



# **TENNESSEE BUREAU OF INVESTIGATION**

## *Forensic Services Division*

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### Firearms/Toolmarks Standard Operating Procedures Manual

#### Test Firing Procedures

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## **6. TEST FIRING PROCEDURE**

**6.1 Scope:** To further test the operability of a firearm and to collect ammunition components for microscopic comparisons, a minimum of three (3) test shots should be fired and recovered. Recovery methods include the bullet recovery water tank, the cotton box, and the range. The type of firearm, ammunition used, and the experience of the firearm examiner shall dictate the type of recovery method used. This method describes test firing practices.

**6.2 Precautions/Limitations:** The firearm examiner shall visually inspect the firearm to ensure that it is not loaded. If loaded, care must be taken to unload the firearm by first removing the source of ammunition and then ensuring the chamber is empty by physical and visual means.

### **6.3 Related Information:**

- 6.3.1** Section 5 Firearm Examination and Classification Procedure
- 6.3.2** Section 4 Safe Firearm Handling Procedure
- 6.3.3** Appendix 1 Worksheets
- 6.3.4** Appendix 3 Firearm Safety
- 6.3.5** Appendix 4 Range of Conclusions
- 6.3.6** Section 8 Ejection Pattern Testing Procedure

### **6.4 Instruments:**

- 6.4.1** Bullet Recovery Water Tank
- 6.4.2** Cotton Box
- 6.4.3** Remote Firing Stand

**6.5 Reagents/Materials:** None

### **6.6 Hazards/Safety:**

**6.6.1** It is the responsibility of the firearm examiner to employ appropriate safety and health practices. Safe firearm handling procedures shall be strictly followed at all times.

**6.6.2** Appropriate hearing and eye protection shall be worn during test firing.

### **6.7 Reference Materials/Controls/Calibration Checks:**

- 6.7.1** TBI FTIU Ammunition Reference Collection
- 6.7.2** TBI FTIU Test Fire Reference Collection

### **6.8 Procedures/Instructions:**

**6.8.1** The following general procedures should be followed for all test firing. The appropriate bullet recovery system will be determined by the firearm examiner.

- Ensure that the firearm is SAFE to fire. Examine to ensure the bore is unobstructed.

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- ALWAYS wear appropriate eye and ear protection.
- Ensure that the in-use warning lights of the indoor shooting areas are activated during test firing.
- Ensure that the door to the range is closed securely and that the exhaust fans are turned on during firing.
- A second examiner or technician, “spotter”, must be present during all test-firing. The spotter should wear the appropriate eye and ear protection if needed.
- Use ammunition designed for the firearm.
  - There will be exceptions to the above when the evidence or additional information indicate that ammunition other than what the firearm was designed to fire were used. (e.g., 16 gauge shotshell in a 12 gauge shotgun, or a 357 Magnum cartridge fired in a 30-30 rifle.)
  - On those occasions where ammunition not designed for a firearm must be fired in that firearm, extreme caution should be maintained. Firing the firearm remotely may be the best option.
- Treat every barrel of multiple barreled firearms separately.
- Fire at least three (3) rounds for all firearms (barrels), although four (4) rounds are recommended when a bullet comparison is necessary. These will be fired into a bullet recovery system. An additional two rounds should be fired down range to ensure the function of the firearm and confirm the ejection pattern (see Firearm Examination Procedure (Section 5) and Ejection Pattern Testing Procedure (Section 8) for more information). The examiner may need to fire additional rounds if multiple ammunition types are received as evidence, the tests aren't reproducing consistently, the exact type of ammunition is not available, or any other reason necessitating additional test fires.
- Only load one round at a time in a magazine for semi-automatic/automatic firearms when firing into a bullet recovery system.
- In certain cases it may be necessary to clean the bore after the first test shots, and before firing any additional test shots. The firearm should be fired as received except when the bore is rusted, corroded, or blocked by mud/dirt such that it could not have been fired and left in that condition.
- The examiner may pre-mark test cartridges to assist in phasing during microscopic examination. This may be done by placing a phase mark on the ogive of the bullet extending down on to the casing and chambering the round with the mark at the 12 o'clock position.
- If evidence cartridges were used, the examiner should mark the bullet and cartridge case with the laboratory number and/or the exhibit number, and the examiner's initials.
- A small cardboard box should be used to hold test fired bullets and cartridge cases. One side of the box should be marked with the following information:
  - TBI Laboratory Number and Exhibit Number assigned to the firearm. This should be noted on the lower left area of the side of the test box.
  - Manufacturer of Firearm. This should be noted on the top left area of the side of



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the test box.

