

Electric Fuzing System Examinations

1 Scope

These procedures describe the process for electric fuzing system examinations and apply to explosives and hazardous devices caseworking personnel who examine these systems and their post-blast remains to determine identifying and functionality information.

2 Introduction

Improvised explosive devices (IEDs) are normally constructed with a main charge explosive and a power source. The power source provides a means of exploding or initiating the main charge and can be of very simple design, such as a length of burning-type fuse or as elaborate as an integrated electrical circuit. With regard to electrical circuits or fuzing systems, they can also be of simple design or extremely complex. However, regardless of complexity, a fuzing system is a switching mechanism designed to provide electrical energy from a source of power, through electrical wires and/or conductors, to an initiator to function the device. Typically, the fuzing system is fabricated to work only once.

Although no attempt will be made to list all the components which could be utilized to construct IEDs, the following components have been used in electrical fuzing systems: electrical wire, batteries, battery holders, tape, solder, electrical switches, self-contained timers, circuit boards, integrated circuits, connectors, and radio control systems.

The examination and identification of electrical fuzing systems assists the investigator with identifying the person(s) and/or group responsible for fabricating the IED.

3 Equipment/Material/Reagents

Below is a list of items that can be used to examine electric fuzing 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, gloves)
- Hand tools (e.g., tweezers, pliers, utility knife)
- Cleaning materials and disinfectants (e.g., cloths, bleach, rubbing alcohol)
- Stereomicroscope (various magnifications)
- Ruler (e.g., standard 12 inch length)
- Micrometer
- Caliper
- Multimeter
- X-ray machine
- Pillboxes, glass containers, and 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 Standards and Controls

Not applicable.

5 Sampling or Sample Selection

Not applicable.

6 Procedures

These procedures are implemented as part of the overall examination process outlined in the Device Examinations Standard Operating Procedure (SOP). Refer to the Safety section of this SOP before starting any examinations.

6.1 Electrical fuzing systems should be examined for the presence of explosive accessories before a detailed analysis of the circuit is conducted.

6.1.1 Should explosive accessories, such as a detonator be found, they should be removed from the circuit and placed into an appropriate explosives storage container.

Explosives and hazardous devices personnel will:

6.2 Before any examination is 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).

6.3 Ensure care is taken not to dislodge any trace evidence, obliterate and identifying marks which have been previously placed on the item(s), or obliterate any microscopic marks of value.

6.4 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.

6.4.1 If the 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.

6.5 Note the physical characteristics of the fuzing system and its components through visual/microscopic examination. Physical measurements should be taken to aid in determining as

many of the following attributes as possible:

- Construction characteristics
- Manufacturer
- Brand
- Type
- Special properties (how utilized in device, how components were assembled, alterations, exploded, etc.)

6.6 If possible, determine the manufacturer, brand, and type by searching EXPeRT, data base, 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.

7 Calculations

Not applicable.

8 Measurement Uncertainty

Not applicable.

9 Limitations

Refer to the Limitations section in the Device Examinations SOP and Appendix B of the Explosives and Hazardous Devices Report Writing Guidelines SOP.

10 Safety

Safety protocols, contained within the FBI Laboratory Safety Manual, will be observed at all times.

10.1 Various components normally associated with electrical fuzing systems can explode, leak, contain sharp edges, and/or constitute an electrical shock hazard. As such the following guidance is provided:

10.1.1 Electrical fuzing systems will not be examined at the same time as explosives or explosive components which can be initiated with electrical energy or static discharge.

10.2 Protective gloves (e.g., latex, nitrile) must be worn when handling items that have been possibly exposed to blood, tissue or other bodily fluids. Gloves will prevent exposure of personnel to possible hazardous material on the items. Gloves will prevent DNA from being transferred to the items.

10.3 Items potentially containing blood or other body fluids will be cleaned in a 2.5 % bleach solution or other suitable disinfectant following discussions with personnel that may conduct other examinations of the items.

11 References

FBI Laboratory Division

FBI Laboratory Quality Assurance Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Operations Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

FBI Laboratory Safety Manual, Federal Bureau of Investigation, Laboratory Division, latest revision.

Explosive Devices SOPs, Federal Bureau of Investigation, Laboratory Division, latest revisions.

Other

Banzhaf, W., Understanding Basic Electronics, 2nd Edition, American Radio Relay League, 2010

Federal Bureau of Investigation, Electrical and Electronic Components Which May Be Encountered in Improvised Explosive Devices (IED), Investigators Bulletin 75-5, FBI Bomb Data Center, 1975

Federal Bureau of Investigation, Batteries and Their Internal Components, General Information Bulletin 78-6, FBI Bomb Data Center, 1978

Mimms, F.M., Getting Started in Electronics, Master Publishing Inc., 2000

Thurman, J.T., Practical Bomb Scene Investigation, 2nd Edition, CRC Press, 2011

Rev. #	Issue Date	History
0	07/07/2006	Original Issue to follow QATU formatting and ASCLD/LAB- <i>International</i> requirements
1	10/02/2017	Administrative changes for grammar, clarity, and conformance to revised QAM and LOM. Removed references to the Explosives Unit to applicability to those conducting explosives and hazardous devices related examinations. Deleted Calibration section since it is not required. Updated Limitations section to refer the reader to the Device Examination SOP and Appendix B of the Explosives and Hazardous Devices Report Writing Guidelines SOP. Updated references.

Approval

Redacted - Signatures on File

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