

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re *Inter Partes* Review of:)
U.S. Patent No. 10,917,737)
Issued: February 9, 2021)
Application No.: 16/558,088)
Filing Date: August 31, 2019)

For: **Defining a Zone with a HPED and Providing Binaural Sound in the Zone**

DECLARATION OF INGRID HSIEH-YEE, PH.D.

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I. Introduction

I, Ingrid Hsieh-Yee, Ph.D., do hereby declare as follows:

1. I have personal knowledge of all of the matters about which I testify in this declaration.

2. I have been retained as an independent expert witness on behalf of Meta Platforms, Inc. (“Meta”) for proceedings before the United States Patent and Trademark Office (“PTO”) regarding the authenticity and public availability of certain prior art reference in relation to U.S. Patent No. 10,917,737 (“the ’737 patent,” **Ex. 1001**).

3. I am being compensated for my work in this matter at my customary hourly rate. I am also being reimbursed for any reasonable expenses associated with my work and testimony in this investigation. My compensation is not contingent on the results of my study, the substance of my opinions, or the outcome of this matter.

A. Qualifications and Professional Experience

4. My complete qualifications and professional experience are described in my academic *curriculum vitae* (**Ex. 1011**). The following is a brief summary of my relevant qualifications and professional experience.

5. In 2022, I was conferred the title of Professor Emerita after 32 years as a professor in the Department of Library and Information Science of the Catholic University of America. I have experience working in an academic library, a medical

library, and a legislative library. I hold a Ph.D. in Library and Information Studies from the University of Wisconsin-Madison and a Masters in Library and Information Studies from the University of Wisconsin-Madison.

6. I am an expert on library cataloging and classification and have published two editions on this subject, *Organizing Audiovisual and Electronic Resources for Access: A Cataloging Guide* (2000 and 2006). I taught a variety of courses, including Cataloging and Classification, Advanced Cataloging and Classification, Organization of Internet Resources, Organization of Information, Metadata, Digital Content Creation and Management, Internet Searches and Web Design, Information Literacy Instruction, Advanced Information Retrieval and Analysis Strategies, and The Information Professions in Society. I am familiar with metadata schema design and implementation. In my teaching I covered the design and implementation of metadata in databases, search engines, digital repositories, digital libraries, and digital archives. I also covered how information organization affects the discovery and access to digital resources on the Internet. My research interests cover cataloging and classification, information organization, metadata, information retrieval, information architecture, digital collections, scholarly communication, social media, user interaction with information systems, and others.

7. I am very familiar with a library cataloging encoding standard known as the “Machine-Readable Cataloging” standard, also known as “MARC,” which

became the national standard for sharing bibliographic data in the United States by 1971 and the international standard by 1973. I am also personally familiar with the Online Computer Library Center (OCLC), which is the largest bibliographic network of the world, with more than 554 million records and thousands of member institutions (many of which are libraries of some type) in more than 100 countries. I am also personally familiar with WorldCat (<http://www.worldcat.org>), which is a free web portal for users to explore more than 10,000 libraries worldwide. I provide a brief overview of MARC records, OCLC, WorldCat, and cataloging below at Section I.E.

8. I am also personally familiar with many online catalogs, databases, and search engines. In preparing for this declaration, I used the following authoritative information systems to search for records:

- Catalog of US Government Publications
(<https://catalog.gpo.gov/F?RN=431058606>)
- Google Scholar (<https://scholar.google.com>)
- NASA Technical Reports Server (NTRS, <https://ntrs.nasa.gov/>)
- Online catalog of the Library of Congress (<https://catalog.loc.gov/>)
- Online catalog of the Stanford University Library
(<https://searchworks.stanford.edu/>)

- Online catalog of the US Naval Academy Library
(<https://www.usna.edu/Library/>)
- Public catalog of the US Copyright Office (<https://cocatalog.loc.gov/>)
- WorldCat (<https://www.worldcat.org>)

B. Scope of This Declaration

9. I have been asked to offer an opinion on the authenticity and public availability date of the following document:

Begault, Durand R., *3-D Sound for Virtual Reality and Multimedia*, NASA-TM-2000-209606 (Aug. 2000), published by the National Aeronautics and Space Administration (NASA), **Ex. 1007** (“*Begault-2000*”).

10. I am rendering my expert opinion on the authenticity of the documents referenced herein and on whether they were published. I will provide my opinion on when and how these documents were publicly disseminated or otherwise made publicly available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, could have located and retrieved these documents.

11. 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

documents themselves, such as the appearance, content, substance, internal patterns, protocols followed or other distinctive characteristics of the item.

12. I am informed by counsel that a given reference is “published” if it is publicly accessible upon a satisfactory showing that such a document has been disseminated or otherwise made publicly available to the extent that persons interested and ordinarily skilled in the subject matter or art could locate it exercising reasonable diligence and obtain the document. I have also been informed by counsel that materials available in a library constitute “printed publications” if they are cataloged and indexed according to general library practices and protocols that make the references available and accessible to members of the interested public.

13. I have been informed by counsel that the ’737 patent was filed in the United States on August 31, 2019 and that it claims priority to a provisional application filed on June 10, 2016. I have assessed public accessibility of the documents referenced below as of this claimed priority date.

C. Person of Ordinary Skill in the Art

14. I have been informed by counsel that the subject matter of this proceeding relates to virtual/augmented reality systems.

15. I have been informed by counsel that a person of ordinary skill in the art at the time of the inventions (“POSA”) 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 and literature applicable to the pertinent field.

16. I am told by counsel that persons of ordinary skill in this subject matter or art in the 2016 timeframe would have had at least a bachelor's degree in electrical or computer engineering (or equivalent degree), and at least five years of industry or academic research experience in virtual/augmented reality system development. A higher level of education, such as a post-graduate degree in related fields, could substitute for less work experience.

17. It is my opinion that such a person would have been actively engaged in learning about the field, possibly through formal instruction through the bibliographic resources. By at least June 2016, such a person would have had access to a vast array of print and electronic resources, including at least the documents referenced below.

D. Evidence Considered in Forming My Opinions

18. In the preparation of this declaration, I have reviewed the documents referenced below and any other documents I reference herein, and each of these is a type of material that experts in my field would reasonably rely upon when forming their opinions:

- (1) NTRS metadata record for *Begault-2000*, available at <https://ntrs.nasa.gov/citations/20010044352> from the NASA Technical Reports Server, accessed and obtained on January 24, 2023, **Appendix 1007A**;

- (2) Bibliographic and MARC records for the microfiche version of *Begault-2000*, available at https://catalog.gpo.gov/F/?func=direct&doc_number=000547656&local_base=GPO01PUB from the Catalog of U.S. Government Publications, accessed and obtained on January 24, 2023, **Appendix 1007B**;
- (3) Bibliographic and MARC records for the microfiche version of *Begault-2000*, available at <https://searchworks.stanford.edu/view/4702295> from the online catalog of the Stanford University Library, accessed and obtained on January 24, 2023, **Appendix 1007C**;
- (4) Bibliographic and MARC records for *Begault-1994* published by AP Professional in 1994, available at <https://lcn.loc.gov/94028168> from the online catalog of the Library of Congress, accessed and obtained on January 24, 2023, **Appendix 1007D**;
- (5) Copyright registration record for *Begault-1994* published by AP Professional in 1994, available at https://cocatalog.loc.gov/cgi-bin/Pwebrecon.cgi?v1=1&ti=1,1&Search%5FArg=Begault%2C%20Durand&Search%5FCode=NALL&CNT=25&PID=btFSBdi9JGlyuOTDnCQetE_g75Za&SEQ=20230124170624&SID=2 from the public catalog of the U.S. Copyright Office, accessed and obtained on January 24, 2023, **Appendix 1007E**;
- (6) Bibliographic and MARC records for *Begault-1994* published by AP Professional in 1994, available at https://usna.primo.exlibrisgroup.com/permalink/01USNA_INS_T/5rvora/alma991000609529706751 from the online catalog of the US Naval Academy Library, accessed and obtained on January 24, 2023, **Appendix 1007F**;
- (7) Bibliographic and MARC records for *Begault-1994* published by AP Professional in 1994, available at <https://searchworks.stanford.edu/view/3099834> from the online catalog of the Stanford University Library, accessed and obtained on January 24, 2023, **Appendix 1007G**;

- (8) 1995 and 2001 Citations to *Begault-1994* published by AP Professional in 1994, obtained from Google Scholar, **Appendix 1007H**.

E. Overview of MARC Records, OCLC, WorldCat, and Cataloging

19. MARC is the primary communications protocol for the transfer and storage of bibliographic metadata in libraries. Experts in my field would reasonably rely upon MARC records when forming their opinions.

