

   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.


   Selected sentences: The decay of a radio-active substance is described by the equation

   \[ N = N_0 e^{-\lambda t} = N_0 10^{-\lambda' t}, \]

   in which \( N \) is the number of particles remaining at the time \( t \); \( N_0 \) is the initial number of the particles; \( \lambda \), the decay constant or fraction of the number present disintegrating per unit of time; and \( \lambda' = 0.4343 \lambda \). 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.


   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.


   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

   \[ F(hkl) = \sum_j f_i \cos 2\pi(hx_i + ky_i + lz_i). \]


   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.


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


2. “The sum of a series of cosecants,” *Phil. Mag.*, s. 6, v. 31, 1916, p. 111–118. $S_n = \sum_{m=1}^{n} \csc(m\pi/n)$ 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) $10 + \int_0^x \log \Gamma(1 + t)dt, x = .01$ $(-.01)$; (c) $\psi(x) = d \ln \Gamma(x)/dx, x = 1(1)101$; (d) $\varphi(x) = 1.5(1)100.5$.

4. “The zeros of Bessel functions,” R. Soc. London, *Proc.*, v. 94A, 1918, p. 190–206. Tables of $J_0(x), U_1(x), -V_1(x), -V_0(x)/U_1(x)$, for $x = [0(.05)2(.2)8; 4D]$. $J_n(x), Y_n(x), H_{10}^n(x)$, and $\arg H_{10}^n(x), n = 0, 1$ to the nearest $0'.01$.

5. “Bessel functions of equal order and argument,” *Phil. Mag.*, s. 6, v. 35, 1918, p. 364–370. Table of $nJ_0J_n(nx)dx, n = [1(2)23; 7D]$. $J_0(x), Y_0(x), J_1(x)$ 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 ALED’S table of $G_0(x)$ and $G_1(x)$ (1900). T. I gives also, for the same range of argument, 7D values of $|H_n^{(1)}(x)|, H_n(x), n = 0, 1$, and of $\arg H_n^{(1)}(x), n = 0, 1$ to the nearest $0''.01$.


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 ALED’S table of $G_0(x)$ and $G_1(x)$ (1900). T. I gives also, for the same range of argument, 7D values of $|H_n^{(1)}(x)|, H_n(x), n = 0, 1$, and of $\arg H_n^{(1)}(x), n = 0, 1$ to the nearest $0''.01$.

T. II consists of tables of $e^xJ_0(x), e^xJ_1(x), e^xK_0(x)$, 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 $J_1(x), Y_1(x), |H_1^{(1)}(x)|$, and $\arg H_1^{(1)}(x)$, of the same scope as T. I; a table of $e^xK_1(x)$ 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 $e^{-x}J_n(x)$ for $n = 2(1)5, x = .1(.1)5; 7S$ at least, or 7D