

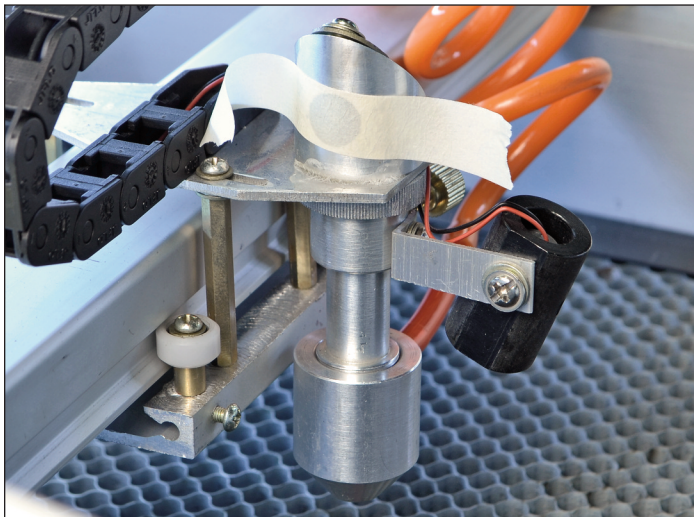


**This machine may have been subjected to strong shock during transport, which may have caused the mirrors or the carriage transport mechanism to shift from factory settings. Please check the mirror alignment before attempting to use the machine for cutting or engraving. See below for instructions for how to perform this simple test.**

## Mirror Alignment Test

***Note: It is not necessary to install the pumps and exhaust fan until after this test is performed.***

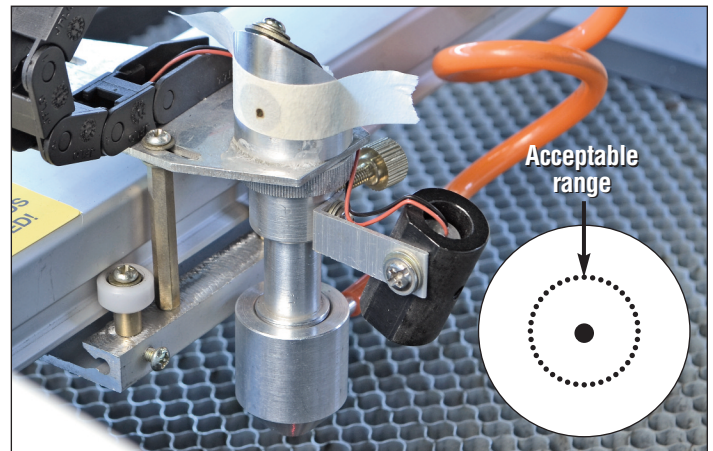
- Unpack the machine and place it on your workbench.
- Carefully remove any packing materials and parts from inside the cutting chamber.
- Gently move the lens housing/carriage around the inside of the chamber, making sure it moves freely from corner to corner...front-right to rear-left.
- Install the power cord and plug it into the 220V socket on the front of the transformer-power supply. Make sure the machine is switched OFF. Check the rear of the transformer-power supply; the input is to be set at 110V. Plug the power supply into the 110V wall socket.
- Place a strip of masking tape across the lens housing opening.



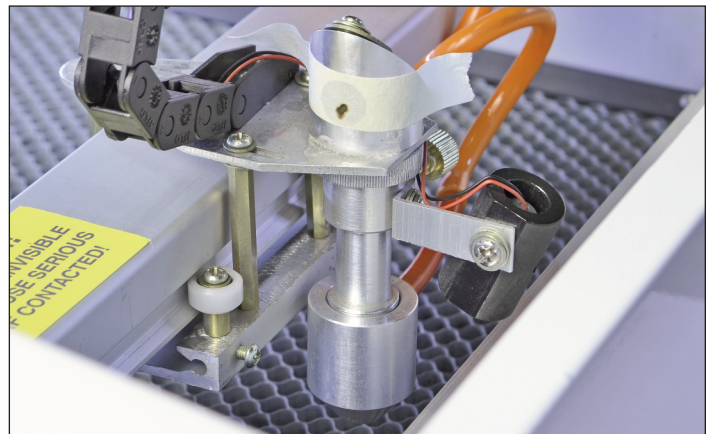
- Move the carriage to the rear-left position and close the lid.
- Set the operating current dial as shown. →
- Press the cutting switch so that it is latched in the down position.
- Turn on the machine power switch.



- **Quickly** press the test button all the way down. Open the lid and see if a dot appeared on the masking tape.



- If not, increase the power and try again. The dot should appear within the range of the mirror opening as in the diagram above. If it does not appear, call Micro-Mark Technical Service at 908-464-1094, 1 pm to 5 pm Eastern Time for further instructions.
- If the dot appeared with the lens positioned in the rear-left, then move the lens to the front-right and test again. The dot should again appear as described above (confirm with a new piece of masking tape).

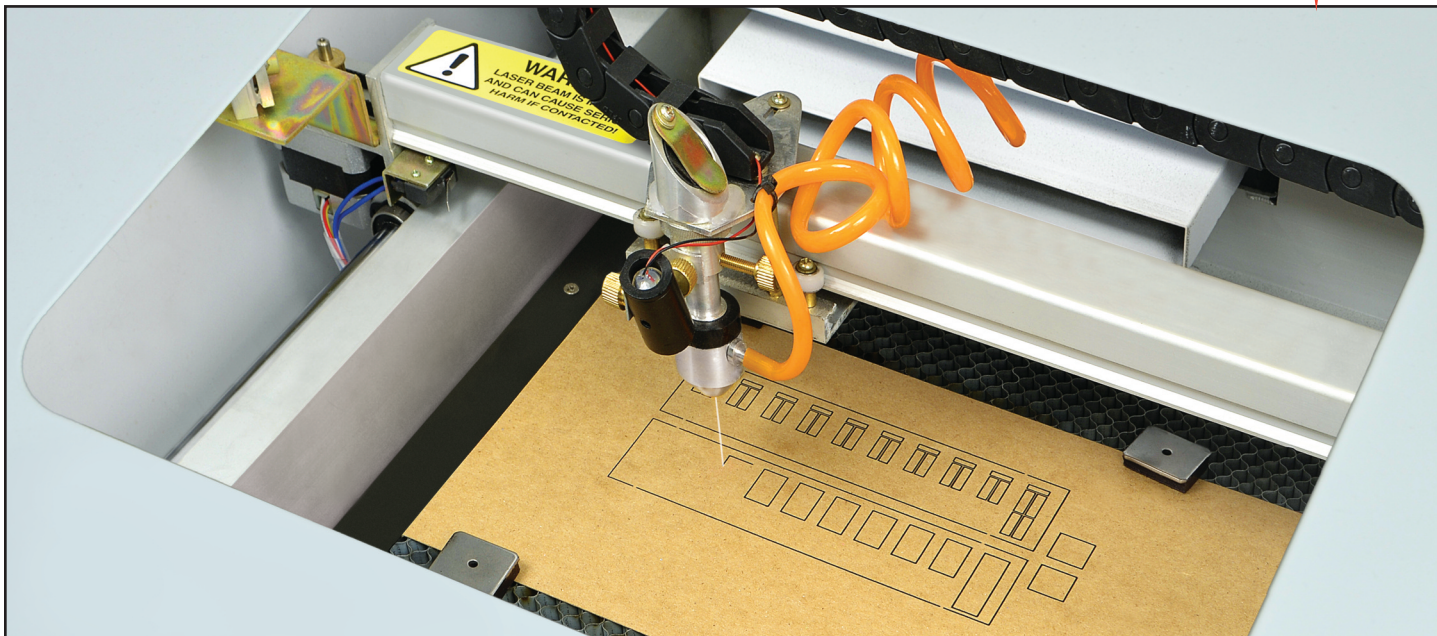


- If the dot appears within the range, the test is complete and you can proceed with the detailed set-up instructions that follow. If the dot does not appear, call Micro-Mark Technical Service at 908-464-1094, 1 pm to 5 pm Eastern Time, for further instructions.

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# MicroLux<sup>®</sup> 2525<sup>™</sup> **LASERKNIFE**

MADE IN CHINA TO MICRO-MARK SPECIFICATIONS



## OWNERS MANUAL & INSTRUCTIONS FOR USE

### What's included in the cartons:

- |   |   |
|---|---|
| 1 – LaserKnife 2525 Engraving/Cutting Machine               | 1 – Power cord  |
| 1 – 110VAC power supply/converter/transformer               | 1 – Ground wire   |
| 1 – Metal honeycomb platen                                  | 1 – Spare fuse  |
| 1 – Air pump  | 1 – USB cable   |
| 1 – Exhaust fan   | 8 – Magnets   |
| 1 – Corrugated plastic exhaust duct, 100 mm dia. with clamp | 5 – Pieces of 10" x 10" chipboard                       |
| 1 – Water pump  | 1 – Piece of scribed siding with 1/16 spacing, 10" long |
| 1 – USB flash drive   | 2 – Piece of scribed siding with 3/32 spacing, 10" long |
| 1 – USB key (dongle)  | 1 – Piece of 10" x 10" x 1/16" acrylic                  |
| 1 – Lens focus gauge  | 1 – Owners manual                                       |

### What's included on the flash drive:

CorelLASER software plug-in

Sample drawings for cutting and engraving

### What you'll need to provide:

- |   |  |
|---|--|
| Computer running Windows 2000 (or later) operating system       | 110VAC power   |
| CorelDRAW software (version 11 or later)                        | Your own drawing files, created in, or importable into, CorelDRAW versions 11 or later |
| 5 gallon plastic bucket containing 3 gallons of distilled water |  |



# CAUTION!

## READ THE FOLLOWING SAFETY PRECAUTIONS BEFORE SETTING UP AND USING THIS MACHINERY.

*Warning: Normal use of this product can expose the user to materials (wood smoke) known to the State of California to cause cancer and birth defects or other reproductive harm, or other Proposition 65 listed chemicals.*

To prevent bodily injury to yourself or others, ***please use common sense*** when using a machine, such as this one, that employs high voltage electronics, laser beams, motors and other mechanisms. These instructions cannot cover every situation you may encounter when using this machine, but the following information, **which you must read before using this machine**, will help you understand its workings and help avoid personal injury. If you need further explanations of specific concern, please call our technical service department at 908-464-1094 for more information.

