1896phae.proj.1670w

KG
11366
v.666

South Pole
Reductions

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Harvard Observatory, Cambridge.

South Pole Reductions.

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Order of tables

					Exposure
Plate I	D4847	A 1903 =	July 11	1896	120m
" II	D4851 D4847	A 1903	"	"	
" III	D6980	A2235 =	Feb 21	1897	60
" IV	D7042 D6981	A2235	"	"	

4847 was meas Oct. 23 1899
4851 " " Nov. 6 "
7042 " " Nov. 8 "
6980 " " Nov. 22

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D 4851

Bk. 16	Ar.	A+b	Ar.	B+D
p. 124	30	4513	28	4223
126	29	4365	28	4228
128	28	4216	30	4519
130	29	4364	28	4215
132	30	4513	30	4513
134	29	4359	29	4362
136	29	4361	29	4366
138	29	4357	29	4367
140	29	4353	29	4365
142	29	4368	28	4206
144	11	1654	10	1502
	302)	45423	298)	44866
		150.407		150.557

D 7042

Bk. 16	Ar.	A+b	Ar.	B+D
p. 154	16	2409	14	2109
156	27	4061	26	3914
158	33	4964	32	4823
160	28	4214	31	4664
162	30	4508	28	4208
164	29	4360	27	4065
166	28	4208	28	4214
168	26	3913	26	3914
170	21	3154	22	3313
172	26	3909	25	3759
174	28	4211	25	3768
	292)	43911	284)	42751
		150.380		150.532

$150.41 : 30 = x : X$

$150.41\,X = 30x$

$X = .199\,x$

$150.56 : 30 = y : Y$

$150.56\,Y = 30y$

$Y = .199\,y$

D 4851

$150.38 : 30 = x : X$

$150.38\,X = 30x$

$X = .199(49)$

$150.53 :: 30 :: y : Y$

$150.53\,Y = 30y$

$Y = .199\,y$

D 7042

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D 4847

Bk. 16 Ao. A+b Ao. B+D

p. 146	29	4365	28	4219
148	3	450	3	451
"	15	2261	15	2263
150	17	2558	16	2414
152	29	4359	28	4215
154	3	453	3	450
	96	14446 ✓	93	14012 ✓
		150.479		150.667

150.48 : 30 = x : X

150.48 X = 30x

X = .199x

150.67 : 30 = y : Y

150.67 Y = 30y

Y = .199y

D 6980

p. 176	28	4209	28	4213 ✓
178	3	452	3	451 ✓
"	19	2854	20	3009 ✓
180	12	1803	12	1805 ✓
182	28	4209	29	4360 ✓
184	3	451	3	450 ✓
	93	13978	95	14288 ✓
		150.301		150.40

150.30 : 30 = x : X

150.30 X = 30x

X = .200x

Nee.

150.40 : 30 = y : Y

150.40 Y = 30y

Y = .199y

D 4847

D 6980

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D 4851

Measures of standard stars. Bk. 16, p. 124

Gilliss	x	Readings 1st	2nd	3d	Mean x	Resid.			y	Readings 1st	2nd	3d	Mean y	Resid.		
7980		298.4	300.2	300.2	299.6	1.2	0.6	0.6		2510.2	2510.0	2510.8	2510.3	0.1	0.3	0.5
8714		313.9	313.9	313.9	313.9	0.0				3432.3	3433.1	3433.7	3433.0	0.7	0.1	0.7
7923		548.0	548.2	548.0	548.1	0.1	0.1	0.1		2485.9	2485.9	2485.9	2485.9	0.0		
6508		1064.1	1064.1	1064.1	1064.1	0.0				1023.0	1022.4	1024.0	1023.1	0.1	0.7	0.9
11113		2178.1	2179.9	2179.7	2179.2	1.1	0.7	0.5		5274.4	5274.2	5274.4	5274.3	0.1	0.1	0.1
a-4034		3929.8	3930.0	3930.2	3930.0	0.2 0.1	0.0 0.0	0.2 0.1		2411.9	2412.1	2413.7	2412.6	0.7	0.5	1.1
13902		4578.3	4578.1	4578.9	4578.4	0.1	0.3	0.5		4642.1	4643.9	4641.9	4642.6	0.5	1.3	0.7
14603		4993.9	4991.9	4991.9	4992.6	1.3	0.7	0.7		4390.0	4390.0	4391.9	4390.6	0.6	0.6	1.3
15462		5485.9	5485.9	5486.1	5486.0	0.1	0.1	0.1		3944.1	3946.1	3946.1	3945.4	1.3	0.7	0.7

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D 4851

	x	Readings 1st	2nd	3d	Mean x	Resid	y	Readings 1st	2nd	3d	Mean y	Resid
e	1532.7	1533.1	1532.7	1532.8	0.1 0.3 0.1		3850.1	3850.0	3850.3	3850.1	0.0 0.1 0.2	
d	2106.0	2105.8	2105.8	2105.9	0.1 0.1 0.1		3702.5	3702.9	3702.9	3702.8	0.3 0.1 0.1	
c	2119.9	2119.7	2119.9	2119.8	0.1 0.1 0.1		3658.2	3658.0	3658.0	3658.1	0.1 0.1 0.1	
g	2274.8	2276.0	2274.8	2275.2	0.4 0.8 0.4		3245.0	3245.6	3245.8	3245.5	0.5 0.1 0.3	
h	2730.2	2729.8	2729.8	2729.9	0.3 0.1 0.1		3206.1	3206.1	3206.1	3206.1	0.0 0.0 0.0	
k	2741.7	2740.7	2741.5	2741.3	0.4 0.6 0.2		2638.2	2638.2	2638.2	2638.2	0.0 0.0 0.0	
r	2810.2	2810.0	2810.2	2810.1	0.1 0.1 0.1		3172.0	3172.0	3172.0	3172.0	0.0 0.0 0.0	
h	2841.9	2841.9	2842.5	2842.1	0.2 0.2 0.4		3153.9	3154.1	3154.1	3154.0	0.1 0.1 0.1	
m	2845.9	2845.9	2845.9	2845.9	0.0		2962.5	2962.5	2962.3	2962.4	0.1 0.1 0.1	
z	2998.4	2998.0	2998.4	2998.3	0.1 0.3 0.1		3048.1	3048.1	3048.1	3048.1	0.0 0.0 0.0	
o	2955.9	2955.9	2955.9	2955.9	0.0		3325.9	3325.9	3325.9	3325.9	0.0 0.0 0.0	
l	2990.0	2990.0	2990.2	2990.1	0.1 0.1 0.1		3387.3	3387.9	3387.9	3387.7	0.4 0.2 0.2	
y	3070.3	3070.0	3070.5	3070.3	0.0 0.3 0.2		3046.3	3046.1	3046.3	3046.2	0.1 0.1 0.1	
f	3027.9	3027.9	3028.1	3028.0	0.1 0.1 0.1		3306.2	3305.6	3306.0	3305.9	0.3 0.3 0.1	
g	3176.2	3176.0	3176.4	3176.2	0.0 0.2 0.2		3172.0	3172.0	3172.0	3172.0	0.0 0.0 0.0	
t	3189.8	3190.0	3190.0	3189.9	0.1 0.1 0.1		3451.5	3452.1	3452.1	3451.9	0.4 0.2 0.2	
w	3289.7	3290.0	3289.9	3289.9	0.2 0.1 0.0		2937.4	2938.2	2938.0	2937.9	0.5 0.3 0.1	
u	3320.1	3321.3	3321.9	3321.1	1.0 0.2 0.8		3153.5	3154.1	3153.7	3153.8	0.3 0.3 0.1	
s	3346.1	3346.9	3346.9	3346.6	0.5 0.3 0.3		2466.0	2466.0	2466.0	2466.0	0.0 0.0 0.0	
b	3424.2	3425.4	3425.2	3424.9	0.7 0.5 0.3		2315.9	2316.3	2314.9	2315.7	0.2 0.6 0.8	
x	3087.7	3087.9	3086.9	3087.5	0.2 0.4 0.6		3188.0	3187.8	3188.2	3188.0	0.0 0.2 0.2	
w	3411.8	3412.0	3411.6	3411.8	0.0 0.2 0.2		3208.1	3208.1	3207.7	3208.0	0.1 0.1 0.3	

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D 4847

Measures of Standard Stars. Bk. 16, p. 146

Gillis	x	Readings 1st	2nd	3d	Mean x	Resid	y	Readings 1st	2nd	3d	Mean y	Resid
7980		300.2	300.2	300.0	300.1	0.1 0.1 0.1		3426.6	3428.2	3427.8	3427.5	0.9 0.7 0.3
8714		313.9	314.7	314.7	314.4	0.5 0.3 0.3		2506.7	2506.3	2506.7	2506.6	0.1 0.3 0.1
7923		549.6	549.8	549.2	549.5	0.1 0.3 0.3		3454.1	3454.5	3454.1	3454.2	0.1 0.3 0.1
6508		1064.1	1064.1	1064.1	1064.1	0.0 0.0 0.0		4917.6	4917.8	4917.6	4917.7	0.1 0.1 0.1
11113		2178.7	2180.1	2179.9	2179.6	0.9 0.5 0.3		664.6	664.2	665.4	664.7	0.1 0.5 0.7
a = 4034		3930.0	3930.1	3930.1	3930.1	-0.1 0.1 0.1		3527.7	3527.9	3528.1	3527.9	0.2 0.0 0.2
13902		4577.9	4579.9	4580.1	4579.3	1.4 0.6 0.8		1296.1	1296.3	1296.1	1296.2	0.1 0.1 0.1
14603		4990.0	4990.1	4991.7	4990.6	0.6 0.5 1.1		1546.3	1546.5	1548.1	1547.0	0.7 0.5 1.1
15762		5485.9	5485.7	5486.1	5485.9	0.0 0.2 0.2		1993.9	1994.5	1994.3	1994.2	0.3 0.3 0.1

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	x	Readings 1st	2nd	3d	Mean x	Resid.	y	Readings 1st	2nd	3d	Mean y	Resid.
e	1531.9	1532.3	1532.1	1532.1	0.2	0.2 0.0	2088.3	2090.0	2090.0	2089.4	1.1	0.6 0.6
d	2105.8	2106.0	2106.0	2105.9	0.1	0.1 0.1	2236.1	2235.9	2236.1	2236.0	0.1	0.1 0.1
c	2119.9	2119.9	2119.9	2119.9	0.0	0.0 0.0	2282.2	2282.2	2281.8	2282.1	0.1	0.1 0.3
g	2274.8	2274.6	2274.2	2274.5	0.3	0.1 0.3	2694.2	2694.2	2694.6	2694.3	0.1	0.1 0.3
p	2728.1	2728.1	2728.1	2728.1	0.0	0.0 0.0	2734.1	2734.1	2734.1	2734.1	0.0	0.0 0.0
k	2740.3	2741.9	2741.7	2741.3	1.0	0.6 0.4	3302.0	3301.8	3302.0	3301.9	0.1	0.1 0.1
r	2810.2	2810.2	2810.0	2810.1	0.1	0.1 0.1	2768.2	2768.4	2768.0	2768.2	0.0	0.2 0.2
h	2842.1	2842.1	2847.1	2842.8	0.0	0.7 1.3	2786.5	2785.9	2786.1	2786.2	0.3	0.3 0.1
m	2845.7	2845.9	2845.9	2845.8	0.1	0.1 0.1	2977.9	2976.3	2977.5	2977.2	0.7	0.9 0.3
z	~~2882.8~~	~~2883.6~~	~~2883.8~~	~~2883.4~~	~~0.6~~	~~0.2 0.4~~	~~2894.3~~	~~2895.7~~	~~2894.3~~	~~2894.8~~	~~0.5~~	~~0.9 0.5~~
o	2955.9	2954.7	2955.9	2955.5	0.4	0.8 0.4	2614.1	2614.3	2614.3	2614.2	0.1	0.1 0.1
l	2989.7	2990.0	2990.0	2989.9	0.2	0.1 0.1	2552.5	2552.7	2552.3	2552.5	0.0	0.2 0.2
y	2998.6	2998.2	2998.0	2998.3	0.3	0.1 0.3	2892.1	2890.5	2892.1	2891.6	0.5	1.1 0.5
f	3026.1	3026.3	3027.9	3026.8	0.7	0.5 1.1	2634.0	2634.2	2634.2	2634.1	0.1	0.1 0.1
q	3176.0	3176.0	3176.0	3176.0	0.0	0.0 0.0	2768.2	2766.4	2767.8	2767.5	0.7	1.1 0.3
t	3189.8	3190.0	3190.0	3189.9	0.1	0.1 0.1	2488.1	2488.7	2487.9	2488.2	0.1	0.5 0.3
n	3288.3	3288.5	3288.7	3288.5	0.2	0.0 0.2	3002.0	3002.2	3002.0	3002.1	0.1	0.1 0.1
u	3321.7	3321.7	3321.7	3321.7	0.0	0.0 0.0	2786.9	2785.9	2786.1	2786.3	0.6	0.4 0.2
s	3346.5	3346.3	3346.1	3346.3	0.2	0.0 0.2	3474.4	3474.2	3474.2	3474.3	0.1	0.1 0.1
b	3424.2	3425.6	3424.4	3424.7	0.5	0.9 0.3	3624.3	3624.1	3623.7	3624.0	0.3	0.1 0.3
x	3086.5	3086.1	3087.7	3086.8	0.3	0.7 0.9	2752.2	2752.2	2752.0	2752.1	0.1	0.1 0.1
w	3411.6	3411.8	3412.2	3411.9	0.3	0.1 0.3	2733.7	2732.7	2732.3	2732.9	0.8	0.2 0.6

W.S.

z = y

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D 7042

Measures of Standard Stars. Bk. 16, p. 154

Gillies.	x	Readings 1st	2nd	3d	Means x	Resid	y	Readings 1st	2nd	3d	Means y	Resid
7980		269.8	269.8	270.2	269.9	0.1 0.1 0.3		2496.1	2496.1	2494.1	2495.4	0.7 0.7 1.3
					270.0	0.1 0.1 0.1						
8714		282.1	282.7	281.7	282.2	0.1 0.5 0.5		3416.2	3418.0	3418.2	3417.5	1.3 0.5 0.7
7923		517.9	518.1	518.1	518.0	0.1 0.1 0.1		2470.0	2470.0	2468.2	2469.4	0.6 0.6 1.2
6508		1037.9	1037.9	1038.1	1038.0	0.1 0.1 0.1		1006.1	1006.3	1006.1	1006.2	0.1 0.1 0.1
11113		2140.1	2140.1	2140.1	2140.1	0.0 0.0 0.0		5264.3	5266.1	5266.1	5265.5	1.2 0.6 0.6
a = 4034		3894.4	3896.2	3896.0	3895.5	1.1 0.7 0.5		2396.2	2396.0	2395.8	2396.0	0.2 0.0 0.2
13902		4540.1	4539.9	4540.1	4540.0	0.1 0.1 0.1		4630.3	4631.9	4630.9	4631.0	0.7 0.9 0.1
14603		4950.0	4950.0	4950.2	4950.1	0.1 0.1 0.1		4380.2	4378.0	4380.0	4379.4	0.8 1.4 0.6
					4950.8	0.0 0.0 0.1						
15462		5448.1	5446.3	5448.3	5447.6	0.5 1.3 0.7		3932.1	3932.1	3932.1	3932.1	0.0 0.0 0.0

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D 7042

	x	1st Reading	2nd	3d	Mean x	Resid.			y	1st Reading	2nd	3d	Mean y.	Resid.		
e	1497.8	1498.0	1498.0		1497.9	0.1	0.1	0.1	3837.8	3838.4	3837.8		3838.0	0.2	0.4	0.2
d	2069.8	2070.0	2070.2		2070.0	-0.2	0.0	0.2	3690.7	3691.1	3690.7		3690.8	0.1	0.3	0.1
c	2083.9	2084.1	2084.1		2084.0	0.1	0.1	0.1	3644.3	3643.9	3643.9		3644.0	0.3	0.1	0.1
g	2241.5	2241.7	2241.9		2241.7	0.2	0.0	0.2	3231.0	3231.4	3230.6		3231.0	0.0	0.4	0.4
p	2696.2	2695.6	2695.8		2695.9	0.3	0.3	0.1	3191.9	3192.1	3193.5		3192.5	0.6	0.4	1.0
k	2709.8	2709.8	2709.6		2709.7	0.1	0.1	0.1	2622.7	2623.1	2622.7		2622.8	0.1	0.3	0.1
r	2777.7	2777.9	2777.9		2777.8	0.1	0.1	0.1	3157.9	3157.9	3157.9		3157.9	0.0	0.0	0.0
h	2808.3	2808.1	2808.3		2808.2	0.1	0.1	0.1	3139.5	3139.5	3139.5		3139.5	0.0	0.0	0.0
m	2812.4	2812.2	2812.2		2812.3	0.1	0.1	0.1	2948.2	2948.4	2948.4		2948.3	0.1	0.1	0.1
g	2965.9	2965.9	2965.9		2965.9	0.0	0.0	0.0	3033.9	3034.3	3033.9		3034.0	0.1	0.3	0.1
s	2922.1	2921.9	2921.9		2922.0	0.1	0.1	0.1	3311.9	3312.1	3311.9		3312.0	0.1	0.1	0.1
l	2955.7	2955.9	2955.9		2955.8	0.1	0.1	0.1	3373.9	3373.9	3373.9		3373.9	0.0	0.0	0.0
y	Ar. S.								Ar. S.							
f	2993.8	2992.4	2993.2		2993.1	0.7	0.7	0.1	3291.8	3291.8	3290.4		3291.3	0.5	0.5	0.9
q	3142.5	3141.9	3142.5		3142.3	0.2	0.4	0.2	3158.1	3158.3	3158.1		3158.2	0.1	0.1	0.1
t	3156.1	3156.1	3155.9		3156.0	0.1	0.1	0.1	3438.5	3439.5	3438.3		3438.8	0.3	0.7	0.5
n	3255.9	3254.7	3255.9		3255.5	0.4	0.8	0.4	2922.5	2922.7	2923.1		2922.8	0.3	0.1	0.3
u	3288.1	3287.7	3286.9		3287.6	0.5	0.1	0.7	3140.1	3140.1	3139.9		3140.0	0.1	0.1	0.1
s	3315.5	3315.7	3315.9		3315.7	0.2	0.0	0.2	2450.4	2450.0	2451.8		2450.7	0.3	0.7	1.1
b	3392.1	3391.1	3390.2		3391.1	1.0	0.0	0.9	2301.9	2300.1	2299.9		2300.6	1.3	0.5	0.7
x	3054.4	3055.0	3054.2		3054.5	0.1	0.5	0.3	3174.0	3174.0	3174.0		3174.0	0.0	0.0	0.0
w	3377.9	3377.9	3377.9		3377.9	0.0	0.0	0.0	3193.9	3193.7	3193.7		3193.8	0.1	0.1	0.1

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D 6980

Measures of Standard Stars. Bk. 16, f. 176

Gilliss	x	Readings 1st	2nd	3d	Mean x	Resid	y	Readings 1st	2nd	3d	Mean y	Resid	
15462	455.8	456.0	456.0	455.9	0.1	0.1	0.1	3938.1	3942.1	3942.1	3940.8	2.7	1.3 1.3 ←
14603	952.0	951.8	951.8	951.9	0.1	0.1	0.1	4390.0	4390.0	4390.0	4390.0	0.0	0.0 0.0
13902	1362.0	1362.4	1362.0	1362.1	0.1	0.3	0.1	4640.1	4641.9	4641.9	4641.3	1.2	0.6 0.6
a = 4034	2008.0	2009.0	2009.2	2008.7	0.7	0.3	0.5	2406.0	2406.0	2406.0	2406.0	0.0	0.0 0.0
11113	3762.0	3762.0	3762.0	3762.0	0.0	0.0	0.0	5274.2	5276.2	5276.0	5275.5	1.3	0.7 0.5
6508	4866.0	4866.0	4866.0	4866.0	0.0	0.0	0.0	1016.0	1018.0	1019.8	1017.9	1.9	0.1 1.9
7923	5386.0	5385.8	5386.0	5385.9	0.1	0.1	0.1	2477.9	2477.9	2479.9	2478.6	0.7 0.7 1.3 1.3 0.7 0.7	
8714	5621.8	5622.0	5622.2	5622.0	0.2	0.0	0.2	3426.2	3428.0	3428.0	3427.4	1.2	0.6 0.6
7980	5634.2	5634.0	5634.0	5634.1	0.1	0.1	0.1	2502.1	2501.9	2502.1	2502.0	0.1	0.1 0.1

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D 6980

	x	1st Reading	2nd	3d	Mean x	Resid.	y	1st Reading	2nd	3d	Mean y	Resid.
b		2512.0	2512.0	2512.2	2512.1	0.1 0.1 0.1		2310.0	2310.0	2310.0	2310.0	
w		2525.8	2525.6	2526.0	2525.8	0.0 0.2 0.2		3202.3	3202.3	3203.5	3202.7	0.4 0.4 0.8
s		2589.8	2589.6	2589.6	2589.7	0.1 0.1 0.1		2460.2	2460.2	2461.8	2460.7	0.5 0.5 1.1
u		2617.6	2616.2	2626.2	2616.7	0.9 0.5 0.5		3149.3	3149.8 3089.8	3149.8 3089.8	3149.6	-0.3 0.2 0.2
m		2649.8	2650.0	2650.0	2649.9	0.1 0.1 0.1		2933.8	2933.4	2933.6	2933.6	0.2 0.2 0.0
t		2748.2	2748.0	2748.2	2748.1	0.1 0.1 0.1		3448.3	3449.1	3449.3	3448.9	0.6 0.2 0.4
g		2762.0	2762.0	2762.0	2762.0	0.0 0.0 0.0		3167.9	3168.1	3167.9	3168.0	0.1 0.1 0.1
4		2849.0	2849.4	2849.2	2849.2	0.2 0.2 0.0		3182.8	3183.8	3184.0	3183.5	0.7 0.3 0.5
f		2910.2	2910.2	2910.0	2910.1	0.1 0.1 0.1		3301.8	3301.8	3302.0	3301.9	0.1 0.1 0.1
~~x~~ z =		2938.0	2937.6	2938.0	2937.9	0.1 0.3 0.1		3042.7	3043.7	3042.7	3043.0	0.3 0.7 0.3
~~l~~		2948.2	2949.6	2948.2	2948.7	0.5 0.9 0.5		3383.9	3384.1	3383.9	3384.0	0.1 0.1 0.1
r		2982.0	2982.0	2982.2	2982.1	0.1 0.1 0.1		3321.9	3321.7	3321.9	3321.8	0.1 0.1 0.1
y = ~~z~~		A. S.										
h		3095.8	3094.4	3096.0	3095.4	0.4 1.0 0.6		3148.9	3149.7	3149.3	3149.3	0.4 0.4 0.0
w		3090.6	3090.6	3091.8	3091.0	0.4 0.4 0.8		2958.1	2958.1	2958.5	2958.2	0.1 0.1 0.3
r		3126.0	3126.0	3126.0	3126.0	0.0 0.0 0.0		3168.3	3168.1	3168.1	3168.2	0.1 0.1 0.1
k		3194.0	3194.4	3194.0	3194.1	0.1 0.3 0.1		2633.8	2633.8	2633.4	2633.7	0.1 0.1 0.3
p		3208.0	3208.2	3208.0	3208.1	0.1 0.1 0.1		3202.1	3202.1	3202.3	3202.2	0.1 0.1 0.1
g		3662.0	3662.0	3662.0	3662.0	0.0 0.0 0.0		3240.2	3241.6	3241.6	3241.1	0.9 0.5 0.5
c		3818.4	3818.4	3818.2	3818.3	0.1 0.1 0.1		3654.0	3654.2	3654.2	3654.1	0.1 0.1 0.1
d		3833.8	3834.0	3833.6	3833.8	0.0 0.2 0.2		3700.1	3701.7	3700.1	3700.6	0.5 1.1 0.5
e		4406.0	4405.8	4405.4	4405.7	0.3 0.1 0.3		3846.2	3847.6	3846.6	3846.8	0.6 0.8 0.2

retain all

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Entered 6, 15.

Measures from 2 squares. 1 div Pl A = 60"

Estimates retaining decimals

Bk.			x	y	C-A	B-D	x×60	y×60	x×60	y×60	C-A	B-D	x.199	y.199	(C-A)²	−½ div	−½ div
p.124	D4851	✓ p	46.0		+0.1		2760		2760.0		+0.2				2730.8		
		✓ a=4034	66.0		−0.1		3960 ✓		3960.0		−0.2				3929.8		
		✓ 2	21.0		−0.2		1260		1260.0		−0.4				1229.6		
		✓ 26	40.0		+0.1		2400		2400.0		+0.2					2369.8	
		✓ 29	70.0		0.0		4200		4200.0		0.0					4170.0	
		✓ 57	42.0		−0.1		2520		2520.0		−0.2				2489.8		
		✓ 88	24.0		0.0		1440		1440.0		0.0					1410.0	
		✓ 92	50.0		0.0		3000		3000.0		0.0				2970.0		
		✓ p	46.0		−0.1		2760		2760.0		−0.2				2729.8		
		✓ a=4034	66.0		0.0		3960		3960.0 ✓		0.0				3930.0		
		✓ 102	67.0		−0.1		4020		4020.0		−0.2					3990.2	
		✓ 117	59.0		−0.1		3540		3540.0		−0.2				3509.8		
		✓ 124	69.0		−0.1		4140		4140.0		−0.2					4110.2	
		✓ 158	69.0		0.0		4140		4140.0		0.0				4110.0		
		✓ 141	64.0		+0.1		3840		3840.0		+0.2					3809.8	
		✓ 165	34.0		+0.1		2040		2040.0		+0.2					2009.8	
		✓ 185	75.0		0.0		4500		4500.0		0.0				4470.0		
		✓ p	46.0		−0.1		2760		2760.0		−0.2				2729.8		
		✓ a=4034	66.0		+0.1		3960 ✓		3960.0		+0.2				3930.2		
		✓ 89	38.1		−0.1		2280		−0.2		−0.2					2250.2	
146	D4847	✓ a=4034	66.0		0.0		3960 ✓		3960.0		0.0 ✓				3930.0		
		✓ "	66.0		+0.1		3960 ✓		3960.0		+0.2 ✓				3930.2		
		✓ "	66.0		+0.1		3960 ✓		3960.0		+0.2 ✓				3930.2		
154	D7042-7980		5.0		−0.1		300 ✓		300.0		−0.2 ✓				269.8		
		✓ d	35.0		−0.1		2100		2100.0		−0.2 ✓				2069.8		
		✓ 14603	83.0		0.0		4980 ✓		4980.0		0.0				4950.0		
		✓ 24	31.0	64.0	+0.1	−148	1860	3840	1860.0	3840.0	+0.2 ✓	−29.5	1830.2			3809.5	
		✓ 40	24.0		−0.1		1440		1440.0		−0.2 ✓					1410.2	
		✓ 65	43.1	44.0	+0.1	+0.1	2580 ✓	2640 ✓	2586.0	2640.0	+0.2 ✓	+0.2	2550.2 ✓			2608.8	

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Estimates Reduced to $\frac{\delta x}{\delta x}$ Centre $\frac{\delta y}{\delta y}$ $= -\frac{1}{2}$ dia.		Meas with const. $X-x$ $Y-y$ applied. x	y	Computed Corrds. X	Y
2730.0					
3930.0				+938.9	
1230.0					
	2370				
	4170				
2490.0					
	1410				
2970.0					
2730.0					
3930.0					
	3990.				
3510.0					
	4110				
4110.0					
	3810				
	2010				
4470.0					
2730.0					
3930.0	2256.0				
3930.0					
3930.0					
3930.0					
270.0					
2070.0					
4950.0					
1830.0	3810				
	1410				
2556.0	2610.0				

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		x	y	C-a	B-D	x×60	y×60	x×60 retaining dec.	y×60	x.199 C-a	x.199 B-D	+(C-a)$^{-\frac{1}{2}}$ dir.	−(B-D)
D7042 D4847	✓ 48	66.0		−0.1		3960			3960.0		−0.2 ✓		3930.2 ✓
	✓ 52	29.0		0.0		1740			1740.0		0.0 ✓		1710.0
	✓ 70	43.9		0.0		2580		2634.0	+1 div x	0.0 ✓		2610. ~~2650.~~ 0 ✓	
	✓ 81	47.1		0.0		2820		2826.0		0.0 ✓		2790. 0	
	✓ 7980	5.0		−0.1		300		300.0		−0.2 ✓		269.8 ✓	
p164 Bk16	✓ d	35.0	62.0	0.0	+1.45	2100	3720	2100.0	3720.0 means + Est y = 0	0.0	+28.9	2070.0 ✓	~~8675.5~~ 3691.1
	✓ 14603	83.0		0.0		4980 ✓		4980.0		0.0 ✓		4950.0 ✓	
	✓ 99	22.0		−0.1		1320			1320.0		−0.2 ✓		1290.2 ✓
	✓ 128	72.0		−0.1		4320			4320.0		−0.2 ✓		4290.2 ✓
	✓ 167	63.0		+0.1		3780			3780.0		+0.2 ✓		3749.8 ✓
	✓ 170	70.0	28.0	+14.0	+0.1	4200	1680	4200.0	1680.0 +1 div x C-A=9	+27.9 ✓	+0.2 ✓	~~4178.09~~ 4167.2	1649.8 ✓
	✓ 7980	5.0		+0.1		300		300.0		+0.2 ✓		270.2 ✓	
	✓ d	35.0		+0.1		2100		2100.0		+0.2 ✓		2070.2 ✓	
	✓ f	57.1		+0.1		3420		3426.0		+0.2 ✓		3390.2 ✓	
	✓ 14603	83.0		+0.1		4980 ✓		4980.0		+0.2 ✓		4950.2 ✓	
176 D6980	✓ b	39.0		0.0		2340				C-2 x.200	0.0 ✓		2810.0 ✓
	✓ f	49.1		+0.1		2940		2946.0		+0.2 ✓		2910.2 ✓	
	✓ b	39.0		0.0		2340			2340.0		0.0 ✓		2810.0
	✓ u	52.9		+0.1		3120	Hdiv y	3174.0			+0.2 ✓		3089.8 ~~3089.9~~ 14
	✓ f	49.0		+0.1		2940		2940.0		+0.2 ✓		2910.2 ✓	
	✓ f	39.0		0.0		2340			2340.0		0.0 ✓		2310.0 ✓
	✓ u	52.9		+0.1		3120	Hdiv y	3174.0			+0.2 ✓		~~3089.9~~ 3140.8 ✓
	✓ f	49.0		0.0		2940		2940.0		0.0 ✓		2910.0 ✓	
D4851 p.186 p.190	32 b	38.0		−1.48		2280			2280.0		−29.5		2309.5
	40	24.0		−0.3		1440	~~1440.0~~		1440.0		−0.6	~~1440.6~~	1440.6
	52	29.0		−0.1		1740			1740.0		−0.2		1740.2

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	3960
	1710
2604.0 ~~2500.0~~	
2790.0	
270.0	
2070.0	3690
4950.0	
	1290
	4290
	3750
4170.0	1650
270.0	
2070.0	
3398.0	
4950.0	
	2310
2918.0	
	2310
	3144.0
	~~3090~~
2910.0	
	2310
	3144.0
	~~3090~~
2910.0	
	2249.5
~~1410.6~~	1410.6
	1710.2

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Remeasured by Miss Leland. Wrong estimate x or y

D6980 e Est. x = 73.9,
75.9 should be 73.9 Bk. 16, p. 180.
73.9
" f Est. x = 53.9
53.9
48.9 should be 53.9 Bk. 16, p. 182.

