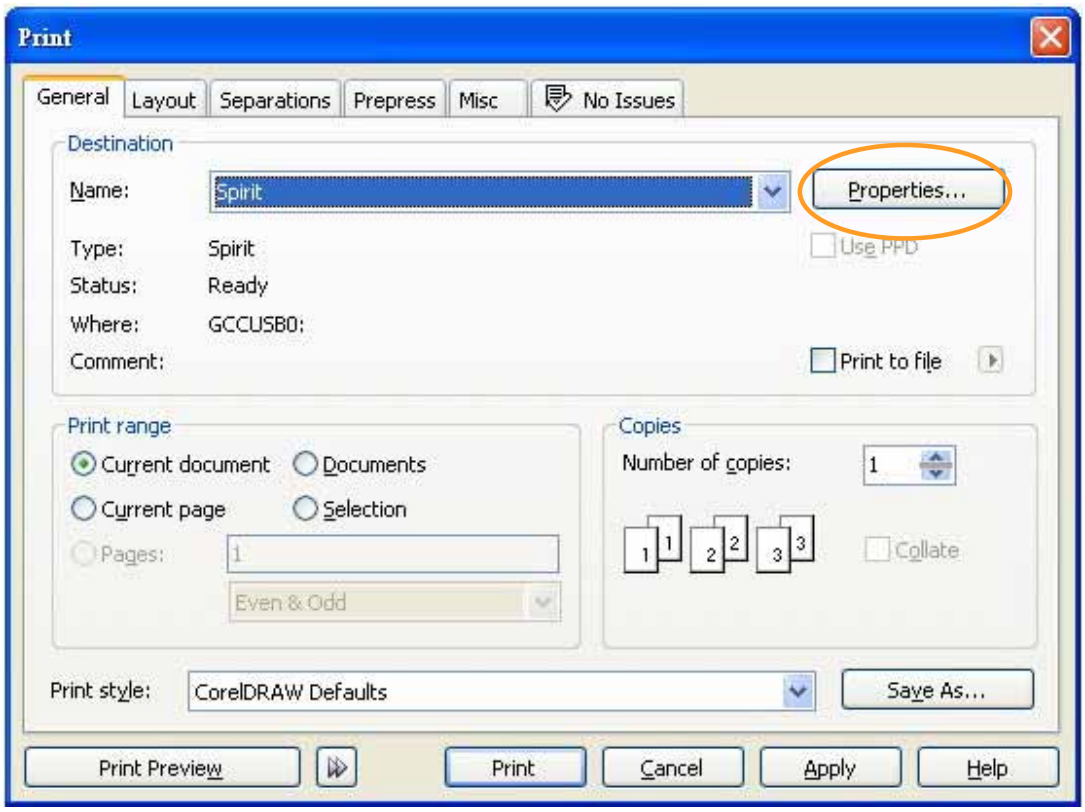
1) From the primary menu, click TOOLS → COLOR MANAGEMENT and CorelDraw's Color Management will appear.
2) Under the Style pull down menu, select COLOR MANAGEMENT OFF.
3) Click OK to complete the color management adjustments.



5.2.3 Using the LaserPro Spirit Print Driver

Now after you have properly set the Page and Layout and Color Management of your graphics software, you are ready to configure the details of your actual job through the LaserPro Spirit Print

Driver. The LaserPro Spirit print driver allows you to adjust your engraving / cutting options. After you have setup your image, design, or text to be engraved in your software application, you can access the LaserPro Spirit print driver by going to FILE → PRINT → PROPERTIES.



Note
For this screenshot example, CorelDraw was used as the software application.

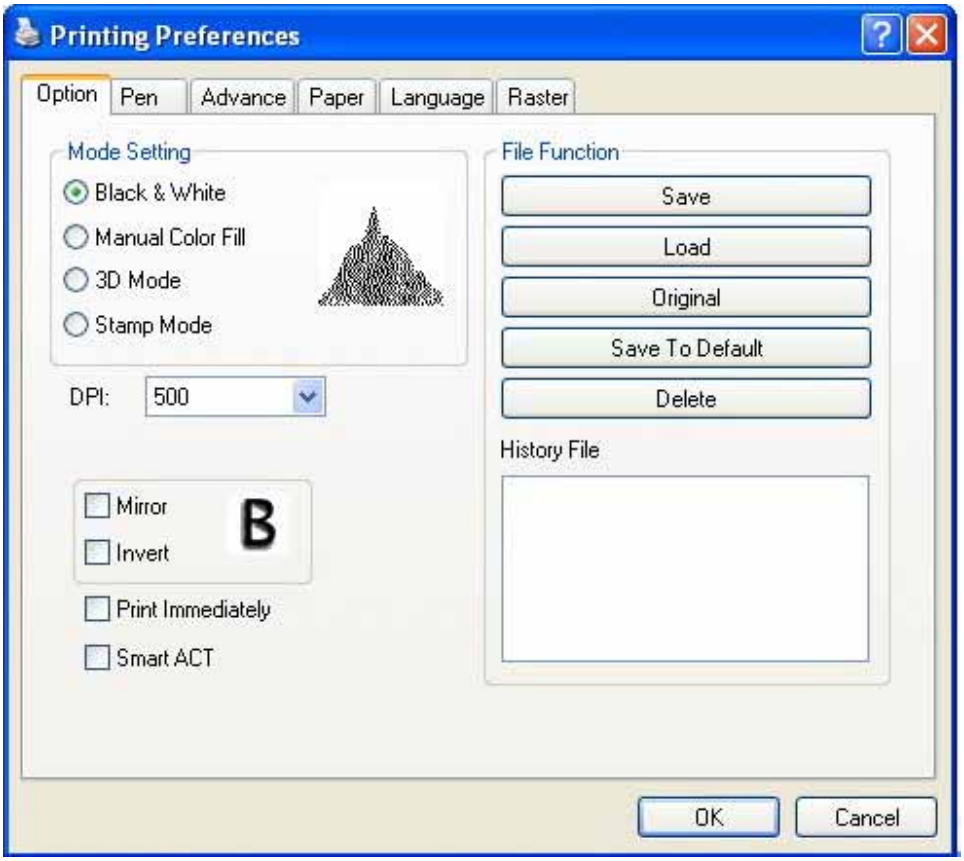
The LaserPro Spirit Print Driver consists of seven primary sections (pages) in which you will be able to choose various engraving / cutting options and settings:

- Option Page
- Pen Page
- Advance Page
- Paper Page
- Language Page
- Raster Page (appears only in Black & White Mode)
- Stamp Page (appears only in Stamp Mode)

TIP

The following sections describe the specific functions for each of the settings found in the LaserPro Spirit Print Driver. If you are new to laser engraving, it is recommended that you first familiar yourself with the general principals of the laser process in Section 6, especially the Vector Cutting and Raster Engraving concepts. This will make it easier to understand the various descriptions and terminology used in this section.

5.2.3.1 LaserPro Spirit Print Driver >> Option Page



Mode Setting (OPTION PAGE)

[DEFAULT SETTING: Black & White]

You can select four primary mode settings, depending on your application or results you would like to achieve.

Black & White: Select this mode when using clipart images or drawings with several colors, shades of gray, or many outlines. This mode outputs in a method similar to that of a black and white laser printer. The entire selected image will be engraved using a single set of power & speed settings (the black pen

from the PEN menu. Please refer to the next section of the manual for details regarding the PEN functions). The LaserPro Spirit print driver will interpret colored and shaded areas as different shades of gray by producing a halftone effect while engraving. Instead of engraving only solid lines, gray/halftone areas will be a collection of dots with varying density.

The resolution and depth of these halftone areas can be adjusted with the DPI setting found on the Options page. Please note that selecting the Black & White mode will add a new Raster page to the menu. The Black & White mode dithering settings can be changed from the Raster page. (Please refer to the Raster section below for details). Experiment with different dithering settings to attain the desired results.

TIP

The Black & White mode interprets the processed image by the varying colors and shades. For the best results, we suggest you convert the image to a grayscale image with your graphics software prior to engraving in the Black & White mode.

NOTE

Selecting the Black & White mode will enable the Raster page on the LaserPro Spirit Print Driver, allowing you to adjust advanced stamp-related settings.

Manual Color Fill: Select this mode when you would like to designate specific power and speed settings and link them to certain colors of your image. The LaserPro Spirit print driver allows a maximum of 16 pen parameters to be set.

3D Mode: Select this mode to attain a sculptured 3D effect on your engraving. By using images that have a range of gray areas, the LaserPro Spirit print driver can manipulate the image to give it added depth, by linking the laser power (depth of engraving) to specific colors. The settings can be adjusted through the DPI setting (Option page) and PPI, power and speed settings (Pen page).

Stamp Mode: Select this mode to when you would like to engrave stamps. The stamp mode is one of the more dynamic functions of the LaserPro Spirit. Due to the unique engraving nature when engraving a stamp, the stamp production requires different operational steps than most engraving or cutting operations.

NOTE

Selecting the Stamp mode will enable the Stamp page on the Spirit Print Driver, allowing you to adjust advanced stamp-related settings.

DPI (Option Page)

[DEFAULT SETTING: 500]

DPI (dots-per-inch) represents the number of times the laser will fire over a one-inch path. This setting determines the image resolution and quality when performing raster engraving functions. Higher DPI settings result in cleaner and deeper engravings, but require a more time to complete. Lower DPI settings result in coarser and shallower engravings, but require less time to complete. The LaserPro Spirit offers 8 DPI options: 125, 250, 300, 380, 500, 600, 760, and 1000, experiment with different settings to get your desired effect.

Below is a chart for your convenience detailing the Set DPI (your input setting) vs. Actual DPI (your output results).

Set DPI	125	250	300 *	380	500	600 *	760	1000
Actual DPI	127	254	381	381	508	762	762	1016

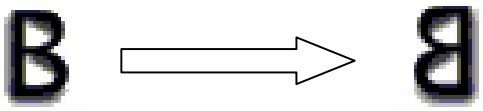
NOTE*
Outputting a full-table (34” x 18”) job using 300 or 600 DPI will result in a truncation error; this is due to the large differences in set DPI vs. actual DPI output for those two particular DPI settings. Therefore, when processing a 34” x 18” job using 300 DPI, we recommend you move to the next higher DPI setting of 380. Similarly, for a 34” x 18” job using 600 DPI, we recommend you use 760 DPI.

Mirror (Option Page)

[DEFAULT SETTING: Unselected]

Checking this box will automatically engrave your image with a mirrored effect. This setting will flip the image along the Y-axis from left to right and vice-versa.

TIP
When engraving a stamp, via the stamp mode, the stamp image needs to be engraved in reverse (mirrored) for the final stamp to be correctly laid out.



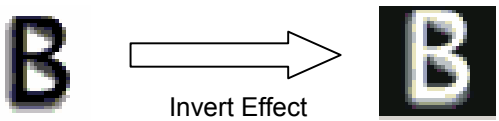
Mirror Effect

Invert (Option Page)

[DEFAULT SETTING: Unselected]

Checking this box automatically inverts / reverses the color of your image (the white areas become black and vice versa). The Invert option is not available in disabled with Manual Color File mode selected.

TIP
Invert mode is useful when creating a stamp in Stamp Mode, as inverting your normal image will set the negative space to be engraved out, with the remaining positive space (your stamp design) protruding out.



Invert Effect

Print Immediately (Option Page)

[DEFAULT SETTING: Unselected]

Checking this will instruct the LaserPro Spirit to immediately begin the laser engraving process, when you select Print from your graphic software program. If Print Immediately is not checked, then selecting Print will transfer the job file to the LaserPro Spirit system and will need to be initialized from the LaserPro Spirit control panel.

SmartACT (Option Page)

[DEFAULT SETTING: Unselected]

SmartACT is reduces the amount of time it takes to process a job, by eliminating unnecessary travel of the laser carriage at the expense of some quality. Usually the quality loss is minimal, but will depend on the image or design you are working with; please take some time to experiment with your particular design to determine whether the tradeoff is acceptable.

TIP

There is a greater performance gain when enabling SmartACT for designs that are vertically longer than they are horizontally wide, as the SmartACT optimization modifies the movement of the X-axis of the laser carriage.

File Function (Option Page):

The file function section allows you to manage various laser parameters. This section is useful when performing repeat jobs on a variety of objects, allowing you to save your frequently used laser parameters and load them in the future.

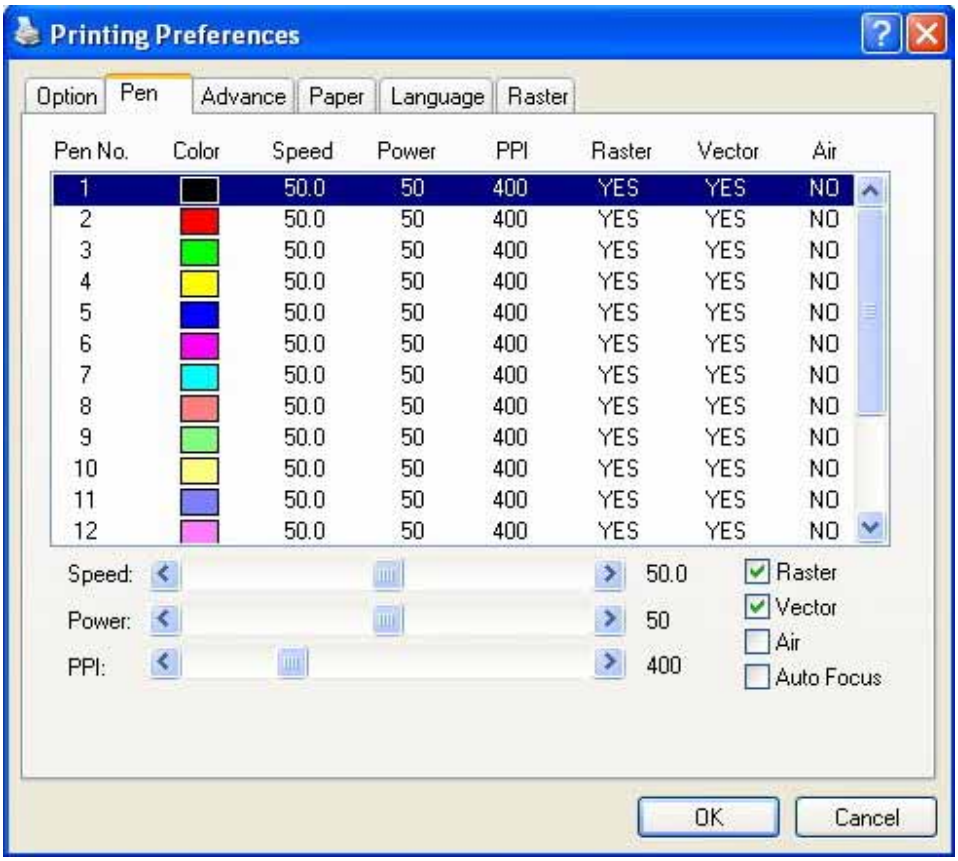
- **History File:** This section contains a list of the recent files you have recently created and worked with, please note that.
- **SAVE:** This function will save the current print driver parameter settings to a file and location on your computer of your selection. (Saved parameter setting files will be tagged with the .H2O extension)
- **LOAD:** This function allows you load a previously saved print driver parameters.
- **ORIGINAL:** This function will load the print driver's original factory parameter settings.
- **SAVE TO DEFAULT:** This function allows you to save your current print driver parameters as the default startup settings.
- **DELETE:** This function will delete the file you select from the History File section. Please note the delete function only removes the file from the history file section, it does not remove the .H2O file from your hard drive, if you wish to completely remove the file from your hard disk, and you will have to manually delete the file from your operating system.)

