The latter value is obtained by assuming the sine=arc and then putting $s'' = \sqrt{63y''} = \sqrt{24 \times 5730\ F \div D}$. $\theta = \frac{Ks^2}{\sin 1^\circ}$.

From equations (b) and (c), y and x may be found, and from these same equations, remembering that

$$R = \frac{5730}{D} \text{ and } K = \frac{D}{11460 s''},$$

we get for the point B

$$y'' = \frac{s''^2}{6\,R} - \frac{s''4}{336\,R^3} + \frac{s''4}{42240\,R^5}$$

$$\text{and } x = s'' - \frac{s''3}{40\,R^2} + \frac{s''5}{3456\,R^4}.$$

(II.) We have now derived all the formulæ from which to make up our tables. In getting s'' for a given circular curve, the R would be assumed and the x'' and y'' then found. s'' may be more conveniently obtained from given values of F, the offset, for assuming $y''=4$ F, an approximate value of s'' results from using only the first term in the value of y''. This value, slightly increased, if substituted in the second and third terms, will give a value of s'' from the first term which will be sufficiently accurate. Having s'', we are now able to find I, K, F, etc. . . .

The values of F are now compared with the assumed one, and several trials may be necessary before the two values agree. If a few values of F in different parts of the table are ascertained, a certain relation is found to exist between F and y'', so that there is little trouble in getting subsequent values of F. When $x=a$ (fig. 1), the x' of the table is the length of the transition curve from P. C. to P. T. C. The $e=x'-a$, or the excess of transition curve over that of the tangent F K; $e'=s''-x'-(100\ I \div D)$ or the excess of transition curve over that of circular curve from P. C. to P. C^1; c is the chord length F B; x is tangent length to P. C.=F. K., and y is ordinate from tangent to the curve opposite P. C.=P. K.

Prof. Crandall has worked up a very complete set of tables, the curvature being up to 26°; 2° to 14° inclusive, and from 14° to 26°, taking 14°, 16°, 18°, etc. S'' ranges from 40 ft. to 800 ft.

For fractional values of F and D we may interpolate. F being very nearly proportional to y'', s''^2 will be proportional to F and therefore to $1 \div D$.

S'' is half length of transition curve.

Below are given a few values from the tables, for illustration:

6° Curve.

S''	I°	x	y	c	e	e'	F	x'	y
60	1.80	60	0.63	60		—.01	0.16	30	0.08
100	3.00	100	1.74	100		.01	0.44	50	0.22
200	6.00	199.8	6.98	199.9	.01	—.01	1.75	100	0.87
300	9.00	299.3	15.68	299.7	.02	.04	3.92	149.9	1.96
400	12.00	398.2	27.83	399.2	.05	.18	6.96	199.7	3.48
600	18.00	594.1	62.38	597.3	.20	.80	15.67	299.0	7.79

S'' is taken for every 20 ft. In computing S''. I. F. and x' only, are really required.

(III.) The curve may be laid out by deflection angles or by offsets. The distance s'' is divided into 20 equal parts, y and x being found from the formula, for each point, then $y \div x$ gives the tangent for the respective deflection angles, the transit being at the P. T. C. These angles are tabulated in parts of I, and are almost proportional to I as D and F vary. The greatest error is really very small. Also from the values of θ in the formula, the central angles, beginning at the P. T. C. are proportional to I, the same being true of the central angles subtended by the short chords. Below we give the notes for a transition curve, by deflections, just as it appears in the transit book. From this we believe the reader will see the method of operation without much further explanation.