

UNITED STATES DEPARTMENT OF LABOR
Mine Safety and Health Administration

**EVALUATION OF SPECIAL DEVICES INC./DAN-MAR
ELECTRONIC DETONATOR BLAST INITIATION SYSTEM--
REQUIREMENTS FOR
SHUNTING & CIRCUIT TESTING**

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By

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1. Purpose

The purpose of this report is to present the technical findings and the evaluation of “shunting” and “circuit testing” for the Special Devices, Inc. electronic detonator ignition module used with the Dan-Mar digital logger and blasting machine with respect to the MSHA standards.

For **electric** detonators, the coal and metal-nonmetal mine requirements for shunting and circuit testing are specified in 30 CFR 77.1303 (y)(1),(2),(3) and 77.1303(z); 56.6401(a),(b),(c); 56.6407(a),(b),(c),(d) and 57.6401 (a),(b),(c) and 57.6407 (a) and 57.6407 (b). **Electric** blasting systems are designed differently than electronic detonator systems and the operational features are not the same. Each electronic detonator system differs in design, construction, operation and testing features.

To resolve the issue of “shunting” and “circuit testing”, technical information was provided by Special Devices, Inc. (SDI) on the details of their electronic detonator ignition module and the Dan-Mar Company digital logger and blasting machine that is used exclusively with the SDI electronic detonator. A trip was also made to examine the SDI electronic detonator system and Dan-Mar digital logger and blasting machine during use in the field at a surface coal mine blast site.

2. Introduction – Using Electric Detonators

Electric detonator systems for performing blasting operations have been in use in the mining industry for many decades. They are used in both series and parallel blasting circuits. All electric detonators produced in the USA have shunts on the free ends of the leg wires. The shunt provides a low resistance path to prevent current from flowing through the bridge wire of the electric detonator. In other words, with a shunt both of the leg wires are at the same potential to prevent extraneous current flow into the detonator. In addition, some designs completely enclose the ends of the wires in order to prevent corrosion and to prevent bare wires from contacting extraneous electrical current sources. The shunt is removed when an electric detonator is connected into the blasting circuit. Electric detonators are supplied with a distinctive, numbered tag to facilitate easy identification of the delay period.

Since electric detonators are designed to fire when electrical energy is supplied to them, any extraneous source of electric current represents a potential source for initiation. Sources such as lightning, high voltage power lines, radio transmitters, and static electricity must be avoided. There are also occurrences where the energy from lightning has traveled several miles along pipes or cables into an underground mine and can represent an unsuspected source for initiation of electric detonators.