NOTE

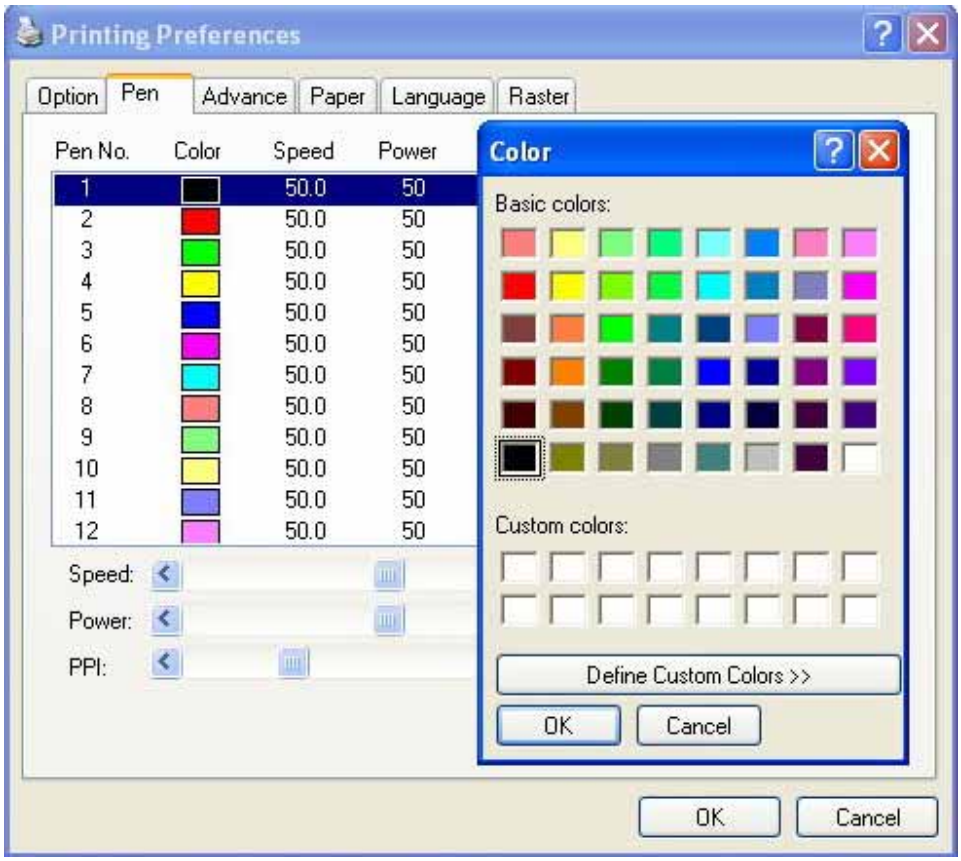
If you are using Windows 2000 or XP as your operating system, then make sure you log in with an administrator or administrator-rights account in order to properly save laser parameter settings.

5.2.3.2 Spirit Print Driver >> Pen Page

The LaserPro Spirit incorporates the use of 16 different colors to represent 16 different laser power and speed settings when cutting and engraving. These colors are referred to as “Pens”. Think of each pen as a designated laser setting, rather than as a color. As an example, a black and white image will use only one power and speed laser setting (Black). An image that is made up of black, red and blue colors will be processed using the laser settings designated for each particular color. In order to utilize up to 16 different pens (laser parameter settings), make sure your graphics software can recognize and utilizes the 16 pen colors designated by the Spirit print driver.



If you would like to specify your own colors to designate to a particular laser setting, then all you have to do is to double-click on that particular pen color from the pen menu and a color manager window will open where you can select “define custom colors” to define your own color (shown in the picture below). This is useful when your image is composed of colors that are not part of the pen menu’s default color selection, and instead of modifying your image, you simply would like to assign the laser settings based on the existing colors based on your current image.



NOTE
The Spirit print driver cannot store more than 16 pen colors or different laser parameter settings per file.

Speed (Pen Page)

[DEFAULT SETTING: 50]

The speed slider controls the laser's speed during operation (engraving speed) with a range setting from 0.1 – 100%. The Spirit's maximum laser processing speed is 60 inches per second, therefore a setting of 100% speed is equivalent to 60 inches per second and a 10% speed setting would be equivalent to 6 inches per second. Keep in mind, this is the speed the laser moves at when cutting or engraving straight lines. The machine will automatically slow down when processing curves.

TIP
Cutting / engraving depth and quality are determined by a combination of power and speed. Slower speeds at higher power will produce deeper cuts and engravings, whereas higher speeds at lower power will produce more shallow cuts and engravings.

Power (Pen Page)
[DEFAULT SETTING: 50]

The power slider controls the laser's power during operation (engraving power) with a range setting from 1 – 100%. The percentage setting represents the power for each laser pulse fired.

TIP

Cutting / engraving depth and quality are determined by a combination of power and speed. Higher power and slower speeds will produce deeper cuts and engravings, whereas lower power and higher speeds will produce more shallow cuts and engravings.

PPI (Pen Page)
[DEFAULT SETTING: 400]

PPI (pulses-per-inch) represents the number of times the laser pulses (fires) per linear inch, exclusive for vector cutting. Higher PPI settings will generate deeper, overlapping laser pulses, resulting in cleaner cuts. Lower PPI settings (lower than 150) will result in the individual laser pulses being spread apart, resulting in a perforated effect (similar to the perforation in the paper between mailing stamps).

If you drag the PPI slider to the furthest right (maximum), the value will change to X. This completely disables the PPI control and continuously fires the laser non-stop, without pulsing. Think of setting PPI to X as being equivalent to turning a water facet on with the water continuously flowing out. This also disables the power ramp functionality, which automatically controls the PPI depending on the speed of the laser carriage (such as vector cutting around the corner of a square).

TIP

For Vector Engraving jobs, we recommend a PPI setting > 150
For Vector Cutting jobs, we recommend a PPI setting of > 400

Raster / Vector (Pen Page)
[DEFAULT SETTING: Selected]

Checking the Raster checkbox will process only the raster functions for the areas of your design that correspond to that particular "pen" color.

Checking the Vector checkbox will process the vector functions for the areas of your design that correspond to that particular "pen" color.

As an example: a particular "pen" color may be assigned to areas in your design containing color fills (raster engraving) and very thin lines (vector cutting). By checking / unchecking the Raster and Vector will force the driver to process / ignore the color fills / thin lines.

	Vector Checked	Vector Unchecked
Raster Checked	Processes both Vector and Raster functions for that particular color	Processes only the Raster functions for that particular color (Vector functions ignored)
Raster Unchecked	Processes only the Vector functions for that particular color (Raster functions ignored)	Does not process Vector or Raster functions for that particular color

Air (Pen Page)

[DEFAULT SETTING: Unselected]

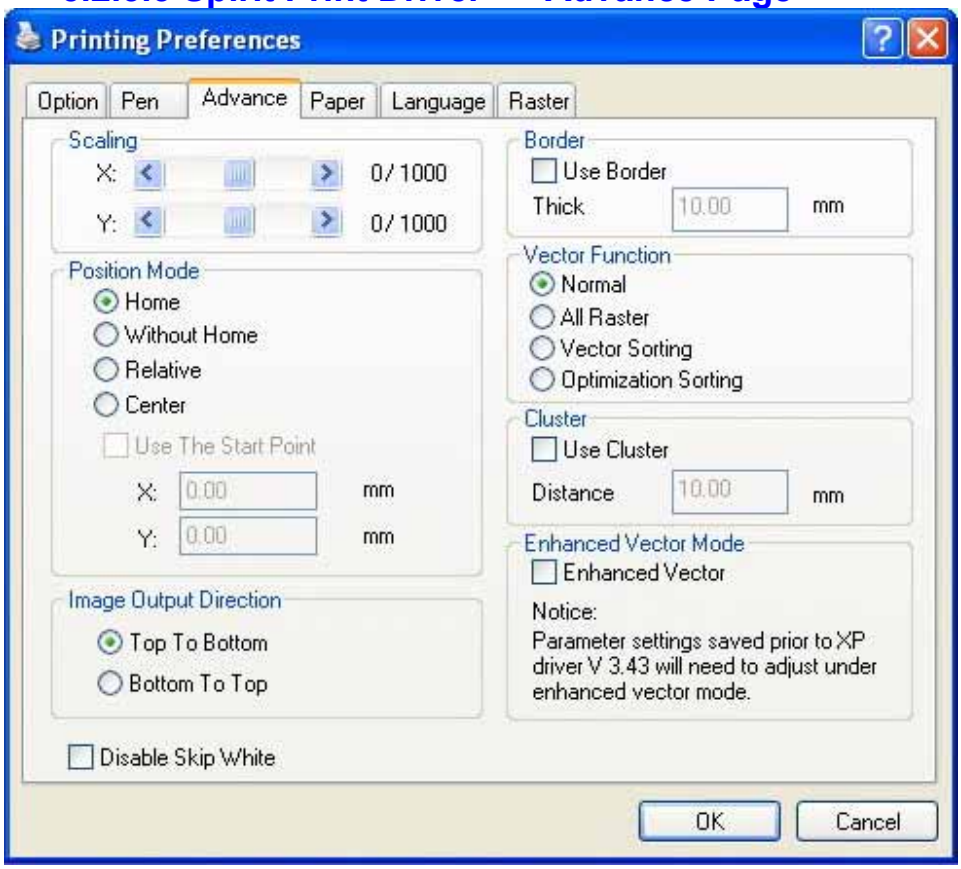
This checkbox controls the SmartAIR air-assist function (if you have the optional air compressor installed). By selecting a pen color and checking this box will enable the SmartAIR air-assist function for that particular pen color. As an example, if you are performing a combination of both surface raster engraving job and deep vector cutting on a material such as acrylic, you may want to enable the SmartAIR air-assist for the vector cutting sections to get the cleanest cuts. To do this, you would simply need to select the pen color that you have assigned to the sections to be cut and select the Air checkbox for those particular pen color.

Auto Focus (Pen Page)

[DEFAULT SETTING: Unselected]

This checkbox sets the Auto Focus for that particular job. With the Auto Focus button checked, the Spirit will automatically initialize the auto focus procedure before starting the job. This will ensure the focal distance is properly set based on the particular material you are working with and the focal lens you have installed.

5.2.3.3 Spirit Print Driver >> Advance Page



Scaling (Advance Page)

[DEFAULT SETTING: 0]

In some cases you may find a slight output inaccuracy in the actual output compared to what you have set in the computer. This margin of error or offset is extremely small (approximately 1/300). What this means that there may be a 1-unit offset for every 300 unit increments. As an example, if you engrave a 300mm straight line, it may end up measuring only 299mm or 301mm in the final output. In this case, you will want to set the scaling setting to +1 / 1000 or -1 / 1000, respectively to compensate. A general rule of thumb is for every 300 unit increment, you will want to adjust the slider by +1 if the final output is 1 unit increment shorter or -1 if the final output is 1 unit increment longer than your graphic design setting.

Position Modes (Advance Page)

[DEFAULT SETTING: Home]

These selections allow you to control the positioning of the laser head after each job completion and before the next subsequent job.

- **Home:** Resets the positioning of the laser head to the 'home position' (upper-right) before and after each job.

- **Without Home:** The laser head will start the next job based on its position from its graphic application software setting, from the last position of the previous job. Upon completion of the current job, the laser head will remain at the last position of the previous job.

- **Relative:** This mode sets the current laser head position to correspond to the origin (top left) position of the graphic software. Therefore, the laser head will process the job from its current position relative to its setting in the graphics software.

- **Center:** Sets the current position of the laser head as the center point for your subsequent job. As an example, if the subsequent job is to vector cut a circle and you have the Position Mode set to Center, then the Spirit will vector cut a circle around the initial position of the laser head.


TIP
It is highly recommended you enable the red dot laser pointer when setting / adjusting the Position Modes, as this makes accurate positioning of your laser carriage for your particular jobs much easier.

Image Output Direction (Advance Page)
[DEFAULT SETTING: Top To Bottom]

These selections allow you to control the direction in which the system processes an engraved image.

- **Top To Bottom:** Selecting this will force the system to process the current task by moving the laser carriage from the top to the bottom of the image (rear end to front end of the work table).

- **Bottom To Top:** Selecting this will force the system to process the current task by moving the laser carriage from the bottom to the top of the image (front end to rear end of the work table)

(Normally, the LaserPro Spirit engraves from left to right, top to bottom. Selecting Bottom Up will force the machine to start from the bottom and work its way to the rear of the working table.


TIP
In situations where the material you will be working with may produce a lot of dust byproducts and you are utilizing the optional air extraction system, it is recommended you select the Bottom To Top image output direction option. This will minimize the amount of dust byproducts lodged in the engraved sections as the air extraction system is vented from the rear of the machine, the same direction as the image is processed.

Border (Advance Page)
[DEFAULT SETTING: Unselected]

In cases where you are working with a negative image (negative outline areas of your image are engraved, rather than the positive areas), you may wish to include a border around your image. To properly add a border, you will first need to Invert your design from the Option Page, then check Use Border and specify a value for the thickness of the border you would like to add to your design.

