

ROGER L. BOYELL, FORENSIC ANALYST
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**EXPERTISE IN ELECTRONIC CONTROL AND COMMUNICATION SYSTEMS.
SERVING THE LEGAL FORUM WITH CONSULTING AND TESTIMONY.**

MISSION STATEMENT

WHEN ELECTRICAL DEVICES AND ELECTRONIC SYSTEMS ARE THE SUBJECT OF CIVIL LITIGATION, CRIMINAL CHARGES, PATENT DISPUTES, OR INSURANCE CLAIMS ("FORENSIC" MATTERS), I SUPPORT LAWYERS, JUDGES, AND ADJUSTERS WITH EXTENSIVE TECHNICAL KNOWLEDGE AND WITH SCIENTIFIC DISCIPLINE TO EXPLORE, EXAMINE, AND EXPLAIN THE ISSUES INVOLVED ("ANALYSIS" TASKS).

TECHNICAL BACKGROUND AND FORENSIC EXPERIENCE

My technical background includes study and hands-on experience in building and maintaining **electrical devices and electronic systems** such as: remote control devices, security and alarm systems, wireless microphones, signal distribution panels, carrier-current transmitters, sound and public address systems, computer and data processing equipment, radio and television equipment, automotive electronics, tape recorders, radar and lidar, cellular telephones, and video surveillance devices.

I have contributed to a variety of legal matters based on **electrical devices and electronics technology** including: electric shock, electrical wiring, surveillance monitoring, lightning damage, disputed recording tapes, questioned acoustical audibility, radio broadcasting interference, traffic radar, voice recognition, police laser radar, pocket paging systems, patent questions involving electronic circuits, accident reconstruction, automobile control systems, telephone communication, computer-controlled 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 develop the ability 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.

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, Long Branch NJ
- Senior Member: Institute of Electrical and Electronics Engineers
- Fellow: American College of Forensic Examiners
- Diplomate: American Board of Forensic Engineering and Technology

RATE STRUCTURE AND OPERATING PRINCIPLES

I charge a **uniform hourly rate**, which includes all overhead, for consultation, field examination, technical analysis, report preparation, deposition, or attendance at trial. During lengthy out-of-town travel I customarily charge for **half** the time actually spent in transit. Billing for my time begins only upon your work authorization.

My fee applies to all authorized work on a case. Out-of-pocket expenses are to be reimbursed at actual cost. If, however, a referral service is in the loop, they may impose a different rate structure.

As with any court expert, my duty is to render and to support an objective scientific opinion on the matter at hand. In particular I can serve as your technical consultant and scientific interface with other narrower specialists who speak only in academic jargon. I can help you debunk the unfounded or pseudoscientific claims of your adversary. I invite **litigants, attorneys, and adjusters** to contact me to discuss assistance in resolving your case dealing with physics or electronics. Conversely, I shall inform you when my qualifications appear not to be appropriate to your case.

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 Mr. Boyell has authored several hundred formal technical reports which must be 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.

EXAMPLES OF FORENSIC ASSISTANCE

(No ranking or chronology is implied by this listing.)

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 resequenced, i.e., edited, and was thus not an accurate representation of the actual conversations as they occurred.
3. Investigation of an equipment fire requiring examination of electrical circuitry and study of after-fire photographs to determine the origin of the fire.
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. Debunking of a vehicle speeding accusation which was based on improper interpretation of a traffic radar reading when used between two roadways.
7. Evidence that an breath alcohol analyzer's reading was affected by radio interference.
8. Analysis of a tractor-trailer's on-board monitoring computer record to prove that it was not exceeding the speed limit in a defined operating area.
9. Reconstruction of a traffic accident from roadway markings to determine the proximate cause was just the opposite of the conclusion reached in preliminary investigation.
10. Consultation on method of measuring acoustic attenuation between buildings to evaluate whether a scream would have been heard.
11. Generation of demonstrative photographic evidence regarding visibility of a certain traffic sign from a specific approach path.
12. Laboratory analysis of an FBI-produced tape recording and findings which contradicted its initially believed authenticity.

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. Analysis of a traffic citation based on what was found to be erroneous operation of a traffic radar, resulting in the dismissal of a separate motor vehicle charge for no probable cause.
16. Examination 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 resulting from visual parallax.
18. Analysis of testimony regarding a traffic matter to elucidate witnesses' inconsistencies.
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 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. Examination of official accident report and physical roadway layout to show that the driver of a vehicle emerging from a stopsign was not necessarily at fault.
24. Experimental determination of the extent to which a breath analysis device's accuracy is affected by cigar lighter fluid vapor.

25. Enhancement of original sound recordings to expose potentially damaging transcript errors.
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 misreadings 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. Testimony about the accuracy with which wireless/cellular telephones can be localized from retained fraud or billing records showing the antenna sites accessed.
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.
