The values of $\Delta\lambda$ range from 1° to 28°; and $\Delta\phi$ from $-5°$ to $+5°$ for $\phi = 0$, $\Delta\lambda = 1°$; to $-1°$ to $+1°$ for $\phi = 79°36'$, $\Delta\lambda = 28°$.

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**231[U].**—GREAT BRITAIN, H. M. Nautical Almanac Office, *Astronomical Navigation Tables*, Volume Q, Latitudes N 70°–N 79°, Air Publication 1618. London, H. M. Stationery Office, 1945, iv, 341 p. 16.5 × 24.8 cm. These tables are available only to certain Government agencies and activities.

This is the fifteenth and last volume in the series of no. 1618 which has had restricted circulation in this country by the Hydrographic Office, under the number H. O. 218. We have already reviewed the earlier volumes, *MTAC*, p. 82f, each one covering five degrees of latitude, v. A, 0°–4° (no volume lettered I or 0) to v. P, 65°–69°, the fourteenth. The present volume covering 10° is naturally the largest, and is applicable between latitudes 69° 30′ and 79° 30′ north for specially selected stars, and both north and south for the rest of the volume.

R. C. A.

**232[U].**—SAMUEL HERRICK, "The air almanac refraction tables," U. S. Naval Inst., *Proc.*, v. 70, Sept. 1944, p. 1140–1141. 17 × 25.5 cm.

In this note Herrick shows how, by graphical representation, the advantages of critical tables can be had in the case of double-entry tables. As illustrations, he chose the tables for total refraction and refraction adjustment as given in the *American Air Almanac*. With height above sea level in feet, and observed altitude in degrees as the ordinate and abscissa respectively, one reads the total refraction (or refraction adjustment) directly from the appropriate graph. Herrick constructed his graphs from data in L. J. COMRIE, *Hughes' Tables for Sea and Air Navigation* (see *MTAC*, p. 111) and notes that there is a slight discrepancy between the figures given by Comrie and those presented by the *American Air Almanac*.

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## MATHEMATICAL TABLES—ERRATA

References have been made to Errata in RMT **216** (N.D.R.C.), **217** (Chebyshev), **222** (Corrington & Miehle), **226** (Vandrey); N **43** (Euler, Legendre, Newman, Powell); QR **18** (Hayashi, Roman).

**67.** JAMES BURGESS, "On the definite integral $(2/\pi^{\frac{1}{2}})\int_0^t e^{-t^2}dt$, with extended tables of values," R. So. Edinburgh, *Trans.*, v. 39, 1898, p. 321. In MTE **62,** *MTAC*, p. 429 there was a reference to the present additional list of errors in Burgess' table.

The test of the values of $L$ was based on the relation $L = t\sqrt{2}\cdot F(t\sqrt{2})$, where $F(x)$ is the function tabulated to 24D in W. F. Sheppard, *The Probability Integral*, T. II (BAASMTC, v. 7, Cambridge, Univ. Press, 1939). My interpolations were all based on 18D of $F(x)$ and its reduced derivatives, while all multiples of $\sqrt{2}$ were carried to 20D. Consequently, the final values of $L$ should be correct to 17D. As an additional check the values of $L$ in the interval $3.0 \leqq t \leqq 5.0$ were differenced repeatedly until 14th differences were reached. This procedure failed to reveal any errors other than those unavoidably committed in curtailing the results. For $t = 5.5$ and 6.0 the values were checked by a second calculation.

Thus it was discovered that the following 13 of the 24 L-entries comprising this table of Burgess are in error, some quite seriously:

| *t* | *For* | *Read* |
|---|---|---|
| 3.0 | ...927 | ...925 |
| 3.1 | ...156 224 | ...148 085 |
| 3.2 | ...583 | ...586 |
| 3.3 | ...178 | ...179 |
| 3.7 | ...828 628 | ...829 207 |
| 3.8 | ...548 822 273 | ...549 029 082 |
| 4.0 | ...029 | ...028 |
| 4.1 | ...654 473 280 | ...659 617 985 |
| 4.6 | ...583 | ...591 |
| 4.7 | ...719 571 814 619 | ...751 397 867 062 |
| 5.0 | ...287 316 | ...315 388 |
| 5.5 | ...386 619 | ...389 857 |
| 6.0 | ...165 | ...439 |

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**68.** H. W. HOLTAPPEL, *Tafels van $e^x$*, Groningen, 1938. Table I: p. 1–100; T. IIA, IIB, IIC, IID: p. 101–102; T. IIIA, IIIB: p. 103–104; T. IIIC: p. 105–114; T. IIID: p. 115–124; T. IIIE: p. 125–130; T. IIIF, IIIG, IV: p. 131–132. See RMT **214**.

