BEK TEK LLC

Audio/Video Forensic Consultants

Bruce E. Koenig **Tel (703) 631-7099**
Douglas S. Lacey **Fax (703) 266-4461**
Suzana Galić Price **BEKTEK@cox.net**

CURRICULUM VITAE OF BRUCE E. KOENIG

Professional Positions

1996-Present Private consultant, examiner, researcher, and owner of the forensic, audio/video, consulting company BEK TEK LLC. Conducts forensic examinations of audio and video media, both analog and digital, to authenticate recordings, improve intelligibility, identify/classify voice and non-voice signals, and compare voice samples; analyzes digital images to enhance quality and review metadata information; provides on-site evaluations of acoustical sounds and environments; prepares transcriptions; presents expert testimony and assists attorneys in preparing for cross-examination of opposing experts and lay witnesses; evaluates appropriate recording and analysis equipment; provides forensic training in audio/video analysis; conducts research regarding forensic applications; and directs the forensic work of other consultants.

1974-1995 Supervisory Special Agent, Engineering Section, Federal Bureau of Investigation (FBI), Washington, D.C., Newington, VA, and Quantico, VA. Conducted examinations of audio and video recordings, both analog and digital, produced or collected by Federal, state, local, and foreign law enforcement and judicial agencies. These forensic analyses included authentication of recordings, intelligibility enhancement, voice comparisons, identification/classification of voice and non-voice signals, and other related examinations. Additional duties included analyses of room acoustics; on-site evaluations of sound pressure levels, gunshot events, and other sounds of interest; testing of audio tapes, tape recorders, laboratory analysis equipment; the presentation of expert testimony in criminal, civil, and administrative matters; training of FBI and other law enforcement personnel in forensic audio analysis; and conducting research. At retirement, was the manager and senior audio examiner of the FBI's Audio/Video Signal Processing program.

1970-1974 Special Agent, FBI. Investigative responsibilities in the Atlanta and Detroit Divisions involving bank robberies, prison escapes, terrorism, and other violations of Federal law. Also the technical coordinator of the photographic laboratory in the Detroit FBI Division.

Formal Education

Bachelor of Science degree, University of Maryland, majors of Physics and Mathematics.

Certificate, DeVry Institute of Technology (now called DeVry University), electronics curriculum on the theory and circuitry design of audio and video components, including tape recorders, radios, and stereo equipment, with an emphasis on televisions and the associated video signal.

Master's degree, George Washington University, major of Forensic Science.

Additional graduate level courses at George Mason University, Massachusetts Institute of Technology, and University of Utah.

Work Experience

Has conducted examinations on over 17,000 separate audio and video recordings, and separate images, in over 5,600 criminal, civil, and administrative matters, including over 2700 authenticity analyses, the enhancement of over 8900 recordings, over 5700 signal analysis determinations, and over 2000 voice comparisons/examinations. Submissions have been received from clients in private and governmental organizations from all 50 states within the United States of America, the Commonwealth of the Northern Mariana Islands, the District of Columbia, Guam, Puerto Rico, the U.S. Virgin Islands (both St. Croix and St. Thomas), Argentina, Australia, Canada, Cayman Islands, Colombia, Costa Rica, Croatia, Denmark, El Salvador, Ecuador, England, Eritrea, Germany, Hong Kong, India, Indonesia, Israel, Italy, Japan, Kenya, Mexico, the Netherlands, New Zealand, Nicaragua, Panama, Philippines, Romania, Singapore, Switzerland, Turkey, Turks and Caicos Islands, Ukraine, and Venezuela.

Has instructed personnel in the FBI, other Federal agencies, state, local, and foreign law enforcement departments, and private consultants in forensic analysis procedures.

On hundreds of occasions has lectured and presented papers before scientific, forensic and legal organizations regarding forensic examinations.

Peer-reviews scientific/technical articles, presentations, books, and doctoral theses in the audio/video signal processing fields.

Member of the Ad Hoc Subcommittee on "The 18½-Minute Erased Portion of Nixon White House Tape 342," Advisory Committee on Preservation, National Archives and Records Administration (2000).

While chairperson of the Voice Identification and Acoustical Analysis Subcommittee, of the International Association for Identification, was responsible for writing and having approved the first comprehensive standards on spectrographic voice identification, outside the FBI (effective January 1, 1992).

FBI's project manager to the National Research Council, National Academy of Sciences, for their evaluation of spectrographic voice identification, titled "On the Theory and Practice of Voice Identification" (1979).

Assisted the members of the National Research Council, National Academy of Sciences' Committee on Ballistics Acoustics, in the examination of the acoustic information in the assassination of President John F. Kennedy (late 1970s).

