ROGER L. BOYELL, ELECTRONICS ANALYST
416 PARRY DRIVE, MOORESTOWN NJ 08057-2877
PHONE 856-234-5800 • FAX 856-234-9539
E-MAIL boyell@ieee.org • WEB SITE www.boyell.com

ENGINEERING EXPERTISE IN ELECTRICITY AND ELECTRONICS.
SERVING THE LEGAL FORUM WITH CONSULTING AND TESTIMONY.

MISSION STATEMENT

When electrical devices and electronic systems are the subject of civil litigation, criminal charges, or insurance claims, I support lawyers, judges, litigants, and adjusters with extensive technical knowledge and with scientific discipline to explore, examine, and explain the issues involved.

SYNOPSIS OF QUALIFICATIONS

My technical background includes study and hands-on experience in building, maintaining, and analyzing **electrical devices and electronic systems** such as: radio and radar systems, security and alarm systems, remote control systems, sound and public address systems, computer and data processing equipment, radio and television equipment, automotive electronic systems, tape and digital recorders, cellular telephone systems, and video surveillance systems.

I have contributed to a variety of legal matters all based on **electrical equipment and electronics technology** including: electric shock, electrical wiring, electrical fire and lightning damage, audio and video recording, radio broadcasting, traffic radar and lidar, electronic control circuitry, cellular phone localization, electronic surveillance, consumer electronics capabilities, automobile control systems, radio and telephone communication, electrical accidents, and industrial machinery. (See **"Examples of Forensic Assistance"** below.)

COMMUNICATION SKILLS AND INDUSTRY QUALIFICATIONS

I provide site inspections, field measurements, laboratory analyses, test reports, and technical findings, with thorough documentation of results, conclusions, and opinions, and I am an experienced **expert witness** in the legal forum.

As a practiced **technical presenter** in high-technology industry, I have also tried to articulate complex scientific constructs and convey their essence for lawyers, judges, juries, and adjusters. Many cases have settled without the need for a trial, as a result of my analyses highlighting the technical nexus and critical characteristics of an incident.

For cases that get to the courtroom I have invariably qualified as an expert in the physics or electronics applicable to the matter. This is due in part to thirty years of full-time employment in the **defense and aerospace industry** at these firms:

- Bendix Radio Division, Baltimore MD
- Sperry Gyroscope Company, Great Neck NY
- Pennsylvania Research Associates, Philadelphia PA
- RCA Corporation, Aerospace & Defense Group, Moorestown NJ
- Computer Sciences Corporation, Integrated Systems Division, Moorestown NJ,

where I studied the **capabilities and limitations of advanced systems** for detection, tracking, communication, control, radar, sonar, and electronic countermeasures. (See "Professional Experience" below.)

I have formulated and evaluated new concepts on acoustic and electronic warfare, for detection and tracking of moving vehicles, for defense against missiles and torpedoes, and on computer-generated imagery. I am credited with 20 **publications** in the open professional technical literature, and I have written several hundred formal **technical reports** bearing government security or proprietary restrictions on their distribution. (See **"Technical Publications"** below.)

DOCUMENTATION OF CREDENTIALS

- Bachelor of Electrical Engineering, University of Florida, Gainesville FL
- Master of Science in Applied Science, Adelphi University, Long Island NY
- Master of Business Administration, Monmouth University, West Long Branch NJ
- Senior Member: Institute of Electrical and Electronics Engineers (IEEE)
- Member: National Society of Professional Engineers (NSPE)
- Fellow: National Academy of Forensic Engineers (NAFE)
- Licensed Professional Engineer (New Jersey)
- Licensed Private Investigator (New Jersey)

OPERATING PRINCIPLES

I charge a **uniform hourly rate** for consultation, field examination, technical analysis, report preparation, deposition, or attendance at trial (four-hour minimum). Time for intercity travel is charged at **half** the time I actually spend in transit.

Reasonable travel or other expenses are to be reimbursed at **actual cost**. My standard rate applies to all authorized work on a case. If, however, an experts-referral service makes our contact, they may impose a different rate structure.

