

# BEK TEK LLC

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## Forensic Audio/Video/Image Consultants

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### CURRICULUM VITAE OF DOUGLAS S. LACEY

#### Professional Positions

**August 2014 – Present** BEK TEK LLC, Stafford, Virginia. Owner, private consultant, examiner, and researcher. Conducts forensic examinations of audio and video media (analog and digital) and digital images, including authentication of recordings/images, intelligibility/visual enhancement, identification/classification of non-voice signals, voice comparison, digital data retrieval/analysis, metadata analysis, and other related examinations. Presents expert testimony and assists attorneys with preparing for cross-examination of opposing experts. Evaluates appropriate recording and analysis equipment. Conducts research in forensic audio/video/image analysis related fields and authors/co-authors peer-reviewed papers and other publications.

**October 1999 – July 2014** DL Technology LLC, Fredericksburg, Virginia. Private consultant, examiner, and researcher for BEK TEK LLC (Clifton, Virginia). Conducted forensic examinations of audio and video media (analog and digital) and digital images, including authentication of recordings/images, intelligibility/visual enhancement, identification/classification of non-voice signals, voice comparison, digital data retrieval/analysis, metadata analysis, and other related examinations. Presented expert testimony and assisted attorneys with preparing for cross-examination of opposing experts. Evaluated appropriate recording and analysis equipment. Conducted research in forensic audio/video/image analysis related fields and authored/co-authored peer-reviewed papers and other publications. LLC registered in July 2003 and amended in August 2014.

**September 1996 – June 2003** Federal Bureau of Investigation (FBI), Quantico, Virginia. Electronics Engineer / Forensic Examiner. Conducted examinations of audio recordings produced or collected by federal, state, local, and foreign law enforcement and judicial agencies. These examinations included authentication of recordings, intelligibility enhancement, identification and classification of non-voice signals, digital data retrieval/analysis, and other related examinations. Additional duties included the presentation of expert testimony in criminal matters, support to FBI field offices and other law enforcement agencies regarding technical assistance pertaining to audio recordings, and training of FBI personnel in the analysis of proprietary digital recording devices. Held a full-field, TOP SECRET clearance for the entirety of the employment.

#### Certifications

Certified Forensic Video Examiner (IAI, August 2014 to August 2019)

Certified Cyber Forensics Professional (CCFP<sup>SM</sup>) [(ISC)<sup>2</sup>, July 2013 to July 2019]

### **Formal Education**

Bachelor of Science Degree, University of Miami, major of Electrical Engineering (Audio Engineering Program)

Additional undergraduate courses at the University of Florida

### **Work and Testimony Experience**

Have conducted examinations on over 3,500 separate audio and video recordings and digital still images in over 1,160 criminal, civil, and administrative matters, which include submissions from 46 states, the District of Columbia, Australia, Brazil, Canada, Chile, Colombia, Croatia, Hong Kong, India, Indonesia, Israel, Italy, the Netherlands, Puerto Rico, Romania, Singapore, Turkey, United Kingdom, and U.S. Virgin Islands.

Have testified as an expert in the fields of audio intelligibility enhancement, video enhancement, audio and video authenticity, and signal analysis in federal and state courts and depositions in Arizona, California, Delaware, Florida, Illinois, Maryland, Minnesota, Mississippi, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, Tennessee, Texas, Virginia, Washington, D.C., West Virginia, and in front of the Ukrainian Parliament.

Have conducted forensic examinations in numerous significant investigations/cases, including: the data recovery and intelligibility enhancement of the cockpit voice recording from United Airlines Flight 93, which crashed in Shanksville, PA on September 11, 2001; the authenticity analysis of the Linda Tripp/Monica Lewinsky telephone recordings involving the investigation of President William J. Clinton; the analysis of digital recordings related to the Washington D.C.-area sniper shootings; the authenticity examination of digital audio recordings from the office of former Ukrainian President Leonid Kuchma; the audio and image enhancement analyses plus transcription preparation in the Duke University Lacrosse Team case; the authenticity analysis of audio microcassette recordings in the Canadian Prime Minister Stephen Harper vs. The Liberal Party of Canada civil case; the authenticity examination of recordings surrounding the Texaco obstruction of justice investigation; and the authenticity examination of a recording related to the Abner Louima police brutality investigation.

