



Technical Topics

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More Books

In the last Tech Topic (1/97) we talked about a new explosive book "Introduction to the Technology of Explosives" by Paul Cooper and Stanley Kurowski of Sandia National Laboratory. We liked the book very much and recommended it highly (and sold a bunch of them at \$55.00 per copy). We still have some in stock and we still recommend it highly. However, since then, Cooper has written another explosive book "Explosive Engineering" which is fatter (and more expensive). Instead of being an introduction, Paul covers fewer subjects in greater detail. Sections include Chemistry of Explosives, Energetics of Explosives, Shock Waves, Detonation, Initiation and Initiators and Engineering Applications. The Initiator section contains a very much expanded section on EBW detonators but nothing on EFl's (sob!). Paul assures me that this is the last book he will write (this year). A worthwhile addition to any library. RISI's resell price including handling, postage, sales tax, etc. is \$85.00. Call for overseas pricing.

Firing Units - Disposable

It almost sounds like an oxymoron but there are (now) such things as inexpensive, disposable firing units. One of our customers, showed us such a creature that he had developed for the oil industry. Uses an over-voltage switch as a trigger, with an input voltage of 200 volts and an output of 5000 volts - sufficient to fire either EBW's or EFl's. He also claims the unit will withstand 225°C. We were impressed enough to offer to distribute it for him. Interested? Call RISI for pricing and a data sheet.

Firing Units - FS-61

It's hard not to have a favorite child just as it's hard not to have a favorite detonator or Fire Set. Just as it is with kids, sometimes it takes many years to discover all their good characteristics. One firing unit that has consistently pleased us with good field reports is the FS-61. This is a 110 v unitary design used for firing detonators on reasonably short cables i.e. if you don't need the 2500 feet separation available with the FS-9, 10, 17 or 43 and if you have access to 110 volts (or 220) it's a good firing unit at a very reasonable price. One of our customers has one of these in the toolbox of each of his trucks and another customer got 50,000 firings off his unit before it had to be rebuilt - the fault was that he had worn out the key switch.

We still have a number of these units in stock and shortly will be coming out with a new improved model (a more rugged key switch). Call RISI for price and delivery.

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Threshold Voltage

Threshold firing voltage can be a confusing but important characteristic of an EBW detonator. Threshold firing voltage is defined as the voltage at which 50% of the detonators would fire and 50% would fail. In our catalog we list the threshold voltages for most of our EBW detonators to be about 500 volts and then we state that our firing units have output voltages of 3000 or 4000 volts. That seems to be a lot of over-kill. The confusion arises because we generally perform our production testing "close coupled" i.e. with a short length of coax cable between the firing unit and the detonator. But in real life, very few of our customers fire over such short distances. For some reason, most people don't like to blow up their firing units on every test. Therefore in order to allow for reasonable firing distances, we have our firing sets put out enough voltage to handle reasonable length shot cables. For example. The RP-80 has a catalog value for threshold of 500 volts "close coupled." But look what happens when we add cabling to the system.

Feet of Twin Lead Cabling	Threshold Voltage
5 ft	500
50 ft	900
100 ft	1200

That's not too bad and still livable, but then people add more dets in series or parallel to the test (see RISI catalog on Series Parallel firing) - and very soon instead of an excess of voltage you find you don't have enough.

As the firing cables get longer or more dets are added to the circuit, not only is more voltage required but another phenomena comes into play; the time to burst the bridgewire gets longer. When close coupled, the time to burst the bridgewire on a RP-80 detonator is about 1 microsecond. With 100 feet of twin lead, the bridgewire burst time increases to 3 microseconds. Beyond 100 feet of twin lead, the time can get so long that the bridgewire will melt rather than explode. A melted bridgewire does not produce the shock wave necessary to initiate the explosive and you end up with a no-fire or low order - - - very embarrassing!

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