This mode is useful for engraving rubber stamps, as it allows you to create the outline around your stamp image.

> ***NOTE***
> If you wish to use the Border and Cluster function simultaneously, then the Border Thickness value must be **less than** the Distance value specified in the Cluster setting.

Vector Function (Advance Page)

[DEFAULT SETTING: Normal]

- **Normal:** This selection will not apply any special advanced vector function to your job. This is the default Vector Function setting.
- **All Raster Output:** This selection will instruct the print driver to process your entire image as a raster engraving. Any vector lines within the image will be treated as raster data and outputted as a raster engraving, similar to a dot-matrix printer.
- **Vector Sorting:** When performing a vector cutting job in which your image has one vector cut area enclosing within another vector cut area, select the vector sorting mode. This mode will automatically instruct the print driver to process the inside vector image and moving outwards. If you try to process a vector image that has multiple layers without using this mode, what may occur is the laser engraver may process the outer vector cutting first, and any inner vector cutting will not be possible as your centerpiece material may have dropped to the cutting table. This setting will always automatically direct the laser to cut from the inner most vector shape and move outwards.
- **Optimization Sorting:** This is a setting that will minimize your process time. When selected, the print driver will analyze your image and automatically determine the most efficient processing path to process your image.

Use Cluster (Advance Page)

[DEFAULT SETTING: Unselected]

This setting allows you to change how the Spirit interprets and processes individual / independent areas of an image in order to minimize job-processing times. The Cluster function is only applicable when multiple areas of an image are broken down and isolated from each other (areas not touching each other, blank space in-between). Another condition that must be met for the Cluster function is that these individual areas of your design must have some X-axis overlap, meaning that they should be somewhat side-by-side with empty space between them. The distance value can be set by the user and represents the limit or cutoff point in which side-by-side objects will be processed in Cluster mode or not. If the distance between side-by-side objects is greater than the set distance value, then the individual areas will be processed in Cluster mode. Conversely, if the distance between side-by-side objects is lesser than the set distance value, then the individual areas will be processed normally (not via Cluster mode).

An example of an image that would benefit from the Cluster function would be: 2 squares to be engraved, side-by-side on the X-axis with a 20 cm gap in between them. In this scenario, you would want to enable the Cluster setting and set the distance to a value less than 20. By doing so, the laser will completely process one square and “leap-frog” to the second square, rather than processing both squares simultaneously. The result: you shorten the processing time by minimizing the unnecessary travel distance the laser head needs to make across the X-axis in between squares, if they were to be processed simultaneously.

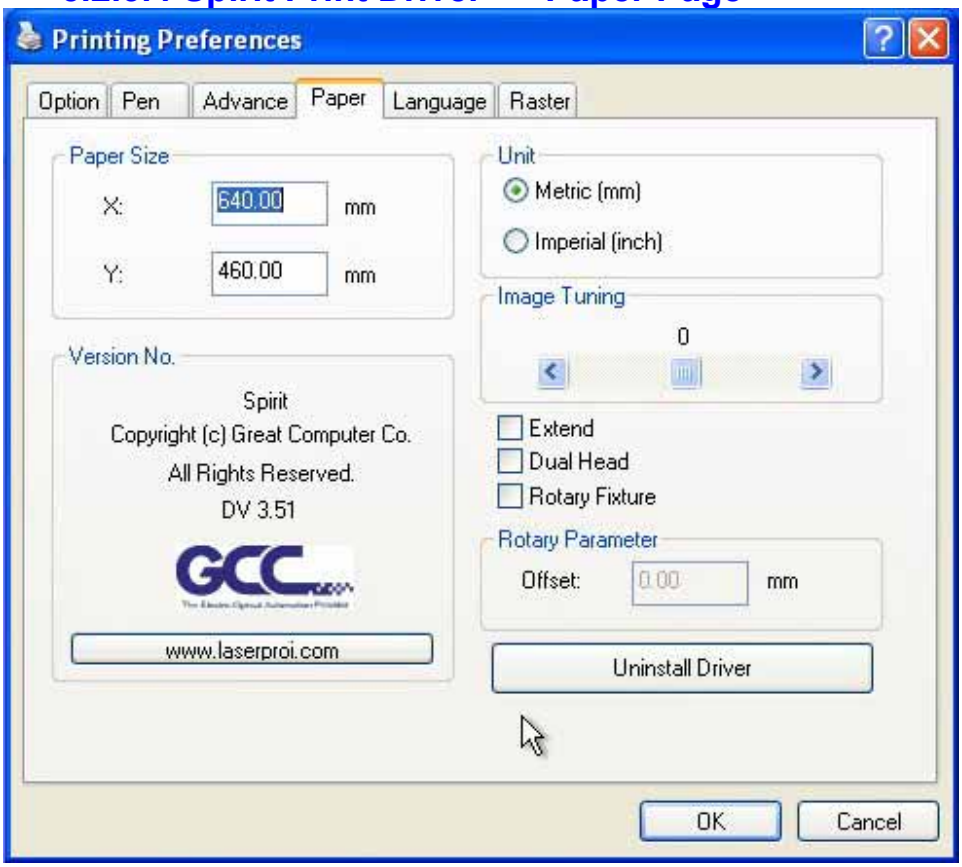
NOTE
If you wish to use the Border and Cluster function simultaneously, then the Border Thickness value must be **less than** the Distance value specified in the Cluster setting.

Enhanced Vector Mode (Advance Page)

[DEFAULT SETTING: Unselected]

This setting allows you to improve the cutting quality at the expense of speed. Your engraving speed will be dropped 50%, to maximize the cutting power. We recommend you enable this function when cutting thicker materials.

5.2.3.4 Spirit Print Driver >> Paper Page



Paper Size (Paper Page)

The paper size represents your total work area. Ensure that the paper size is never set greater than the Spirit's worktable area of 25" x 18" (640mm x 460mm) or 29" x 20" (740mm x 460mm) with the Extend option checked. The X value represents the length and the Y value represents the width.

NOTE

When using the optional rotary attachment system and with the Rotary Fixture option checked, the X value represents the length of your working piece. The Y value will be changed to Diameter, which represents the diameter of your working piece (at the position you wish to engrave).

Unit (Paper Page)

[DEFAULT SETTING: Metric (mm)]

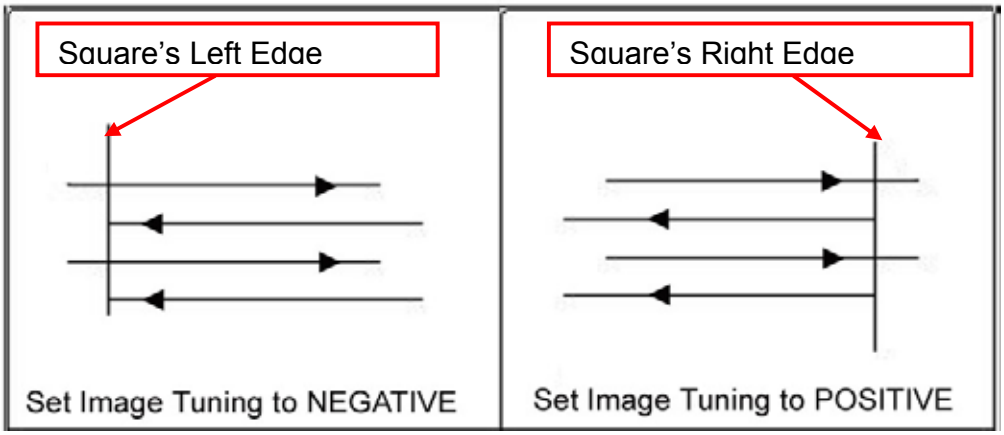
Here you can set your preferred measurement standard in which you would like use with the Spirit print driver. You can choose between metric or imperial standards.

Image Tuning (Paper Page)

[DEFAULT SETTING: 0]

In the event that you are processing extremely fine and detailed designs requiring near-microscopic edge-to-edge precision, you will need to adjust the image tuning setting. To adjust this setting, we recommend you engrave a small black square design as a sample and apply a magnifying glass to the engraved results.

When you look at your engraved test square under a magnifying glass, you may notice the edges of your square may be slightly offset, with every consecutive engraved even or odd line protruding past the square's ideal edge. This occurrence may occur on the left or right side of the square and can be compensated for by the image tuning setting. In the diagram below, the arrows refer to the direction the laser head is moving to generate that engraved line. If the first and every other line protrude to the **left** of the square's ideal edge, you will want to set the image tuning to a **negative value**. If the first and every other consecutive line protrude to the **right** of the square's ideal edge, you will want to set the image tuning to a **positive value**. The further the protruding lines are from the square's ideal edge, the larger you will need to set the Image Tuning value to compensate.



The following is an example of how having the proper image tuning is important when engraving fine, small, intricate text. The following two pictures show engraved text magnified with no image tuning (left picture) and image tuning enabled (right picture).

Extend (Paper Page)

[DEFAULT SETTING: Unselected]

If you are processing a very large area requiring the maximum worktable area, you will want to enable this mode. Enabling this mode will extend the Spirit's maximum work area to 38" x 18" (960mm x 460mm), from the default 32" x 18" (812 mm x 460mm). This function is enabled at the expense of

some quality, usually on the left and right edges of your full-size engraving. Usually the quality loss is minimal and may not be apparent, depending on your design.

> ***NOTE***
> With the Extend function enabled, the following functions are disabled: 3D Mode (Option Page), Stamp Mode (Option Page), SmartACT (Option Page), Disable Skip White (Advance), Auto Focus (Pen Page), and Rotary Fixture (Paper Page).

Dual Head (Paper Page)

[DEFAULT SETTING: Unselected]

> ***NOTE***
> This option is only to be used with the Dual-Head optional accessory properly set up. For instructions on how to set up the Dual Head, please refer to Chapter VII of this manual.

This function allows you to process two identical jobs at the same time through the employment of a secondary laser carriage. With the dual-head optional accessory properly set up:

1) Check the Dual-Head function to enable it. The X (width) value of the paper size will shrink from 64cm to 37cm, to accommodate for simultaneous jobs. The Y (height) value remains the same.
2) Simply lay out your work on a maximum page size of 31cm x 46cm. Prepare your work as if you were making only a single piece, the laser system and dual-head will automatically take care of the duplication process.

Rotary Fixture (Paper Page)

[DEFAULT SETTING: Unselected]

> ***NOTE***
> This option is only to be used with the Rotary Attachment optional accessory properly set up. For instructions on how to set up the Rotary Attachment, please refer to Chapter VII of this manual.

You will need to select the option when processing a job with the optional rotary attachment system to engrave on rounded or cylindrical objects. When you have your material and rotary attachment properly set up:

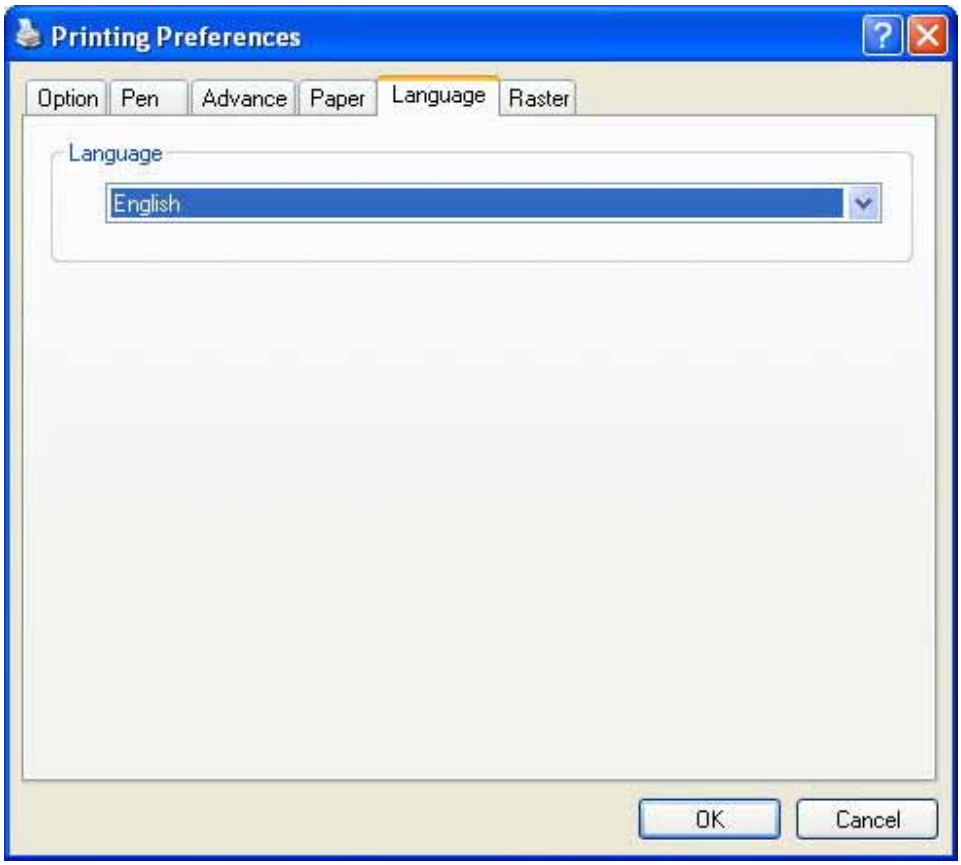
1) Check the Rotary Fixture function and notice the change in the Paper Size fields. Under Paper Size, the X value represents the length of your work piece. Enter the length of your work piece in this field.
2) Under Paper Size, the Diameter value represents the diameter of your working piece (at the position you wish to engrave). Enter the diameter of your work piece in this field. Again, remember the proper diameter value would be the diameter location, at the point of engraving on your work piece.
3) Under Rotary Parameter, the Offset value represents distance from the open end of your work piece to the base of the padded rubber wheel. This value will be displayed on the Spirit's LCD panel. Enter the proper offset value in this field.

Uninstall Driver (Paper Page)

Select this to uninstall the Spirit print driver. You will then need to restart your computer to complete the process.

