THE ERWIN TOMASH LIBRARY
ON THE
HISTORY OF COMPUTING

An Annotated and Illustrated Catalog

Erwin Tomash
Michael R. Williams

December 31, 2008
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Additional illustrations, an electronic edition of the catalog and supplemental material can be found on several different web sites. Use a standard search engine with terms such as “Erwin Tomash Library” to locate these web-based resources.
The books in my library were collected over more than thirty years with the aim of discovering and understanding the origins of computing. Starting out as a young computer engineer in the 1940s and 1950s, and later as an entrepreneur in the first years of the computer industry, I did not foresee that computers would launch an information revolution. By the 1970s, however, it was clear that computers were becoming pervasive and were shaping our daily lives, economy and culture. I began to think it would be a worthwhile project to form a book collection to document computing as a creative endeavor—one that is not new but that, on the contrary, has occupied some of our greatest thinkers over the span of centuries.

My intention in creating this library has been to gather primary sources in a way that has not been done before in order to reveal and illuminate the sequence of the development of computing. The collection as a whole documents the roots of the history of computing. Included in its scope are books on all forms of reckoning, including finger reckoning, and on other aids to calculation such as the slide rule and the abacus. While the library holds works in common with other rare book collections such as the Adler Planetarium Collection of Instrument Books and with more far-reaching and general rare book collections such as those of the British Museum (which seems to have everything), the Huntington Library and the Clark Library, this is the only rare book collection I know of in the history of science that focuses on computation.

As soon as people began producing books, they produced books as aids to reckoning. By bringing together these more than 3,000 books dating from 1180 to 1955, it was possible to study the separate innovations in relation to one another. Thus, the collection provides a context for understanding the development of computation stretching from the Venerable Bede’s finger calculation; to the Roman abacus; to Napier’s invention of logarithms; to Oughtred’s creation of the slide rule; to computing machines such as Pascal’s *Pascaline*, the Leibniz stepped drum, and the first machine to reach production status, the Thomas Arithmometer; and finally, to Aiken’s Computation Laboratory at Harvard, which presaged the modern computer.

As a computer engineer, I started out collecting with an interest in engineering history and the history of mechanical calculators. Originally, I collected early computing machines and devices as well as books, but I found that I could construct a broader, deeper history with books. Early on I decided not to put much emphasis on manuscripts, although the oldest work in the collection is an Arabic manuscript dating from 1180. Manuscripts, even those that have to do with calculation, are less compelling to me personally, perhaps because of their preciousness. My collection focuses on the printed book, in part because I am intrigued by the utility and easy dissemination of knowledge in the simple form of a book.

Rather unexpectedly, I found that I took great pleasure and interest in the books themselves as physical objects. In order to learn more, I took a course at Columbia University on collecting rare books; there we studied elements of early book production—papers, printing, inks, illustration techniques and binding methods—and I came away with a deep appreciation of the crafts involved. Often I will resell books that have been cropped or damaged when a superior copy becomes available. I will also sometimes purchase a later edition to go alongside the original simply because of the attractiveness of the book. On rare occasions, fascinating works such as those on the French automata, while not directly adding to the purpose of the library, have been included simply because their beauty enhances the collection.

Older books and printed materials dealing with the origins of computing and what I have come to characterize as works on early aids to measurement and calculation are now scarce and expensive. At the time when I began my collection, they were costly, but not prohibitively so. I found my intellect challenged as I started to search for these early works. To describe my activities, I borrowed a term from the antiquarian book trade and said that I had embarked on forming a book collection dealing with the “incunable” years of the computer. At the time, quite fortunately, I seemed to be the only individual doing so.

As I became more familiar with my study, I found, not surprisingly, that it was necessary for me to define the subject area and set its boundaries. Defining the roots of a subject is a nearly impossible task similar to describing the intertwined roots of a vigorous plant. I soon found determining the roots of computer history
to be a continuing organic process and a project destined never to be completed.

My interests grew and soon encompassed methods of calculation as well as aids to calculation. However, I saw no reason to limit my interest to the history of calculating machines themselves. I noted that early methods of calculation, both analog and digital, were seldom documented topics. Hence, I included early aids to measurement (instruments), not to mention the very basis of calculation (arithmetic), planetary calculations (astronomy), volumetric computation (gauging), calendric calculation (computus), land measurement (surveying), position reckoning (navigation), calculations associated with erecting sundials (dialing) and, of course, the slide rule, the sector and mathematical tables. In this admittedly broad view, the modern computer is the natural outgrowth of the continuing search for better, more accurate “scientific instruments” and of an associated need for “aids to calculation” to analyze the data arising from measurements made with these instruments.

