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Owner's Manual for EPILOG Radius Model 4000
Revision E, December 1998

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SECTION 1: GETTING STARTED

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

1) Remove it from the crate
2) Connect it to power and your computer (and the chiller for 50 & 100 watt)*
3) Connect the exhaust system*
4) Configure your computer

> *You may need a contractor to install the exhaust(all models) and the 208-240 volts (50 & 100 watt only). This must be done **_PRIOR_** to the arrival of the Epilog Installation technician.

UNPACKING YOUR MACHINE

1) Cut the strapping around the box, and remove it. Some machines will have additional boxes on top. Remove these.
2) Cut the tape on the top of the box. Open the flaps and _remove as much packing foam as you can_.
3) 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.
4) On the pallet (the wooden platform the machine is sitting on) locate the edge that is secured with two wing nuts. _Loosen and remove the wing nuts, and remove the wooden 2"x2"._
5) 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.
6) Locate the four wooden blocks located under the machine. The machine is supported by these blocks, and the blocks will need to be pulled out. With a friend, lift one side of the machine just high enougn to remove two of the blocks. Do the same with the other side to remove the remaining two blocks.
7) 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.
8) Open the door and cut the black plastic straps holding the cardboard accessory box to the table. _Remove the box._
9) Inside the cabinet, locate and remove _eleven ½" diameter RED shipping locks._ There are two on the left side of the carriage and one on the right. There are eight holding the table in place_._ Turn the screws counterclockwise to remove. Please save them.

CONNECTING POWER AND CONNECTING THE COMPUTER

1) Locate the _printer cable from your accessory kit._ The connection point on the Radius is on the back panel of the machine, on the right side. The connector is recessed in a small

rectangular cutout. *Mate the larger end of the printer cable to the Radius*. The connector can be connected only one way. Close the wire retainer clips around the ends of the cable.

2) Connect the other end of the cable to the LPT (parallel printer) connector on your computer.

25/30 WATT ONLY

1) *Locate the "Power" label on the back of the machine*. The label is located in the center of the back panel. The label indicates whether the machine is wired for 120 or 240 volts. *Please verify that the machine is the correct voltage for your building*. Do not proceed if the voltage is incorrect. Call Epilog technical support.

2) *Locate the power cord in the accessory kit*. One end will have the familiar three prong plug for a wall power outlet. Plug the other end into the power receptacle on the back panel of the Radius. The receptacle is located on a recessed panel in the center of the machine, below the voltage label.

3) Plug the machine into your wall power outlet, and *turn the machine on*. The power switch is on the front of the machine, lower right corner.

50 & 100 WATT ONLY

The Radius requires 208-240 VAC, single phase. Building wiring must be performed by a licensed electrician if not already available, and must be done prior to the arrival of the Epilog installation technician. Two 15 amp circuits must be provided. One for the Radius and one for the chiller. Each with a NEMA L6-15R receptacle (HUBBEL 4560 or equivalent)

1) *Unpack the chiller* by cutting the straps securing it to the pallet. Remove the packing material.

2) Lift the chiller off the pallet. The chiller is heavy, and at least two people will be required. Be careful not to lift beyond your ability, or to drop the chiller on a foot or toe.

3) *Locate the chiller hoses from your accessory kit*. There will be a bag with clear tubing and clamps.

4) *Roll the chiller along the left side (looking from the front) of the Radius*, with the chiller water connections facing the rear.

5) Slip two hose clamps onto the first hose, then *connect* one end to the *chiller "outlet"* and the other to the Radius "*coolant water in*". The water chiller connections on the Radius are located in a cutout on the rear corner of the machine. Push the hose all the way onto the barbs, and then *slide the clamps over the barbs and tighten them.*

6) *Repeat for the other hose*. These will be marked "inlet" on the chiller and "coolant water out" on the Radius.

7) Fill the chiller with tap water, remembering to secure the chiller's water cap.

8) Plug the chiller into one of the 208-240VAC single phase receptacles.

9) Turn the chiller on. Let the chiller water circulate through the hoses for one minute. Check for any leaks. If you notice any leaks, ***immediately TURN OFF then UNPLUG the chiller***. With the chiller unplugged, tighten the leaking fitting.

a) After the chiller has run for a minute without leaking, turn the chiller off and unplug it. Add additional water to the chiller to accommodate for the water that was used to fill the hoses and the laser tube. Secure the chiller's water cap and plug in the chiller.

b) The chiller temperature should be set at +/- 2 degrees C (+/- 5 degrees F) of the ambient air temperature in the room where the laser is operating. 20 degrees C (70 Degrees F) is a standard setting for many office/warehouse type environments where the laser is normally used. ***Proper chiller temperature setting is essential to preventing condensation and other damage to the laser***. The chiller manual describes how to properly set the chiller temperature and how to set the chiller for C or F settings.

10) Plug in and turn on the Radius. The Radius power switch is located on the front, lower right of the machine.

ALL MODELS

1) *Verify that the machine "beeps" and begins moving.* The lens carriage will slowly move into the home position, and the display will show the word *"OFFLINE*" if everything is okay.

2) *Press the "focus" key,* and with your finger *spin the black knob on the keyboard clockwise* until the *table is all the way up.* It will stop by itself at the limit of travel.

3) Reach under the table and *remove the two foam shipping supports.*

CONNECTING THE EXHAUST

The exhaust system should be installed by a contractor prior to the arrival of the Epilog installation technician.   The blower should be mounted outside your building for noise considerations. The blower should not be more than twenty feet from the Radius. You should provide a rigid, smooth 6" duct from the blower to the vicinity of the Radius. The Radius requires 400 CFM at 6" of pressure. Remember to put the blower switch in an obvious place

BLOWER

ROOF OR EXTERIOR WALL

6" METAL DUCT

6" TO 4" REDUCER

4" FLEX HOSE

7

RADIUS
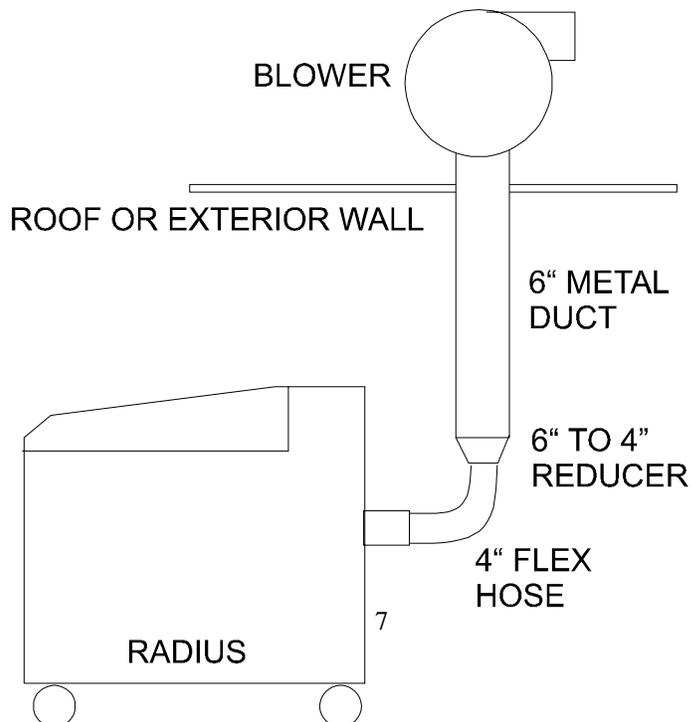
so it won't be forgotten. Please connect the blower as shown below. The blower can be purchased from Grainger's (stock # 7C183).