As with any court expert, my duty is to render an objective scientific opinion on the matter at hand. In particular I can serve as your technical consultant and scientific interface with specialists who speak only in academic jargon. I can help you debunk the unfounded or pseudoscientific claims of your adversary.

I invite **attorneys and adjusters** to contact me to discuss my possible assistance in resolving your case dealing with physics, electricity, or electronics. I shall inform you whenever my qualifications appear **not** to be appropriate to your matter.

My office is just east of center city Philadelphia. I can easily travel as necessary to work at your location or at the site of an incident to be investigated.

TECHNICAL PUBLICATIONS

(The following documents are in the open literature. In addition several hundred of my formal technical reports are excluded from distribution by government security regulations or by corporate proprietary restrictions.)

[A] "Color Television...Wheels or Electrons?" [explores the then-competing CBS mechanical vs. RCA electronic approaches to color TV], *The Florida Engineer*, Vol. 2, No. 2, January 1952.

[B] "ORDVAC Stored Subroutines to Replace IBM Control Panels", *Aberdeen Proving Ground, Ballistic Research Laboratories Memorandum Report 897*, June 1955.

[C] "Maintaining Records of Computer Operation", *Ordnance Computer Research Report*, Vol. 2, No. 3, July 1955.

[D] "Mechanization of Computing Machine Time Utilization Records", Aberdeen Proving Ground, *Ballistic Research Laboratories Technical Note 1034,* August 1955 (with R. C. Ingles).

[E] "Programmed Multiplication on the IBM 407", *Journal of the Association for Computing Machinery*, Vol. 4, No. 4, October 1957.

[F] "Analysis of Time-Sharing in Digital Computers", *Journal of the Society for Industrial and Applied Mathematics,* Vol. 8, No. 1, March 1960.

[G] "The Effect of Input Filtering on the Signal Enhancement of a Broadband Integrator", *15th Annual Meeting of the Association for Computing Machinery,* Milwaukee, August 1960.

[H] "Implementation of the Correlation Process in the Manner of a Parallel Digital Computer", *1961 IRE Convention Record*, Part 9 (with C. W. Olson).

[J] "A Semantically Associative Memory", *Biological Prototypes and Synthetic Systems*, Vol. 1, Plenum Press, New York, 1962.

[K] "The Method of Successive Grids for Reduction of Function Storage Requirements", *The Computer Journal*, Vol. 5, No. 4, January 1963.

[L] "A Compression Method for Representation of Continuous Functions in a Digital Computer", *Spring 1963 Meeting of the Society for Industrial and Applied Mathematics*, Stanford Research Institute, April 1963 (with H. Ruston).

[M] "Hybrid Techniques for Real-Time Radar Simulation", *Proceedings of the 1963 Fall Joint Computer Conference*, Las Vegas, November 1963 (with H. Ruston).

[N] "Computer Techniques for Simulation of Air-to-Ground Radar Displays", *Pennsylvania Research Associates, Inc. Report*, April 1967.

[P] "Computer Simulation of Lunar Displays", *Proceedings of the SPIE 14 Annual Technical Symposium*, San Francisco, August 1969.

[R] "Why Computer Graphics?", guest editorial in *Simulation*, Vol. 16, No. 1, January 1971.

[S] "Defending a Moving Target Against Missile or Torpedo Attack", *IEEE Transactions on Aerospace and Electronic Systems*, Vol. AES-12, No. 4, July 1976.

[T] "Counterweapon Aiming for Defense of a Moving Target", *IEEE Transactions on Aerospace and Electronic Systems*, Vol. AES-16, No. 3, May 1980.

[U] "The Emerging Role of the Forensic Engineer", *IEEE Transactions on Professional Communication*, Vol. PC-30, No. 1, March 1987.

[V] "The Inner Layer of Submarine Defense", *The Submarine Review*, October 1987 (with R. R. Miller).

[W] "The Expert Under Stress of Trial", *The Expert and the Law*, Vol. 11, No. 1, June-July 1993.

[X] "The Expert in the Courtroom", presentation to IEEE Philadelphia Consultants Network, 12 February 2001.

[Y] "Effective Presentation of Expert Testimony", presentation at the SEAK, Inc. *National Expert Witness and Litigation Seminar*, 20 June 2002.

