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## John Davis & Son (Derby) Ltd.

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*Colin Barnes*



The Armorial Bearings of  
JOHN DAVIS & SON (DERBY) LIMITED

### Introduction

The history of John Davis & Son (Derby) Ltd. can be traced back some 170 years, and although not a prodigious maker of slide rules, the company did supply and manufacture them for many years. The origins of the business can be traced back to Gabriel Davi(e)s, an optical and mathematical instrument maker with premises at various addresses in Leeds from 1779. John Davis (note change in the spelling of the surname) was born at Thame in Oxfordshire in 1810 or 1811, and served an apprenticeship with Jacob Abraham, the optical and mathematical instrument maker with premises in Bath and Cheltenham. Abraham was an important maker, with the Duke of Gloucester and Duke of Wellington among his customers. In 1830 John joined his elder brother Edward at his uncle Gabriel's business in Leeds.



Figure 2. John Davis.

John Davis toured the Midlands on behalf of his uncle and regularly visited Derby, and in 1830 opened a shop in Rotten Row for a short season. In the course of his annual travels through central England, John witnessed the special growth of three towns. Led by Liverpool, Cheltenham and Derby were growing rapidly, and John spent short

periods in each, deciding finally to settle in Derby. The growth of Derby accelerated with the arrival of three railway companies, the North Midland, Midland Counties, and Derby & Birmingham Junction. These three finally negotiated among themselves and with the Derby Town Council to build and share a single railway station. The first trains ran to a temporary platform in the summer of 1839. In 1844 the three railway companies amalgamated to form the Midland Railway Company and chose Derby as its headquarters. It was in 1843/44 that John Davis, his wife Amelia and their two young sons moved into 21 Irongate from where he sold his family's instruments.

Derby was a shrewd choice for the fledgling business. The railways were opening up the expanding industrial areas of Yorkshire and the coal fields of Derbyshire, Leicestershire and Nottinghamshire, the sources of the raw materials of coal and iron that fueled industrialization. The mining companies provided a lucrative market for John Davis instruments, specifically theodolites and surveying levels. John also had a special interest in miners' dials and was flattered to be approached by John Hedley, an Inspector of Mines, to produce an improved dial with a swinging limb. With further modifications, Hedley's dial became the standard dial for mining surveyors and continued in production until the 1960s. Another famous Davis instrument was Biram's Patent Anemometer, invented by Benjamin Biram to measure the flow and force of air flowing in mine workings. Again this instrument continued in production for some 123 years. In addition to mining instruments (for which the company was famous and is still producing) John Davis turned his attention to the makers and users of steam engines, making vacuum and pressure gauges, and indicators.

Much more could be said of John Davis, his involvement in civic affairs, his interest, production and export of lightning conductors, his membership in the Derby Philosophical Society which met at Erasmus Darwin's house and was based on the famous Birmingham Lunar Society. Davis presented a number of papers for the Society, six of which have survived on such varied subjects as Iron and Steel, the Eye, Water Supply, Pneumatics, William the Silent (?) and the Great Exhibition. The introduction of the slide rule to the Davis catalogue would, it appears, have been left to his son.

John Davis died in 1873 and the business was continued by his son Henry. In 1875 the business moved to new workshops in Amen Alley (the All Saints Works), although a small workshop was retained at the rear of 21 Irongate. This workshop was in use until 1966 for the calibrating of theodolites and surveying dials, partly to avoid electrical interference but mainly because true north was accurately marked on the workshop wall.



Figure 3. Amen Alley at the corner of Full Street, ca. 1882<sup>1</sup>.

The company continued to expand with a London Office being opened at 118 Newgate Street in 1877, complete with one of the earliest telephones. In the same year another office was opened at 5 Bute Crescent, Cardiff, South Wales. During the subsequent ten years the company was

active in the field of electrical equipment including bells, lights, and telephones. By 1886 the works was generating electrical power from the “Lighting Station” built after the demolition of two cottages behind the All Saints Works. In 1889 excess power at 110 volts was delivered to subscribers in central Derby on a 24-hour basis under the stewardship of a Chief Electrical Engineer named Wallis. The Derby telephone exchange was opened in 1888, and the factory had already installed the instruments in readiness.

### 1889

The first Davis slide rule was recorded in about 1889 when they were advertised in their catalogue of 1890. This 10-inch rule was described simply as a “celluloid slide rule” and the company history records that “They (John Davis) had exclusive importation rights for celluloid slide rules from a German firm.” The late Hans Dennert has confirmed by inspection that this slide rule was made by Dennert & Pape.

The medieval jettied corner building sold breviaries and Mass books to worshipers at the adjacent All Saints Church. The gable on the left was part of the Davis works. The corner site was later purchased by Davis and the works extended.

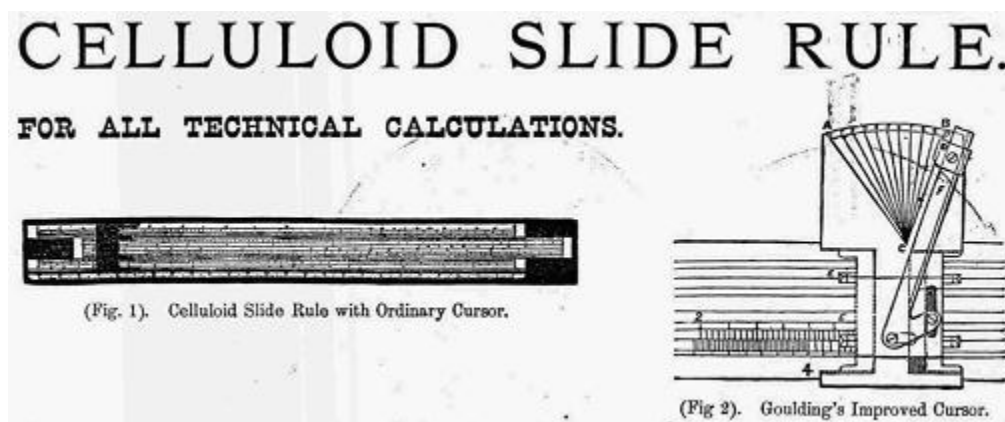


Figure 4. Advertisement for the Celluloid Slide Rule, ca. 1889.

