

Firearms/Toolmarks Discipline Standard Operating Procedure Firearm Examinations

1 Scope

This procedure is designed for the evaluation and examination of firearms and firearm components. Firearm examinations include the safe handling, test firing and recording of information as it pertains to the functionality of an item.

This procedure applies to Firearms/Toolmarks Discipline (FTD) personnel conducting forensic examination in the following category of testing:

- Firearms

2 Equipment/Materials/Reagents

- Arsenal (static) weights
- Bullet recovery system / water tank
- IMADA force gauge or similar
- Indoor range
- Measurement equipment
- Microscope (stereozoom/comparison)
- Personal protective equipment
- Rawhide mallet

3 Standards and Controls

Known exemplars produced from evidentiary items during examination serve as controls. Exemplars may include bullets and/or cartridge cases produced by a known firearm. Exemplars produced from the known item will be treated as secondary evidence in accordance with the *FTD SOP Documentation and Preparation of Evidentiary Items* and marked in accordance with the *FTD QAM Marking and Examination of Evidence*.

4 Performance Checks

4.1 Performance checks on the measurement equipment will be performed and recorded as outlined in the *FTD SOP Measurement, Calibration, Performance Check and Maintenance of Equipment*.

5 Sampling

Not Applicable.

6 Procedures

6.1 Safety Evaluation of a Firearm

6.1.1 An initial safety evaluation must be conducted prior to any examination of a firearm by FTD personnel. Unless exigent circumstances exist, rendering a firearm safe will take precedence over the preservation of evidence, although every effort will be made to preserve as much evidence as possible. A firearm will be considered loaded until it has been inspected and determined to be unloaded by FTD personnel utilizing one of the following inspection procedures:

6.1.2 Revolver

The following should be conducted in the following order:

- a. Open cylinder, check all chambers.
- b. Remove any cartridges and/or cartridge cases remaining in chamber.
- c. Visually inspect bore for obstructions.

6.1.3 Pistol

The following should be conducted in the following order:

- a. Engage safety and remove magazine if present.
- b. Open action and inspect chamber areas.
- c. Remove any cartridges and/or cartridge cases remaining in chamber.
- d. Visually inspect bore for obstructions.

6.1.4 Shotgun

The following should be conducted in the following order:

- a. Engage manual safety, if available.
- b. Remove magazine, if present.
- c. Disengage safety.
- d. Open action and lock open, if possible.
- e. Visually inspect chamber area.
- f. Engage manual safety if action is to be closed.
- g. Press on magazine follower to ensure that no shotshells remain in magazine tube.
- h. Visually inspect bore for obstructions.

6.1.5 Rifle

The following should be conducted in the following order:

- a. Engage safety and remove magazine, if present.
- b. Open action and lock open, if possible.

- c. Inspect chamber and magazine well area and remove any cartridges/cartridge cases remaining in chamber or in magazine tube.
- d. Visually inspect bore for obstructions.
- e. If present, engage manual safety if action is to be closed.

6.1.6 After the initial safety evaluation, anytime a firearm is out of the direct control of FTD personnel, it should be re-inspected to confirm that it is unloaded.

6.2 Firearm Function Examination

A function examination is conducted to determine the condition of the firearm, if it will operate in the manner in which it was designed and whether any modifications have been made.

6.2.1 The firearm should be test fired on the Firearms/Toolmarks Unit (FTU) test range using established safety rules to determine the functionality of a firearm. At the discretion of the examiner, the bullet recovery tank can be used for such testing.

6.2.2 Test firing should be done utilizing the magazine provided with the firearm. If no magazine is provided, a Reference Firearms Collection (RFC) magazine should be substituted if available.

6.2.3 Firearms will be test fired utilizing all modes in which the firearm is capable of firing.

6.2.4 All chambers of firearms having multiple barrels, such as double-barreled shotguns, derringers, etc. should be loaded and fired.

6.3 Collecting Test Fired Specimens

6.3.1 The firearm should be test fired in the bullet recovery tank using established safety rules to obtain known fired bullet and cartridge case specimens.

6.3.2 In those cases where the bullet recovery tank cannot be used, the firearm should be test fired utilizing an alternate bullet recovery/test firing device/system to retrieve the fired specimens.

6.3.3 Test fired bullets and cartridge cases that have been labeled are considered secondary evidence.

6.3.3.1 Secondary evidence will be labeled, packaged and recorded in accordance with the *FTD QAM Marking and Examination of Evidence*.

6.4 Trigger Pull Testing

Trigger pull testing is conducted in the water tank room using static weights or the IMADA, DPS-44 force gauge to determine the amount of force which must be applied to the trigger to release the hammer or firing pin of the firearm.

