10[Z].—R. L. DIETZOLD, "The isograph a mechanical root finder," and R. O. MERCNER, "The mechanism of the isograph," *Bell Laboratories Record*, v. 16, 1937, p. 130–134 and p. 135–140.

These short articles describe the theory, practice and construction of a large instrument designed in 1928 by T. C. Fry primarily for the solution of algebraic equations of degrees ≤ 10. The theory behind the machine is briefly set forth in a review of the S. L. Brown harmonic analyzer, to which review the reader is referred (*MTAC*, p. 128–129). The mechanical methods of generating and adding the ten pairs of motions $a_nr^n \cos n\theta$, $a_nr^n \sin n\theta$ and the drawing of this sum are practically the same as those of the Brown analyzer. There is one difference however. In the latter machine the two motions of any one frequency may be set with any preassigned phase difference, while in the Isograph this difference is inexorably 90°. This means that the use of the Isograph is restricted to equations with real coefficients. An interesting feature of the Isograph is a set of ten cylindrical slide rules driven with frequencies from 1 to 10, for computing the values of a_nr^n ($n = 1, \cdots, 10$) which are the ten amplitudes to be set on the cross heads. These amplitudes must not exceed an inch and a half (as compared with over 6 inches in the Brown analyzer) so that frequent changes in scale must be required for accommodating rather different values of r.

The photographs and diagrams illustrating these articles have been put on 12 slides, and a film has been made. Since these may be borrowed from the Bell Laboratories (New York), together with mimeographed material about the machine, there is the basis for an interesting lecture about the Isograph for mathematics classes and club meetings.

D. H. L.

NOTES

11. ALFRED LODGE.—In referring to sketches of two tablemakers in *Who was Who 1929–1940*, London, 1941 (N **1**) a third one was overlooked, namely: of ALFRED LODGE (1854–1937), brother of Sir Oliver Lodge (1851–1940), long principal of the University of Birmingham, and of Sir Richard Lodge (1855–1936), professor of history at the University of Edinburgh. Alfred Lodge was Fereday fellow of St. John's College, Oxford, 1876–91, professor of pure mathematics at the Royal Indian Engineering College, Cooper's Hill, 1884–1904, and assistant master (mathematics) of Charterhouse from 1904 until his retirement in 1919, at the age of 65. He was president of the Mathematical Association, 1897–98, and scores of his communications appeared in the *Mathematical Gazette*. For some years he was secretary and recorder of Section A of the B.A.A.S. He was a member of its Committee on Calculation of Mathematical Tables for nearly fifty years; except for Airey, more of his tables were published than those of any other member (see *MTAC*, p. 75). He was a joint author of the Committee's *Factor Table* (1935), of which three independent copies were made; compare N **13**. Since Lodge alone had been on the Committee from the day on which Bessel functions were first discussed up to 1937, when the Committee published its first volume of tables of *Bessel Functions*, the volume was dedicated to him. It appeared, however, a few days after his death. See also *The Times*, London, 6 Dec. 1937, p. 14; and C. O. TUCKEY, "Alfred Lodge," *Math. Gazette*, v. 22, 1938, p. 3–4.

12. INTERPOLATION.—If there is suspicion of the accuracy of an entry in a table with equal argument-intervals, the suspicious entry u_0 may be checked in terms of the six adjacent entries u_{-3}, u_{-2}, u_{-1} and u_1, u_2, u_3, by the formula $u_0 = 0.75(u_{-1} + u_1) - 0.30(u_{-2} + u_2) + 0.05(u_{-3} + u_3) - \Delta^6 u_{-3}/20$. If sixth differences are negligible, as is often the case in published tables, the term $\Delta^6 u_{-3}/20$ is omitted, as a zero remainder-term.

In many tables an earlier difference than the sixth may be neglected, yet the formula above is to be preferred to a simpler one using less than six entries, because no division on the machine is needed. [This is because the coefficient of the central term in $(E - 1)^6$ is 20; for no other power has this coefficient powers of 2 and 5 as its only factors].

This formula is fairly obvious when pointed out, but I have never seen it in print.

