

# Shock Tube Detonator Examinations

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## 1 INTRODUCTION

Shock tube initiation systems are commercially available, energetic material (EM) components used in commercial blasting operations to connect explosives to ensure the simultaneous initiation of the charges. Shock tube initiating systems consist of a hollow, plastic tube containing a small, thin quantity of high explosive (HE) coating its interior wall. A non-electric detonator is usually factory-attached to one end of the tube. Upon initiation, a shock wave propagates through the EM without fragmenting the tube and initiates the detonator. Shock tube initiating systems can be used in the construction of improvised explosive devices (IEDs) to initiate the main charge or as the main charge itself. In some cases, it may be possible to recover post-blast fragments. Through an examination of shock tube, or its fragmented remains, its functionality within the device 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 shock tube initiation systems examinations and apply to explosives and hazardous devices personnel who examine these systems 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 shock tube initiation systems 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, utility knife)
- Cleaning materials and disinfectants (e.g., cloths, bleach, rubbing alcohol)
- Stereomicroscope (various magnifications)
- Ruler (e.g., standard 12-inch length)
- Micrometer
- Caliper
- 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 items, as well as their container and packaging, have been appropriately marked in accordance with the [FBI Laboratory Operations Manual \(LOM\)](#) (i.e., item number, initials, and Laboratory number, when practicable).
- B. Take precautions not to obliterate any identifying marks on the shock tube initiating system or obliterate any microscopic marks of value. Record the presence of such marks through notes and sketches.
- C. Take photographs of the items to aid documentation and device reconstruction.
- D. Visually examine the initiating system for evidence such as fingerprints, hairs, fibers, blood, paint, or other particles.
  1. If evidence is to be examined or preserved, contact the appropriate unit and determine if the material should be removed. Record the presence of the material by means of notes, sketches, or photographs before it is removed.
- E. Note the physical characteristics of the shock tube initiating system 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 EM present
  - o Special properties (e.g., physical condition, functionality, modifications)
- F. If possible, determine the manufacturer, brand, and type by searching the EXPERT data base, unit reference materials, manufacturers' literature, or other reference materials. Identifications or associations are made by comparison of observable/measurable physical characteristics with those provided in reference 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 always observed.

- A. Protective gloves (e.g., latex, nitrile) should be worn when handling evidence.
- B. Shock tube initiating systems containing EM should be protected from sources of heat, impact, shock, and friction. Should they be initiated accidentally, they have

the capability of inflicting personal injury and property damage; therefore, they should be handled with care. Personnel should follow the below guidance regarding the handling of shock tube initiating systems:

1. Shock tube initiating systems should be stored in approved, explosion-proof containers (e.g., MK663 container, explosive magazines) when not under examination.
  2. Shock tube initiating systems will be shipped in Department of Transportation (DOT) approved containers (e.g., MK663 containers).
  3. The detonator of shock tube initiating systems will be rendered safe, or inert, by using specialized equipment (e.g., detonator inerting machine).
  4. Appropriate facial protection (e.g., eye protection, full face shield) will be worn when handling these materials.
- C. Shock tube initiation systems will not be examined at the same time that other explosives are being examined.
- D. 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	08/15/2022	Updated to new document template and updates made throughout for clarity.