NOTE

APPROPRIATE FOUNDATION REQUIREMENTS FOR ADMITTING COMPUTER PRINTOUTS INTO EVIDENCE

I. INTRODUCTION

Few mechanical devices have had so powerful an impact on American society as the computer.[1] This impact has, however, produced mixed results: for example, while the computer offers the prospect of a "cashless, checkless" society,[2] it simultaneously threatens individual

1. There are two basic types of computers, analog and digital. An analog computer operates by measuring; a digital computer operates by counting. Most computers in use today are digital computers. A computer that combines features of both types is known as a hybrid computer. Annot., 16 AM. JUR. PROOF OF FACTS 273, 276 (1965); Roberts, *A Practitioner's Primer on Computer-Generated Evidence*, 41 U. CHI. L. REV. 254, 254 (1974); Tapper, *Evidence from Computers*, 8 GA. L. REV. 562, 562 n.1. *See generally* Freed, *A Lawyer's Guide Through the Computer Maze*, 6 PRAC. LAW., Nov. 1960, at 15. When used in this Note, the term computer refers to a digital computer. The potential uses of the computer seem almost unlimited. *See, e.g.*, United States v. Matzker, 473 F.2d 408 (8th Cir. 1973) (Matthes, C.J.) (computer embosses 17,000 credit cards a day); Ege, *Electronic Funds Transfer: A Survey of Problems and Prospects in 1975*, 35 MD. L. REV. 1 (1975) (supermarket sales conducted by computer); Meier & Duke, *Gaming Simulation for Urban Planning*, 32 J. AM. INST. PLANNERS 3 (1966) (city planning by computer). In fact, one commentator claims that the computer has the potential for self-replication. Bernstein, *When the Computer Procreates*, N.Y. Times, Feb. 15, 1976, § 6 (Magazine), at 9. Legal scholars have noted that its impact on the law will undoubtedly be substantial. *See* Freed, *Machine Data Processing Systems for the Trial Lawyer*, 6 PRAC. LAW., Apr. 1960, at 73 (description of a punched card technique for managing trial evidence in large cases); Garland, *Computers and the Legal Profession*, 1 HOFSTRA L. REV. 43 (1973) (discussion of the potential effects of computers on law schools, law practice, and legislative and judicial operations). *See generally* Brown, *Electronic Brain and the Legal Mind: Computing the Data Computer's Collision Course with Law*, 71 YALE L.J. 239 (1961); Freed, *Computer Technology and Trial Technique*, TRIAL LAW. GUIDE 113 (1962); Note, *Automation and the Law: Challenge to the Attorney*, 21 VAND. L. REV. 228 (1968).

2. For a discussion of some of the legal problems presented by the "cashless, checkless" society, see Dunne, *The Checkless Society and Articles 3 and 4*, 24 BUS. LAW. 127 (1968); Stiefel, *A Checkless Society or an Unchecked Society*, 19 COMPUTERS & AUTOMATION 32 (1970).

privacy.[3] Although the computer was invented in the early 1950's,[4] its use in private industry and government[5] has grown so explosively that by 1975 approximately 85,000 systems were in operation in the United States.[6] Because many computers are being used to maintain business records,[7] parties are increasingly offering and courts are admitting into evidence,[8] computer printouts[9]—the only permanent, leg-

3. The threat that computers pose to privacy is discussed in A. MILLER, THE ASSAULT ON PRIVACY: COMPUTERS, DATA BANKS AND DOSSIERS (1972); A. WESTIN & M. BAKER, DATABANKS IN A FREE SOCIETY (1972); A. WESTIN, PRIVACY AND FREEDOM (1970); Countryman, *The Diminishing Right to Privacy: The Personal Dossier and the Computer*, 49 TEX. L. REV. 837 (1971); Miller, *Personal Privacy in the Computer Age: The Challenge of a New Technology in an Information-Oriented Society*, 67 MICH. L. REV. 1089 (1969).

4. The first commercially produced computer, Univac I, was delivered to the United States Bureau of the Census in 1951. Telex Corp. v. International Business Machs. Corp., 367 F. Supp. 258, 271 (N.D. Okla. 1973), *aff'd in part, rev'd in part, remanded in part*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802 (1975); Freed, *Evidence and Problems of Proof in a Computerized Society*, 1 MOD. USES LOGIC L., Dec. 1963, at 171, 180-81; Comment, *Computer Print-Outs of Business Records and Their Admissibility in New York*, 31 ALB. L. REV. 61, 68 (1967). The first International Business Machines (IBM) computer was completed in April 1953, and was intended primarily for scientific work in connection with nuclear research. The company's first commercial computer, the IBM 702, was installed in early 1955. Telex Corp. v. International Business Machs. Corp., *supra*, at 270. *See generally* H. GOLDSTINE, THE COMPUTER FROM PASCAL TO VON NEUMANN (1972).

5. In 1952 the federal government owned 2 computers, but by 1971 had purchased 5,961 computers. It is said that the federal government now owns over 7,000 computers. *See* GENERAL SERVICES ADMINISTRATION, INVENTORY OF AUTOMATIC DATA PROCESSING EQUIPMENT IN THE U.S.A., FISCAL YEAR 1971, at 15A, *cited in* Roberts, *supra* note 1, at 254.

6. Note, *Admissibility of Computer-Kept Business Records*, 55 CORNELL L. REV. 1033, 1033 (1970). The effect of such prodigious growth has been that computers in use today vary tremendously in statistical power. For example, the IBM 370/168 when compared to Univac I has 700 times the storage capacity; adds 4,300 times faster; multiplies 3,100 times quicker; and divides 2,000 times faster. Current tape drives transfer data 40 times faster than the tape drives in Univac I. Telex Corp. v. International Business Machs. Corp., 376 F. Supp. 258, 273 (N.D. Okla. 1973), *aff'd in part, rev'd in part, remanded in part*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802 (1975). There are still computers in use that were developed in the 1950's, and therefore are unsophisticated in both design and capability. Mills, Lincoln & Langhead, *Computer Output—Its Admissibility into Evidence*, 3 LAW & COMPUTER TECH. 14, 15 (1970).

7. United States v. Russo, 480 F.2d 1228, 1239 (6th Cir. 1973), *cert. denied*, 414 U.S. 1157 (1974). It has been argued that "business records will probably be the most common source of computer-generated evidence." Roberts, *supra* note 1, at 255. *See also* Note, *supra* note 1, at 230-37.

8. *See* cases cited note 43 *infra*.

9. The correct spelling of the word is printout. THE RANDOM HOUSE DICTIONARY OF THE ENGLISH LANGUAGE 1145 (1967); UNITED STATES GOVERNMENT PRINTING OF-

ible presentation of the information.[10]

Since a computer printout is a hearsay statement,[11] the rule against hearsay will prevent its introduction into evidence unless it can qualify under an exception.[12] This Note will consider the appropriate foundation requirements for admitting computer printouts into evidence under the business records exception to the hearsay rule. Section II will discuss the hearsay rule and the traditional foundation requirements for both the common law and the statutory business records exception. Section III will describe how a computer operates and maintains records; this section will conclude with a comparison of manual and computer recordkeeping systems. Section IV will investigate the conceptual problems of applying the statutory and common law foundation requirements to the admission of computer printouts and review the relevant case law. Section V will suggest a model statute that the states and the federal government might enact to regulate the admission of computer printouts into evidence.

FICE STYLE MANUAL 111 (rev. ed. 1973). Courts spell it in a number of ways. *Compare* King v. State *ex rel.* Murdock Acceptance Corp., 222 So. 2d 393, 398 (Miss. 1969) (print-out), *with* Olympic Ins. Co. v. H.D. Harrison, Inc., 418 F.2d 669, 670 (5th Cir. 1969) (per curiam) (printout).

10. A computer printout is "a writing which contains in human readable form the contents of a machine readable medium, such as disk, magnetic tape, or drum and is the only permanent, legible form of the results." Elmaleh, *Evidentiary Concepts in a Computerized Society*, 5 COMPUTER L. SERV. 1, 6 n.10 (1972).

11. *See* note 21 *infra.*

12. *See* notes 37-74 *infra* and accompanying text. The introduction of computer printouts into evidence raises numerous other evidentiary problems such as application of the best evidence rule and issues arising during discovery. For a discussion of the best evidence rule and computer printouts, see Freightliner Corp. v. Gyles, 268 Ore. 357, 521 P.2d 1 (1974) (witness' testimony concerning contents of computer printouts held inadmissible because the printouts were the best evidence); Harned v. Credit Bureau of Gillette, 513 P.2d 650 (Wyo. 1973) (computer printouts held inadmissible because not best evidence), *discussed in* Roberts, *supra* note 1, at 278; Freed, *supra* note 4, at 182; Johnson, *Electronic Data Processing and the Judge Advocate*, 44 MIL. L. REV. 1, 18-20 (1969); Note, *supra* note 6, at 1042-44; Note, *Evidence—Admissibility of Computer Print-Outs*, 52 N.C. L. REV. 903, 904 (1974); Note, *Evidence: The Admissibility of Computer Print-Outs in Kansas*, 8 WASHBURN L.J. 330, 332-34 (1969). For a discussion of the problems computer printouts raise in discovery, see United States v. Liebert, 519 F.2d 542 (3d Cir.), *cert. denied*, 423 U.S. 985 (1975) (IRS lists held not discoverable for impeaching the reliability of IRS computers when defendant offered alternative information); BOARD OF EDITORS FOR THE FEDERAL JUDICIAL CENTER, MANUAL FOR COMPLEX AND MULTIDISTRICT LITIGATION § 2.615, at 77-80 (rev. ed. May 18, 1970); Bernacchi & Larsen, *Philosophy, Data Processing, and the Rules of Evidence*, 48 L.A. B. BULL. 374, 375 (1973); Johnson, *supra*, at 19; Comment, *supra* note 4, at 71.

This Note will argue that the traditional foundation requirements of the business records exception to the hearsay rule are ineffective to ensure the reliability of a computer printout. A review of the case law suggests that the courts have failed to recognize this problem and consequently have not developed an adequate test. Therefore, this Note will conclude by proposing a model statute with tailored foundation requirements for admitting computer printouts into evidence.

II. THE RULE AGAINST HEARSAY AND THE BUSINESS RECORDS EXCEPTION

A. *The Rule Against Hearsay*

Professor Wigmore calls the rule against hearsay "that most characteristic rule of the Anglo-American Law of Evidence—a rule which may be esteemed, next to jury trial, the greatest contribution of that eminently practical legal system to the world's methods of procedure."[13] The rule barring hearsay evidence is firmly established,[14] although the exceptions have "virtually swallowed the rule."[15] Professor Wigmore

13. 5 J. WIGMORE, A TREATISE ON THE ANGLO-AMERICAN SYSTEM OF EVIDENCE IN TRIALS AT COMMON LAW § 1364, at 28 (rev. ed. J. Chadbourn 1974) [hereinafter cited as WIGMORE]. For the most complete history of the hearsay rule, see 5 WIGMORE § 1364. There is a shorter history in C. MCCORMICK, HANDBOOK OF THE LAW OF EVIDENCE § 224 (2d ed. E. Cleary 1972) [hereinafter cited as MCCORMICK], and in J. THAYER, A PRELIMINARY TREATISE ON EVIDENCE AT THE COMMON LAW chs. 2-4 (1898). For valuable discussions of the rule against hearsay, see Ladd, *The Relationship of the Principles of Exclusionary Rules of Evidence to the Problem of Proof*, 18 MINN. L. REV. 506 (1934); McCormick, *The Borderland of Hearsay*, 39 YALE L.J. 489 (1930); Morgan, *The Relation Between Hearsay and Preserved Memory*, 40 HARV. L. REV. 712 (1927). The issue of hearsay is not confined to the law. *See, e.g.*, H. LONGFELLOW, EVANGELINE, Bk. 2, ch. 1, in THE COMPLETE POETICAL WORKS OF LONGFELLOW (Riverside ed. 1972) ("Sometimes a rumour, a hearsay . . . came."); P. SIDNEY, ARCADIA, Bk. 1, ch. 10, at 129, in 2 THE COMPLETE WORKS OF SIR PHILIP SIDNEY (A. Grosart 1877) ("[those] whose metall stiff he knew he could not bond with hearsay pictures"); A. TENNYSON, VIVIEN 800, in THE POEMS OF TENNYSON (C. Ricks 1969) ("She blamed herself for telling hearsay tales.").

