

Owner's Manual for EPILOG Legend Model 6000
Revision E, December, 2000



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HOW TO USE THIS OWNER'S MANUAL

Thank you for purchasing an Epilog Legend Model 6000 Laser System (Legend). The Legend has been designed to be easy to operate, but you will utilize it to its fullest potential by taking some time to read this owner's manual prior to use. You will be ready to use the Legend as soon as you read the first four sections. Then you can refer to topics in the remaining chapters, as you work.

STRUCTURE OF THE MANUAL

SECTIONS 1-4

How to uncrate and set up your Legend, important safety information you need to know before you use it, the do's and don'ts of operating the Legend and a brief user's guide to running your first job.

SECTIONS 5-7

Basic Legend operations and maintenance

SECTIONS 8-13

Advanced Legend operations, system options, and material suppliers.

SECTIONS 15-17

Problem troubleshooting, service information, and Legend specifications.

1) GETTING STARTED

You will need to do the following to use your machine:

- 1) Remove it from the crate
- 2) Connect your computer
- 3) Connect the exhaust system
- 4) Connect power
- 5) Configure your computer

You may need a contractor to install the exhaust (all models) and the 208-240 volts (100 watt lasers only). This must be done ***PRIOR*** to the arrival of the Epilog installation technician.

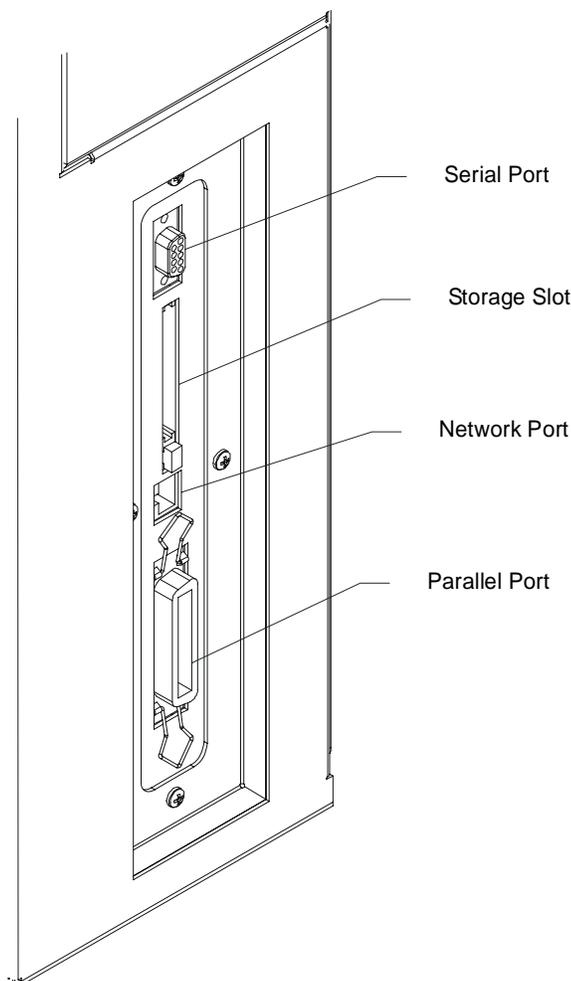
UNPACKING YOUR MACHINE

- 1) Cut and remove the strapping around the box and the plywood top. Remove the plywood top.
- 2) Cut the tape on the top of the box. Open the flaps and *remove as much packing as you can*. Please save this packing material. This includes the foam top supports and four wood and foam corner supports.
- 3) Remove eight (8) Phillips head screws (w/ large washers) located around the base of the corrugated box.
- 4) With a friend, lift the box up over the machine. PLEASE do not throw away the box, you may need it later. Remove the plastic bag over the machine.
- 5) On the pallet (the wooden platform the machine is sitting on) locate the edge that is secured with two screws. *Loosen and remove the screws, and remove the wooden 2"x2"*.
- 6) Under the machine (all the way under), *locate the ramps*. They will be wrapped in plastic. Remove them and *place the metal hooks into the slots on the pallet*. These ramps will allow you to roll the machine off the pallet. There is a left and a right ramp. The *raised edges must be on the outside*, not facing each other.
- 7) Locate the four wooden blocks supporting the machine on the pallet. These blocks need to be pulled out. **CAUTION is urged. These machines can weigh in excess of 400 lbs.** With a friend or two, lift one side of the machine just high enough to remove two of the blocks. Do the same with the other side to remove the remaining two blocks.
- 8) With a friend helping, carefully *roll the machine off the pallet* and down the ramps. You may need to unlock the front casters before the machine will roll freely.
- 9) Locate the accessory kit in the open compartment at the bottom front of the engraver. Remove this box.
- 10) Open the main door to the engraver. Inside the cabinet, locate and remove two 5/8" diameter RED shipping locks. They are toward the front of the machine and on either side of the X carriage. Turn

the screw locks counterclockwise to remove. Please save them. Also cut and remove the tie strap holding the lens carriage in place.

CONNECTING THE COMPUTER

You have two choices for connecting your computer. For basic installations with a single Legend and a single computer, you will probably want to use the *parallel port*. The Legend will connect to the printer port on your computer. For more technical users where a computer network is in place, the Legend should be connected through the *ethernet port*. The network port allows for higher transfer rates, as well as allowing for data to be transferred from any of several computers. A network is also the best way to connect multiple Legends.



The data port connections are on the right side of the machine, towards the rear. The previous drawing shows the location of all the ports. Some features may be optional or not available on your machine.

- 1) Parallel Port: Locate the *printer cable from your accessory kit*. A printer cable is the only cable supplied with the Legend. The connection point on the Legend is on the right side of the machine, near the rear. The connector is recessed in a small rectangular cutout. *Mate the larger end of the*

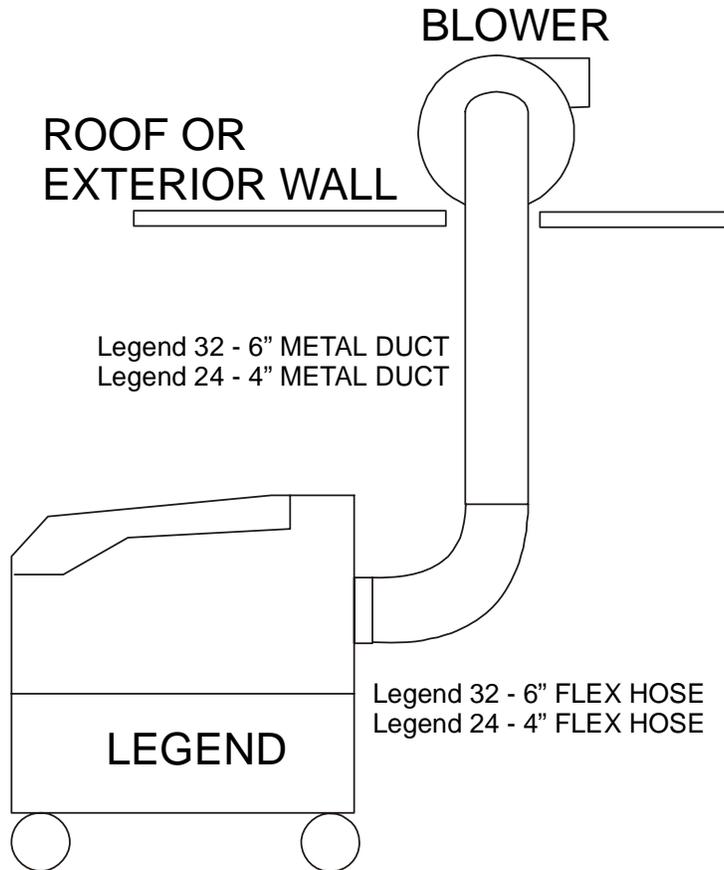
printer cable to the Legend. The connector can be connected only one way. Close the wire retainer clips around the ends of the cable.

- 2) Ethernet Port: Because of the unpredictable physical nature of a network, Epilog does not supply a network cable with the Legend. The Legend uses a 10BaseT style connection. The port is located on the right side of the machine, near the rear. The network parameters can be set at the Legend, and details for doing so are in Section 5, "Using the Epilog Legend".

CONNECTING THE EXHAUST

A contractor prior to the arrival of the Epilog installation technician should install the exhaust system. The blower should be mounted outside your building for noise considerations. The blower should not be more than twenty feet from the Legend. You should provide a rigid, smooth duct from the blower to the vicinity of the Legend. The Legend 32 requires 400 CFM at 6" of static pressure and the Legend 24 requires 400 CFM at 4" of static pressure. Remember to put the blower switch in an obvious and accessible place so it will be routinely switched on prior to using the engraver. Please connect the blower as shown below.

- 1) Locate the exhaust port connector on the rear of the machine. The port is a 6" diameter tube for the Legend 32 and a 4" diameter tube for the Legend 24. Slip the 6" or 4" flex hose over the port, and secure with a hose clamp.

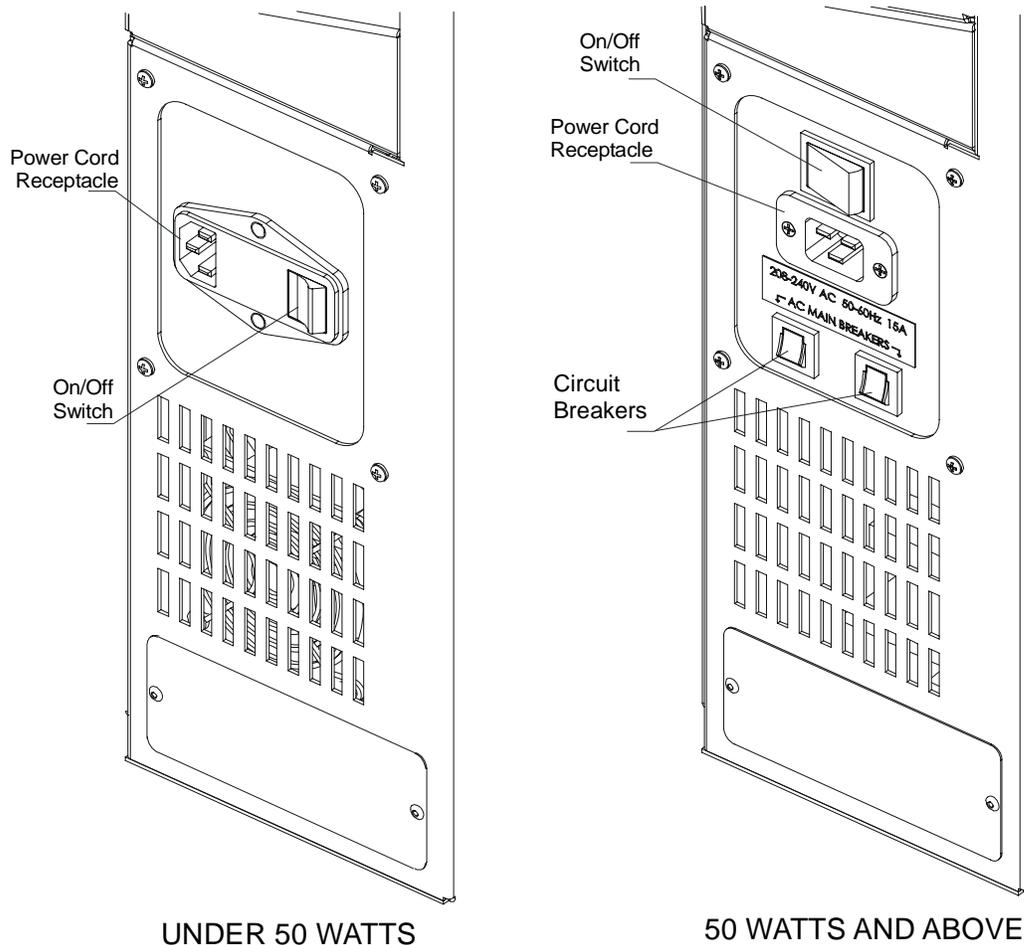


CONNECTING POWER

Laser systems 50 watts and under: Requires a 100 to 240 VAC, single-phase electricity outlet. The Legend will automatically adjust for the line voltage. The Legend should be provided with a dedicated 15-amp circuit, which can be shared with the computer running the Legend. The 50 watt Legend will leave little reserve power on a normal 15 amp 115 Volt service, and the computer may require a separate circuit.

Laser systems over 240 VAC, single phase electrical outlet. The electrical outlet should be fitted with a NEMA L6-15R receptacle (HUBBEL 4560 or equivalent). If not already available, a licensed electrician prior to the arrival of the Epilog installation technician must perform the proper circuit wiring.

The location of the power cord receptacle of the Legend is shown in the drawing below, and is located on the left side of the machine near the back.



- 1) Locate the "Power" label on the left side of the machine, near the back. The label indicates the required operating voltage range for the machine. Please verify that the machine is the correct

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voltage for your building. Do not proceed if the voltage is incorrect. Call Epilog technical support at 303-215-9171.

- 2) *Locate the power cord in the accessory kit.* The end with the recessed terminals connects to the Legend. Locate the power entry receptacle next to the “Power” label on the left side of the machine. Insert the power cord firmly into the receptacle.
- 3) Plug the machine into your wall power outlet, and *turn the machine on.* The power switch is next to where the power cord connects to the Legend. The machine should beep and the carriage should move towards home position.

CONFIGURING YOUR COMPUTER – PRINT DRIVER INSTALLATION

Epilog provides two “printer drivers” for use with Windows based computers. The first is the standard “Legend Engraver Driver” and the second is the “Legend Stamp Driver”. The drivers are included in the accessories kit on a 3.5-inch diskette labeled EPILOG. With the computer turned on and Windows open, insert the diskette into your 3.5-inch disk drive to install the print drivers. ***Your computer must have Windows 95 or Windows 98 already installed.***

INSTALLING THE EPILOG LEGEND PRINT DRIVERS

- 1) Click on the “START” button at the bottom left of your screen.
- 2) Click on “SETTINGS”.
- 3) Click on “PRINTERS”.
- 4) Double Click on “ADD PRINTER”.
- 5) In the ADD PRINTER WIZARD click on “Next”.
- 6) Normally you should select “Local Printer”, and then click “Next”.
- 7) Click on “Have Disk”.
- 8) In the “Install From Disk” window your 3.5” floppy drive should be pre-selected in the “Install From Manufacturer’s Disk” box. If it is, click on OK. If necessary, change the drive designation, and then click on “OK”.
- 9) Click on Legend under “Manufacturer’s”, then click on “Legend Engraver”, and then click on “Next”.
- 10) Under “Available Ports” highlight LPT1: Printer Port, then click on “Next”.
- 11) Click on “Yes” or “No” depending on whether you want this to be the default printer. “Yes” is recommended. Click on “Next”.
- 12) Click on “No” to printing a test page, then click on “Finish”. Your “Legend Engraver” print driver is now installed.
- 13) Follow the above procedure again to install the “Legend Stamp” driver.
- 14) It is recommended that you turn your computer off and restart it after you have installed a new print driver.

2) SAFETY

LASER SAFETY

Epilog Legend Model 6000 Laser Systems are Class IIIa laser products, as defined in 21 CFR 1040, the Federal Performance Standards for Light-Emitting Products.

The output of the high-power engraving laser is fully contained. The Legend's cabinet has interlocked doors, and no special precautions are necessary to operate the high-power laser safely. However, the visible output beam of the Legend's Laser Diode Pointer (Red Dot Pointer) is accessible to the operator. While this device employs the same technology as the familiar laser pen-pointers, like them it is potentially hazardous if its beam is directed into the eye.

We have made every effort to make the Laser Diode Pointer (Red Dot Pointer) as safe as possible. Its beam path is located well inside the cabinet, and under normal conditions, no hazardous levels of laser radiation can escape.

The operator of the Legend Model 6000 should observe the following general precautions:



- **DO NOT** disassemble the machine or remove any of its protective covers while the unit is plugged in.
- **DO NOT** attempt to defeat the door and window interlocks.
- **DO NOT** look directly into the beam of the Laser Diode Pointer (Red Dot Pointer).
- **DO NOT** operate the Laser Diode Pointer (Red Dot Pointer) without the machine's focus lens in place. If the unfocused beam strikes a reflective surface, it could be directed out of the cabinet.

The standard reference for laser safety is the American Standard for the Safe Use of Lasers, Z136.1-1993, developed by the American National Standards Institute (ANSI). This reference is the basis for many of the federal regulations for laser and laser system manufacturers, and for the Occupational Safety and Health Administration (OSHA) laser safety guidelines. It contains detailed information concerning proper installation and use of laser systems.

While the ANSI standard itself does not have the force of law, its recommendations, including warning signage, training, and the designation of a laser safety officer, may be *compulsory* under local workplace regulations when operating laser systems above Class I. It is the operator's responsibility to ensure that the installation and operation of the Epilog Legend Model 6000 Laser System is performed in accordance with all applicable laws.

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Copies of ANSI Standard Z136.1-1993 are available from Epilog Corporation or from:

Laser Institute of America
12424 Research Parkway, Suite 125
Orlando, FL 32826

(407) 380-1553

ELECTRICAL SAFETY

The AC input power to the Epilog Legend Model 6000 Laser System is potentially lethal and is fully contained within the cabinet.



- **DO NOT** open any of the access panels on the rear of the machine while the unit is plugged in. Opening these panels may expose the operator to the unit's AC input power.
- **DO NOT** make or break electrical connections to the system when the unit is turned on.

FIRE SAFETY

Laser engraving machines represent a significant fire hazard. Most engraving materials are inherently combustible, and while the objective of most engraving and cutting operations is to vaporize material without burning, it is easy to ignite a flame. Usually this is a simple "flare" of burning gases, issuing from the focused spot on the work piece, which follows the moving spot and which extinguishes itself as soon as the laser beam is modulated off. But should the work piece actually be set on fire, the fire must be extinguished by the operator at once, or the machine will be seriously damaged or destroyed!



- **DO NOT** operate the machine in the presence of unnecessary combustible materials, explosives, or volatile solvents such as acetone, alcohol, or gasoline.
- **DO NOT** let the machine operate unattended, especially when performing slow cutting operations on easily combustible materials such as paper or poster-board. Again, if a fire starts, it can destroy the machine!

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- **ALWAYS** keep a properly maintained and inspected fire extinguisher on hand. Epilog recommends a carbon dioxide (CO₂) or Halon[®] fire extinguisher. We do not recommend dry-chemical fire extinguishers, because they discharge a corrosive powder, which will severely damage the machine's electrical and mechanical components.

SAFETY FEATURES AND REGULATORY COMPLIANCE

Epilog has incorporated specific safety features into its Legend Model 6000 Laser Systems in order to meet the requirements of 21 CFR 1040.10 and the European standard EN 60825-1. These safety features include:

- A safety enclosure (cabinet), which fully encloses the engraving laser and its beam path.
- Dual redundant interlock systems that turn off the engraving laser when either the cabinet door or window is opened.
- A visible emission indication when the Laser Diode Pointer (Red Dot Pointer) is operating. There is an LED indicator on the machine's front panel.

21 CFR 1040.10 requires that certification, identification, and warning labels be placed on laser products. Reproductions of labels on the Legend Model 6000 Laser System follow, with their locations specified:

- 1) Certification/Identification Label. This engraved plate is located on the left-hand side of the machine's cabinet, by the power inlet connector. The example shown is for the Model 6000/30 product.



- 2) Class IIIa Warning Logotype. This label is located on the left-hand side of the machine's cabinet, below the access door.



- 3) Non-interlocked Protective Housing Safety Labels (2). One is located on the steering mirror cover inside the laser bay at the rear of the cabinet, and the other is under the cover so that it is visible when the cover has been removed.

DANGER - Visible and invisible
laser radiation when open.
AVOID EYE OR SKIN EXPOSURE
TO DIRECT OR SCATTERED
RADIATION.

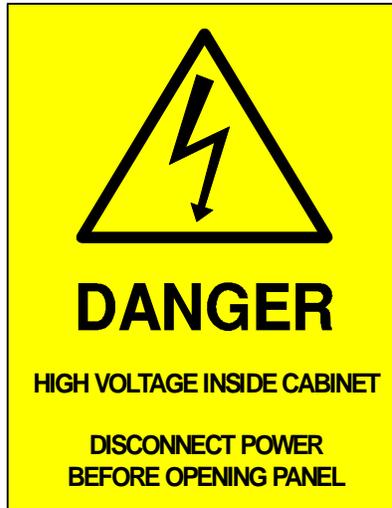
- 4) Defeatably-interlocked Protective Housing Safety Label. This label is located on the right side of the machine's cabinet, below the access door. A special fixture is required to defeat the interlocks on the Model 6000 product.

DANGER - Invisible laser radiation
when open and interlock defeated.
AVOID EYE OR SKIN EXPOSURE
TO DIRECT OR SCATTERED
RADIATION.

- 5) Aperture Safety Label. This label is located inside the machine's cabinet, at the right rear, above the aperture through which the laser and Laser Diode Pointer (Red Dot Pointer) beams enter the cabinet.

AVOID EXPOSURE - Visible and invisible
laser radiation is emitted from this aperture

- 6) Electrical Safety Label. This label is located on the power supply access panel on the rear of the cabinet.



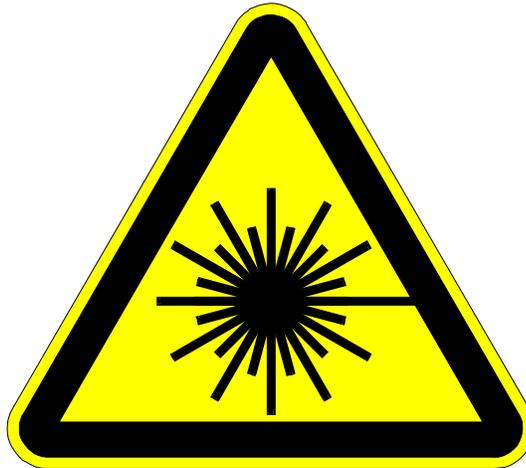
- 7) Fire Safety Label. This label is located on the top of the laser bay cover, at the rear of the machine.



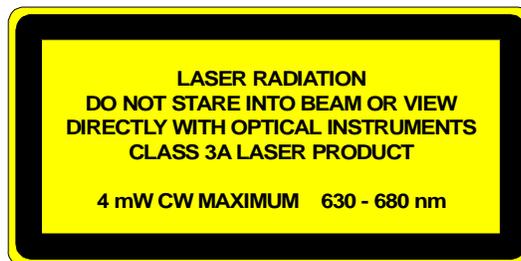
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Legend Model 6000 products exported to the European Union are labeled in accordance with the European standard EN 60825-1. Reproductions of the European labels follow.

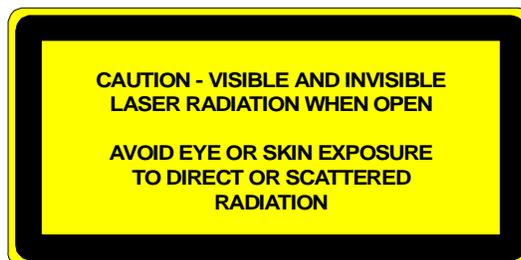
- 8) Warning Label. This label, and the Explanatory label which follows, replace the Warning Logotype (item 2 above). It is located on the left side of the machine's cabinet, below the access door.



- 9) Explanatory Label. This label is located directly below the Warning label, item 8, on the left side of the cabinet.



- 10) Non-interlocked Protective Housing Safety Labels (2). These labels replace items 3 above. One is located on the steering mirror cover inside the laser bay at the rear of the cabinet, and the other is under the cover so that it is visible when the cover has been removed.



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- 11) Defeatably-interlocked Protective Housing Safety Label. This label replaces item 4 above, and is located on the right side of the machine's cabinet, below the access door. A special fixture is required to defeat the interlocks on the Model 6000 product.



3) DO's AND DON'Ts

DON'T!

NEVER operate the machine without a properly operating vent to the outside! Most material will only produce an irritating smoke when engraved. Some materials, including but not limited to paint, varnish, composition board and plastics produce compounds that can be harmful if concentrated. A properly installed vent is the only way to ensure that problems do not occur.

NEVER engrave or cut any material containing PVC or vinyl. When engraved, a corrosive agent is produced that will destroy your machine. Your warranty will be void if your machine is damaged by corrosion from engraving or cutting Vinyl.

NEVER operate your machine unattended. There is a significant risk of fire if the machine is set improperly, or if the machine should experience a mechanical or electrical failure while operating.