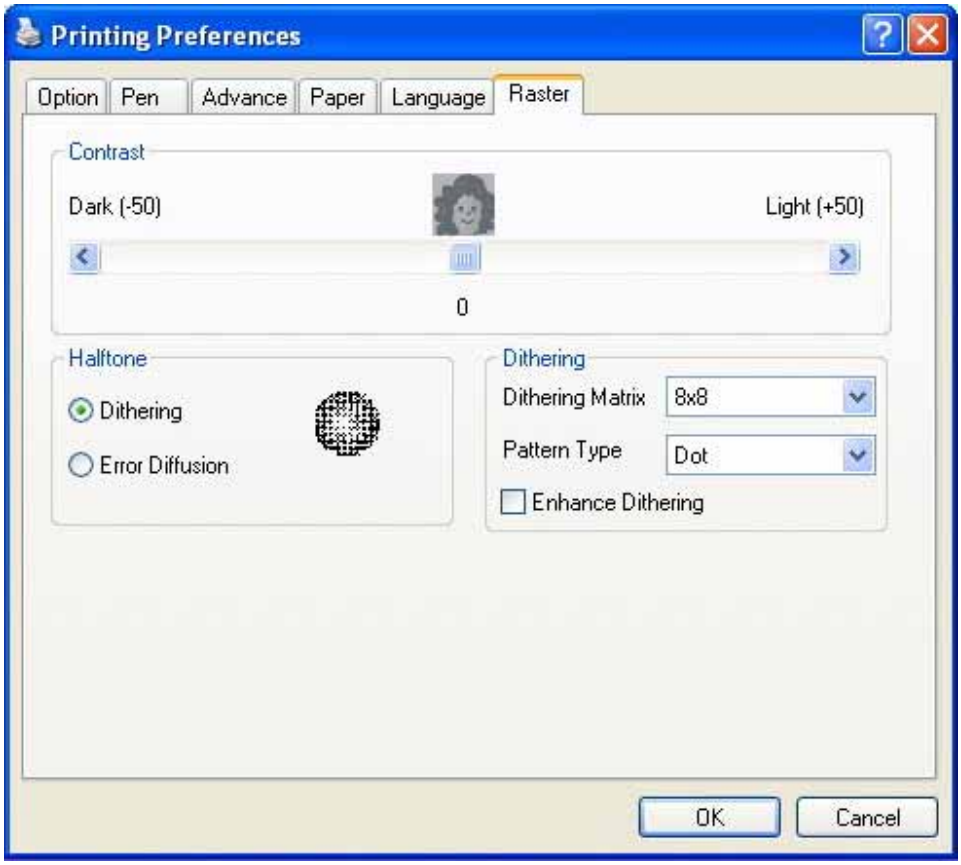
5.2.3.5 Spirit Print Driver >> Language Page

This page allows you specify the language displayed by the Spirit Print Driver. Current language options allow for: English, Spanish, French, And Chinese (Simplified, Traditional), Japanese, and German.



5.2.3.6 Spirit Print Driver >> Raster Page

NOTE
The Raster Page is only available when Black & White Mode Setting is selected from the Option Page, this page offers a number of advanced Raster Engraving output options.



Contrast (Raster Page)
[DEFAULT SETTING: 0]

A quick and easy way to immediately adjust the contrast of an engraved image. Moving the slider to the Dark setting will increase the contrast levels of the engraved output, whereas moving the slider to the Light setting will decrease the contrast levels of the engraved output.

TIP
There are other ways to adjust an engraved image's contrast such as: adjust the power / speed settings or simply adjusting the contrast of the image in software with the graphic software application.

Halftone (Raster Page)
[DEFAULT SETTING: Dithering]

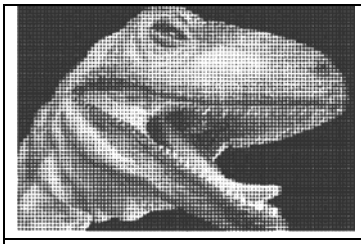
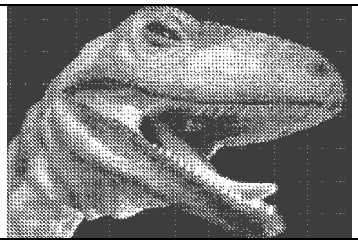
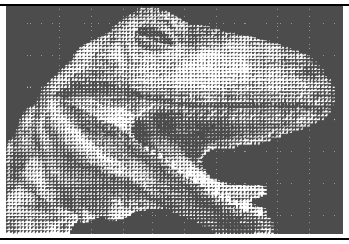
This option controls the way a raster-engraved image is processed. The “digital image to engraved output” process can be processed via two methods: Dithering or Error Diffusion. Each offer additional output options yielding different output effects, style, and quality.

- **Dithering:** Interprets and outputs the raster engraving via the dithering method. This mode will allow you to select the Pattern Type and Dithering Matrix, and Enhanced Dithering.

    - **Pattern Type: Dot, Bayer, Corner, 45 Degree**
      [DEFAULT SETTING: Dot]

      Each pattern type uses a different shape and arrangement of dots to compose the shading effect of a raster image.

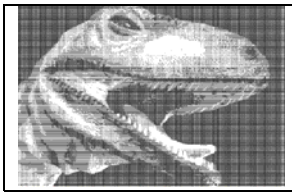
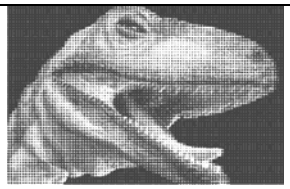
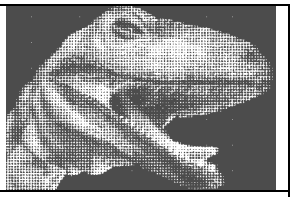
      The following diagram is an example of the raster effects when using the different pattern types.

		
Dot	**Bayer**	**Corner**

    - **Dithering Matrix:** ***Variable depending on the Pattern Type selected.***
      [DEFAULT SETTING: 8x8]

      This controls the resolution (dot size) and the number of dots the image is broken down into for the dithering process. As an example, selecting 2 x 2 will shade with a 5-grade halftone, where as an 8 x 8 Dithering Matrix will dither with a 65-grade halftone.

      The following diagram is an example of the raster effects when using the different dithering matrices.

			
2 x 2 Dithering	**8 x 8 Dithering**	**2 x 2 (Enhance Dithering)**	**8 x 8 (Enhance Dithering)**

- **Enhance Dithering**
  [DEFAULT SETTING: Unselected]

  Selecting this will produce a finer dithering output.

- **Error Diffusion (Raster Page):** Interprets and outputs the raster engraving via the error diffusion method. This mode will allow you to select from three diffusion types: Floyd, Stucki, and Jarvis.

  - **Diffusion Type: Floyd, Stucki, Jarvis**
    [DEFAULT SETTING: Floyd]

    Each diffusion type presents the shade of image as different spread halftones instead of dots to compose a raster image.

    The following diagram is an example of the raster effects when using the different diffusion types.

		
Floyd	**Stucki**	**Jarvis**

TIP

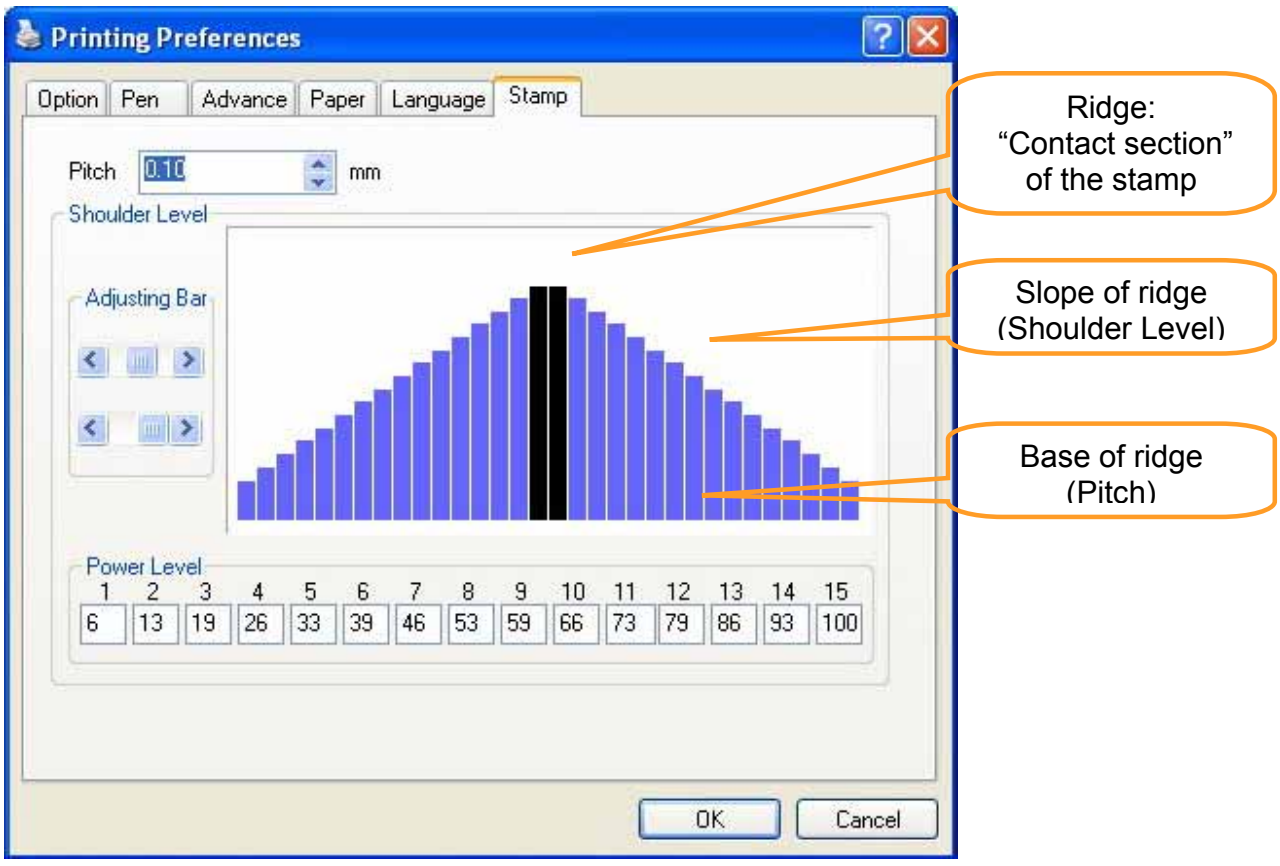
There is no “correct” or “best” setting when using the Raster options. The most appropriate settings will be based on a variety of factors: your design, the material you are engraving on, the results you wish to achieve, etc. Please take some time to experiment with the multitude of raster options to get the one you feel is the best for your piece. This is where much of the fun in engraving is….experimentation!

5.2.3.7 Spirit Print Driver >> Stamp Page

Producing stamps require different operational steps than your standard engraving or cutting jobs. The Stamp page offers dynamic options allowing you to customize your stamp production process.

> ***NOTE***
> The Stamp page will only appear and be accessible when you have selected the Stamp Mode from the Option Page.

> ***TIP***
> Functions located on the other pages that are useful when making a stamp: **Set Shoulder, Pitch, Border, Invert,** and **Mirror**.



Pitch (Stamp Page)

Your stamp will be a reversed image composed of engraved depressions and ridges. Think of these ridges as the "contact sections" of the stamp. If the ridges of these contact sections are too thin, they may break. The Pitch setting allows you to increase the width of the ridge base, hence creating more stable "contact sections" and longer lasting stamp. The pitch value setting allows you to adjust the base width of

the ridge. Broad pitch gives the maximum amount of support for each ridge. Experiment with different pitch value settings in order to produce the stamp that is best suited for your application.

Adjustment Bar / Power Level (Stamp Page)

Another important aspect of creating a stamp is setting the slope level of the shoulder. The shoulder is the section from the “contact section” of the stamp to its base. This function allows you to adjust the slope for the shoulder sections of your stamp. By sliding the sliders or directly input of power levels, you will be able to change the slope of the shoulder.

> ***NOTE***
> The visual representations of the Pitch and Shoulder Levels in the Spirit driver are an exaggerated representation to allow for easy visual guidance and precise input. Remember we are working with distances less than 1 mm here.

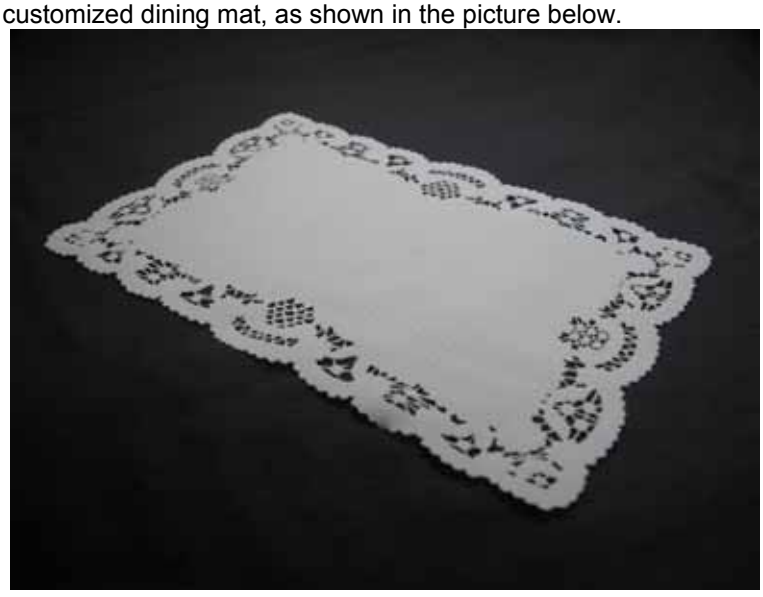
Chapter VI - Engraving and Cutting Techniques

6.1 Raster Engraving

A laser engraver can process text, scanned image, digital picture, or design by “laser firing” grids / dots of individual pixels into a raster image. Think of this as simply “printing” your job onto any particular material. An example of a raster engraved piece would be a photo engraving on tile, as shown in the picture below.

6.2 Vector Cutting

A laser engraver can process text, design, and images composed of lines through continuous-firing of the laser to cut out various shapes. When performing vector cutting operations, imagine the laser head as a pair of scissors cutting out the lines specified in your design. An example of a vector cut piece would be a customized dining mat, as shown in the picture below.



The Spirit Print Driver determines which sections should be raster engraved or vector cut based on the outline width of that particular area or section of the design. In order to prep a particular section for vector cutting, you will need to set that object's fill color to white and set its outline thickness between 0.001" (0.025mm) to 0.004" (0.1mm) via the graphics software.