14. 2 B. JONES, THE LAW OF EVIDENCE: CIVIL AND CRIMINAL § 8:1, at 161 (S. Gard 1972) [hereinafter cited as JONES]. One commentator has pointed out that despite the lack of agreement on what is hearsay, there is a consensus that it is bad. M. LADD, CASES AND MATERIALS ON EVIDENCE 380 (2d ed. 1955). *But cf.* Morgan, *Hearsay Dangers and the Application of the Hearsay Concept*, 62 HARV. L. REV. 177, 219 (1948) ("Classification of evidence as hearsay . . . should not result in its automatic exclusion.").

15. De La Salle Inst. v. United States, 195 F. Supp. 891, 894 (N.D. Cal. 1961). "[C]ourts and legislatures, most particularly in these United States, have over the years made up many rules for excluding from trials a great deal of relevant evidence." J.

and Dean McCormick's definitions are the most accepted and well-known of the numerous attempts to define hearsay.[16] Reflecting his emphasis on the importance of cross-examination, Professor Wigmore maintains that hearsay signifies "a rule rejecting assertions, offered testimonially, which have not been in some way subjected to the test of cross-examination."[17] Dean McCormick's definition, adopted by the Federal Rules of Evidence,[18] is "testimony in court, or *written evidence*, of a statement made out of court, the statement being offered as an assertion to show the truth of matters asserted therein, and thus resisting for its value upon the credibility of the out-of-court asserter."[19] Under either definition a written statement may be hearsay,[20] so that a computer printout, if "offered as an assertion to show the truth of matters asserted therein,"[21] is a hearsay statement.

MAGUIRE, EVIDENCE, COMMON SENSE AND COMMON LAW 10 (1947). *See* notes 37-39 *infra* and accompanying text.

16. Commentators and draftsmen have proposed numerous definitions of hearsay. Some examples are:

a) R. CROSS & N. WILKINS, AN OUTLINE OF THE LAW OF EVIDENCE 90 (1964):
Express or implied assertions of persons, other than a witness who is testifying and assertions in documents produced to the court when no witness is testifying, are inadmissible as evidence of the truth of that which was asserted.

b) UNIFORM RULE OF EVIDENCE 801 (1964):
"Hearsay" is a statement, other than one made by the declarant while testifying at the trial or hearing, offered in evidence to prove the truth of the matter asserted.

c) Maguire proposed a definition that was over a page in length. *See* Maguire, *The Hearsay System: Around and Through the Thicket*, 14 VAND. L. REV. 741, 768-69 (1961).

17. 5 WIGMORE, *supra* note 13, § 1362, at 3. Professor Wigmore devotes almost 250 pages of his study of evidence to a discussion of the rationale for the hearsay rule. *See id.* §§ 1360-1427.

18. FED. R. EVID. 801(c) provides:
"Hearsay" is a statement, other than one made by the declarant while testifying at the trial or hearing, offered in evidence to prove the truth of the matters asserted.

19. MCCORMICK, *supra* note 13, § 246, at 584 (emphasis added) (citation omitted). Dean McCormick states that the definition "seeks to limit the term 'hearsay' to situations where the out-of-court assertion is offered as equivalent to testimony to the facts so asserted by a witness on the stand." *Id.* at 585.

20. 2 JONES, *supra* note 14, § 8:2, at 165; MCCORMICK, *supra* note 13, § 245. *See* UNIFORM RULE OF EVIDENCE 801(a) (1974) (defining statement as "an oral or written assertion . . . "). *See generally* 5 WIGMORE, *supra* note 13, §§ 1361-1362. In fact, "[a] hearsay statement is not necessarily confined to words, written or spoken, but may very well consist of conduct . . . ." JONES, *supra* note 14, § 8:1, at 165. The leading case standing for this proposition is Wright v. Tatham, 7 Eng. Rep. 559 (1838), *discussed extensively in* Maguire, *supra* note 16.

21. If the printout were not offered to "show the truth of matters asserted therein,"

In *Mima Queen v. Hepburn*,[22] Chief Justice Marshall stated that the "inherent weakness" of hearsay is the basis for excluding it from evidence.[23] Employing a more reasoned approach, commentators have reached the same conclusion[24] and isolated three factors to determine the credibility of a witness' testimony: perception, memory, and narration of the witness.[25] Based on these elements, courts have devised three requirements for a witness to testify: oath, personal presence, and cross-examination.[26]

The oath is important both as a symbol of the gravity of testifying in a judicial proceeding and as a reminder of the threat of punishment for perjury.[27] Personal presence is necessary for the trier of fact to observe the witness testifying in court.[28] This requirement is waived

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see note 18 *supra* and accompanying text, it would not be a hearsay statement and therefore not excluded by the rule against hearsay. MCCORMICK, *supra* note 13, § 246, at 584; 5 WIGMORE, *supra* note 13, §§ 1361-1362. *See also* UNIFORM RULE OF EVIDENCE 801 (1974), *quoted in* note 16 *supra*; MODEL CODE OF EVIDENCE rules 501, 502 (1942). *Accord*, Scholle v. Cuban-Venezuelan Oil Voting Trust, 285 F.2d 318, 321 (2d Cir. 1960); Carantzas v. Iowa Mut. Ins. Co., 235 F.2d 193, 196 (5th Cir. 1956).

22. 11 U.S. (7 Cranch) 290 (1813).

23. In discussing the value of hearsay, Chief Justice Marshall stated: "['H]earsay evidence' is in its own nature inadmissible . . . ." Its *intrinsic weakness*, its incompetency to satisfy the mind of the existence of the fact, and the frauds which might be practiced under its cover, combine to support the rule that hearsay evidence is totally inadmissible. *Id.* at 295-96 (emphasis added). *Accord*, Ellicott v. Pearl, 35 U.S. (10 Pet.) 412, 436 (1836) (Story, J.). *But see* Note, *Evidence—Admissibility of Computer Print-Outs*, *supra* note 12, at 955.

24. *See* MCCORMICK, *supra* note 13, § 245; 5 WIGMORE, *supra* note 13, § 1362. *See also* 5 WIGMORE, *supra* note 13, §§ 1367-1368; Falknor, *Silence as Hearsay*, 85 U. PA. L. REV. 484 (1937). Some commentators add sincerity as a fourth element, *see, e.g.*, Morgan, *supra* note 14, at 185-88, but the better view is that it is merely a variation of the other three factors. MCCORMICK, *supra* note 13, § 245.

26. 2 JONES, *supra* note 14, § 8:2, at 166; MCCORMICK, *supra* note 13, § 245.

27. MCCORMICK, *supra* note 13, § 245. *See* Rossville Salvage Corp. v. S. E. Graham Co., 319 F.2d 391, 396 (3d Cir. 1963). It is, however, generally acknowledged today that the value of the oath is negligible. 2 JONES, *supra* note 14, § 8:2, at 166 ("But the absence of the oath is really mostly an incidental factor . . . ."); Morgan, *supra* note 14, at 182. Professor Wigmore claims that the oath is merely an incidental feature accompanying cross-examination. 5 WIGMORE, *supra* note 13, § 1362, at 10. For a general, but dated, discussion of the oath, see White, *Oaths in Judicial Proceedings and Their Effect upon the Competency of Witnesses*, 42 AM. L. REG. (N.S.) 373 (1903).

28. United States v. National Homes Corp., 196 F. Supp. 370, 372-73 (N.D. Ind. 1961); Robertson v. Heath, 132 Ga. 310, 312-13, 64 S.E. 73, 74 (1909); MCCORMICK, *supra* note 13, § 245; Strahorn, *A Reconsideration of the Hearsay Rule and Admissions*, 85 U. PA. L. REV. 484, 500-02 (1937). *But see* 2 JONES, *supra* note 14, § 8:2, at 166.

for a written statement, which may be examined for reliability when offered into evidence. Cross-examination is the most vital requirement.[29] Professor Wigmore believed that cross-examination is "beyond any doubt the greatest legal engine ever invented for the discovery of truth"[30] so that "no statement . . . should be used as testimony until it has been probed and sublimated by that test . . . ."[31] Although Professor Wigmore's faith in its value may be excessive, cross-examination can be a valuable legal tool when properly exercised.[32] Its purpose is to probe for the truth by eliciting undisclosed circumstances and by exposing "inaccuracies and falsehoods."[33]

The value of hearsay evidence is as uneven as that of any other evidence. The numerous exceptions[34] to the rule against hearsay are proof that courts and legislatures do not firmly believe in its "inherent weakness."[35] Application of the rule and its exceptions has so engaged the courts' attention, however, that they have not had the opportunity to review its validity under modern social conditions.[36]

B. *The Business Records Exception to the Rule Against Hearsay*

1. *Early History of the Business Records Exception*

Rigid application of the hearsay rule would often result in the exclusion of necessary, reliable evidence.[37] Consequently, courts have created exceptions to the rule when there is reasonable justification for

29. 2 JONES, *supra* note 14, § 8:2, at 166; MCCORMICK, *supra* note 13, § 245; 5 WIGMORE, *supra* note 13, §§ 1367-1372; Morgan, *supra* note 13, at 712. *But see* Strahorn, *supra* note 28, at 500-02.

30. 5 WIGMORE, *supra* note 13, § 1367, at 32.

31. *Id.*

32. Rossville Salvage Corp. v. S. E. Graham Co., 319 F.2d 391, 396 (3d Cir. 1963); Zippo Mfg. Co. v. Rogers Imports, Inc., 216 F. Supp. 670, 683 (S.D.N.Y. 1963); Pettus v. Casey, 358 S.W.2d 41, 44 (Mo. 1962); J. MAGUIRE, *supra* note 15, at 13. *Cf.* Morgan, *supra* note 14, at 188 ("[I]f a witness is willing to commit perjury and counsel is willing to co-operate . . . cross-examination will [not] be of much avail to expose the willful falsehood unless either witness or counsel is unusually stupid.").

33. 5 WIGMORE, *supra* note 13, § 1367, at 33.

34. *See* notes 37-39 *infra* and accompanying text.

35. Mima Queen v. Hepburn, 11 U.S. (7 Cranch) 290 (1813). *See also* authorities cited note 24 *supra*.

36. J. MAGUIRE, *supra* note 15, at 10.

37. Note, *Evidence—Admissibility of Computer Print-Outs, supra* note 12, at 905. *See* Note, *Business Records Rule, Repeated Target of Legal Reform*, 36 BROOKLYN L. REV. 241 (1970); 31 MOD. L. REV. 668 (1968) ("In a modern sophisticated age it is highly doubtful whether we need rules of evidence at all.").

admitting otherwise unacceptable evidence.[38] Two principles form the basis for the exceptions to the hearsay rule: necessity and a circumstantial probability that the evidence is reliable.[39] When these two considerations are present, courts have been willing to dispense with the test of cross-examination and admit hearsay evidence.

A computer printout is a hearsay statement,[40] but may be admissible under one of the exceptions to the rule against hearsay. For example, if a printout were produced by a party to the action, a court could allow it into evidence against him as an admission.[41] A printout could fall within the exception for a record of past recollection if the testifying witness caused it to be made and verifies its accuracy.[42] Most parties, however, attempt to introduce the printout under the business records exception.[43]

The present business records exception is the product of two historical rules of evidence,[44] the shopbook rule[45] and the regular entries

38. 5 WIGMORE, *supra* note 13, § 1420. Some exceptions to the rule against hearsay are declarations against interest, *see* Jefferson, *Declarations Against Interest: An Exception to the Hearsay Rule*, 58 HARV. L. REV. 1 (1944); dying declarations, *see* Quick, *Some Reflections on Dying Declarations*, 6 HOW. L. REV. 109 (1960); books, treatises, and other professional literature, *see* Note, *Learned Treatises*, 46 IOWA L. REV. 463 (1961); and records of past recollection, *see* Note, *Past Recollection Recorded*, 28 IOWA L. REV. 530 (1943). In fact, there are so many exceptions that "[i]t is very hard indeed to hold clearly in mind all their varying prerequisites and limitations . . . ." Maguire, *supra* note 16, at 774.