1) Locate the exhaust port connector in the accessory kit. It's a round port with a square flange, painted the same color as the base of the machine. On the rear of the machine, locate the four screws around the port. Remove them, place the exhaust connector so the screw holes align, and replace the four screws.
2) Using hose clamps, connect the supplied 4" flex hose to the exhaust port, and then to the exhaust system.

CONFIGURE YOUR COMPUTER

Included in the accessories kit is 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 driver. *Your computer must have Windows 95 or Windows 98 already installed.*

INSTALLING THE EPILOG RADIUS PRINT DRIVER

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", 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, then click on "OK".
9) Click on Radius under "Manufacturer's", then click on Radius Engraver, 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 Radius print driver is now installed.
13) Follow the above procedure to install the Radius Stamp driver.
14) It is recommended that you turn your computer off and restart it after you have installed a new print driver.

SPECIAL NOTE TO COREL 5.0 USERS! If you are using Corel version 5.0 you must perform the following steps:
a) Click on the "START" button at the bottom left of your screen.
b) Click on "SETTINGS"

c) Click on "CONTROL PANEL"

d) Click on "PRINTERS"

e) Double click on "RADIUS ENGRAVER"

f) Click on "PRINTER" in the menu bar

g) Click on "PROPERTIES"

h) Click on "DETAILS"

i) Click on "SETUP"

j) Set the "RESOLUTION" to 160 DPI

k) Set the "PIECE SIZE" to 24 Horizontal, 18 Vertical

l) Click "OKAY"

m) Click "OKAY" again, then exit the Printer windows

This procedure will allow Corel version 5.0 to print all resolutions offered in the Epilog Print Driver.

YOUR RADIUS LASER IS NOW READY FOR USE!

SECTION 2: SAFETY

LASER SAFETY

Epilog Radius Model 4000 Laser Engravers not equipped with the Laser Diode Pointer option are Class I laser products, as defined in 21 CFR 1040, the Federal Performance Standards for Light-Emitting Products. They are fully enclosed, with interlocked doors, and no special precautions are necessary to operate them safely. However, the operator should observe the following general precautions:

DO NOT disassemble the engraver or remove any of its protective covers.

DO NOT attempt to defeat the door and window interlocks.

Radius Models 4000 having the Laser Diode Pointer option are Class IIIa laser products. The output of the high-power engraving laser is fully contained, as in the model without the pointer, but the visible output beam of the pointer itself is accessible to the operator. While it 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 option 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.

To ensure safety, Epilog offers the following recommendations:

DO NOT disassemble the engraver or remove any of its protective covers.

DO NOT attempt to look directly into the beam of the Laser Diode Pointer.

DO NOT operate the Laser Diode Pointer without the engraver's focus lens in place. If the unfocused beam strikes a reflective surface, it could be directed out of the engraver's 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 Model 4000 laser engraver with Laser Diode Pointer option be performed in accordance with all applicable laws.

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 Radius Model 4000 Laser Engravers is potentially lethal and is fully contained within the cabinet.

DO NOT open the power inlet panel on the rear of the unit. There are no operator-serviceable components inside, and opening this cover will expose the operator to the engraver's AC input power.

DO NOT make or break electrical connections to the engraver system when the unit is turned on.

FIRE SAFETY.

Laser engravers 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 astonishingly easy to ignite a flame. Usually this is a simple "flare" of burning gases, issuing from the focused spot on the workpiece, which follows the moving spot and which extinguishes itself as soon as the laser beam is modulated off. But should the workpiece actually be set on fire, the fire must be extinguished by the operator at once, or the engraver will be seriously damaged or destroyed!

DO NOT operate the engraver in the presence of unnecessary combustible materials, explosives, or volatile solvents such as acetone, alcohol, or gasoline.

DO NOT let the engraver 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 engraver!

ALWAYS keep a properly-maintained and inspected fire extinguisher on hand. Epilog recommends a carbon-dioxide fire extinguisher. Epilog advises against dry-chemical fire extinguishers, because they discharge a corrosive powder which will severely damage the engraver.

SAFETY FEATURES AND REGULATORY COMPLIANCE.

Epilog has incorporated specific safety features into the Radius Model 4000 Laser Engravers in order to meet the requirements of 21 CFR 1040.10. These safety features are as follows:

A safety enclosure (cabinet) which fully encloses the engraving laser and its beam path.

Dual redundant interlock systems which turn off the engraving laser when either the cabinet door or window is opened.

An audible emission indication on units having the Laser Diode Pointer option. The engraver's beeper sounds every five seconds when the pointer is on.

21 CFR 1040.10 requires that certification, identification, and warning labels be placed on laser products. Reproductions (samples) of all such labels on the Radius Model 4000 Laser Engraver follow, with their locations specified:

1) Certification/Identification Label. This label is located on the right-hand side of the engraver's cabinet, at the top. The examples shown are for the Model 4000/25 product.

   a) Label for models without the Laser Diode Pointer option:

Epilog Corporation
400 Corporate Circle Suite M
Golden, Colorado 80401 USA

Model Number: 4000/25 Laser Engraver
Serial Number: 4025-970001
Date of Manufacture: July 1997

Class I Laser Product
This product complies with 21 CFR 1040.10
Made In USA

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   b) Label for models with the Laser Diode Pointer option:

```
Epilog Corporation
500 Corporate Circle  Suite L
Golden, Colorado  80401 USA

Model Number: 4000/25 Laser Engraver
With Laser Diode Pointer Option
Serial Number: 4025-980XXX
Date of Manufacture:  February 1998

Class IIIa Laser Product
This product complies with 21 CFR 1040.10
Made In USA
```

2) Non-interlocked Protective Housing Safety Label. This label is located on the steering mirror cover inside the laser bay at the rear of the cabinet, and also under the cover.

   a) Label for models without the Laser Diode Pointer option:

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

   b) Label for models with the Laser Diode Pointer option:

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

3) Defeatably-interlocked Protective Housing Safety Label. This label is located on the right side of the cabinet, below the access door. A special fixture is required to defeat the interlocks on the Model 4000 product.

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

4) Electrical Safety Label. This label is located on the power inlet panel on the rear of the cabinet.

DANGER

HIGH VOLTAGE INSIDE CABINET

**REFER SERVICING TO
QUALIFIED PERSONNEL**
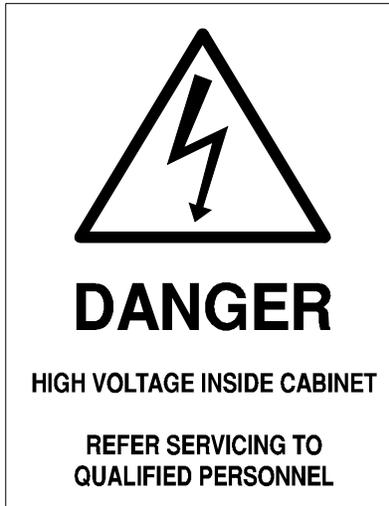
5) Radius Model 4000 Laser Engravers having the Laser Diode Pointer option bear two additional warning labels:

a) Class IIIa Warning Logotype. This label is located on the right-hand side of the engraver's cabinet, directly below the Certification/Identification label.

DANGER

**LASER RADIATION--AVOID
DIRECT EYE EXPOSURE**

**4 mW CW MAX
LASER DIODE, 630-680 nm**

CLASS IIIa LASER PRODUCT

b) Aperture Safety Label. This label is located inside the engraver's cabinet, at the right rear, above the aperture through which the engraving laser and Laser Diode Pointer beams enter the cabinet.

