Slide Chart Calculators – A Modest Proposal

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Table I. A Random Sampling of Types of Slide Chart Calculators

Fluid Flow Calculators
Liquid Flow Calculator and Air Flow Calculator
Line Pressure Drop Calculator
Gravity Flow Hydraulic Calculator
Line Pressure Drop Calculator for Laminar and Turbulent Flow
Pressure Drop ()P) Calculator
Pipe Flow and Obstruction Loss Calculator
Air Velocity Calculator
Valve Size Computer
Resistance Computer for Valves and Fittings
Sewer Hydraulics Calculator
Mechanical and Machine Shop Calculators
Shock and Vibration Computer
Bolt Torque and Stress Calculator
Grinding Wheel Speed Calculator
Speed and Feed Calculator for Carbide Cutting Tools
Design Formulator
Speed and Horsepower Estimator
Spring Weight Calculator
Spring Design Calculator
Speed and Feed Calculator for Carbide Tools
Mold and Piston Size Calculator
Oil Field Pumping Unit Factorule
Silicon Slide Ruler
Drilling and Tapping Calculator
Electrical Calculators
Ohm's Law and Parallel Resistance Calculator
Tank Heating Estimator and Electric Immersion Heating Corrosion Guide
Power Lead Calculator
Aluminum Circuit Calculator
Tape Wound Core Calculator
Microwave Antenna System Computer
Electric Lighting Calculator
Power Lead Calculator
Business Calculators
Buyer's Mark-up Calculator
Backlog and Queue Calculator
Compounded Rate of Increase Calculator and P/E Ratio, Dividend and Commission Calculator
Stockulator for Stock Market Calculations
Net Present Value/Discounted Cash Flow
Reliability Slide Rule "Reliability with Confidence"
Miscellaneous Calculators
Runway Snow Removal Computer
Pocket Computer for Paint Coverage
Uncorrected to Corrected (Blood) Sedimentation
Asphalt Slide Rule
Sighting-In Guide for Rifles

Introduction

A neglected area of slide rule research is the remarkably wide range of special-purpose cardboard and plastic calculating devices distributed by many companies beginning in the 1930s for promotional and advertising purposes. For years, manufacturers and suppliers commissioned designers to develop special-purpose calculating devices for virtually every technical field. These devices have pretty much been passed over by collectors and historians as being of secondary and limited interest. No engineer ever treasured his cardboard calculators and preserved them as he did his slide rule, drafting set and other engineering tools. Thus, many of these calculating devices are probably "extinct" and lost forever to someone researching this particular type of calculator.

At the same time, many such cardboard and plastic calculating devices have survived. I have a box of them and imagine that many other Oughtred Society members have also accumulated an assortment. For the most part, these calculating devices never had the aura, attraction, and heft that we associate with conventional slide rules. In other words, they lack the "sex appeal" of the conventional slide rule, and while users may have valued and used them, they never really became attached to them. As inexpensive promotional items, users weren't expected to retain them indefinitely. Many were simply special-purpose advertising gimmicks with limited half-lives.

Irrespective of the low esteem in which they may have been generally held, many of these calculating devices were cleverly, sometimes ingeniously, designed and fabricated to solve specific problems. They were basically sliding nomographs that obviated the need to solve an equation mathematically or to use a straight edge to align numerical factors on a page of paper to solve the same equation. Although some special-purpose calculating devices have been recognized in the literature, I am unaware of anyone having written a comprehensive paper on this subject. Thus our knowledge as well as our appreciation of these specialized calculating devices is shallow to say the least. It's a neglected field of study that merits attention.

The Diversity of Slide Chart Calculators

The first challenge in researching slide chart calculators would be to explore their remarkable variety, to organize them into categories and to catalog them. Cataloging information could include the name, description and purpose of the device, its size, designer and maker, distributor and type of user for which the device was intended as well as a scanned image of the front and reverse side. Given what must be hundreds, perhaps thousands of such devices that have survived, this would be no mean task. The first challenge would be to compile as complete a list and description as practicable of existing devices. Table I, a random sampling of my own collection, illustrates the broad range of uses of such calculating devices.