[AA] "Operator-Induced Errors in Speed Measurement of Motor Vehicles", presented at American Academy of Forensic Sciences Annual Meeting, New Orleans LA, February 2005.

[AB] "Mobile Telephones: Subscriber Localization", presented at the University of North Carolina School of Government, 2006 Fall Public Defender Conference, Asheville NC, November 2006.

[AC] "Forensic Engineering Experience with Purported Electric Shocks", *Journal of the National Academy of Forensic Engineers*, Vol. XXVI, No. 2, October 2012.

[AD] "Forensic Engineering Experience with Electrically Ignited Fires", *Journal of the National Academy of Forensic Engineers*, Vol. 32, No. 1, June 2015

PROFESSIONAL EXPERIENCE

(Prior to my full-time self-employment as a consultant and forensic analyst, I worked in high-technology industry. This was my employment resume, listed in inverse chronological order.)

Computer Sciences Corporation, Moorestown NJ (12 years). Mr. Boyell was program manager on the concept definition phase of an electronic warfare (EW) system in which CSC was responsible for the software that performs control and processing, in association with equipment being developed by other firms for electronic sensing and electronic attack. In this capacity he coordinated all CSC technical activity and served as the link with other team members and the Navy customer. Critical aspects of this work were integration of the EW system with the shipboard combat system, the optimal extent of automation to achieve performance under stress environments, and system acceptance of technology improvements over its lifetime. Before that concept definition award he was a principal contributor to CSC's understanding of the emerging EW requirements, in particular the integration of the EW system with a host combat system such as the AEGIS computer-controlled shipborne weapon system.

At CSC Mr. Boyell's assignments were in technical and business development, dealing with requirements, technology, and program planning, including management of IR&D activities on antisubmarine warfare (ASW) and EW. On one project he formulated the system concept and technical approach for a passive (non-alerting) system to detect and track submerged submarines by digital processing of optically received signals. On another project he conducted a study of communications interoperability which explored the variety of incompatible modulation methods, operating frequencies, and coding schemes used by various government agencies.

For an FAA air traffic system he analyzed alternative means for detecting and tracking aircraft and vehicles on airport runways and taxiways. The study included proximity detectors (pressure, infrared, magnetic) and remote sensors (radio emission, radar, optical), dealing with both their technical performance (range, accuracy, consistency) and their suitability for unattended operation in a harsh environment. In connection with this work, he projected the capabilities of a newly developed British system for localization of moving vehicles relying on their individual measurement of relative phase from multiple radio transmitters. This system is unique in allowing the reference transmitters to be emitters of opportunity not necessarily connected to or cooperating with the vehicle location system itself.

For a Coast Guard waterways management system, he evaluated modern electronic methods of performing automatic dependent surveillance by which ship positions are continuously updated at a central site. This involved study of navigation by global positioning system (GPS), interconnection of GPS receivers with digital selective calling radios, onboard and remote data processing for performing ship tracking, and conformity of newly available products for these purposes with internationally accepted signaling formats and protocols.

RCA Corporation, Moorestown NJ (13 years). As a member of a staff operating at the Aerospace and Defense Group level, he anticipated naval system requirements, analyzed alternative technical approaches, formulated applied technology objectives, and developed advanced system concepts applicable to Navy requirements. He defined independent research and development projects and developed business plans for penetration in this field oriented toward both surface ships and submarines.

In this activity Mr. Boyell developed a new technique for detection and tracking of torpedoes. This work involved threat recognition, acoustic signal processing, and system analysis, and formed the basis for several RCA contracts with the Navy on advanced torpedo defense systems for surface ships.

Working with DARPA, independent consultants, and RCA advanced computer personnel, he formulated the concept which became the 'advanced

autonomous array', a self-deploying ASW system featuring a passive acoustic sensor array with in-buoy signal and data processing, to effect an off-ship means of submarine detection and tracking.

Pennsylvania Research Associates, Inc., Philadelphia PA (11 years). Vice President – Performed contract research and consulting on radar and sonar system design, computer applications, signal processing, real-time simulation, communications, and electronic/acoustic countermeasures. He directed projects for government and commercial sponsors.

