UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORPORATION,
Petitioner,

v.

VLSI TECHNOLOGY LLC,
Patent Owner.

IPR2019-01196
U.S. Patent 7,246,027

DECLARATION OF DR. JAMES L. MULLINS

I, Dr. James L. Mullins, declare as follows:

1. My name is Dr. James L. Mullins.

2. I have been retained by petitioner Intel Corporation ("Intel") in the above-captioned *inter partes* review relating to U.S. Patent 7,246,027 to provide opinions on various documents.

I. INTRODUCTION

3. My career as a professional and academic/research spanned more than 44 years including library positions at Indiana University, Villanova University, Massachusetts Institute of Technology, and Purdue University. Appendix A is a true and correct copy of my curriculum vitae describing my background and experience.

4. In 2018, I founded the firm Prior Art Documentation Librarian Services, LLC, located at 106 Berrow, Williamsburg, VA 23188 after purchasing the intellectual property of and successor to Prior Art Documentation, LLC located at 711 South Race Street, Urbana, IL 61801. Further information about my firm, Prior Art Documentation Librarian Services, LLC (PADLS), is available at www.priorartdoclib.com.

5. I have been retained by Intel to offer my opinion on the authenticity and dates of public accessibility of various documents. For this service, I am being paid my usual hourly fee of $225.00. I have no stake in the outcome of this proceeding

or any related litigation or administrative proceedings, and my compensation in no way depends on the substance of my testimony or the outcome of this proceeding.

II. QUALIFICATIONS

6. I received a Bachelor of Arts degree in History, Religion and Political Science in 1972 as well as a Master of Arts degree in Library Science in 1973 from the University of Iowa. I received my Ph.D. in Academic Library Management in 1984 from Indiana University. Over the past forty four years, I have held various positions in the field of library and information sciences.

7. I am presently Dean of Libraries Emeritus and Esther Ellis Norton Professor Emeritus at Purdue University, and have been since January 1, 2018. I have been previously employed as follows:

- Dean of Libraries and Professor and Esther Ellis Norton Professor, Purdue University, West Lafayette, IN (2004-2017)
- Assistant/Associate Director for Administration, Massachusetts Institute of Technology (MIT) Libraries, Cambridge, MA (2000-2004)
- University Librarian and Director, Falvey Memorial Library, Villanova University, Villanova, PA (1996-2000)
- Director of Library Services, Indiana University South Bend, South Bend, IN (1978-1996)

- Part-time Instructor, School of Library and Information Science, Indiana University, Bloomington, IN (1979-1996)
- Associate Law Librarian, and associated titles, Indiana University School of Law, Bloomington, IN (1974-1978)
- Catalog Librarian, Assistant Professor, Georgia Southern College (now University), Statesboro, GA (1973-1974)

8. I am a member of the American Library Association ("ALA"), where I served as the chair of the Research Committee of the Association of College and Research Libraries ("ACRL"). My service to ALA included service on the editorial board of the most prominent library journal, *College and Research Libraries*. I also served on the Standards Committee, College Section of the Association of College and Research Libraries, where I was instrumental in developing a re-issue of the *Standards for College Libraries* in 2000.

9. I am an author of numerous publications in the field of library science, and have given presentations in library sciences at national and international conferences. During more than 44 years as an academic librarian and library science scholar, I have gained extensive experience with catalog records and online library management systems (LMS) built using Machine-Readable Cataloging ("MARC") standards. As an academic library administrator, I have had responsibility to ensure that students were educated to identify, locate, assess, and integrate information

garnered from research library resources. I have also facilitated the research of faculty colleagues either directly or through the provision of and access to the requisite print and/or digital materials and services at the universities where I worked.

10. Based on my experience identified above and detailed in my curriculum vitae, which is attached hereto as Appendix A, I consider myself to be an expert in the field of library science and academic library administration. I have previously offered my opinions on the public availability and authenticity of documents in over 40 cases. I have been deposed in one case.

III. BACKGROUND ON PUBLIC ACCESSIBILITY

A. Scope of This Declaration

11. I am not a lawyer, and I am not rendering an opinion on the legal question of whether a particular document is, or is not, a "printed publication" under the law. I am, however, rendering my expert opinion on the authenticity of the document referenced herein and when and how this document was disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, could have located the document.

12. I am informed by counsel that an item is considered authentic if there is sufficient evidence to support a finding that the item is what it is claimed to be. I

am also informed that authenticity can be established based on the contents of the document itself, such as the appearance, content, substance, internal patterns, or other distinctive characteristics of the item.

13. I am informed by counsel that a given reference qualifies as "publicly accessible" if it was disseminated or otherwise made available such that a person interested in and ordinarily skilled in the relevant subject matter could locate it through the exercise of ordinary diligence.

14. While I understand that the determination of public accessibility under the foregoing standard rests on a case-by-case analysis of the facts particular to an individual publication, I also understand that a printed publication is rendered "publicly accessible" if it is cataloged and indexed by a library such that a person interested in the relevant subject matter could locate it (*i.e.*, I understand that cataloging and indexing by a library is sufficient, though there are other ways that a printed publication may qualify as "publicly accessible"). One manner of sufficient indexing is indexing according to subject matter. I understand that it is not necessary to prove someone actually looked at the printed publication in order to show it was publicly accessible by virtue of a library's cataloging and indexing thereof. I understand that cataloging and indexing by a single library of a single instance of a particular printed publication is sufficient. I understand that, even if access to a library is restricted, a printed publication that has been cataloged and indexed therein

is publicly accessible so long as a presumption is raised that the portion of the public concerned with the relevant subject matter would know of the printed publication. I also understand that the cataloging and indexing of information that would guide a person interested in the relevant subject matter to the printed publication, such as the cataloging and indexing of an abstract for the printed publication, is sufficient to render the printed publication publicly accessible.

15. I understand that evidence showing the specific date when a printed publication became publicly accessible is not necessary. Rather, routine business practices, such as general library cataloging and indexing practices, can be used to establish an approximate date on which a printed publication became publicly accessible.

B. Person of Ordinary Skill in the Art

16. In forming the opinions expressed in this declaration, I have reviewed the documents and appendices referenced herein. These materials are records created in the ordinary course of business by publishers, libraries, indexing services, and others. From my years of experience, I am familiar with the process for creating many of these records, and I know that these records are created by people with knowledge of the information contained within the record. Further, these records are created with the expectation that researchers and other members of the public will use them. All materials cited in this declaration and its appendices are of a type

that experts in my field would reasonably rely upon and refer to in forming their opinions.

17. I have been informed by counsel that the subject matter of this proceeding relates to integrated circuits and computer architecture, including, for example, determining an adjustment signal for a power supply voltage.

18. I have been informed by counsel that a "person of ordinary skill in the art at the time of the inventions" (POSITA) is a hypothetical person who is presumed to be familiar with the relevant field and its literature at the time of the inventions. This hypothetical person is also a person of ordinary creativity, capable of understanding the scientific principles applicable to the pertinent field.

19. I have been informed by counsel that persons of ordinary skill in this subject matter or art would have included someone with at least a master's degree in electrical engineering or computer engineering, plus at least two years of experience in integrated circuit design, or alternatively a bachelor's degree in one of those fields plus at least four years of experience in integrated circuit design.

20. It is my opinion that such a person would have been actively engaged in academic research and learning through study and practice in the field, and possibly through formal instruction through the bibliographic resources relevant to his or her research. By the 2000s, such a person would have had access to a vast

array of print resources, including at least the documents referenced below, as well as to a fast-changing set of online resources.

C. Library Catalog Records and Other Resources

21. Some background on MARC (Machine-Readable Cataloging) formatted records, OCLC, and WorldCat is helpful to understand the library catalog records discussed in this declaration. I am fully familiar with the library cataloging standard known as the MARC standard, which is an industry-wide standard method of storing and organizing library catalog information.[1] MARC practices have been consistent since the MARC format was developed by the Library of Congress in the 1960s, and by the early 1970s became the U.S. national standard for disseminating bibliographic data. By the mid-1970s, MARC format became the international standard, and persists through the present. A MARC-compatible library is one that has a catalog consisting of individual MARC records for each of its items. The underlying MARC format (computer program) underpins the online public access catalog (OPAC) that is available to library users to locate a particular holding of a library. Today, MARC is the primary communications protocol for the transfer and

[1] The full text of the standard is available from the Library of Congress at http://www.loc.gov/marc/bibliographic/.

storage of bibliographic metadata in libraries.[2] The MARC practices discussed below were in place during the late 1990s time frame relevant to the documents referenced herein.

