KG
11366
v.725

Eros. Book No. 3.

Eros – List of Plates &c

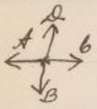
* Centre precedes 0.66 s 8.6" South

	Plates	Bk. "Eros"	See Eros 2 p 50 Adopted Centres 1875	Authority for Comparison Stars	Ast Gesell Vol.	RA 1875	Decl. 1875
1	I 9801 Oct 28 1893	3	6 16.8 +58 10	H.C.O. Vol XV (Prof R)		5 58 48.12	+53 39 46.8
2	I 9832 .. 30 ..	3	5 46.1 +58 12	"		Brightest part 6 4 33.14	+54 6 25.2 *
3	I 9862 .. 31 ..	3	6 28.4 +53 26	"		6 7 37.62	+54 20 12.3
4	I 10095 Nov 26 ..	3	7 49.6 +56 57	Helsingfors		7 17 31.2$\overset{0}{2}$	+57 49 33.$\overset{5}{6}$
5	I 10215 Dec 19 ..	4		H.C.O. XV	..	7 45 56.54	+54 38 39.2
6	I 10280 .. 23 ..	4		..	..	7 45 57.50	+52 58 15.6
7	I 10321 .. 27 ..	4	7 26.1 +48 8	"	"	7 44 43.18	+50 54 59.9
8	I 10469 Jan 19 1894	4	7 27.3 +33 8	Camb. Eng.		7 26 28.30	+28 45 48.8
9	I 10559 .. 25 ..	4		Berlin		7 23 33.46	+21 14 57.5
10	A 222 Feb 5 ..	4	7 28.5 + 7 22	Leipsic		7 23 17.80	+ 8 45 23.8
11	A 246 .. 16 ..	5	7 28.8 +2 18	Nikolajew (Kortazzi)		7 29 58.51	−0 21 42.4
12	I 10685 .. 16 ..	4	7 17.8 +3 16	"		7 29 58.86	−0 21 56.2
13	B 10909 Apr 16 ..	3	9 14.5 −17 24	Prof Searles Zone	mss	9 17 0.60	−13 33 53.1
14	B 10951 .. 18 ..	3	9 12.1 −17 12	" "	"	9 21 46.96	−13 38 52.0
15	B 11174 May 19 ..	3	10 29.8 −11 55	" Harkness, v. letter from Washington		10 38 1.92	−14 57 20.2
16	B 15531 Apr 6 1896	4		A.G. C. +Z6		18 36 59.94	−38 32 48.3
17	B 16108 June 4 "	5		" "		18 30 7.18	−40 2 45.1
18	B 16157 " 5 ..	5		" "		18 27 51.39	−39 58 32.6
19	B 16165 .. 5 ..	4		" "		18 27 39.58	−39 58 0.4
20	B 16518 .. 29 ..	4		" "		17 37 43.86	−36 21 26.0
21	A 1876 .. 30 ..	4		" "		17 36 22.23	−36 11 20.6

Notes on Measures of Position of Eros and of reduction of same.

Plates adjusted for measures with North at top film side out and numbered consecutively on glass side from left to right or ~~on~~ film side ~~from~~ right to left.

Estimated values of x and y in millimetres are read from the edges of the squares, measured values from the centres by means of the eyepiece scale in seconds of arc. A to the left, B below C to the right, D above



The whole numbers of the estimated values of x + y are reduced to seconds of arc by multiplying by the value of 1 mm in sec of arc for the telescope used, these give the coordinates of the square in which the star is found; to these values are applied C-A and B-D in x + y respectively, with the signs +(C-A) + +(B-D). [This rule applying for the signs of ~~applying~~ (C-A) + (B-D) applies to all parts of the sky except the North pole (South Pole also which is not yet measured), for which the rectangular co-ordinates have been computed by Fabritius method and +(C-A) + -(B-D) were ~~used~~ for contact contact prints, ~~(C-A)~~ (B-D) on direct on dark plates. For ω Centauri plates D4828 + D4831 (direct prints) which were measured with North at left, +(C-A) + -(B-D) were used.]

Before (C-A) + (B-D) were applied at all they are corrected for "Runs" which is the difference between the value of 1 mm as measured in the eyepiece scale and 1 mm on the enlargement

Runs obtained from the proportion:

Mean C-A is to ½ value 1 mm as x : X.

For I plates 1 mm = 163".
B .. .. 179.
a .. .. 60.

Proportion for Rims:

For I 9801 D6441

$\frac{6567}{32}$ or 205.22 : ½ 163 = x : X and $\frac{6548}{32}$ or 204.62 : ½ 163 = y : Y

0.397 x = X 0.398 y = Y

Prof. P's Rule
To see if meas. + estimates are made from same Square. { After Rims have been applied compare (C–A) and (B–D) with tenths of Estimated values and see that they correspond with uniform values of (C–A) & (B–D). 0 .1 .9 For Eros .0 & .1 are –

or any way
To compare Estimates with (measures) Scale values. { Reduce the estimates to the Centre of the preceding Square as follows: Since Scale readings follow estimates numerically by ½ division, Subtract ½ div. from positive values and Add ½ division to the negative values if the meas. Centres have been applied, if not, est. are all +

Compare Est. & Meas. for:

1) Measure from 2 Sq. N. Pole & ω Cent. for Eros see below* { Measures in either coordinate made from 2 Squares →

have been reduced by adding ½ division arithmetically to the measured value. (For N. Pole & ω Cent. the measured values of the Coords of the Centre of Plate had been applied first) This reduces the meas. to the centre of one of the two sqs., to find out which is the correct one, compare the estimated value + add 1 div. to neg. vals or sub. 1 div. from the pos.

2) Meas. from different sqs. { Whenever the same stars are meas. from different squares and for all non catalogue stars compare with

3) Meas. of Non Cats. ? { estimates reduced to centre of preceding Square, there is no other way of finding out if the Square is correct. Prof. P's rule does not seem to apply to meas. from 2 Sqs. For the Catalogue Stars the Computed X & Y settle it.

General Order of Reduction: 1. Computed X & Y by Turner for Eros; Fabritius for N. & S. Poles
2. Reduction of measures and means of same = x and y.
3. Examination by Prof. P's rule to see if meas. are made from same div. as est.
4. Least Square Solution for Plate constants or errors of scale orientation &c.

1)* For Eros the reduction of measures from 2 Squares was made before the Constants for Centres of Plates ($X-x$) and ($Y-y$) were applied, so that all values were positive, ½ division was subtracted the comparison with estimates made & 1 division added or subtracted.

Rule: Sub. ½ div. from pos., add ½ div. to neg. vals, whether centres applied or not, in order to re

Least Square Solution:

to reduce to preceding square.

For Recomputation see Bk. 5, p. 58

X

Measured Values of x and y of "Eros" and Comparison Stars

D6441 from I 9801 = Oct 28 1893

Meas. Bk. 15, p. 4.

Design		x 1st Meas.	x 2nd Meas.	x Mean of 1st & 2nd Meas	Residuals x		Diff 1st − 2nd	Computed X	X − Mean x	Mean x + Constant (−12140) x	x − X
Cand. U.S. 2397	a	9.9″	10.7	10.3	−0.4	0.4	0.8	−12140.1″	−12150.4″	−12129.7″	
2401	b	318.5	320.4	319.4	−0.9	10	19	−11828.8	48.2	−11820.6	
2403	c	685.7	685.7	685.7				−11458.0	43.7	−11454.3	
2418	e	2255.6	2253.8	2254.7	0.9	−0.9	1.8	−9886.5	41.2	−9885.3	
2431	k	3411.1	3410.7	3410.9	0.2	−0.2	0.4	−8725.6	36.5	−8729.1	
2432	l	3536.0	3536.4	3536.2	−0.2	0.2	0.4	−8604.1	40.3	−8603.8	
2433	m	3631.7	3627.7	3629.7	2.0	−2.0	4.0	−8507.8	37.5	−8510.3	
2436	n	4099.6	4100.0	4099.8	−0.2	0.2	0.4	−8036.1	35.9	−8040.2	
2440	o	4629.9	4625.5	4627.7	2.2	−2.2	4.4	−7503.7	31.4 5.1	−7512.3	

− 12140.6 = Mean

−12140. = adopted constant in X

adopted scale value, orientation re

a = −.346 × .01 a′ = −.309 × .01
b = −.112 × .01 b′ = +.089 × .01.
c = +11.2 c′ = +7.4

To be sub. fr. meas

	x 1st Meas.	x 2nd Meas.	x Mean of 6	Residuals		Diff	ax	by	c	Σ	x − Σ Corr x	X x + Const.
Eros*	2514.5	2514.4	2514.4	0.1	−0.3		−8.7 8.70	−.9 .86	+11.2 11.19	+1.6 1.63	2512.8	−9627.2″ −9627.2
″	2514.1	2514.5		−0.3	0.1							
″	2514.9	2514.5		0.5	0.1							
c	685.7	685.7	685.7									
d	1027.6	1027.6	1027.6									
f	1974.3	1973.9	1974.1	0.2	−0.2	0.4						
g	2108.3	2109.1	2108.7	−0.4	0.4	0.8						
h	3222.7	3222.7	3222.7									
1) * Cat Star												
n for check on signs			4099.8				−14.2	−1.5		−4.5	4104.3	−8035.7

see above X = −8036.1

∴ p10 x − X + 0.4

* Est Val x 15.6mm × 163″ − ½ div = 2510.2″

Y

	1st Meas	2 Meas.	Mean y	Resids		Diff	Computed Y	Constant Y-Mean y	Mean y+Constant	y − Y
a	587.5	587.5	587.5″				−16118.6″	−16706.1″	−16112.5″	
b	1536.6	1536.6	1536.6				−15166.9	703.5	−15163.4	
c	3592.4	3590.8	3591.6	0.8	−0.8	1.6	−13104.6	696.2	−13108.4	
e	3786.8	3786.8	3786.8				−12911.5	698.3	−12913.2	
k	2128.2	2129.0	2128.6	−0.4	0.4	0.8	−14573.0	701.6	−14571.4	
l	184.9	184.9	184.9				−16524.3	709.2	−16515.1	
m	610.2	609.4	609.8	0.4	−0.4	0.8	−16098.7	708.5	−16090.2	
n	1365.3	1365.7	1365.5	−0.2	0.2	0.4	−15341.4	706.9	−15334.5	
o	(2033.2) −163 1870.2	(2034.4) 163 1871.4	1870.8	−0.6	0.6	1.2	−14837.0	707.8	−14829.2	

38.1 ~~3.1~~

~~−16700.3~~

−16704.2 mean

−16700. = adopted Constant in Y

	Mean of 6	a′y	b′x	c′	Σ	y − Σ = corr y	Y = y+Const.
*Eros.	766.2	−2.4 −2.36	+2.2 2.24	+7.4 7.38	+7.2 7.26	759.0	−15941.0″ −15941.1 chk
"							
"							

	1st Meas	2 Meas.	Mean y	Resids		Diff
c						
d	2211.6	2212.4	2212.0	−0.4	0.4	0.8
f	912.3	912.3	912.3			
g	725.6	724.8	725.2	0.4	−0.4	0.8
h	856.8	857.2	857.0	−0.2	0.2	0.4

1365.5

* Est val $y = \overset{mean}{57} \times 16.3 - \frac{1}{2}$ div = 767.0″

Equations of Condition

Comparison Stars for Eros

D 6441 from I 9801

Desig.	Meas. x − 12140″.	Computed X	x − X	=	x/100	y/100
a	− 12129.7″	− 12140.1″	+ 10.4″	=	0.10″	5.88″
b	− 11820.6	− 11828.8	+ 8.2	=	3.19	15.37
c	− 11454.3	− 11458.0	+ 3.7	=	6.86	35.92
e	− 9885.3	− 9886.5	+ 1.2	=	22.55	37.87
k	− 8729.1	− 8725.6	− 3.5	=	34.11	21.29
l	− 8603.8	− 8604.1	+ 0.3	=	35.36	1.85
m	− 8510.3	− 8507.8	− 2.5	=	36.30	6.10
n	− 8040.2	− 8036.1	− 4.1	=	41.00	13.66
o	− 7512.3	− 7503.7	− 8.6	=	46.28	18.71
			+ 23.8			
		±42.6	− 18.7			
			+ 5.1	=	225.75 a	156.65 b

	y − 16700	Computed Y	y − Y		y/100	x/100
a	− 16112.5″	− 16118.6″	+ 6.1″	=		
b	− 15163.4	− 15166.9	+ 3.5	=		
c	− 13108.4	− 13104.6	− 3.8	=		
e	− 12913.2	− 12911.5	− 1.7	=		
k	− 14571.4	− 14573.0	+ 1.6	=		
l	− 16515.1	− 16524.3	+ 9.2	=		
m	− 16090.2	− 16098.7	+ 8.5	=		
n	− 15334.5	− 15341.4	+ 6.9	=		
o	− 14666.2 + 1 div 163.	− 14837.0	+ 170.8	=		
			+ 7.8			
			+ 43.6			
			− 5.5			
		±49.1	+ 38.1	=		

$(x-\bar{X})\,x/100$	$x^2/100$	$x/100\;y/100$	$(x-\bar{X})\,y/100$	$x\,y$	y^2
+1.04 =	.01	.59	+61.15		34.57
+26.16 =	10.18	49.03	+126.03		236.24
+25.38 =	47.06	249.41	+132.90		1290.25
+27.06 =	508.50	853.97	+ 45.44		1434.14
−119.38 =	1163.49	726.20	− 74.52		453.26
+ 10.61 =	1250.33	65.42	+ .56		3.42
− 90.75 =	1317.69	221.43	− 15.25		37.21
−168.10 =	1681.00	560.06	− 56.01		186.60
−398.01 =	2141.84	865.90	−160.91		350.06
+ 90.25			+ 366.18		
−776.24			− 30669		
−685.99 =	8120.10	3592.01	+ 59.49		4025.75

$(y-\bar{Y})\,y/100 =$	$(y-\bar{Y})\,x/100 =$
+35.87 =	+ .61 =
+53.80 =	+11.16 =
−136.50 =	− 26.07 =
−64.38 =	− 38.34 =
+34.06 =	+ 54.58 =
+17.02 =	+325.31 =
+ 51.85 =	+308.55 =
+ 94.25 =	+ 282.90 =
+145.94 =	+ 360.98 =
+432.79	+ 1344.09
−200.88 ±633.67	− 64.41 ±1408.50
+231.91 =	+1279.68

Normal Equations for X

Comparison Stars for Eros

D6441 from I 9801 Equations for a b c

X * +5.1 . = 225.75 a + 156.65 b + 9. c

− 685.99 = 8120.10 a + 3592.01 b + 225.75 c

+ 59.49 = 3592.01 a + 4025.75 b + 156.65 c

0.70757 = 2.35363 2.19493 0.95424

2.83632 = 3.90956 3.55534 2.35363

1.77444 = 3.55534 3.60485 2.19493

÷ coeff c 9.75333 = 1.39939 a 1.24069 b + c

0.48269 = 1.55593 1.20171

9.57951 = 1.36041 1.40992 a = −.346 b = −.112 Σ c =

1 +″.5667 = +25″.08 a + 17″.41 b + c	−8.68	−1.95	−10.63 + c	+11″.20
2 −3.0387 = +35.97 +15.91	−12.45	−1.78	−14.23	+11.19
3 +.3798 = +22.93 +25.70	−7.93	−2.88	−10.81	+11.19

1−2 +3.6054 = −10.89 a + 1.50 b

2−3 −3.4185 = +13.04 a − 9.79 b

0.55695 = 1.03703 a 0.17609 b

0.53384 = 1.11528 0.99078

a = −.346
b = −.112
c = +11″.2
To be subtr from meas.

÷ a 9.51992 = a 9.13906 b 8.18987
9.05081

9.41856 = a 9.87550 b 8.92631

+.33107 = −a + .13774 b −.01548

−.26216 = +a − .75076 b +.08439

+.06891 = −.61302 b

8.83828

9.78747n

9.05081 b = −.11241

a = −.34655

−.34655

*A 1st Solution was made with x − x_1 = 5″.2 = k 1st eq
this gave the values of a = −.346
b = −.114
c = +11″.2

Normal Equations for V

Equations for a′ b′ c′

V $+38.1 = 156.65\,a' + 225.75\,b' + 9\,c'$

+coeff a′ = V/100 $+231.91 = 4025.75\,a' + 3592.01\,b' + 156.65\,c'$

b′ = V/100 $+1279.68 = 3592.01\,a' + 8120.10\,b' + 225.75\,c'$

1.58092 = 2.19493 2.35363 0.95424

2.36532 = 3.60485 3.55534 2.19493

3.10710 = 3.55534 3.90956 2.35363

÷ coeff c′

0.62668 = 1.24069 1.39939

0.17039 = 1.40992 1.36041

0.75347 = 1.20171 1.55593

a′ = −.309
b′ = +.089

c′ =

(1) $+4.2333 = +17.41\,a' + 25.08\,b'$ −5.38 +2.23 −3.15 + c′ +7.38″

(2) $+1.4804 = +25.70 + 22.93$ −7.94 +2.04 −5.90 +7.38

(3) $+5.6685 = +15.91 + 35.97$ −4.92 +3.20 +1.72 +7.39

1–3 $-1.4352 = +1.50\,a' - 10.89\,b'$

2–3 $-4.1881 = +9.79\,a' - 13.04\,b'$

a′ = −.309
b′ = +.089
c′ = +7.4″
To be subtracted from meas.

0.15691 = 0.17609 1.03703

0.62202 = 0.99078 1.11528

÷ b′

9.11988 = 9.13906 a′ − b′ 8.62892

9.48986

9.50674 = 9.87550 a′ − b′ 9.36536

$-0.13179 = +.13774\,a' - b'$ −.04255 b′ = +.08924

$-0.32117 = +.75076\,a' - b'$ −.23193 +.08924

$+.18938 \quad -.61302\,a'$

9.27733

9.78747

9.48986_n $a' = -.3089$

a = −346
b = −,112
c = +11″.2

Residuals

D6441 from I9801

	p4 x/100	ax	by	c	Σ = Computed Σ = x−X	p6 Obs. x−X	O−C
a	0.10	.0″	−.7″	+11″.2	+10″.5	+10″.4	−.1″
b	3.19	−1.1	−1.7		+8.4	+8.2	−.2
c	686	−2.4	−4.0		+4.8	+3.7	−1.1
e	22.55	−7.8	−4.2		−.8	+1.2	+2.0
k	34.11	−11.8	−2.4		−3.0	−3.5	−.5
l	35.36	−12.2	−0.2		−1.2	+0.4	+1.6
m	36.30	−12.6	−0.7		−2.1	−2.5	−4
n	41.00	−14.2	−1.5		−4.5	−4.1	+.4
o	46.28	−16.0	−2.1		−6.9	−8.6	−1.7

−4.0
+4.0
±8.0

±″.90 ±89
±.89

a′ = −309
b′ = +089
c′ = +7″.4

	p5 y/100	a′y	b′x	c′	C y−Y	O y−Y	O−C
a	5.88	−1″.8	+0″.0	+7″.4	+5″.6	+6″.1	+0″.5
b	15.37	−4.7	+0.3		+3.0	+3.5	+0.5
c	35.92	−11.1	+0.6		−3.1	−3.8	−0.7
e	37.87	−11.7	+2.0		−2.3	−1.7	+0.6
k	21.29	−6.6	+3.0		+3.8	+1.6	−2.2
l	1.85	−0.6	+3.1		+9.9	+9.2	−0.7
m	6.10	−1.9	+3.2		+8.7	+8.5	−0.2
n	13.66	−4.2	+3.6		+6.8	+6.9	+0.1
o	18.71	−5.8	+4.1		+5.7	+7.8	+2.1

Miss Woods

+38
−38
±76 ±.85 4±84

chkd by Miss B.

no need of completing in this form unless meas. coords corrected for abc &c are required viz this col ↙

ax	by	c	Σ	Corr. x	$\underset{=0}{\overset{\text{corr}}{x} + \text{Constant}}$	C	O–C

↙

$a'y$	$b'x$	c'	Σ	corr y	y + Constant		O–C

Eros from 2 Enlargements of same plate Oct 28 1893 = I 9801

Turners Computation of α + δ from corrected X + Y or X + Y of Eros for 1875 see pp 4–5

Turners D6441	Eros from I9801	check = ax + by + c to hundredths see pp 4 + 5	D6442 Eros from I9801 *	Check ax + by + c to .01 see p14
Y	−15941.0″ ✓	−15941.1″	−15941.7″	−15941.2″
log −Y	4.2025156n ✓ 5.3144251		4.2025183 ✓	4.2025210
Y/R = tan⁻¹ Y = d = b − D	8.8880905n ✓		8.8880932 ✓	8.8880959n
d	−4 25 9.38 ✓		−4 25 9.48 ✓	−4 25 9.58
D	+58 10		+	
b = D + d	+53° 44 50.62 ✓		+53 44 50.52 ✓	+53 44 50.42
X	−9627.2″ ✓	+9627.2	−9627.1″ ✓	−9627.1
log X	3.9835000n ✓ 5.3144251		3.9834955n ✓	3.9834955n
X/R	8.6690749n ✓		8.6690704n ✓	8.6690704n
cos d	9.9987069 ✓		9.9987069 ✓	9.9987069
X/R cos d	8.6677818n ✓		8.6677773n ✓	8.6677773n
cos b	9.7718419 ✓		9.7718422	9.771842$\overset{5}{5}$
X/R cos d / cos b = tan a	8.8959399n ✓		8.8959351n	8.89593$\overset{48}{50}$n
a = (α − A) arc	−4° 29′ 58.36″ ✓		−4 29 58.18	−4° 29′ 58.1$\overset{7}{8}$″
time	−0h 17m 59.89s		−0 17 59.88	−0 17 59.88
A = 6h 16.8m	6h 16m 48s	adopted Mar 20 1899		6 16 48
1875 α = a + A	5 58 48.11 ✓		5 58 48.12 ✓	5 58 48.12
1875 α Circular 37	5 58.8	To Mr Chandler Mar 25 decls to tenths } by Mrs F.		
tan b	0.1347181 ✓		0.1347177 ✓	0.1347173 2 Bagay
cos a	9.9986594 ✓		9.9986594 ✓	9.9986594
tan b cos a = tan δ	0.1333775 ✓		0.1333771 ✓	0.1333767
δ 1875	+53° 39′ 46.85″ # ✓		+53 39 46.76	+53 39 46.67
1875 δ Circular 37	+53 40		* Rejected see note p22 see also Mrs Woods	↑ Same as the value on p17 →

Mar 14 1899

April 1899 Mr Chandler's position (from letter Apr 17 1899) of Eros.

I 9801 Position angle + distance measured from contact print of original and reduced by Lum. plate

Eros I 9801 gives the following place:

$\alpha 1875$ 5^{h} 58^{m} $47^{s}.92$ $\delta 1875$ $+53^{\circ}$ $39'$ $46''.72$

" 5 58 47.96 " +53 39 46.91 definitive result

May 5 1899 Mr. Chandler's place not greater than 5^{h} 58^{m} $48^{s}.02$

June 3 1899) he has examined his result + reaches this conclusion.

" 7
V −159 41.8 7
X −962 ~~8.3~~ 7.6) see p17 for computation of final Rt + decl from D6442

H.C.O. place of Eros from I 9801 mean of D6441 + D6442 is

$\alpha 1875$ 5^{h} 58^{m} $48^{s}.$~~05~~12 ✓ $\delta 1875$ $+53^{\circ}$ $39'$ $46''.8$ ✓

5 58 ~~47.99~~ 48.12

+53. 39 46.~~8~~7 sep 17

applying Σ of corr before and after Const. is applied to measures gives the same result.

x Eros = 2478.7
−3.0 sub = 2481.7″
Before −12110.
−9628.3

after 2478.7″
−12110.
−9631.3
− 3.0 subtracted
−9628.3

D 6442 from I 9801 October 28, 1893. Meas. Bk. 15, p. 32.

Comb. N.S.				Mean x ″				X	X − mean x	(−12110) Mean x + Const. ″	x − X ″
2397	a	−26.2	−25.8	−26.0	−0.2	0.2	0.4	−12140.1	−12114.1	−12136.0	+4.1
2401	b	284.3	284.3	284.3	0.0	0.0		−11828.8	113.1	−11825.7	+3.1
2403	c	650.0	650.0	650.0	0.0	0.0		−11458.0	108.0	−11460.0	−2.0
2418	e	2216.5	2216.5	2216.5	0.0	0.0		−9886.5	103.0	−9893.5	−7.0
2431	k*	3373.4 3374.2	3373.4	3373.7	−0.3 0.5	−0.3		−8725.6	099.3	−8736.3	−10.7
2432	l	3497.2	3496.4	3496.8	0.4	−0.4	0.8	−8604.1	100.9	−8613.2	−9.1
2433	m	3595.9	3595.9	3595.9	0.0	0.0		−8507.8	103.7	−8514.1	−6.3
2436	n	4065.1	4065.1	4065.1	0.0	0.0		−8036.1	101.2	−8044.9	−8.8
2446	o	4593.8	4593.8	4593.8	0.0	0.0		−7503.7	097.5	−7516.2	−12.5
				22250.1				−86690.7	40.8		+7.2
				9				9			−56.4
				2472.2				−9632.3			−49.2

−12104.5 mean for Recid comp pp 114–8

−12110. adopted

Values in blue are Final p23

Rejected p22	Final p23		by	
a −.328	−.3~~4~~3 45×01	a′ −.272	−.27~~4~~6×01	Sub. fr. meas.
b −.117	−.1~~35~~23	b′ +.094	+.0~~89~~7	
c +4.8	+5.~~5~~9	c′ −2.1	−~~2.0~~ 1.9″	

							ax	by	c	Σ	″	
Eros	2478.7	2478.0	2478.7	0.0	−0.7		−8.1	−.9	+4.8	−4.2	2482.9	(?) −9627.1*
						chk	8.13	.89	4.79	−4.23	2482.9	−9627.1
Est. x = 15.9 = 2591.7″ (fr. edge)	2478.7	2478.7		0.0	0.0							See p12 for α & δ
½ sq = 81.5							~~−8.4~~	~~−.1.0~~	~~+5.5~~	~~−3.0~~ 9	~~2481.7~~ 2.6	−9628.3 7.4
2510.2 (fr. centre)	2478.7	2479.5		0.0	0.8		−8.45	−.101	+5.49	−3.06 98	2481.8 2.7	~~−9628.2~~ 7.3
						adopted Dec 6 Final corrected values	−8.3	−.9	+5.0	−4.2	2482.9	−9627.1

* Rejected see note p 27

For Eros from Recid Comp. see p 118 & below

d	987.9	987.9	987.9	0.0	0.0	
f	1935.4	1937.7	1936.6	−1.2	1.1	2.3
g	2072.2	2073.3	2072.8	−0.6	0.5	1.1
h	3187.3	3186.6	3187.0	0.3	−0.4	0.7

Eros (Recomp made after Dec 6) 2478.7 +8.3 +.9 −10.4 −1.2 add 2477.5″ (−12104.5) −9627.0

*k all three meas. in both coords retained Mar 17 1899 (Prof P)

* changed Jan 13 1900 Solution in this book made with −3778.5 star e y

			Mean y				Y	Y − mean y	(−16700.) Mean y + Const	y − Y
a	578.4	578.8	578.6	−0.2	0.2	0.4	−16118.6	−16697.2	−16121.4	−2.8
b	1527.9	1527.9	1527.9	0.0	0.0		−15166.9	16694.8	−15172.1	−5.2
c	3583.2	3584.0	3583.6	−0.4	0.4	0.8	−13104.6	16688.2	−13116.4	−11.8
e	3778.1	3778.9	3778.5 4*	−0.4	0.4	0.8	−12911.5	16690.0	−12921.5	−10.0
k	2117.4 2121.0	2121.0	2119.8	−2.4 1.2	1.2		−14573.0	16692.8	−14580.2	−7.2
l	176.9	176.9	176.9	0.0	0.0		−16524.3	16701.2	−16523.1	+1.2
m	598.3	598.7	598.5	−0.2	0.2	0.4	−16098.7	16697.2	−16101.5	−2.8
n	1356.9	1356.9	1356.9	0.0	0.0		−15341.4	16698.3	−15343.1	−1.7
o	1863.0	1862.6	1862.8	0.2	−0.2	0.4	−14837.0	16699.8	−14837.2	−0.2
			15583.5				−134676.0	49.5		+1.2
			9				9			−41.7
			1731.5				−14964.0			−40.5

−16695.5 mean. for comp in pp 114−8

−16700. adopted.

						a′y	b′x	c′			
Eros.	756.9	757.3	757.0	−0.1	0.3	−2.1	+2.3	−2.1	−1.9	758.9 (3)	−15941.1 *
						−2.06	2.33	2.12	1.85	758.8	−15941.2
Est y = 5.2 = 848.5	757.3	756.9		+0.3	−0.1						see p12 for α+δ
−½ sq 845	757.3	756.5		0.3	−0.5	−2.1	+2.2	−2.0	−1.9	758.9	−15941.1
767.0						−2.07	+2.21	−1.97	−1.8	758.8	−15941.2
				adopted	final corrected value	−2.1	+2.2	−1.9	−1.8	758.8	−15941.2
Estimated x y 6.6 14.0 d*	2200.9	2200.5	2200.7	+.2	−.2						
f	904.8	904.4	904.6	0.2	−0.2	0.4					
g	715.7	717.7	716.7	−1.0	1.0	2.0					
h	846.8	845.6	846.2	0.6	−0.6	1.2					

(−16695.5)

							add		
Eros	757.0	+2.1	−2.2	−2.5	−2.4	+754.6	−15941.1		

* Measured from 2 Sqs in y; Est y 14.0×163 − ½ div = 2200.5

Comparison of D6441 & D6442 both from I9801

	6441 6442 x − x	D6441 x − X	D6442 x − X	x − X 6441 − 6442	Resids fr. mean
		″	″	″	
a	36.3	+10.4	+4.1	+6.3	+.3
b	35.1	+8.2	+3.1	+5.1	−.9
c	35.7	+3.7	−2.0	+5.7	−.3
e	38.2	+1.2	−7.0	+8.2	+2.2
k	37.2	−3.5	−10.7	+7.2	+1.2
l	39.4	+0.3	−9.1	+9.4	+3.4
m	33.8	−2.5	−6.3	+3.8	−2.2
n	34.7	−4.1	−8.8	+4.7	−1.3
o	33.9	−8.6	−12.5	+3.9	−2.1
				54.3	+71 −68 ±139

mean = +6.0

±1.6 av. dev. of diff of 2 cal I9801 in x

	D6441 y − Y	D6442 y − Y	y − Y 6441 − 6442	Resids fr. mean
	″	″	″	″
a	+6.1	−2.8	+8.9	+.2
b	+3.5	−5.2	+8.7	+.0
c	−3.8	−11.8	+8.0	−.7
e	−1.7	−10.0	+8.3	−.4
k	+1.6	−7.2	+8.6	−.1
l	+9.2	+1.2	+8.0	−.7
m	+8.5	−2.8	+11.3	+2.6
n	+6.9	−1.7	+8.6	−.1
o	+7.8	−0.2	+8.0	−.7
			64	+28 −27 ±55

mean +8.7

± .6 av. dev. of diff of 2 cal of I9801 in y

Eros from D6442 Trial values of RA + decl

1875	Used tenths p15 Adopted	Used hundredths p15 Check	p12 6441−6442 diff V	D6442
V	−15941.″1	−15941.″2	+.~~1~~2	−15941.2
	4.2025183n	4.2025210		4.2025210
	8.8880932n	8.8880959n		8.8880959n
	−4 25 9.48	−4 25 9.58		−4 25 9.58
	+58 10			+58 10
b	+53° 44′ 50.″52	+53° 44′ 50.″42		53 44 50.42
X	−9628.3	−9628.2	~~+.1~~ −0.1	−9627.1
	3.9835496n	3.9835451n		3.9834955n
	8.6691245n	8.6691200n		8.6690704n
	9.9987069	9.9987069		9.9987069
	8.6678314n	8.6678269n		8.6677773n
	9.7718422	9.7718425		9.7718425
	8.8959892n	8.8959844n		8.8959348n
	−4° 30′ 0.″19	−4 30 0.01		−4° 29′ 58.″17
	0h 18m 0.s01	0h 18m 0.s00	nat. cos δ = .592	−0 17 59.88
	6 16 48.		diff α × 15 cos δ	
α 1875	5 58 47.99	5 58 48.00	~~+.2~~ s.01 ~~±1.″1~~ −0.″1	5 58 48.12
tan b	0.134717 7	0.1347173		0.1347173
cos u	9.9986591	9.9986591		9.9986594
Σ	0.1333768	0.1333764		0.1333767
δ 1875	+53° 39′ 46.″6$\overset{8}{9}$	+53 39 46.60	+.″1~~6~~8	+53° 39 46.67

June 3 1899

Equations of Condition

D6442 from I 9801

	$x - X$ =n	$x/100$ =a	$y/100$ =b	$(x-X)\,x/100$
a	+4.1 =	−0.26	+5.79	−1.07 =
b	+3.1 =	+2.84	+15.28	+8.80 =
c	−2.0 =	+6.50	+35.84	−13.00 =
e	−7.0 =	+22.16	+37.78	−155.12 =
k*	−10.7 =	+33.74	+21.20	−361.02 =
l	−9.1 =	+34.97	+1.77	−318.23 =
m	−6.3 =	+35.96	+5.98	−226.55 =
n	−8.8 =	+40.65	+13.57	−357.72 =
o	−12.5 =	+45.94	+18.63	−574.25 =
	+7.2			+8.80
±63.6	−56.4	+222.76 − 26		−2006.96 ±2015.76
	−49.2	(+222.50	+155.84	~~−2001.84~~ −1998.16

for final solution pp 23-25)

$x-X\,\frac{x}{100}$ −1998.16
" $\frac{y}{100}$ −897.95
" −49.2
Σ = −2945.31
Sn = −2945.29 see p19 ↘

	$y - Y$ =n'	$(y-Y)\,y/100$
a	−2.8 =	−16.21
b	−5.2	−79.46
c	−11.8	−422.91
e	−10.0	−377.80
k	−7.2	−152.64
l	+1.2	+2.12
m	−2.8	−16.74
n	−1.7	−23.07
o	−0.2	−3.73
	+1.2	+2.12
±42.9	−41.7	−1092.56
	−40.5	−1090.44 ±1094.68

$y-Y\,\frac{x}{100}$ − 692.29
" $\frac{y}{100}$ −1090.44
" − 40.5
−1823.23
Σ, Sn' −1823.2 →

* k from 3 meas all the other stars from 2 meas.

For final Solution see pp 23–25

Data for Equations on pp 24 25
right hand coeffs of normals below

$(x-\bar{x})\,y/100$	$xy = ab$	$x^2 = aa$	y^2
+23.74	−1.51 ✓	.07 ✓	33.52 ✓
+47.87	+43.40 ✓	8.07 ✓	233.48 ✓
−71.68	+232.96 ✓	42.25 ✓	1284.51 ✓
−264.46	+837.20 ✓	491.07 ✓	1427.33 ✓
−226.84	+715.29 ✓	1138.39 ✓	449.44 ✓
−16.11	+ 61.90 ✓	1222.90 ✓	3.13 ✓
−37.67	+215.04 ✓	1293.12 ✓	35.76 ✓
−119.42	+551.62 ✓	1652.42 ✓	184.14 ✓
−232.88	+855.86 ✓	2110.48 ✓	347.08 ✓
+71.11 ✓	$+3513.28^{7}$ ✓	7958.77 ✓	
−969.06 ✓	− 1.51		
−897.95 ±1040.17	$+3511.77^{6}$ ✓		3998.39 ✓

Check reduction
Miss B's mult.

$(y-\bar{y})\,x/100$	s = cs	as	bs	sn		sn′
+0.73	+6.53	−1.7	+37.8 ✓	+ 26.8 ✓	.77	−18.3
−14.77	19.12	+54.3	292.1 ✓	+59.3 ✓	.27	−99.4
−76.70	43.34	281.7	1553.3 ✓	− 86.7 ✓	.68	−511.4
−221.60	60.94	1350.4	2302.3 ✓	−426.6 ✓	.58	−609.4
−242.93	55.94	1887.4	1185.9 ✓	−598.6 ✓	.56	−402.8
+ 41.96	37.74	1319.8	66.8 ✓	−343.4 ✓	43	+45.3
−100.69	42.94	1544.1	256.8 ✓	−270.5 ✓	.52	−120.2
−69.10	55.22	2244.7	749.3 ✓	−485.9 ✓	.94	−93.9
−9.19	+ 65.57	+3012.3	+1221.6 ✓	−819.6 ✓	.62	−13.1
+42.69	+387.34 ✓	+11694.7 − 1.7	+7665.9	$+86.1^{04}$		+45.3
−734.98		+11693.0		-3031.3^{33}		−1868.5
−692.29 ±777.67				−2945.29		−1823.2

$x^2 = +7958.77_6$
$xy = +3511.77$
$x = +222.50$
$+11693.04^3$

$y^2 +3998.39$
$xy +3511.77^6$
$y +155.84$
+7666.00
5.99

This Σ .1 too small

Dec 4 checked by Miss B. & corr^t found

Normal Equations in X

D6442 from I9801

see p8. Used D6441 for right hand equations

− 49.2√ =

X54''2. − 2001.84√ =

− 897.95√ =

1.69197 0.95424

3.30143 2.35363

2.95325 2.19493

0.73773

0.94780

0.75832

a = −.328
b = −.117

Sofria C

				Σ	
− 5.4668	see p8 D6441 for coeffs of a + b	−8.23	−2.04	−10.27 + c	C = +4.80
− 8.8665		−11.80	−1.86	−13.66	+4.79
− 5.7322		−7.51	−3.01	−10.52	+4.79

1−2 + 3.3997 = +10.89 − 1.50

2−3 − 3.1843 = +13.04 − 9.79

Rejected see note p22
~~adopted~~ for Eros see pp 12 + 14

a = −.328 401
b = −.117 "
c = +4.8 "

To be subtracted from meas.

log coeff a

0.53144 = 1.03703 a

0.49614 = 1.11528 a

9.49441 9.13906 8.20784
9.06878
9.38086 9.87550 8.94428

+ .31218 = − a −.01614 a = −.32832

−.24036 = + a +.08796 a = −.32832

+.07182

8.85625

9.78747 a

log b 9.06878 b = −.11716

y

− 40.5 = Used D6441 Eq. on right See p9

− 1090.44 =

− 692.29 =

coeffs c'

1.60746 0.95424

3.03760 2.19493

2.84029 2.35363

÷ coff c'

0.65322

0.84267

0.48666

a' = −.272

b' = +.094

To find c'

− 4.5001 −4.74 +2.36 −2.38 + c' c' = −2.12

− 6.9610 −6.99 +2.16 −4.83 −2.13

− 3.0666 −4.33 +3.38 −0.95 −2.12

Rejected see note p22

~~adopted~~ pp 12 + 14

1−3 −1.4335

2−3 −3.8944

a' −.272 ±.01

b' +.094 "

c' −2.1"

To be subtracted fr. meas.

0.15640 1.03703 b'

0.59044 1.11528 b'

÷ coff b'

9.11937 = 9.13906 8.57436 ✓

9.43530

9.47516 = 9.87550 9.31080 ✓

−.13163 + ... −b' −.03753 b' = +.09410

−.29865 + ... −b' −.20455 b' = +.09410

+.16702

9.22277

9.78747n

9.43530n a = −.27245

Rej. p22

$$\left\{\begin{array}{l} a = -.328 \\ b = -.117 \\ c = +4''.8 \end{array}\right. \qquad \left.\begin{array}{l} a' = -.272 \\ b' = +.094 \\ c' = -2''.1 \end{array}\right\}$$

note: Constants using D6441 data on right of Normals see pp20 21

They give practically the same values of the Residuals O-C as those derived from the solution with D6442 data on right. Compare p22 with p118

Residuals

D6442 from I9801

		x/100 p18	ax/100	by/100	c	x−X Σ = Computed	see p14 x−X Obs	O−C
a	a	−0.26	+0″.1	−0″.7	+4″.8	+4″.2	+4″.1	−″.1
b	b	+2.84	−.9	−1.8		+2.1	+3.1	+1.0
c	c	6.50	−2.1	−4.2		−1.5	−2.0	+.5
e	e	22.16	−7.3	−4.4		−6.9	−7.0	−.1
k	k	33.74	−11.1	−2.5		−8.8	−10.7	−1.9
l	l	34.97	−11.5	−0.2		−6.9	−9.1	−2.2
m	m	35.96	−11.8	−0.7		−7.7	−6.3	+1.4
n	n	40.65	−13.3	−1.6		−10.1	−8.8	+1.3
o	o	45.94	−15.1	−2.2		−12.5	−12.5	0

−43
+42
85 ±.94

Have rejected p22. It is the only plate done in this way and was done so purposely. (Prof P.)

Have recomputed D6442 with its own meas. $\frac{x}{100}$ $\frac{y}{100}$ on right of Equations see pp114-9.

For all other plates have used either the measured values $\frac{x}{100}$ $\frac{y}{100}$ for each enlargement or the computed values $\frac{X}{100}$ $\frac{Y}{100}$ for both enlargements from the same original.

It makes no practical difference whether the measured or computed values are used see slips p23 (over)

		Y/100 p19	a′y/100	b′x/100		Σ = C	p15 Obs y−Y	O−C
Eros	a	+5.79	−1.6	−0.0	−2.1	−3″.7	−2″.8	+″9
	b	15.28	−4.2	+0.3		−6.0	−5.2	+.8
	c	35.84	−9.7	+0.6		−11.2	−11.8	−.6
	e	37.78	−10.3	+2.1		−10.3	−10.0	+.3
d	k	21.20	−5.8	+3.2		−4.7	−7.2	−2.5
f	l	1.77	−0.5	+3.3		+0.7	+1.2	+.5
g	m	5.98	−1.6	+3.4		−0.3	−2.8	−2.5
h	n	13.57	−3.7	+3.8		−2.0	−1.7	+.3
	o	18.63	−5.1	+4.3		−2.9	−0.2	+2.7

−5.6
+5.5
±11.1 ±1.23

Reject p22

Adopted Values

$a = -.3\cancel{45}$ −.335
$b = -.1\cancel{35}$ −.123 ?
$c = +5.4\cancel{9}$ +5.0

$a' = -.27\cancel{4}^{6}$
$b' = +.08\cancel{9}^{7}$
$c' = -1.9\cancel{7}$

Constants using D6442 data see pp 24 25

Some error in X found that m 2 x − X x/100 p18 & corrected

Residuals from Final Solution

D6442 from I 9801

Final →

p18 x/100		a x/100	b y/100	c	Σ = C	O − C	Σ = C	O − C
a	−0.26	+.1 +.1	−.8 −.7	~~+5.5~~ +5.0	+4.8 ✓	−.7	+4.4	−.3
b	+2.							
c	6.							
e	.22							
k	33.							
l	34							
m	35							
n	40							
o	45							

tenths used

p 23

To hundredths →

	a x/100	b y/100	c	Σ = C	+14 Obs x − X	O − C
a	+.09	−.71 ✓	+4.96	+4.34	+4.1	−0.2
b	−.95	−1.88 ✓		+2.13	+3.1	+1.0
c	−2.18	−4.41 ✓		−1.63	−2.0	−0.4
e	$-7.4\cancel{3}^{2}$	−4.65		$-7.1\cancel{2}^{1}$	−7.0	+0.1
k	−11.30	−2.61 ✓		−8.95	−10.7	−1.7
l	−11.71	−0.22 ✓		−6.97	−9.1	−2.1
m	−12.05	−0.74		−7.83	−6.3	+1.5
n	−13.62	−1.67 ✓		−10.33	−8.8	+1.5
o	−15.39	−2.29 ✓		−12.72	−12.5	+0.2

−4.4
+4.3
±8.7

±.97

.98 p
Some error
hundredths
−4.4
+4.3
±.97

p19 y/100	a x/100		b y/100		Σ = C	O − C	Σ = C	O − C
5.77								
15.28	−4.2	−4.2	$+0.\cancel{2}^{3}$	+.2	$-\cancel{6.0}$ 5.9	$+.\cancel{8}^{7}$	−5.9	+.7
35.84	−9.8	−9.9	+0.6	+.6	−11.2 ✓	−.6	−11.2	−.6
37.78	−10.4	−10.4	+2.0	+1.9	−10.4	+.4	−10.4	+.4
21.20	−5.8	−5.9	+3.0	+2.9	−4.8	−2.4	−4.9	−2.3
1.77	−.5	−.5	+3.1	+3.0	+0.6	+.6	+.6	+.6
5.98	−1.6	−1.6	+3.2	+3.1	−0.4 ✓	−2.4	−.4	−2.4
13.57	−3.7	−3.7	$+3.\cancel{6}^{6}$	+3.5	−2.1	+.4	−2.1	+.4
18.63	−5.1	−5.1	$+4.\cancel{0}^{1}$	+4.0	$-3.\cancel{1}^{0}$	$+2.\cancel{9}^{8}$	−3.0	+2.8

~~+5.7~~
~~−5.4~~

~~+5.9~~ 8
~~−5.4~~
~~±11.3~~ 2

± ~~1.26~~ 5

+5.6
−5.3
±10.9

±1.21

chkd by Miss B.

Adopted Values

a = −.345 −.335
b = −.135 −.123 ?
c = +5.49 +5.0

a' = −.274 6
b' = +.089 7
c' = −1.97

Constants using D6442 data see pp 24 25

Some error in x found but in 2 x.4 x/100 p18 & corrected

Residuals from Final Solution

D6442 from I9801

p18	x/100	a x/100	b y/100	c	Σ = C	O−C	Final Σ = C	O−C
a	−0.26	+.1 +.1	−.8 −.7	+5.5 +5.0	+4.8	−.7	+4.4	−3
b	+2							
c								
e								
k	3							
l								
m								
n	4							
o	4							

tables used

D6442 (−12140.5)

Computed X − Const.		x/100 not used Error 3"	x/100 used gives p23 D6442	x/100 rejected gives p22 D6441	differences (2) − (3)	(1) − (2)
a	−35.6 ÷ 10 =	−.36	−0.26	+0.10	−.36	−.10
b	+275.7	+2.76	+2.84	3.19	.35	−.08
c	646.5	6.46	6.50	6.86	.36	−.04
e	2218.0	22.18	22.16	22.55	.39	+.02
k	3378.9	33.79	33.74	34.11	.37	+.05
l	3500.4	35.00	34.97	35.36	.39	+.03
m	3596.7	35.97	35.96	36.30	.34	+.01
n	4068.4	40.68	40.65	41.00	.35	+.03
o	4600.8	46.01	45.94	46.28	.34	+.07
		(1)	(2)	(3)		

Since it makes no practical difference in constants see p214 whether (2) or (3) is used it certainly makes none whether (1) or (2).

p19	a x/100	b y/100	Σ = C	O−C	Final Σ = C	O−C
5.77		−2.0 −1.7			−3.0	+.7
15.28	−4.2 −4.2	+0.2 3 +.2	−6.0 5.9	+.8 7	−5.9	+.7
35.84	−9.8 −9.9	+0.6 +.6	−11.2	−.6	−11.2	−.6
37.78	−10.4 −10.4	+2.0 +1.9	−10.4	+.4	−10.4	+.4
21.20	−5.8 −5.9	+3.0 +2.9	−4.8	−2.4	−4.9	−2.3
1.77	−.5 −.5	+3.1 +3.0	+0.6	+.6	+.6	+.6
5.98	−1.6 −1.6	+3.2 +3.1	−0.4	−2.4	−.4	−2.4
13.57	−3.7 −3.7	+3.6 6 +3.5	−2.1	+.4	−2.1	+.4
18.63	−5.1 −5.1	+4.0 1 +4.0	−3.1 0	+2.9 8	−3.0	+2.8
			~~+57 −54~~	+5.9 8 −5.4 ±11.3 2	± 1.26 5	+56 −53 ±109 ±1.21

±.98 ? all some corr… hundredths gives −44 +43 ±.97

checked by Miss D.

Adopted Values

a = ~~-.345~~ -.335
b = ~~-.135~~ -.123 ?
c = ~~+5.49~~ +5.0

a′ = ~~-.274~~ 6
b′ = +.089 7
c′ = ~~-1.97~~

Constants using D6442 data supp. 24 25

Some error in x found that in 2 x-t x/100 p18 & corrected

Residuals from Final Solution
D6442 from I9801

Final →

p18	x/100	ax/100		by/100		c		Σ = C	O−C	Σ = C	O−C
a	−0.26	+.1	+.1	−.8	−.7	~~+5.5~~	+5.0	+4.8	−.7	+4.4	−.3
b	+2.84	~~−.9~~ −1.0	−1.0	~~−2.2~~ 1	−1.9			+2.4	+.7	+2.1	+1.0
c	6.50	−2.2	−2.2	~~−5.1~~ 4.8	−4.4			~~−1.8~~ 5	~~−.2~~ 5	−1.6	−.4
e	22.16	~~−7.7~~ 6	−7.4	~~−5.4~~ 1	−4.6			~~−7.6~~ 2	~~+.6~~ 2	−7.0	.0
k	33.74	~~−11.7~~ 6	−11.3	~~−3.1~~ 2.9	−2.6			~~−9.3~~ 0	~~−1.4~~ 7	−8.9	−1.8
l	34.97	−12.1	−11.7	−.2	−.2			−6.8	−2.3	−6.9	−2.2
m	35.96	−12.4	−12.0	~~−.9~~ 8	−.7			~~−7.8~~ 7	~~+1.5~~ 4	−7.7	+1.4
n	40.65	−14.0	−13.6	~~−2.0~~ 1.8	−1.7			~~−14.5~~ 3	~~+1.7~~ 5	−10.3	+1.5
o	45.94	−15.8	−15.4	~~−2.7~~ 5	−2.3			~~−13.0~~ 2.8	~~+.5~~ 3	−12.7	+.2

+.143 used ?

~~− 5~~ 2 ?
~~+ 4~~

~~−4.6~~
~~+5.0~~
±9.6 ± ~~1.07~~

−4.7
+4.1
±8.8

±.98 ? no

Dec 6 still some error

Jan 3 1900 See slips to Leavenworth gives −44 +43 ±.97

Tenths used

p19 y/100	a′y/100		b′x/100		c′		Σ = C	O−C	Σ	O−C
5.79	−1.6	−1.6	−.00	−.00	−2.0	−1.9	−3.6	+.8	−3.5	+.7
15.28	−4.2	−4.2	~~+0.2~~ 3	+.2			~~−6.0~~ 5.9	~~+.8~~ 7	−5.9	+.7
35.84	−9.8	−9.9	+0.6	+.6			−11.2	−.6	−11.2	−.6
37.78	−10.4	−10.4	+2.0	+1.9			−10.4	+.4	−10.4	+.4
21.20	−5.8	−5.9	+3.0	+2.9			−4.8	−2.4	−4.9	−2.3
1.77	−.5	−.5	+3.1	+3.0			+0.6	+.6	+.6	+.6
5.98	−1.6	−1.6	+3.2	+3.1			−0.4	−2.4	−.4	−2.4
13.57	−3.7	−3.7	~~+3.6~~ 6	+3.5			−2.1	+.4	−2.1	+.4
18.63	−5.1	−5.1	~~+4.0~~ 1	+4.0			~~−3.1~~ 0	~~+2.9~~ 8	−3.0	+2.8

~~+57~~
~~−54~~

~~+5.9~~ 8
~~−5.4~~
±~~11.3~~ 2 ± ~~1.26~~ 5

+56
−53
±109
±1.21

chkd by Miss B.

See double sheet (data on pp 18–19) for recomputation of pp 24–25

Final Solution

D 6442 from I 9801

For check see pp 114–118

Normal Equations in X

See p 19 for right hand data

has not been ~~solved~~ yet ~~to be~~ solved by Gauss method.

$-49.2 = \overset{x}{22\overset{2}{\cancel{5}}.50}\,a + \overset{y}{155.84}\,b + 9c$

Reject pp 24–25

$-\cancel{2001.84} = \overset{x^2}{7958.77}\,a + \overset{xy}{3511.77}\,b + 22\overset{2}{\cancel{5}}.50\,c$

$-897.95 = 3511.77\,a + \overset{y^2}{3998.39}\,b + 155.84\,c$

	aa = $x^2/100$	ab = $xy/100$	ac = $x/100$		an = $(x-X)\,x/100$
	+7958.77	+3511.77	$+22\overset{2}{\cancel{5}}.50$		~~−2001.84~~
	3.90085 ✓	3.54553 ✓	$2.3\overset{4733}{\cancel{5315}}$ ✓		3.30143n ✓
		9.64468 ✓	$8.45\overset{4648}{\cancel{230}}$ ✓		
		(3.19021 ✓)	$(1.99\overset{201}{\cancel{783}}$ ✓)		(2.94611 ✓)
	−2001.84	bb = $y^2/100$	bc = y		bn = $(n-X)\,y/100$
	$-1\overset{222}{\cancel{343}}.$	+3998.39 ✓	+155.84		−897.95
	$+\overset{475}{\cancel{502}}.$	$+154\overset{5}{\cancel{9}}.56$	$+\overset{8.18}{\cancel{99.50}}$ ✓		−883.30 ✓
	$-28\overset{7}{\cancel{4}}\overset{8.8}{\cancel{3}}.$	subtract +2448.83	$+5\overset{7.66}{\cancel{6.34}}$ ✓ bc1		−14.65 ✓ bn'
	$3.4\overset{391}{\cancel{538}}$n	3.38896 ✓	$1.7\overset{6}{\cancel{5}}08\overset{7}{\cancel{1}}$ ✓		1.16584n ✓
	aa 3.9008		$8.3\overset{7}{\cancel{6}}1\overset{1}{\cancel{8}}\cancel{6}$		
	$9.5\overset{383}{\cancel{530}}$n		$(0.1\overset{3}{\cancel{1}}268)$ bc1/bb1 bc1		9.5~~2770~~
x =	$-3\overset{45}{\cancel{57}}$ ✓		$(0.\overset{79381}{\cancel{80545}}$ ✓) ac/aa ac		(1.75~~373~~n ✓)
	−14.65		CC = coefficient		cn = x − X
	$-3\overset{16.7}{\cancel{35.4}}$		+9.00 ✓		−49.2 ✓
	$-3\overset{31.3}{\cancel{50.0}}$		$+6.\overset{22}{\cancel{39}}$ ✓		−56.7 ✓ ?
	$2.5\overset{202}{\cancel{441}}$n ✓		$+2.\overset{78}{\cancel{61}}$ ✓		+7.5 ✓ cn'
	bb1 3.3890		$+1.3\overset{6}{\cancel{0}}$ ✓ bc1/bb1 bc1		−3 ✓ ?
	$9.1\overset{312}{\cancel{551}}$n		$+1.3\overset{42}{\cancel{1}}$ ✓		+7.8
y =	$-.1\overset{35}{\cancel{43}}$ ✓		~~0.1173~~ ✓		0.8921 ✓
			0.1523		$0.1\overset{52}{\cancel{8}}3$
					$0.7\overset{39}{\cancel{7}}48$ ✓
				Z =	$+\cancel{5.95}$ 5.49

$\frac{2.0.7398n \quad 2.3473}{3.0871}$

$\begin{array}{l} 2.0.7748n \\ ac\ 2.3532 \\ \hline 3.1280n \end{array}$

$\begin{array}{l} y\ 9.1951 \\ ab\ 3.5455 \\ \hline 2.7006 \end{array}$

ab/aa 9.64468

$\begin{array}{l} 9.1312 \\ 3.5455 \\ \hline 2.6767 \end{array}$

2 0.7748n 0.7398n 1.7609 bc1 1.7808 2.5256n 2.5007n

ac/aa $8.45\overset{4648}{\cancel{234}}$

bc1/bb1 $8.3\overset{7}{\cancel{6}}1\overset{1}{\cancel{8}}6$

These are final: when corrected) y =

Adopted Constants

scale a = x −.345

orient b = y −.135

c = Z +5.49

scale a' = y' −.274

orient b' = x' $+.0\overset{89}{\cancel{93}}$

c' = Z' $-.\cancel{244}$ 197

To be subtracted from meas.

pp 24–25

(Dec 1 1899) Recomputation D6442 from I9801

For Resid. Comp. eliminating c + c′ see pp 114–118

See double sheet (data on pp18–19) for recomputation of pp24–25

24 D6442, from I 9801, Recomputation.

$\frac{x^2}{100}$ = aa	$\frac{xy}{100}$ = ab	$\frac{x}{100}$ = ac	as	$(x-X)\frac{x}{100}$ an
7958.77	+3511.77	+222.50	+116930	−1998.16
3.90085	3.54553	2.34733	4.06793	3.30063_n
	9.64468	8.44648	0.16708	
	(3.19021)	(1.99201)	(3.71261)	(2.94531_n)

−1998.16	bb = $\frac{y^2}{100}$	bc = $\frac{y}{100}$	bs	$(x-X)\frac{y}{100}$ bn	
−1103.09	+3998.39	+155.84	+7665.9	−897.95	
+433.27	(.57) +1549.6	+98.18	+5159.5	−881.68	
−2667.98	+2448.82	+57.66	+2506.4	−16.27	
3.42618_n	3.38896	1.76087	3.39905	1.21139_n	
3.90085					
		8.37191	0.01009		
9.52533_n		(0.13278)	(1.77096)	(9.58330_n)	(1.22148_n)
−.335		(0.79381)	(2.51441)	(1.74711_n)	(3.46771_n)

I 0.69528_n
bc 1.76087
2.45615_n

	cc	cs	cn	sn
−16.27				
−285.86	+9.00	+387.34	−49.2	−2945.29
−302.13	+6.22	+326.90	−55.86	$-2935.\overset{69}{7}$
2.48019_n	+2.78	+60.44	+6.66	$-9.\overset{60}{5}$
bb 3.38896	+1.36	+59.02	−38	−16.65
9.09123_n	+1.42	+1.42	+7.04	$+7.\overset{0}{0}5$
b = y = −.123	0.15229		0.84757	
			0.69528	

c = z +4.96

z 0.69528_n
ac 2.34733
3.04261_n

y 9.09123
ab 3.54553
2.63676

a = −.335 a′ −.276
b = −.123 b′ +.087
c = +4.96 c′ −1.88

To be subtracted from meas.

Decl examined but do not find error.
" " "

bs1 = bb1 + bc1
cs1 = cc1 + bc1
cs2 = cc2
sn1 = bn1 + cn1
sn2 = cn2

an'
−692.29
2.84029_n

(2.48497_n)

−692.29
+418.36
+970.22
$+696.2\overset{9}{6}$

2.84279
3.90085
$8.9419\overset{4}{7}$

b' = x' = +.08748

bn'
−1090.44
−305.47
−784.97
2.89485_n

(1.26676_n) (2.90494_n)
(1.28677_n) (3.00737_n)

−784.97
+108.42
−676.55
2.83030_n
9.44134_n

0.27422
1.76087
2.03509

a' = y' = −.276

cn'

−40.5	−1823.2
−19.35	−1017.1
−21.15	−806.1
−18.48	−803.4
−2.67	−2.7

0.42651_n
0.27422_n

c' = z' = −1.88

z' 0.27422
ac 2.34733
2.62155

y' 9.44134
ab 3.54553
2.98687

[illegible] (plate in 14.18–19) for reconstruction of these 25

See p19 for right hand data.

− 40.5 =
− 1090.44 =
∓ 692.29 =

$an' = (y-Y)\,{}^{\alpha}/_{100}$
− 692.29
2.84029n
8.93944 omit
(2.48497) $\log \frac{ab}{aa} an'$

$bn' (y-Y)\,{}^{y}/_{100}$
− 1090.44
− 305.47 $\frac{ab}{aa} an'$
− 784.97 bn'
2.89485n

(1.2~~5671~~₂) $\log \frac{bc'}{bb'} bn'$
(1.2~~9259~~n) $\log \frac{ac'}{aa} an'$

$cn' - y - Y$
− 40.5 ✓
− 19.6 ? $\frac{bc'}{bb'} bn'$
− 20.9 cc'
− 18.1 ? $\frac{bc'}{bb'} bn'$
− 2.8 $cc'z$
0.4472n
52
0.1~~17~~3
2942
0.~~329~~9n
z′ = − ~~2.11~~
1.97

− 692.29″
38.0
+ 4~~82.1~~
61.4
+ 9~~53.6~~
07.1
+ 7~~40.4~~
495
2.8~~712~~
3.9008
487
8.9~~784~~
888
orientation x′ = +.0~~934~~

− 784.97″
13.5
+ 1~~20.4~~
70.5
− 6~~63.6~~
64
2.82~~79~~
3.3890
74
9.43~~27~~
scale y′ = − ~~.271~~
.274

For Recomputation see Bk. 5, p. 76

Comparison Stars for Eros.