### **Specialized Short Courses and Professional Training**

*ABCs of Video & Digital Technology*, presented by the Sony Training Institute, in Lanham, MD

*Advanced Forensic Audio Processing Techniques*, presented by Digital Audio Corporation, Inc., in Raleigh, NC

*Forensic Image and Video Enhancement with Amped FIVE*, presented by Amped Software, Inc., in Stafford, VA

*FBIRD Training*, presented by Adaptive Digital Systems, Inc., in Quantico, VA

## **Specialized Short Courses and Professional Training (continued)**

*FBIRD Training (Personalized Instruction)*, presented by Adaptive Digital Systems Inc., in Irvine, CA

*Fast Fourier Analysis*, presented by Signal Processing Systems, in San Diego, CA

*File Systems Revealed*, presented by X-Ways Software Technology AG, in Seattle, WA

*Forensic Audio Filtering and Tape Enhancement*, presented by Digital Audio Corporation, Inc., in Quantico, VA

*Forensic Authentication of Digital Audio workshop*, presented by the National Center for Media Forensics, University of Colorado, Denver, CO

*Forensic Authentication of Digital Images*, presented by the National Center for Media Forensics, University of Colorado, Denver, CO

*Forensic Image and Video Processing*, presented at the American Academy of Forensic Sciences, in San Antonio, TX

*Image and Video Processing Using MATLAB*, presented by MathWorks, in Vienna, VA

*Innovation in Forensic Image and Video Analysis*, presented at the American Academy of Forensic Sciences, in Atlanta, GA

*New Professional Core Curriculum Training Program, Phases I and II*, presented by the Federal Bureau of Investigation, in Quantico, VA

*Principles of Acoustics and the Measurement of Sound*, presented by Brüel & Kjær, in Livonia, MI

*Principles of Vibration Measurement and Analysis*, presented by Brüel & Kjær, in Livonia, MI

*R-DAT Format Training*, presented by Sony Corporation, in Quantico, VA

*Signal and Image Processing and Analysis for Scientists and Engineers*, presented by Applied Technology Institute, in Laurel, MD

*Spectrum Analysis of Sound & Vibration*, presented by Brüel & Kjær, in Livonia, MI

*Technical Recovery of Electronic Evidence*, presented by Computer Security Institute, in Rancho Cucamonga, CA

*Video Analyst System Training*, presented by Intergraph, in Huntsville, AL

*Video Capture, Enhancement and Analysis*, presented by The Institute for Forensic Imaging (in association with Indiana University and Purdue University), Indianapolis, IN