Figure 4 shows a modified D&P No. 1 standard slide rule of 1888 the mm. scales on the bevelled edge and under the slide replaced with an inch scale. The advertisement shows the rule with a Goulding cursor, but an example from 1910 has a metal-framed glass cursor, stamped D.P. - D.R.G.M.; the rule itself is also stamped D.R.P. No. 126499—all evidence of Dennert & Pape manufacture.

Reviews of this slide rule taken from *The Engineer* and *The Electrical Engineer* are given in the Appendix.

In about 1895 there is a tantalizing reference in the company history to the production of “time saving calculators” that showed at a glance units of time and velocity, Henry Davis having “that day shipped six to Yokohama”.

By 1900 the company was trading internationally and had appointed agents in Johannesburg, Buda Pesth (Budapest), China, Japan, Russia, Australia (Scott Henderson & Co. of New South Wales) and were actively seeking representation in New Zealand. The John Davis company was appointed agents for Jeffrey & Co. of Columbus, Ohio, manufacturers of electric locomotives and mining machines.

### 1905

An extract from the Davis catalogue of 1905 shows a list of six celluloid-faced rules, the type “Hellener” having a metal back; however, this should not be confused with the Davis patented metal back that appeared in 1916.

<sup>1</sup>Derby Old and New, Frank Rogers.

By 1905 the Dunlop-Jackson (also referred to as the Jackson-Davis and Davis Log-Log) slide rule had been introduced. This rule was supplied with a second slide with E or loglog scale.

Code Word	Length	Description
Dunson	10 in	Celluloid slide rule, with glass cursor, and spare logologarithmic slide, as arranged by Lt. Col. C. Dunlop, R.F.A. & C.S. Jackson, M.A.
Dunsoner	20 in	ditto

Patents are known for both H.C. Dunlop (23886 of 1901) and for a T. Jackson (129533 of 1918). Neither of these patents relate to the description of the Dunlop-Jackson slide rule. A review of this rule is given in the Appendix.

Also from 1905, we have a review from *Nature* (see Appendix), referring to a slide rule to which a second slide may be clipped to one edge and a wide cursor used. This rule is described in Pickworth, *The Slide Rule*<sup>2</sup> and designated the Jackson-Davis Double Slide Rule.

Further details from the 1905 catalogue are given here:

Code Word	Length	Description
Simplex	5 in	Slide rule, with long ends, containing A,B,C, and D scales in celluloid with glass cursor and case, with two bevelled edges.
Simple	10 in	Slide rule, with long ends, containing A,B,C, and D scales, also divided on edges in ins. and m/m on celluloid, glass cursor with centre line, and case
Hellen	5 in	Slide rule, with long ends, containing A,B,C,D,S, and T scales subdivided similarly to the 10 in, also divided on the back in ins. and m/m on celluloid, with magnifying cursor and case. The body is provided with a steel back as shown in the sectional illustration A, and is slotted under the slide longitudinally end to end, thus overcoming expansion or contraction. Should the slide become loose, all that is necessary is to press the sides of the rules (when the slide is withdrawn); this may be done without fear of damage.
Hellener	10 in	Celluloid slide rule, new form, with spring steel back as shown, with glass cursor
Hellenera	15 in	ditto
Hellenest	20 in	ditto

## 1910

During the next five years there was considerable activity in the field of slide rules. In ca. 1910 Davis published their catalogue number 122A - Mathematical Drawing Instruments, Slide Rules, Drawing Office Materials. Some sixteen slide rules are listed together with three magnifying cursors and the Smith-Davis Premium Calculator and

Smith-Davis Piece Work Balance. Particularly mentioned in this catalogue are the “Stelfox” and “Dr. Yokota’s” slide rules, both of which are known to have been made by D&P, however the catalogue states that, with regard to the Yokota rule, it is manufactured by Davis as Sole Licensees under British Patent. Also *The Engineer* of February, 1910 says. . . the Yokota slide rule, is manufactured by John Davis & Son (Derby), Limited, and resembles the more familiar rule associated with the firm’s name (see Appendix). Identification of these rules is further complicated by the fact that Davis did not always mark their rules with either a manufacturer’s name or a type name or number.

The following lists rules in the 1910 catalogue but excludes rules listed in previous catalogues:

### Special Rules

Slide rules constructed in the usual way are affected by extremes of temperature and moisture, and in consequence the slide becomes too tight or too loose. The “Special” slide, as illustrated above, is provided with a steel back as in “Hellener,” and the wood is slotted longitudinally from end to end. It is also provided with adjusting screws, arranged as shown in the illustration, so that the slide may be made to travel smoothly.