20. A MARC record consists of 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. **Appendix A** is a true and correct copy of Parts VII to X of “Understanding MARC Bibliographic: Machine-Readable Cataloging” (<http://www.loc.gov/marc/umb/um07to10.html>) from the Library of Congress. *Understanding MARC Bibliographic* was originally published by the Follett Software Co. and copyrighted in 1988. Editions in 1989, 1990, 1994, 1998, 2000, 2003 and 2009 include changes. The latest edition was copyrighted in 2009. This document explains commonly-used MARC fields. For example, the personal author of the work is recorded in Field 100, the title is recorded in Field 245, publisher information is recorded in Field 260, the physical volume and characteristics of a publication are recorded in Field 300, and topical subjects are recorded in Fields 650.

21. OCLC was founded in 1967 to promote and support library cooperation. According to the “Third Article, Amended Articles of Incorporation of OCLC Online Computer Library Center, Inc.,” 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 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” (source: <https://www.oclc.org/content/dam/oclc/membership/articles-of-incorporation.pdf>).

22. OCLC members can contribute original cataloging records in MARC to the system or derive cataloging records from existing records, an activity referred to as “copy cataloging.” When an OCLC participating institution acquires a work, it can create an original MARC record for the work in OCLC’s Connexion system (a system for catalogers to create and share MARC records), and the system will automatically generate a code for the date of record creation in the yymmdd format, and the creating library’s OCLC symbol is recorded in subfield “a” of the 040 field. Once the MARC record is in Connexion, it becomes available to other OCLC members for adoption to their local online catalogs (*i.e.*, copy cataloging).

23. After a MARC record is created in Connexion, it also becomes searchable and viewable on WorldCat, which is a free web portal for users to explore more than 10,000 libraries worldwide. Records in WorldCat, however, are not presented in MARC fields. Instead, the data elements are labeled to help users interpret the records. Thus, the information stored in MARC records in Connexion is available to the interested public through the user-friendly WorldCat web portal.

24. WorldCat is “the world’s largest network of library content and services” and its features are summarized in “What is WorldCat.org?” (<https://www.worldcat.org/about>). WorldCat began operation in January 1998 as a free web portal to the collections of more than 10,000 libraries worldwide. Through WorldCat, users can search for information resources in their local libraries and libraries around the world. WorldCat allows users to search for books, CDs, videos, and many new types of digital content, such as audiobooks, in many languages. Users can also retrieve research materials and article citations with links to their full text. After an item is retrieved, WorldCat helps users identify a library nearby that holds the item or all the libraries that hold the item. WorldCat is an efficient way to explore the content held by more than 10,000 libraries around the world. WorldCat is publicly accessible, and there is no fee to perform a search on WorldCat.

25. Library online catalogs gained acceptance in the early 1980s and many libraries migrated their systems to the World Wide Web in the mid-1990s. Library

online catalogs are based on MARC records that represent their collections in order to help the public understand what materials are publicly accessible in those libraries. Most libraries with online catalogs have made their catalogs freely available on the Web. These online catalogs offer user-friendly search interfaces. Strong user interest in keyword searches and the popularity of Google have led to the “googlization” of library search systems. As a result, many library catalogs now provide a single search box for users to conduct keyword searches, with additional support for searches by author, title, subject terms, and other data elements such as ISBN (International Standard Book Number). Library catalogs these days also offer features for users to narrow their search results by language, year, format, and other elements. Many libraries display MARC records on their online catalogs with labels for the data elements to help the public interpret MARC records. Many libraries also offer the option to display MARC records in MARC fields.

26. Libraries create MARC records for works they acquire, including books, serials, motion pictures, and publications in other formats. Monograph cataloging is fairly common in libraries, and most libraries make a newly cataloged monograph available to the public soon after the cataloging work is completed, usually within a week. Libraries can create original cataloging records or use an existing record in OCLC to create a copy cataloging record. As soon as the cataloging record is completed, it is added to the library’s online catalog for users.

If the record is an original record, it is also entered into the OCLC system. If it is a copy cataloging record, the library's holding symbol is attached to the existing original record in the OCLC system to facilitate searching and interlibrary loan.

II. Authenticity and Public Availability of *Begault-2000* (Ex. 1007)

A. Authentication

27. **Ex. 1007** is a true and correct copy of *3-D Sound for Virtual Reality and Multimedia* by D. R. Begault ("*Begault-2000*") that I obtained from the NASA Technical Reports Server (NTRS). When I began my research on this work I searched Google Scholar for records for *Begault* and found a link that led me to the metadata record for this work at <https://ntrs.nasa.gov/citations/20010044352> on NTRS. I followed the download link in this metadata record to obtain a copy of *Begault-2000*. This copy is presented as **Ex. 1007** in this Declaration.

28. Page 1 of **Ex. 1007** is the cover that shows the title and author of this work, identifies it as "NASA/TM-2000-209606" and indicates that it was published in "August 2000" by the National Aeronautics and Space Administration, Ames Research Center of Moffett Field, California. Page 2 is the acknowledgement page that shows this work is available from the NASA Center for AeroSpace Information of Hanover, MD and the National Technical Information Service of Springfield, VA. Pages 3 to 6 (internal pages v to viii) are the table of contents that shows this work has six chapters, bibliographic references that begin on internal page 213 and an

index that begins on internal pages 229. Page 7 (internal page ix) is the “Preface to the NASA Technical Memorandum version” by Begault who states that “[s]ince its publication in 1994, *3-D Sound for Virtual Reality and Multimedia* has received considerable attention in the audio and virtual reality community ... I have continued to receive many requests for this book since it went out of print in 1998, and so have decided to provide this facsimile of the original printing for virtual acoustic researchers and enthusiasts.”

29. Internal page 244 of **Ex. 1007** is the “Report Documentation Page” that shows this work is a “Technical Memorandum,” the report date is “August 2000,” the National Aeronautics and Space Administration is the sponsoring agency, and “NASA/TM-2000-209606” is the sponsoring agency report number. This page also shows an abstract that describes the topics covered by each of the six chapters and indicates this technical memorandum “is a reprint of the 1994 book from Academic Press.” In addition, this page shows this technical memorandum has a total of 244 pages, its subjects are “Virtual reality,” “Acoustics,” and “Human-machine interfaces.” This page also shows that the security classification of *Begault-2000*, the report documentation page, and the abstract is “Unclassified,” meaning there is no access restriction on the report, the document page or the abstract.

30. **Ex. 1007** is in a condition that creates no suspicion about its authenticity. Specifically, this copy is not missing any intermediate pages, the text

on each page appears to flow seamlessly from one page to the next, and there are no visible alterations to the document. Furthermore, this copy of *Begault-2000* was found in the custody of NASA, the sponsoring agency of this report, a place where, if authentic, it would likely be found. I therefore see no reason to question the authenticity of this copy of *Begault-2000*.

B. NASA Metadata Record

31. **Appendix 1007A** is a true and correct copy of the NASA metadata record for *Begault* that I obtained from the NASA Technical Reports Server (NTRS). I personally located, identified and obtained this metadata record. This is the type of record experts in my field would reasonably rely upon when forming their opinion. The NASA metadata record is presented as **Appendix 1007A** in this Declaration.

32. Page 1 of **Appendix 1007A** shows the metadata record is available at <https://ntrs.nasa.gov/citations/20010044352>. The metadata record shows the title, abstract, document ID, and document type of *Begault-2000*. The “Authors” field shows Begault as the first author. The “Publication Date” field shows this work was published on “August 1, 2000” and the “Date Acquired” field shows this work was acquired by NTRS on “September 7, 2013,” making *Begault-2000* discoverable on NTRS from that date on. The metadata record also shows the report/patent numbers and the funding number. The “Distribution Limits” field shows the work can be distributed to the public, and the “Copyright” field shows this report is a “Work of

the US Gov. Public Use Permitted.” The metadata record also shows this work is available for download. The title, abstract, first author, publication date, report number, funding number, and distribution limit match the information presented in **Ex. 1007**, confirming this metadata record represents *Begault-2000*.

C. U.S. Government Publications Catalog Records

33. Because the NASA metadata record (**Appendix 1007A**) indicates *Begault-2000* is a work of the US government, I searched the Catalog of the U.S. Government Publications (CGP) to determine if any records were created for this work, and the search results showed that GPO (Government Publications Office) cataloged the microfiche version of *Begault-2000* and made it discoverable in their online catalog in 2002. The library records are presented as **Appendix 1007B** in this Declaration.

34. **Appendix 1007B** is a true and correct copy of the bibliographic record and MARC record for the microfiche version of *Begault-2000*. I personally located, identified, and obtained these library records. They are the type of records experts in my field would reasonably rely upon when forming their opinion.

35. Pages 1 to 2 of **Appendix 1007B** are the bibliographic record for the microfiche version of *Begault-2000* that shows the title, author, publisher and distributor, series title and numbering, and the “August 2000” publication date on the cover. The information in these fields matches the information presented in the

copy obtained from the NASA Technical Reports Server (**Ex. 1007**), confirming this record represents *Begault-2000*. Since 1895 the United States Government Printing Office (GPO) has managed the Federal Depository Library Program (FDLP) to provide free public access to U.S. federal government publications. The print format was the dominant format for document distribution for many years, and by 1978 US government publications were also distributed in microfiche (source: Powell, M. S. (1999), *The US Federal Depository Library Program and US Government Information in an Electronic Environment: Issues for the Transition and the Millennium*). Because microfiche was a common format for distributing US government publications to depository libraries, GPO cataloged the microfiches and made GPO records available to depository libraries for copy cataloging to facilitate public discovery and access to government publications. **Appendix 1007B** is an example of this type of record. The “SuDoc Number” field shows the “Superintendent of Documents” number that is the type of call number typically applied to federal documents. The first general note shows the shipping list no. for the microfiche version of *Begault-2000* is “2002-0039-M.” Two Linking Field notes show this work is also available in print and online.