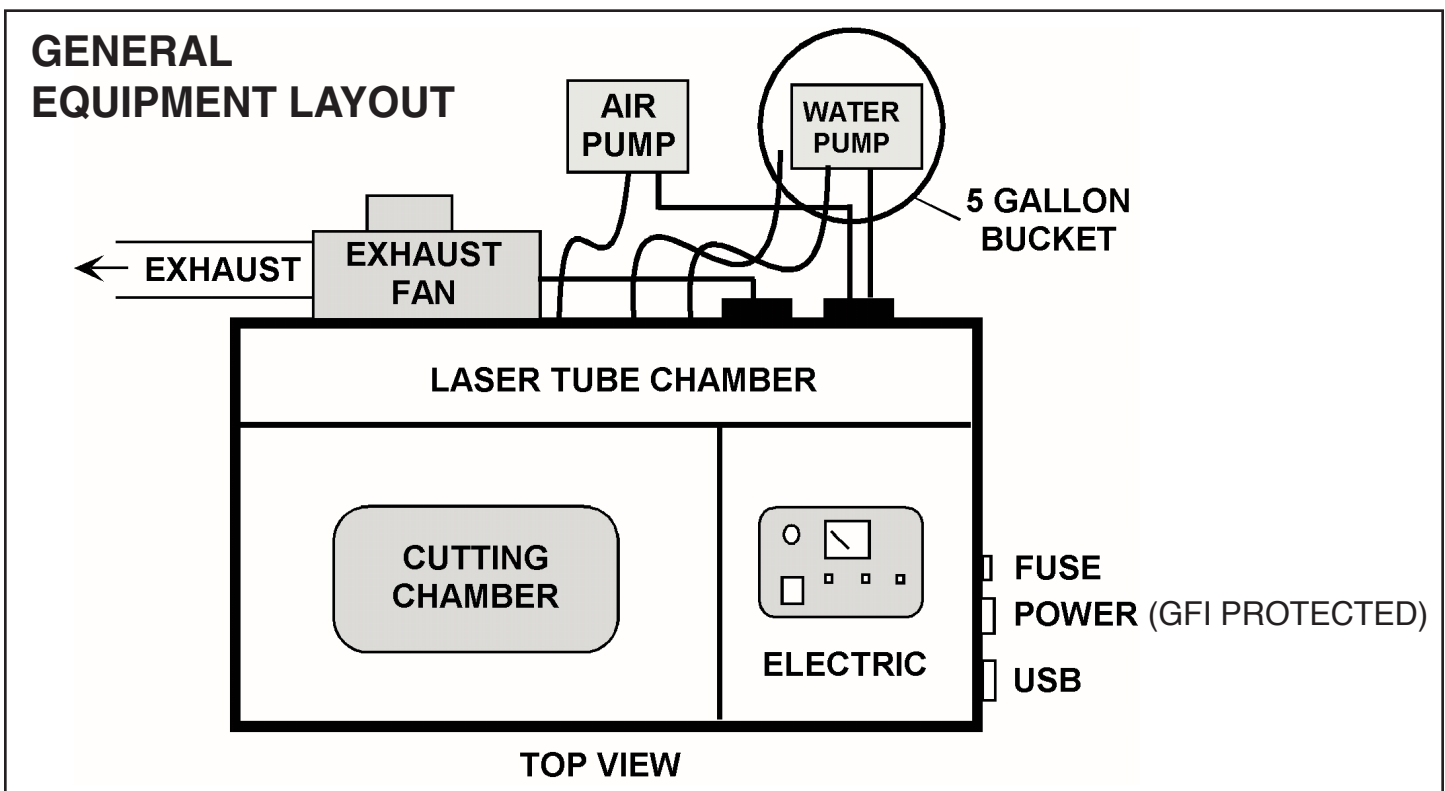
This machine employs an **invisible beam** of high energy light to cut through soft materials, such as wood and plastic. It will easily cut and/or burn human flesh and will cause injury if you are not careful to avoid contact with the laser beam. Do NOT reach into the cabinet unless the machine is switched off **and** the power control knob is turned all the way off (turned all the way counterclockwise). To avoid injury, do not place any part of your body in the beam's line of action (at the output end of the laser, between mirrors, and/or under the lens).

To avoid fracturing the glass laser tube, cooling water MUST be circulating before power up. Make sure the cooling water is flowing through the system by checking the return line (labeled Water Out) to the water bucket for water flow.

The front-right chamber of the cabinet contains high voltage electrical connections. Do NOT reach into this chamber unless the power cord is disconnected from the machine.

Avoid contact with any connections to the laser tube unless the power cord is disconnected from the machine.

Since this machine uses an electric-driven water pump which circulates water through the product, the use of GFI circuitry to protect from electric shock is **MANDATORY**.



## **LaserKnife 2525...How it Works**

The cabinet includes three chambers: one containing a laser tube and mirror, one containing electronic circuits/power supply, and one main chamber for cutting out wood, card, plastic and acrylic sheet materials, and for engraving (burning) images into surfaces.

The laser emits a powerful, concentrated beam of light that, when reflected by mirrors and focused through a lens, is capable of cutting through a piece of wood, paper, cloth, acrylic sheet, and many other non-metallic materials. A computer-controlled motorized carriage, suspended above the workpiece, moves the mirrors and the lens with pin-point accuracy. This motion, combined with computer-controlled powering of the laser, enables the machine to easily cut out intricate, tight-tolerance parts or engrave high definition images into the surface of the workpiece.

Note: A personal computer (not included), running Windows 2000 or later MS operating systems plus CorelDRAW version 11 or later, is required to control the LaserKnife 2525. A USB port on the side of the cabinet connects to the computer via the supplied cable.

### **The control panel includes the following:**

- Master (ON-OFF) Switch, which, when lit, energizes the power supply, control circuits, and powers up the ancillary equipment (see below).
- Current regulating knob, which controls the amount of current available to the laser tube and, subsequently, the cutting power.
- Current meter, which displays the laser current in milliamps, thereby giving a corresponding indication of cutting power.
- Test button, which energizes a burst of the laser beam and indicates the laser current setting on the meter.
- Cutting button, which, by pressing it, allows you to toggle the laser beam ON/OFF while the carriage continues to function normally.
- Lighting switch, which toggles the lamp in the main chamber ON or OFF whenever the main power cord has power (no matter whether the position of the Master switch is set to ON or OFF).

### **Ancillary equipment provided with the machine includes:**

- A small air pump to blow debris away from the cutting/engraving location
- A red LED laser beam location pointer
- A small water pump to circulate cooling water through the laser tube
- An exhaust fan to draw any smoke from the cabinet and send it outside through the provided 100 mm diameter plastic duct

All equipment (except the personal computer) is designed to operate on 220VAC line voltage (a step-up transformer is included to convert regular 110VAC line voltage from the wall outlet to the 220VAC needed for the machine). The use of GFI circuitry to protect from electric shock is **MANDATORY**. All ancillary equipment is controlled by one flick of the ON-OFF Master Switch.

The purchaser will need to supply a 5-gallon plastic bucket containing about 3 gallons of distilled water **at room temperature** for cooling the laser tube.

*Note: Failure to provide circulating cooling water to the laser tube will most-likely cause irreparable damage to the equipment and will definitely void the warranty. Before powering the laser, make sure the water is flowing from the bucket, through the laser tube, and back to the bucket. See the detailed instructions for more information about water pump operation.*

*Running the laser at continued high current will eventually overheat the cooling water and laser tube and reduce its lifetime; water temperature must be monitored by the user and the laser shut off if it gets too warm. This machine is intended for private home use for making parts used for hobby craft-type projects. This equipment has not been designed to withstand the rigors of production/manufacturing operations, and such use will void any warranty.*

*See the owners manual and user instructions for explicit details on how to operate the equipment properly.*

***For video demonstrations of setting up the LaserKnife and to see it in action, go to  
[www.micromark.com/MLX-LASERKNIFE-2525](http://www.micromark.com/MLX-LASERKNIFE-2525) and scroll to the bottom of the page***

## **LaserKnife 2525 Hardware (the machinery) Set Up Instructions**

**Do not connect the line cord to the machine before reading and performing ALL of the instructions below.**

***For video demonstrations of setting up the LaserKnife and to see it in action, go to [www.micromark.com/MLX-LASERKNIFE-2525](http://www.micromark.com/MLX-LASERKNIFE-2525) and scroll to the bottom of the page***

### **Unpacking**

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The machine is heavy; please ask someone to help you lift the machine out of the carton and onto your workbench or other sturdy table (with the work surface 30 to 36 inches off the floor) so you can remove the packing materials. It's a good idea to use a table equipped with casters or is otherwise easy to move...especially with the machine placed on it...as access to the back side of the machine will be necessary. Ideally, your work table will have space between it and the wall.