Code Word	Length	Description
Special	10 in	Celluloid slide rule, “Special,” for hot or damp climates, with three adjusting screws, glass cursor
Specialer	15 in	ditto
Specialist	20 in	Celluloid slide rule, “Special,” for hot or damp climates, with five adjusting screws, glass cursor

### Tacheometrical Slide Rules

Code Word	Length	Description
Tactical	20 in	Tacheometrical slide rule divided for 360° and 400°
Tactician	20 in	ditto, designed by Werner, Vienna, proportion $\cos 2a$ and $\frac{1}{2} \sin a$

### Cursors for Slide Rules

Code Word	Description	For Rule Size
Spare	Spare glass cursor	10in. rule
Spared	ditto	20in. rule
Magor	Magnifying cursor	5in. rule
Mag	ditto	10in. rule
Maggie	ditto	20in. rule

### No. 1C Pattern

SPECIAL FEATURES. - A wider rule, containing two extra scales on the face thereon, viz.: the “E” and “F”, in addition to the usual A,B,C, and D scales, permitting the third power and third root to be more readily obtained.

<sup>2</sup>10th edition, 1906, Emmott and Co., Ltd.

Code Word	Length	Description
Onesee	10 in	No. 1C slide rule without adjusting screws, with glass cursor and full instructions
Oneset	10 in	ditto ... with adjusting screws
Twensee	20 in	ditto ... without adjusting screws
Twenset	20 in	ditto ... with adjusting screws as described above for extreme climates

### Dr. Yokota's Slide Rule

(see Figure 5)

From the Davis 1914 *Catalogue*:

“As adopted at the Royal Naval College, Greenwich; Tokyo University, and elsewhere. We are Sole Licensees under the British Patent.

#### *Special Features*

In addition to the four customary scales of the ordinary rule, seven additional scales are given, three lying on the top strip, three on the lower, and one on the moving slide. The three upper scales are engraved proportionally to the logarithms of the logarithms of numbers enabling involution and evolution to be carried out on any number to any positive integral or fractional degree. The three lower scales are complimentary to these, and enable the same processes to be effected with negative indices. The sixth scale is provided to enable 3rd, 2/3rd, and 3/2th powers of any number to be read off directly. The scales are 10 inches in length instead of the usual 25cms. This permits a direct method of reading logarithms of numbers to be employed by using a tongue on the cursor in conjunction with the decimally divided ten-inch scale on the edge.”

Reference has been made above to Davis slide rules fitted with adjusting screws. This feature consists of transverse screws through the stock for adjusting slide tension. No patent has been found for this construction; however, the illustration given in the full Yokota patent clearly illustrates the screw head on the edge of the rule. (See Figure 6, next page)

#### The Stelfox Slide Rule

The Stelfox slide rule is 5 inches long with a 10-inch jointed slide, and combines the accuracy of the larger and the portability of the smaller; and the A,B,C,D scales are as open as in the 10-inch size.

The slide is jointed in the middle by means of long dowels, and can be separated instantly for carrying.

The back of the rule and also of the slide are left blank for notes, which can be permanently or temporarily marked.

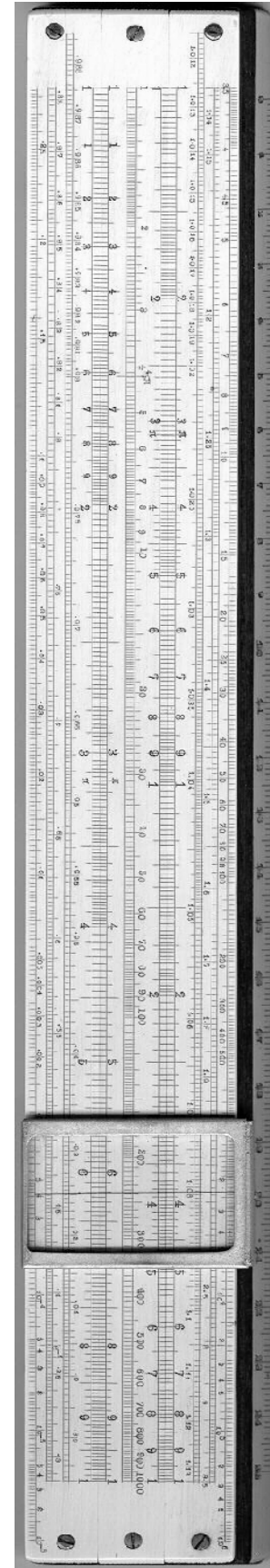
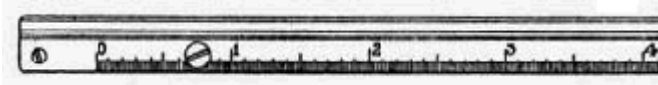


Figure 5. Yokota Slide Rule. British Patent 18218/07



Adjusting screw head  
Figure 6. Detail from Yokota patent.



Figure 7. British Patent 13852/10.  
Stelfox 5-inch slide rule with 10-inch jointed slide

Two further slide rules are mentioned in the 1914 catalogue. They are: “Wingham’s” slide rule for calculating furnace charges, and “Pickworth’s Power Computer” in two versions, one in cardboard and one with ivorine scales. It is not known whether either of these rules was made by Davis, or whether they were simply retailed by them, as was the case with Halden’s Calculex, Fullers, Boucher’s circular calculator, and the Cuntz rule.