D7042 11113 Est. y = 88.3
88.3
87.3 should be 88.3 Bk. 16, p. 172
" 15462 Est. y = 66.1
66.1
86.1 should be 66.1 Bk. 16, p. 174

D6980 15462 Est. y = 66.2 should be 66. Bk. 16, p. 176
26.3 " " 66 " " " 178
26.3 " " 66. " " " 182

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General Rules.

"When Constant = X + x or Y + y, apply it to measures
Constant - x or Const - y." "Use y - Y. Inreside, - (y + Y)"

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Wrong Square Estimates.

		x	y	a	B	C	D	c-a	B-D	
D 7042	ν 145	66.0		1	148			+147		Est. 0 meas. 9 sub. 1 div.
"	ν 170	70.0		5	145			+140		" " " " " 1 "
"	ν 24		64.0	1		149			−148	" " " " 1 "

Wrong ~~estimates~~ scale reading. C+a or B+D not equalling 150 approx.

	~~142~~	a	B	c	D	a+c	B+D
D 7042	148		142		18		160
D 7042	148		78		63		141

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Remeasures. Wrong stars.

4851 37042 27
" " 40
" " 52
" " 53
" " 150
" " 161
D4847 3
D4851 7

Additional stars.

Cape 17.
J

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Defects.

No.

4 see note p. 202 ^ defect on original A 1903 → 3 here = 4 of Sp. mss

108 defect on enl D 4851

123 " " "

137 " " "

154 " " "

157 " " "

158 " " "

162 " " "

163 " " "

165 " " "

169 " " "

179 " " "

182 " " "

184 " " defective region on D 7042

Wrong star meas for 4 on enls from A 1903 = defect on enlargements

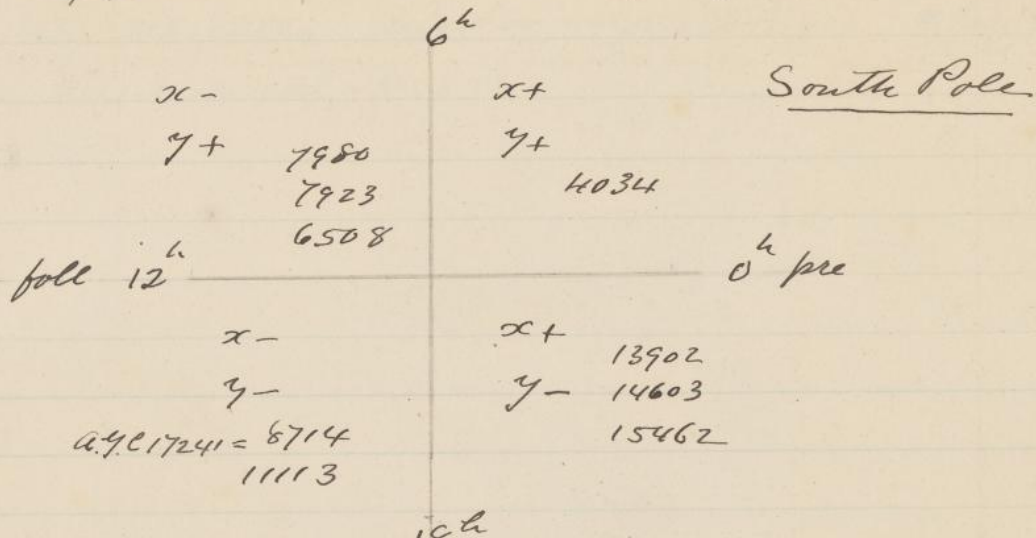
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Diagram. Computed Coordinates XY 9 Gillis S. Polar Stars



Notes on Diagrams p 27.

X The values of x have been measured from 12h to 0h on Pls I, II, and IV and from 0h to 12h on Pl. III

The values of x on Pl. III differ numerically from all the other plates. Compare p 128 with pp 60, 88 and 100.

Used −x in reductions Plate III

Y The values of y have been measured from 6h to 18h on Pls II, III, and IV and from 18h to 6h on Pl. I.

The values of y on Pl. I differ numerically from all the other plates. Compare p 166 with pp 80, 100 and 128

Used −y on Plates II, III and IV reductions.

1903 Mar 23 Correct since +x +y are in 1st Quad 0h to 6h

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Gillis
1500 Cards

Lettered Vars. prec 4857 / 1903 Sept. Bk.

2500 2000 1500 1000 +500 0 -500 -1000 -1500 -2000 -2500

6h

2500
2000
1500
1000
+500
0 0 h/me
-500
-1000
-1500
-2000
-2500

· 6508
x = -1908".5
y = +1916".9

· 4034 a

· 7923 · 7980

· 8714
= a.y. C17241

· 15462
x = +2485".7
y = -980".8

· 14603

· 13902

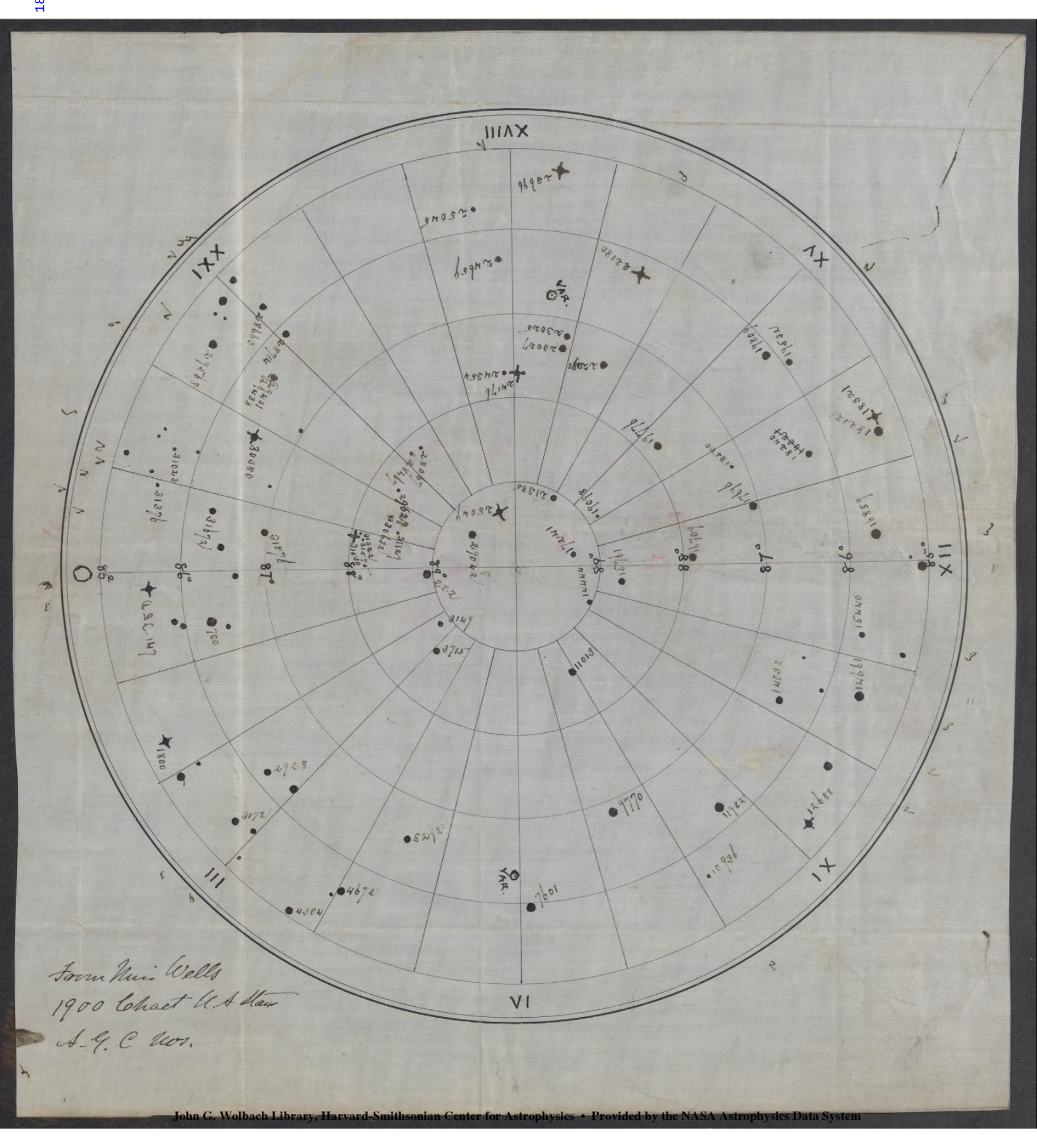
· 11113

Plotted like a neg.
also like Clusters in
Vol XX X. VIII x + | - x
foll y + | - y foll
x + | - x
y - | + y

Plotted
with Le 4857 Jan 26 1903

18h
5

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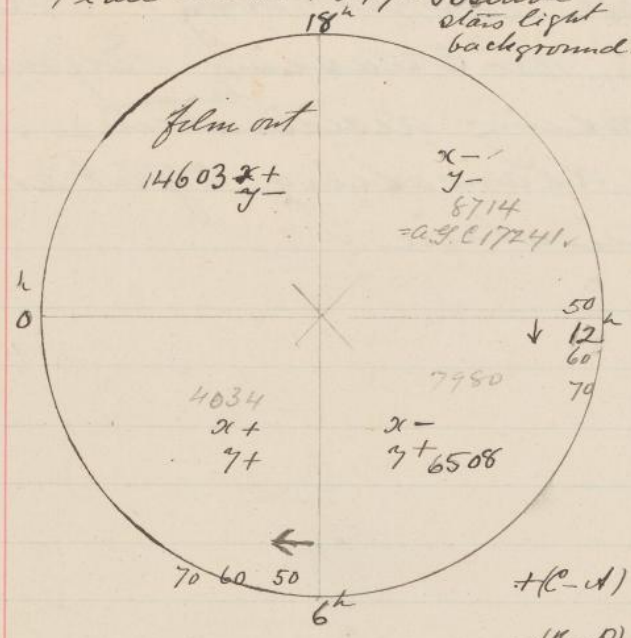
From Miss Wells
1900 Chart U.A Stars
A.G.C Nov.

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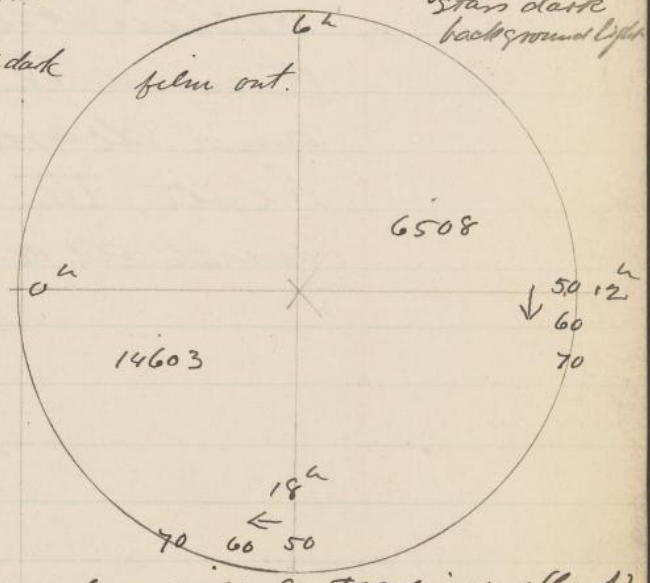
Diagrams of Four South Polar Plates
Original Positions

Plate I = D 4847 = Positive
stars light
background dark



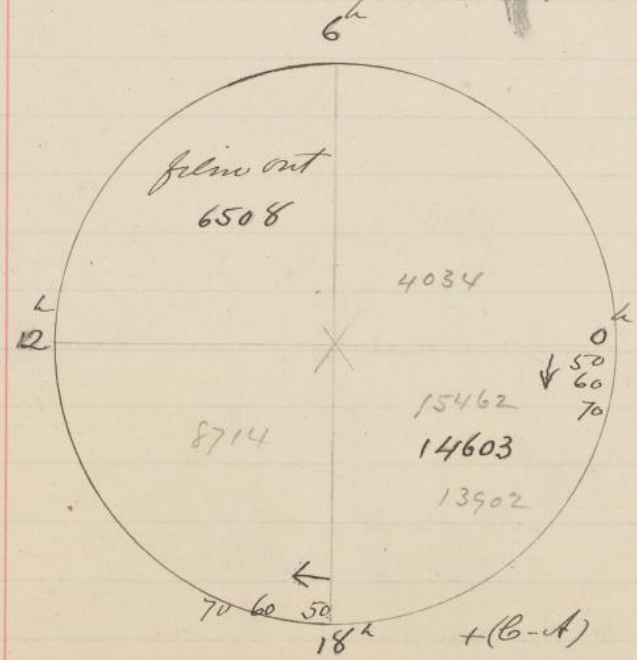
+(C−A)
−(B−D)

Pl. II = D 4851 = * Negative
stars dark
background light



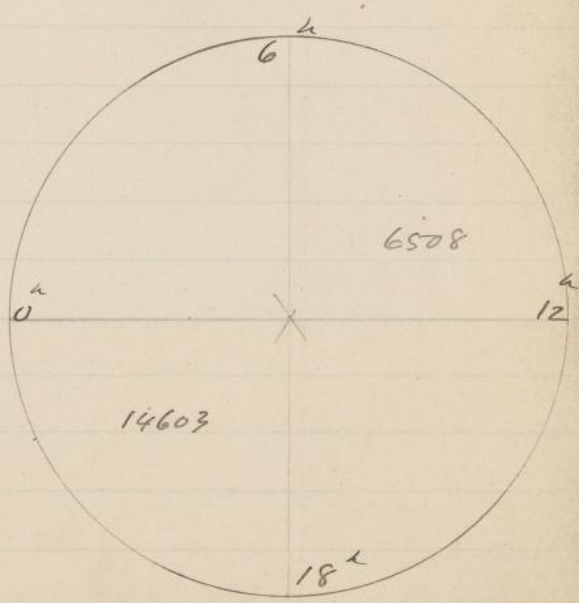
Co side least reading ∴ +(C−A)
B .. .. greater .. ∴ −(B−D)
Jan 26 1903 exam.

Pl. III = D 6980 = Positive ✓



+(C−A)
−(B−D)

Pl. IV = 7042 same has as 4851



* 4851 Jammered up but
meas with proper scale down.

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Plate I was numbered and measured in the direction of increasing right ascension and declination respectively. Plates II and IV, increasing right ascension and decreasing declination. Plate III decreasing right ascension and declination.

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Gilliss Catalogue Stars used as Standards.

Reduction to X & Y 1900.

page	Gilliss	x (1900)	y
45	4034	+938.92	+537.70
46	5752	-1185.98	+2501.83
47	5941	-1285.45	+2259.56
48	6508	-1908.53	+1916.94
49	7923	-2424.13	+462.05
50	7980	-2667.96	+436.02
51	11113	-800.59	-2315.29
52	13902	+1587.52	-1680.84
53	15462	+2489.66	-980.80
54	8714	-2656.38	-480.62
55	14603	+1999.74	-1429.76

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Gillies 4034

$6^h\ 24^m\ 47^s.56\ -89°\ 51'\ 4.1''\ 9.3$

See Sheets "Additional data for Vol XVIII IX"

(1850) α	$6^h\ 24^m\ 47^s.56$ ✓
(1850) δ	$-89°\ 51'\ 4.1''$ ✓
α arc	$96°\ 11'\ 53.''40$ ✓
	[6 11 53.40 (take off)]
log cos α	9.0332933n ✓
" cos δ	7.4146582 ✓
" sin α	9.9974538 ✓
cos δ cos α	6.4479515n ✓
R	5.3144251 ✓
R cos δ cos α	1.7623766n ✓
x (1850)	− 57.''86 ✓
$\Delta x t_{(1900)}$	+ 996.60 ✓
$\Delta^2 x t^2$	+ .18 ✓
x (1900)	+938.92 ✓

log cos δ sin α	7.4121120n ✓
R " "	2.7265376 ✓
y (1850)	+ 532.''77 ✓
$\Delta y t_{(1900)}$	+ 10.50 ✓
$\Delta^2 y t^2$	− 5.57 ✓
y (1900)	+537.70 ✓

Corr. x 1900 + 938.''9 ✓

y 1900 + 537.7 ✓

Prec. Constants. 1900

Δx	−19.932 ✓
$\Delta^2 x$	+.01366 ✓
	63
Corr $\Delta^2 x$	+.01429 ✓
$\frac{1}{2}$ os Corr $\delta^2 x$	+.00007145 ✓
Δy	+.210 ✓
$\Delta^2 y$	−.44550 ✓
$\frac{1}{2}$ os $\Delta^2 y$	−.0022275 ✓

Taken from Tables I II III Vol XVIII IX with signs of x_{1900} & y_{1900} reversed except Δy for which the combined sign is used.

In applying prec. 1900 reverse sign of Δx t only ✓

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Gillis 5752 $8^h\ 42^m\ 24^s.95$ $-89°\ 4'\ 40''.0$ 9.3

1850 α	$8^h\ 42^m\ 24^s.95$ ✓	Corr. x 1900 = −1186".1 ✓	
1850 δ	$-89°\ 4'\ 40''.0$ ✓	y 1900 = +2501.8 ✓	
α arc	$130°\ 36'\ 14''.25$ ✓		
	[40 36 14.25 take diff.]	Δx −19.493 ✓	
log cos α	9.8134653n ✓	$\Delta^2 x$ +.00129 ✓	
" cos δ	8.2066942 ✓	Corr $\Delta^2 x$ +.00192 ✓	
" sin α	9.8803713 ✓	$\frac{1}{200}$ Corr $\Delta^2 x$ +.0000096 ✓	
cos δ cos α	8.0201595n ✓		
R	5.3144251 ✓	Δy −.265 ✓	
R cos δ cos α	3.3345846n ✓	$\Delta^2 y$ −.43537 ✓	
x 1850	−2160.65+ ✓	$\frac{1}{200}\Delta^2 y$ −.0021768 ✓	
$\Delta x\, t_{(1900)}$	∓ 974.65 ✓		
$\Delta^2 x\, t^2$	+ 02 ✓		
x 1900	−1185.98 ✓		

log cos δ sin α	8.0870655 ✓
R " "	3.4014906 ✓
y 1850	+2520.52 ✓
$\Delta y\, t_{(1900)}$	− 13.25 ✓
$\Delta^2 y\, t^2$	− 5.44 ✓
y (1900)	+2501.83 ✓

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Gillies 5941

$8^h 59^m 9^s.73$ $-89° 6' 28''.0$

$8^h 59^m 9^s.73$ ✓
$-89° 6' 28''.0$ ✓
$134° 47' 25''.95$ ✓
[44 47 25.95 take off.]
9.8478915 n ✓
8.1923328 ✓
9.8510669 ✓
8.0402243 n ✓
3.3546494 n ✓
− 2262.82 ✓
∓ 977.35 ✓
+ .02 ✓
− 1285.45 ✓

Corr. x 1900 $-1285''.5$ ✓
y 1900 +2259.6 ✓

Δx −19.547 ✓
$\Delta^2 x$ +.00067 ✓
Corr. $\Delta^2 x$ +.00130 ✓
$\frac{1}{200}$ " " +.000065 ✓

Δy −.288 ✓
$\Delta^2 y$ −.43658 ✓
$\frac{1}{200}\Delta^2 y$ −.002182 ✓

8.0433997 ✓
3.3578248 ✓
+2279.42 ✓
− 14.40 ✓
− 5.46 ✓
+2259.56 ✓

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Gilliss 6508 $9^h 44^m 17^s.32$ $-89° 1' 57''.3$

1850 α	$9^h 44^m 17^s.32$ ✓
1850 δ	$-89° 1' 57''.3$ ✓
α arc	$146° 4' 19''.80$ ✓
	[56 4 19.80 take off.]
log cos α	9.9189427n ✓
" cos δ	8.2274703 ✓
" sin α	9.7467495 ✓
cos δ cos α	8.1416130n ✓
R	5.3144251 ✓
R cos δ cos α	3.4608381n ✓
x 1850	−2889.60 ✓
$\Delta x\, t$ (1900)	+981.10 ✓
$\Delta^2 x\, t^2$	− .03 ✓
x 1900	−1908.53 ✓

Corr. x 1900	−1908.6 ✓
y 1900	+1916.9 ✓
Δx	−19.622 ✓
$\Delta^2 x$	−.00308 ✓
Corr $\Delta^2 x$	−.00245 ✓
$\frac{1}{200}$ " "	−.00001225 ✓
Δy	−.427 ✓
$\Delta^2 y$	−.43820 ✓
$\frac{1}{200} \Delta^2 y$	−.002191 ✓

log cos δ sin α	7.9742198 ✓
R " "	3.2886449 ✓
y 1850	+1943.77 ✓
$\Delta y\, t$ (1900)	−21.35 ✓
$\Delta^2 y\, t^2$	− 5.48 ✓
y 1900	+1916.94 ✓

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Gillies 7923 $11^h 27^m 5^s.37$ $-89° 2' 22''.8$

$11^h 27^m 5^s.37$ ✓
$-89° 2' 22''.8$ ✓
$171° 46' 20''.55$ ✓
[81 46 20.55 take off.]
9.9955068n ✓
8.2242790 ✓
9.1556583 ✓
8.2197858n ✓
5.3144251 ✓
3.5342109n ✓
−3421.46 ✓
+997.~~30~~ 40 ✓
− .07 ✓
−2424.23 ✓

7.3799373 ✓
2.6943624 ✓
+494.72 ✓
− 27.10 ✓
− 5.57 ✓
+462.05 ✓

* Error, see sheets.