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

14
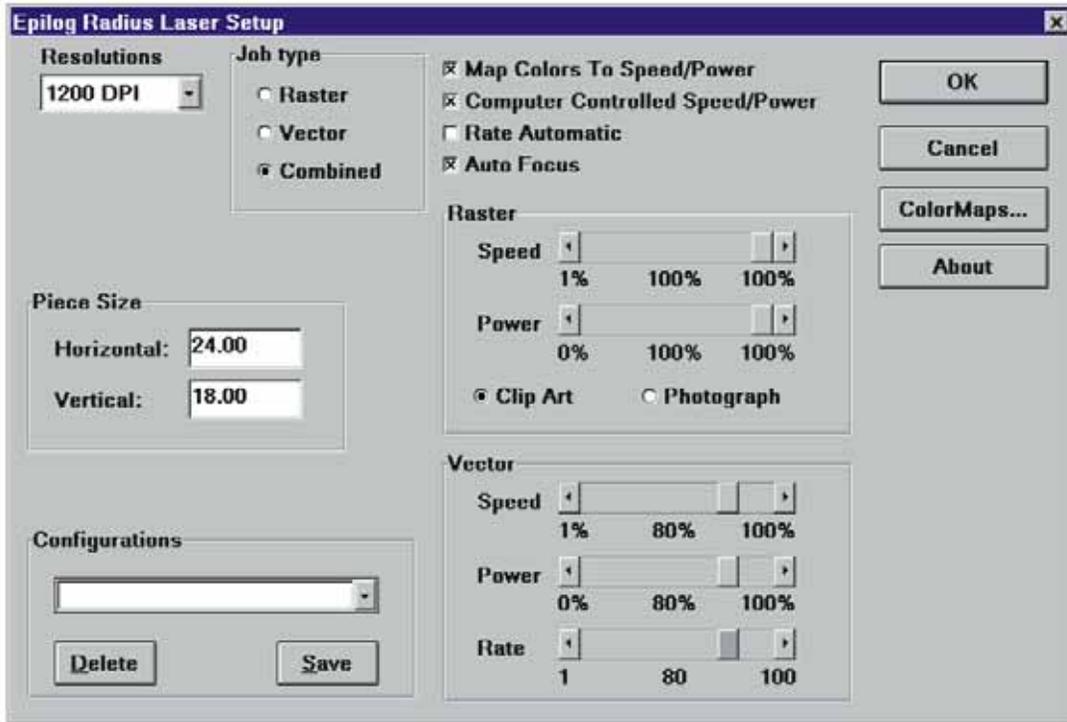
SECTION 3: USING THE EPILOG RADIUS PRINT DRIVER

The Epilog Radius print driver allows you to control the laser functions from your computer. The Print Driver Setup window is shown below.

RESOLUTION

Resolution determines how many cuts or lines per inch the machine will engrave. Available resolutions range from 160 to 1200 DPI. 300 is normally a minimum for production work. 500 or 600 would be used when quality is more critical. The greater the number of lines per inch, the greater the engraving time required.

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.

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 five of this manual.

Clip Art

The Clip Art setting is the default setting for raster engraving jobs. Use it for all engraving jobs that do not have photographs in the artwork. The Clip Art setting is ideal for all grey shades, and all clipart, including color clipart.

Photograph

The photograph setting should be selected when you are raster engraving scanned photographs. Epilog uses an error diffusion process in the print driver to greatly enhance the look of an engraved photograph. All **_black_** text and other scanned **_black & white images_** will engrave correctly in the Photograph setting. While it is a matter of personal taste, you will probably find that **_grey shades_** and **_color clipart_** look better when engraved using Clip Art mode.

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.
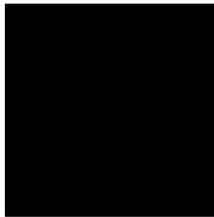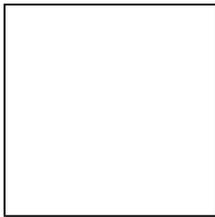
<u>CORRECT</u> <u>INCORRECT</u>

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 laser will engrave the Raster portion of the job first, then perform the Vector portion second, after all of the Raster engraving is finished.

Control of which elements are cut raster and which are cut 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.

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 Radius is 24" horizontally and 18" front to back. Generally, jobs will print faster given a smaller page size, even if the size of the image is the same.

CONFIGURATIONS

The Configurations box allows you to save all of the different settings in the Epilog Radius Laser Setup window as a custom setup. First, select the desired settings for a particular job in the Epilog Radius Laser Setup window. Next, to save these settings and identify them with a name, click the cursor in the Configurations box and type in your 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 Epilog Radius Laser Setup window you can click on the Configurations down arrow to retrieve your different custom job setups.

AUTOFOCUS

An "X" in the autofocus box will enable the autofocussing system of the Radius. The table will automatically move the object to the correct height for processing. The only restriction on autofocus is that the work must be flat. You cannot focus to the inside of a bowl for example, or to a point on a cylinder. Generally, the autofocus will operate faster if the work is positioned above correct focus point.

COMPUTER CONTROLLED SPEED/POWER

When this box has an X in it the Speed and Power are controlled from the computer. The engraver 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 engraver will use the settings on the control panel of the engraver, and they can be altered at any time.

RATE AUTOMATIC

Rate Automatic is used when vector cutting to adjust the rate that the laser is firing to the match the speed of the carriage. The higher the rate the more pulses that the laser will fire in a given distance. Normally the higher the rate, the better the cutting. Normally you would leave the Rate Automatic box checked on.

MAP COLORS TO SPEED/POWER

The Radius 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 machine to engrave an area deeper than surrounding areas for emphasis. You can also program the machine 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 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:
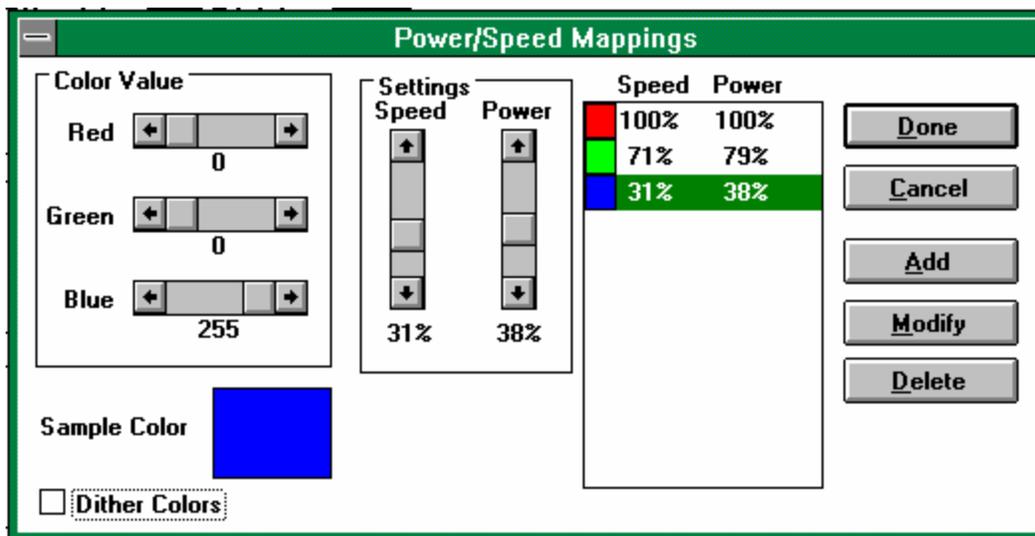
COLOR VALUE

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.

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.

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 out as a smooth solid.

When you are finished, click on the DONE button and you will go back to the previous screen. If you don't want the changes you have made to stick, click on the CANCEL button and everything you have done will be forgotten.

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.

