OTHER AIDS TO COMPUTATION

Bibliography Z–IX

1. R. T. Brown, "Notes on the use of the log-log slide rule in connection with trigonometric functions," *Jn. Engin. Educ.*, v. 38, 1948, p. 393–394. 15 × 22.5 cm.

2. A. E. Carter & D. H. Sadler, "The application of the National Accounting Machine to the solution of first-order differential equations," *Quart. Jn. Mech. Appl. Math.*, v. 1, 1948, p. 433–441. 15.4 × 23.4 cm.

Summary: Milne's formula for approximate quadrature is used as the basis of a method for the solution of first-order differential equations on the National machine. The method, which is illustrated by a numerical example, enables the machine to form the required dependent variable without the necessity for conversion from a sum to an integral.

3. Harold P. Knauss, "Slide rule calculations of radioactive decay," *Science*, v. 107, 26 Mar. 1948, p. 324.

Selected sentences: The decay of a radio-active substance is described by the equation $N = N_0e^{-\lambda t} = N_0 10^{-\lambda' t}$, in which N is the number of particles remaining at the time t; N_0 is the initial number of the particles; λ, the decay constant or fraction of the number present disintegrating per unit of time; and $\lambda' = .4343\lambda$. On the log log rule a single setting of the slide gives the values of N/N_0 for the time. Three significant figures are obtained with a 10″ slide rule.

4. H. W. Richards & D. H. Sadler, "The application of the National Accounting Machine to the calculation of apparent places of stars," RAS, *Mo. Not.*, v. 108, 1948, p. 154–161 + a folding tabular plate. 17 × 25.1 cm.

Summary: A method is developed for the systematic calculation of apparent places of stars, using the National machine. Checked copy, printed by the machine in precisely the form required by the printer, is produced in a time which compares favourably with other methods.

5. V. Vand, "A mechanical calculating machine for X-ray structure factors," *Nature*, v. 163, 29 Jan. 1949, p. 169–170. 17.4 × 25.5 cm.

First sentences: A large mechanical machine for calculation of X-ray crystallographic structure factors has now been completed in our laboratories [Lever Bros. and Unilever Ltd., Port Sunlight, Cheshire] and is running satisfactorily. The machine is of a tide-predictor type, and it deals with up to 24 harmonic components at a time. The expression calculated is $F(hkl) = \Sigma f_i \cos 2\pi(hx_i + ky_i + lz_i)$.

6. Heinz Wittke, *Die Rechenmaschine und ihre Rechentechnik. Eine Einführung und ein Übungsbuch mit ausgewählten Anwendungsbeispielen aus der Geodäsie, Geometrie und angewandten Mathematik. 2. Auflage. Mit 52 Abbildungen, 12 Formularen und 1 Tabellenanhang.* (*Sammlung Wichmann*, v. 12). Berlin, Herbert Wichmann, 1948, viii, 160 p. 17.4 × 24.4 cm. "Veröffentlicht unter Lizenz-Nr. 136 der Sowjetischen Militärverwaltung in Deutschland."

This is the so called second edition of which we listed the first edition in *MTAC*, v. 3, p. 390. The first edition was neatly bound in full boards. The second edition is a poor paper bound offset print of the first edition, authorized by license of the Soviet military powers. The first 70 p. include a description of various desk calculating machines, of problems with which they may deal, and also lists of references to literature appearing before 1942.

R. C. A.

NOTES

106. George Neville Watson—Table Maker.—This distinguished British Mathematician and Table Maker was born in Westward Ho, Devonshire, 31 January 1886. He was a student at Trinity College, Cambridge, senior wrangler, 1907; class I (div. ii), mathematical tripos, part II, 1908; Smith's Prizeman, 1909; fellow of Trinity, 1910–1916.

He was an assistant professor of pure mathematics at University College, London, 1915–18; professor of mathematics at the University of Birmingham since 1918, of pure mathematics since 1937; gold medallist of the Danish Royal Academy of Sciences, 1912; a fellow of the Royal Society of London, 1919; honorary secretary, 1919–33, and president, 1933–35, of the London Mathematical Society; president of the Mathematical Association, 1932–34; Sylvester medallist of the Royal Society, 1946; and De-Morgan medallist of the London Mathematical Society, 1947. He is also a Sc.D. of Univ. of Cambridge, D.Sc. Univ. of London, M.Sc. Univ. of Birmingham, Hon. LL.D. Univ. of Edinburgh, Hon. Sc.D. Univ. of Dublin.

