

Lichtenburg Pyrography



- A demonstration by East Slope Woodturning

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The following presentation is for **demonstration only**, NOT intended to be an instructional presentation.

This method is not the only way, and may not be the best way, it is just “my way” of accomplishing the Lichtenburg style Pyrography while paying particular attention to personal safety.

Working with Electrical Devices can be Dangerous.

Do not attempt this activity unless you are aware of the hazards that can exist AND you protect yourself.

Be advised that YOU and YOU ALONE are responsible for your own personal safety.

Lichtenburg Pyrography, System Components

Wood burning with electricity can be accomplished many different ways, this demonstration will show one way to accomplish the task being aware of risks.

A “Typical” Wood Burning System hardware could include the following hardware;

- 120vac power bar
- Power monitor, capable of displaying Watts (I use a Kill-a-watt P3)
- 120 VAC 5amp Variac (varying Low voltage power to transformer varies High Voltage output to probes)
- Two momentary push button hand switches in series with power supply.
- High Voltage Neon Sign transformer, current limiting (typical 9000VAC or 12000VAC 35mA)
- 15 kilo-volt rated flexible wire leads, with alligator clips on ends
- Copper rod probes, mounted in simple shop-made probe holders.
- Electrolyte Solution (Baking Soda, Alum, Borax, KCl, CaCl, MgCl)
- Small paint brush
- Fan

System Set-Up

Set up a work area large enough to set up all the hardware.

Be sure to locate the controls at one end of the work space and locate the work piece at the other end of the work space. A 2' x 4' area or table is sufficient.

1. Clamp the power bar to the table to keep it from sliding around, plug the power bar into a 120vac power supply receptacle or extension cord.
2. Plug in a small fan that will draw any smoke or fumes away from the table area.
3. Plug the Kill-a-Watt P3 or equivalent Power Monitor into the power bar.
4. Plug the Variac into the Power Monitor.
5. Plug the hand switch-board to transformer, into the Variac. (switch-board contains two switches hard wired to the transformer). **Both** need to be pushed **and held** to allow electricity to reach the transformer. For SAFETY **Both** hands are needed to apply power. (it is not safe to make probe adjustment while transformer has power applied)
6. Place a probe holder near the work piece and attach on alligator clip to the probe.
7. Place the second probe holder near the work piece and attach the second alligator clip to the probe.

Electrical System, Assembled and Ready for use.

- The Kill-a-Watt power monitor should indicate the source power voltage, select Watts Function, the reading will be at or near zero.
- Turn on Variac, (Note; the power monitor will indicate a watt reading that corresponds to the energy used just to turn the Variac on, even with no voltage output going to the transformer.)
- At this time if **both hand switches** are pressed, power will be applied to the probes.
- Hardware setup is complete.
- To set up a work piece apply electrolyte solution of choice
- Position probes on work piece where electrolyte is applied
- Press **both hand switches**, one hand on each switch to apply high voltage to probes.

Lichtenburg Pyrography in Action!

Now the FUN can begin!

- In order to successfully create a Lichtenburg figure on a piece of wood, an electrolyte solution must first be applied to the surface of the wood.
- This electrolyte solution provides the conductive path for the electrical current to **try** to flow. There are many readily available electrolyte solutions that will work. Sodium Bicarbonate(Baking Soda) or Magnesium Chloride(common ice melter) is what we will use in this demonstration.
- The solution should be applied and allowed to soak into the surface of the wood. Highly sanded surfaces may not absorb enough solution to burn effectively. A 180 -220 grit surface finish seems to work well.
- Note; Baking Soda may stain some woods slightly, one could consider coating the whole work piece with solution so that any staining or discolouration is more uniform.

Lichtenburg Pyrography in Action!

There are **TWO** hand switches on the power supply, power will be **OFF for all work adjustments** .

- Place probes on the work piece, positioned where burning is desired.
- Note the power monitor Watts reading.
- Push both hand switches and note the watt reading, it shouldn't change much as the Variac should still be at minimum.
- Adjust the Variac up to approximately half range.
- Push both hand switches again and note the power meter readings now.
- There may or may not be any sparking happening on the wood at this setting however the power meter will indicate some current flow. Just because there is no sparking doesn't mean that there isn't some electrical activity going on.
- If you try to move a probe or adjust something the power to the transformer is cut off as soon as you remove one hand. REMEMBER SAFETY FIRST you cannot see electricity, but the reading on the Power Monitor lets you know if energy is flowing.

Lichtenburg Pyrography Electrolyte Solutions

These are some samples of pyrography tests done with electrolytes such as KCl, CaCl, MgCl, Borax, Alum, and Sodium Bicarbonate (Baking Soda). A few tests were done with mixtures of two or more. It is interesting to note that Borax used the least amount of Watts to initiate the burn compared to CaCl which needed the highest Watts to initiate a burn. These tests were done on ¼" alder plywood and results may vary dramatically on other species of wood. MgCl and Sodium Bicarbonate both provided a lot of fine detail.