SECTION 4: USING THE EPILOG RADIUS

KEYBOARD COMMANDS
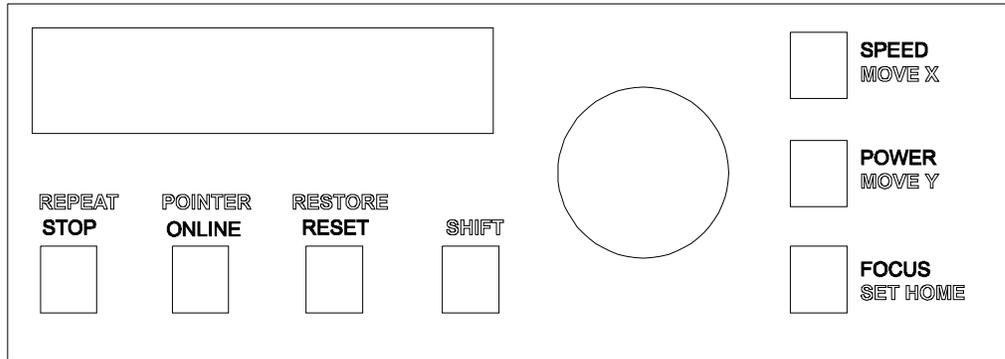
The keyboard is set up so that most keys have two jobs. The shift key determines whether the red or the white function will be done. When the shift key is pressed, the display will say "shift" in the upper right hand corner. When "shift" is being displayed, the red labels determine what the keys will do. If the display does not say "shift", the white labels determine what the keys do. The manuals are not printed in color, so the red labels are shown as an outline.

SHIFT
This key activates the red functions on the keyboard. "SHIFT" will appear in the display. Shift automatically cancels if Repeat, Pointer, Restore or Set Home are pressed. Or you can cancel shift by pressing the shift key again.

STOP
This key will stop the carriage, and turn off the laser. Once the engraver has stopped, you can open the door to examine your engraving. By closing the door and pressing the ONLINE button, the engraver will start engraving at the point where it stopped. As long as you did not disturb the workpiece, the engraver will continue engraving without loss of registration.
CAUTION: If you have stopped the engraver and opened the door to examine your work, you must close the door before you depress the Online button to continue engraving. The machine will not operate with the door open.

ONLINE
This key enables the engraver to start engraving. Pressing the key will toggle the display between ONLINE and OFFLINE. When OFFLINE the machine is in the disabled state and will not accept a design from the computer. When ONLINE, the machine should be loaded with the item to be engraved and the door should be closed. When the engraver is Online and a design is received from the computer the engraver will automatically begin engraving. **Do not**

send a new design while the machine is engraving; if you do, your computer will display an error message and you may have other difficulties.

RESET

This key is used to terminate a job in process or to clear an error. To avoid accidental resets, the machine must first be Stopped or taken Offline. If the machine is engraving the Reset key has no effect. Reset does not erase a design from memory. Resetting the engraver will send the carriage back to home position and allow you to repeat the same design or begin a new one.

POWER

This key enables you to vary the power output of the laser. The power level is continuously displayed in one percent increments from 0% to 100% on the Liquid Crystal Display. When you press the POWER key the indicator "P" on the display will blink. To vary the power output press the POWER key and then dial in the desired power setting using the rotary control knob. You can vary the power output at any time, whether the machine is stopped or engraving. The power cannot be adjusted at the engraver if you are in "Computer Controlled Speed/Power" mode in the computer.

SPEED

This key enables you to vary the engraving speed of the laser. Just like the POWER function, SPEED is continuously displayed, can be adjusted at any time. The speed cannot be adjusted at the engraver if you are in "Computer Controlled Speed/Power" mode in the computer.

FOCUS

Pressing the Focus key and turning the control knob raises or lowers the engraving table to move your workpiece closer to or further from the fixed focus lens. A metal focus gage is provided to determine the correct distance from the workpiece to the focus lens. The focus gage is the small, metal triangle in the accessory kit. The gage attaches to the shelf immediately in front of and below the focus lens. The work should be lifted just to the point where the gage touches. Remove the gage when you are done focussing.

REPEAT

This key instructs the engraver to repeat the last design. If the repeat key is pressed, the display will display REPEAT and the machine will immediately begin engraving the previous design. The repeat key will display an error if no design has been sent by the computer. The repeat function is cleared at the end of each design, and is reactivated by pressing the key.

POINTER

This key will turn on the optional red pointer, if it is installed in your machine. The pointer is a visible indicator of where the laser will go. It will project a small red spot onto the work. This is useful in conjunction with the move and set home features. You can move the spot to the point you want the engraving to take place, and set home. Or you can use it as a measuring system. The position of the red spot is displayed in inches across the top line of the display when using the move x or move y functions. The machine will beep as a gentle reminder that the red pointer is on. The pointer is actually a low power visible laser, and you should take

care never to place your eye in the beam path. Press "shift" and the pointer key again to turn the beam off.

MOVE X

Pressing this key will enable the move x feature. Spinning the black knob will cause the x carriage to move right or left, depending on which direction the knob is turned. The current actual position will be shown on the display. This is useful for locating a position on a work piece, or for setting the home position to a new location.

MOVE Y

This key is similar to the move x key, except for moving the y-axis instead of the x-axis. Move Y will not display numerical movement when the Rotary Attachment is connected.

SET HOME

This key in conjunction with the MOVE X and MOVE Y keys allow for home position to be set anywhere on the table. For example, you could move x and y to where you would like the engraving to start on an irregularly shaped part. Press SET HOME and the machine will from that point on use that position as the starting point.

RESTORE

Pressing this key will cause the machine to release any new home position, and go back to the true home in the upper left-hand corner of the table.

OPTICS

The Radius is equipped with a two-inch focal length lens as standard equipment. Other lenses are available as options for special situations. Color-coded slots are provided for each lens, so that they will all focus to the same point. The green lens goes into the green slot, and the red lens goes into the red slot. The red lens is a longer focal length, and will give better results cutting thick material and engraving at lower resolutions (300 DPI and below). The blue lens is a shorter focal length, and will give better results engraving at high resolutions (600 DPI and above).   For engraving inside bowls or shadow boxes, the red lens can be put into the bottom slot for maximum clearance between the work and the carriage. You will need to focus manually, and set the distance from the work to the lens at 2 and ½ inches. Epilog provides a special focus gage designed specifically for this purpose.

LOADING YOUR WORK

The engraving field of your machine is 24 by 18 inches. The table allows you to engrave work up to 12 inches thick. The home position of the engraving field is at the upper left corner of the table. Place your workpiece 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 ONLINE key. The ONLINE status should be displayed. 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 Radius 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 autofocus)
3) Close the door
4) Confirm the exhaust is on.
5) Press ONLINE and then "Print" from your computer.

SECTION 5: SPEED AND POWER RECOMMENDATIONS

Material hardness, the desired effect and personal taste will by nature require adjustments to the recommendations given below. Depth of cut varies with speed and power. Generally, you will want to experiment on a practice piece any time you are not sure what settings to use. Don't be afraid to experiment over the whole range of settings. Settings are given for different operations for the three laser power levels available with the Radius. Be sure to find the table that is correct for your laser. The label on the front of the machine indicates the laser power.