The following is a list of Professor Watson's tables, and of some papers with numerical results of some importance:

1. (with G. A. Schott) "Asymptotic formulae occurring in electron theory," *Quart. Jn. Math.*, v. 47, 1916, p. 311–333. Various numerical results are given.

2. "The sum of a series of cosecants," *Phil. Mag.*, s. 6, v. 31, 1916, p. 111–118. $S_n = \sum_{m=1}^{n-1} \csc(m\pi/n)$ is tabulated for n = [2(1)30(5)100, 360, 1000; 5D].

3. [Tables connected with gamma functions], BAAS, *Report*, 1916, p. 123–126. Four 10D tables: (a) $10 + \ln \Gamma(1 + x)$, $x = .005(.005)1$; (b) $10 + \int_0^x \log \Gamma(1 + t)dt$, x = .01-(.01)1; (c) $\psi(x) = d \ln \Gamma(x)/dx$, $x = 1(1)101$; $\psi(x)$ for $x = 1.5(1)100.5$.

4. "The zeros of Bessel functions," R. Soc. London, *Proc.*, v. 94A, 1918, p. 190–206. Tables of $J_{\pm\frac{1}{3}}(x)$, $U_{\frac{1}{3}}(x)$, $-V_{\frac{1}{3}}(x)$, $-V_{\frac{1}{3}}(x)/U_{\frac{1}{3}}(x)$, for x = [0(.05)2(.2)8; 4D].

5. "Bessel functions of equal order and argument," *Phil. Mag.*, s. 6, v. 35, 1918, p. 364–370. Table of $n\int_0^1 J_n(nx)dx$, n = [1(2)23; 7D].

6. *A Treatise on the Theory of Bessel Functions*, Cambridge, England, 1922; second ed., New York, 1944; reprinted Feb. 1945, Apr. 1948; tables, p. 665–752. For tabular errors in this v. see *MTAC*, v. 2, p. 49–51.

T. I: $J_0(x)$, $Y_0(x)$, $J_1(x)$ and $Y_1(x)$, for x = [0(.02)16; 7D]. The values of $J_0(x)$, $J_1(x)$ up to 15.5 were taken from Meissel's 12D table (1889) while the values of $Y_0(x)$ and $Y_1(x)$ were computed partly by interpolation in Aldis' table of $G_0(x)$ and $G_1(x)$ (1900). T. I gives also, for the same range of argument, 7D values of $|H_n^{(1)}(x)|$, $\mathbf{H}_n(x)$, $n = 0, 1$, and of arg $H_n^{(1)}(x)$, $n = 0, 1$ to the nearest 0″.01.

T. II consists of tables of $e^{-x}I_0(x)$, $e^{-x}I_1(x)$, $e^xK_0(x)$, and $e^xK_1(x)$, e^x, for x = [0(.02)16; 7D]. The 8S or 9S table of e^x was constructed with the help of Newman's 12–18D table of e^{-x} (1883).

T. III consists of $J_{\frac{1}{3}}(x)$, $Y_{\frac{1}{3}}(x)$, $|H_{\frac{1}{3}}^{(1)}(x)|$, and arg $H_{\frac{1}{3}}^{(1)}(x)$, of the same scope as T. I; a table of $e^xK_{\frac{1}{3}}(x)$ is also included.

T. IV gives 7D values of $J_n(x)$, for $n = 2(1)5$, $x = .1(.1)5$; 6D values of $J_n(x)$, $n = 0(1)20$, for $x = 1(1)12$; 7S at least, or 7D values of $Y_n(x)$ for $n = 0(1)10$, and $x = 0(.1)5$, and 7D for $n = 0(1)13$, $x = 6(1)12$; 7D values of $e^{-x}I_n(x)$ for $n = 2(1)5$, $x = .1(.1)5$; 7S at least, or 7D