22. Online Computer Library Center (OCLC) is a not-for-profit worldwide consortium of libraries. Similar to MARC standards, OCLC's practices have been consistent since the 1970s through the present. Accordingly, the OCLC practices discussed below were in place during the time frame discussed in my opinions section. OCLC was created "to establish, maintain and operate a computerized library network and to promote the evolution of library use, of libraries themselves, and of librarianship, and to provide processes and products for the benefit of library

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[2] Almost every major library in the world uses a catalog that is MARC-compatible. *See, e.g.*, *MARC Frequently Asked Questions (FAQ)*, LIBRARY OF CONGRESS, https://www.loc.gov/marc/faq.html (last visited Jan. 24, 2018) ("MARC is the acronym for MAchine-Readable Cataloging. It defines a data format that emerged from a Library of Congress-led initiative that began nearly forty years ago. It provides the mechanism by which computers exchange, use, and interpret bibliographic information, and its data elements make up the foundation of most library catalogs used today."). MARC is the ANSI/NISO Z39.2-1994 (reaffirmed 2009) standard for Information Interchange Format.

users and libraries, including such objectives as increasing availability of library resources to individual library patrons and reducing the rate of rise of library per-unit costs, all for the fundamental public purpose of furthering ease of access to and use of the ever-expanding body of worldwide scientific, literary and educational knowledge and information."[3] Among other services, OCLC and its members are responsible for maintaining the WorldCat database (http://www.worldcat.org/), used by libraries throughout the world.

23. Libraries worldwide use the machine-readable MARC format for catalog records. MARC-formatted records include a variety of subject access points based on the content of the document being cataloged. A MARC record for a particular work comprises several fields, each of which contains specific data about the work. Each field is identified by a standardized, unique, three-digit code corresponding to the type of data that follows. For example, a work's title is recorded in field 245, the primary author of the work is recorded in field 100, a work's International Standard Book Number ("ISBN") is recorded in field 020, and the work's Library of Congress call number (assigned by Library of Congress) is

[3] Third Article, Amended Articles of Incorporation of OCLC Online Computer Library Center, Inc., Revised November 30, 2016 (available at https://www.oclc.org/content/dam/oclc/membership/articles-of-incorporation.pdf.

recorded in field 050. Some fields can contain subfields, which are indicated by letters. For example, a work's publication date is recorded in field 260 under the subfield "c."

24. The MARC Field 040, subfield "a," identifies the library or other entity that created the catalog record in the MARC format. The MARC Field 008 identifies the date when this first MARC record was created.

25. MARC records also include several fields that include subject matter classification information. An overview of MARC record fields is available through the Library of Congress at http://www.loc.gov/marc/bibliographic/. For example, 6XX fields are termed "Subject Access Fields."[4] Among these, for example, is the 650 field; this is the "Subject Added Entry – Topical Term" field. *See* http://www.loc.gov/marc/bibliographic/bd650.html. The 650 field is a "[s]ubject added entry in which the entry element is a topical term." *Id.* The 650 field entries "are assigned to a bibliographic record to provide access according to generally accepted thesaurus-building rules (e.g., *Library of Congress Subject Headings* (LCSH), *Medical Subject Headings* (MeSH))." *Id.* Thus, a researcher can easily discover material relevant to a topic of interest with a search using the terms employed in the MARC Fields 6XX.

[4] *See* http://www.loc.gov/marc/bibliographic/bd6xx.html.

26. Further, MARC records include call numbers, which themselves include a classification number. For example, the 050 field is dedicated as the "Library of Congress Call Number"[5] as assigned by the Library of Congress. A defined portion of the Library of Congress Call Number is the classification number, and "[t]he source of the classification number is *Library of Congress Classification* and the *LC Classification-Additions and Changes*." *Id.* Thus, included in the 050 field is a subject matter classification. As an example: TK5105.59 indicates books on computer networks – security measures. When a local library assigns a classification number, most often a Library of Congress derived classification number created by a local library cataloger or it could it could be a Dewey Decimal classification number for example, 005.8, computer networks – security measures, it appears in the 090 field. In either scenario, the MARC record includes a classification number in the call number field that represents a subject matter classification.

27. WorldCat is the world's largest public online catalog, maintained by the OCLC, a not-for-profit international library consortium, and built with the records created by the thousands of libraries that are members of OCLC. OCLC provides bibliographic and abstract information to the public based on MARC-

[5] *See* http://www.loc.gov/marc/bibliographic/bd050.html.

compliant records through its OCLC WorldCat database. WorldCat requires no knowledge of MARC tags and code and does not require a login or password. WorldCat is easily accessible through the World Wide Web to all who wish to search it; there are no restrictions to be a member of a particular community, etc. The date a given catalog record was created (corresponding to the MARC Field 008) appears in some detailed WorldCat records as the Date of Entry but not necessarily all. WorldCat does not provide a view of the underlying MARC format for a specific WorldCat record. In order to see the underlying MARC format the researcher must locate the book in a holding library listed among those shown in WorldCat, and search the online public catalog (OPAC) of a holding library. Whereas WorldCat records are widely available, the availability of library specific MARC formatted records varies from library to library. When a specific library wishes to make the underlying MARC format available there will be a link from the library's OPAC display, often identified as a MARC record or librarian/staff view.

28. When a MARC record is created by the Library of Congress or an OCLC member institution, the date of creation for that record is automatically populated in the fixed field (008), with characters 00 through 05 in year, month, day

format (YYMMDD).[6] Therefore, the MARC record creation date reflects the date on which the publication associated with the record was first cataloged. Thereafter, the local library's computer system may automatically update the date in field 005 every time the library updates the MARC record (*e.g.*, to reflect that an item has been moved to a different shelving location within the library, or a reload of the bibliographic data with the introduction of a new library management system that creates and manages the OPAC).

D. Monograph Publications

29. Monograph publications are written on a single topic, presented at length and distinguished from an article and include books, dissertations, and technical reports. A library typically creates a catalog record when the monograph is acquired by the library. First, it will search OCLC to determine if a record has already been created by the Library of Congress or another OCLC institution. If a record is found in OCLC, the record is downloaded into the library's LMS (Library Management System) that includes typically the OPAC (online public access catalog by which researchers locate a particular library holding in a user-friendly format), acquisitions, cataloging, and circulation integrated functions. Once the item is

[6] Some of the newer library catalog systems also include hour, minute, second (HHMMSS).

downloaded into the library's LMS, the library adds its identifier to the OCLC database so when a search is completed on WorldCat, the library will be indicated as an owner of the title. Once a record is created in a Library's LMS, it is searchable and viewable through the library's OPAC, typically by author, title, and subject heading, at that library and from anywhere in the world through the internet by accessing that library's OPAC. The OPAC also connects with the circulation function of the library, which typically indicates whether the record is available, in circulation, etc., with its call number and location in a specific departmental/disciplinary library, if applicable. The OPAC not only provides immediate bibliographic access on-site, it also facilitates the interlibrary loan process, which is when one publication is loaned from one library to another.

E. Periodicals

30. A library typically creates a catalog record for a periodical publication when the library receives its first issue. When the institution receives subsequent issues/volumes of the periodical, the issues/volumes are checked in (often using a date stamp), added to the institution's holding records, and made available very soon thereafter – normally within a few days of receipt or (at most) within a few weeks of receipt.

31. The initial periodicals record will sometimes not reflect all subsequent changes in publication details (including minor variations in title, frequency, etc.).

F. Ownership and date stamp

32. Every library has a different practice or policy on whether or not to date stamp, but all will have an ownership stamp somewhere in the book. The ownership stamp typically appears, on the cover page, verso of the cover page, or a designated page within the book, sometimes even on the top, side, or bottom edge of the monograph or periodical. The ownership and date stamp can also vary from one library to another when the stamp is entered on the monograph or periodical. It could occur when received in acquisitions after shipment to the library, or it could be at time of cataloging.

G. Indexing

33. A researcher may discover material relevant to his or her topic in a variety of ways. One common means of discovery is to search for relevant information in an index of periodical and other publications. Having found relevant material, the researcher will then normally obtain it online, look for it in libraries, or purchase it from the publisher, a bookstore, a document delivery service, or other provider. Sometimes, the date of a document's public accessibility will involve both indexing and library date information. Date information for indexing entries is, however, often unavailable. This is especially true for online indices.

34. Indexing services use a wide variety of controlled vocabularies to provide subject access and other means of discovering the content of documents. The formats in which these access terms are presented vary from service to service.

35. Online indexing services commonly provide bibliographic information, abstracts, and full-text copies of the indexed publications, along with a list of the documents cited in the indexed publication. These services also often provide lists of publications that cite a given document. A citation of a document is evidence that the document was publicly available and in use by researchers no later than the publication date of the citing document.

36. ***IEEE Xplore*** – The Institute of Electrical and Electronics Engineers is the world's largest organization for the advancement of technology with some 430,000 members in 160 countries. Known by its acronym IEEE, it has created a database, IEEE Xplore, that provides access to its hundreds of publications and those of it publishing partners. This include the content of over 170 journals, more than 1,400 conference proceedings, some 5,100 technical standards, 2,000 ebooks and 400 educational courses. In all, more than three million documents, dating from 1872 on, are searchable and available for purchase either through subscription or individually. Many of these records are accessible via Google Scholar.

