



Shunts

*“In the beginning was the word, and the word was . . .
EBW’s (and EFL’s) shall be shipped without shunts.”*

That’s what we learned when we got into this business a long time ago and that’s the way we always treated them. Our submittals to the government for shipping approvals never showed shunts and we never used them and the government never used them when they shipped their EBWs. However, recently we received a call from a police officer from one of our beloved Southern states questioning this policy. It seems he had stopped one of our customers transporting un-shunted EBW’s on his highway and apparently they had a few words about whether the EBW’s should or should not be shunted. Being a conscientious public servant, he decided to investigate this further and he called us. We assured him that our customer was right (customers are always right) and truly EBW’s did not need to be shunted. He tactfully wanted to know who the hell were we to set official US Government policy and what he really wanted was a piece of official US Government paper stating that EBW’s did not need to be shunted. After a frantic search of our files, and calls to all the government agencies we could think of, we finally found a procedure from one of the lesser known government agencies stating that EBW’s were not shunted during shipment (the truth of the matter is that they were quoting what we had previously told them). We forwarded him a copy of this and hopefully it got our customer out of the pokey. But it set us to thinking. Logically, since all our EBW’s have a threshold burst current of around 200 amps with a good tight standard deviation, its hard to see why a shunt would be required, but we still need that piece of paper. So if any of you government readers have an official piece of paper, we would love a copy to guarantee that our customer is really out of the pokey.

Inductance

Hopefully by now, everyone realizes that electrical energy must be deposited rapidly in a bridgewire in order for the Exploding Bridgewire Detonator to function properly. This rapid deposition of current requires a fast rate of current rise i.e. di/dt must be large. di/dt is proportional to voltage and inversely proportional to inductance or:

$$di/dt = \text{voltage}/\text{inductance}$$

which means the bigger the voltage, the better, the smaller the inductance the better. With most RISI firesets, voltage is fixed either at 4000 volts or 3000 volts so not much can be done with adjusting that parameter which leaves only the inductance. Now 100 feet of RISI’s high voltage twin lead cabling has an inductance of 17.5 micro henries which is about the maximum that one of our detonators can handle. Changing to RISI’s high voltage coaxial cabling (Type C) lets you shoot across 300 feet of cabling since the coax has an inductance approximately 1/3 that of the twin lead. If you decide (as some of our customers have) that the high voltage

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in the little bitty twin lead is dangerous and you decide to physically separate the two conductors you could easily raise the inductance of 100 feet of separated twin lead to about 40 micro henries - which would just about guarantee to give you 100% failures. We tried it - it does.

The closer together the two conductors the smaller the inductance.

Also, using only the center conductors of two coaxial cables does not help. The small inductance only comes from using the center conductor and the mating braid. Some tricks to minimizing inductance are to twist the leads together, especially if running a long string of dets in series - or add another cable in parallel (see Tech Topic of 7/92). This really does work since the added parallel cable will cut the overall cable inductance in half allowing you to shoot over twice the cable length.

Books

The previous two Tech Topics talked about Paul Cooper's (with Stan Kurowski) books on explosives and that we had a number of copies for resale. The response was overwhelming and we had to replenish our supply a number of times to satisfy the demand. We still have a few of both available so if you haven't picked up your copy, give us a call.

To refresh your memory they were:

Introduction to the Technology of Explosives by Cooper and Kurowski \$55.00

Explosive Engineering by Cooper \$85.00

Call for overseas pricing.

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We accept Visa, MasterCard
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