25 WATT RADIUS

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

Matboard	100-70	100-70	20-80
Melamine	40-100	60-100	N/A
Rubber Stamps	15-100	20-100	5-100

30 WATT RADIUS

	300 DPI ENGRAVING SPEED-POWER	600 DPI ENGRAVING SPEED-POWER	CUTTING SPEED-POWER
1/4" Wood	25-100	35-100	5-100
1/4" Acrylic	25-100	100-15	5-100
Anodized Aluminum	100-60	100-40	N/A
Brass-Painted	100-55	100-40	N/A
Corian Or Avonite	25-100	25-100	N/A
Delrin	30-100	35-100	15-100
Glass	45-100	50-100	N/A
Laserable Plastic	100-65	100-55	18-50
Leather	100-65	100-55	N/A
Marble	35-100	35-100	N/A
Matboard	100-65	100-65	20-75
Melamine	45-100	65-100	N/A
Rubber Stamps	18-100	20-95	10-100

50 WATT RADIUS

	300 DPI ENGRAVING SPEED-POWER	600 DPI ENGRAVING SPEED-POWER	CUTTING SPEED-POWER
3/8' Wood	60-100	80-100	20-100
3/8" Acrylic	100-30	100-20	10-100
Anodized Aluminum	100-40	100-30	N/A
Brass-Painted	100-40	100-30	N/A
Corian Or Avonite	40-100	50-100	N/A
Delrin Seals	40-100	60-100	45-100
Glass	50-100	60-100	N/A
Laserable Plastic	100-40	100-35	25-30
Leather	100-50	100-40	N/A
Marble	50-100	60-100	N/A
Matboard	100-50	100-30	20-40
Melamine	70-100	80-100	N/A
Rubber Stamps	40-100	50-100	30-100

100 WATT RADIUS

	300 DPI ENGRAVING SPEED-POWER	600 DPI ENGRAVING SPEED-POWER	CUTTING SPEED-POWER
1/2" Wood	100-100	100-100	1-100
1/2" Acrylic	100-20	100-25	5-100
Anodized Aluminum	100-30	100-30	N/A
Brass-Painted	100-25	100-25	N/A
Corian Or Avonite	100-100	100-100	N/A
Delrin Seals	40-100	60-100	35-25
Glass	60-100	70-100	N/A
Laserable Plastic	100-20	100-15	35-10
Leather	100-30	100-25	N/A
Marble	100-100	100-100	N/A
Matboard	100-30	20-Oct	35-10
Melamine	100-80	100-70	N/A
Rubber Stamps	70-100	100-100	30-50

SECTION 6: DOs 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.

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 operate with any of the covers or enclosures removed, and never modify the enclosure. The laser 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.

Learn how your machine operates so you can plan your layouts to minimize processing time. There is a considerable difference between typical and maximum engraving time for a given job size and speed. In the example below, the reasons for the difference are shown.

```
+-------------------+
|      AWARD        |          AWARD
|                   |
|   JOHN SMITH      |        JOHN SMITH
+-------------------+
```

The design on the right will engrave in about one third of the time required for the design on left, even though the text and the number of characters are identical. The difference is the border. Engraving time depends on how much of the surface the laser must "scan". A border requires the laser to scan virtually the entire surface. The design on the right has no border, and the laser only has to go over the lettering. Even the area between the top and

bottom lines of text is skipped, greatly reducing the required engraving time. The machine will be more efficient if your designs allow the laser to work with a logo and text, as opposed to having to work strictly in terms of the number of square inches on the item to be engraved (which is the case with a border).

SECTION 7: DOUBLE HEAD OPTION

Locate the components for the Double head option.
     Connecting strut
     Strut thumbscrews (2)
     Bearing Plate
     Optical Assembly
     Bearing plate screws (2)

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 "V" groove bearings on the optical assembly up against the "V" on the underside of the "I" beam.
3) Put the bearing plate over the top of the optical assembly so the screw holes align with the optical assembly, and put the screws in and tighten them. Please be careful to keep the screws straight so they thread in properly. See photo to verify part placement.
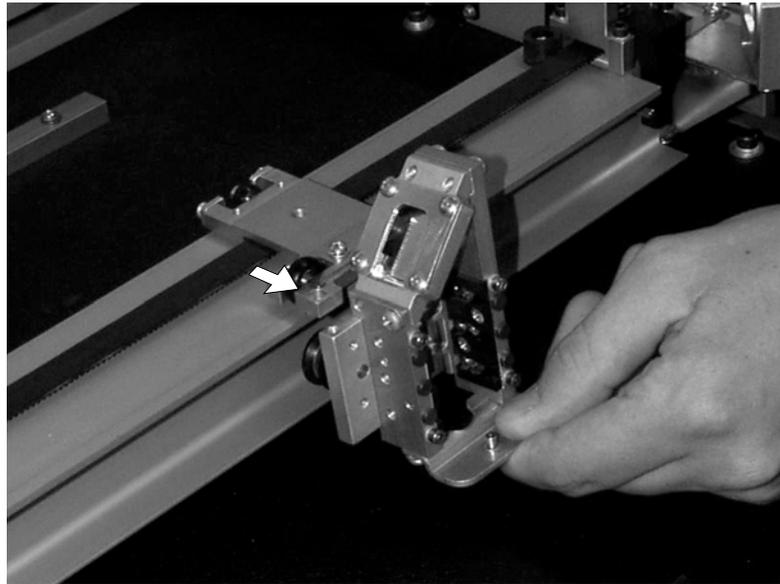
4) Space the primary and secondary heads about 12 inches apart, and set the connecting strut in between the heads. The flanges on the strut face down. Align the holes in the end of the strut with the holes on the carriages, and insert and tighten the thumbscrews.

Lay out your work on a maximum page size of 12" wide and 18" tall. If you try to go beyond 12" 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.

SECTION 8: AIR ASSIST OPTION

The air assist option is to allow for deeper engraving and cutting than would otherwise be possible without the assist. The assist carries away the materials that might combust at the point of engraving, providing a cleaner removal of material. Generally, compressed air at 20 PSI is adequate. If for any reason you use something other than air, take adequate precautions against leaks.

The connection point for the compressor is on the back panel, on the recessed power plate. The Radius uses a ¼" rigid plastic quick release connector. Simply push in the supply hose from the compressor and you are attached.

In the upper right corner of the engraving cavity there is a flow control valve that adjusts the air pressure flowing through the air lines. Ensure that this valve is open, and that adequate air is flowing through the air lines. Adequate air pressure is somewhat subjective, but experimenting by feel and then watching the air movement to the back of the engraving cavity are good indicators for judging flow.

SECTION 9: ROTARY OPTION

The rotary option allows you to mark or engrave "in the round". To install the fixture in the machine please do the following:

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. Route the plug behind the steel Y-motor shaft and plug it into the mating connector at the back left hand side of the engraver. There is a release tab on this connector that must be towards the front of the machine. This connector is oriented so that you cannot install it backwards unless you use undue force.
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.

<u>ARTWORK SETUP FOR THE ROTARY</u>

1) There is no special requirement 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.

<u>USING THE ROTARY FIXTURE</u>

The following drawing identifies the important parts of the attachment.

