



<b>ATF-LS-QD16</b> <b>Line Sequence Examinations</b>	Published Online: <b>March 2018</b>
Authority: Technical Leader	
Unofficial Copy; May Not Be Most Current Version	Page: 1 of 2

**PRINCIPLE:**

To determine, if possible, the sequence of application of a given line of writing, typewriting, or toner came before another line of similar or different type (or crease).

**SPECIAL HANDLING:**

1. Evidence containing body fluids that is received in the Document Section should be dried under a hood and then repackaged in a paper box or envelope. Items should be handled in order to prevent examiner exposure and preserve DNA, if requested by the submitter. Contents should be documented on the front of the packaging.
2. When handling a contaminated document the examiner must have on a lab coat and rubber gloves. The evidence should be opened and examined only under biohazard safety hood. After examination the document should be heat sealed. The work area should be disinfected and the lab coat placed in a biohazard bag and sent to the laundry. The gloves must be placed in a properly labeled biohazard disposal after the examination is concluded.
3. Evidence submitted requesting a latent print examination should be placed in a plastic or mylar sheet protector covering the evidence. In this case, item and examiner identifying marks should be placed on the protective sheet.

**SPECIMEN(S):**

1. An item containing an unknown/questioned entry.
2. Sufficient standards from a suspect printer and suspect computer, if available

**SUPPLIES REQUIRED:**

Paper, photocopies of evidence or photocopied or photograph enlargements of evidence

**APPARATUS REQUIRED:**

Stereoscopic microscope, sufficient light sources, VSC 2000HR, computer and scanner, printer

**CALIBRATION REQUIREMENTS:**

No special calibration beyond routine maintenance is required.

**PROCEDURE:**

1. The evidence is marked with the appropriate item number as it appears on the Laboratory transmittal sheet, the case number, and the examiner's initials or other mark. Items on the transmittal sheet may be amended by adding "Q" and "K" identifiers. Such amendments should be notated on a copy of the transmittal placed in the case jacket and the contributor should be

notified via phone or email.

2. If possible, determine the direction of the stroke(s). If the examination of the writing involves a ball point type of writing instrument, observe the "burr striations" which may be present. The "burr striations" will run toward the outside edge of the curve in the direction the pen was moving. Observe the "gooping" of ink after a change in direction of the pen. Determine which side of the paper fibers the ink or carbon deposits pile up against (on the side opposite the direction of travel).
3. Examine the line intersection using the microscope, VSC 2000 and/or VSC 2000HR and/or Laser/alternate light source. Check for differences in inks used and check to see if material from the first writing is dispersed or redistributed along the later line.
4. Examine the paper surface to determine if paper fibers are dislodged, displaced or distorted in such a way as to show writing sequence.
5. Examine the depressions in the paper formed by the writing instruments to see if the continuity or interruption of the wall or trough indicates line sequence. Observe skipping of the later stroke, narrowing of the later stroke where the two lines meet and ink loading.
6. Examine the reverse side of the document at the line crossing.
7. If the line crossing involves carbon typewritten impressions, lifting of the carbon may be necessary. However, this is a destructive process and the necessary approval must be obtained before destructive testing can be done.
8. Examine folded and creased areas of paper where line sequence is questioned by noting any breakage of the ink line, skipping or "globbing" of the ink or leaching out of the ink into the disturbed paper fibers.
9. The Electrostatic Detection Apparatus (QD-002) may be used in the determination of line sequence by seeing if it can determine which writing impressions give a continuous impression on the ESDA prints.
10. Many factors influence the determination of line sequence problems and this type of examination warrants extreme caution. Some of these factors include, but are not limited to, the fluidity and drying time of writing materials and ink, pressure used to produce lines, colors of the ink (dark lines almost always appear to be on top, even when they are not) and the particular combination of paper, pens, pencil, carbon, etc. used.
11. Arrive at a conclusion based on the examination.
12. Report the results of these procedures as appropriate.

#### **DOCUMENTATION:**

Work notes consisting of photocopies or micro photographs of significant characteristics of the evidence on which the examiner marks evidence of sequencing together with any other written observations of the examiner.

A Questioned Document Worksheet will accompany each case and should include the equipment and/or procedures used, the identifying or eliminating features, and the results of analysis.

#### **REFERENCES:**

ASTM 1422 (current edition) Standard Guide for Test Methods for Forensic Writing Ink Comparison

Various professional papers written on various aspects of computer printers.