

Firearms/Toolmarks Discipline

Technical Procedure for Documentation and Preparation of Evidentiary Items

1 Scope

This procedure is designed for the documentation, evaluation, and preparation of evidentiary items. In addition, this procedure outlines the methods for evidence workflow. This procedure applies to Laboratory personnel who are authorized to document and prepare items for examination in the Firearms and Toolmarks Discipline.

2 Equipment/Materials/Reagents

- 3D toolmark topographical instruments
- Caliper (measurement within ± 0.001 in.)
- Camera
- Casting material
- Cleaning solvent
- Computer
- Cotton swabs
- Known exemplars
- Measurement equipment
- Metal Scribe / Marker
- Microscope (stereozoom/comparison)
- Modeling clay or equivalent
- Non-abrasive cleaning tools
- Personal protective equipment (PPE)
- Bullet recovery/test firing device/system
- Stage micrometer or measuring reticle
- Test media (e.g., lead, brass, copper)

3 Standards and Controls

Known exemplars produced from evidentiary items during examination serve as controls. Exemplars produced from the known item will be treated as secondary evidence in accordance with the *FTD QAM Marking and Examination of Evidence*.

4 Performance Checks

4.1 Performance checks of the measurement equipment and calibration on a 3D instrument will be performed and recorded in accordance with the *FTD Technical Procedure Measurement, Calibration, Performance Check and Maintenance of Equipment*.

5 Sampling

5.1 Statistical sampling is not applicable in the FTD.

5.2 Non-Statistical sampling is employed in the FTD. It is based on the training, experience and competence of the examiner. No assumptions are made regarding items/portions that were not selected for examination and Results of Examination in *Laboratory Reports* are specific to the items/portions that were examined.

6 Procedures

6.1 Itemizing Evidentiary Items

6.1.1 Ensure the evidence received reflects the item descriptions in FA and/or what is listed on the request for examination.

6.1.1.1 If a discrepancy is noted between what is received and what is listed in FA and/or on the request for examination, refer to *LOM - Processing a Submission and Evidence Breakdown*.

6.1.2 The person inventorying the item for further examination will begin recording details in the appropriate *FTD Worksheets* located in Appendix B of the *FTD QAM Case Assignment, Records, Results and Verifications*.

6.1.2.1 Non-evidentiary items will be inventoried, transferred appropriately, but will not be described in *FTD Worksheets*.

6.1.2.2 If items need to be subdivided, refer to *LOM - Practices for Assigning Cases and Conducting Examinations*.

6.1.3 Any observations that are recorded regarding the condition of the item and/or packaging will be recorded in the appropriate *FTD Worksheets*.

6.1.3.1 Personnel will employ universal precautions, including wearing the appropriate PPE, when itemizing and subdividing packaging that contains a biohazard label, or when packaging descriptions suggest the potential for biohazard.

6.2 Labeling Evidentiary Items

6.2.1 Ensure the item is labeled with the appropriate item identifiers. Examples include:

- Metal scribe used to etch identifiers onto a surface that does not interfere with areas of interest.
- Marker used to label identifiers onto a surface that does not interfere with areas of interest.
- A tag, labeled with the identifiers, is attached to the item.
- A container, labeled with the identifiers, used to preserve the item.

6.2.2 Ensure the electronic evidence, when printed or copied, is labeled with the appropriate item identifiers.

6.3 Creating Case Notes

6.3.1 Depending on the evaluation of physical characteristics of an item, an *FTD Worksheet* will be started.

6.3.2 The minimum required fields when starting an *FTD Worksheet* include:

- Description of packaging
- Item Identifier
- Laboratory number
- Name of preparer(s)
- Start date of examinations

6.3.3 The remaining required fields in the *FTD Worksheets* may be completed when examinations continue.

6.4 Photographing Evidentiary Items

6.4.1 Photographs may be added to the *FTD Worksheets* that represent detail(s) about the item that cannot otherwise be described in the required fields.

6.4.2 Prior to cleaning an item, a photograph should be collected of the evidence being examined.

6.4.3 Photographs that are printed as an attachment to *FTD Worksheets* or incorporated into the case file 1A will include:

- Date of examinations
- Identifier(s)
- Laboratory Number
- Name of preparer or examiner

6.5 Cleaning Evidentiary Items

6.5.1 Cleaning an item of debris or biohazard material can be done using the following methods:

- Cloth or cotton swab to loosen debris
- Non-abrasive cleaning tool, brush or wooden toothpick to loosen debris
- Cleaning solvent, such as water, alcohol or acetone can be used to remove paint and other debris.
- For corrosion or heavily stained items, CLR™ or an equivalent cleaner can be used to facilitate the restoration of the original surface.
- Note: Due to the deleterious effects of prolonged exposure of metal to this type of cleaner, this method should be used as a last resort and/or monitored.