39. 5 WIGMORE, *supra* note 13, § 1420-1422; Strahorn, *supra* note 28, at 502-04. There is no general exception to the hearsay rule, and "[a] careful analysis of the decisions will disclose that there is no theory that will explain all of the exceptions or harmonize one with another . . . ." E. MORGAN, SOME PROBLEMS OF PROOF UNDER THE ANGLO-AMERICAN SYSTEM OF LITIGATION 221 (1956).

40. *See* note 21 *supra* and accompanying text.

41. *See generally* Jefferson, *supra* note 38; Morgan, *Admissions as an Exception to the Hearsay Rule*, 30 YALE L.J. 355 (1921). At present no case has been reported in which a party has employed this argument to have a computer printout admitted into evidence.

42. Laughlin, *Business Entries and the Like*, 46 IOWA L. REV. 276, 278 (1961).

43. *See, e.g.*, United States v. Fendley, 522 F.2d 181 (5th Cir. 1975) (computer printouts held admissible under the business records exception to prove tax evasion); United States v. De Georgia, 420 F.2d 889 (9th Cir. 1969) (absence of entry in a computerized business record admissible to prove nonoccurrence of event); King v. State *ex rel.* Murdock Acceptance Corp., 222 So.2d 393 (Miss. 1969) (computer printouts admissible under business records exception to prove amount of damages); Transport Indem. Co. v. Seib, 178 Neb. 253, 132 N.W.2d 871 (1965) (computer printouts held admissible as a business record exception to determine amount of claims owed on insurance policy).

44. MCCORMICK, *supra* note 13, § 306, at 718-20; 5 WIGMORE, *supra* note 13, §§ 1517-1518.

45. For a complete study of the shopbook rule and its development in the United

rule.[46] Under the shopbook rule a tradesman's books were admissible although the party himself was disqualified as a witness.[47] After parties were allowed to testify as witnesses, the need for the rule disappeared,[48] and the regular entries rule superseded it.[49] This rule was significantly broader in scope than the shopbook rule since it also included the records of a third party.[50]

The common law regular entries exception had five prerequisites for an admissible record: 1) the entries were original entries; 2) the entries were produced in the regular course of business; 3) the entries were posted at or near the time of the transaction recorded; 4) the entries were made with the personal knowledge of the recorder or the person(s) reporting to him; and, 5) the recorder or his informer(s) was unavailable.[51] If these requirements were satisfied, the business record was considered reliable, and the court would admit it into evidence.[52]

States, see Radtke v. Taylor, 105 Ore. 559, 210 P. 863 (1922), *noted in* 3 ORE. L. REV. 154 (1923). The Supreme Court of Oregon devoted 27 pages of its opinion to an analysis of the cases and commentaries which revealed significant confusion about the rule. *See also* J. MCKELVEY, HANDBOOK OF THE LAW OF EVIDENCE 442-60 (5th ed. 1944).

46. For a discussion of the development of the regular entries rule, see 5 WIGMORE, *supra* note 13, § 1518; Norville, *The Uniform Business Records as Evidence Act*, 27 ORE. L. REV. 188, 191-95 (1948); Polasky & Paulson, *Business Entries*, 4 UTAH L. REV. 327, 334-38 (1955).

47. MCCORMICK, *supra* note 13, § 305; Laughlin, *supra* note 42, at 278.

48. Whittier, *Account Books in California*, 14 CALIF. L. REV. 263, 272 (1926).

49. MCCORMICK, *supra* note 13, § 305. *See also* Kinnare, *Account Books as Evidence in Illinois*, 11 CHI.-KENT L. REV. 278, 284 (1933); Whittier, *supra* note 48, at 272.

50. 5 WIGMORE, *supra* note 13, § 1518, at 350-51.

51. The only significant distinction between the foundation requirements of the shopbook rule and the regular entries rule is that the latter demands that the person making the entries or his informer(s) not be available. Laughlin, *supra* note 42, at 283. Recognizing the practical impossibility of this requirement under modern business conditions, some courts were willing to relax this requirement. Thus, when the records were bulky and the testimony of every person who handled the record would be pointless, courts waived the requirement. *See, e.g.*, Massachusetts Bonding & Ins. Co. v. Norwich Pharmacal Co., 18 F.2d 934 (2d Cir. 1927) (Learned Hand, J.) (32,000 sales orders admitted into evidence on verification of single clerk without calling all other clerks); French v. Virginia Ry., 212 Va. 383, 93 S.E. 585 (1917) (train dispatcher's record of train movement admissible on testimony of the claim dispatcher who had access to record); State v. Larue, 98 W. Va. 677, 128 S.E. 116 (1925) (business record admitted into evidence without testimony of the recorder and his informers because inconvenience of calling witnesses outweighed probable utility). Another requirement infrequently applied was that there be no motive to misrepresent. 5 WIGMORE, *supra* note 13, § 1527.

52. *See, e.g.*, People v. Small, 319 Ill. 437, 150 N.E. 435 (1926); Smith v. Sullivan, 58 Mont. 77, 190 P. 288 (1920).

2. *The Statutory Solutions*

The confusion caused by the courts' disparate treatment of the regular entries rule[53] and a feeling that the exception should be broadened led to two major efforts to draft uniform legislation revising the provisions of the exception.[54] In 1927, the Commonwealth Fund of New York proposed a model act for "Proof of Business Transactions"[55] which was adopted by the federal government[56] and some states.[57] Nine years later the National Conference of Commissioners on State Laws, using the earlier act as a model,[58] formulated the Uniform Busi-

53. Norville, *supra* note 46, at 195-96 (Massachusetts Bonding & Ins. Co. v. Norwich Pharmacal Co., 18 F.2d 934 (2d Cir. 1927) (Learned Hand, J.)); E.I. DuPont de Nemours & Co. v. Tomlinson, 296 F. 634 (4th Cir. 1924); Bracken v. Dillon, 64 Ga. 243 (1879); Fiedler v. Collier, 13 Ga. 496 (1853); Givens v. Pierson, 167 Ky. 574, 181 S.W. 324 (1916). *See also* Polasky & Paulson, *supra* note 46, at 340.

54. The common law regular entries rule had become so unwieldy that it provoked this comment from Judge Cardozo: "Some of its rules are so unwieldy that many of the simplest things of life, transactions so common as the sale and delivery of merchandise, are often the most difficult to prove." Cardozo, *A Ministry of Justice*, 35 HARV. L. REV. 113, 121-22 (1921). Professor Wigmore said that the rule had "developed a mass of detailed petty limitations that had no relation to the practical trustworthiness of the documents offered." 5 WIGMORE, *supra* note 13, § 1561(a), at 489. *See generally* E. MORGAN, Z. CHAFEE, R. GIFFORD, AND J. WIGMORE, THE LAW OF EVIDENCE: SOME PROPOSALS FOR ITS REFORM ch. 5 (1927) [hereinafter cited as E. MORGAN *et al.*].

55. The Commonwealth Fund of New York had set up a special committee to review rules of evidence that needed revision. Edmund Morgan was chairman of the committee, and its members included such scholars as Zachariah Chafee, Jr. and John H. Wigmore. E. MORGAN *et al.*, *supra* note 54, at viii. For an interesting history of the evolution of the Commonwealth Fund's model act, see Morgan, *Practical Difficulties Impeding Reform in the Law of Evidence*, 14 VAND. L. REV. 725 (1961). The model act stated:

> Any writing or record, whether in the form of an entry in a book or otherwise, made as a memorandum or record of any act, transaction, occurrence, or event shall be admissible in evidence in proof of said act, transaction, occurrence, or event, if the trial judge shall find that it was made in the regular course of any business, and that it was the regular course of such business to make such memorandum or record at the time of such action, transaction, occurrence or event or within a reasonable time thereafter. All other circumstances of the making of such writing or record, including lack of personal knowledge by the entrant or maker, may be shown to affect its weight, but they shall not affect its admissibility. The term business shall include business, profession, occupation and calling of every kind.

E. MORGAN *et al.*, *supra* note 54, at 65.

56. 28 U.S.C. § 1732 (Supp. V 1975) (originally enacted as Act of June 20, 1936, ch. 640, § 1, N.Y. Stat. 1561).

57. *E.g.*, ALA. CODE tit. 7, § 415 (1960); GA. CODE ANN. § 38-771 (1974); N.Y. CIV. PRAC. LAW § 4518(a) (McKinney 1963), *cited in* Tapper, *supra* note 1, at 591 nn. 164 & 165.

58. Norville, *supra* note 46, at 197 n.57. Professor Morgan felt that the Uniform

ness Records as Evidence Act (UBREA)[59] which has enjoyed widespread acceptance.[60] Numerous other model statutory formulations have subsequently been proposed,[61] one of which provides for computer

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Business Records as Evidence Act (UBREA) was somewhat more flexible than the Commonwealth Fund's model act. Morgan, *supra* note 55, at 727.

59. The Uniform Business Records as Evidence Act provides:

> An Act to make uniform the use of business records as evidence:
>
> Section 1. (Definition.) The term 'business' shall include every kind of business, profession, occupation, calling, or operation of institutions, whether carried on for profit or not.
>
> Section 2. (Business Records.) A record of an act, condition or event shall, in so far as relevant, by competent evidence if the custodian or other qualified witness testifies to its identity and the mode of its preparation, and if it was made in the regular course of business, at or near the time of the act, condition or event, and if, in the opinion of the Court, the sources of information, method and time of preparation were such as to justify its admission.
>
> Section 3. (Uniformity of Interpretation.) This Act shall be so interpreted and construed as to effectuate its general purpose to make uniform the law of those states which enact it.
>
> Section 4. (Short Title.) This Act may be cited as the Uniform Business Records as Evidence Act.

UNIFORM BUSINESS RECORDS AS EVIDENCE ACT (superseded by FED. R. EVID. 803(6), *cited in* 9A UNIFORM LAWS ANNOTATED 504, 506 (1965).

60. The following jurisdictions have adopted UBREA: Arizona, California, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Texas, Vermont, Virgin Islands, Washington, and Wyoming. UNIFORM RULE OF EVIDENCE 303, Historical Note (1974).

61. In 1937, Roscoe L. Barrow offered another model statute:

> Section 1. (Definitions.) The term 'business' shall include the operation of institutions, every kind of profession, occupation, or calling, whether or not carried on for profit. The term 'record' shall include any writing or record, whether in the form of an entry in a book or otherwise, made as a memorandum or record of any act, transaction, condition, occurrence, or event, including any transfer of cash. The term 'record' shall include the records made by or for a party to the suit, and the records made by or for any third person not a party to the suit.
>
> Section 2. Any record shall, in so far as relevant, be competent evidence if any person who is familiar with the regular course of the business, even though a party or interested person, testifies to its identity, the mode of its preparation, and that it appears that the record was made in the regular course of the business at or near the time of the act, transaction, condition, occurrence, or event. All other circumstances of the making of such record, including lack of personal knowledge of the entrant or maker, may be shown to affect its weight, but they shall not affect its admissibility.
>
> Section 3. Any record of a deceased person shall, in so far as relevant, be competent evidence if the personal representative of such deceased person shall testify that such record was found in the effects of the deceased, that the record is the same as at the time such record was found in the effects of the deceased, and that, in the knowledge of such personal representative, there are no witnesses capable of testifying to the identity of such record, the mode of its preparation, and that such record was made in the regular course of the business

at or near the time of the act, transaction, condition, occurrence, or event. The personal representative shall testify that he has no knowledge or information indicating that the record was not made in the regular course of business at or near the time of the act, transaction, condition, occurrence, or event.

Section 4. The absence of an entry regarding any act, transaction, condition, occurrence, or event in any record where it would have regularly been recorded had it taken place, shall be received as competent evidence that no such act, transaction, condition, occurrence, or event did take place.

Note, *Business Entries Before the Court*, 32 ILL. L. REV. 334, 352 (1937).

In 1942, The American Law Institute published its Model Code which contained a suggested provision for a business records exception:

> A writing offered as a memorandum or record of an act, event or condition is admissible as tending to prove the occurrence of the act or event or the existence of the condition if the judge finds that it was made in the regular course of business and that it was the regular course of that business for one with personal knowledge of such an act, event or condition to make such a memorandum or record or to transmit information thereof to be included in such a memorandum or record, and for the memorandum or record to be made at or about the time of the act, event or condition or within a reasonable time thereafter.

MODEL CODE OF EVIDENCE rule 514 (1942).