*X-Ways Forensics*, presented by X-Ways Software Technology AG, in Seattle, WA

## **Peer-Reviewed Publications**

1. Koenig, Bruce E.; Lacey, Douglas S. Forensic Authenticity Analyses of the Metadata in Re-Encoded iPhone M4A Files. *2017 Audio Engineering Society International Conference on Audio Forensics* **2017**.
2. Smith, Jeff M.; Lacey, Douglas S.; Koenig, Bruce E.; Grigoras, Catalin. Triage Approach for the Forensic Analysis of Apple iOS Audio Files Recorded Using the “Voice Memos” App. *2017 Audio Engineering Society International Conference on Audio Forensics* **2017**.
3. Koenig, Bruce E.; Lacey, Douglas S. “Forensic Authentication of Digital Audio and Video Files.” *Handbook of Digital Forensics of Multimedia Data and Devices*. Ed. Anthony T. S. Ho. Ed. Shujun Li. Chicester: John Wiley & Sons, Ltd. **2015**. 133-181. Print.
4. Koenig, Bruce E.; Lacey, Douglas S. The Average Direct Current Offset Values for Small Digital Audio Recorders in an Acoustically Consistent Environment. *Journal of Forensic Sciences* **2014**, 59(4), pp 960-966.
5. Lacey, Douglas S; Koenig, Bruce E. The Effect of Sample Length on Cross-Correlation Comparisons of Recorded Gunshot Sounds. *The Proceedings of the AES 54th International Conference on Audio Forensics* **2014**, pp 122-129.
6. Koenig, Bruce E.; Lacey, Douglas S. Forensic Authenticity Analyses of the Metadata in Re-Encoded WAV Files. *The Proceedings of the AES 54th International Conference on Audio Forensics* **2014**, pp 77-84.
7. Koenig, Bruce E.; Lacey, Douglas S.; Reimond, Christina E. Selected Characteristics of MP3 Files Re-Encoded With Audio Editing Software. *Journal of Forensic Identification* **2014**, 64(3), pp 304-321.
8. Koenig, Bruce E.; Lacey, Douglas S.; Grigoras, Catalin; Price, Suzana Galić; Smith, Jeff M. Evaluation of the Average DC Offset Values for Nine Small Digital Audio Recorders. *Journal of the Audio Engineering Society* **2013**, 61(6), pp 439-448.
9. Koenig, Bruce E.; Lacey, Douglas S. Forensic Authenticity Analyses of the Header Data in Re-Encoded WMA Files From Small Olympus Audio Recorders. *Journal of the Audio Engineering Society* **2012**, 60(4), pp 255-265.
10. Koenig, Bruce E.; Lacey, Douglas S.; Richards, Gerald B. Video Frame Comparisons in Digital Video Authenticity Analyses. *Journal of Forensic Identification* **2012**, 62(2), pp 165-182; 62(3), p 89.
11. Lacey, Douglas S.; Koenig, Bruce E. Identification of Identical and Nearly-Identical Frames from a Lawmate PV-500 Digital Video-Audio Recorder. *Journal of Forensic Identification* **2012**, 62(1), pp 36-46.
12. Koenig, Bruce E.; Lacey, Douglas S. An Inconclusive Digital Audio Authenticity Examination: A Unique Case. *Journal of Forensic Sciences* **2012**, 57(1), pp 239-245.
13. Lacey, Douglas S.; Koenig, Bruce E. Audio Extraction from Silicor Technologies’ Digital Video Recorder File Format. *Journal of Forensic Identification* **2010**, 60(5), pp 573-588.
14. Koenig, Bruce E.; Lacey, Douglas S. Evaluation of Clipped-Sample Restoration Software. *Forensic Science Communications* **2010**, 12(2). [LINK](#)
15. Koenig, Bruce E.; Lacey, Douglas S. Forensic Authentication of Digital Audio Recordings. *Journal of the Audio Engineering Society* **2009**, 57(9), pp 662-695.

### **Peer-Reviewed Publications (continued)**

16. Koenig, Bruce E.; Lacey, Douglas S. Distinctiveness of Non-Standard VHS Head Parameters. *Journal of Forensic Identification* **2009**, 59(1), pp 97-126.
17. Lacey, Douglas S.; Koenig, Bruce E. Identification of an Eccentricity in the Date/Time Metadata of a PAL MiniDV Recording. *Journal of Forensic Sciences* **2008**, 53(6), pp 1417-1423.
18. Koenig, Bruce E.; Lacey, Douglas S.; Killion, Steven A. A Digital System for Imaging Bitter Patterns. *Journal of Forensic Identification* **2008**, 58(2), pp 238-264; 58(3), pp 281-282.
19. Koenig, Bruce E.; Lacey, Douglas S. Audio Record and Playback Characteristics of Small Solid-State Recorders. *Journal of Forensic Identification* **2007**, 57(4), pp 582-598.
20. Koenig, Bruce E.; Lacey, Douglas S.; Killion, Steven A. Forensic Enhancement of Digital Audio Recordings. *Journal of the Audio Engineering Society* **2007**, 55(5), pp 352-371.
21. Koenig, Bruce E.; Lacey, Douglas S.; Herold, N. Video and Audio Characteristics in VHS Over-Recordings. *Forensic Science Communications* **2006**, 8(3). [LINK](#)
22. Lacey, D. S. Burning Digital Audio Files to Standard Audio Compact Discs: More Than Drag and Drop. *NATIA News*. Summer 2005.
23. Koenig, Bruce E.; Lacey, Douglas S.; Killion, S. A. Analysis of the Radio Shack Micro-30 and the Olympus Pearlcorde S950 Time Code. *Journal of Forensic Identification* **2004**, 54(4), pp 442-451. Authors' Response to Letter. *Journal of Forensic Identification* **2004**, 54(6), pp 629-632.
24. Koenig, Bruce E.; Lacey, Douglas S.; Herold, Noel. Equipping the Modern Audio-Video Forensic Laboratory. *Forensic Science Communications* **2003**, 5(2). [LINK](#)