6.5.1.1 Wire brushes or other abrasive materials should not be used to clean the area as these items can alter the surface features.

6.5.2 A cleaning technique that was used can be described in the appropriate *FTD Worksheets*.

6.5.3 Following cleaning, it may be necessary to acquire additional photographs of the items or surfaces being examined.

6.6 Casting of Marked Surfaces

6.6.1 Depending on the size and shape of the evidentiary item, it may be necessary to cast any marked surfaces for the evaluation and preservation for future comparisons.

6.6.2 It may also be necessary to cast an evidentiary item which contains multiple marked surfaces.

6.6.3 Prior to casting, thoroughly examine the marked surfaces and make specific notations of what is observed, to include any trace material. This can include taking measurements of characters, known items or marked surfaces.

6.6.3.1 Measurements will be recorded in accordance with the *FTD Technical Procedure Measurement, Calibration, Performance Check and Equipment Maintenance*.

6.6.3.2 It is at the discretion of the examiner to ensure coordination of the removal and preservation of trace evidence with the appropriate discipline examiner.

6.6.3.3 Treat each marked surface area independently and record accordingly.

6.6.4 If an item contains multiple areas for casting, those areas should be labeled appropriately and visible in the photographs.

6.6.5 Casting material may be tested on an inconspicuous area of the item to ensure:

- Casting material performs/replicates the casted substrate/item.
- Casting material does not alter the item.

6.6.6 If necessary, build a dam around the area of interest using modeling clay or suitable substrate. The dam should be constructed to retain the casting material in place until it has fully hardened.

6.6.7 Place casting material into the dam and allow time to harden. Casts may set at varying times depending on multiple factors. Variables such as temperature may result in prolonged cast curing time. Casting materials designed to be used within a specific temperature range should be used if possible.

6.6.7.1 Identifiers may be placed on the substrate to become a permanent part of the cast, or a paper label may be placed in the back of the cast. See Section 6.7 of this document for the minimum required information.

6.6.8 Once the cast has fully set, remove the clay dam, and remove the cast. Examine the cast for deposits of any debris that might have been missed during the cleaning process.

6.6.8.1 It may be necessary to make multiple casts of each area to remove debris and capture the microscopic detail and to facilitate undistorted comparisons.

6.6.9 Retained cast material is considered secondary evidence and will be marked or labeled using procedures detailed in Section 6.7.

6.6.9.1 It is at the discretion of the examiner as to whether unused casts are retained.

6.7 Generating Secondary Evidence

6.7.1 Secondary evidence derived from an examination process on an item of evidence will be labeled, packaged and recorded in accordance with the *FTD QAM Marking and Examination of Evidence*.

7 Calculations

Not Applicable.

8 Measurement Uncertainty

When a measurement of a firearm or barrel will be reported as requested by a contributor or is probative to a case, the measurement will be recorded in accordance with the *FTD Technical Procedure Firearm Barrel and Overall Length Measurements*.

9 Limitations

The composition of the substrate being cast may not be suitable for obtaining microscopic features for comparison purposes. (Porous material (e.g. bone))

10 Safety

Take standard precautions for the handling of all evidentiary items, certified reference materials and working standards. Personal protective equipment should be also be utilized.

11 References

Cadigan, James J. and Klees, Gregory S., “A Casting Vehicle Identification Numbers – A Technical Aid in Auto Theft Investigation”, FBI Law Enforcement Bulletin, Vol. 47, No. 6, August, 1978.

FBI Laboratory Quality Assurance Manual, latest revision.

FBI Laboratory Operations Manual, latest revision.

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

Klees, G., “A Casting Material Update on Toolmark Reproduction”, AFTE Journal, 1988; 20(4): 463.

Miller, Jerry, “An Introduction to the Forensic Examination of Toolmarks”, AFTE Journal, 2001; 33 (2): 233 through 247.

“SWGGUN Admissibility Resource Kit (ARK).” Resources, The Association of Firearm and Tool Mark Examiners. Web. Accessed 6 March 2021.

Rev. #	Issue Date	History
0	03/02/20	Original issuance. Created from FTD SOPs Bullet Examinations, Cartridge/Shotshell Case Examinations. Firearm Examination and Toolmark Examination.
1	04/15/21	Updated technical procedure throughout document. Revised scope to include authorized personnel from other disciplines. Moved requirements for marking secondary evidence scanned for virtual comparison microscopy to QAM Marking and Examination of Evidence. Updated reference.

Approval

Redacted - Signatures on File

Firearms/Toolmarks
Acting Unit Chief

ate: 04/15/2021

Scientific & Biometrics
Analysis Unit Chief

ate: 04/15/2021

Firearms/Toolmarks
Technical Leader

ate: 04/15/2021