Save the packing materials; they were designed for safe transport of the machine. If the machine ever needs service, it will travel best in its original packing.

### **Set Up**

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***Access to the back side of the machine will be necessary in order to make water, air, exhaust and electrical connections to ancillary equipment.***

***DO NOT CONNECT THE MAIN POWER CORD TO THE MACHINE UNTIL LATER (WE'LL LET YOU KNOW WHEN TO DO SO).***

Before installing ancillary equipment, you will need to open the large lid (the one with the window) and carefully remove the 100 mm diameter plastic exhaust duct from the main chamber; set it aside for later use. Remove any protective covering from the lid's plastic window. Look for and carefully remove any packing materials, such as foam, that secure the inner workings of the carriage, mirrors and other mechanical devices. Gently push the carriage and lens housing around a little bit to confirm freedom of movement; otherwise, damage may occur when the machine is powered up.

***Note: Do not touch the surface of the mirrors.***

There are two lever-actuated micro-switches located inside the main chamber at the carriage end stops. Make sure they are in working order; that is, no packing materials or debris has fouled the actuator levers.

The machine has been tested at the factory and at the Micro-Mark warehouse. If you find any cuttings from this testing, or other debris from the manufacturing process, you may remove them with a vacuum cleaner equipped with a small brush or thin nozzle. This equipment should be handled with care. It contains sensitive motors, switches and controls essential for precision operation. To obtain the optimum satisfaction with your LaserKnife 2525, please handle and use the machine carefully and gently.

### **Install the Exhaust Fan and Duct**

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The exhaust fan slides into the "pocket" located on the back side of the cabinet. After removing the loose ends of any tubing stored in that area for shipment, orient the 100 mm output fitting in a convenient direction for connection to the exhaust duct. The top edge may be sealed with tape, or you may choose a more-permanent installation by installing a couple of self-tapping screws (not included) in the top corners to draw the fan housing against the laser tube access lid (we prefer this latter method, but be careful to avoid piercing the lid too deeply and damaging equipment located within). You may remove the lock screw and open the laser tube access lid to see what's inside and where it's located before drilling through the cabinet. Attach the exhaust duct to the fan outlet with the provided clamp and direct the exhaust outside the building into the open air; this last part of the exhaust installation is to be devised by the user (Note: The 100 mm exhaust tube is a bit smaller than a standard 4" diameter USA dryer duct; some adaptation may be required, or substitute a 4" dryer duct from your hardware/home improvement retailer). Plug the exhaust fan power cord into the socket on the rear of the cabinet labeled "Fan" or "Exhaust." Note: this equipment operates on 220VAC; do not plug into 110VAC wall outlet.

***Tip: if the equipment plugs enter the sockets a bit too loosely, you may use a plier to gently bend the prongs slightly for a more-secure fit and good electrical connection.***

## Hardware Set Up Instructions (continued)

### Install the Air Pump

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Connect the output fitting (usually brass) of the air pump to the plastic tube marked "Air In" (usually orange) and place the air pump on the floor or small table. The pump will vibrate and may "wander around" while it is running; make sure it does not wander across the table and fall to the floor! Plug the air pump power cord into the socket on the rear of the cabinet labeled "AIR PUMP." **Note: this equipment operates on 220VAC; do not plug into 110VAC wall outlet.**

**Tip: The pump makes noise that can be damped by placing it on a piece of foam rubber, which will also keep it from wandering around. Do not enclose the pump in a sound-proof box; it needs ventilation to keep from overheating.**

### Install the Water Pump

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Connect the outlet of the water pump to the tubing marked "Water In" and place the pump inside a 5 gallon bucket containing about 3 gallons of distilled water that you can purchase at your local grocery store. Secure the power cord in such a way that a minimum amount of wire (and especially any factory-spliced wire connection) is not submerged in water. Place the return water tube (marked "Water Out") inside the bucket so that the open end is below the surface of the water; in that way, once air is purged from the system, no air can flow back into the cooling lines and cause the system to lose its "prime." Secure the tubing so that it does not move from its ideal position as just described. It's also a good idea to cover the bucket to reduce evaporation; cut a small slot in the cover to clear the tubes and power cord. Plug the water pump power cord into the socket on the rear of the cabinet labeled "WATER PUMP." **Note: this equipment operates on 220VAC; do not plug into 110VAC wall outlet.** When power is turned on (later), the pump should pick up the water and circulate it through the system. You can verify that the water is circulating by momentarily lifting the end of the return tubing out of the water and visually checking for flow. If the water does not circulate after several seconds, check the connection of the tubing to the pump for leakage. **IMPORTANT: You may also have to gently lift the pump out of the water and set it back in to "prime" the pump for proper water flow, which is critical to the life of the laser tube.**

### Connect the Main Power

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Attach the included ground wire between the machine cabinet and a solid electrical ground, such as a metal water pipe or ground circuit in the electric supply socket box.

**NOW:** Make sure the master ON-OFF switch is set to OFF. Then plug the main power cord into the socket located on the right side of the cabinet. Note that the other end of this cord is to be plugged into a 220VAC power source. The cord has an unusual plug that will remind you of this requirement. If your shop is equipped only with 110VAC outlets, then use the included step-up transformer to convert to 220VAC.

Cycle the Lighting switch and verify that the internal lamp is turning on and off. (Yes...even with the master switch set to OFF).

Turn on the main power switch located on the control panel and confirm that the air pump, water pump and exhaust fan are running. The carriage may index itself (move) to the left-rear corner of the main chamber...the 0,0 (zero-zero) position. This is normal. If it doesn't move to that location, do not worry; we'll index it later.

If the water is not circulating back to the bucket, gently lift the water pump out of the water for a second or two, and it should then start to flow.

**Now, shut off the main power.**

*\*The power source **MUST** be GFI protected.*

### Connect to your Personal Computer

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Use the provided cable to connect a USB port on your computer to the USB port located on the right side of the machine in the rectangular hole near the power cord connection. Note: The USB cable should be arranged so that the end closer to the ferrite choke (that cylindrical object surrounding the cable at one point) is plugged into the laser cutter. Be careful to orient the USB plug properly; that is, do not force it into the socket located on the printed circuit board. If it does not enter the socket easily, rotate it 180 degrees and try again.

This completes the hardware set up.

**Please proceed to the LaserKnife 2525 Software Set-Up Instructions.**

## LaserKnife 2525 Software Set Up

**To see a video demonstration of the LaserKnife software installation and first cut, go to [www.micromark.com/MLX-LASERKNIFE-2525](http://www.micromark.com/MLX-LASERKNIFE-2525) and scroll to the bottom of the page**

The LaserKnife 2525 is controlled by a plug-in program for CorelDRAW called CorelLASER, which is included with the purchase of the machine and provided on the flash drive you'll find along with the sheet titled "IMPORTANT INFORMATION – READ THIS FIRST." The plug-in is designed to work with CorelDRAW versions 11 and later, including X3, X4, etc., running on Windows 2000 and later operating systems. CorelLASER supports/imports the following file types: CDR, AI, DXF, DWG, WMF, EMF, EPS, PSD, PLT, SVG, JPG, PNG, BMP, GIF, PDF, PCX, JPG and TIF.

**Please note: CorelLASER software is not compatible with "Home" and "Student" versions of CorelDRAW.**

CorelDRAW must be loaded onto the computer before CorelLASER can be downloaded (the user needs to supply the CorelDRAW program). To prevent unauthorized use of CorelLASER, a USB "key" is provided with the LaserKnife 2525. After the software is in place, be sure to plug the key into a USB port on your computer or CorelLASER will not be accessible. A warning message or window will pop up in case you forget. Don't lose the key!