Corr. x 1900 −2424.2 ✓
y 1900 ~~+472.0~~ * +462.0 ✓

Δx −19.94~~6~~ 8 ✓
$\Delta^2 x$ −.0063~~8~~ 4 ✓
Corr. $\Delta^2 x$ −.0057 1
$\frac{1}{200}$ " " −.00002855 ✓

Δy −.542 ✓
$\Delta^2 y$ −.445~~35~~ 40 ✓
$\frac{1}{200}\Delta^2 y$ −.00222~~45~~ 7 ✓

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Gillies 7980 $11^h\ 30^m\ 41^s.25\ -88^\circ\ 58'\ 24''.1$

1850 α	$11^h\ 30^m\ 41^s.25$ ✓	Corr. x 1900	−2668.0 ✓
1850 δ	$-88^\circ\ 58'\ 24''.1$ ✓	y 1900	+436.0 ✓
α arc	$172^\circ\ 40'\ 18''.75$ ✓		
	[82 40 18.75 take off]	Δx	−19.953 ✓
log cos α	9.9964381 n ✓	$\Delta^2 x$	−.00779 ✓
" cos δ	8.2532718 ✓	Corr $\Delta^2 x$	−.00716 ✓
" sin α	9.1056855 ✓	$\frac{1}{200}$ " "	−.0000358 ✓
cos δ cos α	8.2497099 n ✓		
R	5.3144251 ✓	Δy	−.596 ✓
R cos δ cos α	3.5641350 n ✓	$\Delta^2 y$	−.44549 ✓
x 1850	−3665.52 ✓	$\frac{1}{200}$ "	−.0022745 ✓
Δx t (1900)	+997.65 ✓		
$\Delta^2 x t^2$	− .09 ✓		
x 1900	−2667.96 ✓		

log cos δ sin α	7.3589573 ✓
R " "	2.6733824 ✓
y 1850	+471.39 ✓
Δy t (1900)	−29.80 ✓
$\Delta^2 y t^2$	− 5.57 ✓
y 1900	+436.02 ✓

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For 8714 see p 54

Gillis 11113 $15^h\ 26^m\ 3^s.32$ $-89°\ 11'\ 0''.8$

$15^h\ 26^m\ 3^s.32$ ✓
$-89°\ 11'\ 0''.8$ ✓
$231°\ 36'\ 49''.80$ ✓
[51 30 49.80 take opps.]
9.7940177n ✓
8.1537893 ✓
9.8936278n ✓
7.9478070n ✓
5.3144251 ✓
3.2622321n ✓
−1829.08 ✓
+1028.45 ✓
+ .04 ✓
− 800.59 ✓

Corr. x 1900 $-800''.6$ ✓
y 1900 −2315.3 ✓

Δx −20.569 ✓
$\Delta^2 x$ +.00290 4
Corr. $\Delta^2 x$ +.00353 7
$\frac{+}{200}$ " " +.0000176 8

Δy −.179 ✓
$\Delta^2 y$ −.45950 ✓
$\frac{+}{200}\Delta^2 y$ −.0022975 ✓

8.0474171n ✓
3.3618422n ✓
−2300.60 ✓
− 8.95 ✓
− 5.74 ✓
− 2315.29 ✓

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Gillis 13902 $19^h 13^m 56^s.48$ $-89° 30' 15".0$

1850 α	$19^h 13^m 56^s.48$ ✓
1850 δ	$-89° 30' 15".0$ ✓
α arc	$288° 29' 7".20$ ✓
	[18 29 7.20 take off.]
log cos α	9.5011441 ✓
" cos δ	7.9372077 ✓
" sin α	9.9769938 n ✓
cos δ cos α	7.4383518 ✓
R	5.3144251 ✓
R cos δ cos α	2.7527769 ✓
x 1850	+ 565.95 ✓
Δx t	1900 7 1021.35 ✓
$\Delta^2 x$ t^2	1900 + .22 ✓
x 1900	+1587.52 ✓

log cos δ sin α	7.9142015 n ✓
R " "	3.2286266 n ✓
y 1850	−1692.88 ✓
Δy t	1900 + 17.75 ✓
$\Delta^2 y$ t^2	1900 − 5.71 ✓
y 1900	−1680.84 ✓

Corr. x 1900 +1587.5 ✓
y 1900 −1680.9 ✓

Δx −20.427 ✓
$\Delta^2 x$ +.01720 ✓
Corr. $\Delta^2 y$ +.01783 ✓
$\frac{1}{200}$ " " +.0000891 5 ✓

Δy +.355 ✓
$\Delta^2 y$ −.45665 ✓
$\frac{1}{200}$ $\Delta^2 y$ −.0022832 5 ✓

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For 14603 see p 55

Gillis 15462 $21^h 43^m 11.^s88$ $-89° 30' 15.''6$

$21^h 43^m 11.^s88$ ✓
$-89° 30' 15.''6$ ✓
$325° 47' 58.''20$ ✓
[55 47 58.20 take 1/4.]
9.9175453 ✓
7.9370617 ✓
9.7498063 n ✓
7.8546070 ✓
5.3144251 ✓
3.1690321 ✓
+1475.82
$\mp$ 1013.58[5] Using changed y
+ 0.29 ✓
+2489.64[6] ✓

7.6868680 n ✓
3.0012931 n ✓
−1002.98 ✓
+ 27.85 ✓
− 5.67 ✓
−980.80 ✓

* Error on sheets

Corr. x 1900 +2489.6
y 1900 ~~+980.8~~ −980.8 ✓
Using y_2 = −980.8 no change except Δx = −20.271
Δx −20.270
$\Delta^2 x$ +.02265 ✓
Corr. $\Delta^2 x$ +.02328 ✓
$\frac{+}{200}$ " " +.0001164 ✓

Δy +.557 ✓
$\Delta^2 y$ −.45326 ✓
$\frac{+}{200}\Delta^2 y$ −.0022663 ✓

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out of order

Gillies 8714
= a.y.c 17241

$12^h\ 27^m\ 43^s.13\ -88°\ 58'\ 28''.7$

1850 α	$12^h\ 27^m\ 43^s.13$	Corr. x 1900	-2656.3 ✓
1850 δ	$-88°\ 58'\ 28''.7$	y	-480.7 ✓
α arc	[186° 55' 46".95] ✓		
		Δx	-20.157 ✓
log cos α	9.9968158n ✓	$\Delta^2 x$	-.00785 ✓
" cos δ	8.2527310 ✓	Corr $\Delta^2 x$	-.00722 ✓
" sin α	9.0815330n ✓	$\frac{1}{200}$ " "	-.000361 ✓
cos δ cos α	8.2495488n ✓		
R	5.3144251 ✓	Δy	-.593 ✓
R cos δ cos α	3.5639719n ✓	$\Delta^2 y$	-.45007 ✓
x 1850	-3664.14 ✓	$\frac{1}{200}\Delta^2 y$	-.00225035 ✓
Δx t 1900	∓1007.85 ✓		
$\Delta^2 x t^2$	- .09 ✓		
x 1900	-2656.38 ✓		

log cos δ sin α	7.3342640n ✓
R " "	2.6486891n ✓
y 1850	-445.34 ✓
Δy t	-29.65 ✓
$\Delta^2 y t^2$	-5.63 ✓
y 1900	-480.62 ✓

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See order. Gillies 14603. $20^h 16^m 34^s.71$ $-89° 30' 52''.3$

20 16 34.71
−89 30 52.3
304 8 40.65 ✓

9.7749182 5 ✓
7.9280366 ✓
9.9178328 n ✓
7.6772191 ✓
5.3144251 ✓
2.9916442 ✓
+980.94 ✓
∓1018.55 ✓
+ .25 ✓
+1999.74 ✓

7.8458694 n ✓
3.1602945 n ✓
−1446.42 ✓
+ 22.35 ✓
− 5.69 ✓
−1429.76 ✓

Corr. x 1900 +1999.7 ✓
y 1900 −1429.87 ✓

Δx −20.371 ✓
$\Delta^2 x$ +.01968 ✓
Corr. $\Delta^2 x$ +.02031 ✓
$\frac{1}{200}$ " " +.00010155 ✓

Δy +.447 ✓
$\Delta^2 y$ −.45545 ✓
$\frac{1}{200}\Delta^2 y$ −.0022775 ✓

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D 4851

Gilliss	Mean x	Comp. X	X − x	−2981.5 x+Const.	x−X
7980	299.6	−2668.0	−2967.6	−2681.9 ✓	−13.9
8714	313.9	−2656.4	−2970.3	−2667.6 ✓	−11.2
7923	548.1	−2424.1	−2972.2	−2433.4 ✓	−9.3
6508	1064.1	−1908.5	−2972.6	−1917.4 ✓	−8.9
11113	2179.2	−800.6	−2979.8	−802.3 ✓	−1.7
4034	3930.0	+938.9	−2991.1	+948.5 ✓	+9.6
13902	4578.4	+1587.5	−2990.9	+1596.9 ✓	+9.4
14603	4992.6	+1999.7	−2992.9	+2011.1 ✓	+11.4
15462	5486.0	+2489.7	−2996.3	+2504.5 ✓	+14.8
	23391.9 =	+7015.8	733.7 =		+45.2
	9	−10457.6	9		−45.0
	2599.1	−3441.8 =	−2981.5		+0.2 ✓
		9			
		−382.4			

	Mean y	Comp. Y	Y+y	+2953.7 Const.−y	y−Y
7980	2510.3	+436.0	+2946.3	+443.4 ✓	+7.4
8714	3433.0	−480.6	+2952.4	−479.3 ✓	+1.3
7923	2485.9	+462.0	+2947.9	+467.8 ✓	+5.8
6508	1023.1	+1916.9	+2940.0	+1930.6 ✓	+13.7
11113	5274.3	−2315.3	+2959.0	−2320.6 ✓	−5.3
4034	2412.6	+537.7	+2950.3	+541.1 ✓	+3.4
13902	4642.6	−1680.8	+2961.8	−1688.9 ✓	−8.1
14603	4390.6	−1429.8	+2960.8	−1436.9 ✓	−7.1
15462	3945.4	−980.8	+2964.6	−991.7 ✓	−10.9
	30117.8 =	+3352.6	483.1 =		+31.6
	9	−6887.3	9		−31.4
	3346.4	−3534.7 =	+2953.7		+0.2 ✓
		9			
		−392.7			

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x Residuals.	X	x−X	$\frac{X}{100}$	$\frac{Y}{100}$	$(x-\bar{X})\frac{X}{100}$	$\frac{XY}{100}$	$\frac{X^2}{100}$	$(x-\bar{X})\frac{Y}{100}$	$s=\frac{X}{100}+\frac{Y}{100}$	sn	as
−2299.5	−2285.6	−13.9	−22.9	+8.3	+318.31	−190.07	524.41	−115.37	−14.6	+202.94 ✓	+334.34 ✓
−2285.2	−2274.0	−11.2	−22.7	−0.9	+254.24	+20.43	515.29	+10.08	−23.6	+264.32 ✓	+535.72 ✓
−2051.0	−2041.7	−9.3	−20.4	+8.5	+189.72	−173.40	416.16	−79.05	−11.9	+110.67 ✓	+242.76 ✓
−1535.0	−1526.1	−8.9	−15.3	+23.1	+136.17	−353.43	234.09	−205.59	+7.8	−69.42 ✓	−119.34 ✓
−419.9	−418.2	−1.7	−4.2	−19.2	+7.14	+80.64	17.64	+32.64	−23.4	+39.78 ✓	+98.28 ✓
+1330.9	+1321.3	+9.6	+13.2	+9.3	+126.72	+122.76	174.24	+89.28	+22.5	+216.00 ✓	+297.00 ✓
+1979.3	+1969.9	+9.4	+19.7	−12.9	+185.18	−254.13	388.09	−121.26	+6.8	+63.92 ✓	+133.96 ✓
+2393.5	+2382.1	+11.4	+23.8	−10.4	+271.32	−247.52	566.44	−118.56	+13.4	+152.76 ✓	+318.92 ✓
+2886.9	+2872.1	+14.8	+28.7	−5.9	+424.76	−169.33	823.69	−87.32	+22.8	+337.44 ✓	+654.36 ✓
+8590.6	+8545.4		+854	+49.2	+1913.56	+823.83	+3660.05	+132.00		+1387.83	+2615.34
−8590.6	−8545.6		−85.5	−49.3		−1387.88		−727.15		−69.42	−119.34
0.0	−0.2 ✓					−1164.05		−595.15		+1318.41	+2496.00

$(x-\bar{X})\frac{X}{100}$ +1913.56 $\frac{XY}{100}$ −1164.05

$(x-\bar{X})\frac{Y}{100}$ −595.15 $\frac{X^2}{100}$ +3660.05

+1318.41 +2496.00

y	Y	y−(y+Y)	$(y-\bar{Y})\frac{Y}{100}$	$\frac{XY}{100}$	$\frac{Y^2}{100}$	$(y-\bar{Y})\frac{X}{100}$	sn′	as
−836.1	+828.7	+7.4	+61.42		68.89	−169.46	−108.04 ✓	−121.18 ✓
+86.6	−87.9	+1.3	−1.17		0.81	−29.51	−30.68 ✓	+21.24 ✓
−860.5	+854.7	+5.8	+49.30		72.25	−118.32	−69.02 ✓	−101.15 ✓
−2323.3	+2309.6	+13.7	+316.47		533.61	−209.61	+106.86 ✓	+180.18 ✓
+1927.9	−1922.6	−5.3	+101.76		368.64	+22.26	+124.02 ✓	+449.28 ✓
−933.8	+930.4	+3.4	+31.62		86.49	+44.88	+76.50 ✓	+209.25 ✓
+296.2	−1288.1	−8.1	+104.89		166.41	−159.57	−55.08 ✓	−87.72 ✓
+1044.2	−1037.1	−7.1	+73.84		108.16	−168.98	−95.14 ✓	−139.36 ✓
+599.0	−588.1	−10.9	+64.31		34.81	−312.83	−248.52 ✓	−134.52 ✓
+4953.9	+4923.4		+803.21		+1440.07	−1168.28	−606.48	+859.95
−4953.7	−4923.8		−1.17			+67.14	+307.38	−583.93
+0.2 ✓	−0.4 ✓		+802.04			−1101.14	−296.10	+276.02
							−249.10	

$(y-\bar{Y})\frac{Y}{100}$ +802.04 $\frac{XY}{100}$ −1164.05

$(y-\bar{Y})\frac{X}{100}$ −1101.14 $\frac{Y^2}{100}$ +1440.07

−299.10 +276.02

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~~8.0~~			$(x-\bar{X})\frac{X}{100}$	
			+1913.56	
			3.28184	
			2.78433 w	3.11559
8.09940 w ✓	−1913.56		$(x-\bar{X})\frac{Y}{100}$	sw
3.06597 w ✓	+ 14.63	✓	− 595.15	+1318.41
1.16537 ✓	+1928.19	✓	−608.60	+1304.94
	3.28514	✓	+ 13.45	+ 13.47
	3.56349	✓	1.12875	
	9.72165	✓	8.09940	
$a = \bar{x} =$	+ 0.5268	✓	$b = \bar{y} =$ +0.0126	✓

$(x-\bar{X})\frac{X}{100} = \frac{X^2}{100} + \frac{XY}{100}b$

$+1913.56 = +3660.05a - 1164.05b$

$(\div +1164.05) \quad +1.644 = +3.144a - b$

$(x-\bar{X})\frac{Y}{100} = \frac{XY}{100}a + \frac{Y^2}{100}$

$-595.15 = -1164.05a + 1440.07b$

$(\div +1440.07) \quad -0.413 = -0.808a + b$

$+1.231 = +2.336a$

$+.527 = +a$

$+1.644 = +1.657 - b$

$b = +.013$

$-595.15 = -613.45 + 18.72 = -594.73$

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		$(y-\bar{Y})\frac{X}{100}$	
		1101.14	
		3.04184 n	
		2.54433	2.87559 n
9.62566 n	−1101.14 ✓	$(y-\bar{Y})\frac{Y}{100}$	
3.06597 n	+491.62 ✓	+802.04	−299.10
2.69168 ✓	−609.52 ✓	+350.21	−750.92
	2.78499 n ✓	+451.83	+451.82
	3.56349 ✓	2.65498	
	9.22178 n ✓	9.62566	
	$b' = x' = -0.16653$ ✓	$a' = y' = +0.4223$ ✓	

$(y-\bar{Y})\frac{Y}{100} = \frac{Y^2}{100}a' + \frac{XY}{100}b'$

$+802.04 = +1440.07a - 1164.05b'$

$(\div +1164.05) \quad +0.689 = +1.237a' - b'$

$(y-\bar{Y})\frac{X}{100} = \frac{XY}{100}a' + \frac{X^2}{100}b'$

$-1101.14 = -1164.05a' + 3660.05b'$

$(\div +3660.05) \quad -.301 = -.318a' + b'$

$+.388 = +.919a'$

$+.422 = +a'$

$+.689 = +.522 - b'$

$b' = -.167$

$+802.04 = +607.71 + 194.40 = +802.11$

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64.

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add. $a = -.527$ $a' = -.422$
$b = -.013$ $b' = +.167$

X − Const. −2981.5	$\frac{X-C}{100}$	$a\frac{X}{100}$	$b\frac{Y}{100}$	x − X	Σ	Resids.
+ 313.5	+ 3.1	− 1.6	+ 0.3	−13.9	−15.2	− 2.0
+ 325.1	+ 3.3	− 1.7	+ 0.4	−11.2	−12.5	+ 0.7
+ 557.4	+ 5.6	− 3.0	+ 0.3	− 9.3	−12.0	+ 1.2
+ 1073.0	+10.7	− 5.6	+ 0.1	− 8.9	−14.4	− 1.2
+ 2180.9	+21.8	−11.5	+ 0.7	− 1.7	−12.5	+ 0.7
+ 3920.4	+39.2	−20.7	+ 0.3	+ 9.6	−10.8	+ 2.4
+ 4569.0	+45.7	−24.1	+ 0.6	+ 9.4	−14.1	− 0.9
+ 4981.2	+49.8	−26.2	+ 0.6	+11.4	−14.2	− 1.0
+ 5471.2	+54.7	−28.8	+ 0.5	+14.8	−13.5	− 0.3
					119.2 =	+ 5.0
						− 5.4
					− 13.24	− 0.4
						10.4 = ± 1.16
					C = +13.2	9

Y − Const. +2953.7	$\frac{Y-C}{100}$	$a'\frac{Y}{100}$	$b'\frac{X}{100}$	y − Y	Σ	Resids.
− 2517.7	−25.2	+ 10.6	+ 0.5	+ 7.4	+ 18.5	0.0
− 3434.3	−34.3	+ 14.5	+ 0.6	+ 1.3	+ 16.4	− 2.1
− 2491.7	−24.9	+ 10.5	+ 0.9	+ 5.8	+ 17.2	− 1.3
− 1036.8	−10.4	+ 4.4	+ 1.8	+13.7	+ 19.9	+ 1.4
− 5269.0	−52.7	+ 22.2	+ 3.6	− 5.3	+ 20.5	+ 2.0
− 2416.0	−24.2	+ 10.2	+ 6.5	+ 3.4	+ 20.1	+ 1.6
− 4634.5	−46.3	+ 19.5	+ 7.6	− 8.1	+ 19.0	+ 0.5
− 4383.5	−43.8	+ 18.5	+ 8.3	− 7.1	+ 19.7	+ 1.2
− 3934.5	−39.3	+ 16.6	+ 9.1	−10.9	+ 14.8	− 3.7
					+ 166.1 =	+ 6.7
						− 7.1
					18.46	− 0.4
					+ 18.5	13.8 = ± 1.53
					c' = −18.5	9

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D 4851 Reduction of Catalogue Stars.

a −0.527 a' −0.422
f −0.013 f' +0.167
c +13.2 c' −18.5

see p. 6.

	Mean x	ax	fy	c	Σ		O	C	O−C	p. 64
							−2981.5	X		
7980	299.6	−1.6	+0.3	+13.2	+11.9	311.5	−2670.0	−2668.0	−2.0	−2.0
8714	313.9	−1.7	+0.4		+11.9	325.8	−2655.7	−2656.4	+0.7	+0.7
7923	548.1	−2.9	+0.3		+10.6	558.7	−2422.8	−2424.1	+1.3	+1.2
6508	1064.1	−5.6	+0.1		+7.7	1071.8	−1909.7	−1908.5	−1.2	−1.2
11113	2179.2	−11.5	+0.7		+2.4	2181.6	−799.9	−800.6	+0.7	+0.7
a=4034	3930.0	−20.7	+0.3		−7.2	3922.8	+941.3	+938.9	+2.4	+2.4
13902	4578.4	−24.1	+0.6		−10.3	4568.1	+1586.6	+1587.5	−0.9	−0.9
14603	4992.6	−26.3	+0.6		−12.5	4980.1	+1998.6	+1999.7	−1.1	−1.0
15462	5486.0	−28.9	+0.5		−15.2	5470.8	+2489.3	+2489.7	−0.4	−0.3

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see p.6 [* Mee − y]

	Mean y	a'x	b'x	c'	Σ	O	+2953.7	C / I	O−C	p.64
7980*	−2510.3	+10.6	+0.5	−18.5	−7.4	−2517.7	+436.0	+436.0	0.0	0.0
8714	−3433.0	+14.5	+0.5		−3.5	−3436.5	−482.8	−480.6	−2.2	−2.1
7923	−2485.9	+10.5	+0.9		−7.1	−2493.0	+460.7	+462.0	−1.3	−1.3
6508	−1023.1	+4.3	+1.8		−12.4	−1035.5	+1918.2	+1916.9	+1.3	+1.4
11113	−5274.3	+22.3	+3.6		+7.4	−5266.9	−2313.2	−2315.3	+2.1	+2.0
a=4034	−2412.6	+10.2	+6.6		−1.7	−2414.3	+539.4	+537.7	+1.7	+1.6
13902	−4642.6	+19.6	+7.6		+8.7	−4633.9	−1680.2	−1680.8	+0.6	+0.5
14603	−4390.6	+18.5	+8.3		+8.3	−4382.3	−1428.6	−1429.8	+1.2	+1.2
15462	−3945.4	+16.6	+9.2		+7.3	−3938.1	−984.4	−980.8	−3.6	−3.7

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1896phae.proj.1670W

D 4851 Reduction of Lettered Stars.

sep 1.7

	Mean x	ax	by	c	Σ	−2981.5
e	1532.8	−8.1	+6.5	+13.2	+5.6	1538.4 − 1443.1
d	2105.9	−11.1	+0.5		+2.6	2108.5 − 873.0
c	2119.8	−11.2	+0.5		+2.5	2122.3 − 859.2
g	2275.2	−12.0	+0.4		+1.6	2276.8 − 704.7
p	2729.9	−14.4	+0.4		−0.8	2729.1 − 252.4
k	2741.3	−14.4	+0.3		−0.9	2740.4 − 241.1
r	2810.1	−14.8	+0.4		−1.2	2808.9 − 172.6
h	2842.1	−15.0	+0.4		−1.4	2840.7 − 140.8
m	2845.9	−15.0	+0.4		−1.4	2844.5 − 137.0
j	2998.3	−15.8	+0.4		−2.2	2996.1 + 17.6
o	2955.9	−15.6	+0.4		−2.0	2953.9 − 27.6
l	2990.1	−15.8	+0.4		−2.2	2987.9 + 6.4
y	3070.3	−16.2	+0.4		−2.6	3067.7 + 86.2
f	3028.0	−16.0	+0.4		−2.4	3025.6 + 44.1
q	3176.2	−16.7	+0.4		−3.1	3173.1 + 191.6
t	3189.9	−16.8	+0.4		−3.2	3186.7 + 205.2
v	3289.9	−17.3	+0.4		−3.7	3286.2 + 304.7
u	3321.1	−17.5	+0.4		−3.9	3317.2 + 335.7
s	3346.6	−17.6	+0.3		−4.1	3342.5 + 361.0
b	3424.9	−18.0	+0.3		−4.5	3420.4 + 438.9
x	3087.5	−16.3	+0.4		−2.7	3084.8 + 103.3
w	3411.8	−18.0	+0.4		−4.4	3407.4 + 425.9

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sup. 7

	Mean	a'x	b'y+c'	Σ		+2953.7
e	-3850.1	+16.2	+2.6 -18.5	+0.3	-3849.8	- 896.1
d	-3702.8	+15.6	+3.5	+0.6	-3702.2	- 748.5
c	-3658.1	+15.4	+3.5	+0.4	-3657.7	- 704.0
g	-3245.5	+13.7	+3.8	-1.0	-3246.5	- 292.8
f	-3206.1	+13.5	+4.6	-0.4	-3206.5	- 252.8
k	-2638.2	+11.1	+4.6	- 2.8	-2641.0	+ 312.7
r	-3172.0	+13.4	+4.7	-0.4	-3172.4	- 218.7
h	-3154.0	+13.3	+4.7	-0.5	-3154.5	- 200.8
m	-2962.4	+12.5	+4.8	~~+0.8~~ -1.2	-2963.6	- 9.9
z	-3048.1	+12.9	+5.0	-0.6	-3048.7	- 95.0
o	-3325.9	+14.0	+4.9	+0.4	-3325.5	- 371.8
l	-3387.7	+14.3	+5.0	+0.8	-3386.9	- 433.2
y	-3046.2	+12.9	+5.1	-0.5	-3046.7	- 93.0
p	-3305.9	+14.0	+5.1	+0.6	-3305.3	- 351.6
q	-3172.0	+13.4	+5.3	+0.2	-3171.8	- 218.1
t	-3451.9	+14.6	+5.3	+1.4	-3450.5	- 496.8
n	-2937.9	+12.4	+5.5	-0.6	-2938.5	+ 15.2
u	-3153.8	+13.3	+5.5	+0.3	-3153.5	- 199.8
s	-2466.0	+10.4	+5.6	-2.5	-2468.5	+ 485.2
b	-2315.7	+ 9.8	+ 5.7	- 3.0	-2318.7	+ 635.0
x	-3188.0	+13.5	+5.2	+0.2	-3187.8	- 234.1
w	-3208.0	+13.5	+ 5.7	+0.7	-3207.3	- 253.6

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D 4851 Reduction of Faint Stars.

a	-.527	a'	-.422
b	-.013	b'	+.167
c	+13.2	c'	-18.5

	Mean x				✓ -2981.5	✓ -2981.5
1	+1190.4	-6.3	+0.4	+13.2	+7.3	+1197.7	-1783.8
2	1229.6	-6.5	+0.4		+7.1	+1233.7	-1747.8
3	1264.0	-6.7	+0.4		+6.9	+1270.9	-1710.6
4	1262.8	-6.7	+0.4		+6.9	+1269.7	-1711.8
5	1280.1	-6.7	+0.4		+6.9	+1287.0	-1694.5
6	1328.2	-7.0	+0.4		+6.6	+1334.8	-1648.7
7	1335.9	-7.0	+0.3		+6.5	+1342.4	-1639.1
	1335.7	-7.0	+0.3		+6.5	+1342.2	-1639.3
8	1380.0	-7.3	+0.4		+6.3	+1386.3	-1595.2
9	1412.7	-7.4	+0.5		+6.3	+1419.0	-1562.5
10	1426.3	-7.5	+0.4		+6.1	+1432.4	-1549.1
11	1432.2	-7.5	+0.3		+6.0	+1438.2	-1543.3
12	1465.5	-7.7	+0.3		+5.8	+1471.3	-1510.2
13	1461.9	-7.7	+0.3		+5.8	+1467.7	-1513.8
	1462.1	-7.7	+0.3		+5.8	+1467.9	-1513.6
14	1540.1	-8.1	+0.5		+5.6	1545.7	-1435.8
15	1570.0	-8.3	+0.5		+5.4	1575.4	-1406.1
16	1637.7	-8.6	+0.5		+5.1	1642.8	-1338.7
17	1618.0	-8.5	+0.4		+5.1	1623.1	-1358.4
18	1699.9	-9.0	+0.5		+4.7	1704.6	-1276.9
19	1652.1	-8.7	+0.4		+4.9	1657.0	-1324.5
20	1657.9	-8.7	+0.3		+4.8	1662.7	-1318.8
21	1692.1	-8.9	+0.3		+4.6	1696.7	-1284.8
22	1693.9	-8.9	+0.2		+4.5	1698.4	-1283.1
23	1821.7	-9.6	+0.3		+3.9	1825.6	-1155.9
24	1864.8	-9.8	+0.5		+3.9	1868.7	-1112.8
25	1858.4	-9.8	+0.4		+3.8	1862.2	-1119.3
3a	1236.3	-6.5	+0.4		+7.1	1243.4	-1738.1
14a	1508.2	-7.9	+0.3		+5.6	1513.8	-1467.7
14b	1510.1	-8.0	+0.3		+5.5	1515.6	-1465.9

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	Mean. y					+29537
1	−2818.2	+11.9	+2.0	−18.5	−4.6	−2822.8 + 1309
2	−3358.2	+14.2	+2.1		−2.2	−3360.4 − 406.7
3	−3268.7	+13.8	+2.1		−2.6	−3271.3 − 317.6
4	−2931.0	+12.4	+2.1		−4.0	−2935.0 + 18.7
5	−2894.5	+12.2	+2.1		−4.2	−2898.7 + 55.0
6	−2876.4	+12.1	+2.2		−4.2	−2880.6 + 73.1
7	−2270.0 (9.0)	+9.6	+2.2		−6.7	−2276.7 + 677.0 (85, 68)
	−2278.4	+9.6	+2.2		−6.7	−2285.1 + 668.6
8	−3167.5	+13.4	+2.3		−2.8	−3170.3 − 216.6
9	−3570.7	+15.1	+2.4		−1.0	−3571.7 − 618.0
10	−3297.8	+13.9	+2.4		−2.2	−3300.0 − 346.3
11	−2252.3	+9.5	+2.4		−6.6	−2258.9 + 694.8
12	−2269.7	+9.6	+2.4		−6.5	−2276.2 + 677.5
13	−2298.1	+9.7	+2.4		−6.4	−2304.5 + 649.2
	−2298.1	+9.7	+2.4		−6.4	−2304.5 + 649.1
14	−3662.2	+15.5	+2.6		−0.4	−3662.6 − 708.9
15	−3538.2	+14.9	+2.6		−1.0	−3539.2 − 585.5
16	−3757.5	+15.9	+2.7		+0.1	−3757.4 − 803.7
17	−2702.0	+11.4	+2.7		−4.4	−2706.4 + 247.3
18	−4164.1	+17.6	+2.8		+1.9	−4162.2 − 1208.5
19	−2884.2	+12.2	+2.8		−3.5	−2887.7 + 66.0
20	−2022.5	+8.5	+2.8		−7.2	−2029.7 + 924.0
21	−1936.1	+8.2	+2.8		−7.5	−1943.6 + 1010.1
	(1877.9)					(85.7) 1068.0
22	~~−1861.8~~	+7.9	+2.8		−7.8	−1869.6 + 1084.1
23	−2346.2	+9.9	+3.0		−5.6	−2351.8 + 601.9
24	−3822.3	+16.1	+3.1		+0.7	−3821.6 − 867.9
25	−3337.7	+14.1	+3.1		−1.3	−3339.0 − 385.3
3a	−3062.2	+12.9	+2.1		−3.5	−3065.7 − 112.0
14a	−2398.2	+10.1	+2.5		−5.9	−2404.1 + 549.6
14b	−2490.5	+10.5	+2.5		−5.5	−2496.0 + 457.7