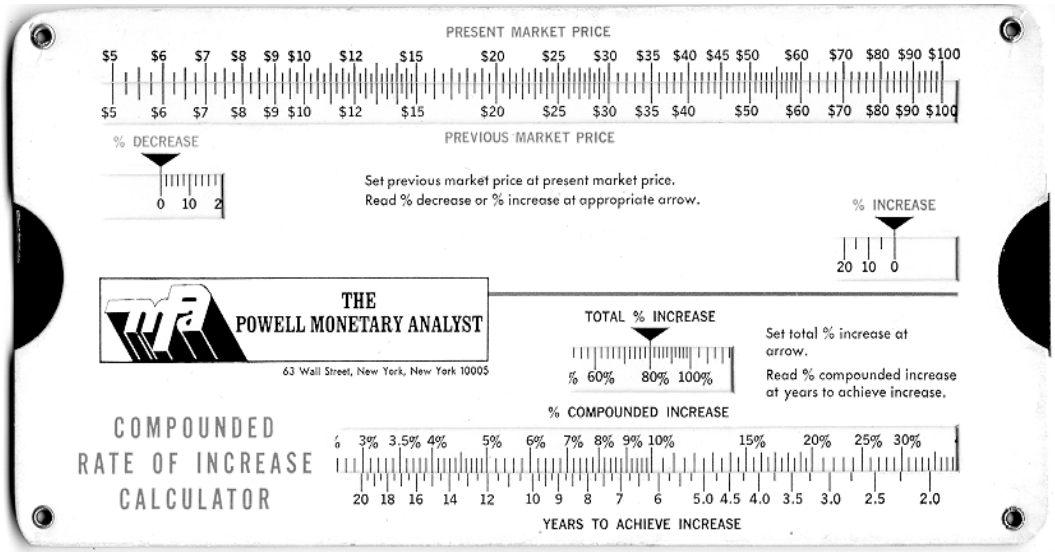

Figure 1. A cardboard P/E Ratio, Dividend and Comission Calculator combined with a Compounded Rate of Interest Calculator on the reverse side. Produced for the Powell Monetary Analyst by Perrygraf in 1973. ($6\frac{3}{8}$" $\times$ $3\frac{1}{8}$")

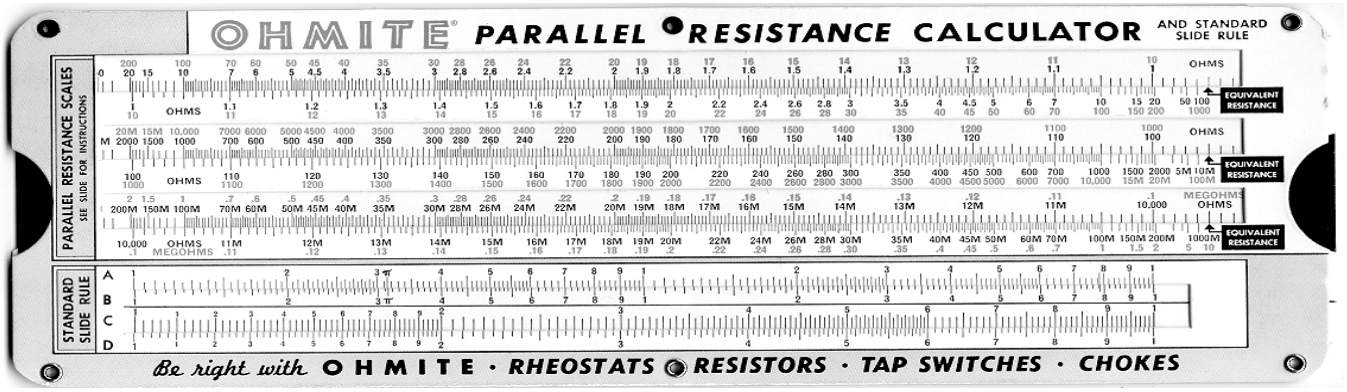

Figure 2. A stiff cardboard Parallel Resistance Calculator that includes a "Standard Slide Rule" at the bottom of the card, with an Ohm's Law Calculator on the reverse side. Produced by the Ohmite Manufacturing Company and priced at 25¢ in 1949. ($8\frac{5}{8}$" $\times$ 3")

