

FBI Laboratory Firearms and Toolmarks Unit Key Examination and Comparison

1 Scope

This procedure is designed for the examination of keys (manufactured for mechanical locks), including the comparison of keys with each other.

2 Equipment/Materials/Reagents

Stereozoom binocular microscope (magnification range 4X-20X minimum); Caliper capable of measuring lengths up to 3 inches, within + .002 inch; Metal scribe.

3 Standards and Controls

Not Applicable.

4 Calibration

Not Applicable.

5 Sampling

Not Applicable.

6 Procedures

Document the physical design configuration and biting cut sequence of each specimen key. Compare biting sequences of specimen keys having compatible key blade designs.

6.1 Marking for Identification

All keys must be scribed or tagged for identification, being careful to preserve all marks already present on the specimen. The choice of the method used to affix such identifying marks is at the examiner's discretion.

6.2 Determination of Key Blank

Document the physical configuration of the submitted key and note any coined or stamped markings (company logos, manufacturer item numbers, etc) on the specimen. Examine the key for degree of wear, and the presence or absence of toolmarks indicative of key duplication. When possible and pertinent, note whether the key under examination is a lock manufacturer's factory original key, or one cut from an aftermarket key blank. Use catalogs of key blank manufacturers, such as ILCO, JET, and SILCA, to determine the key blank used to cut the key under examination. The characteristics considered in identifying the correct key blank are:

- a. Cross-sectional configuration of the key blade;
- b. Length of the key blade;
- c. Presence (and position) or absence of shoulders on the key blade;
- d. Key bow shape, and the presence or absence of any coatings (such as plastic).
- e. Presence or absence of additional security devices, such as General Motors Vehicle Anti-Theft System (VATS) resistors or transponder chips.

6.3 Examine Biting Cuts and Decode the Key

6.3.1 Document the biting cuts in the key. Determination of cutting positions and depths should be made using a caliper, and when appropriate note the cut angle. Include in the examination notes details such as:

- a. Count of the number of biting cuts; their position and depth relative to the appropriate key blade reference surfaces (blade back, tip, shoulder, side milling surface, etc.);
- b. Note the profile of the individual biting cuts (whether flat bottomed or rounded, machine milled, punched or hand filed, etc);
- c. The angle of each cut (45° Left, 90° , or 45° Right), when the key is made to operate a lock with bi-axial (chisel-pointed) pins.

6.3.2 Compare the data obtained by the procedure 6.3.1 with standard lock industry code references to characterize the type (manufacturer/brand, model, model-year, etc.) of the device the key is designed to access. In the same way, determine which manufacturer's direct biting code is most consistent with the observed biting sequence in the key under examination. These conclusions will be documented in the examiner's notes.

6.4 Determination of Key Blank

In order for two or more keys to operate a lock they must have compatible key blade configurations that permit them to fit into the same lock, and must have the same biting sequence (see step 6.3.1 and 6.3.2 above). Such "associations" are to be recorded in writing in the examiner's notes. In addition the examiner may record such associations using macroscopic photography.

7 Calculations

Not Applicable.

8 Uncertainty of Measurement

Not Applicable.

9 Limitations

The methods set forth in these protocols pertain to the examination of keys designed for key –operated mechanical, rather than devices associated with electro-mechanical (card-access, fingerprint reader, etc) locks.

10 Safety

Not Applicable.

11 References

Paholke, Arthur R., What the Tool Mark Examiner Should Know About Locks (A Guide for the Firearms Examiner), AFTE Newsletter, Number 19 (April 1972).

Sherlock, William E., Forensic Locksmithing Used in a Lock Investigation, AFTE Journal, Vol. 15, Number 3 (October 1983).

Tobias, Marc Weber, Locks, Safes, and Security (An International Police Reference), Chapters 6-17, Charles C. Thomas Publishing, LTD (2000).

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FBI Laboratory Quality Assurance Manual

FBI Laboratory Operations Manual

<u>Rev. #</u>	<u>Issue Date</u>	<u>History</u>
0	07/10/06	Original issue for ASCLD/LAB- <i>International</i> accreditation
1	11/05/07	Updated section 4 to remove stereomicroscope and caliper calibrations.

Approval

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