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13. Johann Theodor Peters.—An obituary notice by W. R. A. Klose in *Z. angew. Math. u. Mech.*, v. 22, Apr. 1942, p. 220, states that "Jean Peters," the greatest mathematical table-maker of all time, died on 24 August 1941. Since he was born on 25 August 1869 his span of life completed almost exactly 72 years. His full name, as given above, is as he sent it for publication in Poggendorff's *Biographisch-literarisches Handwörterbuch*, v. 6, part 3, 1938. In his published mathematical tables he always gave his name as "Dr. J. Peters" or "Prof. Dr. J. Peters." In the *Porträtgallerie*, 1931 (*MTAC*, p. 12) the name is "Johannes Peters." Since we know the name which Peters himself regarded as complete for the last decade at least, whence the name "Jean"?

Peters was born in the rather genial atmosphere of Cologne, and took his doctorate in 1895 at the University of Bonn under the astronomer Friedrich Küster. According to the *Jahresverzeichnis . . . Universitäten . . . Abhandlungen*, for 1894–95, his dissertation was printed under the name "Jean Peters." Hence *Deutsches Bücherverzeichnis*, *Kürschners Gelehrten-Kalender*, *Minerva*, and other standard sources, preserved this form which was also copied on catalogue cards of the Library of Congress, and used by Klose, an associate of earlier years. From 1899 until his retirement in 1937 he was on the staff of the Astronomisches Recheninstitut of Berlin-Lichterfelde, where rigid formalism in name and otherwise was more the order of the day. Here he was the one principally responsible for the annual *Berliner Astronomisches Jahrbuch*, and *Nautisches Jahrbuch*. Besides elaborate tables for dealing with problems of pure astronomy (Kepler's and coordinate transformations, for example) he published *New Calculating Tables for multiplication and division by all numbers from one to four places* (1909), an 8-place table (with Bauschinger) of the logarithms of numbers 1–200 000 (1910), 7-, and 10-place (*Anhang* with J. Stein) tables of the logarithms of numbers 1–100 000 (1940, and 1922), *Zweiundfünfzigstellige Logarithmen* (with J. Stein, 1919), the *Factor Table giving the Complete Decomposition of all numbers less than 100 000* (B.A.A.S., *Math. Tables*, v. 5, 1935), and fifteen other volumes of tables of logarithmic and natural trigonometric functions. The first of these volumes was (with Bauschinger) the eight-place logarithmic table for each sexagesimal second (1911). This was later followed by tables of varying number of decimal places (3, 5, 6, 7, 8, 10, and 21) for logarithmic, machine, and other calculations, with sexagesimal division of the quadrant, with decimal division of the degree, with time as argument, and with centesimal division of the quadrant. Since during 1938–40 there were three editions of his six-place table for each $0^g.001$, its possible use in connection with war problems is suggested.

Klose refers to a large number of unpublished tables by Peters, but names only one, an eight-place table of reciprocals. Earlier reference has been made to eleven others; four of these (*MTAC*, p. 39, 114) being seven-, eight-, and ten-place tables of natural trigonometric functions for the centesimal division of the quadrant, and eight-place table of addition and subtraction logarithms (see L. J. Comrie, Br. Astr. Assoc., *Handbook*, 1929, p. 39). From information at hand it seems possible that one of these, the seven-place table for each $0^g.001$, was really published at Leipzig in 1939. The seven-place logarithmic table for each $0^g.001$ appeared in 1940; see RMT **125.** Fifth and sixth unpublished mss. are referred to in RMT **78, 127,** and five more in RMT **125.**

"J. Peters was an accurate and speedy calculator capable of sustained effort. He excelled in organizing great calculating tasks. His methods of calculation, and of avoidance of errors, were well thought through. Unfortunately these are scarcely known except to a small circle of his most intimate collaborators." The excellent appearance of type-display in his published tables is also noted.

[There are references to Peters and his works in *MTAC*, p. 7, 8, 10–15, 25, 26, 39, 42, 43, 45, 55, 57–59, 64, 65, 82–84, 86–89, 100, 114, 121, 122, 125, 143–148, 162–164, 170, 171].

R. C. A.

14. RMT **98.**—It seems worth while supplementing this review of MATHEMATICAL TABLES PROJECT *Miscellaneous Physiacl Tables*, by remarking that, in Table V if we regard x as a sine, G and xG are secants and tangents respectively. Similarly if x is a cosine, G and xG are cosecants and cotangents. This purely trigonometrical relationship is not pointed out in the Introduction. It is quite evident that this table may be used for applications other than electronic functions. x (review) = β (Table V).