D6377 from I 9832 — October 30, 1893.

Meas. Bk. 15, p. 6-10.

Camb. H.S.	h			Mean x				X	X − Mean x	Mean x + Constant	x − X
2431)	k	150.7	149.5	150.1	0.6	−0.6	1.2	+7534″.7	+7384.6	+7549″.1	+14″.4
2433)	m	518.0	515.6	516.8	1.2	−1.2	2.4	+7924.6	+7407.8	+7915.8	− 8.8
2436)	n	909.7	910.1	909.9	−0.2	0.2	0.4	+8307.2	+7397.3	+8308.9	+ 1.7
2440)	o	1384.2	1384.6 1384.6	1384.$\overset{5}{4}$	−0.3	0.1	0.1	+8779.2	+7394.$\overset{7}{8}$	+8783.$\overset{5*}{6}$	$\overset{4.3*}{+ 4.4}$
2448)	p	1882.6	1880.2	1881.4	1.2	−1.2	2.4	+9269.3	+7387.9	+9280.4	+11.1
2457)	u	3221.9	3222.3	3222.1	−0.2	0.2	0.4	+10613.1	+7391.0	+10621.1	+ 8.0
2458)	w	3293.0	3293.3	3293.2	−0.2	0.1	0.3	+10694.8	+7401.6	+10692.2	− 2.6
2459) omit	x	3381.3	3381.3	3381.3							
2462)	H	4258.2	4257.1	4257.6	0.6	−0.5	1.1	+11671.4	+7413.8	+11656.6	−14.8
2464)	L	4466.9	4468.5	4467.7	−0.8	0.8	1.6	+11881.7	+7414.0	+11866.7	−15.0
2463) omit	M	4498.5	4514.4 4502.5								
2465) omit	N	—	—								

892.$\overset{7}{8}$

7399.2 mean

+7399 = adopted Constant

Jan 29 1900 * Value of Y = −14888.254 used −14888.2 in this book see also p. 39

* For Recomputation see Eros 5 with Mean Const. X-mean x & Y-mean y

			Mean y				Y		y	y − Y
k	1754.8	1755.2	1755.0	−0.2	0.2	0.4	−14758.4	−16513.4	−14733.0	+25.4
m	260.7	260.3	260.5	0.2	−0.2	0.4	−16251.0	−16511.5	−16227.5	+23.5
n	1056.0	1055.6	1055.8	0.2	−0.2	0.4	−15447.4	−16503.2	−15432.2	+15.2
o	1616.1	1612.1 1612.1	1613.4	2.7	−1.3	−1.3		$-14888.\overset{2*}{3}$	$-16501.\overset{6}{8}$	−14874.6	$+13.\overset{6}{7}$
p	2105.5	2108.3	2106.9	−1.4	1.4	2.8	−14385.9	−16492.8	−14381.1	+4.8
u	1969.9	1970.3	1970.1	−0.2	0.2	0.4	−14499.8	−16469.9	$-14\overset{5}{4}\overset{1}{7}7.9$	−18.1
w	1103.2	1102.8	1103.0	0.2	−0.2	0.4	−15371.1	−16474.1	−15385.0	−13.9
x	—	—	—							
H	720.5	721.6	721.0	−0.5	0.6	1.1	−15744.0	−16465.0	−15767.0	−23.0
L	689.8	693.0	691.4	−1.6	1.6	3.2	−15768.9	−16460.3	−15796.6	−27.7
M	83.4	—	—							
N	2560.2	2559.8	2560.0	0.2	−0.2	0.4				

791.9

−16488 = also the mean

To be subtracted a = -.300 ×.01
b = +1.367 ×.01
c = -10″.6
angle = 0° 47′

Eros &c

+7399

D6377 Jun I 9832			x Mean of 6 meas.				ax	by	c	Σ	Corr x	Corr x + Const
* Eros centre			2367.4				-7.1	+27″.8	-10″.6	+10″.1	2357″.3	+ 9756″.3
* " centre of brightest part			2371.4				-7.1	+27.9	-10.6	+10.2	2361.2	+9760.2
Canal, H.S.		see note on sheet										
h	85.6	- 77.0 86.0										
g	2105.9	2109.1 2109.1										
r	2359.4	2361.4	2360.4	-1.0	1.0	2.0						
s	2518.8	2518.8	2518.8									
t	2594.9	2593.3	2594.1	0.8	-0.8	1.6						
z	3373.4	3373.4	3373.4									
A	3697.8	3699.4	3698.6	-0.8	0.8	1.6						
B	3710.1	3707.3	3708.7	1.4	-1.4	2.8						
C	3770.4	3769.6	3770.0	0.4	-0.4	0.8						
D	3886.6	3885.8	3886.2	0.4	-0.4	0.8						
F	4042.0	4041.3	4041.6	0.4	-0.3	0.7						
K	4354.9	4355.3	4355.1	-0.2	0.2	0.4						
Cat Star L			4467.7				-13.4	+9.5	-10.6	-14.5	4482.2	+11881.2

O-C = -″.5

* Eros Centre of Image	2366.4	2367.6	2367.4	-1.0	0.2
	2367.6	2367.6		0.2	0.2
	2367.6	2367.6		0.2	0.2
* Eros Centre of bright part	2372.3	2371.2	2371.4	0.9	-0.2
	2371.6	2371.6		0.2	0.2
	2371.2	2370.8		-0.2	-0.6

$a' = -.203 \times .01$
$b' = -1.285 \times .01$
$c' = +31.2''$

−16488.

Estimates x	y		Est y	Mean of 6 measures y	a'y	b'x	c'	Z	Corr y	corr y + Const
15.0	13.0 ×163 = 2119. − 81.5		2038.5	2197.8 −div = 2034.8	−4.1''	−30.4''	+31.2''	−3.3''	2038.1''	−14449.9''
15.1	13.1	2135.3	2053.8	2044.5	−4.2	−30.4	+31.2	−3.4	2047.9	−14440.1

not measured from 2 sqs in either Coörd. but from different sqs in y

h	467.5	469.5 467.1	468.5			
g	1985.5	1984.3 1984.7	1984.8	0.7	−0.5	−0.1
r	1292.5	1290.1	1291.3	1.2	−1.2	2.4
s	2538.4	2538.0	2538.2	0.2	−0.2	0.4
t	2335.7	2332.5	2334.1	1.6	−1.6	3.2
z	3165.5	3166.3	3165.9	−0.4	0.4	0.8
A	586.3	585.5	585.9	0.4	−0.4	0.8
B	3154.7	3153.9	3154.3	0.4	−0.4	0.8
C	3079.1	3079.1	3079.1			
D	2852.6	2852.6	2852.6			
F	3336.0	3336.0	3336.0			
K	1256.6	1256.6	1256.6			

691.4

2196.6	2197.8	2197.8	−1.2	0.0
2197.0	2200.6		−0.8	2.8
2197.4	2197.4		−0.4	−0.4
2044.2	2044.6	2044.5	−0.3	0.1
2044.6	2044.6		0.1	0.1
2045.0	2043.8		0.5	−0.7

Equations of condition.

D6377 form I 9832

	$x-X$	=	$\frac{x}{100}$	$\frac{y}{100}$	$(x-X)\frac{x}{100}$	$\frac{x^2}{100}$	$\frac{x}{100}\frac{y}{100}$
k	+14.4	=	1.50	17.55	+21.60	+2.25	+26.32
m	−8.8	=	5.17	2.60	−45.50	26.73	13.44
n	+1.7	=	9.10	10.56	+15.47	82.81	96.10
o	+4.4	=	13.84	16.13	+60.90	191.55	223.24
p	+11.1	=	18.81	21.07	+208.79	353.82	396.33
u	+8.0	=	32.22	19.70	+257.76	1038.13	634.73
w	−2.6	=	32.93	11.03	−86.62	1084.38	363.22
H	−14.8	=	42.58	7.21	−~~63.02~~ 630.18	1813.06	307.00
L	−15.0	=	44.68	6.91	−670.20	1996.30	308.74
	+39.6		200.83	112.76	+564.52	6589.03	2369.12
H ±808	−41.2				~~−865.34~~		
					~~−1432.56~~		
L	−1.6	=			−~~300.82~~		
					−867.98		

	$y-Y$	$y/100$	$x/100$	$(y-Y)\frac{y}{100}$		$y^2/100$	$x\,y$
k	+25.4 =			+445.77	=		
m	+23.5 =			+61.10	=		
n	+15.2 =			+160.51	=		
o	+13.6 =			+219.37	=		
p	+4.8 =			+101.14	=		
u	−18.1 =			−356.57	=		
w	−13.9 =			−153.32	=		
H	−23.0 =			−165.83	=		
L	−27.7 =			−191.41	=		
	+82.5			+987.89			
	−82.7			−867.13			
				+120.76			

$(x-X)\frac{y}{100}$	$\frac{x}{100}\frac{y}{100}$	$\frac{y^2}{100}$
+ 252.72		308.00
− 22.88		6.76
+ 17.95		111.51
+ 70.97		260.18
+ 233.88		443.94
+ 157.60		388.09
− 28.68		121.66
− 106.71		51.98
− 103.65		47.75
+ 733.12	2369.12	1739.87 ✓
− 261.92		
+ 471.20	±995.04	

$(y-Y)\frac{x}{100}$		xy	x^2
+ 38.10	=		
+ 121.50	=		
+ 138.32	=		
+ 188.22	=		
+ 90.29	=		
− 583.18	=		
− 457.73	=		
− 979.34	=		
− 1237.64	=		
+ 576.43			
− 3257.89			
− 2681.46	±3834.32		

Normal Equations. X

D6377 from I 9832

Σ_i		a x	b y	c	Check substituting adoption vals a + c + log b
$x-\bar{x}$	−1.6 =	200.83 a	+112.76 b	+9. c	$= -1''.5$
$(x-\bar{x})\frac{x}{100}$	− 867.98 =	6589.03 a	+ 2369.12 b	+ 200.83 c	= −867.4
$(x-\bar{x})\frac{y}{100}$	+ 471.20 =	2369.12 a	+1739.87 b	+ 112.76 c	= + 472.0

0.20412 = 2.30283 2.05216 0.95424

2.93851 = 3.81882 3.37459 2.30283

2.67320 = 3.37459 3.24052 2.05216

÷ coff c 9.24988 = 1.34859 1.09792 + c

0.63568 = 1.51599 1.07176 + c

0.62104 = 1.32243 1.18836 + c

Computation of c $a = -.30$ $b = +1.367$

								Σ	
(1)	− .1778 =	22.32 a	12.53 b	+ c	−6.70	+17.13	+10.43 + c	$c = -10''.61$
(2)	− 4.3219 =	32.81	11.80	+ c	−9.84	+16.13	+ 6.29	−10.61
(3)	+ 4.1787 =	21.01	15.43	+ c	−6.30	+21.09	+14.79	−10.61

(1)−(2) +4.1441 = −10.49 a + 0.73 b

(2)−(3) −8.5006 = +11.80 a − 3.63 b

0.61743 = 1.02078 a 9.86332 b

0.92945 = 1.07188 a 0.55991 b

adopt

a = −.300

b = +1.367 log b = 0.13569

$c = -10''.6$

÷ coff a 9.59665 = a 8.84254 b 8.97823

0.13569

9.85757 = a 9.48803 b 9.62372

+.39505 = − a + .06959 b +.09511 a = −.29994

−.72039 = + a − .30763 b −.42045 −29994

−.32534 −.23804 b

9.51234 n

9.37665 n

0.13569 b = + 1.3668

$\overline{\underline{y}}$

a'y b'x c'

Σ_3 $y-\overline{y}$ − 0.2 = 112.76 a' 200.83 b' 9. c'

$(y-\overline{y})\,y/100$ + 120.76 = 1739.87 a' 2369.12 b' 112.76 c'

$y-\overline{y}\ x/100$ − 2681.46 = 2369.12 a' 6589.03 b' 200.83 c'

9.30103 = 2.05216 2.30283 0.95424 c'

2.08192 = 3.24052 3.37459 2.05216

3.42837 = 3.37459 3.81882 2.30283

÷ coeff c' 8.34679 =

0.02976 =

1.12554 =

a' = +.203
b' = −1.285

									Σ	
(1)	− .0222 =	12.53 a'	22.32 b'	+ c'	− 2.54	− 28.69	− 31.23	c' = +31.21
(2)	+ 1.0709 =	15.43	21.01		− 3.13	− 27.00	− 30.13	+31.20
(3)	− 13.3518 =	11.80	32.81		− 2.40	− 42.16	− 44.56	+31.21

(1)−(3) + 13.3296 = + 0.73 a' − 10.49 b'

(2)−(3) + 14.4227 = + 3.63 a' − 11.80 b'

1.12481 = 9.86332 a' 1.02078 b'

1.15905 = 0.55991 a' 1.07188 b'

a' = −.203
b' = −1.285
c' = +31.2″

÷ coeff b' 0.10403 = 8.84254 a' − b' 8.15074

0.08717 = 9.48803 a' − b' 8.79623 (9.30820)

+ 1.2707 = + .06959 a' − b' −.0142 b' = − 1.2849

+ 1.2223 = + .30763 a' − b' −.0626 b' = − 1.2849

+ .0484 = − 23804 a'

8.68485

9.37665_n

9.30820_n a' = −.20333

a = −.300
b = +1.367
c = −10.6
} To be subtracted from meas.

~~(a−1)~~ a = +7

Residuals

D 6377 from I 9832

x

p26 x/100		ax	by	c	Σ = C	O	O − C	~~(a−1)x~~
		″	″	″	″	″	″	
1.50	k	−.4	+24.0	−10.6	+13.0	+14.4	+1.4	~~+1.0~~
5.17	m	−1.~~5~~6	+3.6		−8.~~5~~6	−8.8	−.~~3~~2	
9.10	n	−2.7	+14.4		+1.1	+1.7	+.6	
13.84	o	−4.2	+22.0		+7.2	+4.4	−2.8	~~+9.7~~
18.81	p	−5.6	+28.8		+12.2	+11.1	−1.1	
32.22	u	−9.7	+26.9		+6.6	+8.0	+1.4	
32.53	w	−9.9	+15.1		−5.1	−2.6	+2.5	
42.58	H	−12.8	+9.9		−13.5	−14.8	−1.3	
44.68	L	−13.4	+9.4		−14.6	−15.0	−0.4	
							+5.9 −5.~~9~~8 ±11.~~8~~7	± 1″.3~~1~~0

y

a′ = −.203
b′ = −1.285
c′ = +31″.2

p27 y/100		a′y	b′x	c′	Σ = C	O	O − C
		″	″	″	″	″	″
17.55	k	−3.6	−1.9	+31.2	+25.7	+25.4	−.3
2.60	m	−.5	−6.6		+24.1	+23.5	−.6
10.56	n	−2.1	−11.7		+17.4	+15.2	−2.2
16.13	o	−3.3	−17.8		+10.1	+13.6	+3.5
21.07	p	−4.3	−24.2		+2.7	+4.8	+2.1
19.70	u	−4.0	−41.4		−14.2	−18.1	−3.9
11.03	w	−2.2	−42.3		−13.3	−13.9	−.6
7.21	H	−1.5	−54.7		−25.0	−23.0	+2.0
6.91	L	−1.4	−57.4		−27.6	−27.7	−.1
							−7.7 +7.6 ±15.3 ±1.70

chkd by Miss B

D6377 from I9832

Turners formulae

	Eros Centre	brightest part
Y 1875	−14449.9″	−14440.1″
log Y	4.1598648n ✓	4.1595702n
log Y/R = tan⁻¹Y = d = b − D	8.8454397n ✓	4.8451451n
d	−4° 0′ 26″.33 ✓	−4° 0′ 16″.58 ✓
D	+58° 12	+58 12
b = D + d	+54 11 33.67 ✓	+54 11 43.42 ✓
X 1875	+9756.3 ✓	+9760.2
log X	3.9892851	3.9894587
.. X/R	8.6748600	8.6750336
.. cos d	9.9989369	9.9989383
.. X/R cos d	8.6737969	8.6739719
.. cos b	9.7672013 ✓	9.7671728
X/R cos d / cos b tan a	8.9065956 ✓	8.9067991
a = α − A arc	+4° 36′ 39″.00 ✓	+4° 36′ 46″.74 ✓
.. time	0h 18m 26s.60	0 18 27.12
A = 5h 46.1	5 46 6	5 46 6.
1875 α = a + A	6h 4m 32s.60 ✓	6 4 33.12 ✓
Circular 37	6 4.5	
log tan b	0.1418138 $\overset{7}{}$	0.1418570
.. cos a	9.9985922	9.9985~~807~~ 909
.. tan b cos a = tan δ	0.1404060 39	0.14043~~77~~ 479
δ 1875	+54 6 16.~~28~~ .25 ✓	+54 6 ~~23.45~~ 25.73 ✓
Circular 37	+54 6	

ordered Feb or Mar. 1899

June 23 all sent to Mr Chandler by Prof P.

92–95

(1

Work on Ens 3

1) Check entering data see Check Table where blank
2) " X′ + Y′ Ens for all 7 plates (origs)
3) " α + δ " pp 37 & ~~58 & 73~~
~~4) also " " " p17 119 134-5 (on paper thus 6)~~
5) See if O–C's are chkd on pp 10 23 34 46
57 (100 112 approx only → has been done) 143. also 118

6) Compare Ens 1 & 3 after all changes are made.

~~6) Check α+~~

7) Table III to be made out for the plates in Ens 3 after data has been chkd.

Reduction of X′ Y′ to α + δ to be especially chkd for:
B 16108 Y's
I 9832 Y's centre
X's brightest part
chkd I 10095 Y's ✓
chkd I 9862 X's (because of differences between $\Delta X' \Delta Y'$ + $15 \Delta \alpha \cos \delta$ + $\Delta \delta$ in the 2 cal, see Approx Chk

~~Ens 1~~
~~... VII to be cut~~
T
used in Eq

add

92-95

~~…sst~~
~~…ec VII~~ to be cut
…sed in Eq

Ems 3

For Miss Woods Dec 20–27

Dec 27 rest done

adhibe…

92–95

5 Cat. Stars

p. 10. half. sheets.
" 20 " ".
" 28 " "
" 38 " "

Miss Leland Bk. 7 p. 86 Check entered
" " 0 pl. 6350–16108
7 " "

()
~~H. 6501~~
~~Table VII to be cut~~
~~out~~

used in Eq

admitted

92-95

( )

~~t. Esss. 1~~

~~Tabl. VII to be cut~~

~~ns 1~~

used in Eq

added

× 11 7 18

~~Miss Winlock B16157~~
~~page~~ 90
star c A246

Miss Breslin
B16108 Eros ×
16157 reduce Eros
Is X-Const Check?

admitted

I.E.W.
Change Eros 10469
10321

)
~~t. Eros ,~~
~~Table VII to be cut~~
os I

used in Eq

92–95

Eros

Normals (Condensed)

Table VI†

~~to be cut. Eros I~~

~~also Table VII to be cut in Eros I~~

admitted May 1900

Computed coordinates used in Eq "C" pp 160–165 of Eros I

92–95

Eros

Normals (Condensed)

Table VI*

~~To be cut. Eros I~~

~~also Table VII to be cut in Eros I~~

adopted May 1900

Computed coordinates used in Eq = "C" pp 160–165 of Eros I

Final Condensed Table of Normals

Coefficients of

1

Orig. Pl. No.	Encl. Pl. No.	$x-X_{100}$ $x-X_{\prime\prime}\frac{Y}{100}$	a: $\frac{X^2}{100}$ $\frac{XY}{100}$	b: $\frac{XY}{100}$ $\frac{Y^2}{100}$	Mean $X-x$	$y-Y\frac{Y}{100}$ $y-Y_{\prime\prime}\frac{X}{100}$	Mean $Y-y$	a	b	c	a′	b′	c′
I9801	D6441	−817.69	+2479.18	−343.84	−12140.6	−432.51	−16704.2	+.00346	+.00113	−10″.6	+.00308	−.00088	−3″.2
		−28.32	−343.84	+1304.85		+324.74							
	D6442	−785.72			−12140.5	−392.44	−16695.5	+.00334	+.00122	−10.2	+.00278	−.00086	−2.7
		−44.89				+309.89							
1		1			2	1	2	2			2		

2

3

4

5.

~~To be cut. Ens1 when form is decided upon.~~

Shall it be divided into 2 Tables? 1 & 2 above.

6.

Table VI

Normals and Constants.

Table VI Normal Equations and derived constants.

Orig. Pl.	Enl. Pl.	Absolute Terms X	Coefficients a and b'	b and a'	X − x	Absolute Terms Y	Y − y	a	b	c	a'	b'	c'	Absolute Terms Y
I9801	D6441	−817″.69	+2479″.18	−343″.84	−12140″.6	−432″.51	−16704″.2	+.00346	+.00113	−10″.6	+.00308	−.00088	−3″.2	+324″.74
		−28.32	−343.84	+1304.85		+324.74								−432.51
	D6442	−785.72			−12140.5	−392.44	−16695.5	+.00334	+.00122	−10.2	+.00278	+.00086	−2.7	+309.89
		−44.89				+309.89								−392.44
I9832	D6377	−839.47	+2123.67	−124.62	+7399.2	+88.68	−16488.0	+.00316	−.01356	+9.9	+.00216	−.01278	−31.2	−2686.79
		+482.55	−124.62	+326.81		−2686.79								+88.68
	D6378	−782.35			+7250.8	+77.89	−16522.1	+.00296	−.01234	+8.8	+.00218	+.01197	−31.3	−2515.64
		+440.06				−2515.64								+77.89
I9862	D6391	−239.41	+448.80	+271.31	−12887.2	−188.09	+1388.7	+.00431	+.00169	−11.3	+.00366	−.00006	−3.9	−96.34
		−204.81	+271.31	+519.40		−96.34								−188.09
	D6392	−247.52			−12742.3	−187.73	+1364.4	+.00322	+.00380	−10.9	+.00498	−.00262	−0.2	−17.55
		−284.67				−17.55								−187.73
I10095	D6390	−329.12	+762.97	+70.26	−16040.7	−45.66	+1125.8	+.00299	+.01443	−37.1	+.00192	−.01530	+25.0	+1152.11
		−1173.87	+70.26	+798.58		+1152.11								−45.60
	D6389	−419.68			−15919.0	−115.54	+1321.2	+.00416	+.01461	−36.3	+.00284	−.01587	+22.7	+1189.55
		−1196.12				+1189.55								−115.54
I10215	D6375	−240.12	+402.15	−222.92	+8878.3	−245.45	+2966.7	+.00380	−.00392	+0.8	+.00389	+.00358	−17.1	−57.49
		+412.59	−222.92	+836.90		−57.49								−245.45
	D6376	−185.89			+8706.1	−150.80	+2998.2	+.00255	−.00373	+2.6	+.00243	+.00236	−11.3	−40.66
		+369.06				−40.66								−150.80

Orig. Pl.	Eval. Pl.	Absolute Terms X	Coefficients a and b′	b and a′	X−x	Absolute Terms Y	Y−y	a	b	c	a′	b′	c′	Absolute Terms Y
I10280	D6416	−241.09	+343.07	+13.58	−12400″.0	+40.89	−3017.4	+.00334	+.01958	−71.3	−.00204	−.02478	+52.6	+852″.77
		−74.22	+13.58	+35.60		+852.77								+ 40.89
	D6417	−111.40			−12355.4	+27.92	−3042.7	+.00238	+.02179	−77.4	+.00139	−02419	+39.0	+828.08
		−80.82				+828.08								+ 27.92
I10321	D6383	−224.73	+780.15	−181.93	+8432.7	−163.87	+8507.0	+.00296	−.00072	− 2.9	+.00220	+.00165	−6.7	− 88.38
		+116.78	−181.93	+879.84		− 88.38								−163.87
	D6382	− 227.28			+8338.4	−240.19	+8478.6	+.00282	−.0041	− 3.7	+.00302	+.00138	− 8.1	−52.51
		+ 87.13				− 52.51								−240.19
I10469	D6408	−70.62	+170.55	+9.80	−2869.7	−13.73	−17457.2	+.00349	+.01130	−33.2	+.00250	−.01167	+25.9	+196.58
		−117.37	+ 9.80	+100.84		+196.58								− 13.73
	D6409	− 67.77			−2842.9	− 1.54	−17457.5	+.00325	+.01254	−35.0	+.00147	−.01350	+32.6	+228.70
		−129.61				+228.70								− 1.54
I10559	D6393	−313.78	+870.81	+578.71	−5800.3	−193.51	+9547.4	+.00200	+.00241	−9.3	+.00298	−.00225	+0.1	+24.02
	/	−378.50	+578.71	+1089.40		+ 24.02								−193.51
	D6394	− 367.86			−5827.4	−204.34	+9559.1	+.00234	+.00284	−11.1	+.00336	−.00245	−0.1	+ 19.22
		− 445.73				+ 19.22								−223.56 ~~−204.34~~
A222	D6410	+23.05	+880.01	− 430.74	−6641.8	+713.00	+3281.8	−.00653	−.01280	+32.8	−.00436	+.01109	−8.1	−1163.47
		+409.69	−430.74	+539.66		−1163.47								+713.00
	D6411	+107.98	+345.09		−6693.1	+761.14	+3330.9	−.00715	−.01210	+32.2	−.00510	+.01128	−7.8	−1212.35
		+345.09				−1212.35								+761.14

Orig. Pl.	Enl. Pl.	Absolute Terms X	Coefficients a and b'	b and a'	X − x	Absolute Terms Y	Y − y	a	b	c	a'	b'	c'	Absolute Terms Y
A246	D6414	+394.56	+712.95	+77.39	−1051″.4	+622.84	−10982″.9	−.00527	−.00246	+15.8	−.00472	+.00290	+4.2	−170″.31
		+376.90	+77.39	+1367.39		−170.31								+622.84
	D6415	+386.91			−1078.0	+714.04	−10987.1	−.00529	−.00128	+13.5	−.00532	+.00167	+8.0	−77.75
		+216.04				−77.75								+714.04
I10685	D6436	−257.98	+874.97	+73.11	+9102.0	−859.41	−15754.1	+.00225	+.00830	−28.9	+.00294	−.00756	+4.6	+639.87
		−2602.34	+73.11	+3110.95		+639.87								−859.41
	D6437	−250.53			+8988.2	−909.31	−15701.4	+.00228	+.00696	−24.9	+.00308	−.00668	+3.6	+562.36
		−2181.38				+562.36								−909.31
B10909	D6371	−142.40	+2208.92	−955.70	−208.5	−1271.75	+11913.5	+.00338	+.00632	−23.0	+.00470	−.00971	+13.9	+2593.76
		−139.76	−955.70	+7323.7		+2593.76								−1271.75
	D6374	+99.49			−58.4	−1529.47	+11835.5	+.00426	+.01089	−35.8	+.00495	−.01221	+17.4	+3169.54
		−390.48				+3169.54								−1529.47
B10951	D6365	−92.49	+381.99	+120.67	+5672.2	−377.10	+10479.0	+.00420	−.00564	+4.3	+.00402	+.00478	−13.9	−231.16
		+397.84	+120.67	+795.20		−231.16								−377.10
	D6370	−42.66			+5660.7	−328.01	+10501.0	+.00260	−.00471	+4.7	+.00338	+.00488	−12.9	−227.17
		+343.17				−227.17								−328.01
B11174	D6344	−346.07	+841.37	−126.79	+4700.1	−823.42	−13278.6	+.00547	+.00901	−25.6	+.00554	−.00857	+4.8	+791.35
		−1093.40	−126.79	+1290.05		+791.35								−823.42
	D6346	−331.25			+4711.3	−746.43	−13231.8	+.00518	+.00823	−23.2	+.00501	−.00793	+4.8	+730.66
		−995.51				+730.66								−746.43

					″	L	″		b	″		b′	″	″
B15531	D6360	+90.34	+798.16	-424.62	-9643.5	-815.98	-6106.4	+.00497	+.01146	-27.4	+.00575	-.01181	+4.6	(+1187.15)
		-415.43	-424.62	+546.53		+1187.15								-815.98
	D6361	+176.49			-9679.3	-866.12	-6092.3	+.00438	+.01238	-28.3	+.00612	-.01252	+5.3	+1259.14
		-490.80				+1259.14								-866.12
B16108	D6350	-469.81	+293.35	+281.46	-12892.9	+21.18	-11094.3	+.00391	+.01262	-38.5	+.00424	-.01219	+20.7	+238.16
		-1068.74	+281.46	+759.76		+238.16								+21.18
	D6351	-500.60			-12735.0	+64.04	-11121.9	+.00301	+.01465	-40.8	+.00368	-.01222	+20.0	+254.67
		-1197.70				+254.67								+64.04
B16157	D6355	-380.41	+559.03	+65.04	+13666.0	-191.03	+6391.4	+.00458	+.01912	-58.7	+.00409	-.01687	+34.2	+916.76
		-1436.91	+65.04	+736.05		+916.76								-191.03
	D6357	-314.14			+13803.3	-235.24	+6389.9	+.00361	+.01728	-51.3	+.00458	-.01570	+27.8	+847.70
		-1295.41				+847.70								-235.24
B16165	D6353	-243.05	+531.15	-36.62	-343.3	-21.28	-11059.1	+.00511	+.00777	-36.0	+.00086	-.00344	+7.6	+185.64
		-59.50	-36.62	+100.63		+185.64								-21.28
	D6354	-262.11	-		-335.9	-28.82	-11034.3	+.00531	+.00545	-30.1	+.00123	-.00450	+9.7	+243.41
		-35.37				+243.41								-28.82
B16518	D6348	-209.70	+680.17	$+788.\overset{5}{\cancel{6}}5$	-11610.4	-903.47	+1980.8	+.00343	-.00030	-7.3	+.00366	+.00197	-12.8	-423.22
		-209.50	$+788.\overset{5}{\cancel{6}}5$	+2040.69		-423.22								-903.47
	D6349	-325.64			-11619.9	-841.95	+1981.8	+.00422	+.00049	-10.9	+.00365	+.00124	-11.1	-371.86
		-432.67				-371.86								-841.95
A1876	D6413	+ ~~75.76~~ 51.16	+767.78	-471.75	+4176.6	+639.68	+2580.7	-.00533	-.00759	+18.2	-.00606	+.00763	-4.4	-816.53
		+ ~~147.04~~ 195.22	-471.75	+588.44		-816.53								+639.68
	D6412	+ ~~51.16~~ 75.76			+4189.7	+716.07	+2593.6	-.00497	-.00648	+16.1	-.00462	+.00779	-6.5	-871.41
		~~+195.22~~ 147.04			-	-871.41								+716.07

D6378 from I 9832

	Eros Centre	Brightest part.	6377-78 Centre diff Y	6377-78 Br. pt. diff Y
I	−14449.7	−14441.4	−.2	+1.3
	4.1598588n	4.1596093n		
	5.3144251			
	8.8454337n	8.8451842n		
	−4 0 26.13	−4 0 17.87		
	+58 12	+58 12		
	+54 11 33.87	+54 11 42.13	diff X	diff X
X	+9754.0	+9760.7	+2.3	−.5
	3.9891828	3.9894810		
	5.3144251			
	8.6747577	8.6750559		
	9.9989370	9.9989381		
	8.6736947	8.6739940		
	9.7672007	9.7671766		
	8.9064940	8.9068174		
	+4 36 35.13	+4 36 47.44		
	$+0^h$ 18 26.34	+0 18 27.16	cos δ = .585	
	5 46 6.	5 46 6.	diff α 15 cos δ	diff α 15 cos δ
	$6^h\ 4^m\ 32^s.34$	$6^h\ 4^m\ 33^s.16$	$+.26^s = +2''.3$	$-.04^s = -''.3^4$
tan b	0.1418146	0.1418513		
	9.9985929	9.9985908		
	0.1404075	0.1404421	diff δ	diff δ
	+54° 6′ 16″.61	+54° 6′ 24″.42	−″.4 #	+″1.3

June 1899

D6378 from I9832 October 30, 1893. Meas. Bk. 15, p. 34.

Camb. U.S.	1st Reading	2nd	Mean x	Resid.	Diff 1st & 2nd	X	X − mean x	(+7251.1) Mean x + Const.	x − X
(2431) k	296.2	296.2	296.2			+7534.7	+7238.5	+7547.3	+12.6
(2433) m	665.9	665.9	665.9			+7924.6	7258.7	+7917.0	−7.6
(2436) n	—					+8307.2			
(2440) r	1533.3	1533.3	1533.3			+8779.2	7245.9	+8784.4	+5.2
(2448) p	2029.4	2029.4	2029.4			+9269.3	7239.9	+9280.5	+11.2
(2457) u	3369.4	3369.4	3369.4			+10613.1	7243.7	+10620.5	+7.4
(2458) w	3440.9	3440.9	3440.9			+10694.8	7253.9	+10692.0	−2.8
(2459) x	3531.6	3531.6	3531.6			+10804.1	7272.5 omit.		
(2462) H	4407.0	4407.0	4407.0			+11671.4	7264.4	+11658.1	−13.3
(2464) L	4617.6	4617.6	4617.6			+11881.7	7264.1	+11868.7	−13.0
(2463) M	4651.2	4653.6	4652.4	−1.2 1.2	2.4	+11920.8	7268.4 omit		
(2465) A	4804.4	4804.4	4804.4			+12045.1	7240.7 omit		
							409.1 / 8		+364 −367 0.3

Mean + 7251.1 adopted constant X

a = +.00268 a′ +.00192
b = −.01267 b′ +.01198
c = +9″.8 c′ −33″.0

												X
k			296.2			+.79	−22.56	+9.75	−12.02	284.2	7535.3	7534.7
						a x	b y	c	Σ		+7251.1.	
						nearest tenth +6.7	−26.1	+9.8	−9.6			
Eros. of Centre Image	2514.5	2510.5	2512.5	2.0	−2.0	(+6.73	−26.71	(+9.75)	−9.63)	2502.9	9754.0	
	2514.5	2514.1		2.0	1.6							
	2510.9	2510.5		−1.6	2.0							
						+6.8	−26.2	+9.8	−9.6 use			
Eros, Centre of bright part	2522.4	2518.4	2519.2	3.2	−0.8	(+6.75	−26.22		−9.72)	2509.6	9760.7	
	2518.4	2518.4		−0.8	−0.8							
	2518.4	2519.2		−0.8	0.0							

* see note p 27

See if there is any note
why star n was omitted
here? also see if it is on
edge of print.

	1st Reading	2nd	Mean y	Resid.		Diff. 1st & 2nd	Y ″	Y − mean y ″	Mean y + Const	y − Y
k	1787.8	1787.0	1787.4	0.4	−0.4	0.8	−14758.4	− 16545.8	−14732.6	+25.8
m	293.0	292.6	292.8	0.2	−0.2	0.4	−16251.0	16543.8	−16227.2	+23.8
n	1091.2	1091.2	1091.2	0.0			−15447.4	16538.6	omit	
o	1644.7	1644.3	1644.5	0.2	−0.2	0.4	−14888.2 *	16532.7	−14875.5	+12.7
p	2140.1	2140.9	2140.5	−0.4	0.4	0.8	−14385.9	16526.4	−14379.5	+ 6.4
u	2006.1	2005.8	2006.0	0.1	−0.2	0.3	−14499.8	16505.8	−14514.0	−14.2
w	1137.8	1138.2	1138.0	−0.2	0.2	0.4	−15371.1	16509.1	−15382.0	−10.9
x	13.9	13.9	13.9				−16501.5	16515.4	omit	
H	754.9	753.3	754.1	0.8	−0.8	1.6	−15744.0	16498.1	−15765.9	−21.9
L	729.2	729.6	729.4	−0.2	0.2	0.4	−15768.9	16498.3	−15790.6	−21.7
M	113.2	115.6	114.4	−1.2	1.2	2.4	−16379.4	16493.8	omit	
N	2598.0	2598.0	2598.0				−13890.2	− 16488.2	omit	

1160.0
8

Mean −16520.0 adopted constant.

k 1787.4 +3.43 + 3.55 = 32.96 − 2598 1761.4

Y = * −14758.4
−14758.6

						a′y	b′x	c′	Σ	~~16520.0~~	−16520.0
						+4.0	+30.1	− 33.0			
Eros Centre of Image	2069.2	2069.2	2069.2	0.0	0.0	(+3.99	+30.10	−32.96)	+1.1	2070.3	−14449.7
	2069.2	2069.2		0.0	0.0						
	2069.2	2068.9		0.0	−0.3						
						+4.0	+ 30.2				
Eros Centre of bright part.	2077.6	2077.2	2077.4	0.2	−0.2	+3.99	+30.18		+1.2	2078.6	−14441.4
	2077.2	2077.2		−0.2	−0.2						
	2077.2	2078.0		−0.2	0.6						

	1st Meas.	2nd.	Mean x.	Resid.	Diff. 1st & 2nd
l	236.4	236.4	236.4		
q	2256.2	2259.4	2257.8	-1.6 1.6	3.2
r	2510.5 ~~2256.2~~	2510.5 ~~2259.4~~	2510.5 ~~2257.8~~	~~-1.6~~ ~~1.6~~	~~3.2~~
s	2666.4	2665.6	2666.0	0.4 -0.4	0.8
t	2741.6	2741.6	2741.6		
g	3524.5	3523.7	3524.1	0.4 -0.4	0.8
A	3849.7	3846.5	3848.1	1.6 -1.6	3.2
B	3855.2	3858.4	3856.8	-1.6 1.6	3.2
C	3918.0	3918.0	3918.0		
D	4033.3	4033.3	4033.3		
F	4192.3	4192.3	4192.3		
K	4503.3	4502.5	4502.9	0.4 -0.4	0.8

h	502.9	502.1	502.5	0.4	-0.4	0.8
g	2017.7	2017.7	2017.7			
G	1325.5	1325.1	1325.3	0.2	-0.2	0.4
s	2574.2	2573.8	2574.0	0.2	-0.2	0.4
t	2369.8	2367.4	2368.6	1.2	-1.2	2.4
δ	13.9	13.9	13.9.			
A	621.4	622.2	621.8	-0.4	0.4	0.8
B	3190.0	3190.4	3190.2	-0.2	0.2	0.4
C	3114.1	3115.3	3114.7	-0.6	0.6	1.2
D	2723.2	2722.0	2722.6	0.6	-0.6	1.2
F	3364.9	3365.7	3365.3	-0.4	0.4	0.8
K	1294.0	1294.8	1294.4	-0.4	0.4	0.8

D63.78 from I 98.32

c = coefficients

	x − X ″ n	x/100 ″ a	y/100 ″ b	(x − X) x/100	x²/100	x y/100
k	+12.6	2.96 ✓	17.87 ✓	+37.30 ✓	+8.76 ✓	+$\overset{5}{\cancel{4}}$2.90 ✓
m	−7.6	6.66 ✓	2.93 ✓	−50.62 ✓	+44.36 ✓	+19.51 ✓
o	+5.2	15.33 ✓	16.44 ✓	+79.72 ✓	+235.01 ✓	+252.02 ✓
p	+11.2	20.29 ✓	21.40 ✓	+227.25	+411.68 ✓	+434.21 ✓
u	+7.4	33.69 ✓	20.06 ✓	+249.31 ✓	+11$\overset{3}{\cancel{4}}$5.02 ✓	+675.82 ✓
w	−2.8	34.41 ✓	11.38 ✓	−96.35 ~~−586.13~~	+1184.05 ✓	+391.59 ✓
H	−13.3	44.07 ✓	7.54 ✓	−586.13	+1942.16 ✓	+332.29 ✓
L	−13.0	46.18 ✓	7.29 ✓	−600.34	+21$\overset{3}{5}$2.$\overset{5}{3}$9 ✓	+336.65 ✓
	+36.4 ✓ −36.7 ✓ −0.3	$\overset{20}{\cancel{19}}$3.59 ✓	104.91 ✓	+593.58 ✓ −1333.44 −739.86 ✓	+7$\overset{09}{\cancel{}}$3.63 ✓	+24$\overset{9}{8}$4.99 ✓

	y − Y = n′	(y − Y) y/100
k	+25.8″	+461.05 ✓
m	+23.8	+ 69.73
		+ 208.79
o	+12.7	+ 136.96
p	+ 6.4	−284.85
u	−14.2	−124.04
w	−10.9	
H	−21.9	−165.13
L	−21.7	−158.19
	+68.7 −68.7	−732.21 +876.53 +144.32 ✓

$\Sigma x^2 = 7093.63$ Σy^2 +169804
Σxy 2494.99 Σxy +249499
Σx 793,59 y +10491
97~~8~~2.21 +4297.94
9

Miss Br's work

$(x-X)y/100$	$xy/100$	$y^2/100$	Check Σ $a+b+c$ $=S=CS$ also	S_n S multiplied by n	Sum $an+bn+cn$ $=Sn$	a mult. by S $=aS$ xS	Sum x^2+xy+x $=aS$
+225.16 ✓		+319.34 ✓	+21.83	+275.06	275.06	+64.62 ✓	64.62
− 22.27 ✓		+ 8.58 ✓	10.59	− 80.48	− 80.49	70.53 ~~502.36~~	70.53
+ 85.49 ✓		+270.27 ✓	32.77	+170.40	+170.41	502.36	502.36
+239.68 ✓		+457.96 ✓	42.69	+478.13	+478.13	866.18	866.18
+148.44 ✓		+402.40 ✓	54.75	+405.15	+405.15	1844.53	1844.53
− 31.86		+129.50 ✓	46.79	−131.01	−131.01	1610.04	1610.05
−100.28		+ 56.85 ✓	52.61	−699.71	−699.71	2318.52	2318.52
− 94.77		+ 53.14 ✓	54.47	−708.11	−708.11	2515.42	2515.42
+698.77 −249.18 +449.59 ✓		+1698.04 ✓	316.51	+1328.74 −1619.31 − 290.57	−290.57	9792.20	9792.21

$(y-Y)x/100$	Sn'	Sn' $an'+bn'+cn'$	$=bS$ ys	y^2+xy+y $=bS$
+76.37 ✓	+563.21	+563.22	390.10	390.11
+158.51	+252.04	+252.04	31.03	31.02
+194.69	~~+416.18~~			
+129.86	+416.18 ~~+273.22~~	+416.18	538.74	538.73
−478.40	+273.22	+273.22	913.57	913.57
−375.07	−777.45	−777.45	1098.29	1098.28
	−510.01	−510.01	532.47	532.47
−965.13	−1152.16	−1152.16	396.68	396.68
−1002.11	−1182.00	−1182.00	397.09	397.08
−2820.71 + 559.43 −2261.28 ✓	+1504.65 −3621.62 −2116.97	−2116.96	4297.97	4297.94

Miss Br's work

D6378 from I9832

aa	ab	ac	as	
+7093.63	+2494.99	+203.59	+9792.20	−73986
3.85087	3.39706	2.30876	3.99088	3.86915
3.8508	3.3971	2.3088	3.9909	2.8691n
	9.54619	8.45789	0.14001	
	9.5463	8.4580	0.1401	
	2.94325	1.85495	3.53707	2.41534
	(2.9434)	(1.8551)	(3.5372)	(2.4154)

r 0.9891
ac 2.3088
3.2979

0.1009n
ab 3.3971
3.4980 n

	y^2		bs	
−739.86	+1698.04	+104.91	+4297.97	+449.59
+1985.5	+877.50	+71.63	+3445.06	−260.22
−3146.	+820.54	+33.28	+853.91	+709.87
−1900.4	+820.1 bb1	+33.3 bc1	+853.0 bs1	+709.8 bn1
3.2788n	2.91410	1.5224	2.93141	2.85114
3.8508	~~2.9138~~ used	8.6089	2.9309	2.8511
9.4280n	2.9139	(0.1303)	0.01731	(1.4593)
$x =$ −.268		(0.7668)	0.0170	(1.3271n)
			(1.5391)	
			(2.4489)	

5 pl. logs

(2.86845)
(2.8688)
3.00916
(3.0092n)

0.9891
bc1 1.5224
2.5115

		cs		sn
+709.8	+8.00	+316.51	−0.3	−290.57
+324.4	+5.84	+281.1	−21.2	−1021.
+1034.2	+2.16 cc1	+35.41 cs1	+20.9 cn1	+730.4
3.0145	+1.35	+34.60	+28.8	+738.0
bb1 2.9139	+0.81 cc2	+.77 cs2	−7.9 cn2	−7.6
0.1006	9.9085		0.8976n	
$y =$ +1.261			9.9085	
			0.9891n	

$\frac{cn_2}{cc_2} = z =$ −.975

recalc
a = x −.268
correct
b = y +1.261
c = z −.975

a′ = y′ −.191
b′ = x′ −1.198
c′ = z′ +.3296

To be sub from meas.

bsr 853.9
5 pl. logs.

8.0
5 pl.

Chauv. p 553

Substitution formula

$$x + \frac{ab}{aa}y + \frac{ac}{aa}z + \frac{an}{aa} = 0 \quad \text{or} = -\frac{an}{aa}$$

$$y + \frac{bc1}{bb1}z + \frac{bn1}{bb1} = 0 \quad -\frac{bn1}{bb1}$$

$$z + \frac{cn2}{cc2} = 0 \text{ or } z = -\frac{cn2}{cc2}$$

-2261.28″

3.3544n

(2.9007n)

1.5180
ac 2.3088
3.8268n

9.28~~24~~09n
3.3971
2.67~~79~~80

-2261.3
-6712.
+ 478.~~1~~ 6.4
-84~~95.~~ 6.9
3929~~2~~ 3n
3.8508
0.078~~4~~ 5n
x′ orient — 1.19~~7~~ 8 8

+144.32
-795.6
+939.9
2.9731
(1.5817) 2.9902
(1.8124n) 34945

to more dec

5n 5pl. logs
See pencil vals above

and

-1021.31
+730.7
+738.~~1~~ 7
-~~7.6~~ 8.0 Sn^2

0.8808n 0.9031

0.9723
-9.38 9.88

15180n
1.522~~4~~ 1
3.040~~4~~ 1n

+939.9
-109~~7.~~ 6.5
-1~~57.1~~ 56.6
2.19~~62~~ 48n
2.913~~8~~ 9
9.28~~24~~ 09n
y′ scale = -.19~~2~~ 1 ✓

sn′
0.0 -2116.9
-64.9 -3122
+64.9 +1005.
+38.2 +978
+26.7 +27.
1.4265
9.9085
1.5180
z′ = +32.96

$\left(z = \frac{Sn^2}{cS2}\right)$

Check
4 pl. logs

+853.0 $bS_1 = bb_1 + bc_1$ +820.1 +33.3 = 853.4

+35.4 $cS_1 = cc_1 + bc_1$ + 2.16 + 33.3 = 35.46

+.8 $cS_2 = cc_2$ + .81

+730.~~7~~ 4 $Sn_1 = bn_1 + cn_1$ +709.8 + 20.9 = +730.7

-7.~~7~~ 6 $Sn_2 = cn_2$ = -7.9 ~~does not check?~~ ~~not dec places enough?~~

See p 544 Chauv. II

a = −.268
b = +1.26~~2~~1
c = −9.8

a′ −.19~~2~~1
b′ −1.198
c′ +33.0

} To be sub. from meas.

D6378 from I9832

	x/100	ax/100	by/100	c	Σ = C	x−X p38 O	O−C
k	2.96	−.8″	+22.~~6~~5″	−9.8″	+~~12.0~~11.9″	+12.6″	+0.~~6~~7″
m	6.66	−1.8	+3.7		−7.9	−7.6	+.3
~~n~~							
o	15.33	−4.1	+20.~~8~~7		+6.~~9~~8	+5.2	−1.~~7~~6
p	20.29	−5.4	+27.0		+11.8	+11.2	−.6
u	33.69	−9.0	+25.3		+6.5	+7.4	+.9
w	34.41	−9.2	+14.4		−4.6	−2.8	+1.8
H	44.07	−11.8	+9.5		−12.1	−13.3	−1.2
L	46.18	−12.4	+9.2		−13.0	−13.0	0.0

+3.~~6~~7
−3.~~5~~4
±7.1 ± 0.89

		a′y/100	b′x/100	c′	Σ = C	y−Y p39 O	O−C
k	17.87	−3.4″	−3.6″	+33.0′	+26.0	+25.8	−.2
m	2.93	−.6	−8.0		+24.4	+23.8	−0.6
~~n~~		~~−3.2~~	—				
o	16.44	−3.~~2~~1	−18.4		+11.~~4~~5	+12.7	+1.~~3~~2
p	21.40	−4.1	−24.3		+4.6	+6.4	+1.8
u	20.06	−3.8	−40.4		−11.2	−14.2	−3.0
w	11.38	−2.2	−41.2		−10.4	−10.9	−.5
H	7.54	−1.4	−52.8		−21.2	−21.9	−.7
L	7.29	−1.4	−55.3		−23.7	−21.7	+2.0

↑ ↑ Min Pr.s work

−5.0
+5.~~1~~0
±10.~~1~~0 ±1.2~~6~~5

For Recomputation see Bk. 5, p. 112

X

Measured Values of x and y of "Eros" and Comparison Stars.

D 6390 from I 10095 Nov. 26, 1893. Bk. 15 (E.F.L.) p. 14.

Cat. Stars Helsingfors Design.	x 1st Meas.	x 2nd Meas.	x Mean of 1st & 2nd	Resid x		Diff.	Computed X	x−X−Mean x	x+Const.	x−X
b (5085)	952.2	952.2	952.2	0.0	0.0	0.0	−15077.85	−16030.0	−15087.8	−10.0
c (5089)	1341.7	1341.7	1341.7	0.0	0.0	0.0	−14685.77	−16027.5	−14698.3	−12.5
d (5092)	1162.4	1164.0	1163.2	−0.8	0.8	1.6	−14902.28	−16065.5	−14876.8	+25.5
e (5093)	1453.1	1453.1	1453.1	0.0	0.0	0.0	−14578.27	−16031.4	−14586.9	−8.6
f (5095)	1382.2	1381.8	1382.0	0.2	−0.2	0.4	−14680.53	−16062.5	−14658.0	+22.5
h (5126)	3572.~~5~~1	3572.5	3572.3	−0.2	0.2	0.4	−12450.49	−16022.8	−12467.7	−17.2
k (5128)	3496.4	3496.8	3496.6	−0.2	0.2	0.4	−12548.32	−16044.9	−12543.4	(*) + + 4.9 found Nov 22

2846
16040.7

−48.3 −53.2
+52.9 +48.0
+4.6 −5.2

used pp 50−56 adopt −16040.

* mean −16040.7 used in Resid Comp pp 120−

a = ~~−.491~~ .281 × .01 a′ = −.16~~5~~4 × .01
b = −1.~~355~~456 × .01 b′ = +1.539 × .01
c = ~~+38.1~~ 37.7 c′ = −25.~~4~~7

} To be sub. fr. Meas.

				Resid	
Eros	665.9	665.1	665.5	0.4	−0.4
"	666.3	665.1		0.8	−0.4
"	665.5	665.1		0.0	−0.4

ax	by	c	Σ	x − Σ = Corr x	X x+Const
−1.9	−42.5	+37.7	−6.7	672.2	−15367.8
~~−3.3~~	~~−39.6~~	~~+38.1~~	~~−4.8~~	~~670.3~~	~~15369.7~~
−1.8 1.84	−42.3 42.34	+36.9	−7.2	672.7	−15368.0 *

				Resid x		Diff.	Computed X
*a (5076)							−16082.63
g	3455.6	3453.6	3454.6	1.0	−1.0	2.0	

Est. x Eros = 4.6 × 163 = 749.8 + const = −15290.2 ½ div added −15371.2 Est Vals
" y " = 18.4 " 2999.2 +4125.2 " sub +4044.2

* a is cat star but cannot be measured in x. Reject as standard star. Phil. '99

Y

Jan 29 1900 * Star f Y = +1798.55 used +1798.6 in this book see also pp 120–124 and p 63

Design.	y 1st Meas.	y 2nd.	y Mean of 1st & 2nd	Resid. y		Diff.	Computed Y	Y − Mean y	Y + Const.	y − Y
b	3186.4	3186.0	3186.2	0.2	−0.2	0.4	+4325.84	+1139.6	+4312.2	−13.6
c	3142.8	3142.8	3142.8	0.0	0.0	0.0	+4279.18	+1136.~~4~~3	+4268.8	−10.~~4~~3
d	743.0	742.2	742.6	0.4	−0.4	0.8	+1877.62	+1135.0	+1868.6	−9.0
e	2790.9	2792.9	2791.9	−1.0	1.0	2.0	+3929.28	+1137.4	+3917.9	−11.4
f	669.5	665.9	667.7	1.8	−1.8	3.6	+1798.55*	+1130.9	+1793.7	−4.~~8~~9
h	3144.8	3146.8	3145.8	−1.0	1.0	2.0	+4247.28	+1131.5	+4271.8	+24.5
k	1563.5	1562.3	1562.9	0.6	−0.6	1.2	+266~~2.52~~3.13	~~+1099.6~~ 1100.2	+2688.9	+2~~6.4~~5.8
								181.0 ~~180.4~~		−49.2
								26.0 ~~25.8~~		+50.~~4~~3
							adopt +1126.		used pp 50–56	
							mean	+1125.8		+1.~~2~~1

no 22

pp120–

*Constants from pp 120–124 Resid Comp. add to meas.

a = +.276 a′ +.211 +.168

b = +1.450 b′ −1.5~~34~~40 −1.536

c = −.369 c′ +.2~~50~~48 +.256

Design.	y 1st Meas.	y 2nd.	y Mean	Resid. y		Diff.	Computed Y			Σ	y − Σ Comp	Y
Eros	2919.7	2920.1	2920.0	−0.3	0.1		−4.8	+10.2	−25.~~6~~7	−20.~~2~~3 sub	2940.~~2~~3	+4066.~~2~~3
"	2920.1	2920.5		0.1	0.5		−~~6.2~~4.9	+10.~~3~~2	−2~~5.0~~4.8	−20.~~9~~8	2940.~~9~~8	+40~~66.7~~6
"	2919.7	2920.1		−0.3	0.1				+25.6	+20.3 add	2940.3	+4066.3
a	1548.6	1548.6	1548.6	0.0	0.0	0.0	+2540.32					
g	4219.7	4219.7	4219.7	0.0	0.0	0.0						

Equations of condition.

D 6390 from I 10095 *

	$x-\overline{X}$ =	$\frac{x}{100}$ ″a	$\frac{y}{100}$ ″b	$(x-\overline{X})\frac{x}{100}$ =	$\frac{x^2}{100}$	$\frac{x}{100}\frac{y}{100}$
b	−10.0	9.52	31.86	− 95.20	90.63	303.31
c	−12.5	13.42	31.43	− 167.75	180.10	421.79
d	+25.5	11.63	7.43	+ 296.56	135.26	86.41
e	− 8.6	14.53	27.92	− 124.96	211.12	405.68
f	+22.5	13.82	6.68	+ 310.95	190.99	92.32
h	−17.2	35.72	31.46	− 614.38	1275.92	1123.75
k	+ 4.9	34.97	15.63	+ 171.35	1222.90	546.58
	+ 48.0	133.61	152.41	+ 607.51	3306.92	29~~8~~79.84
	− 53.2			~~−1173.64~~		
	− 5.2			− 566.13		
				+778.86		
				−1002.29		
				−223.43		

+52.9
−48.3
+4.6

	$y-\overline{Y}$ =	$\frac{y}{100}$	$\frac{x}{100}$	$(y-\overline{Y})\frac{y}{100}$ =	$\frac{y^2}{100}$	$\frac{x}{100}\frac{y}{100}$
b	−13.6			− 43~~2~~3.30	1015.06	
c	−10.3			− 323.73	987.84	
d	− 9.0			− 66.87	55.20	
e	−11.4			− 318.29	779.53	
f	− 4.~~8~~9			− 32.~~06~~73	44.62	
h	+24.5			+ 770.77	989.73	
k	+25.8			+ 403.25	244.30	
	+50.3	152.41	133.61	+1174.02	4116.28	29~~6~~79.84
	−49.2			~~−1173.25~~		
	+ 1.1			−1174.92		
				~~+ 0.77~~		
				~~− 0.22~~		
				− 0.90		

* ~~Some errors here~~

*

Mr. B's work, as before

$(x-X)\frac{y}{100}$	$\frac{x}{100}\frac{y}{100}$	$\frac{y^2}{100}$	s	as	bs
−318.60			+42.38	+403.46	+1350.23
−392.88			45.85	615.31	1441.07
+189.46			20.06	233.30	149.05
−240.11			43.45	631.33	1213.12
+150.30			21.50	297.13	143.62
−541.11			68.18	2435.39	2144.94
$\overset{+}{\pm}$ 76.59			+ 57.60	1804.45	806.51
+339.76	$29\overset{7}{6}9.84$	4116.28	+293.02	+6420.37	+7248.54
−1569.29					
−1229.53					
+416.35					
−1492.70					
−1076.35					

$\Sigma\, x^2/100$	3306.92	$y^2/100$	+4116.28
$xy/100$	2979.84	$xy/100$	2979.84
$x/100$	133.61	y	152.41
	+6420.37		7248.53

$(y-Y)\frac{x}{100}$	$=\frac{x}{100}\frac{y}{100}$	$\frac{x^2}{100}$	Sx	Sx′
−129.47			−423.80	−576.37
− $\overset{138}{\cancel{809}}$.23			−573.12	−472.26
−104.67			+511.53	−180.54
−165.64			−373.67	−495.33
− $\overset{7.72}{66.34}$			+483.75	−105.35
+875.14			−1172.70	+1670.41
+ $\overset{9}{8}$02.23			$\overset{+}{\pm}$ 252.84	+1331.28
$+1\overset{7}{6}77.37$	$29\overset{7}{6}9.84$	3306.92	~~+995.28~~ +1248.12	+3001.69
~~−1275.35~~			~~−2796.13~~ 2543.29	−1829.85
~~+402.02~~			~~−1800.85~~ −1295.17	+1171.84
−604.35 → −605.73				
~~+1173.02~~	+1777.37			
+1171.64	+1171.64			

$x-X\ x/100$ — ~~566.13~~ 223.43 $y-Y\ y/100$ − .90

" $y/100$ ~~−1229.53~~ 1076.35   " $x/100$ +1171.64

" ~~− 5.2~~ + 4.6   " + 1.1

~~−1800.86~~ −1295.1   +1171.84

see double Sheet for corrected recomputation

Normal Equations in X

D6390 from I10095

Same error here as on pp 52-53 in x Eq.

same in B's mult. Errors in mult. col

x coeff c = 1

∴ a = x/100

∴ b = y/100

		x	y		Substituting a	b	c
−5.2	=	133.61 a	+ 152.41 b	+ 7 c	− 65.60	− 206.52	+ 266.70
−566.13	=	x^2 3306.92	xy 2989.84	133.61	− 1623.70	− 4037.68	+ 5090.54
−1229.53	=	xy 2989.84	y^2 4116.28	152.41	− 1463.10	− 5577.56	+ 5806.82

. . . . .

Reject pp 54-55

2.75292 = 3.51942 3.47419 2.12584

3.08973 = 3.47419 3.61450 2.18301

. . . .

0.62708 = 1.39358 1.34835

0.90672 = 1.29118 1.43149

a = .491

b = 1.355

To find c

− .7428	=	19.09	21.77	− 9.37	− 29.50	− 38.87	C = + 38.13
− 4.2372	=	24.75	22.30	− 12.15	− 30.22	− 42.37	+ 38.13
− 8.0671	=	19.55	27.01	− 9.60	− 36.60	− 46.20	+ 38.13

1−2 + 3.4944 = − 5.66a − .53b

2−3 + 3.8299 = + 5.20a − 4.71b

adopt

a = −.491

b = −1.355 To be sub.

C = + 38.″1 from meas.