#### 1912/14

In June, 1912 a review of the Jakins’ Slide Rule appeared in *The Engineer* (see Appendix). This rule is quoted as being “A modified Rule for Surveyors”. The following brief description of the rule is taken from the *Napier Tercentenary Celebration Handbook* of 1914:

“Jakins” - 11-inch rule. This is a quick and convenient instrument for performing calculations in surveying, and is a most ingenious device. It is claimed to give an average accuracy of within 1 in 10,000 in all calculations performed on the rule: at times the degree of accuracy greatly exceeds this. The rule is a distinct advance on all others, and although it is primarily intended for surveyors, its applicability is very wide.”

There is reason to believe that a patent was applied for, but no record has been found to confirm one was granted.

The only other rule mentioned in the *Tercentenary Handbook* not previously described was the 10-inch “Electrical” slide rule. Practical electrical calculations can be most simply and quickly carried out with this type of rule. One or two movements of the slide are usually sufficient, whereas, with the old type of rule, several settings were needed to obtain the required result. The scales on the edge of the slide, and those on the stock adjacent to them, are as in ordinary slide rules, so that the use of the instrument for usual calculations is not interfered with in any way.

With the war of 1914 approaching, the official company history records that Wilfred (or Wilfrid), son of

Henry Davis, had taken over the day-to-day running of the business, and had extended the All Saints Works to meet increased demand for mining equipment. The company history goes on to record:

“From at least 1901 the firm had been selling other firms’ slide rules, and had been assisting in the manufacture of the Jackson-Davis slide rule very early in the reign of Edward VII (i.e. c.1901). But it was only on the eve of war that demand for slide rules suddenly exploded. Having decided to equip themselves to meet that demand, Davis’s went ahead very quickly and for the next half century they poured out vast quantities of ever-improving slide rules under various trade names. Among the most popular were the ‘Daffield’ and the ‘Autocrat’.”

The close mutual relationship between John Davis and Dennert & Pape was now to come to an end due to the war. Davis was busy during the war years and introduced a number of new slide rules, some to their design and some to those of others.

In 1914 Lee and Bottomley patented their design for a slide rule for calculations related to toothed wheel design. I have no direct evidence for Davis manufacture of this slide rule, but it has been reported and listed in Hopp and Pickworth<sup>3</sup>. It is assumed that this rule was made in the linear version indicated in the abridged patent shown here.

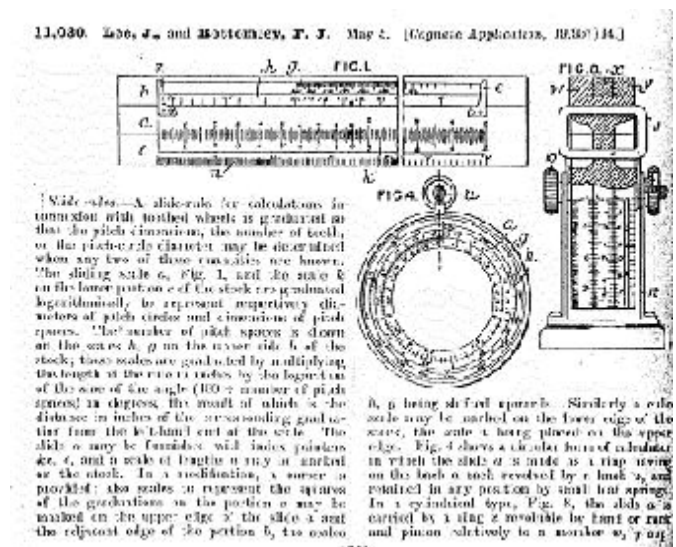


Figure 8. The Lee and Bottomley  
Patent 11,030 of 1914 (abridged).

#### 1916-1920

Probably as a result of war, there was an increase in the production and use of slide rules accompanied by new patents and models. The first of these was the Davis

<sup>3</sup>For example, the 15th edition of *The Slide Rules*, 1917, page 118.

patent for the steel back to the slide rule which superseded the previously used method of construction. The main point of difference is the inclusion of a strip of celluloid (marked c in the drawing) laid along the bottom of the groove in the stock. Illustrations in "Pickworth" indicate that the transverse adjusting screws were retained for use in some models.

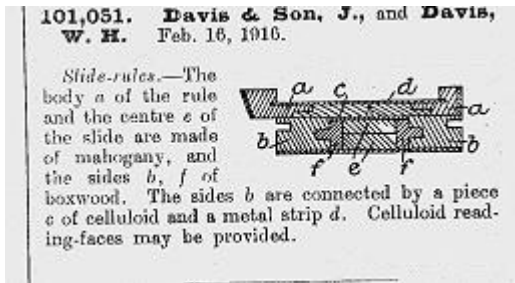


Figure 9. Davis & Son Patent 101,051 of 1916 (abridged).

In 1917 a further Davis patent was granted; this time for a tensioning device fitted at the ends of the stock and used in conjunction with the new construction method. This arrangement was probably cheaper than the transverse screw arrangement which may have been discontinued although both designs are still described in "Pickworth" until at least the 22nd Ed., 1941, at about the time Davis stopped production.

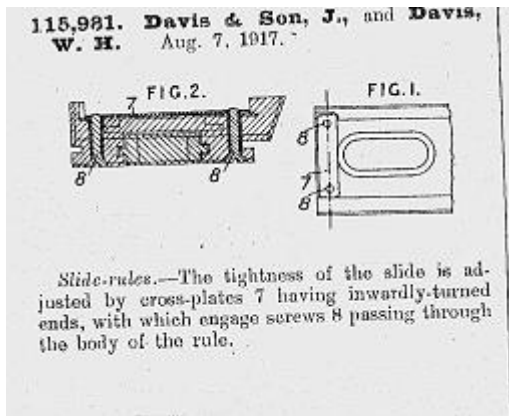


Figure 10. Davis & Son Patent 115,981 of 1917 (abridged).