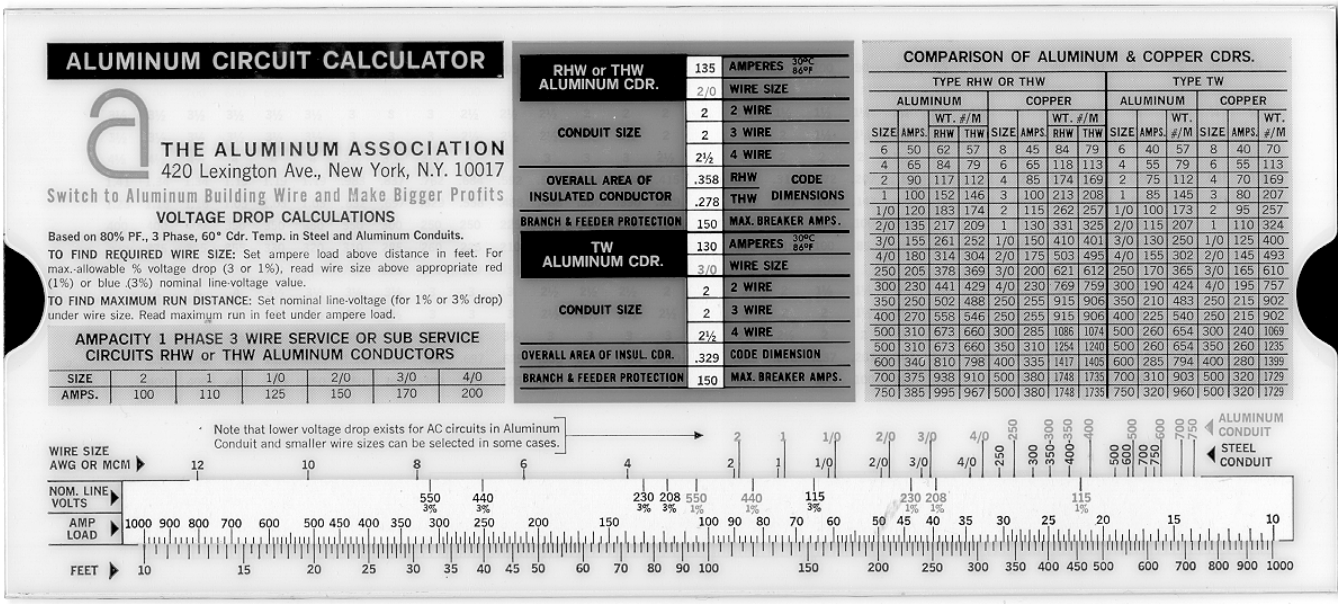

Figure 3. In 1967 Perrygraf designed a plastic and cardboard Aluminum Circuit Calculator for The Aluminium Association with the byline "Switch to Aluminium Building Wire and Make Bigger Profits". ($9\frac{1}{2}$" $\times$ 4")