Errors in T. I were discovered in the course of proofreading of Holtappel's values against values given to more decimal places either in our own *Tables of the Exponential Function $e^x$*, 1939, or in Van Orstrand's memoir, "Tables of the exponential function and of the circular sine and cosine to radian argument," 1921. Whenever discrepancies arose, the values in question were recomputed. Since the values of $e^x$ for the ranges from 5 to 10, and from − 2.5 to − 10, were not recomputed, but checked by our differencing process, there may conceivably be some last-place errors in these ranges which we were unable to detect by our technique.

In testing the remaining 32 pages for error, part of the work was done by differencing Holtappel's values, and subsequently recomputing the values indicated by the differencing to be in error. In T. IIIB and IIID, however, the values were actually recomputed.

TABLE I

| | Argument | *For* | *Read* |
|---|---|---|---|
| $e^x$ | 1.848 | ...26048 | ...25947 |
| | 1.849 | ...28920 | ...28819 |
| | 3.144 | ...67404 | ...74038 |
| | 6.196 | 492.78... | 490.78... |
| | 6.197 | 492.27... | 491.27... |
| | 6.199 | 491.25... | 492.25... |
| | 6.672 | ...35155 | ...35145 |
| | 6.685 | ...076 81756 | ...067 81756 |
| | 7.141 | ...84199 | ...84119 |
| | 7.373 | ...58935 | ...58953 |
| | 7.581 | ...39445 | ...39945 |
| | 7.755 | ...47695 | ...47659 |
| | 8.302 | ...17236 | ...17226 |
| | 8.361 | ...98222 | ...82216 |
| | 8.506 | ...63744 | ...63774 |
| | 9.465 | ...24458 64430 | ...22458 64430 |
| $e^{-x}$ | 2.331 | ...84500 | ...85000 |
| | 3.650 | ...12288 | ...11288 |
| | 4.158 | ...64 88043 | ...63 88043 |
| | 4.198 | ...59980 | ...55980 |
| | 5.397 | ...10510 | ...01510 |
| | 5.701 | ...344 26212 | ...334 26212 |
| | 7.460 | ...56572 | ...56562 |
| | 8.565 | ...010 06636 | ...019 06636 |
| | 9.659 | ...38433 | ...38483 |

There should be unit increases in last figures for $e^x$, for arguments: 1.149, 1.188, 3.277, 3.752; $e^{-x}$, for argument: .956. For the following entries there should be unit decreases for $e^x$, for arguments: 1.364, 2.137, 2.152, 2.846, 5.360, 6.650; for $e^{-x}$, for arguments: .764, .819, 1.788, 1.844, 1.943, 2.024.

### Table IIA

| Argument | *For* end figures | *Read* |
|---|---|---|
| 18 | 4 | 6 |
| 19 | 3 | 9 |
| 20 | 37 | 54 |
| 21 | 29 | 75 |
| 22 | 474 | 598 |
| 23 | 145 | 482 |
| 24 | 4364 | 5281 |

There should be unit increases of last figures for arguments: 12–15, 17; and unit decreases for arguments: −18, −19, −21.

### Table IIC

There should be unit increases of last figures for arguments: .06, .08; and unit decreases for arguments: .05, .07, −.04.

### Table IID

For argument: .007, *for* ...68848..., *read* ...66848....

### Table IIIA

For argument: 1.0, *for* 2.781..., *read* 2.718....

There should be unit decreases of last figures for arguments: 2.3, 2.8, 4.1, 4.6, 7.1, 8.4.

### Table IIIB

There should be unit increases of last figures for arguments: .056, .058, .086, .094, .098.

### Table IIIC

| *Argument* | *For* | *Read* |
|---|---|---|
| .040 | ...07441... | ...07741... |
| .464 | ...3905 | ...3915 |
| .678 | ...6 | ...8 |
| .683 | ...5 | ...0 |

There should be unit increases of last figures for arguments: .006, .262, .284, .369, .375, .395, .423, .447, .481, .483, .489, .764, .769, .775, .783, .915, .989; and unit decreases for arguments: .225, .258, .283, .296, .343, .669, .677, .688, .698, .778.