NEVER engrave or cut acrylic material unattended. This is a popular material to laser however its fumes are extremely flammable and cause flare up in your machine. Always watch carefully when using this material.

NEVER operate with any of the covers or enclosures removed, and never modify the enclosure. The laser beam is invisible!

DO

Please allow a few minutes a week for cleaning your machine. Just a small amount of effort at the end of the week will pay off with years of trouble free operation of your machine. See Section 8 "Engraving Machine Maintenance" of this manual for specifics.

YOUR LEGEND IS NOW READY FOR USE!

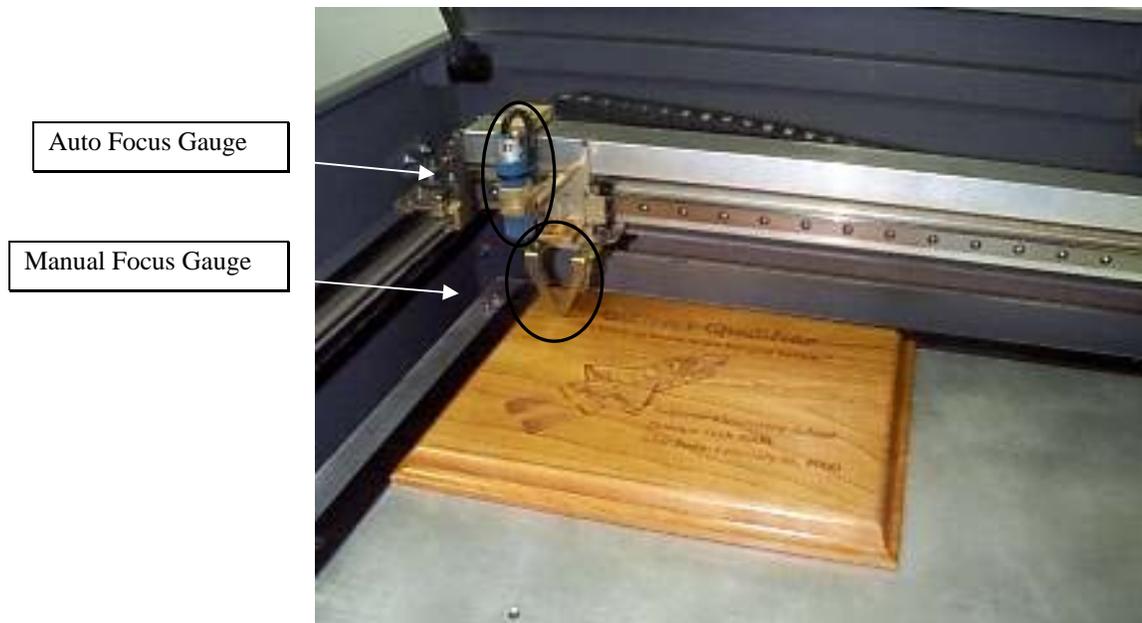
4) JOB SET UP GUIDE

To run a sample piece of material on your new Legend follow these instructions.

1. Setup your Legend machine and computer as instructed in Section 1, "GETTING STARTED".
2. Read Sections 2 and 3, "SAFETY" and "DO'S AND DON'Ts"
3. Follow the setup guidelines detailed below.

JOB SETUP

1. Measure the length and width of your material piece to be cut or engraved. Load your material. The home position of the engraving field is at the upper left corner of the engraving table. Place the material to be engraved on the engraving table in the upper left hand corner, pressed firmly against the metal stops along the top and left edges.
2. Focus on your material
 - **Manual Focus:** A metal focus gauge is provided to determine the correct distance from the work piece to the focus lens. The focus gauge is included in the accessory kit. Place the focus gauge on the lens carriage. Pressing the "FOCUS" key and then turning the jog/shuttle knob raises or lowers the table to move your work piece closer to, or further from, the fixed focus lens. The work piece should be raised just to the point where the gauge touches the material. Remove the gauge when you are done focusing. If the item has a taper, pick an intermediate point between the highest and lowest points being engraved. Press ENTER when you are done focusing. That will restore the control knob to the menu.



- Auto Focus: Alternatively, you can use the optional auto focus if installed on your Legend.
 - Set the Auto Focus on your computer in the print properties window of the Legend print driver: An “X” in the auto focus box will enable the auto focusing system of the Legend. The table will automatically move the object to the correct height for processing. Please be careful when you auto focus on the inside of anything like a bowl or a dish. If the edge is more than an inch higher than the area to be lasered, the part may contact the carriage prior to reaching the correct focus point. Longer focal length optics are available for doing deeper parts. Contact your Epilog Representative for more information.
 - Set the Auto Focus on the Legend on the LCD Display panel. See Sections 7 “USING THE EPILOG LEGEND” of this manual for step by step instructions.
- 3. Turn on the exhaust fan.
- 4. Close the door and press the GO key.
- 5. Layout your Artwork in your drawing program.

ARTWORK LAYOUT

- Now go into your drawing program (CorelDRAW, etc.) and set the page size to the same dimensions of the material piece you have loaded. Then create your design to be engraved or cut within the page outline.
- You can engrave (raster) text, clip-art, photographs, or line drawings. Use your imagination and creativity. Note: thin outlines in clip-art may vector rather than raster if thin enough. If you only want to raster make sure you select raster only in the PROPERTIES print setup window.
- You can also cut (vector) by setting objects and text to be unfilled and drawn with a 0.001 inch outline. The thin outline will cut produce a vector cut. When vectoring, cover your engraving table with either a piece of sheet metal or a vector table to protect it from laser marking. For more information on vectoring read Section 5, “Using the Legend Print Driver” of this manual.



PRINT SETUP

1. Once you have the image ready to engrave, you can select FILE, PRINT. Change the printer name to “Legend”, then select the PROPERTIES button to set your print settings. This is where you set the resolution, speed, power, and again enter the piece size.
2. If placement of your artwork is critical, place a couple layers of masking tape onto the area of the material piece to be engraved and practice at high speed and low power to mark only the tape.
3. For more information on the print setup read Section 5, “Using the Legend Print Driver” of this manual. Now press print and you are engraving and cutting.

REMEMBER THE STEPS:

1. Turn on the power to the engraver, and wait for a “Beep” to note the machine is ready.
2. Insert the item to be engraved. (make sure table is low enough to accommodate piece)
3. Focus with gauge (or enable auto focus).
4. Close the door.
5. Confirm the exhaust is on.
6. Press GO on the Legend.
7. Create your artwork layout on your computer in a software program (i.e. CorelDRAW).
8. Set your print setup properties in the Legend print driver window.
9. Print to the Legend.

5) USING THE EPILOG LEGEND PRINT DRIVERS

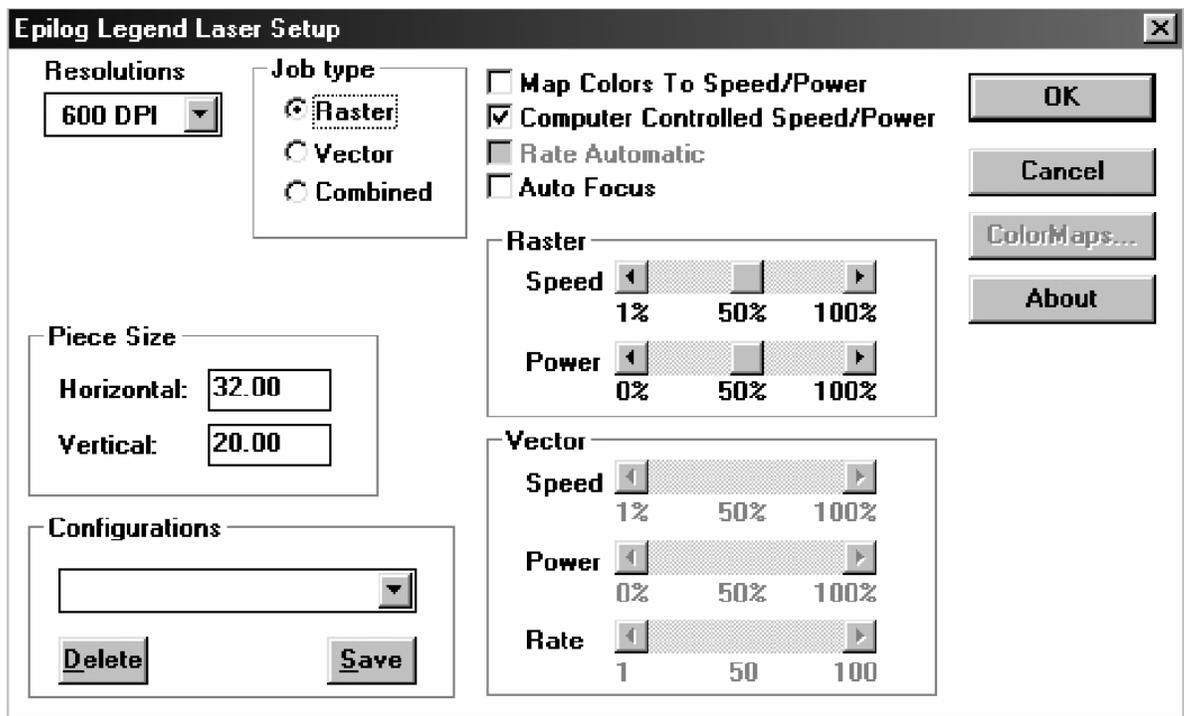
The Epilog Legend print drivers allow you to control the system's functions from your computer. There are two Legend print drivers found on the disk labeled Epilog in your accessories box. The first labeled the "Legend Engraver" is your main driver for both engraving and cutting materials. The "Legend Stamp" driver is used to engrave rubber stamp formats.

INSTALLING THE STAMP DRIVERS

The installation of both of these drivers is detailed in Section 1 under subheading Configuring Your Computer – Print Driver Installation, of this manual. The two drivers are explained in further detail regarding their properties in the following subsections.

USING THE LEGEND ENGRAVER PRINT DRIVER

The "Legend Engraver" print driver setup window is shown below.



1. RESOLUTION: Resolution determines how many cuts, or lines per inch, the machine will engrave. Available resolutions range from 150 to 1200 DPI. 300 DPI is normally a minimum for production

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work. 600 DPI would be used when quality is more critical. The greater the number of lines per inch, the greater the engraving time required.

2. **JOB TYPE:** Job type allows you to designate whether you want to engrave in Raster Mode, cut in Vector mode or Combine the two functions.
 - a. **RASTER:** Raster mode is used for marking or engraving materials. Typical uses would be reproducing clipart, scanned images, photos, text and graphic images. Only the Raster Speed and Raster Power bars will be enabled when you have selected Raster under Job Type. Set the Speed and Power bars to the appropriate settings for the material that you are engraving. Guidelines for recommended speeds and powers are given in Section 7 of this manual.
 - b. **VECTOR:** Vector mode is normally used to cut or make a thin line drawing. You can use vector mode to cut through acrylic or wood, mat board, plastic, cork, paper, etc. Only the Vector Speed and Vector Power bars will be enabled when you have selected Vector under Job Type. Set the Speed and Power bars to the appropriate settings for the material that you are cutting.

When using vector mode, it is necessary to design your job to give the intended result. Objects and text should be unfilled and drawn with the thinnest possible (other than zero) outline, as shown below.



TEXT

CORRECT



TEXT

INCORRECT

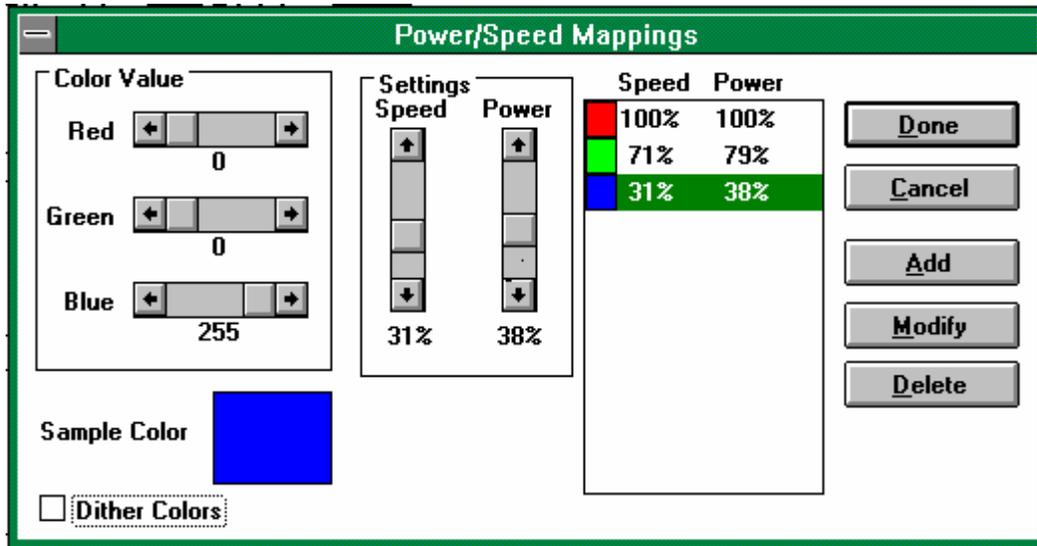
- c. **COMBINED:** “Combined” mode is used when you want to incorporate both “Raster” and “Vector” functions in the same job setup. When you are in “Combined” mode the Legend will engrave the entire raster portion of the job first, then perform the vector portion second.

Control of which elements are raster and which are vector is done with the drawing program. Any solid, filled or scanned elements will raster. Any outlined element will raster if the line thickness is above .010”, and vector if below .003”. The area between is somewhat uncertain depending on the software being used and the resolution selected.

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3. **PIECE SIZE:** The “Piece Size” must match the layout size of your drawing package. If the settings are different, the engraving will not be in the correct position. The maximum area for the Legend 32 is 32” horizontally and 20” front to back. The maximum area for the Legend 24 is 24” horizontally and 12” front to back. Generally, jobs will print faster given a smaller page size, even if the size of the image is the same.
4. **CONFIGURATIONS:** The “Configurations” box allows you to save all of your different print settings in the Legend setup window as a custom setup. First, select the desired settings for a particular job in the Legend setup window. Next, to save these settings and identify them with a name, click the cursor in the Configurations box and type in a custom name of up to 18 characters long (spaces are allowed). When you click the SAVE button this custom setup will be saved. When you are in the Legend’s setup window you can click on the “Configurations” pull-down menu to retrieve your different custom job setups.
5. **AUTO FOCUS:** An “X” in the auto focus box will enable the auto focusing system of the Legend. The table will automatically move the object to the correct height for processing. Please be careful when you auto focus on the inside of anything like a bowl or a dish. If the edge is more than an inch higher than the area to be lasered, the part may contact the carriage prior to reaching the correct focus point. Longer focal length optics are available for doing deeper parts. Contact your Epilog Representative for more information.
6. **COMPUTER CONTROLLED SPEED/POWER:** When this box has an X in it, the speed and power are controlled from the computer. The Legend will disregard any attempt to alter speed or power from the control panel on the engraver. The settings for raster and vector are independent, and are made using the four slide controls. If this box is empty, the Legend will use the settings on the control panel of the engraver as set under the “Setup” menu heading.
7. **RATE AUTOMATIC:** Rate Automatic is used when vector cutting to allow the engraver’s software to adjust the rate at which the laser is firing to match the speed of the carriage. The higher the rate the more pulses the laser will fire in a given distance. Normally for most materials, a higher rate will produce a better cutting action. In most cases, you should choose to place an X in the “Rate Automatic” box. “Rate Automatic” sets the rate default to 100.
8. **MAP COLORS TO SPEED/POWER:** The Legend also has the capability to assign different power and speed settings to objects in a design. This is useful in a variety of ways. You can program the Legend to engrave an area deeper than surrounding areas for emphasis. You can also program the Legend to make columns for your engraving jobs, which will cut down on engraving time. The feature also allows you to control the sequence or order of marking/engraving. Make sure that the MAP COLORS TO SPEED/POWER box has an X in it and then click on the COLOR MAPS button. You should see a screen like this:



- a. **COLOR VALUE:** This is how you define a color. The description uses an RGB (Red Green Blue) value to define a color. Use the slide bars to produce the color you want. A value of 255 Blue with 0 Green and 0 Red is shown. This is plain old blue. Each combination of the three-color values is unique and can be used to set a power and speed value. The colors will engrave in the sequence shown in the box on the right.
- b. **SETTINGS:** Here you set the speed and power values for the color you have created. Adjust the sliders to the values that you want and click on the ADD button. You should see the color you entered with the speed and power show up in the list of colors on the right. Please be careful not to add the same color to the list twice. Each setting must have a different color. If you want to change the speed and power for a color that is already in the list, just click on the entry you want to change. Now move the speed and power controls to the new values and click on the MODIFY button. If you have made a mistake, click on the entry you want to remove and then click on the DELETE button.
- c. **DITHER COLORS:** If you have an X in this box, the colors will be given a texture. If the box is empty, the colors will engrave as a smooth solid.

When you are finished, click on the DONE button and you will go back to the previous screen. If you do not want the changes you have made to apply, click on the CANCEL button and all changes revert to their previous settings.

You will need to be sure that your drawing program uses an RGB model for colors. CorelDRAW! and most other drawing programs have several color methods, and you will need to make sure you always use RGB. With Corel, when you assign a color using the fill tool, you will see a field with CMYK and a scroll button. Click on the button and select RGB. Then you will see Red, Green and Blue control buttons that match those in the print

driver. If you fill an object with a color that is defined in the color maps, the speed and power for that color will be used.

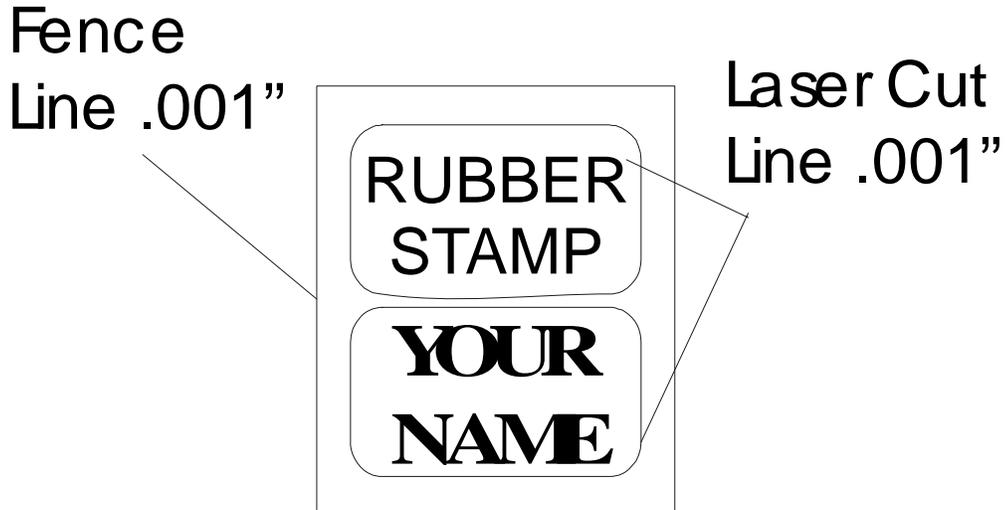
USING THE EPILOG LEGEND RUBBER STAMP PRINT DRIVER

The Epilog Legend requires a unique print driver for producing rubber stamps. The stamp driver is similar to the standard driver and is included on the disk along with the standard driver that you received with your engraver. All of the unique stamp attributes are controlled from the stamp driver including shoulder attributes, speed and power setting and more.

Processing rubber stamp files requires a computer that has adequate processing power and memory capabilities. The faster your computer, and the more memory that you have reduces the amount of time that your computer spends processing the stamp file. Individual stamps will be processed fairly quickly on almost any computer, but if you are producing large numbers of stamps you will want to have at least a 500 MHz computer with a minimum of 64 MB RAM.

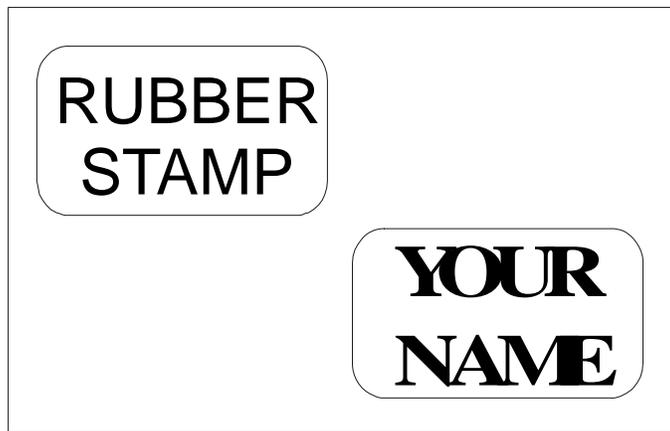
LAYOUT FOR STAMPS

- 1) Set up your artwork in Corel so that your computer image looks like the image that you want to stamp. Areas to be stamped should be black, with the area to be removed white.
- 2) If you want to have the laser cut the individual stamps out from the sheet, place a .001" outline with no fill around each stamp. You can use rectangles, or you can use the pen tool to draw a tight outline that follows the shape of the stamp.
- 3) Draw your boundary. The boundary, or "Fence" is what the laser will use to determine the limits of the background material to be engraved away. This is a rectangle with a .001" outline and no fill. Every part of your design must be inside the fence for the engraving to work properly. The fence should be as small as practical, as this will reduce wasted material and also reduce engraving time. Try and place your stamps in such a way that they can be enclosed by the smallest fence. When engraving multiple stamps, do not enclose individual stamp layouts with individual fences. One large fence must enclose all stamps.
****NOTE*** The fence must be at least .050 inch from the edge of any characters or images. Putting the fence too close to the characters will result in an unsatisfactory stamp.
- 4) Mirror your design in CorelDraw before printing
- 5) Print your design to the Legend Stamp driver.



A Good Design

Example
1

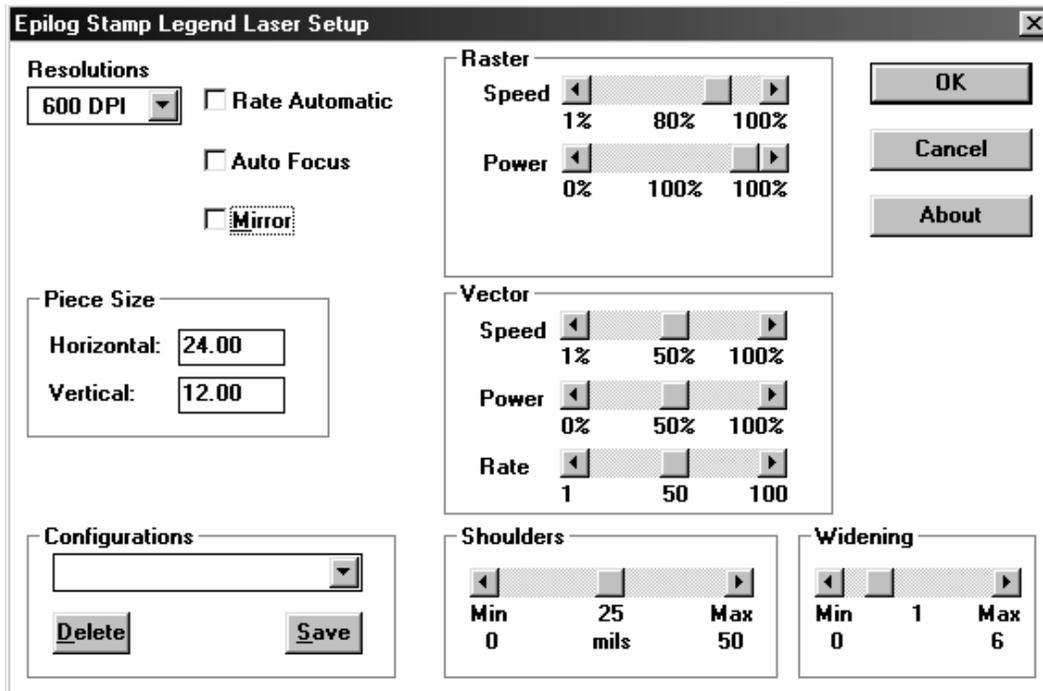


A Wasteful Design

Example
2

Please remember, the fence must have a .001" outline and must **completely** enclose your design. You can cut out individual stamps by using a .001" outline within the fence.