36. Pages 3 and 4 are the MARC record for the microfiche version of *Begault-2000*. The first six digits of Field 008 show the MARC record was created on “021030” (*i.e.*, October 30, 2002), and Subfield “a” of Field 040 shows the record

was originally created by “GPO” (the Government Printing Office at the time, later changed to Government Publications Office). Data from Fields 008 and 040 inform my opinion that since October 30, 2002, the microfiche version of *Begault-2000* has become discoverable in the catalog of the Government Printing Office. **Appendix 1007B** shows that Begault is included as the author in Field 100, title is recorded in Field 245, a variant title is included in Field 246 to help users discover this work, the NASA Center for AeroSpace Information is included in Field 264 to help users obtain this work, Field 533 explains that this MARC record represents a microfiche reproduction of the original work, and Field 710 shows Ames Research Center can be used to discover this work.

37. Subjects of *Begault-2000* are represented in Field 086 by a Superintendent of Documents Classification number of “NAS 1.15:209606” and by six Library of Congress subject headings in Fields 650, with “Sound,” “Sound-waves,” “Virtual reality,” “Human-computer interaction,” “Signal processing,” and “Psychoacoustics” as the topics.

38. This MARC record shows that *Begault-2000* was published in 2000, and the MARC record for the microfiche version has made it discoverable at the online catalog of the Government Printing Office Library since October 30, 2002. Interested users would have been able to conduct subject searches by the SuDocs number and by the Library of Congress subject headings to discover this work. They

would also have been able to search for this work by the author, title, variant title, and the publisher.

D. Stanford University Records

39. **Appendix 1007C** is a true and correct copy of the bibliographic record and MARC record for the microfiche version of *Begault-2000* that I obtained from the online catalog of the Stanford University Library. I personally searched for records for this work by its title and located, identified, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinion.

40. Pages 1 to 3 of **Appendix 1007C** are the bibliographic record that shows the title, author, imprint, physical description, series, contributor, subjects, publication date, title variation, and notes for *Begault-2000*. Pages 4 and 5 are the MARC record. The first six digits of Field 008 show the original MARC was created on “021030” (*i.e.*, October 30, 2002), Subfield “a” of Field 040 shows “GPO” created the original record, and Field 916 shows *Begault-2000* was cataloged by the Stanford University Library on “20021212” (*i.e.*, December 12, 2002). Data from Fields 008, 040 and 916 inform my opinion that the Stanford University Library used the original MARC record created by GPO on October 30, 2002, for copy cataloging and completed their copy cataloging record on December 12, 2002,

making the microfiche version of *Begault-2000* discoverable in their online catalog from that date on.

41. Because the Stanford University Library MARC record is a copy cataloging record based on the GPO MARC record, it is natural that the two records have many fields in common, including the SuDoc Classification number in Field 086, the author in Field 100, title in Field 245, variant title in Field 246, publisher and distributor information in Field 260 (or 264), physical description in Field 300, series information, notes, microfiche reproduction note in Field 533, subject heading fields in Fields 650, and the publisher in Field 710. In addition, the Stanford University Library MARC record has a Field 530 that indicates this work is also “available via Internet from the NTRS web site. Address as of 5/22/06: <http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/200100443252%5F2001071187.pdf>; current access is available via PURL” and the PURL in Field 856 shows the permanent URL of this work is <https://purl.fdlp.gov/GPO/LPS70089>, which led me to an online version *Begault-2000*. I have compared the online version with **Ex. 1007** and concluded that the two copies are the same.

42. The Stanford University Library records (**Appendix 1007C**) is a copy cataloging record completed on December 12, 2002, making *Begault-2000* discoverable in the library online catalog from that date on. Users would have been able to conduct subject searches by the SuDocs number and by the Library of

Congress subject headings to discover it. They would also have been able to search for this work by the author, title, variant title, and the publisher. In addition, when the online version of *Begault-2000* became available in May 2006, the Stanford University Library added a note to alert users of the availability of the online version and also provided a PURL (i.e., permanent URL) note in Field 856 to lead users to the online version.

E. Library of Congress records for *Begault-1994*

43. The “Preface to the NASA Technical Memorandum version” by Begault in **Ex. 1007** states that the technical memorandum (NASA/TM-2000-209606) was published in 1994 (“*Begault-1994*”), and in response to many requests, he decided “to provide this facsimile of the original printing for virtual acoustic researchers and enthusiasts.” To determine whether *Begault-1994* was available in libraries, I searched WorldCat by the title of this book and found a record at <https://worldcat.org/title/30701019> that shows the Library of Congress, the US Naval Academy Library, and Stanford University Library are three of the holding libraries. I then searched the online catalog of the Library of Congress for their records for this book and the retrieved records at <https://lcn.loc.gov/94028168> show the library has two copies. These records are presented as **Appendix 1007D** in this Declaration.

44. **Appendix 1007D** is a true and correct copy of the bibliographic and MARC records for *3-D Sound for Virtual Reality and Multimedia* by Durand R. Begault that was originally published by AP Professional in 1994. I personally located, identified, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions.

45. Pages 1 to 2 are the bibliographic record that shows the author, title, publisher, physical description, ISBN (International Standard Book Number), subjects, and classification numbers for this book. The “Item Availability” area shows the call number for this book is “QA76.9.H85 B44 1994” for two copies stored offsite and users can request the copies at the Jefferson or Adams Building Reading Rooms of the Library of Congress.

46. Pages 3 and 4 are the MARC record. The first six digits of Field 008 show the record was created on “940616” (*i.e.*, June 16, 1994), and the “s1994” code following the record creation date indicates this book has a single publication date of 1994. Field 955 records local cataloging activities on this book, and the last subfield shows “CIP ver. pv06 11-04-94.” This note indicates the original record was a CIP record (Cataloging in Publication record created before publication of the book) and the record was verified on November 4, 1994. Subfield “a” of Field 040 shows “DLC” created the record. According to the *Directory of OCLC Members* (<https://www.oclc.org/en/contacts/libraries.html>), “DLC” is the OCLC library

symbol for the Library of Congress. Data from Field 008, 955 and 040 inform my opinion that the Library of Congress created a CIP record for *Begault-1994* on June 16, 1994, before the book was published, and the CIP record was verified by Library of Congress catalogers on November 4, 1994. As discussed above, a common library practice is to process newly cataloged books quickly for public access and the processing work is usually completed within a week after the cataloging work is completed. Based on my experience with the Library of Congress and their collections, it takes one to three months for a newly cataloged book to become available for public access at the Library of Congress. It is therefore my opinion that *Begault-1994* would have become discoverable in the online catalog of the Library of Congress on June 16, 1994, when the CIP record was created, and, after processing, the library copy would have become publicly accessible between December 1994 and February 1995 at the Library of Congress.

47. Field 020 shows the ISBN of *Begault-1994*, Field 100 shows Begault as the author, Field 245 shows the title and statement of responsibility, and Field 260 shows AP Professional of Boston published this book in 1994. Field 300 shows the physical details of this work, Field 504 shows the book includes bibliographical references and index, and Field 740 shows a variant title is included to help users discover this book.

48. Subjects of this book are represented in Field 050 by a Library of Congress Classification number of “QA76.9.H85” that represents “Human-computer interaction” and in Field 082 by a Dewey Decimal Classification number of “621.389/3” that represents “Sound recording and reproducing system.” Subjects are also represented in Fields 650 by five Library of Congress subject headings: Human-computer interaction, Virtual reality, Multimedia systems, Computer sound processing, and Sound in virtual reality. These subject representations enable users to conduct subject searches to discover *Begault-1994*.

49. The MARC record (**Appendix 1007D**) informs my opinion that *Begault-1994* became searchable in the online catalog of the Library of Congress on June 16, 1994, when the CIP record was created. Since June 1994 the MARC record has supported users to discover *Begault-1994* in the library’s online catalog by subjects, author, title, variant title, and ISBN. After processing, the library copy would have become publicly accessible between December 1994 and February 1995.

F. Copyright Registration Record for *Begault-1994*

50. **Appendix 1007E** is a true and correct copy of the copyright registration record for *3-D Sound for Virtual Reality and Multimedia* by Durand R. Begault that was originally published by AP Professional in 1994. I obtained this record from the public catalog of the United States Copyright Office in the Library of Congress by

first accessing their website at <http://www.copyright.gov>, following the “Learn More” link under “Search Copyright Records” and selecting the “Official Public Catalog (1978-present)” link to search for records by the author. I personally located, identified and obtained this record. This is the type of record experts in my field would reasonably rely upon when forming their opinions.