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	Meas. x	ax	by	c	Σ	−2981.5
26	1870.1	−9.9	+0.3	+13.2	1873.7	−1107.8
27	1841.9	−9.7	+0.2	+3.7	1845.6	−1135.9
"	1842.1	−9.7	+0.2	+3.7	1845.8	−1135.7
28	1902.3	−10.0	+0.6	+3.8	1906.1	−1075.4
29	1920.2	−10.1	+0.5	+3.6	1923.8	−1057.7
30	1908.3	−10.1	+0.5	+3.6	1911.9	−1069.6
31	1906.1	−10.0	+0.5	+3.7	1909.8	−1071.7
32	1944.1	−10.2	+0.3	+3.3	1947.4	−1034.1
33	2050.0	−10.8	+0.4	+2.8	2052.8	−928.7
34	2093.8	−11.0	+0.2	+2.4	2096.2	−885.3
Additional 1=34	2092.6	−11.0	+0.2	+2.4	2095.0	−886.5
35	2148.3	−11.3	+0.4	+2.3	2150.6	−830.9
36	2194.3	−11.6	+0.5	+2.1	2196.4	−785.5
37	2226.0	−11.7	+0.4	+1.9	2227.9	−753.6
38	2245.9	−11.8	+0.4	+1.8	2247.7	−733.8
39	2196.1	−11.6	+0.2	+1.8	2197.9	−783.6
40	2243.9	−11.8	+0.2	+1.6	2245.5	−736.0
"	2202.1	−11.6	+0.2	+1.8	2203.9	−777.6
41	2252.1	−11.9	+0.5	+1.8	2253.9	−727.6
42	2290.0	−12.1	+0.5	+1.6	2291.6	−689.9
43	2278.4	−12.0	+0.4	+1.6	2280.0	−701.5
44	2274.2	−12.0	+0.4	+1.6	2275.8	−705.7
45	2274.0	−12.0	+0.4	+1.6	2275.6	−705.9
46	2303.9	−12.1	+0.2	+1.3	2305.2	−676.3
47	2314.3	−12.2	+0.6	+1.6	2315.9	−665.6
48	2318.3	−12.2	+0.5	+1.5	2319.8	−661.7
49	2336.2	−12.3	+0.5	+1.4	2337.6	−643.9
50	2340.2	−12.3	+0.2	+1.1	2341.3	−640.2
32a	1940.1	−10.2	+0.3	+3.3	1943.4	−1038.1
32b	1940.1 1922.0	−10.1	+0.3	+3.4	1925.4	−1056.1
40	2202.1	−10.0	+0.3	+3.5	1911.8	−1069.7

1038.1

W S meas for 32a=32c 1908.3

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	Mean.	γ	$\alpha\gamma$	$\delta\alpha$	δ'	Σ	+29537
26	-2369.8	+10.0	+3.1	-18.5	-5.4	-2375.2	+5885
27	-1659.1	+7.0	+3.1		-8.4	-1667.5	+1286.2
"	1658.7	+7.0	+3.1		-8.4	-1667.1	+1286.6
28	-4300.3	+18.1	+3.2		+2.8	-4297.5	-1343.8
29	-4170.0	+17.6	+3.2		+2.3	-4167.7	-1214.0
30	-3902.0	+16.5	+3.2		+1.2	-3900.8	-947.1
31	-3656.4	+15.4	+3.2		+0.1	-3656.3	-702.6
32	-2381.9	+10.1	+3.2		-5.2	-2387.1	+566.6
33	-3061.8	+12.9	+3.4		-2.2	-3064.0	-110.3
34	-1418.1	+6.0	+3.5		-9.0	-1427.1	+1526.6
"	1418.1	+6.0	+3.5		-9.0	-1427.1	+1526.6
35	-3258.3	+13.8	+3.6		-1.1	-3259.4	-305.7
36	-3556.1	+15.0	+3.7		+0.2	-3555.9	+602.2
37	-3182.2	+13.4	+3.7		-1.4	-3183.6	-229.9
38	-3086.1	+13.0	+3.8		-1.7	-3087.8	-134.1
39	-1886.1	+7.5	+3.7		-7.3	-1893.4	+1060.3
		8.0			-16.8	1.29	
40	-1458.3	+6.2	+3.7		-8.6	-1466.9	+1486.8
"	1428.1	+6.0	+3.7		-8.8	-1436.9	+1516.8
41	-3935.9	+16.6	+3.8		+1.9	-3934.0	-980.3
42	-3796.3	+16.0	+3.8		+1.3	-3795.0	-841.3
					72		5
43	-3276.3	+13.8	+3.8		-0.9	-3276.9	-323.8
44	-3190.3	+13.5	+3.8		-1.2	-3191.5	-237.8
45	-3087.9	+13.0	+3.8		-1.7	-3089.6	-135.9
46	-1338.1	+5.6	+3.8		-9.1	-1347.2	+1606.5
47	-4458.3	+18.8	+3.9		+4.2	-4454.1	-1500.4
48	-3942.1	+16.6	+3.9		+2.0	-3940.1	-986.4
49	-3712.2	+15.7	+3.9		+1.1	-3711.1	-757.4
50	-1548.3	+6.5	+3.9		-8.1	-1556.4	+1397.3
32a	2594.5	+10.9	+3.2		-4.4	-2598.9	+354.8
32b	2249.5	+9.5	+3.2		-5.8	-2255.3	+698.4
	14281	+10.9	+3.2		-4.4	-2588.4	+365.3

For 2nd meas 32c see p 76-77

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D 4851

32c 1908.1 −10.1 +0.3 +3.4 1911.5 = 1070.0

	Mean x	ax	by	c	Σ		−2981.5
51	2324.5	−12.3	+0.2	+13.2	+1.1	2325.6	− 655.9
52	2369.7	−12.5	+0.2		+0.9	2370.6	− 610.9
"	2369.3	−12.5	+0.2		+0.9	2370.2	− 611.3
53	2395.0	−12.6	+0.5		+1.1	2396.1	− 585.4
"	2394.2	−12.6	+0.5		+1.1	2395.3	− 586.2
54	2378.3	−12.5	+0.5		+1.2	2379.5	− 602.0
55	2462.2	−13.0	+0.4		+0.6	2462.8	− 518.7
56	2468.0	−13.0	+0.2		+0.4	2468.4	− 512.1
57	2489.8	−13.1	+0.5		+0.6	2490.4	− 491.1
58	2547.9	−13.4	+0.4		+0.2	2548.1	− 433.4
59	2537.5	−13.4	+0.2		0.0	2537.5	− 444.0
	2537.7	−13.4	+0.2		0.0	2537.7	− 443.8
60	2504.1	−13.2	+0.2		+0.2	2504.3	− 477.2
61	2543.9	−13.4	+0.6		+0.4	2544.3	− 437.2
62	2572.6	−13.6	+0.5		+0.1	2572.7	− 408.8
63	2569.9	−13.5	+0.5		+0.2	2570.1	− 411.4
64	2564.3	−13.5	+0.5		+0.2	2564.5	− 417.0
65	2581.2	−13.6	+0.3		−0.1	2581.1	− 400.4
66	2560.1	−13.5	+0.2		−0.1	2560.0	− 421.5
67	2618.3	−13.8	+0.4		−0.2	2618.1	− 363.4
68	2653.9	−14.0	+0.3		−0.5	2653.4	− 328.1
69	2617.9	−13.8	+0.2		−0.4	2617.5	− 364.0
70	2637.2	−13.9	+0.2		−0.5	2636.7	− 344.8
71	2671.9	−14.1	+0.5		−0.4	2671.5	− 310.0
72	2694.4	−14.2	+0.6		−0.4	2694.0	− 287.5
73	2696.2	−14.2	+0.5		−0.5	2695.7	− 285.8
74	2676.1	−14.1	+0.3		−0.6	2675.5	− 306.0
75	2734.1	−14.4	+0.5		−0.7	2733.4	− 248.1

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32C 2584.2 +10.9 +3.2 −4.4 2588.6 +365.1

	Meas. y	a'y	b'y	c'	Σ		+2953.7
51	−1457.1	+6.1	+3.9	−18.5	−8.5	−1465.6	+1488.1
52	−1726.1	+7.3	+4.0		−7.2	−1733.3	+1220.4
"	1726.1	+17.3	+4.0		−7.2	−1733.3	+1220.4
53	−3490.1	+14.7	+4.0		+0.2	−3489.9	−536.2
"	3490.1	+14.7	+4.0		+0.2	−3489.9	−536.2
54	−4058.7	+17.1	+4.0		+2.6	−4056.1	−1102.4
55	−2711.9	+11.4	+4.1		−3.0	−2714.9	+238.8
56	−1310.4	+5.5	+4.1		−8.9	−1319.3	+1634.4
57	−4172.1	+17.6	+4.2		+3.3	−4168.8	−1215.1
58	−2992.0	+12.6	+4.3		−1.6	−2993.6	−39.9
59	−1910.2	+8.1	+4.2		−6.2	−1916.4	+1037.3
"	1910.2	+8.1	+4.2		−6.2	−1916.4	+1037.3
60	−1446.2	+6.1	+4.2		−8.2	−1454.4	+1499.3
61	−4265.8	+18.0	+4.2		+3.7	−4262.1	−1308.4
62	−4042.7	+17.1	+4.3		+2.9	−4039.8	−1086.1
63	−3752.1	+15.8	+4.3		+1.6	−3750.5	−796.8
64	−3548.2	+15.0	+4.3		+0.8	−3547.4	−593.7
65	−2624.5	+11.1	+4.3		−3.1	−2627.6	+326.1
66	−1767.9	+7.5	+4.3		−6.7	−1774.6	+1179.1
67	−3088.1	+13.0	+4.4		−1.1	−3089.2	−135.5
68	−2628.3	+11.1	+4.4		−3.0	−2631.3	+322.4
69	−1532.5	+6.5	+4.4		−7.6	−1540.1	+1413.6
70	−1273.9	+5.4	+4.4		−8.7	−1282.6	+1671.1
71	−4156.1	+17.5	+4.5		+3.5	−4152.6	−1198.9
72	−4602.1	+19.4	+4.5		+5.4	−4596.7	−1643.0
73	−4050.7	+17.1	+4.5		+3.1	−4047.6	−1093.9
74	−2359.5	+10.0	+4.5		−4.0	−2363.5	+590.2
75	−3853.9	+16.3	+4.6		+2.4	−3851.5	−997.8

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	Meas. x	ax	by	c	Σ		-2981.5
76	2772.3	-14.6	+0.5	+13.2	-0.9	2771.4	- 210.1
77	2785.9	-14.7	+0.5		-1.0	2784.9	- 196.6
78	2745.9	-14.5	+0.4		-0.9	2745.0	- 236.5
79	2805.9	-14.8	+0.5		-1.1	2804.8	- 176.7
80	2833.7	-14.9	+0.2		-1.5	2832.2	- 149.3
81	2820.2	-14.9	+0.2		-1.5	2818.7	- 162.8
82	2837.7	-15.0	+0.2		-0.6	2836.1	- 145.4
83	2852.1	-15.0	+0.6		-1.2	2850.9	- 130.6
84	2889.8	-15.2	+0.3		-1.7	2888.1	- 93.4
85	2878.0	-15.2	+0.2		-1.8	2876.2	- 105.3
86	2873.8	-15.1	+0.2		-1.7	2872.1	- 109.4
87	2890.0	-15.2	+0.2		-1.8	2888.2	- 93.3
88	2901.9	-15.3	+0.2		-1.9	2900.0	- 81.5
89	2950.0	-15.5	+0.3		-2.0	2948.0	- 33.5
90	2961.7	-15.6	+0.3		-2.1	2959.6	- 21.9
91	2948.0	-15.5	+0.2		-2.1	2945.9	- 35.6
92	2970.0	-15.7	+0.3		-2.2	2967.8	- 13.7
93	2984.1	-15.7	+0.2		-2.3	2981.8	+ 0.3
94	2996.0	-15.8	+0.3		-2.3	2993.7	+ 12.2
95	3085.5	-16.3	+0.3		-2.8	3082.7	+ 101.2
96	3200.1	-16.9	+0.6		-3.1	3197.0	+ 215.5
97	3152.1	-16.6	+0.2		-3.2	3148.9	+ 167.4
98	3242.0	-17.1	+0.5		-3.4	3238.6	+ 257.1
99	3251.9	-17.1	+0.2		-3.7	3248.2	+ 266.7
100	3323.9	-17.5	+0.6		-3.7	3320.2	+ 338.7

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	Mean y	a'y	b'x	c'	Σ	+2953.7
76	-3801.9	+16.0	+4.6	-18.5	+2.1 -37998	- 846.1
77	-3548.2	+15.1	+4.7		+1.3 -35469	- 593.2
78	-2738.3	+11.6	+4.6		-2.3 -2740.6	+ 213.1
79	-4130.0	+17.4	+4.7		+3.6 -4126.4	-1172.7
80	-1810.1	+7.6	+4.7		-6.2 -1816.3	+1137.4
81	-1633.7	+6.9	+4.7		-6.9 -1640.6	+1313.1
82	-1207.6	+5.1	+4.7		-8.7 -1216.3	+1737.4
83	-4577.9	+19.3	+4.8		+5.6 -4572.3	-1618.6
84	-2533.9	+10.7	+4.8		-3.0 -2536.9	+ 416.8
85	-1762.5	+7.4	+4.8		-6.3 -1768.8	+1184.9
86	-1732.0	+7.3	+4.8		-6.4 -1738.4	+1215.3
87	-1411.9	+6.0	+4.8		-7.7 -1419.6	+1534.1
88	-1410.0	+6.0	+4.8		-7.7 -1417.7	+1536.0
89	-2256.0	+9.5	+4.9		-4.1 -2260.1	+693.6 -2254.3 +699.4
90	-2129.1	+9.0	+4.9		-4.6 -2133.7	+ 820.0
91	-1288.1	+5.4	+4.9		-8.2 -1296.3	+1657.4
92	-2392.6	+10.1	+5.0		-3.4 -2396.0	+ 557.7
93	-1296.1	+5.5	+5.0		-8.0 -1304.1	+1649.6
94	-1998.3	+8.4	+5.0		-5.1 -2003.4	+ 950.3
95	-2584.0	+10.9	+5.2		-2.4 -2586.4	+ 367.3
96	-4665.7	+19.7	+5.3		+6.5 -4659.2	-1705.5
97	-1476.5	+6.2	+5.3		-7.0 -1483.5	+1470.2
98	-4156.9	+17.5	+5.4		+4.4 -4152.5	-1198.8
99	-1307.9	+5.5	+5.4		-7.6 -1315.5	+1638.2
100	-4577.9	+19.3	+5.6		+6.4 -4571.5	-1617.8

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	Meas. x	ax	by	c	Σ	−2981.5
101	3328.1	−17.5	+0.6	+13.2	−3.7	3324.4 + 342.9
102	3301.6	−17.4	+0.5		−3.7	3297.9 + 316.4
103	3318.1	−17.5	+0.5		−3.8	3314.3 + 332.8
104	3289.9	−17.3	+0.4		−3.7	3286.2 + 304.7
105	3283.1	−17.3	+0.3		−3.8	3279.3 + 297.8
106	3374.1	−17.8	+0.5		−4.1	3370.0 + 388.5
107	3369.8	−17.8	+0.5		−4.1	3365.7 + 384.2
108	3380.1	−17.8	+0.5		−4.1	3376.0 + 394.5
109	3385.5	−17.8	+0.2		−4.4	3381.1 + 399.6
110	3391.1	−17.9	+0.6		−4.1	3387.0 + 405.5
111	3437.5	−18.1	+0.5		−4.4	3433.1 + 451.6
113 = ~~112~~	3474.4	−18.3	+0.5		−4.6	3469.8 + 488.3
114 = ~~113~~	3487.6	−18.4	+0.5		−4.7	3482.9 + 501.4
115 = ~~114~~	3490.0	−18.4	+0.3		−4.9	3485.1 + 503.6
112 = ~~115~~	3447.9	−18.2	+0.3		−4.7	3443.2 + 461.7
116	3468.1	−18.3	+0.2		−4.9	3463.2 + 481.7
117	3509.8	−18.5	+0.2		−5.1	3504.7 + 523.2
118	3538.6	−18.6	+0.6		−4.8	3533.8 + 552.3
	3539.2	−18.7	+0.6		−4.9	3534.3 + 552.8
119	3550.1	−18.7	+0.5		−5.0	3545.1 + 563.6
120	3514.3	−18.5	+0.5		−4.8	3509.5 + 528.0
121	3522.5	−18.6	+0.5		−4.9	3517.6 + 536.1
	3522.1	−18.6	+0.5		−4.9	3517.2 + 535.7
122	3600.0	−19.0	+0.6		−5.2	3594.8 + 613.3
123	3602.0	−19.0	+0.6		−5.2	3596.8 + 615.3
124	3587.7	−18.9	+0.5		−5.2	3582.5 + 601.0
125	3617.9	−19.1	+0.5		−5.4	3612.5 + 631.0

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	Mean. y	a'y	b'y	c'	Σ	+2953.7
101	-4307.5	+18.2	+5.6	-18.5	+5.3	-4302.2 -1348.5
102	-3990.2	+16.8	+5.5		+3.8	-3986.5 -1032.7
103	-3938.3	+16.6	+5.5		+3.6	-3934.7 -981.0
104	-2710.0	+11.4	+5.5		-1.6	-2711.6 +242.1
105	-2044.2	+8.6	+5.5		-4.4	-2048.6 +905.1
106	-4068.3	+17.2	+5.6		+4.3	-4064.0 -1110.3
107	-3819.9	+16.1	+5.6		+3.2	-3816.7 -863.0
108	-3722.0	+15.7	+5.6		+2.8	-3719.2 -765.5
109	-1687.2	+7.1	+5.7		-5.7	-1692.9 +1260.8
110	-4684.2	+19.8	+5.7		+7.0	-4677.2 -1723.5
111	-4090.9	+17.3	+5.7		+4.5	-4086.4 -1132.7
113=~~112~~	-3762.9	+15.9	+5.8		+3.2	-3759.7 -806.0
114=~~113~~	-3650.0	+15.4	+5.8		+2.7	-3647.3 -693.6
115=~~114~~	-2491.5	+10.5	+5.8		-2.2	-2493.7 +460.0
112=~~115~~	-2178.5	+9.2	+5.8		-3.5	-2182.0 +771.7
116	-1542.1	+6.5	+5.8		-6.2	-1548.3 +1405.4
117	-1507.6	+6.4	+5.9		-6.2	-1513.8 +1439.9
118	-4490.2	+18.9	+5.9		+6.3	-4483.9 -1530.2
	-4490.4	+18.9	+5.9		+6.3	-4484.1 -1530.4
119	-3695.9	+15.6	+5.9		+3.0	-3692.9 -739.2
120	-3670.7	+15.5	+5.9		+2.9	-3667.8 -714.1
121	-3556.1	+15.0	+5.9		+2.4	-3553.7 -600.0
	-3556.1	+15.0	+5.9		+2.4	-3553.7 -600.0
122	-4478.1	+18.9	+6.0		+6.4	-4471.7 -1518.0
123	-4368.3	+18.4	+6.0		+5.9	-4362.4 -1408.7
124	-4110.2	+17.3	+6.0		+4.8	-4105.4 -1151.7
125	-3858.9	+16.3	+6.0		+3.8	-3855.1 -901.4

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D4851

Mean x	ax	by	c	Σ	−2981.5
126	3606.4	−19.0	+0.4 +13.2	−5.4	3601.0 + 619.5
127	3629.5	−19.1	+0.3	−5.6	3623.9 + 642.4
128	3673.7	−19.4	+0.6	−5.6	3668.1 + 686.6
129	3673.9	−19.4	+0.5	−5.7	3668.2 + 686.7
130	3636.3	−19.2	+0.3	−5.7	3630.6 + 649.1
131	3642.7	−19.2	+0.2	−5.8	3636.9 + 655.4
132	3702.5	−19.5	+0.4	−5.9	3696.6 + 715.1
133	3720.2	−19.6	+0.4	−6.0	3714.2 + 732.7
134	3722.0	−19.6	+0.2	−6.2	3715.8 + 734.3
135	3741.9	−19.7	+0.2	−6.3	3735.6 + 754.1
136	3767.7	−19.9	+0.6	−6.1	3761.6 + 780.1
137	3780.0	−19.9	+0.5	−6.2	3773.8 + 792.3
138	3773.8	−19.9	+0.4	−6.3	3767.5 + 786.0
139	3793.9	−20.0	+0.3	−6.5	3787.4 + 805.9 ✓
	3794.1	−20.0	+0.3	−6.5	3787.6 + 806.1 ✓
140	3756.5	−19.8	+0.3	−6.3	3750.2 + 768.7
141	3811.9	−20.1	+0.5	−6.4	3805.5 + 824.0
142	3828.5	−20.2	+0.5	−6.5	3822.0 + 840.5
143	3812.1	−20.1	+0.2	−6.7	3805.4 + 823.9
144	3942.3	−20.8	+0.6	−7.0	3935.3 + 953.8
145	3965.2	−20.9	+0.5	−7.2	3958.0 + 976.5
146	3948.1	−20.8	+0.4	−7.2	3940.9 + 959.4
147	3940.3	−20.8	+0.3	−7.3	3933.0 + 951.5
148	3962.0	−20.9	+0.2	−7.5	3954.5 + 973.0
149	3988.1	−21.0	+0.2	−7.6	3980.5 + 999.0
150	4028.4	−21.2	+0.5	−7.5	4020.9 + 1039.4 ✓
"	4030.0	−21.2	+0.5	−7.5	4022.5 + 1041.0 ✓

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Mean.	y	a'y	b'x	c'	Σ	+2953.7
126	-3451.9	+14.6	+6.0	-18.5	+2.1	-3449.8 - 496.1
127	-2434.3	+10.3	+6.1		-2.1	-2436.4 + 517.3
128	-4302.3	+18.2	+6.1		+5.8	-4296.5 - 1342.8
129	-3592.0	+15.2	+6.1		+2.8	-3589.2 - 635.5
130	-1990.1	+8.4	+6.1		-4.0	-1994.1 + 959.6
131	-1322.0	+5.6	+6.1		-6.8	-1328.8 + 1624.9
132	-3456.1	+14.6	+6.2		+2.3	-3453.8 - 500.1
133	-3144.1	+13.3	+6.2		+1.0	-3143.1 - 189.4
134	-1898.1	+8.0	+6.2		-4.3	-1902.4 + 1051.3
135	-1546.1	+6.5	+6.2		-5.8	-1551.9 + 1401.8
136	-4544.3	+19.2	+6.3		+7.0	-4537.3 - 1583.6
137	-4161.9	+17.6	+6.3		+5.4	-4156.5 - 1202.8
138	-3098.5	+13.1	+6.3		+0.9	-3097.6 - 143.9
139	-2327.9	+9.8	+6.3		-2.4	-2330.3 + 623.4
	-2328.1	+9.8	+6.3		-2.4	-2330.5 + 623.2
140	-2302.5	+9.7	+6.3		-2.5	-2305.0 + 648.7
141	-3809.8	+16.1	+6.4		+4.0	-3805.8 - 852.1
142	-4126.9	+17.4	+6.4		+5.3	-4121.6 - 1167.8
143	-1912.4	+8.1	+6.4		-4.0	-1916.4 + 1037.3
144	-4420.3	+18.7	+6.6		+6.8	-4413.5 - 1459.8
145	-4063.1	+17.1	+6.6		+5.2	-4057.9 - 1104.2
146	-2948.2	+12.4	+6.6		+0.5	-2947.7 + 6.0
147	-2298.5	+9.7	+6.6		-2.2	-2300.7 + 653.0
148	-1574.1	+6.6	+6.6		-5.3	-1579.4 + 1374.3
149	-1627.0	+6.9	+6.7		-4.9	-1631.9 + 1321.8
150	-4228.3	+17.8	+6.7		+6.0	-4222.3 - 1268.6
"	-4229.3	+17.8	+6.7		+6.0	-4223.3 - 1269.6

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Meas.	x.	ax	by	c	Σ	−2981.5
151	4018.0	-21.2	+0.5	+13.2	-7.5	4010.5 +1029.0
152	4031.9	-21.2	+0.4		-7.6	4024.3 +1042.8
153	4042.7	-21.3	+0.3		-7.8	4034.9 +1053.4
154	4094.1	-21.6	+0.5		-7.9	4086.2 +1104.7 ✓
	4093.9	-21.6	+0.5		-7.9	4086.0 +1104.5
155	4088.0	-21.5	+0.5		-7.8	4080.2 +1098.7
156	4090.7	-21.6	+0.4		-8.0	4082.7 +1101.2
157	4097.9	-21.6	+0.3		-8.1	4089.8 +1108.3
158	4110.0	-21.7	+0.3		-8.2	4101.8 +1120.3
159	4122.1	-21.7	+0.6		-7.9	4114.2 +1132.7
160	4114.1	-21.7	+0.6		-7.9	4106.2 +1124.7
161	4138.0	-21.8	+0.5		-8.1	4129.9 +1148.4
"	4138.0	-21.8	+0.5		-8.1 ✓	4129.9 +1148.4 ✓
162	4125.9	-21.7	+0.3		-8.2	4117.7 +1136.2
163	4126.1	-21.7	+0.3		-8.2	4117.9 +1136.4
164	4122.1	-21.7	+0.3		-8.2	4113.9 +1132.4
165	4127.7	-21.8	+0.3		-8.3	4119.4 +1137.9 ✓
166	4151.9	-21.9	+0.3		-8.4	4143.5 +1162.6 ✓
167	4194.4	-22.1	+0.2		-8.4	4185.7 +1204.2 ✓
168	4199.6	-22.1	+0.5		-8.4	4191.2 +1209.7 ✓
169	4197.2	-22.1	+0.3		-8.5	4188.8 +1207.4
170	4198.0	-22.1	+0.2		-8.7 ✓	4189.3 +1207.8 ✓
171	4262.0	-22.5	+0.2		-9.1	4252.9 +1271.4
172	4246.1	-22.4	+0.4		-8.8 ✓	4237.3 +1255.8 ✓
173	4286.3	-22.6	+0.4		-9.0	4277.3 +1295.8
174	4285.9	-22.6	+0.3		-9.1	4276.8 +1295.3
175	4292.1	-22.6	+0.5		-8.9	4283.2 +1301.7

