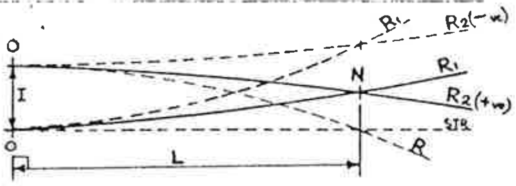
PERMANENT WAY
NOTES

PERMANENT WAY MATHEMATICS ③

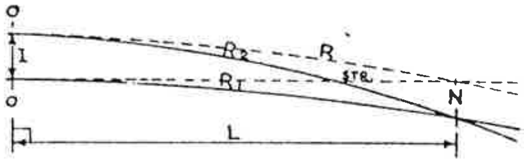
THESE NOTES ARE INTENDED FOR THE GUIDANCE AND ASSISTANCE OF STAFF ENGAGED UPON PERMANENT WAY WOR THEY DO NOT IN ANY WAY MODIFY, SUPPLEMENT OR AMEND THE INSTRUCTIONS LAID DOWN IN E.D.I., STANDARD DRAWINGS CIRCULARS ETC., WHICH SHOULD BE REFERRED TO IN ALL CASES.

INTERSECTING CURVES

MAIN LINE FLEXURE CONTRARY TO R FLEXURE.



MAIN LINE FLEXURE SIMILAR TO R FLEXURE.



R_1 = MAIN LINE RAIL RADIUS

R_2 = RAIL RADIUS OUT OF CURVE

R = RAIL RADIUS OUT OF STR (WITH I & N CONSTANT.)

Main line flexure contrary to R flexure:

$$R = \frac{R_1 R_2}{R_1 + R_2 - \frac{I}{2}}$$

$$R_1 = \frac{R(R_2 - \frac{I}{2})}{R_2 - R}$$

$$R_2 = \frac{R(R_1 - \frac{I}{2})}{R_1 - R}$$

$$I = (R_1 + R_2) \mp \sqrt{(R_1 + R_2)^2 - \frac{R_1 R_2}{N^2 + \frac{1}{4}}}$$

$$R_1 = \frac{4I(N^2 + \frac{1}{4})(R_2 - \frac{I}{2})}{2R_2 - 4I(N^2 + \frac{1}{4})}$$

$$R_2 = \frac{4I(N^2 + \frac{1}{4})(R_1 - \frac{I}{2})}{2R_1 - 4I(N^2 + \frac{1}{4})}$$

$$N = \sqrt{\frac{(R_1 - \frac{I}{2})(R_2 - \frac{I}{2})}{2I(R_1 + R_2 - \frac{I}{2})}}$$

$$L = \frac{1}{R_1 + R_2 - I}\sqrt{2I(R_1 - \frac{I}{2})(R_2 - \frac{I}{2})(R_1 + R_2 - \frac{I}{2})}$$

$$L = \frac{R_1 R_2 N}{(R_1 + R_2 - I)(N^2 + \frac{1}{4})}$$

Main line flexure similar to R flexure:

$$R = \frac{R_1 R_2}{R_1 - R_2 + \frac{I}{2}}$$

$$R_1 = \frac{R(R_2 - \frac{I}{2})}{R - R_2}$$

$$R_2 = \frac{R(R_1 + \frac{I}{2})}{R_1 + R}$$

$$I = (R_2 - R_1) + \sqrt{(R_1 - R_2)^2 + \frac{R_1 R_2}{N^2 + \frac{1}{4}}}$$

$$R_1 = \frac{4I(N^2 + \frac{1}{4})(R_2 - \frac{I}{2})}{4I(N^2 + \frac{1}{4}) - 2R_2}$$

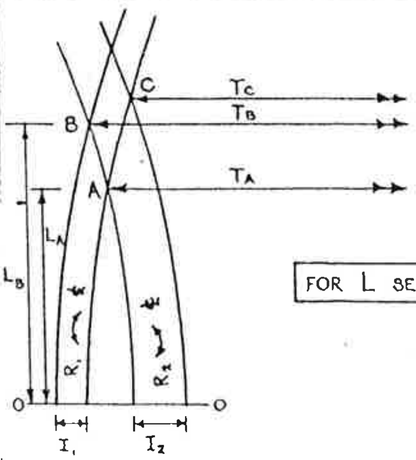
$$R_2 = \frac{4I(N^2 + \frac{1}{4})(R_1 + \frac{I}{2})}{4I(N^2 + \frac{1}{4}) + 2R_1}$$

$$N = \sqrt{\frac{(R_1 + \frac{I}{2})(R_2 - \frac{I}{2})}{2I(R_1 - R_2 + \frac{I}{2})}}$$

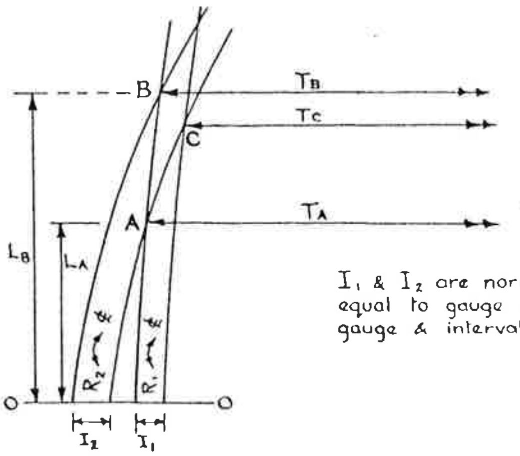
$$L = \frac{1}{R_1 - R_2 + I}\sqrt{2I(R_1 + \frac{I}{2})(R_2 - \frac{I}{2})(R_1 - \ldots}$$

$$L = \frac{R_1 R_2 N}{(R_1 - R_2 + I)(N^2 + \frac{1}{4})}$$

LATERAL DISPLACEMENT OF INTERSECTIONS IN CONCENTRIC CURVES.



FOR L SEE ABOVE



I_1 & I_2 are normally equal to gauge or gauge & interval.

$$T_A - T_B = \frac{R_1 I_1}{OQ} \qquad T_A - T_B = \frac{R_2 I_2}{OQ}$$

$$T_A - T_C = \frac{R_2 I_2}{OQ} \qquad T_A - T_C = \frac{R_1 I_1}{OQ}$$

WHERE OQ IS DISTANCE BETWE THE CENTRES O THE CIRCLES R, MEASURED ALONG THE COMMON R

THESE VALUES ARE USEFUL FOR OBTAINING DIAMOND SIDES & SIMILAR DIMENSIONS SINCE $AB = \sqrt{(L_B - L_A)^2 + (T_A - T_B)^2}$ & $AC = \sqrt{(L_C - L_A)^2 + (T_A - T_C)^2}$