In 1951, Professor Roy Ray suggested a proposal which was later substantially incorporated in Texas as TEX. CIV. CODE ANN. tit. 55, § 3737e (Vernon) (Supp. 1973):

> (A) A memorandum or record of an act, event or condition shall, in so far as relevant, be competent evidence of the occurrence of the act or event or the existence of the condition if the judge finds that:
>
> (1) It was made in the regular course of business
>
> (2) It was the regular course of that business for an employee or representative of such business with personal knowledge of such act, event or condition to make such memorandum or record or to transmit information thereof to be included in such memorandum or record
>
> (3) It was made at or near the time of the act, event or condition or reasonably soon thereafter.
>
> (B) The identity and mode of preparation of the memorandum or record in accordance with the provisions of paragraph (A) may be proved by the testimony of the entrant, custodian or other qualified witness even though he may not have personal knowledge as to the various items or contents of such memorandum or record. Such lack of personal knowledge may be shown to affect the weight and credibility of the memorandum or record but shall not affect its admissibility.
>
> (C) Evidence to the effect that the records of a business do not contain any memorandum or record of an alleged act, event or condition shall be competent to prove the non-occurrence of the act, or event or the non-existence of the condition in that business if the judge finds that:
>
> It was the regular course of that business to make such memoranda or records of all such acts, events or conditions at the time or within reasonable time thereafter and to preserve them.
>
> (D) 'Business' as used in this rule includes any and every kind of regular organized activity whether conducted for profit or not.

Ray, *Business Records—A Proposed Rule of Admissibility*, 5 SW. L.J. 33, 41-42 (1951).

In 1965, the National Conference of Commissioners on Uniform State Laws also proposed a model statute which makes admissible

> writings offered as memoranda or records of acts, conditions or events to prove the facts stated therein, if the judge finds that they were made in the reg-

printouts.[62]

Despite slight variations in their language and requirements,[63] the effect of these statutes has been to relax the common law requirements by removing the demand that the recorder and his informer(s) testify if available.[64] With the growth of the modern corporation this requirement had acted as an impediment to the admission of regularly kept records.[65] With minor exceptions the new statutes require only that

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ular course of a business at or about the time of the act, condition or event recorded, and that the sources of information from which they were made and the method and circumstances of their preparation were such as to indicate their trustworthiness.

UNIFORM RULES OF EVIDENCE 63(13) (1965), *cited* in 5 J. WIGMORE, *supra* note 13, § 1561(a), at 492 n.5.

62. The Federal Rules of Evidence specifically provide for the admissibility of "data compilations":

A memorandum, report, record, or *data compilation*, in any form, of acts, events, conditions, opinions, or diagnoses, made at or near the time by, or from information transmitted by, a person with knowledge, if kept in the course of a regularly conducted business activity, and if it was the regular practice of that business activity to make the memorandum, report, record, or data compilation, all as shown by the testimony of the custodian or other qualified witness, unless the source of information or the method or circumstances of preparation indicate lack of trustworthiness. The term 'business' as used in this paragraph includes business, institution, association, profession, occupation, and calling of every kind, whether or not conducted for profit.

FED. R. EVID. 803(6) (emphasis added). *See* notes 184-94 *infra* and accompanying text.

63. For the language of the various acts, see notes 55, 59, 61, 62 *supra*. Laughlin actually gives a comparative breakdown of the language of UBREA, the Model Code of Evidence, and the Uniform Rules of Evidence. Laughlin, *supra* note 42, at 283-84.

64. United States v. Fendley, 522 F.2d 181 (5th Cir. 1975); United States v. De Georgia, 420 F.2d 889 (9th Cir. 1969); Transport Indem. Co. v. Seib, 178 Neb. 253, 132 N.W.2d 871 (1965). In Higgins v. Loup River Pub. Power Dist., 159 Neb. 549, 68 N.W.2d 170 (1955), the Nebraska Supreme Court stated that the purpose of that state's statute (Nebraska had enacted UBREA) was

to permit admission of systematically entered records without the necessity of identifying, locating, and producing as witnesses the individuals who made entries in the records in the regular course of business rather than to make a fundamental change in the established principles of the shop-book exception to the hearsay rule.

Id. at 557, 68 N.W.2d at 176 (footnotes omitted). *Accord*, Mills, Lincoln & Langhead, *supra* note 6, at 201. *See* MCCORMICK, *supra* note 13, § 311.

65. In describing the causes for changes in the rule Professor Wigmore stated: "The merchant and the manufacturer must not be turned away remediless because methods in which the entire community places a just confidence are a little difficult to reconcile with technical judicial scruples . . . ." 5 WIGMORE, *supra* note 13, § 1530, at 452. Much of the impetus for legislatures enacting statutes to amend the common law regular entries rule was the study done by E. Morgan and others which showed the impracticality of the old rule under modern business conditions. *See* E. MORGAN *et al.*, *supra*

the transaction 1) occur in the regular course of business and 2) be recorded in the regular course of business at or near the time of its occurrence.[66]

The regular course of business requirement may be separated into two elements, regularity and business.[67] Regularity is the heart of the regular entries exception: occasional memoranda and infrequent reports do not fall within the exception.[68] The business requirement does not limit admissible items to records maintained by commercial enterprises, but has been broadly interpreted to include, for example, hospital[69] and private financial records.[70] Courts have also liberally interpreted the requirement that the entry be recorded at or near the time of the transaction so long as the time span is not so lengthy that it endangers accuracy.[71]

The statutes rest on the assumption that these requirements, when combined with the business' reliance upon the records, are sufficient to ensure the trustworthiness of the records.[72] At the same time, necessity demands that modern businesses be able to introduce their records

note 54, at 54-63; notes 54 & 55 *supra*. *See also* Massachusetts Bonding & Ins. Co. v. Norwich Pharmacal Co., 18 F.2d 934 (2d Cir. 1927) (Learned Hand, J.).

66. MCCORMICK, *supra* note 13, §§ 308-310; Roberts, *supra* note 1, at 273. *See generally* Laughlin, *supra* note 42, at 283-99; Norville, *supra* note 46, at 196-201.

67. Laughlin, *supra* note 42, at 286.

68. *Id.* at 287. *See* Standard Oil Co. v. Moore, 251 F.2d 188 (9th Cir. 1957), *cert. denied*, 356 U.S. 975 (1958); 2 JONES, *supra* note 14, § 12:8, at 347.

69. *See* Ulm v. Moore-McCormack Lines, Inc., 115 F.2d 492 (2d Cir.), *cert. denied*, 313 U.S. 567 (1940); Borucki v. MacKenzie Bros. Co., 125 Conn. 92, 3 A.2d 224 (1938); Medina, *Current Developments in Pleading, Practice, and Procedure in the New York Courts*, 30 CORNELL L.Q. 449, 454-58 (1945). *But see* New York Life Ins. Co. v. Taylor, 147 F.2d 297 (D.C. Cir. 1945). *See generally* McCormick, *The Use of Hospital Records as Evidence*, 26 TUL. L. REV. 371 (1952).

70. MCCORMICK, *supra* note 13, § 308; 5 WIGMORE, *supra* note 13, § 1523, at 444. *See* Norville, *supra* note 46, at 219 n.148 (giving extensive listing of private records admitted into evidence).

71. 2 JONES, *supra* note 14, § 12:9, at 350 ("A resonable construction is given to this requirement; exact contemporaneity is not exacted by the courts . . . ."); MCCORMICK, *supra* note 13, § 309. *See* Standard Oil Co. v. Moore, 251 F.2d 188 (9th Cir. 1957), *cert. denied*, 356 U.S. 975 (1958) (record admitted despite entries being made several months after transaction); Stanley v. Wickam, 112 Kan. 628, 211 P. 1117 (1923) (record admitted despite 30 day delay between time of event and time of recording).

72. 5 WIGMORE, *supra* note 13, § 1522; Polasky & Paulson, *supra* note 46, at 330-33. *See also* Sims v. Charlotte Liberty Mut. Ins. Co., 257 N.C. 32, 35, 125 S.E.2d 326, 329 (1962), in which the court stated: "Modern business and professional activities have become so complex, involving so many persons each performing a different function that an accurate daily record of each transaction is required in order to prevent utter confusion." *See also* Comment, *Admissibility of Computer Business Records as*

into evidence to prove their causes of action.[73] Consequently, the statutory business records exception satisfies the two policy considerations justifying an exception to the rule against hearsay.[74] It is questionable, however, whether these requirements are sufficient to ensure the trustworthiness of a computer printout since it differs so radically from a traditional business record.[75]

III. THE COMPUTER

A. *How the Computer Works*

It is necessary to understand how a computer operates in order to grasp the unique evidentiary problems presented by a computer printout. A computer is "a system of machines that processes information in the form of letters, numbers, and other symbols . . . ."[76] Most computers use a binary number system as their language because it can translate data into machine language more easily than a decimal number system.[77]

A computer consists of two components known as hardware and software.[78] Software is "any program written for the computer,"[79] and

an Exception to the Hearsay Rule, 48 N.C. L. REV. 687, 689 (1970) (record has "a presumed inherent trustworthiness due to internal business reliance on its accuracy").

73. Judge Learned Hand noted that "unless they [referring to business records] can be used in court . . . nobody need ever pay a debt . . . ." Massachusetts Bonding & Ins. Co. v. Norwich Pharmacal Co., 18 F.2d 934, 937 (2d Cir. 1927). *See also* 5 WIGMORE, *supra* note 13, § 1521.

74. MCCORMICK, *supra* note 13, § 306, at 720; 5 WIGMORE, *supra* note 13, §§ 1521-1522.

75. *See* notes 100-11 *infra* and accompanying text.

76. Freed, *A Lawyer's Guide Through the Computer Maze*, *supra* note 1, at 17. A student commentator has described the computer as "a modern miracle made of transistors, tubes and diodes which are internally connected by a colored maze of wiring. It is activated by countless buttons and switches and supplemented by machines and devices for punching and sorting cards." Note, *Evidence: The Admissibility of Computer Print-Outs in Kansas*, *supra* note 12, at 330. A noted judge has stated that "[t]he term is sufficient to describe the various industrial embodiments of systems for processing information in the form of words, numbers, and other symbols." Brown, *supra* note 1, at 241.

77. A binary number system consists of two digits (zero and one) and is founded on powers of two. Roberts, *supra* note 1, at 256. *See also* Comment, *Patentability: Piecing Together the Computer Software Patent Puzzle*, 19 ST. LOUIS U.L.J. 351, 352 (1975).

78. Telex Corp. v. International Business Machs. Corp., 367 F. Supp. 258, 273 (N.D. Okla. 1973), *aff'd in part, rev'd in part, remanded in part*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802 (1975); M. ABRAMS & P. STEIN, COMPUTER HARDWARE AND SOFTWARE: AN INTERDISCIPLINARY INTRODUCTION 3 (1973).

79. M. ABRAMS & P. STEIN, *supra* note 78, at 14. For an excellent, short discussion

may be divided into two types: systems programs that operate the hardware and processing programs that solve users' problems.[80] Despite its size and complexity, the computer's mechanical apparatus, known as hardware, is simple, being composed of five basic elements: input, memory, control, arithmetic, and output.[81]

Input equipment translates information from readable form into internal machine language.[82] This may be achieved by punched cards,[83] magnetic tape, paper tape, or transparent film. Memory receives data and instructions, and stores or produces them on demand.[84] Storage devices can be either internal ("cores") or external such as magnetic tape,[85] disks,[86] cards, or drums, all of which are detachable and give the machine an almost limitless memory capacity.[87] The control mechanism, known as the central processing unit, interprets instructions stored in memory and directs the operations of the other components.[88] The arithmetic unit performs the mathematical functions.[89] Some output media, such as punched cards, magnetic tape, and paper tape, merely record the results.[90] Other output devices, such as the cathode

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of the software industry, see Note, *Patents and Computer Programs—The Supreme Court Makes a Decision*, 62 KY. L.J. 533, 533-35 (1974).

80. M. ABRAMS & P. STEIN, *supra* note 78, at 14. *See also* A. FELDZAMEN, THE INTELLIGENT MAN'S EASY GUIDE TO COMPUTERS 97-102 (1971).

81. Telex Corp. v. International Business Machs. Corp., 367 F. Supp. 258, 274 (N.D. Okla. 1973), *aff'd in part, rev'd in part, remanded in part*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802 (1975). *See also* Annot., *supra* note 1, at 280.

