



# **Computing for Science, Engineering, and Production**

Mathematical tools for the second industrial revolution

Karl Kleine (editor)

Proceedings of the 19th International Meeting of collectors  
and researchers of historical computing instruments

Berlin, October 11–12, 2013

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Bibliografische Information der Deutschen Nationalbibliothek

Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie;  
detaillierte bibliografische Daten sind im Internet über [www.dnb.de](http://www.dnb.de) abrufbar.

ISBN 978-3-732228813-1

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Herstellung: BOD — Books on Demand, Norderstedt, [www.bod.de](http://www.bod.de)

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**Dieter von Jezierski**  
1927 – 2013

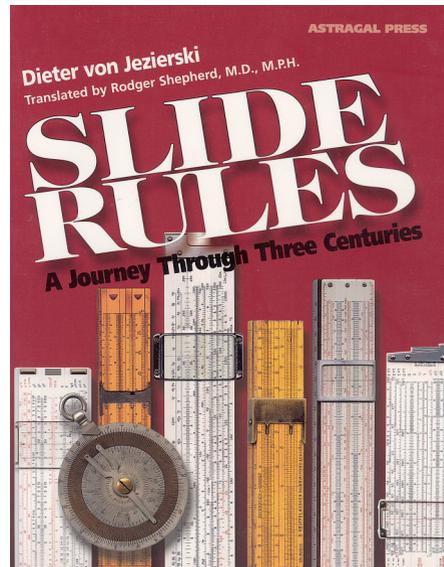
These conference proceedings are dedicated to the memory of Dieter von Jezierski, who unexpectedly died on June 17, 2013.

Dieter was born May 30, 1927 in Wolfen, near Bitterfeld. In 1931 the family moved to Frankfurt/Oder, and here he spent his youth, which he remembered with joy. That came to a dramatic end by the Second World War, when the 16 year old was drafted for anti-aircraft gunnery defending Berlin against the many air raids. Nearing the age of 18, he was drafted to the navy in the Baltic sea. At the end of the war he became prisoner of war in Mecklenburg and later on the island of Fehmarn. He was lucky, it was an American POW camp.

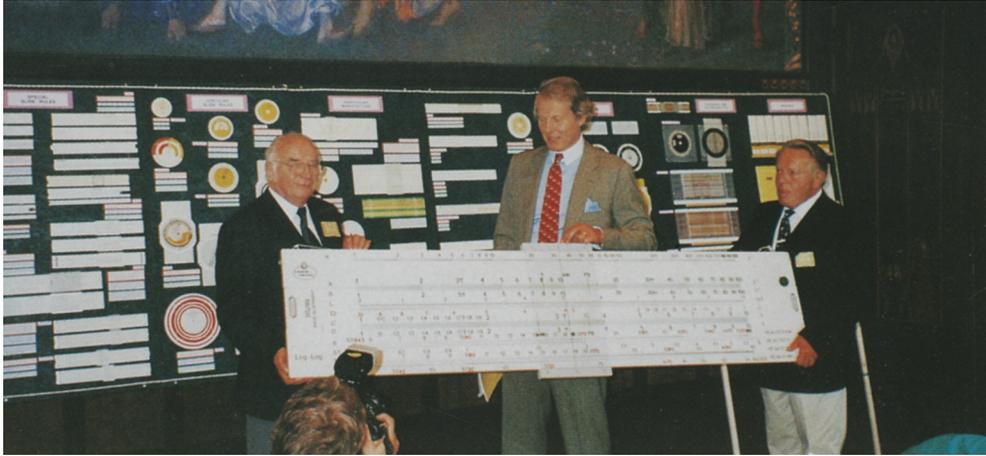
It was only 1948 that Dieter von Jezierski could finish high school with the “Abitur” diploma. After that he began an apprenticeship in business management at the MAN factory in Nürnberg. After earning his degree he joined the marketing department of Faber-Castell in nearby Stein in 1952. Here he spent his work life until his retirement in 1991. He worked in the department for technical drawing instruments, and that

included slide rules. This product group became Dieter's domain, and in due time Dieter was promoted to product manager for slide rules. It is a bit of sad that Dieter became head of the department only in 1975, when the end of the slide rule era neared. Overall we can say today that the slide rule business of Faber-Castell after WWII was to a large extent shaped by Dieter von Jezierski.

Even after his retirement he remained busy with the company. Living close by the Faber castle and factory in Stein, he often guided visitor tours, and he kept answering questions directed to Faber-Castell regarding slide rules. During all the years, Dieter had accumulated an immense and often incredible know-how about slide rules, next to his collection of slide rules, and he kept researching. But he also knew that much of his knowledge was just in his head and his personal notes, there was no written history of the modern slide rule — the last such book was Cajori's of 1910. So it was in a sense only natural that he sat down and wrote his book "*Rechenschieber – eine Dokumentation: Geschichte, Hersteller, Modelle*", which he self-published in 1997. It got much applause and turned out a success, Dieter had to reprint it several times.