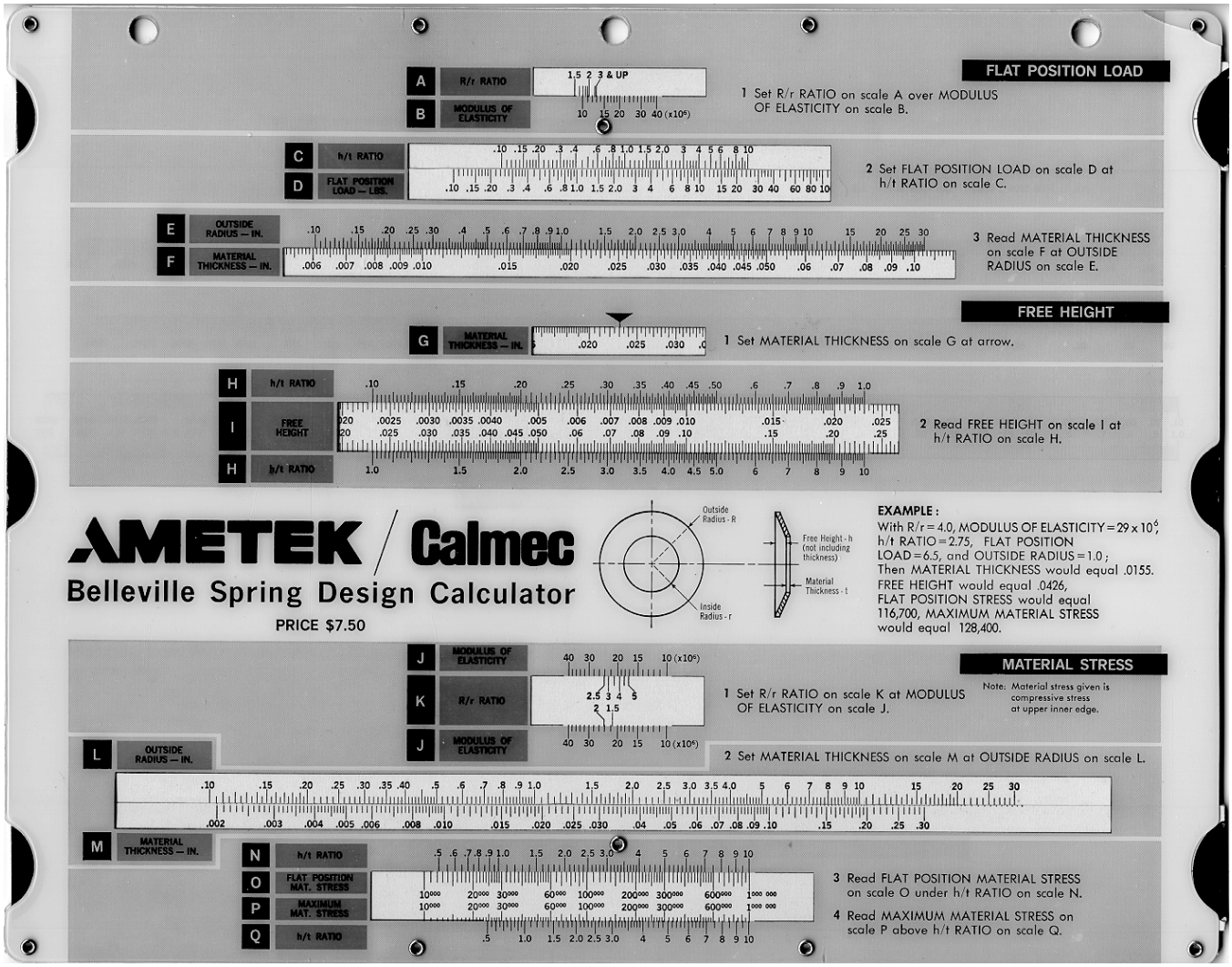

Figure 4. A comparatively large and sophisticated three slide plastic and cardboard Belleville Spring Design Calculator was produced by Perrygraf in 1967 for Calmec, a division of Ametek and priced at $7.50. (11" × $8\frac{1}{2}$")

It would be a formidable project to gather information on such a diverse assortment of calculating devices and then to array it all in some coherent order. This is reason enough that no one of whom I am aware has undertaken such a project. It is, however, a project that someone or perhaps some group should seriously consider taking on. Perhaps a first step would be to develop an inventory of such devices as may have survived. The scope of the undertaking could be limited by focusing on the products of a single maker of slide chart calculators, just as some of us concentrate on collecting Post, Pickett, or K&E slide rules. Alternatively, one could focus on calculators that were commissioned and distributed by a single corporate entity or used within a particular industrial sector such as in the automotive or petroleum industries. Such a research effort would enhance our appreciation of these specialized calculating devices, and enable us better to understand their diversity and applications. From my perspective, this appears to be a significant void in our knowledge of calculating devices that needs attention.

Jessica Helfand, in her book *Reinventing the Wheel*[1] describes a series of rotating cardboard and plastic reference devices that were offered by companies as advertising premiums. This attractively illustrated, entertaining volume, is an eye-opener in showing the remarkable variety of such wheel-shaped devices. It is not a book on circular slide rules, although the author does include the Prestolog Profitometer manufactured in the mid-1930s by H. Kempenich of Palo Alto, California, and the Microtomic Van Dyke Slide Rule produced by the Eberhard Faber Pencil Company of Neumarkt, Germany. William Oughtred is recognized as the inventor of both the linear and circular slide rules. While Helfand's book is not, nor was it meant to be, a discussion of special-purpose calculating devices, it does show how one author attractively displays and discusses a variety of circular cardboard and plastic reference devices.

For starters, it would be interesting to know if card-

[1]Helfand, Jessica, *Reinventing the Wheel,* Princeton Architectural Press, 2002. See *Journal of the Oughtred Society,* 12:1, p2, Spring 2003, for a review of this publication.

board and thin plastic calculating devices were as common in Europe as they were in America. In the U.S., any firm of significant size that marketed technical products or services would likely have a number of calculating devices in their arsenal of sales promotion tools.