37. ***SpringerLink*** – The service provides researchers with access to millions of scientific documents from journals, books, series, protocols, reference works and proceedings. https://link.springer.com/.

38. ***ProQuest Ebook Central*** – This credible content from authoritative, scholarly sources, Ebook Central delivers, with breadth and depth of ebooks from scholarly sources, including University Presses and other top publishers.

39. ***Funkschau*** – Founded in 1929, Funkschau in its early days was a sheet for technically interested radio listeners and electronics hobbyists and transformed from the late 1940s to the 1980s to a trade journal for the radio and television retailers. It offered retailers a practical overview of current and upcoming technologies. http://www.funkschau.de/.

40. ***Google Scholar –*** This web search engine indexes full text or metadata of scholarly literature, covering numerous formats and disciplines. The size of the database is not published by Google, but researchers have estimated that it contained approximately 160 million items in 2014. (See Oduna-Malea, Enrique, Ayllon, Juan Manuel, Martin-Martin, Alberto, Delgado Lopez-Cozar, Emilio "About the size of Google Scholar: playing the numbers", Jul 2014. Scientometrics, 104(3), pp 1-43, https://arxiv.org/ftp/arxiv/papers/1407/1407.6239.pdf.) The database is not limited by type of publication, and includes dissertations, prepublication materials, technical

reports, patents and more. Google Scholar is similar to many subscription databases, e.g., Scopus and Web of Science in its broad subject coverage.

41. ***Wisconsin TechSearch (WTS)*** – WTS is a set of services offered by the University of Wisconsin Libraries. WTS offers an array of article delivery and research services to any individual or organization who requests the specialized skills of WTS staff in locating and retrieving information, regardless of whether the individual is affiliated with the University of Wisconsin.

IV. OPINION REGARDING AUTHENTICITY AND PUBLIC ACCESSIBILITY

A. Ex. 1014: M. Morris Mano. *Digital Logic and Computer Design.* Prentice-Hall, Inc., 1979. 612 pages. ("Mano")

1. Authentication

42. I have been asked to opine on Digital Logic and Computer Design ("Mano"). Mano is a book authored by M. Morris Mano published by Prentice Hall, Inc., in 1979. It contains, in 612 pages, 13 Chapters, Appendix, and Index.

43. I have evaluated the Mano reference in two ways: (1) by assessing scans of a copy of Mano (Ex. 1014), provided by counsel, owned by the Library of Congress; (2) by assessing scans of a print copy held by the Cornell University Libraries provided to me at my request through Wisconsin TechSearch (WTS).

44. Ex. 1014, provided by counsel, is a scan of parts of a copy of Mano including, the cover, inside front cover with stamp of the Library of Congress, title page, verso of the title page (copyright) with handwritten call number: "TK7888.3

.M345 Copy 2"; Contents; pages 1-4, and back cover with inventory barcode from the copy held by the Library of Congress.

45. All identifying characteristics, such as stamps and notations, on Ex. 1014, are consistent with library practice and procedure that I have observed during my career as a professional librarian, specifically with those items held by the Library of Congress. I have no cause for concern about the authenticity or accuracy of these identifying attributes. In addition, Mano was found within the custody of a library, the Library of Congress, one of the most likely locations for an authentic publication to be located.

46. Attachment 1014A includes scans provided to me at my request through Wisconsin TechSearch (WTS) on June 18, 2019 from a copy of Mano held by the Cornell University Libraries. Ex. 1014A includes scans of Mano: cover; flyleaf inside front cover with stamp of "Cornell University Libraries, Ithaca, N.Y. Engineering Library," inventory barcode of "Cornell University Library," stamp that reads "ENGR. LIBR. JUN 17 1996", date due slip with various dates with earliest ones: FEB 26, 1997, Aug 24, 1997, SEP 7, 1999, etc.; flyleaf with call number "Engr TK7888.3.M345x 1979"; title page; verso of title page (copyright page) with stamp of "Cornell University Libraries, Ithaca, N.Y."; and Contents. All identifying characteristics, such as stamps and notations, on Ex. 1014A are consistent with library practice and procedure that I have observed during my career as a

professional librarian. I have no cause for concern about the authenticity or accuracy of these identifying attributes. In addition, Mano was found within the custody of a library, the Cornell University Engineering Library, one of the most likely locations for an authentic publication to be located.

47. After comparison between Attachment 1014A and the corresponding pages of Ex. 1014, I found no difference between the two. Therefore, upon finding Mano in libraries, the Library of Congress and the Cornell University Libraries, I have determined that Ex. 1014, Mano is an authentic document.

48. I conclude and affirm that Mano, Ex. 1014, is an authentic document.

2. Public Accessibility

49. Attachment 1014B is a true and correct copy of the WorldCat entry for Mano. I obtained Attachment 1014B by completing a search on WorldCat on June 18, 2019.

50. Attachment 1014B shows that Mano is the document associated with this WorldCat entry, as verified by the author: M. Morris Mano; title: Digital Logic and Computer Design; publisher and publication date: Prentice-Hall in 1979; and ISBN: 0132145103.

51. Mano could have been located by searching for the author – M. Morris Mano; title: Digital Logic and Computer Design; or by searching the subject headings: *Electronic digital computers; Logic circuits; Digital integrated circuits;*

as well as the subject headings listed toward the bottom of the entry including*: Logic design.*

52. When I searched WorldCat for holdings of Mano in the District of Columbia, the Library of Congress was third on the list among the 395 libraries shown as holding Mano worldwide. When I searched in the State of New York, Cornell University Library was eleventh on the list among the 395 libraries shown as holding Mano worldwide.

53. The searches discussed above could have been performed anywhere in the world by anyone who accessed WorldCat and its predecessor database through an OCLC member library in the 1990s through today.

54. Attachment 1014C is a download I made from the Library of Congress OPAC (online catalog) on June 18, 2019. The document cataloged in this record is Mano as verified by the fields listing the author: M. Morris Mano; title: Digital Logic and Computer Design; publisher and publication date: Prentice-Hall in 1979; and ISBN: 0132145103. I compared the Library of Congress Classification (call number): TK7888.3.M345 with that shown on the copyright page of Ex. 1014, and it is the same on both with the exception of the designation of Copy 2, which is shown elsewhere in the OPAC record.

55. Mano could have been located in the Library of Congress OPAC by searching for the author: M. Morris Mano; title: Digital Logic and Computer

Design; or by searching the subject headings: *Electronic digital computers; Logic circuits; Digital integrated circuits; and/or Logic design.*

56. Attachment 1014D is the MARC record I downloaded from the Library of Congress OPAC on June 18, 2019. The MARC format provides information about the processing of Mano by the Library of Congress. The MARC 955 field is not appearing on the Library of Congress MARC record for Mano. The MARC 005 and MARC 008 fields provide dates of the processing and cataloging of Mano by the Library of Congress. As discussed above, the MARC 005 field is the field used by the cataloging library (in this case Library of Congress) when it was last processed, cataloged or possibly had a change in location or designation. The MARC 005 field on this record for Mano is: 19790803000000.0 which indicates on August 3, 1979 Mano was cataloged and entered into the Library of Congress OPAC. Assuming typical time for labeling, processing and transfer to the shelf, Mano would have been accessible within 10 days, or August 13, 1979.

57. Once Mano was entered into the general collection of the Library of Congress, members of the public could access the book by having it brought to either the Jefferson or Adams Reading Rooms. The collections of the Library of Congress are searchable by subject matter, author, or title such that a skilled searcher could find works in which they were interested. For example, a member of the public could have located Ex. 1014 by searching for the subject field "*Electronic digital*

computers; Logic circuits; Digital integrated circuits; and/or Logic design" in topical term MARC field 650 on the Library of Congress OPAC. Members of the public could read, study, and make notes about a selected work in the Reading Rooms. Further, members of the public were permitted to make photocopies of portions of the works while in the Reading Room. Accordingly, Ex. 1014 was available to the general public when it was available for access by members of the public at the Library of Congress.

58. Attachment 1014E is a download I made from the Cornell University Libraries OPAC (online catalog) on June 18, 2019. The document cataloged in this record is Mano as verified by the fields listing the author: M. Morris Mano; title: Digital Logic and Computer Design; publisher and publication date: Prentice-Hall in 1979; and ISBN: 0132145103. I compared the Library of Congress Classification (call number): TK7888.3.M345x 1979 with that shown on the flyleaf page of Attachment 1014A and the OPAC record. It is the same on both.

59. Mano could have been located by searching Cornell University Library OPAC for the author: M. Morris Mano; title: Digital Logic and Computer Design; or by searching the subject headings: "*Electronic digital computers; Logic circuits; Digital integrated circuits; and/or Logic design*".