Once your artwork is set up, you need to specify how you want the machine to cut the stamp. The "Legend Stamp" print driver setup window is shown below.



1. RESOLUTION: 600 DPI resolution is recommended. This resolution provides a very high quality engraving. 1200 DPI will provide a higher quality stamp but will take approximately twice as long to engrave.
2. PIECE SIZE: This is the size of the plate. If the size here is not the same as the size in your drawing program the engraving will be in the wrong position.
3. CONFIGURATIONS: The “Configurations” box allows you to save all of your different print settings in the “Legend Stamp” setup window as a custom setup. First, select the desired settings for a particular job in the “Legend Stamp” setup window. Next, to save these settings and identify them with a name, click the cursor in the Configurations box and type in a custom name of up to 18 characters long (spaces are allowed). When you click the SAVE button this custom setup will be saved. When you are in the Legend Stamp’s setup window you can click on the “Configurations” pull-down menu to retrieve your different custom stamp job setups.
4. RASTER: Controls the laser speed and power for the engraving portion of the stamp. On most rubber, operate the machine at full power and adjust the speed to get the depth you want. Be sure that you do not run the engraver so slowly that the rubber flares or flames. You will ruin your work and possibly damage the optics of the engraver. **NEVER RUN THE MACHINE UNATTENDED!**
5. VECTOR: Vector mode is used in the stamp driver to cut out the stamps after they have been engraved. Generally, cut only most of the way through the sheet. Leaving a small amount of rubber generally gives the best result, allowing the sheet to be easily peeled apart.

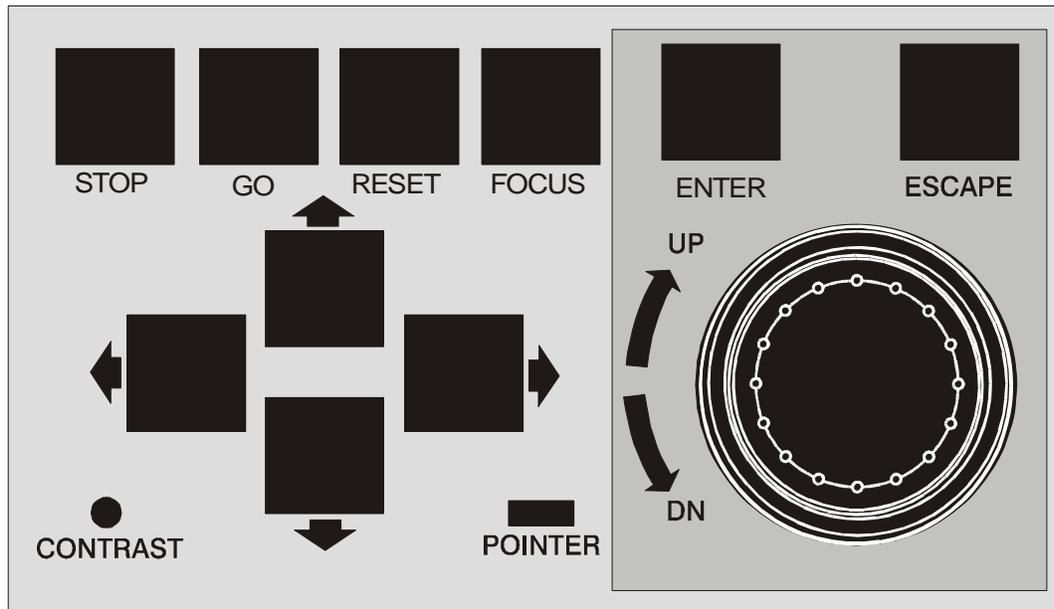
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6. **SHOULDERS:** Use the slider bar to determine the size of the shoulders. A small number will give steep shoulders, with a large number giving very broad shoulders. Shoulders of 25 or 30 are recommended.
7. **WIDENING:** Use the adjuster to determine the width of the character as it is engraved. A low value (1 or 2) will produce a narrow character. A high value (6 or 7) will produce wider, or bolder, character. A value of 1 is recommended.
8. **RATE AUTOMATIC:** "RATE" varies the laser cutting frequency for the vector portion of the job. Generally on rubber sheets, put an "X" in the rate automatic box.
9. **AUTOFOCUS:** Putting an "X" in the auto focus box enables the auto focus feature of the Legend if you have the auto focus feature installed on your machine.
10. **MIRROR:** This feature is not currently available, do not place an "X" in this box. Mirror your design in CorelDRAW prior to setting the properties in the print dialog window.

6) USING THE EPILOG LEGEND

As you start to use your new Epilog Legend, you will notice the Keyboard Commands, Liquid Crystal Display, and Laser optics. These Legend components make the Legend Laser System extremely user friendly. The functions and uses of these items as well as loading your work and operations are described in detail in the following.

KEYBOARD COMMANDS



The keyboard on the Legend is pictured above.

JOG/SHUTTLE (ROUND KNOB)

The Jog/Shuttle is used to raise and lower the table, as well as to change settings like speed and power. The keys and menus are used to specify what the Jog/Shuttle will do. These functions are described in detail later in this Section. The rate of change caused by the inner ring depends on how fast you spin it. The direction depends on whether you spin it clockwise or counterclockwise. The outer ring rate depends on the angle of the ring. The farther you turn it, the faster the change (up to the limit).

STOP

This key will stop the carriage, and turn off the laser beam. Once the Legend has stopped, you can open the door to examine your engraving. By closing the door and pressing the GO button, the Legend will start

engraving at the point where it stopped. As long as you did not disturb the work piece, it will continue engraving without loss of registration.

GO

This key serves two purposes. 1) Use this key to continue a job that has been stopped. If the machine has been stopped mid-job it will resume where it left off. 2) Pressing this key immediately before a job is sent to be printed puts the Legend into “Idle” mode and will allow the sent job to start immediately without accessing the “Jobs” menu.

RESET

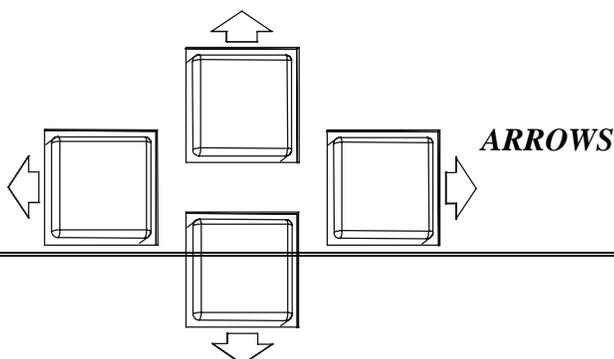
This key is used to reset the carriage to home position. RESET does not erase a design/job from memory. Resetting the Legend will send the carriage back to home position and allow you to repeat the same design/job or begin a new one. The “STOP” key should always be used to stop the job before pressing the “RESET” key.

FOCUS

Pressing the FOCUS key and then turning the Jog/Shuttle knob raises or lowers the table to move your work piece closer to, or further from, the fixed focus lens. A metal focus gauge is provided to determine the correct distance from the work piece to the focus lens. The focus gauge is included in the accessory kit. The work piece should be raised just to the point where the gauge touches your work piece. Remove the gauge when you are done focusing. Press ENTER when you are done focusing. That will restore the control knob to the menu.

ENTER AND ESCAPE (MENU CONTROLS)

The Legend has direct keys for the most commonly used functions. Others must be accessed through a menu. Across the top of the Liquid Crystal Display (LCD) are the menu headings. Push the left and right arrow keys and you will see the “active” heading scroll from left to right by means of highlighting. When the one you are interested in is highlighted, press the ENTER key. That will cause the chosen menu heading to drop down, much like the menus on a personal computer. Press the up and down arrow keys and the highlighted sub-heading will scroll up and down. Again, when the one you want is highlighted press ENTER. You can either select one from a list of choices, or enter a numeric quantity by turning the Jog/Shuttle knob (like speed or power). You can back up one level in the menu by pressing the ESCAPE key. All the choices shown below may not be available on your machine, as they involve optional features or equipment.



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The arrow keys are used to move through the menu selections up, down, right, or left. The arrow keys are also used to move the carriage when you are in the “Service”, “Move X/Move Y” mode.

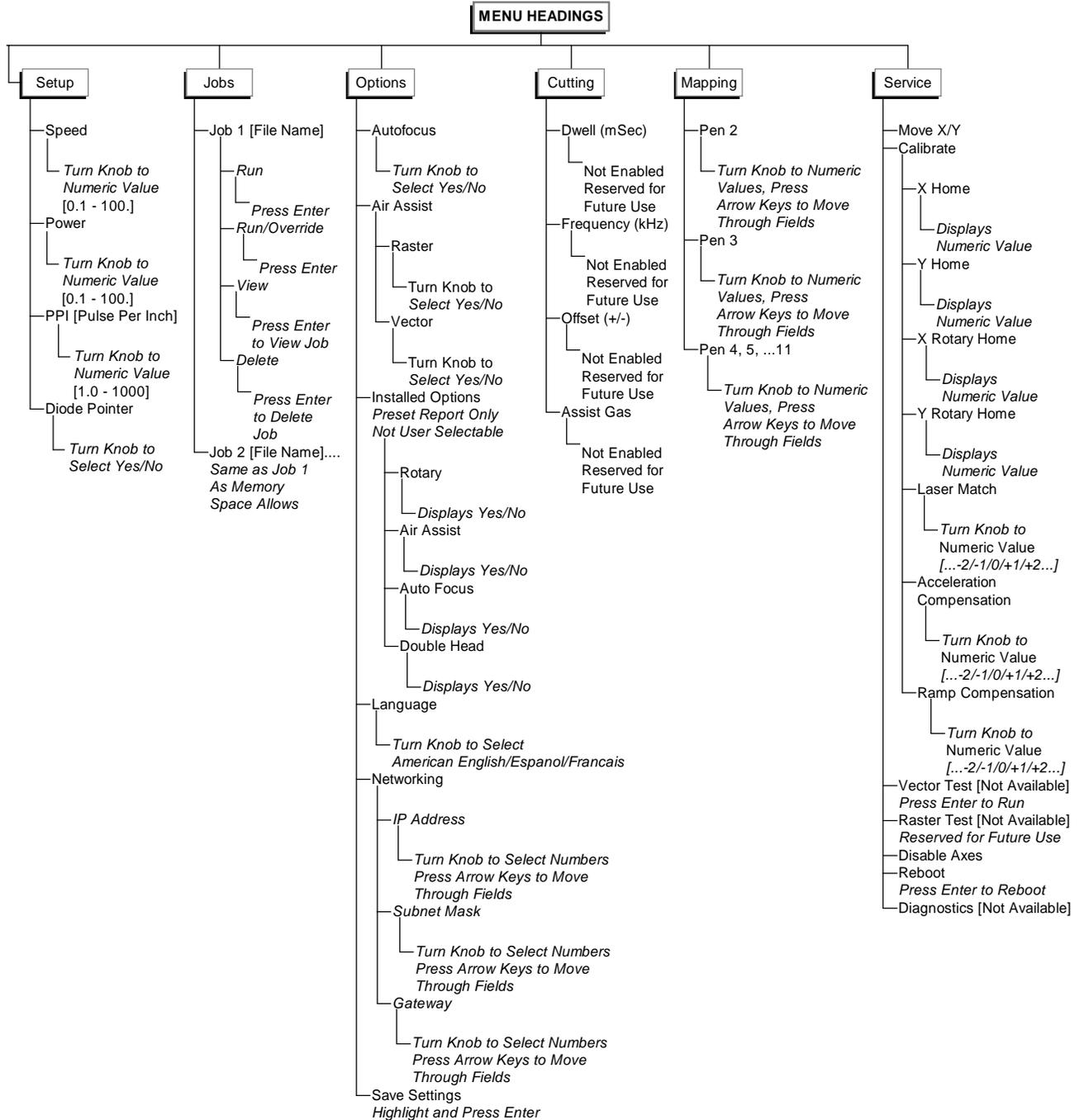
CONTRAST

The display is a Liquid Crystal Display (LCD), and for best viewing the contrast may need to be adjusted lighter or darker. Insert a small, flat blade screwdriver into the slot just below the surface of the keyboard, and rotate the adjuster to get the best display contrast for your work environment.

POINTER

This is simply a visible reminder that the Laser Diode Pointer (Red Dot Pointer) is turned on. This Laser Diode Pointer (Red Dot Pointer) is much like the hand held laser pointers, and has a bright red beam. When this is turned on, **DO NOT** place your head inside the engraving area, as you may look into the beam. For additional information, read Section 2 “Safety” contained in this manual.

LEGEND LCD MENU HEADINGS



LEGEND LIQUID CRYSTAL DISPLAY

The Legend is equipped 320 x 240 pixel LCD graphic display. The menu choices are listed across the top of the display, much like that of your personal computer. The bottom of the display shows the current machine status, along with job information. The center section is used for drop down menus and for displaying images.

In the event of an error, there will be a flashing bar just above the status bar that will give an error message.

The LCD menu headings and settings are discussed in the following sections.

SETUP

The "SETUP" menu allows you to manually set the systems speed, power, and pulses-per-inch (PPI). It also provides the On/Off function for the red diode pointer on the machine. The Speed/Power/PPI settings in this menu command will be over-ridden if the job was sent with "Computer Controlled Speed/Power" selected in the print driver.

1. Speed: To set the "SPEED", turn the "JOG/SHUTTLE KNOB" to the desired numeric value. The choices range from 0.1 to 100. The lowest number will allow your machine to move very slowly and the highest will set the machine to run at its fastest.
2. Power: To set the "POWER", turn the "JOG/SHUTTLE KNOB" to the desired numeric value. The choices range from 1.0 to 100. A lower number reduces the depth of cut. A higher number increases depth of cut.
3. Diode Pointer: The "DIODE POINTER" setting allows for manually turning "ON" or "OFF" the Laser Diode Pointer (Red Dot Pointer). This visible output beam is much like the hand held laser pointers, and has a bright red beam. This beam allows the operator to visually note where the laser is engraving or cutting. While this device employs the same technology as the familiar laser pointers, like them it is potentially hazardous if its beam is directed into the eye. For additional information, read Section 2, "Safety" contained in this manual. Use the diode pointer in conjunction with the Move X/Move Y coordinates to locate a given position on the table.

JOBS

This is the main access for starting jobs that are stored in the Legend. The Legend has the capability to store multiple jobs in memory. If there are jobs in the Legend memory, select the "JOBS" menu heading and press the "ENTER" key. The list of valid jobs in memory will drop down. Highlight the one you want, and press, "ENTER". This will give you the drop down list of options "RUN", "RUN/OVERRIDE", "VIEW", or "DELETE". Highlight the option you want by using the "ARROWS" to scroll down through the list. Pressing "ENTER" will initiate that function.. An explanation of drop down items and operations are listed below.

1. Run: The machine will begin processing the job that you have selected.

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2. Run/Override: This selection allows you to override the computer controlled Speed, Power, and PPI settings that were sent with the job from your computer. To use this selection:
 - a. Change the appropriate parameters (Speed/Power/PPI) in the "SETUP" menu.
 - b. Highlight the job that you want to run from the "JOBS" menu,
 - c. Press the "RUN/OVERRIDE" option. The job will run with the manual settings that you have selected.
3. View: The LCD will display a facsimile of the job that you have selected. This feature does not operate in vector mode if "smoothing" is enabled, or in rubber stamp mode.
4. Delete: Selecting "DELETE" will permanently remove that job from memory. You cannot delete a job if it is currently running. You cannot retrieve a job that has been deleted.

You can load jobs at any time. All jobs will appear in the order that they were printed with the most current job received at the top of the list.

For additional information on the Legend's memory, read Section 11, "Memory Configuration" contained in this manual.

OPTIONS

The "OPTIONS" menu allows you to enable/disable all installed options. Highlight the "OPTIONS" menu, then press "ENTER".

1. Auto Focus: Use the down arrow key to highlight "AUTO FOCUS" and press "ENTER". Turn the "JOG/SHUTTLE KNOB" back and forth to select "Yes or No". Selecting "Yes" will enable the Auto Focus to work when the "Auto Focus" command is selected in the print driver. If "Auto Focus" is not selected in the print driver, the "Auto Focus" feature will not be enabled. Do not enable the Auto Focus option unless your machine is actually equipped with the auto focus sensor. Erratic operation will result.
2. Air Assist: Use the down arrow key to highlight "AIR ASSIST" and press "ENTER". This option enables the Air Assist to be automatically turned On/Off during Raster engraving or Vector cutting functions.
 - a. Raster: Turn the "JOG/SHUTTLE KNOB" to Select "YES" or "NO". Selecting "YES" will turn on the Air Assist "ON" during raster mode and "NO" will turn it OFF. Next arrow down to "VECTOR"
 - b. Vector: Turn the "JOG/SHUTTLE KNOB" to Select "YES" or "NO". Selecting "YES" will turn on the Air Assist "ON" during vector mode and "NO" will turn it OFF. Then press "ENTER".

The air assist option allows for deeper engraving and cutting than would otherwise be possible. The compressed air assists in pushing away materials that might combust at the point of engraving. **Never leave your laser unattended while engraving or cutting.** Some materials are extremely flammable and burning cannot be extinguished even with the Air Assist at full flow. Generally, compressed air at 20 PSI is adequate. Do not use gas other than air when using the Air Assist option. Never use Oxygen with the Air Assist option.

3. Installed Options: This selection lists the installed options.
 - a. Rotary The "ROTARY" option allows you to mark or engrave cylindrical objects. This menu item designates either installed by displaying "YES" or not installed by displaying "NO".

- b. Air Assist The "AIR ASSIST" option allows for deeper engraving and cutting than would otherwise be possible. This menu item designates either installed by displaying "YES" or not installed by displaying "NO".
 - c. Autofocus The "AUTO FOCUS" system on the Legend uses an ultrasonic beam to determine the proper distance from the work piece to the focus lens. This menu item designates either installed by displaying "YES" or not installed by displaying "NO".
 - d. Double Head: The "DOUBLE HEAD" option allows you to mark or cut one job onto two pieces of material at the same time with a split laser beam. This menu item designates either installed by displaying "YES" or not installed by displaying "NO".
4. Language: The Legend machine's LCD display can be set to display different languages. To change or set the "LANGUAGE" using the "ARROWS" to highlight "LANGUAGE" under the "OPTIONS" menu heading. Press "ENTER" then use the "ARROWS" to highlight the preferred language and press "ENTER".
 5. Networking: The Legend can be connected to your computer using a standard 10Base-T Ethernet card. Set all network addresses in this selection. Refer to the "Network Connections" section (Section 8) in this manual to establish network capabilities.
 6. Save Settings: "SAVE SETTINGS" allows you to permanently save laser parameters that you have made using the LCD menu commands. Changes that are not saved with the "SAVE SETTINGS" command will return to their original default position upon power down.

CUTTING

Currently, only the frequency and smoothing commands are operational. The others are not enabled and are reserved for future use

1. Frequency: This control allows direct setting of the pulsing of the laser in vector mode. The control allows setting from ten hertz to five thousand hertz. The lower frequencies are normally used for perforating an edge when you do not want to completely separate the cutout from the background. Otherwise, most materials will show some difference in edge appearance as the frequency is changed, and this is a mostly a matter of personal preference.
2. Smoothing: The smoothing control can be enabled or disabled by setting the control to yes or no. This control only has an effect in vector mode. If your work is mostly straight lines with very little in the way of curves (text is normally mostly curves) your machine will process jobs faster with smoothing turned off (set to no). Otherwise, smoothing should be enabled (set to yes). Curves cut faster as well as being significantly better finished with smoothing on.

MAPPING

These features are not enabled and are reserved for future use.

SERVICE

1. Move X/Y: "MOVE X/Y" allows you to move the carriage to locate a point on the engraving/cutting surface. When you are in the Move X/Y mode, the X and Y coordinates are displayed on the LCD and increment/decrement as the carriage moves. Using the red dot pointer in conjunction with the Move X/Y command provides a visual indicator to complement the numeric readout on the LCD.
 - a. In the "SERVICE" menu highlight "MOVEX/Y". Press "ENTER". You are now able to move the X and/or Y axis using the "ARROW" keys to move the carriage left, right, front or back.

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- b. Press “RESET” to move the carriage back to Home Position.
- 2. Calibrate: The “CALIBRATE” menu allows you to set or change a number of the machines operating parameters.
 - a. X-Home: This function calibrates the home position of the machine relative to the left table guide. This parameter is set at the factory and normally does not need to be changed. This function allows you to change home without moving the table guide. The Home position counter provides a relative position and has a numeric range that starts at -200 and increments to 0 (zero). If you need to adjust the home position, do the following:
 - i. Open CorelDraw or other drawing package and draw a square box on the page so that the upper left corner of the box is positioned one inch down and one inch to the right of the upper left corner of the page. Place a flat piece of material into the upper left corner of the Legend, being sure that it rests firmly against the left and top table guides. “Print” the box to the Legend and run the job. Use a ruler to measure the location of the box on your scrap piece.
 - ii. Adjust the X Home counter, press the “ENTER” key, and print the box to the Legend again.
 - iii. Repeat this procedure if necessary for fine-tuning.
 - iv. Incrementing the X Home counter will shift the position of the engraved box to your left by .001 inch.
 - v. Decrementing the X Home counter will shift the position of the engraved box to your right by .001 inch.
 - vi. Once home is properly set, go to “OPTIONS” on the LCD panel then “SAVE SETTINGS” to permanently save the new home settings. Failure to “SAVE SETTINGS” will result in the laser returning to the default settings the next time that you power down the Legend.
 - b. Y-Home: This function calibrates the home position of the machine relative to the top table guide. Refer to the X Home procedure above to set the Y Home position.
 - i. Incrementing the Y Home counter will shift the position of the engraved box up towards the table guide by .001 inch.
 - ii. Decrementing the Y Home counter will shift the position of the engraved box down away from the table guide by .001 inch.
 - c. X Rotary Home: Not enabled. Reserved for future use.
 - d. Y Rotary Home: Not enabled. Reserved for future use.
 - e. Laser Match: “LASER MATCH” provides a horizontal adjustment that properly aligns the left to right registration of the engraved lines when in raster engraving mode. This setting has a range of -10 to 10 and is factory set. This setting is determined visually and a setting of 2 or 3 is standard. Once Laser Match is properly set, go to “OPTIONS” on the LCD panel then “SAVE SETTINGS” to permanently save the new settings. Failure to “SAVE SETTINGS” will result in the laser returning to the default settings the next time that you power down the Legend.
 - f. Stamp Match: same function as laser match only for rubber stamps. Typically this is set to around 50.
 - g. Acceleration Compensation: “ACCELERATION COMPENSATION” is a speed control and controls how quickly the carriage changes direction in the raster mode. It does not change the actual speed that the carriage is traveling, it only changes the turn around time. The acceleration counter has a numeric range from 0 (zero) to 10. The higher the number (10), the faster the carriage turns around, which results in faster job processing times. Depending on the type of image that you are producing, the “ACCELERATION COMPENSATION” can be adjusted to provide the best combination of quality and speed. Fine details or

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demanding graphics should be run using the factory settings. Large block lettering or less demanding images can be run at values of 9 or 10 to increase production speeds.

- i. This parameter is set at the factory at a setting of 5 and normally does not need to be changed.
- ii. This adjustment can be made “on the fly” while the Legend is engraving.
- iii. Select “SERVICE”, then “CALIBRATE”, then “ACCELERATION COMPENSATION”.
- iv. Using the “JOG SHUTTLE KNOB”, change the setting, then press the “ENTER” key. The acceleration will change immediately and stay at the new value until you reboot or power down your Legend.
- v. If you wish to save your settings go to “OPTIONS” on the LCD panel then “SAVE SETTINGS” to permanently save the new settings.
- vi. Failure to “SAVE SETTINGS” will result in the laser returning to the default settings the next time that you power down the Legend.