0.54337 = 0.75282 a 9.72428 b

0.58319 = 0.71600 0.67302

Error in normals corrected on double sheet

Corr. 22

÷ coeff b

0.81909 = 1.02852 0.71920

9.91017 = 9.69066 0.04298 9.73364

+ 6.59314 = − 10.6792 a − b + 5.23847 b = − 1.3547

+ .81312 = + 1.1040 a − b − .54156 − 1.3548

+ 5.77995 = − 11.7832 a

5.77995 Same

0.76192

1.07126

9.69066 a = −.49052

"Ens 3" pp. 54 55

Recomputation (Nov. 1899)

D 6390 from I 10095

For Revd. Comp. eliminating c + c' see pp 120–124

D6390 form I 10095 Recomputation

aa $\frac{x^2}{100}$	ab $\frac{xy}{100}$	ac $\frac{x}{100}$	as	an
3306.92	2979.84	133.61	+6420.37	−223.43 ~~566.13~~
3.51942	3.47419	2.12584	3.80756	2.34914_n ~~2.75292_n~~
	9.95477	8.60642	0.28814	
	(3.42896)	(2.08061)	(3.76233)	2.30391 ~~$(2.70769)_n$~~

	bb y^2	bc $\frac{y}{100}$	bs	bn	
223.43 − ~~566.13~~					
5042.32 − ~~5127.31~~	4116.28	152.41	+7248.54	−1076.35 ~~−1229.55~~	
4337.90 + ~~4056.21~~	+2685.10	+120.39	+5785.36	201.33 ~~+510.14~~	
927.85 − ~~1637.23~~	+1431.18	+32.02	+1463.18	−875.02 − ~~719.39~~	
2.96748 ~~3.21411_n~~	3.15569	1.50542	3.16530	2.94202_n ~~2.85696_n~~	
3.51942		8.34973	0.00961	1.29175_n	2.95163_n
9.44806 ~~9.69469_n~~		9.85515	(1.51503)	~~(1.20669_n)~~	~~(2.86657_n)~~
		(0.73226)	(2.41398)	~~(1.35934)~~ 0.95556_n	~~(3.04706_n)~~ 2.63728_n

a = x = ~~−.495~~ 281

sign rev

Z ~~1.58405_n~~ 1.57679_n

bc₁ 1.50542

~~3.08947_n~~

3.08221

		cc	cs	cn	sn
	875.02 − ~~719.39~~				
	1208.40 − ~~1228.77~~	7.00	+293.02	+4.6 ~~−8.2~~	−1295.18 ~~+1800.85~~
	2083.42 − ~~1948.16~~	+5.40	+259.41	−9.03 ~~−22.87~~	−433.79 ~~+1099.16~~
	3.31878 ~~3.28962_n~~	+1.60	+33.61	+13.63 ~~+17.67~~	−861.39 ~~−701.69~~
bb₁	3.15569	+.72	+32.74	−19.58 ~~−16.10~~	894.60 ~~−735.48~~
	0.16309 ~~0.13393_n~~	+.88	+.87	33.21 ~~+33.77~~	+33.21 ~~+33.79~~
b = y ≐	1.456 ~~1.361~~	9.94448		1.52127 ~~1.52853~~	
				1.57679 ~~1.58405~~	

C = Z = 37.73 ~~+38.38~~

z ~~1.58405_n~~ 1.57679

ac 2.12584

~~3.70989_n~~

3.70263

y ~~0.13393~~ 0.16309

ab 3.47419

~~3.60812~~

3.63728

a = ~~−.495~~ −.281 a′ = −.164

b = ~~−1.361~~ −1.456 b′ = +1.539

c = ~~+38″.4~~ +37.7 c′ = −25″.7

4 place logs sufficient S

z′

ac

y

ab

b′

$(y-y')\frac{x}{100}$

an′

+1171.64

3.06879

6

(3.02356)

z′ 1.40944
ac 2.12584
3.53528 +1171.64

+3429.89

y 9.21477 + 488.61
ab 3.47419
2.68896 +5090.14

3.70673
3.51942n
0.18731

b′ = x′ = + 1.539

bn′

−0.90

+1055.75

−1056.65

3.02393n

(1.37366n) (3.03354n)
(1.67521) (3.35693)

z′ 1.40944
bc1 1.50542
2.91486

−1056.65

+ 821.98

−234.67

2.37046n

bb1 3.15569

9.21477n

a′ = y′ −.164

cn	sn′
+1.1	+1171.84
+47.33	+ 2274.73
−46.23	−1102.89
−23.64	−1080.29
−22.59	− 22.60

1.35392n

1.40944n

c′ = z′ = −25.67

See over →

Solution in x with 4-place logs: before error was found.

3306.92	2979.84	133.61		−566.13
3.5194	3.4742	2.1258		2.7529n
	9.9548	8.6064		
	(3.4290)	(2.0806)		(2.7077n)
	4116.28	152.41		−1229.53
	2685	+120.4		−510.1
	+1431.	+32.0		−719.4
	3.1556	1.5051		2.8569n
		8.3495		
		(9.8546)		(1.2064n)
		(0.7322)		(1.3593n)
		+7.00		−5.2
		+5.40		−22.9
		+1.60		+17.7
		+.72		−16.1
		+.88		+33.8
		9.9445		1.5289
				1.5844
				+38.41

* see double sheet for recomp. with these values.

Normal Equations in γ

* not close enough?

Check Σ

-5.42 +1.~~γ~~ = 152.41 a′ 133.61 b′ +7c′ ~~−25.15 +205.63 −179.2 = +1.28~~ * Check Σ

-570.84 * −0.90 ~~+0.23~~ = 4116.28 2979.84 152.41 ~~− 679.19 +4585.97 −3901.70 = +5.08~~

-1233.84 * 1.64 +11~~73.02~~ = 2979.84 3306.92 133.61 ~~−491.67 +5089.35 −3420.42 = +1177.26~~

9.36173 2.18301

3.06930 2.12584

7.17872

0.94346

a = −.165
b = +1.539

+0.1556 = 21.77 19.09 −3.59 +29.38 +25.79 c′ = −25.63″

−0.0015 = 27.01 19.55 −4.46 +30.09 +25.63 −25.63

+8.7794 = 22.30 24.75 −3.68 +38.09 +34.41 −25.62

1 − 3 −8.6238 = −.53 −5.66

2 − 3 −8.7809 = +4.71 −5.20

adopt
a′ = −.165 to be used
b′ = +1.539 from a new
c′ = −25.6″

0.93570 = 9.72428 a′ 0.75282 b′

0.94354 = 0.67302 0.71600

ready for a′

1.21142 = 1.02854 1.21581

0.27052 = 0.04298 0.23025

0.18727

−16.2712 = −a′ −10.6792 b′ −16.4365 a′ = −1.653

−1.8643 = +a′ −1.1040 b′ −1.6992 −.1651

−18.1355 = − 11.7832 b′

1.25853

1.07126

0.18727 b′ = +1.5391

a = −.491
b = −1.355
c = +38.1

Residuals

X D6390 from I 10095

	p50 $\frac{x}{100}$	ax	by	c	Σ = C	p50 or 52 O	O − C
b	9.52	−4.7 ✓	−43.2 ✓	+38.1	−9.8	−10″.0	−″.2
c	13.42	6.6 ✓	42.6 ✓		−11.1	−12.5	−1.4
d	11.63	5.7 ✓	10.1 ✓		$+\overset{22.3}{29.0}$	+25.5	$+3.\overset{2}{5}$
e	14.53	7.1 ✓	37.8 ✓		−6.8	−8.6	−1.8
f	13.82	6.8 ✓	9.1 ✓		$+22.\overset{2}{3}$ ✓	+22.5	+.3
h	35.72	17.5 ✓	42.6 ✓		−22.0	−17.2	+4.8
k	34.97	17.2 ✓	21.2 ✓		−0.3	+ +4.9	−4.6

−8 0 3
+8 6
±16 1 3
± 2″.37 3
~~2.36~~

Y a′ = −.165
b′ = +1.539
c′ = −25.6

		a′y	b′x	c′	Σ = C	p50 O	O − C
b	31.86	−5.3 ✓	+14.7 ✓	−25.6	−16.2 ✓	−13.6	+2″.6 ✓
c	31.43	5.2 ✓	20.7 ✓		−10.1 ✓	−10.3	−.2 ✓
d	7.43	1.2 ✓	17.9 ✓		−8.9 ✓	−9.0	−.1 ✓
e	27.92	4.6 ✓	22.4 ✓		−7.8 ✓	−11.4	−3.6
f	6.68	1.1 ✓	21.3 ✓		−5.4 ✓	$-4.\overset{9}{8}$	$+.\overset{5}{6}$ ✓
h	31.46	5.2 ✓	55.0 ✓		+24.2	+24.5	+.3
k	15.63	2.6 ✓	53.8 ✓		+25.6 ✓	$+2\overset{5.8}{6.4}$	$+.\overset{2}{8}$ ✓

+4 3 236
−3 9
8 1′
″1.6 ✓

$\sqrt{\frac{\text{Resids}^2}{7-3}}$ = mean error

Recomputation see pp 54-55 double sheet.

a -.495 -.281 a' -.164
b -1.361 -1.456 b' +1.539
c +38.4 +37.7 c' -25.7

1st Sol. c rotation in Solution of Eq.

X

a $\frac{x}{100}$	b $\frac{y}{100}$	c	Σ=b	O p50	
"	"	"	"	"	"
-2.7	-46.4	+37.7	-11.4	-10.0	+1.4
-3.8	-45.8		-11.9	-12.5	-.6
-3.3	-10.8		+23.6	+25.5	+1.9
-4.1	-40.7		-7.1	-8.6	-1.5
-3.9	-9.7		+24.1	+22.5	-1.6
-10.0	-45.8		-18.1	-17.2	+.9
-9.8	-22.8		+5.1	+4.9	-.2

+42
-39
±8.1 ±1.16

a' -.164
b' +1.539
c' -25.7

		c'	Σ=b	O p50
"	"	"	"	"
-5.2	+14.7	-25.7	-16.2	+2.6
-5.2	+20.7		-10.2	-.1
-1.2	+17.9		-9.0	.0
-4.6	+22.4		-7.9	-3.5
-1.1	+21.3		-5.5	+.6
-5.2	+55.0		+24.1	+.4
-2.6	+53.8		+25.5	+.3

+39
-36
±75 ±1.07

~~D~~6390 from I 10095 for other end of this plate see p73 →

Turner's formulae

	Eros. see p59 →	check		* 2nd Sol. Eros from Constants pp120–124	pp and 6389-90
Y (1875)	+4066.2	α	7h 17m 31.16s	* +4066.~~7~~ 6"	~~1".2~~
log Y	3.6091888	δ	+57° 49' 33".81	3.6092~~421~~ 315	
log $\frac{Y}{R}$ = log^{-1} d	8.2947637	$\alpha - A = a$	−32 4.84	8.2948~~270~~ 064	
$d = b - D$	+1° 7' 45".67	a arc	8 1 12.60	+ ~~1~~ 7 46.47	
D	+56 57	log tan δ	0.2012813		
$b = D + d$	+58 4 45.67	" cos a	9.9957312	+58 4 46.47	
X (1875)	−15369.7	" $\frac{\tan\delta}{\cos a}$ = log tan b	0.2055501	−15368.0	~~−2.5~~
log X	4.1866654 n ✓	b	+58° 4' 45".66	4.1866174 n	
" $\frac{X}{R}$	8.8722403 n ✓	log tan a	9.1489103	8.8721923 n	
" cos d	9.9999156 ✓	" cos b	9.7232457	9.9999156	
" $\frac{X}{R}$ cos d	8.8721559 n ✓	" tan a cos b	8.8721560	8.8721079 n	
" cos b	9.7232456	" cos d	9.9999156	9.7232439	
$\frac{\frac{X}{R}\cos d}{\cos b}$ = log^{-1} a	9.1489103 n	" $\frac{X}{R}$ = log $\frac{\tan a \cos b}{\cos d}$	8.8722404	9.1488640 n	
a	−8° 1' 12".60	" $X = R$ "	4.1866655	−8 1 9.56	
A = 7h 49.6m	117 24 00	X	15369.70		
$\alpha = a + A$ arc	+109 22 47.40	$d = b - D$	+1 7 45.66	109 22 50.44	
time Circular 37	+7h 17m 31.16s 7 17.5	log $\frac{Y}{R}$ = log tan d	8.2947622	7 17 31.36	−29s = −23"
log tan b	0.2055501	" $Y = R \tan d$	3.6091873	0.205552~~4~~ 0	
" cos a	9.9957312	Y	4066.19	9.9957321	
log tan b cos a = log tan δ	0.2012813			0.201284~~5~~ 1	
δ	+57 49 33.81			+57 49 34.~~50~~ 41	−1.5
Circular 37	+57 50				

Note on Final place of Eros on I 10095 Eros 3 p59

1. Adopted coordinates to Jan. 1900, designated old comp.

means of 2 end. $\left\{ \begin{array}{l} X' = -15369''.2 ✓ \quad 68''.0 \quad 70.5 \\ Y' = +4065.9 ✓ \quad 66.3 \quad 65.5 \end{array} \right.$ give α $7^h\ 17^m\ 31^s.22$ $31^s.37$ D6390 p59, 31.07 D6389 p73

δ $+57°\ 49'\ 33''.6$ 34.15 33.02

2. Check by Cluster method starting with the above X' and Y' give $c = -''.17$ and $c' = 6''.04$ which subtracted from the adopted $\bar{X}$ and $\bar{Y}'$ and from the α, $\left(\frac{-''.17}{15 \cos\delta} = -^s.02\right)$ and δ

give $\bar{X}' = -15369''.0$ $\alpha = 7^h\ 17^m\ 31^s.24$ $(\cos\delta = 7995)$

$\bar{Y}' = +4065.9$ and $\delta = +57\ 49\ 33.6$

computing α and δ from the last $\bar{X}'$ and $\bar{Y}'$ give essentially the same values: $\alpha = 7^h\ 17^m\ 31^s.25$

$\delta = +57°\ 49'\ 33''.6$

3. Feb 19 1900, Recomputation made by Mr. Woods for uniformity, with computed coordinates in equation, designated "new" recomputation.

$\bar{X}' = -15369''.4$ $7^h\ 17^m\ 31^s.20$

$\bar{Y}' = +4065.8(5)$ used $\longrightarrow$ $+57°\ 49'\ 33''.5$ } finally adopted.

The "old" or the "check" computations are the best, the "old" because measured ($\frac{x}{10}$ $\frac{y}{10}$) were used in equations and more decimal places than in the "new". In "new" and also in check computation the computed coordinates were used in equations and in the new fewer decimal places, tenths only, used. In the "new" recomputation star f, Y used $+1798''.5$ instead of $+1798''.6$, that is a change of $''.1$ only in data, ($+1798''.545$ is the exact computed Y of f).

Feb 19 1900, adopted and sent the "new" recomputation to Mr. Chandler except put $\delta = 33''.6$ instead of $\delta = 33''.5$

adopted

Eros — Check by the Cluster method mean 2 ent together α + δ computed from the adj X′ + Y′ corrected by applying C + C′

(1st Sol α + δ not formed. D6389)

C + C′ eliminated by latting Resids. in Eq.
C + C′ formed by substitution

1st Sol not elim C + C′

* D6390	2 Sol. p73 6389–90	D6390		
+4066.3	− 0.8	+4066.3	Y′	+ 4065.9
3.6091994		3.6091994		
8.2947743				
+ 1 7 45.77 ✓				1° 7′ 45″.37
+ 56 57				
+ 58 4 45.77				58 4 45.37
−15368.0	diff X −2.5	−15367.8	X′	−15369″.0
4.1866174n		4.1866117n		4.1866456n
				5.3144251
8.8721923n		8.8721866n		8.8722205n
9.9999156 ✓		9.9999156	csd (add)	9.9999156
8.8721079n		8.8721022n		8.8721361n
9.7232453 ✓		9.7232453	csb (sub)	9.7232466
9.1488626		9.1488569n		9.1488895n
−8 1 9.47 ✓		9.09		−8° 1′ 11″.23
117 24				− 32m 4s.75
				7 49 36
109 22 50.53		50.91		
7 17 31.37	−.30s = −2″.4	31.39	α 1875	7h 17m 31s.25
0.2055506 ✓		0.2055506		
9.9957322 ✓		3		
0.2012828		9		
+57 49 34.15 ✓	−1.~~4~~2 ✓	34.17 ✓		
(.13 Vega)		(.15 Vega)		

see p73 for other cal of E1895 D6389

~~must~~ have used use Bag to get nearest tenth

Comparison of the two end of Σ10095

	D6390 p50 Mean x	D6389 p62 Mean x	D6390 − D6389	Resids fr. mean
b 1	952.2	8329	+ 119.3 ✓	− 2.4
c	n		121.3 ✓	− .4
d			121.3 ✓	− .4
e			123.2 ✓	+ 1.5
f			119.8 ✓	− 1.9
h			123.6 ✓	+ 1.9
k			123.4 ✓	+ 1.7
			119	− 51
				+ 51
			+ 121.7	± 1.02

± 1.46 av. dev. of the diff. of the 2 end of Σ10095 in x

	D6390 Mean y	D6389 Mean y	639 − 6389	
b	3186.2	2987.7	+ 198.5 ✓	+ 3.2
c		te	194.9 ✓	− .4
d			195.9 ✓	+ 6
e			193.9 ✓	− 1.4
f			194.6 ✓	− .7
h			197.9 ✓	+ 2.6
k			191.6 ✓	− 3.7
			37.3	+ 64
				− 62
			+ 195.3	± 124

± 1.77 same as above in y

or for M 120-124?

Results of D63.e Resid. Comp. eliminating C+C′

For recomputation see Bk. 5, p. 112 etc

X

Measured Values of x and y of "Eros" and Comparison Stars.

D 6389 from I 10095. November 26, 1893. Bk. 15, (E.F.L.) p. 44.

Cat. Stars Design	x 1st Meas.	2nd	x Mean of 1st & 2nd	Resid.		Diff 1st & 2nd	Computed X	X − Mean x	x + Const.	x − X
b (5085)	832.9	832.9	832.9	0.0	0.0	0.0	−15077.8	−15910.7	−15086.1	− 8.3
c (5089)	1220.6	12~~18~~20.2	12~~19~~20.4	0.2	−0.2	0.4	−14685.8	−15906.2	−14698.6	−12.8
d (5092)	1041.7	1042.1	1041.9	−0.2	0.2	0.4	−14902.3	−15944.2	−14877.1	+25.2
e (5093)	1329.9	1329.9	1329.9	0.0	0.0		−14578.3	−15908.2	−14589.1	−10.8
f (5095)	1262.2	1262.2	1262.2	0.0	0.0		−14680.5	−15942.7	−14656.8	+23.7
h (5126)	3448.5	3~~333.2~~448.9	~~3333.4~~ 3448.7	−0.2	0.2	0.4	−12450.5	−15899.2	−12470.3	−19.8
k (5128)	3373.2	3373.2	3373.2	0.0	0.0		−12548.3	−15921.5	−12545.8	+ 2.5
			12509.2				−98923.5	−15919.0		+51.4
			7				7			−51.7
			1787.0				−14131.9			

a = +.392 a′ +.260
b = +1.471 b′ −1.598
c = −36.4″ c′ +23.5″ $\overset{4}{}$

} sup. 71 To be added to meas. Constants from solution eliminating c + c′

adopted −15919.0 = Mean; Use for both sols; c+c′ included + c+c′ eliminated X pp 72–73

Eros	542.7	542.7	542.6	0.1	0.1	
"	542.7	542.7		0.1	0.1	
"	542.7	541.9		0.1	−0.7	
*a (5076)						−16082.6
g	3333.6	3333.2	3333.4	0.2	−0.2	0.4 ~~−16082.6~~

+2.1 +40.0 $\overset{2}{-36.4}$ $\overset{9}{+5.7''}$ $\underset{5}{548.3}$ $\overset{5}{15370.7''}$

(from constants on pp 66–68 with elim c+c′
+2.1 +40.0 −36.1 +6.0 548.6 15370.4)

d

(50 reduce to centre of sq.)

Eros Est x = 3.7 × 163 = 663.1 (−15919) + Const = −15315.9″ ½ div added to neg vals = Est Vals −15396.9″

" y = 17.3 2819.9 (+1321) + Const = +4140.9 .. sub fr. pos .. +4059.9″

*a is Cat Star but can not be measured in x. Reject as standard star. April 1, 1899.

Y

* see note p 51

Design.	1st Meas.	2nd	Mean of 1st & 2nd	Resid.		Diff 1st & 2nd	Computed Y	Y − Mean y	y + Const.	y − Y
b	2987.7	2987.7	2987.7	0.0	0.0		+4325.8	+1338.1	+4308.7	−17.1
c	2947.9	2947.9	2947.9	0.0	0.0		+4279.1	+1331.2	4268.9	−10.2
d	546.7	546.7	546.7	0.0	0.0		+1877.6	+1330.9	1867.7	−9.9
e	2598.0	2598.0	2598.0	0.0	0.0		+3929.3	+1331.3	3919.0	−10.3
f	474.3	471.9	473.1	1.2	−1.2	2.4	+1798.6 *?	+1325.5	1794.1	−4.5
h	2947.9	2947.9	2947.9	0.0	0.0		+4247.3	+1299.4	4268.9	+21.6
k	1372.9	1369.7	1371.3	1.6	−1.6	3.2	+2663.1	+1291.8	2692.3	+29.2
			13872.6				23120.8	1321.2		+50.8
			7				7			−52.0
			1981.8				3303.0	+1321.		

abc pp 66-67

adopted +1321. for Sol incl. c+c′

Should adopt +1321.2 the mean viz for Solution elim c+c′ abc pp 72-73

pp 66-67

Errs.	2721.6	2722.8	2722.5	−0.9	0.3
"	2722.8	2722.0		0.3	−0.5
"	2723.2	2722.8		0.7	0.3
*a	1190.8	1190.8	1190.8	0.0	0.0
g	4825.2	4025.2	4025.2	0.0	0.0

Σ +1321.2 4 " 8 " 3 + " 3

+7.1 −8.7 +23.5 +21.9 2744.4 4065.1

See p 73 for α + δ from final val Y = +4065.5

(from constants on pp 66-68 not elim c+c′)
(+7.1 −8.7 +23.5 +21.9 2744.4 +4065.4)
1321.

+2540.3

d

+1321.2 6.1 *

+1.4 −16.6 +23.4 +8.2 554.9 1875.9 −1.7

correct val −1.5

*−1.5 on pp 71 + 72 : try getting the Stand. Coord X + Y from the meas. x + y

Equations of condition.

D6389 from I 10095.

	$n = cn = x - \underline{X}$	$= \frac{x}{100}$ = coeff a	$\frac{y}{100}$ = coeff b	es Check coeffs a+b+c Σ = s	$(x-\underline{X})\frac{x}{100}$ = an	$= \frac{x^2}{100}$	$\frac{x\ y}{100}$	x s
b	−8.3 =	8.33	29.88	3921	− 69.14	69.39	248.90	326.62
c	−12.8 =	12.20	29.48	4268	−156.16	148.84	359.66	520.70
d	+25.2 =	10.42	5.47	1689	+ 262.58	108.58	57.00	175.99
e	−10.8 =	13.30	2598	40.28	− 143.64	176.89	345.53	535.72
f	+23.7 =	12.62	4.73	1835	+ 299.09	159.26	59.69	231.58
h	−19.8 =	34.49	2948	64.97	− 682.90	1189.56	1016.77	2240.82
k	+2.5 =	33.73	1371	48.44	+ 84.32	1137.71	462.44	1633.88
	+51.4 −51.7	125.09	138.73	270.82	+645.99 −1051.84	2990.23	2549.99	5665.31
	−0.3				−405.85			

5540.22
125.09
5665.31

n = cn

	$y - \underline{Y}$	$= \frac{y}{100}$	$\frac{x}{100}$	an $(y-\underline{Y})\frac{y}{100}$	$= \frac{y^2}{100}$	$\frac{x\,y}{100}$
b	−17.1 =			−510.95		
c	−10.2 =			−300.70		
d	−9.9 =			− 54.15		
e	−10.3 =			− 267.59		
f	− 4.5 =			− 21.28		
h	+21.6 =			+ 636.77		
k	+29.2 =			+400.33		
	+50.8 −52.0			+1037.10 −1154.67		
	−1.2			−117.57		

bn

y^2	$(x-X)\frac{y}{100}=$	$\frac{xy}{100}$	$\frac{y^2}{100}$	ys	$sn=$	$an+bn+cn$
892.81	−248.00			1171.59	−325.44 =	325.44
869.07	−377.34			1258.21	−546.30	546.30
29.92	+137.84			92.39	+425.63	425.62
674.96	−280.58			1046.47	−435.02	435.02
22.37	+112.10			86.80	+434.90	434.89
869.07	−583.70			1915.32	−1286.41	1286.40
187.96	+34.28			664.11	+121.10	121.10
3546.16	+284.22 −1489.62			6234.89	+981.63 −2593.17	
	−1205.40				−1611.54	

254999 354616
609615
138.73
6234.88

δn

$(y-Y)\frac{x}{100}=$	$\frac{xy}{100}$ ~~100~~	$\frac{x^2}{100}$	$sn=$	$a'n+b'n+c'n$
−142.44			−670″.49 =	−670″.49
−124.44			−435.34	−435.34
−103.16			−167.21	−167.21
−136.99			−414.88	−414.88
−56.79			−82.58	−82.57
+744.98			+1403.35	+1403.35
+984.92			+1414.45	+1414.45
+1729.92 −563.82			+2817.80 −1770.50	
+1166.08			+1047.30	

D6389 from I 10095

solved by Ganss method

1st Sol.

−0.3 =

−405.85

−1205.40

	aa = x^2/w	ab = xy/w	ac = x/w	as	an$(x-X)x/w$
	+2990.23	+2549.99	+125.09	+5665.31	−405.85
	3.47570	3.40654	2.09722	3.75322	2.60837n
		9.93084	8.62152 $\frac{ac}{aa}$	0.27752	9.13267n
	−405.85 −4512.	bb = y^2/w	bc = y/w	bs	$(x-X)y/w$
	+3748.	+3546.16	+138.73	+6234.89	−1205.40
	−11698	+ 21746	+106.67	+4831.2	−346.11
	3.0681n	+1371.6	+32.06	bc1 +1403.7	−859.29
aa	3.4757	3.13723	1.50596	3.14727	2.93414n
	9.5924n		8.36873	$\frac{bc_1}{bb_1}$ 0.01004	9.79691n

sign obs.
z 1.5572n
ac 2.0972
3.6544n

y 0.1673
ab 3.4065
3.5738

scale x = −.3912

		CC-coefficient	cs	$cn = (x-X)$
z 1.5572n bc1 1.5060 3.0632	−859.29	+7.00	+270.82	−0.3
	−1157.	+5.23	+237.00	−16.98
	−2016.3	+1.77	+33.82	+16.7
	3.30456n			
bb1	3.13723	+.75	+32.81	−20.08
	0.16733n	+1.02	+1.01	+36.8
orientation y =	−1.4700	0.0086		1.5658
				0.0086
			log Z =	1.5572
			Z =	+36.1

For adopted values from Resid Comp. see pp 70–71

$x = -.391$ $y' = -.261$
$y = -1.470$ $x' = +1.596$
$z = +36.1$ $z' = -23.5$
} To be subtracted from measures

D6389 Got essentially the same values of the constants (a b c a' b' c') from solving with 3 unknown quantities as from 2 + substituting for the 3rd. Used an approx const. X−x in the 3 (above) in y. Used the Resids (x−X) (y−Y) + the adopted const = mean for the 2 unknowns (to the Resid Comp) pp 70–71

$-\int |a-1$

$(x - X) = -((~~1+a~~)x + by + c)$

unfinished
this way has
been solved by
Gauss' method

$-1.2 = 138.73\,a' + 125.09\,b' + 7\,c'$

$-117.57 = 3546.16\,a' + 2549.99\,b' + 138.73\,c'$

$+1166.08 = 2549.99\,a' + 2990.23\,b' + 125.09\,c'$

$an' = y - Y\ x/100$

+1166.08

3.06673

9.59103

2.07030 = 3.54976   3.40654   2.1421 7 ✓

3.06673 = 3.40654   3.47570   2.09722 ✓

$bn' = y - Y\ (1.29975\,b)/100$

+1166.08

+2943.5

+664.8

+4774.4

3.6789

3.4757

0.2032

$x' = +1.596$

z 1.3716

ac 2.0972

3.4688

y 9.4162

ab 3.4065

2.8227

−117.57

+994.43

−1112.00

3.04610_n bn1

9.90887_n

$\frac{ac}{aa}\frac{a'}{}(1,688.25)$

9.92813 ✓ = 1.40759   1.36437

0.96951 ✓ = 1.30932   1.37848

− 0.1714 ✓ =   19.82   17.87

− 0.8475   25.56   23.14

+ 9.3220 ✓   20.38   23.90

sn 1−3 −9.4934 = −.56 a′ −6.03 b′

−1611.54
~~−2593.17~~ 2−3 −10.1695 = +5.18   −.76

−768.94

−842.60

−879.39

+36.79

÷ coeff a′

0.97742 = 9.74819   0.78032

1.00730 = 0.71433   9.88081

1.22923

0.29297

−16.9524

−1.9632

−18.9157

1.27682_n

sn′

+1047.30

~~−1770.50~~

+2209.3

−1162.0

−1138.0

−24.0 = sn2 is check on cn2*

21.3716

bc 11.5060

2.8776

−1112.0 $Cn = -1.2\ y - Y$

+754.4

−357.6

2.5534_n

3.1372

9.4162_n

$y' = -.261$

+48.8

−50.0

−26.0 $\frac{bc1}{bb1}$ bn1

−24.0 cn2*

1.3802_n

0.0086

1.3716_n

$z' = -23.5$

D6389 from I 10095

Design	Residuals from Measurest Computed Values eliminating c			
t	Resid X	= a(Resid x)	+ b(Resid y)	~~Σx~~
b	- 945.9	-954.1	+1005.9	~~+902483.19~~
c	- 553.9	-566.6	+ 966.1	~~+313839.74~~
d	- 770.4	-745.1	-1435.1	~~+574025.04~~
e	- 446.4	-457.1	+ 616.2	~~+204049.44~~
f	- 548.6	-524.8	-1508.7	~~+287905.28~~
h	+1681.4	+1661.7	+ 966.1	~~+2793982.38~~
k	+1583.6	+1586.2	- 610.5	~~+2511906.32~~
	+3265.0	+3247.9	+3554.3	
Sums	-3265.2	-3247.7	∓3554.3	

	Resid Y =	~~Σy~~
b	+1022.8	~~1028834.52~~
c	+ 976.1	~~943010.21~~
d	-1425.4	~~2045591.54~~
e	+ 626.3	~~385926.06~~
f	-1504.4	~~2269688.28~~
h	+ 944.3	~~912288.23~~
k	- 639.9	~~390658.95~~
	+ 3569.5	
	- 3569.7	

	$x-\overline{X}$ ″	$x/100$ ″	$y/100$ ″	$(x-\overline{X})x/100$	$x^2/100$	$xy/100$	$(x-X)y/100$	$xy/100$	$y^2/100$
0 =	−8.2	−9.54a	+ 10.06b	0=+78.23	91.01	−95.97	− 82.49		101.20
	−12.7	−5.67	+ 9.66	+72.01	32.15	− 54.77	− 122.68		93.32
	+25.3	−7.45	−14.35	−188.48	55.50	+106.91	− 363.06		205.92
	−10.7	−4.57	+ 6.16	+48.90	20.88	−28.15	− 65.91		37.95
	+23.8	− 5.25	−15.09	−124.95	27.56	+ 79.22	− 359.14		227.74
	−19.7	+16.62	+ 9.66	−327.41	276.22	+160.55	− 190.30		93.32
	+ 2.6	+15.86	− 6.10	+ 41.24	251.54	− 96.75	− 15.86		37.21
	−51.3	+32.48	+35.54	+240.38	754.86	+346.68			
	+51.7	−32.48	−35.54	−640.84		−275.64	−1199.44		796.66
				−400.46		+ 71.04			

	″	$y/100$	$x/100$	$0=(y-Y)y/100$	$y^2/100$	$xy/100$	$0=(y-Y)x/100$	$xy/100$	$x^2/100$
0 =	−16.9	+ 10.06a′	−9.54b′	−170.81			+161.23		
	−10.0	+ 9.66		− 96.60			+ 56.70		
	−9.7	− 14.35		+139.20			+ 72.26		
	−10.1	+ 6.16		− 62.22			+46.16		
	−4.3	− 15.09		+ 64.89			+22.58		
	+21.8	+ 9.66		+210.59			+362.32		
	+29.4	− 6.10		−179.34			+466.28		
	−51.0	+35.54		− 508.17			+1187.53		
	+51.2	−35.54		+ 414.68					
				− 93.49					

Normals in X, C Eliminated.

D6389 from I10095

$$0 = -400.46 + \overset{x^2}{754.86a} + \overset{xy}{71.04b}$$

$$0 = -1199.44 + 71.04a + \overset{y^2}{796.6\overset{3}{6}b}$$

2.60256 2.87787 1.85150b

3.07898 1.85150 2.90126b

÷ coeff b

0.75106 1.02637 0.61976

9.59339

0.17772 8.95024 8.54363

$$0 = -5.6371 + 10.626a + b + 4.1664 \quad b = +1.4707$$

$$0 = -1.5056 + .089a + b + .0350 \quad +1.4706$$

$$0 = -4.1315 + 10.537a$$

0.61611 1.02272

9.59339

$a = +.3921$

a = +.392
b = +1.471
c = −36.″4 see p72 } To be added to meas.

a + b subs in Resids p69: = Check on O−C

	Resids x/100	y/100	x, y p69	ax	by	Σ =	O − C	p72 O − C	diff
				″			″	″	
b	−9.54	+10.06	−8.2	−3.7	+14.8	+11.1	+2.9	+2.7	
c	−5.67	+9.66	−12.7	−2.2 ✓	+14.2 ✓	+12.0	−.7	+.1	
d	−7.45	−14.35	+25.3	−2.9	−21.1	−24.0	+1.3	+1.0	
e	−4.57	+6.16	−10.7	−1.8 ✓	+9.1	+17.3	−3.4	−3.7	
f	−5.25	−15.09	+23.8	−2.1 ✓	−22.2	−24.3	−.5	−.7	
h	+16.62	+9.66	−19.7	+6.5	+14.2 ✓	+20.7	+1.0	+.8	
k	+15.86	−6.10	+2.6	+6.2 ✓	−9.0 ✓	−2.8	−.2	−.4	

+52
−48
±100 ±143

$0 = (x - \overline{X}) + ((\overset{a-1}{\cancel{1+a}})x + by + c)$

$0 = \overset{+}{-}93.49 + \overset{y^2}{79\overset{3}{6}.66}\,a' + \overset{xy}{71.04}\,b'$

$0 = \overset{-}{+}1187.53 + \overset{xy}{71.04}\,a' + \overset{x^2}{754.86}\,b'$

$0 = 1.97077 \quad 2.9012\overset{6}{\cancel{7}} \quad 1.85150$

$0 = 3.07464 \quad 1.85150 \quad 2.87787$

$\div$ coeff a'

$0 = 9.0695\overset{1}{\cancel{0}} \quad 8.950.23 \quad 9.15367$

$\qquad\qquad\qquad 0.20344$

$0 = 1.22314 \quad 1.02637 \quad 1.22981$

$a' = +.260$
$b' = -1.598$
$c' = +23.5''$

Σ To be added to the meas.

$0 = \overset{+}{-}.1174 ✓ + a' + .089 b' \quad - .1424 \quad a' = \overset{-}{+}.2598$

$0 = \overset{-}{+}16.7163 + a' + 10.626 \quad - 16.9750 \quad + .2597$

$0 = -16.8337 \quad - 10.537 b'$

$1.22616_n \quad 1.02272_n$

log b' 0.20344

$b' = \overset{+}{-}1.5975$

pencil $b = +1.6$

see other comp on p67

$a = -$
$b = +$
Σ to be sub from meas

Signs $x - X$ changed + $y - Y$ } $0 = -(x - X) - ((\overset{1+a}{a-1})x + by + c)$ same as red eq. above,

$a'+b'$ substituted in Resids p69 gives:

	ax	by	O = p69	a'y	b'x	Σ a'y+b'x	O-C
b	− 8.2	− 2.5	− 16.1	−16.9	+2.6''	+15.2	+17.8''	+0.9''
c	− 12.7	− 1.5	− 15.4	−10.0	+2.5	+ 9.1	+11.6	+1.6
d	+ 25.3	− 1.9	+ 23.0	−9.7	−3.7	+ 11.9	+8.2	−1.5
e	− 10.7	− 1.2	− 9.9	−10.1	+1.6	+ 7.3	+8.9	−1.2
f	+ 23.8	− 1.4	+ 24.1	−4.3	−3.9	+ 8.4	+4.5	+ .2
h	− 19.7	+ 4.3	− 15.4	+21.8	+2.5	− 26.6	−24.1	−2.3
k	+ 2.6	+ 4.1	+ 9.8	+29.4	−1.6 ✓	−25.3	−26.9	+2.5

+52
−50
±10.2 ± 1.4$\overset{6}{\cancel{4}}$''

D6389 from I 10095

To find c & c′

a + b substituted in meas. values p64

a = +.392
b = +1.471

corrected May 27 1895

		$a x$	$b y$	p69	$\Sigma = c$	O − C = Resid fr. Mean	
b	0 =	+3.3 ✓	+44.0 ✓	−8.2″	+ 39.1	+2.7″	+2.9″
c		+4.8 ✓	+43.4 ✓	−12.7	$\overset{5}{36.5}$	+0.1	−.7
d		+4.1 ✓	+ 8.0	+25.3	$\overset{4}{37.5}$	+1.0	+1.2
e		+5.2 ✓	+38.2 ✓	−10.7	32.7	−3.7	−3.5
f		+4.9 ✓	+ 7.0 ✓	+23.8	35.7	−.7	−.5
h		+13.5 ✓	+43.4 ✓	−19.7	37.2	+.8	+1.0
k		+13.2 ✓	+20.2 ✓	+2.6	36.0	−.4	−.2
					44.6	+4.6	+51
						−4.8	−49
				− c =	$+\overset{7}{36.4}$	±9.4	~~±1.36~~ ±100 ±1.43″
				c =	$-\overset{7}{36.4}$ ✓		

a′ = +.260
b′ = −1.598 } p71

		$b'x$ ~~a y~~	$a'y$ ~~b x~~	p69	$\Sigma = c'$	O − C = Resid	
b	0 =	−13.3 ✓	+7.8 ✓	−16.9	~~−23.0~~ 22.4	+.5″	+1.0″
c		−19.5 ✓	+7.7 ✓	−10.0	−21.8	+1.3	+1.6
d		−16.6 ✓	+1.4 ✓	−9.7	−24.9	−1.4	−1.5
e		−21.3 ✓	$+\overset{8}{6.9}$	−10.1	−24.6	−1.0	−1.2
f		−20.2 ✓	+1.2 ✓	−4.3	−23.3	+.2	+0.1
h		−55.2	+7.7 ✓	+21.8	−25.7	−2.2	−2.3
k		~~−54.0~~ 53.9	+3.6 ✓	+29.4	−20.9	+2.4	+2.5
					242	+4.4	+52
						−4.6	−50
							±102
				− c′ =	$-\overset{4}{23.5}$	9.0	± 1.3 ±$1.4\overset{6}{4}$
				c′ =	$+\overset{4}{23.5}$		

Centre of I10095

$A = 7^h\ 49^m.5 = 30^s$

$D = +56° 57'$

see p 58 for other end of this plate

D6389

	Eros reject	adopt	D6389 6390 diff V	6389-90
V (1875)	+4065.3	+4065.5″	−0.7″	−0.8″
log V	3.6090926 ✓	3.6091140 ✓		
	5 31/44/251	5 31/44251		
log V/R = log tan d	8.2946675	8.2946889 ✓		
d = b − D	+1 7 44.77 ✓	+1 7 44.97 ✓		
D	+56 57	+56 57		
b = D + d	+58 4 44.77	+58 4 44.97 ✓		
X (1875)	−15370.7 ✓	−15370.5	−0.8	−2.5
log X	4.1866936n ✓	4.1866881	4.1866880	
" X/R	8.8722685n ✓	8.87226~~85~~ 30 n	8.8722629	
" cos d	9.9999157 ✓	9.9999157		
" X/R cos d	8.8721842n ✓	8.8721~~842~~ 787 n	8.8721786	
" cos b	9.~~9~~7 232487	9.7232480	9.7232480	
X/R cos d / cos b = log tan a	9.1489355n	9.14893~~62~~ 97 n	9.1489306	
a	−8° 1′ 14.″25	−8° 1′ ~~14.30~~ 13.93	−8 1 13.93	
A	117 24	117 24	Nat cos δ = .533	
α = a + A arc	109 22 45.75	109 22 4~~5.70~~ 6.07	diff α × 15 cos δ	
time	7ʰ 17ᵐ 31.05ˢ 7 17.5	7 17 31.0~~5~~ 7	~~−.09ˢ = −.7″~~	
circular 37 log tan b	0.2055459	0.2055468 ✓		
" cos a	9.9957308	9.9957308 ✓		
log tan b cos a =	0.2012767	0.2012776 ✓		
δ	+57° 49′ 32.″82	+57 49 33.02 ✓	~~−.79″~~	
circular 37	+57 50			

corrected May 31 1899

For recomputation using computed values in equations, see Bk. 5, p. 148

Comparison Stars for Eros. Measured + Computed Values Rect. Coords.

D6371 from B10909 April 16, 1894.

Meas. Bk. 15, p. 46.

			Mean. x	Resid.		Diff. 1-2	X	X-Mean x	x+Const	x-X
	Prof. Seidel's		″				″			
a	471.3	471.3	471.3				+ 261.5	-209.8	+ 262.8	+1.3
b	495.2	495.2	495.2				+ 283.7	-211.5	+286.7	+ 3.0
d	1016.3	1016.3	1016.3				+ 805.0	- 211.3	+807.8	+ 2.8
h	2337.0	2336.6	2336.8	0.2	-0.2	0.4	+2133.7	- 203.1	+2128.3	- 5.4
o	4445.2	4445.2	4445.2				+4242.0	- 203.2	+4236.7	- 5.3
p	4444.8	4445.2	4445.0	-0.2	0.2	0.4	+4240.1	-204.9	+4236.5	- 3.6
q	4544.6	4544.6	4544.6				+4328.7	- 215.9	+4336.1	+ 7.4
								-1459.7 / 7 =		+14.5
			17754.4 / 7							- 14.3
			2536.3				2327.8	-208.5		+0.2

			Mean. y	Resid.		Diff. 1-2	Y	Y-mean y	y+Const	y-Y
a	3196.5	3196.5	3196.5				+15135.7	+11939.2	+15110.0	-25.7
b	2919.7	2921.7	2920.7	-1.0	1.0	2.0	+14857.4	+11936.7	14834.2	-23.2
d	2754.6	2754.6	2754.6				+14683.4	+11928.8	14668.1	-15.3
h	2901.0	2901.0	2901.0				+14819.3	+11918.3	14814.5	- 4.8
o	2125.3	2126.1	2125.7	-0.4	0.4	0.8	+14020.0	+11894.3	14039.2	+ 19.2
p	2066.4	2066.4	2066.4				*13960.0 ~~+13970.1~~	+11893.6 ~~+11903.7~~	13979.9	+19.9
q	13.9	13.9	13.9				+11897.4	+11883.5	11927.4	+30.0
								+83394.4 / 7		-69.2
										+69.1
										+0.1
			2282.7				~~+74197.6~~ 99373.2 / 7 = +14196.2	+11913.5		

*"p" 1875 pos. changed Apr. 25.

Check: $s = \frac{x}{100} + \frac{y}{100}$	sn	sn'
-11.51	-14.96	(0) +295.81
-14.03	-42.09	(49) +325.50
-10.48	-29.34	+160.34
+4.18	-22.57	-20.06
+17.52	-92.86	(9) +336.38
+16.93	-60.95 (4)	+336.91
-2.61	-19.31 (2)	-78.30
	-282.08	+1454.94
		-98.36
		+1356.58

$x - X \frac{x}{100} = -141.14$

$x - X \frac{y}{100} = -140.94$

-282.08

$y - Y \frac{y}{100} = -1238.62$

$y - Y \frac{x}{100} = +2595.19$

$+1356.57$

Residuals

Residuals ÷ 100

x	X	$x - X$	$x/100$	$(x-X)\,x/100$	$x^2/100$	$x\,y/100$	$(x-X)\,y/100$
″	″	″					
-2065.0	-2066.3	+1.3	-20.65	-26.84	426.42	4? -188.75	+11.88
-2041.1	-2044.1	+3.0	-20.41	-61.23	416.57	-130.22	+19.14
-1520.0	-1522.8	+2.8	-15.20	-42.56	231.04	-71.74	+13.22
-199.5	-194.1	-5.4	-2.00	+10.80	4.00	-12.36	-33.37
+1908.9	+1914.2	-5.3	+19.09	-101.18	364.43	-29.97	+8.32
+1908.7	+1912.3	-3.6	+19.09	-68.72	364.43	-41.23	+7.78
+2008.3	+2000.9	+7.4	+20.08	+148.59	403.21	-455.62	-167.91
Σ -5825.6	-5827.3	+14.5	+58.26	+159.39	2210.10	-929.89	+60.34
Σ +5825.9	+5827.4	-14.3	-58.26	-300.53			-201.28
+0.3	+0.1	+0.2		-141.14			-140.94
				±459.92			±261.62

y	Y	$y - Y$	$y/100$	$(y-Y)\,y/100$	$y^2/100$	$(y-Y)\,x/100$
+913.8	+939.5 +938.1	-25.7 -24.3	+9.14	-222.10 -234.90	83.54	+530.70 +501.80
+638.0	+661.2 +659.8	-23.2 -21.8	+6.38	-139.08 -148.02	40.70	+473.51 +444.94
+471.9	+487.2 +485.8	-15.3 -13.9	+4.72	65.61 - ~~79.51~~ -72.22	22.28	+232.56 +211.28
+618.3	+623.1 +621.7	-4.8 -3.4	+6.18	-21.01 -29.66	38.19	+9.60 +6.80
-157.0	-176.2 -177.6	+19.2 +20.6	-1.57	-32.34 -30.14	2.46	+366.53 +398.25
-216.3	-236.2 -227.5	+19.9 +11.2	-2.16	-24.19 -42.98	4.67	+379.89 +213.81
-2268.8	-2298.8 -2300.2	+30.0 +31.4	-22.69	-712.47 -680.70	514.84	+602.40 +630.51
+2642.0	+2711.0	+69.1 ~~-63.4~~	+26.42	~~-1230.70~~	706.68	+2595.19 +2402.39
-2642.1	-2711.2	-69.0 ~~+63.2~~	-26.42	-1216.80 -1238.62		
-0.1	-0.2	+0.1				

a +.331 a′ +.465
b +.635 b′ −.979
c −22.″9 c′ +14.″2 } pp 78-79 To be added to meas.
Constant X −208.″5 Y +119 13.5 pp 74-75.

Ens.

D6371 from B10909

X

Ens	Est. Vals 2412.6,	2412.6,	Mean x,	Resid			ax by c Σ Σ Corr. x app. Const.
				0.1	0.1		−208.5
..	2412.6	2412.6	2412.5	0.1	0.1		+7.99 +12.13 −22.9 −2.8 2409.7 +2201.2 2.78
..	2412.2	2412.6		−0.3	0.1		
c	862.8	863.2	863.0	−0.2	0.2	0.4	
e	2074.4	2074.4	2074.4				
f	2503.2	2504.0	2503.6	−0.4	0.4	0.8	
g	2623.3	2623.3	2623.3				
k	2539.0	2538.6	2538.8	0.2	−0.2	0.4	
l	2758.6	2758.6	2758.6				
m	3227.6	3228.0	3227.8	−0.2	0.2	0.4	
n	3378.3	3378.3	3378.3				
q			4544.6				+15.0 +0.1 −22.9 −7.8 +4536.8 +4328.3 O +4328.7 C − 0.4 O−C

Y

							a′y b′x c′ Σ Corr. y Const. +11913.5
Ens	1910.5	1910.5	1910.8	−0.3	−0.3		+8.89 −23.62 +14.2 −0.5 1910.3 +13823.8 .19 0.54 .26 .76
"	1911.3	1910.5		0.5	−0.3		
"	1910.5	1911.3		−0.3	0.5		
c	3140.4	3140.4	3140.4				
e	802.8	802.4	802.6	0.2	−0.2	0.4	
f	1378.3	1378.7	1378.5	−0.2	0.2	0.4	
g	1020.3	1020.3	1020.3				
k	1746.6	1744.2	1745.4	1.2	−1.2	2.4	
l	1881.8	1883.4	1882.6	−0.8	0.8	1.6	
m	2901.0	2901.8	2901.4	−0.4	0.4	0.8	
n	2317.0	2317.0	2317.0				
q cal. for check on signs			13.9				+0.1 −44.5 +14.2 −16.3 +11897.2 = O +11897.4 = C −0.2 O−C

B10909

See Eros 5 p 156 ~~plate~~ put here 30th Jan with-Computed Coords in Eq.

D6371 ~~see p 87 for D6374~~ with- meas. in Eq. D6374.

	Eros	Eros.	6371–6374 diff Y
1875 Y	+13823″.8	+13825.6 ✓	– 1″.8
log Y	4.1406274 ✓	4.1406840 ✓	
	5.3144251		
log Y/R = tan d	8.8262023 ✓	8.8262589 ✓	
d = b – D	+3° 50′ 3″.16 ✓	+3° 50′ 4″.95 ✓	
D	–17 24	–17 24	
b = D + d	–13 33 56.84 ✓	–13 33 55.05 ✓	
/			
1875 X	+2201″.2	+2200.8	+ 0″.4
log ..	3.3426595	3.3425806	
.. .. ÷R	8.0282344	8.0281555	
.. cos d	9.9990269 ✓	9.9990266 ✓	
X/R cos d	8.0272613	8.0271821	
.. cos b	9.9877115 ✓	9.9877124 ✓	
diff = tan a	8.0395498	8.0394697	
a α – A (arc)	+0° 37′ 39″.22 ✓	+0° 37′ 38″.80 ✓	
.. .. (time)	138 37 30	138 37 30	nat cos δ .972
A = 9h 14m.5	139 15 9.22	139 15 8.80 ✓	diff α × 15 cos δ
α = a + A	9h 17m 0s.61	9h 17m 0s.59 ✓	+.02s ± .3″
Circular No 37	9 17 0±		
log tan b	9.3825456n ✓	9.3825291n ✓	
.. cos a	9.9999739 ✓	9.9999739 ✓	
.. Σ = tan δ	9.3825195n ✓	9.3825030n ✓	
δ 1875	–13 33 54.01 ✓	–13 33 52.22 ✓	–1″.79
Circular 37	–13 34 15±		

Normals eliminating c or c′

D6371 from B10909

$$0 = -141.14 \quad \overset{x^2}{+2210.10}\,a \quad \overset{xy}{-929.88}\,b$$

$$-140.94 \quad -929.88\,a \quad \overset{y^2}{+706.68}\,b$$

0 = 2.14965 3.34441 2.96843

2.14903 2.96843 2.84922

÷ coff b

0 = 9.18122 0.37598 9.89591

9.29981 $\overset{9.51993}{0.11921}$ 9.63914

$-0.1517\overset{8}{\cancel{8}} \quad +2.3767 - b \quad +.78688 \quad 0 = -b + .635\overset{10}{\cancel{03}}$

$-0.19944 \quad -1.3159 + b \quad -.43565 \quad 0 = +b - .635\overset{9}{\cancel{03}}$

$-.351\overset{22}{\cancel{17}} \quad +1.060\overset{85}{\cancel{9}}$

$9.5455\overset{8}{\cancel{4}} \quad 0.0256\overset{5}{\cancel{7}}$

$\log a = 9.519\overset{93}{\cancel{87}} \qquad a = +.33108$

adopt

a = +.331 To be added to meas.

b = +.635

c = −22.″9

Substituting a & b to find c

X

	x/100	y/100		ax	by	[illegible]	Σ	O-C	Subst. in Resids =Check on O-C
a	4.71	31.97	0 =	+1.″6	+20.″3	+1.″3	+23.″2	+0.″3	+″3
b	4.95	29.21		+1.6	+18.5	+3.0	23.1	+ .2	+2
d	10.16	27.55		+3.4	+17.5	+2.8	23.7	+ .8	+8
h	23.37	29.01		$\overset{7.7}{\cancel{+8.0}}$	+18.4	−5.4	$\overset{20.7}{\cancel{21.0}}$	$-\overset{2.2}{\cancel{1.9}}$	−2.2
o	44.45	21.26		+14.7	+13.5	−5.3	22.9	0	0.0
p	44.45	20.66		+14.7	+13.1	−3.6	24.2	+1.3	+1.3
q	45.45	0.14		+15.0	+ .1	+7.4	22.5	− .4	−0.4

$-2\overset{6}{\cancel{3}}$ −2.6

+2.6

Mean

$$0 = +c + 22.94 \quad \frac{+2.6}{\overset{}{\cancel{\pm 4.9}}\;5.2} \quad \pm .7''0$$

c = −22.9

Ems 3

Check of Eq. B10909 pp 78-9 + 88-9

B10909

D6371

	aa	ab	as	an	Ens 3 pp78-79
	+2210.10 ✓	−929.88 ✓		−141.14 ✓	
	8.3444	2.9684_n		2.1495_n ✓	
		9.6240_n			
		(2.5924		(1.7735)	
	−141.14	+706.68 ✓		−140.94	−282.08
2.7710_n	−590.$\overset{1}{2}$	+391.2		+ 59.35	
	−731.3	+315.5		−200.29	
	2.8639_n	2.4990		2.3016_n	
	9.5195_n			9.8026_n	
	−.331			−.635 ✓	

D6374

					pp 88-89
	+2214.98 ✓	−926.27 ✓		+103.44 ✓	
	3.3454	2.9667_n		2.0145	
		9.6213_n		$(1.6358)_n$	
		(2.5880)			Σ
	+103.44	+701.35 ✓		−387.79	= −284.35
3.0071_n	−1017.	+387.3		− 43.23	
	−913.6	+314.$\overset{1}{0}$		−344.56	5 pl logs
	2.9608_n	2.497$\overset{1}{0}$ ✓	5 pl.	2.5374_n ✓	2.5373
	9.6154_n			0.0404_n	0.0402
	−.412			−1.097 ✓	1.097

$(y-y')\frac{x}{100}$

+2595.19 ✓

3.4142

(3.0382_n)

$(y-y')\frac{y}{100}$

−1238.62 ✓ +1356.58

+2595.19

2,6356 −432.1

+2163.1

3,3351

9,9907

+.979

−1092.

−146.6

2.1662_n

9.6672_n

−.465 ✓

+3175.~~56~~35 also 5p.s. logs. +3175

3.501~~9~~8 3.5018

($3.12~~37~~31_n$)

$(y-y')\frac{y}{100}$

−1480.27 ✓ +1695.07 ✓

+3175.35

2,6523. −449.1

−1328. ✓

logs +2726.3

3,4355

0.0901

1.231

−152.3

2.1826_n

9.6856_n

−.485 ✓

Normals Eliminating c

~~to be corr~~

0 = −12~~16.80~~38.62 +706.68a′ −929.88b′

0 = +~~2402.39~~2595.19 −929.88a′ +2210.10 b′

3.0~~8522~~9294 2.84922 2.96843

3.~~38064~~41417 2.96843 3.34441

÷ coeff a′

0.~~23600~~24372 ✓ 0.11921 ✓ 0.10984

0.~~41221~~44574 ✓ 9.99063 0.37598 ✓ 0.36661

−1.7~~219~~527 ✓ + a −1.3159 1.2878 a′ = +.~~6532~~4649

+ 2.~~5835~~7909 ✓ − a +2.3767 2.3260 a′ = +.~~6531~~4649

+~~0.8616~~1.0382 +1.06085

~~9.93531~~0.01628 0.02565

log b′ 9.9~~0966~~9063 b′ = −.~~81219~~97866

adopt

a′ = +~~.683~~ +.465 to be added to meas.

b′ = −~~.842~~ −.979

c′ = +14.″2

to find c′ using corrected values.

Resids ✓

y/100	x/100		a′y	b′x	1.75 y − Y	Σ = c′	O−C
+9.14	−20.65	a	+14.87 ✓	−4.61 ✓	−25.7 ✓	−15.4 ✓	−1.2 ✓
+6.38	−20.41	b	+13.58 ✓	−4.85 ✓	−23.2 ✓	−14.4 ✓	−0.2
+4.72	−15.20	d	+12.81 ✓	−9.95 ✓	−15.3 ✓	−12.5 ✓	+1.7 ✓
+6.18	−2.00	h	+13.49 ✓	−22.88 ✓	−4.8 ✓	−14.2 ✓	0.0 ✓
−1.57	+19.09	o	+9.89 ✓	−43.52 ✓	+19.2 ✓	−14.4 ✓	−0.2 ✓
−2.16	+19.09	p	+9.61 ✓	−43.52	+19.9 ✓	−14.0 ✓	+0.2 ✓
−22.69	+20.08	q	+.07 ✓	−44.50 ✓	+30.0 ✓	−14.4 ✓	−0.2 ✓

nearest tenth used in sums

$\frac{-99.3}{7} =$ $\frac{+1.9}{-1.8}$ ✓ $\frac{3.7}{7} = \pm 0.53$ ✓

0 = c −14.2

c = +14.″2 ✓ ~~c′ = +5.″7~~

.19

Sums in Resids Check in O−C

a′y	b′x	y′−Y	Σ = O−C
+4.2	+20.2	−25.7	−1.3
+3.0	+20.0		−.2
+2.2	+14.9		+1.8
+2.9	+2.0		.0
−0.7	−18.7		−.2
−1.0	−18.7		+.2
−10.6	−19.7		−.2

−19
+20
±39

±.56

see p83 for data, for the equations.

~~not finished to be~~ solved by Gauss' method? for check. *W.a.

Normals not eliminating c

$+0.2 = 177.54a + 159.80b + 7c$

D6371 from $-136.05 = 5712.18 + 3122.75 + 177.54c$

1510909 $-136.34 = 3122.75 + 4354.73 + 159.80c$

	9.30103	2.24930	2.20358	0.84510
	2.13370	3.75680	3.49454	2.24930
	2.13462	3.49454	3.63896	2.20358
÷ coeff a	7.05173		9.95428	7.08830 coeff c ÷ a
	8.37690		9.73774	8.49250
	8.64008		0.14442	8.44678

$+.00113 \quad a + .9001b + .0012c$

$+.02382 \quad a + .5467 \quad +.0311$

$-.04366 \quad a + 1.3945 \quad +.0280$

1-2 $+.02495 \quad +.3534b - .0299c$

2-3 $+.01984 \quad -.8478b + .0031c$

8.29754

pp 80–81

11 Dec 1899 Computation D6371 from B10509

with – a b c a' b' c' in eq.