51. The title, author, imprint, copyright date, description and copyright claimant information match the information presented in the Library of Congress records (**Appendix 1007D**). The record shows “1994” is the date of creation, “1994-09-23” is the date of publication, and this work was registered with the US Copyright Office on “1994-10-19” and assigned a registration number of “TX0003918351.”

G. US Naval Academy Library Records for *Begault-1994*

52. My research on WorldCat identified the US Naval Academy Library as another holding library of *Begault-1994*, so I obtained the records for this work from their online catalog to determine the public availability date. I personally located, identified, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinion. These records are presented as **Appendix 1007F** in this Declaration.

53. **Appendix 1007F** is a true and correct copy of the bibliographic and MARC records for *Begault-1994* obtained from the US Naval Academy Library. Pages 1 to 3 are the bibliographic record that shows this book is available “at Nimitz

Library Third Floor General Stacks (QA76.9.H85 B44 1994).” The bibliographic record includes title, ISBN, creator, subjects, other title, publisher, creation date, format, and a local note.

54. Page 4 of **Appendix 1007F** is the MARC record. The first six digits of Field 008 show the record was originally created on “940616” (*i.e.*, June 16, 1994). Field 005 is a machine-generated field that records the last time this MARC record was modified, and it shows “19951121” (*i.e.*, November 21, 1995) as the last record modification date. Subfield “a” of Field 040 shows “DLC” (*i.e.*, Library of Congress) created the original record, and Subfield “d” shows “UNA” used the original MARC record for copy cataloging. According to the *Directory of OCLC Members* (<https://www.oclc.org/en/contacts/libraries.html>), “UNA” is the OCLC library symbol for the US Naval Academy. Based on the data in Fields 008, 005 and 040, it is my opinion that the US Naval Academy Library used the Library of Congress record to create a copy cataloging record for *Begault-1994*, and their record was last modified by November 21, 1995, meaning this record would have been in their online catalog no later than November 21, 1995, and the record would have made *Begault-1994* discoverable at least from that date on in this library.

55. Because the US Naval Academy MARC record (**Appendix 1007F**) is based on the Library of Congress MARC record (**Appendix 1007D**), the former contains the same data as the latter, except for a few fields of local details. **Appendix**

1007F shows that the interested public would have been able to conduct subject searches to discover *Begault-1994*. They would also have been able to discover this book by the author, title, variant title, and ISBN. The copy of this book would have become publicly accessible at this library by November 28, 1995.

H. Stanford University Library Records for *Begault-1994*

56. My research on WorldCat also identified the Stanford University Library as another holding library of *Begault-1994*, so I obtained their records from their online catalog to determine the public availability date. I personally located, identified, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinion. These records are presented as **Appendix 1007G** in this Declaration.

57. **Appendix 1007G** is a true and correct copy of the bibliographic and MARC records for *Begault-1994* obtained from the Stanford University Library. Pages 1 to 3 are the bibliographic record that shows this book has a call number of QA76.9.H85 B44 1994, is stored at SAL3 (off-campus storage), and is available for user request. The bibliographic record shows the title, author, imprint, physical description, notes, subjects, and a variant title.

58. Pages 4 and 5 of **Appendix 1007G** is the MARC record. The first six digits of Field 008 show the record was originally created on “940616” (*i.e.*, June 16, 1994). Subfield “a” of Field 040 shows “DLC” (*i.e.*, Library of Congress) created

the original record, and Field 916 shows *Begault-1994* was cataloged on “19960205” (*i.e.*, February 5, 1996). Based on the data in Fields 008, 040, and 916, it is my opinion that the Stanford University Library used the Library of Congress record to create a copy cataloging record for *Begault-1994*, and completed their record on February 5, 1996. These data mean that the Stanford University Library MARC record was in their online catalog on February 5, 1996, making *Begault-1994* discoverable from that date on.

59. Because the Stanford University Library MARC record (**Appendix 1007G**) is based on the Library of Congress MARC record (**Appendix 1007D**), the former contains the same data as the latter, except that the Stanford University Library record uses four Library of Congress subject headings, while the Library of Congress record uses five Library of Congress subject headings. In addition, the Stanford University Library record includes a contents note and a publisher’s summary. **Appendix 1007G** shows that the interested public would have been able to conduct subject searches to discover *Begault-1994*. They would also have been able to discover this book by the author, title, variant title, and ISBN. The copy of this book would have become publicly accessible at this library by February 12, 1996.

I. Usage Record

60. Actual usage of a work is reflected by other publications that make reference to it. The citation history of Google Scholar shows *Begault-1994* was cited 1,791 times. **Appendix 1007H** shows five 1995 citations to *Begault-1994* to demonstrate early usage. The earliest citation appeared in August 1995. After *Begault-2000* was published by NASA as a Technical Memorandum, researchers have continued to cite the original work, because *Begault-2000* is a facsimile of the original printing, and a common citation practice is to cite the original source when it is known and available. I have included five 2001 citations in **Appendix 1007H** to show that *Begault-1994* continued to be cited after *Begault-2000* became available. Page 3 of **Appendix 1007H** is a screen capture of Google Scholar that shows *Begault-1994* was cited 1,791 times, page 4 is a screen capture showing it was cited 11 times in 1995, and page 5 is a screen capture showing it was cited 53 times in 2001.

J. Summary of My Opinion on *Begault-2000* and *Begault-1994*

61. *Begault-2000* (NASA/TM-2000-209606) (**Ex. 1007**) was published by NASA in August 2000, and the NASA metadata record (**Appendix 1007A**) shows that this work was added to the NASA Technical Reports Server system on “September 7, 2013,” making it discoverable in this information system from that date on. Because *Begault-2000* is a US federal government publication, it was

distributed in microfiche by the Government Printing Office (GPO) to a network of libraries in the Federal Depository Library Program, and GPO created a MARC record for the microfiche version on October 30, 2002 (**Appendix 1007B**) to facilitate the discovery and access to *Begault-2000* at depository libraries. As a depository library, the Stanford University Library used the GPO record for copy cataloging and completed their record on December 12, 2002 (**Appendix 1007C**). The Stanford University Library record later added a note indicating the online version of *Begault-2000* was available on the NTRS web site by May 22, 2006, and a PURL (permanent URL) note is included for users to access the online version at <https://purl.fdlp.gov/GPO/LPS70089>; this link leads to the current PURL of this work at <https://permanent.fdlp.gov/lps70089/20010044352.pdf>. Based on these records, it is my opinion that *Begault-2000* was published in August 2000, a microfiche version was distributed to libraries in the Federal Depository Library Program, the microfiche version was cataloged by GPO on October 30, 2002, making the microfiche version discoverable from that date on in the online catalog of the Government Printing Office. The GPO MARC record includes two notes to alert users of the availability of the print and online versions of *Begault-2000*. After the Stanford University completed their copy cataloging work on December 12, 2002, they updated their record with a note that by May 22, 2006, the online version of *Begault-2000* could be accessed via the permanent URL included in their record.

It is therefore my opinion that the microfiche version of *Begault-2000* would have been discoverable at the GPO library and the Stanford University Library by October and December of 2002, respectively, and interested users would have been able to access the microfiche version within a week after the cataloging work was completed. In addition, the Stanford University Library record shows that by May 22, 2006, the online version of *Begault-2000* was publicly accessible. The NTRS metadata record (**Appendix 1007A**) shows *Begault-2000* would have been discoverable in that information system by September 7, 2013.

62. Because *Begault-2000* is a facsimile of the original printing of *Begault-1994*, I obtained records from three libraries to show public accessibility of *Begault-1994* at libraries. The Library of Congress created a Cataloging in Publication record for *Begault-1994* on June 16, 1994, making this book discoverable in the library catalog from that date on. After the Library of Congress verified the CIP record on November 4, 1994, their copy would have become publicly accessible between December 1994 and February 1995. The copyright registration record (**Appendix 1007E**) shows *Begault-1994* was published on September 23, 1994. The MARC record from the US Naval Academy Library shows their library used the Library of Congress record for copy cataloging and they completed their cataloging work no later than November 21, 1995. The MARC record from the Stanford University Library shows they also used the Library of Congress record for copy cataloging and

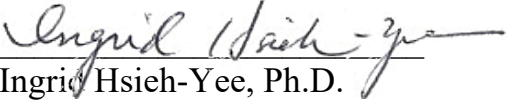
completed their cataloging work on February 5, 1996. These records inform my opinion that *Begault-1994* became discoverable in June 1994, and the copy would have become publicly accessible between December 1994 and February 1995 at the Library of Congress. The book became discoverable in November 1995 at the US Naval Academy Library. It also became discoverable in February 1996 at the Stanford University Library. Citation history shows the earliest citation to *Begault-1994* appeared in August 1995, and after *Begault-2000* became available in August 2000, researchers have continued to cite *Begault-1994* because it is the original source.