With the help of his friend and fellow slide rule collector Rodger Shepherd he published a revised and extended english edition "*Slide Rules — A Journey through Three Centuries*" in 2000 with Astragal Press. For the revival of interest in slide rules and their collection in the 1990ies this book came just in time, and it got much well deserved praise. It is considered a "must have" for any slide rule collector.



Dieter was also active in the slide rule collectors groups and their meetings, both the German RST and the International Meetings (IM), where he often gave lectures. In 1997 he organized together with his friend and Faber-colleague Hans Schiller the third IM at the Faber-Castell castle in Stein. Above you see Dieter (right) with Anton Wolfgang Graf von Faber-Castell (middle) and Hans Schiller (left) holding a Faber demonstration slide rule at this International Meeting. Last not least, a number of personal friendships grew out of these meetings of slide rule collectors.

He also wrote a number of articles for the *Journal of the Oughtred Society* and other publications of the slide rule collector community, like the *Skid Stick* or the *Slide Rule Gazette*. Numerous were the letters, emails and telephone calls asking for information or advice regarding slide rules that he got and answered. But it was the personal contact with fellow collectors, where Dieter proved his huge knowledge and expertise about all kinds, makes and models of slide rules. He was happy helping and advising anybody with a question about slide rules, although often the answer was already in his books and articles. His constancy in attending IM and RST meetings gave stability to their ups and downs. Often his expert comments and amendments to a lecture were invaluable. For all of this he was the winner of the *Award of the Oughtred Society* of 1997, the highest distinction for slide rule collectors.



Dieter von Jezierski will be missed by his friends and fellow slide rule collectors.



# International Meeting 2013 — an Invitation

*Karl Kleine*

Welcome to the 19<sup>th</sup> International Meeting of collectors and researchers of historical computing instruments in Berlin! Before I further elaborate on the actual IM, let me give a brief review of its history and the people involved.

## **A brief history of the IM**

The production of slide rules had stopped between 1975 and 1978 due to the advent of pocket calculators, which by then had fallen in price that far that they became affordable on the one hand and powerful enough on the other. In the late 1970ies microprocessor based “personal computers” appeared. Whereas these first were geared towards the hobbyist market, the appearance of the IBM PC in 1981 opened the professional market of desktop computers. In 1984 Apple introduced the MacIntosh computer. For engineers and scientists companies like Digital Equipment (DEC), Sun Microsystems and Apollo started to offer workstations in the mid 1980ies. Calculators and computers made the slide rule disappear from the workplace.

But not for everybody. A number of “old hands” kept using their slide rules as primary computing instrument or for quick calculation of rough answers, before using a computer for all the glorious details. Around the 1980ies to 1995, a number of people started to actively collect slide rules, and often also other computing devices, in particular analogue instruments (in contrast to the new generation of all digital

computers) and instruments based on logarithms.

In the early 1990ies a number of collectors of slide rules found together, both on a national and an international basis. First to name is the *Oughtred Society*<sup>1</sup>, which started 1991 with a group of collectors in the San Francisco bay area, but almost immediately became international. Today, the Oughtred Society has about 500 members, of which roughly 350 reside in the United States. It regularly holds meetings on the west coast and the east coast of the US, but the most important means of communication is the *Journal of the Oughtred Society* (JOS), published twice a year. For any serious collector, a JOS subscription is a “must have”.

In Europe, four communities of collectors exists. Whereas the Oughtred Society is a legal body, the groups in Germany, The Netherlands, the United Kingdom, and Spain are loosely coupled, usually without a strong legal framework. The first three of them started in the 1990ies.

- In Germany it is the *Rechenschieber-Sammler-Treff*<sup>2</sup>, RST for short. It holds two regular meetings per year, roughly sometime in march and in september. These are informal conferences, starting friday evening and lasting throughout saturday, often with an excursion on sunday, with typically about 25–30 participants. RST meetings are also attended by Swiss collectors, and there are typically also a few from the Netherlands and some other contries.
- The Dutch *Circle of Slide Rule Collectors*<sup>3</sup> (Kring) started in 1991. It regularly holds informal meetings at members’ homes. Furthermore, Kring publishes a newsletter.
- The British *United Kingdom Slide Rule Circle*<sup>4</sup> (UKSRC) also hold meetings at members’ homes. The UKSRC publishes both a newsletter, called *Skid Stick*, and a journal, the *Slide Rule Gazette*.
- The Spanish *Amigos de las Reglas de Cálculo*<sup>5</sup> (ARC) is a relative newcomer; it started only in 2006, and unfortunately I know very little about it.