60. As described above, Attachment 1014A is a true and accurate copy of Mano held by Cornell University Libraries as provided to me by the Wisconsin Tech

Services (WTS). Attachment 1014A includes scans of Mano: cover; flyleaf inside front cover with stamp of "Cornell University Library, Ithaca, N.Y. Engineering Library," inventory barcode of "Cornell University Library," stamp that reads "ENGR. LIBR. JUN 17 1996", date due slip with various dates, the earliest ones: FEB 26, 1997, Aug 24, 1997, SEP 7, 1999, etc.; flyleaf with call number "Engr TK7888.3.M345x 1979"; title page; verso of title page (copyright page) with stamp of "Cornell University Libraries, Ithaca, N.Y."; and Contents. The initial date due stamp indicates that Attachment 1014A was available for check out from the Engineering Library of Cornell University Libraries on February 26, 1997.

61. Attachment 1014A—flyleaf with date due slip—indicates that the book was checked out and due back on February 26, 1997, the earliest date recorded on the date due slip. This is consistent with the cataloging date found in the MARC 905 field, June 11, 1996, in the Cornell University Library MARC record, Attachment 1014F (which I downloaded from the Cornell University Libraries on June 18, 2019).

> *905 |a19960611120000.0* – June 11, 1996 (remaining digits are check digits

62. As discussed in the introduction, the 9XX MARC field has been designated as 'local notes' for the cataloging library to use as it deems necessary. Cornell University Library (as confirmed with Cornell University Library cataloging

staff) have consistently used the 905 field to indicate date of cataloging and addition of the record into the OPAC of the Cornell University Library.

63. With cataloging completed and addition to the Cornell University Libraries OPAC on June 11, 1996, it would take approximately a week for final labeling and transfer to the Engineering Library shelf, so by June 18, 1996, Mano would have been accessible (consistent with the stamp date of June 17, 1996 shown in Attachment 1014A).

3. Conclusion

64. I conclude that Mano, Ex. 1014, is an authentic document and would have been publicly accessible through the Library of Congress no later than August 13, 1979 and at Cornell University Libraries, June 18, 1996.

B. Ex. 1016: Paul Horowitz and Winfield Hill. *The Art of Electronics.* 2nd Edition. Cambridge University Press, 1989. 1125 pages. ("Horowitz")

1. Authentication

65. I have been asked to opine on The Art of Electronics, 2nd Edition. Horowitz is a book authored by Paul Horowitz and Winfield Hill published by Cambridge University Press in 1989. It contains, in 1125 pages, 15 Chapters, Appendices A-K, Bibliography, and an Index.

66. I have evaluated the Horowitz reference in two ways: (1) by assessing scans of a copy of Horowitz (Ex. 1016), provided by counsel, owned by the Library

of Congress; and (2) by assessing scans of a print copy held by the Purdue University Libraries.

67. Ex. 1016, provided by counsel, is a scan that contains parts of a copy of Horowitz, including the spine, having a label with a printed call number: TK7815.H67 1989; half title page; title page; the verso of the title page (copyright page); having a stamp indicating Library of Congress, Aug 31 1989 (date received by the Library of Congress) and toward the top of the page is a handwritten call number: TK7815.H67 1989; contents, and pages 522-528.

68. All identifying characteristics, such as stamps and notations, on Ex. 1016 are consistent with library practice and procedure that I have observed during my career as a professional librarian, specifically with those items held by the Library of Congress. I have no cause for concern about the authenticity or accuracy of these identifying attributes. In addition, Horowitz was found within the custody of a library, the Library of Congress, one of the most likely locations for an authentic publication to be located.

69. Attachment 1016A are scans provided to me at my request on June 10, 2019 from a copy of Horowitz held by the Purdue University Libraries. It was provided to me through my affiliation with Purdue University. Ex. 1016A includes Horowitz scans: Horowitz, The Art of Electronics and label with call number: TK7815.H87 1989; inside front cover with stamp that reads "Purdue University

Libraries"; title page with stamp in red that reads "Library of the Department of Chemistry, Purdue University"; verso of the title page (copyright); Contents; inside back cover with a label that reads "Heckman Bindery, Inc. July 04" and back cover with barcode inventory label indicating Purdue University Libraries. From my experience as a librarian and administrator of Purdue University Libraries I affirm that all labels and markings are consistent with those observed during my tenure at Purdue.

70. After comparison between Attachment 1016A and the corresponding pages of Ex. 1016, I found no difference between the two. Therefore, upon finding Horowitz in libraries, the Library of Congress and the Purdue University Libraries, I have determined that Ex. 1016, Horowitz is an authentic document.

71. I conclude and affirm that Horowitz, Ex. 1016, is an authentic document.

2. Public Accessibility

72. Attachment 1016B is a true and correct copy of the WorldCat entry for Horowitz. I obtained Attachment 1016B by completing a search on WorldCat on June 9-10, 2019.

73. Attachment 1016B shows that Horowitz is the document associated with this WorldCat entry, as verified by the authors: Paul Horowitz and Winfield

Hill; title: The Art of Electronics, 2nd Edition; publisher and publication date: Cambridge University Press in 1989; and ISBN: 0521370957.

74. Horowitz could have been located by searching for the authors – Paul Horowitz and Winfield Hill; title: The Art of Electronics; or by searching the subject headings: *Electronics; Electronic circuit design; and/or Electronique.*

75. When I searched WorldCat for holdings of Horowitz in the District of Columbia, the Library of Congress was fourth on the list among the 1501 libraries shown as holding Horowitz worldwide. When I searched in Indiana, Purdue University Library was seventh on the list among the 1501 libraries shown as holding Horowitz worldwide.

76. The searches discussed above could have been performed anywhere in the world by anyone who accessed WorldCat and its predecessor database through an OCLC member library in the 1990s through today.

77. Attachment 1016C is a download I made from the Library of Congress OPAC (online catalog) on June 10, 2019. The document cataloged in this record is Horowitz as verified by the fields listing the authors: Paul Horowitz and Winfield Hill; title: The Art of Electronics, 2nd Edition; publisher and publication date: Cambridge University Press in 1989; and ISBN: 0521370957. I compared the Library of Congress Classification (call number): TK7815.H67 1989 with that shown on the copyright page of Ex. 1016, and it is the same on both.

78. Horowitz could have been located by searching for the authors – Paul Horowitz and Winfield Hill; title: The Art of Electronics, or by searching the subject headings: "*Electronics; and/or Electronic circuit design*".

79. The date stamped on Ex. 1016 of August 31, 1989 indicates receipt of Horowitz by the Library of Congress, consistent with library operations and practice, Horowitz would have been publicly accessible through the Library of Congress OPAC no later than 10 days after receipt, therefore, September 10, 1989. Once Horowitz was entered into the general collection of the Library of Congress, members of the public could access the book by having it brought to either the Jefferson or Adams Reading Rooms. The collections of the Library of Congress are searchable by subject matter, author, or title such that a skilled researcher could find works in which they were interested. For example, a member of the public could have located a copy of Ex. 1016 by searching for the subject fields "*Electronics; and/or Electronic circuit design"* in topical term MARC field 650. Members of the public could read, study, and make notes about a selected work in the Reading Rooms. Further, members of the public were permitted to make photocopies of portions of the works while in the Reading Rooms. Accordingly, a copy of Ex. 1016 was available to the general public when it was available for access by members of the public at the Library of Congress.

80. Attachment 1016D is the MARC record I downloaded from the Library of Congress OPAC. The MARC format provides information about the processing of Horowitz by the Library of Congress. In the case of Horowitz, the manuscript was not submitted to the Library of Congress for "Cataloging in Publication" review and processing. On the copyright page it indicates this was performed by the British Library. *See* Ex. 1016. Therefore the 955 field was omitted from the Library of Congress MARC record for Horowitz.

81. Attachment 1016E is a download I made from the Purdue University Libraries OPAC (online catalog) on June 10, 2019. The document cataloged in this record is Horowitz as verified by the fields listing the authors: Paul Horowitz and Winfield Hill; title: The Art of Electronics, 2nd Edition; publisher and publication date: Cambridge University Press in 1989; and ISBN: 0521370957. I compared the Library of Congress Classification (call number): TK7815.H67 1989 with that shown on the copyright page of Ex. 1016A, and it is the same on both.

82. Horowitz could have been located by searching for the authors – Paul Horowitz and Winfield Hill; title: The Art of Electronics, or by searching the subject headings: "*Electronics; and/or Electronic circuit design*".

83. On Attachment 1016A, the scans from the Purdue University Libraries copy of Horowitz, the Heckman Bindery label July 04 (July 2004) indicates that the Purdue University Libraries copy of Horowitz was re-bound due to wear (the binding

appearance indicates it is not the original published cover). Therefore, the Purdue University Libraries copy of Horowitz was accessible July 2004.

3. Conclusion

84. I conclude that Horowitz, Ex. 1016, is an authentic document and would have been publicly accessible through the Library of Congress no later than September 10, 1989 and at Purdue University Libraries, July 2004.