Defect

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	Meas.	y	∆y	f'x	c'	Σ	+2953.7
151	-3834.0	+16.2	+6.7	-18.5	+4.4	-3829.6	-875.9
152	-3178.8	+13.4	+6.7		+1.6	-3177.2	-223.5
153	-2671.1	+11.3	+6.8		-0.4	-2671.5	+282.2
154	-3692.5	+15.6	+6.8		+3.9	-3688.6	-734.9
	3691.9	+15.6	+6.8		+3.8	-3688.0	-734.3
155	-3632.5	+15.3	+6.8		+3.6	-3628.9	-675.2
156	-2905.9	+12.3	+6.8		+0.6	-2905.3	+48.4
157	-2005.9	+8.5	+6.8		-3.2	-2009.1	+944.6
158	-2010.9	+8.5	+6.9		-3.1	-2014.0	+939.7
159	-4296.1	+18.1	+6.9		+6.5	-4289.6	-1335.9
160	-4232.3	+17.9	+6.9		+6.3	-4226.0	-1272.3
161	-3716.2	+15.7	+6.9		+4.1	-3712.1	-758.4
"	3716.0	+15.7	+6.9		+4.1	-3711.9	-758.2
162	-2053.7	+8.7	+6.9		-2.9	-2056.6	+897.1
163	-2046.0	+8.6	+6.9		-3.0	-2049.0	+904.7
164	-2018.9	+8.5	+6.9		-3.1	-2022.0	+931.7
165	-2009.8	+8.5	+6.9		-3.1	-2012.9	+940.8
166	-1914.0	+8.1	+6.9		-3.5	-1917.5	+1036.2
167	-3762.1	+15.9	+7.0		+4.4	-3757.7	-804.0
168	-2618.1	+11.0	+7.0		-0.5	-2618.6	+335.1
169	-1730.2	+7.3	+7.0		-4.2	-1734.4	+1219.3
170	-1665.9	+7.0	+7.0		~~+5.5~~ -4.6	-1660.4	+1293.3
171	-4098.1	+17.3	+7.1		+5.9	-4092.2	-1138.5
172	-3336.1	+14.1	+7.1		+2.7	-3333.4	-379.7
173	-2851.9	+12.0	+7.2		+0.7	-2851.2	+102.5
174	-2567.9	+10.8	+7.2		-0.5	-2568.4	+385.3
175	-3921.3	+16.5	+7.2		+5.2	-3916.1	-962.4

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D 4851

	38041	-20.0 +0.2	-6.6	3797.5 + 816.0	
Additional (2)	3804.5	-20.0 +0.2	-6.6	3797.9 + 816.4	
3	4701.9	-24.8 +0.3	-11.3	4690.6 +1709.1	
4	4760.1	-25.1 +0.4	-11.5	4748.6 +1767.1	
	Meas. x	ax	by	c	Σ	-2981.5
176	4341.1	-22.9 + 0.3	+13.2	- 9.4	43317	+13502
177	43742	-23.1 + 0.4		- 9.5	4364.7	+13832
178	4370.2	-23.0 +0.4		- 9.4	4360.8	+1379.3
179	4413.7	-23.3 +0.4		- 9.7	4404.0	+14225
180	4418.5	-23.3 +0.4		- 9.7	4408.8	+1427.3
181	4424.1	-23.3 +0.3		- 9.8	4414.3	+1432.8
182	4429.9	-23.3 +0.3		-9.8	4420.1	+1438.6
183	4416.5	-23.3 +0.3		- 9.8	4406.7	+1425.2
184	4417.7	-23.3 +0.3		- 9.8	44079	+1426.4
185	4470.0	-23.6 +0.3		- 10.1	44599	+1478.4
186	4478.1	-23.6 +0.3		- 10.1	4468.0	+1486.5
187	4488.1	-23.7 +0.3		- 10.2	4477.9	+1496.4
188	4490.0	-23.7 +0.5		- 10.0	4480.0	+1498.5
	4490.7	-23.7 +0.5		-10.0	4480.25	+1498.7
189	4494.4	-23.7 +0.5		-10.0	44844	+15029
	4495.8	-23.7 +0.5		-10.0	4485.8	+1504.3
190	4521.9	-23.8 +0.5		-10.1	45118	+15303
	4521.7	-23.8 +0.5		-10.1	4511.6	+1530.1
191	4533.9	-23.9 +0.5		-10.2	4523.7	+1542.2
192	4566.2	-24.1 +0.3		-10.6	4555.1	+1574.1
193	4618.0	-24.3 +0.5		-10.6	46074	+16259
194	4601.7	-24.3 +0.4		- 10.7	4591.0	+1609.5
195	4690.0	-24.7 +0.4		-11.1	4678.9	+16974
196	4739.8	-25.0 +0.4		-11.4	47284	+1746.9
197	4752.1	-25.0 +0.4		-11.4	47407	+1759.2
	4752.1					+1759.12
Cape 17	3621.9	-19.1 +0.2		-5.7	3616.2	+634.7
J 265	4666.1	-24.6 +0.5		-10.9	4655.2	+1673.7
Defect W.S. meas for 3 v. bk 16 p 194	28840	-15.2 +0.4		-1.6	28824	-99.1

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Additional	-1362.7	-1.4 -1369.1	+1584.6
2	-1362.3 +5.7 +6.4	-6.4 -1368.7	+1585.0
3	-2324.1 +9.8 +7.9	-0.8 -2324.9	+628.8
4	-3270.0 +13.8 +7.9	+3.2 -3266.8	-313.1
	Meas. y a'y b'y c'	Σ	+2953.7
176	-2522.4 +10.6 +7.2 -18.5	-0.7 -2523.1	+430.6
177	-3400.3 +14.3 +7.3	+3.1 -3397.2	-443.5
178	-3147.5 +13.3 +7.3	+2.1 -3145.4	-191.7
179	-3375.5 +14.2 +7.4	+3.1 -3372.4	-418.7
180	-3266.1 +13.8 +7.4	+2.7 -3263.4	-309.7
181	-2679.1 +11.3 +7.4	+0.2 -2678.9	+274.8
182	-2470.0 +10.4 +7.4	-0.7 -2470.7	+483.0
183	-2174.1 +9.2 +7.4	-1.9 -2176.0	+777.7
184	-1984.0 +8.4 +7.4	-2.7 -1986.7	+967.0
185	-2577.8 +10.9 +7.5	-0.1 -2577.9	+375.8
186	-2350.3 +9.9 +7.5	-1.1 -2351.4	+602.3
187	-2170.0 +9.2 +7.5	-1.8 -2171.8	+781.9
188	-3754.1 +15.8 +7.5	+4.8 -3749.3	-795.6
	-3754.3 +15.8 +7.6	+4.8 -3749.5	-795.8
189	-3673.9 +15.5 +7.5	+4.5 -3669.4	-715.7
	-3674.1 +15.5 +7.8	+4.5 -3669.6	-715.9
190	-3704.3 +15.6 +7.4	+4.7 -3699.6	-746.1
	-3703.9 +15.6 +7.6	+4.7 -3699.2	-745.5
191	-3708.5 +15.6 +7.6	+4.7 -3703.8	-750.1
192	-2305.9 +9.7 +7.6	-1.2 -2307.1	+646.6
193	-3496.1 +14.8 +7.7	+4.0 -3492.1	-538.4
194	-3394.1 +14.3 +7.7	+3.5 -3390.6	-436.9
195	-2854.5 +12.0 +7.8	+1.3 -2853.2	+100.5
196	-3217.9 +13.6 +7.9	+3.0 -3214.9	-261.2
197	-2756.0 +11.6 +7.9	+1.0 -2755.0	+198.7
	-2756.2 +11.6 +7.9	+1.0 -2755.2	+198.5
Cafe 17	-1277.9 +5.4 +6.0	-7.1 -1285.0	+1668.7
J 265	-3588.1 +15.1 +7.8	+4.4 -3583.7	+630.0
W.S. measures	-3044.1 +12.8 +4.8	-0.9 -3045.0	-91.3

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D4847

Gilliss	Mean x	Comp. X	X − x	x + Const. (−2981.7)	x − X
7980	300.1	−2668.0	−2968.1	−2681.6 ✓	−13.6
8714	314.4	−2656.4	−2970.8	−2667.3 ✓	−10.9
7923	549.5	−2424.1	−2973.6	−2432.2 ✓	−8.1
6508	1064.1	−1908.5	−2972.6	−1917.6 ✓	−9.1
11113	2179.6	−800.6	−2980.2	−802.1 ✓	−1.5
4034	3930.1	+938.9	−2991.2	+948.4 ✓	+9.5
13902	4579.3	+1587.5	−2991.8	+1597.6 ✓	+10.1
14603	4990.6	+1999.7	−2990.9	+2008.9 ✓	+9.2
15462	5485.9	+2489.7	−2996.2	+2504.2 ✓	+14.5
	23393.6 / 9 =	+7015.8	7354 / 9 =		+43.3
		−10457.6			−43.2
	2599.3	−3441.8 / 9 =	−2981.7		+0.1 ✓
		−382.4			

	Mean y	Comp. Y	Y − y	y + Const. (−2985.6)	y − Y
7980	3427.5	+436.0	−2991.5	+441.9 ✓	+5.9
8714	2506.6	−480.6	−2987.2	−479.0 ✓	+1.6
7923	3454.2	+462.0	−2992.2	+468.6 ✓	+6.6
6508	4917.7	+1916.9	−3000.8	+1932.1 ✓	+15.2
11113	664.7	−2315.3	−2980.0	−2320.9 ✓	−5.6
4034	3527.9	+537.7	−2990.2	+542.3 ✓	+4.6
13902	1296.2	−1680.8	−2977.0	−1689.4 ✓	−8.6
14603	1547.0	−1429.8	−2976.8	−1438.6 ✓	−8.8
15462	1994.2	−980.8	−2975.0	−991.4 ✓	−10.6
	23336.0 / 9 =	+83526 = 68673 = 5534.7 / 9 =	770.7 / 9 =		+33.9
					−33.6
	2592.9	−392.7	−2985.6		+0.3 ✓

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For $\frac{XY}{100}$ + $\frac{X^2}{100}$ see p 61

Residuals.

x	X	x-X	$\frac{X}{100}$	$\frac{Y}{100}$	$(x-X)\frac{X}{100}$	$(x-X)\frac{Y}{100}$	s	sm
-2299.2	-2285.6	-13.6	-22.9	+8.3	+311.44	- 112.88	-14.6	+198.56 ✓
-2284.9	-2274.0	-10.9	-22.7	-0.9	+247.43	+ 9.81	-23.6	+257.24 ✓
-2049.8	-2041.7	- 8.1	-20.4	+8.5	+165.24	- 68.85	-11.9	+ 96.39 ✓
-1535.2	-1526.1	- 9.1	-15.3	+23.1	+139.23	- 210.21	+7.8	- 70.98 ✓
- 419.7	- 418.2	- 1.5	- 4.2	-19.2	+ 6.30	+ 28.80	-28.4	+ 35.10 ✓
+1330.8	+1321.3	+ 9.5	+13.2	+ 9.3	+125.40	+ 88.35	+22.5	+213.75 ✓
+1980.0	+1969.9	+10.1	+19.7	-12.9	+198.97	- 130.29	+6.8	+ 68.68 ✓
+2391.3	+2382.1	+ 9.2	+23.8	-10.4	+218.96	- 95.68	+13.4	+123.28 ✓
+2886.6	+2872.1	+14.5	+28.7	- 5.9	+416.15	- 85.55	+22.8	+330.60 ✓
+85887	+85454	7433			+1829.12	+ 126.96		+1323.60
-85888	-85456	-432				- 703.46		- 70.98
- 0.1	- 0.2	+0.1				- 576.50		+1252.62
✓	✓							

+1829.12
- 576.50
+1252.62

For $\frac{Y^2}{100}$ see p 61

y	Y	y-Y	$(y-Y)\frac{Y}{100}$	$(y-Y)\frac{X}{100}$	sm'
+834.6	+828.7	+ 5.9	+ 48.97	- 135.11	- 86.14 ✓
- 86.3	- 87.9	+ 1.6	- 1.44	- 36.32	-37.76 ✓
+861.3	+854.7	+ 6.6	+ 56.10	- 134.64	- 78.54 ✓
+2324.8	+2309.6	+15.2	+ 351.12	- 232.56	+118.56 ✓
-1928.2	-1922.6	- 5.6	+ 107.52	+ 23.52	+131.04 ✓
+935.0	+930.4	+ 4.6	+ 42.78	+ 60.72	+103.50 ✓
-1296.7	-1288.1	- 8.6	+ 110.94	- 169.42	- 58.48 ✓
-1045.9	-1037.1	- 8.8	+ 91.52	- 209.44	- 117.92 ✓
- 598.7	- 588.1	- 10.6	+ 62.54	- 304.22	- 241.68 ✓
+4955.7	+4923.4	+33.9	+ 871.49	+ 84.24	+353.10
-4955.8	-4923.8	-33.6	- 1.44	-1221.71	-620.52
- 0.1	- 0.4	+0.3	+ 870.05	- 1137.47	- 267.42
✓	✓				

$(y-Y)\frac{Y}{100}$ +870.05
$(y-Y)\frac{X}{100}$ -1137.47
- 267.42

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D 4847

$\frac{X^2}{100} = aa$	$\frac{XY}{100} = ab$	as	$(x-\bar{X})\frac{X}{100}$	sw
+3660.05	-1164.05	+2496.00	+1829.12	
3.56349 ✓	3.06597n ✓	3.39724 ✓	3.26224 ✓	
	9.50248n ✓	9.83375 ✓	9.69875 ✓	
	2.56845 ✓	2.89972n	2.76472n	3.09599 ✓
	$\frac{Y^2}{100}$	bs	$(x-\bar{X})\frac{Y}{100}$	sw
7.68917n	+1829.12 ✓	+1440.07	+276.02	-576.50	+1252.62
3.06597n	+ 5.69 ✓	+370.21 ✓	-793.82	-581.73	+1247.35 ✓
0.75518	+1834.81 ✓	+1069.86 ✓	+1069.84	+ 5.23	+ 5.27 ✓
	3.26359 ✓	3.02933		0.71850	
	aa 3.56349			7.68917	
	9.70010				
	a = x = +0.5013 ✓			b = y = +0.0049	✓

$+1829.12 = +3660.05a - 1164.05b$

$(\div +1164.05) \quad +1.571 = +3.144a - b$

$-576.50 = -1164.05a + 1440.07b$

$(\div +1440.07) \quad -.400 = -.808a + b$

$+1.171 = +2.336a$

$+.501 = +a$

$+1.571 = +1.575(144) - b$

$b = +.0041.$

$-.400 = -.404808 + b$

$b = +.0048$

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		$(y-\overline{Y})\frac{X}{100}$	
		-1137.47	
		$3.05594n$ ✓	
9.		2.55842 ✓	$2.88969n$ ✓
		$(y-\overline{Y})\frac{Y}{100}$	$\delta u'$
$9.67678n$	-1137.47 ✓	$+870.05$	-267.42
$3.06597n$	$+553.03$ ✓	$+361.76$ ✓	-775.70 ✓
2.74275 ✓	-584.4 ✓	$+508.29$ ✓	$+508.28$ ✓
	$2.76671n$ ✓	2.70611 ✓	
	3.56349 ✓	9.67678 ✓	
	$9.20322n$ ✓		
	$b'=x'=-0.1597$ ✓	$a'=y'=+0.4751$ ✓	

$+870.05 = +1440.07a' - 1164.05b'$

$(\div +1164.05) +.747 = +1.237a' - b'$

$-1137.47 = -1164.05a' + 3660.05b'$

$(\div +3660.05) -.311 = -.318a' + b'$

$+.436 = +.919a'$

$+.474 = +a$

$+.747 = +.586 - b'$

$b' = -.161$

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D 4847

$a = -0.501$ ✓ $a' = -.475$ ✓
$f = -.005$ ✓ $f' = +.160$ ✓

-2981.7

X-Const.	$\frac{\text{X-Const.}}{100}$	$a\frac{X}{100}$	$f\frac{Y}{100}$	$x-X$	Σ	Reside.
+313.7	+3.1 ✓	-1.6 ✓	-0.2 ✓	-13.6	-15.4 ✓	-2.3 ✓
+325.3	+3.3 ✓	-1.7 ✓	-0.1 ✓	-10.9	-12.7 ✓	+0.4 ✓
+557.6	+5.6 ✓	-2.8 ✓	-0.2 ✓	-8.1	-11.1 ✓	+2.0 ✓
+1073.2	+10.7 ✓	-5.4 ✓	-0.2 ✓	-9.1	-14.7 ✓	-1.6 ✓
+2181.1	+21.8 ✓	-10.9 ✓	0.0 ✓	-1.5	-12.4 ✓	+0.7 ✓
+3920.6	+39.2 ✓	-19.6 ✓	-0.2 ✓	+9.5	-10.3 ✓	+2.8 ✓
+4569.2	+45.7 ✓	-22.9 ✓	-0.1 ✓	+10.1	-12.9 ✓	+0.2 ✓
+4981.4	+49.8 ✓	-24.9 ✓	-0.1 ✓	+9.2	-15.8 ✓	-2.7 ✓
+5471.4	+54.7 ✓	-27.4 ✓	-0.1 ✓	+14.5	-13.0 ✓	+0.1 ✓
					-118.3 ✓	+6.2 ✓
					$\frac{-118.3}{9}$ =	-6.6 ✓
					-13.14	-0.4 ✓
						$\frac{12.8}{9}$ = ±1.42 ✓

C = +13.1

-2985.6

Y-Const.	$\frac{\text{Y-Const.}}{100}$	$a'\frac{Y}{100}$	$f'\frac{X}{100}$	$y-Y$	Σ	
+3421.6	+34.2 ✓	-16.2	+0.5	+5.9	-9.8	-1.7
+2505.0	+25.0 ✓	-11.9	+0.5	+1.6	-9.8	-1.7
+3447.6	+34.5 ✓	-16.4	+0.9	+6.6	-8.9	-0.8
+4902.5	+49.0 ✓	-23.3	+1.7	+15.2	-6.4	+1.7
+670.3	+6.7 ✓	-3.2	+3.5	-5.6	-5.3	+3.2 (2.8)
+3523.3	+35.2 ✓	-16.7	+6.3	+4.6	-5.8	+2.3
+1304.8	+13.0 ✓	-6.2	+7.3	-8.6	-7.5	+0.6
+1555.8	+15.6 ✓	-7.4	+8.0	-8.8	-8.2	-0.1
+2004.8	+20.0 ✓	-9.5	+8.8	-10.6	-11.3	-3.2
					-73.0	+7.8 (7.4)
					$\frac{-73.0}{9}$ =	-7.5
					-8.11	-0.1 ✓
						$\frac{14.9}{9}$ = ±1.66

C' = +8.1

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D4847 Reduction of Catalogue Stars.

a −0.501 a' −0.475
b −0.005 b' +0.16.0
c +13.1 c' +8.1

+4

see p. 8

	Mean x	ax	by	c	Σ	10 −2981.7	C X	O-C	p. 92
7980	300.1	-1.5	-0.2	+13.1	+11.4	311.5	-2670.2	-2668.0	-2.2	-2.3
8714	314.4	-1.6	-0.1		+11.4	3258	-2655.9	-2656.4	+0.5	+0.4
7923	549.5	-2.8	-0.2		+10.1	559.6	-2422.1	-2424.1	+2.0	+2.0
6508	1064.1	-5.3	-0.2		+7.6	10717	-1910.0	-1908.5	-1.5	-1.6
11113	2179.6	-10.9	0.0		+2.2	21818	-799.9	-800.6	+0.7	+0.7
a=4034	3930.1	-19.7	-0.2		-6.8	39233	+941.6	+938.9	+2.7	+2.8
13902	4579.3	-22.9	-0.1		-9.9	45694	+1587.7	+1587.5	+0.2	+0.2
14603	4990.6	-25.0	-0.1		-12.0	49786	+1996.9	+1999.7	-2.8	-2.7
15462	5485.9	-27.5	-0.1		-14.5	54714	+2489.7	+2489.7	0.0	+0.1

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+y

see p. 8

	Heavy a/y	b/x	c'	Σ	O	C	I	O-C	p. 92
					-2985.6				
7980	3427.5	-16.3 +0.5	+8.1	-7.7	3419.8	+ 434.2	+436.0	- 1.8	-1.7
8714	2506.6	-11.9 +0.5		-3.3	2503.3	- 482.3	-480.6	- 1.7	-1.7
7923	3454.2	-16.4 +0.9		-7.4	3446.8	+ 461.2	+462.0	- 0.8	-0.8
6508	4917.7	-23.4 +1.7		-13.6	4904.1	+1918.5	+1916.9	+ 1.6	+1.7
11113	664.7	- 3.2 +3.5		+ 8.4	673.1	- 2312.5	-2315.3	+2.8	+2.8
a=4034	3527.9	- 16.8 +6.3		- 2.4	3525.5	+ 539.9	+ 537.7	+2.2	+2.3
13902	1296.2	- 6.2 +7.3		+9.2	1305.4	- 1680.2	-1680.8	+0.6	+0.6
14603	1547.0	- 7.3 +8.0		+8.8	1555.8	- 1429.8	-1429.8	0.0	-0.1
15462	1994.2	- 9.5 +8.8		+7.4	2001.6	- 984.0	-980.8	∓3.2	-3.2

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D4847 Reduction of Lettered Stars.

sup p. 9

	Mean x	ax	by	c	Σ	−2981.7
e	1532.1	−7.7	−0.1	+13.1	1537.4	−1444.3
d	2105.9	−10.6	−0.1	+2.4	2108.3	−873.4
c	2119.9	−10.6	−0.1	+2.4	2122.3	−859.4
g	2274.5	−11.4	−0.1	+1.6	2276.1	−705.6
p	2728.1	−13.7	−0.1	−0.7	2727.4	−254.3
k	2741.3	−13.7	−0.2	−0.8	2740.5	−241.2
r	2810.1	−14.1	−0.1	−1.1	2809.0	−172.7
h	2842.8	−14.2	−0.1	−1.2	2841.6	−140.1
m	2845.8	−14.3	−0.1	−1.3	2844.5	−137.2
defect W.S	~~2882.8 2883.4~~ mean 2883.4	−14.4	−0.1	−1.4	~~2881.4 2882.0~~ 2882.0	~~−100.3 −99.5~~ −99.7 −99.39 include in Table VI sup 86
o	2955.5	−14.8	−0.1	−1.8	2953.7	−28.0
l	2989.9	−15.0	−0.1	−2.0	2987.9	+6.2
3 x	2998.3	−15.0	−0.1	−2.0	2996.3	+14.6
f	3026.8	−15.2	−0.1	−2.2	3024.6	+42.9
q	3176.0	−15.9	−0.1	−2.9	3173.1	+191.4
t	3189.9	−16.0	−0.1	−3.0	3186.9	+205.2
n	3288.5	−16.5	−0.2	−3.6	3284.9	+303.2
u	3321.7	−16.6	−0.1	−3.6	3318.1	+336.4
s	3346.3	−16.8	−0.2	−3.9	3342.4	+360.7
b	3424.7	−17.2	−0.2	−4.3	3420.4	+438.7
x	3086.8	−15.5	−0.1	−2.5	3084.3	+102.6
w	3411.9	−17.1	−0.1	−4.1	3407.8	+426.1
defect y	3070.1	−15.4	−0.1	−2.4	3067.7	+86.0

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see p. 9

	Means	a'y	b'x	c'	Σ	−2985.6
e	2089.4	−9.9	+2.5	+8.1	2090.1	−895.5
d	2236.0	−10.6	+3.4	+0.9	2236.9	−748.7
c	2282.1	−10.8	+3.4	+0.7	2282.8	−702.8
g	2694.3	−12.8	+3.6	−1.1	2693.2	−292.4
p	2734.1	−13.0	+4.4	−0.5	2733.6	−252.0
k	3301.9	−15.7	+4.4	−3.2	3298.7	+313.1
N	2768.2	−13.1	+4.5	−0.5	2767.5	+218.1
h	2786.2	−13.2	+4.5	−0.6	2785.6	−200.0
m	2977.2	−14.1	+4.6	−1.4	2975.8	−9.8
WS	2894.8	−13.8	+4.6	−1.1	2893.7	−91.9
o	2614.2	−12.4	+4.7	+0.4	2614.6	−371.0
l	2552.5	−12.1	+4.8	+0.8	2553.3	−432.3
y	2891.6	−13.7	+4.8	−0.8	2890.8	−94.8
f	2634.1	−12.5	+4.8	+0.4	2634.5	−351.1
q	2767.5	−13.1	+5.1	+0.1	2767.6	−218.0
t	2488.2	−11.8	+5.1	+1.4	2489.6	−496.0
v	3002.1	−14.3	+5.3	−0.9	3001.2	+15.6
u	2786.3	−13.2	+5.3	+0.2	2786.5	−199.1
s	3474.3	−16.5	+5.4	−3.0	3471.3	+485.7
b	3624.0	−17.2	+5.5	−3.6	3620.4	+634.8
x	2752.1	−13.1	+4.9	−0.1	2752.0	−233.6
w	2732.9	−13.0	+5.5	+0.6	2733.5	−258.1
z	2893.9	−13.7	+4.9	−0.7	2893.2	−92.4

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D7042

Gillies.	Mean x	Comp. X	X − x	x + Const.	x − X
				−2947.0	
7980	2699 ~~2700~~	−2668.0	−2938.0 (7.9)	−2677.8	−9.8
8714	2832	−2656.4	−2938.6	−2664.8	−8.4
7923	518.0	−2424.1	−2942.1	−2429.0	−4.9
6508	1038.0	−1908.5	−2946.5	−1909.0	−0.5
11113	2140.1	−800.6	−2940.7	−806.9	−6.3
4034	3895.5	+938.9	−2956.6	+948.5	+9.6
13902	4540.0	+1587.5	−2952.5	+1593.0	+5.5
14603	4950.8	+1999.7	−2950.8 (4)	+2003.8	+3.8 (4)
15462	5447.6	+2489.7	−2957.9	+2500.6	+10.9
		~~+7015.8~~		~~+7045.1~~	+29.84
		~~−10457.6~~			−29.42
	23081.4	3441.8	4232		+ 0.2
	9	9	9		
	2564.6	−382.4	−2947.0		

	Mean y	Comp. Y	Y + y	Const. − y	y − Y
				+2939.8	
7980	2495.4	+436.0	+2931.4	+444.4	+ 8.4
8714	3417.5	−480.6	+2936.9	−477.7	+ 2.9
7923	2469.4	+462.0	+2931 ~~2907~~ .4	+470.4	+ 8.4
6508	1006.2	+1916.9	+2923.1	+1933.6	+16.7
11113	5265.5	−2315.3	+2950.2	−2325.7	−10.4
4034	2396.0	+537.7	+2933.7	+543.8	+ 6.1
13902	4631.0	−1680.8	+2950.2	−1691.2	−10.4
14603	4379.4	−1429.8	+2949.6	−1439.6	− 9.8
15462	3932.1	−980.8	+2951.3	−992.3	−11.5
		~~+3552.6~~			+42.5
		~~−6887.7~~			−42.1
	29992.5	3334.7	3578		+ 0.4
	9	9	9		
	3332.5	−392.7	+2989.8		

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Residuals.

x	X	x-X	x/100	y/100	(x-X)x/100	XY/100	X²/100	(x-X)y/100	S	Sm
-2294.7	-2285.6	-9.1	-22.9	+8.3	+208.39			-75.53	-14.6	+132.86
-2282.4	-2274.0	-8.4	-22.7	-0.9	+190.68			+ 7.56	-23.6	+198.24
-2046.6	-2041.7	-4.9	-20.4	+8.5	+ 99.96			- 41.65	-11.9	+ 58.31
-1526.6	-1526.1	-0.5	-15.3	+23.1	+ 7.65			- 11.55	+7.8	- 3.90
- 424.5	- 418.2	- 6.3	- 4.2	-19.2	+ 26.46			+ 120.96	-23.4	+147.42
+1330.9	+1321.3	+ 9.6	+13.2	+9.3	+126.72			+ 89.28	+22.5	+216.00
+1975.4	+1969.9	+ 5.5	+19.7	-12.9	+108.35			- 70.95	+6.8	+ 37.40
+2385.4	+2382.1	+ 3.3	+23.8	-10.4	+ 80.92			- 35.36	+13.4	+ 45.56
+2883.0	+2872.1	+10.9	+28.7	-5.9	+312.83			- 64.31	+22.8	+248.52
+8574.8	+8545.4	+29.4	+85.4	+49.2	+1157.29			+ 217.80		+1084.31
-8574.8	-8545.6	-29.2	-85.5	-49.3				- 299.35		+1081.51
0.0	- 0.2	+ 0.2	- 0.1	- 0.1	+1161.96			- 81.55		- 3.90
										+1077.61
										+1080.41

