## TRANSACTIONS

OF THE

### SOUTH AFRICAN PHILOSOPHICAL SOCIETY.

# NOTE ON THE THREE-POINT, OR POTHENOT'S, PROBLEM.

#### By H. G. FOURCADE.

#### (Read January 27, 1897.)

The ordinary methods of computation of the position of a point, given the angles subtended by three other points of known positions are chiefly :—



#### First method.

an

**3** 1. Compute the length and "angle of direction" of  $\alpha$  from the co-ordinates of C and A.

2. Compute the length and angle of direction of  $\beta$  from C and B.

3. Put PAC=x, PBC=y. Then  $\tan \frac{1}{2} (x-y) = \tan (z-45^{\circ}) \tan \frac{1}{2} (x+y)$ Where

$$\tan z = \frac{a \sin \beta}{b \sin a}$$
and
$$\frac{1}{2} (x+y) = 180^{\circ} - \frac{1}{2} (a+\beta+C)$$
51

3

#### 52 Transactions of the South African Philosophical Society.

4. Compute the co-ordinates of P either from triangle PCA or triangle PBC.



Second method.

1. Compute the length and angle of direction of C from the co-ordinates of A and B.

2. Compute the co-ordinates of O from the triangle OAB in which  $OAB=\beta$  and  $OBA=\alpha$ .

3. Compute the angle of direction of O C from the co-ordinates of O and C.

4. Compute the co-ordinates of P either from triangle POA or PBO. Both these methods are avoided by

many surveyors on account of their length. A shorter method will now be given, with a numerical example showing the arrangement of the computation.

Taking the middle point C for origin, put x' y' and x'' y'' for the co-ordinates of A and B. The equations to the circles (1) through A and C and containing the angle a (2) through C and B and containing the angle  $\beta$  are

$$\tan \alpha \prec y (y-y') + x(x-x') \succ -xy' + yx' = 0$$
  
$$\tan \beta \prec y (y-y'') + x(x-x'') \succ -yx'' + xy'' = 0$$

reducible to

$$y^2 + x^2 + Ay - Bx = 0$$
  
$$y^2 + x^2 - Cy + Dx = 0$$

Where

$$A = x' \cot a - y' \qquad B = y' \cot a + x' C = x'' \cot \beta + y'' \qquad D = y'' \cot \beta - x''$$

Then

$$\frac{y}{x} = \frac{B+D}{A+C} = m$$
$$m^2 x + x = B - mA$$
$$x = \frac{B-mA}{m^2+1} \quad y = mx$$

Example.			
A - 1811.59	-1018.55	y' = -1376.55	x' = +406.90
B + 6.81	-930.26	y'' = + 441.85 x	c'' = +495.19
C - 435.04	-1425.45	0.00	0.00
$a = 64 \cdot 7 \cdot 40$			
$\beta = 20.33.20$			
+9.685719	+9.685719	+0.425980	+0.425980
+2.609488	-3.138792	+2.694772	+2.645275
+2.295207	-2.824511	+3.120752	+3.071255
+197.34	-667.59	+1320.54	+1178.30
-y + 1570.00	+x + 400.90	+y + 441.60	-x - 490.19
A + 1073.89	B - 260.69	C + 1762.39 A $\pm 1573.89$	D + 683.11 B - 260.69
A + 3.196974	-2.662730	1 2336.98	D = 200 00 + 199.19
1.0.000456	0.000900	+333020	+422 42
+2.299400 -mA = 199.28	x - 2.000824 9 102482	2.020744 3.523262	m9.102482 $m^28.204964$
+B-260.69	$\frac{3102102}{1.758306}$	$m^2 \perp 1$	-1.01603
-459.97	<i>g</i> -1,100000		<u> </u>
		-435.04	-1425.45
	Co-ordinates	of P: $-492.36$	-1878.16

A check is afforded by the computation of the angles of direction PA and PB. PC is given by

 $\tan^{I} m$ .

March, 1898.

.

.



Fourcade, Henry George. 1895. "NOTE ON THE THREE-POINT, OR POTHENOT'S, PROBLEM." *Transactions of the South African Philosophical Society* 9, 51–53. <u>https://doi.org/10.1080/21560382.1895.9526315</u>.

View This Item Online: <a href="https://www.biodiversitylibrary.org/item/113784">https://doi.org/10.1080/21560382.1895.9526315</a> Permalink: <a href="https://www.biodiversitylibrary.org/partpdf/175387">https://www.biodiversitylibrary.org/partpdf/175387</a>

**Holding Institution** Field Museum of Natural History Library

**Sponsored by** The Field Museum's Africa Council

**Copyright & Reuse** Copyright Status: NOT\_IN\_COPYRIGHT

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at https://www.biodiversitylibrary.org.