

FIRING ACCURACY OF ELECTRIC DETONATORS

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Reference to specific products does not imply endorsement by the U.S. Bureau of Mines.

ABSTRACT

The U.S. Bureau of Mines (Bureau) has conducted research to evaluate the firing accuracy of electric delay detonators used in surface blasting operations. Over four billion pounds of explosives and blasting agents are used every year in surface blasting in coal, metal and non-metal mines. In a typical large-scale surface blast, several thousand pounds of explosives are fired in a timed sequence using delay detonators. The delayed firing of explosive charges allows time for the fragmented rock to move out before the next charge is fired.

Over the last decade there has been an increased demand for more accurate detonators for efficient blasting and vibration control. The explosive industry is responding to this demand by manufacturing more accurate delays. The improved accuracy has been credited with more efficient fragmentation, increased production, better control of muck displacement and reduced vibration and fly rock.

The Bureau evaluated the firing accuracy of delay detonators marketed by two domestic manufacturers. Twenty detonators of each delay period were tested for timing accuracy. High speed digital oscilloscopes were used for measuring firing times. The data reported in this paper include average firing time, standard deviation, and fastest and slowest firing time for each period. Test results indicate that the timing accuracy of delay detonators utilizing pyrotechnic delay elements have improved significantly in recent years.