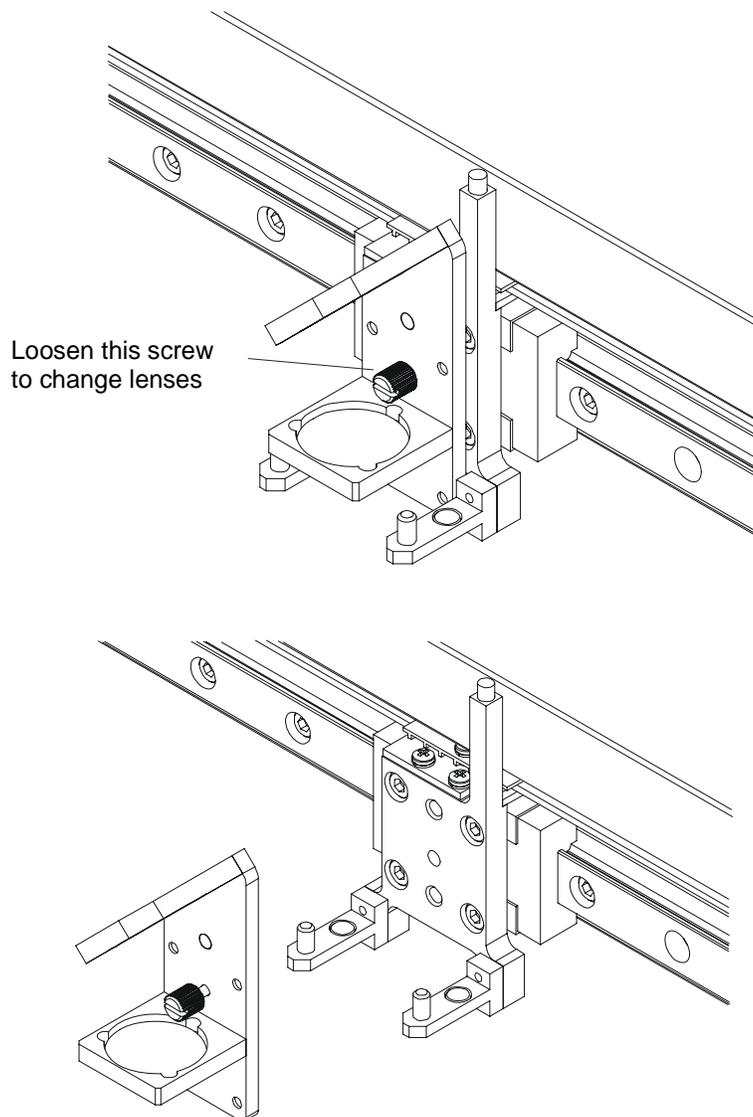
While this feature can affect engraving times, it is not the recommended method of adjusting engraving speed. Normally you would adjust the engraving speed either from the print driver or from the “SETUP” menu on the LCD.

- h. Ramp Compensation: “RAMP COMPENSATION” controls the distance of over-shoot that the carriage has when it gets to the end of each engraving line. The Ramp Compensation counter has a numeric range from 0 (zero) to 10. The higher the number (10), the greater the distance that the carriage will over-shoot. Higher numbers will increase the amount of time that it takes to complete a job. Depending on the type of image that you are producing, the “RAMP COMPENSATION” can be adjusted to provide the best combination of quality and speed. Fine details or demanding graphics should be run using the factory settings. Large block lettering or less demanding images can be run at values of 1 or 2 to increase production speeds.
 - i. This parameter is set at the factory at a setting of 5 and normally does not need to be changed.
 - ii. This adjustment can be made “on the fly” while the Legend is engraving.
 - iii. Select “SERVICE”, then “CALIBRATE”, then “RAMP COMPENSATION”.
 - iv. Using the “JOG SHUTTLE KNOB”, change the setting, then press the “ENTER” key.
 - v. The acceleration will change immediately and stay at the new value until you reboot or power down your Legend.
 - vi. If you wish to save your settings go to “OPTIONS” on the LCD panel then “SAVE SETTINGS” to permanently save the new settings.
 - vii. Failure to “SAVE SETTINGS” will result in the laser returning to the default settings the next time that you power down the Legend.
3. Vector Test: Not enabled. Reserved for future use.
4. Raster Test: Not enabled. Reserved for future use.
5. Disable Axes: This feature allows you to disable the electrical current to the X and Y axis motors. Disabling the current allows you to move the carriage freely by hand to any point on the engraving/cutting surface. Disabling the axes provides a means to quickly focus on an uneven surface in either standard engraving mode or it is particularly helpful for focusing when using the Rotary Attachment.
 - a. In the “SERVICE” menu highlight “DISABLE AXES”. Press “ENTER”. You are now able to move the carriage freely without any resistance from the motors.
 - b. Pressing “REBOOT” is the only way to re-enable the axes.

6. Reboot: This feature reboots the Legend. All settings that have not been saved, and all jobs in memory will be lost when you reboot. Use this command to reboot the Legend after you have used the "DISABLE AXES" command.
7. Diagnostics: Not enabled. Reserved for future use.

OPTICS

The Legend is equipped with a two-inch focal length lens as standard equipment. The lens assembly is removed by loosening the captive screw in the center of the optics plate. Other lenses are available as options for special situations. A one and a half inch lens is available for fine detail work, and a two and a half inch lens is available for cutting thick materials. Other lenses are available as well. The picture below illustrates how to change a lens.



LOADING YOUR WORK

The home position of the engraving field is at the upper left corner of the table. Place your work piece in the upper left corner, pressed firmly against the metal stops along the top and left edges.

OPERATION

Load a practice piece and set the focus. Close the door and press the GO key. Turn on the exhaust fan. Now go into your drawing program (CorelDRAW, etc.) and set the page size to the dimensions of the practice piece you have loaded. Then enter your name in half-inch text anywhere on the page. Once you have the image ready to engrave, print to the machine through the Legend print driver using the standard print command. Your drawing program should give you the opportunity to do a print setup, where you can set the Resolution, speed and power.

REMEMBER THE STEPS:

- 1) Insert the item to be engraved.
- 2) Focus (or enable auto focus).
- 3) Close the door.
- 4) Confirm the exhaust is on.
- 5) Press GO and then "Print" from your computer.

7) ENGRAVING MACHINE MAINTENANCE

CLEANING - IMPORTANT!

The single most important thing that you can do to keep your Legend working as if it were new is to keep it clean! Five minutes once a day will keep the residue and debris from building up and causing problems. There is virtually no maintenance required for your Legend if you **KEEP IT CLEAN!**

EXHAUST

Make sure the exhaust blower you are using receives proper maintenance. Periodically clean the exhaust blower and duct system to remove built-up debris. If you detect odor while engraving, or if the smoke in the cabinet is visible in the area of the lens carriage, inspect the exhaust system. Check for loose or broken pipe/hose connections, or obstructions. Many blowers are belt driven, and the belts will wear with time.

BEARINGS

The bearing system on the Legend should be cleaned once a week. Use a soft cloth and some alcohol or similar mild solvent. Using the drawing on the next page, clean each of the bearing tracks shown. A cotton swab is perfect for cleaning out the inside of the grooved tracks. About once every three months, you should lubricate the bearings. Using the lubricant Syringe from your accessory kit, apply a thin bead of grease on the bearings shown in the diagram on the next page. Each bearing has two grease points. The grease should go down inside the small groove on each side of the bearing.

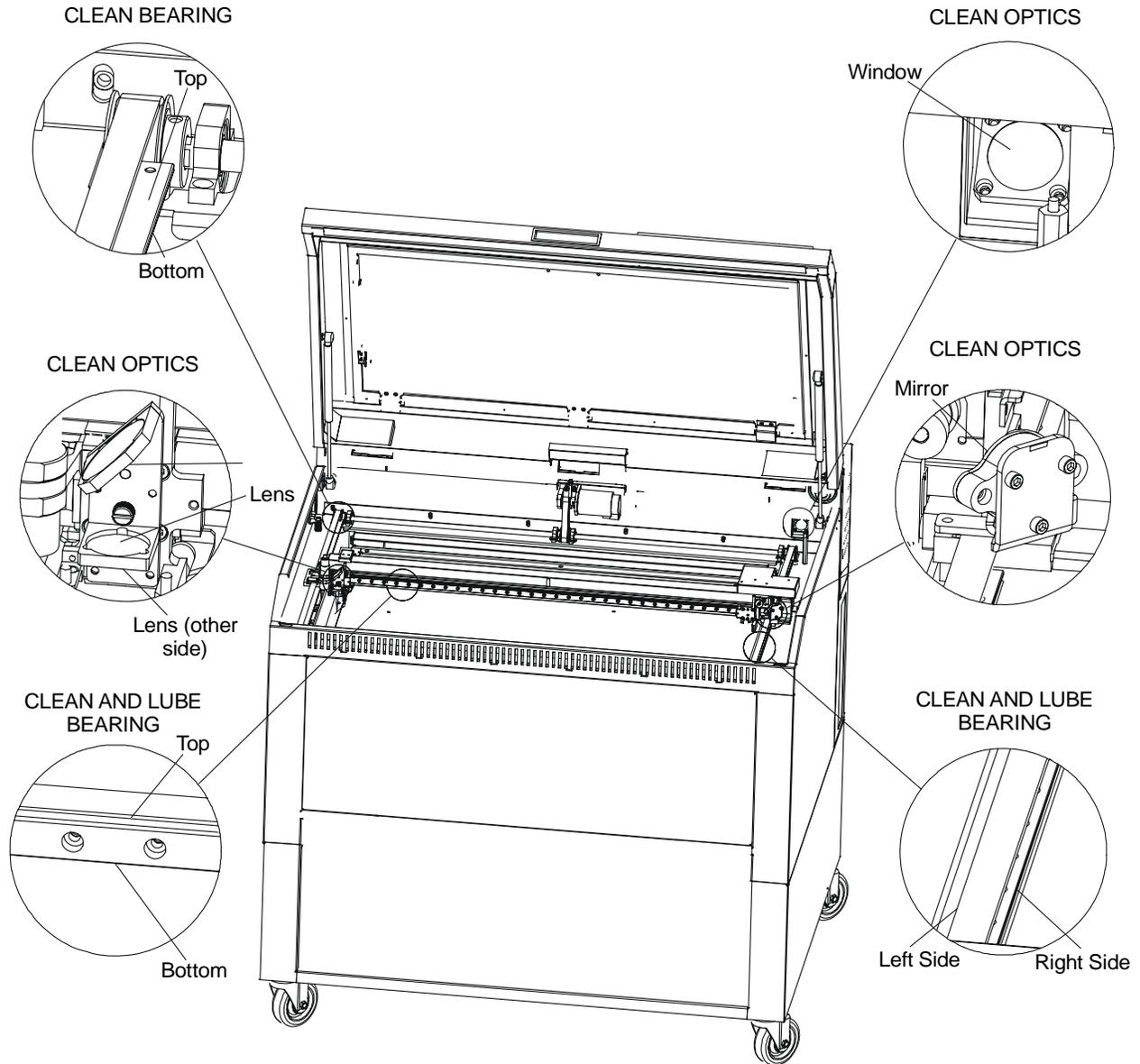
After cleaning the bearings, clean off the table and the rest of the inside of the machine. Spending just a few minutes a week will pay off in the long run with better quality and performance.

OPTICS

About once a week, you will need to clean the optics (mirrors and lenses) of your Legend. If smoke, resin, or other contaminants are allowed to accumulate too heavily, they will reduce the available laser power and may cause damage. See the diagram on the next page for the location of all the optics.

The two optical components most likely to require cleaning are the focus lens and the mirror directly above it. The lens and mirror are a single assembly, and can be removed from the machine to make cleaning easier. To remove the assembly, loosen the large phillips head screw in the center.

LEGEND CLEANING AND LUBRICATION



To clean the optics use a high-quality cotton swab moistened with the optics cleaner supplied in the accessory kit. Please read the label on the bottle carefully. Rubbing alcohol should be used only to remove fingerprints. If you run out of the cleaner supplied by Epilog, acetone can be used as a temporary measure, but should not be used for regular cleaning as it contains impurities, which can contaminate the optics. If you run out of solvent, pure ethyl (grain) alcohol such "Golden Grain" and "Everclear" are highly recommended because of their pure nature and because they are readily available at most liquor stores.

Wet the swab thoroughly with the solvent, and then blot it against a piece of cotton so that it is no longer soaking-wet. Then daub the optic gently, rotating the swab after each daub to expose clean cotton to the

surface, until the optic is free of visible contamination. At that point, prepare a fresh swab and clean the surface with a gentle zigzag motion across it. Avoid any hard "scrubbing" of the surface, especially while there are visible particles on it, and try not to use repetitive circular motions. When you are done, be careful to remove any cotton threads that may have snagged on the mountings, and allow the optics to dry before you operate your engraver.

LASER TUBE

The laser tube used in the Legend does have a maximum service life. The amount of engraving time that you get from a tube will depend to a large extent on how much material you remove from your plaques. Typical operating tube life is 10,000 – 20,000 hours. Depending on your particular usage, the tube should be good for a very long time. The tubes can be refurbished and are available on an exchange basis.

8) SPEED AND POWER RECOMMENDATIONS

The following are general guidelines for using the Legend system. Please remember that these are only guidelines. Depth of cut is a matter of personal preference. As such, there is no “correct” setting. Depth will increase if the power is increased, or if the speed is decreased. Table one provides starting points for 35 watt lasers or less. Table 2 provides starting points for 50 watts or greater.

35 WATTS OR LESS

	300 DPI ENGRAVING SPEED-POWER	600 DPI ENGRAVING SPEED-POWER	CUTTING SPEED-POWER
1/4" Wood	20-100	30-100	10-100
1/4" Acrylic	90-100	90-60	10-100
Anodized Aluminum	90-80	90-55	N/A
Brass-Painted	90-60	90-55	N/A
Corian Or Avonite	10-100	20-100	N/A
1/8" Delrin	20-100	30-100	5-100
Glass	30-100	40-100	N/A
Laserable Plastic	80-100	90-100	50-50
Leather	90-70	90-60	N/A
Marble	20-100	25-100	N/A
Matboard	90-100	90-100	60-80
Melamine	20-100	30-100	N/A
Rubber Stamps	10-100	15-100	25-100

50 WATTS OR GREATER

	300 DPI ENGRAVING SPEED-POWER	600 DPI ENGRAVING SPEED-POWER	CUTTING SPEED-POWER
3/8' Wood	60-100	70-100	20-100
3/8" Acrylic	100-30	100-25	15-100
Anodized Aluminum	100-50	100-40	N/A
Brass-Painted	100-35	100-30	N/A
Corian Or Avonite	40-100	50-100	N/A
Delrin Seals	50-100	60-100	50-100
Glass	70-100	75-100	N/A
Laserable Plastic	100-40	100-35	75-30
Leather	100-45	100-40	N/A
Marble	50-100	60-100	N/A
Matboard	100-45	100-40	75-40
Melamine	70-100	80-100	N/A
Rubber Stamps	40-100	50-100	50-100

9) NETWORK PRINTING

There are several different methods to print over the network to the Legend. This document describes how to set up the Legend to work with the network connection on your Windows 95/98 PC(s). A procedure for installing network connection software (INTELLIscribe) is provided under heading "Installing INTELLIscribe" addressed later in this section.

Any number of Legends and computers can be mixed on the user's local area network. This includes a single computer controlling multiple Legend engravers, multiple computers controlling a single Legend, or multiple computers controlling multiple Legends. The Legend's network printing facility is implemented using the TCP/IP based LPR/LPD protocol.

The different methods of printing to the Legend with a network connection are as follows:

- Server-less printing without a hub.
- Server-less printing using a hub.
- Server based printing.

SERVER-LESS PRINTING WITHOUT A HUB

This method involves direct printing from your computer's network card to the Legend. This method is similar to printing through the parallel port with the distinct advantage that it allows you to use a much longer cable (up to 328 feet) than a standard parallel printing cable allows.

REQUIREMENTS

- 1) A 10Base-T Ethernet network card installed in your Windows 95/98 computer.
- 2) A crossover network cable connecting the network card to the Legend.
- 3) INTELLIscribe software.

Warning! - The crossover network cable looks exactly like a standard straight-through network cable, but they have different purposes for making network connections. Normally, the crossover cable should only be used when connecting the Legend directly to your computer. Ask your network administrator for assistance if you are unsure of which type of cable you have. It is a good idea to place a tag or label on the cable indicating if it is a crossover cable or straight-through cable.

INSTALLATION

- 1) Install a 10Base-T Ethernet network card and supporting software / drivers in your PC. Network cards can be obtained at any local computer store.
- 2) Connect a crossover cable from the computer to the Legend control board.

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- 3) On the Legend display panel select the drop-down menu item “Options”, then “Networking”. Set the network settings to the following:

IP Address	192	168	98	1
Subnet Mask	255	255	255	0
Gateway Address	0	0	0	0

NOTE – The “IP Address” in the Legend must exactly match the INTELLIscribe network Address! Insure the “Subnet Mask” matches the numbers listed above. Ask your network administrator if you want to assign different “Subnet Mask” numbers.

- 4) Install INTELLIscribe software onto your computer. Installing INTELLIscribe is explained later in this document.
- 5) Print your first job!

SERVER-LESS PRINTING USING A HUB

This method allows you to print directly from your computer to the Legend through a hub without going through your network server. The hub allows you to maintain current connections to your local area network or other devices that you may already have. This method has the advantage of isolating your Legend engraver from the network if you wish, but does not isolate your computer from your network. This is a simplified printing solution that does not affect your server.

REQUIREMENTS

- 1) A 10Base-T Ethernet network card installed in your Windows 95/98 computer.
- 2) Three standard straight-through network cables.
- 3) A 10Base-T Ethernet network hub.
- 4) INTELLIscribe software.

INSTALLATION

- 1) Install a 10Base-T Ethernet network card in your PC. Network cards and installation can be obtained at any local computer store.
- 2) Connect one standard network cable from the computer to the hub.
- 3) Connect one standard network cable from the hub to the Legend.
- 4) Connect one standard network cable from the hub to your local area network wall connection.

NOTE: Be sure that you use the correct input/output ports on the particular hub you are using. The hub manufacturer instructions will indicate which ports are input and output.

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- 5) On the Legend display panel select the drop-down menu item "Options", then "Networking". Set the network settings to the following:

IP Address	192	168	98	1
Subnet Mask	255	255	255	0
Gateway Address	0	0	0	0

NOTE – The "IP Address" in the Legend must exactly match the INTELLIscribe network Address! Insure the "Subnet Mask" matches the numbers listed above. Ask your network administrator if you want to assign different "Subnet Mask" numbers.

- 6) Install INTELLIscribe software onto your computer. Installing INTELLIscribe is explained later in this section.
- 7) Print your first job!

SERVER BASED PRINTING

The third method of printing to the Legend is through a network connection using your network server. The Legend acts as a standard network printer and can be configured in the same manner that you would configure any other network printer. Ask your network administrator to configure your server to work with any number of computers and/or as many Legend engravers as you wish. Your network administrator will need to provide the appropriate configurations for the IP Address, Subnet Mask, and Gateway Address on the Legend engraver.

INSTALLING INTELLISCRIBE:

Server-less printing is accomplished by installing third party software (INTELLIscribe) on the Windows 95/98 computer(s) that you are using to print to the Legend. Prior to installing INTELLIscribe software, you should ensure that the TCP/IP protocol is installed on the Windows 95/98 computer. Ask your network administrator to verify that the TCP/IP protocol is properly installed.

INTELLIscribe software can be obtained from Brooks Internet Software. Contact information is provided at the end of this document.

Before installing INTELLIscribe, install your Legend print driver according to the instructions in the Legend owner's manual.

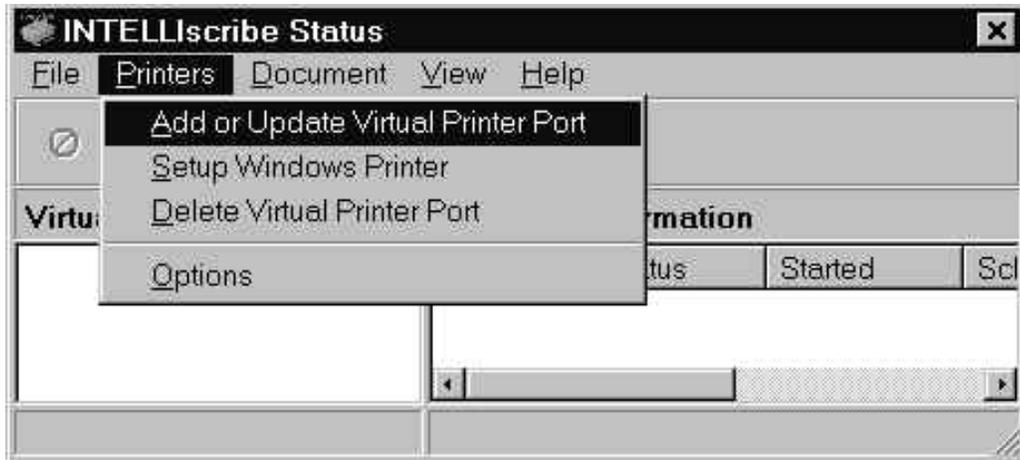
To install INTELLIscribe:

- 1) Insert the INTELLIscribe diskette into drive A:\
- 2) Click on the Windows "Start" button.
- 3) Select "Run".
- 4) Type a:\setup.exe, and then click "OK".

INTELLscribe will walk you through the install process. Follow the instructions in the dialogue boxes until you are prompted to restart your computer.

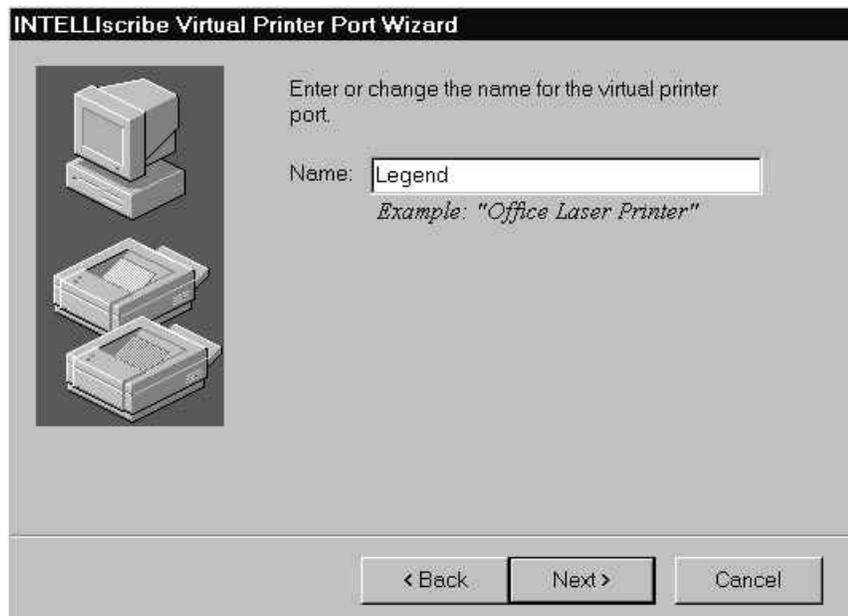
- 5) Restart your computer.
- 6) Click on the Windows “Start” button
- 7) Select “Programs”, “INTELLscribe” to start the INTELLscribe program.
A series of dialog windows will appear to set up your Legend.

The following window will appear:



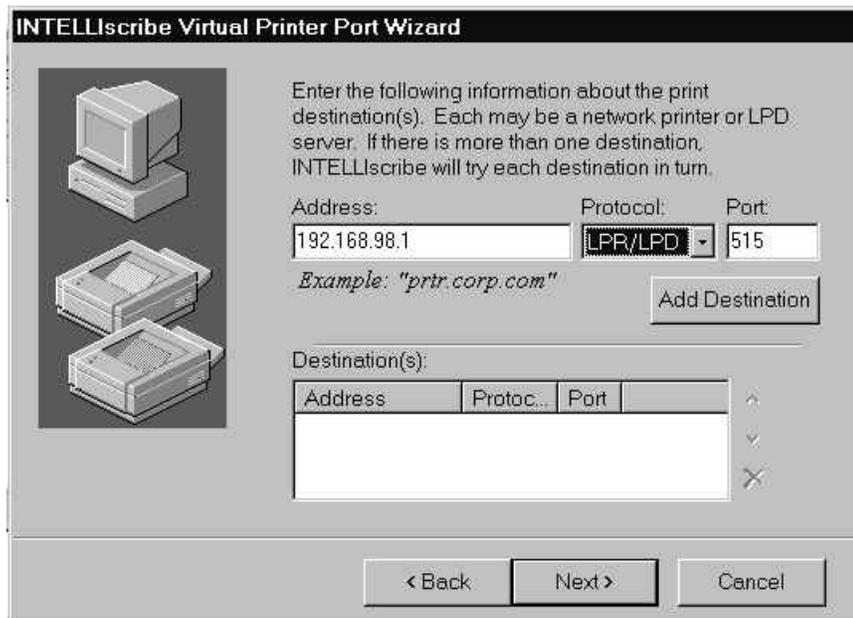
- 8) From the Menu bar select “Printers” then select “Add or Update Virtual Printer Port”.

