

13 [7, 13.15].—HERBERT SHIPLEY, *Standard Tables for Circular Curves*, Edwards Brothers, Inc., Ann Arbor, Mich., 1963 (second printing, November 1965), 736 pp., 24 cm. Price \$24.00. (Obtainable from Curve Data, P.O. Box 542, Kingman, Arizona 86401.)

These voluminous tables, prepared specifically for the use of civil engineers, provide 8D approximations to five lengths (tangent, exsecant, arc, segment height, and chord) associated with the central angle in a circle of unit radius. In trigonometric notation the tabulated quantities are, respectively, $\tan (\Delta/2)$, $\sec (\Delta/2) - 1$, Δ in radians, $1 - \cos (\Delta/2)$, and $2 \sin (\Delta/2)$. The argument Δ assumes the values $0^\circ(10'')120^\circ$, which range, according to the author, suffices for all practical applications in civil engineering. For each tabulated quantity, average first differences are provided at intervals of $1'$ in the argument. There is appended a 10-page conversion table which gives 8D equivalents in degrees of angles to 1° expressed in minutes and seconds.

The underlying calculations were performed to 9D on a UNIVAC system, and the results were then rounded to 8D for printing. The retention of only a single guard figure has naturally led to a relatively large number of rounding errors; none, however, is as large as two final units, so far as this reviewer could ascertain from a comparison of several hundred entries with corresponding data derived from Peters' definitive 8D tables [1].

Photo-offset printing of these tables from edited computer output has resulted in nonuniform typographic quality; nevertheless, all the tabular entries seem to be legible.

Examination of the tabular literature [2] reveals that the tables under review exceed all others of their kind with respect to range, precision, and fineness of argument. They should be of significant value to practicing civil engineers and others requiring these specific data in a convenient compilation.

J. W. W.

1. J. PETERS, *Eight-Place Tables of Trigonometric Functions for Every Second of Arc*, Chelsea, New York, 1963. (See *Math. Comp.*, v. 18, 1964, p. 509, RMT 65.)

2. A. FLETCHER, J. C. P. MILLER, L. ROSENHEAD & L. J. COMRIE, *An Index of Mathematical Tables*, second edition, Addison-Wesley Publishing Co., Reading, Mass., 1962, v. 1, pp. 189-191.

14 [7, 13.15].—HERBERT SHIPLEY, *Areas of Curve Elements*, Edwards Brothers, Inc., Ann Arbor, Mich., 1962 (second printing, November 1965), 131 pp., 24 cm. Price \$12.00. (Obtainable from Curve Data, P.O. Box 542, Kingman, Arizona 86401.)

This is a companion to the author's *Standard Tables for Circular Curves*, described in the preceding review. It gives 8D values (without differences) of the areas of six configurations determined by various combinations of radii, tangents, chords, and arcs associated with central angles in a circle of unit radius. As explicitly stated in the table headings, multiplication of the tabular entries by a proportionality factor R^2 yields the corresponding areas for a circle of radius R .

The tabular argument is the central angle, Δ , which assumes the values $0^\circ(1')120^\circ$. In trigonometrical notation the tabulated quantities are, respectively, $\tan (\Delta/2)$, $\frac{1}{2} \sin \Delta$, $\Delta/2$ in radians, $\tan (\Delta/2) - \Delta/2$, $\tan (\Delta/2) - \frac{1}{2} \sin \Delta$, and