Below is an example of how to prep an area (in this case, we will use a section of text) for vector cutting. CorelDraw will be used as the selected graphics software.

1) With the text function, create a string of characters and select those characters by clicking on the text.

2) Change the text fill color of the selected characters to white by left clicking on the white color from the CorelDraw Color Palette (located on the right hand side of the screen).

3) Change the outline color of the selected characters outline by right clicking on the desired color from the CorelDraw Color Palette.

4) Change the selected characters outline thickness to the thinnest width by right clicking on the selected text → select <Properties> → Click on the <Outline> tab and change the Width to its thinnest dimension. Click on "OK" to apply the changes.

5) Now your string of characters has been properly designated as an area to be vector cut. Simply "print" your job (output the file to the Spirit) and watch as your string of characters is vector cut.

6.3 Vector and Raster

In some cases, you will want to process both raster engraving and vector cutting tasks within a single project. For example, if you wanted to engrave a design onto a particular material and then cut a particular shape around that engraving. The picture below is an example of an engraving on a piece of cork, which has then been cut out with a square shape:

In these situations when there are raster engraving and vector cutting operations on a single project, the LaserPro Spirit driver will interpret between raster sections and vector sections by the types of

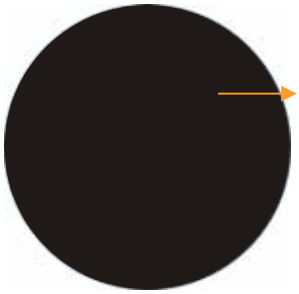
lines and line widths of your design. Areas of your design with line widths set between 0.001" (0.025mm), 0.004" (0.1mm) will be designate for vector cutting, and the other areas will be designated for raster engraving.

6.4 3D Tips

When doing 3D sample on LaserPro Spirit (SI-25), acrylic or MDF wood are ideal materials for the purpose. For acrylic the suggested PWR is 100%, SPD around 30% (depends on how deep you want to cut).

(REVISE THIS SECTION WITH MORE SUBSTANTIAL DETAILS, INSTEAD OF GENERALITIES)
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 (WHAT SORT OF MATERIALS?) 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%.



Create a black image for polishing

Chapter VII - Optional Items

When purchasing the LaserPro Spirit from your local authorized GCC distributor, you will be provided a chance to purchase optional items to enhance your experience with your system. If anytime after the purchase of your Spirit, would you like to purchase any optional item, please contact your local authorized GCC distributor.

7.1 Air Extraction System Option

To properly remove dust, vaporized materials and chemical smoke from the working area and machine, it is necessary to install a suitable air extraction system. The air extraction system and other components are readily available from your local authorized GCC distributor or you can elect to purchase and install one yourself with components found at your local industrial supply store.

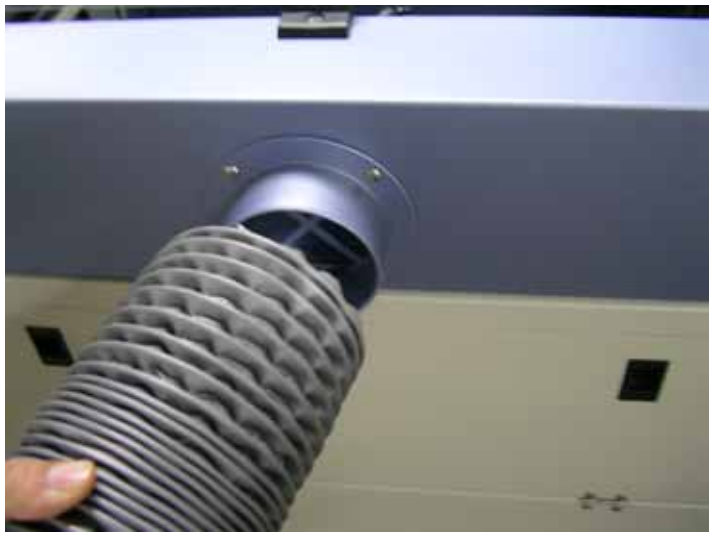
LaserPro's Air Extraction Systems are specifically designed to prevent personnel from inhaling hazardous fumes and dust generated by the laser process. Available for all LaserPro engravers, the LaserPro Air Extraction System represents the latest in fume extraction and odor reduction technology for all types of applications. Quiet operation, high vacuum capacity, compact design and long life expectancy are but a few outstanding features. Each LaserPro Air Extraction System is powered by a maintenance-free, continuous-running turbine. In order to ensure personnel safety and legal compliance, the LaserPro Air Extraction System is CE-compliant for Europe and ETL-certified for the United States and Canada. To purchase a LaserPro Air Extraction System, contact your local authorized GCC distributor

INSTALLATION (Self-Assembled Unit):

1) Purchase an exhaust system at your local industrial supply store, we recommend you have a contractor install the exhaust system. We highly recommend you install the exhaust system outside of the building for both noise considerations and if it does not possess filtering capabilities.

2) Mount the exhaust system in an obvious and accessible location, not too far from the Spirit, so it can be routinely switched on prior to laser engraving. The maximal distance you should mount the exhaust system away from the Spirit depends on the blower's vacuum capacity. We recommend you consult with the vendor regarding the unit's vacuum force, maximal distances, based on the available models.

3) Connect rigid and smooth walled tubing such as PVC or sheet metal with a 4" diameter to the ventilation opening located on the rear side of the Spirit. (As shown in the picture below). Try to keep this tubing as straight as possible as bends reduce the exhaust efficiency. Use the appropriate sized tube clamps and sealants to ensure a tight and secure attachment.



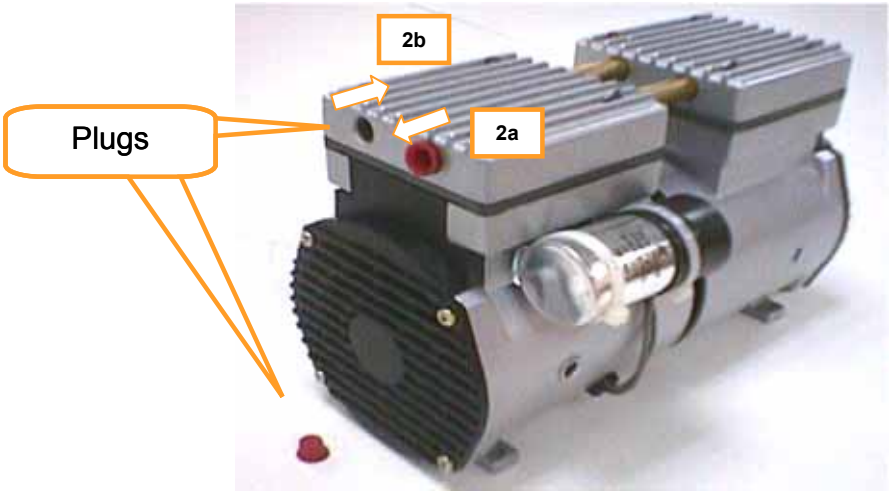
7.2 Air Compressor Option

Specifically designed for laser engravers, the air compressor utilizes an oil-free diaphragm. The air compressor helps eliminate harmful and potentially damaging moisture from the laser optics, maximizing laser optic life. In addition the air compressor provides the optimal air flow to the SmartAIR nozzles to minimize flaming, suppress working temperatures, and blow away dust and particle byproducts generated from the laser process.

INSTALLATION:

1) Remove the plugs on the air compressor to expose the air inlets.

2) Fasten the included air tube fastener valve to the outgoing air inlet (indicated by 2a) and the air filter into the ingoing air inlet (indicated by 2b).



3) Connect a ¼" tubing to the air tube fastener valve on the air compressor.

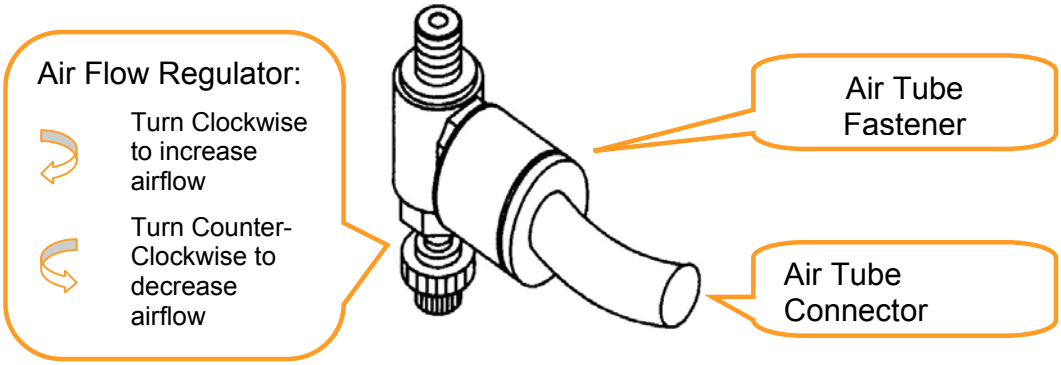
> ***NOTE***
> It is important that the ¼" air tubing has clean, straight cuts on each end. Jagged or slanted cuts will not produce adequate sealing capabilities.

4) Open the bottom doors found on the front side of Spirit to locate both the Air-Assist Valve and Internal Power Sockets. As indicated below:

5) Plug the air compressor's power cord A into the AC internal power socket.

6) Plug the female end of power cord B to the AC internal power socket and the male end to an external power outlet.

7) Take the unattached end of the ¼" air tubing (other end already connected to air compressor) and connect it to the air tube connector on the air assist valve. Make sure you press down on the air tube fastener when inserting the ¼" air tubing, to form a tight, secure attachment as indicated in the diagram below.



8) Congratulations, you have finished setting up the air compressor. Make sure you have the proper SmartAIR nozzle installed (depending on your application), before you turn on and utilize the air compressor.

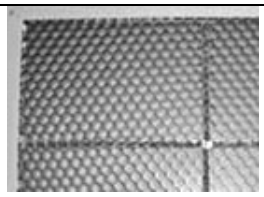
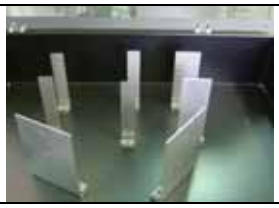
OPERATION:

1) Switch on the air compressor unit and make sure that the airflow regulator on the air assist valve is opened (turn clockwise to increase the airflow, counter-clockwise to decrease the airflow). The air nozzle under the laser head should emit a steady flow of air.

With the SmartAIR nozzle and air compressor properly installed and operating, all configurations and settings relating to air-assist functions are controlled through the LaserPro Spirit print driver and hardware control panel. Please refer to the LaserPro Spirit print driver and graphic control panel sections of this manual for details on how to enable and configure air-assist functionalities.

7.3 SmartBOX Option

The SmartBOX is an innovative combination of a cutting box, honeycomb table, and material support stands. During the cutting and engraving process, unwanted scrap, dust, and vapor byproducts are left behind. The cutting box collects the larger scrap byproducts while venting out the smaller dust particles, vapors, and smoke to minimize excess buildup on the machine, worktable, and your project. The SmartBOX allows you to maintain a clean worktable and minimizes backside burning of your media, whether you are working with thick and firm materials or thin and flexible materials.

SmartBOX Components	
Cutting Box	
Honeycomb Table	
Material Support Stands	 
Thumb Screws	

It is highly recommended that you use different setups of the SmartBOX depending on the physical properties of the material you will be working with. Here is the recommended SmartBOX component setups based on your working material.

Component / Application	Cutting Box	Honeycomb Table	Material Support Stands
Thin, Flexible Materials	Required	Required	Not Required
Thick, Firm Materials	Required	Not Required	Required

NOTE

Advanced users may choose to try other component setups to suit their particular engraving / cutting techniques or working material. Feel free to explore different ways to setup the various SmartBOX components to adapt to the results you wish to achieve.

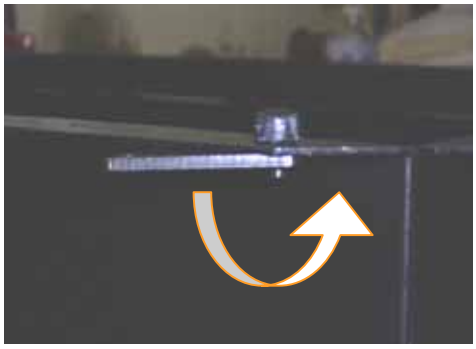
INSTALLATION / OPERATION (Cutting Box and Honeycomb Table):

1) Open the front pass-through door and lower the Spirit's worktable to the lowest possible position through the Spirit control panel.
2) Insert the cutting box and attached honeycomb table through the open front pass-through door onto the worktable, with the air extraction opening facing towards the back end of the Spirit. Ensure the rear and left side of the cutting box is aligned flush to the edges of the left and right rulers on the worktable.
3) Open the honeycomb table to find the four screw holes at the bottom of the cutting box. With the included thumbscrews, secure the cutting box to the work table and close the honeycomb table.
4) **[OPTIONAL]** If you have an air extraction system option installed, then you will need to attach the air extraction system's pipe connector to the SmartBOX's air extraction opening from the Spirit's rear side. (For detailed instructions to setup the air extraction system, please see the AIR EXTRACTION UNIT section in section 7.1).

Congratulations, you are now ready to position your thin, flexible materials on top of your honeycomb table / cutting box and start working.

INSTALLATION / OPERATION (Cutting Box and Material Support Stands):

1) In order to use the cutting box along with the material support stands, you must first remove the honeycomb table from the cutting box. Before you position the cutting box in the Spirit, first unscrew the screws that attach the hinges of the honeycomb table to the cutting box.
2) Remove the honeycomb table. Please keep in mind the honeycomb table surface is fragile; therefore, it is suggested to keep it in a safe place.
3) Open the front pass-through door and lower the Spirit's worktable to lowest possible position through the Spirit control panel.
4) Insert the cutting box through the open front pass-through door onto the worktable, with the air extraction opening facing towards the back end of the Spirit. Ensure the rear and left side of the cutting box is aligned flush to the edges of the left and right rulers on the worktable.
5) Find the four screw holes at the bottom of the cutting box. With the included thumbscrews, secure the cutting box to the worktable.
6) On the front right hand side of the cutting table, there will be a metal guard, which must be swiveled so that it is perpendicular to the front side of the cutting table (as shown in the picture below). This allows the Spirit to properly account for the extra height the cutting table adds to the cutting table.