V. AVAILABILITY FOR CROSS-EXAMINATION

85. In signing this Declaration, I recognize that this Declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the U.S. Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

VI. RIGHT TO SUPPLEMENT

86. I reserve the right to supplement my opinions in the future to respond to any arguments that the Patent Owner raises and to take into account new information as it becomes available to me.

VII. JURAT

87. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the full knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the U.S. Code.

Dated: June 26, 2019

James L. Mullins

Dr. James L. Mullins

APPENDIX A

JAMES L. MULLINS

Prior Art Document Librarian Services
106 Berrow
Williamsburg, VA 23188
jlmullins@priorartdoclib.com
ph. 765 479 4956

Experience:

2018 -	**Dean of Libraries Emeritus & Esther Ellis Norton Professor Emeritus**
2011 - 2017	**Dean of Libraries and Esther Ellis Norton Professor**
2004 - 2017	**Dean of Libraries & Professor** **Purdue University, West Lafayette, IN.**
2000-2004	**Associate Director for Administration, MIT Libraries,** **Massachusetts Institute of Technology, Cambridge, MA.**
1996-2000	**University Librarian & Director, Falvey Memorial Library.** **Villanova University, Villanova, PA.**
1978-1996	**Director of Library Services, Indiana University South Bend.**
1974-1978	**Associate Librarian, Indiana University Bloomington, School of Law.**
1973-1974	**Instructor/Catalog Librarian. Georgia Southern University.**

Teaching::

1977-1996	**Associate Professor (part-time), School of Library and Information Science,** **Indiana University.**

Education:

The University of Iowa. Honors Bachelor of Arts in History, Religion and Political Science.
The University of Iowa. Master of Arts in Library Science.
Indiana University. Doctor of Philosophy. Concentration: Academic Library Management.
Emphasis:. Legal Librarianship.

Awards and Recognition:

2017 Distinguished Alumnus Award by the School of Informatics and Computing, Indiana University, Bloomington. Given June 25, 2017.

2016 Hugh C. Atkinson Memorial Award, jointly sponsored by the four divisions of the American Library Association (ALA), June 27, 2016.

2015 ACRL Excellence in University Libraries Award, April 23, 2015.

Named Esther Ellis Norton Professor by Purdue Trustees, December 11, 2011.

International Review Panel to evaluate the University of Pretoria Library, February 20 – 24, 2011. Pretoria, South Africa

Publications: (selected)

A Purdue Icon: creation, life, and legacy, edited by James L. Mullins, Founder's Series, Purdue University Press, 138pp., August, 2017.

"The policy and institutional framework." In *Research Data Management, Practical Strategies for Information Professionals,* edited by Ray, J M. Purdue University Press, pp.25-44, 2014.

"DataCite: linking research to data sets and content." In Benson, P and Silver, S. *What Editors Want: An Author's Guide to Scientific Journal Publishing*. University of Chicago Press, pp. 21-23, December 2012.

"Library Publishing Services: Strategies for Success," with R. Crow, O. Ivins, A. Mower, C. Murray-Rust, J. Ogburn, D Nesdill, M. Newton, J. Speer, C. Watkinson. *Scholarly Publishing and Academic Resources Coalition (SPARC),* version 2.0, March 2012.

"The Changing Definition and Role of Collections and Services in the University Research Library." *Indiana Libraries,* Vol 31, Number 1 (2012), pp.18-24.

"Are MLS Graduates Being Prepared for the Changing and Emerging Roles that Librarians must now assume within Research Libraries?" *Journal of Library Administration.* Volume 52, Issue 1, 2012, p. 124-132

Baykoucheva, Svetla. What Do Libraries Have to Do with e-Science?: An Interview with James L. Mullins, Dean of Purdue University Libraries. Chem. Inf. Bull. [Online] 2011, 63 (1), 45-49. http://www.acscinf.org/publications/bulletin/63-1/mullins.php (accessed Mar 16, 2011).

"The Challenges of e-Science Data-set Management and Scholarly Communication for Domain Sciences and Technology: a Role for Academic Libraries and Librarians," chapter in, *The Digital*

Deluge: Can Libraries Cope with e-Science?" Deanna B. Marcum and Gerald George, editors, Libraries Unlimited/Teacher Ideas Press, 2009. (a monograph publication of the combined proceedings of the KIT/CLIR proceedings).

"Bringing Librarianship to e-Science," *College and Research Libraries.* vol. 70, no. 3, May 2009, editorial.

"e Librarian's Role in e-Science" *Joho Kanri (Journal on Information Processing and Management),* Japan Science and Technology Agency (formerly Japan Information Center of Science and Technology), Tokyo, Japan. Translated into Japanese by Taeko Kato.

March, 2008.
to Domain Sciences and Engineering: a Role for Academic Libraries and Librarians," KIT (Kanazawa Institute of Technology)/CLIR (Council of Library and Information Resources) International Roundtable for Library and Information Science, July 5-6, 2007. Developments in e-science status quo and the challenge, The Japan Foundation, 2007.

"An Administrative Perspective," Chapter 14, *Proven Strategies for Building an Information Literacy Program*, Susan Curzon and Lynn Lampert, editors, Neal-Schuman Publishers, Inc., New York, 2007. pp. 229-237. .

Library Management and Marketing in a Multicultural World, proceedings of the IFLA Management and Marketing (M&M) Section, Shanghai, China, August 16-17, 2006, edited. K.G. Saur, Munchen, Germany, June 2007. 390 pp.

ACRL Research Committee, with Frank R. Allen and Jon R. Hufford. *College & Research Libraries,* April 2007, vol.68, no.4. pp.240-241, 246.

To Stand the Test of Time: Long-term Stewardship of Digital Data Sets in Science and Engineering. A report to the National Science Foundation from the ARL Workshop on New Collaborative Relationships: the Role of Academic Libraries in the Digital Data Universe. September 26-27, 2006, Arlington, VA. p.141. http://www.arl.org/bm~doc/digdatarpt.pdf

"Enabling Interaction and Quality in a Distributed Data DRIS," *Enabling Interaction and Quality: Beyond the Hanseatic League*. 8th International Conference on Current Research Information Systems, with D. Scott Brandt and Michael Witt. Promoted by euro CRIS. Leuven University Press, 2006. pp.55-62. Editors: Anne Garns Steine Asserson and Eduard J. Simons.

"Standards for College Libraries, the final version approved January 2000," prepared by the ACRL College Libraries Standards Committee (member), *C&RL News*, March 2000, p.175-182.

"Standards for College Libraries: a draft," prepared by the ACRL College Libraries Section, Standards Committee (member), *C&RL News*, May, 1999, p. 375-381.

"Statistical Measures of Usage of Web-based Resources," *The Serials Librarian,* vol. 36, no. 1-2 (1999) p. 207-10.

(On a lighter note) "Philly's dining Renaissance," *American Libraries,* vol. 30, no. 1 (Jan. 99) p. 86-90. With Susan Markley. A guide to the restaurants for the American Library Association Meeting in Philadelphia in 1999.

"An Opportunity: Cooperation between the Library and Computer Services," in *Building Partnerships: Computing and Library Professionals.* Edited by Anne G. Lipow and Sheila D. Creth. Berkeley and San Carlos, CA, Library Solutions Press, 1995. p. 69-70.

"Faculty Status of Librarians: A Comparative Study of Two Universities in the United Kingdom and How They Compare to the Association of College and Research Libraries Standards, " in *Academic Librarianship, Past, Present, and Future: a Festschrift in Honor of David Kaser.* Englewood, Colorado; Libraries Unlimited, 1989. p. 67-78. Review in: *College & Research Libraries,* vol. 51, no. 6. November 1990, p. 573-574.

Presentations: (Representative)

"How Long the Odyssey? Transitioning the Library and Librarians to Meet the Needs and Expectations of the 21st Century University," David Kaser Lecture, School of Informatics & Computing, Indiana University, Bloomington, IN, November 16, 2015.

Presentation at University of Cape Town, Cape Town, South Africa, August 20, 2015.

"The Challenge of Discovering Science and Technology Information," Moderator, International Federation of Library Associations (IFLA) Science and Technological Libraries Section Program, Cape Town, South Africa, August 18, 2015.

"An Odyssey in Data Management: Purdue University," International Federation of Library Associations (IFLA) Research Data Management: Finding Our Role – A program of the Research Data Alliance, Cape Town, South Africa, August 17, 2015.

Presentation at University of Pretoria, Pretoria, South Africa, August 11, 2015.

Co-Convener with Sarah Thomas, Harvard University, at the Harvard Purdue Symposium on Data Management, Harvard University, Cambridge, MA, June 15-18, 2015.

"Strategic Communication," panel discussion on the Director's role and perspective on library communications at Committee on Institutional Cooperation (CIC) Center for Library Initiatives (CLI) Annual Conference, University of Illinois Urbana-Champaign, May 20, 2015.