But even before there were some of these groups of collectors mentioned above, a couple of collectors from various countries met in 1995 in Utrecht, and held their first “International Meeting of Slide Rule Collectors”. The name stuck and it became a yearly conference, typically in fall, lasting friday and saturday, with an excursion

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<sup>1</sup><http://www.oughtred.org>

<sup>2</sup><http://www.rechenschieber.org>

<sup>3</sup><http://www.rekenlinialen.org>

<sup>4</sup><http://uksrc.org.uk>

<sup>5</sup><http://arc.reglasdecalculo.org>

option for sunday. The organization and the selection of the place of is now in the hands of volunteers of the RST, Kring and UKSRC on a rotational basis.

### International Meetings

<i>year</i>	<i>place</i>	<i>country</i>
1995	Utrecht	The Netherlands
1996	Cambridge	United Kingdom
1997	Stein	Deutschland
1998	Hutwill	Schweiz
1999	Cambridge	United Kingdom
2000	Ede	The Netherlands
2001	München	Deutschland
2002	Lemington Spa	United Kingdom
2003	Amsterdam / Breukelen	The Netherlands
2004	Bad Driburg	Deutschland
2005	near Cambridge	United Kingdom
2006	Greifswald	Deutschland
2007	Lelystad / Enkhuizen	The Netherlands
2008	Lemington Spa	United Kingdom
2009	Greifswald	Deutschland
2010	Leiden	The Netherlands
2011	Cambrige, MA / Boston	USA
2012	Bletchley Park	United Kingdom
2013	Berlin	Deutschland

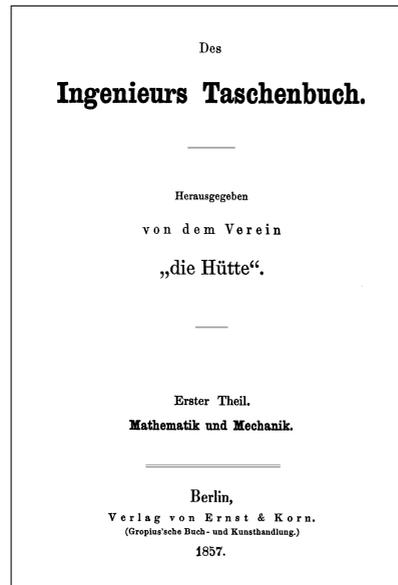
The 2011 meeting in the USA was an exception for the 20<sup>th</sup> anniversary of the Oughtred Society. The 2014 meeting will again be in the Netherlands.

Whereas in the early years the subjects were always slide rules, the scope has widened in recent years to include logarithms in general, including non-instrument computing aids like tables, and all kinds of computing instruments, with a tendency towards analogue ones. Nevertheless, slide rules are still in the center of interest. There is second shift, from the collectors' view of objects to a more research oriented view and a view towards the applications and how and whatfor the computing instruments were used. Accordingly, the title of the conference now reflects these changes, but its primary title is still the "International Meeting" or just "IM" for the community of collectors and researchers of historical computing instruments.

## This year's location: Berlin, the "Hütte"

This year's international meeting takes place in Berlin, capital of Germany and known for its cultural heritage and life. But next to politics and culture, Berlin was and is shaped by industries. Starting with the railways and continuing with the industrialization in the 19<sup>th</sup> century Berlin became a place for factories of all kinds. It exploded both in area and population. The second industrial revolution made Berlin the largest industrial city in central Europe before World War II. And it wasn't just production plants, but many facilities for research and development. Famous names like Borsig, Siemens, and AEG stand out as examples, but there were many, many more. All that was not possible without the right people and the right tools, and this is led both to the theme of the conference, *Computing for Science, Engineering, and Production*, and to the actual place of our annual conference.

The meeting takes place at the residence of the oldest German student union of engineering students, called *Akademischer Verein Hütte*. It was founded in 1846 by students of the precursor of the Technical University, and it was quite influential in shaping the engineering profession in Germany in the 18<sup>th</sup> and early 19<sup>th</sup> century: Not only that members of the *Hütte* founded the German Engineering Association, the *Verein Deutscher Ingenieure*, or *VDI* for short, but they embarked on a publication project, which had an even more profound effect: In 1857 *Hütte* published the first edition of *The Engineer's Handbook*, its title page shown on the right side. This pocket book evolved over the next hundred years into a multi-volume encyclopedia of engineering data, a compact summary of the state of the art and "technical bible" for the professional engineer with its collection of formulae, tables, and drawings. There were also spin-off volumes for particular needs, like the *Betriebshütte*, or the *Stoffhütte*, as well as foreign language editions. The current 34<sup>th</sup> edition of the base volume appeared in 2012 as a fat book of nearly 2000 pages. For generations of university educated engineers, the German *Diplom-Ingenieur*, these books defined the professional standards of their time and were indispensable for their work. For nearly