The following window will appear:



- 9) Type the word Legend in the “Name:” box, then click “Next”.

The following window will appear:



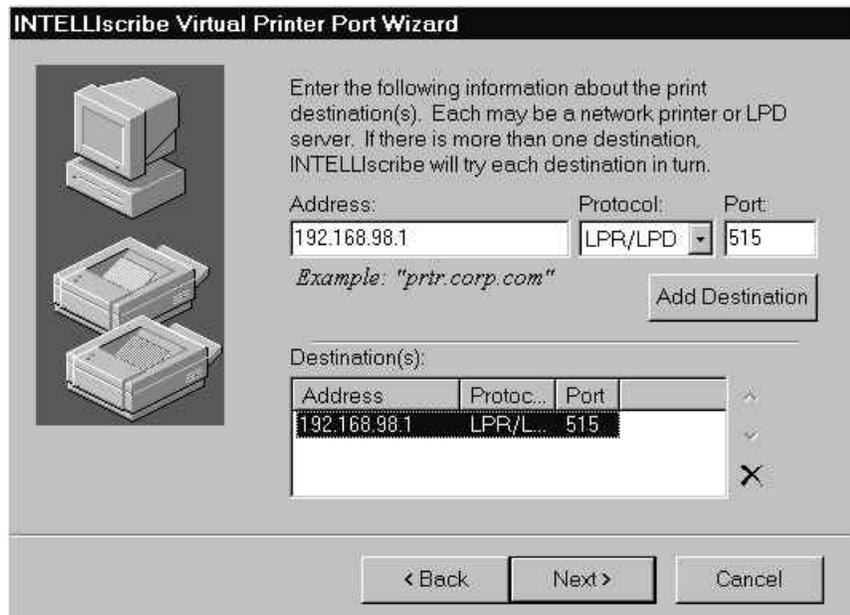
- 10) Type 192.168.98.1 into the "Address:" box.

Very Important Note* - The most likely cause of print failure through the network connection is caused from the number in the "Address:" box being different from the number in the "IP Address" box in your Legend laser. They must match exactly.

- 11) Select the "Protocol" down arrow and select "LPR/LPD". The "Port" setting will automatically be properly set to 515.
- 12) Click on the "Add Destination" button.
The address that you typed in above window will be displayed in the "Destination(s):" box.
- 13) Single click on the address in the "Destination(s):" box to highlight the address.

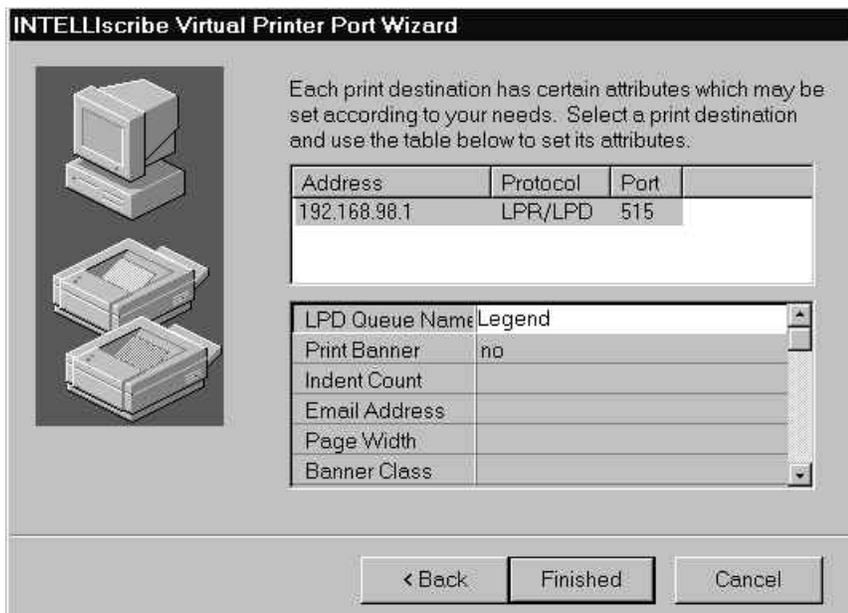
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This window will now appear as follows:



- 14) Click "Next".

The following window appears:



- 15) Single click to highlight "192.168.98.1 LPR/LPD 515" in the address box.
- 16) Click on "LPD Queue Name".
- 17) Type the word Legend into the empty field.

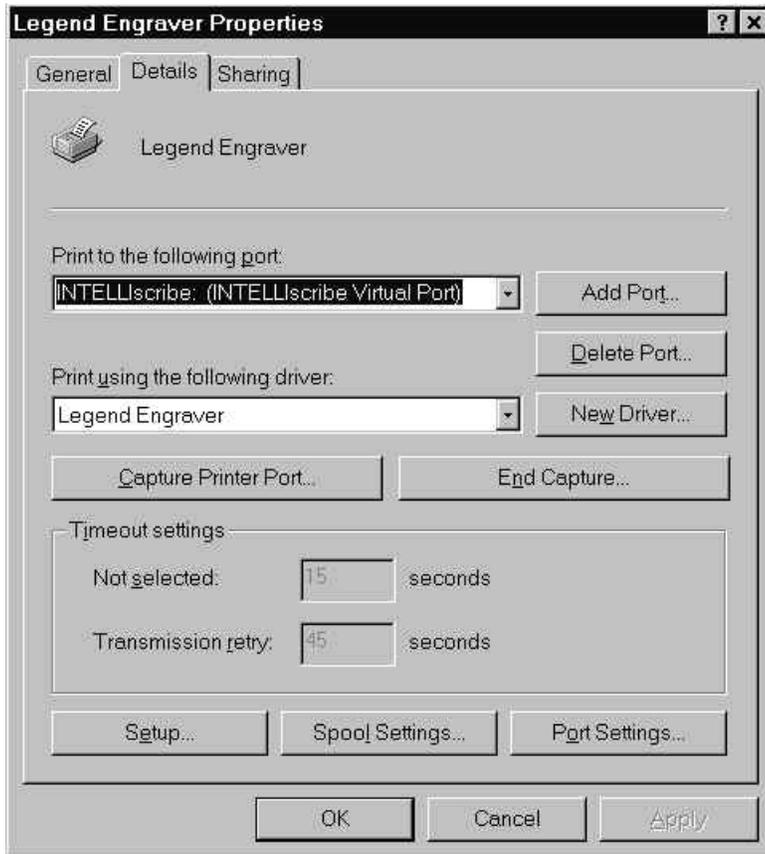
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- 18) Click “Finished”.
- 19) Close the INTELLIscribe Status Window and INTELLIscribe is installed!

Once INTELLIscribe is installed, you will need to set up your computer to print to the Legend from the INTELLIscribe Virtual Port instead of your LPT1 port.

- 20) Click on the Windows “Start” button.
- 21) Select “Settings”, and “Printers”.
- 22) Double click on the Legend print driver icon.
- 23) In the “Legend Engraver” window, click on “Printer” and then click on “Properties”.
- 24) In the “Legend Engraver Properties” window click on the “Details” tab.

The following window appears:



- 1) Make sure “INTELLIscribe: (INTELLIscribe Virtual Port)” appears in the “Print to the following port:” box.
- 2) Click on the down arrow to select “INTELLIscribe: (INTELLIscribe Virtual Port)” if it does not already appear.

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- 3) Make sure that "Legend Engraver" is in the "Print using the following driver:" box
- 4) Click on "Okay". Click on the down arrow to select the "Legend Engraver" if it does not already appear.
- 5) Close the "Legend Engraver" window, and you are ready to print over the network.

INTELLIscribe Software Contact Information

Brooks Internet Software
1-800-523-9175
email: sales@brooksnet.com
www.brooksnet.com

10) ENGRAVING TECHNIQUES

The Legend Laser system is very versatile. It can mark and cut several materials. Following is information regarding some of the materials the Legend will mark and cut. For specific information regarding materials not mentioned below, please contact your local Epilog representative for information.

ACRYLIC

ACRYLIC BACKGROUND

Next to wood, acrylic is the most popular material to use with laser systems. It engraves and cuts very easily, comes in a wide variety of shapes and sizes, and can be relatively inexpensive.

Acrylic comes in two forms, Cast and Extruded. Cast Acrylic is used for almost all engraving purposes because the frost produced when lasered provides a nice white contrast against the clear material. Extruded acrylic remains clear when engraved and does not produce an adequate contrast.

Extruded acrylic on the other hand is ideal if you are only going to vector cut. Extruded is less expensive than cast and also has a lower melting point that produces an almost flame finished edge when cut with the Legend.

ACRYLIC ENGRAVING TECHNIQUES

Most acrylic is engraved on the backside to produce a look through effect from the front surface. Remove the back protective cover layer before engraving. Leave the top protective cover layer on so that it remains intact to prevent scratching while handling the acrylic.

Since you are engraving the backside of the acrylic, you will need to reverse or mirror your artwork before sending the job to the Legend.

Engrave the acrylic at a high speed and low power. A small amount of power is all it takes to mark acrylic and high power levels tend to distort the acrylic when engraving.

There are a large number of acrylic products that are painted on one side to add color to the clear acrylic piece. You can engrave directly through the paint into the acrylic for a very nice presentation effect. Leave the speed the same as if you are engraving clear acrylic and turn up the power about 10% to get cleanly through the paint. Applying too much power to the paint will melt it and cause distortion.

ACRYLIC VECTOR CUTTING TECHNIQUES

Acrylic is one of the most popular cutting materials available. It comes in a variety of colors and thickness. Laser cutting produces very nice edge quality without the need for polishing or secondary clean up.

Use a Vector Table to elevate the acrylic before cutting. Air Assist will greatly reduce flaming when cutting acrylic.

Vectoring acrylic is similar to vectoring other materials. First, experiment to determine the correct speed and power setting. Cutting acrylic is usually best achieved with relatively slow speed and relatively high power. This combination allows the laser beam to melt the edges of the acrylic and produce an almost flame polished edge. Acrylics generally require only a single pass to cut, but thicker acrylics may need two passes.

As with engraving, it is sometimes necessary to mask and dampen the acrylic before cutting.

Warning! Never leave your Legend unattended when vector cutting acrylic! Acrylic is very flammable.

ANODIZED ALUMINUM

Anodized aluminum comes in a variety of colors and can usually be easily engraved with a CO2 laser. Black anodized aluminum is great to work with because it turns white when lasered. Black anodize provides the best contrast of all of the colors of anodized aluminum. Some colors of anodize – red for instance – will not turn completely white when laser engraved. Red anodize will produce a light pink color. Performing a second pass can see some improvement but usually a slight shadow of color will remain.

Engrave anodized aluminum at high speeds and low powers for crisp, clean images. Too much power applied to the anodize will distort the engraving and tends to over-burn the image.

Warning! Metals are reflective, and using full power will potentially cause damage to the machine.

BRASS - PAINTED

BRASS BACKGROUND

Un-coated brass cannot be laser engraved. In order to engrave brass with a laser you need to use brass that has some sort of coating – typically paint. The laser removes the paint and exposes the brass substrate. There are three basic types of engraving brass available to engravers but they are not all compatible with the laser.

By far, the most popular laser brass is actually brass-coated steel. First, a steel substrate is coated with a thin layer of brass. Next, the brass is polished to a reflective finish and a coat of lacquer is applied to the brass.

Finally, a paint coating is applied on top of the lacquer for the finished product. When laser engraving brass-coated steel, you are removing only the paint and exposing the polished brass coating that is protected by the lacquer. The lacquer prevents the brass from oxidizing and the bright reflective surface will stay bright for years.

The other two types of engraving brass are solid brass that either can or cannot be acceptable for laser engraving. Some manufacturers will polish the brass before applying the paint coating and some will not. If the brass is polished before the paint is applied you will have a nice reflective engraved surface. If the brass is not polished, the result will be a dull, tarnished brass that will require a secondary polishing process after laser engraving. This is time consuming and most engravers do not want to spend the time and effort necessary to turn this into an acceptable product.

If you are unsure if the piece that you have is brass or brass-coated steel, you can test the material with a magnet. A magnet will stick readily to brass-coated steel, but since solid brass is not magnetic, a magnet will fall helplessly away from solid brass.

BRASS ENGRAVING TECHNIQUES

Engrave painted brass at high speed and low power. It takes very little power to remove the paint coating and too much power will melt the paint and distort the image. If you are producing engraving that appears to be “fat” or has a balloon appearance to it, you are probably using too much power. Reducing the power will bring back the nice sharp images that are normally produced with painted brass.

It is possible to laser bare, un-coated brass and apply an oxidizing agent to the engraved area to produce a black image. This process is the same as the process used when rotary engraving brass and using an oxidizing agent. Be sure that you are using brass that does not have a lacquer coating. The laser has a very difficult time adequately removing the lacquer coating and the oxidizing agent must react with the bare brass in order to work properly. You will need to experiment to ensure that the brass that you are using can be oxidized after laser engraving as it can be difficult to determine if there is a lacquer coating over bare brass.

NOTE* - Use caution when trying to engrave brass coated pens. Many pens have a very hard epoxy paint that is completely unacceptable for CO2 laser engraving. The results are a tarnished, brown looking finish that cannot be corrected. You should only use pens that you have experimented with or that are specifically designed for CO2 laser engraving. Be aware that there are many pens that can be laser engraved with a YAG laser but these pens are usually not compatible with the CO2 laser that you are using.

Use caution when trying to engrave blue painted brass. Blue paints contain very aggressive pigments that penetrate the metal surface and it can be extremely difficult to remove all of the blue color. Some manufacturers will use black paint as a base coat before applying the blue paint and this process produces a product that is acceptable for laser engraving.

GLASS

BACKGROUND

When a laser strikes glass it fractures the surface but it will not engrave deeply or remove material. The fracturing of the glass surface will produce a frosted appearance but can cause roughness and chipping depending on the type of glass being engraved. While the frosted appearance is desired the roughness and chipping are not. Below, we explain how to eliminate the roughness and produce a very smooth frosted finish.

The composition and quality of glass varies widely and you cannot always predict the effect that you will achieve. It is always best to experiment with an unfamiliar glass source. Generally speaking, flat glass tends to have a very consistent hardness throughout, and the engraved areas do not tend to have lighter and darker areas. Bottles on the other hand, tend to have soft and hard spots that will cause the engraved area to appear lightly frosted in one area and heavily frosted in another. Engraving at medium speed and high power will somewhat compensate for this, as will two or more engraving passes.

While the laser beam itself is very hot, the heat does not build up easily and it should not prevent you from engraving onto full bottles of wine, champagne or other filled glass bottles. Laser engraving filled bottles is a very popular method of creating custom presentations for special occasions. The laser will not damage the liquid inside the bottle, and as long as you are not completely engraving away a large section of bottle you have very little chance of breaking the bottle.

ENGRAVING TECHNIQUES

To produce a smooth frosted finish, follow this procedure:

- Using your finger or a paper towel, apply a thin coat of liquid dish soap – any kind will do – over the area to be engraved.
- Cut a piece of newspaper or paper towel a little larger than the area to be engraved. Completely soak the paper with water then wring out the excess water.
- Apply the paper to the glass and smooth out the paper so that there are no wrinkles.
- Place the glass into the engraver and laser through the paper while it is still wet.
- Remove the glass, discard the remaining paper, and clean the glass.
- If necessary, gently polish the glass with a ScotchBrite pad.

NOTE* - You need to be especially careful when laser engraving leaded crystal. The lead in the crystal expands at a different rate than the crystal does and this can cause cracking and breakage of the crystal. Using a lower power setting can help this problem, but we always recommend having a spare in case of breakage.

COMBINING LASER ENGRAVING WITH SANDBLASTING

Combining the best of both processes, you can use your laser to engrave the artwork then use sandblasting to provide a deep etch into glass. Using the laser to create the artwork mask is an ideal process for one-of-a-kind custom pieces as well as large production runs. This eliminates the photo process usually associated with sandblast mask.

- Apply an adhesive backed mask material to the glass that you are going to engrave.
- Laser completely through the mask and into the glass.
- Remove the glass from the engraver and sandblast to the desired depth.
- You now have a sandblasted glass presentation with the detail of laser engraving!

NOTARY SEALS - DELRIN

ENGRAVING

Notary seals can be easily manufactured using 1/16-inch thick delrin plastic. A seal consists of two pieces - a male die and a female die, both shown below. The male die consists of white lettering on a black background and the female die is an inverted and mirrored image of the male. Inverting and mirroring are easily accomplished in most graphics software packages. Simply duplicate the male die, then invert the black and white colors and then mirror the image.

The male image should be produced without the use of outlines around the text or graphics. Add a .007 to .010 inch outline to the text and graphics of the female die. This outline creates a large enough void between the male and female dies to emboss paper without tearing.

Apply a .001 outline around the seal to define the outside edge of the seal. Use the combined Engraving/Vector mode to first engrave the seal and then cut out the seal.



Male
Artwork



Female
Artwork

PLASTIC

PLASTIC BACKGROUND

Engraving plastics have changed greatly in the past few years. Before lasers, plastic manufacturers designed plastic for rotary engraving systems. A rotary engraving system uses a mechanical spinning bit to remove material. Therefore the depth of the top layer or “cap sheet” was designed to make it easy to rotary engrave. Cap sheet thickness was approximately .010 inches thick and laser engraving was nearly impossible because by the time you applied enough power to get through the cap sheet the laser melted and deformed the plastic.

Plastic manufacturers have developed a broad range of plastics that have thinner cap sheets that are .002 to .003 inches thick that provide much better engraving and cutting characteristics. These plastics are commonly referred to as Micro Laminates, Micosurfaced, or simply laser engravable plastics. These plastics are generally very easy to engrave with a laser since they all have similar characteristics.

Because there is such a broad range of plastics it is necessary to experiment to determine if a particular type of plastic is laser compatible. Different color plastics, even if they are from the same manufacturer will have unique speed and power settings. Use the guidelines in this manual as a starting point when determining the correct speed and power settings. If you do not get acceptable initial results with the recommended speed and power settings start experimenting by first changing only the power setting. If adjusting the power setting does not work, start over and adjust only the speed setting. Once you have acceptable results, record those settings for that particular plastic so that you do not have to repeat the experimentation process.

PLASTIC ENGRAVING TECHNIQUES

Always remove the clear protective cover layer before engraving.

Once you have the correct speed and power settings you can improve your engraving results even more by taking the focus lens out of focus (lower the table) by about 1/16 of an inch. This technique enlarges the focus beam a little bit and provides more beam overlap on each pass of the laser. The greater overlap produces a smoother engraved surface on the plastic and eliminates the grooves that you sometimes see when engraving plastic.

With some plastics it is best to engrave using two passes. The first pass cuts through the cap layer and the second pass cleans away the residue that some plastics leave behind.

Another technique that can be useful is to mask the plastic before engraving with transfer or masking tape. This will prevent a buildup of residue on the plastic surface. Misting the transfer tape with water will reduce heat buildup and melting on sensitive plastics.

PLASTIC VECTOR CUTTING TECHNIQUES

Use a Vector Table to elevate the plastic before cutting. Air Assist will greatly reduce flaming when cutting plastic.

Vectoring plastics is similar to vectoring other materials. First, experiment to determine if the plastic can be cut with the laser. Plastics that are up to 1/16 inch thick can usually be cut in a single pass. Thicker plastics may need two passes.

As with engraving, it is sometimes necessary to mask and dampen the plastic before cutting. Even masking and wetting both front and backsides of the plastic is desirable on sensitive plastics that have very low melting points.

Warning! Never leave your Legend unattended when vector cutting plastics! Plastic can be very flammable.

Do not engrave PVC (Polyvinyl Chloride). PVC will destroy the optics and mechanics of your Legend. Cutting or engraving PVC will void your warranty.

WOOD

- Solid Wood
- Manufactured Wood Products
- Engraving
- Vector Cutting
- Cleaning
- Color Filling

SOLID WOOD

Wood is by far the most laser friendly material available. It can be engraved or cut very easily. When engraved, lighter colored woods like cherry or maple produce very nice contrast where the laser burns away the wood. This high visual contrast is what makes lighter woods so popular when combined with an Epilog Legend. There are many types of other wood products that are designed for use with the laser and many more that are waiting to be discovered by you.

Every type of wood has it's own characteristics. Some wood is denser than other wood, with the denser, harder woods requiring more laser power to cut or engrave. Epilog recommends that when working with wood other than the ones listed in this section that you investigate the engraving and cutting characteristics before committing to use. There are woodworking shops in nearly every large city that will have a wealth of information on nearly all woods. If you have access to the Internet do a search on wood see what you find.

Owner's Manual for EPILOG Legend Model 6000

December, 2000

The most common woods used with the Legend are Cherry, Walnut, Maple, Alder, & Oak. These woods are considered hard woods, and have grains that work well with lasers.

Grain can vary greatly in density. Cherry, Alder, Walnut & Maple all have fairly little veins of grain in them, while Oak has medium to large veins in it. For example: If a large box was engraved into a piece of Cherry and a piece of Oak, the box engraved into the Cherry would have a very uniformed appearance, the area engraved or the background would be smooth with little variation in height. The Oak on the other hand would vary greatly in height and have a very non-uniformed appearance.

Legends can engrave in very fine detail. The spot size ranges from .003" to .008" of an inch in diameter, and, if there are large variations in the material that one is engraving into it will greatly effect the quality of the finished piece. Therefore the majority of laser users will stick with Cherry, Alder, Walnut or Maple.

The differences between Cherry and Alder are little. The grain, color and densities are nearly identical. The color of these two woods is a light red. We recommend stains that are clear allowing the natural color to show through. Alder isn't quite as expensive as Cherry and it is a little more readily available. Walnut is a dark brown in color and has a greater density than either Cherry or Alder. Maple is light blonde in color and has a density that is even greater than Walnut. It is important to mention the density, because it will take a little more laser power to cut and to engrave to the same depth in woods that have greater densities.

MANUFACTURED WOOD PRODUCTS

Plywood

Standard building grade plywood is a material that usually does not produce an acceptable result when engraved. It is also a very difficult material to cut. Plywood is constructed of layers of wood glued together. Since the grain of the wood chips in the plywood run in different directions it is difficult to obtain a consistent depth when engraving. Air bubbles within the plywood cause problems because they severely disrupt the laser beam when cutting. Because of the air bubbles it is virtually impossible to cut cleanly through standard plywood.

There are specialty plywood products that can be found in hobby shops or specialty wood stores that will engrave and cut much nicer than standard plywood products purchased through your local lumber supplier.

MELAMINE

See MELAMINE earlier in this chapter.

WOOD ENGRAVING TECHNIQUES

To create a quality image on wood, contrast and depth are desired. The higher the power levels, the higher the contrast and depth will be.

Speed and Power Settings - Wood is a great material to laser engrave because it discolors when engraved and the depth of engraving is greater than most materials. The downside is that it takes a lot of power to deeply engrave wood at high speeds. Most wood can be engraved using full power no matter whether you are using a 25-watt laser or a 100-watt laser. Depending on the wattage of your laser, the best approach is to set the laser power at 100% and adjust the speed to obtain the desired depth.

Resolution Settings – Wood is a very easy material to work with and you can produce very nice detail with as little as 300 DPI engraving. 600 DPI engraving into wood produces fabulous results.

Grey scales – Grey scales look wonderful when engraved into wood. The reason for this is that the wood will react much differently to each level of gray scale, providing amazing contrast. Experiment! Take a piece of clipart and ungroup it and change the colors so that they range from a dark color like red, to a light color like yellow, then engrave it. This will create a shading effect that is almost 3-D in its appearance.

WOOD VECTOR CUTTING TECHNIQUES

Legends are ideal for cutting through solid wood material. The thickness of the wood that you can cut varies with the wattage of the laser and the hardness of the wood, but in general you can cut approximately ¼ inch wood with a 25-watt laser and up to ½ inch wood with a 100-watt laser.

As with any application there are techniques that will greatly enhance the success of your vectoring of any material. When cutting wood of any thickness Epilog recommends using a Vector Table and Air Assist. The Vector Table raises the wood off of the solid metal engraving table and supports the wood on an aluminum grid. The grid greatly reduces backside burning of the wood and also provides ventilation that allows the fumes and smoke to be exhausted to the rear of the engraving cabinet.