His work on storage and retrieval of cartographic data provided the foundation of real-time displays of synthesized imagery. He developed compact digital representations of contour maps, studied new polynomial and polyhedral methods of reconstructing 2- and 3-dimensional functions, and devised hierarchical organizations of memory and computation to produce textured displays by calculating video data profiles and raster portrayals in real time.

Sperry Gyroscope Company, Great Neck NY (3 years). Computers and sonar.

Bendix Radio Division, Towson MD (3 years). Television, radio, and computers.

Prior to bachelor's degree. Radio repair shops, electronics hobbyist.

EXAMPLES OF FORENSIC ASSISTANCE

(No ranking or chronology is implied by this case listing. Details have been redacted to preclude identification of the parties to any given matter.)

1. Resolution of a patent licensing dispute among three companies, centering on electronic means for synchronizing radio broadcasting transmitters.

2. Analysis of a tape recorded succession of telephone conversations to show they had been re-sequenced, i.e., edited, and was thus not an accurate representation of the actual conversations as they occurred.

3. Determination of the extent of bodily injury caused by an electric shock from a defective appliance plug, and analysis of electric shocks purportedly given to humans in a dozen different cases involving wiring, appliances, and machinery.

4. Empirical proof that a traffic radar could be influenced by an airport surveillance radar even operating on another frequency.

5. Explanation of the effects on two-way radio communication when employed inside metal buildings.

6. Investigation of how a malfunction in the electrically assisted steering gear caused a motor vehicle accident.

7. Field tests to show how a breath alcohol analyzer's reading was affected by radio-frequency interference, and in another case by cigar lighter fluid vapor.

8. Rigging of electrical power to, and electronic control of, sample panels of 8 x 16 light-emitting diodes (LEDs) which, when assembled on site, comprise a four-story self-illuminated video sign, to determine the extent of operating failures.

9. Analysis of an electrical malfunction in a garment press which pinned and burned its operator.

10. Consultation on method of measuring acoustic attenuation between buildings to evaluate whether a scream would have been heard.

11. Evaluations, in three separate cases, of the accuracy and reliability of GPS-based navigation and mapping systems used to track fleet vehicles and suspects.

12. Analysis and testimony on mobile phone technology in several different cases including text message processing, subscriber localization accuracy, presence of incriminating evidence, and spoofing of caller ID.

13. Comparison of a novel computer-based means of processing video signals with an alternate design, under an intellectual property dispute, showing that independent engineering effort had been performed rather than imitation.

14. Determination of the extent to which a shipment of blank recording tape was damaged in transit, on the basis of its measured sound recording capabilities.

15. Report on a $10 outlet strip whose surge suppressor actuated to save a $1,000 computer but in doing so ignited a building fire which did $100,000 damage.

16. Examination of the content of surveillance recordings to verify/refute charges of official misconduct in which the recordings were primary evidence.

17. Determination of errors in use of VASCAR as a speed-time-distance computing instrument which resulted from visual parallax.

18. Experimentation with automatic teller machines which would fail to accept or dispense payments because of a latent but serious electrical design defect.

19. Laboratory examination of recorded telephone conversations in light of offeror's claims about how the recordings were prepared, to determine acceptability as evidence for alleged drug distribution.

20. Reconstruction of accident scene on site, using sun shadows visible on photographs of bloodspots and debris, to locate vehicle impact point precisely.

21. Correction of speed and frequency response of damaged surveillance tape recordings in order to permit meaningful playback in court.

22. Preparation of one-party telephone recording, and tailoring to match a previously supplied recording, as the basis for subsequent voice identification.

23. Determination of cause and extent of water damage to the electrical installation, in separate cases, of a residence, a business, and an office building.

24. Experimentation with a motorcycle electrical system to replicate a believed defect that caused abrupt loss of engine power and consequent rider injury.

25. Examination of building electrical systems for residual or latent effects of storm damage including smoke damage and water intrusion, in residences, office buildings, large apartment buildings, and skyscrapers.

26. Detection of the mis-settings of fire department radios giving rise to inadequate communication in a severe stress environment in which firefighters were killed, through transcript review and dissection of fire-damaged equipment.