6.4.1 Trigger pull testing should not be conducted if parts that would directly affect the trigger pull, such as triggers, springs, etc., have been installed by the examiner in order to make the firearm operable for other exams.

6.4.2 Because trigger pull testing involves dry firing of the firearm and poses a threat of damage to firing pins and breech areas, such testing should not be conducted until after the firearm has been test fired and sufficient specimen bullets and cartridge cases have been obtained.

6.4.3 The trigger pull for each mode possible for a firearm (single action, double action, semi-auto, full-auto) should be determined. The static weights hanger shall touch the trigger at a point where the trigger finger would normally rest, and with the force applied approximately parallel to the bore axis.

6.5 Accidental Discharge Test

Accidental discharge testing will be conducted in the FTU indoor range when specifically requested by the contributor or when an examiner determines such a test is necessary.

6.5.1 The accidental discharge test will be conducted in all modes of fire for a particular firearm, utilizing a primed cartridge case.

6.5.1.1 A firearm being held will be struck with a rawhide or similar styled mallet on its six planes:

1. Front of muzzle
2. Butt plate
3. Top of breech and chamber
4. Bottom of trigger guard and frame
5. First side of the receiver/frame
6. Second side of the receiver/frame

6.5.2 Any additional testing undertaken in order to attempt to duplicate the conditions under which the firearm discharged is left to the discretion of the examiner.

6.6 Firearm Drop Test

The firearm drop test will be conducted in the FTU indoor range when specifically requested by the contributor or whenever an examiner determines such a test is necessary.

6.6.1 Prior to a drop test being conducted, the examiner will inform the contributor of the potentially destructive nature of this test and of the risk of significant damage to the firearm and record the notification in the Communication Log. This test should be conducted after all other examinations have been completed.

6.6.2 The drop test will be conducted utilizing a primed cartridge case.

6.6.3 Absent specific information provided by the contributor concerning the discharge of the firearm, the method of testing to be used is left to the discretion of the examiner. If known, the conditions surrounding the discharge of the firearm at a shooting scene, such as height or type of surface, should be duplicated as closely as possible.

6.7 Individual Characteristic Database Search

6.7.1 Individual characteristic database searches, including NIBIN, of known test fired cartridge cases will be performed in accordance with the *FTD SOP Individual Characteristic Database Searches*.

6.8 National Database Search

6.8.1 National database searches, including eTrace and NCIC, of the serial number will be performed in accordance with the *FTD SOP National Database Searches*.

7 Calculations

Not applicable.

8 Measurement Uncertainty

Not applicable.

9 Limitations

Due to damage or other factors, some of or all of the above examinations might not be possible. It is at the discretion of the examiner as to what examinations are necessary and if they should be conducted.

10 Safety

FTD personnel will follow the established policies and guidance located in the FBI Laboratory Safety Manual as outlined by the FBI Laboratory's Health and Safety Group.

10.1 FTU personnel are not permitted to test fire alone in the indoor range or in the bullet recovery tank room and must adhere to the guidelines outlined in the *FTU Safety Protocols for the Handling of Firearms and Ammunition* (Appendix A).

10.2 Additionally, FTU personnel are required to review the *FTU Safety Protocols for the Handling of Firearms and Ammunition* on an annual basis. A signature/date on the sign-off sheet signifies understanding and compliance.

10.2.1 A record of this review will be maintained in the Firearms/Toolmarks Unit quality assurance program records.

10.3 If a request has been made for non-FTU personnel to perform test-firing within the FTU indoor range or bullet recovery tank room, the FTU Chief will be notified, and the request will be evaluated. If the FTU Chief approves this request, the appropriately trained FTU personnel will be present.

11 References

FBI Laboratory Quality Assurance Manual

FBI Laboratory Operations Manual

FBI Laboratory Safety Manual

Glossary of the Association of Firearm and Tool Mark Examiners, AFTE Training and Standardization Committee, 6th Edition, Version 6.030317.1

“SWGGUN Admissibility Resource Kit (ARK).” Resources, The Association of Firearm and Tool Mark Examiners. Web. Accessed 5 February 2020.

Rev. #	Issue Date	History
7	04/30/14	Section 2 added “or similar” to force gauge. Sections 6.1.1 through 6.1.4 redacted “numerical.” Correction made to Section 6.2.5 and added 6.2.5.1. Sections 6.3.3 through 6.3.3.2, 6.3.4 and 6.6.1 were updated for the addition of Forensic Advantage. Updated References.
8	03/02/20	Scope was updated to include FTD personnel who utilize this procedure for FTU initiatives. Section 2 was reformatted. Section 3 and Section 4 updated with new SOP references and grammatical modifications. Section 6 updated to include FTD personnel. Sections 6.1.2 through 6.1.5 were reformatted. Alternate recovery system was added to Section 6.3.2. Section 6.3.3.1 was updated with FTD QAM reference. Reformatted Section 6.5.1.1. Added communication log record to Section 6.6.1. Added Sections 6.7 and 6.8. Updated Section 8 title. Updated Section 10 and clarified where record of annual review will be maintained. Section 11 References updated. Appendix A was added.