82. Annot., *supra* note 1, at 282; Note, *supra* note 6, at 1033.

83. For a general description of how punched cards are prepared, see G. DAVIS, COMPUTER DATA PROCESSING chs. 1 & 2 (1969).

84. Annot., *supra* note 1, at 285-91. It is the memory which transforms the computer from a mere mechanical calculator into a high-speed information processor. United States v. Russo, 480 F.2d 1228, 1239 (6th Cir. 1973), *cert. denied*, 414 U.S. 1157 (1974); Garland, *supra* note 1, at 43. A computer unit recently developed for the National Aeronautics and Space Administration has a memory that has the potential to handle 169 billion bits of information transmitted by 25 million satellites orbiting the world. St. Louis Post-Dispatch, Mar. 7, 1976, § 2, at 11, col. 5.

85. A single reel of tape will on the average contain 15,000,000 alphabetic or 30,000,000 numeric characters. Elmaleh, *supra* note 10, at 4.

86. A disk file is "a storage device on which information is recorded on the magnetizable surface of a rotating disk." Bernacchi & Larsen, *supra* note 12, at 376 n.6.

87. *See* note 84 *supra*.

88. Annot., *supra* note 1, at 291; Note, *supra* note 6, at 1034.

89. Annot., *supra* note 1, at 291-92.

90. In electronic data processing systems printing devices are nothing more than mechanical translators. Johnson, *supra* note 12, at 18.

ray tube[91] and the high-speed line printer,[92] translate output into readable form and display it. A storage device retains output, which is produced in the form of a printout.[93]

The reliability of the computer printout is the most important factor in determining whether the record should be admitted under the business records exception.[94] Despite its reputation for making errors,[95] a computer is a precise machine, substantially more accurate than people.[96] In fact, humans, not machines, cause most errors.[97] There are three basic sources of computer mistakes: human error, mechanical error, and deliberate falsification of the processing program or the data base.[98] Selection of input data, processing of input data, and programming are the primary causes of human errors.[99] Machine errors,

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91. A cathode ray tube is like a television screen and permits rapid data display for reading by humans. A. FELDZAMEN, *supra* note 80, at 257.

92. A mechanical line printer can produce output at rates up to 2,000 lines per minute; electrostatic printers which operate in a fashion similar to xerox copiers can produce output at even faster rates. Roberts, *supra* note 1, at 263.

93. The output of one computer may be transferred to another computer for further processing without human intervention. Annot., *supra* note 1, at 292. *See* City of Seattle v. Heath, 10 Wash. App. 949, 520 P.2d 1392 (1974) (computer in State Traffic Violations Bureau transferred information directly to computer in State Department of Motor Vehicles).

94. Annot., *supra* note 1, at 297. Reliability is one of the two policy considerations underlying the basis of the business records exception to the hearsay rule. *See* United States v. Russo, 480 F.2d 1228, 1239-40 (6th Cir. 1973), *cert. denied*, 414 U.S. 1157 (1974); text accompanying note 39 *supra*.

95. Bronson v. Consolidated Edison Co., 350 F. Supp. 443 (S.D.N.Y. 1972) (an "Orwellian nightmare" of computer control breaking down through errors). *See also* Palmer v. Columbia Gas Co., 342 F. Supp. 241 (N.D. Ohio 1972); Freed, *A Lawyer's Guide Through the Computer Maze, supra* note 1, at 27. *But see* Awalt, *Corporations*, in LAW AND COMPUTERS IN THE MID-SIXTIES 82 (R. Bigelow ed. 1966).

96. Annot., *supra* note 1, at 293. Lamont, *Computer Installations Must be Adapted to Tax Audit Necessities*, 25 J. TAX. 302, 303 (1972).

97. Despite the great accuracy that a computer can achieve, the data fed into it by human beings limits its reliability. Annot., *supra* note 1, at 298. "[H]uman participation in computer operations is a substantially greater source of inaccuracies and fallibility than the machine mechanism itself . . . ." Freed, *A Lawyer's Guide through the Computer Maze, supra* note 1, at 25. *Accord*, Roberts, *supra* note 1, at 264 ("Each time human intervention is required to transfer or translate data, the problem of introduction of error is presented."). This has led to the maxim: "garbage in, garbage out." *See* Proxmire, *Out with the Garbage*, 7 TRIAL 18, 18 (1971) (if errors are fed into the computer, then printout will contain errors).

98. Mills, Lincoln & Langhead, *supra* note 6, at 17.

99. Freed, *A Lawyer's Guide Through the Computer Maze, supra* note 1, at 25-26; Tapper, *supra* note 1, at 566-67.

although infrequent, may occur because of electrical interference or component failure.[100]

Deliberate falsification of the processing program, data base, or both is the most serious problem affecting the reliability of the computer printout. To some degree this danger is similar to that present in a traditional recordkeeping system; a computer printout is, however, more susceptible to deliberate alteration.[101] Falsification of a manual recordkeeping system is a time-consuming process involving the physical alteration of the books by persons familiar with the accounting system. A single person familiar with the operation of a computer can manipulate the processing program or the data base to produce a falsified printout containing the desired information.[102] The processing program may be changed by erasing the tape and substituting new instructions, or by replacing the punched cards.[103] In the same way, falsified input data may be fed into the computer to produce an incorrect printout.[104]

B. *Record Maintenance By Computer*

Because of its speed and economy of operation, business is increasingly relying on the computer for maintaining records, thereby making traditional forms of record maintenance obsolete.[105] Employment of a computer to keep business records results in significant differences from traditional methods.[106] A traditional recordkeeping system involves written records maintained by human beings. Because of the

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100. Annot., *supra* note 1, at 297; Freed, *A Lawyer's Guide Through the Computer Maze, supra* note 1, at 25-26. One set of commentators argues that attorneys can anticipate an easier task in proving the reliability of a machine of limited capability than a system of complex design. Mills, Lincoln & Langhead, *supra* note 6, at 15.

101. Annot., *supra* note 1, at 298-99. *See* Note, *supra* note 6, at 1035.

102. Annot., *supra* note 1, at 298-99.

103. *Id.*

104. Data is generally fed into a computer in the same manner as the programming instructions, so that problems of the method of falsification of one are equally applicable to the other. Annot., *supra* note 1, at 298; Note, *supra* note 6, at 1035.

105. Freed, *A Lawyer's Guide Through the Computer Maze, supra* note 1, at 27. *See also* Roberts, *supra* note 1, at 255. One commentator maintains that the revolution in business recordkeeping caused by computers will begin with the larger corporations and spread to small businesses. Lamont, *supra* note 96, at 302.

106. BOARD OF EDITORS FOR THE FEDERAL JUDICIAL CENTER, *supra* note 12, § 2.615, at 84-85; Tapper, *supra* note 1, at 566; Note, *supra* note 6, at 1034. *But see* 16 J. TAX. 373, 373 (1962).

computer's remarkable computational speed,[107] computerized recordkeeping removes these two features of a traditional system. First, since the computer performs a series of separate tasks as a single simultaneous operation, many steps previously carried out by human beings are now performed solely by machine.[108] Consequently, the number of persons familiar with the recordkeeping process decreases dramatically. Second, because the computations are generated and relayed by electrical impulse, the machine produces no written records as evidence of the process by which it derives its results.[109]

Manual recordkeeping is a cumulative process involving the addition or subtraction of new and previous entries.[110] A computerized system, on the other hand, updates records by combining new and old entries, destroying the latter.[111] This results in the loss of intermediate records, which can be not only a valuable evidentiary aid in establishing the reliability of the offered evidence, but also a deterrent to a party contemplating falsification.[112]

Entries in a manual recordkeeping system are made close to the time when the transaction occurs.[113] A business using a computer, however, will often retain its records in raw form until sufficient data has accumulated to warrant the expense of running a program.[114] Thus, lengthy periods may elapse between computer runs. Also, businesses today often contract with computer service bureaus to maintain their records.[115] When this arrangement is employed, even longer periods may pass before the computer records the transaction.

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107. *See* note 6 *supra*.

108. Because of its increased efficiency and lower operating costs, the computer has taken over functions previously performed by humans. Tapper, *supra* note 1, at 565. *See also* Note, *supra* note 6, at 1034-35.

109. The machine's processes are carried on internally, and the only legible product is the output in printout form; a computer could record on paper or other permanent form the intermediate steps, but this would be expensive. Note, *supra* note 6, at 1034-35.

110. E. SPILLER, FINANCIAL ACCOUNTING 57-61 (4th ed. 1973).

111. Freed, *Evidence*, in COMPUTERS AND THE LAW 139-41 (R. Bigelow 2d ed. 1969); Mills, Lincoln & Langhead, *supra* note 6, at 18. The computer could be instructed to keep the old records in memory or print them out, but this is not done.

112. For example, a manual ledger system will usually consist of "T" accounts. As each event occurs, it is recorded in the account, and the computation retained and reflected in the ledger. *See generally* E. SPILLER, *supra* note 110.

113. *See* note 71 *supra* and accompanying text.

114. Tapper notes that the computer may record the transaction at or near the time of its occurrence, but not print it for "months or years." Tapper, *supra* note 1, at 593.

115. A service bureau is an independent company that owns or leases computers and

The form of computerized records differs substantially from that of traditional recordkeeping methods.[116] A manual system consists of ledger books containing entries made by hand in readable form.[117] A computerized system retains the record as an electronic impulse in memory until it is printed out or transferred to a storage medium.[118] Since a printout is the only permanent, legible form of the record,[119] fewer persons will be familiar with the record unless the business frequently produces a printout and makes it available to personnel.

IV. Computer Printouts and the Business Records Exception

A. *Conceptual Problems Presented by Computer Printouts*

It is clear from the foregoing comparison of a traditional and a computer recordkeeping system that the latter is a hybrid process different from the former.[120] Consequently, a computer printout poses a set of problems not common to a traditional recordkeeping system. The result is that the statutory foundation requirements developed for testing the reliability of traditional business records are inadequate when applied to computer printouts.

First, it is simpler deliberately to alter a computer printout than a traditional record since false data can easily be fed into memory.[121] Neither the "business" nor the "regularity" requirements required by statute are effective to ensure that the data base, and thus the printout, has not been altered. Therefore, unless a court imposes foundation requirements specifically developed to test the reliability of the data base, the chance of admitting a printout containing falsified information increases significantly.[122]

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then performs data processing services on a fee basis for customers. Thus, the customer has his records processed by computer even though he does not own or lease one. Telex Corp. v. International Business Machs. Corp., 367 F. Supp. 258, 273 (N.D. Okla. 1973), *aff'd in part, rev'd in part, remanded in part*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802 (1975). *See also* State v. Hodgeson, 305 So.2d 421 (La. 1974).

116. Note, *supra* note 6, at 1035. The form of a computer printout should not detract from its reliability simply because it differs from that of a traditional record. Annot., *supra* note 1, at 300.

117. *See generally* E. Spiller, *supra* note 110.

118. *See* notes 84-86 *supra* and accompanying text.

119. *See* note 10 *supra* and accompanying text.

120. *See* authorities cited note 106 *supra*.

121. Mills, Lincoln & Langhead, *supra* note 6, at 17.

122. One commentator argues that audits by an independent agent may be necessary,

Second, the difficulty of detecting falsification exacerbates the problem. Since a computer recordkeeping system involves little human participation and produces no intermediate records,[123] a person can falsify the data base and leave few traces of his activity.[124] The "business" and the "regularity" requirements do not improve a court's ability to detect tampering with a printout. A foundation requirement that a record be kept "in the ordinary course of business" will neither increase human input into the process nor create intermediate records explaining the source of the record's information.

Third, statutory foundation requirements have been devised to probe the reliability of a unitary recordkeeping system such as the traditional manual process.[125] A correct analysis of a computer recordkeeping system, however, would consider separately the input procedures, the data base, and the processing program because each raises a different set of problems. Input procedures and the data base are appropriate subjects within the purvey of the hearsay rule because their reliability can only be proven by circumstantial evidence.[126] A computer programmer can by expert testimony, however, verify the reliability of a processing program.

Fourth, a computer recordkeeping system raises two false problems—that is, issues that apparently bear on the reliability of the computer printout, but actually do not. First, the reliability of the hardware per se is irrelevant. Although it has a reputation for making

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Note, *Evidence—Admissibility of Computer Print-Outs*, *supra* note 12, at 913, while another critic maintains that there should be restricted access to the hardware along with periodic compilation of the records, Note, *supra* note 6, at 1035.