Perrygraf and American Slide Chart

Even today, there are companies such as Perrygraf that continue to produce sliding chart calculators in limited numbers to serve special niche markets. Perrygraf, founded in 1934, currently advertises that "we started with a vision—to help every business achieve its sales and marketing goals through creative, accurate, beautifully designed slide-charts, wheel-charts and pop-ups. As the original slide-chart communications company, Perrygraf has the experience and the expertise to translate your vision into business communications tools that have lasting impact on your market." Sphere Research Corporation of Kelowna, BC, Canada, summarizes the history of Perrygraf:

> Not all slide rules are formidable wood and plastic monsters. Some of the most useful and commonly used rules are inexpensive cardboard or thin plastic "purpose-built" devices. One of the original and largest makers of these specialized rules was Perrygraf, originally based in Maywood, Illinois. They were ingenious in adapting basic slide rule concepts into product selectors, parameter analyzers, and dedicated calculators of all kinds. Perrygraf was sold in 1968 to Nashua Corporation, which moved the company operations to Los Angeles, California, and then to Puerto Rico. James E. Johnson, formerly of Perrygraf, didn't want to move into the new organization, and continued to design and make slide charts in his home. He eventually took over the private customers of Perrygraf's founder, Oscar Perry, after he passed away and established American Slide Chart in 1970. American Slide Chart was very successful, and eventually took over Perrygraf itself in 1988, making it the largest producer of this type of slide rule product, as well as pop-up 3D calendars. Today, Perrygraf and American Slide Chart continue to operate as individual companies and often compete for the same customers.[2]

Perrygraf Corporation was America's leading maker of slide-chart calculating devices as evidenced by the number of calculators in my collection produced by that company. A colorful 35-page Perrygraf sales brochure, dated 1965, provides the reader with 65 pictures and 46 case histories showing how company marketing representatives can build sales using Perrygraf Slide-Charts. The promotional pitch goes on to assert:

> A slide-chart is a device that puts product facts at the fingertips. It will make your product easy to sell and easy to buy. In the pull of a slide or turn of a disc, a slide-chart selects the equipment, shows how it works, shows how it's used and, solves engineering problems.
>
> A slide-chart always relates your product to your prospect's need. It appeals powerfully to the man you want to reach but nobody else. It seeks out the man who can buy your product, but is never wasted on non-prospects.
>
> Slide-charts cost little. Ten thousand can be bought for the price of a business advertisement. Profit on a single order often pays for all your slide-charts. Slide-charts work for years at pennies per year.[3]

Perrygraf also emphasized that their calculating devices helped sales representatives open the right doors and access the right people. The lead-in on one page of their 1965 brochure asks, "What products are being sold with slide-charts? Lipsticks to locomotives and everything in between." There follows a list of nearly 200 product lines for which Perrygraf designed special-purpose calculators. Following the list is a virtual directory of America's major corporations as Perrygraf identifies over 200 of their "thousands of satisfied customers".

However, fast forwarding to the present, a review of Perrygraf's current product line suggests that the company has a much more limited product line than it once had. Production now consists primarily of reference-oriented devices such as dial charts, product information guides and conversion scales rather than calculating devices. Clearly, the focus of the company has changed to reflect industry preferences and customer usage. This change in demand from calculating to reference devices is an interesting commentary on how markets have evolved over the last 30 years. Much less attention is given to engineering calculations associated with technical product applications, and there is greater emphasis on simply providing product information and conversion charts.

Like Perrygraf, American Slide-Chart Corporation advertises slide charts, wheel charts, and pop-ups.

Other Makers of Slide Chart Calculators

IWA Slide Charts of Batavia, Illinois, is another company like Perrygraf that continues to produce a range of reference devices. These include a number of slide charts for pharmaceutical use. IWA F. Riehle GmbH & Co. presented those attending the Third International Slide Rule Collectors meeting with an interesting packet of calculating devices the firm had produced over the years.

[2]Sphere Research Corporation's website is *www.sphere.bc.ca/test/perrgraf.html.*

[3]Perrygraf Slide-Charts, a division of the Nashua Corporation, Los Angeles, California.