**Note: To assure cutting accuracy, place/draw an object on the sheet, then verify that CorelDraw>File>Export>Page>Plotter Units=1000.**

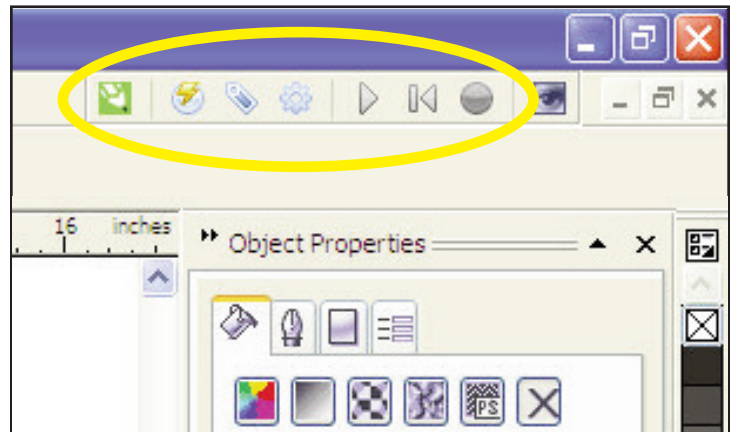
### CorelLASER Installation

**Please follow the software download sheet included elsewhere in this manual.**

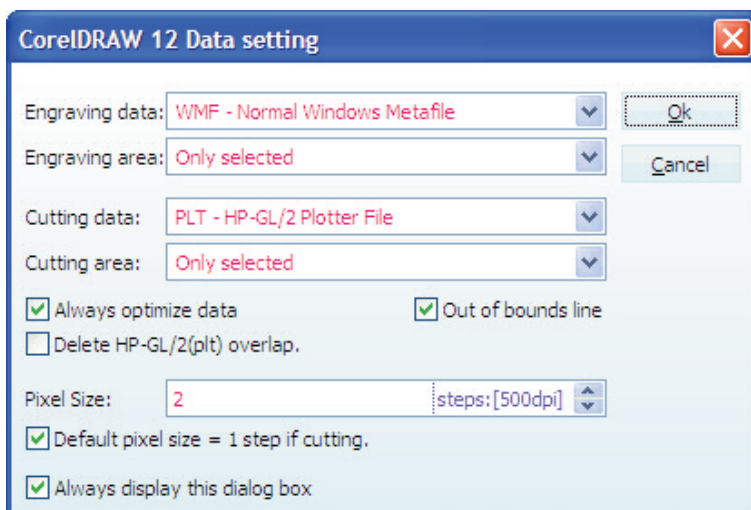
After the software is downloaded to your computer, you'll need to reset or confirm certain settings of CorelLASER so that the computer can communicate with and control the LaserKnife 2525. Proceed as follows:

Insert the USB "key" into a USB port on your computer.

Start CorelLASER (give it time to load) and you should ultimately see the CorelLASER controls in the upper right corner of the Corel window...just below the blue bar. This means CorelDRAW is open and functioning and the CorelLASER plug-in is operating.



Click on the green pencil  (the bubble should say CorelDRAW setting) and a window will open that looks like the following:




For the initial use of the LaserKnife 2525, we suggest you use the pull-down menus to choose settings that match those at left. Later, you can change the settings based on the type of files you are using, and whether or not you want the machine to engrave/cut everything on the page or only what you have selected.

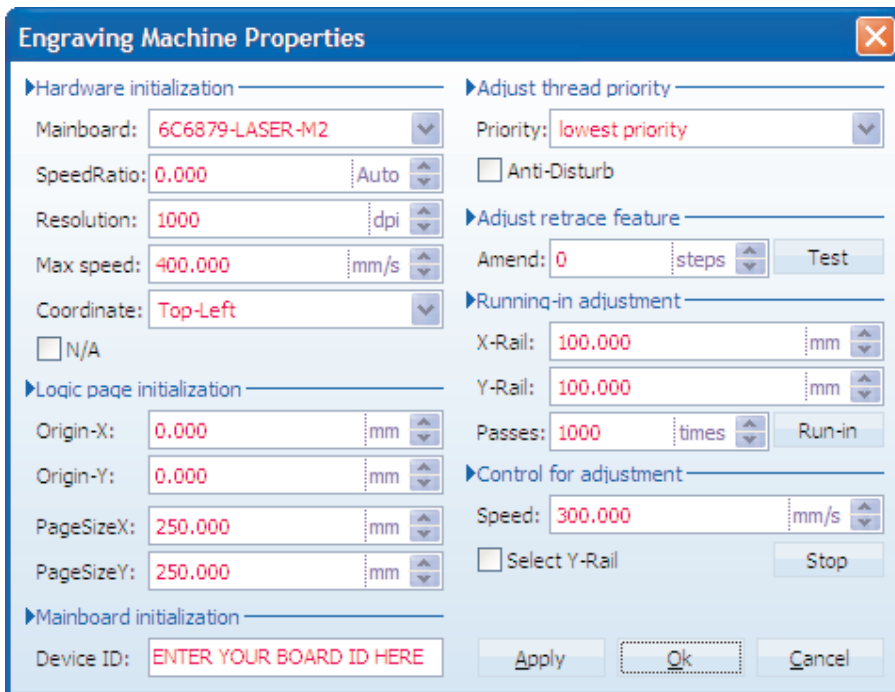
You can later experiment with the effects of changing the various settings... a rather fun exercise!

Click OK to accept and save.



## Software Set Up (continued)

Next, click on the gear icon  (third to the right of the green pencil you clicked on before). You should see a window that looks like the following:



Check the settings, and use the pull-down menus to change them to what's shown at left.

Notice the field in the lower left corner ... "Device ID."

**IMPORTANT: You'll need to enter your specific machine identification number in this field.**

This number can be found on a label located above the opening in the machine cabinet through which you plugged in the USB cable. If you do not enter or replace any existing number with the correct ID, the machine will not respond to the computer commands. For future reference, take a moment now to write the machine ID number on the following line:

ID: \_\_\_\_\_

**WARNING! You must be certain that the PageSizeX and PageSizeY are set to a maximum of 250.000 mm as shown above.**

A higher setting will cause the machine to run the carriage into the end stops and may damage the machine. A lower setting will do no harm, other than restrict the overall size of the image you will cut or engrave.

Be sure to click OK to accept and save your settings. If so instructed, "X-out" and then restart the CorelLASER application to activate the new device ID and initialize installation of the software.

## Let's Try Cutting Out Some Parts

OK, now it's time to open a drawing file and cut out some parts. We've included a couple of simple sample files to get you started.

In the upper left corner of the CorelDRAW window, click on File, then Open. Navigate to LaserKnife demonstration files, double-click and select Laser Cut HO shanty Demo by double-clicking the file name. A set of wall outlines should appear. (Notice that additional CorelDRAW functions also appear). Click on an object line, hold the mouse key down, and drag the image to a location near the top of the page. Release the mouse button. If the object stays selected (black squares appear around the outline), don't touch it. If it is not selected, click on an image line to do so. Because of previous settings to cut "only selected," you need to select the image, which we've grouped together for you, for the machine to accept for cutting.


**Tip: You can also "select all>objects" under Edit.**

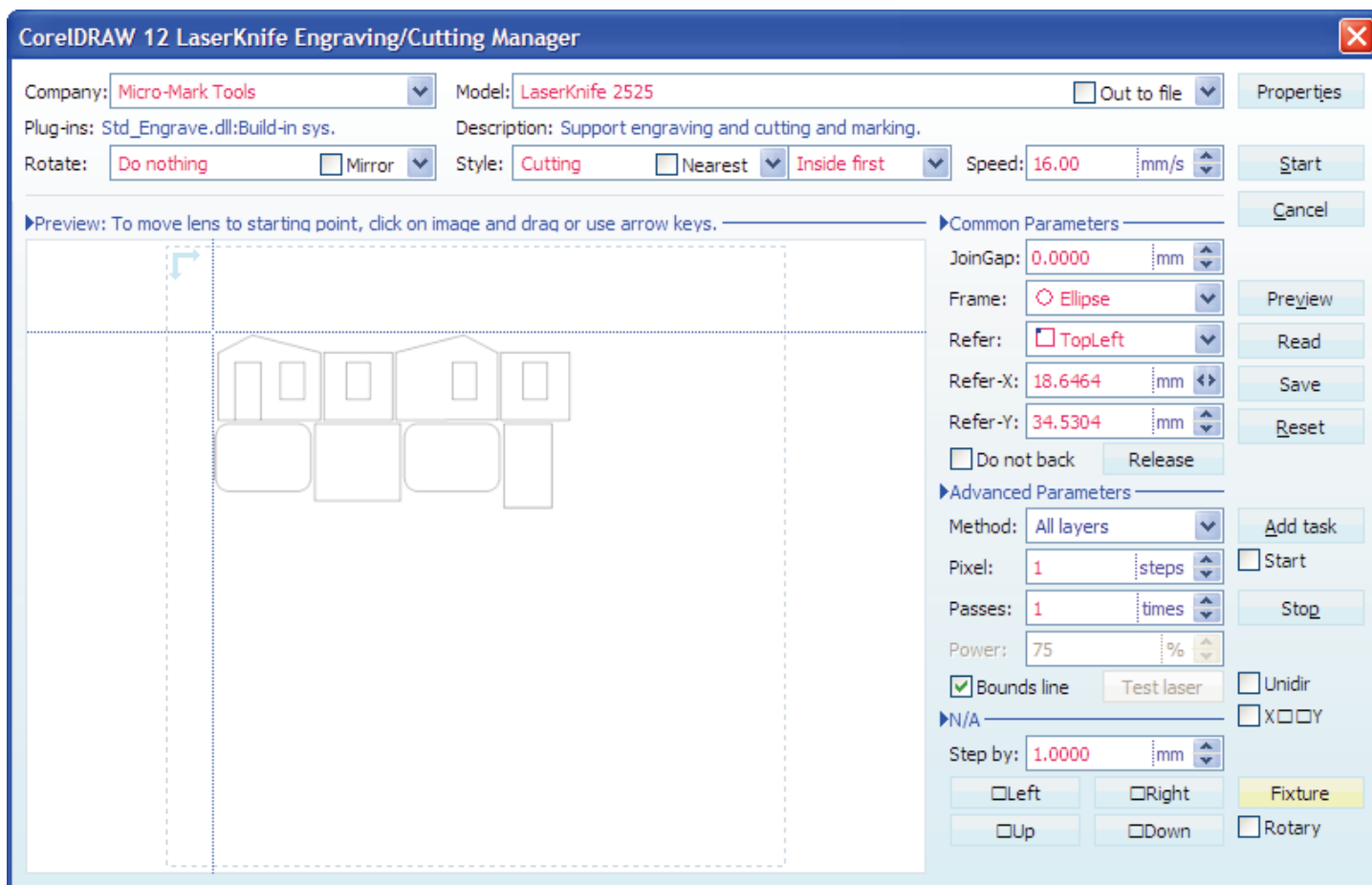
Turn ON the LaserKnife Master ON-OFF switch and verify that the water is flowing by lifting the return water line out of the water in the bucket and visually checking for flow. If water is flowing, place the return tube back under the water. If no water is flowing, correct the problem before continuing.