27. Determination that a hospital's complex radio/telephone paging system was not malfunctioning when on one occasion one of its 500 pocket pagers displayed digits not corresponding to the proper calling telephone extension.

28. Enhancement of a noisy surreptitious tape recording to reveal statements quite different from those transcribed, in particular whether the answers to critical questions were "yeah" or "naah", and just which part of his body she touched.

29. Investigation of successive generations of copies of a tape-recorded police interview to prove that artifacts exhibited were imposed during the copying process, but that the original recording was correct and complete.

30. Analysis of the circumstances giving rise to a serious electric shock in part due to defective wiring set up by a user in order to provide an unauthorized temporary modification to a properly manufactured device.

31. Reconstruction of operation of a traffic radar at a specific location to suggest why mis-readings would occur there.

32. Expert comparison of patent claims for a battery condition meter with that of an allegedly infringing competitor.

33. Determination of which of two different conversations on a telephone tape recording was last made based on the start/stop signatures left on the tape by the recorder's operation.

34. Analysis of the audibility of an emergency vehicle siren with respect to other sounds presented to the operator of another motor vehicle, by field measurement of acoustic levels as a function of listener location.

35. Testimony about the inferences to be drawn from the character of a short gap in a long tape recording which happened to correspond to the portion of a public meeting whose precise content later became under dispute.

36. Discovery of an improper wiring alteration combined with an internal defect that caused a hot-grease chicken frying machine to shock its operator.

37. Analysis of a disturbingly loud noise in a long-distance telephone connection by one party's cordless phone locally sounding its low-battery alert tone which was simultaneously transmitted to the other party's instrument.

38. Investigation of inaccuracies in use of a certain state police traffic lidar (lightwave radar) justifying the state's dropping of a lengthy case before trial.

39. Determination of how a control system released an overhead door to close on a forklift operator just as he was driving through. Also found an inoperative hold-open safety device for a double swinging door which had abruptly closed on a pedestrian.

40. Exploration of an industrial crane remote control which exhibited a rare over-run condition due to an obscure timing error between transmitter and receiver, with laboratory demonstration to reproduce the condition on demand.

41. Analysis of an event wherein a computer-based "911" call center failed to respond correctly to an incoming emergency call due to a computer program error.

42. Evaluation of industrial electrical machinery post-incident in several cases for which insurance carriers required confirmation or refutation of the insured's claims.

43. Enhancement of several noisy tape recordings to reveal otherwise inaudible conversations, to determine who said what, and to validate a questioned transcript.

44. Assistance with reverse engineering of a microprocessor-based point-of-sale machine to expose its circuitry, algorithms, and logic for scrutiny in a patent case. Required study of magnetic card reading technology along with formulation of custom test cards which revealed suspected intricacies of the internal calculations.

45. Testimony about potential interference from a proposed wireless/cellular transmitting site in light of some existing and nearby sensitive receiving apparatus.

46. Analysis and testimony, in several separate cases, to interpret video recordings: identification of camera- and recorder-induced effects, validation of date-time stamping, and reconstruction of true activities from shadowy imagery.

47. Testimony on possible latent damage to an electrical power wire that was alleged to be from defective cable staple installation several years previously.

48. Determination of why a commercial coffeemaker shocked a waitress.

49. Testimony and demonstration to the jury describing how a defective electric battery caused chemical burns to the user of a portable CD player.

50. Investigation of damage to hotel telephone systems allegedly from lightning.

51. Measurement of voltage and current on the frame of a portable "neon" sign with respect to the voltage and current that is expected to cause personal injury.

52. Evaluation of wireless telephone facility ("cell site") coverage for prospective mobile telephone systems in PA, NJ, VA, MD, NY, MA, and CA, with technical recommendations about site suitability and potential alternate locations.

53. Arbitration testimony relating to a transit company's use of traffic radar to monitor its employees' driving habits.

54. Analysis of an existing amateur radio ("ham") antenna installation and recommendations for technical modifications, to reduce the claimed visual stress to adjacent property owners, while minimally reducing the ham's two-way radio performance.

