19[7.15].—H. J. J. TE RIELE, *Tables of the First* 15,000 *Zeros of the Riemann Zeta Function to* 28 *Significiant Figures, and Related Quantities,* Report NW 67/79, Stichting Mathematisch Centrum, Amsterdam, June 1979, 5 pp. text + 154 pp. tables.

Table 1 of this report is a table of the imaginary parts of the first 15,000 zeros ρ_n of the Riemann zeta function $\zeta(s)$ in the upper half of the critical strip. Table 2 gives $|\rho_n\zeta'(\rho_n)|^{-1}$, and Table 3 gives $\arg(\rho_n\zeta'(\rho_n))$.

The computation of Table 1 was performed using (mainly) double-precision arithmetic on a Cyber 73/173 and required about 21 hours of CPU time. The author claims an accuracy of "about 28 digits" and the table gives each ρ_n to 28 significant digits.

The reviewer checked the accuracy of a few entries in Table 1, using 40S computation and his multiple-precision arithmetic package [1], and both the Euler-Maclaurin formula for $\zeta(s)$ (as used by te Riele) and the Riemann-Siegel formula with a sufficient number of terms [2]. The largest error found was 66 units in the last place (ρ_{10142} = 9998.850397089674049057631757 is correct, te Riele gives 9998.850. . . 631691). Thus, the final two digits of entries in the table should be regarded with suspicion. Despite this, the table is a significant advance over the 9S table of $\rho_1, \ldots, \rho_{1600}$ given in [3] and other tables known to the reviewer.

Tables 2 and 3 are given to 10S, although computed to "about 14 significant digits". The reviewer has not found any errors exceeding 0.5 units in the last place in these tables.

The tabulated quantities were used by the author in computations concerning Mertens' conjecture [4]. However, the reviewer wonders what point there is in publishing *all* of them in this manner. Anyone wishing to continue the Mertens conjecture computation would hardly use the values of ρ_n given in Table 1; a horrifying amount of key-punching and verifying would be required. Instead, he would either recompute them, using Table 1 for checking purposes, or obtain them in machine-readable form, e.g. on magnetic tape. Unfortunately, te Riele does not say if his tables are available on magnetic tape, nor does he reproduce the program that generated them, although he does clearly describe the computational method.

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1. R. P. BRENT, "A Fortran multiple-precision arithmetic package," *ACM Trans. Math. Software,* v. 4, 1978, pp. 57–70.

2. R. P. BRENT, *Numerical Investigation of the Riemann Siegel Approximation,* Tech. Report, Dept. of Computer Science, Australian National University. (To appear.)

3. C. B. HASELGROVE in collaboration with J. P. C. MILLER, *Tables of the Riemann Zeta Function,* Royal Soc. Math. Tables, Vol. 6, Cambridge, 1960.

4. H. J. J. TE RIELE, "Computations concerning the conjecture of Mertens," *J. Reine Angew. Math.,* v. 311/312, 1979, pp. 356–360.

20[9.10].—SIRPA MÄKI, *The Determination of Units in Real Cyclic Sextic Fields,* Computer Table, 122 pages, University of Turku, Finland, 1979. Reference [3] subsequently appeared as Lecture Notes No. 797, 1980 and contains a photographic copy of this table.