(x-X)x/100 +1157.29 +1161.96

(x-X)y/100 - 79.68 - 81.55

+1077.61 +1080.41

y	Y	-(y+Y)	(y-Y)y/100	(y-Y)x/100	Sm'
- 837.1	+828.7	+8.4	+ 69.72	- 192.36	-122.64
+ 85.0	- 87.9	+2.9	- 2.61	- 65.83	- 68.44
-863.1	+854.7	+8.4	+ 71.40	- 171.36	- 99.96
-2326.3	+2309.6	+16.7	+ 385.77	- 255.51	+130.26
+1933.0	-1922.6	-10.4	+ 199.68	+ 43.68	+243.36
- 936.5	+930.4	+ 6.1	+ 56.73	+ 80.52	+137.25
+1298.5	-1288.1	-10.4	+ 134.16	- 204.88	- 70.72
+1046.9	-1037.1	- 9.8	+ 101.92	- 233.24	- 131.32
+ 599.6	- 588.1	-11.5	+ 67.86	- 330.05	-262.20
+4963.0	+4923.4		+1087.23	+ 124.20	+ 510.87
-4963.0	-4923.8		- 2.61	-1453.23	-755.28
0.0	- 0.4		+1084.62	-1329.03	-244.41

(y-Y)y/100 +1084.62

(y-Y)x/100 -1329.03

-244.41

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D 7042

		$(x-\overline{X})\frac{X}{100}$	
		+1157.29	
		3.063544	
		2.56593 n	2.89719
		$(x-\overline{X})\frac{Y}{100}$	S n
9.430665 n	+1157.29	−79.68	+1077.61
3.06597 n	+313.78	−368.07	+789.21
2.49662	+1471.07	+288.39	+288.40
	3.167683	2.45998	2.45942
	3.56349	9.430665	9.43009
	9.597414	$b=y=+0.2698$	+.2692
	$a=x=+0.4019$		

+1157.29 =
(÷ +1164.05) +.994 =

−79.68 =
(÷ +1440.07) −.055 =

+.939 = +2.336 a
+.402 = +a

+.994 = +1.264 − b
b = +.270

−79.68 = −467.95 + 388.82 = −79.13

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1896phae.proj.1670w

		$(y-\overline{Y})\frac{X}{100}$	
		-1329.03	
		$3.12353n$	
		2.62601 ✓	$2.95728n$
		$(y-\overline{Y})\frac{Y}{100}$	
$9.79149n$	-1329.03	$+1084.62$	-24441
$3.06197n$	$+720.28$	$+422.68$ ✓	-906.32
2.85747	-608.80	$+661.94$	$+661.91$
	$2.78447n$	2.82082 ✓	
	3.56349	9.79149 ✓	
	9.22098		
	$b' = x' = -0.1663$ ✓	$a' = y' = +0.6187$ ✓	

$+1084.62 =$

$(\div +1164.05) +.932 =$

$-1329.03 =$

$(\div +3660.05) -.363 =$

$+.569 = +.919\, a'$

$+.619 = a'$

$+.932 = +.766 - b'$

$+b' = -.166$

$-1329.03 = -720.55 - 670.57 = -1828.12$

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D 7042

$-.403$ $a = -.402$ $a' = -.619$

$-.269$ $b = -.270$ $b' = +.166$

(−2947.0)

X − Const.	$\frac{X-Const.}{100}$	$a\frac{X}{100}$	$b\frac{Y}{100}$	x − X	Σ		
+279.0	+2.8	−1.1	+6.8	−9.9	−3.5	−2.0	−2.1
+290.6	+2.9	−1.2	+9.2	−8.4	−0.4	+0.9	+1.0
+522.9	+5.2	−2.1	+6.7	−4.9	−0.3	+1.0	+1.1
+1038.5	+10.4	−4.2	+2.8	−0.5	−1.9	−0.6	−0.6
+2146.4	+21.5	−8.6	+14.2	−6.3	−0.7	+0.6	+0.5
+3885.9	+38.9	−15.6	+6.5	+9.6	+0.5	+1.8	+1.8
+4534.5	+45.3	−18.2	+12.5	+5.5	−0.2	+1.1	+1.0
+4946.7	+49.5	−19.9	+11.8	+3.4	−4.8	−3.5	−3.3
+5436.7	+54.4	−21.9	+10.6	+10.9	−0.5	+0.9	+0.9
				+0.4	+0.5	+6.3	−6.0
				−12.7	−12.0	−6.7	+6.3
				$\frac{-12.3}{9} =$	$\frac{-11.5}{9} =$	+0.2	+0.3
				−1.4	−1.3	$\frac{12.4}{9} = \pm 1.38$	$\frac{12.3}{9} = \pm 1.37$

$c = +1.84$

(+2939.8)

Y − Const.	$\frac{Y-Const.}{100}$	$a'\frac{Y}{100}$	$b'\frac{X}{100}$	y − Y	Σ	
−2503.8	−25.0	+15.5	+0.5	+8.4	+24.4	−0.6
−3420.4	−34.2	+21.2	+0.5	+2.9	+24.6	−0.4
−2477.8	−24.8	+15.4	+0.9	+8.4	+24.7	−0.3
−1022.9	−10.2	+6.3	+1.7	+16.7	+24.7	−0.3
−5255.1	−52.6	+32.6	+3.6	−10.4	+25.8	+0.8
−2402.1	−24.0	+14.9	+6.5	+6.1	+27.5	+2.5
−4620.6	−46.2	+28.6	+7.5	−10.4	+25.7	+0.7
−4369.6	−43.7	+27.1	+8.2	−9.8	+25.5	+0.5
−3920.6	−39.2	+24.3	+9.0	−11.5	+21.8	−3.2
						+4.5
					$\frac{224.7}{9} =$	−4.8
						−0.3
					+24.97	$\frac{9.3}{9} = \pm 1.03$
					+25.0	

$c' = -25.0$

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D7042 Reduction of Catalogue Stars.

−.403 = a −0.402 a′ −0.619
−.269 = b −0.270 b′ +0.166
+1.4 = c +1.3 c′ −25.0

see p. 10

	Mean x	ax	by	c	Σ	O	C	O−C	p. 104
						−2947.0			
7980	269.9	−1.1	+6.7	+1.4	+7.0	276.9	−2670.1	−2668.0	−2.1	−2.1
8714	282.2	−1.1	+9.2		+9.5	291.7	−2655.3	−2656.4	+1.1	+1.0
7923	518.0	−2.1	+6.7		+6.0	524.0	−2423.0	−2424.1	+1.1	+1.1
6508	1038.0	−4.2	+2.7		−0.1	1037.9	−1909.1	−1908.5	−0.6	−0.6
11113	2140.1	−8.6	+14.2		+7.0	2147.1	−799.9	−800.6	+0.7	+0.5 ?
a=4034	3895.5	−15.7	+6.4		−7.9	3887.6	+940.6	+938.9	+1.7	+1.8
13902	4540.0	−18.3	+12.5		−4.4	4535.6	+1588.6	+1587.5	+1.1	+1.0
14603	4950.2	−19.9	+11.7		−6.8	4943.3	+1996.3	+1999.7	−3.4	−3.3
15462	5447.6	−22.0	+10.6		−10.0	5437.6	+2490.6	+2489.7	+0.9	+0.9

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see f. 10

Mean y	a'y	b'x	c	Σ		O	C	O-C	
						+2939.8			
7980	-2495.4	+15.4	+0.4	-25.0	-9.2	-2504.6	+435.2	+436.0	-0.8	-0.6
8714	-3417.5	+~~15.3~~ 21.2	+0.5		-3.3	-3420.8	-481.0	-480.6	-0.4	-0.4
7923	-2469.4	+15.3	+0.9		-8.8	-2478.2	+461.6	+462.0	-0.4	-0.3
6508	-1006.2	+6.2	+1.7		-18.1	-1023.3	+1916.5	+1916.9	-0.4	-0.3
11113	-5265.5	+32.6	+3.6		+11.2	-5254.3	-2314.5	-2315.3	+0.8	+0.8
a=4034	-2396.0	+14.8	+6.5		-3.7	-2399.7	+540.1	+537.7	+2.4	+2.5
13902	-4631.0	+28.7	+7.5		+11.2	-4619.8	-1680.0	-1680.8	+0.8	+0.7
14603	-4379.4	+27.1	+8.2		+10.3	-4369.1	-1429.3	-1429.8	+0.5	+0.5
15462	-3932.1	+24.3	+9.0		+8.3	-3923.8	-984.0	-980.8	-3.2	-3.2

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D7042 Reduction of Lettered Stars.

see p. 11

	Means					-2947.0
e	1497.9	-6.0	+10.3	+1.4	+ 5.7	1503.6 -1443.4
d	2070.0	-8.3	+9.9		+ 3.0	2073.0 - 874.0
c	2084.0	-8.4	+9.7		+2.7	2086.7 - 860.8
g	2241.7	-9.0	+8.7		+ 1.1	2242.8 - 704.2
h	2695.9	-10.9	+8.6		- 0.9	2695.0 - 252.0
k	2709.7	-10.9	+7.1		- 2.4	2707.3 - 239.7
r	2777.8	-11.2	+8.5		- 1.3	2776.5 - 170.5
h	2808.2	-11.3	+8.4		- 1.5	2806.7 - 140.3
m	2812.3	-11.3	+7.9		- 2.0	2810.3 - 136.7
z	2965.9	-12.0	+8.2		- 2.4	2963.5 + 16.5
s	2922.0	-11.8	+8.9		- 1.5	2920.5 - 26.5
l	2955.8	-11.9	+9.1		- 1.4	29544 + 7.4
y	N. S.					
f	2993.1	-19.1	+8.9		~~+0.2~~ -1.8	2993.3 + 46.3
q	3142.3	-12.7	+8.5		- 2.8	3139.5 + 192.5
t	3156.0	-12.7	+9.3		- 2.0	3154.0 + 207.0
w	3255.5	-13.1	+7.9		- 3.8	3251.7 + 304.7
u	3287.6	-13.2	+8.4		- 3.4	3284.2 + 337.2
s	3315.7	-13.4	+6.6		- 5.4	3315.3 + 363.3
b	3391.1	-13.7	+6.2		- 6.1	3385.0 + 438.0
x	3054.5	-12.3	+8.5		- 2.4	3052.1 + 105.1
v	3377.9	-13.6	+8.6		- 3.6	3374.3 + 427.3

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see p. 11

	Means				+2939.8
e	-3838.0	+23.8+2.5-25.0	+1.3	-3836.7	-896.9
d	-3690.8	+22.8+3.4	+1.2	-3689.6	-749.8
c	-3644.0	+22.6+3.5	+1.1	-3642.9	-703.1
g	-3231.0	+20.0+3.7	-1.3	-3232.3	-292.5
p	-3192.5	+19.8+4.5	-0.7	-3193.2	-253.4
k	-2622.8	+16.2+4.5	-4.3	-2627.1	+312.7
r	-3157.9	+19.5+4.6	-0.9	-3158.8	-219.0
h	-3139.5	+19.4+4.7	-0.9	-3140.4	-200.6
m	-2948.3	+18.2+4.7	-2.1	-2950.4	-10.6
g	-3034.0	+18.8+4.9	-1.3	-3035.3	-95.5
o	-3312.0	+20.5+4.9	+0.4	-3311.6	-371.8
l	-3373.9	+20.9+4.9	+0.8	-3373.1	-433.3
y	Nr. 8.				
f	-3291.3	+20.4+5.0	+0.4	-3290.9	-351.1
q	-3158.2	+19.5+5.2	-0.3	-3158.5	-218.7
t	-3438.8	+21.3+5.2	+1.5	-3437.3	-497.5
w	-2922.8	+18.1+5.4	-1.5	-2924.3	+15.5
u	-3140.0	+19.4+5.5	-0.1	-3140.1	-200.3
s	-2450.7	+15.2+5.5	-4.3	-2455.0	+484.8
b	-2300.6	+14.2+5.6	-5.2	-2305.8	+634.0
x	-3174.0	+19.6+5.1	-0.3	-3174.3	-234.5
v	-3193.8	+19.8+5.6	+0.4	-3193.4	-253.6

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Dr042 Reduction of Faint Stars.

a −40.8 a' −.619
b −.270 b' +.166
c +1.4 c' −25.0

Table VI No.	Orig. No.	+X Meas. X	ax	by	c	Σ		−2947.0
5	1	1161.7	−4.7	+7.5	+1.4	+4.2	1165.9	−1781.1
6	2	1197.6	−4.8	+9.0		+5.6	1203.2	−1743.8
9	3	1232.3	−5.0	+8.8		+5.2	1237.5	−1709.5
7	3a	1204.2	−4.8	+8.2		+4.7	1208.9	−1738.1
8	4	1232.3	−5.0	+7.8		+4.2	1236.5	−1710.5
10	5	1250.2	−5.0	+7.8		+4.1	1254.3	−1692.7
11	6	1297.9	−5.2	+7.7		+3.9	1301.8	−1645.2
12	7	1306.3	−5.3	+6.1		+2.2	1308.5	−1638.5
		1306.3	−5.3	+6.1		+2.2	1308.5	−1638.5
13	8	1348.1	−5.4	+8.5		+4.5	1352.6	−1594.4
14	9	1380.4	−5.6	+9.6		+5.4	1385.8	−1561.2
15	10	1393.9	−5.6	+8.9		+4.6	1398.5	−1548.5
16	11	1401.9	−5.6	+6.0		+1.8	1403.7	−1543.3
18	12	1434.8	−5.8	+6.1	+1.4	+1.7	1436.5	−1510.5
17	13	1435.0	−5.8	+6.2		+1.7	1436.7	−1510.3
		1434.2	−5.8	+6.18		+1.7	1435.19	=1511.81
22	14	1506.6	−6.1	+9.9		+5.1	1511.7	−1435.3
19	14a	1480.3	−6.0	+6.4		+1.8	1482.1	−1464.9
20	14b	1478.5	−5.9	+6.7		+2.1	1480.6	−1466.4
23	15	1537.3	−6.2	+9.5		+4.7	1542.0	−1405.0
25	16	1602.5	−6.5	+10.1		+5.0	1607.5	−1339.5
24	17	1587.9	−6.4	+7.2		+2.2	1590.1	−1356.9
30	18	1666.1	−6.7	+11.2		+5.9	1672.0	−1275.0
26	19	1621.2	−6.5	+7.7	+1.4	+2.6	1623.8	−1323.2
27	20	1630.0	−6.6	+5.4		+0.2	1630.2	−1316.8
28	21	1664.3	−6.7	+5.2		−0.1	1664.2	−1282.8
29	22	1666.1	−6.7	+5.0	+1.4	+1.3	1667.4	−1279.6
31	23	1792.0	−7.2	+6.3		+0.5	1792.5	−1154.5
34	24	1830.2	−7.4	+10.4		+4.2	1834.4	−1112.6

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Use −y

	Meas. y	a'y	b'y	c'	Σ		+2939.8
1	−2802.3	+17.3	+1.9	−25.0	−5.8	−2808.1	+ 131.7
2	−3342.7	+20.7	+2.0		−2.3	−3345.0	− 405.2
3	−3253.7	+20.1	+2.0		−2.9	−3256.6	− 316.8
3a	−3048.1	+18.9	+2.0		−4.1	−3052.2	− 112.4
4	−2916.1	+18.1	+2.0		−4.9	−2921.0	+ 18.8
5	−2880.2	+17.8	+2.1		−5.1	−2885.3	+ 54.5
6	−2861.9	+17.7	+2.2		−5.1	−2867.0	+ 72.8
7	−2262.1	+14.0	+2.2		−8.8	−2270.9	+ 668.9
	−2262.7	+14.0	+2.2		−8.8	−2271.5	+ 668.3
8	−3152.3	+19.5	+2.2		−3.3	−3155.6	− 215.8
9	−3557.9	+22.0	+2.3		−0.7	−3558.6	− 618.8
10	−3283.7	+20.3	+2.3		−2.4	−3286.1	− 346.3
11	−2236.1	+13.8	+2.3		−8.9	−2245.0	+ 694.8
12	−2254.3	+14.0	+2.4	−25.0	−8.6	−2262.9	+ 676.9
13	−2282.4	+14.1	+2.4		−8.5	−2290.9	+ 648.9
	−2282.2	+14.1	+2.5		−8.6	−2292.7	+ 647.1 +649.1 with ass. val. scale D
as scaled	−2282.8	+14.1	+2.5		−8.5	−2291.3	+ 648.5
14	−3648.3	+22.6	+2.4		+0.0	−3648.3	− 708.5
14a	−2382.3	+14.7	+2.5		−7.8	−2390.1	+ 549.7
14b	−2475.9	+15.3	+2.5		−7.2	−2483.1	+ 456.7
15	−3525.9	+21.8	+2.6		−0.6	−3526.5	− 586.7
16	−3744.1	+23.2	+2.7		+0.9	−3743.2	− 803.4
17	−2684.3	+16.6	+2.6		−5.8	−2690.1	+ 249.7
18	−4154.1	+25.7	+2.8		+3.5	−4150.6	−1220.8
19	−2870.2	+17.8	+2.7	−25.0	−4.5	−2874.7	+ 65.1
20	−2005.9	+12.4	+2.7		−9.9	−2015.8	+ 924.0
21	−1918.6	+11.9	+2.8		−10.3	−1928.9	+1010.9
22	−1861.8	+11.5	+2.8	−25.0	−10.7	−1872.5	+1067.3
23	−2331.8	+14.4	+3.0		−7.6	−2339.4	+ 600.4
24	~~−3869.5~~ −3809.5	~~+24.0~~ +23.6	~~+3.0~~	~~+1.6~~	+1.6	−3807.9	− 868.1

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D7042

a -.403 a' -.619
b -.269 b' +.166
c +1.4 c' -25.0

Tab. VI		Meas. x	ax	by	c	Σ		-2947.0
33	25	1825.7	-7.4	+8.9	+1.4	+2.9	1828.6	-1118.4
35	26	1840.1	-7.4	+6.3		+0.3	1840.4	-1106.6
32	27	1779.9	-7.2	+4.4		-1.4	1778.5	-1168.5
	1813.9 "		-7.3	+4.4		-1.5	1812.4	-1134.6
36	28	1868.0	-7.5	+11.5		+5.4	1873.4	-1073.6
40	29	1883.9	-7.6	+11.2		+5.0	1888.9	-1058.1
38	30	1873.9	-7.6	+10.5		+4.3	1878.2	-1068.8
37	31	1872.1	-7.5	+9.8	+1.4	+3.7	1875.8	-1071.2
43	32	1914.0	-7.7	+6.4		+0.1	1914.1	-1032.9
42	32a	1911.6	-7.7	+6.9		+0.6	1912.2	-1034.8
	1910.8		-7.7	+6.9		+0.6	1911.4	-1035.6
41	32b	1892.1	-7.6	+6.0		-0.2	1891.9	-1055.1
44	33	2016.3	-8.1	+8.2	+1.4	+1.5	2017.8	-929.2
45	34	2065.9	-8.3	+3.8		-3.1	2062.8	-884.2
	Additional 1=34	2065.9	-8.3	+3.8		-3.1	2062.8	-884.2
48	35	2113.9	-8.5	+8.7		+1.6	2115.5	-831.5
50	36	2160.2	-8.7	+9.5		+2.2	2162.4	-784.6
53	37	2192.1	-8.8	+8.5		+1.1	2193.2	-753.8
54	38	2213.6	-8.9	+8.3		+0.8	2214.4	-732.6
51	39	2168.0	-8.7	+5.0		-2.3	2165.7	-781.3
52	40	2175.7	-8.8	+3.8		-3.6	2172.1	-774.9
	"	2175.5	-8.8	+3.8		-3.6	2171.9	-775.1
55	41	2216.2	-8.9	+10.6		+3.1	2219.3	-727.7
60	42	2254.9	-9.1	+10.2		+2.5	2257.4	-689.6
59	43	2254.7	-9.1	+8.8		+1.1	2246.8	-700.2
58	44	2242.1	-9.0	+8.5	+1.4	+0.9	2243.0	-704.0
56	45	2241.9	-9.0	+8.3		+0.7	2242.6	-704.4
61	46	2276.0	-9.2	+3.6		-4.2	2271.8	-675.2
62	47	2278.0	-9.2	+12.0		+4.2	2282.2	-664.8
63	48	2283.6	-9.2	+10.6		+2.8	2286.4	-660.6
65	49	2303.7	-9.3	+10.0		+2.1	2305.8	-641.2
66 = 39	50	2312.5	-9.3	+4.1		-3.8	2308.7	-638.3
For 2 Meas v p 116	32c	1879.9	-7.6	+6.9		+0.7	1880.6	-1066.4

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Mar-y

Meas. y	a'y	b'x	c'	Σ	+2939.8
25 -3322.5	+20.6	+3.0	-25.0	-1.4	-33239 - 384.1
26 -2341.4 (-53.9)	+14.6	+3.1		-7.3	-2361.2 + 578.6
27 -1621.4 (-33.9)	+10.1	+3.0		-11.9	-16458 + 1297.0
" 1642.7	+10.2	+3.0		-11.8	-16545 + 1285.3
28 -4289.5	+26.6	+3.1		+4.7	-42848 - 2345.0
29 -4158.5	+25.7	+3.1		+3.8	-41547 - 1214.9
30 -3890.0	+24.1	+3.1		+2.2	-38878 - 948.0
31 -3643.9	+22.6	+3.1	-25.0	+0.7	-3643.2 - 703.4
32 -2367.7	+14.7	+3.2		-7.1	-23748 + 565.0
32a ~~33~~ -2580.2	+16.0	+3.2		-5.8	-25860 + 353.8
" -2581.8	+16.0	+3.2		-5.8	-25876 + 352.2
32b ~~34~~ -2234.1	+13.8	+3.1		-8.1	-22422 + 697.6
33 ~~35~~ -3046.9	+18.9	+3.3		-2.8	-30497 - 109.9
34 ~~36~~ -1401.7	+8.7	+3.4		-12.9	-14146 + 1525.2
" -1401.7	+8.7	+3.4		-12.9	-14146 + 1525.2
35 -3244.2	+20.1	+3.5		-1.4	-32456 - 305.8
36 -3542.0	+21.9	+3.6		+0.5	-3541.5 - 601.7
37 -3166.7	+19.6	+3.6		-1.8	-31685 - 228.7
38 -3071.7	+19.0	+3.7		-2.3	-30740 - 134.2
39 -1870.0	+11.6	+3.6		-9.8	-18798 + 1060.0
40 -1410.2	+8.7	+3.6		-12.7	-14229 + 1516.9
" -1410.6	+8.7	+3.6		-12.7	-14233 + 1516.5
41 -3924.1	+24.3	+3.7		+3.0	-39211 - 981.3
42 -3783.6	+23.4	+3.7		+2.1	-37815 - 841.7
43 -3264.1	+20.2	+3.7		-1.1	-32652 - 325.4
44 -3176.0	+19.7	+3.7		-1.6	-31776 - 237.8
45 -3074.1	+19.0	+3.7		-2.3	-30764 - 136.6
46 -1322.0	+8.2	+3.8		-13.0	-13350 + 1604.8
47 -4448.2	+27.5	+3.8		+6.3	-44419 - 1502.1
48 -3930.2	+24.3	+3.8		+3.1	-39271 - 987.3
49 -3700.1	+22.9	+3.8		+1.7	-36984 - 758.6
50 -1532.1	+9.5	+3.8		-11.7	-15438 + 1396.0
32c -2567.8	+15.9	+3.1		-6.0	-25735 + 365.8

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32c		1879.9	-7.6	+6.9	+0.7	1880.6	-1066.4
		Mean x	ax	by	c	Σ	-2947.0
64	51	~~2293.7~~ 2340.2	-9.2	+3.9	+1.4	-3.9	2289.8 -657.2
67	52	~~2280.2~~ 2361.5	-9.4	+4.6	+1.4	-3.4	2336.8 - 610.2
	52=2342.0		-9.4	+4.6		-3.4	2338.6 - 608.4
69	53	~~2301.5~~ 2359.9	-9.5	+9.4		+1.3	2362.8 - 584.2
	"		-9.5	+9.4		+1.3	2361.2 - 585.8
68	54	2342.2	-9.4	+10.9		+2.9	2345.1 - 601.9
70	55	2431.1	-9.8	+7.3		-1.1	2430.0 - 517.0
71	56	2440.3	-9.8	+3.5		-4.9	2435.4 - 511.6
72	57	2454.2	-9.9	+11.2		+2.7	2456.9 - 490.1
76	58	2516.0	-10.1	+8.0		-0.7	2515.3 - 431.7
74	59	2509.9	-10.1	+5.1		-3.6	2506.3 - 440.7
		2509.9 -	-10.1	+5.1		-3.6	2506.3 - 440.7
73	60	2475.9	-10.0	+3.8		-4.8	2471.1 - 475.9
75	61	2506.9	-10.1	+11.4		+2.7	2509.6 - 437.4
80	62	2537.9	-10.2	+10.8	+1.4	+2.0	2539.9 - 407.1
79	63	2533.7	-10.2	+10.1		+1.3	2535.0 - 412.0
78	64	2529.8	-10.2	+9.5		+0.7	2530.5 - 416.5
81	65	2556.0 10.2	-10.3	+7.0		-1.9	2548.3 - 398.7
77	66	2531.9	-10.2	+4.7		-4.1	2527.8 - 419.2
83	67	2585.8	-10.4	+8.3		-0.7	2585.1 - 361.9
85	68	2621.9	-10.6	+7.0		-2.2	2619.7 - 327.3
82	69	2590.0	-10.4	+4.1		-4.9	2585.1 - 361.9
84	70	~~2550.0~~ 2610.0 5	-10.8	+3.4		-5.8	~~2548.5~~ 2604.3 - 342.7 ~~- 402.5~~
86	71	2636.0	-10.6	+11.2		+2.0	2638.0 - 309.0
88	72	2657.7	-10.7	+12.4		+3.1	2660.8 - 286.2
89	73	2661.1	-10.7	+10.9		+1.6	2659.5 62.7 - 284.3
87	74	2646.0	-10.7	+6.3		-3.0	2643.0 - 304.0
91	75	2698.4	-10.9	+10.3		+0.8	2697.6 9.2 - 247.8

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32 C	2567.5	+15.9	+3.1	-6.0 -2573.5	+3663
	Mean.	a	$\frac{1}{3}x$	c' Σ	+2939.8
	1449.10				4
51	r.s.	+8.9	+3.8	-12.3 -1452.3	+1587.5
52	-1710.0	+10.6	+3.9 -25.0	-10.5 -1720.5	+1219.3
52=1710.2	-1717.4	+10.6	+3.9	-10.5 -1720.7	+1219.1
53	-3469.5	+21.5	+3.9	+0.4 -3477.0	-537.2
"	-3471.8	+21.5	+3.8	+0.4 -3477.4	-537.16
54	-4048.1	+25.1	+3.9	+4.0 -4044.1	-1104.3
55	-2695.6	+16.7	+4.0	-4.3 -2699.9	+239.9
56	-1294.1	+8.0	+4.1	-12.9 -1307.0	+1632.8
57	-4161.9	+25.8	+4.1	+4.9 -4157.0	-1217.2
58	-2978.1	+18.4	+4.2	-2.4 -2980.5	-407
59	-1894.5	+11.7	+4.2	-9.1 -1903.6	+1036.2
	-1894.31	+11.7	+4.2	-9.14 -1903.4	+1036.4
60	-1430.6	+8.9	+4.1	-12.0 -1442.6	+1497.2
61	-4253.8	+26.3	+4.2	+5.5 -4248.3	-1308.5
62	-4031.9	+25.0	+4.2 -25.0	+4.2 -4027.7	-1087.9
63	-3740.1	+23.2	+4.2	+2.4 -3737.7	-797.9
64	-3534.2	+21.9	+4.2	+1.1 -3533.1	-593.3
65	-2608.8	+16.2	+4.2	-4.6 -2614.4	+3254
66	-1751.7	+10.8	+4.2	-10.0 -9.0 -1760.7	+1179.1
67	-3073.9	+19.0	+4.3	-1.7 -3075.6	-1358
68	-2614.1	+16.2	+4.4	-4.4 -2618.5	+3213
69	-1515.9	+9.4	+4.3	-11.3 -1527.2	+1412.6
70	-1257.8	+7.8	+4.3	-12.9 -13.0 -1270.8	+1669.8
71	-4146.0	+25.7	+4.4	+5.1 -4140.9	-1201.1
72	-4592.1	+28.4	+4.4	+7.8 -4584.3	-1644.5
73	-4039.9	+25.0	+4.4	+4.4 -4035.5	-1095.7
74	-2344.2	+14.5	+4.4	-6.1 -2350.3	+389.5
75	-3842.0	+23.8	+4.5	+3.3 -3838.7	-898.9