"Issues in Data Management," panel discussion moderated by Catherine Woteki, United States Undersecretary for Research, Education & Economics at 20th Agriculture Network Information Collaborative (AgNIC) Annual Meeting in the National Agricultural Library, Beltsville, MD, May 6, 2015.

"Active learning/IMPACT & the Active Learning Center at Purdue University," Florida Institute of Technology, Melbourne, FL, February 11, 2015.

"Science+art=creativity: libraries and the new collaborative thinking," panel moderator, International Federation of Library Associations (IFLA) 80th General Conference and Assembly, Lyon, France, August 19, 2014.

"Purdue University The Active Learning Center—A new concept for a library," Association of University Architects 59th Annual National Conference, University of Notre Dame, South Bend, IN, June 23, 2014.

"Big Data & Implications for Academic Libraries," keynote speaker, Greater Western Library Alliance (GWLA) Cyber-infrastructure Conference, Kansas City, MO, May 28, 2014.
"Research Infrastructure," panel moderator, Association of Research Libraries (ARL) 164th Membership Meeting, Ohio State University, Columbus, OH, May 7, 2014.

"An Eight Year Odyssey in Data Management: Purdue University," International Association of Scientific and Technological University Libraries (IATUL) 2013 Workshop Research Data Management: Finding Our Role, University of Oxford, UK, December 2013.

"Purdue University Libraries & Press: from collaboration to integration," Ithaka Sustainable Scholarship, The Evolving Digital Landscape: New Roles and Responsibilities in Higher Education, libraries as publishers, New York, New York, October 2013.

"Tsinghua and Purdue: Research Libraries for the 21st Century," Tsinghua University, Tsinghua, China, August 2013.

"Purdue Publishing Experience in the Libraries Publishing Coalition," Association of American University Presses Annual Meeting, Press-Library Coalition Panel, Boston, Massachusetts, June 21, 2013.

"Indiana University Librarians Day: Purdue University Libraries Ready for the 21st Century," Indiana University Purdue University Indianapolis (IUPUI), June 7, 2013.

"Purdue University Libraries and Open Access; CNI Project Update," Coalition for Networked Information, San Antonio, TX, April 5, 2013.

Memorial Resolution, honoring Joseph Brannon, to the Board of the Association of College & Research Libraries, Seattle, WA, January 2013.

"An overview of sustaining e-Science collaboration in an Academic Research Library—the Purdue experience," Duraspace e-Science Institute webcast, October 17, 2012.

"The Role of Libraries in Data Curation, Access, and Preservation: an International Perspective," Panel Moderator, 78th General Conference and Assembly, International Federation of Library Associations, Helsinki, Finland, August 15, 2012.

"21st Century Libraries," moderator of First Plenary Session, International Association of Technological University Libraries 33rd Annual Conference, Singapore, June 4, 2012.

"Planning for New Buildings on Campus," panel presenter, University of Calgary Building Symposium on Designing Libraries for the 21st Century, Calgary, Alberta, Canada, May 17, 2012.

"Data Management and e-Science, the Purdue Response." Wiley-Blackwell Executive Seminar-2012, Washington, DC, March 23, 2012.

"An overview of Sustaining e-Science Collaboration in Academic Research Libraries and the Purdue Experience." Leadership & Career Development Program Institute, Association of Research Libraries (ARL). Houston, TX, March 21, 2012.

"An overview of Data Activities at Purdue University in response to Data Management Requirements." Coalition for Academic Scientific Computation (CASC). Arlington, VA, September 8, 2011.

"Getting on Track with Tenure," Association of College and Research Libraries (ACRL) Research Program Committee. Washington, DC, June 26, 2011.

"Integration of the Press and Libraries Collaboration to Promote Scholarly Communication," Association of Library Collections & Technical Services (ALCTS) Scholarly Communication Interest Group – American Library Association, New Orleans, Louisiana, June 25 2011.

"Cooperation for improving access to scholarly communication," with N. Lossau (Germany), C. Mazurek (Poland), J. Stokker (Australia), panel moderator and presenter, Second Plenary Session, International Association of Scientific and Technological University Libraries (IATUL) 32nd Conference 2011, Warsaw, Poland. May 29-June 2, 2011.

"Riding the Wave of Data," STM Annual Spring Conference 2011. Trailblazing & transforming scholarly publishing **2011**. Washington, D.C., April 28, 2011.

"Confronting old assumptions to assume new roles: physical and operational integration of the Press and Libraries at Purdue University," keynote speaker, 2011 BioOne Publishers & Partners Meeting. Washington, D. C., April 22, 2011.

"Are MLS Graduates Being Prepared for the Changing and Emerging Roles that Librarians must now assume within Research Libraries?" University of Oklahoma Libraries Seminar, March 4, 2011, Oklahoma City, Oklahoma.

"The Future Role of University Librarians," the University of Cape Town, South Africa, February 25, 2011.

Purdue University – a case study. International Council for Science and Technology (ICSTI); Ottawa, Canada. June 9, 2009.

"Reinventing Science Librarianship: Models for the Future," Association of Research Libraries / Coalition for Networked Information. October 16-17th, 2008, Arlington, VA. Moderator and convener of Data Curation: Issues and Challenges.

"Practical Implementation and Opportunities Created at Purdue University," African Digital Curation Conference, Pretoria, South Africa, (live video transmission), February 12, 2008.

Keynote speaker. *"Scholarly Communication & Academe: The Winter of Our Discontent,"* XXVII Charleston Conference on Issues in Book and Serial Acquisition, Charleston, South Carolina. November 8, 2007.

Keynote speaker. "*Enabling Access to Scientific & Technical Data-sets in e-Science: a role for Library and Archival Sciences,"* Greater Western Library Alliance (GWLA), Tucson, Arizona. September 17, 2007. A meeting of library directors and vice presidents for research of member institutions.

"*The Challenge of e-Science Data-set Management to Domain Sciences and Engineering: a Role for Academic Libraries and Librarians,"* KIT (Kanazawa Institute of Technology)/CLIR (Council of Library and Information Resources) International Roundtable for Library and Information Science, July 5-6, 2007. Invited to participate by the Deputy Librarian of Congress.

International Association of Technological University Libraries (IATUL), Stockholm, Sweden. June 8, 2007. Invited paper, *Enabling International Access to Scientific Data-sets: creation of the Distributed Data Curation Center (D2C2).*

"A New Collaboration for Librarians: The Principles of Library and Archival Sciences Applied to the Curation of Datasets," Symposium of the Libraries and the College of Engineering, University of Louisville, April 6, 2007.

"Purdue University Libraries: Through Pre-eminent Innovation and Creativity, Meeting the Challenges of the Information Age," Board of Trustees, Purdue University, February 15, 2007.

ARL Workshop on New Collaborative Relationships: The Role of Academic Libraries in the DigitalData Universe, September 26-27, 2006, Arlington, VA. Invited participant.

NARA and SDSC: A partnership. A panel before the National Science Foundation, June 27, 2008.

"Kaleidoscope of Scientific Literacy: fusing new connections," with Diane Rein, American Section, Annual Conference, New Orleans, June 26th, 2006.

"Leadership for Learning: Building a Culture of Teaching in Academic Libraries – an administrative perspective, American Library Association, Association of College and Research Libraries, Instruction Section, Annual Conference, New Orleans, June 25th, 2006.

"Building an interdisciplinary research program in an academic library:
how the Libraries' associate dean for research makes a difference at Purdue University," International Association of Technological University Libraries (IATUL), Porto, Portugal, May 23rd, 2006.

Beyond the Hanseatic League. 8th International Conference on Current Research Information Systems, with D. Scott Brandt and Michael Witt. Promoted by euro CRIS, Bergen, Norway, May 12th, 2006, Brandt and Witt presented in person

"Interdisciplinary Research," with D. Scott Brandt, Coalition for Networked Information (CNI) Spring Meeting: Project Briefing, Washington, D.C., April 3rd, 2006.

"An Interview with Purdue's James Mullins," a podcast submitted by Matt Pasiewicz, on *Educause Connect,* http://connect.educause.edu/James_L_Mullins_Interview_CNI_2005

"Managing Long-Lived Digital Data-sets and their Curation: Interdisciplinary Policy Issues," Managing Digital Assets Forum, Association of Research Libraries (ARL), Washington, D.C., October 28th, 2005.

"The Odyssey of a Librarian." Indiana Library Federation (ILF), District 2 Meeting, South Bend, Indiana. October 4th, 2005.

"Is Anyone There?" LAMA, Statistics Section, ALA, Atlanta, June 19, 2002. Research presentation on librarian recruitment at the IvyPlus institutions during the last three years.

"New College Library Standards," Standards Committee Presentation, ALA, Chicago, July 7, 2000.

SUNY Library Directors, Lake George, New York. "*The College Library Standards: a Tool for Assessment."* April 5, 2000.

Tri-State College Library Association, *Finding You Have Talents You Never Knew You Had,* Penn State Great Valley, March 25, 2000.

Using Web Statistics, American Library Association, New Orleans, June 24, 1999.

