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Identification of Electric Blasting Caps by Manufacturer

With the ever increasing number of bombings occurring in the United States each year, it is imperative for bomb scene technicians to be acquainted with the classification by manufacturer of electric blasting caps and blasting cap components discovered at the scene of a bombing.

There are primarily three manufacturers of electric blasting caps in the United States: Atlas, Dupont, and Hercules. Many other explosive manufacturers have blasting caps manufactured under their own trade name by one of the above cited manufacturers. Although the exterior configuration of the blasting cap may appear to be similar, normally the blasting cap may still be identified with the manufacturer through the use of fluoroscopy or radiographs (see Fig. 1).

Basically, all electric blasting caps consist of a metallic cylinder into which are loaded several explosive charges and an electrical ignition element attached to a pair of insulated wires called "leg wires." Blasting cap manufacturers use both copper and iron leg wires on their caps. Iron wire, used primarily for mine work, is less expensive, but has a higher resistance than copper wire. The iron and copper leg wires are coated with tin to prevent corrosion. Hercules iron leg wires are coated with white colored insulation [1], Atlas iron leg wires are coated with a salmon and white colored insulation material [2], Dupont iron leg wires may vary in insulation color: bronze shell instantaneous electric blasting caps of number six strength, used primarily in coal mines, have one leg wire with light blue insulation, the other light orange in color. Dupont also manufactures an aluminum shell electric blasting cap with iron leg wires, for use in salt mines. On this type of cap, one leg wire has light blue insulation and the other leg wire is coated with bright orange insulation [3]. Leg wire diameter for all manufacturers will usually be 20, 22, 23, or 24 gauge tinned copper or iron wire, depending on the type of blasting cap and the length of the leg wire.

Blasting cap shells are usually made of aluminum or commercial bronze which is 90 percent copper and 10 percent zinc. Shells will vary from 1.250 in. in length and 0.250 in. in diameter to approximately five in. in length. The charge contained within the cap will vary with the manufacturer. Normally, manufacturers will use a combination of potassium permanganate, hexamitromannite (HNM), diazodinitrophenol (DIAZO), lead azide or lead styphanate for initiation and priming charges, with either pentaerythritol-tetranitrate (PETN) or cyclotrimethylenetrinitramine (RDX), both having a detonating rate of approximately 21,000 ft per s for base charges.

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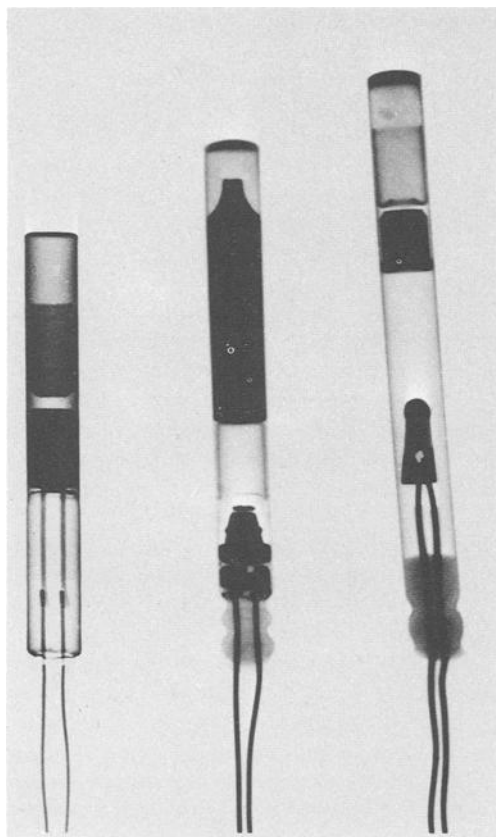


FIG. 1—Radiograph depicting interior component parts of Hercules, Dupont, and Atlas delay electric blasting caps.

A small amount of graphite is added to the PETN or RDX for lubrication purposes. This charge is then pressed into the blasting cap shell at approximately 3000 psi.

Initiating and priming charges, due to their extreme sensitivity, are not pressed into the blasting cap. It should be noted that mercury fulminate has not been used in blasting caps since World War II because of the great hazard involved in the handling and storage of the fulminate.

A bridge wire normally made of nickel chromium and measuring approximately 0.00150 to 0.002 in. diameter with a one ohm resistance is used to initiate the blasting cap. A standard blasting cap requires approximately 0.5 A to cause detonation. The most sensitive blasting cap manufactured will fire at approximately 0.25 A. Blasting caps will vary from instantaneous to delays of approximately 16 s.

It is possible for an investigator to identify the manufacturer of the electric blasting cap by examination of the external configuration of the shell of the cap. Also, the type of insulation material coating the leg wires and the color of the material will assist the investigator. Dupont and Hercules use various compositions of polyethylene and polyolefin. Atlas uses polyvinyl-chloride for leg wire insulation.



FIG. 2—Photograph of exterior configuration of Atlas, Dupont, and Hercules delay electric blasting caps.

The three major types of electric blasting caps can be identified by exterior configurations in basic construction (see Fig. 2). Atlas blasting caps are distinguished by the presence of one single, narrow crimp. Dupont blasting caps can be identified by the presence of two broad crimps. Hercules electric blasting caps are differentiated from both Atlas and Dupont manufactured caps by the absence of a crimp.

After a detonation, it is sometimes possible that fragmentation from the blasting caps may be located and identified if the investigator is familiar with the construction of blasting caps and is aware of what he is searching for.

Figures 3, 4, and 5 show component parts used in the construction of the various delay blasting caps.

The Atlas blasting cap shown in Fig. 3 contains an ignition system, referred to by the manufacturer as the match head, which is coated with a very sensitive compound and initiated by a bridge wire passing through the compound. A soft black rubber plug seals the end of the cap, with the leg wires passing through the plug and affixed to the match head.

