

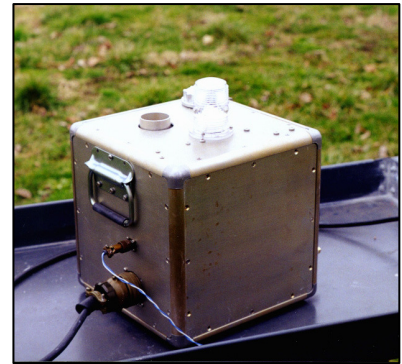
Non-Pyrotechnic Audio/Visual Cueing Device

The Non-Pyrotechnic Audio/Visual Cueing Device is designed to replace existing pyrotechnic audio/visual cueing devices presently used in force-on-force Tactical Engagement Simulation systems such as CATIES, MILES II, MILES 2000, PRIME, TWGSS, and DFIRST. In this context, audio/visual cueing devices provide natural flash/bang/smoke cues to indicate incoming artillery fire. The flash, bang, and smoke provide an unmistakable warning of incoming artillery fire to troops in the target area, while the flash and smoke show distant artillery spotters that their fire is being delivered on target. Audio/visual cueing devices are mounted on combat vehicles and are fired by the Tactical Engagement Simulation scoring system to indicate the fall of artillery rounds on or near the vehicle.

The Spectra Research Non-Pyrotechnic A/V Cueing Device is self contained in a 12 inch cube powered by 24 V DC vehicle electrical power. The bang is produced by a shock tube supplied with compressed air by an internal compressor. The shock tube is discharged by a proprietary high speed valve (patent pending) so that the only consumable material is the powder used to produce the smoke. The smoke powder reservoir can be refilled at scheduled maintenance intervals and the powder is inert, so no special handling or storage are required.

Cue Specifications:

- **Bang:** 135 ±5 dB peak SPL at 2 meters.
- **Flash:** visible from one mile.
- **Smoke:** white, visible from one mile.



• NON-PYROTECHNIC EXPLOSION SIMULATION TECHNOLOGY

S*R has developed a modular approach to non-pyrotechnic explosion simulation employing microprocessor-controlled electromechanical hardware to duplicate the effect of pyrotechnics at reduced cost and greater safety. S*R has developed two approaches, one using single-shot cartridges and the other using a high speed valve to excite the shock tube. The cartridge approach offers the advantages of simpler equipment and the ability to mix cartridges for different effects. The high speed valve approach offers unattended operation and the lowest cost per shot, since the only consumable is smoke powder.

- **Flash** is produced by a xenon flashlamp
- **Bang** (a shock wave) is produced by a shock tube driven by compressed air.
- **Smoke** is produced by entraining non-toxic, non-flammable smoke powder in the air blast from the shock tube. A variety of colors are available.



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- **ADVANTAGES**

Spectra Research non-pyrotechnic explosion simulation technology offers several advantages over pyrotechnics:

- No fire hazard, as no flammable materials are used.
- Cost per shot is substantially lower than pyrotechnics.
- Flash, bang, and smoke levels can be independently tailored to suit training requirements.
- The Sound Pressure Level (SPL) of the bang can be closely controlled to comply with safety requirements.
- Simplified logistics, transportation, and storage.

- **SAFETY**

Like pyrotechnic A/V cues, the Non-Pyrotechnic A/V Cue provides a visible safe/arm indication and an audible pre-fire warning to alert troops in the immediate vicinity that it is about to discharge. However, the Non-Pyrotechnic A/V Cue is intrinsically safer than pyrotechnic cues for a number of reasons:

- Will not ignite flammable material such as dry grass, brush, vehicle canvas, or vehicle fuel in the vicinity of the device.
- Since discharge involves a sequence of events, a single component failure cannot result in an accidental discharge without warning.
- Safety problems inherent in the storage, shipping, and safe handling of pyrotechnic cartridges are eliminated.

- **ENVIRONMENTAL**

The Non-Pyrotechnic A/V Cue also offers a number of environmental advantages:

- Will not ignite fires.
- Smoke powder is non-toxic, non-flammable, and environmentally benign.
- Leaves no empty cartridges for disposal.

- **PRODUCT STATUS**

Spectra Research non-pyrotechnic explosion simulation technology was developed under U.S. Army STRICOM SBIR Phase I and II contracts M67004-93-C-0037 and M67004-94-C0039, respectively. The device as described above was completed and demonstrated in the spring of 1998. The high speed valve successfully completed a 1,000 shot durability test late in 1997. S*R has received a patent (U.S. Patent No. 5,511,978) on the basic principle of the Non-Pyrotechnic A/V Cue, and a patent (US Patent No. 6,439,891) on its high speed valve incorporated in the brassboard design.

- **PARTNERING OPPORTUNITIES**

Spectra Research, Inc. is actively seeking partnerships with companies, government agencies, universities, and individuals interested in producing the S*R Non-Pyrotechnic Audio/Visual Cueing Device. For further information, visit our website at www.spectra-research.com or contact:

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