It also became apparent that I would need to define a time scale for my nascent book collection. The lower end posed no difficulty; I simply decided that the beginning of the printed book in Europe in the fifteenth century was a reasonable starting point. Equally arbitrary was my decision to establish the first decade after World War II as an upper limit. Thus, I established the gestation period of the electronic computer as roughly the 500 years from 1455 to 1955. I soon found myself fascinated by personalities such as Napier, Galileo, Kepler, Tunstall, Riese, Riggs, Hood and Babbage (to name only a few) who had pioneered these fields as expressed in their works and books.

The collection focuses on arithmetics and reckoning but not on mathematics per se; therefore, it does not include works on calculus or higher mathematics. For this reason, there are not many works in the collection by Newton. On the other hand, I have several works by Galileo because of his invention of a sector, a calculating instrument based on similar triangles. The most prized of these is a copy of the first edition of Galileo’s first book: *Le operazioni del compasso geometrico et militare*, Padua, 1606. It is a truly scarce work, having been printed in only sixty copies.

In 1607, Baldassar Capra plagiarized this work of Galileo when he published *Usus et fabrica circini cuiusdam proportionis &c*, Padua, 1607. With characteristic feistiness, Galileo responded with *Difesa di Galileo Galilei ... Contro alle calunie & imposture di Baldessar Capra Milanese ...*, Venice, 1607. The copy in the Erwin Tomash Library is a signed presentation copy to one of the three professors at the University of Venice appointed to adjudicate the matter. The tribunal found that Galileo had been wronged by Capra and ordered that all the copies of Capra’s book in Italy be destroyed. Unfortunately, Capra had already sent copies out of the country, where they could not be reached by the Italian authorities. Very few copies survived, and thus Capra’s plagiarized work is the rarest book in the Erwin Tomash Library. The collection is unique in its ownership of all three of the works involved in this scandal.

The library has all the works of John Napier, famous for his invention of logarithms and for creating the first pocket calculator, described in his *Rabdologiae* of 1617. A copy of this book was my first serious purchase. (Unfortunately, the copy I purchased had been rebound, and in doing so, the binder had cropped some of the running heads. I was able to obtain a nicer copy, bound in vellum, several years later. This copy remains in the collection.) In this work, Napier describes his invention of not one but three mechanical aids to calculation—not only Napier’s rods but also a promptuary for rapid multiplication, and a chessboard calculator using the binary notation (although the concept of base was unknown in Napier’s day). Napier had written in Latin, and his *Rabdologiae* was not translated into English until Tomash Publishers reprinted it in 1990. I had the privilege of identifying the Madrid Promptuary, an example of a promptuary probably built contemporaneously with Napier’s life.

The collection also contains a number of works by Kepler, the creator of Kepler’s Laws (of importance to astronomy), as well as the work of Tunstall, the first person in England to publish a book on arithmetic. The table abacus is represented by several works by the German *Rechenmiester* Adam Riese, and there are also a number of works by the Frenchman Barreme. Both these names are synonymous with calculation in their respective countries.

Logarithm tables in the collection range from the original *Descriptio* of Napier to the posthumous publication of his *Constructio* by his son Robert. Henry Briggs, of Gresham College, who in consultation with Napier contributed the concept of making logarithms to the base 10, is also an author found in the collection. Another British mathematician, Thomas Hood, who published on the sector in 1599, some seven years prior to Galileo, is represented by his *The Making and Use of a Geometrical Instrument Called the Sector*. The Erwin Tomash Library also boasts a copy of a unique...
table by Ezechiël de Decker. This copy of the Tweede Deel van de Nieuwe Tel-Konst (which was thought never to have been published) was discovered in 1920 in the library of a Dutch insurance company. Charles Babbage of Calculating Engine fame also experimented widely with logarithm tables. He sought to make them both more accurate and easier to read by improving their layout and using different colored papers as background. He is represented by several volumes, including a signed presentation copy of Passages from the Life of a Philosopher, 1864. Representing the near end of the time scale is a nearly complete run of the forty-volume Proceedings of the Harvard Computation Laboratory.

Finally, an early example of computer art is a copy of Livre de prières woven in silk, with black threads forming the letters, by Jacquard loom in Lyon, France, from 1886 to 1887. It consists of reproductions, with punched cards controlling the loom, of books of prayer from the fourteenth to the sixteenth centuries. Other quite rare works are pointed out in the catalog entries.

Over the course of the last thirty years, I have taken three different approaches to pursuing my interest in the history of computing. I have found this historical quest intellectually challenging, and while I have not recorded the history-in-the-making, as I once thought to do, I hope that my contributions in framing the questions and collecting the primary sources that hold so many keys will become part of the answers that future historians will discover. It is interesting to me to notice that of the three approaches I have taken, two of them—the founding of and my involvement in the Charles Babbage Institute for the History of Computing, and the Tomash Publishers Reprint Series with MIT Press—are projects that involve institutions, boards of directors, staff members and the visions of many people (a short essay on their history is included in the appendix). However, the third of these, the Erwin Tomash Library on the History of Computing, has been a personally motivated scholarly pursuit that I could make my own. I have taken great satisfaction in its quiet rewards.