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		Meas.	x ax	by	c	Σ		−2947.0
94	76	2738.1	−11.0	+10.2	+11.4	+0.6	2737.5	−209.5
95	77	2752.0	−11.1	+9.5		−0.2	2751.8	−195.2
93	78	2713.9	−10.9	+7.3	+1.4	−2.2	2711.7	−235.3
96	79	2770.0	−11.2	+11.1		+1.3	2771.3	−175.7
99	80	2804.1	−11.3	+4.8	+1.4	−5.1	2799.0	−148.0
98	81	2780.0	−11.2	+4.4		−5.4	2784.6	−162.4
100	82	2808.3	−11.3	+3.2		−6.7	2801.6	−145.4
102	83	2816.4	−11.4	+12.3		+2.3	2818.7	−128.3
106	84	2857.7	−11.5	+6.8		−3.3	2854.4	−92.6
105	85	2848.1	−11.5	+4.7		−5.4	2842.7	−104.3
104	86	2843.9	−11.5	+4.6		−5.5	2838.4	−108.6
107	87	2861.9	−11.5	+3.8		−6.3	2855.6	−91.4
108	88	2874.0	−11.6	+3.8		−6.4	2867.6	−79.4
110	89	2918.1	−11.8	+6.0		−4.4	2913.7	−33.3
112	90	2930.2	−11.8	+5.7		−4.7	2925.5	−21.5
109	91	2918.1	−11.8	+3.4		−7.0	2911.1	−35.9
113	92	2938.0	−11.8	+6.4		−4.0	2934.0	−13.0
114	93	2954.1	−11.9	+3.4		−7.1	2947.0	0.0
116	94	2966.9	−12.0	+5.3		−5.3	2961.6	+14.6
119	95	3053.6	−12.3	+6.9		−4.0	3049.6	+102.6
124	96	3162.3	−12.7	+12.5		+1.2	3163.5	+216.5
121	97	3122.0	−12.6	+3.9		−7.3	3114.7	+167.7
125	98	3204.1	−12.9	+11.2		−0.3	3203.8	+256.8
126	99	3222.1	−13.0	+3.5		−8.1	3214.0	+267.0
133	100	3286.5	−13.2	+12.3		+0.5	3287.0	+340.0

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	Mean y	$a_3 y$	f_x	c'	Σ	+2939.8
76	-3788.4	+23.5	+4.5	-25.0	+3.0	-3785.4 - 845.6
77	-3534.4	+21.9	+4.6		+1.5	-3532.9 - 593.1
78	-2723.9	+16.9	+4.5	-25.0	-3.6	-2727.5 + 212.3
79	-4118.3	+25.5	+4.6		+5.1	-4113.2 - 1173.4
80	-1794.4	+11.1	+4.6	-25.0	-9.8	-1803.6 + 1136.2
81	-1617.2	+10.0	+4.6		-10.4	-1627.6 + 1312.2
82	-1192.0	+7.4	+4.7		-12.9	-1204.9 + 1734.9
83	-4567.8	+28.3	+4.7		+8.0	-4559.8 - 1620.0
84	-2519.6	+15.6	+4.7		-4.7	-2524.3 + 415.5
85	-1746.2	+10.8	+4.7		-9.5	-1755.7 + 1184.1
86	-1714.3	+10.6	+4.7		-9.7	-1724.0 + 1215.8
87	-1395.7	+8.6	+4.8		-11.6	-1407.3 + 1532.5
88	-1393.7	+8.6	+4.8		-11.6	-1405.3 + 1534.5
89	-2234.3	+13.8	+4.8		-6.4	-2240.7 + 699.1
90	-2113.9	+13.1	+4.9		-7.0	-2120.9 + 818.9
91	-1271.7	+7.9	+4.8		-12.3	-1284.0 + 1655.8
92	-2378.1	+14.7	+4.9		-5.4	-2383.5 + 556.3
93	-1279.9	+7.9	+4.9		-12.2	-1292.1 + 1647.7
94	-1982.6	+12.3	+4.9		-7.8	-1990.4 + 949.4
95	-2570.2	+15.9	+5.1		-4.0	-2574.2 + 365.6
96	-4654.3	+28.8	+5.2		+9.0	-4645.3 - 1705.5
97	-1461.7	+9.0	+5.2		-10.8	-1472.5 + 1467.3
98	-4146.0	+25.7	+5.3		+6.0	-4140.0 - 1200.2
99	-1290.2	+8.0	+5.3		-11.7	-1301.9 + 1637.9
100	-4568.0	+28.3	+5.5		+8.8	-4559.2 - 1619.4

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Tab. VI		Mean x	ax	by	c	Σ	−2947.0
134	101	3291.6	−13.3	+11.6	+1.4	−0.3	3291.3 + 344.3
130	102	3264.1	−13.2	+10.7		−1.1	3263.0 + 316.0
131	103	3281.7	−13.2	+10.6		−1.2	3280.5 + 333.5
129	104	3255.9	−13.1	+7.3		−4.4	3251.5 + 304.5
127	105	3251.9	−13.1	+5.5		−6.2	3245.7 + 298.7
137	106	3338.5	−13.5	+10.9		−0.8	3337.7 + 390.7
136	107	3333.9	−13.4	+10.2		−1.7	3332.5 + 385.5
Defect.	108	A.S.					
138	109	3356.0	−13.5	+4.5		−7.2	3348.8 + 401.8
139	110	3354.0	−13.5	+12.6		+0.9	3354.9 + 407.9
142	111	3400.5	−13.7	+11.0		−1.3	3399.2 + 452.2
143	112	3416.4	−13.8	+13.9	+1.4	−6.6	3409.8 + 462.8
145	113	3438.3	−13.9	+10.1		−2.4	3435.9 + 488.9
146	114	3452.1	−13.9	+9.8		−2.7	3449.4 + 502.4
147	115	3458.1	−13.9	+6.7		−5.8	3452.3 + 505.3
144	116	3439.9	−13.9	+4.1		−8.4	3431.5 + 484.5
148	117	3480.2	−14.0	+4.0		−8.6	3471.6 + 524.6
151	118	3501.9	−14.1	+12.1		−0.6	3501.3 + 554.3
		3501.9	−14.1	+12.1		−0.6	3501.3 + 554.3
152	119	3516.1	−14.2	+9.9		−2.9	3513.2 + 566.2
149	120	3478.4	−14.0	+9.8		−2.8	3475.6 + 528.6
150	121	3489.6	−14.1	+9.5		−3.2	3486.4 + 539.4
		3489.8	−14.1	+9.5		−3.2	3486.6 + 539.6
154	122	3561.9	−14.4	+12.0		−1.0	3560.9 + 613.9
Defect.	123	A.S.					
153	124	3551.7	−14.3	+11.0		−1.9	3549.8 + 602.8
156	125	3581.9	−14.4	+10.3		−2.7	3579.2 + 632.2

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	Mean y	ay	bx	c'	Σ	$+2939.8$
101	-4296.3	+26.6	+5.5	-25.0	+7.1	-4289.2 -1349.4
102	-3978.3	+24.6	+5.4		+5.0	-3973.3 -1033.5
103	-3927.9	+24.3	+5.4		+4.7	-3923.2 - 983.4
104	-2696.2	+16.7	+5.4		-2.9	-2699.1 + 240.7
105	-2027.7	+12.6	+5.4		-7.0	-2034.7 + 905.1
106	-4056.3	+25.1	+5.5		+5.6	-4050.7 -1110.9
107	-3808.1	+23.6	+5.5		+4.1	-3804.0 - 864.2
108	A. S.					
109	-1670.2	+10.3	+5.6		-9.1	-1679.3 +1260.5
110	-4674.8	~~+29.1~~ 28.9	+5.6		+9.5	-4665.3 -1725.3
111	-4080.2	+25.3	+5.6		+5.9	-4074.3 -1134.5
112	-2162.4	+13.4	+5.7	-25.0	-5.9	-2168.3 + 771.5
113	-3750.7	+23.2	+5.7		+3.9	-3746.8 - 807.0
114	-3635.9	+22.5	+5.7		+3.2	-3632.7 - 692.9
115	-2477.9	+15.3	+5.7		-4.0	-2481.9 + 457.9
116	-1525.9	+ 9.4	+5.7		-9.9	-1535.8 +1404.0
117	-1490.6	+ 9.2	+5.8		-10.0	-1500.6 +1439.2
118	-4481.7	+27.7	+5.8		+8.5	-4473.2 -1533.4
	-4482.3	+27.7	+5.8		+8.5	-4473.8 -1534.0
119	-3683.5	+22.8	+5.8		+3.6	-3679.9 - 740.1
120	-3658.0	+22.6	+5.8		+3.3	-3654.7 - 714.9
121	-3542.0	+21.9	+5.8		+2.7	-3539.3 - 599.5 ~~+ 400.5~~
	-3542.6	+21.9	+5.8		+2.7	-3539.9 - 600.1
122	-4468.1	+27.7	+5.9		+8.6	-4459.5 -1519.7
123	A. S.					
124	-4097.9	+25.4	+5.9		+6.3	-4091.6 -1151.8
125	-3846.2	+23.8	+5.9		+4.7	-3841.5 - 901.7

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Tab.		Mean x	ax	by	c	Σ		−2947.0
155	126	3570.7	−1444	9.3	+1.4	−3.7	3567.0	+ 620.0
158	127	3596.2	−14.5	+6.5		−6.6	3589.6	+ 642.6
161	128	3635.9	−14.7	+11.5		−1.8	3634.1	+ 687.1
162	129	3638.3	−14.7	+9.6		−3.7	3634.6	+ 687.6
159	130	3605.8	−14.5	+5.3		−7.8	3598.0	+ 651.0
160	131	3612.1	−14.6	+3.5		−9.7	3602.4	+ 655.4
163	132	3668.2	−14.8	+9.3		−4.1	3664.1	+ 727.1
164	133	3685.9	−14.9	+8.4	+1.4	−5.1	3680.8	+ 733.8
165	134	3690.3	−14.9	+5.1		−8.4	3681.9	+ 734.9
166	135	3712.2	−15.0	+4.1		−9.5	3702.7	+ 755.7
168	136	3731.5	−15.0	+12.2		−1.4	3730.1	+ 783.1
Defect.	137	Dr. 8						
169	138	3739.9	−15.1	+8.3		−5.4	3734.5	+ 787.5
170	139	3760.1	−15.2	+6.2		−7.6	3752.5	+ 805.5
		3761.9	−15.2	+6.2		−7.6	3754.3	+ 807.3
167	140	3724.0	−15.0	+6.2		−7.4	3716.6	+ 769.6
172	141	3776.2	−15.2	+10.2		−3.6	3772.6	+ 825.6
174	142	3791.9	−15.3	+11.1		−2.8	3789.1	+ 842.1
				+11.1		−2.8	3789.1	
173	143	3782.0	−15.2	+5.1		−8.7	3773.3	+ 826.3
177	144	3904.2	−15.7	+11.9		−2.4	3901.8	+ 954.8
180	145	3928.3	−15.8	+10.9		−3.5	3925.8	+ 978.8
178	146	3913.9	−15.8	+7.9		−6.5	3907.4	+ 960.4
176	147	3906.0	−15.7	+6.1		−8.2	3897.8	+ 950.8
179	148	3932.1	−15.8	+4.2 +4.3 +4.2		−10.2	3921.9	+ 974.9
181	149	3958.0	−16.0	+4.3		−10.3	3947.7	+ 1000.7
183	150	3992.1	−16.1	+11.2		−3.5	3988.6	+ 1041.6
	"	3990.9	−16.1	+11.3		−3.4	3987.5	+ 1040.5

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Meas.	y	a	y	f'x	c	Σ	+2939.8
126	-3439.5	+21.3	+5.9	-25.0	+2.2	-3437.3	-497.5
127	-2419.9	+15.0	+6.0		-4.0	-2423.9	+515.9
128	-4290.2	+26.6 (22.2)	+6.0		+7.6	-4282.6	-1342.8
129	-3579.9	+22.2	+6.0		+3.2	-3576.7	-636.9
130	-1974.0	+12.2	+6.0		-6.8	-1980.8	+959.0
131	-1304.1	+8.1	+6.0		-10.9	-1315.0	+1624.8
132	-3444.1	+21.3	+6.1		+2.4	-3441.7	-501.9
133	-3129.8	+19.4	+6.1	-25.0	+0.5	-3129.3	-189.5
134	-1881.7	+11.6	+6.1		-7.3	-1889.0	+1050.8
135	-1528.1	+9.5	+6.2		-9.3	-1537.4	+1402.4
136	-4534.3	+28.1	+6.2		+9.3	-4525.0	-1585.2
137	Jr. D.						
138	-3084.1	+19.1	+6.2		+0.3	-3083.8	-144.0
139	-2316.1 (-2311.4)	+14.3 (+14.0)	+6.2 (+6.2)		-4.5 (-4.5)	-2320.6 (-2315.6)	+619.2 (+624.2)
140	-2288.2	+14.2	+6.2		-4.6	-2292.8	+647.0
141	-3797.9	+23.5	+6.2		+4.8	-3793.2	-853.4
142	~~-4115.3~~ (-4113.3)	+25.5	+6.3		+6.8	-4108.5 (-4110.5)	~~+1687~~ -1170.7 reject. Scale 13 mm corrected
143	-1896.3	+11.7	+6.3		-7.0	-1903.3	+1036.5
144	-4406.1	+25.1 (25.3)	+6.5		+8.8	-4397.3	-1457.5
145	-4052.3	+25.1	+6.5		+6.6	-4045.7	-1105.9
146	-2934.0	+18.2	+6.5		-0.3	-2934.3	+5.5
147	-2284.0	+14.1	+6.5		-4.4	-2288.4	+651.4
148	~~-1556.0~~ (-1558.0)	+9.6	+6.5		-8.9	~~-1565.9~~ (-1567.9)	~~+1373.9~~ +1372.9
149	-1612.2	+10.0	+6.6		-8.4	-1620.6	+1319.2
150	-4176.3	+25.9	+6.6		+7.5	-4168.8	-1229.0
"	4217.9	+26.1	+6.6		+7.7	-4210.2	-1270.4

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Tab VI.		Meas.	x	y	c	Σ	−2947.0
182	151	3981.9	−16.0	+10.3+1.4	−4.3	3977.6	+1030.6
184	152	3997.9	−16.1	+8.5	−6.2	3991.7	+1044.7
185	153	4010.0	−16.2	+7.1	−7.7	4002.3	+1055.3
191 = J257 =		4010.2	−16.5	+10.0	−5.1	4097.0	+1150.0 p196 B&16
See also p126	154	N. S.					
154=155 "		~~4052.1~~	~~−16.3~~	~~+9.9~~	~~−5.0~~	~~4047.1~~	~~+1100.1~~ p190
186	155	4053.1	−16.3	+9.7	−5.2	4047.9	+1100.9
		4052.1	−16.3	+9.7	−5.2	4047.9	+1099.9 ✓
187	156	4057.7	−16.4	+7.8	−7.2	4050.5	+1103.5
Defect.	157	N. S.					
Defect.	158	N. S.					
	159	4084.4	−16.5	+11.5	−3.6	4080.8	+1133.8
188	160	4076.0	−16.4	+11.4+1.4	−3.6	4072.4	+1125.4 p171 ✓
		4076.2	−16.4	+11.4	−3.6	4072.6	+1125.6, 1125.6
160 =	161	~~4076.2~~	~~−16.4~~	~~+11.2~~	~~−3.8~~	~~4072.4~~	~~+1125.4~~ ✓ p171 191 B&16 See p126 this Bk for J257
		4076.2	−16.4	+11.2	−3.8	4072.4	+1125.4 ✓
Defect.	162	N. S.					
Defect.	163	N. S.					
189	164	4090.0	−16.5	+5.4	−9.7	4080.3	+1133.3
Defect.	165	N. S.					
192	166	4120.3	−16.6	+5.1	−10.1	4110.2	+1163.2
193	167	4158.5	−16.8	+10.1	−5.3	4153.2	+1206.2
195	168	4165.9	−16.8	+7.0	−8.4	4157.5	+1210.5
Defect.	169	N. S.					
		4167.9					
194	170	~~4227.9~~	−16.8	+4.4	−11.0	4156.9	+1209.9
197	171	4225.9	−17.0	+11.0	−4.6	4221.3	+1274.3
196	172	4210.0	−17.0	+8.9	−6.7	4203.3	+1256.3 ✓
198	173	4252.2	−17.1	+7.6	−8.1	4244.1	+1297.1
199	174	4253.2	−17.1	+6.9	−8.8	4244.4	+1297.4
200	175	4254.0	−17.1	+10.5	−5.2	4248.8	+1301.8

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	Mean y	a'y	b'x	c'	Σ	+2939.8
151	-3822.3	+23.7	+6.6	-25.0	+ 5.3	- 3817.0 - 877.2
152	-3165.9	+19.6	+6.6		+ 1.2	- 3164.7 - 224.9
						+ 280.3
153	-2657.7	+16.5	+6.7		- 1.8	-2659.5 - 19.7
	3709.4	+22.9	+6.8		+ 4.7	- 3696.4 - 758.16
154	[illegible]					
	3679.9	+22.8	+6.7		+ 4.5	- 3675.4 - 735.6 Error of 1 div. but = 155
155	-3620.1	+22.4	+6.7		+ 4.1	- 3616.0 - 676.2
	3619.9	+22.4	+6.7		+ 4.1	- 3615.8 - 676.0
156	-2891.9	+17.9	+6.7		- 0.4	-2892.3 + 47.5
157	A. S.					
158	A. S.					
159	-4285.9	+26.5	+6.8		+ 8.3	- 4277.6 - 1337.8
160	-4221.9	+26.1	+6.8	-25.0	+ 7.9	- 4214.0 - 1274.2
	4222.1	+26.1	+6.8		+ 7.9	- 4214.2 - 1274.4, 1274.4
* 161	4162.1	+25.8	+6.8		+ 7.6	- 4154.5 - 1214.7
"	4162.1	+25.8	+6.8		+ 7.6	- 4154.5 - 1214.7
162	A. S.					
163	A. S.					
164	-2003.9	+12.4	+6.8		- 5.8	-2009.7 + 930.1
165	A. S.					
166	-1898.1	+11.7	+6.8		- 6.5	- 1904.6 +1035.2
167	-3749.8	+23.2	+6.9		+5.1	- 3744.7 - 804.9
168	-2603.7	+16.1	+6.9		- 2.0	-2605.7 + 334.1
169	A. S.					
170	-1649.8	+10.2	+6.9		- 7.9	-1657.7 +1282.1
171	-4088.2	+25.3	+7.0		+7.3	- 4080.9 - 1141.1
172	-3322.1	+20.6	+7.0		+2.6	-3319.5 - 379.7
173	-2837.9	+17.6	+7.1		- 0.3	-2838.2 + 101.6
174	-2552.7	+15.8	+7.1		- 2.1	-2554.8 + 385.0
175	-3910.0	+24.2	+7.1		+6.3	- 3903.7 - 963.9

161 4222.1
error 1 eq. in Eat. y

161 = J 257 b84 + b126

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181		2 2nd means	3776.2	−15.2 +3.6	−10.2	3766.0	+819.0
		Additional 2	3776.0	−15.2 +3.6	−10.2	3765.8	+818.8
220		3	4668.3	−18.8 +6.2	−11.2	4657.1	+1710.1
223		4	4724.1	−19.0 +8.8	−8.8	4715.3	+1768.3
			Meas. x	a+ by	c	Σ	−2947.0
201		176	4306.1	−17.4+6.7	+1.4 −9.3	4296.8	+1349.8
203		177	4337.9	−17.5+9.1	−7.0	4330.9	+1383.9
202		178	4335.9	−17.5 +8.4	−7.7	4328.2	+1381.2
	Defect	179	N. d.				
205		180	4384.2	−17.7 +8.7	−7.6	4376.6	+1429.6
206		181	4390.1	−17.7 +7.2	−9.1	4381.0	+1434.0
	Defect	182	N. d.				
204		183	4384.0	−17.7 +5.8	−10.5	4373.5	+1426.5
	Defect ?	184	N. d.				
207		185	4436.2	−17.9+6.9	−9.6	4426.6	+1479.6
208		186	4446.0	−17.9 +6.3	−10.2	4435.8	+1488.8
209		187	4453.9	−17.9 +5.8	−10.7	4443.2	+1496.2
210		188	4455.9	−18.0 +10.1	−6.5	4449.4	+1502.4
			4454.1	−18.0 +12.1	−6.5	4447.6	+1500.6
211		189	4459.9	−18.0 +9.9	−6.7	4453.2	+1506.2
			4460.1	−18.0 +9.9	−6.8	4453.3	+1506.3
212		190	4488.1	−18.1 +9.9	−6.8	4481.3	+1534.3
			4486.3	4497.8 −18.1 +9.9	−6.8	4479.5	+1532.5
213		191	4497.6	−18.1 +9.9	−6.8	4490.8	+1543.8
			4497.8	−18.1 +9.9	−6.8	4491.0	+1544.0
214		192	4534.1	−18.3 +6.2	−10.7	4523.4	+1576.4
217		193	4582.1	−18.5 +9.4	−7.7	4574.4	+1627.4
216		194	4566.0	−18.4 +9.1	−7.9	4558.1	+1611.1
219		195	4655.7	−18.8 +7.6	−9.8	4645.9	+1698.9
221		196	4701.7	−18.9 +8.6	−8.9	4692.8	+1745.8
222		197	4718.1	−19.0 +7.4	−10.2	4707.9	+1760.9
			4718.3	−19.0 +7.4	−10.2	4708.1	+1761.1
157	Cafe 17 dbl.		3592.0	−14.5 +3.4	−9.7	3582.3	+685.3
191	J. 257		4101.7	−16.5+10.0	−5.1	4096.6	+1149.6
218	J. 265		4630.0	−18.7 + 9.6	−7.7	4622.3	+1675.3

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	−1346.1	+8.3	+6.3	−10.4	−1356.5	+1583.3
Additional						
2	1347.9	+8.3	+6.3	−10.4	−1358.3	+1481.5
3	2310.0	+14.3	+7.7	−3.0	−2313.0	+626.8
4	3256.1	+20.2	+7.8	+3.0	−3253.1	−313.3
	Means					+2939.8
176	−2508.3	+15.5	+7.1	−25.0	−2510.7	+429.1
177	−3387.9	+21.0	+7.2	+3.2	−3384.7	−444.9
178	−3133.9	+19.4	+7.2	+1.6	−3132.3	−192.5
179	Ar. S.					
180	−3252.1	+20.1	+7.3	+2.4	−3249.7	−309.9
181	−2663.9	+16.5	+7.3	−1.2	−2665.1	+274.7
182	Ar. S.					
183	−2158.0	+13.4	+7.3	−4.3	−2162.3	+777.5
184	Ar. S.					
185	−2562.1	+15.9	+7.4	−1.7	−2563.8	+376.0
186	−2336.2	+14.5	+7.4	−3.1	−2339.3	+600.5
187	−2154.2	+13.3	+7.4	−4.3	−2158.5	+781.3
188	−3741.9	+23.2	+7.4	+5.6	−3736.3	−796.5
	−3742.1	+23.2	+7.4	+5.6	−3736.5	−796.7
189	−3664.2	+22.7	+7.4	+5.1	−3659.1	−719.3
	−3662.6	+22.7	+7.4	+5.1	−3657.5	−717.7
190	−3692.3	+22.9	+7.5	+5.4	−3686.9	−747.1
	−3692.3	+22.9	+7.4	+5.3	−3687.0	−747.2
191	−3698.1	+22.9	+7.5	+5.6	−3692.7	−752.9
	−3697.1	+22.9	+7.5	+5.4	−3691.7	−751.9
192	−2291.9	+14.2	+7.5	−3.3	−2295.2	+644.6
193	−3482.2	+21.6	+7.6	+4.2	−3478.0	−538.2
194	−3381.9	+20.9	+7.6	+3.5	−3378.4	−438.6
195	−2839.9	+17.6	+7.7	+0.3	−2839.6	+100.2
196	−3202.1	+19.8	+7.8	+2.6	−3199.5	−259.7
197	−2744.3	+17.0	+7.8	−0.2	−2744.5	+195.3
	−2742.3			−0.2	−2742.5	+197.3

Cafe 17	1259.6	+7.8	+6.0	−11.2	−1270.8	+1669.0
J. 257	3703.7	+22.9	+6.8	+4.7	−3699.0	−759.2
J. 265	3576.1	+22.1	+7.7	+4.8	−3571.3	−631.5

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Gillis	Meany	Comp. X	X+x	+2956.3 Comet-x	x-X
7980	5634.1	-2668.0	+2966.1	-2627.8 ✓	-9.8 -0.2
8714	5622.0	-2666.4	+2965.6	-2665.7 ✓	-9.3
7923	5385.9	-2424.1	+2961.8	-2429.6 ✓	-5.5
6508	4866.0	-1908.5	+2957.5	-1909.7 ✓	-1.2
11113	3762.0	-800.6	+2961.4	-805.7 ✓	-5.1
4034	2088.7	+938.9	+2947.6	+947.6 ✓	+8.7
13902	1362.1	+1587.5	+2949.6	+1594.2 ✓	+6.7
14603	951.9	+1999.7	+2951.6	+2004.4 ✓	+4.7
15462	455.9	+2489.7	+2945.6	+2500.4 ✓	+10.7
	30048.6 =	+501.78 -104.57.6 = 3441.8 =	506.8 =		+30.8 -30.9
	9	9	9		-0.1
	3338.7	-382.4	+2956.3		✓

	Meany	Comp. Y	Y+y	+2949.4 Comet-y	y-Y
7980	2502.0	+436.0	+2938.0	+445.9 ✓	+11.4 +9.9
8714	3427.4	-480.6	+2946.8	-478.0 ✓	+2.6
7923	2478.6	+462.0	+2946.6	+470.8 ✓	+8.8
6508	1017.9	+1916.9	+2934.8	+1931.5 ✓	+14.6
11113	5275.5	-2315.3	+2960.2	-2326.1 ✓	-10.8
4034	2406.0	+537.7	+2943.7	+543.4 ✓	+5.7
13902	4641.3	-1680.8	+2960.5	-1691.9 ✓	-11.1
14603	4390.0	-1429.8	+2960.2	-1440.6 ✓	-10.8
15462	3940.8	-980.8	+2960.0	-991.4 ✓	-10.6
	30079.5 =	-3534.7 =	4448 =		+43.1 -43.3
	9	9	9		-0.2
	3342.2	-392.7	+2949.4		✓

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y	$\bar{X}$	$-(x+\bar{X})$	$\frac{X}{100}$	$\frac{Y}{100}$	$(x-\bar{X})\frac{X}{100}$
+2295.4	-2285.6	-9.8	-22.9	+8.3	+224.42
+2283.3	-2274.0	-9.3	-22.7	-0.9	+211.11
+2047.2	-2041.7	-5.5	-20.4	+8.5	+112.20
+1527.3	-1526.1	-1.2	-15.3	+23.1	+18.36
+423.3	-418.2	-5.1	-4.2	-19.2	+21.42
-1330.0	+1321.3	+8.7	+13.2	+9.3	+114.84
-1976.6	+1969.9	+6.7	+19.7	-12.9	+131.99
-2386.8	+2382.1	+4.7	+23.8	-10.4	+111.86
-2882.8	+2872.1	+10.7	+287	-5.9	+307.09
+8576.5	+8545.4		+85.4	+49.2	+1253.29
-8576.2	-8545.6		-855	-49.3	
+0.3	-0.2		-0.1	-0.1	

✓ ✓

$(x-\bar{X})\frac{Y}{100}$	s	sw
-81.34	-14.6	+143.08 ✓
+8.37	-23.6	+219.48 ✓
-46.75	-11.9	+65.45 ✓
-27.72	+7.8	-9.36 ✓
+97.92	-23.4	+119.34 ✓
+80.91	+22.5	+195.75 ✓
-8643	+6.8	+45.56 ✓
-48.88	+13.4	+62.98 ✓
-63.13	+22.8	+243.96 ✓
+187.20		+1095.60
-354.25		-9.36
-167.05		+1086.24

$(x-\bar{X})\frac{X}{100}$ +1253.29
$(x-\bar{X})\frac{Y}{100}$ -167.05
+1086.24

y	$\bar{Y}$	$-(y+\bar{Y})$	$(y-\bar{Y})\frac{Y}{100}$
-840.2	+828.7	+11.5	+94.62
+085.2	-87.9	+2.7	-2.34
-863.6	+854.7	+8.9	+76.80
-2324.3	+2309.6	+14.7	+337.26
+1933.3	-1922.6	-10.7	+207.36
-936.2	+930.4	+5.8	+53.01
+1299.1	-1288.1	-11.0	+143.19
+1047.8	-1037.1	-10.7	+112.32
+598.6	-588.1	-10.5	+62.54
+4964.0	+4923.4		+1085.10
-4964.3	-4923.8		-2.34
-0.3	-0.4		+1082.76

✓ ✓

* Use y-I page 128.