Clamp

Idler Wheels

Elevator

Drive Wheels

Elevator
Lock

Adjustment
Knob
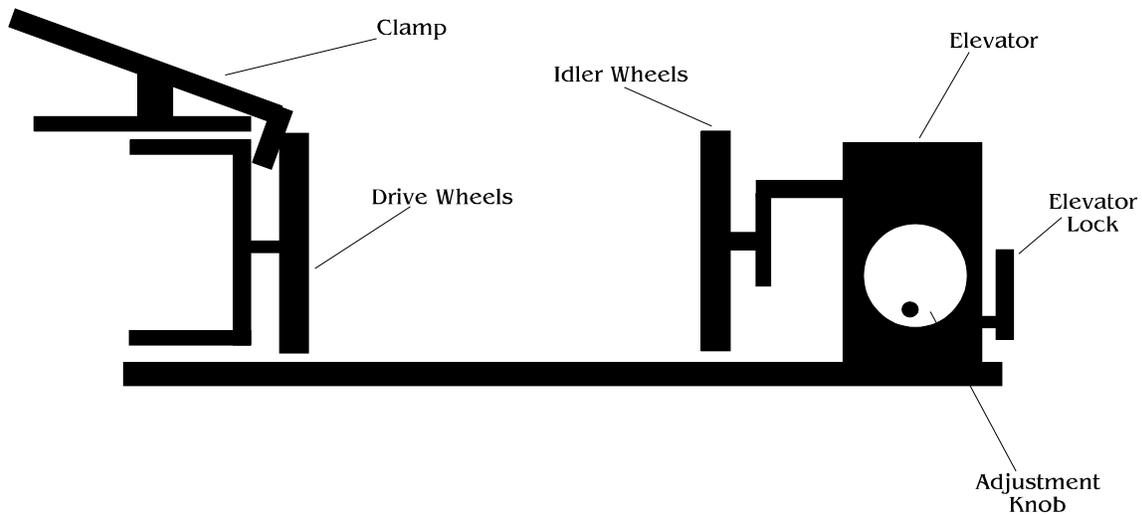
1) Load your glass with the open end to the left side of the attachment. The clamp is designed to sit inside the glass and clamp the glass to the drive wheels. Insure the glass is all the way to the left against the plastic stop.

2) The elevator lock is in the unlock position when it is in the forward position. Unlock the lock and slide the elevator left or right until the glass is supported solidly by the idler wheels. The elevator can be raised or lowered with the adjustment knob to accommodate glasses that have different diameters at either end.

3) Lock the elevator lock.

4) If you are engraving a bottle it is best to put the bottom of the bottle at the left side of the attachment. Loosen the two thumbscrews that hold the clamp in place and slide the clamp to your right and set it down on the engraving table so that you don't forget where you put it. You will need it later for engraving glasses.

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.

FOCUS WITH THE ROTARY

1) Place the focus gage on the lens carriage. Press "shift" and then use the "Move X" and "Move Y" functions to get the focus gage directly over the area that you want to engrave. Spin the knob after pressing each move key to get the position you want. If the item has a taper pick an intermediate point between the highest and lowest points being engraved. The display will give you the X axis position (Y axis position will not display) of the carriage, which you can use in your drawing program to more accurately place your engraving. Press "shift" to clear out the shift function. Then push "focus" and run the table up until the gage just touches. Remove the gage. Press "reset" and then "online" and you are ready to engrave.

DO NOT USE AUTOFOCUS.

ROTARY REMOVAL

1) Open the large door.
2) Turn off the power to the laser.
3) Depress the release tab on the connector and unplug the connector.
4) Remove the rotary attachment.

NOTE! The rotary device only works in Raster mode. The front control panel will display "Remove Rotary" if Vector mode is selected from the driver.

SECTION 10:   ENGRAVING RUBBER STAMPS

The Epilog Radius is has a second print driver for doing rubber stamps. All unique stamp attributes are added by the driver including shoulders, mirroring of the artwork and raising the pattern from the background.

A very fast computer is required for producing stamps. The computer must have a large amount of memory as well. Generally, a 300 Megahertz Pentium or faster is needed, with 64 Megabytes of memory.

INSTALLING THE STAMP DRIVER

There are two different print drivers on the disk in your accessory pack. The primary driver is the Radius. The other driver is called Radius Stamp, and it is used to produce rubber stamps. Use the procedure in section 1 to install the stamp driver onto your system, and make sure that it is selected as your active or default printer.

LAYOUT FOR STAMPS

1) Set up your artwork. Areas to be left raised should be black, with areas 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 out. 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 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) Print your design.

FENCE

RUBBER
STAMP

LASER WILL
CUT HERE

YOUR
NAME

A good design

RUBBER
STAMP
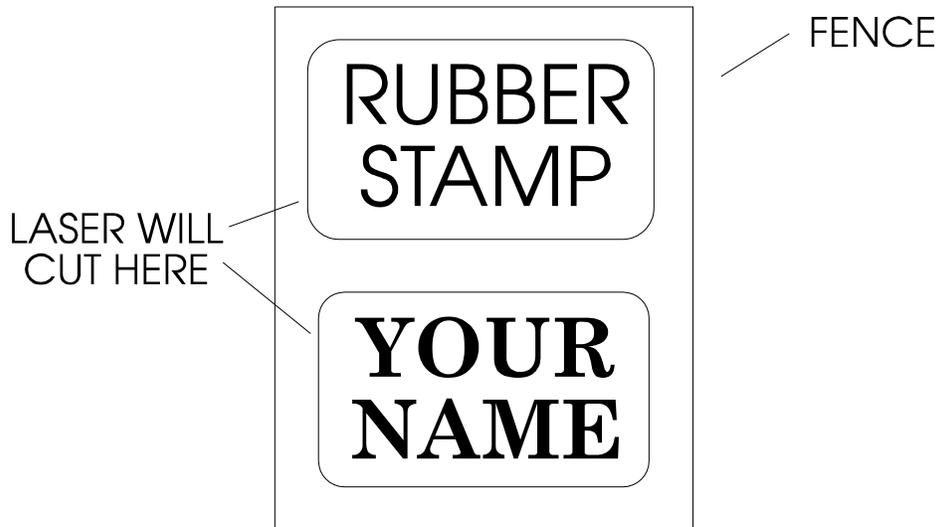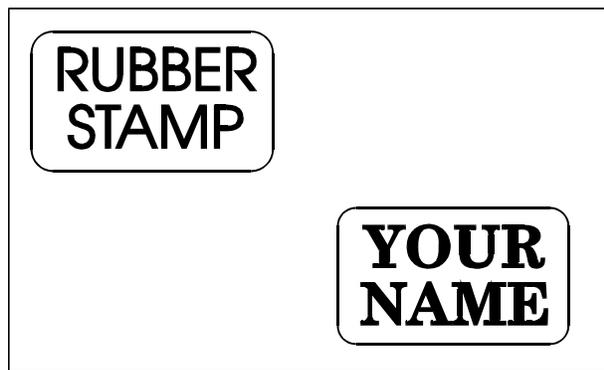
YOUR
NAME

A Wasteful Design

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.

The stamp driver panel is shown below. Once your artwork is set up, you need to specify how you want the machine to cut the stamp.