III. Conclusion

63. In signing this declaration, I recognize that the declaration will be filed as evidence in a Petition for *Inter Partes* Review before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to deposition in the case. If deposition is required of me, I will appear at a reasonable time and place to be agreed upon.

64. All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true. Further, I am aware that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001. I declare under penalty of perjury that the foregoing is true and correct.

Executed on June 5, 2023 in Burbank, California


Ingrid Hsieh-Yee, Ph.D.

APPENDIX

1007A

[Back to Results](#)

3-D Sound for Virtual Reality and Multimedia

Technology and applications for the rendering of virtual acoustic spaces are reviewed. Chapter 1 deals with acoustics and psychoacoustics. Chapters 2 and 3 cover cues to spatial hearing and review psychoacoustic literature. Chapter 4 covers signal processing and systems overviews of 3-D sound systems. Chapter 5 covers applications to computer workstations, communication systems, aeronautics and space, and sonic arts. Chapter 6 lists resources. This TM is a reprint of the 1994 book from Academic Press.

Document ID 20010044352

Document Type
Technical Memorandum (TM)Authors
Begault, Durand R.
(NASA Ames Research Center Moffett Field, CA United States)
Trejo, Leonard J.

Date Acquired September 7, 2013

Publication Date
August 1, 2000Subject Category
Man/System Technology And Life SupportReport/Patent Number
NASA/TM-2000-209606 IH-010
NAS 1.15:209606Funding Number(s)
PROJECT: RTOP 548-15-12Distribution Limits
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NASA/TM—2000–209606



3-D Sound for Virtual Reality and Multimedia

Durand R. Begault
Ames Research Center, Moffett Field, CaliforniaNational Aeronautics and
Space AdministrationAmes Research Center
Moffett Field, California 94035

August 2000

APPENDIX

1007B

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Record 2 out of 2

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Title	3-D sound for virtual reality and multimedia /
Format	microfiche
Author	Begault, Durand R., 1957-
Published	Moffett Field, Calif. : National Aeronautics and Space Administration, Ames Research Center ; Hanover, MD : Available from NASA Center for AeroSpace Information, [2000]
SuDoc Number	NAS 1.15:209606
Item Number	0830-D (MF)
Variation of Title	Three D sound for virtual reality and multimedia
Description	1 volume.
Content Type	text
Series	(NASA technical memorandum ; 209606.)
General Note	Shipping list no.: 2002-0039-M. "August 2000."
Bibliography	Includes bibliographical references and index.
Subject - LC	Sound. Sound-waves. Virtual reality. Human-computer interaction. Signal processing. Psychoacoustics.
Added Entry	Ames Research Center.
Linking Field	Print version: Begault, Durand R., 1957- 3-D sound for virtual reality and multimedia (OCoLC)52099274 Online version: Begault, Durand R., 1957- 3-D sound for virtual reality and multimedia (OCoLC)858249113

Stock Number/Avail. 20010044352 NASA**Holdings** [All items](#)**OCLC Number** ocm50900168
(OCoLC)50900168**CGP Record Link** [https://catalog.gpo.gov/F/?
func=direct&doc_number=000547656&local_base=GPO01PUB](https://catalog.gpo.gov/F/?func=direct&doc_number=000547656&local_base=GPO01PUB)**System Number** 000547656[◀ Previous Record](#)[Next Record ▶](#)

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- 533** la Microfiche. lb [Washington, D.C. : lc National Aeronautics and Space Administration, Id 2002?]. le 3 microfiches.
- 650 0** la Sound. l0 <http://id.loc.gov/authorities/subjects/sh85125363>
- 650 0** la Sound-waves. l0 <http://id.loc.gov/authorities/subjects/sh85125404>
- 650 0** la Virtual reality. l0 <http://id.loc.gov/authorities/subjects/sh92000880>
- 650 0** la Human-computer interaction. l0 <http://id.loc.gov/authorities/subjects/sh88003229>
- 650 0** la Signal processing. l0 <http://id.loc.gov/authorities/subjects/sh85122397>
- 650 0** la Psychoacoustics. l0 <http://id.loc.gov/authorities/subjects/sh85108410>
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- 77608** li Print version: la Begault, Durand R., 1957- It 3-D sound for virtual reality and multimedia lw (OCoLC)52099274
- 77608** li Online version: la Begault, Durand R., 1957- It 3-D sound for virtual reality and multimedia lw (OCoLC)858249113
- 830 0** la NASA technical memorandum ; l0 <http://id.loc.gov/authorities/names/n83707893> lv 209606.
- 994** la C0 lb GPO
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APPENDIX

1007C

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Cite Send to Select

3-D sound for virtual reality and multimedia

Responsibility Durand R. Begault.
Imprint Moffett Field, Calif. : National Aeronautics and Space Administration, Ames Research Center ; Hanover, MD : Available from NASA Center for AeroSpace Information, [2000]
Physical description 1 volume.
Series NASA technical memorandum 209606.

Online

Available online

purl.fdlp.gov

At the library



Green Library

Today's hours: 11a - 3a

Find Bing Wing lower level Microform cabinets

Description

Creators/Contributors

Author/Creator
[Begault, Durand R., 1957-](#)
Contributor
[Ames Research Center.](#)

Contents/Summary

Bibliography
Includes bibliographical references and index.

Subjects

Available online

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[Sound-waves.](#)

[Virtual reality.](#)

[Human-computer interaction.](#)

[Signal processing.](#)

[Psychoacoustics.](#)

[Acoustics.](#)

[Human-computer interface.](#)

[Sound waves.](#)

[Three dimensional models.](#)

Bibliographic information

Publication date

2000

Title variation

Three D sound for virtual reality and multimedia

Series

[NASA technical memorandum] ; NASA/TM-2000-209606

Note

Shipping list no.: 2002-0039-M.

"August 2000."

Title variation

Three D sound for virtual reality and multimedia

Series

[NASA technical memorandum] ; NASA/TM-2000-209606

Note

Shipping list no.: 2002-0039-M.

"August 2000."

Note

Also available via Internet from the NTRS web site. Address as of 5/22/06:

<http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20010044352%5F2001071187.pdf>; current access is available via PURL.

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035 a| (OCoLC)50900168

037 a| 20010044352 b| NASA

074 a| 0830-D (MF)

074 a| 0830-D (online)

086 0 a| NAS 1.15:209606

100 1 a| Begault, Durand R., d| 1957- =| ^A834196

245 1 0 a| 3-D sound for virtual reality and multimedia / c| Durand R. Begault.

246 3 a| Three D sound for virtual reality and multimedia

260 a| Moffett Field, Calif. : b| National Aeronautics and Space Administration, Ames Research Center ; a| Hanover, MD : b| Available from NASA Center for Aerospace Information, c| [2000]

300 a| 1 volume.

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337 a| microform b| h 2| rdamedia

338 a| microfiche b| he 2| rdacarrier

490 1 a| [NASA technical memorandum] ; v| NASA/TM-2000-209606

500 a| Shipping list no.: 2002-0039-M.

500 a| "August 2000."

530 a| Also available via Internet from the NTRS web site. Address as of 5/22/06: <http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20010044352%5F2001071187.pdf>; current access is available via PURL.

504 a| Includes bibliographical references and index.

533 a| Microfiche. b| [Washington, D.C. : c| National Aeronautics and Space Administration, d| 2002?]. e| 3 microfiches.

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650	0	a Virtual reality. = ^A1092722
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994		a Z0 b STF
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APPENDIX

1007D

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BOOK

3-D sound for virtual reality and multimedia

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Personal name

Begault, Durand R., 1957-

Main title

3-D sound for virtual reality and multimedia / Durand R. Begault.

Published/Created

Boston : AP Professional, c1994.

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Description xv, 293 p. : ill. ; 24 cm.

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Notes Includes bibliographical references (p. 265-285) and index.