CAUTION
Damage may occur to the system if you try to raise the work table without proper setting of the metal guard.

7) Now position the included material support stands so they support the thick, firm material you will be working with, while avoiding the laser path. In other words, avoid placing the support stands underneath any section of the material that will be lasered, especially during laser cutting.

7.4 SmartAIR Fine / Ultra Nozzles Option

The SmartAIR™ Fine and Ultra Nozzles minimize flaming, suppress working temperatures, and blow away dust and particle byproducts generated from the laser process.

The SmartAIR Fine Nozzle is recommended for engraving or cutting thin material such as textile. The smaller caliber nozzle is positioned closer to the object for a concentrated blast directed over a small area to eliminate burning on the cutting edge. The vertical design of the SmartAIR Fine Nozzle produces a concentrated airflow to blow away dust and unwanted residue, leaving a clean product surface.

The SmartAIR Ultra Nozzle is recommended for cutting thick material such as acrylic. The larger caliber nozzle produces strong airflow over a wider area to prevent flaming when the laser is cutting at slower speeds.

> ***NOTE***
> The Spirit comes standard with the SmartAIR Standard Nozzle, but for specialized jobs on specific materials, we highly recommend the use of the SmartAIR Fine or Ultra Nozzles.

INSTALLATION:

1) Unscrew the thumbscrews securing the front plate of the laser head, and remove the faceplate.
2) Remove the currently installed nozzle by simply sliding it outwards (towards you).
3) With either the SmartAIR Fine or Ultra Nozzle, simply slide into the slot (where you removed the original nozzle), with the pointed end face down.
4) Position the faceplate back onto the laser head and screw the thumbscrews back into place.

OPERATION:

1) With the air compressor unit and applicable SmartAIR Nozzle properly installed. Switch on the air compressor unit and make sure that the airflow regulator on the air assist valve is opened (turn clockwise to increase the airflow, counter-clockwise to decrease the airflow). The air nozzle under the laser head should emit a steady flow of air.
2) With the SmartAIR nozzle and air compressor properly installed and operating, all configurations and settings relating to air-assist functions are controlled through the LaserPro Spirit print driver and hardware control panel. Please refer to the LaserPro Spirit print driver and graphic control panel sections of this manual for details on how to enable and configure air-assist functionalities.

7.5 SmartGUARD Fire Alarm Option

Laser cutting and engraving operations using the SmartGUARD system protects the operator, machine, and the work products from potential fire hazards. During the engraving process, flaming may occur when working with combustible or easily-flammable materials, such as paper or wood. The SmartGUARD Fire

Alarm is a pre-installed optional item that can be set to notify the operator through audio warnings and automatically shutdown the current operation.

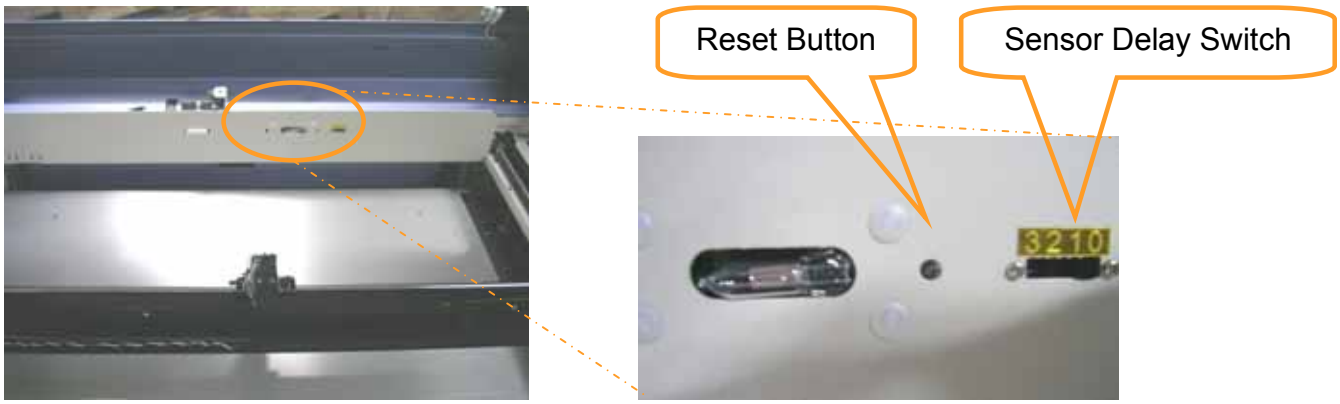
INSTALLATION:

If you have purchased your system with the SmartGUARD option, then no installation is required, as your system will arrive with the SmartGUARD pre-installed.

For system owners that did not initially purchase this option, but would now like to add the SmartGUARD, will need to contact their local authorized GCC distributor to have this great feature installed. The installation process of the SmartGUARD fire alarm is complicated and not recommended to be performed by the end user.

OPERATION:

The SmartGUARD fire alarm is installed on the bottom inner side of the Spirit located beneath the top primary door (as shown in the picture below). There is a Sensor Delay Switch and Reset Button.



- **Sensor Delay Switch**: The sensor delay switch controls the delay time from when a fire is detected until alarm activation and automatic system shutdown. The sensor delay switch settings and results are shown below. As an example, if the sensor delays switch is set to the 2 position, then the SmartGUARD fire alarm will alert and automatically shutdown the laser system four seconds after detecting a fire.

Sensor Delay Switch Setting	Result
0	Disables the SmartGUARD
1	Alert and shutdown after 1 second
2	Alert and shutdown after 4 seconds
3	Alert and shutdown after 8 seconds

- **Reset Button:** If a fire is detected and the SmartGUARD fire alarm is activated, the reset button can be switched to reset the SmartGUARD fire alarm and reactivate the laser system.

WARNING
Setting the Sensor Delay Switch setting to 0 will completely disable the SmartGUARD fire alarm. The result is equivalent to not having the SmartGUARD fire alarm installed.

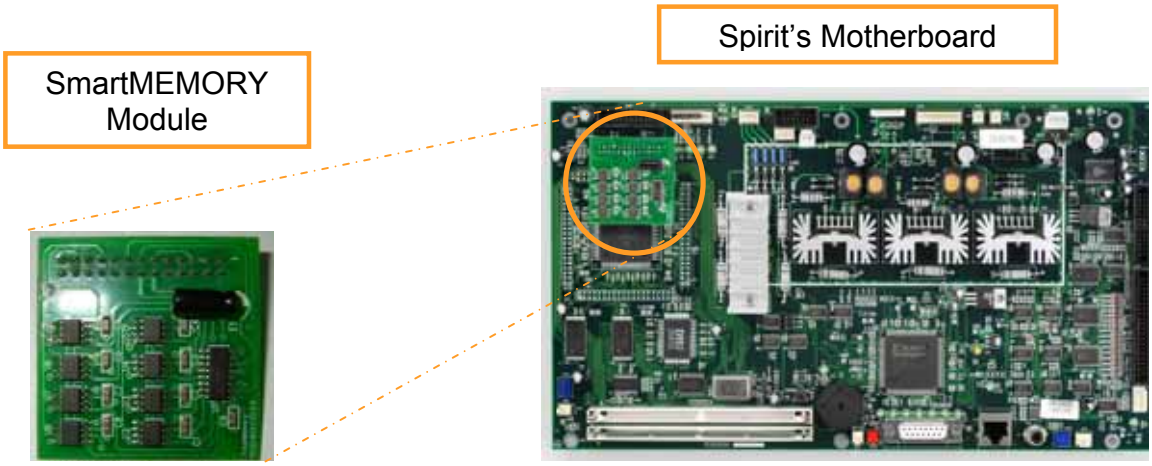
7.6 SmartMEMORY Module Option

The SmartMEMORY module option increases productivity and efficiency by allowing you to save and load unfinished tasks, without having to retransmit task settings from the computer again. It enables to save and load your working files to and from the SPIRIT. In addition, the SmartMEMORY module is portable and can be used to transfer task settings from one machine to another.

INSTALLATION:

> ***CAUTION***
> It is highly recommended you completely turn off the SPIRIT and unplug its cord from the power source before installing or removing the SmartMEMORY module.

1) To install the SmartMEMORY module, you will need to first access the system's motherboard. To do so, use a screwdriver to remove the two screws securing the panel on the right hand side of the SPIRIT.
2) Open the panel and to expose the Spirit's motherboard.
3) Simply connect the SmartMEMORY module to the connector on the Spirit's motherboard (indicated in the pictures below).



OPERATION:

With the SmartMEMORY module installed, you will be able to SAVE and LOAD to the SmartMEMORY:

> ***NOTE***
> In order to properly use the SmartMEMORY module with the Spirit, ensure the Spirit's firmware is version 1.02 or later. Also keep in mind, the capacity of the SmartMEMORY module is 4MB, please do not save files that exceed this limit.

SAVE files to the SmartMEMORY module:

1) Navigate to the Write Flash Memory function. From the Spirit Control Panel, press the F4 (Function) → MACHINE SETTING → FLASH MEMORY → WRITE FLASH MEMORY.
2) By selecting the Write Flash Memory function, the tasks stored on the Spirit will be transferred over to the SmartMEMORY module.

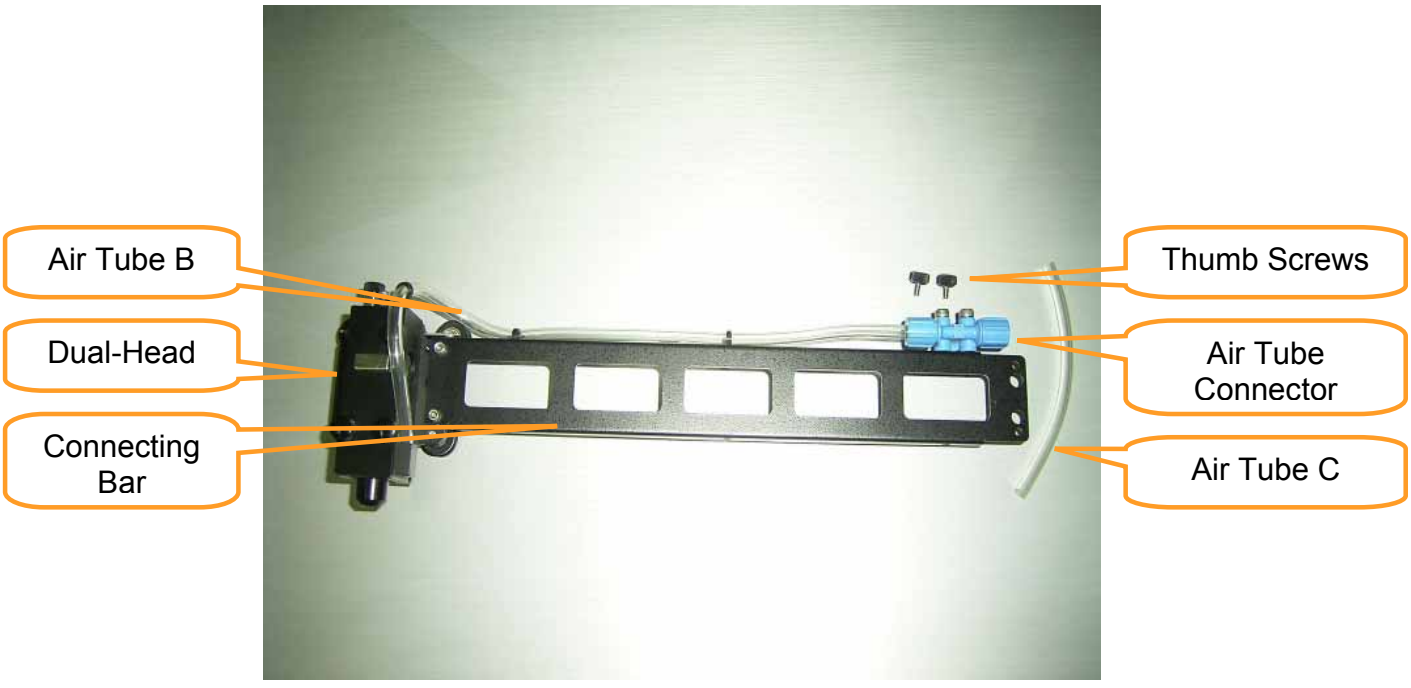
LOAD files from the SmartMEMORY module:

1) Navigate to the Read Flash Memory function. From the SPIRIT Control Panel, press the F4 (Function) → MACHINE SETTING → FLASH MEMORY → READ FLASH MEMORY.
2) By selecting the Read Flash Memory function, the tasks stored on the SmartMEMORY module will be transferred over to the SPIRIT.

7.7 Dual-Head Option

With the Dual-Head optional item, an additional carriage head is integrated onto the engraver, allowing for two identical engraving or cutting jobs to be performed at the same time. The worktable is automatically divided into two identical work areas with each of the two laser carriages working each area. The dual-head is ideally suited for high volume production of identical items, not only saving you time, but doubling your productivity.

The dual-head device of LaserPro Spirit consists of six components: dual head (the 2nd laser carriage), connecting bar, air tube B, air tube C, air tube connector and thumb screws. The main benefit of dual head device is to increase the working efficiency. With two laser carriages, two identical jobs can be engraved or cut at the same time. This can not only save time but also provide you the more flexible working productivity. Please follow up the steps below to install the dual head.



INSTALLATION:

1) With the machine off, slide the original laser carriage all the way to the right.
2) Use a screwdriver and loosen the two screws on the dual-head.
3) Mount / install the dual-head on the X-rail and to the left side of the original laser carriage.
4) Use a screwdriver and tighten the two screws on the dual head to secure it to the X-rail.
5) Attach the dual-head's connecting bar (right side) to the original laser carriage (left side) using the included thumbscrews.
6) Now with your dual-head firmly in place, unscrew and remove the top and right blue caps from the air tube connector.
7) Remove (pull out) the air tube from the original laser carriage and connect this tube to the top-side opening of the air tube connector (opened in step 6).
8) Connect one end of the included air tube C to the right-side opening of the air tube connector (opened in step 6) and connect the other end of air tube C to the original laser carriage's air tube location. (Removed in step 7).
9) Congratulations! Your dual-head is now properly installed and ready for use as shown in the following photo.