Epilog Stamp Radius Laser Setup

Resolutions: 1200 DPI — Rate Automatic — ☒ Auto Focus — ☐ Mirror

Raster
Speed: 1% — 100% — 100%
Power: 0% — 100% — 100%
◉ Clip Art ○ Photograph

Vector
Speed: 1% — 50% — 100%
Power: 0% — 50% — 100%
Rate: 1 — 50 — 100

Piece Size
Horizontal: 24.00
Vertical: 18.00

Configurations
Delete   Save

Shoulders
Min 0 — 25 mils — Max 50

Widening
Min 0 — 1 — Max 6

OK   Cancel   About
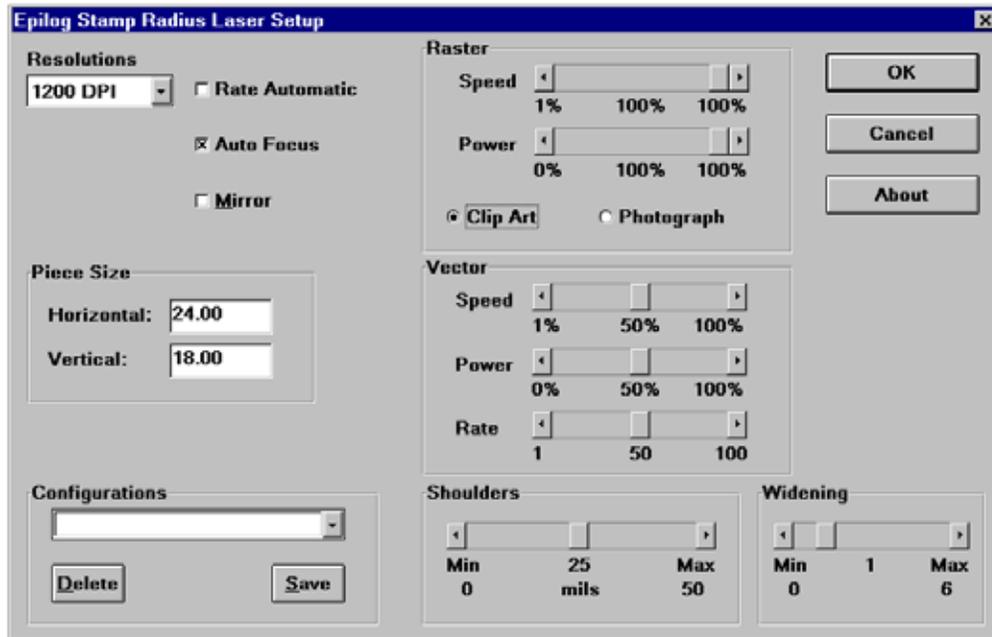
1) RESOLUTION: 600 DPI resolution is recommended. This resolution provides a very high quality engraving with appropriate depth. 1200 DPI will provide a higher quality stamp. 1200 DPI will take about twice as long to engrave as 600 DPI.

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) RASTER POWER AND SPEED: 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**!

4) VECTOR POWER AND SPEED: 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.

5) SHOULDERS: Use the adjuster 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.

6) 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.

7) 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.

8) AUTOFOCUS: Putting an "X" in the autofocus box enables the autofocus feature of the Radius.

SECTION 11:   MEMORY CONFIGURATION

The Epilog Radius memory buffer allows you to download any size single file of up to 16 MB in size. The file will remain in memory as long as the machine is turned on or until you send down another job. Pressing the repeat button after the file has engraved will repeat the job.

If you have a file that is larger than 16 MB the laser will automatically go into "rolling buffer" mode. In rolling buffer mode the laser accepts 16 MB of data then starts to discard used data as it engraves to make room for additional new data. If you print a file larger than 16 MB to the laser it will engrave the entire job, but you will not be able to repeat that job. If you want to repeat a job that is larger than 16 MB you will need to download it to the laser from your computer.

Please be aware that if you are sending a job that is 16 MB or larger to the laser much of the file will continue to spool from your computer after the print window has disappeared. You need to check your print window and insure that the entire file has printed before you switch ports or turn off your computer. Failure to do so will result in a loss of data to your laser.

SECTION 12:   IN CASE OF DIFFICULTY

Avoiding Common print problems:

Your Radius will begin to engrave as soon as the first line of data from the computer has been received by the engraver. 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 the engraver is put ONLINE unless you take precautions to clear it out. To avoid most common print problems, **<u>ALWAYS</u>** double click on the Radius printer icon (under settings, printers) to check for partial jobs if you interrupt a job in progress. They can then be cancelled 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 "Job Done" 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,
>   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 "wireframe" 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 thirteen 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 on.

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 with your serial number of your Corel they will require it.
-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".
                        First find the option "Bitmap Printing"
                              Set it to   "Output Entire Bitmap"
                        Then find the option "Driver Banding"
                              Set it to " Send Bands to Driver"
                        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: Backup Sensors Errors.

Solution:
      - Autofocus is not detecting the workpiece. Remember the basic rule that the work must be flat, and it must be located in the upper left hand corner.

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) Cleaning of 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 more then likely a maintenance issue. See section thirteen 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. Verify that the design is not to close to the edge of your page in CorelDRAW. Increase your border by .25 inch.
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"X3" in the center of the 24"X18" 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: Light burned out.

Solution:

-The plastic lens over the light can be removed by squeezing the top and bottom, then gently pulling. Try reseating the bulb. Replace the bulb if it still won't turn on. You can get one from Epilog, or from a hardware or leisure (RV's, Campers) store.

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 outer protective covers on the focus blocks. These covers are made of plastic and 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 it's 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 don't) 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 Radius print driver selected.

Problem: Table is not at proper level with the carriage. Symptoms of this
           problem is engraving starts out nice then slowly decreases either
           on the right or on the bottom.

Solution: Put on your focus gauge and manually focus the table to where the table just

                touches the gauge. Shut off the machine and with your hand move the carriage to
                each of the four corners with the focus gauge still installed. It should just touch
                the table in the four corners as it did in the starting position (upper left corner). If
                there is a variance the table will need to be readjusted. Contact Epilog for the
                correct procedure.

Problem: Engraver stops in the middle of a job.

Solution: The printing job from the computer was interrupted. This is normally only seen
                in computer systems with an additional printer connected to the computer.
                Switching from the engraver to the printer must not be done until the entire job
                has been transferred.

Problem: When the ONLINE button is pushed and the engraver starts engraving immediately.

Solution: -There is an incomplete print job waiting in the computer. Click on START,
                settings, printers and then double click on the last driver you printed through and
                look to see if there is a job printing. If so, delete it or cancel printing by using the
                pull down menus.

Problem: Computer errors or print error messages on your computer screen.

Solution:
                1) Symptoms of this are; the computer possibly displaying " problem printing to
                    LPT1".
                    (A) If this is the case verify the engraver is "ONLINE" (press the online key).

> (B) Is the printer cable connected correctly? Review the hookup configuration.
>
> (C) If you have multiple LPT printer ports make sure you are printing with the one connected to the engraver.
>
> (D) Always terminate any print job that didn't transmit properly. Do not leave part of the design waiting for transmission. Sending another job with a stalled job will complicate matters.

2) Any other error reported to your computer screen is going to be an internal computer error. There is either a problem with the computers hardware and/or software. Contact a reputable computer representative for assistance.

Problem: Engraver displays "no cooling" (50 & 100 w)

Solution: -Turn on the chiller
            -If the chiller is on, and this is the first time you have used the machine, the connections are probably backwards. There is a valve in the Radius that will only allow the water to flow the correct direction. Disconnect the hoses and switch them, and try it again.

Problem: Engraver displays "door open"

Solution   -The engraver will not operate with either door open, by law and design.
            -If the doors are closed and you get this message, check to be sure that there are no obstructions and the doors are closed completely. If they are closed completely, the door contacts need adjustment. Please call Epilog for assistance.

Problem: Engraver displays "laser error"

Solution   This signal may occasionally appear during periods of low speed, high power operation. If the display persists for long periods of time your laser may be in need of service.

Problem   Engraver displays "unknown data"

Solution: The engraver received data it did not recognize. Check to be sure you are printing with the Epilog Radius driver. Also check to make sure you haven't interrupted a previous print job without clearing out the balance of the job. You can check by click on "START", settings, printers and double clicking on the RADIUS driver icon. If the box has a job in it, delete it with the pull down menus.

Problem: Engraver displays "internal error"

Solution: This indicates a loss of program integrity with the Radius' internal computer. If it persists, you may need a replacement. Contact Epilog technical support.

Problem: Engraver displays "amp error"

Solution   This indicates a fault in one of the electrical systems. Turn power off, and try again. If the error persists, your machine needs to have a component replaced. Contact Epilog technical support.

Problem: Engraver displays "remove rotary"

Solution: The rotary can not be used for vector jobs. Reset the print mode to "RASTER".

