

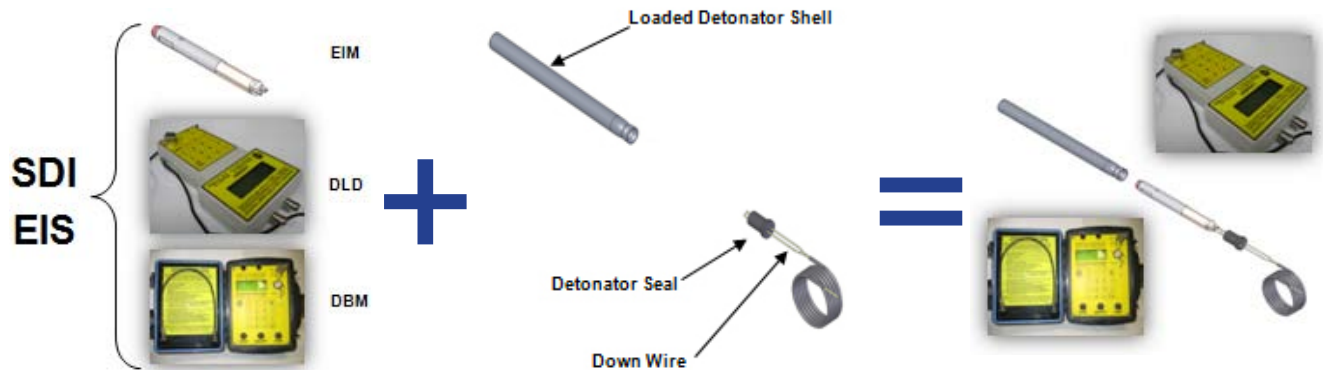


# Electronic Initiation System

Globally Positioned

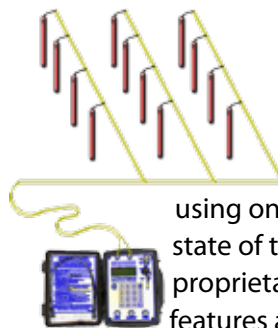
## THE SDI ELECTRONIC INITIATION SYSTEM

SDI offers an Electronic Initiation System (EIS) that is comprised of: (1) An Electronic Ignition Module (EIM), (2) Digital Logging Device (DLD), and (3) Digital Blasting Machine (DBM). SDI manufactures the EIM which is the electronic, programmable delay element that replaces conventional pyrotechnic delay elements used in non-electric and electric detonators. DanMar Company, Huron Ohio manufactures the DBM and DLD. The EIM is designed and sized to be integrated into existing detonator manufacturing operations with minimal cost and development time. SDI has leveraged its Aerospace technology and Automotive manufacturing heritage in providing a state of the art and reliable product. Create your electronic detonator using SDI's EIM technology.



## Create Your Electronic Detonator Using SDI's EIM Technology

### System Description



The SDI EIS works on a two-wire parallel, polarity independent buss system capable of initiating up to 1,600 electronic detonators using one DBM. The EIM contains a state of the art ASIC incorporating proprietary technology. The SDI EIS features a patented and robust serial protocol communications system that has been rigorously tested and demonstrated in the nearly 1.0 million units initiated in the field in the 3 years since production launch. SDI EIM powered electronic detonators have been successfully utilized in Surface mining operations, Quarry and Construction, Underground (Tunneling and Stope), and Seismic both domestic and international.

### Safety

At SDI Safety / Quality / Productivity is the center of our core principles and working culture. We put safety first in everything we do, including the designed in safety features in the EIS. These safety features include ensuring an EIM powered electronic detonator cannot be initiated when connected to the logger. In addition the EIS is designed to withstand ESD, RF and EMI sources. Utilizing our Aerospace technology and incorporating Automotive processes we have developed our supply chain and internal manufacturing processes to ensure capability for a reliable, repeatable finished product. Please contact an SDI representative to learn about ALL of the EIS safety features.

## Easy To Use

The ease of use of the SDI EIS can be describe as four basic steps: PROGRAM IT, CONNECT IT, VERIFY IT, and FIRE IT.

### PROGRAM IT

Connect the EIM powered electronic detonator to the DanMar Co. DLD and program the desired delay time (1 to 10,000 ms) and a specific unit ID number (i.e. borehole number for the blast). The programmed information is stored within the EIM allowing for greater flexibility in programming: at the factory, at the magazine or at the blast site.

### CONNECT IT

Once all the detonators in the blast are programmed, simply connect all the detonators to a two conductor buss line. No special connecting sequence or other special connection control devices are required. Simply connect all units to the buss line in any order.

### VERIFY IT

Once all the detonators are connected to the buss line, the logger can be used to VERIFY that all logged units are connected and communicating properly. During this VERIFY process the logger will detect any unlogged detonator that was connected to the buss line, utilizing SDI's patented Auto Buss Detection (ABD) feature. The ABD features ensures all connected units are detected and programmed per the blast plan.