everybody, *Hütte* became the name of these books, and the student union<sup>6</sup> was and is virtually unknown. Today, the many editions<sup>7</sup> offer an unforeseen benefit: As they trace the technological developments with hard data, they allow us, the collectors and researchers of calculating instruments, to understand the historical computational needs, and thus our instruments, like special purpose slide rules, their actual use, and evolution.

## The conference programme and this book

The sequence of chapters of this book corresponds to the conference programme. The friday afternoon session starts with two presentations about logarithms and their computation, the papers by Klaus Kühn and Wolfgang Irler. This is followed by a talk by Stephan Weiss about a combinatorial problem and how it was solved with the help of a special slide rule. This first session is followed at the conference by the traditional display and swap session, where the participants show pieces of their collection, often items mentioned or described in the talks, as well as trade collector's items.

The saturday is dedicated to the conference theme. We start with the state of mathematics in German universities at the end of the 19<sup>th</sup> century, which had a tendency towards 'pure mathematics' in the proverbial ivory tower. The raise of industry and engineering required 'applied mathematics' and suitable tools. A very notable step was the DMV exhibition of 1893 in Munich, and Werner Rudowski will open the saturday programme with a report on this exhibition, focussing on instruments based on logarithms. Renate Tobies discusses the situation in German universities with respect to mathematical instruments, taking the leading mathematical institute of Göttingen University as an example, and the transition of know-how from there to industry. A particular example of packaging technological and mathematical know-how into a form usable by workers and technicians in their offices, work shops, and factories were special purpose slide rules. The organization for efficient production AWF designed and marketed quite a number of these in low cost versions, but most were up to now unknown to collectors. Karl Kleine changes this with his extensive survey of all of them. Huge improvements on a broad scale were possible without the user having a deep understanding of details of the underlying science and technology. This holds in particular for the core of the Second Industrial Revolution, the transformation of work shops to factories, with Taylor's 'scientific management' and

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<sup>6</sup><http://www.av-huette.de>

<sup>7</sup>[http://www.av-huette.de/chronik\\_buecher.html](http://www.av-huette.de/chronik_buecher.html)

the Ford's assembly line as corner stones. But as Ed Chamberlain will show in his paper, it wasn't Taylor but his colleague Carl Barth, who invented the machine shop slide rule to achieve the best results with metal processing machines like lathes, drills or milling machines. Special purpose slide rules gave a dramatic improvement and helped production planning and control. More examples come from applications, like the planning of electrical illumination, a talk by Klaus Krämer, the textile industry, a talk by David Rance, or the brewing beer, presented by Peter Holland.

Next to that we have two papers on 'out-of-the-way' slide rule designs, the first by Jerry McCarthy about the non-logarithmic Schumacher slide rule based on modular arithmetic, and the second by Jose Fernández about a Pythagorean and logarithmic slide rule combination in a particular form intended for calculations in the field by railway surveyors. Two very special slide rules indeed.

But it is not an instrument by itself that makes the difference, but its proper and clever use and thus the competence of the user. Erhard Anthes presents a biography of the high-school mathematics teacher Albert Rohrberg, who had by his books a very large influence on the use and the didactics of teaching the slide rule.

The act of counting seems trivial. However it's not, as Barbara Haeberlin shows in her talk, particularly in the case of votes to be counted. So, in the industrial age, machines had to come to rescue, and Barbara will guide us through an impressive panoptikum of vote counting machines.

It has often been said that "the computer killed the slide rule". But in essence it is just another mathematical instrument helping with calculations, next to all the others like slide rules, planimeters, intergraphs, and more. It is only the modern electronic digital computer's capability for general data processing, storage and management that made it such a success and nowadays ubiquitous. Taking a broader view of the history of technology, industry, and the mathematical tools used to further them and keep them running, we should not be surprised in any way that it was here, in Berlin, that a young engineer sought, invented and actually build the next generation of mathematical instruments to automate his lengthy and tedious calculations. Konrad Zuse's Z3 machine was the first operational programmable computer. Unfortunately, this milestone in mathematical instruments and in the history of technology got lost in the Second World War. Konrad's son Horst Zuse will present his recent rebuilt of the Z3, both with a presentation of his paper at this conference, closing the Saturday programme, and with a guided tour of the display of his Z3 replica and other Zuse machines at the *Deutsches Technikmuseum* on Sunday.