Clients, since establishing BEK TEK LLC, have included the U.S. Department of Justice; Federal Bureau of Investigation; U.S. Congress; Office of Independent Counsel, Bureau of Alcohol, Tobacco, Firearms and Explosives; Drug Enforcement Administration; Security and Exchange Commission; U.S. Department of Defense; U.S. Department of Energy; U.S. Customs Service; Federal Trade Commission; United Nations Criminal Tribunal; National Academy of Sciences; district attorney's offices; public defender's offices; police departments; prosecuting attorney's offices; law school legal clinics; ombudsmen; sheriff's departments; state attorney general's offices; bar associations; city & county attorney's offices; private investigators; universities/colleges; the news media; private law firms; insurance companies; major corporations; utilities; labor unions; magazine editors; and small businesses.

Work Experience (continued)

Has conducted forensic examinations in numerous significant investigations, including: the authenticity analysis of the Linda Tripp telephone recordings involving the investigation of President William J. Clinton; the authenticity analysis of the telephone recordings concerning Housing and Urban Development Secretary Henry G. Cisneros; the enhancement examination of President Richard M. Nixon's White House recordings, including the "Watergate tapes"; the gunshot analyses in the assassination of President John F. Kennedy and the attempted assassination of Ronald W. Reagan; the authenticity and enhancement analyses of the undercover informant's recordings in the Archer Daniels Midland antitrust cases; the authenticity and enhancement examinations in the John Gotti and other high-profile organized crime cases; the authenticity determination and identification of gunshot sounds on audio and video tapes involved in the burning of the Branch Davidian complex in Waco, Texas; the authenticity and voice comparison analyses of audio recordings involved in three criminal trials before the United Nations Criminal Tribunal for the former Republic of Yugoslavia; the intelligibility determination and transcript preparation of U.S. government recordings in the Sabrina Aisenberg kidnapping investigation; the video authenticity analyses involved in the investigation by the U.S. Congress of presidential campaign financing in the Clinton administration; the authenticity examination of digital audio recordings from the office of Ukrainian President Leonid Kuchma; the authenticity examination of the FBI's undercover analog and digital recordings in the $2.7 billion fraud prosecution of Richard M. Scrushy, former CEO of HealthSouth Corporation; the analysis of the gunshots fired by members of the Ku Klux Klan, the American Nazi Party, the Communist Workers Party, and the Socialist Workers Party during a "Death to the Klan" demonstration in Greensboro, NC; the authenticity analysis of audio microcassette recordings in the Canadian Prime Minister Stephen Harper vs. The Liberal Party of Canada civil case; the authenticity analysis of 35 digital audio recordings in the conspiracy and interception of wire communications prosecution in the U.S. vs. Anthony Pellicano and Terry Christensen case; the authenticity and enhancement of air traffic control recordings involved in the destruction of Korean Airlines Flight 007 by a Russian missile; many espionage cases and other major airplane crashes since the late 1970s; the audio and image enhancement analyses plus transcription preparation in the Duke University Lacrosse Team case; the signal analysis examination of the engine, rotor and electrical system sounds of the Sikorsky helicopter crash near Weaverville, CA resulting in the death of seven firefighters, the pilot and the safety officer.

Specialized Short Courses (partial listing)

Acoustics and Electroacoustic Measurement, presented by Brüel & Kjær, in Marietta, GA

Applications of Modern Image Processing Systems, presented by The International Society for Optical Engineering, Bellingham, WA

Cellular Telephone System, presented by Douglas A. Kerr, in Dallas, TX

Computer Science Technology, University of Utah, Salt Lake City, UT

Digital Signal Analysis for Applications in Sound and Vibration, presented by Pope Engineering Company and Brüel & Kjær, in Norcross, GA

Electroacoustic Measurements on Telephones, presented by Brüel & Kjær, in Marietta, GA

Essentials of Industrial Security Management, presented by the Army Institute for Professional Development, Fort Eustis, VA

Fast Fourier Analysis, presented by Spectral Dynamics, in San Diego, CA

FBI Laboratory Quality Assurance Training on Evidence Submission, Examination, and Return, presented by the FBI Laboratory Division, Quantico, VA

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

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

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

Image Processing and Analysis, presented by The International Society for Optical Engineering, Bellingham, WA

Mastering Analog Video Technology, presented by The Sony Video Institute, in San Jose, CA

Mastering Digital Video Technology, presented by the Sony Training Institute, in San Jose, CA

Mastering Telecommunications Fundamentals, presented by Two Rivers Technologies, in Washington, D.C.