Keynote speaker at the JSTOR Workshop, January 29, 30, 1999. University of Pennsylvania, Philadelphia, PA.

"The New Standards for Electronic Resources Statistics," Society of Scholarly Publishers, Washington, D.C., September 17, 1998.

"Evaluating Online Resources: Now that you've got them what do you do?," joint presenter with Chuck Hamaker, LSU, at the NASIG Conference, Boulder, Colorado. June 1998.

"What Employers Are Looking for in New Librarians?" Pennsylvania Library Association, Philadelphia. September 26, 1997.

"The Theory of Matrix Management" panel presentation of the Comparative Library Organization Committee of the Library Organization and Management Section of the Library Administration and Management Association, a division of the American Library Association, Annual Meeting, Chicago, June 24, 1990.

Professional Involvement: (summary of recent emphasis)

The focus for my professional involvement and research has moved recently toward managing massive data-sets. This has resulted in working with faculty in the sciences and technology to determine how librarians can collaborate in managing, curating, and preserving data-sets for future access and documentation. This has included various speaking opportunities as well as participation in planning with the National Science Foundation (NSF) on ways in which librarians can be integrated more completely into the funded research process. Participation in the Kanazawa Institute of Technology/Council of Library Resources Roundtable was particularly rewarding and provided new opportunities to share with international colleagues the issues surrounding data-set management. I was the champion for the creation of the Distributed Data Curation Center (D2C2) at Purdue University (http://d2c2.lib.purdue.edu/)

Throughout my career, beginning with my dissertation, I have been actively involved with assessing and evaluating libraries. In the fall of 1999, I contacted twenty-two academic library directors to determine whether the need was also felt by others. The response was overwhelmingly affirmative. This resulted in a meeting at ALA Midwinter, January, 2000. A formal meeting followed at Villanova University in April, 2000. As convenor, I helped to form the University Libraries Group (ULG), modeled after the Oberlin Group for college libraries. The ULG is made up of university libraries that support diverse wide ranging programs through doctoral level, and have a level of support that places them in the top tier of academic institutions. A few of the member libraries, along with Villanova, are William and Mary, Wake Forest, Lehigh, Carnegie-Mellon, Tufts, Marquette, Miami of Ohio, and Southern Methodist.

In 1994, I was appointed to the Standards Committee, College Section, Association of College and Research Libraries. During the next six years, the Committee concentrated on changing the focus of the standards from quantitative analysis of input and output factors to emphasis on assessment of the outcome. Culmination of the work was a re-issue of the *Standards for College Libraries* in 2000. The knowledge gained through my work experience enabled me to formulate the changes needed in the standards. This work allowed for close collaboration with accrediting agencies, both professional and regional.

During this same time another focus emerged, the impact of digital resources. Through my work on the JSTOR Statistics Task Force, standards were developed on the collection of use of electronic databases. This Standard was later adopted in 1998 by the International Consortium of Library Consortia (ICOLC).

In 2002, the American Library Association appointed me to serve as the liaison to the Marketing and Management Section of the International Federation of Library Associations (IFLA).

Professional Service: (representative list)

Nominations Committee, Association of Research Libraries (ARL), 2016.

Steering Committee, Scholarly Publishing and Academic Resources Coalition (SPARC), 2016 – 2018.

"Excellence in Library Services," Chair, Review Team, City University of Hong Kong, Hong Kong, August 24-27, 2015.

Chair, Management Advisory Board, 2015-2017; Member, Scientific Advisory Board, arXiv, Cornell University, 1/1/2013 – July 1, 2017.

Advisory Board for the Wayne State University School of Library and Information Science, July 2012 – 2018.

Advisory Board for Microsoft Academic Search, 2012 – 2015. Redmond, WA.

Transforming Research Libraries, a Strategic Direction Steering Committee of the Association of Research Libraries (ARL), 2012-2015.

Science and Technology section, representing ARL, International Federation of Library Associations (IFLA), Chair, 2013 – 2017; Member, 2011 to present.

Co-chair, Local Arrangements Planning Committee for 2013 Conference, Association of College and Research Libraries (ACRL), a division of the American Library Association (ALA).

Association of Research Libraries Leadership & Career Development Program Mentor, 2011-2013.

e-Science Task Force, Association of Research Libraries. July 2006 – present. Chair, October 2011 – October 2012.

Board of Directors, International Association of Technological University Libraries (IATUL). January 2008 – December 2014.

Midwest Collaborative for Library Services (MCLS); Board Member, October 2010 – December 2012.

Chair, Library Directors, Committee on Institutional Cooperation (CIC), July 2010 – June 2012.

Board of Directors, Association of Research Libraries (ARL); October 2008 – October 2011.

Scholarly Communication Steering Committee, Association of Research Libraries (ARL) 2008-2011.

Editorial Board, *College and Research Libraries*, Association of College and Research Libraries, American Library Association. January 2008 – December 2014.

Chair, Organizing Committee for IATUL Conference 2010, June 21-24, 2010, Purdue University, West Lafayette, Indiana/Chicago, Illinois.

Conference Planning Committee for National Conference of the Association of College and Research Libraries, 2009, Seattle, Washington.

Research Committee, Association of College and Research Libraries, ACRL, division of ALA. 2002-2007, chair, 2005-2007.

Association of Research Libraries, Search and Screen Committee, Executive Director. March – January 2008.

Center for Research Libraries, Board of Directors. April 2006 – April 2012.

Academic Libraries of Indiana, Board of Directors, 2004 – present. Vice-president, 2005-2007. President, 2007- 2009.

ALA Representative to the International Federation of Library Associations (IFLA), Marketing and Management (M&M) Section, initial term 2003-2007, re-appointed for second term, 2007-2011.

ALA Nominating Committee - 2005. Appointed as LAMA representative.

Invited to represent Research Libraries at the ACRL/3M Wonewok Retreat to assess Marketing of Academic Libraries, October, 2002.

Hugh A. Atkinson Award Committee, LAMA Representative, ALA, 2001-2005.

Program Committee, Library Administrators and Management Association (LAMA), a division of ALA. 1996-2001.

ACRL, Standards and Accreditation Committee, a division of ALA. Liaison to RBMS Section of ACRL. 1997-2002.

Elected to the Executive Committee of LAMA, LOMS, a division of the American Library Association, 1998-2000. Nominated as Chair/Elect for 2003 – 2005.

Columbia University Press Advisory Committee. 1996 - 2000.

LITA/LAMA Conference Evaluation Committee, Pittsburgh, Pennsylvania, October, 1996.

"New Learning Communities," Coalition for Networked Information, Indianapolis. November 19-21, 1995. Facilitator for invitational, national conference committed to developing collaborative learning and teaching techniques, involving librarians.

Planning Committee-Evaluation. LITA/LAMA 1996 Conference, Pittsburgh. This first conference, to be held jointly between two divisions of ALA, will focus on new technologies within libraries.

Indiana Cooperative Library Services Authority (InCoLSA), elected to Executive Committee, April 1991, served as President in 1993-94. InCoLSA is a statewide network of academic, public, school and special libraries that supports library cooperation for cataloging, interlibrary loan, collection development and application of new technologies.

Governor's Conference on Libraries and Information Services. Served on Planning Committee, Academic Libraries Representative, appointed by the Governor to represent academic libraries in Indiana, Chair, Finance Committee, April, 1989-July 1991.

Indiana Library Endowment Foundation Board, 1984-92. Charter Member, 1984, President, 1988-1992. 2004-2005.

University Service: (Summary)