Approval

Redacted - Signatures on File

Firearms/Toolmarks
 Unit Chief

Date: 02/28/2020

Firearms/Toolmarks
 Technical Leader

Date: 02/28/2020

Appendix A: FTU Safety Protocols for the Handling of Firearms and Ammunition

1 Purpose

The purpose of this document is to ensure the safety of all Firearms/Toolmarks Unit (FTU) personnel and non-FTU personnel, when handling firearms and ammunition during examinations and firing in the FTU indoor range and bullet recovery tank (BRT).

2 Requirements

- 2.1** In the FTU, when handling a firearm or firearm component, safety is the first concern. Make sure the firearm is unloaded before handling. If there is any doubt about the operability of a firearm, consult with an appropriately trained FTU personnel, protocols, or manufacturer's literature before handling.
- 2.2** FTU personnel are responsible for following proper firearms handling and safety procedures and have a working knowledge on the operation of range equipment while in the FTU.
- 2.3** Firing in the FTU indoor range and BRT on the weekend and after regular business hours, unless previously approved by the FTU Chief, is prohibited. Accommodations can be made for casework examinations that require working after regular business hours and on the weekend.
- 2.4** Firearms that exceed range limitations are not permitted to be fired in the FTU indoor range or BRT unless the proper accommodations have been made to ensure the safety of personnel using the range/equipment and the integrity of the range/equipment.
- 2.5** Prior to exiting the indoor range or BRT, FTU personnel and non-FTU personnel will ensure all firearms are cleared and the safety is engaged.
- 2.6** FTU ranges are not designed or approved by Federal Bureau of Investigation Headquarters (FBIHQ) for the purpose of firearms qualification.
- 2.7** Unsecured ammunition will not be stored in the FTU indoor range or BRT.
- 2.8** No eating, drinking, or smoking is permitted in FBI Laboratory/FTU examination areas that include: indoor range, BRT, examination suites and reloading room.

3 Safety Rules

- 3.1** The muzzle of ALL firearms will be pointed in a safe direction at ALL times.

- 3.2 All firearms will be handled as though they are LOADED. The firearm will be inspected and made safe upon being handled.
- 3.3 Keep your finger outside of the trigger group until you have a safe sight picture.
- 3.4 Always be aware of what is behind your target.

4 Safety Procedures for Handling Firearms

- 4.1 Always point the muzzle of the firearm in a safe direction, especially when loading, unloading, firing, or checking a firearm.
- 4.2 Inspect ALL FIREARMS EACH TIME you handle them to ensure they are safe and unloaded.
 - a. Revolvers – open cylinder, check all chambers, and leave action open.
 - b. Pistols – remove magazine, open action, inspect chamber, inspect magazine to ensure empty, engage safety, and lock action open.
 - c. Shotguns – open action/breech, inspect chamber, inspect magazine to ensure empty, engage safety, and lock action open.
 - d. Rifles – remove magazine, open action, inspect chamber, inspect magazine to ensure empty, engage safety, and lock action open.
- 4.3 The safety function within a firearm should be engaged whenever possible, especially while being transported or when left in an examination area.

Note: Anytime the action of a firearm is closed or it is out of the **direct control** of the Examiner or appropriately trained employee, it should be re-inspected before any further handling occurs.

5 Safety Procedures for Firing a Firearm

- 5.1 When transporting a firearm to the BRT or indoor range, the action should be opened, safety engaged and the safety rules followed as outlined in Section 3, above.
- 5.2 Perform a safety check to ensure the firearm is in firing order, the safety is functional, and the headspace is not excessive.
- 5.3 The safety function within a firearm should be engaged whenever possible, especially while being transported or when left in an examination area
- 5.4 The barrel and cylinder/chamber of all firearms will be examined for obstructions, cracks, deformations, residue/rust build-up, etc. prior to firing.
- 5.5 Do not test fire alone.