### **Other Publication**

25. Baker, David W.; Brothers, Samuel I.; Geradts, Zeno J.; Lacey, Douglas S.; Nance, Kara L.; Ryan, Daniel J.; et al. Digital evolution: history, challenges and future directions for the digital and multimedia sciences section. In: Ubelaker, Douglas H.; editor. *Forensic Science: Current Issues, Future Directions*. Chichester, UK: Wiley-Blackwell, **2013**, pp 252-91. [Contributing author]

### **Professional Associations, Seminars, & Activities**

#### **Organization of Scientific Area Committees (OSAC)**

- Member (2016 – present) of the Digital/Multimedia Scientific Area Committee (SAC)
- Member (2014 – 2016) & Affiliate Member (2016) of the Video/Imaging Technology and Analysis Subcommittee within the Digital/Multimedia Scientific Area Committee (SAC)
- Member (2014 – present) of the Audio Forensics Task Group within the Digital Evidence Subcommittee of the Digital/Multimedia SAC

#### **International Association for Identification (IAI)** [Active Member, 2004 – present]

- Member of the Editorial Board for the *Journal of Forensic Identification* (2011 – present)
- Former member of the IAI's Forensic Video Analysis Certification Study Committee

## **Professional Associations, Seminars, & Activities (continued)**

### **American Academy of Forensic Sciences (AAFS) [Fellow, 2006 – present]**

- Director of the Digital & Multimedia Sciences section (2016 – present)
- Chair of the Digital & Multimedia Sciences section (2012 – 2014)
- Secretary of the Digital & Multimedia Sciences section (2010 – 2012)
- Digital & Multimedia Sciences section Program Committee member (2013 – 2014)
- Digital & Multimedia Sciences section By-Laws Committee member (2009 – 2010)
- AAFS Nominating Committee (2014 – 2015)
- AAFS Membership Committee member (2010 – 2014)
- AAFS Continuing Education Committee member (2010 – 2014)
- AAFS Mentoring Committee (ad hoc) (2015 – present)
- Member of the Editorial Board for the *Journal of Forensic Sciences* (2015 – 2020)
- Guest Reviewer for the *Journal of Forensic Sciences* (2008 – 2010)

### **Scientific Working Group on Digital Evidence (SWGDE) [Member, 2016 – present]**

- Member of the Audio Committee

### **Audio Engineering Society (AES) [Member, 1997 – present]**

- Member of the Technical Committee on Audio Forensics

### **National Technical Investigators Association (NATIA) [Former member]**

Have attended seminars and conferences of the AES, the IAI, the AAFS, OSAC, SWGDE, NATIA, and a regional meeting of the Acoustical Society of America. Invited exam developer for the (ISC)<sup>2</sup> Certified Cyber Forensics Professional (CCFP<sup>SM</sup>) certification program.

## **Testimony**

1. 04/07/2016; Harrisonburg, VA; Criminal Trial (video authenticity & miscellaneous video) [Case # CR15000247-00; Rockingham County Circuit Court];
2. 02/08/2016; Boca Raton, FL (via video teleconference from Alexandria, VA); Deposition (audio enhancement) [Case # 50 2013 CA 013276 MB AJ; Circuit Court for Palm Beach County];
3. 10/30/2015; White Plains, NY; Deposition (miscellaneous video) [Case # 08 Civ. 4903 (KTD) (JM); US District Court for the Southern District of New York];
4. 09/29/2015; Lancaster, OH (via telephone from Stafford, VA); Deposition (video authenticity) [Case # 14CV 736; Court of Common Pleas, Fairfield County, Ohio];
5. 08/04/2015; Stafford, VA; Civil Trial (audio & video authenticity) [Case # JA035448-01-00, et al.; Stafford County Juvenile and Domestic Relations District Court];
6. 08/19/2014; Hohenwald, TN; Criminal Trial (audio authenticity) [Case # 2012-CR-6; Circuit Court of Lewis County];
7. 07/22/2014; Franklin, TN; Criminal Hearing (audio authenticity) [Case # 2012-CR-6; Circuit Court of Lewis County];
8. 11/19/2013; Stafford, VA; Criminal Trial (miscellaneous video) [Case # GC13014487-0; General District Court];

