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PROGRAM INFORMATION BULLETIN NO. P04-20

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SUBJECT: Electronic Detonators and Requirements for Shunting and Circuit Testing

**Who needs this information?**

Operators of surface coal and metal and nonmetal mines and underground metal and nonmetal mines, manufacturers of electronic detonator systems, Mine Safety and Health Administration (MSHA) enforcement personnel, miners' representatives, state mining agencies, and other interested parties need this information.

**Why is MSHA issuing this bulletin?**

MSHA has received a number of inquiries concerning how to apply the MSHA requirements for shunting and circuit testing to electronic detonators. This bulletin clarifies the application of the "shunting" and "circuit testing" requirements of Title 30 CFR (30 CFR) §§ 77.1303, 56.6401, 56.6407, 57.6401, and 57.6407 to electronic detonators.

**What blasting operations are affected by this bulletin?**

This Program Information Bulletin (PIB) applies to surface coal and surface and underground metal and nonmetal blasting operations that may use electronic detonator systems. There are no electronic blasting systems approved to date by MSHA for use where permissible explosives are required.

**What does this bulletin recommend?**

The Daveytronic® Digital Blasting System and I-KON ™ Digital Energy Controlled System electronic detonator systems incorporate circuit testing by use of their unique blasting controllers. The means of shunting is provided by their design and constructional features. Both of these systems have gone through extensive testing which included sources of stray and extraneous electricity. Therefore, these two systems contain their own integral elements for shunting and circuit testing, that meet the intended MSHA requirements when the systems are used according to the manufacturer's instructions. MSHA has determined that these two types of electronic detonators comply with MSHA standards and do not need to be shunted by the twisting together of leg wires or circuit tested using a blasting galvanometer. MSHA's Office of Technical Support (TS) personnel examined and witnessed the use of the Daveytronics® and the I-KON™ electronic detonator systems. These systems detected open blasting circuits which enabled the blasting crew to specifically locate and correct the fault. This prevented misfires from occurring and causing a safety hazard. TS prepared a report about the technical evaluation of the Daveytronics® and the I-KON™ electronic detonator systems. The report is available on MSHA's website at http://www.msha.gov/techsupp/acc/acchome.htm. Look for the technical report on electronic detonators.

At this time, no other electronic detonator systems have been evaluated by TS to determine if adequate means for shunting and circuit testing are incorporated into their designs. All other systems need to be physically shunted and conventionally circuit tested using a blaster's galvanometer like other electric detonators. Manufacturers desiring to have their electronic detonator systems evaluated may do so by making a request to MSHA, TS, Approval & Certification Center (A&CC).

A&CC will maintain a list of the electronic detonator systems that have been evaluated and comply with MSHA standards. The list will be posted and periodically updated on MSHA's home page at www.msha.gov under TS, Approved Products. A copy of the list may also be obtained by calling one of the contact persons.

**In general, what is the difference between an electric and an electronic detonator system?**

Conventional electric detonators systems are designed with a pyrotechnic fuse train and a base charge. The pyrotechnic delay element burns at an approximated rate. The length and composition of the pyrotechnic train control the approximate rate of burn and thus the timing. Since the approximate rate of burn is subject to variation, the timing accuracy is affected.

By contrast, electronic detonator systems do not have a pyrotechnic fuse train. These systems, typically, have been designed with an integrated circuit and a capacitor system internally wired to each electronic detonator, which separates the leg wires from the

base charge. A specially designed blast control unit unique to each manufactured electronic detonator system controls the detonation firing sequence by transmitting a selectable digital signal that is identified by each wired electronic detonator. The blast control unit indicates any incomplete circuits during hookup prior to blasting. The wired round will not fire until all detonators in the circuit are accounted for according to the blasting layout. This design configuration improves the timing accuracy and safety during blasting operations.

**What is the authority for this bulletin?**
30 CFR, Sections 77.1303 (y)(1),(2),(3) and (z); 56.6401(a),(b),(c); 56.6407(a),(b),(c),(d); 57.6401 (a),(b),(c); and 57.6407 (a) and (b).

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**Is this program information bulletin on the Internet?**
This bulletin may be viewed on the World Wide Web by accessing the MSHA home page (http://www.msha.gov) and choosing “Compliance Info”, and Program Information Bulletins."

**Who will receive this bulletin?**
Program Policy Manual Holders
Surface and Underground Mine Operators
Explosive Products and Blasting Equipment Manufacturers
Special Interest Groups
Miners' Representatives