Air assist greatly reduces flaming that may occur if too much laser power is applied to the wood piece being cut.

Depending on the type of wood being vector cut, it is sometimes advantageous to apply a cover of masking or transfer tape to the surface before cutting. The masking tape will reduce residue buildup on the top surface of the wood surrounding the cut line.

Warning: Wood is a combustible material. Never leave your Legend unattended while vector cutting any material.

WOOD CLEANING TECHNIQUES

When laser engraving or cutting wood, resin in the wood comes to the surface, mixes with the smoke and is deposited as a residue. If the wood has a coating of polyurethane or lacquer the coating protects the surface of the wood from the resin/smoke damage. You can remove the resin from coated materials with a wet chamois or a sponge with a web cover. Some people like to use 409, Windex or other mild cleaning product, but water works well and is usually the most readily available wetting agent. The chamois that Epilog recommends has a sponge in the middle of it, and is available in the automotive car wash section of any Wal-Mart or K-Mart.

If the wood is not coated with polyurethane, the resin and smoke will stain the surface and you will need to sand the surface to remove the resin.

Never use a paper towel to clean the wood surface. The paper towel will shred and it is impossible to get the shredded fibers out of the engraved recesses of the wood. Most wood products that are designed for laser engraving will have a polyurethane coating so that they are very easy to clean.

WOOD COLOR FILLING TECHNIQUES

Color filling engraved areas of wood adds either greater contrast or a splash of color to your wood presentation. Normally, color filling is not required for lighter colored wood materials such as maple or cherry, but walnut can often benefit from adding a black color fill to provide more contrast. You will need to take some precautions when color filling wood, because if you are not careful, the liquid color fill material will absorb into the grain of the wood on the surface of the plaque where it is not wanted.

The best way to add a black color fill is shown below:

- 1) Apply a thin coat of Johnson's Paste Wax to the surface of the wood before you engrave it.
- 2) Engrave through the paste wax into the wood. Do not wipe off excess paste or residue after engraving.
- 3) Fill the engraved voids with Turtlewax "Color Magic" black liquid car polish. The car polish will absorb into the engraved wood grain, but will not absorb into the wood grain that is covered with paste wax.
- 4) Wrap a paper towel around a block of material that has a flat surface. Rub the flat surfaced paper towel over the surface of the wood to clean off the excess car polish and paste wax. The flat surface prevents the paper towel from getting into the engraved recesses.

You can follow the procedure above to add different colors to wood, but instead of car polish, use water based acrylic paint (the kind in the tubes works great!)

11) MEMORY CONFIGURATION

The Legend has the capability to store multiple jobs in memory. The machine will save any and all jobs sent until there is no free memory left. At that point, the oldest job will be deleted automatically to make room for new jobs. To avoid losing the oldest job, you can manually delete other jobs in memory.

SINGLE JOB MODE:

If you press the "GO" key on the keyboard, you are telling the Legend that a job will be coming from the host computer. To verify the state of the machine, look at the Status bar across the bottom of the display. The display should indicate, "Ready". The Legend will wait until the job arrives, and then run it. The name of the job will show up at the bottom of the status bar.

MULTIPLE JOB MODE:

If there are jobs in memory, select the "JOBS" menu heading and press the "ENTER" key. The list of valid jobs in memory will drop down. Select the one you want, and press, "ENTER". This will give you the options of Run, View, or Delete. Select the one you want and press, "ENTER". If you select Run, the machine will begin processing that job. View is an option and may not be available on your machine. Delete will remove that job from memory. You cannot delete a job if it is currently running.

You can load jobs at any time. If the machine is doing another job, it will save anything sent during that job for later. If the machine is idle, you can send jobs without having to run them immediately. Just make sure that the status bar at the bottom of the display indicates that the machine is "Idle". The Legend will receive the jobs without running them.

12) OPTIONAL EQUIPMENT

Optional equipment can be purchased with the Legend laser systems. These items are in addition to the standard items included with a Legend purchase. These items can be added to your Legend at a latter time after purchase if requested and purchased. The current optional equipment described following includes the “Double Head Attachment”, “Rotary”, “Air Assist”, “Auto Focus” and “Additional Optical Lens”.

DOUBLE HEAD

INSTALLATION

Locate the components for the Double head option.

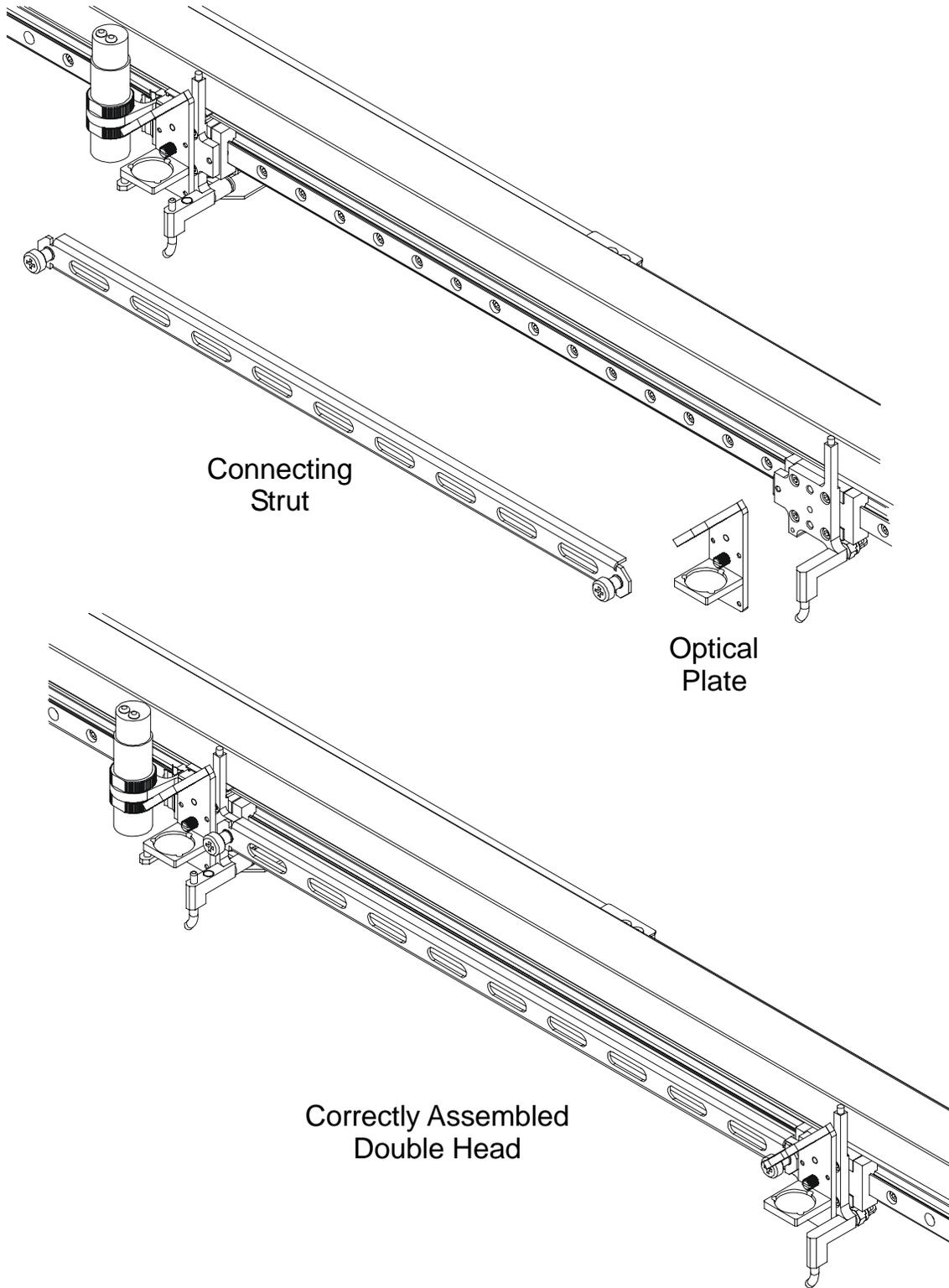
- Connecting strut
 - Optical Plate
- 1) With the machine off, open the door and slowly pull the “I” beam assembly to the front of the machine to where it is a comfortable reach.
 - 2) Put the optical plate up against the second bearing block and tighten the holding screw.
 - 3) Space the primary and secondary heads about 16 inches apart, and place the connecting strut in between the heads. Align the holes in the end of the strut with the holes on the carriages, and insert and tighten the thumbscrews. Please see the drawing on the next page.

ARTWORK LAYOUT

Lay out your work on a maximum page size of 16” wide and 20” tall. If you try to go beyond 16” width the machine will give an error and stop. Remember, the machine will take care of the duplication automatically. Prepare your artwork as though you were making only a single piece.

If you ordered the double head and are not using it, the area available as a single head is 30 x 20 inches. Please keep the second head in a safe place so it stays clean. See the diagrams on the following page for correct installation of the double head.

Double Head Installation

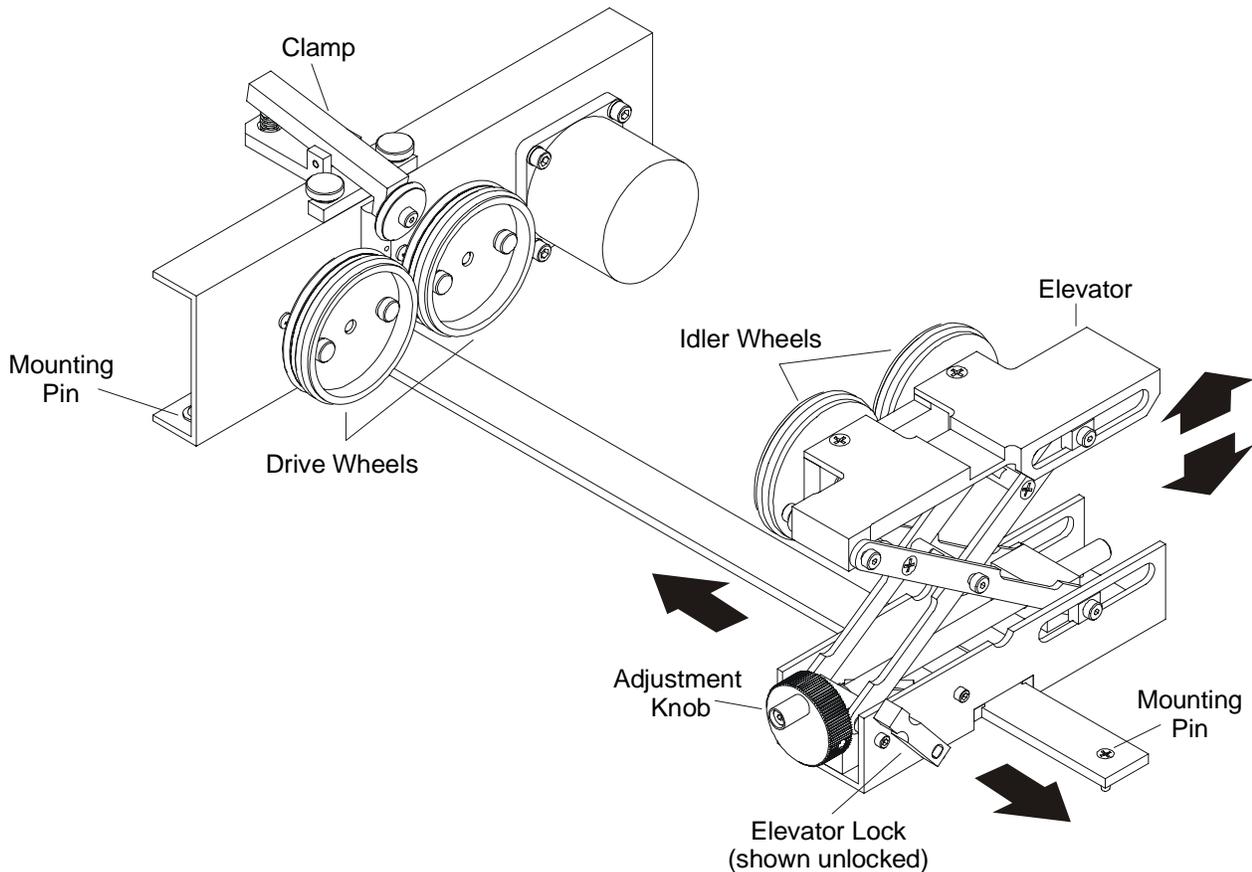


ROTARY OPTION

The rotary option allows you to mark or engrave cylindrical objects.

INSTALLATION

- 1) Lower the engraving table to its lowest point.
- 2) Turn off the power to the engraver.
- 3) Set the rotary attachment onto the engraving table so that the three pins in the bottom of the rotary attachment slide into the three corresponding holes in the table. Ensure the bottom of the attachment is flush to the engraving table at all three-pin positions.
- 4) There is a motor on the rotary attachment with a plug on the end. Plug the rotary into the mating connector located at the inside, front, left hand corner of the engraver. This connector is oriented so that you cannot install it backwards unless you push really hard.
- 5) The rotary attachment is now installed! Turn the power on.
- 6) The engraver knows that the rotary attachment is installed and changes its home position to a point directly above the center point of the drive wheels on the attachment.



SETUP

The part to be engraved should rest between the two sets of wheels. The wheels on the left are the driving wheels, and spin the work. The wheels on the right are for support. They can be raised or lowered to get the work surface to be engraved level with the table. The area being engraved must be level for the part to engrave correctly. They also can be moved from left to right to adjust to the length of the part being engraved.

- 1) Load your part with the open end (if there is one) to the left side of the rotary. The clamp is designed to sit inside the part and clamp it to the drive wheels. Insure the part is all the way to the left against the plastic stop. The clamp can be removed if the part has a closed end (like a wine bottle).
- 2) The elevator lock (see drawing) is in the unlocked position when it points to the front of the machine. Unlock the elevator and slide it left or right until the idler wheels support the part solidly. The elevator can be raised or lowered with the adjustment knob to accommodate parts that have different diameters at the ends.
- 3) Lock the elevator by flipping it to point to the back of the machine.
- 4) If you are engraving a bottle, it is best to put the base of the bottle at the left side of the attachment.
- 5) If you are engraving a mug with a handle the two drive wheels can be reduced in width by removing the two thumbscrews on the inside of each wheel.

ARTWORK LAYOUT

- 1) There are no special requirements for laying out jobs for the rotary. The left margin of your job layout corresponds with the left edge of the fixture. If you place your work at the top edge of the job layout, engraving will take place without any rotation. If you bring the work an inch from the top of the page, the rotary will spin one inch prior to beginning to engrave.
- 2) Be aware of orientation. If you are doing glassware, you will need to rotate your artwork 90 degrees for it to read properly.
- 3) The rotary automatically adjusts for diameter.
- 4) If placement of your artwork is critical, place a couple layers of masking tape onto the area of the glass to be engraved and practice at high speed and low power to mark only the tape.

FOCUS WITH THE ROTARY

- 1) Place the focus gauge on the lens carriage. Then spin the knob to bring the part you are going to engrave into focus. It should just touch the focus gauge. If the item has a taper, pick an intermediate point between the highest and lowest points being engraved. Remove the gauge. Press "GO" and you are ready to engrave. Alternatively, you can use the optional auto focus.

ROTARY REMOVAL

- 1) Open the door.
- 2) Turn off the power to the Legend.
- 3) Depress the release tab on the rotary connector (front left inside corner) and unplug the connector.
- 4) Remove the rotary attachment.

***NOTE!** The rotary device only works in Raster mode.

AIR ASSIST OPTION

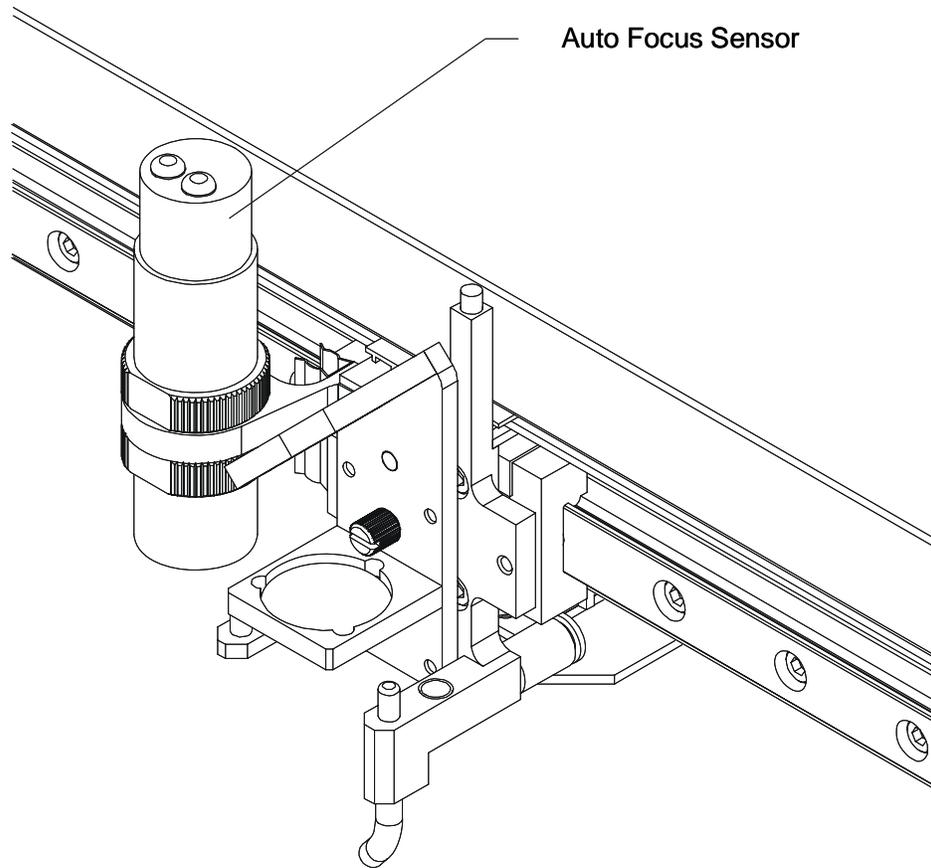
The air assist option allows for deeper engraving and cutting than would otherwise be possible. The air assist also carries away materials that might combust at the point of engraving. Generally, compressed air at 20 PSI is adequate. If for any reason you use something other than air, be sure to ensure adequate ventilation.

INSTALLATION

The air assist is a factory-installed option, and will be present on your machine when it is delivered. You will need to locate the air compressor that shipped with the machine and connect it. The connection point to the Legend from the compressor is on the back panel. The Legend uses a ¼" rigid plastic quick release connector. Simply push in the supply hose from the compressor and it is attached. You will need to plug the compressor into a wall plug for power. Please verify the voltage listed on the compressor matches your building power.

In the upper right corner of the engraving cavity there is a flow control valve that adjusts the air volume flowing through the line. *Ensure that this valve is open*, and that adequate air is flowing. Adequate airflow is somewhat subjective, but experimenting by feel and then watching the debris movement to the exhaust vent during engraving should allow for proper adjustment of the airflow.

In the "OPTIONS" menu in the engraver you can set when the air assist will turn on. *You can select Off, On, Raster Only, or Vector Only.*



AUTO FOCUS OPTION

The auto focus system on the Legend uses an ultrasonic beam to determine the proper distance for the work to be from the focus lens. The beam is stable and accurate, and can be used to focus on almost any surface. The auto focus must be enabled in the “OPTIONS” menu on the engraver. The “OPTIONS” menu is at the top center of the display when you turn your machine on.

Do not enable the auto focus option unless your machine is actually equipped with the auto focus sensor. Erratic operation will result.

Once you have enabled the option in the Legend, you can use the auto focus by clicking on the auto focus box in the print driver when you are ready to send the Legend a job. The auto focus can be turned off for a given job by deselecting auto focus in the print driver, or by turning the option off with the menu control.

The auto focus sensor works with the 1.5 inch, 2.0 inch and 2.5 inch lenses only. Other lenses require manual focus.

13) MATERIAL SUPPLIERS

The following list contains supplier information for materials typically used with your legend machine.

LASER ENGRAVABLE PRODUCTS (WEBSITE)

Laserbits.com

ACRYLIC

Acrylic Idea Factory

6669-C Peachtree Industrial Blvd.
Norcross, GA 30092
Phone: 800-543-9253
Fax: (770) 447-1113

LASER ENGRAVABLE COATED METALS

Identification Plates, Inc.

1555 High Point Drive
Mesquite, TX 75149-9009
Phone: 800-395-2570
Fax: (972) 216-1555

Victory

1820 N. Major Avenue
Chicago, IL 60639
Phone: 800-327-5578
Fax: (773) 637-7799

R. S. Owens & Co.

5535 North Lynch Avenue
Chicago, IL 60630
Phone: 800-282-6200

PRESSBOARD PLAQUES - MELAMINE

Quail Industries

300 Fallon Road
Hollister, CA 95023
Phone: 800-232-1031
Fax: (831) 636-1033

WALNUT PLAQUES & SPECIALTY WOOD PRODUCTS

Colorado Heirloom

333 E. 4th Street
Loveland, CO 80537
Phone: (970) 667-4222
Fax: (970) 667-8880

Kentucky Woodcrafts Co.

P.O. Box 220
McKee Industrial Park
McKee, KY 40447
Phone: 800-354-0196
Fax: (606) 287-8047

Lee's Wood Products

31 Smithers Street
P.O. Box 159
Rocky Mount, VA 24151
Phone: 800-552-5337
Fax: (540) 483-4645

Stanton Manufacturing

Lake Road 54-15
Lake Ozark, MO 65049
573-365-2441

MIRRORED ACRYLIC

Alenite Dodge
5750 W. Bloomingdale Avenue
Chicago, IL 60639
800-227-2440

CORIAN OR FOUNTAINHEAD - SYNTHETIC MARBLE

Johnson Plastics
9240 Grand Avenue South
Minneapolis, MN 55420-3604
Phone: 800-869-7800
Fax: (612) 888-4997

ENGRAVABLE PLASTICS

Innovative Plastics Inc.
P.O. Box 7065
Alogonquin, IL 60102
Phone: (815) 477-0778
Fax: (815) 477-1210

Johnson Plastics
9240 Grand Avenue South
Minneapolis, MN 55420-3604
Phone: 800-869-7800 - Customer Service
Fax: (612) 888-4997

FLAT GLASS

Gold Coast Graphics
15841 Graham Street
Huntington Beach, CA 92649
888-733-0061

PEN & PENCIL SETS

IMARK Pen Co.
3008 Pleasant Valley Lane
Arlington, TX 76015
Phone: (817) 465-6681
Fax: (817) 465-7411

RUBBER STAMP MATERIAL

Stewart Superior
1800 W. Larchmont Avenue
Chicago, IL 60613-2496
Phone: 800-621-1205

14) IN CASE OF DIFFICULTY

AVOIDING COMMON PRINT PROBLEMS:

Your Legend will begin to engrave as soon as the engraver has received the first line of data from the computer. This has the advantage of reducing the total time required for engraving, as the machine is not idle while the job is being loaded.

Printing problems are normally related to stopping, resetting or trying to repeat a job before the computer has been allowed enough time to transmit the entire job. If you do interrupt a job, whatever was left of the job you interrupted will be the first thing the computer will send when you press GO on the engraver, unless you take precautions to clear it out. To avoid most common print problems, **ALWAYS** double click on the Legend printer icon (under settings, printers) to check for partial jobs if you interrupt a job in progress. They can then be canceled or deleted with the pull down menus.

Problem: Engraver will not vector.

Solution:

- Please verify that the print driver is set to “vector” or “combined”.
- Verify that your artwork is correct for vectoring.
 - Scanned images will not vector.
 - Filled or solid images will not vector (outlines only).
 - If you are using Corel 3.0 or Corel 5.0, verify that line width is .007 or less.
 - If you are using Corel 6.0 or Corel 7.0, the line width is DPI dependent.
 - If you are vectoring at 600 DPI, then your line width must be .001.
 - If you are vectoring at 300 DPI, then your line width must be .003.

Problem: Engraver beeps and displays “IDLE” but no engraving took place.