### **Testimony (continued)**

9. 01/17/2013; Baltimore, MD; Civil Trial (video enhancement and miscellaneous video) [Case # 1:11-cv-01399-WMN; Federal District Court];
10. 01/11/2013; Richmond, VA; Civil Trial (videotaped testimony) (miscellaneous video and video enhancement) [Case # CL08-000389; Circuit Court of the County of Gloucester];
11. 12/19/2012; Richmond, VA; Deposition (miscellaneous video and video enhancement) [Case # CL08-000389; Circuit Court of the County of Gloucester];
12. 12/17/2012; St. Paul, MN (via telephone from Clifton, VA); Deposition (signal analysis) [Case # 3494960; State of Minnesota Office of Administrative Hearings, Workers' Compensation Division];
13. 11/28/2012; Wilmington, DE; Criminal Hearing (audio authenticity) [Case # 0104015882; Superior Court of the State of Delaware In and For New Castle County];
14. 03/26/2012; Baltimore, MD; Criminal Hearing (miscellaneous video) [Case # 109317007 & 109317008; Circuit Court for Baltimore City];
15. 12/21/2011; Chicago, IL; Civil Trial (miscellaneous video) [Case # 08 L 4878; Circuit Court of Cook County];
16. 10/26/2011; Los Angeles, CA; Deposition (miscellaneous audio) [Case # BC363201; Superior Court of California (deposition in Washington, D.C.)];
17. 04/20/2011; Washington, D.C.; Criminal Trial (miscellaneous audio) [Case # 2010 DVM 002499; Superior Court of the District of Columbia];
18. 03/30/2011; Leesburg, VA; Civil Trial (video duplication and authenticity) [Case # CL00059123-00; Circuit Court of Loudon County];
19. 03/17/2011; Los Angeles, CA; Deposition (miscellaneous audio) [Case # BC363201; Superior Court of California (deposition in Naples, FL)];
20. 12/20/2010; Chicago, IL (via video teleconference from Herndon, VA); Deposition (video enhancement) [Case # 07L2399; Circuit Court of Cook County];
21. 12/13/2010; Charlotte, NC; Criminal Trial (audio enhancement and miscellaneous audio) [Case # 09CR260997, 09CR260999; Mecklenburg County District Court];
22. 12/03/2010; Minneapolis, MN; Criminal Hearing (miscellaneous video) [Case # 82-CR-09-7129; Hennepin County District Court];
23. 10/25-26/2010; Vicksburg, MS; Civil Hearing (audio authenticity) [Case # 05-0004; Chancery Court of Issaquena County];
24. 07/29/2010; Williamson, WV; Criminal Hearing (video authenticity) [Case # A10-F88, A10-F102; Circuit Court of Mingo County];
25. 11/02/2009; New York, NY; Criminal Trial (miscellaneous audio and voice comparison) [Case # 03-CR-987-DAB; Federal District Court];
26. 08/26/2009; Tucson, AZ; Criminal Trial (video enhancement) [Case # CR-20063636; Pima County Superior Court];
27. 05/20/2009; Staunton, VA; Civil Hearing (video authenticity and miscellaneous video) [Case # CL06-000002; Augusta County Circuit Court];
28. 01/27/2009; Providence, RI; Deposition (miscellaneous video) [Case # 06-5785; Providence County Superior Court];
29. 12/13/2007; Yorktown, VA; Criminal Hearing (audio authenticity) [Case # CR06R38229-01; York County-Poquoson Circuit Court];
30. 09/27/2007; Tucson, AZ (via telephone from Clifton, VA); Criminal Trial (video enhancement) [Case # CR-20063636; Pima County Superior Court];