123. *See* notes 107-09 *supra* and accompanying text.

124. Annot., *supra* note 1, at 299. Bernacchi and Larsen state:

> Thus, we have gone from a situation in which many illegal or questionable practices and activities could be discovered by examination of hardcopy business records or computer listings, or by depositions of a staff of people presumptively available to perform certain types of analytical or clerical work, to a state of technology in which a single business executive can engage in illegal practices in the privacy of a relationship known only to him and his computer.

Bernacchi & Larsen, *supra* note 12, at 377.

125. Before the computer was used to keep records, a traditional recordkeeping system consisted of ledger books in which entries were made by hand. *See generally* E. SPILLER, *supra* note 110.

126. For a discussion of the circumstantial nature of hearsay evidence, see Morgan, *supra* note 14, at 177-81. *See also* Milligan v. State, 109 Fla. 219, 227, 147 So. 260, 263 (1933) (term includes all evidence of indirect nature); Twin City Fire Ins. Co. v. Lonas, 255 Ky. 717, 722, 75 S.W.2d 348, 350 (1934) (existence of principal facts is only inferred from circumstances).

errors,[127] the computer is a precise machine.[128] Consequently, it is unnecessary for a party offering computer printouts into evidence to prove the machine's accuracy. If the party shows that he did, in fact, rely on the printouts, this reliance is sufficient.[129] Second, the statutory requirement that a "transaction be recorded at or near the time of its occurrence"[130] is irrelevant to determining a printout's dependability.[131] Input procedures, the data base, and processing programs are unaffected by the passage of time; consequently, their reliability remains constant as long as they are not tampered with.

Finally, courts are unfamiliar with, if not afraid of, the computer.[132] Although this attitude will eventually fade as computers become a more commonplace part of everyday life, at present a computer is still a menacing device to persons unfamiliar with it. The effect of this judicial wariness is that courts do not rigorously analyze the problems of admitting a computer printout into evidence.[133]

B. *Case Law*

The issue of the appropriate foundation requirements for admitting a printout into evidence is sufficiently serious that it can determine the outcome of a lawsuit.[134] Appellate courts grant considerable weight

127. *See* note 95 *supra* and accompanying text.

128. *See* note 96 *supra* and accompanying text.

129. Note, *Evidence—Admissibility of Computer Print-Outs, supra* note 12, at 913.

130. *See* language of the Commonwealth Fund's model act, *quoted in* note 55 *supra;* UBREA, *quoted in* note 59 *supra;* MODEL CODE OF EVIDENCE rule 514 (1942), *quoted in* note 61 *supra;* UNIFORM RULE OF EVIDENCE 63(13) (1965), *quoted in* note 61 *supra;* FED. R. EVID. 803(6), *quoted in* note 62 *supra.*

131. United States v. Russo, 480 F.2d 1228, 1240 (6th Cir. 1973), *cert. denied,* 414 U.S. 1157 (1974). *But see* People v. Dorsey, 43 Cal. App. 3d 953, 118 Cal. Rptr. 362 (1974).

132. Chief Judge Brown of the United States Court of Appeals for the Fifth Judicial Circuit correctly noted this problem in an early article on computers and the law: "Clearly, a thing as mystifying and bewildering to the average judge as a data computer is going to be viewed with an intuitive apprehension born of ignorance." Brown, *supra* note 1, at 249. For an opinion reflecting a court's obvious ignorance of the computer, see Ed Gurth Realty, Inc. v. Gingold, 34 N.Y.2d 440, 315 N.E.2d 441, 358 N.Y.S.2d 367 (1974) ("Certainly, compiling and feeding data into a computer . . . would seem to be as routine as could be imagined.").

133. *See* notes 134-85 *infra* and accompanying text.

134. For example, in a case involving the issue of tax evasion, a conviction may depend on the ability of the Government to prove that no tax return was filed. *See* United States v. Fendley, 522 F.2d 181 (5th Cir. 1975); United States v. Farris, 517 F.2d 226 (7th Cir.), *cert. denied,* 423 U.S. 892 (1975); United States v. Greenlee, 380 F. Supp. 652 (E.D. Pa. 1974), *aff'd,* 517 F.2d 899 (3d Cir.), *cert. denied,* 423 U.S. 985 (1975).

to the trial court's decision to admit or exclude evidence and will not reverse it absent an obvious abuse of discretion.[135] Therefore, it is important to establish clear, precise standards for trial courts to follow in admitting computer printouts. In the limited number of cases on this issue,[136] courts have applied diverse standards, suggesting the complexity of the problem.[137] Courts that have faced the issue may be divided into two classes: those which have admitted the printouts without directly confronting the question, and those which have applied the foundation requirements before admitting or rejecting the evidence.

Courts in the first category have admitted the printouts either by failing to discuss the issue or by relying on grounds other than the business records exception. An illustration of the former is *United States v. Edick*[138] in which the defendant was convicted of misapplication of bank funds and making false bank entries.[139] He appealed, claiming

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The Government may need a computer printout to prove that an event did occur. *See* United States v. De Georgia, 420 F.2d 889 (9th Cir. 1969). A plaintiff may want to prove the existence of a debt. *See* Transport Indem. Co. v. Seib, 178 Neb. 253, 132 N.W.2d 871 (1965).

135. Shore Line Properties, Inc. v. Deer-O-Paints & Chem., Ltd., 24 Ariz. App. 331, 538 P.2d 760 (1975); Drumwright v. Lynn Eng'r & Mfg., Inc., 14 Ariz. App. 282, 482 P.2d 891 (1971); People v. Dorsey, 43 Cal. App. 3d 953, 118 Cal. Rptr. 362 (1974); Mahoney v. Minsky, 39 N.J. 208, 188 A.2d 161 (1963); Cantrill v. American Mail Line, Ltd., 42 Wash. 2d 590, 257 P.2d 179 (1953). *See also* Note, *Evidence—Admissibility of Computer Print-Outs, supra* note 12, at 913.

136. As businesses increasingly begin to use computers as recordkeeping devices, the issue of the admissibility of computer printouts will become more common. In fact, the question of admitting computer printouts has been termed "the most interesting recent expansion of the regularly kept records exception." McCORMICK, *supra* note 13, § 314, at 733.

137. *Compare* United States v. Edick, 432 F.2d 350 (4th Cir. 1970) (Haynsworth, C.J.), *discussed in* notes 138-41 *infra* and accompanying text, *with* United States v. Russo, 480 F.2d 1228 (6th Cir. 1973), *cert. denied*, 414 U.S. 1157 (1974), *discussed in* notes 186-96 *infra* and accompanying text.

138. 432 F.2d 350 (4th Cir. 1970) (Haynsworth, C.J.). In Sierra Life Ins. Co. v. First Nat'l Life Ins. Co., 85 N.M. 409, 512 P.2d 1245 (1973), the foundation for the admission of a computer listing of insurance policies consisted solely of the testimony of a former officer of the offeror who testified that "the computer print-out [*sic*] was the listing of policies . . . ." Solely on the basis of this testimony, the Supreme Court of New Mexico affirmed the trial court's decision to admit the computer listing. *Id.* at 412, 512 P.2d at 1248-49. In Del Monte Corp. v. Stark & Son Wholesale, 474 S.W.2d 854 (Mo. Ct. App. 1971), the trial court failed to require any foundation for admitting into evidence exhibits ever produced by plaintiff's computer. Nevertheless, the appellate court affirmed the trial court's decision. *Id.* at 856-57.

139. United States v. Edick, 432 F.2d 350, 351 (4th Cir. 1970) (Haynsworth, C.J.). Defendant was manager of the proof department of a corporation that was a wholly-owned subsidiary of a bank holding company. The department handled the bookkeeping

error in the introduction of computer printouts and master tapes.[140] In affirming defendant's conviction, the Fourth Circuit reasoned that "[t]hese exhibits are admissible under the provisions of 28 U.S.C.A. § 1732(a) [the Federal Business Records Act] as business records."[141] Judge Haynsworth's one line characterization of a computer printout and master tape as ordinary business records overlooks the conceptual problems posed by the former. The result is an inadequate opinion.

It is more common, however, for an appellate court in this category to discover other grounds on which to uphold the lower court's decision to admit the printouts.[142] In *United States v. Fendley*,[143] the Fifth Circuit affirmed defendant's conviction for tax evasion and filing a false tax return despite its finding that the "Government failed to completely lay a proper foundation for the admission of the evidence [referring to computer printouts]."[144] The court reached this position by deciding that defendant's objection at trial was "loosely formulated and imprecise," so that

> [t]here was no objection on the only grounds which would have permitted the trial court to have required that a fuller foundation be laid for the admission of the exhibit—that the printout was made and kept

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for the member banks. Because of his position as manager, defendant was able to misapply the bank's funds to his own account. *Id.* at 351-52.

140. *Id.* at 354.

141. *Id.*

142. For example, in People v. Dorsey, 43 Cal. App. 3d 953, 118 Cal. Rptr. 362 (1974), defendant was convicted of two counts of issuing insufficient checks. On appeal, he argued that no proper foundation, as required by the business records exception, had been laid for admitting the bank's computerized records. The court rejected this argument, distinguishing computerized bank statements from ordinary business records because the former are prepared daily. *Id.* at 960, 118 Cal. Rptr. at 367. This argument is unpersuasive: computerized bank statements are not distinguishable from other business records because they are prepared daily. *See also* United States v. Farris, 517 F.2d 226 (7th Cir.), *cert. denied*, 423 U.S. 892 (1975) (computer printouts from IRS National Computer Center in Martinsburg, West Virginia, are self-authenticating); Regents of Univ. of Colo. v. K.D.I. Precision Prod., Inc., 488 F.2d 261 (10th Cir. 1973) (computer printouts admissible as summary); Endicott Johnson Corp. v. C.M. Golde, 190 N.W.2d 752 (N.D. 1971) (computer printouts held admissible as photostatic copy of original documents).

143. 522 F.2d 181 (5th Cir. 1975). For other cases involving computer printouts and tax evasion, see United States v. Farris, 517 F.2d 226 (7th Cir.), *cert. denied*, 423 U.S. 892 (1975); United States v. Greenlee, 380 F. Supp. 652 (E.D. Pa. 1974), *aff'd*, 517 F.2d 899 (3d Cir.), *cert. denied*, 423 U.S. 985 (1975).

144. 522 F.2d at 186. Defendant and certain employees devised a scheme to induce their employer, Western Life Insurance Company, to pay them commissions on sham policies of insurance. *Id.* at 183.

> in the regular course of business, for regular business purposes and relied upon by the business . . . .[145]

The court also dismissed defendant's contention that introducing the evidence without proper foundation was clear error because "computer evidence is [not] so intrinsically unreliable as to make its introduction clear error."[146] Judge Godbold dissented, arguing that the "prosecution's failure [to lay a satisfactory foundation] should not be salvaged at the appellate level by the palliative that there was an insufficient objection."[147] He would, however, have applied the same traditional foundation requirements as the majority to determine the admissibility of the printouts.[148] The court's reasoning is poor. First, as the dissent correctly observed, the majority avoided the issue; second, both majority and dissent treated the printout as an ordinary business record. Consequently, this court, like the Fourth Circuit in *Edick*,[149] failed to recognize the unique problems presented by computer printouts.

The decisions in this first category—those that have admitted the printouts without directly confronting the question—are uniformly weak. They show two basic errors: first, the courts failed to apply *any* foundation requirements, statutory or otherwise, to test the reliability of the printouts;[150] second, had they actually tested the trustworthiness of the computer records, the courts would have employed the traditional foundation requirements. The first is inexcusable; the latter, although unacceptable, may be accounted for by the courts' unfamiliarity with and mystification by computers.[151]

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145. *Id.* at 185 (citation omitted). In Olympic Ins. Co. v. H.D. Harrison, Inc., 418 F.2d 669 (5th Cir. 1969) (per curiam), the Fifth Circuit upheld the admissibility of the printouts stating that "[i]n view of the appellants' failure to list any specific objections as to the accuracy of the printouts, we cannot say that the district court erred in relying on them as the basis for its judgment." *Id.* at 670. *See also* D & H Auto Parts, Inc. v. Ford Marketing Corp., 57 F.R.D. 548 (E.D.N.Y. 1973).

