

Electric Detonator Examinations

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1 INTRODUCTION

An electric detonator is a small explosive component whose general purpose is to initiate a detonator-sensitive explosive into which it is inserted. Electric detonators generally consist of wires attached to a match element or bridge wire embedded in very sensitive explosives. The match element, or bridge wire, and explosives are contained within a cylindrical metal shell that is usually sealed on one end with a closure plug. The proper application of current to the wires causes the match element or bridge wire to heat up, causing the explosives within the detonator to explode. Commercial electric detonators are generally used in blasting operations to initiate larger quantities of detonator-sensitive explosives. Electric detonators can be used in the fabrication of improvised explosive devices (IEDs) to initiate other explosives or they can be used as the only explosive component within a device. Depending on the amount of explosive into which the detonator is inserted and its exact use within the IED, it may be possible to recover detonator fragments in a post-blast environment. Through an examination of the fragmented remains of a detonator, its functionality within the IED and manufacturing information can sometimes be determined. This information can assist the investigator in identifying the subject(s) responsible for constructing the device.

2 SCOPE

These procedures describe the process for electric detonator examinations and apply to explosives and hazardous devices personnel who examine electric detonators and their post-blast remains to determine identifying and functionality information.

3 EQUIPMENT

Below is a list of items that can be used to examine electric detonators and their post-blast remains. Explosives and hazardous devices personnel should choose the most appropriate items based on the nature of the evidence.

- Personal protective equipment (e.g., lab coat, eye protection, full face shield, gloves)
- Hand tools (e.g., tweezers, pliers, cutters, wire strippers, utility knife)
- Cleaning materials and disinfectants (e.g., cloths, bleach, rubbing alcohol)
- Stereomicroscope (various magnifications)
- Ruler (e.g., standard 12 inch length)
- Micrometer
- Caliper
- Galvanometer (appropriate for the testing of detonators to not cause inadvertant functioning)
- X-ray machine
- Detonator inerting machine
- Pillboxes, glass containers, static-proof plastic bags
- FBI Laboratory Explosives Reference Tool (EXPeRT) Database
- Reference texts, manuals, manufacturers' literature, and known materials are maintained in the explosives library. Additional reference information can be obtained from direct contact with manufacturers and distributors

4 PROCEDURE

These procedures are implemented as part of the overall examination process outlined in the Explosives and Hazardous Devices Examinations Technical Procedure (TP). Refer to the Safety section of this TP before starting any examinations.

Explosives and hazardous devices personnel will:

- A. Before any examinations are conducted, ensure that the item(s), as well as its container(s) and packaging, have been appropriately marked in accordance with the [FBI Laboratory Operations Manual \(LOM\)](#) (i.e., item number, initials, and full Laboratory number, when practicable).
- B. Ensure care is taken not to obliterate any identifying marks which have been previously placed on the item(s), or obliterate any microscopic marks of value.
- C. Take photographs of the detonator before inerting a live detonator to preserve any markings.
- D. Visually examine the item(s) for any trace evidence that could be of value. This evidence could include, but not limited to the following: hairs, fibers, blood, paint, or other particles.
 1. If trace evidence is to be examined or preserved, contact the appropriate unit and determine if the material should be removed. Record the material by means of notes, sketches, or photographs before it is removed.
- E. Note the physical characteristics of the detonator through visual/microscopic examination. Physical measurements should be taken to aid in determining as many of the following attributes as possible:
 - o Construction characteristics
 - o Manufacturer
 - o Country of manufacture
 - o Brand
 - o Type
 - o Explosives present
 - o Special properties (e.g., physical condition, functionality, modifications made for use in IED)
- F. If possible, determine the manufacturer, brand, and type by searching the EXPeRT database, explosive reference files, manufacturers' literature, and/or reference or known materials collection. Identifications or associations are made by comparison of observable/measurable physical characteristics with those provided in the above reference/literature materials.

5 LIMITATIONS

Refer to the Limitations section in the Explosives and Hazardous Devices Examinations TP and Appendix A of the Explosives and Hazardous Devices Report Writing Guidelines.

6 SAFETY

Safety protocols, contained within the [FBI Laboratory Safety Manual](#), will be observed at all times.

- A. Protective gloves (e.g., latex, nitrile) should be worn when handling evidence.
- B. Electric detonators should be protected from sources of heat, shock, friction, and extraneous current. Should a detonator be initiated accidentally, it has the capability of inflicting personal injury or death; therefore, it should be handled with care. Personnel will follow the below guidance regarding the handling of electric detonators:
 - 1. When not under examination, detonators will be stored in approved, explosion-proof containers (e.g., MK663 container, explosives magazine).
 - 2. Detonators will be shipped in Department of Transportation (DOT) approved containers (e.g., MK663 containers).
 - 3. Detonators can be rendered safe, or inert, by using specialized equipment (e.g., detonator inerting machine). Inert detonators should be marked as such.
 - 4. Appropriate facial protection (e.g., eye protection, full face shield) will be worn when handling live detonators.
 - 5. Detonators and other types of explosive materials and components will not be examined at the same time or placed in close proximity to each other.
 - 6. The leg wires of an electric detonator will be shunted to prevent extraneous current from initiating the detonator.
 - 7. Leg wires will never be placed in a location where they could come in contact with a source of current unless the detonator is being purposely functioned for examination purposes.
- C. Items containing blood or other body fluids can be cleaned with a bleach-based solution or other suitable disinfectant following discussions with personnel that may conduct other examinations of the items.

7 REVISION HISTORY

Revision	Issued	Changes
02	06/15/2022	Updated to new document template and updates made throughout for clarity.