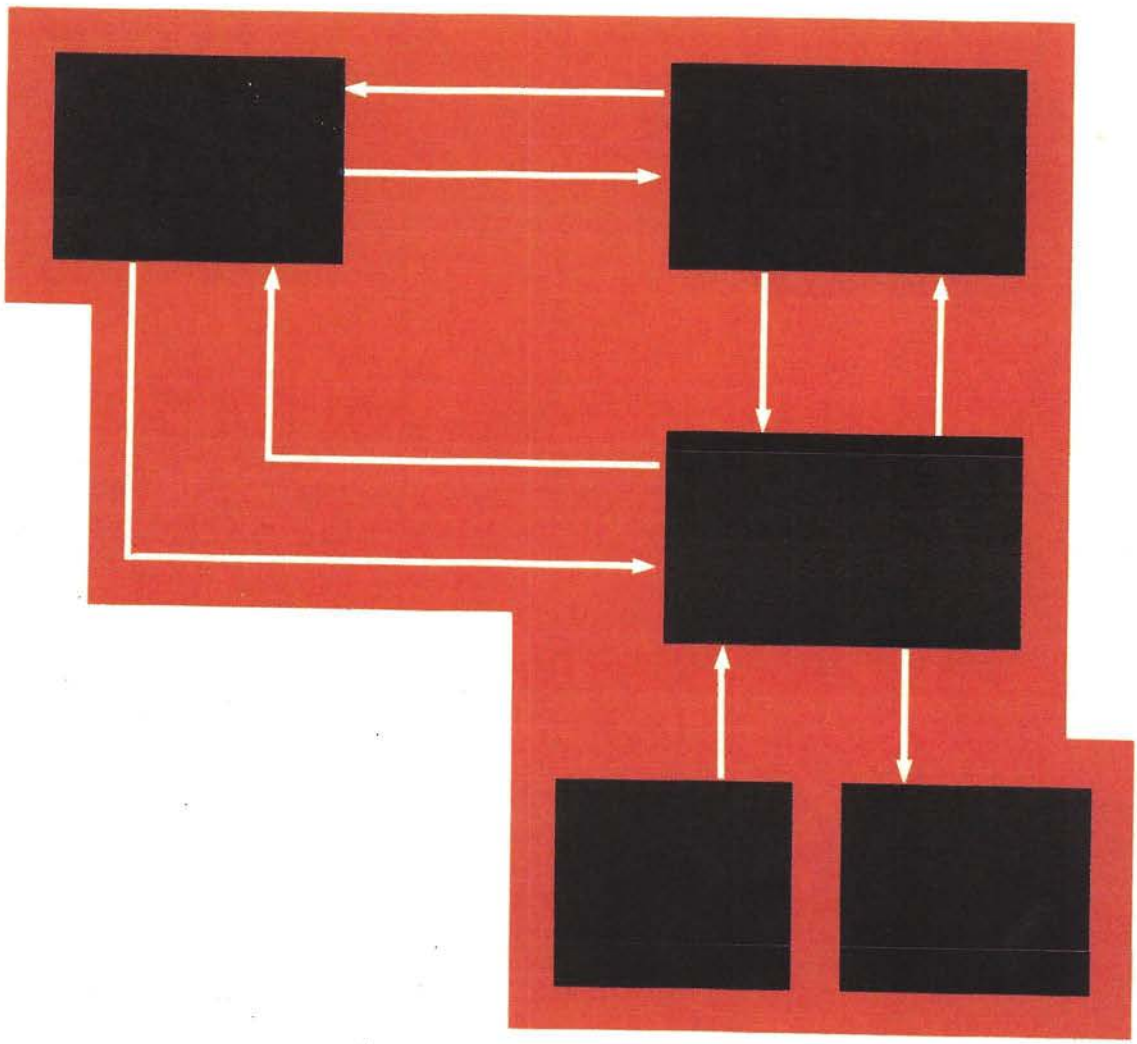
During my career I have served on search and screen committees for senior positions including chancellor, dean and directors; most recently I have been asked to serve on the search committee for the provost of Purdue University. At MIT service included the Library Council & appointment to the Administrative Council by President Vest, 2001-2003 & Member of the Faculty Committee on the Library System. At Purdue appointed by the President to the Search Committee for the Provost, October 2007 to May 2008; member of the Capital Projects Committee, and IT Operational Oversight Committee as senior academic dean, 2008-2014; Global Council, Global Policy Institute, 2012 – 2016.
Academic Program Excellence and Rankings (APER) project team, 2014.
Representative of the Academic Deans on the Re-engineering Business Operations, Purdue University, 2016 –
Academic Deans Council chaired by Provost – 2004 – present.
University Promotion and Tenure Committee – 2006 – present.

Community Service: (Summary)

Beyond commitment to the profession and the university, there is also a need to support the community in which one lives. Because that belief is very important to me, I have valued my service on numerous boards, committees and councils with a range of concerns. I have been involved with inner city community development (West Washington Neighborhood Organization), historic preservation (West Washington Design Review Board), social services (Center for the Homeless, Madison Center for Mental Health) and community cultural services (South Bend Regional Museum of Art, the George W. Rickey Sculpture Exhibition, the Fischoff National Chamber Music Competition, the Northern Indiana Center for History).
University Chair of the United Way Campaign, 2006.

Attachment 1014A

Digital Logic and Computer Design



M. MORRIS MANO

Digital Logic and Computer Design

M. MORRIS MANO

Professor of Engineering
California State University, Los Angeles

Prentice-Hall, Inc., Englewood Cliffs, N.J. 07632

Library of Congress Cataloging in Publication Data

MANO, M. MORRIS (date)
Digital logic and computer design.

Bibliography: p.
Includes index.
1.–Electronic digital computers. 2.–Logic circuits. 3.–Digital integrated circuits. 4.–Logic design. I.–Title.
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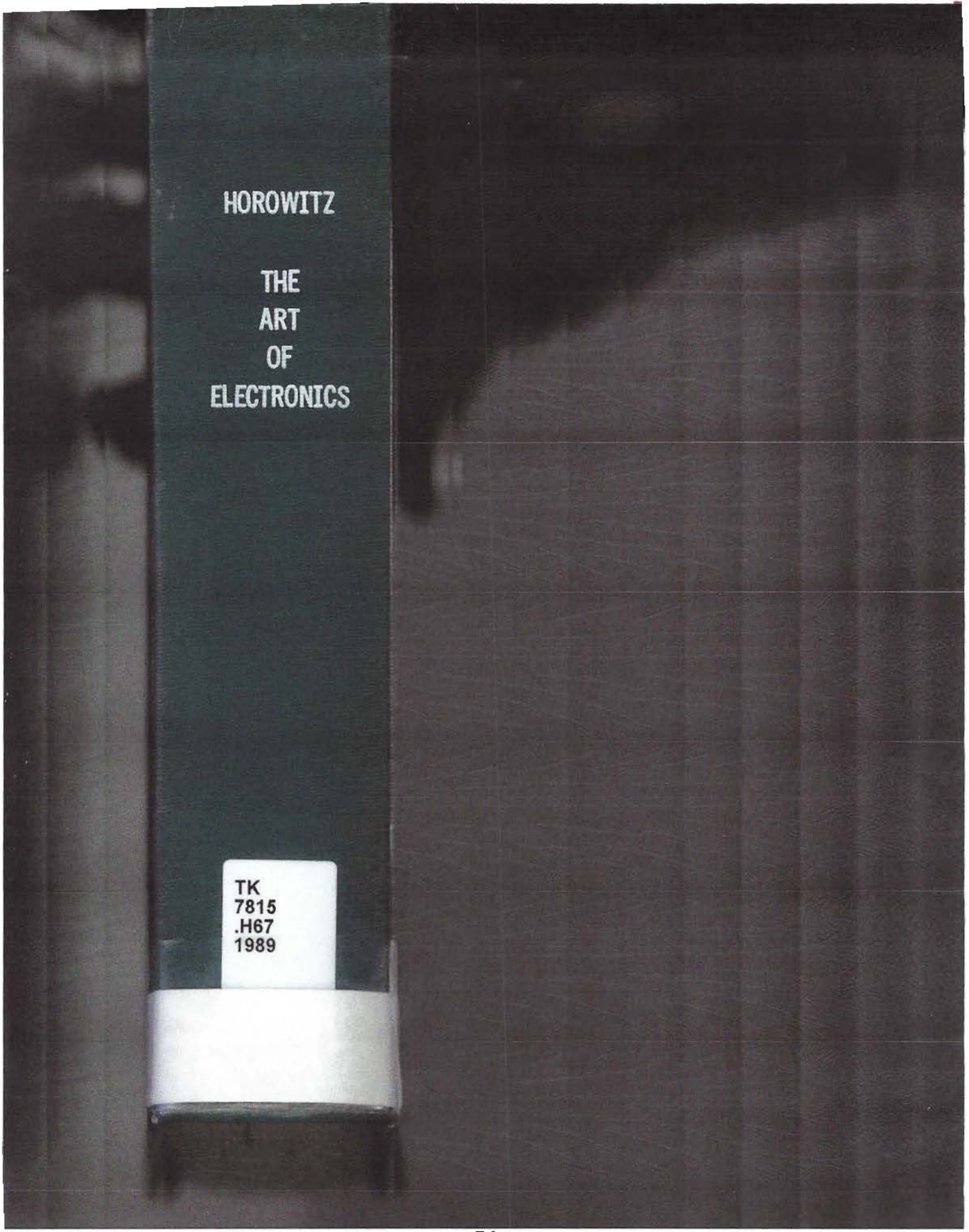
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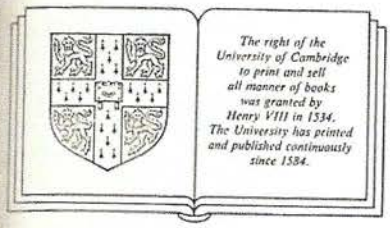

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Reprinted 1990

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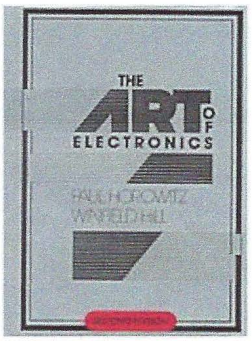

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Author: Paul Horowitz; Winfield Hill

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