



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

Application Note Number: AN-22

Revision: 04/24/18

### Simple Voltage Mode/Current Mode Testing of a High Voltage Power Supply

#### Issue

The proper and complete testing of a high voltage power supply requires specialized skills and equipment, with safety being the primary focus. Customers with a “questionable” high voltage power supply frequently ask if there is something they can do to simply test the operational capability of a unit in question. The following procedure can provide a quick but limited “kick the tires” to see if the power supply has basic functionality. No special equipment is needed but appropriate high voltage safety skills are required.

#### Safety Warning:

High voltage power supplies are dangerous and can have lethal consequences. Please utilize all safety information provided in the power supplies manual and on the website. If you do not have the skills and high voltage safety qualifications to perform these tests, please do not attempt these tests. If in doubt, contact Spellman High Voltage and return the power supply to the factory for evaluation. Your safety is your responsibility, if there is any doubt in your ability to safely perform these tests...DO NOT TRY TO DO THESE TESTS. Return the power supply to Spellman for assessment.

#### Concept

Virtually all of Spellman’s high voltage power supply have voltage and current programming capability, allowing the unit to function as either a voltage source or a current source. Most people use our power supplies as a voltage source...set the current programming to maximum and adjust and control the output voltage of the power supply. But it is also possible to use the unit as a current source...set the voltage to maximum and adjust and control the output current of the power supply. We can check the functionality of Voltage Mode and Current Mode fairly simply without any specialized skills and equipment. This is just a rudimentary test but it could be helpful in determining basic functionality of a questionable power supply.

#### Voltage Mode

To test the power supplies ability to function in Voltage Mode we are going to run it into an “open circuit”, otherwise known as no load testing. A properly functioning high voltage power supply should be able to make full rated output voltage into an open load condition. For the purpose of these instruction the assumption is the power supply is a full feature rack mount unit. These instructions will work for modular units too, but the programming and feedback signal will need to be measured and interpreted.

Make certain the power supply is properly connected to the input power and grounded as outlined in the operator’s manual. Confirm the power supply is powered off, wait 5 minutes for any residual charge to dissipate and remove the high voltage output cable from the power supply.

Apply input power to the power supply. Turn the power supply into standby (HV OFF). Adjust the current programming to maximum, adjust the voltage programming to minimum. Enable the power supply into HV ON. Slowly turn the voltage programming up. The corresponding output voltage should be displayed on the front panel voltage meter. The word VOLTAGE should be displayed in the fault diagnostic panel, indicating the unit is operating in Voltage Mode. Dial the output voltage up to maximum, the power supply should have no problem making full output voltage into an open load.

Put the power supply into standby (HV OFF). Remove the input power from the supply and wait 5 minutes for any residual charge to decay.

### **Current Mode**

To test the power supplies ability to function in Current Mode we are going to run it into a "short circuit". A properly functioning high voltage power supply should be able to make full rated output current into a short circuited load condition.

We are going to need to use the high voltage output cable that was disconnected in the previous test. This is important for safety, the "load end" (unterminated) of the high voltage cable needs to be connected to the ground stud on the rear panel of the power supply. Only after this is done can you insert the terminated end of the high voltage cable into the rear panel of high voltage power supply. The output of the power supply is now safely connected to ground.

Apply input power to the power supply. Turn the power supply into standby (HV OFF). Adjust the voltage programming to maximum, adjust the current programming to minimum. Enable the power supply into HV ON. Slowly turn the current programming up. The corresponding output current should be displayed on the front panel current meter. The word CURRENT should be displayed in the fault diagnostic panel, indicating the unit is operating in Current Mode. Dial the output current up to maximum, the power supply should have no problem making full output current into a short circuited load condition.

Put the power supply into HV OFF. Remove the input power from the supply and wait 5 minutes for any residual charge to decay. Remove the terminated side of the high voltage cable from the power supply. Next disconnect the unterminated (load end) of the high voltage cable from the rear panel ground stud.

### **Summary**

These two test have shown that the voltage loop (programming and feedback circuitry) is functioning and the current loop (programming and feedback circuitry) is functioning. Because we operated the unit into an open circuit and short circuit we really didn't test the power supplies ability to make power. But these two simple tests can confirm that the power supply has some basic functionality and check proper voltage and current programming and feedback capability.