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010	— a 94028168
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050	00 a QA76.9.H85 b B44 1994
082	00 a 621.389/3 2 20
100	1_ a Begault, Durand R., d 1957-
245	10 a 3-D sound for virtual reality and multimedia / c Durand R. Begault.
260	— a Boston : b AP Professional, c c1994.
300	— a xv, 293 p. : b ill. ; c 24 cm.
504	— a Includes bibliographical references (p. 265-285) and index.
650	_0 a Human-computer interaction.
650	_0 a Virtual reality.
650	_0 a Multimedia systems.
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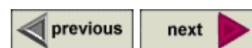
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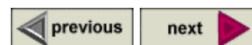
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Other title	Three-dimensional sound for virtual reality and multimedia.
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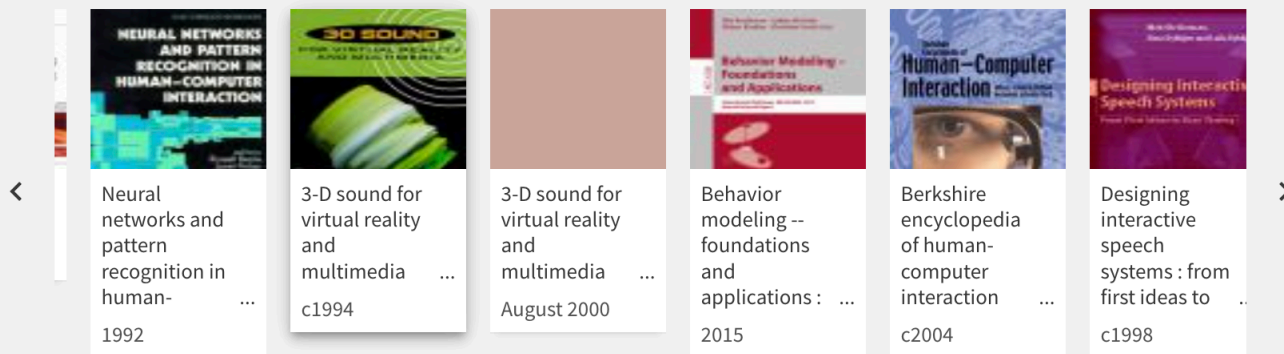
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Contents

- Virtual auditory space - context, acoustics and psychoacoustics
- overview of spatial hearing
- azimuth and elevation perception
- sound source distance and environmental context
- implementing 3-D sound
- application examples
- what's next ? - future and futuristic 3-D sound applications.
- (source: Nielsen Book Data)

Publisher's Summary

One of the key underlying technologies of immersive virtual reality (VR) is 3-D sound for computers. This text provides the reader with an understanding of the communication chain between source and listener, and how important issues in psychoacoustics and engineering interact. It covers components of spatial auditory displays, psychoacoustics of spatial hearing, what sounds are appropriate to spatialize, applications to human-machine interfaces (including virtual reality and multimedia) and future directions.
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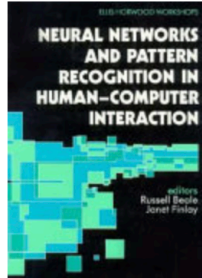
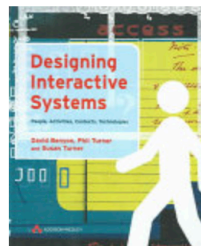
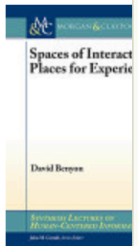
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100 1 a| Begault, Durand R., d| 1957- =| ^A834196

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596 a| 31

650 0 a| Human-computer interaction. =| ^A2948043

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1995 and 2001 Citations to Begault (1994)

Source Document

Begault, D. R., & Trejo, L. J. (1994). *3-D sound for virtual reality and multimedia*. Academic Press.

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Noser, H., & Thalmann, D. (1995, August). Synthetic vision and audition for digital actors. In *Computer Graphics Forum* (Vol. 14, No. 3, pp. 325-336). Edinburgh, UK: Blackwell Science Ltd.

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Synthetic vision and audition for digital actors

H Noser, D Thalmann - Computer Graphics Forum, 1995 - Wiley Online Library

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Vision steered beam-forming and transaural rendering for the artificial life interactive video environment (alive)

MA Casey, WG Gardner, S Basu - Audio Engineering Society Convention ..., 1995 - aes.org

This paper describes the audio component of a virtual reality system that uses remote

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[DR Begault](#), [EM Wenzel](#), [MR Anderson](#) - Journal of the Audio Engineering ..., 2001 - aes.org

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APPENDIX A

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MARC 21 Reference Materials

[Part VII: A Summary of Commonly Used MARC 21 Fields](#)

[Part VIII: A List of Other Fields Often Seen in MARC Records](#)

[Part IX: The Leader](#)

[Part X: Field 008 for Books](#)

Part VII:

A Summary of Commonly Used MARC 21 Fields

This is a summary of the MARC 21 tags used most frequently by libraries in entering their own bibliographic records. For full listings of all MARC 21 tags, indicators, and subfield codes, see *MARC 21 Format for Bibliographic Data*.

In the explanations on these pages:

Tags -- The tags (3-digit numbers) are followed by the names of the fields they represent. In this summary, and in the *MARC 21 Format for Bibliographic Data*, if a tag can appear more than once in one bibliographic record, it is labeled repeatable (R). If it can only be used once, it is labeled non-repeatable (NR). For example, a catalog record can have several subjects, so the tags for subject added entries (6XX) are labeled repeatable (R).

Indicators -- The use of indicators is explained in fields where they are used. Indicators are one-digit numbers. Beginning with the 010 field, in every field -- following the tag -- are two character positions, one for Indicator 1 and one for Indicator 2. The indicators are not actually defined in all fields, however. And it is possible that a 2nd indicator will be used, while the 1st indicator remains undefined (or vice versa). When an indicator is undefined, the character position will be represented by the character # (for blank space).

Subfield codes -- All the data in each field (beginning with the 010 field) is divided into subfields, each of which is preceded by a delimiter-subfield code combination. The most common subfield codes used with each tag are shown. Each subfield code is preceded by the character \$, signifying a delimiter. The name of the subfield follows the code.

In general, every field **MUST** have a subfield 'a' (**\$a**). One exception that is often seen is in Field 020 (ISBN), when the ISBN information (subfield **\$a**) is unavailable but the price (subfield **\$c**) is known. Some subfields are repeatable. In this summary, repeatability is noted for only the more common repeatable subfields.

Examples: Examples follow the explanation for each field. For clarity, one space has

been placed between the tag and the first indicator, one space has been placed between the second indicator and the first delimiter- subfield code, and one space has been inserted between the delimiter-subfield code and the subfield data.

010 Library of Congress Control Number -- (LCCN)

(NR, or Not Repeatable)

Indicators undefined.

Subfield used most often:

\$a -- Library of Congress control number

Example: 010 ## \$a ###86000988#

020 International Standard Book Number -- (ISBN)

(R, or Repeatable)

Indicators undefined.

Subfields used most often:

\$a -- International Standard Book Number

\$c -- Terms of availability (often a price)

\$z -- Cancelled/invalid ISBN (R)

Example: 020 ## \$a 0877547637

040 Cataloging source -- (NR)

Indicators undefined.

Subfields used most often:

\$a -- Original cataloging agency

\$c -- Transcribing agency

\$d -- Modifying agency (R)

Example: 040 ## \$a DLC
 \$c DLC
 \$d gwhs

100 Main entry -- Personal name -- (primary author)

(NR; there can be only one main entry)

Indicator 1: Type of personal name entry element

0 -- Forename

1 -- Surname (this is the most common form)

3 -- Family name

Indicator 2 undefined.

Indicator 2 became obsolete in 1990. Older records may display 0 or 1

Subfields used most often:

\$a -- Personal name

\$b -- Numeration

\$c -- Titles and other words associated with a name (R)

\$q -- Fuller form of name

\$d -- Dates associated with a name (generally, year of birth)

Example: 100 1# \$a Gregory, Ruth W.
 \$q (Ruth Wilhelme),
 \$d 1910-

130 Main entry -- Uniform title -- (NR)

Indicator 1: Nonfiling characters

0-9 -- Number of nonfiling characters present (for initial articles, including spaces)

Indicator 2 undefined.

Indicator 2 became obsolete in 1990. (See 100 above.)

Subfields used most often:

\$a -- Uniform title

\$p -- Name of part/section of a work (R)

\$l -- Language of a work

\$s -- Version

\$f -- Date of a work

Example: 130 0# \$a Bible.
 \$p O.T.
 \$p Psalms.

240 Uniform title (NR)

Indicator 1: Uniform title printed or displayed

0 -- Not printed or displayed

1 -- Printed or displayed (most common)

Indicator 2: Nonfiling characters

0-9 -- Number of nonfiling characters present (for initial articles, including spaces)

Subfields used most often:

\$a -- Uniform title

\$l -- Language of a work

\$f -- Date of a work

Example: 240 10 \$a Ile mystérieuse.
 \$l English.
 \$f 1978

245 Title Statement (NR)

Indicator 1: Title added entry

(Should the title be indexed as a title added entry?)

0 -- No title added entry

(indicates a title main entry; i.e. no author is given)

1 -- Title added entry

(the proper indicator when an author given in 1XX; the most common situation)

Indicator 2: Nonfiling characters

0-9 -- Number of nonfiling characters present, including spaces; usually set at zero, except when the title begins with an article; e.g., for *The robe*, the second indicator would be set to 4. The letters *T*, *h*, *e*, and the space following them are then ignored in alphabetizing titles. The record will be automatically filed under "*r*" -- for *Robe*.

Subfields used most often:

\$a -- Title proper

\$h -- Medium (often used for non-book media)

\$p -- Name of part/section of a work (R)

\$b -- Reminder of title (subtitles, etc.)

\$c -- Remainder of title page transcription/Statement of responsibility

Example: 245 14 \$a The DNA story :
 \$b a documentary history of gene
 cloning /
 \$c James D. Watson, John Tooze.

246 Varying form of title (R)

Indicator 1: Note/title added entry controller

1 -- Note, title added entry

3 -- No note, title added entry

Indicator 2: Type of title

-- No information provided

0 -- Portion of title

1 -- Parallel title

4 -- Cover title

8 -- Spine title

Subfield used most often:

\$a -- Title proper

Example: 246 3# \$a Four corners power review

250 Edition statement (NR)

Indicators undefined.