- Model of the Firearm, if known. This should be noted on the top right area of one side of the test box, if applicable.
- The Serial Number of the Firearm. The serial number should be noted in the center of the side of the test box.
  - If the firearm is manufactured without a serial number, this area may be left blank.
  - If the serial number had been obliterated and restored, the recovered serial number should be listed.
  - If the serial number had been obliterated, and restoration was not possible, a notation of “obliterated” should be placed in this area.
- The Firearm Type (e.g., PI, PR, S, etc), Caliber, and General Rifling Characteristics should be noted on the lower right area of the side of the test box. (e.g., PI / 380 Auto / 6R)
- After test firing each firearm, ensure that all test fired bullets and cartridge cases are placed in the test boxes before firing additional firearms.
- The test fires should be marked uniquely (1,2,3,4, etc) to differentiate one from the other. These markings do not have to be the order of fire. These designations may be used to identify which test was used to make the identification or document the identification photographically.

**6.8.2** When using the bullet recovery water tank, the examiner shall adhere to the following additional steps:

- Ensure that the water level is appropriate.
- Ensure that the lid of the bullet recovery tank is closed and properly secured.
- Ensure that the exhaust fan is turned on.
- For firearms with detachable magazines, only one cartridge may be loaded into the magazine at a time.
- Fire the firearm through the shooting port. If the firearm is capable of firing in both single and double action modes, a minimum of one (1) shot per mode should be obtained.
- Recover the fired bullets and cartridge cases.

**6.8.3** When using the cotton box, the examiner shall adhere to the following additional steps:

- The examiner should consider wetting the first section of cotton of the cotton/paper in the box.
- The examiner should place paper partitions at various points in the cotton box to ensure tracking of the fired bullet.
- Ensure that the exhaust fan in the range is turned on, and that the in-use warning light is illuminated.
- For firearms with detachable magazines, only one cartridge may be loaded into the

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magazine at a time.

- Fire the firearm through the shooting port. If the firearm is capable of firing both single and double action modes, a minimum of one (1) shot per mode should be obtained.
- Bullets should be recovered by searching through cotton, using partitions as guides.
- Ejected cartridge cases shall be retrieved and placed in the test box.

**6.8.4** When using the range, the examiner shall adhere to the following additional steps:

- Ensure that the exhaust fan is turned on and warning light is illuminated.
- The examiner may load more than one cartridge into the firearm during testing in the range area.

**6.8.5** While using the remote firing stand the examiner shall adhere to the following method:

- Set up the remote firing device as per manufacturer's guidelines in front of the appropriate recovery system.
- Place firearm in device. It is recommended that the examiner first dry-fire the firearm in the remote firing device before using live ammunition.
- Ensure that the exhaust fans or system is turned on.
- Ensure all warning systems are activated.
- For firearms with detachable magazines, only one cartridge may be loaded into the magazine at a time.
- Activate the remote device while standing behind a protective shield or while standing at a safe distance away from the firearm.
- Obtain the appropriate test fired components.

**6.8.6** Test Fire Selection and Handling

- Whenever practical, the firearm examiner should use laboratory reference ammunition that is similar to the submitted evidence.
- The firearm examiner may use ammunition submitted with the firearm if necessary.
  - The ammunition shall be inspected first to ensure it is factory produced ammunition. Using reloaded ammunition may be necessary, but extreme caution should be exercised.
- All test fires shall be considered reference materials and shall be treated as such. See Appendix 9 Test Fire Reference Collection.

**6.8.7.** Ejection Pattern Tests

Ejection Pattern Tests are performed upon request of the submitting agency to determine the pattern produced when a cartridge case/shotshell case is ejected from a firearm during the firing process.



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See Ejection Pattern Testing Procedure (Section 8).

**6.9 Records:** The firearm examiner shall document their findings in the form of handwritten notes, computer generated notes, photography, or by utilizing a firearms worksheet.

**6.10 Interpretations of Results:** Not Applicable

**6.11 Report Writing:** Not Applicable.

#### **6.12 References**

Association of Firearms and Toolmark Examiners Training Manual, March 3, 2001.

Association of Firearms and Toolmark Examiners Procedures Manual, July 9, 2001.

Association of Firearms and Toolmark Examiners Glossary, 5<sup>th</sup> Edition, 2007.

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Love, Ed, "Fifty Caliber Cotton Box Recovery", AFTE Journal, Winter 2009, Vol. 41, No. 1, pgs. 77-79.

"A Guide to Firearms Safety", A Safety and Educational Publication of the National Rifle Association, May 1994.

"Forensic Examiners Firearms Recall/Safety Warning List", FBI Laboratory.