SECTION 13: ENGRAVING MACHINE MAINTENANCE

IMPORTANT!

The single most important thing that you can do to keep your Radius 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 Radius 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.

BEARINGS: The bearing system on the Radius is designed to be maintenance free, with the exception of periodic cleaning. No lubrication or adjustment should be required.

CLEANING: Periodically (once a week), the machine will benefit from a light cleaning. Use a soft cloth and some hardware store alcohol. Open the large door and wipe down the bearing surfaces first, while the cloth is still clean. These are shown with arrows in the photo. Please clean these components thoroughly, along their entire length.
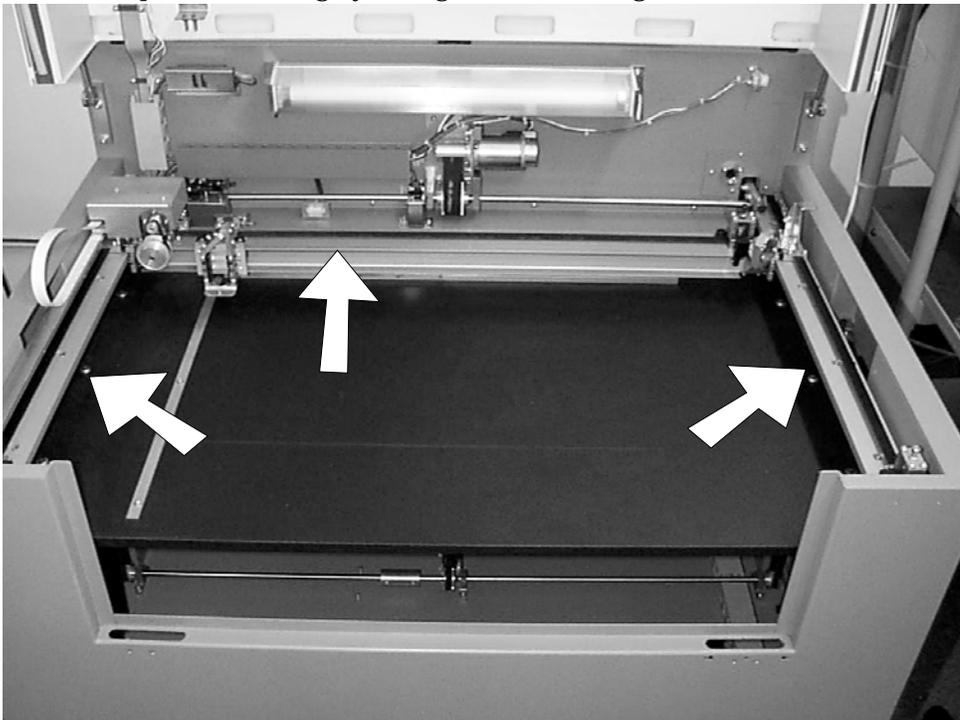
After cleaning the bearings, clean off the table and the rest of the inside of the machine. Spending just a few minutes a week will pay off in the long run with better quality and performance.

OPTICS: About once a week, you will need to clean the optics (mirrors and lenses) of your Radius. If smoke, resin, or other contaminants are allowed to accumulate too heavily, they will reduce the available laser power and may even cause damage.

The two optical components most likely to require cleaning are the focus lens and the mirror directly above it. The lens can be removed from the mount to make cleaning easier. The lens is mounted in a colored (red, blue or green) retainer. Please don't disassemble the retainer, as the lens itself is fragile. In addition, there is one other mirror at the right end of the "I" beam that will need cleaning.

To clean the optics use a high-quality cotton swab moistened with reagent-grade acetone, ethyl alcohol, or anhydrous isopropyl alcohol. Acetone is supplied in your accessories kit. Please read the label on the bottle carefully. Do not use rubbing alcohol or "hardware store" solvents such as denatured alcohol, as they contain impurities which can contaminate the optics. If chemicals are not readily available in your area, you may obtain pure ethyl (grain) alcohol at any liquor store, under such brand names as "Golden Grain" and "Everclear."

Wet the swab thoroughly with the solvent, and then blot it against a paper towel or 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: The laser tube used in the Epilog engraver 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 tube life is 10000 - 20000 hours, operating. Depending on your particular usage, the tube should be good for a very long time. The tubes are refurbished and are available on an exchange basis.

SECTION 14: MATERIAL SUPPLIERS

Laser Engraving Materials Sources
For Use With Your Epilog Radius

1) <u>ACRYLIC</u>

   Acrylic Idea Factory
   6669-C Peachtree Industrial Blvd.
   Norcross, GA 30092
   800-543-9253

2) <u>LASER ENGRAVABLE COATED METALS</u>
   Identification Plates, Inc.
   1555 HighPoint Drive
   Mesquite, TX 75149-9009
   800-395-2570

   Victory
   1820 N. Major Avenue
   Chicago, IL 60639
   800-327-5578

   R. S. Owens & Co.
   5535 North Lynch Avenue
   Chicago, IL 60630
   800-282-6200

3) <u>PRESSBOARD PLAQUES</u> - Melamine

   Quail Industries
   300 Fallon Road
   Hollister, CA 95023
   800-232-1031

4) <u>WALNUT PLAQUES & SPECIALTY WOOD PRODUCTS</u>

   Colorado Heirloom
   333 E. 4th Street
   Loveland, CO 80537
   (970) 667-4222 - Voice

(970) 667-8880 - FAX

Kentucky Woodcrafts Co.
PO Box 220 McKee Industrial Park
McKee, KY 40447
800-354-0196
Lee's Wood Products
31 Smithers Street
P.O. Box 159
Rocky Mount, VA 24151
 800-552-5337

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

5)   MIRRORED ACRYLIC

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

6) CORIAN or FOUNTAINHEAD - Synthetic Marble

Johnson Plastics
9240 Grand Avenue South
Minneapolis, MN 55420-3604
800-869-7800 - Customer Service

7) ENGRAVEABLE PLASTICS

Innovative Plastics Inc.
PO Box 7065
Alogonquin, IL 60102
(815) 477-0778

Johnson Plastics
9240 Grand Avenue South
Minneapolis, MN 55420-3604

800-869-7800 - Customer Service

8) <u>FLAT GLASS</u>

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

9) <u>PEN & PENCIL SETS</u>

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

10) <u>RUBBER STAMP MATERIAL</u>

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

SECTION 15:   ABOUT THE RADIUS

Your EPILOG RADIUS has been designed as an "open architecture" product. The Radius will work with many popular graphics, engineering and specialty software products. The common requirement is that they all must run within the framework of Microsoft Windows 95 or Windows 98, on an IBM compatible PC (personal computer).   Windows requires every program to output through a common point, which is the "driver" that is shipped with the Radius.

RECOMMENDED COMPUTER

Pentium Microprocessor (200Mhz minimum)
- 64 MB RAM
- One 3.5 inch 1.44MB floppy
- 2 GB Hard Drive(minimum)
- Super VGA Color Monitor
- CD ROM Drive
- 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

Windows 95 or Windows 98 is required

In addition, an application program (graphics, CAD, etc.) is required.   Epilog recommends Corel Draw Version 5.0, 7.0, or 8.0. 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 RADIUS uses the latest technology, providing a powerful tool that is simple to setup and operate. The Radius can mark(engrave) and cut a variety of non-metallic materials.

The Radius is available with three different laser power levels.   Any model can be upgraded to a higher wattage at the factory. The 25 and 30 watt units are air cooled, and the cooling fans are built in the rear of the unit. The 50 and 100 watt units require water cooling. An external water chiller is required and included with the system.

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 with the Radius. 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 Radius 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 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.