Two slide rule patents of 1916 with military applications were taken up and made by Davis: the Stokes field gunnery rule and the Martin wireless rule. The Stokes rule was adapted for both "encounter" and "entrenched" field gunnery. The patent drawing shows a slide on both front and rear faces, confirming the Davis statement that the rule has "two slides and 19 named scales". The rule is assumed to be made of wood. It is eight inches long with one beveled edge with scales for map work.

No example of the Martin wireless rule, patented in the same year, has been examined. It is recorded as being a 10-inch rule. Both rules continued to be made until at least ca. 1925.

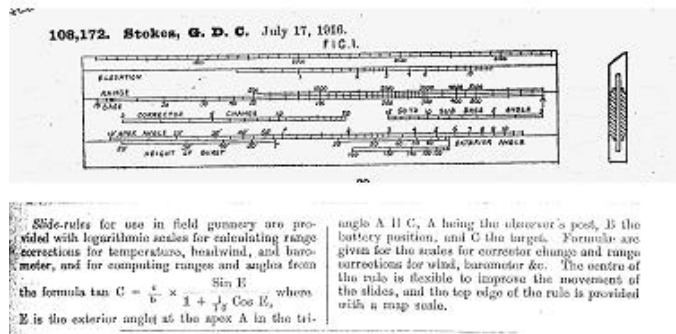


Figure 11. G.D.C. Stokes Patent 108,177 of 1916 (abridged).

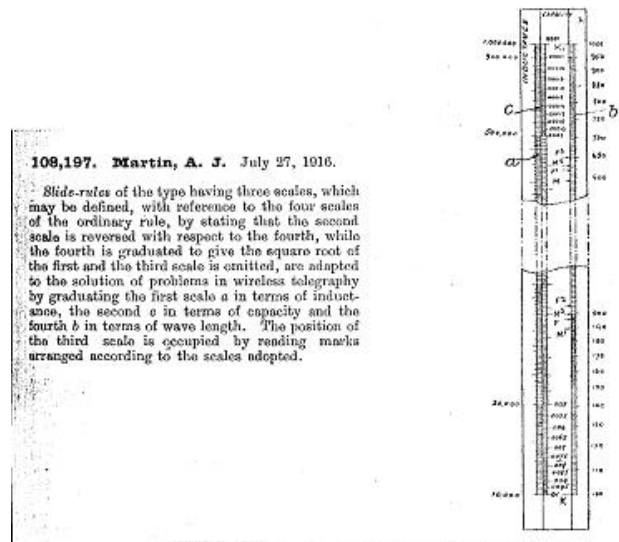


Figure 12. A.J. Martin Patent 108,197 of 1916 (abridged).

In January 1917, Henry Davis died suddenly. The "Derby Mercury", in its long obituary said "he worked himself to death over the war effort". His son Wilfred, who was already Managing Director, now had full responsibility for the running of the business.

John Davis emerged from the war in 1918 in a relatively strong position with a continuing demand for slide rules however, optimism was short lived and the planned extension to the Slide Rule Shop, approved by the Ministry of Munitions, was refused by the Derby Corporation Building Department. Plans to purchase the Bath Inn in order to extend the Works were delayed and then the Ministry of Munitions canceled an order for 265 fifteen-inch rules. It seemed that the slide rule market was threatened with collapse due to the perceived "dumping" by French manufacturers of their products in Britain. With the help of Mr. J.H. Thomas, a Derby Member of Parliament, a ban was introduced on the importation of all slide rules except metal ones. This ban was to last until September, 1919, when the situation was to be reviewed.

With the relaxation of wartime restrictions in 1919, the company saw business improve. The Ministry of Munitions agreed to pay for 96 slide rules already made to

the previous year's order and to pay £400 compensation for the cancellation of the contract. The All Saints Works were modernized and alterations included an extension to the Slide Rule Shop. The Bath Inn was purchased followed by the purchase of Nos. 3 and 4, Amen Alley at a cost of £785. Parts of these two cottages remained tenanted while parts were put to immediate use until 1920, when the last tenant left, the properties were demolished, and the workshops extended over the site.

### 1920s

The depression years saw the company's profit drop dramatically, although it was reported that "slide rules sold well" and that the company, with its diverse range of products, particularly in the field of mining products, "survived better than most".

Two new patents were granted in 1925, one for a slide rule for non-decimal calculations (G.G. Scurfield Pat. No. 227,643 of 1925) and one for a slide rule construction method (L.E. Edwards Pat. No. 232,037 of 1925). Both these patents were adopted by Davis, in the first instance as the Davis-Scurfield slide rule, and in the second as the Davis "Glider". The main feature of the Edwards patent is the construction of the slide, which is slotted longitudinally with spring or other resilient inserts fitted at intervals within the slot. The patent drawings show a number of methods of construction. Used in conjunction with the normally longitudinally slit stock or, as in the case of Davis rules, the metal-backed stock, this arrangement is intended to provide an even pressure between stock and slide under various climatic conditions. Only one version of the Davis "Glider" rule with this method of construction is recorded (see list below).