55. Determination of the extent of water damage to a multichannel two-way radio installation on the top floor of a building near where a sprinkler pipe ruptured.

56. Determination of the extent of smoke damage to certain customized computer equipment.

57. Analysis of a commercial FM broadcast transmitter's failure to maintain full radio-frequency (RF) power output, as a result of differential phase drift between two transmitters along with an impedance mismatch in their RF combiner.

58. Survey of RF field strength due to a homeowner's concern about the many transmitters (mobile telephone, paging systems, commercial broadcast, police/fire) in his neighborhood, and field testing of metallic window film for radiation level reduction.

59. Analysis of welding-torch damage to sections of fiber optic cabling and conduit running across a bridge, supervision and review of reflectometry tests, and experimentation with a novel repair technique which obviated total reinstallation.

60. Testing of a hair-setting electrical appliance alleged to have burned the user.

61. Investigation of the extent of mechanical upset damage to the optics and electronics within a truck shipment of photographic processing equipment.

62. Experimentation with an exemplar ceiling light fixture installation to determine the heat rise that would occur with a bulb of higher than rated wattage.

63. Verification of printing press damage when driven by multiple three-phase motors for which one phase conductor opened unexpectedly under full load.

64. Finding that a bomb threat caller was a certain individual faking an accent.

65. Finding that a harassing phone call was not from the suspected individual.

66. Review of law enforcement use of an available radio scanner to intercept cordless telephone conversation in light of cited federal and State wiretap laws.

67. Study of electrical controls, safety features, and wiring modifications in a 150-ton press brake which severed a worker's hands by its unexpected actuation.

68. Confirmation that thermal overload of an extension cord string caused a fire.

69. Finding that a surge suppressor was a victim, not a cause, of an office fire.

70. Examination of an automobile whose aftermarket alarm system installation allegedly caused malfunctions in microprocessors controlling vehicle functions.

71. Use of computer voice processing to show in separate cases whether a 911 emergency call was made by the assigned guard or by someone else, whether a particular series of crank calls were made by a suspected employee, and which of the participants in a surveillance conversation admitted he had the drugs for sale.

72. Examination of a television broadcasting station in litigation with an audience rating service, found to be only a polarity reversal within the station's audio chain.

73. Experimentation with exemplar golf carts to show that their battery cable clamps loosening through use permits ignition of fire during overnight charging.

74. Examination of a fire alarm that failed to signal a central monitoring station, found to be due to a surreptitiously cut-away section of the premises wiring.

75. Determination that a blown-open neutral conductor caused a fraternity house fire, and in a separate matter, that a corrosion failure in a service neutral conductor caused a worker to be shocked when installing a cable television dropwire.

76. Experimentation with an "uninterruptible power supply" designed to keep computers running under power loss, which was found to work as intended during full blackout but exhibited a peculiar failure mode during slow voltage sags.

77. Retrospective tracking of wireless telephones by plotting their movements from cell site to cell site, in order to confirm/refute the alleged presence of their users at defined crime sites, in separate cases in IL, OH, SC, WA, MI, PA, NJ and MD.

78. Examination of automatic hospital doors, industrial overhead doors, and retail establishment doors in different locations, in order to determine whether they were

fitted with properly operating electronic sensors and whether the electrical control systems operated correctly, under circumstances giving rise to injuries.

79. Examination of pitch and volume of car motor recordings to determine which of two known vehicles gunned the engine when ramming the other vehicle.

80. Testimony and courtroom demonstration of metal detector sensitivity as affected by the size, shape, composition, and orientation of claimed contraband.

81. Demonstration of how a gun could be concealed inside the headlamp control switch panel on the dashboard of a certain model car.

82. Analysis of electric shocks, in separate cases, sustained by a construction worker, a transmitter installer, a swimming pool occupant, and an individual in touching a defectively repaired "neon" light assembly.

83. Measurement of the acoustic characteristics of a fire alarm siren which allegedly caused permanent hearing damage in a nearby unsuspecting individual.

84. Measurement of the thermal characteristics of an automobile seat heater which allegedly caused third-degree burns to a partially desensitized individual.