Solution:

- Please verify that the page size in your drawing program is the same as the piece size in the print driver. If you are still experiencing the same problem, you will need to go into Windows Setup and verify page size. Click on Start, move up to Setting and click on Printers. Highlight proper printer then click on File, Properties, Details, and Setup. Verify the page size there and change if needed. Assure that the “Measurement System” in Windows is set to “U.S.”. To accomplish this click on “Start”, “Control Panel”, “Regional Settings”, “Number”.
- Verify that your artwork is as you intended. Some programs have a “wire frame” preview that won’t remind you that you are using white letters on a white background.

Problem: Will not print text or text does not print correctly.

Solution:

- Some operations with Text in some versions of CorelDRAW require the text to be converted to curves. This command is located in one of the pull down menus.

Problem: Engraving appears weak.

Solution:

- All mirrors and lens need to be cleaned and inspected for damage. See Section 7 of the manual for instructions. If you are unsure of the location of all of the mirrors on your engraver, please contact Technical Support.
- Verify that the lens is in correct focus.
- Verify correct speed and power settings for the type of material that you are engraving.

Problem: No laser beam but the engraver appears to be running normally.

Solution:

- Verify focus is set properly.
- Verify power and speed settings are appropriate.

Problem: Scanned images will not print or will not print correctly.

Solution:

- If you are using Corel 3.0 or 5.0, do not rotate your image. Rotate the artwork before you scan it.
- If you are using Corel 5.0, verify that it is version G1.
To do this click on “Help” in Corel 5.0 then click on “About CorelDraw”. If it is not revision G1, then contact Corel for the free upgrade. Be prepared to supply Corel with your software serial number.
If you are using Corel 6.0 or 7.0, there are three settings in Corel that require the proper setting. Put some type of design on your screen, a basic square will do. Then follow the instructions below.
Click on:
 - File
 - Print
 - Options
 - Then “Options” page
 - Then under “Special Settings” you will find the choice of “Options” and “Setting”.
 1. First find the option “Bitmap Printing”
Set it to “Output Entire Bitmap”
 2. Then find the option “Driver Banding”
Set it to “Send Bands to Driver”
 3. Then find the option “Text Output Method”
Set it to “All Text as Graphics”
- Verify that Corel 6.0 is version .176; follow the instructions above for verification and updates.

Problem: Inadequate Exhaust.

Solution:

- 1) The closer the blower is to the machine the better exhaust you will receive.
- 2) If you are using flex hose, do not bundle up the excess. Stretch out the flex hose and use only what you need.
- 3) Clean your exhaust system on a regular basis including engraver and blower. Use a bottlebrush and a vacuum on the areas where the exhaust buildup accumulates.

Problem: Engraver will not power up. Nothing transpires when engraver is turned on.

Solution:

- 1) Verify there is power being supplied to the engraver, that your outlet is in good working condition and that the engraver is actually plugged in.
- 2) Check to make sure the carriage can be moved freely with the power off. If the engraver can't find the home position, it will not power up properly.

Problem: Poor engraving quality.

Solution:

- 1) If you feel you are not getting the depth that you once were, this is probably a maintenance issue. See the maintenance section (Section 7) for instructions on cleaning the optics. If you are not sure of the location of all of your mirrors, contact Epilog.
- 2) If you are experiencing a blurry or erratic image, check to make sure you are in focus and all optics are clean.
- 3) If you are experiencing a double image problem or any other quality issue, it is best to run a sample of what the machine is doing and send it to Epilog attention Technical Support. Please include a letter stating the configuration of your machine along with speed and power settings of the sample you ran and any other pertinent information.

Problem: Image at the wrong location on the work piece.

Solution:

- 1) Verify that the page size in Corel does not exceed the maximum engravable area of the machine.
- 2) Verify that the page size in Corel matches the piece size in Print Setup. If you have a page size of 2"X3" and a piece size in Print Setup of 24 X 18", then it will place the 2 X 3" in the center of the 24 X 18" area.
- 3) If you see that the image is constantly off in one direction, you will need to reset the "home position" on the machine. Please call technical support for instructions.

Problem: LCD display is malfunctioning.

Solution:

- Verify that the engraver is still engraving. If the engraver is still operating, shut the engraver off and verify the ribbon cable is connected to the LCD display on the backside of the display. If the ribbon cable is properly connected, then contact Epilog for replacement.

Problem: Fan Malfunction.

Solution:

- 1) Verify that there is nothing obstructing the rotation of the fan.
- 2) Verify the fan is clean. Using a vacuum should clean the fan adequately.
- 3) Verify the connector is still connected.
- 4) If need be contact Epilog for replacement.

Problem: Table will not move.

Solution:

- 1) Verify that there is nothing obstructing the travel of the table.
- 2) Attempt to manual focus by pushing the Focus button and turn the round knob.
- 3) If you are still experiencing problems, contact Epilog Technical Support.

Problem: Auto focus is out of focus or will not operate properly.

Solution:

- Clean the bottom surface of the focus block. This cover should be cleaned with Window cleaner or water. Do not use acetone or alcohol.

Problem: Position Error displayed on LCD front console.

Solution:

- If you receive a Position Error on your display, the engraver is informing you that it has lost its correct positioning. Power off engraver and verify there is nothing obstructing the travel of the carriage both left to right and front to back. With the engraver shut off, move the carriage with your hand in all directions. The carriage should travel quite freely. With the engraver on, the carriage should resist you trying to move it. It will still move if you force it (please do not) but it will resist. Notify Technical Support if you are in need of assistance.

Problem: Extreme right side of graphic is missing.

Solution:

- Check the printer driver by going into "Printer Setup".
- Make sure you have the Epilog Legend print driver selected.

Problem: Table does not maintain a consistent level with the carriage. A symptom of this problem is that the depth of engraving starts out uniform and correct, but then varies either on the right side or at the bottom.

Solution:

- At the home position, put on your focus gauge and manually raise the table ("Focus" key and rotate knob clockwise) to where it just touches the gauge. Shut off the machine and with your hand, move the carriage to each of the other three corners of the table. The focus gauge should just touch each of the corners as it did in the starting (home) position. If there is a variance, the table needs to be adjusted. Contact Epilog for the correct procedure.

Problem: Computer error or print error message (such as: "There was an error writing to LPT1...") appears on your computer screen.

Solution:

- 1) Verify that the Legend is READY (press the "GO" key).
- 2) Is the printer cable connected correctly? Review the hookup configuration.
- 3) If you have multiple LPT printer ports, make sure you are printing with the one connected to the engraver.
- 4) Always delete any print job that did not transmit properly. Do not leave part of the design waiting for transmission. Sending another job with one waiting in the print queue will complicate matters.
- 5) Any other error reported to your computer screen is going to be an internal computer error. There is either a problem with the computer's hardware and/or software. Contact a reputable computer representative for assistance.

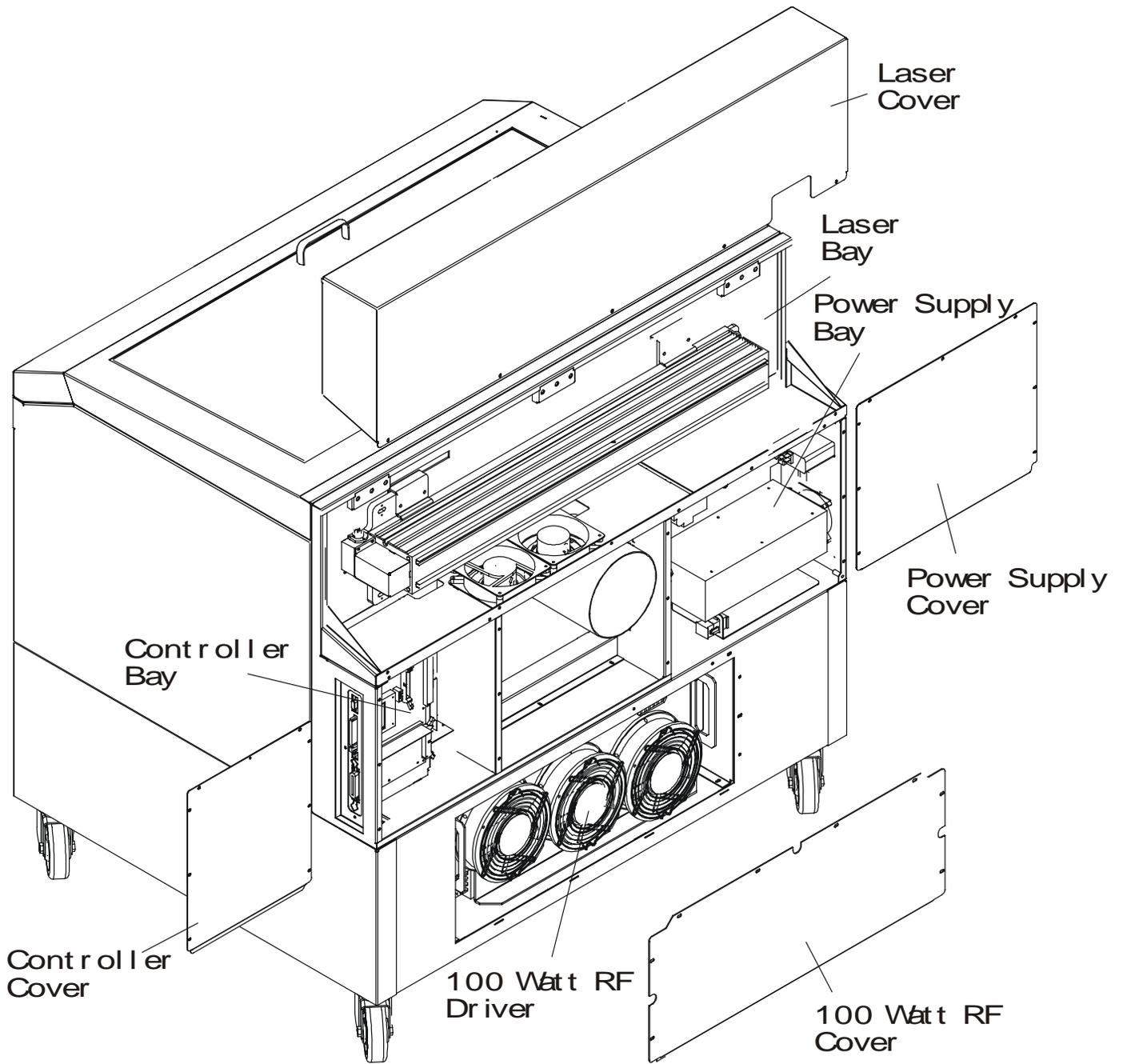
15) SERVICING THE LEGEND

The Legend has been designed so that the owner of the equipment can do most servicing. Most of the major components are modular, and can be replaced with a phillips head screwdriver or allen wrench.



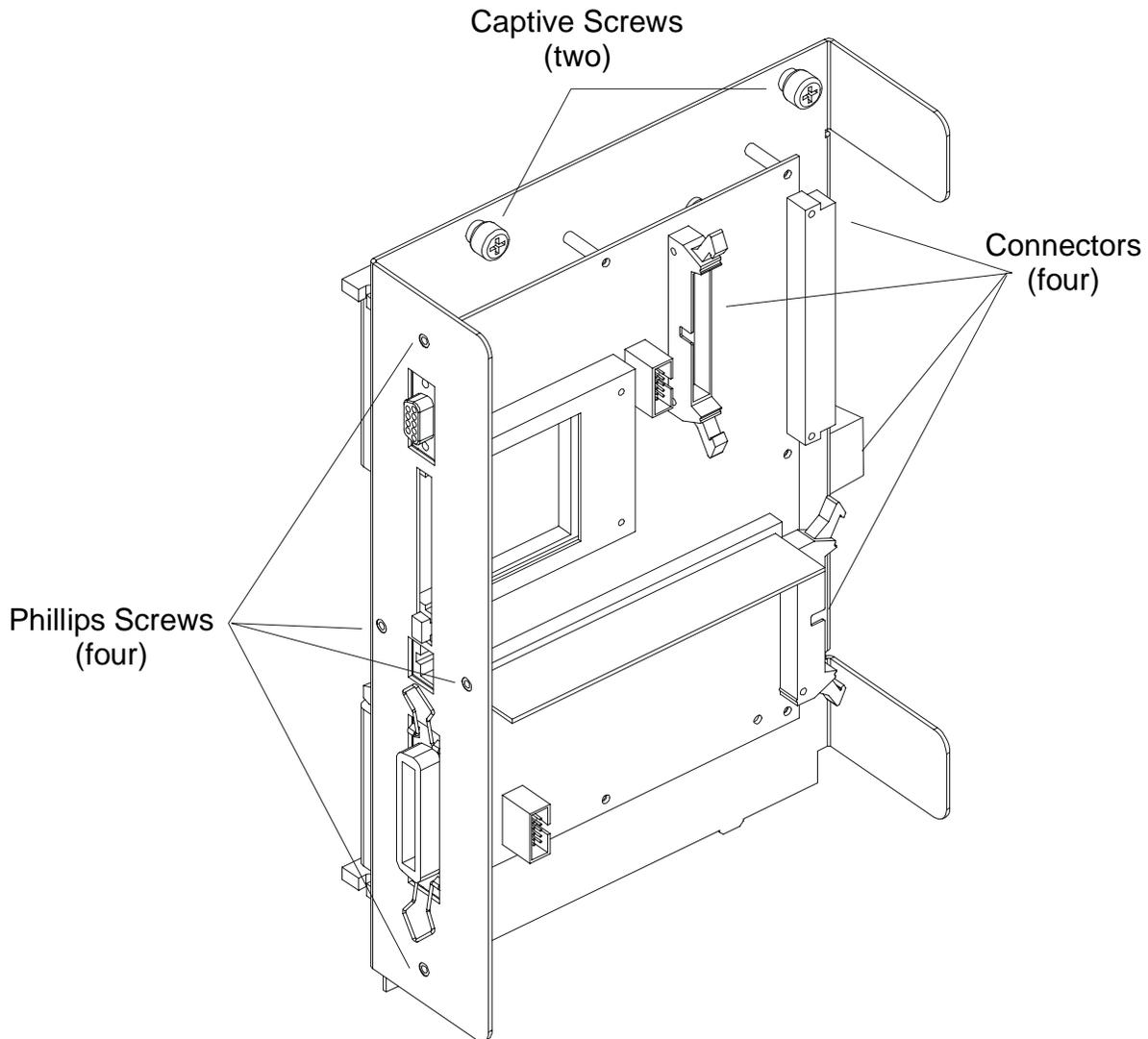
WARNING! Any servicing of the equipment should be done with the power cord disconnected from the machine. **Injury or death may occur if you attempt to service the machine with power connected.** The machine must be unplugged from the wall socket providing electrical power. See the Diagram on the next page for the location of the modular assemblies.

SERVICE MODULE LOCATION DIAGRAM



CONTROLLER

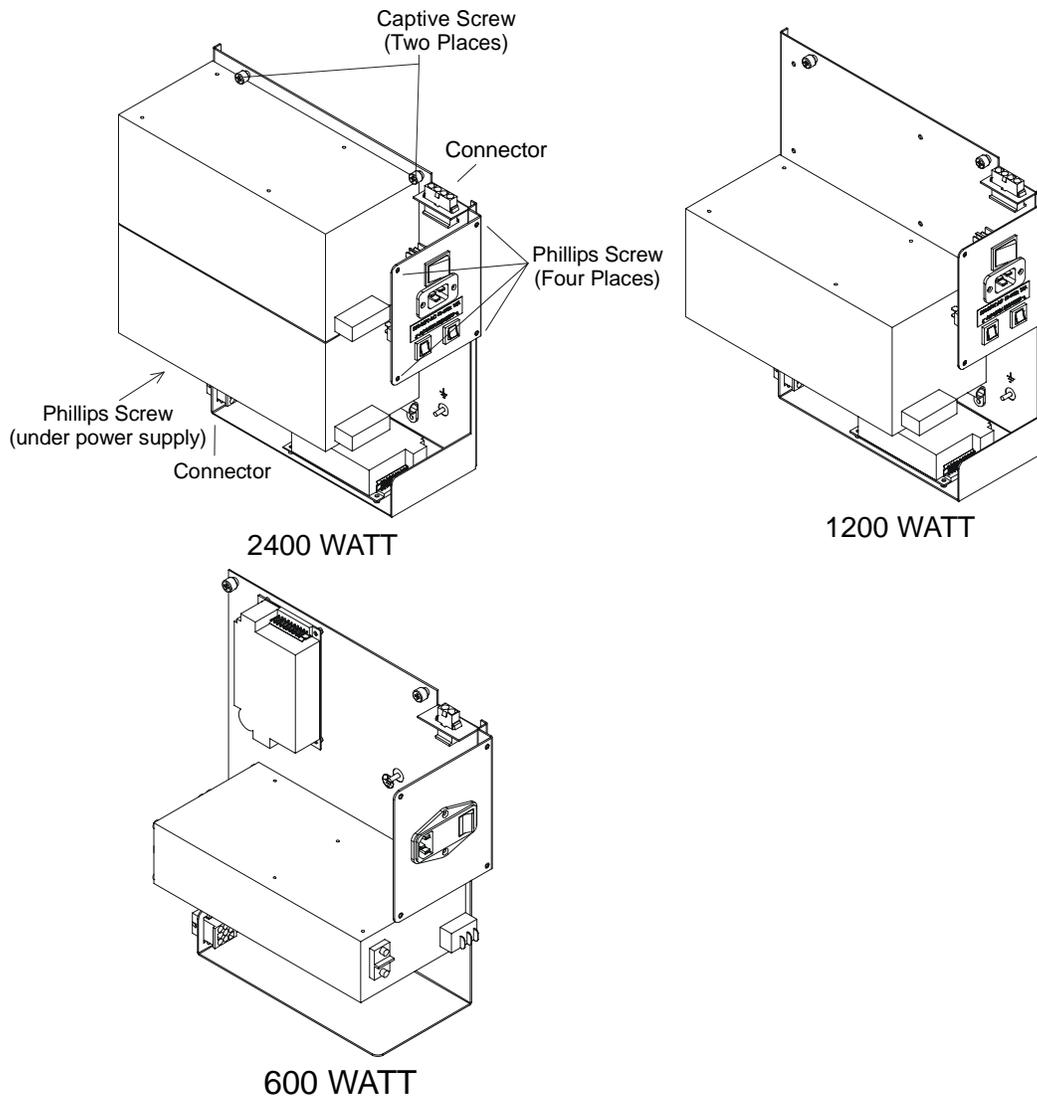
The controller (part #LM1) is located in the controller bay, and is the main electronic component module for the Legend, see diagram on page 61. To remove and/or service this module, first turn the machine off and unplug the power cord from the machine or from the wall. Demate the four connectors shown in the diagram below. Then remove the screws shown in the diagram. The captive screws are inside the machine, and the four Phillips screws are on the outside. The assembly can now be lifted up and out of the machine. Then install the replacement. Please be careful to make sure all the connectors are fully seated. Please do not forget to return the failed component to Epilog.



POWER SUPPLY

The power supply (part #LM2-600/2-1200/2-2400) is located in the power supply bay, see diagram on page 61. To remove and/or service this module, first turn the machine off and unplug the power cord from the machine or from the wall. There are three versions of the power module. They have different capacities. Standing at the rear of the machine, remove the plate on the lower right corner. It is held in place with phillips head screws. Also remove the laser cover, which is the cover across the top of the cabinet, see diagram on page 58. The laser cover has a connector that must be demated. Press on the tab to release it.

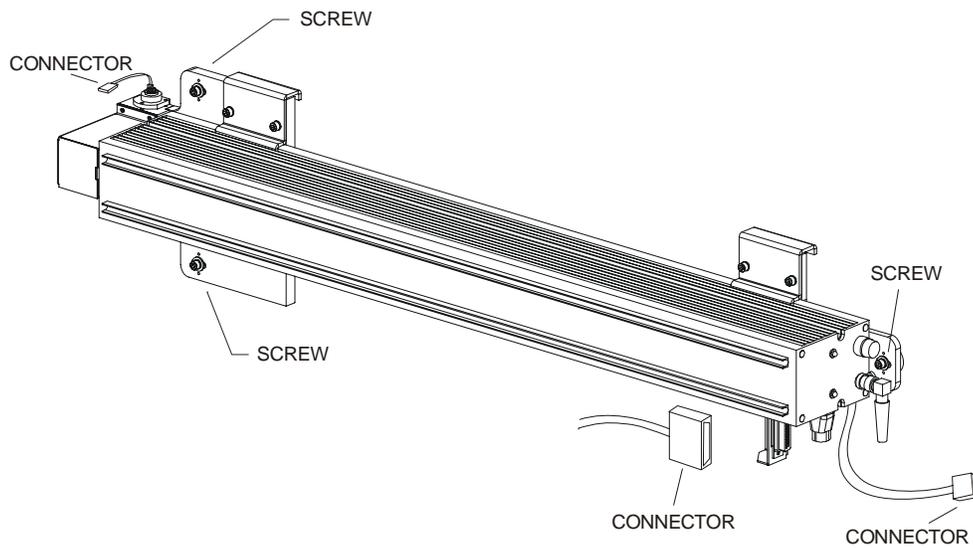
To remove the power module, loosen and remove the four phillips head screws on the outside of the machine shown in the drawing below. Demate the two connectors shown in the drawing. Then loosen the two captive screws across the top of the module. Remove one final screw located above and to the left of the bottom connector. The power module can now be removed. Slide it towards the center of the machine and lift it clear. Then install the replacement. Please remember to return the failed component to Epilog.



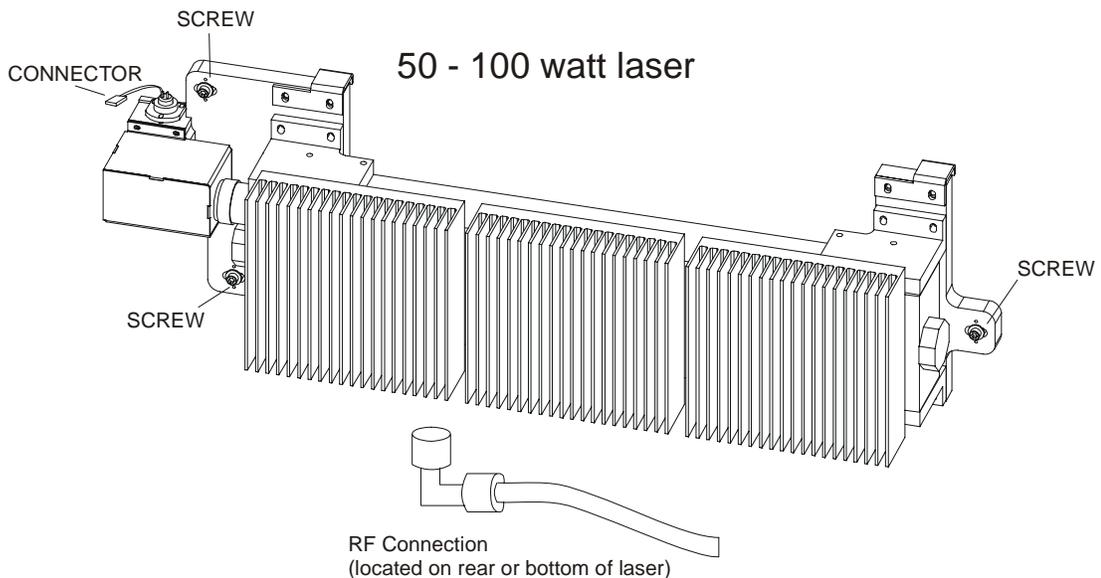
LASER MODULE

The laser module for the Legend (part #LM3-25/3-30/3-35/4-60/4-80/4-100) is located in the laser bay, see diagram on page 61. To remove and/or service this module, turn the machine off and unplug the power cord from the machine. Remove the laser cover. The cover is secured with four or five Phillips head screws along the lower edge of the cover. Once the cover is free, there is a connector under the cover that you will need to disconnect before you can set the cover aside. The laser on your machine will resemble one of the two shown in the drawing below. There are differences in appearance that do not effect servicing. First remove the electrical connectors, then the three allen head screws shown in the drawings. The RF connection on the 50 - 100 watt lasers can only be removed once the laser is lifted out of the machine. Once the screws are free, lift the laser off the hangers and it should pull free (except for the RF connection, which should be unscrewed at this time).