See p 83 for data

80 D6371 from B10909. Computation made as a check. For do

$x^2 = aa$	$xy = ab$	$x = ac$	as	$(x-\bar{X})\frac{x}{100} = an$
6713.37	3122.70	177.54	10013.63	−136.05
3.82694	3.49453 9.66759 (3.16212)	2.24930 8.42236 (1.91689)	4.00059 0.17365 (3.66818)	2.13370n (1.80129n)

−136.05	$y^2 = bb$	$y = bc$	bs	$(x-\bar{X})\frac{y}{100} = bn$	
−4076.3	4354.09	159.79	+7636.56	−136.35	
+1986.4	+1452.5	+82.58	+4657.8	−63.28	
−2226.0	+2901.6	+77.21	+2978.8	−73.07	
3.34753	3.46264	1.88767 8.42503	3.47404 0.01140	1.86374n	
3.82694					
9.52059		(0.31270) (0.67166)	(1.89907) (2.42295)	(0.28877n) (0.55606n)	(1.87514n) (2.30735n)
a = x − .332					

1.36097n 1.88767 3.24864n	−73.07	c =	cs	$x-\bar{X} = cn$	sn
	−1772.7	+7.00	+344.33	+.2	−272.20
	−1845.8	+4.70	+264.82	−3.60	−202.92
	3.26618n	+2.30	+79.51	+3.80	−69.28
	3.46264	+2.05	+79.26	−1.94	−75.01
	9.80354n	+.25	+.25	+5.74	+5.73
b	y = −.636	9.39794		0.75891	
				1.36097	
			c = z	+22.96	

−z 1.36097n
ac 2.24930
3.61027n

−y 9.80354
ab 3.49453
3.29807

Dec 1/83

$(y-\bar{y})\frac{x}{1w}$

+2597.98

3,41464

(3,08223)

+2597.98

+2528.2

+1450.5

+6576.7

3.81801

3.82694

9.99107

$b' = x' = +$ .980

$(y-\bar{y})\frac{y}{1w}$

−1236.29

+1208.4

−2444.7

$3,38823_n$

(1.81326_n) (3.39963_n)

(1.83700) (3,58829)

1.15351

1.88767

3.04118

−2444.7

+1096.9

−1347.8

3.12963_n

3.46264

9.66699_n

$a' = y' =$ −.464

$y-\bar{y}$	$s\,n'$
+.1	+1361.81
+68.71	+3875.2
−68.61	−2513.4
−65.05	−2509.8
−3.56	−3.6

0.55145_n

1.15351_n

$c' = z' =$ −14.24

−z′ 1.15351

ac 2.24930

3.40281

−y′ 9.66699

ab 3.49453

3.16152

Stamp 10 out here

unfinished

~~0.2~~ = 159.80 a′ + 177.54 b′ + 7 c′
~~+1221.47~~ = 4354.73 + 3122.75 + 159.80
~~+12053.60~~ = 3122.75 + 5712.18 + 177.54

~~3.08688~~ 3.63896 a′ 3.49454 b′
~~3.31252~~ 3.49454 3.75680

÷ coff b′

~~9.64234~~ 0.14442 a′
~~9.55572~~ 9.73774

1 + .9001
2 − ~~.29115~~ + 1.3945 a′ + b′
3 + ~~.35942~~ + .5467 a′ + b′

1 − 3
2 − 3 − ~~.75057~~ + 8478 a′

~~9.87539~~

* For adopted Solution from
Residuals see pp 78-79
no need of reworking
these pages 80-81
Dec 11 1889 Recomputed these
pp. on double sheet
for check on the adopted
values of abc a′b′c′

Comparison of the two enlargements of B10909

6371 − 6374

	$(x-\bar{X})-(x-\bar{X})$
a	+1″.0
b	+2.6
d	+1.0
h	+2.9
o	+ .7
p	+ .9
q	−8.9

	$(y-\bar{Y})-(y-\bar{Y})$
a	+5″.9
b	+5.5
d	+2.8
h	+ .9
o	+5.6
p	+4.2
q	+5.5

Data for Normals not eliminating c for p 80

(1899) Dec 11. done as a check on the adjusted Solution ~~not done for c′ with star p corrected~~.
For the adjusted Solution from Resids see pp 74–79 with star p corrected.

D6371 from B10909

	p74 ″w x−X̄	″a x/100	″b y/100	(x−X̄)x/100	x²/100	xy/100	(x−X̄)y/100	y²/100
a	+1.3	4.71	31.9~~7~~6	+6.12	22.18	150.~~58~~37	+41.5~~6~~3	1.47 1027.08
b	+3.0	4.95	29.21	+14.85	~~23.31~~ 24.50	144.59	+87.63	853.22
d	+2.8	10.16	27.55	+28.45	103.23	279.91	+77.14	759.00
h	−5.4	23.37	29.01	−126.20	546.16	677.96	−156.65	841.58
o	−5.3	44.45	21.26	−235.58	1975.80	945.01	−112.68	451.99
p	−3.6	44.45	20.66	−160.02	1975.80	918.34	−74.38	426.84
q	+7.4	45.45	0.14	+336.33	2065.70	6.36	+1.04	.02
	+145 −143 +.2	177.54	159.79	+385.75 −521.80 −136.05	6713.37	3122.75 0	+207.3~~7~~6 −343.71 −136.3~~4~~5	4354.73 .09

star p corrected

New Words work new B's

	″w y−Ȳ	s	(y−Ȳ)x/100	(y−Ȳ)y/100	as	bs	su	su′
a	−25.7	37.67	−121.05	−821.37	177.44	1203.93	+48.97	−968.12
b	−23.2	35.16	−114.84	−677.67	174.04	1027.02	+105.48	−815.71
d	−15.3	38.71	−155.45	−421.52	393.29	1066.46	+108.39	−592.26
h	−4.8	53.38	−172.18	−139.25	1247.49	1548.55	−288.25	−256.22
o	+19.2	66.71	+853.44	+408.19	2965.26	1418.25	−353.56	+1280.83
p	+19.9	66.11	+884.56	+411.13	2938.59	1365.83	−238.00	+1315.59
q	+30.0	46.59	+1363.50	+4.20	2117.52	6.52	+344.77	+1397.70
	+69.1 −69.0 ~~+3.81~~	344.33	+3101.50 −503.52 +2597.98	+823.52 −2059.81 −1236.29	10013.63	7636.56	−272.20	+1361.81

x−X̄ x/100	−136.05	y−Ȳ x/100	+2597.98	x²	6713.37	y²	4354.09
" y/100	−136.35	" y/100	−1236.29	xy	3122.70	xy	3122.70
"	+.2	"	+.1	x	177.54	y	159.79
Σ	−272.20		+1361.79		10013.61		7636.58
su	−272.20	su′	+1361.81	as	10013.63	bs	7636.56

D 6374 from B 10909. April 16, 1894. Meas. Bk. 15, p. 50.

x	Prof. Searle's 1st Reading	2nd	Mean x	Resid.		Diff.	Comp. X	X-Mean x	x+Const.	x-X
a	320.2	320.2	320.2				+261.5	-58.7	261.8	+0.3
b	342.5	342.5	342.5				+283.7	-58.8	284.1	+0.4
d	865.2	865.2	865.2				+805.0	-60.2	806.8	+1.8
h	2181.8	2185.8	2183.8	-2.0	2.0	4.0	+2133.7	-50.1	2125.4	-8.~~7~~3
o	4294.8	4294.0	4294.4	0.4	-0.4	0.8	+4242.0	-52.4	4236.0	-6.0
p	4294.0	4294.0	4294.0				+4240.1	-53.9	4235.6	-4.5
q	4405.4	4401.4	4403.4	2.0	-2.0	4.0	+4328.7	-74.7	4345.0	+16.3
			16703.5 / 7 = 2386.2				16294.7 / 7 = 2327.8	-408.8 / 7 = -58.4		+18.8 -18.8 0.0

y	1st Reading	2nd	Mean y	Resid.		Diff.	Comp. Y	Y-Mean y	y+Const.	y-Y	
a	3268.6	3268.6	3268.6				+15135.7	+11867.1	1510~~5.5~~41	-30.2	-31.6
b	2993.2	2993.2	2993.2				+14857.4	11864.2	148~~30.1~~287	-27.3	-28.7
d	2829.4	2830.2	2829.8	-0.4	0.4	0.8	+14683.4	11853.6	1466~~6.7~~53	-16.7	-18.1
h	2978.1	2978.1	2978.1				+14819.3	11841.2	1481~~5.0~~3.6	-4.3	-5.7
o	2208.9	2209.7	2209.3	-0.4	0.4	0.8	+14020.0	11810.7	1404~~6.2~~4.8	+26.2	+24.8
p	2147.2	2150.0	2148.6	-1.4	1.4	2.8	~~+13970.1~~ 13960.0	~~11821.5~~ 11811.4	1398~~5.5~~4.1	~~+15.4~~ +24.1	+24.1
q	97.4	97.4	97.4				+11897.4	11800.0	119~~34.3~~39	+36.9	+35.5
			16525.0 / 7 = 2360.7				~~99383.3~~ / 7 = ~~14197.6~~ 99373.2 / 7 = 14196.2	~~+82858.3~~ / 7 = ~~+11836.9~~ 82848.2 / 7 = +11835.5			+84.4 -84.1 +0.3

Resid. x	Resid. X	x-X	x/100	(x-X) x/100	x²/100	xy/100	(x-X) y/100	x/100 + y/100 = S
-2066.0	-2066.3	+0.3	-20.66	-6.20	426.84	-187.59	+2.72	-11.58
-2043.7	-2044.1	+0.4	-20.44	-8.18	417.79	-129.18	+2.53	-14.12
-1521.0	-1522.8	+1.8	-15.21	-27.38	231.34	-71.33	+8.44	-10.52
-202.4	-194.1	-8.3	-2.02	+16.77	4.08	-12.46	-51.21	+4.15
+1908.2	+1914.2	-6.0	+19.08	-114.48	364.05	-28.81	+9.06	+17.57
+1907.8	+1912.3	-4.5	+19.08	-85.86	364.05	-40.45	+9.54	+16.96
+2017.2	+2000.9	+16.3	+20.17	+328.77	406.83	-456.45	-368.87	-2.46
+5833.2	+5827.4	+18.8	+58.33	+345.54			+32.29	
-5833.1	-5827.3	-18.8	-58.33	-242.10			-420.08	
+0.1	+0.1			+103.44	+2214.98	-926.27	-387.79	

Resid. y	Res. Y	y-Y	y/100	(y-Y) y/100	y²/100		(y-Y) x/100	sn'
+907.9	~~+938.1~~ +939.5	~~-30.2~~ -31.6	+9.08	-274.22	82.45		+623.93	+365.93
+632.5	~~+659.8~~ +661.2	~~-27.3~~ -28.7	+6.32	-172.54	39.94		+558.01	(5) +405.24
+469.1	~~+485.8~~ +487.2	~~-16.7~~ -18.1	+4.69	-78.32	22.00		+254.01	+190.41
+617.4	~~+621.7~~ +623.1	~~-4.3~~ -5.7	+6.17	-26.53	38.07		+8.69	-23.66
-151.4	~~-177.6~~ -176.2	~~+26.2~~ +24.8	-1.51	-39.56	2.28		+499.90	(3) +435.74
-212.1	~~-227.5~~ -236.2	~~+15.4~~ +24.1	-2.12	-32.65	4.49		+293.83	+408.74
-2263.3	~~-2300.2~~ -2298.8	~~+36.9~~ +35.5	-22.63	-835.05	512.12		+744.27	-87.33
+2626.9	~~+2705.4~~ +2711.10	~~+78.5~~ +84.4	+26.26					+1806.06
-2626.8	~~-2705.3~~ -2711.2	~~-78.5~~ -84.1	-26.26					-110.99
+0.1	-0.2	+0.3		-1458.87	+701.35		+2982.64	+1695.07

(y-Y) y/100	(y-Y) x/100
-286.93	+652.86
-181.38	+586.63
-84.89	+275.30
-35.17	+11.72 51
-37.45	+473.18
-51.09	+459.83
-803.36	+716.04
-1480.27	+3175.56 35

$(y-Y)\frac{y}{100} = -1480.27$

$(y-Y)\frac{x}{100}$ +3175.35

+1695.08

a +.412 a' +.485
b +1.097 b' -1.231
c -35.7 c' +17.9
Constants X = -58.4 Y = +11835.5

To be added to meas.

D6374 from B10909

	1st Reading	2nd	Mean x	Resid.		Diff.	ax	by	c	Σ	Corr. x	(Const.) -58.4 = X
X Eros	2261.3	2262.1	2263.8	-2.5	-1.7		+9.33	+21.83	-35.7	-4.6	2259.2	+2200.8
"	2265.3	2263.7		1.5	-0.1							
"	2265.3	2265.3		1.5	1.5							
c	710.0	709.2	709.6	0.4	-0.4	0.8						
e	1927.2	1927.2	1927.2									
f	2352.9	2352.9	2352.9									
g	2475.4	2476.2	2475.8	-0.4	0.4	0.8						
k	2388.7	2387.9	2388.3	0.4	-0.4	0.8						
l	2611.4	2611.4	2611.4									
m	3076.8	3076.0	3076.4	0.4	-0.4	0.8						
n	3227.2	3228.0	3227.6	-0.4	0.4	0.8						
q			4403.4				+18.1	+ 1.1	-35.7	-16.5	4386.9	+4328.5 O Comp +4328.7 -0.2 O-C

	1st Reading	2nd	Mean y	Resid.		Diff.	a'y	b'x	c'	Σ	Corr. y	+11835.5
Y Eros	1990.1	1990.9	1990.4	-0.3	0.5		+9.65 .7	-27.87	+17.9 .90	-0.3 0.32	1990.1 .08	+13825.6 .58
"	1990.9	1990.1		0.5	-0.3							
"	1990.1	1990.1		-0.3	-0.3							
c	3216.0	3216.0	3216.0									
e	881.9	883.5	882.7	-0.8	0.8	1.6						
f	1461.1	1459.9	1460.5	0.6	-0.6	1.2						
g	1099.9	1099.9	1099.9									
k	1823.8	1826.6	1825.2	-1.4	1.4	2.8						
l	1962.2	1963.0	1962.6	-0.4	0.4	0.8						
m	2980.5	2981.3	2980.9	-0.4	0.4	0.8						
n	2396.6	2396.6	2396.6									
q			97.4				+.5	~~-18.1~~ -54.2	+17.9	~~+0.3~~ -35.8	+61.6	+11897.1 = O 11897.4 - C -0.3 = O-C

	Errs.	Uncorr vals 6374	6371	uncorr diff 6371 − 6374	see p76 Corr diff
V 1875	+13825″.6	2205.4	2204.0	−1″.4	+.4
X 1875	+2200.8				

Normals eliminating c c c'

D6374
from B10909

$0 = +103.44 \quad +2214.98\,a \quad -926.27\,b$

$\quad -387.79 \quad -926.27 \quad +701.35$

2.01469   3.34537   2.96674
2.58860   2.84593

÷ coeff b

9.04795   0.37863   9.99369
9.74267 $\overset{9.61506}{0.12081}$ 9.73587

$+.11167 \quad + \quad 2.3913\,a - b \quad +.98558$ b = +1.09725
$-.55293 \quad - \quad 1.3207\,a + b \quad -.54434$ +1.09727
$-.44126 \quad + \quad 1.0706$
9.64469   0.02963
log a   9.61506   a = +.41215

adopt
a = +.412
b = +1.097
c = −35″.7 see below

To find c

a + b Subs. in Resids → = Check on O−C

	x/100	check a x & Resids	by	x−X	ax	by	Σ=c	Resids fr. mean =O−C	O−C
a	+3.20	$-8.5^{″51}$	$+10.0^{11.96}$	+3″	+1″.32	+35″.86	+37.5	+1″.8	$+1″.8^{.75}$
b	3.42	-8.4^{42}	$+6.9^{.93}$	+.4	+1.41	+32.83	+34.6	−1.1	$-1.1^{.09}$
d	8.65	-6.3^{37}	$+5.1^{.14}$	+1.8	+3.56	+31.05	+36.4	+0.7	$+.6^{.67}$
h	21.84	-0.8^{83}	$+6.8^{.77}$	−8.3	+9.00	+32.67	+33.4	−2.3	$-2.3^{.34}$
o	42.94	$+7.9^{86}$	$-1.7^{.66}$	−6.0	+17.69	+24.23	+35.9	+.2	$+.2^{20}$
p	42.94	$+7.9^{86}$	-2.3^{33}	−4.5	+17.69	+23.57	+36.8	+1.1	$+1.1^{.03}$
q	44.03	$+8.3^{31}$	$-24.8^{.82}$	+16.3	+18.14	+1.06	+35.5	−.2	$-.2^{21}$
		M 88.9	nearest tenths used in sums				401	+3.8 −3.6 ±7.4	+37 +.365 −36 −.364 ±.73 4
					Mean		+35.7	±1.06	±1.04

C = −35.7

Same in p. 90

		a′	b′
y-V y/100	0 = −1480.27	+ 701.35	−926.27
.. x/100	0 = + 3175.56	− 926.27	+2214.98
	3.17034	2.84593	
	3.50182	2.96674	
÷ coeff a′			
	0.32441	0.12081	0.21093
		0.09012	
	0.53508	0.37863	0.46875

0 = − 2.1106 + a′ − 1.3207 b′ +1.6253   0 = +a′ +.6422

+ 3.4281 − a′ + 2.3913 b′ − 2.9427   0 = −a′ + .6423

+ 1.3175   +1.0706

0.11975

0.02963

log b′ 0.09012   b′ = − 1.2306

adebt

a′ = +.485

b′ = −1.231

e′ = + 17.″9 see below

To find e′

a + b Subst. in Resids

y/100	0=	a′y	b′x	p.85 y−V	Σ	
32.69	a	+15.85	−3.94	−31.6	−19.7	− 1.8
29.93	b	+14.52	−4.21	−28.7	−18.4	− 0.5
28.30	d	+13.73	−10.65	−18.1	−15.0	+2.9
29.78	h	+14.44	−26.89	−5.7	−18.2	− 0.3
22.09	σ	+10.71	−52.86	+24.8	−17.4	+ 0.5
21.49	p	+10.42	−52.86	+24.1	−18.4	− 0.5
0.97	q	+0.47	−54.20	+35.5	−18.2	− 0.3

125.3 / 7 = −17.9

+ 3.4
− 3.4
6.8 / 7 ± 0.97

e′ = +17.″9 / 90

See also p. 90

Resids   Check on a b

	b′x	+ a′y	− Σ	= y−V ″
0=	+25.4	+4.4	+29.8	−1.8
	+25.2	+3.1	+28.2	−.5
	+18.7	+2.3	+21.0	+2.9
	+ 2.5	+3.0	+ 5.5	− 2
	−23.5	−.7	−24.2	+.6
	−23.5	−1.0	−24.5	−.4
	−24.8	−11.0	− 35.8	−.3

−32
+35
±67
±.96

a +.412
b +1.097
~~c −35.7~~
~~X −58.4~~

a' +.485
b' −1.231
~~c' +17.9~~
~~Y +11835.5~~

To find c c'

Residuals

D6374 from B10909

X	x/100	ax	by	c	Σ = C	O(x−X)	O−C
a	3.20	+1.32	+35.86	−35.7	+1.5	+0.3	−1.2
b	3.42	+1.41	+32.83		−1.5	+0.4	
d	8.65	+3.56	+31.05			+1.8	
h	21.84	+9.00	+32.67				
o	42.94	+17.71	+24.23				
p	42.94	+17.71	+23.57				
q	44.03	+18.14	+1.06				

	y/100	a'y	b'x	c'	Σ = C	O(y−Y)	O−C
a	32.69	+15.85	−3.94	~~+17.9~~	~~+29.8~~	~~−31.6~~	~~1.8~~
b	29.93	14.52	4.21				
d	28.30	13.73	10.65				
h	29.78	14.44	26.89				
o	22.09	10.71	52.86				
p	21.49	10.42	52.86				
q	0.97	0.47	54.20				

For recomputation using Computed X & Y see Book 5, p. 166.

D 6344 from B 11174. May 19, 1894.

Meas. Bk. 15, p. 54

x Washington	1st Read.	2nd	Mean x	Resid.	Diff.	Comp. X	X-Mean x	x+Const.	x-X
a	312.2	311.4	311.8	0.4 -0.4	0.8	+5004.8	+4693.0	+5011.9	+7.1
b	651.5	653.5	652.5	-1.0 1.0	2.0	+5359.0	4706.5	5352.6	-6.4
c	714.0	714.0	714.0			+5397.9	4683.9	5414.1	+16.2
d	1764.1	1764.1	1764.1			+6452.4	4688.3	6464.2	+11.8
k	2437.1	2437.1	2437.1			+7159.9	4722.8	7137.2	-22.7
l	2475.8	2475.8	2475.8			+7187.7	4711.9	7175.9	-11.8
*n	3668.8 179. 3489.8	3668.4 179. 3489.4	(~~3668.6~~) 1 div. 179. 3489.6	0.2 -0.2	0.4	+8183.6	4694.0 ~~4515.0~~	8189.7	+6.1
			11844.9 = 7 1692.1			44745.3 7 +6392.2	32900.4 = 7 +4700.1		+41.2 -40.9 +0.3

y Washington	1st Read.	2nd	Mean y	Resid.	Diff.	Comp. Y	Y-Mean y	y+Const.	y-Y
a	2045.0	2045.0	2045.0			-11221.5	-13266.5	-11233.6	-12.1
b	3156.3	3156.3	3156.3			-10105.1	-13261.4	-10122.3	-17.2
c	562.9	562.9	562.9			-12714.0	-13276.9	-12715.7	-1.7
d	296.3	296.3	296.3			-12991.1	-13287.4	-12982.3	+8.8
k	3844.6	3844.6	3844.6		/	-9430.8	-13275.4	-9434.0	-3.2
l	2523.9	2523.9	2523.9			-10755.5	-13279.4	-10754.7	+0.8
n	264.6	264.6	264.6			-13038.7	-13303.3	-13014.0	+24.7
			12693.6 = 7 1813.4			-80256.7 = 7 11465.2	550.3 = 7 -13278.6		+34.3 -34.2 +0.1

* n D6344 Est. x = 20.0 sub 1 div.

n D6346 " x = 19.9

Residuals.

x	X	$x-X$	$x/100$	$(x-X)\,x/100$	$x^2/100$	$xy/100$	$(x-X)\,y/100$
−1380.3	−1387.4	+7.1	−13.80	−97.98	190.44	−32.02	+16.47
−1039.6	−1033.2	−6.4	−10.40	+66.56	108.16	−139.67	−85.95
−978.1	−994.3	+16.2	−9.78	−158.44	95.65	+122.25	−202.50
+72.0	+60.2	+11.8	+0.72	+8.50	0.52	−10.92	−179.01
+745.0	+767.7	−22.7	+7.45	−169.12	55.50	+151.31	−461.04
+783.7	+795.5	−11.8	+7.84	−92.51	61.47	+55.66	−83.78
+1797.5	+1791.4	+6.1	+17.98	+109.68	323.28	−278.51	−94.49
+3398.2	+3414.8	+412	+33.99	+184.74		−461.12	+16.47
−3398.0	−3414.9	−40.9	−33.98	−518.05		+329.22	−1106.77
+0.2	−0.1	+0.3		−333.31	+835.02	−131.90	−1090.30

y	Y	$y-Y$	$y/100$	$(y-Y)\,y/100$	$y^2/100$	$xy/100$	$(y-Y)\,x/100$
+231.6	+243.7	−12.1	+2.32	−28.07	5.38		+166.98
+1342.9	+1360.1	−17.2	+13.43	−231.00	180.36		+178.88
−1250.5	−1248.8	−1.7	−12.50	+21.25	156.25		+16.63
−1517.1	−1525.9	+8.8	−15.17	−133.50	230.13		+6.34
+2031.2	+2034.4	−3.2	+20.31	−64.99	412.50		−23.84
+710.5	+709.7	+0.8	+7.10	+5.68	50.41		+6.27
−1548.8	−1573.5	+24.7	−15.49	−382.60	239.94		+444.11
~~+4376.2~~	+4347.9	+34.3	+43.16	+26.93			+819.21
−4316.4	−4348.2	−34.2	−43.16	−840.16			−23.84
+4316.2	−0.3	+0.1		−813.23	+1274.97		+795.37
−0.2							

±843.05

± 867.09

a = +.543 ✓
b = +.911 ✓
c = −25″.~~8~~7 ✓

a′ = +.548 ✓
b′ = −.866 ✓
c′ = +4″.~~9~~7 ✓

To be added to meas.

Const. X +4700″.1

Y = −13278″.6

D 6344.

	X	1st Read.	2nd	Mean x	Resid	Diff	a x	b y	c	Σ	x + Σ
	Eros.	2460.2	2460.2	2461.4	-1.2 -1.2		+13.4 ✓	+20.9 ✓	~~−25.8~~ −25.7	+8.~~5~~6 ✓	24~~69.9~~ 70.0 ✓
a	"	2464.2	2461.8		2.8 0.4						
b	"	2461.0	2461.0		-0.4 -0.4						
c	e	1776.9	1776.1	1776.5	0.~~5~~4 -0.~~5~~4	0.8					
d	f	2110.2	2110.2	2110.2							
k	g	2313.1	2313.1	2313.1							
l	h	2393.5	2393.5	2393.5							
n	m	2655.2	2655.2	2655.2							

y

	Y	1st Read.	2nd	Mean y	Resid.	Diff.				Σ	
a											
b	Eros.	2296.4	2297.2	2297.1	-0.7 0.1		+12.6 ✓	−21.3 ✓	+4.~~8~~7	−~~3.8~~ 4.0 ✓	229~~3.3~~ 3.1 ✓
c	"	2297.2	2297.2		0.1 0.1						
d	"	2297.2	2297.2		0.1 0.1						
k	e	3422.9	3422.9	3422.9							
l	f	2364.8	2364.8	2364.8							
n	g	2562.5	2563.7	2563.1	-0.6 0.6	1.2					
	h	2313.1	2313.1	2313.1							
	m	2066.4	2066.4	2066.4							

*

see p109 p6346

+7170.″~~2~~1 ✓

−10985.~~3~~5 ✓

DC344 from BII174

$$0 = -333.31 + \overset{x^2}{835.02}a - \overset{xy}{131.90}b$$

$$0 = -1090.30 \qquad + \overset{y^2}{1274.97}$$

2.52285 2.92170 2.12024

3.03755 3.10550

÷ coeff a 9.60115 9.19854 9.15796

0.91731 $\overset{9.95942}{0.98526}$ 0.94468

$-0.3992 + a - .1580b \qquad -.1439 \qquad 0 = +a - .5431$

$\underline{-8.2609} \quad \underline{- a + 9.6663b} \qquad +8.8040 \qquad 0 = -a + .5431$

$0 = -8.6601 \qquad +9.5083b \qquad a = +.543$

0.93752

add with signs given here 0.97810

log b 9.95942 $b = +.91079$

$a \overset{+}{=} \backsim .543$

Check on the above. Gauss form.
(Feb 1900)

	aa	ab		aw
	+835.02	−131.90		−333.31
	2.9217	2.1202_n		2.5228_n
		9.1985_n		
		1.3187		1.7213
	−333.31	+1274.97		−1090.30
2.0798_n	−120.2	+20.83		+52.64
	−453.5	+1254.14		−1142.94
	2.6566_n	3.0983		3.0579_n
	9.7349			9.9596_n
sub. from meas. with these signs. $x =$	$a = -.543$		$b = y =$	−.911

y^2 xy

$0 = -813.23 + 1274.97\, a'$

$0 = +795.37$ xy x^2

2.91021 3.10550 2.12024

2.90057 2.12024 2.92170

coeff b′

0.78997 0.98526 0.72426

9.97887 9.73900 9.19854 8.93754

$-6.1655 + \quad -b' \quad +5.2998$ $0 = -.8657 - b'$

$\underline{+.9524 - \quad +b'}$ $- .0866$ $+.8658 + b'$

$-5.2131 \quad +9.5083\, a'$

$b' = -.866$

0.71710

$\underline{0.97810}$

9.73900 $a' = +.54828$

an′

+795.″37

2.9006

2.0991n

+795.37 −813.23

1.8593n $\underline{-72.34}$ $\underline{-125.6}$

+723.03 −687.6

2.8591 2.8374n

9.9374 9.7391n

$b' = x' + .866$ $a' = y = -.548$

a = +.543 ✓
b = +.911 ✓

D 6344 = B 11174
To find c + c′

1894

	x/100	a x	b y	x − X (p 106)	Σ = C	O − C	
a	3.12	+ 1.7	+ 18.6	+ 7.1	+ 27.4	+ 1.6	+ 1.7
b	6.52	3.5	28.8	− 6.4	25.9	+ 1	+ 0.2
c	7.14	3.9	5.1	+ 16.2	25.2	− 6	− 0.5
d	17.64	9.6	2.7	+ 11.8	24.1	− 1.7	− 1.6
k	24.37	13.2	35.0	− 22.7	25.5	− .3	− 0.2
l	24.76	13.~~9~~ 4	23.0	− 11.8	~~25.1~~ 46	− .7	− 1.1
n	34.90	+ 19.0	+ 24	+ 6.1	+ 27.5	+ 1.7	+ 1.8
					+ ~~25.8~~	+ 34 − 33 6.7	+ 3.7 − 3.4 + 0.3

a′ = +.548 ✓
b′ = −.866 ✓

C = − ~~25.8~~ $\frac{180.2}{7}$ = +25.7 ✓

~~± .96~~

$\frac{7.1}{7}$ = ± 1.01 ✓

	y/100	a′ y	b′ x	y − Y	Σ = c′	O − C	
a	20.45	+ 11.2	− 2.7	− 12.1	− 3.6	+ 1.3	+ 1.1
b	31.56	+ 17.3	− 5.6	− 17.2	− 5.5	− .6	− 0.8
e	5.63	+ 3.1	− 6.2	− 1.7	− 4.8	+ .1	− 0.1
d	2.96	+ 1.6	− 15.~~4~~ 3	+ 8.8	− ~~5.0~~ 4.9	− 1	− 0.2
k	38.45	+ 21.1	− 21.1	− 3.2	− 3.2	+ 1.7	+ 1.5
l	25.24	+ 13.~~9~~ 8	− 21.~~6~~ 4	+ 0.8	− ~~7.3~~ 6.8	− 2.2	− 2.1
n	2.65	+ 1.~~1~~ 5	− 30.2	+ 24.7	? − ~~5.1~~ 4.0	− 2	+ 0.7
					− ~~4.9~~	− 31 + 31	+ 3.3 − 3.2 + 0.1

$\frac{32.8}{7}$ =

c′ = + ~~4.9~~ 4.7 ✓ ± .62 ± .~~89~~

$\frac{6.5}{7}$ = ± 0.93 ✓

c′ = + 4.7 ✓

Check on O−C a b a′ b′ Substituted in Resids.

~~to be~~ checked

pg 5

Resids x/100	Resids ax	$\overset{\Sigma}{ax+by}$ by	$x-X$		approx $\Sigma = O-C$
−13.80	−7.5	+2.1 ✓	−5.4	~~−5.4~~	+1.7
−10.40	−5.6	+12.2 ✓	+6.6		+.2
	−5.3	−11.4 ✓	−16.7		−.5
	+0.4	−13.8 ✓	−13.4		−1.6
	+4.0	+18.5 ✓	+22.5		−.2
	+4.3 ✓	+6.5 ✓	+10.8		−1.0 ?
	+9.8	−14.1 ✓	−4.3		+1.8

+3.7
−3.3
±7.0
±1.00

Resids y/100	$a'y$	$b'x$	$y-Y$	$\Sigma = O-C$
+2.32	+1.3	+12.0		+1.2
+13.43	+7.4	+9.0		−.8
−12.50	−6.8	+8.5		0
−15.17	−8.3	−0.6		−.1
+20.31	+11.1	−6.4		+1.5
+7.10	+3.9	−6.8		−2.1
−15.49	−8.5	−15.6		+.6

+3.3
−3.0
±.63 ±.90

see Eros 5 p 174 for sol. with Computed Coords in Equations.

B 11174 Eros from 2 eql.

Eros by Turners measures in Equations. p 109

	D6344	D6346	Mean	Mr C's ass Val: + his Corrs see p 185
Y 1875	-10985."~~3~~5	-10982."0	-10983".65	-10973.4 -9.95 = -10973.4
log Y	4.04081~~1~~99 n	4.0406814 n		
	5.3144251	5.3144251		
"Y/R	8.7263~~868~~948 n	8.7262563 n		
d = b - D	-3° 2' ~~54".93~~ 55.13	-3° 2' 51".64		
D	-11 55	-11 55		
b = D + d	-14 57 ~~54.93~~ 55.13	-14 57 51.64		
X	+7170.~~0~~1	+7171.~~6~~7	+ 7170".8	+7166.2 + 4.5 = + 7170.7
log X	3.8555~~192~~252	3.8556~~161~~221		
"X/R	8.541~~0941~~1001	8.54119~~10~~70		
cos d	9.99938~~50~~49	9.9993853		
X/R cos d	8.5404~~791~~850	8.54057~~63~~823		
cos b	9.985014~~2~~1	9.9850161		
X/R cos d / cos b = tan a	8.5554~~649~~709	8.55556~~02~~62		
a = α - A	+2 3 28.~~04~~14	+2 3 29.~~66~~76		
A = 10h 29m.8	157 ~~57~~27 00			
α = a + A	159 30 28.04	159 30 29.~~66~~76 = 1s.98		
time	10h 38m 1s.87	10h 38m 1s.98		
Circular 36 α =	10 38.0			

checked again June 1 1900 see Eros 5 p 174 with computed values in Equations. → + 2° 3' 28".14

→ 10 38 1.88

log tan b	9.42699~~80~~97 n	9.4269702 n
cos a	9.9997198	9.9997197
Σ	9.42671~~78~~95 n	9.4266899 n
δ 1875	-14° 57' ~~21".74~~ 21".94	-14° 57' 18".44
Circular 36 δ =	-14 57 18.44	

Mean α 1875 Eros 10h 38m 1s.9~~2~~3 } Mean from the 2 eql.
δ " " -14° 57' 20".~~1~~2 }

May 8 1899
Mr Chandler's Solution from mean Δξ + Δη 10h 38m 1s.91, -14° 57' 20".0 } Mr Chandler's Solution see p 185 + his corrs.

10h 38m 1s.92, -14 57 20.3 } my solution from Mr C's data see pp 186–187

D6344

p.112 +1.7
+0.7
0.0
−3.0
+0.4
−2.1
+2.6
+5.4
−5.1
+0.3
10.5 / 7 = ±1.50

p.96 c = 7 −25.7 c′ = +4.7
+13.4 +20.9 − 25.7 = +8.6 2470.0 +7170.1 +4700.1
+12.6 −21.3 +4.7 = −4.0 2293.1 −10985.5

−10985.5
4.0408199n
5.3144251
−13278.6 8.7263948n
−3 2 55.13
−11 55
−14 57 55.13

+ 7170.1
3.8555252
5.3144251
8.5411001
9.9993849
~~9.9850141~~
8.5404850
~~8.5560860~~
9.9850141
~~+2 3 38.68~~
~~8.55547~~09
2 3 28.12
+0 8 13.87
10 29 48
10 38 1.87
9.4269997n
9.9997198
9.4267195n
−14 57 21.94

c = −23.4 Z +4711.3
p.108 +12.6+18.9−23.4+8.1 2460.4 + 7171.7

3.8556221
5.3144251
8.5411970
9.9993853
8.5405823
9.9850161
8.5555662
+2 3 29.76
+0 8 13.98
10 29 48
10 38 1.98

D6344	D6346	
−10985.5	−10982.0	−3.5
+7170.1	+7171.7	−1.6
		cos δ 0.96~~5~~69
10 38 1.87	10 38 1.98	−0.11 × 14.49 = −1.59
−14 57 21.94	−14 57 18.44	−3.50

Mean R.A. 10 38 1.92
" Dec. −14 57 20.19

Mr C' ass Val
+ my corr sep 186-7

. Mr C uses Comp – Obs + adds Z + Z' bass val.

$-10''3$

$= -10973''.7$

D6344-6346
diff γ
$-3''.\overset{5}{8}$

$+4.8$

$= +7171''.0$

diff X
$-1''.6$ ✓

Nat cos δ .966

diff α
$-.\overset{s}{11} = -1''.6$ ✓

diff δ
$-3.\overset{''5}{30}$

D6346 from B11174. May 19, 1894. Meas. Bk. 15, p. 56

x	Washington 1st Read.	2nd	Mean x.	Resid.	Diff.	Comp. X	X-Mean x	x+Const.	x-X
a	300.3	300.3	300.3			+5004.8	+4704.5	5011.6	+6.8
b	642.4	642.4	642.4			+5359.0	+4716.6	5353.7	-5.3
c	702.1	702.1	702.1			+5397.9	+4695.8	5413.4	+15.5
d	1751.0	1749.8	1750.4	0.6 -0.6	1.2	+6452.4	+4702.0	6461.7	+9.3
k	2427.6	2428.4	2428.0	-0.4 0.4	0.8	+7159.9	+4731.9	7139.3	-20.6
l	2464.2	2464.2	2464.2			+7187.7	+4723.5	7175.5	-12.2
n ~~m~~	3478.6	3478.6	3478.6			+8183.6	+4705.0	8189.9	+6.3
			11766.0 / 7 =			44745.3 / 7 =	32979.3 / 7 =		+37.9 -38.1
			1680.9			+6392.2	+4711.3		-0.2

y	Washington 1st Read.	2nd	Mean y	Resid.	Diff.	Comp. Y	Y-Mean y	y+Const.	y-Y
a	1998.8	1998.8	1998.8			-11221.5	-13220.3	-11233.0	-11.5
b	3111.9	3112.6	3112.2	-0.3 0.4	0.7	-10105.1	-13217.3	-10119.6	-14.5
c	515.5	515.1	515.3	0.2 -0.2	0.4	-12714.0	-13229.3	-12716.5	-2.5
d	248.6	248.6	248.6			-12991.1	-13239.7	-12983.2	+7.9
k	3796.8	3796.8	3796.8			-9430.8	-13227.6	-9435.0	-4.2
l	2479.3	2476.9	2478.1	1.2 -1.2	2.4	-10755.5	-13233.6	-10753.7	+1.8
n ~~m~~	216.0	216.0	216.0			-13038.7	-13254.7	-13015.8	+22.9
			12365.8 / 7 =			80256.7 / 7 =	222.5 / 7 =		+32.6 -32.7
			1766.54			-11465.24	-13231.8		-0.1

Equations of Condition

Residuals resid

x	X	O= x − X	x/100	(x−X) x/100	x²/100	xy/100	(x−X) y/100
−1380.6	−1387.4	+6.8	−13.81	−93.91	190.72		+15.78
−1038.5	−1033.2	−5.3	−10.38	+55.01	107.74		−71.34
−978.8	−994.3	+15.5	−9.79	−151.74	95.84		−193.90
+69.5	+60.2	+9.3	+.70	+6.51	0.49		−141.17
+747.1	+767.7	−20.6	+7.47	−153.88	55.80		−418.18
+783.3	+795.5	−12.2	+7.83	−95.53	61.31		−86.86
+1797.7	+1791.4	+6.3	+17.98	+113.27	323.28		−97.65
+3397.6	+3414.8	+37.9	+33.98	+174.79			−1003.32
−3397.9	−3414.9	−38.1	−33.98	−495.06			
−0.3	−0.1	−0.2		−320.27	+835.18		
							±1024.88

Residuals. resid

y	Y	y − Y*	y/100	(y−Y) y/100	y²/100	xy/100	(y−Y) x/100
+232.3	+243.7	−11.4	+2.32	−26.68	5.38	−32.04	+158.82
+1345.7	+1360.1	−14.4	+13.46	−195.17	181.17	−139.71	+150.51
−1251.2	−1248.8	−2.4	−12.51	+31.28	156.50	+122.47	+24.48
−1517.9	−1525.9	+8.0	−15.18	−119.92	230.43	−10.63	+5.53
+2030.3	+2034.4	−4.1	+20.30	− $\overset{85}{\cancel{+27}}$.26	412.09	+151.64	−31.37
+711.6	+709.7	+1.9	+7.12	+12.82	50.69	+55.75	+14.09
−1550.5	−1573.5	+23.0	−15.50	−354.95	240.25	−278.69	+411.74
+4$\overset{3}{8}$29.9	+4$\overset{3}{8}\overset{4}{8}$7.9	+32.9	+43.20	+44.10	1276.51	+329.86	+733.80
−4319.6	−4348.2	−32.3	−43.19	−781.98		−461.07	
+0.3	−0.3	+0.6		−737.88		−131.21	
				±826.08		±790.93	±796.54

*Use y−Y page 106.

a +.515
b +.839
c −23.~~5~~4

a′ +.496
b′ −.801
c′ +4.7

To be added to meas.

Cent X +4711″.3   Y −1323″1.8

D6346 from B11174.

x	1st Read	2nd	Mean x	Resid.	Diff.	ax	by	c	Σ	x+Σ
Eros	2451.1	2452.3	2452.3	−1.2 0.0		+12.6	+18.9	~~−23.5~~4	+8.~~0~~1	+2460.~~3~~4
"	2452.3	2452.7		0.0 0.4						
"	2452.3	2453.1		0.0 0.8						
e	1764.1	1764.9	1764.5	−0.4 0.4	0.8					
f	2101.0	2098.2	2099.6	1.4 −1.4	2.8					
g	2301.1	2301.1	2301.1							
h	2383.5	2383.5	2383.5							
m	2643.2	2643.2	2643.2							

Y	1st Read.	2nd	Mean y	Resid.	Diff.				Σ	y+Σ
Eros	2253.4	2253.4	2253.5	−0.1 −0.1		+11.2	−19.6	+4.7	−3″.7	+2249.8
"	2253.4	2253.8		−0.1 0.3						
"	2253.8	2253.4		0.3 0.1						
e	3377.1	3375.5	3376.3	0.8 −0.8	1.6					
f	2319.0	2317.0	2318.0	1.0 −1.0	2.0					
g	2513.6	2516.0	2514.8	−1.2 1.2	2.4					
h	2265.3	2265.3	2265.3							
m	2018.8	2018.8	2018.8							

adopted Value X	Uncorr. values difference of the 2 cul D6346 Mean x + Const X	D6344 p96	X Uncorr diff 6344-6346	sep 96 Corr diff
+7171″.6 7	+7163″.6	+7161″.5	−2″.1	−1″.6

Un corr. Vals

Y	D6346	D6344	Y	
−10982″.0	−10978.3	−10981.5	−3″.2	−3.3

B11174

D6346

0 = −320.27 +835.18 a −131.21 b

0 = ∓1003.32 −131.21 +1276.51

2.50552 2.92178 2.11797

3.00144 3.10602

÷ coff a

9.58374 9.19619 9.11993

9.92374

0.88347 0.98805 0.91179

− .38348 + a − .15710 b − .13180 a = +.5153

−7.6465 − a +9.72866 b +8.1619 +.5154

0 = − 8.0300 +9.5715 b

0.90472

0.98098

9.92374 b = +.83896

↑ add with upper signs a + b a′ + b′

sub with lower signs a ∓ b a′ ∓ b′

↓ Check on the above

(Feb. 1900)

	aa	ab		an
	+835.18	−131.21		−320.27
	2.9218	2.1179_u		2.5055_u
		9.1961_u		
		1.3140		1.7016
	−320.27	+1276.51		−1003.32
2.0418_u	−110.1	+ 20.60		+ 50.30
	−430.37	+1255.91		−1053.62
	2.6339_u	3.0990		3.0229_u
	9.7121_u			9.9239_u
a = x =	−.515		b = y =	−.839

$0 = ~~+737.88~~ + 1276.51\,a' - 131.21\,b'$

$0 = +733.80 - 131.21 + 835.18$

2.86799
2.86558

+coeff b' 0.75002 0.98805 0.68331
9.69526
9.94380 9.19619 8.89145

$-.56237 + 9.7286\,a' - b' + 4.8229\ 0 = -b' - .8008$

$+~~8.87862~~ - .1571\,a' + b' - .07788\ 0 = +b' + .8007$

$0 = -4.7451 + 9.5715\,a'$

$b = -.801$

0.67624
0.98098
9.69526 $a' = +.49575$

				$(y - y_1)\frac{x}{100}$ $a n'$
				+733.80
				2.8656
				2.0617_n
	+733.80			−737.88
1.8131_n	− 65.03			−115.3
	+668.77			−622.6
	2.8253			2.7942_n
	9.9035			9.6952_n
	$b' = x' + .801$			$a' = y' = -.496$

$a = +.515$ ✓
$b = +.839$ ✓

D6346 from B11174
To find c & c'

	p106 x/100	ax	by	p106 x − X	Σ = c	O − C	
a	3.00	+ 1.5	+16.8	+6.8	+25.1	+1.6	+1.7 ✓
b	6.42	3.3	26.1	−5.3	24.1	+.6	+0.7 ✓
c	7.02	3.6	4.~~4~~3	+15.5	23.~~5~~4	0	0.0 ✓
d	17.50	9.0	2.1	+9.3	20.4	−3.1	−3.0 ✓
k	24.28	12.5	31.9	−20.6	23.8	+.3	+0.4 ✓
l	24.64	12.7	20.8	−12.2	21.3	−2.2	−2.1 ✓
n	34.79	17.9	1.8	+6.3	26.0	+2.5	+2.6 av. dev.
					24.~~2~~1		

+5.4 ✓
−5.1 ✓
$\frac{10.5}{7} = \pm 1.50$ ✓

+ 50
− 5 x 3
±1 03

±1.~~47~~50 D6346
±~~.96~~1.01 D6344 p100
(±1.2~~3~~6 Mean)

Mean +23.~~3~~4
C = −23.~~3~~4 ✓

Mean of 2 ed Mr. Chandler's ±1.66 see p185
My recomp of " ±1.23 "
There were errors in his x y z, x' y' z'

$a' = +.496$ ✓
$b' = -.801$ ✓

	y/100	a'y	b'x	p106 y − Y	Σ = c'	O − C
a	19.99	+9.9	−2.4	−11.5	−4.0	+.7
b	31.12	+15.4	−5.1	−14.5	−4.2	+.5
c	5.15	+2.6	−5.6	−2.5	−5.5	−.8
d	2.49	+1.2	−14.0	+7.9	−4.9	−.2
k	37.97	+18.8	−19.4	−4.2	−4.8	−.1
l	24.78	+12.3	−19.7	+1.8	−5.6	−.9
n	2.16	+ 1.0	−27.9	+22.9	−4.0	+.7
				Mean	−4.7	+1.9
						−2.0
						±3.9

C' = +4.7

±.56 D6346
±~~.89~~.93 D6344 p100
← (±.7~~2~~4 Mean)

D av. dev.²
6346 ±.56² = .31
6344 ±.89² = .79
1.10 av. dev. of from 2 ed. ⇐
$\sqrt{1.10} = 1.05$

Mr C's fr. mean of 2 ed ±.97 see p185
My recomp of " ±.64 "

a b a′ b′ substituted in Resids = Check on O-C

	resid ${}^x/_{100}$	ax	by	x-X	Σ
a	-13.81	-7.11	+1.95	+6.8	+1.7
b	-10.38	-5.35	+11.29	-5.3	+0.6
c	- 9.79	-5.03	-10.50	+15.5	0.0
d	+ 0.70	+0.36	-12.74	+9.3	-3.0
k	+ 7.47	+3.85	+17.03	-20.6	+0.2
l	+ 7.83	+4.03	+5.97	-12.2	-2.2
n	+17.98	+9.26	-13.00	+6.3	+2.6
					+5.1 -5.2

p106

	resid. ${}^y/_{100}$	a′y	b′x	y-Y	Σ
a	+ 2.32	+1.2	+11.1	-11.5	+0.8
b	+13.46	+6.7	+ 8.3	-14.5	+0.5
c	-12.51	-6.2	+7.8	-2.5	- 0.9
d	-15.18	-7.5	-0.6	+7.9	-0.2
k	+20.30	+10.1	-6.0	-4.2	-0.1
l	+7.12	+3.5	-6.3	+1.8	- 1.0
n	-15.50	-7.7	-14.4	+22.9	+0.8

+21
-22
±4.3 ±.62

Check computation pp 14-25 D6442 from I9801, Solution eliminating c & c' by taking Residuals from mean x & mean y before ~~making~~ solving

~~mean~~ Const. -12104.5 p14
x = -26.0
ξ -12130.5
X -12140.1 → p14
x - X = +9.6

	see p14 mean x	Resids x	Comp. ~~mean~~ X	Resids X	x - X
a	-26.0	-2498.2	-12140.1	-2507.8	+9.6
b	284.3	-2187.9	-11828.8	-2196.5	+8.6
c	650.0	-1822.2	-11458.0	-1825.7	+3.5
e	2216.5	-255.7	-9886.5	-254.2	-1.5
k	3373.7	+901.5	-8725.6	+906.7	-5.2
l	3496.8	+1024.6	-8604.1	+1028.2	-3.6
m	3595.9	+1123.7	-8507.8	+1124.5	-0.8
n	4065.1	+1592.9	-8036.1	+1596.2	-3.3
o	4593.8	+2121.6	-7503.7	+2128.6	-7.0
	22249.7 = 9		-86690.7 = 9		+21.7 -21.4
	+2472.2		-9632.3		

	mean y	Resid. y	Comp. Y	Resid. Y	y - Y
a	578.6	-1152.9	-16118.6	-1154.6	+1.7
b	1527.9	-203.6	-15166.9	-202.9	-0.7
c	3583.6	+1852.1	-13104.6	+1859.4	-7.3
e	3778.5	+2047.0	-12911.6	+2052.5	-5.5
k	2119.8	+388.3	-14573.0	+391.0	-2.7
l	176.9	-1554.6	-16524.3	-1560.3	+5.7
m	598.5	-1133.0	-16098.7	-1134.7	+1.7
n	1356.9	-374.6	-15341.4	-377.4	+2.8
o	1862.8	+131.3	-14837.0	+127.0	+4.3
	15583.5 = 9		-134676.0 = 9		
	1731.5		-14964.0		

Resids. a'' Residuals

x/100	(x−X) x/100	x²/100	xy/100	=bn (x−X) y/100	y²/100
−24.98	−239.83	624.00	+288.02	−110.68	132.94
−21.88	−188.1~~5~~7	478.73	+44.~~55~~63	−17.51	4.1~~5~~6
−18.22	−63.78	331.97	−337.4~~9~~3	+64.82	342.99
−2.56	+3.84	6.5~~4~~5	−52.~~34~~40	−30.70	419.02
+9.0~~1~~2	−46.~~88~~90	81.~~27~~36	+35.00	−20.19	15.0~~8~~5
+10.25	−36.89	105.06	−159.~~28~~39	+55.97	241.80
+11.24	−8.99	126.34	−127.3~~2~~5	+9.06	128.37
+15.93	−52.57	253.76	−59.~~67~~74	+12.36	14.0~~3~~6
+21.22	−148.51	450.29	+27.8~~6~~0 +395.45 −736.31	−9.19	1.72
	+3.84	24~~57.96~~58.06	−340.~~66~~86	+142.21	1300.1~~0~~1
	−785.6~~0~~2			−188.27	
	−~~778.24~~			−46.06	
	−781.78				

y/100'' b	=bn' (y−Y) y/100	as	bs	sn	=an' (y−Y) x/100	s	sn'
−11.53	−19.60	+912.02	+420.96	−350.50	−42.47	−36.51	−62.07
−2.04	+1.43	+523.37	+48.80	−205.71	+15.32	−23.92	+16.74
−18.52	−135.20	−5.~~55~~47	+5.56	+1.05	+133.02	+.30	−2.19
+20.47	−112.58	−45.85	+366.62	−26.86	+14.06	+17.91	−98.50
+3.88	−10.48	+116.36	+50.05	−67.08	−24.3~~4~~5	+12.90	−34.83
−15.55	−88.61	−54.3~~3~~2	+82.42	+19.08	+58.40	−5.30	−30.21
−11.33	−19.26	−1.01	+1.02	+.07	+19.10	−0.09	−0.15
−3.75	−10.49	+194.03	−45.68	−40.19	+44.60	+12.18	+34.10
+1.31	+5.65	+478.09	+29.51	−157.71	+91.23	+22.53	+96.88
	+7.08	+2223.87	+1004.94	−848.05	+375.73	−65.82	−227.95
	−396.22	−106.65	−45.68	+20.20	−66.8~~1~~2	+65.82	+147.72
	−389.14	+2117.22	+959.26	−827.85	+308.9~~4~~1		−80.23

x² = +2458.06 y² +1300.11 an −781.78
xy = −340.86 xy −340.86 bn −46.06
+2117.20 +959.25 −827.84

an' +308.9~~4~~1
bn' −389.14
−80.23

D6442 fr. I9801 Normals Eliminating c + c′ ~~unfinished~~

See pp14–25 for solution * not eliminating c and c′

$$0 = \overset{(x-\bar{X})x/100}{-\cancel{778.24}\ 781.78} + \overset{x^2/100}{\cancel{2457.96}\ 2458.06}\,a - \overset{xy/100}{\cancel{340.66}\ 340.86}\,b$$

$$\overset{(x-\bar{X})y/100}{-46.06} - 340.66\,a + \overset{y^2/100}{\cancel{1300.10}\ 1300.11}\,b$$

aa = x²	ab = xy	as # =	an	
+~~2457.96~~ 2458.06	−~~340.66~~ 340.86	+2117.22	−~~778.24~~ 781.78	
3.3905~~7~~9	2.532~~32~~58 n	3.32577	2.89~~144~~308 n	
	9.141~~70~~99 n	9.93518		
	(1.6740~~7~~5 n)	(2.46776 n)	(2.03~~286~~507 n)	(2.82826 n)
	y²	bs	bn	sn
−~~778.24~~ 781.78	+1300.1~~0~~1	+959.26	−46.06	−827.85
−~~38.92~~ 42.03	+ 47.27	−293.60	+10~~7.86~~8.41	−673.38
−8~~17.16~~23.81	+1252.84 ~~+1347.31~~	+1252.86	−15~~3.72~~4.47	−154.47
2.91~~231~~583 n	~~3.12947~~		2.18~~730~~884 n	
9.52~~174~~52 n	3.09790		9.~~05783~~09094 n	

a = x = −.33~~2~~5

b = y −.~~111~~

−.123

~~z~~ =

* Results from this solution to be added to meas. $0 = +(x-\bar{X}) + [(a-1)x + by + c]$

# . . . . . subtracted from meas $(x-\bar{X}) = [\overset{(a-1)}{a}x + by + c]$

unfinished

$(y-\bar{y})\,y/_{100}$ -389.14

$(y-\bar{y})\,x/_{100}$ $+308.9\overset{1}{\cancel{2}}$

$a\,n'\ (y-\bar{y})\frac{x}{100}$

$+308.9\overset{1}{\cancel{2}}$

$2.4898\overset{3}{\cancel{8}}$

$(1.6316\overset{82}{\cancel{0}}{}_n)$ (2.42501)

$b\,n'$ $(y-\bar{y})\frac{y}{100}$ $8n'$

~~$+.94234_n$~~	$+308.9\overset{1}{\cancel{2}}$	$+308.91$
	-87.58	-94.22
	$+221.34$	$+214.69$
	2.34406	2.33181
	8.95349	8.94122
$b'=x'=$	$+.0898$	$+.087$

-389.14	-80.23
$-42.\overset{84}{\cancel{77}}$	$+266.08$
$-346.3\overset{0}{\cancel{7}}$	-346.31
$2.539\overset{45}{\cancel{54}}{}_n$	
$9.\overset{44155}{\cancel{41007}}{}_n$	

$a'=y'=-.\cancel{257}$

$-.276$

Solution eliminating c & c′

D 6442 from I 9801

To find c & c′ — a = ~~+.332~~ +.335 — a′ ~~+.257~~ +.276

b = ~~+.144~~ +.123 — b′ ~~−.090~~ −.087 — add to meas.

(See also p. 23 Sol. not elim c & c′ gives same constants)

	p18 mean x/100	ax/100	by/100	p114 x−X	Σ = c		
a	−0.26	−.1	+0.7	+9.6	+10.2″	+.1	+.2″
b	+2.84	~~+.9~~ +1.0	~~+1.7~~ +1.9	+8.6	~~11.2~~ 11.5	+1.0	+1.1
c	6.50	+2.2	~~+4.1~~ +4.4	+3.5	~~9.8~~ 10.1	−.4	−.3
e	22.16	+7.4	~~+4.3~~ +4.6	−1.5	~~10.2~~ 10.5	.0	+.1
k	33.74	~~+11.2~~ +11.3	~~+2.4~~ +2.6	−5.2	~~8.4~~ 8.7	−1.8	−1.7
l	34.97	~~+11.6~~ +11.7	+0.2	−3.6	~~8.2~~ 8.3	−2.0	−2.1
m	35.96	~~+11.9~~ +12.0	+0.7	−0.8	~~11.8~~ 11.9	+1.6	+1.5
n	40.65	~~+13.5~~ +13.6	~~+1.5~~ +1.7	−3.3	~~11.7~~ 12.0	+1.5	+1.6
o	+45.94	~~+15.2~~ +15.4	~~+2.1~~ +2.3	−7.0	~~10.3~~ 10.7	+.1	+.3
					3.9 ~~1.8~~	+43 −42 ±85	+46 −43 ~~±89~~
					−c = ~~+10.2~~ +10.4		.94 ±.99

	x	ax	by	c	Σ of corr		Const X	X′
Ens	+2478.7	~~+8.2~~ +8.3	+.9	~~−10.2~~ −10.4	~~−1.1~~ −1.2	~~+2477.6~~ +2477.5	−12104.5	~~−9626.9~~ −9627.0

	Mean y/100	a′y/100	b′x/100	y−Y	Σ = c′		O.C.
a	+5.79″	~~+1.5~~ +1.6″	+.0″	+1.7″	~~+3.2~~ +3.3″	+1.0	+.8″
b	15.28	~~+3.9~~ +4.2	−.2	−.7	~~+3.0~~ +3.3	+.8	+.8
c	35.84	~~+9.2~~ +9.9	−.6	−7.3	~~+0.9~~ +2.0	−1.3	−.5
e	37.78	~~+9.7~~ +10.4	~~−2.0~~ −1.9	−5.5	~~+2.2~~ +3.0	.0	+.5
k	21.20	~~+5.4~~ +5.9	~~−3.0~~ −2.9	−2.7	±0.3	−2.5	−2.2
l	1.77	+0.5	~~−3.1~~ −3.0	+5.7	~~+3.1~~ +2.2	+.9	−.3
m	5.98	~~+1.5~~ +1.6	~~−3.2~~ −3.1	+1.7	~~0~~ +0.2	−2.2	−2.3
n	13.57	~~+3.5~~ +3.7	~~−3.7~~ −3.5	+2.8	~~+2.6~~ +3.0	+.4	+.5
o	18.63	~~+4.8~~ +5.1	~~−4.1~~ −4.0	+4.3	~~+5.0~~ +5.4	+2.8	+2.9
				Σ 22.7	20.9 ~~+19.7~~	+59 −60 ±119	+55 −53 ±108
				−c′ = +2.5	~~+12.2~~		~~±1.32~~ ±1.20″

Min B's mult.

	y	a′y	b′x	c′	Σ of corr		Const Y	Y′
Ens	757.0	~~+1.9~~ +2.1	−2.2	~~−2.2~~ −2.5	~~−2.5~~ −2.4	~~754.5~~ 754.6	−16695.5	~~−15941.0~~ −15941.1

Eros D 6442 from I 9801

$Y =$	$-15941''.0$	$-15941''.1$
$\log Y$	4.2025156_n	4.2025183
$\cdot Y/k = d$	8.8880905_n	8.8880932
d	$-4\ 25\ 9.38$	$-4\ 25\ 9.48$
D	$+58\ 10$	$+58\ 10$
$b = D + d$	$+53\ 44\ 50.62$	$+53\ 44\ 50.52$
$X =$	$-9626''.9$	$-9627''.0$
$\log X$	3.9834865_n	3.9834910_n
$\cdot \frac{X}{k}$	8.6690614_n	8.6690659_n
$\cdot \cos d$	$\underline{9.9987069}$	$\underline{9.9987069}$
$\cdot X/k \cos d$	8.6677683_n	8.6677728_n
$\cdot\cdot \cos b$	$\underline{9.7718419}$	$\underline{9.7718422}$
$\Sigma X/k \frac{\cos d}{\cos b}$	8.8959264_n	8.8959306_n
$a = \alpha - A$	$-4\ 29\ 57.86$	$-4^{\circ}\ 29'\ 58''.01$
	$-0^h\ 17^m\ 59^s.86$	$-0^h\ 17^m\ 59.87$
A	$\underline{6\ 16\ 48}$	$\underline{6\ 16\ 48.}$
$a + A$	$5\ 58\ 48.14$	$5\ 58\ 48.13$
$\cdot \tan b$	0.1347181	0.1347177
$\cdot \cos a$	$\underline{9.9986595}$	$\underline{9.9986595}$
	0.1333776	0.1333772
	$+53\ 39\ 46.86$	$+53\ 39\ 46.77$

Check computation D6390 from I10095 pp 50–56
Solution eliminating c+c′

used Resid x−X on the other vol. D6389 of this orig. see pp 68–69

see p 50 not Resids but form Constant " Mean = −16040.7 or "mean const".