Subfield used most often:

\$a -- Edition statement

Example: 250 ## \$a 6th ed.

260 Publication, distribution, etc. (Imprint) (R)

Indicator 1: Sequence of publishing statements

-- No information provided

Indicator 2: Undefined

Subfields used most often:

\$a -- Place of publication, distribution, etc. (R)

\$b -- Name of publisher, distributor, etc. (R)

\$c -- Date of publication, distribution, etc. (R)

Example: 260 ## \$a New York :
\$b Chelsea House,
\$c 1986.

300 Physical description (R)

Indicators undefined.

Subfields used most often:

- \$a** -- Extent (number of pages) (R)
- \$b** -- Other physical details (usually illustration information)
- \$c** -- Dimensions (cm.) (R)
- \$e** -- Accompanying material (for example, "teacher's guide" or "manual")

Example: 300 ## \$a 139 p. :
 \$b ill. ;
 \$c 24 cm.

440 Series statement / Added entry--Title

This field was made obsolete in 2008 to simplify the series statement. See 490 and 830.

490 Series statement (No added entry is traced from field) (R)

Indicator 1: Specifies whether series is traced (whether an 8XX tag is also present)

- 0 -- Series not traced
- 1 -- Series traced (8XX is in record)

Indicator 2 undefined.

Subfield used most often:

- \$a** -- Series statement (R)
- \$v** -- Volume number (R)

Example: 490 1# \$a Colonial American craftsmen

500 General note (R)

Indicators undefined.

Subfield used most often:

- \$a** -- General note (Used when no specialized note field has been defined for the information. Examples: Notes regarding the index; the source of the title; variations in title; descriptions of the nature, form, or scope of the item.)

Example: 500 ## \$a Includes index.

504 Bibliography, etc. note (R)

Indicators undefined.

Subfield used most often:

\$a -- Bibliography, etc. note

Example: 504 ## \$a Includes bibliographical references.

505 Formatted contents note (R)

Indicator 1: Type of contents note

0 -- Complete contents

1 -- Incomplete contents (used with multivolume set when some volumes are not yet published)

2 -- Partial contents

Indicator 2: Level of content designation

-- Basic

Subfield used most often:

\$a -- Formatted contents note

Example: 505 0# \$a Pride and prejudice -- Emma
-- Northanger Abbey.

520 Summary, etc. note (R)

Indicator 1: Display constant controller

-- Summary

1 -- Review

2 -- Scope and content

3 -- Abstract

Indicator 2 undefined

Subfields used most often

\$a -- Summary, abstract, or annotation

\$b -- Expansion of summary note

Example: 520 ## \$a This basic guide to parliamentary procedure tells how to conduct and participate in a meeting properly.

600 Subject added entry -- Personal name (R)*Indicator 1:* Type of personal name entry element

- 0 -- Forename
- 1 -- Surname (this is the most common form)
- 3 -- Family name

Indicator 2: Subject heading system/thesaurus (identifies the specific list or file which was used)

- 0 -- Library of Congress Subject Headings
- 1 -- LC subject headings for children's literature
- 2 -- Medical Subject Headings
- 3 -- National Agricultural Library subject authority file
- 4 -- Source not specified
- 5 -- Canadian Subject Headings
- 6 -- Répertoire de vedettes-matière
- 7 -- Source specified in subfield \$2

(Note regarding Sears subject headings: The MARC 21 format does not provide an assigned indicator for Sears subject headings. Therefore, an indicator of 7 is used, and the MARC defined code "sears" is placed in subfield \$2.)

Subfields used most often:

- \$a** -- Personal name (surname and forename)
- \$b** -- Numeration
- \$c** -- Titles and other words associated with a name (R)
- \$q** -- Fuller form of name
- \$d** -- Dates associated with a name (generally, year of birth)
- \$t** -- Title of a work
- \$v** -- Form subdivision (R)
- \$x** -- General subdivision (R)
- \$y** -- Chronological subdivision (R)
- \$z** -- Geographic subdivision (R)
- \$2** -- Source of heading or term (used with 2nd indicator of 7)

Example: 600 10 \$a Shakespeare, William,
 \$d 1564-1616
 \$x Comedies
 \$x Stage history.

Example: 600 10 \$a Shakespeare, William,
 \$d 1564-1616
 \$x Knowledge

\$z Rome \$v Congresses.

Notice that subfields \$v, \$x, and \$z in the 600 field are repeatable. Subfields \$v, \$x, \$y, and \$z do not have to be in alphabetical order. They will be in the order prescribed by the instructions given by the subject heading system.

610 Subject added entry -- Corporate name (R)

Indicator 1: Type of corporate name entry element

- 0 -- Inverted name (not used with AACR2)
- 1 -- Jurisdiction name
- 2 -- Name in direct order

Indicator 2: Subject heading system/thesaurus.

See indicator 2 under 600

Subfields used most often:

- \$a -- Corporate name or jurisdiction name as entry element
- \$b -- Subordinate unit (R)
- \$v -- Form subdivision (R)
- \$x -- General subdivision (R)
- \$y -- Chronological subdivision (R)
- \$z -- Geographic subdivision (R)
- \$2 -- Source of heading or term (used with 2nd indicator of 7)

<i>Example:</i> 610 10 \$a United States. \$b Army Air Forces \$v Biography.
--

650 Subject added entry -- Topical term (Most subject headings fit here.) (R)

Indicator 1: Level of subject

- # -- No information provided

Indicator 2: Subject heading system/thesaurus

(identifies the specific list or file which was used)

- 0 -- Library of Congress Subject Headings
- 1 -- LC subject headings for children's literature
- 2 -- Medical Subject Headings
- 3 -- National Agricultural Library subject authority file
- 4 -- Source not specified
- 5 -- Canadian Subject Headings
- 6 -- Répertoire de vedettes-matière
- 7 -- Source specified in subfield \$2

Note regarding Sears subject headings: The MARC 21 format does not provide an assigned indicator for Sears subject headings. Therefore, an indicator of 7 is used, and the MARC defined code "sears" is placed in subfield \$2.)

Subfields used most often:

- \$a -- Topical term
- \$v -- Form subdivision (R)
- \$x -- General subdivision (R)
- \$y -- Chronological subdivision (R)
- \$z -- Geographic subdivision (R)
- \$2 -- Source of heading or term used with 2nd indicator of 7)

Example: 650 #0 \$a Theater
 \$z United States
 \$v Biography
 \$v Dictionaries.

Notice that subfields \$v, \$x, and \$z in the 650 field are repeatable. Subfields \$v, \$x, \$y, and \$z do not have to be in alphabetical order. They will be in the order prescribed by the instructions given by the subject heading system.

651 Subject added entry -- Geographic name (R)

Indicator 1: undefined.

Indicator 2: Subject heading system/thesaurus.

See indicator 2 under 600

Subfields used most often:

- \$a -- Geographic name
- \$v -- Form subdivision (R)
- \$x -- General subdivision (R)
- \$y -- Chronological subdivision (R)
- \$z -- Geographic subdivision (R)
- \$2 -- Source of heading or term (used with 2nd indicator of 7)

Example: 651 #0 \$a United States
 \$x History
 \$v Chronology.

Notice that subfields \$v, \$x, and \$z in the 651 field are repeatable. Subfields \$v, \$x, \$y, and \$z do not have to be in alphabetical order. They will be in the order prescribed by the instructions given by the subject heading system.

700 Added entry -- Personal name (R)*Indicator 1:* Type of personal name entry element

0 -- Forename

1 -- Surname (this is the most common form)

3 -- Family name

Indicator 2: Type of added entry

-- No information provided (most common; co-authors, editors, etc.)

2 -- Analytical entry (The values for Indicator 2 changed in 1994 with Format Integration, and older records may display additional values. An analytical entry involves an author/title of an item contained in a work.)

*Subfields used most often:***\$a** -- Personal name**\$b** -- Numeration**\$c** -- Titles and other words associated with a name (R)**\$q** -- Fuller form of name**\$d** -- Dates associated with a name (generally, year of birth)**\$e** -- Relator term (such as ill.) (R)**\$4** -- Relator code (R)

Example: 700 1# \$a Baldridge, Letitia.

710 Added entry -- Corporate name (R)*Indicator 1:* Type of corporate name entry element

0 -- Inverted name (not used with AACR2)

1 -- Jurisdiction name

2 -- Name in direct order

Indicator 2: Type of added entry.

See Indicator 2 under 700

-- No information provided

2 -- Analytical entry

*Subfields used most often:***\$a** -- Corporate name or jurisdiction name as entry element**\$b** -- Subordinate unit (R)

Example: 710 2# \$a Sunburst Communications (Firm)

740 Added entry -- Uncontrolled related/analytical title (R)*Indicator 1:* Nonfiling characters

0-9 -- Number of nonfiling characters present (for initial articles, including spaces)

Indicator 2: Type of added entry. See Indicator 2 under 700

-- No information provided

2 -- Analytical entry

(This field was redefined in 1994 with Format Integration. Prior to 1994, the field was also used for variant titles, such as a different wording on a spine title. In records created since Format Integration, those variant titles appear in a 246 field.)