25 - 40 watt laser



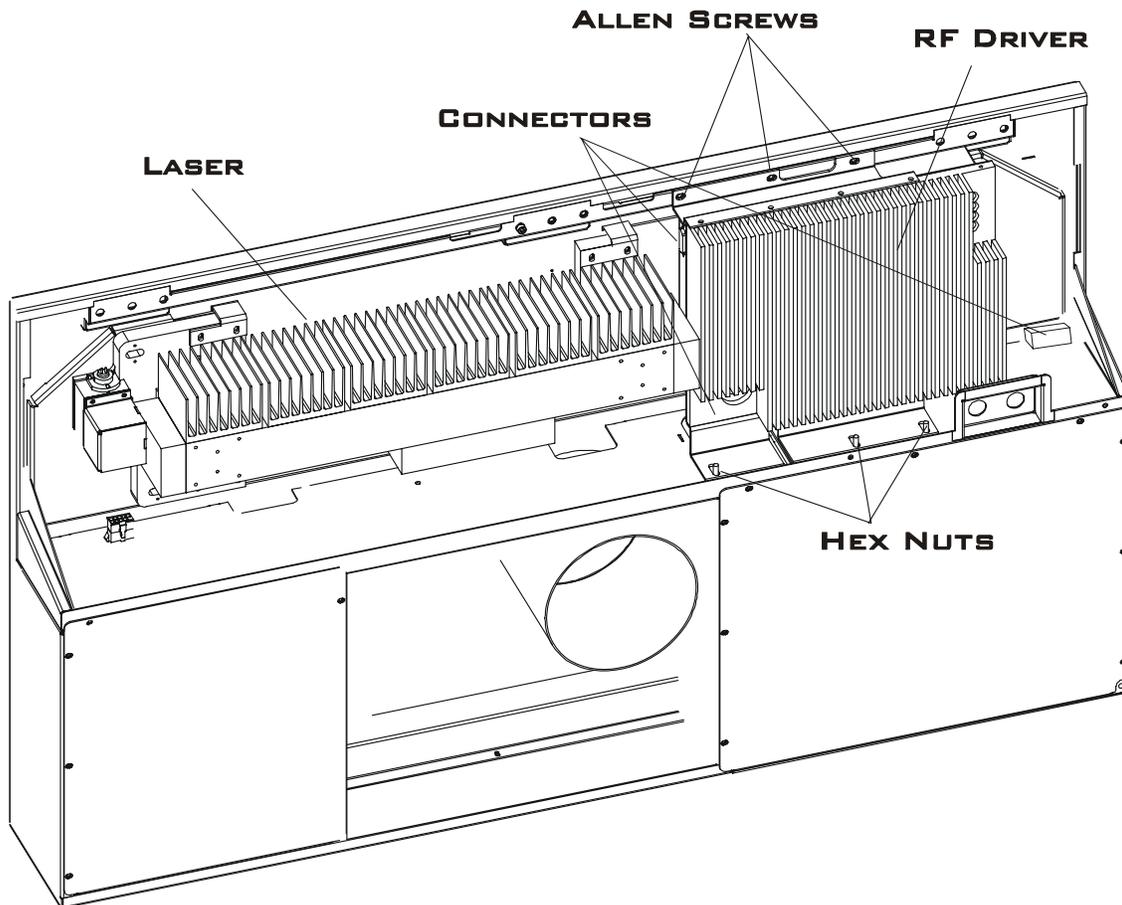
50 - 100 watt laser



RF MODULE

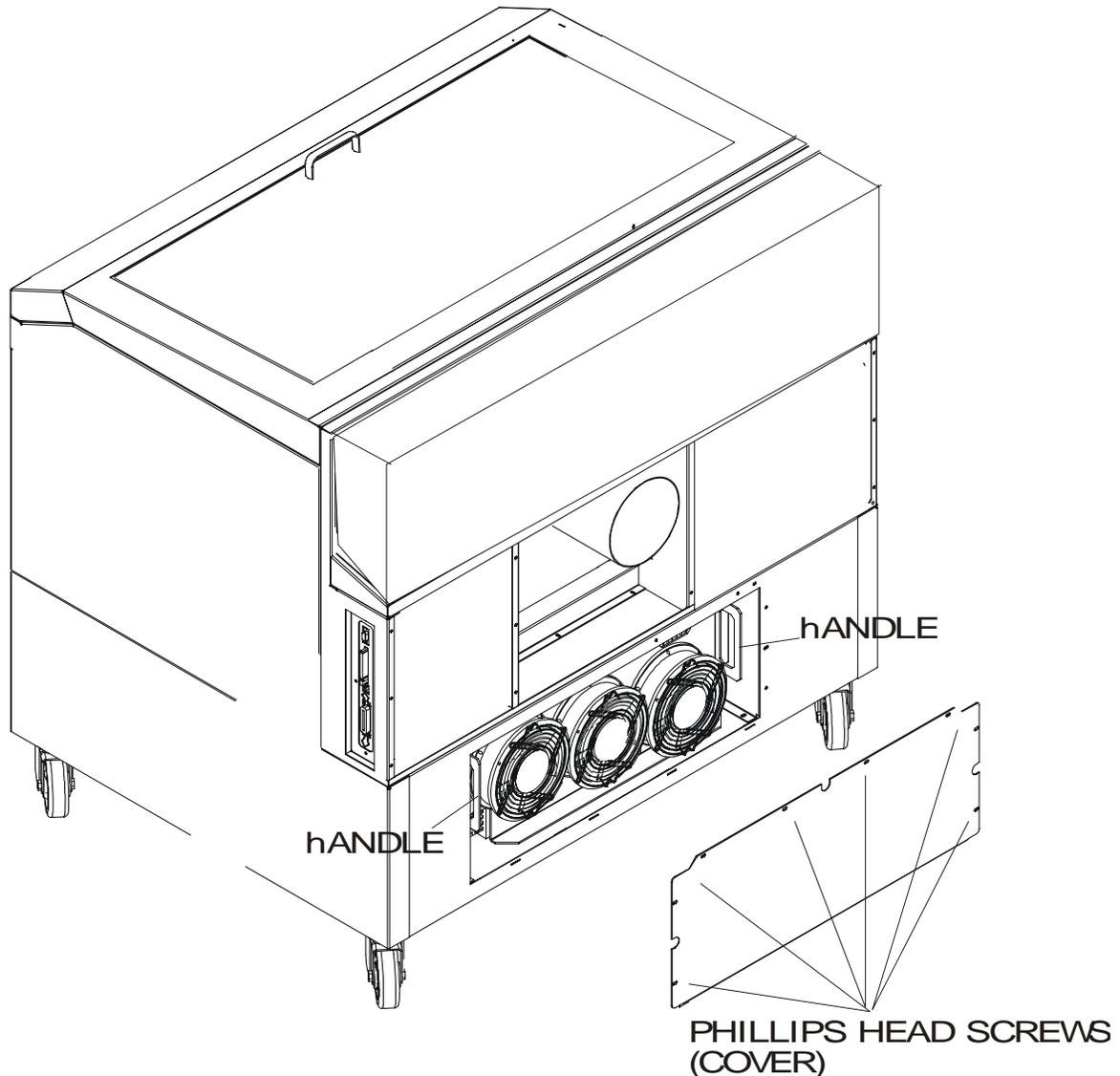
The 50 and 100 watt laser systems use lasers with separate RF drivers. This is done for performance reasons, to keep the heat generated by the RF away from the laser itself.

50 watt air cooled configuration



The RF driver for the 50 watt is located to the right of the laser, under the laser cover. To service the RF, remove the laser cover. The cover is held in place with four or five phillips head screws. The RF is held in place by three or four Allen head screws on the top, and three or four hex nuts on the bottom as shown in the following diagram. You will also need to demate the power, control and RF connectors shown in the drawing.

100 WATT AIR COOLED CONFIGURATION



The RF driver for the 100 watt is located on the bottom of the machine, in the base pedestal. To service the RF, first remove the cover. The cover is held in place with phillips head screws. The RF is held in place by four large phillips head screws. They are located two per side, just inside the handles shown in the drawing. The unit can now be pulled partially out of the machine so the electrical connections can be demated. There are three of them.

KEYBOARD/DISPLAY

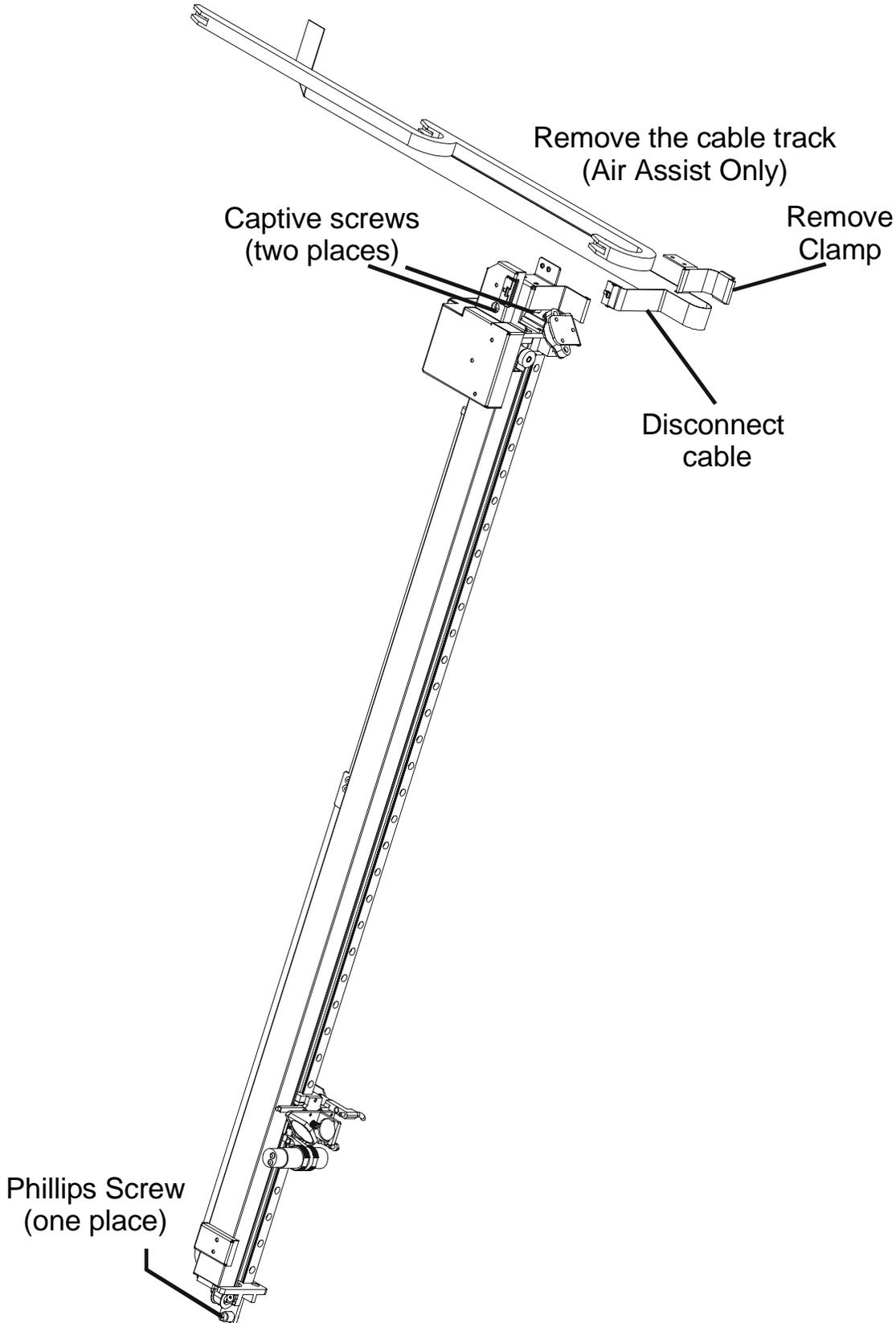
The keyboard/display module for the Legend (part #LM5) is located on the cover of the Legend. To remove/service this module, first turn the machine off and unplug the power cord from the machine or from the wall. Open the large door. Remove the four nuts holding the metal cover over the keyboard/display. Remove the cover. The keyboard is now loose, and should be supported with a free hand. On the right edge of the keyboard there is a flat ribbon cable. Push the "ears" on the connector away from each other, and the connector should back out far enough to be easily removed. The keyboard will now slide off the four mounting posts. Installation is the reverse of removal.

X BEAM

The X beam module for the Legend (part #LM6-32) is located inside the Legend cabinet. To remove/service this module, first, if you have not already done so, turn the machine off and unplug the power cord from the machine or from the wall. Open the large door, and gently pull the beam forward until it is a comfortable reach. Loosen the phillips head screw on the left of the beam, and the two captive screws on the right of the beam shown in the drawing on the next page. The captive screws have a Phillips head, and are taller than "normal" screws. Then disconnect the white flat cable from the right end of the beam. There is a small tab on the top center of the connector that needs to be depressed to allow the cable to be removed. The clamp, holding the cable down, needs to be removed as well. Installation of the new beam is the reverse of the removal. Please be careful of the mirror mount on the right side of the beam. The mirror is prealigned, and alignment will be lost if you bump it hard enough.

When installing the new beam, please start all three screws carefully prior to tightening any of them.

REPLACING THE BEAM ASSEMBLY



16) UPGRADING THE OPERATIONAL FIRMWARE

Upgrading Your Legend Using FlashMaster Software

FlashMaster 1.00.00.02

4/28/00

FlashMaster is a software application that enables the user to download new releases of the operational firmware to the Legend. Users can use FlashMaster to re-program the Legend via either the parallel port or the network connection. The user will be periodically supplied with updates to the Legend when new features become available or when enhancements to existing firmware are released. FlashMaster allows the user to incorporate these features into their own machines at their own convenience.

FlashMaster and Legend upgrades will be supplied either on standard 3.5" diskettes or via email.

Upgrading your Legend for the first time is a three-step process:

1. Install FlashMaster onto your computer – FlashMaster is the program that allows you to download the upgrades from your computer to your Legend.
2. Install new Legend firmware onto your computer – The new Legend firmware is sent to you as a compressed file that needs to be extracted (decompressed) onto your hard drive before you can download it to your Legend.
3. Install the new firmware from your computer to your Legend – You will use FlashMaster to download the new firmware to your Legend.

*** NOTE: If you already have FlashMaster installed on your computer you can skip step one.**

INSTALLING FLASHMASTER ONTO YOUR COMPUTER.

From Diskette: Use Windows Explorer or the Run command to start the FlashMaster Setup.exe program from the disk labeled FlashMaster. Move through the install dialogs to completion and then FlashMaster is ready to use. You can keep FlashMaster on your computer for future use.

Via Email: Download all of the FlashMaster files to a single 3.5" diskette. Label and save this diskette for your files. Install from diskette as per the instructions above.

INSTALLING NEW LEGEND FIRMWARE ONTO YOUR COMPUTER

From Diskette: Use Windows Explorer or the Run command to access the Legend firmware upgrade file. Select the Legendxxx.exe file (where xxx is the release number) that is found on the Legend diskette. Click

on “Unzip” to extract the file. By default, the archive is extracted to the users default temporary directory – normally C:\Windows\Temp. Once the firmware upgrade file is extracted, continue on to step three to install the new firmware release onto your Legend laser.

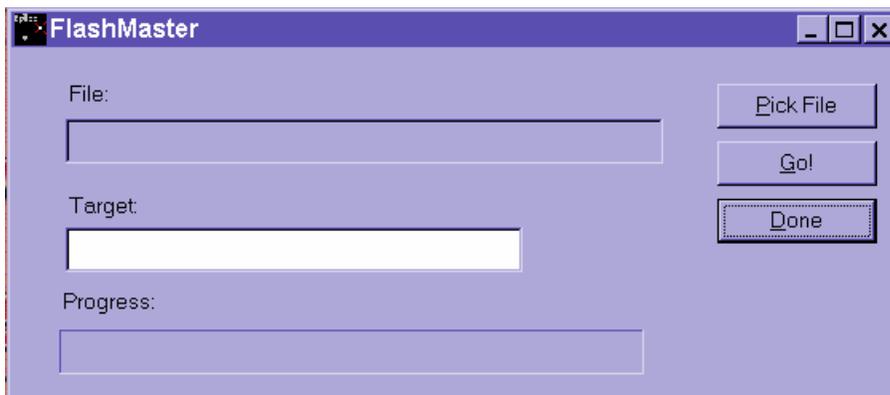
Via Email: Download the firmware upgrade file to a standard 3.5” diskette. Install from diskette as per the instructions above.

***NOTE:** - It is extremely important that you Unzip the Legendxxx.exe file before trying to upgrade. The Unzip process will convert the Legendxxx.exe file into a file with a .hex extension. Use only the file with the .hex extension to upgrade your Legend.

INSTALLING NEW FIRMWARE FROM YOUR COMPUTER TO YOUR LEGEND

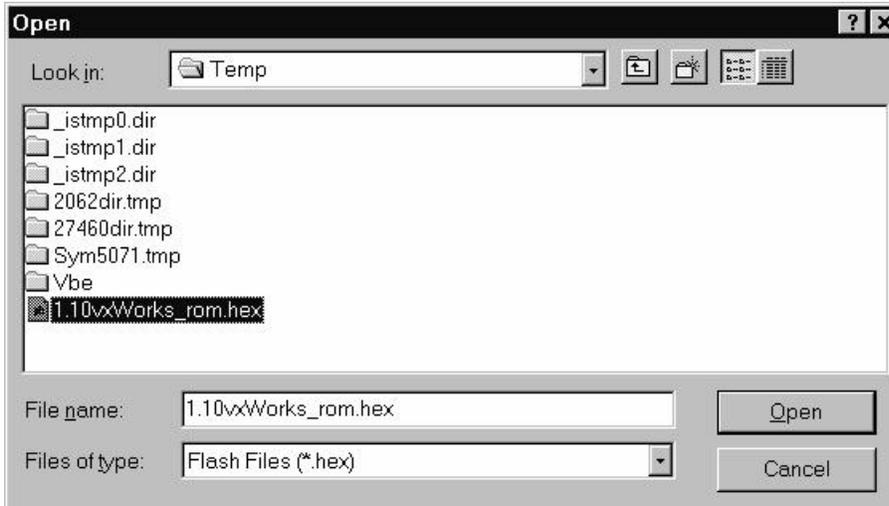
Prior to starting FlashMaster, the user should ensure that the Legend is turned on and that it is connected to the computer by either the parallel port or network cable.

FlashMaster is started by selecting the Start/Programs/Epilog/FlashMaster menu item from the taskbar in Windows 98/95/NT/2000. Once started, FlashMaster appears:



Click “Pick File”.

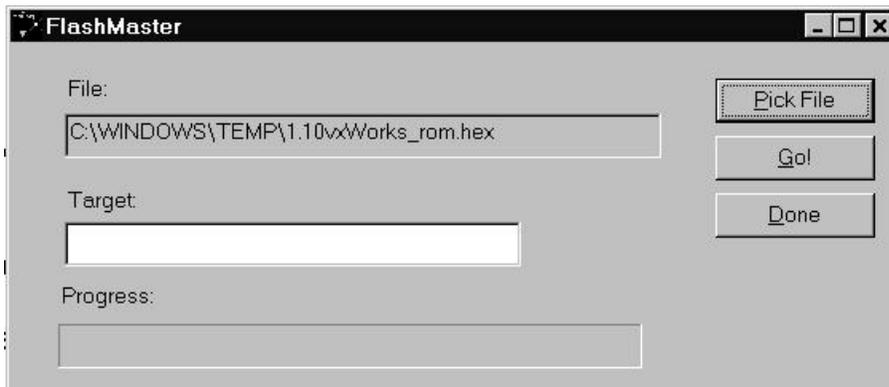
Navigate through the “Open” window to the C:\Windows\Temp folder. The file that was extracted in step 2 above will be listed in this directory as a vxworks_rom.hex file.



Highlight the appropriate vxworks.hex file then click the “Open” button.

***NOTE - It is extremely important that you choose the proper file with a .hex extension. Sending the wrong file to your Legend will render the upgrade unsuccessful.**

The file will appear in FlashMaster:



If the user is using the LPT1 parallel port, they may just press ‘Go’ at this point. If the user is using another parallel port, they should enter it into the ‘Target’ field. ‘LPT2:’ and ‘LPT3:’, are both examples . The colon at the end of the port name is required.

If the user wishes to program the Legend over the network, the TCP/IP address of the Legend in the ‘Target’ field. Once the target is set, the ‘Go’ button can be pressed.

Sending the update to the Legend over the parallel port takes about 4-5 minutes. The computer and the Legend should not be disturbed during this time. On a Windows 95/98 computer the ‘Progress’ field will properly indicated the progress of sending the file over. On a Windows NT/2000 computer, the progress field will only indicate progress in sending to the spooler, which then in turn, sends to the Legend. When using a network to program the Legend, the progress indicator always shows actual progress, regardless of operating system. Sending over the network takes about 13-15 minutes, depending on network traffic. If the power fails

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or some other problem disconnects the computer from the Legend during the file sending operation, it can be re-tried, once the problem is corrected. If there is a sending problem, there will be an error indicator on the Legend front panel saying: **"Programming Receive Failure, please retry"**. If this is observed, reboot both the host computer (PC) and the Legend and try again. Once the file has been completely received by the Legend, it will begin the act of re-programming itself with the upgrade version of its firmware.

The front panel will say: **"Programming Machine DO NOT DISTURB"**

DO NOT POWER DOWN THE LEGEND DURING THIS TIME. If you lose power, or purposefully power down the Legend during this time, your controller board in the Legend will be ruined, and will have to be replaced. This operation will take about 90 seconds.

After programming is complete this message will appear: **"Programming Complete, please reboot"**

You may re-boot at this time and you will then have the new version of the Legend firmware installed in your Legend. There is a README file supplied with the Legend firmware update in the self-extracting archive. Please read it to get the latest information on Legend features and upgrades.

17) SPECIFICATIONS

LEGEND 32 SPECIFICATIONS

Working Area	32 x 20 in.	(single head)
	16 x 20 in.	(double head)
	30 x 20 in.	(double head disabled)
Electrical	100 – 240 VAC, 15 Amperes	(50 watts and under)
	auto detection on input voltage	
	208 – 240 VAC, 15 Amperes	(over 50 watts)

Cooling Requirements

Maximum ambient temperature is 85° F (27° C).

COMPATIBILITY

The Epilog Legend has been designed as an “open architecture” product. The Legend will work with many popular graphics, engineering and specialty software products. To benefit from all the functionality that was built into the Legend, a Windows based PC is recommended. The print driver that is shipped with the Legend offers a host of unique features, and only works with Windows based operating systems (non-Macintosh).

In addition to Windows based programs, the Legend can be used with many other programs that generate standard HPGL output.

RECOMMENDED COMPUTER

Pentium Microprocessor (400Mhz minimum) The faster the better.

64 MB RAM

One 3.5-inch 1.44MB floppy

4 GB Hard Drive (minimum)

Color Monitor

CD ROM Drive

Windows

CorelDRAW!

Mouse

SCANNER

Epilog recommends Hewlett Packard scanners. They are of excellent quality and reliability. Hand held “mouse” scanners do not provide the necessary accuracy and should not be used.

SOFTWARE

Epilog print driver requires Windows 95 or Windows 98.

In addition, an application program (graphics, CAD, etc.) is required. Epilog recommends Corel Draw Version 9.0. Other packages are available, but the technical support staff at Epilog may be less familiar with them and less able to help with questions. Check with Epilog if you have a question on compatibility.

ABOUT THE LASER

The Epilog Legend uses the latest technology, providing a powerful tool that is simple to setup and operate. The Legend can mark (engrave) and cut a variety of non-metallic materials.

The laser beam itself is invisible. The beam is about half the diameter of a #2 pencil. Unfocused, it will just make an ugly burn, leaving lots of charred material behind. The focus lens gives the beam an hourglass shape. At the center point the energy density is concentrated, allowing the very precise and clean material removal that is characteristic of laser engraving. The center of the hourglass is the “focal point”.

The laser beam path is completely enclosed within the Legend. Please do not disassemble or modify any of the covers or windows on the machine. If at any time you notice that the laser operates with a door or window open, please contact Epilog technical support immediately.

The Legend has two basic operating methods. For cutting (vector), the laser is driven along a path and the laser is left on all the time. The path could be the outline of a letter or a geometric shape like a circle. The

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laser will cut entirely through the material, separating the part from the background. For marking (engraving), the laser is swept across the work from left to right, and the laser is turned on and off at the correct points to produce the first line of the image. Then the carriage advances one line and the process is repeated, eventually assembling a full image.

Federal Communications Commission (FCC) Notice

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy; and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.