	Mean x see p50	Resids x	Computed X	Resids X	Resids v x−X	x−X	p50 −16040.7 x+const
		"	"	"	"	"	"
b	952.2	−956.5	−15077.8	−945.9	−10.6	−10.7	−15088.5
c	1341.7	−567.0	−14685.8	−553.9	−13.1	−13.2	−14699.0
d	1163.2	−745.5	−14902.3	−770.4	+24.9	+24.8	−14877.5
e	1453.1	−455.6	−14578.3	−446.4	−9.2	−9.3	−14587.6
f	1382.0	−526.7	−14680.5	−548.6	+21.9	+21.8	−14658.7
h	3572.3	+1663.6	−12450.5	+1681.4	−17.8	−17.9	−12468.4
k	3496.6	+1587.9	−12548.3	+1583.6	+4.3	+4.2	−12544.1
		−3251.3		−3265.2	+51.1	+50.8	
		+3251.5		+3265.0	−50.7	−51.1	

see p50 "Mean Const" = +1125.8

	Mean y	Resids y	Computed Y	Resids Y	Resids y−Y = v′	y−Y	p51 +1125.8 y+Const
	"		"	"	"	"	
b	3186.2	+1009.1	+4325.8	+1022.8	−13.7	−13.8	+4312.0
c	3142.8	+965.7	+4279.2	+976.1 ?	−10.4 ?	−10.5	+4268.6
d	742.6	−1434.5	+1877.6	−1425.4	−9.1	−9.2	+1868.4
e	2791.9	+614.8	+3929.3	+626.3	−11.5	−11.6	+3917.7
f	667.7	−1509.4	+1798.6	−1504.4	−5.0	−5.1	+1793.5
h	3145.8	+968.7	+4247.3	+944.3	+24.4	+24.3	+4271.6
k	1562.9	−614.2	+2663.1	−639.9	+25.7	+25.6	+2688.7
		+3558.3		+3569.5	−49.7	−50.0	
		+3558.1		−3569.7	+50.1	+49.9	

Miss B's work Means not filled in

~~unfinished~~
take sums to
do red values ?. no.
get sn sn'

Residuals

a	=av		=aa	=ab	bv	bb	
x/100	(x−X) x/100		x²/100	xy/100	(x−X) y/100	y²/100	s
−9.56	+101.34	+102.29	+91.39	−96.46	−106.95	101.81	+0.53
−5.67	+74.28		32.15	−54.77	−126.55	93.32	+3.99
−7.4~~5~~6	−185.~~50~~75		55.~~50~~65	+106.98	−357.07	205.64	−21.80
−4.56	+41.95		20.79	−28.04	−56.58	37.82	+1.59
−5.27	−115.41		27.77	+79.52	−330.47	227.71	−20.36
+16.64	−296.19		276.89	+161.24	−172.48	93.90	+26.33
+15.88	+68.28		252.17	−97.50	−26.40	37.70	+9.74
	+285.85 ✓		+756.81 ✓	−276.77 ✓	−1176.50 ✓	+797.90 ✓	
	−597.35 ✓			+347.74 ✓			
	−311.50			+70.97			

b	bv'	as	bs	av'	sn	sn'
		min B's work				
y/100	(y−Y) y/100	*		(y−Y) x/100		
+10.09	−138.23	−5.07	+5.35	+130.9~~8~~7	−5.62	−7.26
+9.66	−100.46	−22.62	+38.54	+58.97	−52.27	−41.50
−14.34	+130.49	+162.63	+312.61	+67.8~~6~~9	−542.82	+198.38
+6.15	−70.72	−7.25	+9.78	+52.44	−14.63	−18.28
−15.09	+75.45	+107.30	+307.23	+26.35	−445.88	+101.80
+9.69	+236.44	+438.13	+255.14	+406.02	−468.67	+642.45
−6.14	−157.80	+154.67	−59.80	+408.12	+41.88	+250.32
	−467.21 ✓	−34.94	+928.65	+1150.76 ✓	+1529.89	−67.04
	+442.38	+862.73	−59.80		+41.88	+1192.95
	−24.83	+827.79	+868.85		+1488.01	+1125.91

Σ an+bn   Σ an'+bn'
+1488.00   +1125.93

Σ x²+xy +827.78   +868.87

Σ y²+xy

D6390 from I10095 Normals eliminating c & c′ ~~not found~~

See pp 150–56

	aa	ab	as	an	
	+756.81	+70.97	+827.79	−311.50	
	2,87899	1.85107	2.91792	2.49346_n	
		8.97208	0.03893		
		(0.82315)	(1.89000)	(1.46554_n)	(2.53239_n)
	−311.50	bb	bs	bn	sn
2.01243	+102.90 ✓	+797.90	+868.85	−1176.50	−1488.01
	−208.60 ✓	+ 6.655	+77.62	− 29.21 ✓	∓ 340.71
	2.31931_n	$+791.2\overset{6}{4}$	+791.23	−1147.29	−1147.30
	9.44032_n ✓	$2{,}8983\overset{1}{2}$		3.05967_n	
a = x	−.276 ✓			$0.1613\overset{6}{5}_n$	
			b = y	$-1{,}44\overset{50}{\cancel{99}}$	

				a n'	
				+1150.76	
				3.06098 ✓	
				(2.03306) ✓	(3.09991)
	+1150.76			b n'	s n'
1.$\overset{0}{\cancel{1}}$7576	+ ~~14.99~~ ✓	+11.91 ✓		−24.83	+1125.91
	~~+11$\overset{6}{9}$5.75~~	+1162.67		+107.91 ✓	+125$\overset{8}{6}$.$\overset{6}{0}$6
	3.07634	3.06$\overset{546}{\cancel{661}}$		~~+~~ 132.74	−132.75
	0.19135	0.18$\overset{647}{\cancel{762}}$		2.12300 n	
b' = x' =	+ 1.5536″	+1.5$\overset{36}{\cancel{40}}$ ✓		9.$\overset{2}{8}$246$\overset{9}{8}$ n	
			a' = y'	~~+.211 n~~	
				−.168	

For other comp of this incl. see pp 50–56 Eq. solved for a b c a′ b′ c′
" " incl. " I10095 " 62–67 " " "
" " " " " 68–73 " ab a′b′ only

D6390 from I10095 ~~obs~~

To find c + c′ a = +276 a + b substituted in measured Values from p50
b = +1.450

	mean x/100 p50	ax/100	by/100	p120 Resids x−X	Σ=c	″
b	9.″52	+2.″6	+46.″2	−10.″6	+38.″2	+1.3
c	13.42	+3.7	+45.6	−13.~~2~~1	+36.~~1~~2	−.~~8~~7
d	11.63	+3.~~3~~2	+10.8	+24.9	+3~~9.0~~8.9	+2.0
e	14.53	+4.0	+40.5	−9.2	+35.3	−1.6
f	13.82	+3.8	+9.7	+21.9	+35.4	−1.5
h	35.72	+9.~~8~~9	+45.6	−17.8	+37.~~6~~7	+.~~7~~8
k	34.97	+9.7	+22.7	+4.3	+36.7	−2
					48.34	
					+36.9	+41
						−40
				c =	−369	±8~~2~~1

±1.″1~~7~~6

a′ = +211
b′ = −1.5~~54~~40

	mean y/100	a′y/100	b′y/100	Resids y−Y	Σ=c′	″
b	31.″86	+6.″7	−14.″~~8~~7	−13.″7	−21.″~~8~~7	+3.″~~2~~1
c	31.43	+6.6	−20.~~9~~7	−10.4	−24.~~7~~5	+.3
d	7.43	+1.6	−~~18.1~~ 17.9	−9.1	−25.~~6~~4	−.6
e	27.92	+5.9	−22.~~6~~4	−11.5	−28.~~2~~0	−3.2
f	6.68	+1.4	−21.~~5~~3	−5.0	−2~~5.1~~4.9	−.1
h	31.46	+6.6	−55.~~5~~0	+24.4	−24.~~5~~0	+.~~5~~8
k	15.63	+3.3	−~~54.4~~ 53.9	+25.7	−~~25.4~~ 24.9	−.~~4~~3 −.1
					35.~~5~~2″	+40 2
					33.4	−43
					−~~25.0~~	±83
					24.8	
				c′ =	+~~25.0~~	

+4.2
−40

±1.″19

For Eqs with these consts see p 50 in red ink*

Compare with pp. 56-57 & tenths differ.

For Errs from this Resid Comp see pp 50-51 + p59 for α + δ 1875.

$a' = +.168$

$b' = -1.5\cancel{3}6$

$\frac{a'y}{100}$	$\frac{b'x}{100}$	Resids $y-y'$	$\Sigma = c'$	
+5.4″	−14.6″	−13.7″	−22.9	+2.7″
+5.3	−20.6	−10.4	−25.7	−.1
+1.2	−17.9	−9.1	−25.8	−.2
+4.7	−22.3	−11.5	−29.1	−3.5
+1.1	−21.2	−5.0	−25.1	+.5
+5.3	−54.9	+24.4	−25.2	+.4
+2.6	−53.7	+25.7	−25.4	+.2
			4.2	+38
			−25.6	−38
				±76

±1.09″

$c = +25.6$

Mult chkd by Miss B.

D 6391 from I 9862

Meas. Bk. 15, p. 12.

D.M. + Camb. U.S.	1st Reading	2nd	Mean x	Resid.	Diff.	Comp. X	X − Mean x	x + Const.	x − X
u +54° 1005 2457	1138.2	1138.2	1138.2			−11751.9	−12890.1	−11749″.0	+2″.9
w +53° 1000 2458	1091.4	1091.4	1091.4			−11803.2	−12894.6	−11795.8	+7.4
H +53 1003 2462	1992.1	1993.7	1992.9	−0.8 0.8	1.6	−10896.4	−12889.3	−10894.3	+2.1
L +53 1005 2464	2196.0	2196.0	2196.0			−10692.9	−12888.9	−10691.2	+1.7
N +54 1009 2465	2637.8	2637.0	2637.4	0.4 −0.4	0.8	−10246.7	−12884.1	−10249.8	−3.1
P +54 1012 2467	3083.1	3082.7	3082.9	0.2 −0.2	0.4	−9798.6	−12881.5	−9804.3	−5.7
Q +54 1014 2469	3246.1	3245.3	3245.7	0.4 −0.4	0.8	−9636.0	−12881.7	−9641.5	−5.5
			15384.5			4725.7	50.2		
Means			2197.8			−10689.4	−12887.2 adopt = Mean.		

	1st Reading	2nd	Mean y.	Resid.	Diff.	Comp. Y	Y − Mean y	y + Const.	y − Y
u	1381.0	1380.2	1380.6	0.4 −0.4	0.8	+2771″.3	+1390″.7	+2769″.3	−2″.0
w	516.8	516.0	516.4	0.4 −0.4	0.8	+1902.1	+1385.7	+1905.1	+3.0
H	6.0	6.0	6.0			+1391.4	+1385.4	+1394.7	+3.3
L	−49.6	−47.6	−48.6	−1.0 1.0	2.0	+1335.7	+1384.3	+1340.1	+4.4
N	1767.2	1767.2	1767.2			+3158.1	+1390.9	+3155.9	−2.2
P	2049.5	2049.5	2049.5			+3439.9	+1390.4	+3438.$\overset{2}{4}$	−1.7
Q	2037.6	2037.8	2037.7	−0.1 0.1	0.2	+3431.4	+1393.7	+3426.4	−5.0
			+7757.4 48.6 +7708.8			+17429.9	61.1		
			+1101.3			+2490.0	+1388.7		

chk on signs see p128
Q

Check $\Sigma S n = \Sigma(a n + b n)$
by sums $\Sigma S n' = \Sigma(a n' + b n)$
$\Sigma a S = \Sigma(X^2 + XY)$
$\Sigma b S = \Sigma(Y^2 + XY)$

Check

Residuals		= n	= a	= b	= bn	= ab	= a²	= an	$\frac{X}{100}+\frac{Y}{100}$ ↓	by mult.	
x	X	$x-X$	$X/100$	$Y/100$	$(x-X)X/100$	$XY/100$	$X^2/100$	$(x-X)Y/100$	s	sn	as
−1059.6	−1062.5	+2.9	−10.6	+2.8	−30.74	−29.68	+112.36	+8.12	−7.8	−22.62	+82.68
−1106.4	−1113.8	+7.4	−11.1	−5.9	−82.14	+65.49	+123.21	−43.66	−17.0	−125.80	+188.70
−204.9	−207.0	+2.1	−2.1	−11.0	−4.41	+22.77	+4.41	−23.10	−13.1	−27.51	+27.18
−											:00
+4											584
+8											376
+1											895
−23											0.11
+237											
−0.											

h m s ° ′ ″
4 19 4.16 .08 −9 46 7.6 1.5 D. 8.6
4.24 −9 46 9.1 S.

+27							54
−5							30
−10							77
−11							2.25
+665.9	+668.1	−2.2	−14.74	+44.89	−9.68	−24.42	+74.37
+948.2	+949.9	−1.7	−16.15	+90.25	−15.13	−31.28	+174.80
+936.4	+941.4	−5.0	−47.00	+88.36	−52.50	−99.50	+187.06
+2829.8	+2840.7	−10.9	−188.09	+519.40	−117.54	−300.03	+812.55
−2830.1	−2840.8	+10.7			+21.20	+15.60	−21.84
−0.3	−0.1	−0.2		ΣXY +271.31	−96.34	−284.43	+790.71
				+790.71	$\Sigma bn'$ −188.09		

$\Sigma sn' = -284.43$

Check by sums $\Sigma S n = \Sigma(a n + b n)$
$\Sigma S n' = \Sigma(a n' + b n')$
$\Sigma a S = \Sigma(X^2 + XY)$
$\Sigma b S = \Sigma(Y^2 + XY)$

Residuals

x	X	x−X =n	X/100 =a	Y/100 =b	(x−X)X/100 =bn	XY/100 =ab	X²/100 =a²	(x−X)Y/100 =an	Check X/100+Y/100 → S	Sn	aS by mult.
−1059.6″	−1062.5″	+2.9″	−10.6″	+2.8″	−30.74″	−29.68″	+112.36″	+8.12″	−7.8″	−22.62″	+82.68
−1106.4	−1113.8	+7.4	−11.1	−5.9	−82.14	+65.49	+123.21	−43.66	−17.0	−125.80	+188.70
−204.9	−207.0	+2.1	−2.1	−11.0	−4.41	+22.77	+4.41	−23.10	−13.1	−27.51	+27.18
+665.9	+668.1	−2.2			−14.74	+44.89		−9.68	−24.42		+74.37
+948.2	+949.9	−1.7			−16.15	+90.25		−15.13	−31.28		+174.80
+936.4	+941.4	−5.0			−47.00	+88.36		−52.50	−99.50		+187.06
+2829.8	+2840.7	−10.9			−188.09	+519.40		−117.54	−300.03		+812.55
−2830.1	−2840.8	+10.7						+21.20	+15.60		−21.84
−0.3	−0.1	−0.2				ΣXY +271.31		−96.34	−284.43		+790.71
						+790.71					

Σbn′ −188.09

ΣSn′ = −284.43

748259
1067513

1138.2
613.7

10689.4
62.5

128901

11751.9
11803.2
10896.6
10692.9
10246.7
9798.6
9636.0
7)74825.9
10689.4

4

108

9968

7.2
50.4

2.3
128872

12890.1
1138.2

0° 2′ 24.0″ — 12° 53.8′

Check by sums
$\Sigma S n = \Sigma(an + bn)$
$\Sigma S n' = \Sigma(an' + bn')$
$\Sigma aS = \Sigma(X^2 + XY)$
$\Sigma bS = \Sigma(Y^2 + XY)$

Residuals		n	a	b	bn	ab	a²	an	Check $X/100 + Y/100$ ↓	by mult.	
x	X	x − X	X/100	Y/100	(x − X) X/100	XY/100	X²/100	(x − X) Y/100	S	Sn	aS
−1059.6″	−1062.5″	+2.9″	−10.6″	+2.8″	−30.74″	−29.68″	+112.36″	+8.12″	−7.8″	−22.62″	+82.68
−1106.4	−1113.8	+7.4	−11.1	−5.9	−82.14	+65.49	+123.21	−43.66	−17.0	−125.80	+188.70
−204.9	−207.0	+2.1	−2.1	−11.0	−4.41	+22.77	+4.41	−23.10	−13.1	−27.51	+27.18
−1.8	−3.5	+1.7	0.0	−11.5	0.00	0.00	0.00	−19.55	−11.5	−19.55	0.00
+439.6	+442.7	−3.1	+4.4	+6.7	−13.64	+29.48	+19.36	−20.77	+11.1	−34.41	+48.84
+885.1	+890.8	−5.7	+8.9	+9.5	−50.73	+84.55	+79.21	−54.15	+18.4	−104.88	+163.76
+1047.9	+1053.4	−5.5	+10.5	+9.4	−57.75	+98.70	+110.25	−51.70	+19.9	−109.45	+208.95
−2372.7	−2386.8	−14.3	+23.8	+28.4	−239.41 ✓	+300.99	+448.80 ✓	−212.93		−444.22	+720.11
+2372.6	+2386.9	+14.1	−23.8	−28.4		−29.68		+8.12			
−0.1	+0.1	−0.2				+271.31 ✓		−204.81 ✓			

ΣX^2 +448.80
+720.11 →

Σbn −239.41
−444.22 ↗

Residuals			bn′		an′	Check	
y	Y	y − Y	(y − Y) Y/100	Y²/100	(y − Y) X/100	Sn′	bS
+279.3″	+281.3″	−2.0″	−5.60″	+7.84″	+21.20″	+15.60″	−21.84″
−584.9	−587.9	+3.0	−17.70	+34.81	−33.30	−51.00	+100.30
−1095.3	−1098.6	+3.3	−36.30	+121.00	−6.93	−43.23	+143.77
−1149.9	−1154.3	+4.4	−50.60	+132.25	0.0	−50.60	+132.25
+665.9	+668.1	−2.2	−14.74	+44.89	−9.68	−24.42	+74.37
+948.2	+949.9	−1.7	−16.15	+90.25	−15.13	−31.28	+174.80
+936.4	+941.4	−5.0	−47.00	+88.36	−52.50	−99.50	+187.06
+2829.8	+2840.7	−10.9	−188.09 ✓	+519.40 ✓	−117.54	−300.03	+812.55
−2830.1	−2840.8	+10.7		ΣXY +271.31	+21.20	+15.60	−21.84
−0.3	−0.1	−0.2		+790.71	−96.34 ✓	−284.43	+790.71

$\Sigma bn'$ −188.09
$\Sigma Sn'$ = −284.43 ↗

D6391 from I 9862.

a = +4.~~29~~ 31   a′ +36.6
b = +16.9 3   b′ −.006
c = −11.2   c′ −3.9
} add to meas.

	1st Reading	2nd	Mean x	Resid.		Diff.	ax	by	c	Σ	Corr. x	C −12887.2
f	+41.7	+40.9	41.3	.04	−.04	.08	+0.2	+2.6	−11.3	−8.5	32.8	−12854.4
r	192.8	192.8	192.8				+0.8	+1.4		−9.1	183.7	−12703.5
s	516.8	518.0	517.4	−0.6	0.6	1.2	+2.2	+3.4		−5.7	511.7	−12375.5
t	566.4	566.8	566.6	−0.2	0.2	0.4	+2.4	+3.1		−5.8	560.8	−12326.4
y	1278.2	1280.2	1279.2	−1.0	1.0	2.0	+5.5	+6.3		+0.5	1279.7	−11607.5
z	1453.1	1454.7	1453.9	−0.8	0.8	1.6	+6.3	+4.~~8~~ 3		−0.~~2~~ 7	1453.~~1~~ 2	−1143~~5.5~~ 4.0
a	1417.4	1417.8	1417.6	−0.2	0.2	0.4	+6.1	~~+~~ −0.1		−5.3	1412.3	−11474.9
B	1777.9	1777.9	1777.9				+7.7	+4.2		+0.6	1778.5	−11108.7
C	1834.7	1832.7	1833.7	1.0	−1.0	2.0	+7.9	+4.0		+0.6	1834.3	−11052.9
D	1896.1	1896.1	1896.1				+8.2	+3.4		+0.3	1896.4	−10990.8
F	2132.9	2133.7	2133.3	−0.4	0.4	0.8	+9.2	+4.4		+2.3	2135.6	−10751.6
G	2133.7	2132.9	2133.3	+0.4	−0.4	0.8	+9.2	+6.2		+4.1	2137.4	−10749.8
K	2159.9	2160.3	2160.1	−0.2	0.2	0.4	+9.3	+0.9		−1.1	2159.0	−10728.2
O	3009.0	3007.4	3008.2	0.8	−0.8	1.6	+13.0	~~+3.7~~ +3.4		~~+5.4~~ 5.1	3013.~~0~~ 3	−9873.~~8~~ 9
Eros	1983.4	198~~2.4~~ 1.8	1982.~~5~~ 4	~~0.9~~ 10	~~−0.1~~ −0.6		+8.5 8.54	+3.8 3.82	−11.~~2~~ 3	+1.~~1~~ 0	1983.~~5~~ 4	−10903.~~7~~ 8
	1982.2	1981.8		−0.~~8~~ 2	−0.~~7~~ 6							
	1982.6	1982.6		0.~~1~~ 2	0.~~1~~ 2							

Chk on signs

2   3245.7   +13.9 (14.0) +3.4   +6.1 3251.8 −9635.4 = D

−9636.0 = 6

See p132   + 0.6 D−6

	1st Reading	2nd	Mean y	Resid.		Diff.	a'y	b'x	c'	Σ	Corr y	+1388.7
q	1544.4	1544.4	1544.4				+5.7	-0.0	-3.9	+1.8	1546.2	+2934.9
r	824.9	824.9	824.9				+3.0	-0.0		-0.9	824.0	+2212.7
s	2033.0	2032.2	2032.6	0.4	-0.4	0.8	+7.4	-0.0		+3.5	2036.1	+3424.8
t	1822.4	1820.0	1821.2	1.2	-1.2	2.4	+6.7	-0.0		+2.8	1824.0	+3212.7
y.	3755.0	3755.0	3755.0				+13.7	-0.1		+9.~~8~~7	3764.7	+5153.4
z	2535.0	2537.3	2536.2	-1.2	1.1	2.3	+9.3	-0.1		+5.~~4~~3	2541.5	+~~4~~3930.2
A	-50.0✓ ~~42.5~~	49.2✓	-49.6✓ ~~-45.8~~	- 0.4 ~~3.3~~	0.4 ~~-3.4~~	~~4.7~~	~~+~~ -0.2✓	-0.1		-4.2✓	- 53.8✓ ~~-50.0~~	+ 1334.9✓ ~~+2884.9~~
B	2481.9	2478.7	2480.3	1.6	-1.6	3.2	+9.1	-0.1		+5.1	2485.4	+3874.1
C	2396.2	2395.4	2395.8	0.4	-0.4	0.8	+8.8	-0.1		+4.8	2400.6	+3789.3
D.	1998.1	1994.5	1996.3	1.8	-1.8	3.6	+7.3	-0.1		+3.3	1999.6	+3388.3
F	2609.2	2607.2	2608.2	1.0	-1.0	2.0	+9.5	-0.1		+5.5	2613.7	+4002.4
G	3655.5	3651.5	3653.5	2.0	-2.0	4.0	+13.4	-0.1		+9.4	3662.9	+5051.6
K	527.5	526.7	527.1	0.4	-0.4	0.8	+1.9	-0.1		-2.1	525.0	+1913.7
O	* ~~2200.4~~	~~2200.4~~	~~2200.4~~				~~+8.8~~ 1	~~-1.2~~ 0.2	~~-3.9~~	~~+2.7~~ +4.0	~~2202.7~~ 4.4	~~+3574.6~~ +359[illegible]
Eros	2260.2	2260.2	2260.4	-0.2	-0.2		+8.~~2~~3✓	~~-1.2~~ - 0.1✓		~~+3.1~~ 4.3✓	~~2263.5~~ 4.7✓	+365~~2.2~~ 3.4✓
	2263.3	2264.1		+2.9	+3.7							
	2258.2	2256.2		-2.2	-4.2							
2			2037.7				+7.5					
*O Corrected	2037.4	2037.4	2037.4				+7.5	-0.2		+3.4	2040.8	3429.5✓

D6391 from I 9862

	aa = $\overline{X}^2/_1 r$	ab $\overline{XY}/_1 w$	as	$(x-\overline{X})\,\overline{X}/_{100}$ = an	
	+448.80″	+271.31″	+720.11″	−239.44″	
	2.6521 ✓	2.4335	2.8574	2.3791n	
		9.7814	0.2053		
		(2.2149)	(2.6388)	(2.1605n)	(2.5844n)
	−239.41	Y^2	bs	$(x-\overline{X})\,Y/_{100}$ = bn	sn
9.2282 ab 2.4335	+ 45.88 ✓ add	+519.40″	+790.71″	−204.81″	−444.22
1.6617 ✓	−193.53 ✓	+164.0 sub	+435.3	−144.7	−384.1
	+ 2.28~~45~~67 n	+355.4	355.4	− 60.1	− 60.1
aa		2.5507 ✓		1.7789n	
	9.63~~24~~46 n			2.5507	
a = x =	−.4~~29~~31 ✓			9.2282n	
			b = y =	−.169 ✓	

D6392 from I 9862

				an	
				−247.52 ✓	
				2.3936n	
				(2.1750n)	(2.5989n)
	−247.52			bn	sn
2.0134	+103.15			−284.67	−632.19
	−144.37			−149.6	−397.1
	2.1595n ✓			−135.1	−135.1
				2.1306n ✓	
	9.5074n ✓				
a = x =	− .322 ✓			9.5799n ✓	
			b = y =	−.380 ✓	

$(y-\bar{y})\bar{x}/100$
−96.34
1.9838_n

(1.7652_n) ($2.189'_n$)

4.5629 −96.34 $(y-\bar{y})\bar{y}/100$ sn'
1.9964 +99.18 −188.09 −28443
+2.84 −58.24 −1546
0.4533 −129.85 −129.8
2.1136_n

7.8013

b' = x' = +.006 9.5629_n
a' = y' = −.366

an'
−17.55
1.2442_n

(1.0256_n) (1.4495_n)

2.1310 −17.55 −17.55 bn'
~~1.7945~~ +62.30 +135.2 −187.73 −205.28
+44.75 +117.6 −10.61 −28.15
−177.12
~~−84.6~~
1.6508 2.0705 −177.13
26521
2.2482_n ~~1.9117_n~~

8.9987 9.4184

b' = x' = +.0997 +.262 9.6975_n ~~9.3610_n~~
a' = y' = ~~−.230~~
−.498

a = +.4~~29~~31 a′ +.366
b = +.169 b′ −.006

D6391 from I 9862

To find c & c′

$\frac{X-cent}{100}$		$aX/100$	$bY/100$	$(x-X)$ p126	Σ = c	O−C
u +1135.3 +	11.4	+4.9	+2.3	+2.9	+10.1	−1.~~1~~2
w +1084.0	10.8	+4.~~6~~7	+0.9	+7.4	+12.9 3.0	+1.7
H +1990.8	19.9	+8.~~5~~6	+0.0	+2.1	+10.~~6~~7	−.~~6~~ −.6
L +2194.3	21.9	+9.4	−0.1	+1.7	+11.0	−.~~2~~3
N +2640.5	26.4	+11.~~3~~4	+3.0	−3.1	+11.~~2~~3	.0
P +3088.6	30.9	+13.3	+3.5	−5.7	+11.1	−.~~1~~2
Q +3251.2 +	32.5	+~~13.9~~ 14.0	+3.4	−5.5	+11.~~8~~9	+.6
					~~+.7~~ 2.1	−2.~~0~~1
						+2.3
				−c =	+11.24 3	±4.~~3~~4 ~~±.61~~ 3
				c =	−11.~~2~~3	

+2.3
−2.3
$\frac{4.6}{7}$ = ±.66

$\frac{Y-cent}{100}$		$a'Y/100$	$b'X/100$	$(y-Y)$ p126	Σ = c′	O−C
u +1382.6 +	13.8	+5.0	−0.1	−2.0	+2.9	−1.0
w +513.4 +	5.1	+1.9	−0.1	+3.0	+4.8	+.9
H +2.7 +	0.0	0.0	−0.1	+3.3	+3.2	−.7
L −53.0 −	0.5	−0.2	−0.1	+4.4	+4.1	+.2
N +1769.4 +	17.7	+6.5	−0.2	−2.2	+4.1	+.2
P +2051.2 +	20.5	+7.5	−0.2	−1.7	+5.6	+1.7
Q +2042.7 +	20.4	+7.5	−0.2	−5.0	+2.3	−1.6
					+27.0	−3.3
						+3.0
					+3.86	±6.3 ±.90
				c′ =	−3.9	

Errs from I 9862

↗ see next page 135

	D6391	D6392	
Y 1875	+365~~2.2~~ 3.4	+3652″.~~0~~ 3	diff Y +″.2 −.1 −1.9 ✓ see p 135
log Y	3.562 ~~5546~~ 6972	3.562 5~~308~~ 664	
∴ Y/R	8.248 ~~1295~~ 2721	8.248 1~~057~~ 413	
d = b − D	+1° 0′ ~~51″.82~~ 53.01	+1° 0′ 51″.~~6~~9 2	
D	+53 26	+53 26	
b = D + d	+54 26 ~~51.82~~ 53.01	+54 26 51.~~6~~9 2	diff X
X	−10903″.7	−10900″.5	−3″.2 ~~−3.6~~
log X	4.0375739n	4.0374464n	
∴ X/R	8.7231488n	8.7230213n	
cos d	9.9999319 ✓	9.9999319 ✓	
X/R cos d	8.7230807n	8.7229532n	
cos b	9.76450~~90~~ 55	9.7645095	
(X cos d / R) / cos b = tan a	8.95857~~17~~ 52 n	8.9584437n	
a = α − A (arc)	−5° 11′ 38″.~~42~~ 57	−5 11 32.95	
a ∴ time	−0h 20m 46s.5~~6~~ 7	−0 20 46.20	
∴ A	6h 28m 24s		cos δ = .584
1875 α = a + A	6 7 37.4~~4~~ 3	6 7 37.80	diff α −.3~~6~~ 9s × 15 cos δ = ~~−3.2~~ ″4
Cir 37 α	6 7.6		
log tan b	0.14589~~42~~ 94	0.14589~~33~~ 46	
∴ cos a	9.998213~~1~~ 0	9.9982141	
∴ Σ = tan δ	0.14410~~73~~ 124	0.14410~~74~~ 87	
δ 1875	+54° 20′ ~~10.09~~ 11″.24	+54 20 10.~~11~~ ″40	diff δ −″.~~0~~3 −2.0
Cir 875	+54 20		

D6392	D6391	6391−92 diff δ
$+3655''.3$ ✓	$+3653''.4$ ✓	-1.9
3.5629230 ✓	3.5626972 ✓	
8.2484979	8.2482721 ✓	
+1 0 54.91 ✓	+1 0 $53^{s}.01$ ✓	
+53 26	+53 26	
+54 26 54.91 ✓	+54 26 $53^{s}.01$ ✓	
$-10900''.1$ ✓	$-10903''.8$ ✓	-3.7
4.0374305_n ✓	4.0375778_n ✓	
8.7230054_n ✓	8.7231527_n ✓	
9.9999319	9.9999319	
8.7229373_n	8.7230846_n	
9.7644999	9.7645055 ✓	
8.9584374_n	8.9585791_n	
−5 11 32.67 ✓	−5 11 38.74 ✓	
−0 20 46.18 ✓	−0 20 46.58 ✓	
6 28 24.	6 28 24.	diff α × 15 cos δ
6 7 37.82 ✓	6 7 37.42 ✓	$-0^{s}.40 = -3''.5$
0.1459079	0.1458994 ✓	
9.9982142 ✓	9.9982130 ✓	
0.1441221	0.1441124 ✓	diff δ
+54 20 13.42 ✓	+ 54 20 11.24 ✓	$-2''.18$

Chkd with Bagay Table

Plate 3

I 9862

a +.431   a' +.366
b +.169   b' -.006
c -11.3   c' -3.9

D 6391

								O	C		
	5.	Mean x	ax	by	c	Σ	Corr. x	-12887.2″	X″	O-C	p. 132
u	1	1138.2	+4.9	+2.3	-11.3	-4.1	1134.1	-11753.1	-11751.9	-1.2	-1.2
w	2	1091.4	+4.7	+0.9		-5.7	1085.7	-11801.5	-11803.2	+1.7	+1.7
H	3	1992.9	+8.6	+0.0		-2.7	1990.2	-10897.0	-10896.4	-0.6	-0.6
L	4	2196.0	+9.5	~~+~~-0.1		-1.9	2194.1	-10693.1	-10692.9	-0.2	-0.3
N	5	2637.4	+11.4	+3.0		+3.1	2640.5	-10246.7	-10246.7	0.0	0.0
P	6	3082.9	+13.3	+3.5		+5.5	3088.4	-9798.8	-9798.6	-0.2	-0.2
Q	7	3245.7	+14.0	+3.4		+6.1	3251.8	-9635.4	-9636.0	+0.6	+0.6

								O	C		
		Mean y	a'y	b'x	c'	Σ	Corr. y	+1388.7	Y	O-C	p. 132
u	1	1380.6	~~+2.3~~ +5.1	-0.1	-3.9	+1.1	1381.7	+2770.4	+2771.3	-0.9	-1.0
w	2	516.4	+0.9 +1.9	-0.1		-2.1	514.3	+1903.0	+1902.1	+0.9	+0.9
H	3	6.0	+0.0 0.0	-0.1		-4.0	2.0	+1390.7	+1391.4	-0.7	-0.7
L	4	-48.6	-0.1 -0.2	-0.1		-4.2	-52.8	+1335.9	+1335.7	+0.2	+0.2
N	5	1767.2	+3.0 +6.5	-0.2		+2.4	176~~4.8~~ 9.6	+3158.3	+3158.1	+0.2	+0.2
P	6	2049.5	+7.5	-0.2		+3.4	2052.9	+3441.6	+3439.9	+1.7	+1.7
Q	7	2037.7	+7.5	-0.2		+3.4	2041.1	+3429.8	+3431.4	-1.6	-1.6

a +.322 a′ +.498
b +.380 b′ −.262
c −10.9 c′ −0.2

D 6392

	Mean x	ax	by	c	Σ	Corr. x	−12742.3 = O	X = C	O−C	p.143
u	991.9	+ 3.2	+ 5.3	−10.9	−2.4	989.5	−11752.8	−11751.9	−0.9	−0.8
w	945.8	+ 3.0	+ 2.0		−5.9	939.9	−11802.4	−11803.2	+0.8	+0.9
H	1850.6	+ 6.0	+ 0.1		−4.8	1845.8	−10896.5	−10896.4	−0.1	−0.1
L	2053.5	+ 6.6	− 0.1		−4.4	2049.1	−10693.2	−10692.9	−0.3	−0.3
N	2492.6	+ 8.0	+ 6.8		+3.9	2496.5	−10245.8	−10246.7	+0.9	+0.9
P	2937.0	+ 9.5	+ 7.9		+6.5	2943.5	− 9798.8	−9798.6	−0.2	−0.2
Q	3099.2	+ ~~9.9~~ 10.0	+ 7.8		+6.~~8~~9	3106.~~0~~1	− 9636.~~3~~2	−9636.0	−0.~~3~~2	−0.1

	Mean y	a′y	b′x	c′	Σ	Corr. y	+1364.4 = O	Y = C	O−C	p.143
u	1402.1	+ 7.0	− 2.6	−0.2	+4.2	1406.3	+2770.7	+2771.3	−0.6	−0.6
w	538.6	+ 2.7	− 2.5		0.0	538.6	+ 1903.0	+1902.1	+0.9	+0.9
H	30.2	+ 0.2	− 4.8		−4.8	25.4	+ 1389.8	+1391.4	−1.6	−1.7
L	−21.8	− 0.1	− 5.4		−5.7	− 27.5	+1336.9	+1335.7	+1.2	+1.2
N	1791.2	+ 8.9	− 6.5		+2.2	1793.4	+3157.8	+3158.1	−0.3	−0.4
P	2074.7	+ 10.3	− 7.7		+2.4	2077.1	+3441.5	+3439.9	+1.6	+1.7
Q	2063.8	+ 10.3	− 8.1		+2.0	2065.8	+3430.2	+3431.4	−1.2	−1.2

D 6392 from I 9862.

Meas. Bk. 15, p. 40.

	1st Reading	2nd	Mean x	Resid.		Diff.	Comp. X	X − Mean x	−12742.3 x + Const.	=v x − X
u	991.9	991.9	991.9				−11751.9	−12743.8	−11750.4	+1.5
w	947.4	944.3	945.8	1.6	−1.5	3.1	−11803.2	−12749.0	−11796.5	+6.7
H	1850.6	1850.6	1850.6				−10896.4	−12747.0	−10891.7	+4.7
L	2053.5	2053.5	2053.5				−10692.9	−12746.4	−10688.8	+4.1
J	2493.8	2491.4	2492.6	1.2	−1.2	2.4	−10246.7	−12739.3	−10249.7	−3.0
P	2937.6	2936.4	2937.0	0.6	−0.6	1.2	−9798.6	−12735.6	−9805.3	−6.7
Q	3099.0	3099.4	3099.2	−0.2	0.2	0.4	−9636.0	−12735.2	−9643.1	−7.1
			14370.6				−74825.7	296.3		+17.0
			7				7			−16.8
			2052.9				−10689.4	−12742.3		+0.2

	1st Reading	2nd	Mean y	Resid.		Diff.	Comp. Y	Y − Mean y	+1364.4 y + Const.	=v′ y − Y
u	1402.3	1401.9	1402.1	0.2	−0.2	0.4	+2771.3	+1369.2	+2766.5	−4.8
w	538.6	538.6	538.6				+1902.1	+1363.5	+1903.0	+0.9
H	30.6	29.8	30.2	0.4	−0.4	0.8	+1391.4	+1361.2	+1394.6	+3.2
L	−21.8	−21.8	−21.8				+1335.7	+1357.5	+1342.6	+6.9
J	1791.4	1791.0	1791.2	0.2	−0.2	0.4	+3158.1	+1366.9	+3155.6	−2.5
P	2076.1	2073.3	2074.7	1.4	−1.4	2.8	+3439.9	+1365.2	+3439.1	−0.8
Q	2065.4	2062.2	2063.8	1.6	−1.6	3.2	+3431.4	+1367.6	+3428.2	−3.2
			7900.6				+17429.9	31.1		+11.0
			−21.8				7	7		−11.3
			7878.8				~~+2489.99~~	+1364.4		
			7				+2490.0			
			1125.5							

Residuals.

x	$\overline{X}$	$x-\overline{X}$ = v	$\frac{\overline{X}}{100}$	$\frac{\overline{Y}}{100}$	= av $(x-\overline{X})\frac{\overline{X}}{100}$	$\overline{X}\overline{Y}/100$	$\overline{X}^2/100$	= bv $(x-\overline{X})\frac{\overline{Y}}{100}$	sep S	by mult Sn	by sums Sn
−1061.0	−1062.5	+1.5	−10.6	+2.8	−15.″90			+4.″20	−7.8	−11.70	~~10.80~~ 11.70
−1007.1	−1113.8	+6.7	−11.1	−5.9	−74.37			−39.53	−17.0	−113.90	−113.90
−202.3	−207.0	+4.7	−2.1	−11.0	−9.~~73~~87			−51.70	−13.1	−61.57	−61.~~43~~57
+0.6	−3.5	+4.1	−0.0	−11.5	0.00			−47.15	−11.5	−47.15	−47.15
+439.7	+442.7	−3.0	+4.4	+6.7	−13.20			−20.10	+11.1	−33.30	−33.30
+884.1	+890.8	−6.7	+8.9	+9.5	−59.63			−63.65	+18.4	−123.28	−123.28
+1046.3	+1053.4	−7.1	+10.5	+9.4	−74.55			−66.74	+19.9	−141.29	−141.29
+2370.7	+2386.9	+17.0	−23.8		−247.~~38~~52			−288.87			−532.~~05~~19
−2370.4	−2386.8	−16.8	+23.8					+4.20			
+0.3	+0.1	+0.2						−284.67			

y	$\overline{Y}$	$y-\overline{Y}$ = v′	= bv′ $(y-\overline{Y})\frac{\overline{Y}}{100}$	$\overline{Y}^2/100$	av′ $(y-\overline{Y})\frac{\overline{X}}{100}$	Sn′	by sums Sn′
+276.6	+281.3	−4.7	−13.″44		+50.″88	+37.44	+37.44
−586.9	−587.9	+1.0	−5.31		−9.99	−15.30	−15.30
−1095.3	−1098.6	+3.3	−35.20		−6.72	−41.92	−41.92
−1147.3	−1154.3	+7.0	−79.35		0.00	−79.35	−79.35
+665.7	+668.1	−2.4	−16.75		−11.00	−27.75	−27.75
+949.2	+949.9	−0.7	−7.60		−7.12	−14.72	−14.72
+938.3	+941.4	−3.1	−30.08		−33.60	−63.68	−63.68
+2829.8	+2840.7	11.3	−187.73		−68.43		−242.72
−2829.5	−2840.8	10.9			+50.88		+37.44
+0.3	−0.1				−17.55		−205.28

Use y-Y page 138.

$a = +32\overset{\prime\prime}{.}2$ $a' = +.\overset{\overset{498}{262}}{\cancel{230}}$
$b = +38.0$ $b' = -\cancel{100}$ } add to meas.
$c = -11.3$ $c' = \cancel{+0.3}$
-10.9 -0.2

D6392 pm I9862

	1st	Reading 2nd	Mean x	Resid		Diff.	ax	by	c	Σ		− 12742.3
q												
r	310.5	308.1	309.3	1.2	−1.2	2.4	$+\overset{1.0}{9.7}$	+2.6	−10.9	−7.3	302.0	−12440.3
s	371.7	372.4	372.0	−0.3	0.4	0.7	+1.2	+7.8		−1.9	370.1	−12372.2
t	420.3	419.5	419.9	0.4	−0.4	0.8	+1.4	+7.0		−2.5	417.4	−12324.9
y	$113\overset{3}{\cancel{7}}.9$	$1134.\overset{3}{\cancel{2}}$	$1134.\overset{8}{\cancel{8}}$	$\overset{-0.2}{\cancel{0.3}}$	$\overset{0.2}{\cancel{0.4}}$	$\overset{0.34}{\cancel{0.7}}$	+3.7	+14.4		+7.2	$1141.\overset{3}{\cancel{8}}$	$-1160\overset{1.0}{\cancel{0.5}}$
Z	1309.6	1309.6	1309.6				+4.2	+9.7		+3.0	1312.6	−11429.7
A	1278.2	1274.2	1276.2	2.0	−2.0	4.0	+4.1	* −0.1		−6.9	1269.3	−11473.0
B	1632.0	1632.0	1632.0				+5.3	+9.5		+3.9	1635.9	−11106.4
C	1687.6	1687.6	1687.6				+5.4	+9.2		+3.7	1691.3	−11051.0
D	1751.3	1747.7	1749.5	1.8	−1.8	3.6	+5.6	+7.7		+2.4	1751.9	−10990.4
F	1989.7	1989.7	1989.7			0.0	+6.4	+10.0		$+5.\overset{5}{\cancel{8}}$	1995.2	−10747.1
G	1989.0	1988.2	1988.6	0.4	−0.4	0.8	+6.4	+14.0		+9.5	1998.1	−10744.2
K	2017.1	2017.5	2017.3	−0.2	0.2	0.4	+6.5	+2.1		−2.3	2015.0	−10727.3
O	2863.7	2863.3	2863.5	0.2	−0.2	0.4	+9.2	+7.8		+6.1	2869.6	−9872.7
Eros	1838.3	1838.3	1838.5	−0.2	−0.2		$+\underset{5.92}{5.9}$	$+\underset{8.68}{8.7}$	$-\overset{10.9}{\cancel{11.3}}$	$+\overset{3.7}{\cancel{3.3}}$	$184\overset{2.2}{\cancel{1.8}}$	$-10900.\overset{1}{5}$
	1838.7	1838.7		0.2	0.2							
	1838.3	1838.7		−0.2	0.2							

	D6392	D6391 p128	6391−6392 Corr diff of 2 plates
Corr X	$-10900.\overset{1}{\cancel{5}}$	-10903.7	$-3.\overset{6}{\cancel{2}}$
" Y	$+365\overset{3}{\cancel{2.1}}$ 55.3	$+365\overset{3.4}{\cancel{2.2}}$	$\overset{-1}{\cancel{-1.2}}$ −1.9

			Un corr diff of 2 plates
Un Corr X	−10903.8 ✓	−10904.8 ✓	−1.0
" Y	+3648.9 ✓	+3649.1	+.2

	1st Reading	2nd	Mean y	Resid.		Diff.	a'y	b'x	c'	Σ		+13644
q	6											
r	669.9	673.8	671.8	-1.9	2.0	3.9	+3.3	-0.8	-0.2	+2.3	674.1	+2038.5
s	2056.7	2057.1	2056.9	-0.2	0.2	0.4	+10.2	-1.0		+9.0	2065.9	+3430.3
t	1846.6	1846.6	1846.6				+9.2	-1.1		+7.9	1854.5	+3218.9
y	3778.8	3778.8	3778.8				+18.8	-3.0		+15.6	3794.4	+5158.8
z	2558.4	2558.8	2558.6	-0.2	0.2	0.4	+12.7	-3.4		+9.1	2567.7	+3932.1
a	-21.8	-22.2	-22.0	+0.2	-0.2	0.4	~~+~~-0.1	-3.3		-3.6	-25.6	+1338.8
B	2503.4	2505.7	2504.6	-1.2	1.1	2.3	+12.5	-4.3		+8.0	2512.6	+3877.0
C	2419.2	2419.2	2419.2				+12.0	-4.4		+7.4	2426.6	+3791.0
D	2017.5	2020.7	2019.1	-1.6	1.6	3.2	+10.1	-4.6		+5.3	2024.4	+3388.8
F	2633.0	2633.8	2633.4	-0.4	0.4	0.8	+13.1	-5.2		+7.7	2641.1	+4005.5
G	3678.7	3678.7	3678.7				+18.3	-5.2		+12.9	3691.6	+5056.0
K	550.5	550.5	550.5				+2.7	-5.3		-2.8	547.7	+1912.7
O	2061.4	2061.4	2061.4				+10.3	-7.5		+2.6	2064.0	+3428.4
Corr.	2283.6	2284.4	2284.5	-0.9	-0.1		~~+5.2~~	~~-1.8~~	~~-0.3~~	~~+3.1~~	~~2287.6~~	~~+3652.0~~
	2284.4	2284.8		-0.1	0.3		11.4 ~~+11~~	~~-4.8~~	~~+0.3~~	~~+3.4~~	~~2287.9~~	~~+3652.3~~
	2285.2	2284.4		0.7	-0.1		✓ +11.4	✓ -4.8	-0.2	✓ +6.4	✓ 2290.9	✓ +3655.3

Reject p142

$a = +.322$ $a' = ~~+.230~~$ $+.498$

$b = +.380$ $b' = ~~-.100~~$ $-.262$

D6392 from I9862

see p182 = D6391

p138

	~~X~~ const/100 $aX/100$	$bY/100$	$(x-X)$	$\Sigma = c$	O–C
u	+3.7″ ✓	+5.2″ ✓	+1.5″ ✓	+10.4″ ✓	−.9″
w	3.5 ✓	+1.9 ✓	+6.7 ✓	+12.1 ✓	+.8
H	6.4 ✓	+0.0 ✓	+4.7 ✓	+11.1 ✓	−.2
L	7.0 ✓	−.2 ✓	+4.1 ✓	+10.9 ✓	−.4
N	8.5 ✓	+6.7 ✓	−3.0 ✓	+12.2 ✓	+.9
P	9.9 ✓	+7.8 ✓	−6.7 ✓	+11.0 ✓	−.3
Q	10.5 ✓	+7.8 ✓	−7.1 ✓	+11.2 ✓	−.1

1.9

+11.3

−1.9

+1.7

±3.6

±.51″

with consts for D6392 → see p143

c = −11.3

	$aY/100$	$bX/100$	$(y-Y)$	$\Sigma = c'$	O–C
u	+ 3.2″ ✓	−1.1″ ✓	−4.8″ ✓	−2.7″	−3.0″
w	+ 1.2 ✓	−1.1 ✓	+0.9 ✓	+1.0	+.7″
H	+ 0.0 ✓	−2.0 ✓	+3.2 ✓	+1.2	+.9
L	− 0.1 ✓	−2.2 ✓	+6.9 ✓	+4.6	+4.3
N	+ 4.1 ✓	−2.6 ✓	−2.5 ✓	−1.0	−1.3
P	+ 4.7 ✓	−3.1 ✓	−0.8 ✓	+0.8	+0.5
Q	+ 4.7 ✓	−3.2 ✓	−3.2 ✓	−1.7	−2.0

+7.6

−5.4

+2.2

+0.31

−6.3

+6.4

±12.7

±1.41″

c′ = −0.3

p138

D6392

← p138

(−12742.3) X-Const	X-Const/100	a X/100	b Y/100	x−X Σ=C	
+990.4″	9.9″	+3.2″	+5.4″	+10.1	−.8
939.1	9.4	+3.0	+2.1	11.8	+.9
1845.9	18.5	+6.0	+0.1	10.8	−.1
2049.4	20.5	+6.6	−0.1	10.6	−.3
2495.6	25.0	+8.0	+6.8	11.8	+.9
2943.7	29.4	+9.5	+7.9	10.7	−.2
3106.3	31.1	+10.0	+7.9	10.8	−.1
				6.6	−15
				+10.9	+18
				C = −10.9	±33 / 7 ±.47

← p138

(+5364.4) Y-Const	Y-Const/100	a′ Y/100		b′ X/100		y′ Σ=c′		O-C	O-C
+1406.9″	+14.1 +	6.9	+7.0″ −	3.0	−2.6″	−.9	−.4	−.6	−.6
+537.7	+5.4 +	2.5	+2.7 −	2.8	−2.5	+.6	+1.1	+.9	+.9
+27.0	+0.3 +	0.0	+0.1 −	5.2	−4.8	−2.0	−1.5	−1.7	−1.7
−28.7	−0.3 −	0.2	−0.1 −	5.7	−5.4	+1.0	+1.4	+1.3	+1.2
+1793.7	+17.9 +	8.8	+8.9 −	6.9	−6.6	−.6	−0.2	−.3	−.4
+2075.5	+20.8 +	10.2	+10.4 −	8.1	−7.7	+1.3	+1.9	+1.6	+1.7
+2067.0	+20.7 +	10.2	+10.3 −	8.5	−8.1	−1.5	−1.0	−1.2	−1.2
						−50	−3.1	−38	−39
						+29	+4.4	+38	+38
						−21	+1.3	±76	±77
						−.3		~~±1.09~~	±1.10

C = +.3 +.2

C′ = −.2

Recomputation of D6441 from I9801, Solution eliminating c and c′
(see pp 4–17 for Solution not eliminating c + c′.) For other col. of I9801 see pp 114–118

	p4 Mean x	Resid x	Computed X	Resid X	Resids = v x − X
	″	″	″	″	″
a	10.3	−2498.0	−12140.1	−2507.8	+9.8
b	319.4	−2188.9	−11828.8	−2196.5	+7.6
c	685.7	−1822.6	−11458.0	−1825.7	+3.1
e	2254.7	−253.6	−9886.5	−254.2	+0.6
k	3410.9	+902.6	−8725.6	+906.7	−4.1
l	3536.2	+1027.9	−8604.1	+1028.2	−0.3
m	3629.7	+1121.4	−8507.8	+1124.5	−3.1
n	4099.8	+1591.5	−8036.1	+1596.2	−4.7
o	4627.7	+2119.4	−7503.7	+2128.6	−9.2
	22574.4	+6763.1	86690.7	+6784.2	+21.4
Mean	2508.3	−6762.8	−9632.3	−6784.2	−21.1

	Mean y	Resid y	Computed Y	Resid Y	Resids v′ y − Y
	″	″	″	″	″
a	587.5	−1152.7	−16118.6	−1154.6	+1.9
b	1536.6	−203.6	−15166.9	−202.9	−0.7
c	3591.6	+1851.4	−13104.6	+1859.4	−8.0
e	3786.8	+2046.6	−12911.5	+2052.5	−5.9
k	2128.6	+388.4	−14573.0	+391.0	−2.6
l	184.9	−1555.3	−16524.3	−1560.3	+5.0
m	609.8	−1130.4	−16098.7	−1134.7	+4.3
n	1365.5	−374.7	−15341.4	−377.4	+2.7
o	1870.8	+130.6	−14837.0	+127.0	+3.6
	15662.1	−4416.7	134676.0	−4429.9	−17.2
Mean	1740.2	+4417.0	−14964.0	+4429.9	+17.5

+ measured values x + y used.

Resid $\frac{x}{100} = a$	$x - X\,\frac{x}{100} = an$	$\frac{x^2}{100} = aa$	$\frac{xy}{100} = ab$	$x - X\,\frac{y}{100} = bn$	$\frac{y^2}{100}$ bb	s
″	″	″	″	″	″	″
−24.98	−244.80	+624.00	+288.02	−112.99	+132.94	−36.51
−21.89	−166.36	+479.17	+44.66	−15.50	+4.16	−23.93
−18.23	−56.51	+332.33	−337.44	+57.38	+342.62	+0.28
−2.54	−1.52	+6.45	−51.99	+12.28	+419.02	+17.93
+9.03	−37.02	+81.54	+35.04	−15.91	+15.05	+12.91
+10.28	−3.08	+105.68	−159.85	+4.66	+241.80	−5.27
+11.21	−34.75	+125.66	−126.67	+35.03	+127.69	−0.09
+15.92	−74.82	+253.45	−59.70	+17.62	+14.06	+12.17
+21.19	−194.95	+449.02	+27.76	−12.05	+1.72	+22.50
−67.64			−735.65	+126.97		−65.80
Σ +67.63	−813.81	+2457.30	+395.48	−156.45	+1299.06	+65.79
			−340.17	−29.48		

Resid $\frac{y}{100} = b$	$y - Y\,\frac{y}{100} = bn'$	$y - Y\,\frac{x}{100} = an'$	as	bs	sn	sn′
″	″	″	″	″	″	″
−11.53	−21.91	−47.46	+912.02	+420.96	−357.80	−69.37
−2.04	+1.43	+15.32	+523.83	+48.82	−181.87	+16.75
+18.51	−148.08	+145.84	−5.10	+5.18	+0.87	−2.24
+20.47	−120.77	+14.99	−45.54	+367.03	+10.76	−105.79
+3.88	−10.09	−23.48	+116.58	+50.09	−52.93	−33.57
−15.55	−77.75	+51.40	−54.18	+81.95	+1.58	−26.35
−11.30	−48.59	+48.20	−1.01	+1.02	+0.28	−0.39
−3.75	−10.12	+42.98	+193.75	−45.64	−57.20	+32.86
+1.31	+4.72	+76.28	+476.78	+29.48	−207.00	+81.00
+44.17						
Σ −44.17	−437.31	+395.01	+2222.96	+1004.53	+13.49	+130.61
	+6.15	−70.94	−105.83	−45.64	−856.80	−237.71
	−431.16	+324.07	+2117.13	+958.89	−843.31	−107.10

x^2 +2457.30	y^2 +1299.06	an −813.81	an′ +324.07
xy −340.17	xy −340.17	bn −29.48	bn′ −431.16
Σ +2117.13	Σ +958.89	Σ −843.29	Σ −107.09

D6441 from I9801 Normals eliminating c + c′

	aa	ab	as	an	
	+2457.30	−340.17	+2117.13	−813.81	
	3.39046	2.53170n	3.32575	2.91052n	
		9.14124n	9.93529		
		(1.67294)	(2.46699n)	(2.05176)	(2.84581n)
9.05513	−813.81	bb	bs	bn	sn
2.53170n	−38.62	+1299.06	+958.89	−29.48	−843.31
1.58683n	−852.43n	+ 47.09	−293.08	+112.66	−701.15
	2.93066n	+1251.97	+1251.97	−142.14	−142.16
	3.39046	3.09759		2.15272n	2.15278
	9.54020n			9.05513n	19
	a = x = −.347			b = y = −.114	−.114

				an'	
				−324.07	
				2.51064n	
				(1.65188n)	(2.44593n)
9.48933	+324.07			bn'	$\delta n'$
2.53170n	−104.96			+431.16	−107.10
2.02103n				−44.86	−279.21
	+219.11			−386.30	−386.31
	2.34066			2.58692n	
	8.95020			9.48933n	
$b' = x' = +.089$					
			$a' = \varphi' = -.309$		

Solution Eliminating c and c′

for (not elim c & c′) Man Sol see pp 4–13
" " ecl " pp

D6441 from I 9801

To find c and c′ a = +.347 a′ = +.309 } add
b = +.114 b′ = −.089

p144

	mean x/100	a x/100	b y/100	𝔛 − X	Σ = c	O − C see p10
a	0.10	+0.0	+0.7	+9.8	+10.5	−0.2
b	3.19	+1.1	+1.8	+7.6	+10.5	−0.2
c	6.86	+2.4	+4.1	+3.1	+9.6	−1.1
e	22.55	+7.8	+4.3	+0.6	+12.7	+2.0
k	34.11	+11.8	+2.4	−4.1	+10.1	−0.6
l	35.36	+12.3	+0.2	−0.3	+12.2	+1.5
m	36.30	+12.6	+0.7	−3.1	+10.2	−0.5
n	41.00	+14.2	+1.6	−4.7	+11.1	+0.4
o	46.28	+16.1	+2.1	−9.2	+9.0	−1.7
					5.9	−43
				−c =	+10.7	+39
						±82

±.91

	x	a x	b y	c	Σ of corr.	Const X	X′
Eros	2514.4	+8.7 8.72	+.9 .87	−10.7	−1.1	−12140.6	−9627.3

	mean y/100	a′ y/100	b′ x/100	𝔜 − Y	Σ = c′	O − C
a	5.88	+1.8	−0.0	+1.9	+3.7	+0.4
b	15.37	+4.7	−0.3	−0.7	+3.7	+0.4
c	35.92	+11.1	−0.6	−8.0	+2.5	−0.8
e	37.87	+11.7	−2.0	−5.9	+3.8	+0.5
k	21.29	+6.6	−3.0	−2.6	+1.6	−1.7
l	1.85	+0.6	−3.1	+5.0	+2.6	−0.7
m	6.10	+1.9	−3.2	+4.3	+3.0	−0.3
n	13.66	+4.2	−3.6	+2.7	+3.3	0.0
o	18.71	+5.8	−4.1	+3.6	+5.3	+2.0
					29.5	+33
				−c′ =	+3.3	−3.5
						±68

±.75

	y	a′ y	b′ x	c′	Σ of corr.	Const Y	−Y′
Eros	766.2	+2.4 2.40	−2.2 2.24	−3.3	−3.1	−16704.2	−15941.1

Sol. elim. c re'

Eros D6441

1875 $\gamma' =$

log γ'

log $\gamma'/R = \tan^{-1}\gamma' = d - b - D$

d

D

$b = D + d$

1875 X'

log X'

" X'/R

" cos d

$\frac{X'}{R}\cos d$

cos b

$\frac{X'/R \cos d}{\cos b} =$ tan a

a-(α-A) arc

A " " time

A =

1875 α = a + A

tan b

cos a

tan b cos a - tan δ

1875 δ

with Eros 3 p 119+ p149

...is. See Eros 5

" 57.0

(.08)

2.1

(.13)

2.1

Summary Results Eros I9801 [149]

I9801

	α 1875	δ 1875
	h m s	Eros 3
D6441	5 58 48.11 ✓	+ 53 39 46.85 p12
D6442	48.12 ✓	46.67 ✓ p17
Mean value adopted Mar 20	48.12	46.8
Mr. C's Value	48.02	46.9 p13
Recomp.		
D6441	48.10 ✓	46.76 ✓ p149
D6442	48.13 ✓	46.77 ✓ p119
Mean Value Jan 1900	48.12	46.8

Eros:

Recomp. I 98

I

x 25 14."

+.01

+345x = + 8.