Presenting Data and Information, presented by Edward R. Tufte, in Arlington, VA

Professional Photography, presented by New York Institute of Photography, New York, NY

Selected Topics in Acoustics, presented by George Mason University, Fairfax, VA

Specialized Short Courses (partial listing - continued)

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

Sonic Boom: Prediction and Effects, presented by American Institute of Aeronautics and Astronautics, in Tallahassee, FL

Speech Enhancement, presented by The University of Utah, Salt Lake City, UT

Speech Spectrogram Reading: An Acoustic Study of English Words and Sentences, presented by the Massachusetts Institute of Technology. Cambridge, MA

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

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

Voice Identification, presented by Voice Identification, Inc., in Manville, NJ

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

Professional Societies

Acoustical Society of America – member. Member of the Forensic Acoustics Subcommittee.

Audio Engineering Society – member

International Association for Identification – distinguished member. Member of the Editorial Board for the *Journal of Forensic Identification*. Former chairperson of both the Voice Identification and the Acoustical Analysis Subcommittee and the Voice Identification Certification Board; former board member of the Forensic Video Analysis Certification Study Committee.

Institute of Electrical and Electronic Engineers (IEEE) – member. Member of the IEEE Signal Processing Society.

National Technical Investigators Association – member

Society of Former Special Agents of the Federal Bureau of Investigation – member

Society of Motion Picture and Television Engineers – member

SPIE [formerly known as The International Society for Optical Engineering] – former member (2000-2010)

Testimony

Testified as an expert in the field of audio/video signal analysis in judicial proceedings, including trials, hearings, and depositions on over 370 occasions in: The Netherlands, Singapore, Turks and Caicos Islands, District of Columbia, Guam, Puerto Rico, U.S. Virgin Islands, Alabama, Alaska, Arizona, California, Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, Washington, and West Virginia.

Seminars

Have attended numerous seminars, conventions, conferences, and workshops of organizations including the Acoustical Society of America, Audio Engineering Society, DSP Expo, International Association for Identification, International Society for Optical Engineering, Institute of Electrical and Electronic Engineers, International Speech Communication Association, National Association of Broadcasting, and National Technical Investigators Association.

Miscellaneous

Full-field, TOP SECRET clearance (1970-2004).

Reviewer/limited contributor for a number of legal papers and books, including the second and third editions of Scientific Evidence by Paul C. Giannelli and Edward J. Imwinkelried.

First-hand account regarding some FBI experiences appears in the chapter entitled "Best Work in Law Enforcement" in the book *Guide to Careers in the FBI*, 2nd edition by John Douglas, published in 2005 by Simon & Schuster.

Scientific Publications

Koenig, Bruce E.; Lacey, Douglas S. Forensic Authenticity Analyses of the Header Data in Re-Encoded WMA Files From Small Olympus Audio Recorders; peer reviewed and accepted for publication in the *Journal of the Audio Engineering Society* with a tentative issue date of April **2012**.

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.

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.

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.

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.

Koenig, Bruce E.; Lacey, Douglas S. Evaluation of Clipped Sample Restoration Software. FBI's *Forensic Science Communications* **2010**, 12(2).

Koenig, Bruce E.; Lacey, Douglas S. Forensic Authentication of Digital Audio Recordings. *Journal of the Audio Engineering Society* **2009**, 57(9), pp 662-695.

Koenig, Bruce E.; Lacey, Douglas S. Distinctiveness of Non-Standard VHS Head Parameters. *Journal of Forensic Identification* **2009**, 59(1), pp 97-126.

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.

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.

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.

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.

Marr, Kenneth W.; Koenig, Bruce E. Fundamental Frequency Analysis of a Metal Baseball Bat. *Forensic Science Communications* **2007**, 9(1).

Scientific Publications (continued)

Koenig, Bruce E.; Lacey, Douglas S.; Herold, Noel. Video and Audio Characteristics in VHS Over-Recordings. FBI's *Forensic Science Communications* **2006**, 8(3).

Koenig, Bruce. E. Procedures for the Playback of the Initial Frames of VHS Video Cassettes. *NATIA News* **2004**, Summer Issue, pp 14-15.

Koenig, Bruce E.; Lacey, Douglas S.; Killion, Steven A. Analysis of the Radio Shack Micro-30 and the Olympus Pearlcorder 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.

Koenig, Bruce E.; Lacey, Douglas S.; Herold, Noel. Equipping the Modern Audio-Video Forensic Laboratory. FBI's *Forensic Science Communications* **2003**, 5(2).

Koenig, Bruce E.; Hoffman, Shawn M.; Nakasone, Hirotaka; Beck, Steven D. Signal Convolution of Recorded Free-Field Gunshot Sounds. *Journal of the Audio Engineering Society* **1998**, 46(7/8), pp 634-653.

