



## APPLICATION NOTES FOR USE WITH SPELLMAN HIGH VOLTAGE POWER SUPPLIES

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#### **“Ground is ground”, right? Well, not always. What you need to know.**

Ground is one of those “ideal” things like the “ideal switch” that’s spoken about in engineering school. An ideal switch has all the good characteristics (no losses, zero switch time, etc) and no bad ones. The truth is, ground is only as good as you make it, and only keeps its integrity if you do the right thing.

It’s much easier to start from scratch and create a good ground system than to try to fix a bad one. Grounding problems can be difficult to isolate, analyze and solve. Here are a few tips on creating a good ground system that will benefit both your high voltage power supply and the rest of your system.

A ground system starts with whatever you use as your ground reference point. There are several that can be used: cold water pipe, electrical service conduit pipe, electrical service ground wire, a building’s steel girder framework, or the old fashioned ground rod. Whichever you use; connect this point to the ground stud on the HVPS with a short, heavy gauge wire and appropriate lug. Earth is the universal reference point and by tying the HVPS to it in this manner you will create a good reference point.

The next important ground connection that’s needed is the load return. Whatever current comes out of the HVPS (be it continuous rated current or transient arc current) must have a return path back to the power supply. This path should be an actual physical wire; again of a short, heavy type. With this connection the large transient arc currents will travel in a known path, without influencing other ground referenced equipment.

Just a point of clarification: the “3rd green ground wire” in the AC power line cord is NOT an adequate system ground. This wire is a safety ground not intended to be used as part of a grounding system. A washing machine typically has a metal chassis. If an AC power wire popped off inside and touched against the chassis you wouldn’t want to open the lid and get shocked. Here, the “3rd wire” grounds the chassis, preventing a shock by bypassing the current to earth. That is its function; to be only a redundant safety ground. Don’t rely on this connection as part of your system ground scheme.

Connect all additional system ground references to the main grounding point of the high voltage power supply. Be it a “star” ground system or a ground frame/plane system, attached the ground connection to the power supply main grounding point. Following these recommendations will help create a proper functioning grounding system.