+113y = +

Sol. elim. c re'

Eros D6441

1875 $Y' =$

log Y'

log $Y'/R = \tan^{-1} Y' = d - b - D$

d

D

$b = D + d$

1875 X'

log X'

" X'/R

" cos d

$\frac{X'}{R} \cos d$

cos b

$\frac{X'/R \cos d}{\cos b} =$ tan a

$a - (d - A)$ arc

" " tan

$A =$

1875 $\alpha = a + A$

tan b

cos a

tan b cos a = tan δ

1875 δ

Eros:
Recomp. F 9801 using computed values X and Y in the equations. See Eros 5

compare with Eros 3 p 119 + p149

D6441

x 2514''.4 y 766''.2

$+.345x = +\overset{(.67)}{8.7}$ $+.308y = +\overset{(.36)}{2.4}$

$+.113y = +\overset{(.87)}{.9}$ $-.088x = \overset{(.24)}{2.2}$

D6442

$x = 2478''.7$ $y = 757''.0$

$+.334x = +\overset{(.28)}{8.3}$ $+.278y = +\overset{(.08)}{2.1}$

$+.122y = +\overset{(.92)}{.9}$ $-.086x = -\overset{(.13)}{2.1}$

Sol. elim. c re'

Eros D6441 from I 9801   For D6442 see p 119

		6441 − 6442 diff Y'
1875 Y' =	$-15941.1''$	0.0
log Y'	4.2025183 ✓	
log $Y'/R = \tan^{-1} Y' = d = b - D$	8.8880932 ✓	
d	−4 25 9.48 ✓	
D	+58 10	
$b = D + d$	+53 44 50.52 ✓	
1875 X'	$-9627.3''$	+ .3
log X'	3.9835045_n	
" X'/R	8.6690794_n	
" cos d	9.9987069 ✓	
$\frac{X'}{R} \cos d$	8.6677863_n ✓	
cos b	9.7718422 ✓	
$\frac{X'/R \cos d}{\cos b} = \tan a$	8.8959441_n ✓	
$a = (\alpha - A)$ arc	$-4^\circ\ 29'\ 58.51''$	
" " time	$-0^h\ 17^m\ 59.90^s$	$\cos\delta = .592$
A =	6 16 48	diff α × 15 cos δ
1875 $\alpha = a + A$	5 58 48.10 ✓	$+0.03^s = +0.3''$

tan b	0.1347177 ✓	
cos a	9.9986594 ✓	
tan b cos a = tan δ	0.1333771 ✓	
1875 δ	+53 39 46.76 ✓	0.0

Nova Sagittarii. Standard Stars.

D 6613 from B 21319. Meas. Bk. 17, p. 18.

1890.

	Prof Scale	1st Reading	2nd	Mean x	Resid	diff	Comp. X	X − mean x	x + Const from f.g.o	Obs − Comp. x − X from f.g.o	x + Const from all 5 stars
f Dm. −13°	5183	1399.2″	1399.2″	1399.2″			+3742.8″	+2343.6″	+3742.0″	−0.8″	+3741.5″
g	5185	1451.7	1452.1	1451.9	−0.2 0.2	0.4	+3792.0	+2340.1	+3794.7	+2.7	+3794.2
l	5194	2322.2	2322.2	2322.2			+4664.2	+2342.0			+4664.5
o	5197	2686.3	2686.3	2686.3			+5031.0	+2344.7	+5029.1	−1.9	+5028.6
p*	5200	2909.0	2909.0	2909.0			+5250.3	+2341.3			+5251.3
(Nova Sag p156				1994.2)			2480.3	8.4			

5
Mean 4496.1

* First + Second meas. were not made from edge of square.

+2342.8 adopted Const X (f.g.o)

+2342.3 " " " from all 5

1890

		1st Reading	2nd	Mean y	Resid	diff.	Comp. Y	Y − mean y	y + Const	y − Y from f.g.o	y + Const from all 5
f Dm. −13°	5183	3150.3″	3150.3″	3150.3″			−1964.4″	−5114.7″	−1969.5	−5.1″	−1972.5″
g	5185	1959.8	1962.4	1961.1	−1.3 1.3	2.6	−3159.7	−5120.8	−3158.7	+1.0	−3161.7
l	5194	2198.3	2198.3	2198.3			−2930.~~3~~4	−5128.6			−2924.5
o	5197	2521.3	2521.3	2521.3			−2602.~~7~~4	−5124.0	−2598.5	+ ~~4.2~~ 3.9	−2601.5
p	5200	2505.1	2505.6	2505.0†	0.1 0.6		−2621.0	−5126.0			−2617.8
		2505.1	2504.3		0.1 −0.7						
(Nova Sag				2529.7)			327~~64~~8.2 / 5	29.5			

† Mean of four.

Mean 2655.6 −5119.8 adopted Const Y (f.g.o)

" −5122.8 " " " from all 5 stars

Prof. Searle's (1890) (see over for X + Y Rect. Coords)

Comp. Stars		DM	α			δ			
	f.	DM −13° 5183	18	54	58.22 58.16 58.19	−13	8	37.0 35.8 36.4	
	g	−13 5185	18	55	1.91 1.90 1.90	−13	28	30.8 31.4 31.1	
	n	−13 5193	not observed.						
	l	−13 5194	18	56	1.45 1.70 1.58	−13	24	36.8 38.3 37.6	
	*o	−13 5197	18	56	26.67 26.50 26.58	−13	19	7.2 8.2 7.7*	
	p	−13 5200	18	56	41.51 41.68 41.60	−13	19	26.2 24.0 25.1	

*Star o Should be 7.2-8.8, Mean 8.0

Von Bonn had it 8.0 Correct

									s x	a S
−									0.78	+2.50
+2.2	−17.0	+5.0	−15.40	49.00	+35.00	−11.00		−12.0	−26.40	+84.00
+0.3	+1.7	−2.7	+0.51	2.89	−4.59	−0.81		−1.0	−.30	−1.70
−2.4	+5.3	+0.5	−12.72	28.09	+2.65	−1.20		+5.8	−13.92	+30.74
+1.0	+7.5	+0.3	+7.50	+56.25	+2.25	+0.30		+7.8	+7.80 −40.62 +8.58	+58.50
			−10.36	+192.48	−16.4~~6~~4	−21.68			−32.04	+176.04

Resids X″ ÷100

−753.3

−704.1

+168.1

+534.9

+754.2

−1457.4

+1457.2

add a = +0.7~~7~~8

b = +2.~~69~~86

Star	X−Const ÷100	aX/100	bY/100	x−X	Σ = c	O−C
f	+1400.5	+1.1	~~+8.5~~ 9.0	−1.3	+8.~~3~~8	+.1
g	+1449.7	+1.1	+5.~~3~~6	+2.2	+8.~~6~~9	+.~~4~~2
l	+2321.9	+1.8	~~+5.9~~ 6.3	+0.3	+8.~~0~~4	−.~~1~~3
o	+2688.7	+2.1	~~+6.8~~ 7.2	−2.4	+6.~~4~~9	−1.8
p	+2908.0	+2.2	~~+6.5~~ 7.2	+1.0	~~+9.7~~ 10.4	+1.~~5~~7
					+8.2 c = Sx/5 = 8.27	+20 ~~±4.0~~ ±8.0

y−Y	Residuals Y	(y−Y)Y/100	Y²/100		(y−Y)X/100		
−8.1″	+691.2″	−55.89	+47.61		+60.75	+4.86	−4.14
−2.0	−504.1	+10.00	25.00		+14.00	+24.00	+60.00
+5.~~8~~9	−274.7	−15.93	7.29		+10.03	−5.90	+2.70
+~~1.1~~ 0.9	+52.9	+0.~~45~~60, +0.60 (+1.2)	0.25		+~~4.77~~ 6.36, +6.36 (+1.2)	+6.96	+2.90
+3.2	+34.6	+0.96	0.09		+24.00	+24.96	+2.34
	+778.7 +778.8	−60.~~41~~26	+80.24		+11~~3.55~~5.14	+54.88	+63.80

Σ = c′	O−C	
+4.5	+.7	+.4
+2.6	−1.2	−1.5
+7.3	+3.5	+3.2
+2.~~4~~7	−1.4	−1.4
+~~0.4~~3.4	−1.4	−.7
−c′ + ~~3.8~~ 4.1	+4.2 −4.9 ±8.2	−3.6 +3.6 ±7.2
c′ = ~~3.8~~ 41	±1.64	±1.44

add a′ +.~~760~~ 640

b′ − .~~525~~ 543

Y−Const	a′Y/100	b′X/100	y−Y	Σ = c′		O−C		
f	+3158.4″	+~~24.0~~ 20.2″	−7.~~4~~6″	−8.1″	+8.5″	4.6	+1.5″	+.9
g	+1963.1	+~~14.9~~ 12.5	−7.~~6~~9	−2.0	+5.3	2.7	−1.7	−1.0
l	+2192.4	+14.~~6~~0	−12.~~2~~6	+5.9	+8.3	7.3	+1.3	+3.6
o	+2520.4	+~~19.1~~ 16.1	−~~14.1~~ 14.6	+~~0.9~~ 1.2	+5.9	1.5	−1.1	−2.2
p	+2501.8	+~~19.0~~ 16.0	−~~15.3~~ 16.8 −15.8	+3.2	+6.9	2.4	−.1	−1.7
					+7.0 −c′ = −7.0	3.7	+2.8 −2.9 ±5.7	+4.5 −4.0 ±9.0 8.0 ±1.14

Used these:

		B21319 X	Y	611827 X	Y
	f	+3742.8″	−1964.4″	−1341.1″	+1642.6″
	g	+3792.0	−3159.7	−1285.1	+448.0
	l	+4664.2	−2930.4	−414.7	+682.3
δ = 8″.0	o	+5031.0	−2602.7	−49.9	+1012.0
	p	+5250.3	−2621.0	+169.3	+994.9

D6613 from

1st Reading

	Prof Scale										
f	dm. −13° 5183	1399.2″									
g	5185	1451.7	1452.1	1451.9	−0.2 0.2	0.4	+3792.0	+2340.1	+3794.7	+2.7	+3794.2
l	5194	2322.2	2322.2	2322.2			+4664.2 ✓	+2342.0			+4664.5
o	5197	2686.3	2686.3	2686.3			+5031.0 ✓	+2344.7	+5029.1	−1.9	+5028.6
p*	5200	2909.0	2909.0	2909.0			+5250.3 ✓	+2341.3			+5251.3
(Nova Says p156				1994.2)			2480.3 / 5	8.4			
						Mean	4496.1				

* First & Second meas. were not made from edge of square.

+2342.8 adopted Const X (f. g. o)

+2342.3 " " " from all 5

1890

		1st Reading	2nd	Mean y	Resid	diff.	Comp. Y	Y − mean y	y + Const	y − Y from f. g. o	y + Const from all 5
f	dm. −13° 5183	3150.3″	3150.3″	3150.3″			−1964.4″ ✓	−5114.7″	−1969.5	−5.1″	−1972.5″
g	5185	1959.8	1962.4	1961.1	−1.3 1.3	2.6	−3159.7 ✓	−5120.8	−3158.7	+1.0	−3161.7
l	5194	2198.3	2198.3	2198.3			−2930.~~3~~4 ✓	−5128.6 ✓			−2924.5
o	5197	2521.3	2521.3	2521.3			−2602.~~7~~4 ✓	−5124.0	−2598.5	+ ~~4.2~~ 3.9	−2601.5
p	5200	2505.1	2505.6	2505.0†	0.1 0.6		−2621.0 ✓	−5126.0 ✓			−2617.8
		2505.1	2504.3		0.1 −0.7						
(Nova Says				2529.7)			327~~7.1~~8.2 / 5	29.5			

† Mean of four.

Mean 2655.6 ✓ −5119.8 adopted Const Y (f. g. o)

" −5122.8 ✓ " " " from all 5 stars

Mult + Σ's chkd by Miss Woods independent comp.

−10.36
−21.68
−32.04

Solution from all 5 stars

x−X	Residuals X/100	Y/100	(x−X)X/100	X²/100	XY/100	(x−X)Y/100	S	Sx	aS
−1.3	−7.5	+6.9	+9.75	+56.25	−51.75	−8.97	−.6	+0.78	+4.50
+2.2	−7.0	−5.0	−15.40	49.00	+35.00	−11.00	−12.0	−26.40	+84.00
+0.3	+1.7	−2.7	+0.51	2.89	−4.59	−0.81	−1.0	−.30	−1.70
−2.4	+5.3	+0.5	−12.72	28.09	+2.65	−1.20	+5.8	−13.92	+30.74
+1.0	+7.5	+0.3	+7.50	+56.25	+2.25	+0.30	+7.8	+7.80	+58.50
			−10.36	+192.48	−16.4~~6~~4	−21.68		−40.62 +8.58 −32.04	+176.04

Resids X ÷100
−753.3
−704.1
+168.1
+534.9
+754.2

−1457.4
+1457.2

add
a = +.07~~7~~8
b = +.2~~69~~86

Star	X−Const ÷100	aX/100	bY/100	x−X	Σ=C	O−C
f	+1400.5	+1.1	~~+8.5~~ 9.0	−1.3	+8.~~3~~8	+.1
g	+1449.7	+1.1	+5.~~3~~6	+2.2	+8.~~6~~9	+.~~4~~2
l	+2321.9	+1.8	~~+5.9~~ 6.3	+0.3	+8.~~0~~4	−.~~2~~3
o	+2688.7	+2.1	~~+6.8~~ 7.2	−2.4	+6.~~5~~9	−1.8
p	+2908.0	+2.2	~~+6.5~~ 7.2	+1.0	~~+9.7~~ 10.4	+1.~~5~~7
					+8.2 C = −8.2	+2.0 −2.0 ±5.4 ±.80

y−Y	Residuals Y	(y−Y)Y/100	Y²/100	(y−Y)X/100	Sy	bS
−8.1	+691.2	−55.89	+47.61	+60.75	+4.86	−4.14
−2.0	−504.1	+10.00	25.00	+14.00	+24.00	+60.00
+5.~~8~~9	−274.7	−15.93	7.29	+10.03	−5.90	+2.70
+~~0.9~~ 1.2	+52.9	+0.~~45~~60, +0.60 (+1.2)	0.25	+~~4.77~~ 6.36, +6.36 (+1.2)	+6.96	+2.90
+3.2	+34.6	+0.96	0.09	+24.00	+24.96	+2.34
	+778.7 +778.8	−60.~~41~~26	+80.24	+113.~~55~~14	+54.88	+63.80

Σ=c'	O−C	
+4.5	+.7	+.4
+2.6	−1.2	−1.5
+7.3	+3.5	+3.2
+2.~~4~~7	−1.4	−1.4
+0.~~4~~3	−1.4	−.7
−c' + ~~3.8~~ 4.1	+4.2 −4.0 ±8.2	−3.6 +3.6 ±7.2
c' = −~~3.8~~ 41	±1.64	±1.44

add
a' + .~~760~~ 640
b' − .~~525~~ 543

Star	Y−Const	a'Y/100	b'X/100	y−Y	Σ=c'	O−C	
f	+3158.4	+~~24.0~~ 20.2	−7.~~4~~6	−8.1	+8.5 4.6	+1.5	+.9
g	+1963.1	+~~14.9~~ 12.5	−7.~~6~~9	−2.0	+5.3 2.7	−1.7	−1.0
l	+2192.4	+14.~~6~~0	−12.~~2~~6	+5.9	+8.3 7.3	+1.3	+3.6
o	+2520.4	+~~19.1~~ 16.1	−~~14.1~~ 14.6	+~~0.9~~ 1.2	+5.9 1.5	−1.1	−2.2
p	+2501.8	+~~19.0~~ 16.0	−~~15.3~~ 16.8 −15.8	+3.2	+6.9 2.4	−.1	−1.7
					+7.0 −c' = −7.0 3.7	+2.8 −2.9 ±5.7	+4.5 −4.0 ±9.0 ±1.~~44~~80

Equations for a b c from Stars f. g. o

Nova Sagittarii

D6613 from B21319

$a = -.00234$
$b = -.00305$

To find C

	$x - X$		x	y				
f	$-0.8 =$		1399.2 a +	3150.3 b + c	−3.3	−9.6 + C		C = +12.1″
g	$+2.7 =$		1451.9 a +	1961.1 b + c	−3.3	−6.0		+12.0
o	$-1.9 =$		2686.3 a +	2521.3 b + c	−6.3	−7.7	…	+12.1
								+12.1

1–2 $-3.5 = -52.7\,a + 1189.2\,b$

2–3 $+4.6 = -1234.4\,a - 560.2\,b$

b =

÷ coeff b $-.002943 = -.0443a + b$ $+.000104$ $-.003047$

$+.008211 = -2.2035a - b$ $+.005164$ $-.003047$.

$+.005268 = -2.2478a$

7.72165

0.35176n

7.36989n

$a = -.00234$

adopted

$a = -.00234$

$b = -.00305$

$C = +12.1$

} To be subtracted from meas.

Constants a b c from all 5 Stand. Stars f. g. l. o. p

$X^2/100$	$XY/100$	as	$(x-X)X/100$
+192.48 ✓	−16.44	+176.04	−10.36 ✓
2.2844 ✓	1.2159n	2.245~~5~~6	1.0153n ✓
	8.9315n	9.9612	8.7309n ✓

		Y^2	bs	$(y-Y)Y/100$	sx	sn
9.4303	−10.36 ✓	+80.24 ✓	+63.80	−21.68 ✓	~~−32.04~~ →	−3204
1.2159n	−4.~~43~~ 70 ✓	+ 1.40 − ~~.08~~ ✓	− 15.04	+ 88 − ~~.05~~ ✓		− 9.47 ✓
0.6462n ✓	15.06 − ~~14.79~~ ✓	~~+80.32~~ ✓	+78.84 +78.84	− ~~21.63~~ ✓	−22.56	−22.57
	1.17~~00~~ 78 n	~~1.9048~~ ✓	1.8967 ✓	~~1.3351~~ n ✓	1.3534	
aa	2.2844			~~1.9048~~ ✓		
	8.8~~856~~ 934 8 n ✓			~~9.4303~~ n ✓	9.4567	
a = x =	−.07~~68~~ 8 ✓			b = y ~~−.269~~ ✓	−.286	

Equations for a' b' c' from Stars f. g. o.

Black ink values to be retained.

a' = −.00492
b' = +.00482
To find c'
493
458

	y−Y		y	x				c'	
f	−5.1 =		3150.3 a' + 1399.2 b' + c'	15.5	6.4	− 15.5 + 6.7 + c'		c' = 4.0	+3.7
g	+1.0 =		1961.1 a' + 1457.9 b' + c'	9.7	6.6	− 9.6 + 7.0		4.1	+3.6
o	~~+3.9~~	+ ~~4.7~~ =	2521.3 a' + 2686.3 b' + c'	12.4	12.3	− 12.4 + 12.9		4.1	+3.7
									+3.7

1−2 −6.1 = +1189.2 a' − 52.7 b'

2−3 ~~−2.9~~ − ~~3.2~~ = −560.2 a' − 1234.4 b'

÷ coeff a'

−.005730 = + a' − .0443 b'   − .000~~214~~ 203 a' = −.004~~916~~ 4927

−.005177 − ~~.005712~~ = − a' − 2.2035 b'   −.01~~0628~~ 10104 a' = −.004~~916~~ 4927

−.010307 − ~~.010842~~ = − 2.2478 b'

8.01313 ~~8.03511~~ n

0.35176 n

7.66137 7.68335

+.004585 b' = +.00482

a' = −.0049~~2~~ 3
b' = +.004~~82~~ 58
c' = ~~+3.7~~ 4.1
To be sub. from meas.

---

a' b' c' from all 5 Stand. Stars

(y−Y) x̄/w a n'

+113.55 +115.14

2.0552 2.0611 2.06123

9.7708

				(y−Y) ȳ/w		s n'
9.8845	9.8060	+113.55	+115.14	−60.41	−60.26	+54.88
1.2159 n	1.2159	−12.49	−10.5~~4~~ 2	+ .59	−9.~~70~~ 83	+105.3
1.0964 n	1.0219	+101.06	+104.6~~0~~ 2	−61.00	−50.~~56~~ 43	−50.42
		2.0045	2.019~~5~~ 6	1.7853 n	1.70~~38~~ 27 n	1.7026 n
		2.2844		1.9048		
		2.7201	9.735~~7~~ 7	9.8805 n	9.80~~7~~ 60 n	9.8059
b' = x'		+.525	+.543~~5~~	a' = y' = −.760	−.64~~1~~ 0	−.640

Constants from f.g.o

a = −.00234 a' −.0049$\overset{3}{\cancel{2}}$
b = −.00305 b' +.004$\overset{58}{\cancel{87}}$
c = +12.1 c' $\overset{4.1}{\cancel{+3.7}}$

} To be sub. from meas.

Nova Sagittarii Const. X +2342.8 Y −5119.8

D6613 from B21319

	1st Read.	2nd	Mean x	Resid	diff	ax	by	c	Σ	Corr x $\bar{\bar{x}}+\Sigma$	X
Nova Sag.	1993.9	1993.9	1994.2	−0.3 −0.3		−4.7"	−7.7"	+12.1"	−.3	1994.5	+4337.$\overset{3}{\cancel{4}}$
	1993.9	1994.8		−0.3 0.6							
	1993.9	1994.8		−0.2 0.2							
a	0.9	1.3	1.1	−0.2 0.2	0.4						
b	92.9	92.9	92.9								
c	552.3	552.3	552.3								
d	792.5	792.5	792.5								
e	983.7	983.3	983.5	0.2 −0.2	0.4						
h	2155.4	2154.6	2155.0	0.4 −0.4	0.8						
k	2276.7	2277.2	2277.0	−0.3 0.2	0.5						
m	2391.2	2391.2	2391.2								
n	2289.9	2289.9	2289.9								
q	3344.2	3342.9	3343.6	0.6 −0.7	1.3						

Cat Stars Comp X @ 6

	Mean x	ax	by	Σ	Corr x	X	
l	2322.2	−5.4	−6.7	−.1	2322.3	+4665.1"	+4664.2 +.9
p	2909.0	−6.8	−7.6	−2.4	2911.4	+5254.2	+5250.3 +3.9

Constants from all 5 Stand. Stars f. g. l. o. p.

a = +.07$\overset{8}{\cancel{7}}$ a' +.$\overset{640}{\cancel{760}}$ } +.640
b = +.2$\overset{86}{\cancel{69}}$ b' −.5$\overset{43}{\cancel{25}}$ } add to meas −.543
c = −8.$\overset{7}{\cancel{1}}$ c' ~~3.7~~ ~~3.8~~ −~~7.0~~ } −4.1 −4.1"
Const X + 2342.3 Y − 5122.8

Nova Sag. from 5 Stars. ax by c Σ
~~+1.5 +6.8 −8.2~~ +.1 ✓ +1994.3 +4336.6" ✓
+1.6 + 7.2 −8.7 +.1

~~Star 0.5 correction to 7.7~~

a′ −.00493
b′ +.00458
c′ +4.1
−5119.8

Retain black ink values.

	Readings 1	2	Mean y	Resid	diff	a′y	b′x	c′	Σ	Corr y = y+Σ	Y	
Nova Sag	2529.6	2530.0	2529.7	−0.1 0.3		−12.″4	+9.″6	+3.″7	+.″9	2528.8	−2591.″0	stet from 1.90
						~~−12.5~~	~~+9.1~~	~~+4.1~~	~~+.7~~	~~2529.0~~	~~−2590.8~~	
	2530.0	2530.0		0.3 0.3								
	2529.6	2529.2		−0.1 −0.5								
a	3595.3	3595.3	3595.3									
b	1252.1	1251.7	1251.9	0.2 −0.2	0.4							
c	4542.7	4542.7	4542.7									
d	1625.4	1625.0	1625.2	0.2 −0.2	0.4							
e	1319.9	1320.7	1320.3	−0.4 0.4	0.8							
h	692.0	692.0	692.0									
k	3893.4	3892.6	3893.0	0.4 −0.4	0.8							
m	4318.7	4318.7	4318.7									
n	2616.4	2617.3	2616.8	−0.4 0.5	0.9							
q	4139.7	4139.7	4139.7									

Cat Stars

										Comp Y	C–C
6 +.9	l	2198.3	−10.8	+~~11.2~~ 10.6	+~~3.7~~ 4.1	+~~4.1~~ 3.9	2194.~~7~~ 4	−2925.~~6~~ 4	−2930.3	+4.″~~7~~ 9
+3.9	p	2505.0	−12.3	+~~14.0~~ 13.3		+5.4 1	2499.~~6~~ 9	−26~~20.2~~ 19.9	−2621.0	+~~0.8~~ 1.1

	a′y	b′x	c′	Σ			
Nova Sag	~~+19.2~~	~~−10.5~~	~~−7.0~~	~~+1.7~~	~~2531.4~~	~~−2591.4~~	Position from 5 Stars
	+16.2	−10.8	−~~3.7~~ 8	+~~1.7~~ 6	25~~31~~.3	−25~~91~~.5	
			−4.1	+1.3	2531.0	−2591.8	

Nova Sagittarii Standard Stars

D6614 from B21319

Prof. Scale	1st Read.	2d	Mean x	Resid	diff.	1890 Comp X	X − mean x	x + Const. from f.g.o	x − X from f.g.o	x + Const from all 5
f	1352.0	1351.6	1351.8	0.2 −0.2	0.4	+3742.8	+2391.0	3741.5	−1.3	+3741.0
g	1404.9	1406.7	1405.8	−0.9 0.9	1.8	+3792.0	+2386.2	3795.5	+3.5	+3795.0
l	2275.9	2276.7	2276.3	−0.4 0.4	0.8	+4664.2	+2387.9			+4665.5
o	2639.1	2639.1	2639.1			+5031.0	+2391.9	5028.8	−2.2	+5028.3
p	2860.9	2861.8	2861.4	−0.5 0.4	0.9	+5250.3	+2388.9			+5250.6
(Nova Sag			1948.6)			2480.3				
						mean + 4496.1	+2389.7 adopted Const. X from f.g.o			
							+2389.2 " " " all 5 stars			

			Mean y	Resid	diff.	1890 Comp Y	Y − Mean y	y + Const from f.g.o	y − Y from f.g.o.	y + Const from all 5
f	3114.2	3111.6	3112.9	1.3 −1.3	2.6	−1964.4	−5077.3	−1968.4	−4.0	−1970.8
g	1922.2	1922.2	1922.2			−3159.7	−5081.9	−3159.1	+0.6	−3161.5
l	2158.1	2158.1	2158.1			$-2930.\overset{4}{3}$	−5088.4			−2925.6
o	2482.0	2482.0	2482.0			$-2602.\overset{4}{7}$	−5084.7	−2599.3	$+3.\overset{+}{4}$	−2601.7
p	2465.4	2465.4	2465.4			−2621.0	−5086.4			−2618.3
(Nova Sag.			2490.7)							
							−5081.3 adopted Const. Y from f.g.o			
							−5083.7 " " " " all 5 stars			

Solution from all 5 stars.

Residuals see p 153

Same as on p 153 → s

$x-\bar{X}$	$\bar{X}/100$	$\bar{Y}/100$	$(x-\bar{X})\frac{\bar{X}}{100}$	$\frac{\bar{X}^2}{100}$	$\bar{X}\bar{Y}/100$	$(x-\bar{X})\bar{Y}/100$	→ s	Sn	a s also b s
″	″	″							
−1.8	−7.5	+6.9	+ 13.50 ✓			− 12.42 ✓		+1.08	
+3.0	−7.0	−5.0	− 21.00 ✓			− 15.00 ✓		−36.00	
+1.3	+1.7	−2.7	+ 2.21 ✓			− 3.51 ✓		− 1.30	
−2.7	+5.3	+0.5	− 14.31 ✓			− 1.35 ✓		−15.66	
+.3	+7.5	+0.3	+ 2.25 ✓			+ 0.09 ✓		+ 2.34	
								−49.54	
			−17.35 ✓			−32.19 ✓			

add

a ~~+12.4~~ 7 ✓

b ~~+4.00~~ 27 ✓

see p153	$\frac{\bar{X}\text{ const}}{100}$	$a\bar{X}/100$	$b\bar{Y}/100$	$x-\bar{X}$	$\Sigma = c$	b b
f	+14.0	~~+1.7~~ 8	~~+12.6~~ 13.5	−1.8	~~+12.5~~ 13.5	+2
g	+14.5	+1.8 ✓	~~+7.8~~ 8.4	+3.0	~~+12.6~~ 13.2	~~+3~~ −1
l	+23.2	+2.9 ✓	~~+7.7~~ 9.4	+1.3	~~+11.9~~ 13.6	~~−4~~ +3
o	+26.9	~~+3.3~~ 4	~~+10.1~~ 8	−2.7	~~+10.7~~ 11.5	~~−1.6~~ 8
p	+29.1	~~+3.6~~ 7	~~+10.0~~ 7	+3	~~+13.9~~ 14.7	~~+1.6~~ 4
					~~+12.3~~	+21 19 −21 19
					C = −12.3 3	±42 ±84 .76

$\bar{Y}$ Const / 100

45

$y-\bar{Y}$	$(y-\bar{Y})\bar{Y}/100$	$\bar{Y}^2$	$(y-\bar{Y})\bar{X}/100$	Sn′
″				3
−6.4	−44.16 ✓		+48.00 ✓	+ 3.84
−1.8	+ 9.00 ✓		+ 12.60 ✓	+21.60
+4.~~1~~8	−12.96 ✓		+8.16 ✓	−4.80
+ ~~1.0~~ 0.7	+ ~~0.35~~ 50 + 0.50 (+1.0)		+ ~~3.71~~ 5.30 ✓ +5.30 (+1.0)	+5.80
+2.7	+ 0.81 ✓		+20.25 ✓	+21.06
				+47.50 ✓
	−46.~~96~~ 81 ✓		+9~~2.72~~ 4.31 ✓	

a′ + ~~.591~~ 492 ✓

b′ − .4~~34~~ 48

see p153	$\frac{\bar{Y}\text{ const}}{100}$	$a'\bar{Y}/100$	$b'\bar{X}/100$	$y-\bar{Y}$	$\Sigma = c'$		b b	
			″	″	″		″	
f	+31.6	~~+18.7~~ 15.15 ✓	−6.~~0~~ 3	−6.4	+6.3	28	+1.0	+3
g	+19.6	~~+11.6~~ 9.6	~~−6.2~~ 5	−1.8	+3.6	1.3	−1.7	−1.2
l	+21.9	~~+12.9~~ 10.8	−10.~~0~~ 4	+4.8	+7.7	52	+2.4	+2.7
o	+25.2	~~+14.9~~ 12.4	~~−11.0~~ 2.9	~~+0.7~~ +1.0	+4.0	1.~~1~~4	−1.3	−1.~~1~~ 1
p	+25.0	~~+14.8~~ 12.3	~~−12.5~~ 13.0	+2.7	+5.0	20	−.3	− 5
					+5.3		~~+3.6~~ 40 −3.5	1.22

124 ✓

means +1.6 −2.5 = C′ = −5.2 ±6 ±1.34

Nova Sagittarii

D 6614 from B 21319 Equations for abc from stars f. 9.0

−1.3" = 1351.8" a + 3112.96" + c   −3.~~5~~7 −~~13.8~~12.9 + c   C = +~~16.0~~15.3

+3.5 = 1405.8 a + 1922.26 + c   −3.~~7~~8 −8.~~5~~0   15.~~7~~3

−2.2 = 2639.1 a + 2482.06 + c   −~~6.9~~7.2 −~~11.0~~10.3   15.~~7~~3

~~15.7~~

+15.3

−4.8 = −54.6 a + 1190.7 b

+5.7 = −1233.3 a − 559.8 b

−.004~~313~~031 = −.04535 a + b   +.0001~~18~~24   b = −.004~~431~~155

+.010182 = −2.2031 a − b   +.00~~5751~~6027   b = −.004~~431~~155

+.00~~5869~~6151 = −2.2484 a

7.7~~6858~~8895

0.35187n

7.4~~1677~~3708   a = −.002~~61~~740

a = −.002~~61~~74

b = −.004~~43~~16   } sub. fr. meas.

C = +15.~~7~~43

Constants a b c from all 5 Stand. Stars

see p 154 Σ²/100 tc

a n

−17.35 ✓

1.2392n ✓

8.9548n ✓

9.6017 ✓
1.2159n
0.8176n

−17.35 ✓

−6.57 ✓ −7.02

−23.92 ✓ −24.37

1.3788n ✓ 1.3868n

2.2844

9.0944n ✓ 9.1024n

a = x = −.124 ✓ −.127

b n   s n

−32.19 ✓   −49.54

−.09 ✓ +1.48 ✓ −15.86

−32.10 ✓ −33.67 −33.68

1.5065 ✓ 1.5272n

1.9048

9.6017 ✓ 9.6305n

b = y = −0.400 ✓ −.427

~~Star v corrected to~~ 7.1

+370
−370

Equations for a′ b′ c′ from Stars f. g. o.

− 4.0 = 11.5 50 − 11.5 + 5.3 + c′ c′ = +2″.2 +2.5
+ 0.6 = 7.1 52 − 7.1 + 5.5 +2.2 2.5
3.1 + ~~3.4~~ = 9.2 9.8 − 9.1 +10.4 +2.1 2.5
stet
c′ = +2.2

− 4.6

−2.5 − ~~2.8~~

− .003863 = + a′ − .000~~179~~ 168 a′ = − .00~~3684~~ 3695
.004466 − .00~~5002~~ = − a′ − .00~~8687~~ 8161 a′ = − .00~~3685~~ 3695
8329 − .00~~8865~~
7.92059 7.~~94768~~n
0.35187
7.56872 7.~~59581~~ b′ = + .00~~3943~~
+.0037044

a′ = − .00~~368~~ 370
b′ = + .00~~374~~ 370
c′ = + 2.~~2~~ 5
sub. fr. meas.

a u′
+ 92.72 + 94.31
1.9672 1.9745
9.6828

s u′
+ 47.50
+ 86.25
−38.75

9.7714
1.2159 n
0.9873 n

+92.72 +94.31
−9.71 −8.08
+83.01 +86.23
1.9192 1.9357
2.2844
9.6348 9.6513
b′ = y′ +.431 +.448

b u′
−46.96 −46.81
+ .48 − 8.05
− 47.44 −38.76
1.6762 1.5884n
1.9048
9.7714 9.6917n
a′ = y′ = −.591 −.492

Nova Sagittarii
D6614 from B 21319

Constants from f.9.0
a = −.00274   a′ −.003~~68~~70
b = −.00416   b′ +.003~~94~~70
c = +15.3   c′ +2.~~1~~5 } sub. fr. meas.
Const X = +2389.7   Const Y −5081.3

	Readings x 1st	2°	Mean x	Resid	diff	ax	by	c	Σ		Corr x
Nova Sag.	1948.5	1948.9	1948.6	−0.1	0.3	−5.~~1~~3	−~~11.0~~10.4	+15.~~7~~3	−0.4	1949.0	+4338.7
	1948.5	1948.9		−0.1	0.3						
	1948.5	1948.5		−0.1	−0.1						
a											
b											
c											
d											
e											
h											
k											
m											
n											
q											

Cat Stars							Comp X	O−C
	2276.3							
l	2276.3	−~~5.9~~6.2	−9.~~6~~0	+.~~2~~1	2276.~~1~~2	+4665.~~8~~9	+4664.2	+1.~~6~~7
p	2861.4	−~~6.7~~7.8	−10.~~7~~3	−~~1.7~~2.8	286~~3.5~~4.2	+5253.~~0~~9	+5250.3	+~~2.7~~3.6

Constants from all 5 Stand. Stars

Nova Sag.
a = +.12~~4~~7 ×.01   a′ = +.~~591~~492 ×.01
b = +.4~~00~~27 "   b′ = −.4~~31~~48 "
c = −1~~2~~3.3   c′ = −~~5.3~~2.5 } add to meas.
Const +2389.2   −5083.7

ax	by	c			
~~+2.4~~	~~+10.0~~	~~−12.3~~	~~+.1~~	~~1948.7~~	~~+4337.9~~
+2.5	+10.6	−13.1	0	1948.6	+4337.8

a' .00370
b' .00370
c' +2.5

~~Star o corrected to 7.7~~

retain black ink values.

	Readings y 1st	2nd	Mean y	Resid	diff	a'y	b'x	c'	Σ		
Nova Sag	2490.7	2490.7	2490.7	0.0	0.0	~~−9.2~~	~~+7.7~~	~~+2.2~~	~~+0.7~~	~~2490.0~~	~~−2591.3~~ stet
						~~−9.2~~	~~+7.2~~	~~+2.5~~	~~+.5~~	~~2490.2~~	~~−2591.1~~
	2490.7	2490.7		0.0	0.0						
	2490.7	2490.7		0.0	0.0						
a											
b											
c											
d											
e											
h											
k											
m											
n											
q											

Cat. Stars

				Σ			Comp. y	O−C
l	2158.1	~~8.0~~ −7.9	~~8.4~~ +9.0	~~2.9~~ +3.3	~~5.2~~ 2154.8	~~1~~ −2926.5	−2930.3	~~4.2~~ +3.8
p	2465.4	~~1~~ −9.0	~~10.6~~ +11.3	~~0~~ +4.5	~~1.4~~ 2460.9	~~19.9~~ −2620.4	−2621.0	~~1.1~~ +0.6

a'y	b'x		Σ			
~~+14.7~~	~~−8.4~~	~~−5.3~~	+1.0	2491.7	−2592.0	Pos. from 5 Stars
+12.2	−8.7	−2.5	+1.0			

Nova Sagittarii from B 21319 Constants from Stars f.g.0

	p156 D6613	p162 D6614	6613-6614 diffs	
Y 1890	−259~~1.0~~ 0.8	−2591.~~3~~ 1 ✓	+.3	
log Y	3.4134~~674~~ 339 n	3.413~~5177~~ 4842 n		
Y/R	8.0990~~423~~ 088 n	8.0990~~926~~ 591 n		
d = b − D	−0 43 ~~10.86~~ 10.66	−0 43 ~~11.16~~ 10.96 ✓		
D	−12 36	−12 36		
b = D + d	−13 19 ~~10.86~~ 10.66	−13 19 ~~11.16~~ 10.96 ✓		
X 1890	+4337.3	+4338.7	−1.4	
log X	3.6372195	3.6373596		
X/R	8.3227944	8.3229345		
cos d	9.9999658	9.9999657		
Σ	8.3227602	8.3229002		
cos b	9.988157~~4~~ 5	9.988157~~2~~ 3		
diff = tan a	8.334602~~8~~ 7	8.33474~~30~~ 29		
arc a = α − A	+1° 14′ 16.1~~6~~ 5″	+1° 14′ 17.59″ ✓		
time a = α − A	+ 4 57.08 ✓	+ 4ᵐ 57.17ˢ ✓		
A	18 50 42.	18 50 42.		
1890 α = a + A	18ʰ 55ᵐ 39.08ˢ ✓	18 55 39.17 ✓	nat cos δ .973	
red to 1900	+ 33.79	+ 33.79	diff α × 15 cos δ	
1900 α	18 56 12.87	18 56 12.96	−.09ˢ = 1.3″	

Precess Comp.

α = 18ʰ 55ᵐ 39ˢ δ = −13° 19′ 0″

283° 55′ ✓

	sin α		sin δ
sin α	9.98706 ✓	cos α	9.38113 ✓
tan δ	9.37419	n″	1.30221
nˢ	0.12611		0.68334
Σ	9.48736		+4.82~~2~~ 3″
	+.3072		
	3.072		
	3.379ˢ ✓		

	D6613		D6614	
log tan t	9.37429~~54~~ 32 n		9.37429~~78~~ 60 n	
cos a	9.999898~~6~~ 7 ✓		9.9998986 ✓	
Σ = tan δ	9.37419~~37~~ 198 n	38	9.374196~~4~~ 46 n	
1890 δ	−13 ~~19 0.07~~ 18 59.889	0.09	−13 19 0.~~36~~ 17 ✓	
red to 1900	+ 48.2~~2~~ 3		+ 48.23	diff δ
1900 δ	−13 18 ~~11.85~~ 6	11.86	−13 18 ~~12.13~~	+.27″
	~~11.65~~		~~11.94~~	

Miss Woods also chk. comp.

Nova Sagittarii from all 5 stand. stars f.g. l.o.p

B 21319

6613-14	6825-6826	D 6613	D 6614
−″.5	+″2	−2591.~~4~~5 ✓	−2592.0 ✓
	−2591.8		
3.4136015		3.4135~~345~~512 n	3.4136350 n
8.0991764		8.0991~~694~~261 n	8.0992099 n
		−0 43 11.~~7~~36 11.66	−0 43 11.86
		−12 36	−12 36
		−13 19 11.~~7~~36 11.66	−13 19 11.86
−″1.2	.″00	+4336.6 ✓	+4337.~~9~~8
		3.6371494	3.6372~~7~~695
		8.3227243	8.3228~~5~~444
		9.9999658 ✓	9.9999658
		8.3226901	8.3228~~2~~102
		9.988157~~6~~0	9.9881569
		8.33455~~29~~30 31	8.3346~~6~~533
		+1° 14′ 15″.44 ✓	+1 14 16.~~8~~67
		+ 4 57.03	+ 4 57.12
		18 50 42	18 50 42
		18 55 39.03	18 55 39.12
		+ 33.79	
−ˢ.08 = −″1.2	.00		
α1900		18 56 12.82	12.9~~1~~0
9.3743026		9.37429~~88~~9 n	9.3743045
9.9998987 ✓		9.9998987 ✓	9.9998986
9.3742013		9.37419~~7~~85 n	9.3742031
(1890) −13 19 0.88		−13 19 0.~~8~~58 0.88	−13 19 1.0
+″.49	+″.20	+ 48.23	
δ1900		−13 18 ~~12.75~~ 3 12.65	−13 18 12.8

Rockport
Aug 1 1899 sent them Rt+Dec + Resid

(Recomp Oct 6 1899) G11827 165

	D6825	D6826
	+1018″.2 p169	+1018.2
	3.0078331	
	7.6934080	
	+0 16 58.19	
	−13 36	
	−13 19 1.81	
	−744.3 p168	−744.2
	2.8717480 n	2.8716897 n
	7.5573229 n	7.5572646 n
	9.9999947	9.9999947
	7.5573176 n	7.5572593 n
	9.9881619	9.9881619
	7.5691557 n	7.5690974 n
	−0 12 44.85	−0 12 44.75
	−0 0 50.99	−0 0 50.98
	18 56 30	18 56 30
(1890)	18 55 39.01	18 55 39.02
	+33.79	
(1900)	18 56 12.80	18 56 12.81
	9.3742100 n	9.3742100 n
	9.9999970	9.9999970
	9.3742070 n	9.3742070 n
(1890)	−13 19 1.49	−13 19 1.49
	+48.23	
(1900)	−13 18 13.26	−13 18 13.26

Nova Sagittarii from all 5 stand. Stars f.g. l.o.p

B 21319 G11827

6613-14 6825-6826	D 6613	D 6614	D6825	D6826
−.5 +2	−2591.~~4~~5 ✓	−2592.0 ✓	+1018.~~8~~3	+1018.3
−2591.8 3.4136015	3.4135~~345~~512 n	3.4136350 n	3.00~~80889~~78757	3.0078757
8.0991764	8.0991~~094~~261 n	8.0992099 n	Small circle [illegible] 7.693~~6638~~4506 4.685 5784 3.00~~80854~~78722	7.6934506 4.6855784 3.0078722
	−0 43 11.~~26~~36 11.66	−0 43 11.86	+0 16 58.~~79~~29	+0° 16′ 58.29″
	−12 36	−12 36	−13 36	
	−13 19 11.~~26~~36 11.66	−13 19 11.86	−13 19 1.~~21~~71	−13 19 1.71
−1.2″ 0.0	+4336.6 ✓	+4337.~~9~~8	−74~~3.9~~4.3	−744.4
	3.6371494	3.6372~~7~~695	2.871~~5146~~7480 n	2.8718064 n
	8.3227243	8.3228~~5~~444	7.557~~0895~~3229 n	7.5573813 n
	9.9999658 ✓	9.9999658	9.9999947	9.9999947
	8.3226901	8.3228~~2~~102	7.557~~0842~~3176 n	7.5573760 n
	9.9881576	9.9881569	9.98816~~20~~19	9.9881619
	8.33453~~29~~30 31	8.3346~~6~~533	7.568~~9222~~91557 n 4.685 5769	7.5692141 n 4.685 5769
	+1° 14′ 15.44″ ✓	+1 14 16.~~7~~67	2.883~~2453~~5788 n	2.8836372 n 764.957
	+ 4 57.03	+ 4 57.1~~7~~1	−0° 12′ 44.~~44~~85″ −0 0 50.9~~6~~	−0° 12′ 44.96 −0 0 51.00
	18 50 42	18 50 42	18 56 30	
	18 55 39.03	18 55 39.1~~2~~1	18 55 39.0~~4~~1	18 55 39.00
	+ 33.79			
−.08ˢ = −.12″ .00 α1900	18 56 12.82	12.9~~1~~0	12.8~~3~~0	18 56 12.79
			Oct 2 Recomp 12.81	Oct 2 Recomp 12.79
9.3743026	9.3742~~9~~988 n	9.3743045 n	9.37420~~44~~91 n	9.3742091 n
9.9998987 ✓	9.9998987 ✓	9.9998986	9.9999971	9.9999971
9.3742013	9.37419~~7~~85 n	9.3742031 n	9.37420~~45~~62 n	9.3742062 n
(1850) −13 19 0.88	−13 19 0.~~8~~58 0.88	−13 19 1.07	−13 19 ~~0.90~~ 1.40	−13 19 1.40
	+ 48.23			
+.49″ +.20″ δ1900	−13 18 12.~~7~~35 12.65	−13 18 12.84	~~12.67~~ 13.17	−13 18 13.17
			Oct 2 Recomp 13.2	Oct 2 Recomp 13.3
				D6826

Rockport
Aug 1 1899 sent them R.A. + Dec + Resids 5 Cat. Stars G11827

Nova Sagittarii from all 5 stand. Stars f

B 21319 G 11827 F[illegible]al Value [illegible] slip

6613-14	6825-6826	D 6613	D 6614	D 6825	D 6826
−".5	+".2	−2591.~~4~~ 5 ✓	−2592.0 ✓	+1018.~~8~~ 3	+101~~9.9~~ 8.1
−2591.8 3.4136015		3.413~~5345~~ 512 n	3.4136350 n	3.00~~80889~~ 78757	3.00~~8576~~ 77904
8.0991764		8.099~~1694~~ 261 n	8.0992099 n	Small [illegible] 7.693~~6638~~ 4506 ✓	7.69~~41325~~ 33653
				4 685 5784	4685 5784
		−0 43 11.~~26~~ 3 11.66	−0 43 11.86	3.00~~80854~~ 78722	3.00~~85541~~ 77869
		−12 36	−12 36	+0 16 58.~~7~~9 2	+0 16 ~~57.87~~ 58.09
				−13 36	−13 36
		−13 19 11.~~26~~ 3 11.66	−13 19 11.86	−13 19 1.~~2~~1 7	−13 19 ~~2.11~~ 1.91
−1".2	0".0	+4336.6 ✓	+4337.~~9~~ 8	−74~~3.9~~ 4.3	−74~~3.8~~ 4.3
		3.6371494	3.6372~~1~~95 6	2.871~~5146~~ 7480 n	2.871~~4562~~ 7480 n
		8.3227243	8.3228~~5~~44 4	7.557~~0895~~ 3229 n	7.557~~0311~~ 3229
		9.9999658 ✓	9.9999658	9.9999947	9.9999947
		8.3226901	8.3228~~2~~02 1	7.557~~0842~~ 3176 n	7.557~~0258~~ 3176 n
		9.988157~~6~~ 0	9.9881569	9.98816~~20~~ 19	9.98816~~27~~ 18 ✓
		8.33453~~29~~ 30 31	8.3346~~6~~33 5	7.568~~9222~~ 91557 n 4 685 5769	7.568~~8631~~ 91558 n 4685 5769
		+1° 14' 15.44 ✓	+1 14 16.~~7~~7 6	2.883~~2453~~ 5788 n	2.883~~2862~~ 5788 n
		+4 57.03	+4 57.1~~7~~ 1	−0° 12' 44.~~44~~ 85 −0 0 50.9~~6~~ 9	−0 12 44.~~34~~ 85 −0 0 50.9~~6~~ 9
		18 50 42	18 50 42	18 56 30	18 56 30
		18 55 39.03	18 55 39.1~~2~~ 1	18 55 39.0~~4~~ 1	18 55 39.0~~4~~ 1
		+33.79			
−.08s = −".12	.00				
α1900		18 56 12.82	12.9~~1~~ 0	12.8~~3~~ 0	12.8~~3~~ 0
				Oct 2 Recomp 12.81	X̄ = −7444 Ȳ = +10183 → 12.79 See slip
9.3743026		9.3742~~98~~ 9 n	9.3743045 n	9.37420~~44~~ 91 n	9.374~~1920~~ 2110 n
9.9998987 ✓		9.9998987 ✓	9.9998986	9.9999971 ✓	9.9999971 ✓
9.3742013		9.37419~~7~~5 8 n	9.3742031 n	9.37420~~15~~ 62 n	9.374~~1911~~ 2081 n
(1880) −13 19 0.88		−13 19 0.~~8~~8 5 0.88	−13 19 1.07 ✓	−13 19 ~~0.90~~ 1.40 ✓	−13 ~~18~~ 19 ~~5.81~~ 1.60
		+48.23			
+".49	+".20				
δ1900		−13 18 12.~~7~~5 3	−13 18 12.84	~~12.67~~ 13.17	~~11.68~~ 13.37
		12.65		Oct 2 Recomp 13.2	13.17

Rockport
Aug 1 1899 sent them Rt asc + decls 5 Cat. Stars G 11827 & [illegible] Pos [illegible].

Recomp		x - X		O-C in x
				"
-.7	+60.3	-27.9	+31.7	-.1
-.7	+13.4	+19.6	+32.3	+5
-1.7	+22.5	+12.1	+32.9	+1.1
-2.1	+35.5	-3.6	+29.8	-2.0
-2.4	+34.7	-0.1	+32.2	+0.4
			+31.8	+20 -21
		C = -318		±41
				±.82

Nova Sagittarii   Standard Stars.

~~D 6825~~ from C 11827

	B.D. Dm	Readings 1st	2d	Mean x		Resid	diff	Comp X	X - mean x	x + Const from f.g.o.	x - X from f.g.o.	x + Const from all 5
				"				"	"	"	"	"
f	-13° 5183	565.3	565.3	565.3				-1341.1 ✓	-1906.4	-1365.0	-23.9	-1369.0
g	5185	668.6	668.9	668.8	-0.2	0.1	0.3	-1285.1 ✓	-1953.9	-1261.5	+23.6	-1265.5
l	5194	1531.7	1531.7	1531.7				-414.7 ✓	-1946.4			-402.6
o	5197	1880.9	1880.7	1880.8	0.1	-0.1	0.2	- 49.9 ✓	-1930.7	- 49.5	+0.4	- 53.5
p	5200	2103.4	2103.6	2103.5	-0.1	0.1	0.2	+169.3 ✓	-1934.2			+169.2
(Nova Sag				1187.7)				-2921.5 5				
							mean		-1930.3 adopted Const from f.g.o.			
							"	- 584.3	-1934.3 " " " all 5 stars.			

Comparison of plates B & C

	B 6613 - C 6825
f	+833.9
g	+783.1
l	+790.5
o	+805.5
p	+805.5

	Dm -13°	Readings 1st	2d	Mean x		Resid	diff	Comp Y	Y - mean y	y + Const from f.g.o.	y - Y from f.g.o.	y + Const from all 5
				"				"	"	"	"	"
f	5183	1498.7	1498.9	1498.8	-0.1	0.1	0.2	+1642.6 ✓	+143.8	+1623.9	-18.7	+1610.4
g	5185	307.1	307.3	307.2	-0.1	0.1	0.2	+448.0 ✓	+140.8	+432.3	-15.7	+418.8
l	5194	579.8	579.8	579.8				+682.~~4~~ 3 ✓	+102.6			+691.4
o	5197	921.3	921.1	921.2	0.1	-0.1	0.2	+1012.~~0~~ ~~3~~ 3*	+ ~~90.8~~ 1.1	+1046.3	+34.~~3~~ 0	+1032.8
p	5200	915.2	914.8	915.0	0.2	-0.2	0.4	+994.9 ✓	+79.9			+1026.6
(Nova Sag				899.9.)				47~~80.1~~79.8 5	+125.1 adopted Const Y from f.g.o			
							mean Y	+956.0 ✓	+111.6 " " " " all 5 stars			

Comparison of plates B & C

	B 6613 - C 6825
f	+1651.5
g	1653.9
l	1618.5
o	1600.1
p	+1590.0

Aug 5 1899

* Corrections have been made in both solutions, "f.g.o"(1) + "all 5"(2), for both end of both plates.

Sept 2 The original values Y were correct for star o.

Nova Sagittarii Standard Stars.

~~D6825~~ from C11827

Recomp		x−X		O−C in x
				"
−.7	+60.3	−27.9	+31.7	−.1
−.7	+13.4	+19.6	+32.3	+ 5
−1.7	+22.5	+12.1	+32.9	+1.1
−2.1	+35.5	−3.6	+29.8	−2.0
−2.4	+34.7	−0.1	+32.2	+0.4
			+31.8	+20
				−21
			C = −31.8	± 41
				±.82

B.D.	Searle	Readings 1st	2d	Mean x	Resid		diff	Comp X	X−mean x	x+Const from f.g.o.	x−X from f.g.o.	x+Const from all 5
f −13° 5183		565.3	565.3	565.3				−1341.1 ✓	−1906.4	−1365.0	−23.9	−1369.0

166+
170 Nova Sag. D6825 Recomp. Star o Resid Y/100 corrected .1

D6825	Recomp.		
$\frac{X^2}{100}$	$\frac{XY}{100}$		$(x-X)\frac{X}{100}$
+193.99	−15.15		+75.58
2.2878	1.1804n		1.8784
	88926n		
	(0.0730)		(0.7710n)

0.6025
1.1804n
1.7829n

	$\frac{Y^2}{100}$		$(x-X)\frac{Y}{100}$
+75.58	+81.43		−327.34
−60.66	+ 1.18		− 5.90
+14.92	+80.25		−321.44
1.1738	1.9045		2.5070n
2.2878			1.9045
8.8860			0.6025n

a = x = +.077

b = y = −4.004

Recomp Oct 6 after final proof of Circular 46 had been corrected. Changes in residuals

B.D.	Searle	Readings 1st	2d	Mean x	Resid		diff	Comp X	X−mean x	x+Const from f.g.o.	x−X from f.g.o.	x+Const from all 5
o	5197	921.3	921.1	921.2	0.1	−0.1	0.2	+1012.~~0~~ 3*	+ 9~~0.8~~ 1.1	+1046.3	+34.3	+1032.8
p	5200	915.2	914.8	915.0	0.2	−0.2	0.4	+994.9 ✓	+ 79.9			+1026.6
(Nova Sag				899.9.)				4780.1				
								5 ~~798~~	+125.1	adopted Const X from f.g.o		
								mean X +956.0 ✓	+111.6	" " " " all 5 stars		

Comparison of plates 13+6

13	6
6613 − 6825	
+1651.5	
1653.9	
1618.5	
1600.1	
+1590.0	

Aug 5 1899

* Corrections have been made in both solutions, "f.g.o" (1) + "all 5" (2), for both end of both plates.

Sept 2 The original values X were correct for star o.

For proof Oct 2 1899

Recomp
a -112
← b +3.942

add
a = ~~-.388~~ .066
b = ~~+4.022~~ .01
+4.007

	X-Const ÷100	aX/100	bY/100	x-X	Σ = C	O-C	
f	+593.2	~~-1.3~~ 0.4	+61.5 2	-27.9	+32.3 9	+3.4	0
g	+649.2	~~-2.5~~ 0.4	+13.7 6	+19.6	+30.8 2	+1.9	-.1
l	+1519.6	~~-8.7~~ 1.0	+22.9 8	+12.1	~~+29.1~~ 33.9	+.2	+1.0
o	+1884.4	~~-7.3~~ 1.2	+36.8 .1	-3.6	~~+25.3~~ 31.2 3	-3.6	-1.7 6
p	+2103.6	~~-8.1~~ 1.4	+35.2 3	-0.1	~~+27.2~~ 33.7 8	-1.7	+.8 9
					+28.9	+5.5	
				Check C =	-28.9 32.9	-5.3 ±10.8	±2.6 ±.72

Residuals

x-X	X	X/100	(x-X)X/100	X²/100	XY/100	(x-X)Y/100	S	Sn	aS
-27.9	-756.8	-7.6	+212.04	+57.76	-52.44	-192.51	-.7	+19.53	+5.32

D6825

y-Y X/100
+812.58
2.9099

(1.8025n)

9.0598
1.1804n
0.2402n

+812.58
- 1.74
+810.84

2.9089
2.2878
0.6211

b' = x' +4.180

y-Y Y/100
-72.67
-63.46
-9.21

0.9643n
1.9045
9.0598n

a' = y' -.115

els are indicated *

167 + 171

Residuals

a = -.077 a', +.115
b = +4.004 b' -4.180 } add to meas.

	X-Const/100	aX/100	bY/100	x-X	Σ=C	O-C	
f	+5.9	-.5	+61.3	-27.9	+32.9	+.1	* all in x
g	+6.5	-.5	+13.6	+19.6	+32.7	-.1	
l	+15.2	-1.2	+22.8	+12.1	+33.7	+.9	
o	+18.8	-1.4	+36.0	-3.6	+31.0	-1.8	
p	+21.0	-1.6	+35.2	-0.1	+33.5	+.7	* +17
				-C =	+32.8		-19 ±36 ±.72

	Y-Const/100	a'Y/100	b'X/100	y-Y	Σ=c'	O-C	
f	+15.3	+1.8	-24.7	-32.2	-55.1	+.2	
g	+3.4	+.4	-27.2	-29.2	-56.0	-.7	*
l	+5.7	+.7	-63.5	+9.1	-53.7	+1.6	
o	+9.0	+1.0	-78.6	+20.8	-56.8	-1.5	*
p	+8.8	+1.0	-87.8	+31.7	-55.1	+.2	*
				-C =	-55.3	-22 +20 ±42	±.84

x-X	X	X/100	(x-X)X/100	X²/100	XY/100	(x-X)Y/100	S	Sn	aS
+20.5 0	+56.3 0	+0.5 6	+ ~~40.25~~ 40 12.48	~~0.25~~ 36		~~+108.65~~		+120.64	+2.90
+31.7	+38.9	+0.4	+ 12.68	+ 0.16		+237.75		+250.43	+3.16
+61.2 -61.4	+781.8 -781.6							+737.83	+65.64

~~-74.40~~ 75 ~~+81.32~~ +810.99 2.68
81.43 per Recomp
-72.67 per Recomp

Star	Y-Const	a'Y/100	b'X/100	y-Y	Σ=C'	O-C	
f	+1531.0	~~+14.9~~ 1.7	-24.7	-32.2	~~-42.0~~ 55.2	+6.2	+.2
g	+336.4	~~+3.3~~ 0.4	-27.2	-29.2	~~-53.1~~ 56.0	-4.9	-.6
l	+570.7	~~+5.5~~ 0.6	-63.5	+9.1	~~-48.7~~ 53.8	-.7	+1.6
o	+900.7	~~+8.7~~ 1.0	-78.6	+20.5 8	~~-57.4~~ ~~-44.4~~ 56.8	-1.1	-1.7 4
p	+883.3	~~+8.5~~ 1.0	-87.8	+31.7	~~-47.6~~ 55.1	+.7	+.3
					-48.2	±6.9	±.88

Recomp = same a' a' = +.974 113
" b' = -4.180 b' = -4.180 79

av dev + Resids same also

+21 -20 ← C'1 = -55.4
av dev ±.82 C' = +55.4 C' = +44.2 6.7 ±2.72

Proof Oct 2 1899

Recomp
a −.112
← b +3.942

add
a = ~~−3.88~~ 0.66
b = ~~+4.022~~ .01
+4.007

	X−Const	aX/100	bY/100	a−X	Σ=C	O−C	
f	+593.2	~~−1.3~~ 0.4	+61.5 2	−27.9	+32.3 9	+3.4	0
g	+649.2	~~−2.5~~ 0.4	+13.7 6	+19.6	+30.8 2	+1.9	−.1
l	+1519.6	~~−8.7~~ 1.0	+22.9 8	+12.1	~~+29.1~~ 33.9	+.2	+1.0
o	+1884.4	~~−7.3~~ 1.2	+36.8 .1	−3.6	~~+25.3~~ 31.2 3	−3.6	−1.7 6
p	+2103.6	~~−8.1~~ 1.4	+35.7 3	−0.1	~~+27.2~~ 33.7 8	−1.7	+.8 9
					+28.9	+5.5	

Check C = −28.9 32.9 ~~5.3~~ ±10.8 ~~±2.6~~ ±.72

Residuals

x−X	X	X/100	(x−X)X/100	X²/100	XY/100	(x−X)Y/100	s	sa	as
−27.9	−756.8	−7.6	+212.04	+57.76	−52.44	−192.51	−.7	+19.53	+5.32
+19.6	−700.8	−7.0	−137.20	49.00	+35.70	−99.96	−12.1	−237.16	+84.70
+12.1	+169.6	+1.7	+20.57	2.89	−4.59	+32.67	−1.7 0	−12.10	−1.70
−3.6	+534.4	+5.3	−19.08	28.09	+ ~~2.65~~ 3.18	− ~~1.80~~ 2.16	+5.8	−20.88	+30.74
−0.1	+753.6	+7.5	−0.75	+56.25	+3.00	−0.04	+7.9	−.79	+59.25
+31.7 −31.6	−1457.6 −1457.6							−251.40	+178.31

+75.58 +193.99 ~~−15.68~~ ~~−326.98~~

−15.15 −327.34 for Recomp

Residuals

y−Y	Y	Y/100	(y−Y)Y/100	Y²/100	(y−Y)X/100	sa'	bs
−32.2	+686.6	+6.9	−222.18	+47.61	+244.72	+22.54	−4.83
−29.2	−508.0	−5.1	+148.92	26.01	+204.40	+353.32	+61.71
+9.6 1	−273.6	−2.7	−24.57	7.29	+15.47	−9.10	+2.70
+20.5 8	+56.5 0	+0.5 6	+ ~~40.25~~ 40 12.48	~~0.25~~ 36	~~+108.65~~ 110.24	+120.64	+2.90
+31.7	+38.9	+0.4	+12.68	+0.16	+237.75	+250.43	+3.16
+61.2 −61.4	+781.8 −781.6					+737.83	+65.64

~~−74.40~~ 75 ~~+81.32~~ 81.43 for Recomp +81~~0.99~~ 2.68

−72.67 for Recomp

Recomp = same a' a' = +.~~94~~ 113
" b' = −4.180 b' = −4.1~~80~~ 79

av dev + Resids same also

Star	Y−Const	a'Y/100	b'X/100	y−Y	Σ=C'	O−C	
f	+1531.0	~~+14.9~~ 1.7	−24.7	−32.2	~~−42.0~~ 55.2	+6.2	+2
g	+336.4	~~+3.3~~ 0.4	−27.2	−29.2	~~−53.1~~ 56.0	−4.9	−.6
l	+570.7	~~+5.5~~ 0.6	−63.5	+9.1	~~−48.7~~ 53.8	−.7	+1.6
o	+900.7	~~+8.7~~ 1.0	−78.6	+20.5 8	~~−49.4~~ ~~57.1~~ 56.8	−1.1	−1.7 4
p	+883.3	~~+8.5~~ 1.0	−87.8	+31.7	~~−47.6~~ 55.1	+.7	+.3
					~~−48.2~~	7.69	~~0.88~~
					~~+48.2~~	−6.7	~~±2.72~~

← C'₁ = −55.4
+21 −2.0 av dev ± .82 C' = +55.4 C' =

168

Constants from f. 9.0

a = -.00100 ✓   a' -.00103
b = +.03977 ✓   b' -.04073
c = -35.1 ✓   c' +43.2 ✓
} add to meas.

