



Lightning Simulator Technologies

There are four basic types of lightning simulators on the market today. The following is a rundown of the various technologies along with the pros and cons of each. We have also provided a list of questions and issues for you to discuss with potential vendors before deciding which technology is best for you.

VOX – Otherwise known as a voice operated relay, we found one company that has adapted this type of circuitry to lightning simulation. This is the most simplistic of all systems on the market. The circuitry “hears” thunder from a sound track, amplifies the signal and closes a relay. This equates to flipping a light switch on and off.

***PROS** – Extremely low cost to manufacture. Few components.*

***CONS** – Single channel, unrealistic effect (on and off only), noisy relay chattering, usually very expensive compared to the technology involved.*

Strobe Controllers – Electronic switches turn a strobe on and off to simulate lightning. Usually a single channel device, but we recently spotted a 2-channel system.

***PROS** – Bright light, extremely low cost of manufacturing.*

***CONS** – Unrealistic effect (on and off only), strobes have limited lifespan.*

Solid State / Burst trigger – Solid state switching using an electronic component called a triac is a popular method of controlling lights. It can be quite effective if properly triggered. There are two common trigger methods used by lightning simulator manufacturers to trigger triacs into conducting and thus turning on a light. The burst method simply sends a signal to the triac to turn on when the system “hears” thunder. Like the two methods mentioned above, burst triggering of a triac can only turn on a light at full brightness or turn it off.

***PROS** – No mechanical noise, longer lasting than mechanical relays or strobes. Inexpensive.*

***CONS** – Unrealistic effect (on and off only), limited features.*

Solid State / phase cut – Solid state switching as described above with much more sophisticated pulse-width phase cut dimming circuitry. This is the only type of circuitry that allows the light intensity to be proportional to the with location and strength of the “lightning strike” (volume of the thunder). Distant strikes (quiet thunder) creates dim flickers. Moderate thunder makes moderately bright lightning. And of course very loud thunder makes bright lightning.

***PROS** – Most realistic, by far. Intensity of lightning matches volume of the thunder. With proper design, can be used with most types of lights, including LED and compact fluorescent. More features possible.*

***CONS** – Properly designed (not all are), there are no cons.*



Now that you understand the technology behind most lightning simulators, here are a few key questions you should consider (or ask your dealer) before purchasing your lightning simulator.

1) What is the technology behind your lightning simulator (i.e., VOX, strobe controller, solid state/burst, solid state/phase cut dimming)?

2) Real lightning comes from a number of areas in the sky. Does your system have multiple channels to better simulate how lightning behaves in nature?

Note: Two or more channels dedicated to lightning is best.

3) Does your system have an audio section with amplifies and filters to tailor your simulator to the specific sounds of thunder?

Note: Without this, the system will react to all audio, not just lightning.

4) Is your system high impedance so it can be connected to true line level outputs from CD players, DVD players, audio repeaters or even a line out connection from a stereo system?

Note: Make sure the system does NOT require connection to speaker terminals of a sound system. If this is the case, you will be required to adjust your lightning simulator every time you change the volume. Only systems with true line level inputs allow you to adjust volume without affecting the lightning effect.. Also, be sure to avoid those systems that use microphones rather than direct connections to the thunder source.

5) Are all user controls and switches readily available on the outside of the housing?

Note: Some systems require that you open the case, exposing yourself to dangerous voltages, in order to make necessary adjustments. All user controls should be on the outside of the box.

6) What is the warranty? Does it cover commercial use?

Note: Some don't specify. The range from those who do disclose a warranty period is anywhere from ninety days to five years.

7) Is the system designed and manufactured in the United States?

8) Does the system have a dedicated dimming channel?

Note: A dimming channel creates the effect of a pending power failure by flickering (dimming) connected lights when there is a lightning strike. Many systems don't offer this important feature. Some allow one channel to be either lightning or dimming. At least one device offers a dedicated dimming channel in addition to multiple lightning channels.

9) Is an upgrade path offered?

Note: Your needs may change and technology never stands still. It's important to make sure an upgrade path is provided for your chosen product.

10) Is this system compatible with LEDs, dimmable compact fluorescent lamps and strobes or is it limited to only incandescent and halogen?

Note: Incandescent lights that were made viable by Thomas Edison in 1879 are quickly being replaced by LEDs and CFLs. It is important to insure that your lightning simulator is compatible with current technologies as well as older legacy light sources.

11) Does your system provide internal diagnostics or at least a test button?

Note: Problems may occur with the audio source, the lightning simulator or with the actual lights. Having a self-test routine or at least a test button to test the internal workings of the simulator as well as the lights connected can save a lot of troubleshooting time in the event of an untimely problem.



12) Does your multi-channel system offer internal audio switching or does it require special cables and connectors when used in the monaural mode?

Note: For reliability and ease of operation, make sure your system offers internal audio switching so no special external cables or connectors are required. Stereo modes should provide stereo sound out to your amplifier. Mono modes should connect a control channel to the lightning simulator, while providing the mono audio to both channels of your amplifier. If barrel connectors and/or "Y" adapters are required, you may wish to reconsider...

13) Is the system microprocessor operated and therefore capable of many modes of operation?

Note: Most systems are pure analog. Some are microprocessor operated and therefore offer many modes of operation to tailor the systems to your specific requirements.

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