OPERATION:

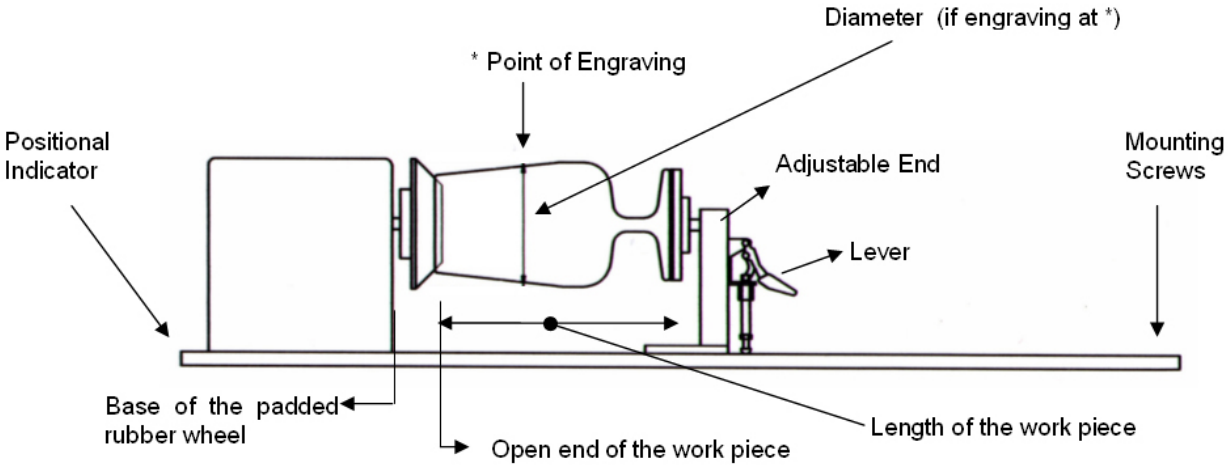
1) With the dual-head installed, go to the Paper Page of the Spirit print driver and check the Dual Head box. This will shrink the X (width) value of the paper size from 64cm to 37cm, to accommodate for dual engraving jobs. Note the Y (height) value remains the same.

NOTE
Please refer to section 5.2 of the reference manual for complete instructions on how to use the Spirit's Print Properties.

2) Simply lay out your work on a maximum page size of 31cm x 46cm. Prepare your work as if you were making only a single piece, the laser system and dual-head will take care of the duplication process automatically.
3) You are now ready to begin your dual engraving process.

7.8 Rotary Attachment Option

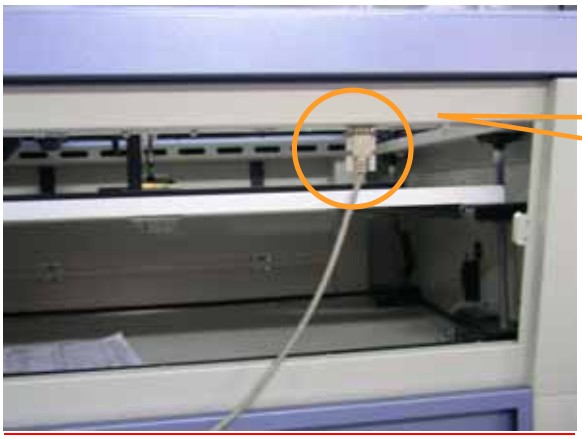
The rotary attachment option provides the Spirit with the ability to engrave on cylindrical or spherical objects. In addition to the standard X, Y, Z axis, the rotary attachment allows for a fourth axis which rotates your object 360° to allow for engraving on cups, wine glasses, and even balls.



Work Piece Limitations	
Maximum Length	450 mm (17.71 inches)
Maximum Loading Weight	5kg (11lbs.)
Minimum Diameter	90mm (3.54 inches)
Maximum Diameter	180 mm (7.09 inches)

INSTALLATION:

1) Turn off the power to the engraver.
2) Set the rotary attachment onto the engraving table so that the bottom mounting screws correspond to the positional holes on the engraving table. In addition, the top end of the rotary attachment must be flush against the engraving table with the rotary's positional indicator (center point of the top of the rotary attachment) aligned to the 10 inch (25.4 cm) position on the engraver's vertical axis.
3) With the rotary attachment properly positioned, tighten the mounting screws to secure the rotary attachment.
4) Open the front panel of the Spirit and connect the rotary attachment cable to the rotary attachment port located inside the Spirit's front panel (shown in the picture below).



5) Close the front panel.
6) The rotary attachment is now properly installed. Power on the Spirit and the rotary attachment will be automatically detected and the engraving table will automatically move to its lowest position.

OPERATION:

1) Use a ruler to measure the diameter (at the point on the work piece you will be engraving) and length of the work piece you will be engraving. Make a record of this.

2) Load the work piece onto the rotary attachment by first listing the lever on the rotary attachment, unlocking the adjustable end of the rotary attachment. Slide the adjustable end to accommodate the length of the work piece. Load the working piece by centering the open end of the work piece against the rubber wheel and slide the adjustable end to fit the bottom of work piece firmly. Now simply lower the lever to secure the work piece with the rotary attachment.

CAUTION
If your work piece is small, please apply 4" focal lens for operation to prevent the lens carriage from colliding with the rotary attachment.

3) Prepare the graphic you would like to engrave with the rotary attachment and go to the Paper Page of the Spirit print driver.

NOTE
Please refer to section 5.2 of the reference manual for complete instructions on how to use the Spirit's Print Properties.

4) From the Paper Page, the first thing you must do is to check the Rotary Fixture. The Paper Size options and Rotary Parameter will change to allow for proper input based on your rotary attachment.

   a) Under Paper Size, the X value represents the length of your working piece. Enter the length of your work piece in this field.

b) Under Paper Size, the Diameter value represents the diameter of your working piece (at the position you wish to engrave). Enter the diameter of your work piece in this field. Again remember the proper diameter value would be the diameter location on your work piece you will be engraving.

c) Under Rotary Parameter, the Offset value represents distance from the open end of your work piece to the base of the padded rubber wheel. This value will be displayed on the Spirit's LCD panel. Enter the proper offset value in this field.

5) Your Spirit print driver settings are now properly set. Manually position the laser carriage to the proper X / Y location on the object you will be engraving and position the auto focus pin over the area to be engraved on your work piece. Hit the Auto Focus button and the Spirit will now properly focus at the location to be engraved.
6) Go back to the Spirit Print Driver to print your design and let the engraving begin.

NOTE
The maximum diameter and length of the to-be-engraved object is 90mm and 450mm respectively. Its maximum weight should not exceed 7kg.

Chapter VIII Basic Maintenance

Keeping your LaserPro Spirit clean and well maintained will ensure quality output, consistent reliability, and extended product life. Smoke, dust or residue build-up inside the laser system or the mechanical components can cause a reduction in the laser power, irregularities in the motion system, reduced product life cycle, and a host of other avoidable problems. This section will cover how to perform regular maintenance on the Spirit's worktable, motion system, mirrors, and focal lens.

The frequency of the cleaning schedule will depend on number of variables such as the types of material you work with, the immediate work environment, the frequency of use, the quality of the exhaust system, etc.

WARNING

- Electrical Shock may occur if you do not turn off and unplug the Spirit before cleaning.
- Damage may occur to the system if you do not turn off and unplug the Spirit before cleaning.
- Always turn off and unplug the Spirit before cleaning!

8.1 Suggested Cleaning and Maintenance Supplies

Cleaning / Maintenance Tool	Special notes
Soap Solution or All-Purpose Cleaner	
Paper Towels	
Cotton Cloth	
Denatured Alcohol	DO NOT use alcohol on any painted surface, plastic, or the laser system!
Acetone	ONLY to be used on the working table
Vacuum Cleaner with a Flexible Nozzle	Only to be used in and around the worktable and motion system
Light Grade Machine Oil	
Cotton Swabs	Supplied
Lens Cleaner	Supplied
Lint Free Lens Tissue	Supplied
#2 Phillips Screwdriver	
Allen Wrench .050"	

8.2 Maintaining the Worktable and Motion System

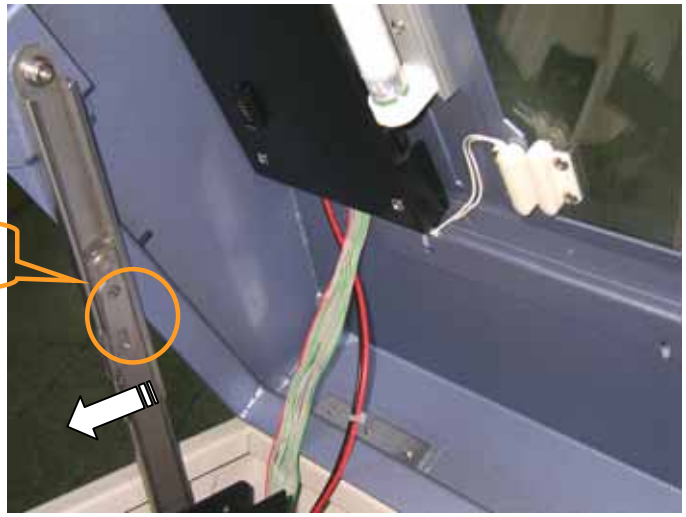
8.2.1 Accessing the Worktable and Motion System

It will be important to gain full access to the worktable and motion system to properly clean and maintain these areas. To do so, you will need to open the LaserPro Spirit's SmartLID. You can do this via the following steps:

Opening the SmartLID:

1) Using the two operational handles, lift up to open the SmartLID from the rear side of the LaserPro Spirit. Ensure you lift up the lid to the maximum (indicated by a small click) to engage the latch (as shown in the picture below).

2) Manually lock the SmartLID via the two sliding locks found on each side of the metal support rails by sliding them towards you into the locked position (as shown in the picture below).



WARNING

Anytime you have the SmartLID open, always make sure you have properly engaged the SmartLID manual locks on both sides of the metal support rails. Failure to do so may pose a crush risk if any part of your body is within the vicinity of the work area.

Closing the SmartLID:

To properly close the SmartLID after you have finished accessing the worktable or motion system, please follow these steps:

1) Disengage both of the sliding locks found on each side of the metal support rails by sliding them away from you into the unlock position.
2) Push the SmartLID away from you to the maximum position to disengage the latch (indicated by a small click) and gently shut the SmartLID.

8.2.2 Cleaning the Worktable and Motion System

Clean the working table and the motion system on a frequent basis through the following steps:

1) Turn the power off and unplug the Spirit before cleaning.
2) Use a vacuum cleaner with a flexible nozzle to remove dust and debris from the worktable and motion system.
3) Apply small amounts of all-purpose cleaner, alcohol, or acetone to a paper or cotton towel to clean the working table.
4) Apply a soap solution, all-purpose cleaner, or alcohol to a paper or cotton towel to wipe down the rails of the motion system.
5) Wait for all cleaning residue to dry completely before plugging in and operating the Spirit.

CAUTION

- Never pour or spray alcohol or acetone directly to the working table.
- Oil, alcohol and acetone can cause fires or smoke build-up if improperly used.

8.2.3 Lubrication of the X / Y Rails

In order to keep the motion system running smoothly, the X / Y rails of the motion system will need lubrication on a semi-regular basis. Use a small amount of light grade machine oil or PS2 grease to a paper or cotton towel and apply to the rails.

You can purchase PS2 grease from NSK dealers worldwide. Please visit http://www.nsk.com/eng/company/network/index.html for additional information.

NOTE

- Always clean and lubricate the rails after working with materials that produce lots of debris (such as wood).
- Too much oil or PS2 grease applied to the X / Y rails will accelerate the build up of debris.

8.3 Cleaning the Optics System

8.3.1 Removing the Mirrors

We recommend you check the mirrors once or twice a week to see if they require cleaning. If any debris or smoke residue is present, use the following steps to clean them.

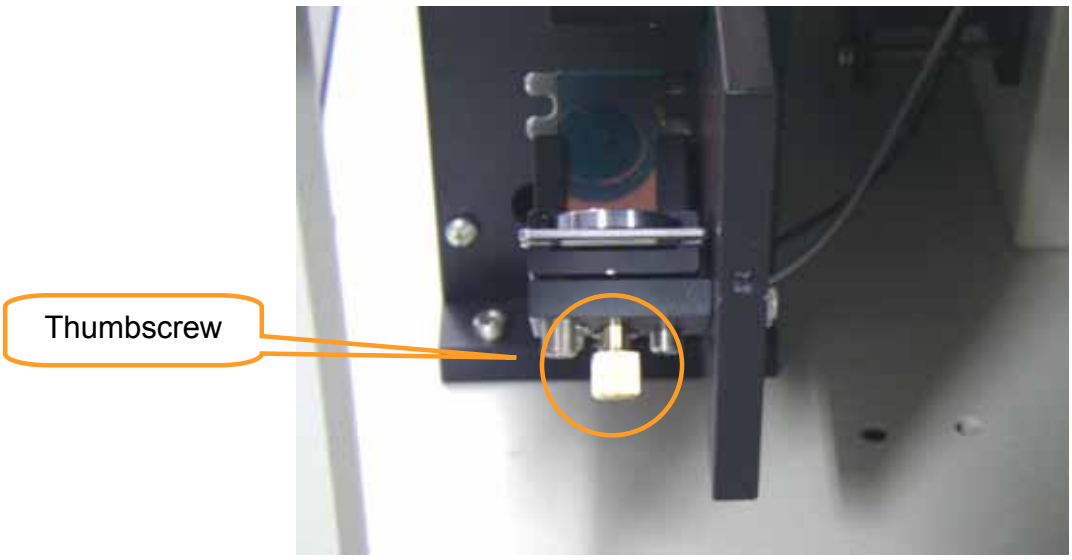
> ***NOTE***
> - It is highly recommended you remove, clean and replace each mirror **one at a time**!
> - Refer to section 8.3.2 on how to clean the mirrors.

The following section will detail how to access and remove each of the four mirrors found on the LaserPro Spirit for cleaning.

Mirror 1

This mirror is located inside the bottom left access panel of the LaserPro Spirit.