You may also turn on the chamber light using the lighting switch on the control panel.



## Let's Try Cutting Out Some Parts (continued)

Now...With the image selected, click on the icon  to the left of the gear in the upper right corner of the main window (callout says "cutting"). Click OK on any windows that pop up until you arrive at the following screen...the Engraving Manager.



**Tip: The Refer-X and Refer-Y settings will vary from the screen shot above based on the location of the starting point (the intersection of the cross-hairs...see below) for the laser head.**

**Tip: There are a few places where the Page Size can be entered. One is on the CorelDRAW main screen, so that you can see the outline of the material you will be using; the other is in the CorelLASER Machine Properties screen. To prevent placing objects "out of bounds," match the settings, and in no case should either dimension exceed 250 mm (9.84 inches).**

**Tip: The Common Parameter "Release" button allows the lens to be pushed by hand out of the way. Make sure power to the laser is off before doing so. See the safety instructions if you are not sure how to do this, or see below.**

**Tip: The "Do not back" button determines whether or not the lens will visit the origin position after the job is complete. Make sure to check this when making multiple passes.**

Make sure the "cutting" switch on the machine control panel is set so the button is popped up (which is the OFF position) and that the current dial is turned all the way to the left (minimum) position. Although the cabinet lid has a safety switch, we like to make sure the laser cannot fire while you're loading material to be cut or engraved.

## Let's Try Cutting Out Some Parts (continued)

For the initial test, let's load a piece of the provided 6" x 9" chipboard onto the honeycomb platform as shown below; that is, all the way to the left edge, and centered in the lens' range of motion from front-to-back.

**Tip: We put a couple of dots of white paint on our platform frame to help reload subsequent chipboards in the same location. This will avoid having to reset the starting crosshair position. You may prefer to use a couple of the supplied magnets along the bottom edge of the piece as a location guide.**

Use the provided magnets to hold the chipboard tight to the platform so that the laser stays focused.

Notice the tiny red dot projected onto the chipboard. This is not the laser beam. This is an LED marker that shows where the laser beam is aimed. The laser beam will ultimately be seen as a bright white flash of light.

Close the lid. Turn the dial to the half-way position and depress the "cutting" switch to its down position (this allows the laser to fire). Now, quickly press and release the "Test" button. Notice the burst of white light that the laser fires at the chipboard. The little burned-through spot should align with the projected red dot. If not, turn off the cutting switch and current dial, then reach into the chamber to adjust the projector/LED housing so they are aligned when you again perform a test fire. In this way, you'll be able to pinpoint the starting point of the laser.

Going back to the computer screen...

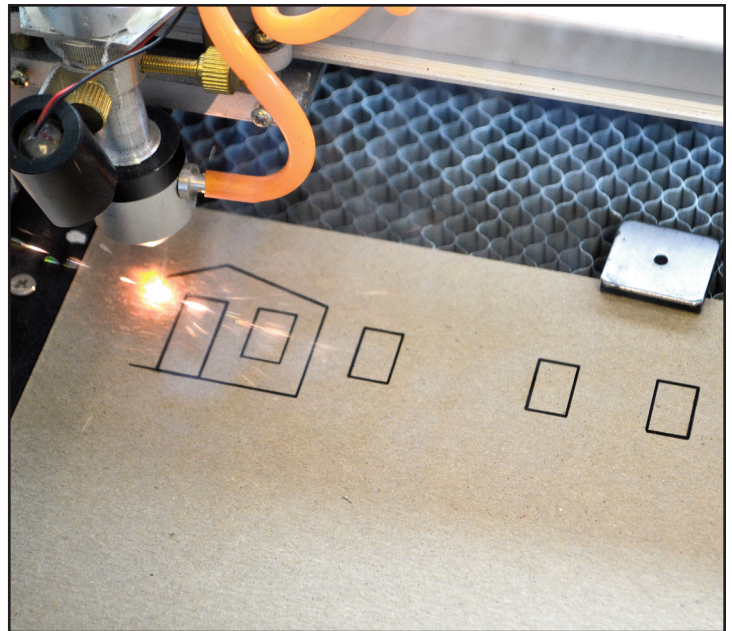
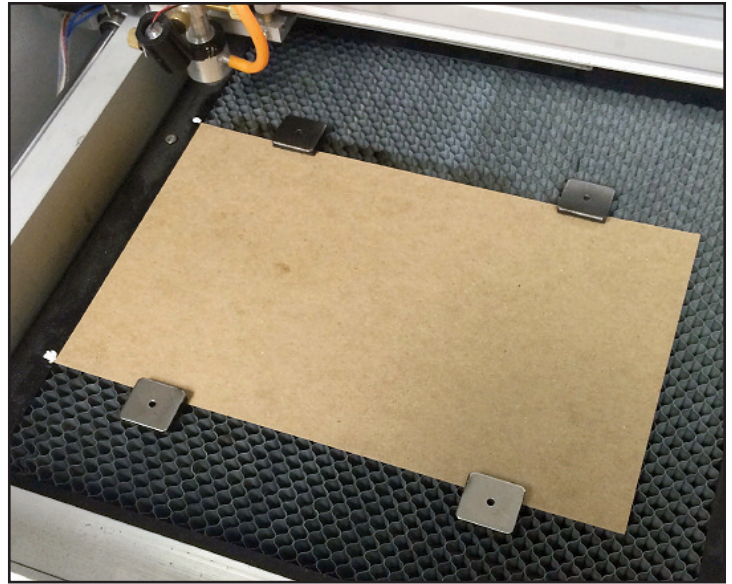
In the upper left corner of the object image, two dotted cross-hairs will be visible.

**Tip: Depending on the type of monitor and its resolution settings, small objects may appear as white outlines, which you can see if you move your head to the side a bit.**

You can click and drag the image to locate the cutting head (the lens) in a good starting spot on the chipboard (you should see the carriage move inside the machine) so that the entire image can be cut out without running off the board or across the magnets. If you think you're in a good location, click on "Starting" (under the Properties button . . . if you forgot to install the USB "key," you'll be reminded right here) and let the machine go through the cutting routine (while the laser is still off). Watch the red pointer to verify the correct travel. If the start position is okay, then at the end of this "dry run," depress the "cutting" button to its down position, and turn up the dial to about 1/3 full current. Then, click on "starting" again and the machine should cut out the parts.

If all went well, and you have the sound turned on, the computer will play a "TA-DA" when the cutting operation is finished. Congratulations!

Remove the parts and the sheet. We suggest using a vacuum cleaner to clean out stray cuttings from the cabinet.



## Let's Try Cutting Out Some Parts (continued)

Now, if you want to make parts to assemble into a real scale model, substitute the provided piece of scribed siding (use the 1/16" spacing for HO, 3/32" for O scale) for the chipboard and cut again, but use a setting of about 60% of full current for the thicker wood sheet.

Hint: Use the "release" button on the Engraving/Cutting Manager window to release the carriage for movement by hand with the laser turned off as described above. **DO NOT FORGET TO TURN OFF THE LASER AND TURN THE CURRENT TO ITS LOWEST SETTING BEFORE REACHING INSIDE THE CABINET!** You can now slide the lens left and right while watching the alignment of the red pointer with the scribed lines in the sheet of wood; otherwise, the scribed lines will be angled on the building.

With everything lined up, loaded and locked, cut out the parts.

If the parts did not cut all the way through, you need to turn up the current. If they are too energetically burned through, cut back the current. It'll take a bit of trial and error to learn the best settings for the various kinds of materials. Remember...you can always cut again, so build up the current slowly, rather than start out too high.

An O scale version of the shanty is included.

You'll have to tinker a bit with a few of the settings and positioning of the materials, but you should have been quite successful at this point. (Note: We've created and provided a Level Fixture drawing file that you can cut out yourself and use to help keep materials aligned while laser cutting.)

Turn off the laser. Remove the parts and remainder of the sheet from the cabinet...if the remainder of the sheet has room for more parts, go back to the object design screen and select only the parts you want. Then, position the pointer where to start and go again.

This is a good time to experience the ease at which you can make changes. For example, on the drawing, click on the rear wall outline and then press Ctrl+U on your keyboard to Ungroup its features. Click the window on the rear wall drawing and press Delete on your keyboard. Select the rear wall and cut again in a blank spot on the material. The window opening is no longer cut into the wall! For another example, try dragging the window to a different location, or change its size, and cut again.

## Let's Try Engraving


***To see a video demonstration the LaserKnife making an engraving, go to  
[www.micromark.com/MLX-LASERKNIFE-2525](http://www.micromark.com/MLX-LASERKNIFE-2525) and scroll to the bottom of the page***

Ready to try engraving (an image burned into the surface of the chipboard)? Then, follow along...