L. J. C.

15. RUSSIAN EDITION OF BARLOW'S TABLES.—The third edition of *Barlow's Tables of Squares, Cubes, Square Roots, Cube Roots, and Reciprocals, of all Integer Numbers up to* 10 000, *edited by* L. J. COMRIE, appeared at London, Spon in 1930 with xii, 208 p. In *MTAC*, p. 17, we noted incidentally the pirated Russian government edition of this. It has two title-pages; the one on the left intended to be the English original, while opposite it is the following (when transliterated): *Tabli͡tsy Barlou kkadratov, kubov, korneĭ kvadratnykh, korneĭ kubichnykh i obratnykh velichin t͡selykh chisel ot* 1 *do* 10 000. Gosudarstvennoe tekhniko-teoreticheskoe Izdatyeli͡estvo, Moscow and Leningrad, 1933. xii, 208 p. There were 10 000 copies in the edition. The last words of the title on the English-title page of the Russian edition are, "all Integer Numbers up 1 to 10 000."

16. A RUSSIAN TABLE OF PRODUCTS.—To meet the needs of the great army of workers on Collective Farms, in Industry, and in Factory Kitchens, and Cooperative Stores, in its second five-year period, the Russian Government published in 1936 an edition of 10 000 copies of the following bound volume: I. P. ZOLOTAREV, *Universalnie Raschetnie Tabliťsy. Prakticheskoe Posobie dlia Bukhgalterov i schetnykh rabotnikov.* [Universal Calculating Tables. Practical Help for Bookkeepers and Computing Workers] Moscow and Leningrad, 565 p. +1 p. errata. 11 × 14.5 cm. Scattered through the volume are 15 other errata slips with one or two corrections on each. By means of this table one may read off at once the products of two numbers N_1 and N_2, if N_1 = 0.01(0.01)0.07,0.10(0.05)1(1)250; and N_2 = 1(1)250,255-(10)525. Examples of practical problems solved by the use of such a table are given on p. 3–9.

QUERIES

7. BRIGGS' ARITHMETICA LOGARITHMICA.—Compare N8. Since the publication of J. W. L. Glaisher, *Report of the Committee on Mathematical Tables*, London, 1873, of J. Henderson, *Bibliotheca Tabularum Mathematicarum*, part 1, *Logarithmic Tables*, Cambridge, 1926, and of A. Fletcher's letter in *Nature*, v. 148, 1941, p. 728 (to which my attention was drawn by L. J. Comrie), it has been generally known that there were some copies of Henry Briggs, *Arithmetica Logarithmica*, 1624, 388 p., with an extra 12 pages containing the logarithms of numbers 100,001(1)101,000, to 14D, and the square roots of integers 1(1)200, to 11D, with first differences in each case. There are copies of such enlarged editions in the library of Trinity College, Cambridge, and in the Savile collection of the Bodleian Library, Oxford. Glaisher tells us that in 1873 C. W. Merrifield[1] owned such a copy. Mr. Fletcher reported that the Harold Cohen Library of the University of Liverpool had a copy of just the 12 supplementary pages of the work of Briggs. Where are other copies of the *Arithmetica Logarithmica*, with the extra pages described above?

R. C. A.

[1] The writer has many of Merrifield's letters to Glaisher, 1873–81, mostly dealing with questions about tables.

QUERIES—REPLIES

7. AN ENGEL TABLE (Q6).—"I am the owner of a copy of this table of natural trigonometric functions, containing 95 pages (19.7 × 29.9 cm.). The volume was an outcome of a meeting of German, Austrian, and Hungarian geodesists at Berlin in Nov. 1917, when the decimal division of the nonagesimal degree was agreed upon as desirable for tables. The Preussische Landesaufnahme undertook the preparation of the three volumes of logarithmic trigonometric tables necessary for this purpose, and published 10-place (1919), 7-place (1921), 6-place (1921) tables, each for sine, tangent, cotangent, cosine, for every thousandth of a degree. These volumes[1] were all by the remarkable J. T. PETERS. As a contribution from Austria to machine calculation ENGEL initiated the computation of the tables published in 1920, under the title given in the Query. It is a 10-place table for