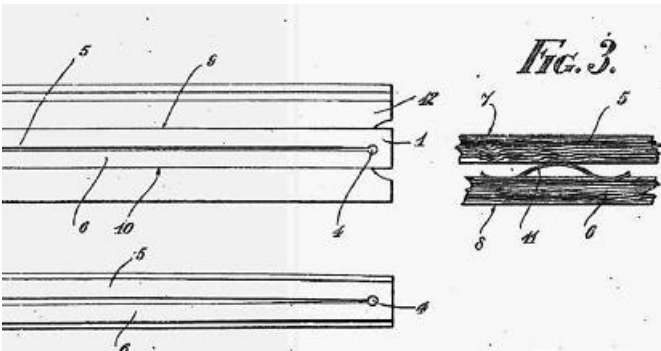


Figure 13. Part of drawing of Edwards Patent 232,037 of 1925 showing enlarged detail of slot in slide and spring insert.

The next list of Davis slide rules available to the author has been found in an instruction book dated ca. 1925. This list is referred to as an "Abridged List" and is given here omitting the "Yokota", "Trician" (electrical), "Stokes Gunnery" and "Martin Wireless" slide rules that have already been described.

Code Word	Length	Description
Autocrat	10 in	Celluloid slide rule, with long ends, with metal back, containing A, B, C, D, S, T, and Log scales and Gunners' Marks, divided on the edges in inches and mm; glass cursor with centre line
Democrat	15 in	ditto
Plutocrat	10 in	Celluloid slide rule, provided with metal back to overcome climatic variations, containing two extra scales on the face, viz. the "E" and "F" in addition to the usual A, B, C, D scales, S and T scales on back and divided on the edges in inches and mm, glass cursor with centre line
Monocrat	10 in	Celluloid slide rule, provided with metal back to overcome climatic variations, containing the 7 scales all on the face of the rule, viz. A, B, C, D, S, L, and T scales, and divided on the edges in inches and mm. Glass cursor with centre line
Glider	10 in	Celluloid slide rule, provided with metal back to overcome climatic variations, containing two extra scales on the face, viz. "E" and "F" in addition to the usual A, B, C, D scales permitting the third power and third root to be more readily obtained; S, T, and log scales on back, and divided on the edge in ins and mm, frameless glass cursor with centre line. Fitted with special spring slide. If with solid leather case: Add X to Code Word
Dafield	10 in	Celluloid slide rule, provided with metal back to overcome climatic variations, containing, as the "Monocrat", the 7 scales all on the face of the rule, A, B, C, D, S, L, and T scales, and divided on the edges in inches and mm. Also the special Split unit Scale; frameless glass cursor with centre line
Aristocrat	5 in	Celluloid slide rule, with long ends, containing A, B, C, D, S, T, and Log scales, sub-divided on the edges in inches and mm on celluloid, with magnifying cursor and case

Code Word	Length	Description
Durocrat	20 in	Slide rule, similar to the "Autocrat" and "Democrat" but more openly divided. With three line cursor and full compliment of scales, including S, T, and Log, and provided with a metal back to overcome climatic conditions
Student	10 in	To meet the demands of the student who feels unable to afford the higher priced rules. Mahogany rule with celluloid facings carrying the A, B, C, and D scales, engine divided and fully marked. Complete with cursor and equal in quality to the more expensive products
Bureaucrat	5 in	Celluloid slide rule, openly divided and fitted with plain glass cursor with centre line, carries A, B, C, and D scales, mounted on mahogany
Grinstead	15 in	Celluloid faced for converting complex quantities. It greatly facilitates calculations involving the conversion of complex quantities from the form $a \times jb$ to the form $R/\theta$ and vice versa

### 1930s and early 1940s

No change in the Davis product range has been noted in the period leading up to WWII and it is assumed that most, if not all, of the rules listed above remained in production. One can only surmise, but it seems probable that the company's concentration in its core business to the mining industry was responsible for the decline in slide rule manufacture and ultimate cessation in about 1941. However, at least one new rule is known to have been made at about this time, the Machine Gun slide rule. This rule, for the MKIII, .303 Vicker's machine gun, is made of boxwood and measures approximately 6" x 3", carrying scales and two slides (with scales on both sides) on the front face and various tables on the back. The beveled edges have scales of 1:250,000 and 1 inch = 1 mile divided in thousands of yards. A "24-inch cord for graticule purposes" is attached to the rule. (See Figure 14 on next page)

It is fortunate that we have a first-hand account of slide rule manufacture at this time. Mr. R. Simpson, as a seventeen year old apprentice, worked in the Slide Rule Shop and has left us his recollections.

"The basic staff of the Slide Rule Shop consisted of two craftsmen, one woman and myself, the apprentice. The main piece of equipment, and the domain of Mr. Herbert Orme, was a large dividing engine, some fifteen to twenty feet in length and upon which the celluloid scales were engraved with a knife. Wood machining was the responsibility of the appropriately named Norman Wood. The main woodworking machines consisted of a saw, planer, and a profile cutter for forming tongues and grooves, etc. Most of the power tools were run by belts from an overhead shaft. Mrs. Doris Atkinson was one of the very

few (if not the only) woman working for Davis at the time, reputedly to pay for her son's education at Repton School. Her job was to hand stamp the numbers, symbols, etc., on the scales, to black wax them and finally to clean and smooth off any burrs. Mistakes could be corrected using acetone as a solvent.

Material for the framed cursors was stamped out from aluminium or German silver sheet. The cursor glass was coated with wax, set in a jig and the hairline scribed with a knife. A small amount of hydrofluoric acid was run up and down the hairline by hand for 20 to 30 seconds before being rinsed off.

In about 1941 some of the last rules to be made were the boxwood Vicker's machine gun rule with two slides. I also recall trimming and finishing the last of the celluloid faced rules at this time. For some reason the two senior craftsmen left Davis and were not replaced and after some 50 years the manufacture of slide rules came to an end."