Load another sheet of chipboard into the chamber and again use magnets to hold it down to the platform.

Use file/close to wipe the page clean of the shanty drawing, then import the file called EngravingDemo.jpg

Drag the protractor icon to create a box about 3.5" wide. Then release the mouse button. You should see an image of a

trolley car. Click on the engraving icon  (first one to the right of the green pencil icon). Click OK to get to the Engraving Manager window. Notice that the settings have changed to those that are better for engraving (the speed is higher and the style has changed to engraving). Make sure "Sunken" is checked.

Position the pointer same as before so the image will engrave into the surface of the chipboard. Use the Test button to set the current knob to about 4 mA, and click on "starting." The carriage should oscillate left and right about 10 times faster than the cutting speed, and slowly travel back-to-front while the image is engraved. If the laser beam is cutting through the material, reduce the current. The picture may take many minutes to completely engrave, so be patient!

At the end of the job, the machine will stop. TA-DA! You've engraved an image.

You can now use the software controls to change the image contrast and engraving settings for the picture you're engraving and for the material on which you're engraving it. You may also un-check the "Sunken" box and see how the image changes. If the material changes in thickness, don't forget to re-focus the lens (see instructions shown later in this manual).

**There you go! Mastering CorelDRAW is up to you, but basic shapes are quite easy. Of particular benefit is the ability to resize parts for perfect fit, and duplicate them for multiple cutting...like a row of windows.**



## LaserKnife 2525 Tips & Tricks

### **WARNING!**

#### **NEVER REACH INTO THE CUTTING CHAMBER WHEN THE LASER BEAM IS IN AN ACTIVE STATE OR COULD SUDDENLY BE ACTIVATED BY MACHINE SOFTWARE.**

- Laser cutting is defined by vector-based objects (example file type .cdr). Laser engraving is defined by raster-based images (example file type .jpg).
- Vector mode moves the laser beam in continuous straight lines, at many angles. Raster mode scans the image area, moving the laser beam back and forth, firing at points where the image should be, to construct the image out of a matrix of dots.
- Setting the CorelDRAW Default style to HAIRLINE, NO FILL, BLACK color will save a lot of work and avoid aggravation.
- Hairline is a CorelDRAW setting. It tells the laser beam to ignore line width and make only one pass (see next paragraph, as well). If your CorelDRAW line width is set wider than Hairline, then the laser will make multiple passes in an attempt to cut a wider line. Also, if the object has a fill, the laser may try to make the fill, as well; this comes in handy to cut patterns at low power into the surface of the material.
- Cutting and engraving line widths are highly influenced by the laser power, speed of cut, workpiece material and thickness. You will need to determine the best settings through trial and error...experience being the best teacher.
- In the Engraving/Cutting Manager window, under Common Parameters, Frame indicates the outline shape of your engraved image.
- If Unidir is unchecked, the laser will cut in both directions (back and forth). If it is checked, the laser will cut in only one direction.
- If your laser cuts the same line repeatedly instead of moving to the next object, it's usually because the object line width is set to other than HAIRLINE, or the object has a fill of some kind. Also, verify the CorelDRAW Data setting screen has the Cutting data setting as PLT – HP-GL/2 Plotter File
- Colors other than black will cut or engrave differently based on color. You'll need to experiment to find out.
- Use magnets to hold thin material flat on the laser bed plate. Positioning magnets around the edges of the material and in the center, as well (obviously avoiding the cut lines), will help hold the material from shifting after being cut. Adding "frets" to the drawing will keep parts from shifting or dropping out. See instructions elsewhere in this manual.
- Thick materials cut best in multiple passes.
- When cutting plywood, the best results are usually obtained by using a faster speed, lower power, and multiple passes. This avoids overheating the glue inside the plywood, which would then stick itself back-together.
- Acrylic (Plexiglas) cuts very well. Protective film does not have to be removed. Cutting acrylic produces some noxious fumes, which should be exhausted from the cutting chamber with the cabinet lid closed for 30 seconds after cutting is completed.
- Avoid cutting PVC or any chlorinated plastic. These materials give off chlorine gas, which is VERY DANGEROUS to the user, bystanders, and the machine itself.
- Styrene sheet may be cut cleanly using low power and multiple passes. If the power is set too high, the material may melt at the cut line and weld itself back-together.
- Gatorfoam cuts very cleanly, but the foam enclosed by the wood veneer may shrink from the cut line.
- In CorelDRAW, change the document size to match the LaserKnife 2525 bed plate, which is 9.8" x 9.8".
- The laser cutting process produces smoke and very fine ash-debris, which eventually accumulates on the lens and mirrors. Occasionally, clean these machine elements GENTLY with a cotton swab and alcohol (70%).
- Exhausting smoke from the cabinet is important to reduce odors and contamination of the workshop. Make sure the exhaust system is free of debris and blockage that would reduce air flow and/or cause a fire. Let the smoke clear before opening the cutting chamber lid.
- Blowing smoke and debris away from the cutting location is important to obtaining good results. Make sure the air pump is working properly.
- Experiment with contrast settings for the picture you're engraving to see how it affects the resulting image. Adjust the laser current and speed to produce the best image or cut line width. Experiment to learn what works best for the variety of images and materials you're using.
- Do not go near the red wire feeding the laser. It is pressurized to about 22,000 volts and can cause bodily harm.
- The machine must be connected to a GFI protected power source.
- Be sure the laser machine is electrically grounded by attaching a wire between the machine cabinet and a household ground, like a water pipe or ground connection in a wall outlet.

## LaserKnife 2525 Tips & Tricks (continued)

- If the thickness of the material you're engraving or cutting changes, re-focus the lens. Set it for the mid-point of the thickness you are going to cut. Obtain a scrap piece that is half the thickness of the material you will be cutting and place the focus gauge on top of that. Check the focus at various points on the bed plate. If the variation from one point on the bed plate to another is excessive, remove the bed plate (4 screws through the frame) and shim as necessary to minimize the variation.
- The location of the starting point of the cutting process, and typically of the object to be cut, is in the top-left position, but can be reset by software.
- Tiny parts may fall through the honeycomb bed plate. Be sure to draw duplicate parts in various locations so that some will remain. After cutting, you can collect them with a piece of tape before removing the larger parts from the bed plate.
- A vacuum cleaner makes fast work of cleaning scraps out of the cabinet. Adding "frets" to the drawing will keep parts from shifting or dropping out. See instructions elsewhere in this manual.
- When designing a rectangular hole for fitting a plastic window, use scrap material to test the hole size before cutting good material.
- Use the red LED pointer to align materials when placing them on the bed plate. With the laser deactivated, move the lens left-to-right and back again to check the placement of the material. A RELEASE button can be clicked in the Engraving Manager window to allow lens movement if otherwise restrained by the system drive belts/motors.
- If you will be cutting multiple pieces of material in the same pattern, devise a little fixture to position new pieces of material when loading the cutting chamber. (See our web site for a sample file). You can use the provided magnets as stop blocks, or use them to hold a fixture in place.
- Be sure to save your drawings in the CorelDRAW version you are using.
- Many helpful techniques and tips can be viewed on the internet at [www.engrave.ca](http://www.engrave.ca) and other informative websites.
- Bubbles in the cooling water line could cause your laser tube to fail prematurely. Make sure the water is flowing strongly and no bubbles are present when using the laser.
- The temperature of the cooling water is not critical and does not have to be maintained between a lower and upper value; however, to avoid a thermal shock that can cause the glass tube to crack, it is a good idea to check that both the laser tube and the water are AT ROOM TEMPERATURE when you start the water pump. If you're using the laser at high power for an extended period of time, DO NOT allow the water to get so warm that it no longer cools the laser tube. NEVER add ice to the water, and DO NOT allow water in the laser tube to freeze. To avoid reducing laser tube and power supply life, we recommend that you let things cool off a bit after extensive high power use. There are too many variables involved here to give you specific facts and figures and settings as guidance. So, some personal judgment will be required during machine operation.

## Creating "Frets" for Laser Cutting Using The CorelDRAW Eraser Tool

Frets are little bridges in the cut lines that keep parts from falling out of the sheet. Frets can be any size you like, and you can place them wherever you desire. For scale model parts, we usually make the fret about .025" wide.

Having the frets is handy to the guy who manufactures kits; in that way, he can be sure that all the parts are in the sheet and packing the kit is easy.

For the model maker, the frets can be a pain. You have to cut through the fret to release the part, then sand off the nub that remains; however, cleaning all the pieces out of the machine is also a pain...especially if they're small. You sometimes can use a piece of masking tape to pick them up.

Frets are especially handy if the parts are tiny; it keeps them from falling through the platen. They're also handy to keep the "donut holes" from falling out of the donuts, like when cutting out text...the letters A, P, Q, B, O, etc.

### ***Here's how you go about adding frets to your laser designs:***

- Draw your outlined shape (object) with CorelDRAW.
- Select the object you've drawn and navigate to Arrange>Convert to Curves; this breaks the object up into individual pieces.
- In the Object Properties tab, uncheck "Close Curve" and click the Apply button. (Do not miss this step!).
- Select the eraser tool, and set the desired width and shape of the fret (round or square; square is recommended for most applications; suggested width to start is .025").
- With the object selected, drag the eraser tool through the shape's outline where you wish to place a fret; the outline will now appear broken.
- Repeat as needed until all frets have been added.
- Proceed with cutting as usual.