146. 522 F.2d at 187.

147. *Id.* at 191 (Godbold, J., dissenting).

148. The majority would have applied the traditional requirements of the business records exception. 522 F.2d at 184 (citing United States v. Miller, 500 F.2d 751, 754 (5th Cir. 1974)). Judge Godbold also would have applied the traditional requirements of the statute to computer printouts. 522 F.2d at 187-91 (Godbold, J., dissenting).

149. United States v. Edick, 432 F.2d 350 (4th Cir. 1970) (Haynsworth, C.J.).

150. The rationale for the business records exception to the hearsay rule is the fundamental reliability of the records. *See* note 72 *supra* and accompanying text. The absence of a rigorous test means reliability will not be proven. The admission of computer printouts without a strong examination of the record's reliability is a dangerous practice. Roberts, *supra* note 1, at 279.

151. *See* notes 132 & 133 *supra* and accompanying text.

Other courts have more thoroughly considered the appropriate foundation requirements for admitting computer printouts into evidence. Because of the inherent flexibility of the common law, courts in jurisdictions that employ the regular entries rule are more free to fashion special foundation requirements for computer printouts.[152] Courts governed by one of the statutes must, however, adapt the more restrictive legislative requirements to the problem.[153]

One of the earliest cases to allow computer printouts into evidence, *King v. State ex rel. Murdock Acceptance Corp.*,[154] was decided in Mississippi, which still uses the common law regular entries rule.[155] In *King*, the defendant was convicted of affixing a false notarial certificate to a deed of trust.[156] On appeal, he claimed that the trial court's admission of "computer sheets" to show the unpaid balance due on the note was error because they did not meet the requirements of the shopbook rule.[157] After reviewing the testimony by the corporation's manager in charge of data processing, the Mississippi Supreme Court affirmed, reasoning that "the law always seeks the best evidence and adjusts its rules to accommodate itself to the advancements of the age it serves."[158] Thus, the court was not "departing from the [common

152. For a definition of common law by the United States Supreme Court, see Western Union Tel. Co. v. Call Publishing Co., 181 U.S. 92, 101-02 (1901). With this freedom to expand and contract the foundation requirements must be compared the common law's historical adhesion to stare decisis, which has severely limited its creativity. Tapper, *supra* note 1, at 612. *See also* Note, *supra* note 6, at 1037.

153. Because courts are restricted by the legislated foundation requirements, their response to the problem has been to apply the requirements with varying degrees of rigidity. *Compare* United States v. Edick, 432 F.2d 350 (4th Cir. 1970) (Haynsworth, C.J.), *discussed in* notes 138-41 *supra* and accompanying text, *with* United States v. Russo, 480 F.2d 1228 (6th Cir. 1973), *cert. denied*, 414 U.S. 1157 (1974), *discussed in* notes 186-96 *infra* and accompanying text.

154. 222 So.2d 393 (Miss. 1969), *noted in* 41 MISS. L.J. 604 (1970). Numerous commentators have discussed *King*. *See* 2 JONES, *supra* note 14, § 12:4, at 336; Note, *supra* note 6, at 1041-42; Comment, *The Admissibility of Computer Printouts under the Business Records Exception in Texas*, 12 S. TEX. L.J. 291, 298 (1970); Comment, *Evidence—Admissibility of Computer Print-Outs as Business Records*, 9 WAKE FOREST L. REV. 428, 432-33 (1973).

155. The regular entries rule in Mississippi is still known as the shopbook rule. For a thorough, though dated, study of the rule in Mississippi, see Note, *Business Entries in Mississippi*, 16 MISS. L.J. 266 (1944).

156. 222 So.2d at 394.

157. *Id.* at 397.

158. *Id.* Judge John Minor Wisdom of the United States Court of Appeals for the Fifth Judicial Circuit echoed this language: "In today's litigation with its endless complexities, many of which are an outgrowth of our scientific age we would hardly think

law regular entries rule], but only extending its application to electronic recordkeeping."[159] As guidelines for the future admission of computer printouts, the court established a three-step foundation requirement:

(1) the electronic computing equipment is recognized as standard equipment,
(2) the entries are made in the regular course of business at or near the time of the happening of the event recorded, and
(3) the foundation testimony satisfies the court that the sources of information, method and time of preparation were such as to indicate its trustworthiness and justify its admission.[160]

These requirements are open to criticism. Equipment development in the computer industry has been so rapid that hardware components are constantly in flux.[161] Thus, the first requirement—that the computer be "standard equipment"—is unhelpful in determining the reliability of the machinery. The reliability of computer hardware is a false problem that can be resolved by requiring the offeror to show that he did, in fact, rely on the equipment.[162]

The second requirement merely restates the traditional foundation requirements.[163] Therefore, it fails 1) to test whether the information fed into the computer was accurate and, 2) to distinguish between the data base and the processing program and test the reliability of each.

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that a court instituted with all of the power the organic constitution could invest in it would have to stand helpless in the face of a new situation." Dallas County v. Commercial Union Assurance Co., 286 F.2d 388, 394 (5th Cir. 1961) (footnote omitted). *Accord*, Brown, *supra* note 1, at 248.

159. 222 So. 2d at 398. Two factors influenced the court to admit the printouts into evidence. First, commercial expediency was an important consideration; the court noted approvingly the trial court's use of Wigmore's famous statement. *Id.* (quoting 5 J. WIGMORE, A TREATISE ON THE ANGLO-AMERICAN SYSTEM OF EVIDENCE IN TRIALS AT COMMON LAW § 1530 (3d ed. 1940)), *quoted in* note 65 *supra*. Second, the court accepted the reliability of the computer, 2 JONES § 6:9 (Supp. 1968), *supra* note 14, in support of its position. 222 So.2d at 398.

160. 222 So.2d at 398. In State v. Hodgeson, 305 So. 2d 421 (La. 1975), the Louisiana Supreme Court adopted these rules as its own. *Id.* at 428.

161. Today, for example, a mainframe computer may have plugged into it numerous peripheral devices that have been developed at different times by different companies. *See* Telex Corp. v. International Business Machs. Corp., 367 F. Supp. 258, 270 (N.D. Okla. 1973), *aff'd in part, rev'd in part, remanded in part*, 510 F.2d 894 (10th Cir.), *cert. dismissed*, 423 U.S. 802 (1975).

162. *See* notes 127-29 *supra* and accompanying text.

163. *Accord*, Note, *supra* note 6, at 1041. For a discussion of the traditional foundation requirements, see notes 53-74 *supra* and accompanying text.

The third requirement is too broadly phrased to indicate what testimony will satisfy the requirement. Consequently, more careful articulation of the contours of this requirement would have significantly improved the guidelines.[164] Despite these problems, the *King* court's willingness to create new requirements shows that the common law is sufficiently elastic to allow the evolution of different tests of the admissibility of a printout.[165]

When a statute has superseded the common law,[166] courts have unevenly applied the legislative foundation requirements. Some courts have freely upheld the discretion of the trial court to admit computer printouts,[167] while others have rigorously applied the statute's requirements. Illustrative of the former category is *Merrick v. United States Rubber Co.*,[168] in which plaintiff's only foundation witness admitted that, although familiar with the account, he had no personal knowledge of the IBM equipment that produced the printout.[169] The court acknowledged that plaintiff could have laid "a more meticulous foundation" but still upheld the admission of the evidence.[170] The court emphasized "that portion of [the Arizona Business Records Rule] which calls for the opinion of the court as to [the record's] admissibility."[171]

This decision vests excessive discretion in the trial court.[172] First, the appellate court failed to set precise standards to guide the trial court in admitting or rejecting the evidence. Without specific standards a trial court is likely to apply the traditional statutory foundation requirements with which it is most familiar, although they are ineffective tests

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164. One commentator argues that the broad phrasing of this requirement is preferable because it "is flexible enough in its wording, yet clear enough in its intent, to be of great value to the courts." Note, *supra* note 6, at 1042. *Accord*, Tapper, *supra* note 1, at 578-79.

165. Tapper, *supra* note 1, at 613-14; Note, *supra* note 6, at 1047.

166. For a listing of the jurisdictions and the particular statute regulating the business records exception which each has enacted, see 5 WIGMORE, *supra* note 13, § 1561(a), at 493-97.

167. *See* Sierra Life Ins. Co. v. First Nat'l Life Ins. Co., 85 N.M. 409, 512 P.2d 1245 (1973). *But see* People v. Gauer, 7 Ill. App. 3d 512, 288 N.E.2d 24 (1972).

168. 7 Ariz. App. 433, 440 P.2d 314 (1968).

169. *Id.* at 435, 440 P.2d at 316.

170. *Id.* at 436, 440 P.2d at 317. The court compared the foundation laid in this case with that laid in Transport Indem. Co. v. Seib, 178 Neb. 253, 132 N.W.2d 871 (1965), *discussed in* notes 177-85 *infra* and accompanying text.

171. 7 Ariz. App. at 435, 440 P.2d at 316.

172. *But see* Comment, *The Admissibility of Computer Printouts under the Business Records Exception in Texas*, *supra* note 154, at 298.

of the reliability of a computer record.[173] Second, even though statutes do entrust the trial court with authority to determine the admissibility of evidence,[174] appellate courts should still subject lower court decisions involving the admissibility of computer printouts to rigorous review[175] since trial courts are unfamiliar with the problems they present.[176]

The first case to admit computer printouts, *Transport Indemnity Co. v. Seib*,[177] exemplifies a vigorous application of the legislative foundation requirements.[178] In *Seib*, an insurance company sued its insured to recover for premiums owed on a retrospective insurance policy.[179] To prove the amount of premiums due, plaintiff introduced computer printouts showing the amount of defendant's debt.[180] In testimony that consumed 141 pages of the record, plaintiff's director of account-

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173. *See* notes 120-31 *supra* and accompanying text.

174. Both UBREA, *quoted in* note 59 *supra*, and UNIFORM RULE OF EVIDENCE 63 (13) (1965), *quoted in* note 61 *supra*, by their express wording vest considerable discretion in the trial court to admit or reject the evidence.

175. Tapper defends the appellate court decisions by finding the discretion to be vested in the trial court by the statute. Tapper, *supra* note 1, at 599-600. Vigorous appellate review of the reliability of the printout is necessary, however, before it is admitted into evidence. Without adequate judicial review falsified or unreliable printouts may be admitted into evidence. *See* United States v. De Georgia, 420 F.2d 889, 895 (9th Cir. 1969) (Ely, J., concurring):

> In a day when the pace of our technology threatens to exceed the development of rules for human conduct, we must be careful to insure that fundamental rights are not surrendered to the calculations of machines . . . . Therefore, it is essential that the trial court be convinced of the trustworthiness of the particular records before admitting them into evidence.

Accord, Roberts, *supra* note 1, at 279.

176. *See* notes 132 & 133 *supra* and accompanying text.

177. 178 Neb. 253, 132 N.W.2d 871 (1965), *noted in* Annot., 11 A.L.R.3d 1377 (1967).

178. For another decision in which a court rigorously applied the statutory requirements, see Union Elec. Co. v. Mansion House Center N. Redev. Co., 494 S.W.2d 309 (Mo. 1973). Most courts, however, have applied the statutory requirements with less than a complete analysis. *See, e.g.*, United States v. De Georgia, 420 F.2d 889 (9th Cir. 1969); D & H Auto Parts v. Ford Marketing Corp., 57 F.R.D. 548 (E.D.N.Y. 1973); Nelson Weaver Mortgage Co. v. Dover Elevator Co., 283 Ala. 324, 216 So. 2d 716 (1968); State v. Springer, 283 N.C. 627, 197 S.E.2d 530 (1973).

179. Defendant operated a fleet of trucks under a retrospective insurance policy issued by plaintiff. Under such a policy defendant pays an advance premium. The insured pays for damages up to a specified amount, and the insurer pays any excess. If the advance premiums exceed the losses, the defendant gets a refund; if they are less, he is obligated to pay the balance. Transport Indem. Co. v. Seib, 178 Neb. 253, 254-55, 132 N.W.2d 871, 873 (1965).