### **Testimony (continued)**

31. 09/13/2007; New York, NY; Deposition (audio authenticity) [Case # 06-CV-1944; US District Court for the Eastern District of Pennsylvania];
32. 09/05/2007; Kingwood, WV; Criminal Trial (signal analysis and audio enhancement) [Case # 07-F-5; Preston County Circuit Court];
33. 01/08/2007; Washington, D.C.; Criminal Hearing (audio enhancement and signal analysis) [Case # 05-CR-00151; US District Court for the District of Columbia];
34. 09/15/2006; Kiev, Ukraine; Hearing in front of the Ukrainian Parliament (audio authenticity);
35. 11/04/2005; High Point, NC; Criminal Trial (audio enhancement) [Case # 05-CRS-23105; Guilford County Superior Court];
36. 10/11/2005; Portland, OR; Criminal Trial (audio authenticity) [Case # 9906-34654; Multnomah County Circuit Court];
37. 02/23/2005; Roanoke, VA; Criminal Hearing (audio authenticity) [Case # 7:03CR00049-4; US District Court for the Western District of Virginia];
38. 02/04/2005; New York, NY; Deposition (audio enhancement) [Case # 99-CV-862-K(J); US District Court for the Northern District of Oklahoma];
39. 10/09/2001; Houston, TX; Criminal Trial (audio enhancement) [Case # 0845174; 176<sup>th</sup> District Court of Harris County];
40. 10/07/2001; Houston, TX; Criminal Hearing (audio enhancement) [Case # 0845174; 176<sup>th</sup> District Court of Harris County]; and
41. 05/13-14/2001; Philadelphia, PA; Criminal Hearing (audio enhancement) [Case # CR 01-88; US District Court for the Eastern District of Pennsylvania].

### **Presentations**

#### **American Academy of Forensic Sciences (AAFS):**

- “An Analysis of Apple® iOS® Version Effects on Format and Metadata Structure of Audio Files Recorded Using the Native ‘Voice Memos’ App” [co-presenter] (2017)
- “Conversion of AVI ‘txts’ Stream Data to Adobe® Premiere Pro® Title Files” (2011) [awarded the Outstanding Case Study Award for the Digital & Multimedia Sciences section]
- “Considerations for the Forensic Authentication of Digital Audio Recordings” (2008)
- “Analysis of MiniDV Recording Date/Time Information” (2007)

#### **Audio Engineering Society (AES):**

- “Triage Approach for the Forensic Analysis of Apple iOS Audio Files Recorded Using the ‘Voice Memos’ App” [co-presenter] (AES International Conference on Audio Forensics, 2017)
- “The Effect of Sample Length on Cross-Correlation Comparisons of Recorded Gunshot Sounds” (AES 54<sup>th</sup> International Conference, 2014)
- “Forensic Digital Data Analysis” (AES 133<sup>rd</sup> Convention, 2012)
- “WinHex for Forensic Audio Analysis – Introduction, Applications, and Scripting” (AES 46<sup>th</sup> International Conference, 2012)
- “Considerations for the Forensic Authentication of Digital Audio Recordings” (Washington DC Section, 2007)
- Overview of the forensic audio field (University of Miami chapter)



**Presentations (continued)**

**International Association for Identification (IAI)** – “Audio Extraction from Silicor Technologies, Inc.’s Digital Video Recorder Format” (2009)

**National Technical Investigators Association (NATIA):**

- “Bits and Bytes: Audio and Video File Analysis” (2013)
- “Authentication of Forensic Audio Recordings: Practices and Considerations” (2004)

**NACDL and Cardozo School of Law National Forensic College (NFC)** – “Considerations with Digital Audio, Video, and Image Evidence” (2017)

**Private Investigators Association of Virginia** – “Benefits & Limitations of Forensic Audio, Video, & Image Examinations” (2016)

**Scientific Working Group on Digital Evidence (SWGDE)** – overview of forensic audio enhancement tools

Various presentations to FBI personnel and Department of Justice personnel.