## Frequently Asked Questions

### What is the typical life of the laser tube?

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The life expectancy of the laser tube depends on the amount and kind of use it gets, and, in particular, its power setting. When used carefully at “normal” power (50% of maximum current) and with proper cooling water circulating through the tube, the laser tube is expected to last for several hundred hours of cutting time. Replacements are available from the Micro-Mark product service department; installation is the responsibility of the purchaser.

### If the laser tube is replaced, or the machine experiences strong shock and no longer cuts properly, is there a fix?

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Yes. Most-likely, the laser tube and/or mirrors have shifted from the original factory alignment and the mirrors will need to be re-aligned to direct the beam properly to the lens. See the attached procedure for doing so.

### Will the machine cut plastic other than acrylic?

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Yes. Acrylic (sometimes sold under the trade name Plexiglas) cuts best. Other plastics, including styrene, can be successfully cut by taking multiple passes (repeats) at low power settings and faster speeds to avoid melting the plastic so that cut lines weld back together.

### Can I cut thick materials?

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Yes, you can, but we recommend you do so in several passes (sometimes called “repeats”). CorelLASER software (supplied with the machine) has a provision for making multiple passes. We’ve successfully cut ¼” thick cherry in 6 passes. We suggest you avoid too high a laser current so that the life of the laser tube is not compromised.

### The lens sometimes moves to the extreme right side and/or front of the chamber and goes “bump-bump-bump.” Will this damage the mechanism and how do I prevent this?

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Verify that the settings for the Engraving Machine Properties Logic Page Initialize are set as follows:

PageSizeX: 250.000 mm

PageSizeY: 250.000 mm

If the settings are larger than these numbers, the software thinks the machine is larger than it really is and tries to send the carriage beyond its mechanical limits. If the machine goes bump, immediately turn off the power switch. If this happens just after you have turned on the machine and the lens is traveling to “home,” check that the micro switch in the right rear of the cutting chamber is not blocked by the air line or debris.

### My machine will not respond to the computer. What’s wrong?

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Most-likely, the Device ID entered under machine properties does not match the number on the CorelLASER PCB located in the electrical chamber. Check the label on the outside of the cabinet by the USB port. Also check that the USB cable is still connected properly and the machine is powered-up.

### Cutting does not match the drawing...especially with repeated shapes all in a row. What’s wrong?

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Usually, the cutting speed is set too high on the Engraving Manager window and the computer cannot keep up with the machine. A good starting point is 16.00 mm/s (millimeters per second). This gives the software enough time to manage the lens position and move it to the next place properly. Use scrap materials or paper to test how high the speed can be set for the design you’re cutting. Also, smoother cuts are obtained with slow speeds, but reduce the power to avoid burning the material.

### When I click on Cutting or Engraving, nothing appears on the Manager window. Why?

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If your setting is for “Only Selected,” you have to click on the object you want to cut or engrave to get it to appear.



## Frequently Asked Questions (continued)

### **The machine cuts in a wild pattern...more like the way I drew it, rather than taking an efficient route. What can I do to improve this?**

In the Manager window, select Style of "Shortest route."

### **I want to move the carriage out of the way so I can load and unload my workpieces. How do I do that?**

First, make sure the laser current switch is turned all the way counterclockwise; then make sure the cutting switch is popped up. Then, in the Manager window, click on "release" and wait a few seconds. The carriage is now free to move. Before starting up the machine again, it's a good idea to move the carriage back to its position before you moved it so it can index to the starting point without much trouble.

### **When I cut materials of different thickness, the cutting or engraving isn't as "sharp" as it should be. Can I compensate for this?**

The lens can be shifted up or down to accommodate workpieces of different thickness. See the attached instructions for setting the lens position (focus). Also try reducing the laser current.

### **Must I draw the location of every hole I want to cut?**

No. Draw just one hole. Then, on your material, mark the starting point of each hole you want to cut. Place this mark under the red dot and make the cut. Move the material, then cut again, and so on...

### **When making multiple passes, the cut lines are not in exact registration**

For best registration, be sure "Do Not Back" is checked.

### **The engraved image is too light or too dark. What can I do to improve this?**

Experiment a bit on scrap pieces to find the right combination of speed and laser current for the material you're cutting.

## Beyond "The Basics"

**Tip: Learning the following CorelDRAW functions in the following order will help you to rapidly make great use of the LaserKnife (see the Help menu for instructions):**

- |  |  |                                     |
|--|--|-------------------------------------|
| • Setting page size                          | • Making sure objects are not filled               | • Duplicating objects               |
| • Setting hairline as the default line width | • Grouping/ungrouping objects                      | • Aligning and distributing objects |
| • Drawing and sizing a rectangular shape     | • Drawing and sizing an elliptical/circular object | • Rotating objects                  |
| • Selecting objects                          | • Deleting objects                                 | • Zooming the view                  |
| • Dragging objects to locate them            |  |                                     |

Cutting curved shapes, even complex ones, and objects with very thin sections, such as model window sash, can be accomplished quickly and accurately; certainly beyond that which can be cut with a standard modelers' knife.

In addition to the sample files provided on the flash drive, many other drawings are available on the internet for free download.

Refining the use of the LaserKnife 2525 goes beyond the intent of these instructions, but we hope that you will share your designs with us. We hope to collect and share, over time, an assortment of fantastic drawings that Micro-Mark customers can use with their LaserKnife 2525.

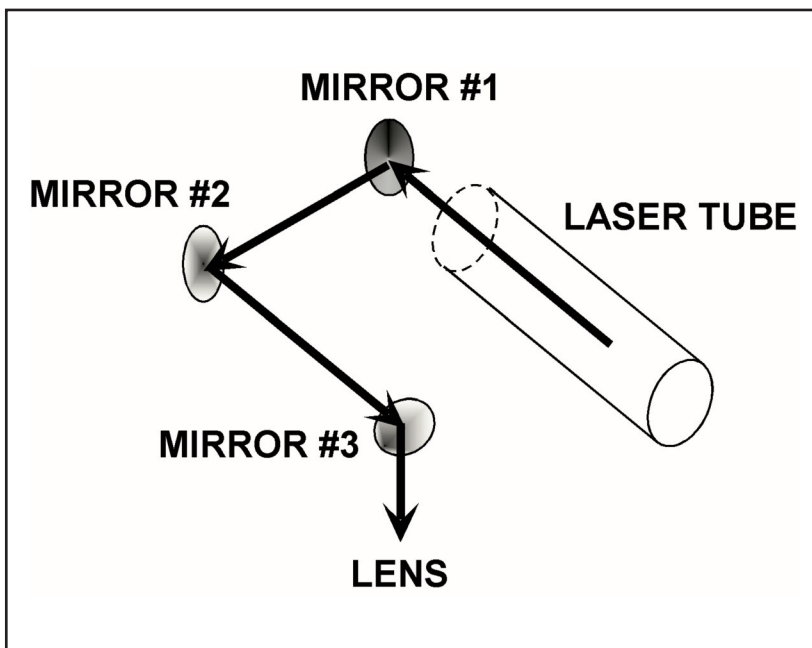
## LaserKnife 2525 Machine Adjustments

### Adjusting the Mirrors

**Note: This machine employs front-surface mirrors...that means the reflectors are NOT protected by a glass surface and can be easily damaged. Consequently, the mirrors (and, additionally, the lens) should not be touched with tools or fingers, and should be gently cleaned only with very soft cotton swabs and a gentle solvent, like alcohol (70%).**

There are 3 mirrors that must be angled properly to direct the laser beam into the center of the lens. We shall refer to them as mirrors #1, #2 and #3, as in the diagram to the right. **Note: if the lens is ever removed for cleaning, please re-install it with its *curved side facing the mirror* and its *flat side facing the workpiece*.** The curved side can be identified by looking at your reflection in the lens from 10" away; if you see your entire face, that is the curved side. Make sure to point this side up and towards yourself when re-installing the lens in the holder.

Mirror #1 is located in the chamber containing the laser tube, and is located in the rear left corner of the cabinet at the output end of the laser tube. It does not move during machine operation, but its angle can be adjusted. This adjustment is needed usually only after the laser tube has been replaced, but it may also be required if the laser tube shifted position during transport.



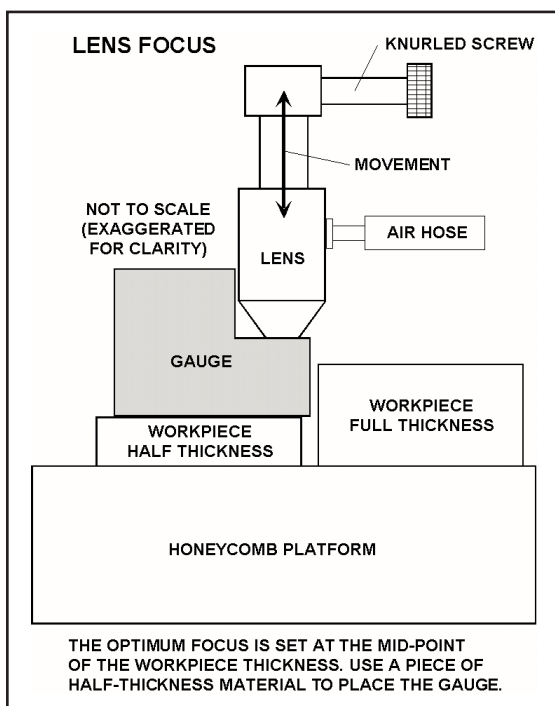
Mirror #2 is located at the extreme left end of the carriage and, during machine operation, travels forward and backward with the carriage.