Dupont (see Fig. 4) uses a bridge wire to initiate their blasting caps. The leg wires pass between two split rubber plugs which seal the end of the cap. Each wire has a "head" on it to work as a discharge for static electricity.

Hercules (see Fig. 5) manufactures blasting caps which contain a hard polyolefin plug which is inserted into the end of the cap [4]. On one end of the plug is affixed the bridge wire and the opposite end secures the leg wires.

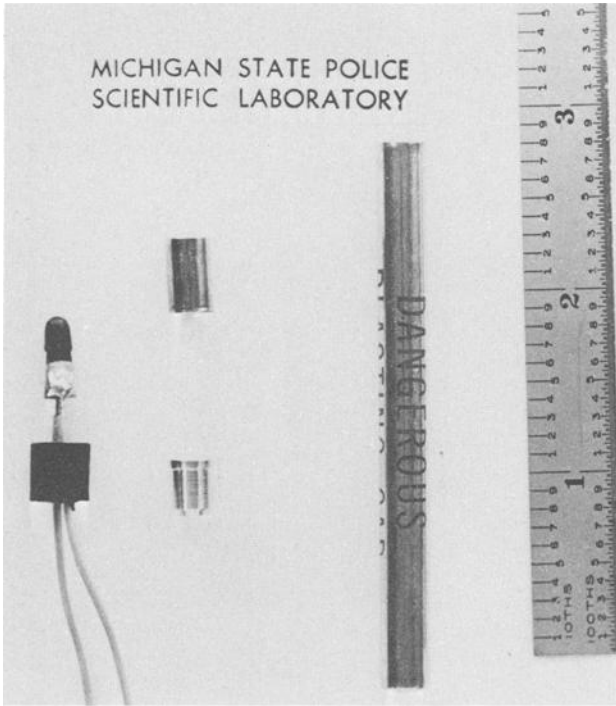


FIG. 3—*Photograph of interior component parts of Atlas delay electric blasting cap.*

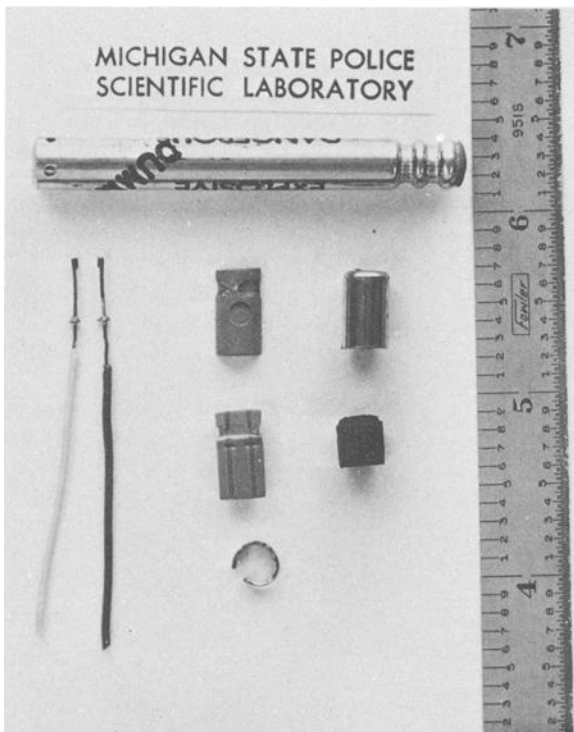


FIG. 4—*Photograph of interior component parts of Dupont delay electric blasting cap.*

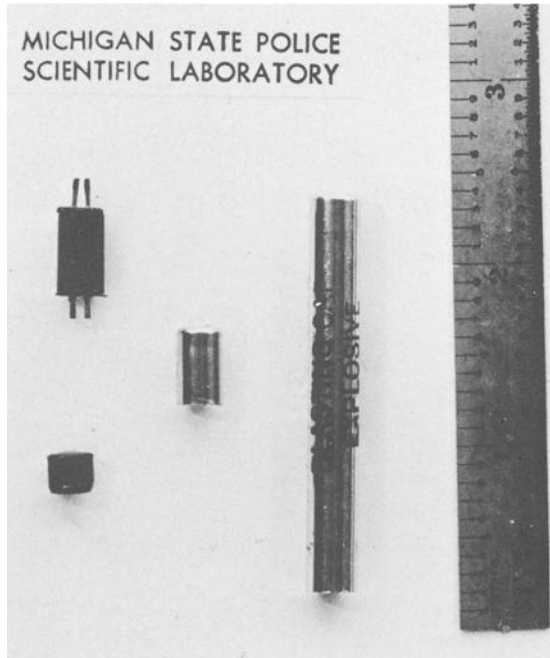


FIG. 5—*Photograph of interior component parts of Hercules delay electric blasting cap.*

Summary

Bomb scene investigators and technicians should be familiar with blasting caps and their construction, and aware of the fact that it is possible to identify the type of blasting cap used in an infernal device by the fragmentation obtained from the bomb scene. Blasting caps may be classified according to manufacturer by exterior configurations and by the interior construction of component parts visible through the use of fluoroscopy or radiographs. It is also possible for blasting caps to be identified by the color and composition of the insulation used on leg wires. Utilizing these methods of identification will assist the bomb scene investigator in the investigation of bombings and infernal devices.

References

- [1] Hercules Explosives Technical Data Sheet p.200-176 17336.
 - [2] Atlas Explosives Sales Technical Handbook p. 4:3:1, 7 Oct. 1966.
 - [3] Dupont Blasters' Handbook, 15th ed., p. 92.
 - [4] Hercules Explosive Technical Data Sheet p. 200-138D 38768.
- Remainder of information gained from personal tours of Hercules, Dupont, and Atlas.

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