Subfield used most often:

\$a -- Title

Example: 740 02 \$a Uncle Vanya.

800 Series added entry -- Personal name (R)

Indicator 1: Type of personal name entry element

0 -- Forename

1 -- Surname

3 -- Family name

Indicator 2 undefined.

Subfields used most often:

\$a -- Personal name

\$b -- Numeration

\$c -- Titles and other words associated with a name (R)

\$q -- Fuller form of name

\$d -- Dates associated with a name (generally, year of birth)

\$t -- Title of a work (the series)

\$v -- Volume number

Example: 800 1# \$a Fisher, Leonard Everett.
 \$t Colonial American craftsmen.

830 Series added entry -- Uniform title (R)

Indicator 1 undefined.

Indicator 2: Nonfiling characters

0-9 -- Number of nonfiling characters present (for initial articles, including spaces)

Subfield used most often:

\$a -- Uniform title

\$v -- Volume number

Example: 830 #0 \$a Railroads of America (Macmillan)

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Part VIII:

A List of Other Fields Often Seen in MARC Records

001	Control number
003	Control number identifier
005	Date and time of latest transaction
006	Fixed-length data elements -- additional material characteristics
007	Physical description fixed field
008	Fixed length data elements (See Part X)
022	International Standard Serial Number (ISSN)
037	Source of acquisition
041	Language code
043	Geographic area code
050	Library of Congress call number
060	National Library of Medicine call number
082	Dewey Decimal classification number (the one recommended by the Library of Congress; locally-assigned call numbers may appear elsewhere)
110	Main entry -- Corporate name (less frequent under AACR2 rules)
256	Computer file characteristics
263	Projected publication date (indicates a CIP -- Cataloging in Publication -- record)
306	Playing time
508	Creation/production credits note
510	Citation/references note (review sources)
511	Participant or performer note
521	Target audience note (first indicator: 0 = reading grade level, 1 = interest age level, 2 = interest grade level, 3 = special audience characteristics, 4 = motivation interest level)
530	Additional physical form available note
538	System details note
586	Awards note
656	Index term -- Occupation
730	Added entry -- Uniform title
852	Location

- 856 Electronic location and access
 9XX Reserved for local use. (They are used by vendors, systems, or individual libraries to exchange additional data)

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Part IX:

The Leader

There are 24 positions in the Leader, numbered from 00 to 23. For fuller explanation, see the *MARC 21 Format for Bibliographic Data*.

- 00-04 Record length (calculated by the computer for each record)
 05 Record status
 a = increase in encoding level
 c = corrected or revised
 d = deleted
 n = new
 p = increase in encoding from prepublication (previous CIP)
 06 Type of record
 a = language material
 c = printed music
 d = manuscript music
 e = cartographic material
 f = manuscript cartographic material
 g = projected medium
 i = nonmusical sound recording
 j = musical sound recording
 k = 2-dimensional nonprojectable graphic
 m = computer file
 o = kit
 p = mixed materials
 r = 3-dimensional artifact or naturally occurring object
 t = manuscript language material
 07 Bibliographic level
 a = monographic component part
 b = serial component part
 c = collection
 d = subunit
 i = integrating resource
 m = monograph/item
 s = serial
 08 Type of control
 # = no specified type
 a = archival

- 09 **Character coding scheme**
 # = MARC-8
 a = UCS/Unicode
- 10 **Indicator count** (always "2")
- 11 **Subfield code count** (always "2")
- 12-16 **Base address of data** (calculated by the computer for each record)
- 17 **Encoding level**
 # = full level
 1 = full level, material not examined
 2 = less-than-full level, material not examined
 3 = abbreviated level
 4 = core level
 5 = partial (preliminary) level
 7 = minimal level
 8 = prepublication level (CIP)
 u = unknown
 z = not applicable
- 18 **Descriptive cataloging form**
 # = non-ISBD
 a = AACR2
 i = ISBD
 u = unknown
- 19 **Multipart resource record level**
 # = Not specified or not applicable
 a = Set
 b = Part with independent title
 c = Part with dependent title
- 20 **Length of the length-of-field portion** (always "4")
- 21 **Length of the starting-character-position portion** (always "5")
- 22 **Length of the implementation-defined portion** (always "0")
- 23 **Undefined** (always "0")

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Part X:

Field 008 for Books

Field 008 is used for Fixed Length Data Elements ("Fixed Field Codes"). There are 40 character positions in field 008, numbered from 00-39. Undefined positions must contain either a blank (#) or a fill character (|). Positions 00-17 and 35-39 are defined the same way for all media.

The information shown here for positions 18-34 applies only to books. For explanation of all the positions below and for positions 18-34 for other media, see the *MARC 21 Format*

for Bibliographic Data.

Note that field 008 has no indicators or subfield codes.

- 00-05 **Date entered on file (YYMMDD),**
 where Y=year, M=month, and D=day
- 06 **Type of date/publication status:**
 b = no dates given; B.C. date involved
 e = detailed date
 s = single known date/probable date
 m = multiple dates
 r = reprint/reissue date (Date 1) and original date (Date 2)
 n = dates unknown
 q = questionable date
 t = publication date and copyright date
 | = no attempt to code
- 07-10 **Date 1/beginning date of publication**
- 11-14 **Date 2/ending date of publication**

Date fields contain the year(s) of publication. The type of date(s) in these elements are specified in fixed field element 06: Type of date/publication status. (For further details, see the field 008 description in the *MARC 21 Format for Bibliographic Data*.)

15-17 **Place of publication, production, or execution**

For example:

pk# = Pakistan
 cau = California (US)

(For a full list of codes used in these positions, see the [MARC Code List for Countries](#).)

- 18-21 **Illustrations (up to 4 codes):**
 # = no illustrations
 a = illustrations
 b = maps
 c = portraits
 d = charts
 e = plans
 f = plates
 g = music
 h = facsimiles
 i = coats of arms
 j = genealogical tables
 k = forms
 l = samples
 m = phonodisc, phonowire, etc.
 o = photographs
 p = illuminations
 | = no attempt to code

- 22 **Target audience:**
 # = unknown or not specified
 a = preschool
 b = primary
 c = pre-adolescent
 d = adolescent
 e = adult
 f = specialized
 g = general
 j = juvenile
 | = no attempt to code
- 23 **Form of item:**
 # = none of the following
 a = microfilm
 b = microfiche
 c = microopaque
 d = large print
 f = braille
 r = regular print reproduction
 s = electronic
 | = no attempt to code
- 24-27 **Nature of contents (up to 4):**
 # = no specified nature of contents
 a = abstracts/summaries
 b = bibliographies (is one or contains one)
 c = catalogs
 d = dictionaries
 e = encyclopedias
 f = handbooks
 g = legal articles
 i = indexes
 j = patent document
 k = discographies
 l = legislation
 m = theses
 n = surveys of literature
 o = reviews
 p = programmed texts
 q = filmographies
 r = directories
 s = statistics
 t = technical reports
 u = standards/specifications
 v = legal cases and notes
 w = law reports and digests
 z = treaties
 | = no attempt to code

- 28 **Government publication:**
= not a government publication
i = international intergovernmental
f = federal/national
a = autonomous or semi-autonomous component
s = state, provincial, territorial, dependent, etc.
m = multistate
c = multilocal
l = local
z = other type of government publication
o = government publication -- level undetermined
u = unknown if item is government publication
| = no attempt to code
- 29 **Conference publication:**
0 = not a conference publication
1 = conference publication
| = no attempt to code
- 30 **Festschrift:**
0 = not a festschrift
1 = festschrift
| = no attempt to code
- 31 **Index:**
0 = no index
1 = index present
| = no attempt to code
- 32 **Undefined (since 1990)** (Earlier records may contain the values 0 or 1)
= Undefined
| = no attempt to code
- 33 **Literary form:**
0 = not fiction (not further specified)
1 = fiction (not further specified)
c = comic strips
d = dramas
e = essays
f = novels
h = humor, satires, etc.
i = letters
j = short stories
m = mixed forms
p = poetry
s = speeches
u = unknown
| = no attempt to code
- 34 **Biography:**
= no biographical material
a = autobiography
b = individual biography

- c = collective biography
- d = contains biographical information
- | = no attempt to code

35-37 Language:

A three-letter code. For example: eng fre ger spa rus ita

(For a full list of codes used in these positions, see the [MARC Code List for Languages](#).)

38 Modified record:

- # = not modified
- x = missing characters (because of characters unavailable in MARC character set)
- s = shortened
- d = "dashed-on" information omitted
- r = completely romanized/printed cards in script
- o = completely romanized/printed cards romanized
- | = no attempt to code

39 Cataloging source:

- # = national bibliographic agency
- c = cooperative cataloging program
- d = other sources
- u = unknown
- | = no attempt to code

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