Merrill, Steven B.; Koenig, Bruce E. Analysis of Hang-up Transients for the Same Model Telephone. *Journal of Forensic Identification* **1996**, 46(3), pp 294-321.

Koenig, Bruce E.; Merrill, Steven B. Determination of the Frequency Characteristics of Filters. *Journal of Forensic Identification* **1995**, 45(1), pp 51-68.

Koenig, Bruce E. Selected Topics in Forensic Voice Identification. *Crime Laboratory Digest* **1993**, 20(4), pp 78-81. Reprinted in *Methods and Metrics of Voice Communications* **1996**; B. G. Kanki; O. V. Prinzo, eds; Federal Aviation Administration, DOT/FAA/AM-96/10.

Koenig, Bruce E. Frequency Measurement of Alternating Current. *Journal of Forensic Identification* **1992**, 42(5), pp 408-411.

Koenig, Bruce E. Reel Periodicity Determinations in Authenticity Examinations. *Journal of Forensic Identification* **1992**, 42(3), pp 237-247.

Koenig, Bruce E. Voiceprints - Believe It or Not. *Detective* **1991**, Spring/Summer issue, pp 8-11.

Koenig, Bruce E. Serial Time Code Analysis in Authenticity Determinations. *Journal of Forensic Identification* **1991**, 41(3), pp 179-189.

Koenig, Bruce E.; Ryan, James John, Jr. Diagonal Erase Head Marks - An Anomaly. *Journal of Forensic Identification* **1991**, 41(2), pp 96-101.

Koenig, Bruce E. Tape Duplication Determination in Authenticity Examinations through Analysis of AC Frequencies. FBI's *Crime Laboratory Digest* **1990**, 17(4), pp 78-81.

Scientific Publications (continued)

Koenig, Bruce E. Authentication of Forensic Audio Recordings. *Journal of the Audio Engineering Society* **1990**, 38(1/2), pp 3-33.

Wallace, Albert Jr.; Koenig, Bruce E. An Introduction to Single Channel FFT Analysis. FBI's *Crime Laboratory Digest* **1989**, 16(2), pp 33-39.

Koenig, Bruce E. Enhancement of Forensic Audio Recordings. *Journal of the Audio Engineering Society* **1988**, 36(11), pp 884-894. Reprinted in *Methods and Metrics of Voice Communications* **1996**; B. G. Kanki; O. V. Prinzo, eds; Federal Aviation Administration, DOT/FAA/AM-96/10.

Koenig, Bruce E. Tape Recorder Azimuth Misalignment. FBI's *Crime Laboratory Digest* **1988**, 15(2), pp 44-54.

Koenig, Bruce E.; Kohus, Barbara A. Measurement of Recorder Speed Changes in Authenticity Examinations. FBI's *Crime Laboratory Digest* **1987**, 14(4), pp 139-152.

Koenig, Bruce E.; Ritenour, Donald V. Jr.; Kohus, Barbara A.; Kelly, Artese Savoy. Reply to 'Some Fundamental Considerations Regarding Voice Identification.' *Journal of the Acoustical Society of America* **1987**, 82, pp 688-689.

Koenig, Bruce E. Making Effective Forensic Audio Tape Recordings. *FBI Law Enforcement Bulletin* **1987**, 56(5), pp 10-18.

Koenig, Bruce E. Spectrographic Voice Identification. FBI's *Crime Laboratory Digest* **1986**, 13(4), pp 105-118.

Koenig, Bruce E. Spectrographic Voice Identification: A Forensic Survey. *Journal of the Acoustical Society of America* **1986**, 79, pp 2088-2090.

Koenig, Bruce E. Acoustic Gunshot Analysis - The Kennedy Assassination and Beyond. *FBI Law Enforcement Bulletin* **1983**, 52(11), pp 1-9 and 52(12), pp 1-9. Reprinted in the *International Criminal Police Review* **1985**, 40(384), pp 2-11 and 40(385), pp 43-53.

Koenig, Bruce E. Overview of the Federal Bureau of Investigation's Technical Analyses of Forensic Tape Recordings, Particularly in Aviation Related Investigations. The Seventeenth Annual Air Law Symposium. *Journal of Air Law and Commerce* **1983**, pp 223-227.

Koenig, Bruce E., et al. Review Requested by the Department of Justice of the Acoustical Reports Published by the House Select Committee on Assassinations. U.S. Department of Justice, Washington, D.C. **1980**.

Koenig, Bruce E. Speaker Identification. *FBI Law Enforcement Bulletin*. **1980**, 49(1), pp 1-4 and 49(2), pp 20-22.

Updated 4/25/2012