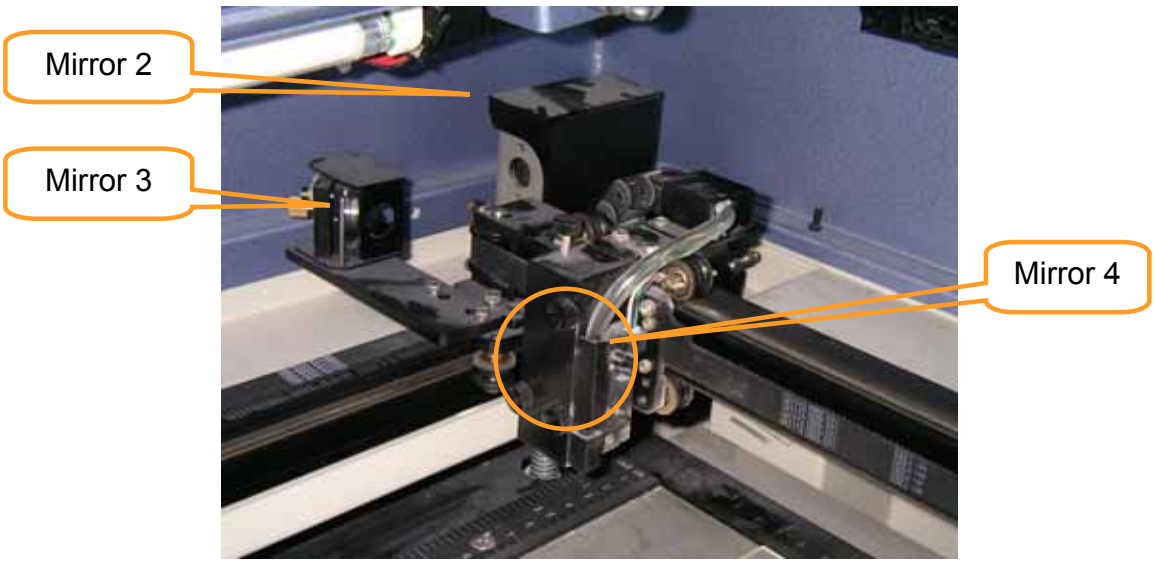
1) Use a #2 Phillips Screwdriver to remove the access panel located on the bottom left side of the LaserPro Spirit.
2) Loosen the thumbscrew and remove the dust cover securing the mirror. (As shown in the picture below).



3) Clean the lens in the proper manner.
4) Re-install the mirror after cleaning.
5) Tighten the thumbscrew.
6) Replace and secure the outer access panel.

Mirror 2, 3, 4

These mirrors are located in the worktable area of the LaserPro Spirit.



Mirror 2

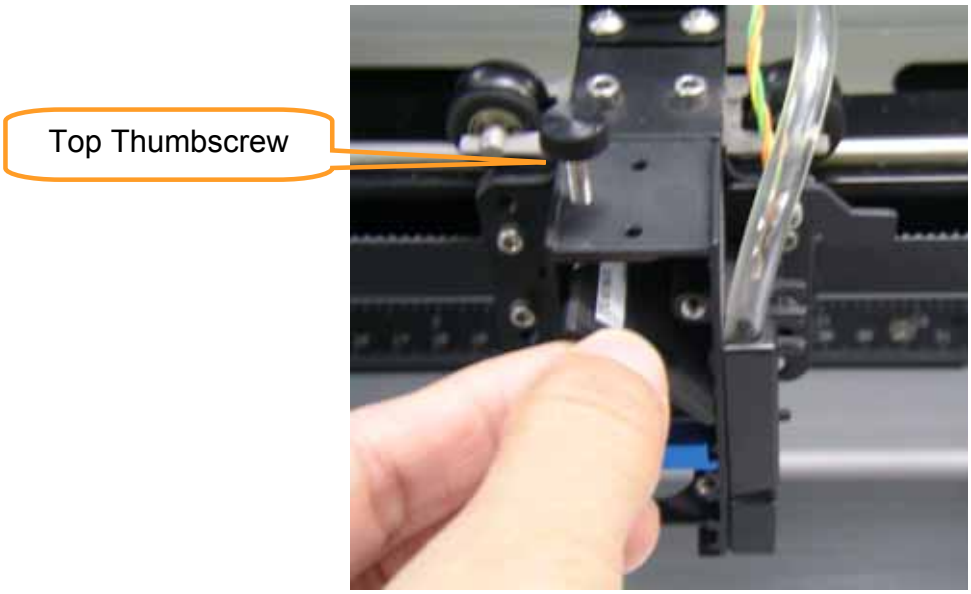
1) Unscrew and remove the black dust cover covering mirror 2.
2) Unscrew the thumbscrew holding mirror 2 in place.
3) Clean the lens in the proper manner.
4) Re-install mirror 2 after cleaning.
5) Tighten the thumbscrew.
6) Replace and secure the black dust cover.

Mirror 3

1) Unscrew the thumbscrew holding mirror 3 in place.
2) Clean the lens in the proper manner.
3) Re-install mirror 3 after cleaning.
4) Tighten the thumbscrew.

Mirror 4

1) Unscrew the three thumbscrews (front face of the laser head) securing the laser carriage panel and remove the laser carriage panel to reveal mirror 4 and the focal lens.
2) Loosen the top thumbscrew to remove mirror 4 (as shown in the picture below).



3) Clean the lens in the proper manner.
4) Re-install mirror 4 after cleaning.
5) Tighten the top thumbscrew.
6) Reinstall the laser carriage panel and tighten the three thumbscrews.

8.3.2 Cleaning the Mirrors

After you have removed each mirror, you will want to inspect each mirror for scratches, smoke residue, or debris. If any residue or debris is present, use the following steps to clean the mirror.

1) Hold the mirror with the reflective side up, without touching the reflective side of the mirror (DO NOT apply any finger pressure or any other cleaning solutions to the mirror surface).
2) Drape a new sheet of lens tissue over the mirror.
3) Apply a few drops of lens cleaner on the tissue covered mirror (apply enough so that the tissue absorbs just enough to cover the mirror surface).
4) Pull the tissue across the mirror in only one direction.
5) Repeat the cleaning processes if the mirror is not completely clean after the first attempt.
6) Make sure that the mirror is completely dry before reinstalling it.

CAUTION

- If the center of the mirror is scratched, contact your LaserPro Spirit dealer for a replacement.

8.3.3 Removing and Cleaning the Focal Lens

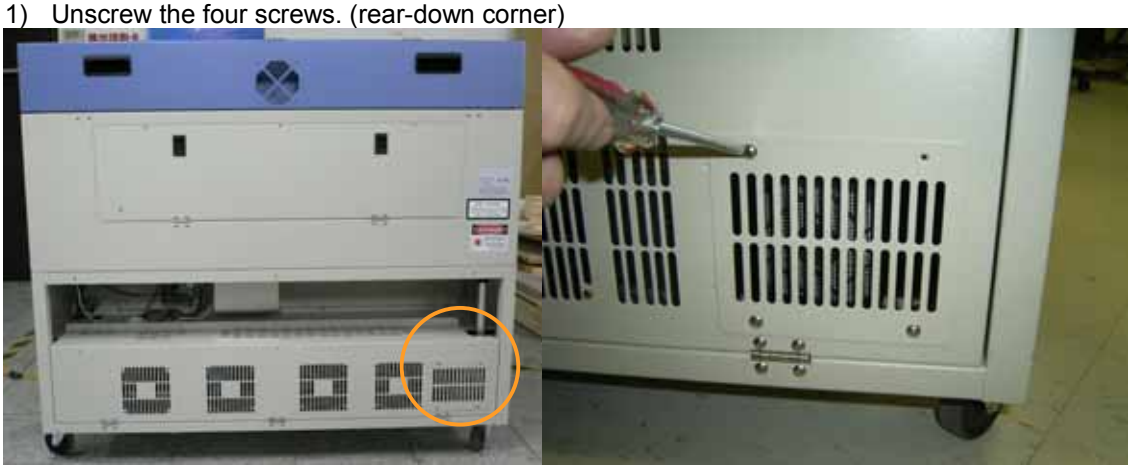
1) Unscrew the three thumbscrews (front face of the laser head) securing the laser carriage panel and remove the laser carriage panel to reveal the focal lens.
2) Carefully pull out the focal lens (as indicated in the picture below).

3) Clean the focal lens with a cotton swab and lens cleaner solution. Be sure to clean both sides of the focal lens (DO NOT apply any finger pressure or other cleaning solutions to the lens surface).
4) After cleaning, use a cotton swab to gently dry the focal lens and lens cover.

8.3.4 Cleaning Purged Air Module

Purged air module can prevent dust from the mirror. Recommend cleaning it every month, the frequency is determined by the working environment.

1) Unscrew the four screws. (rear-down corner)



2) Take off purged air module cover.(black square plastic cover)

3) Cleaning black sponge by water.

4) Please assembling back after the sponge already dried.

Chapter IX - Basic Troubleshooting

Quality Problems

- Check focal length setting under F4 function key-> Machine Setting-> Set Focus Lens to see if it matches the type of the lens installed.
- Check if the focal Lens is installed correctly or if focal Lens is not fixed properly.
- Check if it is caused by the debris or dust builds up in the bearing tracks or x rail.
- Check if it is caused from the damaged or dirty focal lens and mirror 4 in the laser carriage which can not deliver the laser beam effectively.

Non-operational Problems

- **Laser beam does not generate**
  1. If the red alignment beam is not revealed, the laser beam is misalignment. Adjust reflection mirrors for exact focus.
  2. If the red alignment beam is revealed, please check the driver power. The laser power may be too low to be detected. Please increase the percentage setting of the Laser Power from the software driver or the control panel.
  3. Please check if the laser power connector is loose.
  4. For safety purpose, the laser beam will not be generated when the top or front door is opened unless you short the connector of the magnetic switches.
  5. Check water level or temperature of water cooler for 50W and 100W engraver. If over-heated, laser beam will shut down automatically.

NOTE: Unplug the machine before examining the mirrors, lens, motion system or any other part of the laser system.

Other Problems

- **Graphic Was Clipped…" Message**

The size or location of graphic image may be bigger or beyond legal working area.

Do not place graphic object, especially vectors, right from (3,0) origin position, or 0 at either x or y rail of working area on application software, Corel Draw for instance, even vector line's width has been set to the thinnest. Because at thinnest line width, it still goes beyond the boarder and causes the error.

If the message appears randomly but frequently even image object is smaller or within the legal boarder, check or change DRAM module, a bad contact or faulty DRAM could cause such error.

- **Auto Focus Pin is Not Functioning**

The focus pin could be stocked by greasy residue that coats on it. Clean the probe with alcohol or acetone.

Check the cable of focus pin, there might be a bad contact or breakage.

Chapter X - Appendix

10.1 Glossary

Color Fill – Term within the awards and engraving industry used to describe the variety of techniques used to add color or contrast to engraving.

DPI – Dots Per Inch or Pixels Per Inch. The resolution of an image as defined by the amount of dots/pixels included in an inch. The DPI setting of 500, will include tell the machine to include 500 laser firings within an inch.

Driver – A software program that allows the computer to communicate with its components and peripherals: printers, scanners, monitors, etc.

Error Diffusion (Dithering Method) - This effect uses a series of random black and white pixels to represent shading.

Firmware – Programming permanently set into a computer's ROM chips. This information is burned into the computer chips and can only be changed by replacing the chips, or in the case of EEROM, by special procedure.

Parallel Cable – The cable connection between the computer and another device (usually the printer). This allows the computer to send several bits of data simultaneously.

Parallel Port – An outlet on your computer or electronic device that allows the computer and device to be connected and share information simultaneously. Another common name for the parallel port is the LPT port.

PPI – Pulses Per Inch. PPI determines the gross amount of laser pulses there will be per linear inch. PPI is exclusively for the vector setting. A PPI setting of 500 results in the laser firing every .002" (500 times per inch). If the standard lens is producing a vector laser focal point of .007", then higher PPI settings will result in deeper, overlapping laser pulses. PPI settings lower than 150 will result in the individual laser pulses being spread far apart, so they will not touch each other. Low PPI settings are a good example of perforate paper.

Raster – The process of rendering a cutting or engraving by multiple horizontal lines. For example: when cutting out or engraving a square, the raster setting will make the laser use numerous horizontal lines to fill in the outlined space.

Raster Image – An image that is defined as a collection of arranged pixels in a rectangular array of lines. A raster image is similar to a "Bitmap" graphics image.

Raster Line – A raster line is the individual horizontal line that makes up the raster image.

Serial Communication – An interface between a computer and one of its devices that transfers one bit of data at a time.

Serial Port – A connection that allows a computer to send data to a peripheral device one bit at a time. Usually a COM port that meets the RS232C specification.

Vector – The process of cutting or engraving an image by using single horizontal, vertical and curved lines. For example: when cutting out or engraving the outline of a square, the vector setting will make the laser use a thin single line to follow the outline of the shape.

10.2 LaserPro Spirit Specification Sheet

Spirit

Work Area		25 x 18 in. (640x 460mm) extendable to 29 x 18 in. (736 x 460 mm)
Maximum Part Size (W x D x Thick)	All doors closed	31.5 x 22.4 x 6.5 in.(800 x 570 x 165 mm)
	All doors open	26.8 x ∞ x 6.5 in. (680 x ∞ x 165 mm)
Table Size		31.1 x 20.9 in. (790 x 530 mm)
Dimensions		44.3 x 28.3 x 39.6 in. (1125 x 720 x 1005 mm)
Laser Source		12 to 100 Watt Sealed CO2 Laser
Cooling		Air-cooled, Operating environment temperature 15°- 30° C (60° - 86° F)
Drive		DC Servo Control
Speed Control		Adjustable from 0.1~100% of 60 ips (Up to 16 color-linked speed settings per job)
Power Control		Adjustable from 1~100% (Up to 16 color-linked power settings per job)
Z-Axis Movement		Automatic
Resolution (DPI)		Available 125, 250, 300, 380, 500, 600, 750, 1000
Computer Interface		Standard printer port and USB port
Memory Buffer		32MB standard (Upgradeable to 64MB)
Display Panel		4-line LCD panel showing current file name, total working time, laser power, engraving speed, file(s) loaded into memory buffer, setup and diagnostic menus
Safety		Class IIIR for red pointer
Electrical		Below 60Watt, 100~240 Volt AC Auto Switching ; Above 60Watt 200~240 Volt AC Auto Switching
Power Consumption		700W ~ 4400W
Air Exhaust System		External exhaust system required one 4" connection on the back of the machine.