85. Examination of a police department's video tape facility whose time-lapse surveillance tape became blemished, at first unexplainedly but only within the scene which was the subject of litigation for unwarranted brutality. Event reconstruction showed a rare combination of operator error and recorder defect.

86. Authentication of audio recordings of an insurance claim personal interview, of audio recordings of a doctor-patient physical examination, and of video recordings of a police traffic stop incident, all these as subjects for litigation

87. Determination of why a central alarm monitoring station telephone audio logging system failed to record only the critical 3 within its 20 channels.

88. Examination of, and reporting on, electrical failures in, or damage to, an industrial candle-making machine power cord, a home washing machine power cord, and a drink vending machine power cord, all of which caused fire or injury.

89. Assistance to a school system to resolve conflicts among equipment vendors and installation technicians working on their telephone, voicemail, and PA system.

90. Analysis of a mobile telephone and determination of how unintended outgoing calls were being made, resulting in employer monitoring of private conversations.

91. Examination of a rear-ended automobile to determine whether its brake lights were defective as claimed before the accident or inoperative only afterward.

92. Analysis of plans and drawings for a complex three-dimensional intersection involving 31 traffic lights, and determination that opposing motorists' contentions that they both had green lights was, under certain circumstances, correct.

93. Determination that an audio recording was complete, despite the claim that the confidential informant (i.e. the snitch) was being prompted for all his responses.

94. Determination that the blow-up upon initial turn-on of 1,000-ampere 3-phase wiring to a condominium project was due to main electrical service wires crossed during installation.

95. Examination of e-mail and Internet postings attributed to a stalker, and determination of how the addresses could have been spoofed for false accusation.

96. Development of information about car headlight design which is the subject of a manufacturing complaint by a State agency about theft and replacement cost.

97. Measurement of the acoustic characteristics of a hydroelectric power dam to show whether kayakers on the reservoir would have heard the sound in sufficient time to avoid being pulled by the swirling water over the dam.

98. Localization of the electrical short circuit causing a school bus to catch fire.

99. Reconstruction of how a worker disassembling a presumably non-energized electrical panelboard was injured by the arc blast from a live 480-volt terminal.

100. Testimony in a contractor's patent suit against the Government on the design and technology which implemented a certain weapon effects simulator.

101. Analysis of the loss due to power interruption to a computer-controlled telephone switching system which incorporated battery backup for power failure protection.

102. Evaluation of reports and error logs of an electronic access gate system to determine the reasons for its occasional false operation.

103. Assessment of electrical damage due to water cascading through successive floor penetrations down a New York skyscraper.

104. In separate cases, distinguishing between fire being caused by, vs. effects from fire to, damaged electrical wiring in a residence, a computer monitor in an

office, an alternator in an automobile, the pipe heating tape in a frozen basement, and a fluorescent light fixture in an assembly plant.

105. Showing by analysis and measurement how electrical shock to a person from a certain hospital kitchen steam table, a certain baggage X-ray scanner, a certain hand tool operation during building demolition, and a certain supermarket check-out stand could or could not have actually occurred.

106. Testimony about the effects of stored electrical charge on the worker who was electrocuted upon contact with a high-voltage capacitor.

107. Determination whether lightning strikes were the direct cause of claimed damage to various items of electrical and electronic equipment in several different businesses and residences.

108. Experimentation with a desktop halogen lamp in the laboratory to validate or refute the claim of its ability to ignite tissue paper.

109. Evaluation of the extent of damage and the required repair to a rack of advanced computing equipment damaged in transit, a cabinet with custom electrical switchgear dropped in the course of its installation, and a wired and wireless nurse-call intercom system in a rehab center which was struck by lightning.

110. Finding the flaw in the original setup of a residential security system which permitted a knowledgeable thief to bypass its sensors.

111. Pinpointing the location of an electrical arc in a baseboard heater subjected to overvoltage, which ignited adjacent carpet and in turn consumed the building.

112. Reconstruction of the sequence of events in which a parabolic electric heater was intentionally misused to cause or to contribute to an arson fire.

113. Analysis of the time-lapse video surveillance recordings in several separate matters to validate or refute allegations of occupant misbehavior, police misconduct, tampered videotapes, and/or recorder malfunction.