Mirror #3 is located above the lens and moves from left to right on the carriage.

The beam travels from the laser output into Mirror #1, where it is directed to Mirror #2, and subsequently to Mirror #3, which directs it downward through the lens. Carriage movement provides beam access to the entire surface of the workpiece. The control circuit and computer software turn the laser on and off at lightning speed and control the precise movement of the carriage to precisely place the cutting action. For best performance, the mirrors should be angled to center the beam on each mirror, no matter to which location the lens has been moved.

The mirrors are to be adjusted in sequence: first #1, then #2, and finally #3. The basic procedure works as follows: Tape a piece of paper (preferably the heat-sensitive type used in certain calculators and register receipts) directly in front of the mirror; do not get any tape adhesive on the surface of the mirror. With the lid closed and the power turned very low, quickly press the "Test" button momentarily to fire the laser. Adjust the power until you get a very small mark on the paper. Note the position of the mark with respect to the mirror outline and adjust the angle of each mirror, in sequence, using the jack screws and lock nuts (lock nuts are present on mirror #2 only) located on each mirror's housing...you loosen the lock nuts (when present), turn the jack screws to shift the beam, then repeat until the beam is located somewhat near the center of each mirror, no matter where the carriage is located; then, slowly/gently tighten the lock nuts and check again. Note: Jack screws press in opposite directions to each other to hold parts in the desired position; loosen a screw so that the screw on the opposite side can be adjusted in a quasi push-pull arrangement. Make very small adjustments; the beam angle will shift quite a bit with even the smallest change in mirror angle. Check the beam location repeatedly with the carriage in multiple positions around the inside of the cabinet. Note: Start with the lens holder in the rear left corner and then check again with it in the front right corner. With power off, the carriage will move by pushing it gently. It will take multiple adjustments until all is well. This will assure full laser output is reaching the lens and, subsequently, the surface of the workpiece.

## Adjusting the Lens Focus

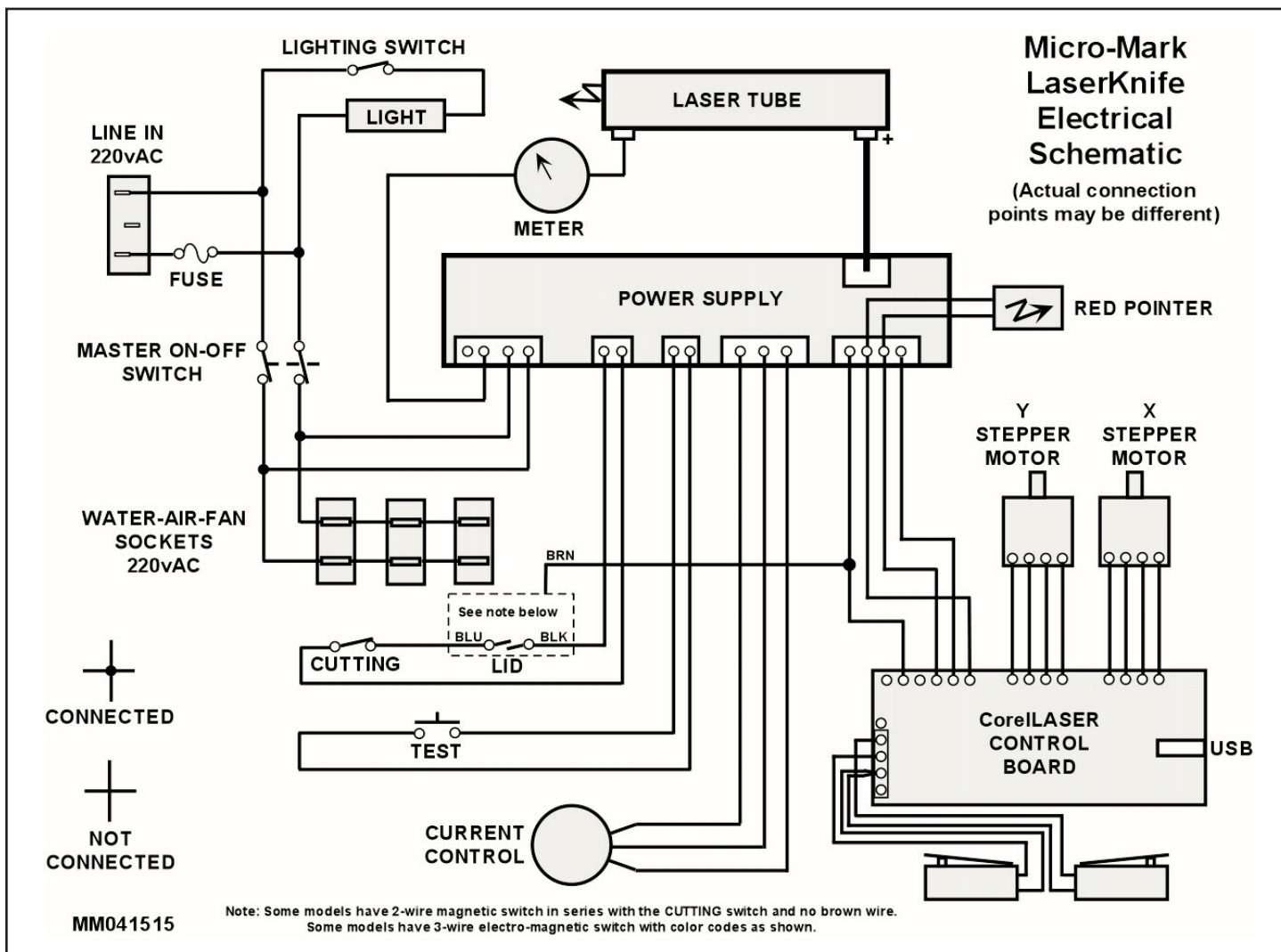


Laser cutters/engravers work best when the lens is focused properly. A clear plastic gauge has been supplied with the machine. It helps you set the proper distance between the bottom of the lens and the surface of the workpiece for optimum focus (see below for details). To reposition the lens, loosen the knurled screw and gently lift or lower the lens housing. Re-tighten the screw to hold the lens in place. Be sure to adjust each time you change material thickness.

For **engraving and for cutting thin materials**, use the gauge to set the distance from your workpiece's top surface.

For **cutting thick materials**, use the gauge on top of a piece of scrap material that is half the thickness of the material you intend to cut. Then adjust the lens position as above. The illustration at left shows this situation.

When cutting or engraving **very thin materials**, you may not be able to lower the lens far-enough to satisfy the focus gauge measurement, and the brass lock screw may not engage the lens barrel properly. In this case, simply put a piece of flat scrap material (perhaps 1/4" thick) under the workpiece to raise the top surface to a more-suitable position for focusing the lens.







## DETAILED INSTRUCTIONS FOR LOADING LASERKNIFE SOFTWARE

*In the following instructions, please note that a distinction is made between CorelDRAW and CorelLASER.*

### How the Software Works

The MicroLux LaserKnife is controlled by a program called CorelLASER, which is a plug-in that adds functionality to a drawing program called CorelDRAW. CorelDRAW is available for download through various internet sources or by purchase from a computer software dealer. CorelLASER is compatible with CorelDRAW versions 11 or later ("Home" and "Student" versions of CorelDRAW are not compatible). Install CorelDRAW on your Windows 2000 (or later operating system) PC before proceeding with the CorelLASER plug-in installation.

The CorelLASER plug-in is included with the purchase of the machine and is provided on the flash drive you'll find along with the sheet titled "IMPORTANT INFORMATION – READ THIS FIRST." The LaserKnife cartons include a "key" that you insert into a USB port on your computer; CorelLASER will not send control signals to the LaserKnife unless this USB key is inserted.

You create your object drawings in CorelDRAW (you can also import images from other compatible programs) and save them, usually as a .cdr file for a drawing or a .jpg for an image, like a picture. Then, when you're ready to cut out your objects or engrave a picture, start CorelLASER, open the saved file, open the Engraving/Cutting Manager window and run the LaserKnife.

### How to Prepare CorelLASER for use with the LaserKnife

Copy the files from the flash drive onto your desktop.

Navigate to the file labeled CorelLASER XXXX.XX.exe and double click to launch. (Note: The X's represent release dates shown in the file name).

Click OK for the English selection.

Follow the on-screen instructions for installation. Be sure to install CorelLASER in the default 3WCAD folder.

After installation, when you start CorelLASER, you may see a window advertising other CorelLASER-type products. Just close this window.

Micro-Mark programmers have created a few revised CorelLASER operating files to make the program more user-friendly. To incorporate these files, please do the following:

Navigate to Start>MyComputer>Local Disk (C:)>ProgramFiles>3WCAD>CorelLASER>Languages

Right-click English.ini and Select Rename. Type EnglishOld.ini and press Enter. Leave this window open.

Navigate to the file labeled English.ini (located within the CorelLASERMasterFiles folder which you copied onto your desktop) and drag the English.ini file into the Languages window you left open. Release the mouse button. The English.ini file should now appear in the Languages folder.

Close all the windows.

**CorelLASER is now ready to go to work for you!**