J2 Electrostatic Detection Apparatus (ESDA®) for Questioned Document Examination — Theory and Application

F.L. Jim Lee, Jr., MS, Summit Forensic Document Examination Lab, PO Box 207, Eden, UT 84310*

After attending this presentation, attendees will have an understanding of the theory and application of the ESDA®, an instrument designed, manufactured, and sold by Foster + Freeman Ltd.

This presentation will impact the forensic science community by equipping attendees with the theory and practical application knowledge in the area of questioned document examination and in the development of indented writings and entries using the ESDA®.

ESDA® is a specialized instrument, generically referred to as an Electrostatic Detection Device (EDD) that is designed for the development and visualization of indentations in the surface of paper that may transfer when a single sheet of paper is placed on top of a stack of several sheets of paper and then written upon. The technique is acute enough in its sensitivity that it is capable of detecting indentations on sheets of paper that are several layers below the top sheet of paper. Additionally, similar to latent fingerprint development, by using this apparatus and technique, indentations may be revealed that were created many years before conducting the examination using the ESDA®.

The ESDA® provides the document examiner with a unique facility for detecting the surface irregularities associated with "indented" or "impressed" writing. While traditional methods and techniques involving illumination by various angles and intensities of light are limited to the detection of simple surface indentations, the ESDA® process, while a bit complex but fairly straightforward in application, will be described in detail during this presentation, showing why and how it responds to more subtle surface abrasions caused by paper-to-paper movement that may occur during the act of writing.

This presentation will cover an overview of the ESDA® process, a description of the resulting image from the process, and controllable factors that may impact results such as document moisture content, ambient humidity, and paper type. Additionally, this presentation will discuss the theory behind and the application of the ESDA® in revealing indented writings and impressions in paper. Also to be discussed are the various methods of toner application in the process, such as the Cascade method, the Aerosol Spray method, the Toner Application Device (TAD) method, and the Brush method used with some other models of EDDs. Additionally, the evaluation of EDD results, both during the pre-examination phase and post-examination phase, will also be discussed. Further, the preservation of the results from an examination using an EDD will be addressed.

While the ESDA® is primarily used for the examination of questioned documents to visualize and decipher indented writing that may be present on the document, the instrument and the technique can reveal the presence of fresh fingerprints and paper fiber disturbance of the surface of paper, potentially indicative of mechanical erasure or the detection of footwear impressions on paper.

ESDA®, Indented Writing, EDD

*Presenting Author