Star 2 3 4

Nova Sag i Marie   Cent X = -1930.3   Cent Y = +125.1

D 6825 from C 11827.

	Readings 1	Readings 2	Mean x	Resid diff	ax	by	c	Σ		Nova X =Corr x
Nova Sag	1187.6	1187.4	1187.7	-0.1 -0.3	-1.2	+35.8	-35.1	-0.5	1187.2	-743.1
	1187.6	1187.8		-0.1 0.1						
	1187.8	1188.0		0.1 0.3						
Dm -13 N 5193	1480.5	1480.7	1480.6	-0.1 0.1 0.2						

Cat Star Dm -13°	Mean x	ax	by	Σ			Comp X	O-C
l 5194	1531.7	-1.5	+22.8	-13.8	1517.9	-412.4	-414.7	+2.3
p 5200	2103.5	-2.1	+36.4	-0.8	2102.7	+172.4	+169.3	+3.1

Constants from all 5 Stand. Stars.

-.066 ← a = -~~.368~~ .066   a' = +~~.971~~ .113
+4.007   b = +4.0~~22~~ 01   b' = -4.~~180~~ 179
-32.9   c = -~~28.9~~ 32.9   c' = +~~48.2~~ 55.4
Cent X - 1934.3   Y +111.6

add to meas
Recomp Oct 2
a +.112   a' +.113
b +3.942   b' +4.180
c - 31.8   c' +55.4

Nova Sag.
~~-4.6 +36.2 -28.9 +2.7 1190.4 -743.9~~ ✓
-0.8 ✓ +36.0 ✓ -32.9 +2.3 ✓ 1190.0 ✓ -744.3 ✓
-1.3 +35.5 -31.8 +2.4 1190.1 -744.2 ✓ Recomp adopted Oct 2 '99
with Oct 6 constants -0.9 +36.0 -32.8 +2.3 -744.3 " Oct 6 ←

[illegible] corrected to 7.7

~~a' -.00100~~
~~b' -.04050~~
~~c' +43.1~~

Const. y +125.1

	Readings 1	2	Mean of Readings	diff		a'y	b'x	c'	Σ	x+Σ	Comp y	
Nova Sag	899.9	899.9	899.9	0.0	0.0	-0.9	-48.~~4~~6	+43.2	-6.~~1~~3	893.~~5~~6	+1018.~~9~~7	+1018.7 retain as corrected
	900.1	899.9		0.2	0.0	~~-0.9~~	~~-48.3~~	~~+43.1~~	~~-6.1~~	~~893.8~~	~~+1018.9~~	
	899.9	899.7		0.0	-0.2							
n	1000.2	1000.4	1000.3	-0.1	0.1	0.2						

Cat. Stars							Comp y	O-C
l	579.8	-0.6	-62.~~x~~0	-19.~~8~~5	+560.~~0~~3	+685.~~1~~4	+682.4	~~+2.7~~ 3.0
p	915.0	-0.9	-85.~~7~~2	-43.~~4~~0	+87~~1.6~~2.0	+99~~6.7~~7.1	+994.9	~~+1.8~~ 2.2

Recomp. Oct 6
a -.077 a' +.115
b +4.004 b' -4.180
c -32.8 c' +55.3

a'y b'x

~~+8.7 -49.6 +48.2 +7.3 +907.2 +1018.8~~
+1.0 -49.6 +55.4 +6.8 +906.7 +1018.3
.99 +1.0 -49.6 +55.4 +6.8 +906.7 +1018.3 Recomp adopted Oct 2 18[illegible]
← too late for Circ. 46 → +1.0 -49.6 +55.3 +6.7 +906.6 +1018.2 6

Nova Sagittarii
D6825 from C11827

Equations for a b c from stars f. g. o.

$-23''.9 = 565.3\overset{x}{a} + 1498.8\overset{y}{b} + c$ +0.6 − 59.6 + c C = +35''.1

$+23.6 = 668.8 \quad 307.2$ +0.7 − 12.2 ✓ +35.1

$+0.4 = 1880.8 \quad 921.2$ +1.9 − 36.6 ✓ +35.1

$-47.5 = -103.5a + 1191.6b$

$+23.2 = -1212.0a - 614.0b$

÷ coeff b

$-.03986 = -.08\overset{686}{\cancel{7}}a + b$ −.00009 ✓ b = −.03977 ✓

$+.03779 = -1.97\overset{39}{\cancel{4}}a - b$ −.00198 ✓ b = −.03977 ✓

$-.00207 = -.206\overset{98}{\cancel{7}}$

7.31597 n
0.3140$\overset{4}{\cancel{8}}$ n
7.001$\overset{93}{\cancel{89}}$ a = +.001004 ✓

a = +.00100 ✓
b = −.03977 ✓ } Sub. p. meas.
c = +35.1 ✓

Constants abc from all 5 standard stars

		as	an	sn
+193.99 ✓	−15.68 ✓	+178.31	+75.58 ✓	−251.40
2.28778		2.25118		
2.2878 ✓	1.1953 n ✓	2.2511	1.8784 ✓	
	8.9075 n ✓	9.96340 9.9633	9.5906 ✓	

~~0.6044~~ ✓ 0.6029
~~8.9075 n~~ ✓ 1.1953 n
~~9.5119 n~~ ✓ 1.798 3n

		bs	bn	
+75.58				
−62.83 ✓				
~~−.32~~ ✓	+81.32 ✓	+65.64	−326.98 ✓	
+12.75 ✓				
~~+75.26~~ ✓	− .98 ✓	+1.27 −14.40	+ .39 ✓	−6.11 +69.45
1.055 ✓ ~~1.8765~~	+81.40 ✓	+80.05 +80.04	−327.37 ✓	−320.87 −320.85
2.2878	1.9106 ✓	1.9034 ✓	2.5150 n	2.5063 n 2.5063 n
8.8177 ✓ ~~9.5887~~			1.9106	
a = x ~~+.388~~ ✓			0.6044 ✓	0.6029 n ✓
+.066 ✓			b = y = −4.022 ✓	−4.00$\overset{7}{\cancel{6}}$

a = +.00$\overset{066}{\cancel{388}}$

b = −.040$\overset{01}{\cancel{22}}$

Equations for a' b' c' from Obs. f. g. o

retain black ink values corrected

+.00100
+.04050

Stet

$-18.7'' =$ ~~+22.9~~ +1.5 +23.0 + c' c' = −43.2 −43.1

$-15.7 =$ +27.1 +.3 +27.2 −43.2 −43.1

+34.0 + ~~34.3~~ = +76.2 + .9 +76.6 −43.2 −43.1

−43.2 −43.1

Stet

$-3.0 = +1191.6a' - 103.5b'$

−49.7 ~~−50.0~~ = $-614.0a' - 1212.0b'$

÷ coeff a'

Stet

$-.00252$ = $+a'$ .003518 ~~−.003544~~ 38 a' = +.001026 0 ~~+.001000~~

−.080945 ~~−.081433~~ = $-a'$ .079943 ~~−.080404~~ 12 a' = +.001032 21 +.001002

.083463 ~~−.083951~~ =

Stet

8.92149 ~~8.92401~~ 3 n +.00100 = a' ~~+.00103~~ 2

~~0.31408~~ 4 n +.04050 = b' ~~+.04073~~ 4 } sub. p. meas.

8.60745 ~~8.60994~~ 9 b' = ~~+.040737~~ ~~−43.1~~ = c' ~~−43.2~~

+.040500

au'

+810.99 +812.58 +73

2.9090 2.9099

0.6212

~~9.8874~~ 9.0542
~~8.9075~~ n 1.1953 n
8.8949 n 0.2495 n

+810.99	+812.58
− .08	− 1.78
+810.91	+810.80
2.9090	2.9089
2.2878	
0.6212	0.6211
+4.180	+4.179

a' = −.00971 113

b = +.04180 79

bu' Su'

−74.90	−74.75	+737.83
+4.18	−65.68	+746.9
−79.08	−9.07	−9.07
1.8980 n	0.9576 n	
1.9106	1.9034	
9.8874 n	9.0542 n	

a' = y' = −.971 −.113

Nova Sagittarii
D 6826 from C 11827

	a X/1.00	b Y/1.00	Σ = C	O − C
f	$-0.\overset{5}{\cancel{4}}$	$\overset{1.1}{+63.8}$	+33.5	+.1
g	$-0.\overset{5}{\cancel{4}}$	$+13.\overset{2}{\cancel{8}}$	+33.2	−.2
l	$-1.\overset{2}{\cancel{0}}$	$\overset{22.8}{\cancel{+23.2}}$	+34.5	+1.1
o	$-1.\overset{5}{\cancel{2}}$	$+36.\overset{0}{\cancel{8}}$	+31.7	−1.7
p	$-1.\overset{7}{\cancel{4}}$	$+35.\overset{2}{\cancel{8}}$	+34.2	+.8
			+33.4	+2.0 −1.9 ±3.9

C = −33.4

Ref Scale	Reading 1st	2d	Mean x	Resid		diff	Comp X	X − Mean x	x + Const from f.g.o	x − X from f.g.o	x + Const from all
f	561.2	561.2	561.2″				−1341.1″	−1902.3″	−1365.3″	−24.2″	−1369.4″
g	665.2	665.4	665.3	−0.1	0.1	0.2	−1285.1	−1950.4	−1261.2	+23.9	−1265.3
l	1528.2	1528.2	1528.2				−414.7	−1942.9			−402.4
o	1877.0	1877.0	1877.0				−49.9	−1926.9	−49.5	+0.4	−53.6
p	2099.6	2099.8	2099.7	−0.1	0.1	0.2	+169.3	−1930.4			+169.1
			1184.0					−1926.5	adopted Const X from f.g.o		

mean −584.3 −1930.6 . . . . . . all

	1	2	Mean y	Resid		diff	Comp Y	Y − Mean y	y + Const from f.g.o	y − Y from f.g.o	y + Const from all
f	$1494.\overset{6*}{\cancel{4}}$	1494.8	$1494.\overset{7}{\cancel{6}}$″	−0.2	0.2	0.4	+1642.6″	+148.0″	+1623.7	−18.9″	$+1610.\overset{2}{\cancel{7}}$″
g	303.3	303.1	303.2	0.1	−0.1	0.2	+448.0	+144.8	+432.3	−15.7	+418.7
l	576.0	576.0	576.0				$+682.\overset{3}{\cancel{4}}$	+106.4			+691.5
o	917.6	917.6	917.6				$+1012.\overset{3}{\cancel{0}}$	$+94.\overset{7}{\cancel{4}}$	+1046.7	$+34.\overset{4}{\cancel{7}}$	+1033.1
p	911.4	911.0	911.2	0.2	−0.2	0.4	+994.9	+83.7			+1026.7
			895.8					+129.1	adopted Const Y from f.g.o		

+956.0 +115.5 . . . . . . all

* Changed Oct 2 1899

Blue ink Values
for Circular 46
Oct 2-3 1899

				Σ = C′	
Recomp Oct 3	+1.8	−24.8		−55.4	+.2″
a′ = +120	0.4	$27.\overset{3}{\cancel{4}}$		$56.\overset{2}{\cancel{3}}$	$-.\overset{6}{\cancel{7}}$
b′ = −4.205	0.7	63.9		54.0	+1.6
	1.1	79.1		56.9	−1.3
	+1.1	−88.3		55.4	+.2
				−55.6	+2.0 −2.0 19 ±4.0 7.8

Nova Sagittarii
D 6826 from C 11827

	aX/100	bY/100	Σ=C	O−C
f	$-0.\overset{5}{4}$	$\overset{1.1}{+63.8}$	+33.5	+.1
g	$-0.\overset{5}{4}$	$+13.\overset{2}{8}$	+33.2	−.2
l	$-1.\overset{2}{0}$	$\overset{22.8}{+23.2}$	+34.5	+1.1
o	$-1.\overset{5}{2}$	$+36.\overset{0}{8}$	+31.7	−1.7
p	$-1.\overset{7}{4}$	$+35.\overset{2}{8}$	+34.2	+.8
			+33.4	+2.0 −1.9 ±3.9

C = −33.4

Prof Scale	Readings 1st	2d	Mean x	Resid diff	Comps X	X − Mean x	x + Const from f.g.o	x − X from f.g.o	x + Const from all

172
4
176 Nova Sag. D6826 Recomp. Star f meas x corrected ".1
" 0 Resid Y/100 " .1

$\frac{X^2}{100}$	$\frac{XY}{100}$	$(x-X)\frac{X}{100}$
+193.99	−15.15	+76.28
2.2878	1.1804n	1.8825
	8.8926n	
	(0.0730)	(0.7751n)

0.6085
1.1804n
1.7889n

+76.28
−61.50
+14.78
1.1697
2.2878
8.8819

a = x = +0.076

$\frac{Y^2}{100}$
+81.43
−1.18
+80.25
1.9045

$(x-X)\frac{Y}{100}$
−331.76
− 5.96
−325.80
2.5130n
1.9045
0.6085n

b = y = −4.060

Recomp. Oct 6 after final proof of Circular 46 had been corrected. Changes in residuals a

o	917.6	917.6	917.6		$+1012.\overset{3}{0}$*	$+94.\overset{7}{4}$*	+1046.7	$+34.\overset{4}{7}$*	+1033.1
p	911.4	911.0	911.2	0.2 −0.2 0.4	+994.9	+ 83.7			+1026.7
			895.8			+129.1 adopted Const Y from f.g.o			
					+956.0	+115.5 .. .. .. all			

*Changed Oct 2 1899

Σ = C'

Recomp Oct 3	+1.8	−24.8	−55.4	+.2	f
a' = +120	0.4	$27.\overset{3}{4}$	$56.\overset{n}{9}$	$-.\overset{6}{7}$	g
b' = −4.205	0.7	63.9	54.0	+1.6	l
	1.1	79.1	56.9	−1.3	o
	+1.1	−88.3	55.4	+.2	p
			−55.6	±2.0 −0.0 19 ±8.0 7.8	

Blue ink Values
for Circular 46
Oct 2-3 1899

Recomp Oct 2 in blue ink adopted in proof of Circular 46

see p172

+32.3	−.3″
+32.5	−.1
+33.9	+1.3
+30.8	−1.8
+33.3	+.7
+32.6	

av. dev ± ~~.78~~ −22 +20 42

± .84

Solution from all 5

a = −~~.065~~ 081

b = +~~4.063~~ 3.996

add

a −~~.311~~ .132

b +~~4.076~~ .063

Sep p167	X-Const/100	aX/100	bY/100	x−X	Σ=C	O−C	
f	+5.9″	−2.3 0.8	+62.~~4~~ 2	−28.3″	+~~34.8~~ 33.1	+~~1.7~~	+.6
g	+6.5	−2.5 0.9	+13.~~9~~ 8	+19.8	+~~31.2~~ 32.8	+~~2.1~~	+.3
l	+15.2	−6.0 2.0	+23.2	+12.3	+~~27.5~~ 33.5	+.4	+1.0
o	+18.8	−7.4 2.5	+36.~~7~~ 6	−3.7	+~~25.6~~ 30.4	−3.5	−2.1
p	+21.0	−8.2 2.8	+35.~~9~~ 8	−0.2	+~~27.5~~ 32.8	−1.6	+.3
				C =	~~129.7~~ ~~25.1~~ 32.5	~~152~~ ~~.51~~ ±03	±2.06 .86

see p172

x−X = w	X/100	Y/100	(x−X)X/100	XY/100	(x−X)Y/100		
						same as on p167 → S	Sw → as Sep 172 also
−28.3″	−7.6″	+6.9″	+215.08		−195.27		+19.81

D6826

		(y−Y)X/100
		+817.31
		2.9124
		(1.8050n)
9.0849 1.1804n 0.2653n	+817.31	(y−Y)Y/100
	−1.84	−73.59
	+815.47	−63.83
	2.9115	−9.76
	2.2878	0.9894n
	0.6237	1.9045
		9.0849n
	b′ = x′ = +4.205	a′ = y′ = −.122

ds are indicated *

D6826
Residuals

173
177

a = −.076
b = +4.060

a′ +.122
b′ −4.205
added to meas.

	X-Const/100	aX/100	bY/100	x−X	Σ=C	O−C
f	+5.9	−0.4	+62.1	−28.3	+33.4	+.3*
g	+6.5	−0.5	+13.4	+19.8	+32.7	−.4
l	+15.2	−1.2	+23.1	+12.3	+34.2	+1.1
o	+18.8	−1.4	+36.5	−3.7	+31.4	−1.7
p	+21.0	−1.6	+35.7	−0.2	+33.9	+.8*
				−C =	+33.1	+22 −21 ±43 ±.86

* all in x

	Y-Const/100	a′Y/100	b′X/100	y−Y	Σ=C′	
f	+15.3	+1.9	−24.8	−32.4	−55.3	+.3*
g	+3.3	+.4	−27.3	−29.3	−56.2	−.6
l	+5.7	+.7	−63.9	+9.2	−54.0	+1.6
o	+9.0	+1.1	−79.1	+21.1	−56.9	−1.3
p	+8.8	+1.1	−88.3	+31.8	−55.4	+.2
				−C′ =	−55.6	+21 −19 40 ±.80

+2~~0.8~~ 1.1	+~~10.40~~ 12.66 55		+1~~0.24~~ 1.83	+122.38
+31.8	+12.72		+238.50	~~+751.22~~
−61.8			+817.31	+741.68
+61.7				

−76~~54~~ 39
73.59 ← for Recomp

+81~~6.48~~ 8.07

	a′Y/100	b′X/100	ΣC′	O−C
f	+2.0″	−24.7″	−55.2″	+.5
g	+0.4	−27.4	−56.3	−.6
l	+0.7	−64.0	−54.5	+1.2
o	+1.2	−79.1	−56.8	−1.1
p	+1.1	−88.4	−55.5	+2
			55.7	+1.9 −1.7 ±36

av dev ±.72

add
a′ +~~.192~~ .128
b′ −~~4.209~~ .156
−4.208

	Y-Const/100	a′Y/100	b′X/100	y−Y	Σ=C′	O−C	
f	+15.3	+~~15.2~~ 2.0	−24.8 5	−32.5	−~~42.1~~ 55.0	+7.4	−.1
g	+3.~~4~~ 31	+~~3.4~~ 0.4	−27.~~6~~ 0	−29.3	−~~53.8~~ 5.9	−3.8	−1.0
l	+5.7	+~~5.6~~ 0.7	−~~64.4~~ 63.2	+9.2	−~~47.6~~ 53.3	−.1	+1.6
o	+9.0	+~~8.9~~ 1.2	−~~77.1~~ 78.1	+2~~0.8~~ 1.1	−~~44.4~~ 56.1 55.8	+.1	−~~1.2~~ 0.9
p	+8.8	+~~8.7~~ 1.1	−~~92.4~~ 87.3	+31.8	−~~52.9~~ 4.4	−3.4	+.5
				−C′ = −54.9	~~49.5~~	~~−73 +75~~	.89

av dev ±.82 C′ = +54.9 C′ = ~~+49.5~~ ±1.48 ±~~3.96~~

Recomp Col 2 in blue ink adopted in proof of Circular 46

+32.3	−.3
+32.5	−.1
+33.9	+1.3
+30.8	−1.8
+33.3	+.7
+32.6	

Solution from all 5

av. dev ± ~~.78~~ −22 +20 42
" ± .84

a = −~~.065~~ .081
b = +~~4.063~~ 3.996

add
a −~~.3?1~~ .132
b +4.0~~76~~ 63

see p167

	X const/100	aX/100		bY/100	x−X	Σ=C	O−C	
f	+5.9	−2.3	0.8	+62.~~4~~ 2	−28.3	~~+31.8~~ 33.1	+2.7	+6
g	+6.5	−2.5	0.9	+13.~~9~~ 8	+19.8	~~+31.2~~ 32.8	+2.1	+.3
l	+15.2	−6.0	2.0	+23.2	+12.3	~~+29.5~~ 32.5	+.4	+1.0
o	+18.8	−7.4	2.5	+36.~~7~~ 6	−3.7	~~+25.0~~ 30.4	−3.5	−2.1
p	+21.0	−8.2	2.8	+35.~~9~~ 8	−0.2	~~+27.5~~ 32.8	−1.6	+.3
						~~+29.7~~	15.2	
					C =	~~+27.1~~ 32.5	5.1	
							±10.3	±2.06
								.86

see p172

see p172

x−X = n	X/100	Y/100	(x−X) X/100	XY/100	(x−X) Y/100	Sn	
−28.3	−7.6	+6.9	+215.08		−195.27	+19.81	also bs
+19.8	−7.0	−5.1	−138.60		−100.98	−239.58	
+12.3	+1.7	−2.7	+20.91		−33.21	−12.30	
−3.7	+5.3	+0.~~5~~ 6	−19.61	+3.18	−~~1.85~~ 2.22	−21.46	
−0.2	+7.5	+0.4	−1.50		−0.08	−1.58	
−32.2						−255.11	
+32.1							
			+76.28	−15.15	−~~331.39~~		

same as on p167 → S → as see p172

for Recomp → −331.76

y−Y = n′	(y−Y) Y/100		(y−Y) X/100	Sn′	bs
−32.~~5~~ 4	−~~224.25~~ 3.56		+247.~~00~~ 6.24	+22.75	
−29.3	+149.43		+205.10	+354.53	
+9.~~1~~ 2	−24.84		+15.64	−9.20	
+2~~0.8~~ 1.1	+1~~0.40~~ 2.66		+1~~0.24~~ 1.83	+122.38	
+31.8	+12.72		+238.50	+251.22	
−61.8			+817.31	+741.68	
+61.7	−76.~~54~~ 39		+81~~6.48~~ 8.07		

73.59 ← for Recomp

	a′Y/100	bX/100	Σ=c′	O−C
f	+2.0	−24.7	−55.2	+.5
g	+0.4	−27.4	−56.3	−.6
l	+0.7	−64.0	−54.5	+1.2
o	+1.2	−79.1	−56.8	−1.1
p	+1.1	−88.4	−55.5	+2
			−55.7	+1.9
				+1.7
				av dev

add
a′ +.~~192~~ 128
b′ −4.~~209~~ 156
−4.208

	Y const/100	a′Y/100	b′X/100	y−Y	Σ=c′	O−C	
f	+15.3	+~~15.23~~ 20	−24.8	−32.5	−~~42.~~ 55.0	+7.4	−1
g	+3.~~4~~ 31	+~~3.4~~ 0.4	−27.~~8~~ 0	−29.3	−5~~3.5~~ 5.9	−3.8	−1.0
l	+5.7	+~~5.6~~ 0.7	−~~64.4~~ 63.2	+9.2	−~~47.6~~ 53.3	−.1	+1.6
o	+9.0	+~~8.9~~ 1.2	−~~79.1~~ 78.1	+2~~0.8~~ 1.1	−~~46.4~~ 55.8	+.1	−~~1.2~~ 0.9
p	+8.8	+~~8.7~~ 1.1	−~~90.4~~ 87.3	+31.8	−5~~2.9~~ 4.4	−3.4	+5
					~~47.5~~	7.3	

−c′ = −54.9

av dev ± 59 c′ = −51.9 c′ +16.5 ±1.8 ±3.96

Constants from Stars f. g. o.

a = −.00103 a′ −.000~~91~~ 89 } Final −.00091

b = +.04028 b′ −.04~~115~~ 090~~4~~ } add to meas. −.04114

c = −35.4 c′ +~~43.6~~ 4 43.2″ } +43.4

Nova Sagittarii Const X −1926.5″ Const Y = +129.1

D 6826 from C 11827.

	Readings 1	2	Mean x	Revd diff	ax	by	c	Σ	x−Σ	Corr x		
Nova Sag	1184.1	1183.9	1184.0	+0.1 −0.1	−1.2	+36.1	−35.4	−0.5	1183.5	−743.0″		
	1183.9	1183.9		−0.1 −0.1								
	1184.1	1183.9		+0.1 −0.1								
n	1477.0	1477.0	1477.0									
Cat Stars											Comp X C-6	
l:			1528.2		−1.6	+23.2		−13.8	1514.4	−412.1	−414.7	+2.6
p			2099.7		−2.2	+36.7		−0.9	2098.8	+172.3	+169.3	+3.0

Constants from all 5 Stars

adopt Oct 2

a −.081

b +3.996

c −32.6

a = −.065

b = +4.063

c = −33.4

a = ~~+.391~~ 134 ×.01

b = ~~+4.076~~ 63 ″

c = ~~+29.1~~ 32.5

a′ = ~~+.192~~ 128 ×.01

b′ = −4.~~209~~ 156 ″

c′ = +~~44.5~~ 54.9

add to meas.

a′ = +.128

b′ = −4.208

c′ = +55.7

Const X −1930.6 Y +115.5

Nova Sag.

~~−1.6 +36.5 −29.1 +2.8 +1186.8 −743.8″~~

~~−1.6 +36.4 −32.5 +2.3 +1186.3 −744.3~~

−0.8 +36.4 −33.4 +2.2 +1186.2 −744.4

Oct 2 −1.0 +~~36.0~~ 35.8 −32.6 +~~2.4~~ 2.2 1186.~~4~~ 2 −744.~~2~~ 4 Recomp Oct 2

· 6 constants −0.9 +36.4 −33.1 +2.4 1186.4 −744.2 Oct 6 too late

~~Star o corrected . 5~~7.7

a' −.00089
b' −.04090
c' +43.2

+29.1

retain corrected blk ink vals.

	Readings 1	2	Mean of Rev'd	diff		Corr y −y'	
Nova Sag	895.8	895.6	895.8	0.0 −0.2	~~−0.8 −48.7 $+43.\overset{4}{3}$ $-6.\overset{1}{2}$ $889.\overset{7}{6}$~~	~~$+1018.\overset{8}{7}$~~	Nova +1018.8
	895.8	895.8		0.0 0.0	~~−.8 −48.4 +43.2 −6.0 889.8~~	~~+1018.9~~	
	895.8	895.8		0.0 0.0			
n	996.4	996.4	996.4				

			Slit—		Comp y	O–C
l	576.0	−0.5 $-62.\overset{5}{9}$	~~$-20.\overset{0}{1}$ $55\overset{6.0}{5.9}$ $+685.\overset{1}{6}$~~		+682.4	~~$+2.\overset{7}{6}$~~
p	911.2	−0.8 $-8\overset{5.9}{6.4}$	$-43.\overset{8}{9}$ $867.\overset{4}{3}$ $+996.\overset{5}{4}$		+994.9	~~+1.5~~
			−19.8 556.2 +685.3			+2.9
			−43.5 867.7 +996.8			+1.9

Recomp Oct 6

a −.076 a' +.122
b +4.060 b' −4.205
c −33.1 c' +55.6
−19306 +115.5

adopt Oct 2

a' = +.120
b' = −4.205
c' = +55.6 or c' +55.7
const y + 115.5 +115.4

Miss Wood's Recomp. gives same O–C as on p172

a'y b'x Σ

~~+8.9 −49.8 +49.5 +8.6 904.4 +1019.9~~

~~+1.1 −49.2 +54.9~~ +6.8 902.6 +1018.1

+1.1 −49.8 +55.7 +7.0 902.8 +1018.3

+1.1 −49.8 +55.6 +6.9 902.7 $+1018.\overset{2}{3}$ Recomp. adopted Oct 2

for Circular 46 +1.1 −49.8 +55.6 +6.9 902.7 +1018.2 " " Oct 6

Nova Sagittarii

DG826 from C11827 Equations for abc from stars f. g. o.

$$\begin{array}{lllll} & x & y & & \\ -24.2 = & 561.2\,a & +1494.6\,b & +\overset{''}{.}6 - \overset{''}{60}.2 + c & c \pm 35.4 \\ +23.9 = & 665.3\,a & +303.2\,b & +.7 - 12.2 & 35.4 \\ +0.4 = & 1877.0\,a & +917.6\,b & +1.9 - 37.0 & \underline{35.5} \\ & & & & +35.4 \end{array}$$

1-2 $-48.1 = -1041\,a + 1191.4\,b$

2-3 $+23.5 = -1211.7\,a - 614.4\,b$

$-.04037 = -.08738\,a + b$ $\quad -.00009$ $\quad b = -.04028$

$+\underline{.03825 = -1.9722\,a - b}$ $\quad -.00203$ $\quad b = -.04028$

$-.00212 = -2.0595\,a$

7.32634_n

$\underline{0.31376_n}$

7.01258 $a = +.001029$

$a = +.00103$

$b = -.04028$

$c = +35.4$

sub. fr. meas.

Constants from all 5 Standard Stars

See p170 for Σx^2/c etc.

				+76.28		
				1.8825		
				9.5947		
0.6102	0.6088 1.1953 1.804	+76.28	+76.28	−331.39		δw −255.11
8.9975n	−50.59 ~~−.33~~		−63.70	+.39	−6.17	+70.12
9.5177n	25.69		+12.58	−331.78	−325.22	−325.23
	~~+75.95~~ 40.97					
	~~1.8805~~		1.0997	2.5208n	2.5122n	
	2.2878			1.9106	1.9034	
	~~9.5927~~ 1.219		8.8119	0.6102n	0.6088n	
a = x	~~+.391~~ +.132		+.065	b = y −4.076	−4.063	

~~Star o corrected +7.7~~

Equations for a' b' c' from Stars f. g. o

a' +.00089 b' +.04090 a' = +.00091 b' = +.04114

a'y b'x

−18.9 = +1.3 +23.0 + 1.3 + 23.1 + c' c' = −43.3 43.2

−15.7 = + .3 +27.2 + 0.3 + 27.4 −43.4 43.2

~~+34.4~~ + 34.7 = + .8 +76.8 + .8 + 77.2 −43.3 43.3

−43.1 +43.2

stet ← final

1−2 − 3.2 =

2−3 ~~−50.1~~ −50.4 =

final fr. f.g.o.

−.002686 = +a' 3574 − .003595 a' = + ~~.00090~~ ~~+.000908~~ 888

.081543 −.082032 = −a' 80657 − .081147 a' = + ~~.00088~~ ~~+.000908~~ 886

.084228 −.08472 = −2.0595 used a' = +.00089 a' = +.00091 89

8.92546 8.92797 n

0.31306 n

8.61170 8.61433 b' = +.04115

+.040898

1st comp. b' +.04115 c' −43.3

a' +.00089

2" b' +.04090 sub. fr. meas.

c' −43.2

5 pl

+816.48 +818.07

2.9120 2.9129 2.91279

2.2878 p170 9.96340

0.6242 2.87619

4.1077 1.1953 n 0.3030 n

+816.48 +818.07 −76.54 −76.39 +741.68

−.08 −2.01 +4.21 −66.13 +752.0

+816.40 +816.06 −80.75 −10.26 −10.27

2.9119 2.9118 1.9072 n 1.0111 n 1.0136 n

2.2878 1.9106 1.9034 1.9034

0.6241 0.6240 9.9966 n 9.1077 n 9.1082 n

9.9666 8.9075 n 8.9041 n

b' = x' +4.209 +4.208 a' = y' −.992 −.128 −.1283

Omicron Sagittarii from 611827
with constants from f.9.0

	D6825	D6826	Reject. D6826	D6825	
Y 1890	+1018.~~9~~ 7	+1018.~~8~~ 9	+1018.7	+1018.7 p169	6825-6826 diff Y −.1
log Y	3.008~~1316~~ 0463	3.008~~0889~~ 1316	3.0080463	3.0080463	
Y/R	7.693~~7065~~ 6212	7.693~~6638~~ 7065	7.6936212	7.6936212	
d = b − D	+0 16 58.~~59~~ 69	+0 16 58.~~79~~ 89 ✓	+0 16 58.69	+0 16 58.69	
D	−13 36	−13 36	−13 36		
b = D + d	−13 19 1.~~41~~ 31	−13 19 1.~~21~~ 11 ✓	−13 19 1.31	−13 19 1.31	
X 1890	−743.1	−743.0	−743.0	−743.1	diff X −.1
log X	2.8710473n	2.8709888n	2.8709888n	2.8710473n	
X/R	7.5566222n	7.5565637n	7.5565637n	7.5566222n	
cos d	9.9999947 ✓	9.9999947 ✓	9.9999947 ✓	9.9999947	
Σ	7.5566169n	7.5565584n	7.5565584n	7.5566169n	
cos b	9.988162~~2~~ 1 ✓	9.9881622 ✓	9.9881621	9.9881621	
diff = tan a	7.568454~~7~~ 8 n	7.5683962n	7.5683963n	7.5684548	
arc a = α − A	−0° 12′ 43.6~~2~~ 1″	−0 12 43.52 ✓	−0 12 43.52 ✓	−0 12 43.61	
time a =	−0h 0m 50.91s ✓	−0 0 50.90	−0 0 50.90	−0 0 50.91	
A	18 56 30.	18 56 30	18 56 30		
1890 α = a + A	18 55 39.09 ✓	18 55 39.10	18 55 39.10	18 55 39.09	
red. to 1900	+33.79	+33.79	+33.79		
1900 α	18 56 12.88	18 56 12.89	18 56 12.89	18 56 12.88	diff α −.01s = −.1″
log tan b	9.37420~~34~~ 53 n	9.37420~~4~~ 3 4n	9.3742053n	9.3742053n	
cos a	9.999997~~0~~ 1 ✓	9.9999971	9.9999970	9.9999971	
Σ = tan δ	9.37420~~67~~ 23 059 n	9.37420~~7~~ 0 5	9.3742023n	9.3742024n	
1890 δ	−13 19 0.~~79~~ 0.80	−13 19 0.~~7~~ 8 0	−13 19 0.99	−13 19 1.00	
red. to 1900	+48.23	+48.23	+48.22		
1900 δ	−13 18 12.~~06~~ 7 12.57	−13 18 12.~~6~~ 5 7	−13 19 12.77	−13 19 12.77	diff δ −.10″
		Adopt	Reject.		

MWards.

Nova Sagittarii:

Prof Hartwig	18h 56m 12.69s	−13° 18′ 22.3″		(1900)	Ast. Nach. 149, 29	
" Wendell	18 56 12.2	−13 18 16		(1900)	Circular no. 42	
p164 D6613	18 55 39.08	−13 19 0.07	.59 88	18 56 12.87	−13 18 ~~11.80~~	11.86
D6614	18 55 39.17	−13 19 ~~0.36~~ 36	0.17	18 56 12.96	−13 18 11.94 ~~12.13~~	12.13
from 6 11827						
D6825	18 55 39.09	−13 19 1.00 ~~0.79~~	.80	18 56 12.88	−13 18 12.57 ~~12.66~~	12.77
p178 D6826	18 55 39.10 39.11	−13 19 0.90 0.56	.80 0.4	18 56 12.89	−13 18 ~~12.77~~ 6 12.57 12.3 2	* 12.67 12.4

12.90

*May 1899 Gave Prof P 12.7″ an approx. value. D6826

Residuals from stars l & p

For plate constants see

			O−C in α	O−C in δ	
B21319	D6613 p154	l	+.9″	+4.7	~~+4.7~~ +4.9
		p	+3.9	+0.8	~~+0.8~~ +1.1
	D6614 p160	l	~~+1.6~~ 1.7	+3.8	~~+3.8~~ 4.2
		p	~~+2.7~~ 3.6	+0.6	~~+0.6~~ 1.1
611827	D6825 p170	l	+2.3	+2.7	~~+2.7~~ 3.0
		p	+3.1	+1.8	~~+1.8~~ 2.2
	D6826 p176	l	+2.6	+2.7	~~+2.6~~ 2.9 ~~2.7~~
		p	+3.0	+1.6	~~+1.5~~ 1.9 ~~1.6~~

Nova Sagittarii from all 5 Standard Stars f. g. l. o p. see p165

		R.A. 1900	p165 1890	Decl. 1900	1890
B21319 D6613	18 56	12.82 3	18h 55m 39.03	−13 18 12.15 3 6	0.6 0.9
D6614		12.90	.17	12.84	1.1
611827 D6825	18 56	12.88 0	.04	−13 18 13.17 ~~12.67~~	1.4 0.9
D6826		12.79 0 ~~12.83~~ 12.83 adopt →	.04 0 39.04 (4)	13.37 ~~11.68~~ adopt 13.0	1.6 0.8 1.2
mean of 8		12.87 6		12.8 6	
" "	18 55	(1890) 39.08		−13 19	1890 0.91 ~~0.5~~

Note: (Rockport Mass)

July 19 1899 sent Prof P. the black ink values (R.A. & Dec 1900 (slice to tenths only) + Resids). Changes in red ink made afterwards (July 25 etc) due chiefly to error of 0.″3 in mean δ of star o. Aug 8 no error in star o.

	Before Least Sq. B21319 6613	6614	611827 6825	6826	After Least Sq. B21319 6613	6614	611827 6825	6826
Nova S								
From f.g.o X	+4337.0″ −13	+4338.3″	−742.6″ −.1	−742.5″	+4337.3″ −1.4	+4338.7″	−743.1″ −.1	−743.0″
Y	−2590.1 +5	−2590.6	+1075.0 +.1	+1074.9	−2590.0 1.0 +3	−2591.1 3	+1018.7 7 −6	+1018.9 8
From all 5 X	+4336.5 −1.3	+4337.8	−746.6 0	−746.6	+4336.6 −1.3 2	+4337.9 8	−743.9 43+0	−743.8 4.3 4
Y	−2593.1 −.1	−2593.0	+1011.5 +.2	+1011.3	−2591.? 8+6 2	−2592.0	+1018.8 11 +2	+1019.9 8.1 3

Aug 14 Did I send Prof P. wrong minute 55m for the Nova?

Dm −13° 5183 = f
−13 5185 = g
−13 5197 = o } Prof Searle's Zone

Rt & Decl. Nova Sagittarii from

	Rt 1890	Decl 1890 (stet)		Rt 1900	Decl 1900	
from B21319	h m s	° ′ ″		h m s	° ′ ″	
p164 D6613	18 55 39.08	−13 19 ~~0.07~~ 9	59.88	18 56 12.87	−13 18 ~~11.86~~ 11.656	11.86
D6614	18 55 39.17	−13 19 ~~0.56~~ 36	0.17	18 56 12.96	−13 18 ~~12.13~~ 11.94	12.13
from 611827						
D6825	18 55 39.09	−13 19 ~~0.79~~ 1.00	.80	18 56 12.88	−13 18 ~~12.96~~ 12.57	12.77
p178 D6826	18 55 39.10 39.11	−13 19 0.99 0 0.56	.80 0.4	18 56 12.89 12.90	−13 18 ~~12.77~~ 6 12.57 12.3 2	* 12.67 12.4

*May 1899 Gave Prof P 12.7″ an approx. value. D6826

Residuals from stars l & p

For plate constants see

			O−C in x		O−C in y
B21319	D6613 p154	l	+9″	+4.7	~~+4.7~~ +4.9″
		p	+3.9	+0.8	~~+0.8~~ +1.1
	D6614 p160	l	~~+1.6~~ 1.7	+3.8	~~+3.8~~ 4.2
		p	~~+2.7~~ 3.6	+0.6	~~+0.6~~ 1.1
611827	D6825 p170	l	+2.3	+2.7	~~+2.7~~ 3.0
		p	+3.1	+1.8	~~+1.8~~ 2.2
	D6826 p176	l	+2.6	+2.7	~~+2.6~~ 2.9	2.7
		p	+3.0	+1.6	~~+1.5~~ 1.9	1.6

Nova Sagittarii from all 5 Standard Stars f. g. l. o. p. see p165

		Rt 1900	1890	Decl. 1900	1890
B21319	D6613	18 56 12.82	18h 55m 39.03	−13 18 12.25 (3, 6)	0.5 (6, 0.9)
	D6614	12.90	.12	12.84	1.1
611827	D6825	18 56 12.83 (0)	.04	−13 18 13.17 ~~12.67~~	1.4 ~~0.9~~
	D6826	12.79 0 ~~12.83~~	.04 39.04 (4)	13.37 ~~11.68~~	1.6
	adopt →	12.83		adopt − ~~12.9~~ 13.0	1.2
	mean of 8	12.86		12.6	
	" "	18 55 (1890) 39.08		−13 19 0.91 ~~0.5~~	1840

Note: (Rockport Mass)

July 19 1899 sent Prof P. the black ink values (Rt & Decl 1900 (since to tenths only) + Resids), changes in red ink made afterwards (July 25 etc) due chiefly to error of 0″.3 in mean δ of star o

Aug 8 no error in star o

		Before Least Sq. B21319 6613	6614	611827 6825	6826	After Least Sq. B21319 6613	6614	611827 6825	6826
From f g o	X	+4337.0″ (−1.3)	+4338.3″	−742.6″ (−.1)	−742.5″	+4337.3″ (−1.4)	+4338.7″	−743.1″ (−.1)	−743.0″
	Y	−2590.1 (+.5)	−2590.6	+1025.0 (+.1)	+1024.9	−2590.8 1.0 (+.3)	−2591.1 3	+1018.1 9 7 (−.6)	+1018.1 9 8
From all 5	X	+4336.5 (−1.3)	+4337.8	−746.6 (0)	−746.6	+4336.6 (−1.3 2)	+4337.9 8	−743.9 43 (+0)	−743.8 4.3 4
	Y	−2593.1 (−.1)	−2593.0	+1011.5 (+.2)	+1011.3	−2591.8 8+6 2	−2592.0	+1018.8 (+1 +2)	+1019.9 8.1 3

Mr Chandlers formulas for Eros and for the Standard Coords. of Comparison Stars.

$A = (\alpha_0 - A_0) \sin 1''$ $\quad D = (\delta - D_0) \sin 1''$ $\quad \delta_1 = \frac{\delta' + \delta}{2}$

$E = \frac{1}{2} D^2 + \frac{1}{2} A^2 (3 \cos^2 \delta - 1)$ $\quad E' = \frac{1}{2} A (1 + D^2) \sin 2\delta$

$F = - A \tan \delta + A D$ $\quad F' = D^2 + \frac{1}{2} A^2 \cos 2\delta$

$G = (- \frac{1}{2} \tan \delta + D) \sin 1''$ $\quad G' = A \cos 2\delta \sin 1''$

$H = \frac{1}{2} A (3 \cos^2 \delta - 1) \sin 1''$ $\quad H' = \frac{1}{4} (1 + D^2) \sin 2\delta \sin 1''$

$I = - A \tan \delta \sec \delta \sin 1''$ $\quad I' = D \sin 1''$

$$(2) \quad (X' - X) \sec \delta_1 = \Delta\alpha + E \Delta\alpha + F \Delta\delta + G \Delta\alpha \Delta\delta + H \Delta^2\alpha + I \Delta^2\delta$$

$$(Y' - Y) = \Delta\delta + E' \Delta\alpha + F' \Delta\delta + G' \Delta\alpha \Delta\delta + H' \Delta^2\alpha + I' \Delta^2\delta$$

(1) also (For Eros) $X_0 \sec \delta_0 \sin 1'' = A + \frac{1}{2} A D^2 + \frac{1}{2} A^3 (3 \cos^2 \delta - 1) + \frac{1}{4} A^3 D \sin 2\delta$

$$Y' \sin 1'' = D + \frac{1}{4} A^2 (1 + D^2) \sin 2\delta + \frac{1}{3} D^3 - \frac{1}{32} A^4 \sin 4\delta$$

(or use Turners trigonometric formulas)

Mr. Chandler's Example

Eros; 1894 May 19 B11174 = plate

$\alpha_0 = 10^h\ 38^m\ 1^s.60$ $\delta_0 = -14°\ 57'\ 10''$ $\cos\delta_0$ 9.985040 $\sin 2\delta$ n 9.6977 $\tan\delta_0$ n 9.4266

$A_0 = 10\ 29\ 48.00$ $D_0 = -11°\ 55'\ 0''$ $\cos^2\delta_0$ 9.9701 $\cos 2\delta$ 9.9379 $\tan\delta_0 \sec\delta_0$ n 9.4416

$\alpha_0 - A_0$ +7404.0 3.869466 $3\cos^2\delta - 1$ 0.2533 $(1+D^2)$ 0.0012 $1000 \sin 1''$ 0.6856 ½ 9.6990

$\delta_0 - D_0$ −10930.0 4.038620

A +.0358956 8.555041 A^2 7.1101

D −.0529901 n8.724195 D^2 7.4484

AD n 7.2792

$$(x'-x)\sec\delta_1 = \Delta\alpha + 2''.57[\Delta\alpha] + 7''.68[\Delta\delta] + 0''.390[\Delta\alpha][\Delta\delta] + 0''.157-[\Delta\alpha]^2 + 0''.048[\Delta\delta]^2$$

$$y'-y = \Delta\delta - 8.97[\Delta\alpha] + 3.37[\Delta\delta] + 0.151[\Delta\alpha][\Delta\delta] - 0.605[\Delta\alpha]^2 - 0.257[\Delta\delta]^2$$

Where the bracketed $[\Delta\alpha]$ $[\Delta\delta]$ are expressed in $1000''$ as unit.

For example continued see pp 182–3

B 11174 = May 19 1894

Mr. Chandlers Example continued

Star	a	b	c	d	k	l	n
$\Delta\alpha$	−2230″.65	−1871″.10	−1815″.90	−723″.0	−18″.30	+20″.55	+1068″.15
	− 5.73	− 4.81	− 4.67	− 1.86	− .05	+ .05	+ 2.75
	− 2.03	+ 6.53	−13.43	− 15.49	+ 11.81	+1.67	− 15.72
	+ 0.23	− 0.62 ✓	+ 1.24	+ 0.57	− .01	+ .00	− 0.85
	+ 0.78	+ 0.55	+ .52	+ .08	+ .00	+ .00	+ .18
	+ .00	+ .04	+ .15	+ .19	+ .11	+ .00	+ .20
Sum $X'-X \sec\delta_0$	−2237.40	−1869.41 ✓	−1832.09	−739.51	− 6.44	+22.27	+1054.71
log	349744	271704	262947	868944	8089	3478	.023133
$\cos\delta_1$	9.984965	985277	984543	984467	985468	985100	984458
$\cos\delta_1\, X'-X$	334709						
$X'-X$	−2161.27	−1807.10	−1768.03	−713.53	− 6.23	+ 21.53	+1017.63
$\Delta\delta$	− 264.24	+851.25	−1748.52	−2016.07	+1537.87	+217.41	−2046.48
	+ 20.01	+ 16.78	+ 16.29	+ 6.49	+ .16	− .18	− 9.58
	− .89	+ 2.87	− 5.89	− 6.79	+ 5.18	+ .73	− 6.90
	+ .09	− 0.24	+ 0.48	+ 0.22	− .00	+ .00	− 0.33
	− 3.01	− 2.11	− 2.00	− .32	− .00	− .00	− 0.69
	− .02	− .18	− .79	− 1.04	− .61	− .01	− 1.03
$Y'-Y$	−248.06	+868.37	−1740.43	−2017.51	+1542.60	+217.95	−2065.01

B 11174

Eros

Approx check

Eros	$\alpha_0 - A_0$	+7404.″0	3.869466
−7404.″00	$\delta_0 - D_0$	−10930.0	4.038620
− 19.03	A	+.03589560	8.5550413
+ 83.96	D	−.05299015	n 8.7241951
− 31.56	$\frac{1}{2}AD^2$	+.00005040	5.70240
+ 8.58	$\frac{1}{2}A^3\cos^2\delta$	+.00002159	5.33417
+ 5.73	$-\frac{1}{6}A^3$	−.00000771	n 4.88697
− 735.63	$+\frac{1}{4}A^3D\sin 2\delta$	+.00000030	3.48407
.86666	sum	+ 6458	
98795	$\sin 1'' \sec\delta\, X_0$	+.03596018	8.555822
	$\sec\delta_0\, X_0$	+7417.″32	3.870247
−715.50	D^2	+.002808	7.44839
	$-\frac{1}{4}A^2\cos 2\delta$	−.000279	n6.44505
	$1+D^2-\frac{1}{4}A^2\cos 2\delta$	+1.002529	0.00110
+10930.00		−.00016101	n6.20685
+ 66.44	$\frac{1}{3}D^3$	−.00004960	n5.69546
+ 36.83 ✓	$\sin 1'' Y_0$	−.05320076	n8.725918
− 12.22			
− 33.17	X_0	+7166.″17	3.855287
− 30.70	Y_0	−10973.44	4.0403403
+10957.20			

(Rigorous) X +7166.″18

" Y −10973.38

Copied May 15 1899

May 19 1894

Entered in green ink from letter sent to Mr. Chandler, May 6, 1899.

B 11174

	Washington			Computed		D6344. Measured		D6346.	
	D.M. No.	R.A. (1875)	Dec.	X'	Y'	ξ' Mean x	η' Mean y	Mean x	Mean y
a	-14° 3164	10 35 32.89	-15° 1' 34.24"	+5004.8"	-11221.5"	311.8"	2045.0	300.3"	1998.8"
b	-14 3165	10 35 56.86	-14 42 58.75	+5359.0	-10105.1	652.5	3156.3	642.4	3112.2
c	-15 3111	10 36 0.54	-15 26 18.52	+5397.9	-12714.0	714.0	562.9	702.1	515.3
d	-15 3115	10 37 13.40	-15 30 46.07	+6452.4	-12991.1	1764.1	296.3	1750.4	248.6
k	-14 3170	10 38 0.38	-14 31 32.13	+7159.9	-9430.8	2437.1	3844.6	2428.0	3796.8
l	-14 3171	10 38 2.97	-14 53 32.59	+7187.7	-10755.5	2475.8	2523.9	2464.2	2478.1
n	-15 3121	10 39 12.81	-15 31 16.48	+8183.6	-13038.7	3489.6	264.6	3478.6	216.0
				X_0	Y_0	ξ	η		
Eros				+7166.2	-10973.4	2461.4	2297.1	2452.3	2253.5

Eros by rigorous form. from the assumed α_0 and δ_0

R.A. of Centre (1875) $10^h 29.8^m$

Dec " " " $-11° 55'$

Eros $10^h 38^m 1.98^s$ $-14° 57'$ $18.44"$

" 10 38 1.60 -14 57 10.00 assumed $\alpha_0 + \delta_0$

	Computed By Series X'	Computed By Series Y'	Differences	
a	+5004.90"	-11221.50"	+0.1"	0.0"
b	+5359.07	-10105.07	+0.1	0.0
c	+5398.14	-12713.87	+0.2	+0.1
d	+6452.64	-12990.95	+0.2	+0.1
k	+7159.94	-9430.84	0.0	0.0
l	+7187.70	-10755.49	0.0	0.0
n	+8183.80	-13038.45	+0.2	+0.2
Eros	+7166.17	-10973.44		

B11174 Mr. Chandlers Solutions in black ink

Is it the
Obs or Comp C-O?
6-6

True Place of Eros to be determined $\alpha_0 + \Delta\alpha_0$ $\delta_0 + \Delta\alpha_0$
$\Delta\alpha_0$, $\Delta\delta_0$ are corrections to assumed place

1st. Compute X' … assumed {approx. place of Eros} X_0, Y_0
α_0 δ_0

Call measur… measured coord of Eros ξ η

Call $\Delta X =$
$\Delta Y =$

Put $n = \Delta X$ …

" $a = \frac{\Delta X}{1000}$ … ~~(a-1)~~ $X = (1000)(a-1)$ $y = 1000\,b$
$X' = 1000\,d$ $y' \cdot 1000\,(e-1)$

$ax +$ … $ax' + by' + \Delta\delta_0 = n'$

aa
log

log $\frac{ab}{aa}$

log $\frac{ac}{aa}$

log $\frac{nc(1)}{Bb(1)}$

log $\frac{cn(2)}{cc}$

p 185

See Mr Chandlers computation in envelope in drawer.

May 8 1899
Mr Chandlers notation.

$\Delta\alpha_0$
α_0
α

$\Delta\delta_0$
δ_0
δ

x+
y +9.51
z +4.51

Substitution	y +8.71 z +4.77			Z+ Sum	Comp	Mr C's C-O? v	O-C	y' +5.84 z' -9.95 ax'	y' +5.24 z' -10.32			Z'+ Sum		Mr C C-C v	O-C
ax		by				v		ax'						v	
						"	"						"		"
-11.04	-11.56	-2.38	-2.18	-9.0	-9.0	-1.6	-1.6	+17.58	+17.80	-1.46	-1.31	+6.2	+6.2	-0.9	-.9
-9.25	-9.68	+8.27	+7.58	+3.4	+2.7	-1.2	-.5	+14.73	+14.91	+5.08	+4.56	+9.9	+9.2	-0.6	+.1
-9.04	-9.47	-16.55	-15.16	-21.2	-19.9	+1.7	+.4	+14.41	+14.58	-10.16	-9.12	-5.7	-4.9	+1.3	+.5
-3.63	-3.80	-19.21	-17.59	-18.4	-16.6	-4.2	+2.4	+5.78	+5.85	-11.80	-10.58	-16.0	-15.0	+1.1	+.1
-0.05	-.05	+14.65	+13.41	+19.0	+18.1	-1.0	-.1	+.08	+0.08	+8.99	+8.07	-0.9	-2.2	-1.9	-.6
+0.10	+.11	+2.09	+1.92	+6.6	+6.8	+1.7	+1.5	-.16	-0.16	+1.28	+1.15	-8.8	-9.3	+1.0	+1.5
+5.21	+5.46	-19.63	-17.94	-10.0	-7.7	-0.2	-2.1	-8.30	-8.40	-12.06	-10.79	-30.3	-29.5	0.0	-.8
	Miss B's				Mr C.	-8.2	-4.3							-3.4	-2.3
	mult.				has this	+3.4	+4.3							+3.4	+2.2
					? the Reversed	±11.6	8.6							±6.8	±4.5
Av. dev.						±1.66	±1.23							±.97	±.64

Error in Mr C's the red values correct.

B 11174 Mr. Chandler's Solution in black ink

Is it the Obs or Comp C-O?
6-0

ΔX ΔY ΔX-Δξ ΔY-Δη

True Place of Eros to be determined $\alpha_0 + \Delta\alpha_0$ $\delta_0 + \Delta\alpha_0$

$\Delta\alpha_0$, $\Delta\delta_0$ are corrections to assumed place

1st. Compute X' & Y' for each star & also for an assumed {approx. place of Eros} α_0 δ_0 X_0, Y_0

Call measured coord. of a star ξ' η' measured coord of Eros ξ η

Call $\Delta X = X' - X_0$ $\Delta\xi = \xi' - \xi$

$\Delta Y = Y' - Y_0$ $\Delta\eta = \eta' - \eta$

Put $n = \Delta X - \Delta\xi$ $n' = \Delta Y - \Delta\eta$

" $a = \frac{\Delta X}{1000}$ $b = \frac{\Delta Y}{1000}$ ~~$x = (1000)(a-1)$~~ $x = (1000)(a-1)$ $y = 1000\,b$

$x' = 1000\,d$ $y' \cdot 1000\,(e-1)$

$ax + by + \Delta\alpha_0 \cos\delta_0 = n$ $ax' + by' + \Delta\delta_0 = n'$

	aa	ab	ac	=	an
	by	bb	bc	=	bn
by $\frac{ab}{aa}$		bb(1)	bc(1)		bn(1)
by $\frac{ac}{aa}$			cc	=	cn
by $\frac{bc(1)}{bb(1)}$			cc(1)		cn(1)
			cc(2		cn(2)

by $\frac{cn(2)}{cc}$ = $\Delta\alpha_0 \cos\delta$

$\Delta\alpha_0 \cos\delta$

May 8 1899 Mr Chandlers notation.

$\Delta\alpha_0$
α_0
α

$\Delta\delta_0$
δ_0
δ

x +
y +9.51
z +4.51 Substitution y +8.71 z +4.77 z' +5.84 -9.95 z' +5.24 -10.32

a x		b y		Z+ Sum	Comp	6-0? v	O-C	a x'				Z'+ Sum		C-C v	O-C
-11.04	-11.56	-2.38	-2.18	-9.0	-9.0	-1.6	-1.6	+17.58	+17.80	-1.46	-1.31	+6.2	+6.2	-0.9	-.9
-9.25	-9.68	+8.27	+7.58	+3.4	+2.7	-1.2	-.5	+14.73	+14.91	+5.08	+4.56	+9.9	+9.2	-0.6	+.1
-9.04	-9.47	-16.55	-15.16	-21.2	-19.9	+1.7	+.4	+14.41	+14.58	-10.16	-9.12	-5.7	-4.9	+1.3	+.5
-3.63	-3.80	-19.21	-17.59	-18.4	-16.6	-4.2	+2.4	+5.78	+5.85	-11.80	-10.58	-16.0	-15.0	+1.1	+.1
-0.05	-.05	+14.65	+13.41	+19.0	+18.1	-1.0	-.1	+.08	+0.08	+8.99	+8.07	-0.9	-2.2	-1.9	-.6
+0.10	+.11	+2.09	+1.92	+6.6	+6.8	+1.7	+1.5	-.16	-0.16	+1.28	+1.15	-8.8	-9.3	+1.0	+1.5
+5.21	+5.46	-19.63	-17.94	-10.0	-7.7	-0.2	-2.1	-8.30	-8.40	-12.06	-10.79	-30.3	-29.5	0.0	-.8
					Mr C.	-8.2	-4.3							-3.4	-2.3
Miss B's					has this	+3.4	+4.3							+3.4	+2.2
mult.					? the Reserved	±11.6	8.6							±6.8	±4.5
Av. dev.						±1.66	±1.23							±.97	±.64

Error in Mr C's the red values correct.