180. *Id.*

ing described the plaintiff's recordkeeping procedures—giving a full explanation of each entry, computing it individually, and reconciling it with the computer-produced results.[181]

After reviewing the record, the Nebraska Supreme Court found: 1) the printouts were bookkeeping records made in the regular course of business; 2) the identification and mode of preparation were fully verified; and, 3) "[a] complete and comprehensive explanation of its meaning and 'identity' were [*sic*] given."[182] The court upheld the introduction of the printouts, noting that defendant's objections related to the weight of the evidence, not its admissibility.[183]

The *Seib* decision is questionable precedent for four reasons.[184] First, judicial economy dictates that a less burdensome method of proving printouts be employed than having a witness recompute every entry by hand. Second, businesses often do not keep the forms from which the information is taken and fed into the computer, so that recreation of the computer record is not possible. Third, if the business does retain the forms, computer-maintained records are often so extensive that they cannot be calculated by hand.[185] Fourth, if it is necessary to recreate the printouts by hand to have them admitted into evidence, there is no reason to maintain records by computer.

The Sixth Circuit's decision in *United States v. Russo*[186] is the most creative application of the traditional foundation requirements. Defendant, an osteopathic physician, was convicted of mail fraud in a scheme to bilk Blue Shield of Michigan by filing claims for unperformed services.[187] On appeal, defendant objected to the introduction of a com-

181. For a discussion of the case by plaintiff's counsel and selected excerpts of the witness' testimony, see Perry, *Computer Records as Evidence of Insurance Premiums Due*, TRIAL LAWYER'S GUIDE 288 (1967). A board was set up in the courtroom, and the witness took every claim on the list and reconciled it by hand computations with the computer's figures. *Id.* at 292.

182. Transport Indem. Co. v. Seib, 178 Neb. 253, 258, 132 N.W.2d 871, 874 (1965).

183. A record once admitted into evidence is not conclusive; the trier of fact must determine the weight of the evidence. Kay v. United States, 255 F.2d 476 (4th Cir.), *cert. denied*, 358 U.S. 825 (1958); Seco, Inc. v. Gauvey Rig & Trucking Co., 166 N.W. 2d 397 (N.D. 1969); Coulter v. State, 494 S.W.2d 876 (Tex. Crim. App. 1973).

184. *But see* Comment, *supra* note 72, at 689 (arguing that "the decision is sound").

185. It is the computer's ability to digest and process quickly large amounts of information that makes it so helpful in maintaining business records. *See* note 6 *supra* and accompanying text. Consequently, businesses that are today using computers are the larger corporations with extensive records to maintain. *See* note 105 *supra*.

186. 480 F.2d 1228 (6th Cir. 1973), *cert. denied*, 414 U.S. 1157 (1974).

187. *Id.* at 1231.

puter printout produced by Blue Shield.[188] At trial two witnesses had provided foundation testimony: the first outlined the company's data input procedures; the second, a corporate vice-president, described the computer equipment, the verification procedures for the accuracy of the input data, and the testing of processing programs for precision.[189]

After noting "the extent to which businesses today depend on computers for a myriad of functions," the court found that the printouts were reliable because: 1) the input data was accurate; 2) the reliability of the output data was verified; and, 3) the reliability of the equipment was not in question.[190] The court rejected defendant's contention that the district court should not have received the evidence because it was not prepared at or near the time of the transaction. The court found that a record of the payment was made on magnetic tape at the time of each transaction, and "[i]t would restrict the admissibility of computerized records too severely to hold that the computer product, as well as the input on which it is based, must be produced at or within a reasonable time after each act or transaction to which it relates."[191]

The *Russo* decision is an excellent analysis of the conceptual problems presented by computer printouts. The court correctly required separate verification of the input procedures and the processing program.[192] The two witnesses gave expert testimony detailing procedures employed by the company to ensure the accuracy of the input information and the reliability of the processing program. The court correctly rejected defendant's timeliness argument: unless there has been tampering with the input procedures, data base, or processing programs, the time of preparation of the printout is irrelevant to its reliability.[193] The court's finding that the hardware was reliable since "[n]o evidence was introduced which put [it] in question" is unfortunate for two reasons.[194] First, requiring the objecting party to prove the equipment's unreliability incorrectly shifts the burden of proof from the offeror.[195] Second, the best test of the trustworthiness

188. *Id.* at 1239.
189. *Id.* at 1233-35.
190. *Id.* at 1239-40.
191. *Id.* at 1240.
192. *See* notes 125 & 126 *supra* and accompanying text.
193. *See* notes 130 & 131 *supra* and accompanying text.
194. 480 F.2d at 1240.
195. *Accord,* United States v. De Georgia, 420 F.2d 889, 895-96 (9th Cir. 1969) (Ely, J., concurring).

of computer hardware is a showing of reliance on the equipment by the offeror.[196]

This review of the case law indicates that the courts' application of the common law and statutory foundation requirements has inadequately tested the reliability of the computer printouts. First, the courts unevenly apply the statutory requirements. Second, even when applying the requirements vigorously, courts treat the computer printout as a manually prepared business record, resulting in ineffective testing of its reliability. Third, because courts are unaware of the unique problems of determining the admissibility of a computer printout, this situation will continue. Consequently, a statute tailored to regulate the admission of computer printouts is necessary.[197]

V. A Model Statute

Two states have passed statutes to regulate the admissibility of computer printouts.[198] Additionally, Rule 803(b) of the Federal Rules of

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196. *See* notes 127-29 *supra* and accompanying text.

197. Commentators and jurists do not agree that the existing statutes are inadequate to deal with computer evidence. Brown, *supra* note 1, at 248 (statutes have "sufficient intrinsic flexibility to permit their adaptation to this new form and type of business records"); Roberts, *supra* note 1, at 272; Note, *The Texas Business Records Act and Computer "Printouts,"* 24 Baylor L. Rev. 161, 168 (1972). Freed states that "[i]n most cases, computer use raises the type of legal questions as in other areas of experience. Existing rules and apt analogies provide sufficient guidance for their solution." Freed, *A Lawyer's Guide Through the Computer Maze, supra* note 1, at 16. *Accord,* Freed, *Providing by Statute for Inspection of Corporate Computer and Other Records Not Legible Visually—A Case Study on Legislating for Computer Technology,* 23 Bus. Law. 457, 463 (1968).

198. The Florida statute provides:

> A record of an act, condition or event, including a record kept by means of *electronic data processing,* shall, in so far as relevant, be competent evidence if the custodian or other qualified witness testifies to its identity and the mode of its preparation, and if it was made in the regular course of business, at or near the time of the act, condition or event, and if, in the opinion of the court, the sources of information, method and time of preparation were such as to justify its admission.

Fla. Stat. Ann. § 92.36(2) (West Supp. 1977) (emphasis added).

The Iowa statute provides:

> Any writing or record, whether in the form of an entry in a book, or otherwise, including *electronic means and interpretations thereof,* offered as memoranda or records of acts, conditions or events to prove the facts stated therein, shall be admissible as evidence if the judge finds that they were made in the regular course of a business at or about the time of the act, condition or event recorded, and that the sources of information from which made and the method and circumstances of their preparation were such as to indicate their trust-

Evidence applies to "a memorandum, report, or data compilation."[199] In enacting these statutes to govern computerized records, the draftsmen have chosen to expand the traditional business records exception to include computer printouts without developing new foundation requirements. This method does nothing to solve the novel evidentiary problems presented by computer printouts. Because of the common law's inherent flexibility, courts, like the Mississippi Supreme Court in *King*,[200] applying the comon law regular entries rule should be able to devise new requirements, but they have not. Jurisdictions in which a statute has superseded the common law circumscribe their courts' flexibility by the language of the statutes. Perhaps, then, "the law has got to be stated over again" in a model statute.[201] The goals of such a statute are to ensure: 1) the accuracy of the information entered into the computer; 2) that the data base has not been falsified; and 3) the accuracy of the processing program. The following statute is suggested:

> Section 1. A computer printout recording a business act, event, or transaction shall be admissible into evidence to prove the truth of the matters asserted therein provided that the offering party shows:
>
> 1) that the input procedures conform to standard practices in the industry; and, the entries are made in the regular course of business, and
>
> 2) that he relied on the data in the data base in making a business decision(s), within a reasonably short period of time before or after producing the printout sought to be introduced at trial, and

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worthiness, and if the judge finds that they are not excludable as evidence because of any rule of admissibility of evidence other than the hearsay rule.

Evidence of the absence of a memorandum or record from the memoranda or records of a business of an asserted act, event or condition, shall be admissible as evidence to prove the nonoccurrence of the act or event, or the nonexistence of the condition, if the judge finds that it was in the regular course of that business to make such memoranda of all such acts, events or conditions at the time thereof or within a reasonable time thereafter, and to preserve them.

The term business, as used in this section, includes business, profession, occupation, and calling of every kind.

IOWA CODE ANN. § 622.28 (West Supp. 1977) (emphasis added).

199. Rule 803(6) of the Federal Rules of Evidence is quoted in note 62 *supra.*

200. 222 So. 2d 393 (Miss. 1969), *discussed in* text accompanying notes 154-65.

201. J. WIGMORE, WIGMORE'S CODE OF THE RULES OF EVIDENCE ix (1942). Brown states that "[i]t is not an overstatement to suggest that the law has a positive duty to accomodate itself somehow to this irrepressible demand of the economic and social world in which we now live." Brown, *supra* note 1, at 248.

3) by expert testimony that the processing program reliably and accurately processes the data in the data base.

Section 2. *Definitions.*

1) A computer is any electronic machine that processes information through high-speed calculations.
2) A computer printout is a writing in readable form of the contents of a machine readable medium such as a disk, drum or magnetic tape.
3) The data base is the information stored in the memory of the computer or in an external storage medium and processed by the processing program.
4) A processing program processes the information in the data base through a series of logical operations to solve a user's problems.

The model statute tests separately the reliability of the input procedures, data base, and processing program.[202] The first section recognizes the existence of standard industry input practices.[203] Requiring the offering party to adhere to these practices lowers the probability of entering incorrect information into the computer.[204] The requirement that the entry be made in the regular course of business follows the usual business records exception[205] on the theory that regular business transactions are a satisfactory indicator of the reliability of the input data.

Ensuring the reliability of the data base presents the most serious problems in admitting computer printouts. The ease of falsification and difficulty of detection make the data base the best target for the computer criminal. The model statute attempts to circumvent these problems by requiring the offering party to prove that he relied on the data base in making a business decision within a reasonably short period of time before or after the printout was produced. What constitutes a "reasonably short period of time" would be a subject of ad hoc judicial resolution.

Given the ease with which computerized data can be altered, this section of the statute is not a wholly adequate guarantee of the relia-

202. *See* notes 125 & 126 *supra* and accompanying text.
203. *See* Roberts, *supra* note 1, at 267.
204. *Id.*
205. *See* notes 66-71 *supra* and accompanying text.

bility of the data base. On the other hand, as businesses increasingly rely on the computer to keep business records,[206] an exception for computer printouts becomes necessary to permit businesses to protect their legal rights. The proposed statute represents a compromise between business necessity and the legal system's demands for reliable evidence.[207] Proof of reasonably contemporaneous business reliance on the data base permits an inference that the data is reliable.

The third section of the proposed statute focuses on the means by which data is retrieved. A computer programmer can verify by expert testimony[208] that the processing program is reliable and accurate. He can read the program for errors in logic, and, if necessary, make a test to ensure that it correctly performs its functions.

The model statute does not include the traditional requirement that the "transaction be recorded at or near the time of its occurrence."[209] Although examining the recording methods may help to verify the accuracy of the input procedures, such a requirement is unhelpful in ensuring the reliability of the printout.[210] The model statute also contains no rule on proof of reliability of the hardware. If the other criteria of the statute are satisfied, one can infer that the computer hardware is reliable. Otherwise, why would the business rely on it in making critical business decisions? The business records exception does not require a party to prove that his bookkeepers meet the standard of the profession;[211] his reliance on them is an adequate substitute for direct proof of competence. A similar rule should govern computer printouts.

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206. *See* note 105 *supra* and accompanying text.

207. Necessity and a circumstantial probability of trustworthiness are the basis of the traditional business records exception to the hearsay rule. *See* notes 72-74 *supra* and accompanying text.

208. For a discussion of expert testimony, see Comment, *Expert Testimony and Voice Spectrogram Analysis,* 1975 WASH. U.L.Q. 775, 778 n.15.

209. *See* note 130 *supra* and accompanying text.

210. *See* note 131 *supra* and accompanying text.

211. *See* note 66 *supra* and accompanying text.