### Table IIID

| Argument | *For* end figures | *Read* | Argument | *For* end figures | *Read* |
|---|---|---|---|---|---|
| 5 | 33 | 83 | 41 | 85 | 95 |
| 18 | 2 | 0 | 42 | 03 | 13 |
| 19 | 9 | 7 | 43 | 21 | 31 |
| 30 | 0 | 3 | 44 | 39 | 49 |
| 31 | 17 | 21 | 45 | 57 | 67 |
| 32 | 4 | 8 | 46 | 76 | 85 |
| 33 | 1 | 5 | 47 | 395 | 404 |
| 34 | 68 | 72 | 48 | 14 | 22 |
| 35 | 85 | 90 | 49 | 33 | 41 |
| 36 | 2 | 7 | 229 | 85 | 76 |
| 37 | 0 | 4 | 731 | 24 | 14 |
| 38 | 37 | 42 | 732 | 66 | 56 |
| 39 | 55 | 60 | 733 | 34 | 24 |

There should be unit increases of last figures for arguments: 21, 22, 92, 93, 95–98, 111, 113, 114, 116–118, 139, 152, 172, 178, 203, 211, 213–215, 220–222, 224, 226, 250, 704, 797, 798, 809, 814, 850, 857, 863, 895, 937, 942, 944, 951, 962, 964, 966, 971, 975, 994. There should be unit decreases for arguments: 11, 14–17, 20, 68, 69, 84, 86, 105, 108, 109, 122, 126, 131, 133, 165, 167, 168, 198, 199, 202, 207, 244, 247, 258, 266, 268, 275, 278, 287, 302, 305–309, 311, 318, 324, 328, 333, 334, 338, 339, 349, 353, 354, 358, 363, 365, 374, 378, 397, 399, 403, 407, 424, 434, 435, 437–439, 445, 451, 453, 455, 456, 458, 460, 465–467, 474, 496–498, 506–508, 517, 519, 523, 525, 527, 537, 542, 543, 549, 557, 558, 567, 572, 577, 579, 581, 588, 589, 594, 596, 598, 632, 635, 636, 637, 645–648, 665, 667, 669, 686, 693, 730, 735, 741, 743, 744, 746, 751, 757.

TABLE IIIE

| Argument | *For* | *Read* | Argument | *For* | *Read* |
|---|---|---|---|---|---|
| 7 | ...02250 | ...02450 | 532 | ...51202 | ...51203 |
| 70 | ...24500 | ...45000 | 753 | ...50057 | ...50457 |
| 335 | ...12551 | ...11251 | 807 | ...64459 | ...62459 |
| 346 | ...85401 | ...85801 | 955 | ...01264 | ...01265 |

NYMTP

EDITORIAL NOTE: While last-figure unit errors are of no special importance, Holtappel's table is such a good one, they have been noted here for use in a new edition.

**69.** NYMTP, *Table of Hahn's function* $S_0(a)$; See *MTAC*, RMT **208,** p. 425.

In our table of this function published in the paper of WHINNEY and JAMIESON, corresponding to the argument $a$ = .05, *for* 26.924, *read* 26.239.

NYMTP

## UNPUBLISHED MATHEMATICAL TABLES

References have been made to unpublished tables *MTAC*, p. **417** (Bickley), Q **15** (Foster), QR **18** (Roman).

**35**[A].—ROBERT JAMES PORTER (1882– ) *Factor Table for the Eleventh Million.* Two independent mss. for the same million calculated during the years 1916–1933, and 1930–1945, and the property of the author, residing at 266 Pickering Road, Hull, England.

*Ms. A. 1916–1933* is in book-form, 267 pp., 8 × 13 inches, each accounting for 3750 numbers, but as the multiples of 2, 3, and 5 are omitted, the actual entries on each page number 1000. The entries are in longhand, in black ink, and are arranged in 40 parallel columns of 25 squares each. The lowest prime factor only is listed, the notation being similar to that used by KULIK, *a* representing 7; *b*, 11; *c*, 13; etc., a bar showing a prime number. About half the entries were made by the stencil method, and the remainder (by an adaptation of the "multiple" method) entered from working-sheets; to obtain the places for a given entry, the column and square were calculated up to, and including, the prime 727, and thereafter the actual number itself.

*Ms. B. 1930–1945* is also in book-form, 200 pp., 7 × 7 inches, each accounting for 5040 numbers, but as the multiples of 2, 3, 5, and 7 are omitted, the actual entries on each page number 1152. The entries are in longhand, in black ink, and are arranged in 24 parallel columns of 24 squares, each square accommodating two entries. The lowest prime factor only is listed, and in the same notation as used in *Ms. A.* In the present Ms. the stencil method was not used at all. The entries for 11, 13, 17, 19, were made by direct comparison with D. N. Lehmer, *Factor Table for the First Ten Millions*, the entries for 23 to 223 inclusive by applying to the pages numbered slips showing at their edges the number of column and square needed for each entry, and thereafter by the method used in *Ms. A* for column and square.

The two mss. were purposely made different in form to avoid errors due to similarity of position of the places of entry, and were afterwards cross-checked, each discrepancy investigated, and the mss. brought into agreement. The results, subjected so far to only one check by the author, show that the total number of primes in this million is 61,945.

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