NOTE: The DLD is continuously monitoring current consumption during programming or VERIFY process. In addition, actual current can be measured at any time a single detonator or array of detonators are connected to the logger.

### FIRE IT

Once the blast site has been cleared and secured in accordance with MSHA regulations, the blast array can be connected to the DanMar Co DBM which would be located a safe distance from the blast site. After the Blasting Machine is powered up it will guide the user through the blasting sequence which includes VERIFY AND ARM phases. Once these processes are complete the "Green" light is illuminated telling the blaster the shot is armed and ready to fire. The blaster sends the firing command by simultaneously holding down two buttons on the blasting machine. The DBM will tell the blaster that the FIRING command has been sent and BANG!! At blast time, all you need is the Blasting Machine.



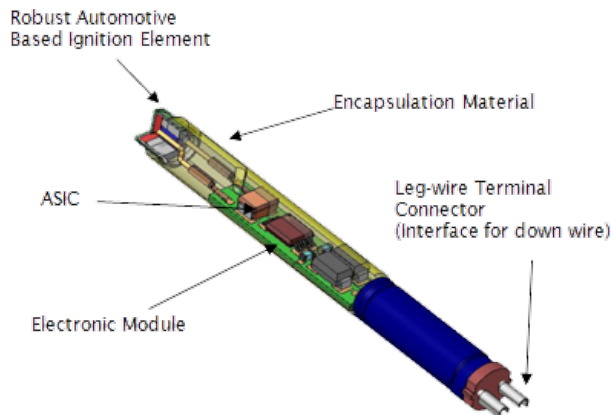
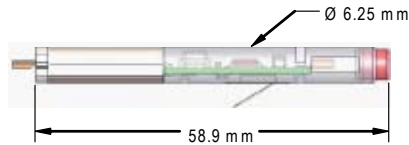
**Remote Firing Capable  
- Leaky Feeder Ready -**



## Application Advantages

Feature	Advantage
Patented Auto Buss Detection (ABD)	Unique serial communications protocol which provides multiple advantages including ability to provide an Electronic Detonator that can be loaded like a conventional non-electric system in any tunneling round application (Underground, Construction etc.).
Patented Dynamic Baselineing	Allows blaster to maintain reliable communications on the buss line even with excessive fluctuating leakage current.
Logger Branch Verification	Allows users to safely VERIFY communications integrity and connection of ALL units connected to the buss line prior to leaving the bench.
Robust Serial Protocol	Extensive testing involving over 15 million firing cycles verifying communication protocol features while considering anticipated buss line conditions (current leakage, inductance, capacitance etc.).
Control Equipment Compatibility	No special "matched" Logger and Blasting Machine sets required allowing standard control equipment can be used with any SDI powered Electronic Initiation System. This enables multiple Loggers to be used on a given blast (large blasts) for efficient programming and verification at blast site.
Programmed information stored in the Detonator	Programmed information (delay times) is stored in the EIM, providing greater flexibility in programming: at the blast site, at the factory, etc.
Blasting Machine Only required to initiate the programmed blast array	No other required additional components or control equipment is needed to initiate the blast.
Easy to Connect blast array	Non-polar, parallel connection to the buss line eliminating any special connecting sequence or additional connecting control devices.
Ease of Tailorability	Flexible serial protocol commands allows for easy and fast revisions to meet specific blast control or user needs.
Security	Advanced serial protocol enables user customization to meet specific security needs.
Unique Serial ID for Traceability	Each EIM contains a unique (over 200 trillion combinations) and permanent serial ID providing further system customization possibilities.

## Electronic Ignition Module



ESD Withstand	Robust ESD Withstand capability to severe ESD discharge networks
RF Interference Immunity	Demonstrated RF Immunity (150kHz to 2.0 GHz)
Storage Temperature	-40°C to +71°C -40°F to 159.8°F
Operating Temperature	-20°C to +71°C -4°F to 159.8°F
Programmable Delay Time:	1 to 10,000 ms (1 ms increments)
Ignition Element	Robust, High Reliability Automotive Technology
Programming:	Programmed time delay stored in EIM, providing programming flexibility (at the factory, at the blast site, etc.)
Shipping Classification	UNS 0454, 1.4S
CE Type Approval	Certificate Number: ENB/D/123/08 issue 3 CE Mark: $\text{CE} 0509$

## EIM Initiation System Key Features

Maximum Detonator Qty:	1600 per Blasting Machine
Programmable Delay Time	1 to 10,000ms
Communication	Patented, state of the art two-way communication protocol
Current Leakage	Robust communication protocol able to withstand excessive current leakage
Equipment Compatibility	Any Logger is compatible with any Blasting Machine with specific security features integrated upon request
Wireless Blasting Machine	Available - Built on Rothenbuhler Technology
Leaky Feeder Blasting Machine	Development Ready
Customization	Easily customizable to differentiate and/or meet user specific applications and needs
Intellectual Property	12 US Patents issued: 7464647 7347145, 7322293, 7107908, 7086334, 7082877, 7054131, 7017494, 6988449, 6966262, 6892643, 6789483, other Patents Pending



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