Erwin Tomash
Soquel, California
November 2008
Acknowledgments

This catalog would not exist were it not for the herculean efforts of my good friend Michael R. Williams, Professor Emeritus of Computer Science at the University of Calgary. He has devoted months of his life to defining, structuring and creating it. It is due to his perseverance and persistence that it has seen the light of day.

I also wish to acknowledge my indebtedness to antiquarian book dealers all over the world for the bibliophilic knowledge I have acquired. Living in Los Angeles, I came to know Barbara Rootenberg, Harry Levinson and especially the late Jacob Zeitlin, then one of the foremost science rare book dealers in the world. The city is blessed with two outstanding libraries, the Huntington and the Clark, which between them hold copies of most early science works. Whenever I traveled, I made it my business to visit antiquarian booksellers and rare book libraries. Through Jake Zeitlin, I was introduced to the London bookselling firms of Bernard Quaritch, Pickering & Chatto, E. P. Goldschmidt and Maggs Brothers. In Milan, I became known to the firms of Chiesa, Pozzi and Vigevani. In New York City, Jonathan Hill and Richard Lan always found time to welcome me. It was on my first visit to E. P. Goldschmidt that I met Robin Halwas, who has since become a close friend and confidant. Robin, a meticulous scholarly bibliophile and independent book dealer, has represented me at auctions throughout Europe and has helped me acquire a number of rare, even unique, books.

In contrast to the intensely competitive computer business, I found the atmosphere of the rare book business to be gentle, relaxed and congenial. My association with the book trade has been a pleasant and fulfilling experience these past thirty years, and I wish to express my sincere appreciation to the many individuals who have befriended me.

No acknowledgment could be complete without recognizing the love, patience and care of Adelle Tomash, my wife of more than sixty years. She has not only traveled hither and yon with me to see a particular copy of a particular book; she has also researched, studied and supported this time-consuming and often overly absorbing project with her own interest, intellect and insights. Without her I have no doubt that there would be no Erwin Tomash Library.

Erwin Tomash
Soquel, California
November 2008
We have attempted to be consistent in using various conventions for items in this catalog; however, there are bound to be errors and exceptions.

**Bold Text** has been used for the names of authors who have their own entries in the catalog. For example, a remark such as *This effort, done well before the time of John Napier, ...* implies that there are entries in this catalog for John Napier. These entries can then be consulted to see why we thought it important to make such a remark.

*Italic text*, rather than quotation marks, has been used for short quotations from the original publication. Longer quotations are indicated by being shown as their own paragraphs, inset from the left edge of the text. There are a few places where italics have been used by us for emphasis, but these should be easily distinguished from quotations. We have attempted to reproduce the exact quotation, complete with errors in spelling and punctuation without use of indicators such as [sic].

Authors’ dates of birth and death are given beside each author when known. If we were unable to determine the dates, we simply left that item off the author entry. When partial date information is available, the following abbreviations are used:

- a. (alive)—known to have been alive in year indicated
- ca. (circa)—the year indicated is approximate
- fl. (flourished)—known to have been working in that year

Other relevant biographical details about an author are given in the first entry for that author, although the fact that we remain silent about a particular individual does not necessarily imply that nothing is known. We have made free use of many reference materials and the Internet in obtaining biographical information. Where no source is specifically acknowledged, it may be assumed that the information was readily available from several places.

Titles of works are in italic, and most capitals have been changed to lowercase except for the first word and the names of individuals. In the case of German titles, we have attempted to reproduce the capitalization of the original title page (where only one case has been used, we default to our normal lowercase title transcription). We have occasionally left certain items capitalized, e.g., the abbreviation *IBM*, when having them in lowercase might lead to a misunderstanding or simply look strange. We initially left periods off the end of the titles unless they actually appeared on the title page. However, this practice led to several inconsistencies. In all cases in which details of spelling, capitalization and punctuation are important, the user should consult the illustration of the title page (often reproduced in the catalog itself and in almost all cases available by consulting the electronic version of this catalog—see the Table of Contents for information as to how to access these resources).