### Afterword

With the British mining industry becoming more mechanized, Davis became more specialized particularly in the fields of mine signaling equipment and communications systems. By 1950 the company discontinued many of its hitherto traditional products. In early 1962 John Davis & Son received an offer from the Standard Industrial Group to buy the business. Wilfred, now nearly 80 years old, was still active but his son Bruce had been running the business as joint Managing Director and Executive Vice Chairman for the past nine years. Bruce had no sons and furthermore had long had the wish to become a farmer. Under these circumstances the family decided to sell the business. The new Board of Directors searched for land on which to build a new factory. They wanted a site as close to the Amen Alley works as possible in order to retain their association with the city and its skilled workforce. In 1966 they moved to Alfreton Road, Derby. The Standard Industrial Group was itself bought by the Pearson Group. In 1980 Pearson acquired Fairey Group and Davis became a division of Fairey Engineering. In 1987 Fairey, including Davis, was the subject of a management buyout, and shortly after Davis returned to private ownership, having been sold to Communications and Control Engineering Company, Ltd., was renamed Davis Derby Ltd., and moved to a new factory at Chequers Lane, only a mile or two from the original site in Amen Alley.

At the time of the original research into the company history (1997) the company was flourishing and remained in the forefront of mining and electrical technology, with the design and manufacture of standard products and the design and development of products for third parties.



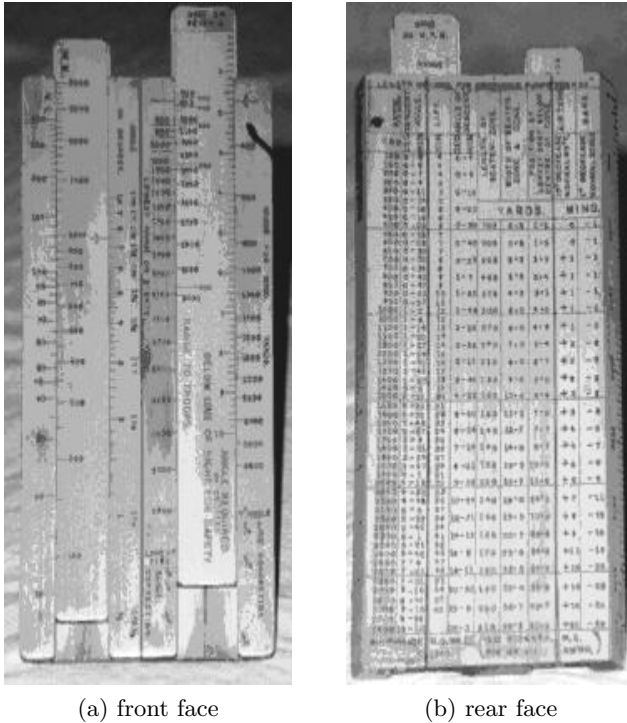


Figure 14. John Davis boxwood  
Vicker's machine gun rule.

### Acknowledgements

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My recent enquiries have been greatly facilitated by the publication of Peter Hopp's book, *SLIDE RULES, Their History, Models and Makers*, Astragal Press; and additional information supplied by Bruce O.B. Williams, both by direct correspondence and by reference to his comprehensive CD-ROM, *Non-Electronic Calculating Apparatus, An Illustrated Listing of 2900+ GB Patent Specifications 1731-1999*, UK Slide Rule Circle.

### Appendix

Excerpt from "The Engineer", 5<sup>th</sup> April 1889

#### A NEW CALCULATING SLIDE RULE

"English rules for calculating purposes have not enjoyed a high reputation for accuracy. The slide rule, on which logarithms of numbers are represented graphically in the form of scales, has been in use for many years in this country for finding the contents of timber and for other purposes; but on the Continent its greater perfection has brought it into general use for all technical calculations. The Gravet calculating rule, 10 inches in length, is said to be accurate to one part in 500. This degree of accuracy is, it is claimed, exceeded by a slide rule that is now being introduced by Messrs. J. Davis & Son, Instrument Makers, Derby and 118, Newgate Street, London. This rule is of the Gravet type, and is also 10 inches in length. The body of the rule is of wood in which are inlaid strips of hard celluloid; on these strips the scale are engraved. These celluloid scales present the advantage of remaining unchanged, or at all events without the slightest relative change in varying temperature, and as the graduations are executed in black lines on a white ground, reading is easy and not tiring to the eyes. The celluloid rules, too, are superior to the ordinary French Gravet rule made of boxwood. The celluloid rule wears remarkably well and possesses the advantage of not becoming discoloured with age as ivory does."

Excerpt from "The Electrical Engineer", 26<sup>th</sup>, April 1889

#### CELLULOID RULE

"Slide rules are now a *sine qua non* to engineers having to undertake long and extensive calculations. A new slide rule of improved construction has been brought out by Messrs. J. Davis & Son of Derby, and 118, Newgate Street, London. The body of the rule is of wood in which are which strips of hard white celluloid are inlaid, and on these celluloid strips the scales are engraved, being thus in black lines on a white ground. The advantages claimed are greater accuracy, together with greater clearness of reading; it wears well and does not become discoloured; and also the markings remain unchanged, or rather without relative change, from variation in temperature. The rule is of Gravet type, 10-in. long and should prove useful to those who use, or who, hereafter, learn to use the slide rule for their calculations".