114. Serving as technical advisor to a Federal court judge who requested assistance in resolving an electronic circuit patent dispute.

115. Tracing fire patterns and electrical damage in several different buildings to nails or screws which had been driven so as to penetrate concealed electrical wires.

116. Measurement of sound levels from heavy equipment operating at a construction site to assist in resolving a worker's hearing loss claim, and sound levels

from alarms and sirens to which a police officer was exposed to support or refute a different claim.

117. Analysis of real-time video processor overload effects in a client's security installation.

118. Testing of the actual operating and standby times of several mobile telephones to compare with specified values for those parameters.

119. Examination and operation of high-technology police surveillance and communications equipment to support or refute introduction of its evidence in court in a foreign country.

120. Determination of how the defective design of an electric wheelchair's hand controller led to throwing its operator.

121. Employment of computer-based techniques to examine audio recordings and enhance them, showing in separate cases that an alarm believed to be silent was actually ringing, and that an evidence telephone recording had actually been edited or altered.

122. Experimentation with wear and abrasion to electrical extension cords and power strips to examine electrical failures exhibiting overheating, flame, or arcing. Reconstruction of a typical surge suppressor explosion under controlled conditions.

123. Examination of surveillance video recordings to calculate, for separate incidents, speed of a pedestrian toward a wall, speed of a police car through an intersection, and speed of a railroad train in the city.

124. Determination of the contributions, if any, of electrical appliances to house-fires in cases separately accusing a steam iron, a dishwasher, a refrigerator, a water cooler, a computer, a hot tub, and several surge suppressor power strips..

125. Analysis of electrically caused industrial fires due, in separate incidents, to an under-tightened busbar connection, to an overloaded electrical distribution panel, to exploding metal-halide arc lamps, and to an air-duct installation which short-circuited a hot wire.

126. Performance of on-site measurements and technical documentation of the acoustic environments in which a police officer claimed hearing damage, a business deal was compromised by an alleged office eavesdropper, and a metal shop exhibited excessive noise levels for the workers.

127. Investigation of alleged electric shocks, some of which incidents resulted in electrocution, involving some indoor and outdoor neon and fluorescent lamp signs, a copying machine, an unconnected power wire, and a lighting fixture.

128. Reconstruction of unintended acceleration/deceleration resulting in personal injury, of a radio-controlled industrial crane in a steel mill, a radio-controlled model helicopter in a field, and an automobile engine ignition circuit on a highway.

129. Analysis of the electrical/electronic malfunctions which led to freeze damage to a hotel's air-handling control system, arm injury to a worker cleaning a waste compactor, explosion in a telephone exchange battery room, head injury to the occupant of a motorized hospital bed, and repeated false alarms in an apartment complex fire detection system.

130. Consulting services on a company's design of an in-line hot-tub water heater, and on another company's design of an in-home electrical power meter.

131. Analysis of an audio recording to reveal whether shots were fired, and of a video recording to determine whether out-of-camera tape editing was performed.

132. Evaluation of radio wave propagation associated with alleged interference causing a ship collision in a harbor, the reliability of emergency services dispatch in a community, and the viability of an alibi based on mobile telephone localization.

133. Enhancement of a 911 recording to show a third person was still alive during the call.

134. Assessment of lightning damage to a toll-bridge vehicle tracking and accounting complex of electronic sensors and processing equipment.

135. Identification of defects in a cellphone which burned in a user's pocket, and of a land-line phone which allegedly caused hearing damage to its user.

136. Analysis and testimony regarding the capabilities of certain "smartphones" to capture, preserve, and identify text messages and pictures sent or received.

137. Investigation of allegations about electrical injury or electrical fire, in separate cases, involving an electric space heater, a car seat heater, an electric meter socket, a mobile electric generator, an LED billboard, and many instances of apparent electrical failure of electric power wiring in residences and businesses.

138. Analysis of accidents due to claimed electronic failures involving, in separate matters, an intrusion alarm system, a toll bridge vehicle sensing system, a residential cooking range, an industrial trash compactor, and a remote controlled (full-size) railroad switching locomotive.

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