B11174 Mr. Chandler's Solutions in black ink

Is it the Obs or Comp C-C?

	Δξ 1st	Δξ 2d	Δξ Mean	Δη 1st	Δη 2d	Δη Mean	ΔX	ΔY	C-C ΔX-Δξ n = 0.	ΔY-Δη n'
a	-2149.6	-2152.0	-2150.8	-252.1	-254.7	-253.4	-2161.4	-248.1	-10.6	+5.3
b	-1808.9	-1809.9	-1809.4	+859.2	+858.7	+859.0	-1807.2	+868.3	+2.2	+9.3
c	-1747.4	-1750.2	-1748.8	-1734.2	-1738.2	-1736.2	-1768.3	-1740.6	-19.5	-4.4
d	-697.3	-701.9	-699.6	-2000.8	-2004.9	-2002.8	-713.8	-2017.7	-14.2	-14.9
k	-24.3	-24.3	-24.3	+1547.5	+1543.3	+1545.4	-6.3	+1542.6	+18.0	-2.8
l	+14.4	+11.9	+13.2	+226.8	+224.6	+225.7	+21.5	+217.9	+8.3	-7.8
m	+1028.2	+1026.3	+1027.2	-2032.5	-2037.5	-2035.0	+1017.4	-2065.3	-9.8	-30.3

ac, bc

a	b	aa	ab	bb	n	an	bn	n'	an'	bn'
-2.16	-0.25	+4.67	+0.53	+0.06	-10.6	+22.9	+2.6	+5.3	-11.5	-1.3
-1.81	+0.87	3.28	-1.58	0.76	+2.2	-4.0	+1.9	+9.3	-16.8	+8.1
-1.77	-1.74	3.13	+3.08	3.03	-19.5	+34.5	+33.9	-4.4	+7.8	+7.7
-0.71	-2.02	0.50	+1.44	4.08	-14.2	+10.1	+30.1	-14.9	+10.6	+30.1
-0.01	+1.54	0.00	-.02	2.37	+18.0	-0.2	+27.7	-2.8	+0.0	-4.5
+0.02	+0.22	0.00	+.00	0.05	+8.3	+0.2	+1.8	-7.8	-0.2	-1.7
+1.02	-2.06 -2.065	1.04	-2.10	4.26	-9.8	-10.0	+20.2	-30.3	-30.9	+62.5
-5.42	-3.44	+12.62	+1.35	14.61	-25.6	+53.5	+118.2	-45.6	-41.0	+10.09

x +5.11
y +9.51
z +4.51

Substitution

x +5.35
y +8.71
z +4.77

x' -8.14
y' +5.84
z' -9.95

x' -8.24
y' +5.24
z' -10.32

ax		by		z+ Sum	Comp	Mr C's C-O? v	O-C	ax'		by'		z'+ Sum		Mr C C-C v	O-C
						"	"						"		"
-11.04	-11.56	-2.38	-2.18	-9.0	-9.0	-1.6	-1.6	+17.58	+17.80	-1.46	-1.31	+6.2	+6.2	-0.9	-.9
-9.25	-9.68	+8.27	+7.58	+3.4	+2.7	-1.2	-.5	+14.73	+14.91	+5.08	+4.56	+9.9	+9.2	-0.6	+.1
-9.04	-9.47	-16.55	-15.16	-21.2	-19.9	+1.7	+.4	+14.41	+14.58	-10.16	-9.12	-5.7	-4.9	+1.3	+.5
-3.63	-3.80	-19.21	-17.59	-18.4	-16.6	-4.2	+2.4	+5.78	+5.85	-11.80	-10.58	-16.0	-15.0	+1.1	+1
-0.05	-.05	+14.65	+13.41	+19.0	+18.1	-1.0	-.1	+.08	+0.08	+8.99	+8.07	-0.9	-2.2	-1.9	-.6
+0.10	+.11	+2.09	+1.92	+6.6	+6.8	+1.7	+1.5	-.16	-0.16	+1.28	+1.15	-8.8	-9.3	+1.0	+1.5
+5.21	+5.46	-19.63	-17.94	-10.0	-7.7	-0.2	-2.1	-8.30	-8.40	-12.06	-10.79	-30.3	-29.5	0.0	-.8
						-8.2	-4.3							-3.4	-2.3
						+3.4	+4.3							+3.4	+2.2
						±11.6	8.6							±6.8	±4.5
Av. dev.						±1.66	±1.23							±.97	±.64

Miss B's mult.

Mr C. has this ? the Observed

Error in Mr. C's the red values correct.

B 11174 = May 19 1894

Computed minus Observed.

Computation using Mr. Chandlers data: $\Delta X - \Delta\xi$ $\Delta Y - \Delta y$

* z + y substituted with the signs reversed

z = 0.6785n
ac 0.7340n
1.4125

y 0.9402n
ab 0.1303
1.0705n

$\frac{ab}{aa}$ 9.0292

aa	ab	ac	an
+12.62	+1.35	−5.42	+53.5
1.1011	0.1303	0.7340n	1.7284
	9.0292 $\frac{ab}{aa}$	9.6329n $\frac{ac}{aa}$	0.6273 $\frac{an}{aa}$ omit
	(9.1595)	(9.7632n)	(0.7576)
+53.5	bb	bc	bn
+25.8	+14.61	−3.44	+118.2
−11.81	+ .14 $\frac{ab}{aa}ab$	− .58 $\frac{ab}{aa}ac$	+ 5.7 $\frac{ab}{aa}an$
+67.5	+14.47	−2.86 bc1	+112.5 bn1
1.8293	1.1605	0.4564n	2.0512
aa 1.1011		9.2959n	
0.7282			
x = +5.35		(9.7523) $\frac{bc_1}{bb_1}bc_1$	(1.3471n)
		(0.3669) $\frac{ac}{aa}ac$	(1.3613n) $\frac{ac}{aa}an$
	bn1 = +112.5	cc	cn
	+13.6	+7.00	−25.6
	Σ +126.1	+2.33 subtract	−23.0
	2.1007	+4.67 cc1	− 2.6 cn1
	bb1 1.1605	+ .56	$\overset{2.2}{-23.0}$
	0.9402	+4.11	+19.6 cn2
	y = + 8.71	0.6138 cc2	1.2923
			0.6138
			0.6785 $\frac{cn_2}{cc_2}$

* z 0.6785n
bc1 0.4564n
1.1349n

$\frac{ac}{aa}$ 9.6329

$\frac{bc_1}{bb_1}$ 9.2959n

My solution		Mr C's
a	x = +5.35	+5.11
b	y = +8.71	+9.51
c	z = +4.77" = 0.32s	+4.51" = 0.31s

Correction to app place of Eros, z = +4.77"

cos δ = ÷15 cos δ: + 0.32s

Mr. Chandlers assumed Rt Eros 10 38 1.60

Final " " 10h 38m 1.92s

" " 1.91

z + z' added to app. vals α + δ of Eros.

an'

−41.0

1.6128_n

0.5017_n omit

(0.6410)

bn'

+10.09

−4.4

+105.3 bn'

2.0224_n

(1.3183_n) $\frac{bc}{bb}$ bn'

(1.2457) $\frac{ac}{aa}$ an'

cn'

−45.6

+17.6

−63.2

−20.8

−42.4 cn'z:

1.6274

0.6138_n cc2

1.0136_n

−10".32

* z'y' with signs reversed

z' 1.0136
ac 0.7340_n
1.7476_n

+y' 0.7192_n
ab 0.1303
0.8495_n

−41.0

−55.9

−7.1

−104.0

2.0170_n

1.1011

0.9159_n

x' = −8.24

* z' 1.0136
0.4564_n
1.4700_n

+105.3

−29.5

+75.8

1.8797

1.1605

0.7192

y' = +5.24

Mr. C has −229; cannot get it

(my notation)			Mr C's
b'	x' =	−8.24	−8.14
a'	y' =	+5.24	+5.84
c'	z' =	−10".3	−9".95

Mr. C's assumed Dec Eq. −14° 57' 10".00

Final " " −14° 57' 20".3

20.0

" "

* Note: adopted computed X + Y
in equations instead of
the measured x + y for
both enlargements of this plate.
and also used one less decimal place ⟶

		x	y
Const.	D6365	+5672.2	+10479.0
	D6370	+5660.7	+10501.0
	Mean Const	5666.4	+10490.0 is the

mean of Comp X − mean x of both End

+sa

D6365 from B10951*

	(1) 1st Reading	(2) 2nd	(3) Mean x	(4) Resid.	(5) Diff.	(6) Comp. X	(7) X − Mean x	(8) (+5666.4) Comp. X − Mean Const.	(9) use (col 8) x − X	(10) not used (+5672.2) Comp X − Const	col 10 x − X
o	682.2	683.0	682.6	−0.4 0.4	0.8	+6347.0	+5664.4	+ 680.6	+2.0	″ +674.8	″ +7.8
p	682.2	682.2	682.2			+6344.8	5662.6	678.4	+3.8	672.6	+9.6
q	749.8	749.8	749.8			+6427.2	5677.4	760.8	−11.0	755.0	−5.2
r	991.6	991.2	991.4	0.2 −0.2	0.4	+6666.5	5675.1	1000.1	−8.7	994.3	−2.9
s	1099.9	1099.9	1099.9			+6775.7	5675.8	1109.3	−9.4	1103.5	−3.6
t	1839.0	1839.8	1839.4	−0.4 0.4	0.8	+7512.5	5673.1	1846.1	−6.7	1840.3	−0.9
w	1896.2	1895.4	1895.8	0.4 −0.4	0.8	+7574.7	5678.9	1908.3	−12.5	1902.5	−6.7
x	2281.2	2281.2	2281.2			+7956.4	5675.2	2290.0	−8.8	2284.2	−3.0
y	2340.1	2340.9	2340.5	−0.4 0.4	0.8	+8008.2	+5667.7	2341.8	−1.3	2336.0	+4.5
							650.2		+5.8		+21.9
Eros			2814.4			*+8482.1	+5672.2		−58.4		−22.3
									−52.6		

* assumed from stars y's used in Solution pp 208–213

	1st Reading	2nd	Mean y	Resid	Diff	Comp. Y	Y − Mean y	+10490.0 Comp. Y − Mean Const.	(col 8) y − Y	+10479.0 Comp Y − Const	col 10 y − Y
o	2806.3	2805.5	2805.9	0.4 −0.4	0.8	+13283.9	+10478.0	2793.9	+12.0	+2804.9	″ +1.0
p	2742.7	2742.7	2742.7			+13223.9	10481.2	2733.9	+8.8	2744.9	−2.2
q	690.1	690.1	690.1			+11161.4	10471.3	671.4	+18.7	682.4	+7.7
r	585.2	583.6	584.4	0.8 −0.8	1.6	+11056.2	10471.8	566.2	+18.2	577.2	+7.2
s	1060.1	1060.1	1060.1			+11534.4	10474.3	1044.4	+15.7	1055.4	+4.7
t	2014.8	2014.8	2014.8			+12497.3	10482.5	2007.3	+7.5	2018.3	−3.5
w	1211.2	1210.8	1211.0	0.2 −0.2	0.4	+11691.1	10480.1	1201.1	+9.9	1212.1	−1.1
x	1755.4	1756.6	1756.0	−0.6 0.6	1.2	+12238.4	10482.4	1748.4	+7.6	1759.4	−3.4
y	3319.4	3319.4	3319.4			+13808.7	10489.3	3318.7	+0.7	3329.7	−10.3
Eros			2273.6			×+12756.1	80.9 / 9 = +10479.0		+99.1		+20.6 −20.5

× assumed from star t

End + same proj ⟶

i.e. retained tenths after dividing by 100

Computed $\bar{X}$ minus mean Constant +5666.4 from col (8) ÷ 100

~~Corr~~ $\frac{X}{100}$	~~Corr~~ $\frac{X^2}{100}$	$\frac{XY}{100}$	$(x-\bar{X})\frac{X}{100}$	$(x-\bar{X})\frac{Y}{100}$
6.8	+46.24	+189.72	+13.60	+ 55.80
6.8	46.24	185.64	+25.84	+ 103.74
7.6	57.76	50.92	- 83.60	- 73.70
10.0	100.00	57.00	- 87.00	- 49.59
11.1	123.21	115.44	-104.34	-97.76
18.5	342.25	371.85	-123.95	-134.67
19.1	364.81	229.20	-238.75	-150.00
22.9	524.41	400.75	-201.52	-154.00
23.4	547.56	776.88	- 30.42	- 43.16
126.2	2152.48	2377.40	+39.44	+159.54
			-869.58	-702.88

$\bar{Y}$ = mean const ÷ 100 from col. 8 ÷ 100

Y/100	Y²/100		$(y-\bar{Y})\frac{Y}{100}$	$(y-\bar{Y})\frac{X}{100}$
27.9	778.41		+334.80	+81.60
27.3	745.29		+240.24	+59.84
6.7	44.89		+125.29	+142.12
5.7	32.49		+103.74	+182.00
10.4	108.16		+163.28	+174.27
20.1	404.01		+150.75	+138.75
12.0	144.00		+118.80	+189.09
17.5	306.25		+133.00	+174.04
33.2	1102.24		+23.24	+16.38
160.8	3665.74		+1393.14	+1158.09

Mrs Woods mult.

a = −.00423 a′ −.00401
b = +.00565 b′ −.00475
c = −10″.00 c′ +24.82
} To be subtracted from meas.

D6365 from B10951.

	1st Reading	2nd	Mean x	Resid.		Diff.	a x	b y	c	Σ		Mean Const. +5666.4
Eros.	2814.2	2814.2	2814.4	-0.2	-0.2		-11.9	+12.8	-10.0	-9.1	2823.5	+8489.9 ✓
							-11.90	+12.85	..	-9.05	2823.45	+8489.8
"	2815.0	2814.2		0.6	-0.2							
"	2814.2	2814.6		-0.2	0.2							
μ	1835.8	1835.8	1835.8									
γ	2360.8	2360.8	2360.8									
A	3045.0	3045.0	3045.0									
B	2933.6	2933.6	2933.6									
C	3068.9	3068.9	3068.9									
D	3638.1	3637.7	3637.9	0.2	-0.2	0.4						

	1st Reading	2nd	Mean y	Resid.		Diff.	a′y	b′x	c′	Σ		+10490.0
Eros.	2273.3	2274.1	2273.6	-0.3	0.5		-9.1	-13.4	+24.8	+2.3	2271.3 ✓	+12761.3 ✓
							-9.12	-13.36	+24.82	+2.34		
"	2273.7	2273.3		0.1	-0.3							
"	2273.7	2273.3		0.1	+0.3							
μ	1740.2	1740.2	1740.2									
γ	2301.5	2301.5	2301.5									
A	2388.3	2388.7	2388.5	-0.2	0.2	0.4						
B	1330.2	1330.6	1330.4	-0.2	0.2	0.4						
C	1196.1	1195.7	1195.9	0.2	-0.2	0.4						
D	481.3	482.9	482.1	-0.8	0.8	1.6						

Eq

D6365 from B10951 (Chauv. notation see Vol II p547)

	$aa = X^2/100$	$ab = Y^2/100$	$ac = X/100$		$an = (x-X)X/100$
	+2152″.48	+2377″.40	+126″.2		−830″.14
	3.33294	3.37610	2.10106		2.91915n
		0.04316	$8.76812^{\frac{ac}{aa}}$		
		(3.41926)	(2.14422)		2.96231n

		$bb = Y^2/100$	$bc = Y/100$		$bn = (x-X)Y/100$
Z = 1.0000 ac = 2.1011 3.1011	−830.14				
	+1262.	+3665.74	+160.8		−543.34
Y 9.7520n ab 3.3761 3.1281n	−1342.	+2625.79	+139.4		−916.87
	−910	+1039.85	+21.4		+373.53 bn1
	2.9590n	3.01697 bb1	1.33041 bc1		2.57233
aa	3.3329		$8.31344 \frac{bc1}{bb1}$		
	9.6261n		$(9.64385 \frac{bc1\,bc1}{bb1}$		$(0.88577 \frac{bc}{bb1} bn1)$
Scale Value x =	−.423		$(0.86918 \frac{ac}{aa} aa$		$(1.68727 \frac{ac}{aa} an)$

			cc = coefficient		cn = (x − X)
	bn1	+373.53			
Z = 1.0000 bc1 1.3304 2.3304		+214	9.00		−52.6
		+587.5	+7.40		−48.7
		2.7690	+1.60 cc1		−3.9 cn1
	bb1	3.0170	+.44		+7.7
		9.7520	+1.16 cc2		−11.6 cn2
orientation	y =	+.565	0.0645n		1.0645n
					0.0645
					1.0000n
				Z =	$-10.00'' \frac{cn2}{cc2}$

Adopted constants

Vol XXVI notation

x = a − .423 ← scale → y′ = a′ −.401

y = b +.565 ← orient → x′ = b′ −.475 } To be subtracted

Z = c −10.00 Z′ = c′ +24.8 } from measures.

an' $(y-V)\,x/100$

+1158.09''

3.06374

(3.10690)

bn' $(y-V)\,y/100$

+1393.14

+1279.09

+114.05

2.05710

(0.37054) $\frac{bc'}{bb'}bn'$

(1.83186) $\frac{ac'}{aa}an'$

z' 1.3949n

ac 2.1011

3.4960n

y' 9.6031

ab 3.3761

2.9792

+1158.09

−3133.

+953.2

−1022

3.0094n

3.3329

9.6765n

orientation x' = −.475

cn' $y-V$

+99.1

+67.9 ✓

+31.2

+2.4

+28.8

1.4594

0.0645 cc z

1.3949

z' = +24''.82

z = 1.3949n

bc 1.3304

2.7253n

+114.05

−531.

−417.

2.6201n

3.0170

log y' 9.6031n

Scale

y' = −.401

D6365 fm B10951

a = -.423　　a' = -.401
b = +.565　　b' = -.475　} To be sub. fm meas.
c = -10.0　　c' = +24.8

a $\frac{X}{100}$	b $\frac{Y}{100}$	c	Σ=C	O-C
-2.9	+15.8	-10.0	+2.9	-0.9
-2.9	+15.4		+2.5	+1.3
-3.2	+3.8		-9.4	-1.6
-4.2	+3.2		-11.0	+2.3
-4.7	+5.9		-8.8	-0.6
-7.8	+11.4		-6.4	-0.3
-8.1	+6.8		-11.3	-1.2
-9.7	+9.9		-9.8	+1.0
-9.9	+18.8		-1.1	-0.2

+4.6
-4.8

$\frac{9.4}{9}$ = ±1.04

a' $\frac{Y}{100}$	b' $\frac{X}{100}$	c'	Σ=C	O-C
-11.2	-3.2	+24.8	+10.4	+1.6
-10.9	-3.2		+10.7	-1.9
-2.7	-3.6		18.5	+0.2
-2.3	-4.8		17.7	+0.5
-4.2	-5.3		15.3	+0.4
-8.1	-8.8		7.9	-0.4
-4.8	-9.1		10.9	-1.0
-7.0	-10.9		6.9	+0.7
-13.3	-11.1		+0.~~8~~4	~~-0.1~~ +3

+3.~~4~~7
-3.~~4~~3

$\frac{\cancel{6.8}\ 7.0}{9}$ = ±0.7~~6~~8

See Ens 5 for Recomputation.

B10951

Sumner

	D6365	D6370	
X	+12761.3 ✓	+12763.0 ✓	diff X −1.7
log X	4.1058949 ✓ 5.3144251	4.1059528 5.3144251	
" $\frac{X}{R}$ = tan d	8.7914698	8.7915277	
d = b − D	+3 32 25.06	+3 32 26.75	
D	−17 12	−17 12	
b = D + d	−13 39 34.94	−13 39 33.25	
Y	+8489.9 ✓	+8488.7 ✓	diff Y +1.2
log Y	3.9289026 ✓ 5.3144251	3.9288412 5.3144251	
" $\frac{Y}{R}$	8.6144775	8.6144161	
" cos d	9.9991704	9.9991702	
" $\frac{Y}{R}$ cos d	8.6136479	8.6135863	
" cos b	9.9875391	9.9875399	
$\frac{\frac{Y}{R}\cos d}{\cos b}$ = log tan a	8.6261088	8.6260464	
a	+2° 25′ 15.″18	+2 25 13.91	
$A = 9^h 12.^m1$	138 1 30 ✓	138 1 30	cos δ = .974
a + A = α arc	140 26 45.18	140 26 43.91	diff α 6365−70
time	$9^h\ 21^m\ 47.^s01$ (1875)	9 21 46.93	$+.^s08 \times 15 \cos\delta = \pm 1.''2$
Cir. 36 Aff. (1875)	9 21 48		
log tan b	9.3856577 ~~9.9875391~~	9.3856422	
" cos a	9.9996122	9.9996123	
tan b cos a = tan δ	9.3852699 ~~9.9871513~~	9.3852545	diff δ 6365−70
δ	−13 38 52.69 (1875)	13 38 51.01	−1.″7
Cir. 36	−13 39 1 ±		

Comparison 125ml

Meas. Bk. 15, p. 62.

D6370 from B10951.

	1st Reading (1)	2nd (2)	Mean x (3)	Resid. (4)	Diff (5)	Comp. X (6)	X − Mean x (7)	(8) p188. (+5666.4) Comp X − Mean const	used (9) col 8 x − X	not used (10) (+5660.7) Comp X − Const	col 10 x − X
r	694.1	694.1	694.1			+6347.0	+5652.9	680.6	″ +13.5	+686.3	+7.8
p	690.1	690.1	690.1			+6344.8	5654.7	678.4	+11.7	684.1	+6.0
q	761.8	761.8	761.8			+6427.2	5665.4	760.8	+1.0	766.5	−4.7
r	1003.2	1003.6	1003.4	−0.2 0.2	0.4	+6666.5	5663.1	1000.1	+3.3	1005.8	−2.4
s	1111.8	1111.8	1111.8			+6775.7	5663.9	1109.3	+2.5	1115.0	−3.2
t	1851.7	1847.7	1849.7	2.0 −2.0	4.0	+7512.5	5662.8	1846.1	+3.6	1851.8	−2.1
w	1907.3	1907.3	1907.3			+7574.7	5667.4	1908.3	−1.0	1914.0	−6.7
x	2296.4	2297.2	2296.8	−0.4 0.4	0.8	+7956.4	5659.6	2290.0	+6.8	2295.7	+1.1
y	2351.7	2352.1	2351.9	−0.2 0.2	0.4	+8008.2	5656.3	2341.8	+10.1	2347.5	+4.4
									+52.5		+19.3
Ems			2826.4			*+8482.7	6.1		−1.0		−19.1
							9		−51.5		
							+5660.7				

* assumed from star y, used in Solution (pp208-213)

	1st Reading	2nd	Mean y	Resid.	Diff	Comp Y	Y − Mean y	sec p188 (+10490.0) Comp Y − Mean const	y − Y	+10501.0 Comp Y − Const	col 10 y − Y
r	2782.0	2782.4	2782.2	−0.2 0.2	0.4	+13283.9	+10501.7	2793.9	″ −11.7	+2782.9	−0.7
p	2722.8	2722.8	2722.8			+13223.9	10501.1	2733.9	−11.1	2722.9	−0.1
q	666.2	666.2	666.2			+11161.4	10495.2	671.4	−5.2	660.4	+5.8
r	563.7	562.9	563.3	0.4 −0.4	0.8	+11056.2	10492.9	566.2	−2.9	555.2	+8.1
s	1040.2	1036.2	1038.2	2.0 −2.0	4.0	+11534.4	10496.2	1044.4	−6.2	1033.4	+4.8
t	1994.9	1994.9	1994.9			+12497.3	10502.4	2007.3	−12.4	1996.3	−1.4
w	1187.3	1187.3	1187.3			+11691.1	10503.8	1201.1	−13.8	1190.1	−2.8
x	1732.3	1732.3	1732.3			+12238.4	10506.1	1748.4	−16.1	1737.4	−5.1
y	3298.8	3298.8	3298.8			+13808.7	10509.9	3318.7	−19.9	3307.7	−8.9
											+18.7
Ems			2253.1			×+12759.2	9.3		−99.3		−19.0
							+10501.0				

× assumed from star x

see p189

$X/100$	$X^2/100$	$XY/100$	$(x-X)X/100$	$(x-X)Y/100$
			″	
			+91.80	+376.65
			+79.56	+319.41
			+ 7.60	+ 6.70
			+33.00	+ 18.81
			+27.75	+ 26.00
			+66.60	+ 72.36
			−19.10	−12.00
			+155.72	+119.00
			+236.34	+335.32
			+698.37	+1274.25
			− 19.10	− 12.00
			+679.27	+1262.25

$(y-Y)Y/100$	$(y-Y)X/100$
−326.43	− 79.56
−303.03	−75.48
− 34.84	−50.92
− 16.53	−29.00
−64.48	−68.82
−249.24	−229.40
−165.60	−263.58
−281.75	−368.69
−660.68	−465.66
2102.58	−1631.11

a = −.00266 a′ −.00334 }
b = +.00471 b′ −.00515 } To be subtracted from meas.
c = +1″.04 c′ +2″.15 }

D6370 from B10951

	1st Reading	2nd	Mean x	Resid.	Diff	ax	by	c	Σ	Corr. x	+5666.4
Eros	2827.0 ~~2253.4~~	2827.4 ~~2252.6~~	2826.4 ~~2253.1~~	06 1.0 ~~0.3 −0.5~~		−7.5 −7.52	+10.6 +10.61	+1.0 +1.04	+4.1	2822.3	+8488.7 ✓
"	2826.2 ~~2253.4~~	2826.2 ~~2252.6~~		−0.2 −0.2 ~~0.3 −0.5~~							
"	2826.2 ~~2253.4~~	2825.4 ~~2253.4~~		−0.2 −1.0 ~~0.3 0.3~~							
u	1847.7 ~~1717.6~~	1847.7 ~~1716.8~~	1847.7 ~~1717.2~~	~~0.4 −0.4~~	~~0.8~~						
g	2372.8 ~~2281.6~~	2372.8 ~~2282.0~~	2372.8 ~~2281.8~~	~~−0.2 0.2~~	~~0.4~~						
a	3056.9 ~~2364.8~~	3056.5 ~~2364.8~~	3056.7 ~~2364.8~~	0.2 −0.2	0.4						
B	2941.6 ~~1310.7~~	2941.6 ~~1310.7~~	2941.6 ~~1310.7~~								
C	3080.0	3081.2	3080.6	−0.6 0.6	1.2						
D	3650.4	3652.4	3651.4	−1.0 1.0	2.0						

6 4-6

0 reduced for chkon signs 6941 +12.3 681.8 +6348.2 +6347.0 +1.2 see p 206

	1st Reading	2nd	Mean y	Resid.	Diff	a′y	b′x	c′	Σ	Corr. y.	+10490.0
~~A~~ Eros	2253.4	2252.6	2253.1	0.3 −0.5		−7.5 −7.52	−14.6 −14.56	+2.2 +2.15	−19.9 ✓	2273.0 ✓	+12763.0 ✓
B "	2253.4	2252.6		0.3 −0.5							
C "	2253.4	2253.4		0.3 0.3							
B u	1717.6	1716.8	1717.2	0.4 −0.4	0.8						
C g	2281.6	2282.0	2281.8	−0.2 0.2	0.4						
D a	2364.8	2364.8	2364.8								
B	1310.7	1310.7	1310.7								
C	1179.4	1179.4	1179.4								
D	462.6	463.4	463.0	−0.4 0.4	0.8						

Cut star for check

0 ~~6941~~

Solution in X

D6370 from B10951

an
+679.27 ✓
2.83204

(2.87520)

an = +679.27
− 131.
− 1120.
− 571.7
2.7571_n
aa 3.3329
9.4242_n

Scale x = −.266

Z 0.0147_n
ac 2.1011
2.1158_n

y 9.6731_n
ab 3.3761
3.0492_n

bn
+1262.25
+ 750.24
+ 512.01
2.70928

(1.02272)
(1.60016)

bn_1 = +512.01
− 22.1
+489.9
2.6901
bb_1 3.0170
9.6731
y = +.4711

orientation

Z 0.0147_n
bc_1 1.3304
1.3451_n

cn
+51.5
+39.8
+11.7
+10.5
+1.2
0.0792
0.0645 cc^2 b192
0.0147
Z = +1.04

x = a −.266
y = b +.471
Z = c +1.04″

y′ = a′ −.334
X′ = b′ −515
Z′ = c′ +2.15

m [illegible]

−1631.11
3.21248n

(3.25564n)

−1631.11
z 0.3334
ac 2.1011
2.4345
−272.
+794.
−y 9.5236n
ab 3.3761
2.8997n
−1109.
3.0448n
3.3329
9.7119n

Orientation $x' = -.515$

−2102.58
−1801.52
− 301.06
2.47865n

(0.79209n)
(1.98060n)

−301.06
z 0.3334n
bc 1.3304
1.6638n
− 46.1
−347.2
2.5406
3.0170
9.5236n

Scale $y' = -.334$

−99.3
−95.6
− 3.7
− 6.2
+2.5
0.3979
0.0645 cc
0.3334
$z' = +2.15$

a = -.266
b = +.471
c = +1.04″

a′ -.334
b′ -.515
c′ +2.15″
} To be sub. from meas.

D6370 from B10957

$a\frac{X}{100}$	$b\frac{V}{100}$	c	Σ=C	O-C
-1.8	+13.1	+1.0	+12.3	+1.2
-1.8	+12.9		+12.1	-0.4
-2.0	+3.2		+2.2	-1.2
-2.7	+2.7		+1.0	+2.3
-3.0	+4.9		+2.9	-0.4
-4.9	+9.5		+5.6	-2.0
-5.1	+5.7		+1.6	-2.6
-6.1	+8.2		+3.1	+3.7
-6.2	+15.6		+10.4	-0.3

+7.2
-6.9

$\frac{14.1}{9} = \pm 1.57$

$a'\frac{V}{100}$	$b'\frac{X}{100}$	c′	Σ=C	O-C.
-9.3	-3.5	+2.2	-10.6	-1.1
-9.1	-3.5		-10.4	-0.7
-2.2	-3.9		-3.9	-1.3
-1.9	-5.2		-4.9	+2.0
-3.5	-5.7		-7.0	+0.8
-6.7	-9.5		-14.0	+1.6
-4.0	-9.8		-11.6	-2.2
-5.8	-11.8		-15.4	-0.7
-11.1	-12.1		-21.0	+1.1

+5.5
-6.0

$\frac{11.5}{9} = \pm 1.28$

B109.51 Mr. Chandler's method as a check. pp 208-213

Assumed a value of X & Y for Ens on each enlargement. It would have been shorter to assume one value for both ends. Mr C assumed one value of R.A & Decl.

	D6365 x−Ens = Δx	D6370 x−Ens = Δx	Mean Δx	D6365 X−Ens = ΔX	n Mean Δx−ΔX	a $\frac{\Delta X}{1000}$	aa $\frac{\Delta X^2}{1000}$	ab $\frac{\Delta X \Delta Y}{1000}$	an $(\Delta x-\Delta X)\frac{\Delta X}{1000}$
	"	"	"	"	"	"	"	"	"
σ	−2131.8	−2132.3	−2132.0	−2135.1	+3.1	−2.1	+4.41	−1.05	−6.51
p	−2132.2	−2136.3	−2134.2	−2137.3	+3.1	−2.1	4.41	−1.05	−6.51
q	−2064.6	−2064.6	−2064.6	−2054.9	−9.7	−2.1	4.41	+3.36	+20.37
r	−1823.0	−1823.0	−1823.0	−1815.6	−7.4	−1.8	3.24	+3.06	+13.32
s	−1714.5	−1714.6	−1714.6	−1706.4	−8.2	−1.7	2.89	+2.04	+13.94
t	−975.0	−976.7	−975.8	−969.6	−6.2	−1.0	1.00	+.30	+6.20
w	−918.6	−919.1	−918.8	−907.4	−11.4	−0.9	.81	+.99	+10.26
x	−533.2	−529.6	−531.4	−525.7	−5.7	−0.5	.25	+.25	+2.85
y	−473.9	−474.5	−474.2	−473.9	−0.3	−0.5	.25	−.55	+.15
					+6.2			+10.00	+67.09
					−48.9	−12.7	+21.67	−2.65	−13.02
					−42.7				
								+7.35	+54.07

	y−Ens Δy	y−Ens Δy	Mean Δy	ΔY	n′ Mean Δy−ΔY	b $\frac{\Delta Y}{1000}$	bb $\frac{\Delta Y^2}{1000}$		bn′ $(\Delta y-\Delta Y)\frac{\Delta Y}{1000}$
σ	+532.3	+529.1	+530.7	+527.8	+2.9	+0.5	.25		+1.45
p	+469.1	+469.7	+469.4	+467.8	+1.6	+0.5	.25		+.80
q	−1583.5	−1586.9	−1585.2	−1594.7	+9.5	−1.6	2.56		−15.20
r	−1689.2	−1689.8	−1689.5	−1699.9	+10.4	−1.7	2.89		−17.68
s	−1213.5	−1214.9	−1214.2	−1221.7	+7.5	−1.2	1.44		−9.00
t	−258.8	−258.2	−258.5	−258.8	+0.3	−0.3	.09		−.09
w	−1062.6	−1065.8	−1064.2	−1065.0	+0.8	−1.1	1.21		−.88
x	−517.6	−520.8	−519.2	−517.7	−1.5	−0.5	.25		+.75
y	+1045.8	+1045.7	+1045.8	+1052.6	−6.8	+1.1	1.21		−7.48
					+33.0	+2.1			+3.00
					−8.3	−6.4			−50.33
					+24.7	−4.3	+10.15		−47.33
(1)	(2)	(3)	(4)	(5)	(6)	(7)			

Miss Woods work checked by Miss Bowden May 29 '99

t_n $(\Delta x-\Delta X)\frac{\Delta Y}{1000}$	D6370 X − Eros = ΔX	Mean $\Delta x-\Delta X$	Same as col(7) $\frac{\Delta X}{1000}$	col(8) $\frac{\Delta X^2}{1000}$	$\frac{\Delta X\,\Delta Y}{1000}$	$\Delta x-\Delta X\,\frac{\Delta X}{1000}$	$\Delta x-\Delta X\,\frac{\Delta Y}{1000}$
″	″	″	″		″	″	″
+1.55	−2135.7	+3.7	−2.1		−1.05	−7.77	+1.85
+1.55	−2137.9	+3.7	−2.1		−1.05	−7.77	+1.85
+15.52	−2055.5	−9.1	−1.8		+3.36	+19.11	+14.56
+12.58	−1816.2	−6.8			+3.06	+12.24	+11.56
+9.84	−1707.0	−7.6			+2.04	+12.92	+9.12
+1.86	−970.2	−5.6			+.30	+5.60	+1.68
+12.54	−908.0	−10.8			+.99	+9.72	+11.88
+2.85	−526.3	−5.1			+.25	+2.55	+2.55
−.33	−474.5	+0.3			−.50	−.15	+.30
+58.29		+7.7			+10.00	+62.14	
− 33		−45.0			− 2.60	−15.69	+55.35
+57.96		−37.3			+7.40	+46.45	

t_n' $(\Delta y-\Delta Y)\frac{\Delta X}{1000}$	ΔY	Mean $\Delta y-\Delta Y$	$\frac{\Delta Y}{1000}$	$\frac{\Delta Y^2}{1000}$		$(\Delta y-\Delta Y)\frac{\Delta Y}{1000}$	$(\Delta y-\Delta Y)\frac{\Delta X}{1000}$
−6.09	+524.7	+6.0	+0.5	.25		+3.00	−12.60
−3.36	+464.7	+4.7	+0.5	.25		+2.35	−9.87
−19.95	−1597.8	+12.6	−1.6	2.56		−20.16	−26.46
−18.72	−1703.0	+13.5	−1.7	2.89		−22.95	−24.30
−12.75	−1224.8	+10.6	−1.2	1.44		−12.72	−18.02
−.30	−261.9	+3.4	−0.3	.09		−1.02	−3.40
−.72	−1068.1	+3.9	−1.1	1.21		−4.29	−3.51
+.75	−520.8	+1.6	−0.5	.25		−.80	−.80
+3.40	+1049.5	−3.7	+1.0	1.00		−3.70	+1.85
+4.15		+56.3	+2.0			+5.35	+1.85
−61.89		−3.7	−6.4	9.94		−65.64	−98.96
−57.74		+52.6	−4.4			−60.29	−97.11

B10951 Mean Solution Stars minus Eros

				Obs − Comp $= \Delta x - \Delta X$	
	$aa = \frac{\Delta X^2}{1000}$	$ab = \frac{\Delta X \Delta Y}{1000}$	$ac = \frac{\Delta X}{1000}$		$an = (\Delta x - \Delta X)\frac{\Delta X}{1000}$
D6365	+21.67	+7.35	−12.7		+54.07
D6370	+21.67	+7.40	−12.7		+46.45
	+21.67	+7.38	−12.7		+50.26
	1.3359	0.8681	1.1038n		1.7012
		9.5322	9.7679n		
		(0.4003)	(0.6360n)		(1.2334)
z 0.8197 ac 1.1038n 1.9235n	+50.26	$bb = \frac{Y^2}{1000}$	$bc = \frac{Y}{1000}$		$bn = (\Delta x - \Delta X)\Delta Y/1000$
	−83.86	+10.15	−4.3		+57.96
y 0.7180n	−38.55	+9.94	−4.4		+55.35
ab 0.8681	−72.15	+10.04	−4.35		+56.66
1.5861n	1.8582n	+2.51	−4.32		+17.12
	1.3359	+7.53	−0.03		+39.54
	0.5223n	0.8768 bb	8.4771n bc		1.5970
	x −3.33		7.6003n		
			(0.8717)		(1.4694n)
			(6.0774)		(9.1973n)
		+39.54	cc = Coeff unity		$cn = (\Delta x - \Delta X)$
	z 0.8197	−.20	+9.00		−42.7
	bc 8.4771n	+39.34	+9.00		−37.3
	9.2968n	1.5948	+9.00		−40.0
		bb 0.8768	+7.44		−29.5
		0.7180	+1.56		−10.5
		+5.22	+.00		−2
	Notation of Vol XXVI		+1.56		−10.3
			0.1931		1.0128n
					0.1931
					0.8197n
					z = −6.60

scale x = −3.33 = a

orient y = +5.22 = b

z = −6.60 = c

Mr C's method modified, used ass. Val. X+Y for Eros and not an assumed α+δ.

$an' = (\Delta y - \Delta Y)\frac{\Delta X}{1000}$

−57.74

−97.11

−77.42

1.8888n

(1.4110n)

$bn' = (\Delta y - \Delta Y)\frac{\Delta Y}{1000}$

−47.33

−60.29

−53.81

−25.76

−28.05

1.4480n

z 0.6457

ac 1.1038n

1.7495n

y 0.5731

ab 0.8681

1.4412

−77.42

−56.16

+27.62

−105.96

2.0251n

1.3359

0.6892n

$x' = -4.89$

(1.6567)

(9.0483)

$cn = (\Delta y - \Delta Y)$

+24.7

+52.6

+38.6

+45.4

−6.8

+.1

−6.9

0.8388n

0.1931

0.6457n

$z' = -4.42$

−28.05

−.13

−28.18

1.4499n

0.8768

0.5731n

$y' = -3.74$

orient x' −4.89 = b'

scale y' −3.74 = a'

z' −4.42 = c'

B10957 Solution by Mr. Chandlers method; {x − Ens / X − Ens}
(Same as already used on Clusters)

Mean Constants
a −3.33
b +5.22
c −6.60

To be sub. from meas.
a′ −3.74
b′ −4.89
c′ −4.42

	$\frac{\Delta X}{1000}$	D6365	D6370						
		Δx − ΔX	Δx − ΔX	Mean = Obs.	$a\frac{\Delta X}{1000}$	$b\frac{\Delta Y}{1000}$	c	Σ = C	O − C
o	−2.1	+3.1	+3.7	+3.4	+6.99	+2.61	−6.60	+3.0	+.4
p	−2.1	+3.1	+3.7	+3.4	+6.99	+2.61		+3.0	+.4
q	−2.1	−9.7	−9.1	−9.4	+6.99	−8.33		−7.9	−1.5
r	−1.8	−7.4	−6.8	−7.1	+5.99	−8.85		−9.5	+2.4
s	−1.7	−8.2	−7.6	−7.9	+5.66	−6.26		−7.2	−.7
t	−1.0	−6.2	−5.6	−5.9	+3.33	−1.57		−4.8	−1.1
w	−0.9	−11.4	−10.8	−11.1	+3.00	−5.74		−9.3	−1.8
x	−0.5	−5.7	−5.1	−5.4	+1.66	−2.61		−7.6	+2.2
y	−0.5	−0.3	+0.3	0.0	+1.66	+5.74		+0.8	−.8
									+5.4
									−5.9
									±11.3

±1.23

Av. dev. from Separate Solutions p194 D6365 ±1.04
p206 D6370 ±1.57
±1.30

	$\frac{\Delta Y}{1000}$	Δy − ΔY	Δy − ΔY	Mean	$a'\frac{\Delta Y}{1000}$	$b'\frac{\Delta X}{1000}$	c′	Σ = C	O − C
o	+0.5	+2.9	+6.0	+4.4	−1.87	+10.27	−4.42	+4.0	+.4
p	+0.5	+1.6	+4.7	+3.2	−1.87	+10.27		+4.0	−.8
q	−1.6	+9.5	+12.6	+11.0	+5.98	+10.27		+11.8	−.8
r	−1.7	+10.4	+13.5	+12.0	+6.36	+8.80		+10.7	+1.3
s	−1.2	+7.5	+10.6	+9.0	+4.49	+8.31		+8.4	+.6
t	−0.3	+0.3	+3.4	+1.8	+1.12	+4.89		+1.6	+.2
w	−1.1	+0.8	+3.9	+2.4	+4.11	+4.40		+4.1	−1.7
x	−0.5	−1.5	+1.6	0	+1.87	+2.44		−.1	+.1
y	+1.1	−6.8	−3.7	−5.2	−4.11	+2.44		−6.1	+.9
									+3.5
									−3.3
									±6.8

±.85

D6365 ±0.76
D6370 ±1.28
±1.02

Note abc a′b′c′ to be ÷ 1000 + subtracted from measures of the Catalogue Stars.
c and c′ to be subtracted from the assumed values of X + Y of Eros giving the corrected X + Y of Eros.

Eros

D6365 p188	D6370 p200				Separate Solutions p 190 D6365	p 202 D6370	Mean 6365 6370
assumed Values		Mean ass.	From Mean Sol.	From Mean Solution *			
X	X	X	c	corr X			
+8482″.1	+8482″.7	+8482″.4	−6″.6	+8489″.0	+8489″.9	+8488″.7	+8489″.3

* If the constants had been determined for each plate instead of from the mean of the two, a closer agreement with the results from the separate solutions would probably have been obtained.

Y	Y	Mean	c′	From Mean Solution corr Y	Sep. Solutions		Mean
+12756″.1	+12759″.2	+12757″.6	−4″.4	+12762″.0	+12761″.3	+12763″.0	+12762″.2

Comparison of Constants

	D6365 p192	D6370 p204	Mean	Mean Sol Mr. C's method.
Scale a	−.423 ×.01	−.266 ×.01	−.344 ×.01	−3.34 ×.001
orient b	+.565 ″	+.471 ″	+.518 ″	+5.22 ″
c	−10.00	+1.04	−4.48	−6.60
a′	−.401 ×.01	−.334 ×.01	−.368	−3.74 ×.001
b′	−.475 ″	−.515 ″	−.495	−4.89 ″
c′	+24.82	+2.15	+13″.48	−4.42

* In Solutions marked "Resids" a b a' b' are found from the Equations and c + c' by substitution.
Solutions not marked "Resids" a b c a' b' c' all found from the Equations.

Eros

Results

Date	Oct 28 1893 adopted (Dec 6)	Reject pp14–15 pp20–22	(Dec 6) Adopted sol to be com pp 14–25	~~to be fin~~ Est Eros! adopt instead of 2 Sol? * Resids pp 114–118
Original Plate	I9801 pp4–13 for Resid Comp D6441	1st Sol. not final used data for D6441 in equations for a or see p8	2 Sol. final.	3 Sol = Check on final Sol
Enlarged "	D6441 see p215 Sol.	D6442	D6442	D6442
Mean of 6 meas. x	2514.4	2478.7		
" " y	766.2	757.0		
No. of Cat Stars used for finding Plate constants in x	9	9		
Same in y	9	9		
Plate Constant a	+.00346 pp8–9	+.00328 pp20–21	$+.003\overset{3}{\cancel{4}}5$ pp24-25	$+.0033\overset{5}{\cancel{2}}$
" " b	+.00112	+.00117	$+.001\overset{23}{\cancel{35}}$	$+.001\overset{23}{\cancel{14}}$
" " c	∓11.2"	−4.8"	$-5.\overset{0}{\cancel{5}}''$	$-.10.\overset{4}{\cancel{2}}$
Adopted Constant in x (= X − x)	−12140." approx.	−12110." ←approx→ p14	−12110.	−12104.5" Mean
Plate constant a'	+.00309	+.00272	$+.0027\overset{6}{\cancel{4}}$	$+.002\overset{76}{\cancel{57}}$
" " b'	∓.00089	−.00094	$-.0008\overset{7}{\cancel{9}}$	$-.000\overset{87}{\cancel{90}}$
" " c'	−7.4"	+2.1"	$+\overset{1.9}{\cancel{2.0}}''$	$-2.\overset{5}{\cancel{2}}''$
Adopted " in y (= Y − y)	−16700." approx.	−16700." ←approx→ p15	−16700.	−16695.5" Mean
Av. dev. in x	±.87	±.94	$\pm\overset{.98}{\cancel{1.07}}$	$\pm.9\overset{9}{\cancel{4}}$
" " y	±.84	±1.23	$\pm1.2\overset{1}{\cancel{5}}$	$\pm1.\overset{20}{\cancel{32}}$
Eros x + Const. (= Uncorr x)	−9625.6"	−9631.3	−9631.3	−9625.8"
y + const (= Uncorr y)	−15933.8	−15943.0	−15943.0	−15938.5
Sum of corrections in x	−1.6"	+ 4.2	$+\overset{4.2}{\cancel{3.0}}$	−1.1
" " y	−7.2	+ 1.9	$+1.\overset{8}{\cancel{9}}$	−2.5
Corrected x = X (= x + Sum of corr + adopted Const.)	−9627.2	−9627.1	$-962\overset{7.1}{\cancel{8.3}}$	$-962\overset{7.0}{\cancel{6.9}}$
" y = Y	−15941.0	−15941.1	$-15941.\overset{2}{\cancel{7}}$	$-15941.\overset{1}{\cancel{0}}$
Uncorr diff. 2 sol			6441−6442 x +5.7" y +9.2"	
Corr.			$x\ \overset{-1}{\cancel{+1.1}}''$ $y + 0.\overset{2}{\cancel{1}}''$	
α 1875	5h 58m 48.11s p12	5 58 48.12 p12	$5\ 58\ \overset{48.12}{\cancel{47.99}}$ p13+17	$5\ 58\ 48.1\overset{3}{\cancel{2}}$ p119
δ 1875	+53° 39' 46.85"	$+53\ 39\ 46.\overset{76}{\cancel{8}}$	$+53\ 39\ 46.\overset{67}{\cancel{8}}$ see p13 Mr C's value I9801	$+53\ 39\ 46.\overset{77}{\cancel{86}}$
Data used in Least Sq. Sol.	Meas. values x + y	Mean Val. of 6441	Meas. Val. x + y	Meas.
Sol. elim c & c'	not elim c	not Elim c Rejected	not elim c	Eliminating C at start by taking Resids from Mean

Signs are given for plate constants to be added to meas. (alg.)

computed Jan 1900 see Bk 5

* Recomputation Eq 5 9 stars used.

* Roids pp4-5 pp144-149 Oct 30 1893

I 9801	I 9832			
D6441	D6377 pp26-37 Centre	Brightest part	D6378 pp38-49 Centre	Brightest part
2514.4	2367.4	2371.4	2512.5	2519.2
B 1766.2	2034.8	2044.5	2069.2	2077.4
9	9		* 8	Only case where diff. no. Ss. used in the 2 eul. from the same plate. Star meas. in y only & not used as a stand. in this enlargement.
9	9		8	not change the value
+.00347	+.00300		+.00268	
+.00114	-.01367		-.01262	* Max changes don't of Eqs.
-10.7	+10.6"		+9.8"	
-12140.6" Mean p4	+7399. approx		+7251.1 Mean	
+.00309	+.00203		+.00192 *	
-.00089	-.01285		+.01198	
-3.3"	+131.2"		-33.0"	
-16704.2" Mean p5	-16488. Mean		-16520.0 Mean	
±.91	±1.310		±0.89	
±.75	±1.70		±1.265	
-9626.2"	+9766.4	+9770.4	+9763.6	+9770.3
-15938.0	-14453.2	-14443.5	-14450.8	-14442.6
-1.1	-10.1	-10.2	-9.6	-9.6
-3.1	+3.3	+3.4	+1.7	+1.2
-9627.3	+9756.3	+9760.2	+9754.0	+9760.7
-15941.1	-14449.9	-14440.1	-14449.7	-14441.4
6441-42 x -0.4 y -0.5		Uncorr	6377 - 6378 Centre x +2.8 y -2.4	6377 - 6378 Br. pt. x +.1 y -.9
x -0.3 y 0.0		Corr	x +2.3 y -0.2	x -.5 y +1.3
5 58 48.10 p149	6 4 32.60	6 4 33.12 p36	6 4 32.34	6 4 33.16 p37
+53 39 46.76	+54 6 16.25	+54 6 25.73	+54 6 16.61	+54 6 24.42
Meas.	Meas.		Meas.	
Elim. c + c'	not elim. c		not elim. c	

Ens Results

Error found & corrected ~~Ck~~ must be some error in this?

~~check?~~ ~~to be fin~~ for Av. dev large & than usual — adopted

adopted

Date	Nov 26 1893			
	pp 50-61	*Resids pp120-124	pp 62-67	*Resids pp 68-73
Orig. Plate No.	I 10095			
Enl ..	D6390 1st Sol	D6390 2 Sol=chk	D6389 1st Sol	D6389 2 Sol
Mean meas x	665.5		542.6	
.. y	2920.0		2722.5	
No of Cat Stars used in x	7	7	7	7
.. .. y	7	7	7	7
	check pp54-55	pp122-123	pp66-67	pp70-71
a	+.00491 495 281	+.00276	+.00391	+.00392
b	+.01355 1361 1456	+.01450	+.01470	+.01471
c	−38.1 38.4 37.7	−36.9	−36.1	−36.4 2
adopted X−x=Const.	−16040. approx	−16040.7 mean	−15919.0 = Mean =	−15919.0
a′	+.00165 164	+.00211 168	+.00261	+.00260
b′	∓.01539 1.539	−0.1554 40 1536	−.01596	−.01598
c′	+25.6 25.7	+ 25.0 48 +25.6	+23.5	+23.4
adopted Y−y=Const.	+1126. approx	+1125.8 mean	+1321. approx	+1321.2 mean
	p57	pp124-5		p72
Av. dev in x	±~~2.37~~ 3 ±1.16	±1.17 6	av dev. not done	±1.43
.. y	±~~1.17~~ ±1.07	±~~1.19~~ 7 ±1.09		±1.46
Ens Uncorr x	−15374.5	−15375.2	−15376.4	−15376.4
.. .. y	+4046.0	+4045.8	+4043.5	+4043.7
Σ of corr in x	~~+4.8~~ 6.7	+7.2	+6.0	+5.9
.. .. y	+20.2 3	~~+20.9~~ 8 +20.3	+21.9	+21.8
Corr x = X	−15369.7 17.8	−15368.0	not used −15370.4	−15370.5
.. y = Y	+4066.2 3	+4066.7 36	+4065.4	+4065.5
Uncorr diff 2 enl			6389−6390 1st Sol x −1.9 y −2.5	6389−6390 2 Sol x −1.9 2 y −2.3 1
Corr ..			x ~~−.7~~ −2.6 y ~~−.8~~ −.9	x ~~−.8~~ −2.5 y ~~−.7~~ ~~−1.7~~ −.8 p73
	h m s .39 p58 9	2 Sol → (p59* red ink val.)		
α 1875	7 17 31.46	7 17 31.36 7		7 17 31.07
δ 1875	+57° 49′ ~~33.81~~ 34.17	57 49 ~~34.50~~ 15		+57 49 33.02
Circular pos α	37 7 17.5			
.. δ	+57 50			
Data used, Meas or Enl.	Meas x + y in Eq.	Meas.	Meas.	Meas.
Sol. elim cor not or No. of	not elim c (3)	(2)	not elim c (3)	elim c (2)

Apr 16 1894 * Resids pp74-79	pp80-83	Resids pp84-93
B10909		
D6371		D6374
2412.5		2263.8
1910.8		1990.4
7		7
7 pp78-9		7 pp88-9
+.00331	+.00332	+.00412
+.00635	+.00636	+.01097
−22.9	−23.0	−35.7
−208.5 Mean for each plate		−58.4 Mean for each plate.
+.00465	+.00464	+.00485
−.00979	−.00980	−.01231
+14.2	+14.2	+7.9
+11913.5 Mean		+11835.5 Mean
±.74 p78	not done would give same results as the ← preceding col	±1.06
±.53		+0.97
+2204.0		+2205.4
+13824.3		+13825.9
−2.8		−4.6
−0.5		−0.3
+2201.2		+2200.8
+13823.8		+13825.6
		6371 − 6374
		x −1.4 y −1.6
		x +.4 y −1.8
9 17 0.61 p77		9 17 0.59 p77
−13 33 54.01		−13 33 52.22
9 17 0±		
−13 34 15±		
Meas. x + y in Eq.		
elim c	not elim c	elim c

Ens

Date	May 19 1894 *Resids pp94-105	*Resids pp106-113	pp184-187		Oct 31 1893 *Resids pp 126-134
Orig plate	B 11174		Mr C's method =		I 9862
Enl	D6344	D6346	Check on both enl		D6391
Mean Meas. x	2461.4	2452.3	Same meas x + y		1982.4
" " y	2297.1	2253.5	+ Cat Stars used		2260.4
No. of Cat Stars used in x	7	7			7
.. in y	7	7	my comp	his comp	7
a	+.00543 ✓	+.00515 ✓	+5.35 ×.001	+5.11 ×.001	+.004~~29~~31
b	+.00911 ✓	+.00839 ✓	+8.71"	+9.51"	+.00169
c	−25."~~8~~7 ✓	−23."~~5~~4 ✓	+4."77	+4."51	−11."~~2~~3
adopted Const X	+4700.1 mean for this plate	+4711.3 mean for each plate			−12887.2 Mean
a'	+.00548 ✓	+.00496 ✓	+5.24 ×.001	+5.84 ×.001	+.00366
b'	−.00866 ✓	−.00801 ✓	−8.24"	−8.14"	−.00006
c'	+4."~~9~~7 ✓	+4."7 ✓	−10."3	−9."95	−3."9
.. Const Y	−13278.6 Mean	−13231.8 Mean			+1388.7 Mean
Av. dev. in x	~~±.96~~ ±1.01 ✓	±1.~~47~~50	±1.23	±1.66	±~~.61~~ ±.66
.. .. .. y	~~±.89~~ ±.93 ✓	±.56	±.64	±.97	±.90
Ens Uncorr x	+7161.5	+7163.6	+7166.2	from ass α+δ	−10964.8
.. .. y	−10981.5	−10978.3	−10973.4		+3649.1
Σ of corr in x	+8.~~5~~6	+8.~~0~~1	C ÷ 15 cos δ = +.32s add to ass α		+1.~~1~~0
.. .. .. y	−~~3.8~~4.0	−3.7	C' = −10."3 add to ass δ		+~~3.1~~4.3
	Mr C. said the α+δ from these values X+Y was absolutely correct		assumed α+δ		
Ens Corr x = X̄	+7170.~~0~~1	+7171.~~6~~7	10h 38m 1.60		−10903.~~7~~8
.. y = Ȳ	−10985.~~3~~5	−10982.0	−14 57 10.00		+365~~2.2~~3.4
Uncorr diff 2 enl		6344 − 6346 x −2.1 y −~~1.6~~3.2			
Corr ..		x −~~3.2~~1.6 ✓ y −3.~~3~~5			
α 1875	10h 38m 1.87s ✓ p102	10h 38m 1.98s ✓ p102	10 38 1.92s mine pp186-7	1.91 Mr C's	6h 7m ~~37.44~~ 37.4~~2~~5 p134
δ ..	−14 57 21.~~7~~94	−14 57 18.44	−14 57 20.3 mine	20.0 Mr C's	+54 20 ~~10.1~~ 11.24
Circular pos. α	10 38.0				6h 7.6m
δ	−14 57				+54° 20'
Data used, Meas or Comp	Meas x + y in Eq.	Meas.			Computed
Sd. elim [illegible]	[illegible]	Elim [illegible]			Elim [illegible]

~~to be com~~
Ens

first plate used
Comp X & Y in Eq.

* Resids pp138–142		Apr 18'94 ~~Resids~~ pp188–199 B 10951	~~Resids~~ pp200–207	pp208–213 Mr. C's method =
D6392		D6365	D6370	Check on both end.
1838.5 ✓		2814.4 ✓	2826.4 ✓	(Same meas x + y
2284.5 ✓		2273.6 ✓	2253.1 ✓	+ Cat Stars used
7		9	9	
7		9	9	
+.00322 ✓		+.00423 ✓	+.00266 ✓	+3.33 ×.001 ✓
+.00380 ✓		−.00565 ✓	−.00471 ✓	−5.22 ✓
−10.9 ~~−11.3~~ ✓		+10.0 ✓	−1.0 ✓	+6.60″ ✓
		(+5672.2 mean for each +5660.7) not used		
−127423 ✓	Mean	+5666.4 used Mean value from the 2 plates		
+.00498 ~~+.00230~~ ✓		+.00401 ✓	+.00334 ✓	+3.74 ×.001 ✓
−.00262 ~~−.00100~~ ✓		+.00475 ✓	+.00515 ✓	+4.89 ✓
−0.2 ~~+0.3~~ ✓		−24.8 ✓	−2.2 ✓	+4.42″ ✓
		(+10479.0 mean for each +10501.0) not used		
+1364.4 ✓	Mean	+10490.0 used Mean Value from the 2 plates		
~~±.51~~ ±.47 ✓		±1.04 ✓	±1.57 ✓	±1.23 ✓
~~±1.11~~ ±1.09 ±1.10 ✓		±.78 ~~±.76~~ ✓	±1.28 ✓	±.85 ✓
				6365 assumed values 6370
−10903.8 ✓		+8480.8 ✓	+8492.8 ✓	+8482.1 ✓ +8482.7 ✓
+3648.9 ✓		+12763.6 ✓	+12743.1 ✓	+12756.1 ✓ +12759.2 ✓
+3.3 +3.7 ✓		+9.1 ✓	∓4.1 ✓	C = +6.6″ add to ~~mean~~ use X
~~+3.1~~ +3.4 +6.4 ✓		∓2.3 ✓	+19.9 ✓	C′ = +4.4″ … Y
−10900.5 ✓ ✓		+8489.9 ✓	+8488.7 ✓ mean 89.3	gives +8489.0 ✓ p213
+3653.0 ~~+3652.0~~ ✓		+12761.3 ✓	+12763.0 ✓ (62.2)	+12762.0 ✓
6391–6392		6365–6370	6365–6370	
x −1.0 ✓ y +2		(x −0.5 y −1.5)	x −12.0 ✓ y +20.5 ✓	
x −3.6 ~~−3.7~~ ~~−3.2~~ y −1.9 ~~+1~~ ~~+2~~			x +1.2 ✓ y −1.7 ✓	
6h 7m 37.82s ~~37.80~~ p134 p135 ✓		9 21 47.01 ✓ p196	9 21 46.93 ✓ p196	
+54 20 13.42 ~~10.1~~ ~~10.4~~ ✓		−13 38 52.69 ~~52.7~~	−13 38 51.01 ✓	
		9 21 48		
		−13 39 1±		
Computed		Computed	Computed	Computed ΔX ΔY
elim C		not elim C	not elim C	

Nova Sagittarii Results. see double sheet. 222
Pl. 152–180