The bibliographic information for each entry contains the following items:

- **Year:** The year of publication as taken from the work itself. If we have determined the year from some other source, it will be mentioned in the text.
- **Place:** The place of publication as taken from the work itself.
- **Publisher:** The publisher and/or printer as noted in the work itself.
- **Edition:** When actual edition numbers are unknown, we use terms such as *early, late, etc.* Items with editions in several languages will be noted as *1st (German)*, meaning that this was the first edition in the German language, but other earlier editions in languages other than German may exist.
- **Language:** The major language used in the work. We do not note other languages used in short passages or quotations.
- **Figures:** The number of major figures, not including small illustrations that may appear in the text. Major figures are usually full-page illustrations, fold-out illustrations or frontispieces. At times this entry will be used to indicate major printing features such as *title in red and black*.
- **Binding:** A brief description of the binding with occasional notes as to whether it is obviously contemporary with the original publication or not.
- **Pagination:** The number of printed pages in each major section or volume of the work, e.g.,
  - pp. iv, 556 indicates four printed pages of preface material and 556 pages in the main body of text. An entry such as
    - v.1: pp. [4], xii, 490; v.2: pp. [2], 491-518, 92, 14, 2
  indicates that volume one begins with four unnumbered pages and has twelve pages of preface and 490 pages of main text while volume
two has two unnumbered pages followed by pages numbered 491 to 518 and then has three other sections containing ninety-two, fourteen, and two pages each.

Collation: A description, in the coded form used by most bibliographers, describing how the item was printed and bound. An entry such as $\pi^8$ A-S $T^1$

means that the work consists of an unmarked signature of eight leaves, followed by signatures marked (usually in the lower right-hand corner) “A,” “B,” “C,” … , “S” each of eight leaves, followed by one signature, marked “T,” of four.

Size: The size, in millimeters, of the pages of the work (not just the size of the text). The first figure is the height, measured from top to bottom, while the second is the width, measured from the outer edge to the point where the page enters the binding.

Reference: Places where the work is mentioned. Usually there are well-known references such as those by Wing and Kiely. We have usually abbreviated the reference to save space, and a complete list of the abbreviations can be found just prior to the indexes at the end of the catalog.

When any of the above items are not relevant, e.g., when there is no obvious collation (as in most modern books) or there are no figures, then that entry is omitted from the bibliographic entries.

The graphics in this catalog were chosen with a view to not only illustrate the title pages but also show the way in which the subject was treated, the quality of the figures themselves and, where we thought it necessary, to provide something to illustrate our own text for those who may not be familiar with the technical details of the subject. At times we include an illustration for no other reason than it pleases us to do so. All images are available on the web site that accompanies this catalog. A search for words such as “Erwin Tomash Library” and “images” will usually provide the web address of one of the sites containing this material.

In all cases the printed illustrations have been enhanced by removal of unwanted items, e.g., foxing, stains, annotations and other items that may detract from the basic information that the original author/printer was attempting to provide. In cases in which the removal of an annotation or stain would compromise the original printed version, it has usually been left unmodified. If it is important to see the condition of the original illustration, one may consult the electronic version of this catalog. The illustrations available with the electronic version have, for the most part, been left as they were originally scanned. Some minor problems exist with these images, e.g., they may have been rotated so that they would be in the correct orientation and this process may have left some artifacts—such as the conversion of a thin straight line into one showing a jagged edge—that were not in the original. There are also some images that were cleaned up before we decided to provide the originals with the catalog—these are obvious when examined closely.

No attempt has been made to create or extend images when doing so would be difficult. For example, if a book had been tightly bound and part of an image was impossible to scan, then we simply took that part of the image that was easily available. Many of the title pages and diagrams clearly show the edge of the image as distorted as it disappears into the binding.

We hope that the inclusion of numerous illustrations will not only make this work a useful reference but also help educate readers in various aspects of the history of computing. Many of the devices described are not well known or, when known, are not fully appreciated. To this end, we have added a number of technical essays in an appendix that try to give short explanations of astrolabes, logarithms and slide rules, Napier’s bones, nomography, sectors, surveying instruments and ready reckoners.

While we have attempted to be as accurate as humanly possible, every time we have looked at the text files for this work, we have found errors of transcription, inconsistent spelling and other similar problems. We have relied heavily on the proofreading skills of others who have caught many of our problems and attempted to force us into using a standard format (an attempt we occasionally resisted). In any work of this size, it is almost impossible to eliminate all such problems, and we hope that the users will simply forgive us if they find slips that we didn’t notice. It is tempting, as was done by Richard Neve (see his entry in the catalog), to say:

Carpare vel noli Nostra, vel ede tua Or as it may be Englished, Either commend me, or come and mend me

Neve again repeats the same thought with

Reader, the Printer’s Faults are none of mine, Correct the Errors, else the Fault is thine.

Unfortunately, the printer’s faults are ours, and rather than blaming the reader, we can only beg for forgiveness.

Michael R. Williams
Calgary, Alberta
Canada
November 2008
Erwin Tomash
Library Catalog