APPLICATION NOTES FOR USE WITH SPELLMAN HIGH VOLTAGE POWER SUPPLIES

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How low can you go? Why signal to noise ratios are important in programming high voltage power supplies.

Virtually all Spellman power supplies are programmable; usually a 0 to 10 volt ground referenced analog programming signal is proportional to 0 to 100% of full scale rate voltage and/or current. Modular supplies typically only accept a remotely provided signal, while rack units also have front panel mounted multi-turn potentiometers to provide local programming capability.

Let's look at two example units, where 0 to 10 volts of voltage programming equates to 0 to 100% of output voltage. The first unit is an SL100P300 (100kV maximum) and the second unit is an SL1P300 (1kV maximum).

If a rather low output voltage of 100 volts was desired, let's look at the level of programming voltage each unit requires.

SL100P300	SL1P300
(100/100,000) (10) = 10mV	(100/1000) (10) = 1 volt

The SL100P300 needs a programming signal of 10mV, while the SL1P300 needs a programming signal of 1 volt to achieve the same 100 volt output.

Noise is present in most electrical systems; it's the low level background signal that is due to switching regulators, clock circuits and the like. Ideally zero noise would be desired, but some amount is present and must be dealt with. In a power supply like the SL Series 25mV of background noise on the analog control lines is not uncommon. Ideally we would like to have the programming signal as large as possible, so the noise signal has the least amount of influence. Let's see how that noise affects the signals of our two example power supplies.

SL100P300	SL1P300
Signal = 10mV	Signal = 1000mV (1 volt)
Noise = 25mV	Noise = 25mV
s/n ratio: signal is smaller than noise!	s/n ratio: signal is 40X larger than noise

It's easy to see that getting a stable, repeatable 100 volt output from the SL100P300 will be quite difficult, while this is easy to do with the SL1P300.

When low output voltages are needed think about the programming signals required and how they compare to the system noise levels. Doing so will provide a stable, repeatable output where noise has minimal effect.