TAD Products Corporation based in Beverly, Massachusetts, also designed special slide rules to meet customer requirements. They went so far as to advertise special-purpose slide rule kits with step-by-step instructions for those who wanted to design their own slide rules. The company's 1971 catalog included the statement, "Whether you are an engineer or a businessman, you can shorten the time you spend on routine calculations. Designing and constructing special rules is not difficult! Now it has been made easier than ever by the introduction of two new kits for making circular and straight type special-purpose slide rules."

For almost 50 years, Datalizer Slide Charts, Inc. of Addison, Illinois, has designed and produced custom slide charts and wheel charts. The company's advertising copy asserts, "We offer the most talented technical and creative staff in the industry and can provide your company with the tools to make your marketing programs a success."

The UK-based Blundell Harling Group advertises its promotional products as designed for constant use and as being portable, durable, and full of information. Their "added value products" include measurement scales, indicators, and converters. To stress the utility of its promotional products, the firm adopted the clever byline "Giveaway but not Throwaway". Blundell Harling has been prominent in U.K.-sponsored International Meetings and generously presented an assortment of slide rules and calculators to attendees at the Fifth International Meeting of Slide Rule Collectors in Cambridge, England.

Another UK-based maker offering a wide range of technically sophisticated industrial calculators is M.H. Mear & Co., Ltd., founded by Norman Mear in 1947. Soon after its founding, the company's Gas Flow Calculator and its Pipe Flow Calculator for Liquids and Gases (Turbulent Flow) found broad acceptance and were translated into French and German. The Electric Lighting Calculator and Glare Index Calculator was translated into Swedish. Initially, the company made calculators out of Ivorine but found that it had a tendency to warp and, consequently, shifted to using cast acrylic Perspex.

In the Fearns-Mear product line was the Tensor Calculator for "Stress: Strain: Moments of Inertia: Curvature of Surfaces: Influence Coefficients" that was awarded a gold medal at the International Inventors Exhibition in Brussels in March, 1967. Comparatively pricey at $36.95, it was described as "an extremely ingenious new type of calculator which is virtually a mechanical analogue computer for calculating components of plane tensors." Today, M.H. Mears' technically complex and well constructed circular calculators are generally priced in the range of £30 to 45 each, excluding VAT, suggesting that, even with a quantity discount, these are not your typical commercial give-away calculating devices.

The Slide Rule as a Give-Away

Not to be confused with the special-purpose slide chart calculators discussed here, are the countless small circular and rectilinear slide rules of conventional logarithmic design that companies marketing technical products and services often gave away as promotional premiums. They were commonly handed out as sales people made their rounds of plants and offices, and also were frequently available to attendees at technical conventions and trade shows. Many of the small circular slide rules were produced by Concise Company Ltd. of Tokyo, Japan, which added company logos so that recipients would be reminded regularly of the donor company. These give-away slide rules were often attractively packaged and proved quite useful; consequently, they seem to have had a somewhat better survival rate than their special-purpose cardboard and plastic counterparts.

One consideration is cost. Special-purpose calculating devices first had to be conceived, designed, and then produced, probably domestically to assure close communication between the customer and the designer/fabricator. Typically, such devices would have been designed to meet the needs of a comparatively narrow technical market. Thus, it intuitively appears that the cost of such an item would be somewhat greater than that of a small conventional slide rule mass-produced, for example, in Japan by Concise. This simply suggests that a company's sales force might have been somewhat more discriminating in distributing its sliding calculators than it would have been in giving out small conventional slide rules. In my view, however, these conventional slide rules represent another genre of corporate promotion and should not be confused with the special-purpose calculating devices discussed here.

A Modest Proposal

Beginning in the 1930s, special-purpose, promotional sliding chart calculators began to appear as an integral part of the calculating scene. At one time, every practicing engineer, technician, and laboratory researcher in a broad range of professional pursuits probably had at least one tucked away in his or her desk for use in making specialized calculations. This writer will duck the question as to whether or not these calculators truly qualify as slide rules. After all, it can be argued that there are numerous examples of what we presently consider slide rules that were designed for special-purpose calculations, thus suggesting that slide chart calculators can justifiably be considered slide rules as well.

Notwithstanding the issue of whether they are or are not slide rules, perhaps it's time to pull out those neglected slide-chart calculators, and give them the attention they merit. I propose that we do so.