The calculations that may be performed by the aid of this rule are endless in number. In addition to the ordinary processes of multiplication, division, evolution and involution, it may be used for a variety of technical calculations, in which its use effects an enormous saving of time. Thus the engineer may compute the strength of beams, moments of inertia, horse-power of engines, hydraulic formulæ, areas of circles and ellipses, cubic contents, weights, conversion of British into metric or other systems of measurement, without putting down a single intermediate quantity. The electrical engineer may solve all problems involving the application of Ohm's law of the relation between current, electro-motive force and reactance. The surveyor may plot by rectangular co-ordinates and

set-out curves. The chemist is enabled by its aid to calculate percentage compositions rapidly.

*Review of New Slide Rule, Nature, May 11, 1905*  
**A NEW SLIDE RULE**

Messrs. JOHN DAVIS AND SON, of Derby, the well known instrument makers, are bringing out a variation of the slide rule which is likely to increase its value for certain classes of calculation without interfering with the simplicity and convenience of the form with which we are all familiar. The lower groove on the outside of the rule, which ordinarily is only wide enough to hold the inturnd edge of the cursor, is made wider, so as to take one of the tongues of a spare slide, and this slide is held in place when required by two light aluminium clips which grasp the ends of the rule and of the spare slide while leaving the usual slide free to move. An extra cursor is also provided which is long enough to grasp both the rule and extra slide. By this means any rare or special scales upon the extra slide are for the time being equivalent to scales upon the rule, and these may be read against scales upon the other slide by means of the long cursor. If desired, the extra slide can take the place of the ordinary slide, or may be removed altogether when the rule, if provided with an ordinary cursor adapted to the altered groove, becomes an ordinary slide rule. In the example submitted, the extra slide carries what are called E and -E scales. The E scale is a log log scale, and is always being re-invented; it was called a P line or power line by Lieut. Thomson, who showed it at the Inventions Exhibition, and it was long before invented by Dr. Roget. This p or E line is very handy, for it at once enables the logarithm of any number on any scale, *i.e.* to any base, to be read according to its position against an ordinary A line, while fractional or high powers of numbers are read with equal facility. Compound interest, pressures and volumes of gases under isothermal or adiabatic conditions are readily evaluated with the aid of the E line read against an A line. If, however, a pair of E slides are used, one in the usual position and one attached below the rule by means of the clips, then against any value, say of  $v$ , on one, the cursor will show the value of  $v^\gamma$  on the other,  $\gamma$  having any desired value according to the relative position of the two slides.

The slide rules made by Messrs. Davis and Son are too well known for their accuracy and finish for it to be necessary to refer more to such points, but by some curious perversity or accident there is one little fault in the rule sent for examination which only needs to be pointed out to be put right. On the feather edge a scale of inches in 16ths is provided; on the lower face outside the rule there is no scale at all, while inside, to be used like a hat measure, there is a scale of millimetres beginning at 550. If, therefore, the rule is required for the prosaic but very useful purpose of measuring a length, this can only be measured in inches if it is 20 inches or less, or in millimetres if it lies between 550 and 1040 millimetres\*.

\*This would indicate that the slide rule reviewed was one of 20 inch length.

*Excerpt from an article by G. H. WYATT Esq., B.Sc., A.R.C.S., which appeared in The School World of June, 1905, pages 216-218, with reference to our Slide Rules generally, and with an especial reference to our Jackson-Davis Rule with the "E" slide, as adopted at Woolwich, an extract of which we give below:-*

"A most useful addition to the ordinary rule is an extra slide to give the value of  $\log(\log x)$ . This slide is used in conjunction with the lower (or more open) scale of the ordinary slide rule. The value of this 'logologarithmic' slide will be understood when it is remembered that the ordinary rule will give squares and square roots, cubes and cube roots, but this new slide rule will give ANY POWER OR ANY ROOT."

*Extract from "The Engineer", 4th Feb., 1910*

**A New Slide Rule.**

Much ingenuity has been from time to time devoted to the construction of slide rules and other mechanical calculators, and in the past we have illustrated and described numerous inventions of this class. Where a formula or particular calculation is of frequent occurrence, there would appear to be a tendency to devise an instrument solely adapted for the work; indeed, there are few mathematical problems, whether in simple arithmetic or the calculus, which cannot be solved by mechanical means. Such instruments naturally possess limitations, and in many cases they have but small interest to those outside the class for whose benefit they are designed. The slide rule herewith illustrated can perform many of the duties required of the specialised instrument, yet it has all the qualities of the ordinary rule, and retains its general applicability. This device, known as the Yokota slide rule, is manufactured by John Davis and Son (Derby), Limited, and resembles the more familiar rule associated with the firm's name.

*Extract from an article in "The Engineer" 14<sup>th</sup> June, 1912*

An example of a new slide rule has been sent to us for our inspection by John Davis & Son (Derby), Ltd. This rule, it is claimed, is specially adapted to survey work calculations, and is designed solely to handle trigonometrical calculations with greatly increased accuracy. . . . This Slide Rule is the invention of an Australian gentleman, Mr. G. (?) Jakins, and as a most ingenious device we are highly impressed with it. The inventor claims to get an average accuracy of within 1 in 10,000 in all calculations performed on the Rule. . . . As we have shown, the degree of accuracy at times greatly exceeds this, and from careful study of the Rule, we have no hesitation in saying that as high as the author's average limit of accuracy undoubtedly is, it is probable that even this is too modest. The Rule is a very distinct advance on all others that we have seen and although it is primarily intended for surveyors its applicability is very wide.