- 5.6** Do not test fire a firearm if not familiar with its function.
- 5.6.1** When test firing a rifle or shotgun without a shoulder stock, use a magnetic level to ensure proper alignment.
- 5.7** Always wear proper eye and ear protection.
- 5.8** At the shooter's discretion, only one cartridge will be loaded and fired at a time, unless performing a full-automatic function test.
- 5.9** Close action when muzzle is pointed down range or inserted in port of the BRT.
- 5.10** If a misfire occurs, keep the firearm pointed down range or keep inserted in port of the BRT for at least 10 seconds before opening the action or cylinder. Recheck the bore and cylinder/chamber for obstructions.
- 5.11** All observers will stand behind the shooter. The shooter is responsible for informing observers of the line, then allowing several seconds for observers to prepare. The shooter will announce when they are prepared to shoot and when the line is 'clear'.
- 5.12** If a firearm is dropped or bumped, re-inspect it prior to firing.
- 5.13** After test firing ensure the firearm is unloaded, the magazine is removed, and the safety is engaged before leaving the firing position on the indoor range or the firing port of the BRT. Ensure the chamber is empty and announce that the weapon is clear to any observers.
- 5.14** The remote firing device should be used when there is the potential for a firearm to fail when test firing.
- 5.15** Before leaving, clean range area, turn off lights, and reset 'in use/open' sign.
- 5.16** Never give a firearm to or take a firearm from anyone unless the action or cylinder is opened and the safety engaged.
- 5.17** Do not place finger on the trigger of a firearm unless you have a safe sight picture.
- 5.18** Do not fire in the full-automatic mode in the indoor range unless necessary for testing or training.
- 5.19** The indoor range and BRT room will be used only by personnel of the FTU.
- 5.20** If a request has been made for non-FTU personnel to perform test-firing within the FTU indoor range or BRT room, the FTU Chief will be notified and the request will be

evaluated. If the FTU Chief approves this request, the appropriately trained FTU personnel will be present.

6 Pulling Bullets

- 6.1** Examiners or appropriately trained employees will wear eye protection when using inertia bullet pullers as primer ignition and possible propulsion of primer is possible.
- 6.2** Pulling bullets by using pliers or other tools (e.g., rimfired cartridges) should be conducted with extreme caution as primer powder in the rim could be crushed by such tools, resulting in the firing of the cartridge.
- 6.3** Accidental discharge testing of a firearm, which could result in the firing of a firearm, should be done with proper eye and ear protection.
- 6.4** Precautions to prevent dropping firearms and cartridges should be taken. In the event a firearm is dropped, it should be inspected prior to firing to ensure it is in safe working condition.

7 Bullet Recovery Tank (BRT) – Safety Rules and Procedures

- 7.1** Do not test fire alone (See Section 5.5).
- 7.2** Ear and eye protection will be worn by all shooters and observers in the BRT room.
- 7.3** Prior to firing into the BRT, the shooter or observer will:
 - a. Check the BRT for other projectiles or debris.
 - b. Close the top of the BRT.
 - c. Ensure doors to the BRT room are closed.
- 7.4** The firearm should be loaded and made ready to fire (e.g., loaded cylinder or slide/bolt closed) ONLY when the muzzle of the firearm is placed into the firing port of the BRT and is pointed towards the water.
- 7.5** At the shooter's discretion, shotguns and full-automatic firearms should not be fired into the BRT.
- 7.6** After firing, if bullet(s) separate in the BRT, as many pieces as possible should be recovered to prevent clogging of the water filter.
- 7.7** Any hazardous waste generated during test firing should be disposed of in the proper hazardous material container. If there is any question on the proper disposal of hazardous material(s), contact a member of the Health and Safety Group.

8 Reloading – Safety Rules and Procedures

- 8.1** Do not reload unless you are experienced at reloading or have received training on the various aspects of reloading.
- 8.2** Prior to reloading, the appropriate reloading manuals should be consulted to ensure maximum and/or minimum powder load(s) are not being exceeded for bullet weight and proper components are being used. Powders used should be researched as to the pressures and burn rates. **DO NOT START WITH THE MAXIMUM LISTED LOADED** as it might be unsafe in the firearm being test fired. Also be aware that maximum loads vary from manual to manual.
- 8.3** When firing reloads, they should be inspected for signs of excessive pressures such as bulging, cracking, separation, gas leaks or excessive head expansion. Never use brass of unknown origin.
- 8.4** Determine that the correct seating depth is used, as excessive or improper seating depth can cause excessive and unsafe pressures.
- 8.5** Determine that bullets utilized for reloading are the proper dimension and weight for the cartridge and firearm it will be fired in.
- 8.6** Do not use cartridge cases that have signs of wear, deformity, cracks, etc.
- 8.7** Eye protection will be worn when removing bullets from a cartridge case or priming or depriming cartridge cases.
- 8.8** Eye protection will be worn when reloading a cartridge case.
- 8.9** Any hazardous materials generated during reloading should be disposed of in the proper hazardous material container. If there is any question on the proper disposal of hazardous material(s), contact a member of the Health and Safety Group.
- 8.10** Do not substitute smokeless powder for black powder or black powder substitutes (e.g., Pyrodex) as smokeless powder develops more pressure than black powder.
- 8.11** Never mix different powders.