$(y-\bar{Y})\frac{X}{100}$	sw
-261.06	-166.44 ✓
-59.02	-61.36 ✓
-179.52	-104.72 ✓
-223.38	+113.88 ✓
+45.36	+252.72 ✓
+75.24	+128.25 ✓
-218.67	-75.48 ✓
-257.04	-144.72 ✓
-304.22	-241.68 ✓
+120.60	+494.85
-1502.91	-794.40
-1382.31	-299.55

$(x-\bar{Y})\frac{Y}{100}$ +1082.76
$(y-\bar{Y})\frac{X}{100}$ -1382.31
-299.55

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Solution for 2 unknown quantities
Computed coords in equations

		$(x-\bar{X})\frac{X}{100}=ax$	
		+1253.29	
		3.09805 ✓	
		2.60053 ✓	2.93180 ✓
	$\frac{Y^2}{100}$	$(x-\bar{X})\frac{Y}{100}$	ay
9.33530 n ✓	+1253.29 ✓	-167.05	+1086.24
3.06597 n ✓	+ 251.92 ✓	- 398.59 ✓	+854.67 ✓
2.40127 ✓	+1505.21 ✓	+231.54 ✓	+231.57
	3.17760 ✓	2.36463 ✓	
	3.56349 ✓	9.33530 ✓	
	9.61411 ✓		
	$a=x=+0.4112$ ✓	$b=y=+0.2164$ ✓	

+1253.29=

(÷+116405)+1.077=

+.961=+2.326,a

+.411=+,a

+1.077=+1.292-b

b=+.215

+1253.29=+1504.28-250.27=+1254.01

-167.05

(÷+144007)=116=

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South Pole, p. 128

	Meang		Y+y	Const.-y	y+Y	y	Y	-(y+Y)
980	2502.0		+2938.0	+447.4	+11.4	-840.2	+828.7	+11.4
8714	3427.4		+2946.8		+2.6	+85.3	-87.9	+2.6
7923	2478.6		+2940.6		+8.8	-863.5	+854.7	+8.8
6508	*1017.3	+1916.9	2934.2	+1932.1	+15.2	-2324.8	+2309.6	+15.2
11113	5275.5		2960.2		-10.8	+1933.4	-1922.6	-10.8
4034	2406.0		2943.7		+5.7	-936.1	+930.4	+5.7
13902	4641.3		2960.5		-11.1	+1299.2	-1288.1	-11.1
14603	4390.0		2960.2		-10.8	+1047.9	-1037.1	-10.8
15462	3940.8		2960.0		-10.6	+598.7	-588.1	-10.6
	9)30078.9		444.2		+43.7	+4964.5		+43.7
	3342.1		+2949.4		-43.3	-4964.8		-43.3
					+0.4	-0.9		+0.4
						0.0		

y-Y	(y-Y)Y/100	(y-Y)X/100
+11.4	+94.62	-261.06
+2.6	-2.34	-59.02
+8.8	+74.80	-179.52
+15.2	+351.12	-232.56
-10.8	+207.36	+45.36
+5.7	+53.01	+75.24
-11.1	+143.19	-218.67
-10.8	+112.32	-257.04
-10.6	+62.54	-304.22
	+1098.96	+120.60
	-2.34	-1512.09
	+1096.62	-1391.49

if constants Σ p. 132.
add & do not change

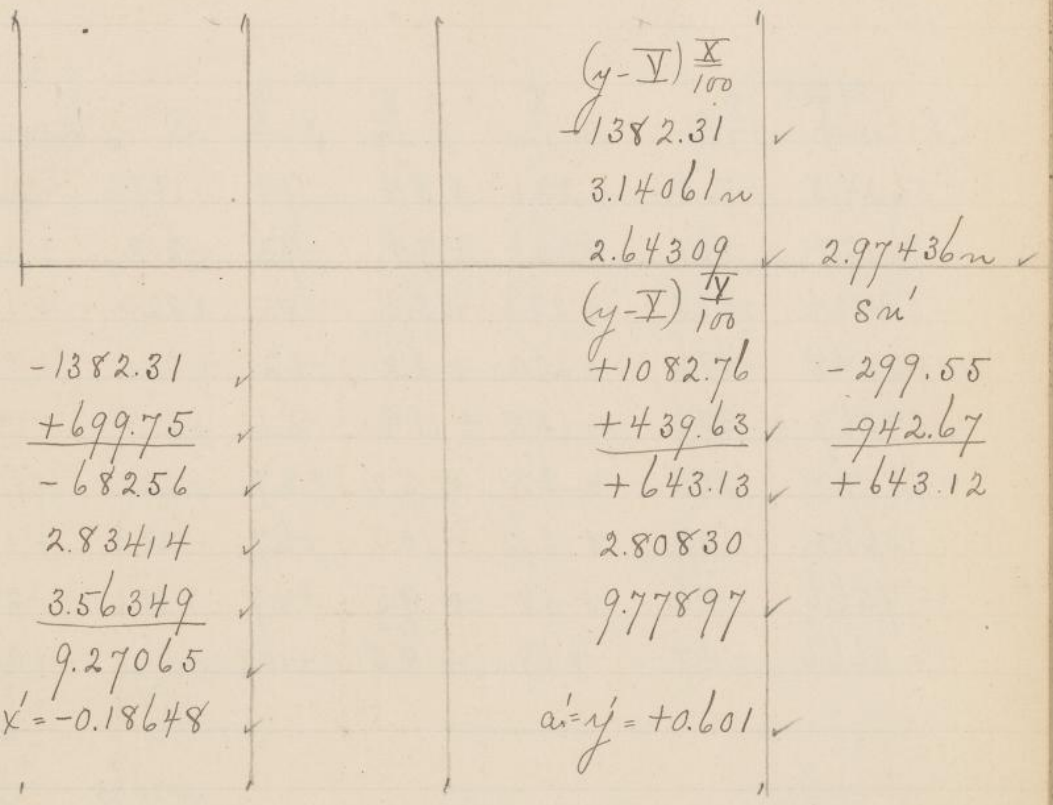
+11.4	+16.0
+2.6	+12.8
+8.8	+13.8
+15.2	+12.4
-10.8	+13.8
+5.7	+16.4
-11.1	+14.2
-10.8	+13.7
-10.6	+12.1
	+125.2
	9
	+13.9
	C' = -13.9

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+1082.76
(÷+116405)+9.30

-1382.31=
(÷+3660.05)-.378=

+.552=+.919 a'
+.601=+a'

+.930=+.743-b'
+b'=-.187

+1082.76=+865.48+217.68=+1083.16

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D6980

$a = -.411$ $a' = -.601$
$b = -.216$ $b' = +.186$

X − Const. +2956.3	$\frac{X-C}{100}$	$a\frac{X}{100}$	$b\frac{Y}{100}$	$x-X$	Σ	Resids.
−5624.3	−56.2	+23.1	+5.4	−9.8	+18.7	−2.2
−5612.7	−56.1	+23.1	+7.4	−9.3	+21.2	+0.3
−5380.4	−53.8	+22.1	+5.4	−5.5	+22.0	+1.1
−4864.8	−48.6	+20.0	+2.2	−1.2	+21.0	+0.1
−3756.9	−37.6	+15.5	+11.4	−5.1	+21.8	+0.9
−2017.4	−20.2	+8.3	+5.2	+8.7	+22.2	+1.3
−1368.8	−13.7	+5.6	+10.0	+6.7	+22.3	+1.4
−956.6	−9.6	+3.9	+9.5	+4.7	+18.1	−2.8
−466.6	−4.7	+1.9	+8.5	+10.7	+21.1	+0.2
					+188.4	+5.3
					9	−5.0
					+20.93	+0.3 ✓
						10.3 / 9 = ±1.14

$c = -20.9$

Y − Const. +2949.4	$\frac{Y-C}{100}$	$a'\frac{Y}{100}$	$b'\frac{X}{100}$	$y-Y$	Σ	
−2513.4	−25.1	+15.1	−10.5	+11.4	+16.0	+2.2
−3430.0	−34.3	+20.6	−10.4	+2.6	+12.8	−1.0
−2487.4	−24.9	+15.0	−10.0	+8.8	+13.8	0.0
−1032.5	−10.3	+6.2	−9.0	+14.6	+11.8	−2.0
−5264.7	−52.6	+31.6	−7.0	−10.8	+13.8	0.0
−2411.7	−24.1	+14.5	−3.8	+5.7	+16.4	+2.6
−4630.2	−46.3	+27.8	−2.5	−11.1	+14.2	+0.4
−4379.2	−43.8	+26.3	−1.8	−10.8	+13.7	−0.1
−3930.2	−39.3	+23.6	−0.9	−10.6	+12.1	−1.7
					+124.6	+5.2
					9	−4.8
					+13.84	+0.4 ✓
						10.0 / 9 = ±1.11

gives Y' = −982.5

$c' = -13.8$

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see Independent Clock p20 Sheets in Envelope

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1896phae.proj.167ow

D 6980 Reduction of Catalogue Stars.

a = −0.411 a' −0.601
b = −0.216 b' +0.186
c = −20.9 c' −13.8

see f. 12

	Mean x	ax	by	c	Σ	O	C-I	O-C	f. 132
						+2956.3			
7980	−5634.1	+23.2	+5.4	−20.9	+7.7	−5626.4	−2670.1	−2668.0	−2.1	−2.2
8714	−5622.0	+23.1	+7.4		+9.6	−5612.4	−2656.1	−2656.4	+0.3	+0.3
7923	−5385.9	+22.1	+5.4		+6.6	−5379.3	−2423.0	−2424.1	+1.1	+1.1
6508	−4866.0	+20.0	+2.2		+1.3	−4864.7	−1908.4	−1908.5	+0.1	+0.1
11113	−3762.0	+15.5	+11.4		+6.0	−3756.0	−799.7	−800.6	+0.9	+0.9
a=4034	−2008.7	+8.3	+5.2		−7.4	−2016.1	+940.2	+938.9	+1.3	+1.3
13902	−1362.1	+5.6	+10.0		−5.3	−1367.4	+1588.9	+1587.5	+1.4	+1.4
14603	−951.9	+3.9	+9.5		−7.5	−959.4	+1996.9	+1999.7	−2.8	−2.8
15462	−455.9	+1.9	+8.5		−10.5	−466.4	+2489.9	+2489.7	+0.2	+0.2

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see f. 12

Mean y	a'y	f'x	c'	Σ		O	C	O-C	f. 132
						+2949.4			
7980	-2502.0	+15.0	-10.5	-13.8	-9.3	-2511.3	∓438.1	+436.0	+2.1	+2.2
8714	-3427.4	+20.6	-10.5		-3.7	-3431.1	∓481.7	-480.6	-1.1	-1.0
7923	-2478.6	+14.9	-10.0		-8.9	-2487.5	+461.9	+462.0	-0.1	0.0
6508	-1017.9	+6.1	-9.1		-16.8	-1034.7	+1914.7	+1916.9	-2.2	-2.0 ?
11113	-5275.5	+31.7	-7.0		+10.9	-5264.6	-2315.2	-2315.3	+0.1	0.0
a=4034	-2406.0	+14.5	-3.7		-3.0	-2409.0	+540.4	+537.7	+2.7	+2.6
13902	-4641.3	+27.9	-2.5		+11.6	-4629.7	-1680.3	-1680.8	+0.5	+0.4
14603	-4390.0	+26.4	-1.8		+10.8	-4379.2	-1429.8	-1429.8	0.0	-0.1
15462	-3940.8	+23.7	-0.8		+9.1	-3931.7	-982.3	-980.8	-1.5	-1.7 ?
		+2368	-.85	+1384	+899	.8	.4			-1.6

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D 6980 Reduction of Lettered Stars.

see f. 13

	Mean x	ax	by	c	Σ	+2956.3
e	-4406.7	+18.1	+8.3	-20.9	+5.5	-4400.2 -1443.9
d	-3833.8	+15.8	+8.0		+2.9	-3830.9 - 874.6
c	-3818.3	+15.7	+7.9		+2.7	-3815.6 - 859.3
g	-3662.0	+15.1	+7.0		+1.2	-3660.8 - 704.5
f	-3208.1	+13.2	+6.9		-0.8	-3208.9 - 252.6
k	-3194.1	+13.1	+5.7		-2.1	-3196.2 - 239.9
r	-3126.0	+12.8	+6.8		-1.3	-3127.3 - 171.0
h	-3095.4	+12.7	+6.8		-1.4	-3096.8 - 140.5
m	-3091.0	+12.7	+6.4		-1.8	-3092.8 - 136.5

y g A. S.

o	-2982.1	+12.3	+7.2		-1.4	-2983.5 - 27.2
l	-2948.7	+12.1	+7.3		-1.5	-2950.2 + 6.1
3 x	-2937.9	+12.1	+6.6		-2.2	-2940.1 + 16.2
f	-2910.1	+12.0	+7.1		-1.8	-2911.9 + 44.4
q	-2762.0	+11.4	+6.8		-2.7	-2764.7 + 191.6
t	-2748.1	+11.3	+7.4		-2.2	-2750.3 + 206.0
n	-2649.9	+10.9	+6.3		-3.7	-2653.6 + 302.7
u	-2616.7	+10.8	+6.8		-3.3	-2620.0 + 336.3
s	-2589.7	+10.6	+5.3		-5.0	-2594.7 + 361.6
b	-2512.1	+10.3	+5.0		-8.6	-2517.7 + 438.6
x	-2849.2	+11.7	+6.9		-2.3	-2851.5 + 104.8
w	-2525.8	+10.4	+6.9		-3.6	-2529.4 + 426.9

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see p. 13

	Means	a'y	f'y	c'	Σ	+2949.4
e	-3846.8	+23.1	-8.2	-13.8	+1.1 -3845.7	- 896.3
d	-3700.6	+22.2	-7.1		+1.3 -3699.3	- 749.9
c	-3654.1	+22.0	-7.1		+1.1 -3653.0	- 703.6
g	-3241.1	+19.5	-6.8		-1.1 -3242.2	- 292.8
p	-3202.2	+19.2	-6.0		-0.6 -3202.8	- 253.4
k	-2633.7	+15.8	-5.9		-3.9 -2637.6	+ 311.8
r	-3168.2	+19.0	-5.8		-0.6 -3168.8	- 219.4
h	-3149.3	+18.9	-5.8		-0.7 -3150.0	- 200.6
m	-2958.2	+17.8	-5.7		-1.7 -2959.9	- 10.5
	A.d.					
o	-3321.8	+20.0	-5.5		+0.7 -3321.1	- 371.7
l	-3384.0	+20.3	-5.5		+1.0 -3383.0	- 433.6
y	-3043.0	+18.3	-5.5		-1.0 -3044.0	- 94.6
f	-3301.9	+19.8	-5.4		+0.6 -3301.3	- 351.9
q	-3168.0	+19.0	-5.1		+0.1 -3167.9	- 218.5
t	-3448.9	+20.7	-5.1		+1.8 -3447.1	- 497.7
n	-2933.6	+17.6	-4.9		-1.1 -2934.7	+ 14.7
u	-3149.6	+18.9	-4.9		+0.2 -3149.4	- 200.0
s	-2460.7	+14.8	-4.8		-3.8 -2464.5	+ 484.9
b	-2310.0	+13.9	-4.7		-4.6 -2314.6	+ 634.8
x	-3183.5	+19.1	-5.3		0.0 -3183.5	- 234.1
w	-3202.7	+19.2	-4.7		+0.7 -3202.0	- 252.6

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D4851 Cont. from page 87.

Check using star c

* Use -y using Lund.

c x= 2119.8 ✓ y*= -3658.1

ax -11.2 ~~.17~~ ✓ ay +15.4 ~~.44~~ ✓

by +0.5 ~~.48~~ ✓ fx +3.5 ~~.54~~ ✓

c +13.2 ~~.24~~ ✓ c' -18.5 ~~.46~~ ✓ 2= +.52 add

+2.55

2122.3 ✓ .35 -3657.7 ✓ -365758

-2981.5 +2953.7

X -859.2 ~~-859.5~~ Y -704.0 ✓ -703.88

p	~~X~~	~~Y~~	x	y*	Δx	Δy	ΔX	ΔY
					-1820.2	+1147.8	-1808.8	+1140.0
								+ 223.4
					-1805.9	+225.1	-1797.2	~~-1184.6~~
					-1671.7	+1172.2	-1564.9	+1166.0
					-1055.7	+2635.0	-1049.3	+2620 ~~272.9~~
					+ 59.4	~~+1616.2~~	+ 58.6	-1611.3
					+1810.2	+1245.5	+1798.1	+1241.7
					+2458.6	-984.5	+2446.7 ~~728.3~~	- 976.8
					+2872.8	-732.5	+2858.9	- 725.8
					+3366.2	-287.3	+3348.9	- 276.8

star c using adopt. constants -859.2 -704.0 2119.8 -3658.1

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$\Delta x - \frac{\Delta X}{1000}$	$\Delta y - \frac{\Delta Y}{1000}$	$\frac{\Delta X}{1000}$	$\frac{\Delta Y}{1000}$	$\left(\frac{\Delta X}{100}\right)^2$	ab	ff	an	fn
								−13.00
−11.4	+7.8	−1.81	+1.14	+3.28	−2.06	+1.30	+20.63	8.89
−8.7	+1.7	−1.80	+.22	3.24	−.40	.05	+15.66	−1.81 .37
−6.8	+6.2	−1.56	+1.17	2.43	−1.83	1.37	+10.64	−7.96
−6.4	+14.1	−1.05	+2.62	1.10	−2.75	6.86	+6.72	−16.77
+0.8	−4.9	+.06	−1.61	.00	−.10	2.59	+.05	−1.29
+12.1	+3.8	+1.80	+1.24	3.24	+2.23	1.54	+21.78	+15.00
+11.9	−7.7	+2.45	−.98	6.00	−2.40	.96	+29.16	−11.66
+13.9	−6.7	+2.86	−.73	8.18	−2.09	.53	+39.75	−10.15
+17.3	−10.5	+3.35	−.28	11.22	−.94	.08	+57.96	−4.84
+56.0	+33.6	+4.30	+6.39		+2.23		+202.32	+15.00
−33.3	−29.8		−3.60		−12.57		.32	−67.58
+22.7	+3.8		+2.79	+38.69	−10.34	+15.28		−52.58

s = +16.09
a = +4.30
b = +2.79
c = 9 +16.09
as = +32.66
aa = +38.69
ab = −10.34
ac = +4.30 +32.65
bs = +7.75
ba = −10.34
bb = +15.28
bc = +2.79 +7.73
sn = +172.44
an = +202.32
bn = −52.58
cn = +22.7 +172.44

$\frac{X}{1000} + \frac{Y}{1000} + 1.00$

an′	bn′	S	as	bs	sn	sn′
−14.12	+8.89	+0.33	−.60	+.38	−3.76	+2.57
−3.06	+.37	−.58	+1.04	−.13	+5.05	−.99
−9.67	+7.25	+.61	−.95	+.71	−4.15	+3.78
−14.80	+36.94	+2.57	−2.70	+6.73	−16.45	+36.24
−.29	+7.89	−.55	−.03	+.89	−.44	+2.70
+6.84	+4.71	+4.04	+7.27	+5.01	+48.88	+15.35
−18.86	+7.55	+2.47	+6.05	−2.42	+29.39	−19.02
−19.16	+4.89	+3.13	+8.95	−2.28	+43.51	−20.97
−35.18	+2.94	+4.07	+13.63	−1.14	+70.41	−42.74
+6.84		+17.22	+36.94	+13.72	+197.24	+60.64
−115.14		−1.13	−4.28	−5.97	−24.80	−83.72
−108.30	+81.43	+16.09	+32.66	+7.75	+172.44	−23.08

sn = +172.44 sn′ −23.08
an = +202.32 an′ −108.30
bn = −52.58 bn′ +81.43
cn = +22.7 +172.44 cn′ +3.8 −23.07

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D 4851

Checking star c

aa	ab	ac	as	an
+38".69 ✓	−10".34 ✓	+4".30 ✓	+3".66 ✓	+20".32 ✓
1.58760	1.01452$_n$	0.63347	1.51402	2.30604
	9.42692$_n$ ✓	9.04587	9.92642 ✓	
	0.44144	0.06039$_n$	0.94094$_n$	1.73296$_n$

bb	bc	bs	bn	
+15.28 ✓	+2.79 ✓	+7.75 ✓	−52.58 ✓	
+2.76 ✓	−1.15 ✓	−8.73	−54.07	
+12.52 ✓	+3.94 ✓	+16.48 ✓	+1.49	
1.09760 ✓	0.59550 ✓	1.21696 ✓	0.17319	
	9.49790 ✓	0.11936		
	0.09340 ✓	0.71486 ✓	9.67109	0.29255 ✓
	9.67934 ✓	0.55989 ✓	1.35191 ✓	2.23246

cc	cs	cn	sn
9.cv ✓	+16.09 ✓	+22.7 ✓	+72.44 ✓
+.48 ✓	+3.62	+22.49	+70.79
+8.52	+12.47	+0.21	+1.65
+1.24 ✓	cc+6c=+12.46 +.5.19	+.47	+1.96
+7.28 ✓	+7.28	−0.26	−0.31
0.86213		9.41497$_n$	9.49136$_n$
		8.55284$_n$	8.62923$_n$
	−c =	−.04	−.04

assumed Σ = −85".2

Σ' = −85".16

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	$a n'$	
	$+08.30$	
	$2.03463\,n$	
	1.46155)	
	$b n'$	
	$+81.43$	
	$+28.94$	
	$+52.49$	
	1.72008	
	1.21798	1.83944
	$1.08050\,d$	$1.96105\,n$
	$c n'$	$s n'$
	$+3.8$	-23.08
	$+12.04$	-91.42
	$+15.84$	$+68.34$
	$+16.52$	$+69.09$
	-0.68	-0.75
	9.83251_n	9.87506
	8.97038	9.01293
$-C' =$	$-.09$	$-.10$
Ass. $T =$	-704.0	
$T =$	-703.91	

Note: The difference between the assumed or adopted T and T, $-.1$, is (perhaps) due to e' (p.64) being between -18.4 and -18.5, -18.5 = adopted value, ~~+ also~~ because hundredths of x by α have not been used in reduction see p.142

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D 4851

Solution for 3 unknown quantities, using measures.

See p 68 for Mean x + y

$x-\bar{X}$	$a\frac{x}{100}$	$b\frac{y}{100}+c$	$(x-\bar{X})\frac{x}{100}$	$\left(\frac{x}{100}\right)^2 a$	$\frac{xy}{100}b + \frac{x}{100}c$
−13.9 ✓	3.0 ✓	25.1 ✓	−41.7 ✓	9.0 ✓	+75.3 ✓
−11.2 ✓	3.1 ✓	34.3 ✓	−34.7 ✓	9.6 ✓	106.3 ✓
−9.3 ✓	5.5 ✓	24.9 ✓	−51.2 ✓	30.2 ✓	137.0 ✓
−8.9 ✓	10.6 ✓	10.2 ✓	−94.3 ✓	112.4 ✓	108.1 ✓
−1.7 ✓	21.8 ✓	52.7 ✓	−37.1 ✓	475.2 ✓	1148.9 ✓
+9.6 ✓	39.3 ✓	24.1 ✓	+377.3 ✓	1544.5 ✓	947.1 ✓
+9.4 ✓	45.8 ✓	46.4 ✓	+430.5 ✓	2097.6 ✓	2125.1 ✓
+11.4 ✓	49.9 ✓	43.9 ✓	+568.9 ✓	2490.0 ✓	2190.6 ✓
+14.8 ✓	54.9 ✓	39.5 ✓	+812.5 ✓	3014.0 ✓	+2168.6 ✓
+45.2			+2189.2 ✓		
−45.0			−2520 ✓	9782.5 ✓	+9007.0 ✓
+0.2 ✓	233.9 ✓	301.1 ✓	+9c		+1930.2 ✓

$y-\bar{Y}$	$a'\frac{y}{100}$	$b'\frac{x}{100}+c'$	$(y-\bar{Y})\frac{y}{100}$	$\left(\frac{y}{100}\right)^2 a' + \frac{xy}{100}b' + \frac{y}{100}c'$
+7.4 ✓			+185.7 ✓	630.0 ✓
+1.3 ✓			+44.6 ✓	1176.5 ✓
+5.8 ✓			+144.4 ✓	620.0 ✓
+13.7 ✓			+139.7 ✓	1040 ✓
−5.3 ✓			−279.3 ✓	2777.3 ✓
+3.4 ✓			+81.9 ✓	580.8 ✓
−8.1 ✓			−375.8 ✓	21530 ✓
−7.1 ✓			−311.7 ✓	19272 ✓
−10.9 ✓			−430.6 ✓	15602 ✓
+31.6 ✓			+596.3	
−31.4 ✓			−1397.4 ✓	11529.0 ✓
+0.2 ✓	= 301.1a'	+233.9b'	+9c' ✓	−801.1 ✓ = 11529.0a' +9007.0b' +301.1c

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$(x-\overline{X})\frac{y}{100} = \frac{xy}{100}a + \left(\frac{y}{100}\right)^2 b + \frac{y}{100}c$

-348.9 ✓
-384.2 ✓
-231.6 ✓
-90.8 ✓
-89.6 ✓
$+231.4$ ✓
$+436.2$ ✓
$+500.5$ ✓
$+584.6$ ✓
$+1752.7$ ✓
-1145.1 ✓
$+607.6$ ✓

$(y-\overline{Y})\frac{x}{100} = \frac{xy}{100}a' + \left(\frac{x}{100}\right)b' + \frac{x}{100}c'$

$+22.2$ ✓
$+4.0$ ✓
$+31.9$ ✓
$+145.2$ ✓
-115.5 ✓
$+133.6$ ✓
-371.0 ✓
-354.3 ✓
-598.4 ✓
$+3369$ ✓
-1439.2 ✓
$-1102.3 = +9007.0\,a' + 9782.56'\,b' + 233.9\,c'$ ✓

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D 4851

Solution with 3 unknown quantities in equations. Measured values used.

$+0.2 = +233.9\,a + 301.1\,b + 9\,c$
$+1930.2 = +9782.5\,a + 9007.0\,b + 233.9\,c$
$+607.6 = +9007.0\,a + 11529.6\,b + 301.1\,c$

$+.022 = +25.989\,a + 33.456\,b + c$
$+8.252 = +41.823\,a + 38.508\,b + c$
$+2.018 = +29.914\,a + 38.290\,b + c$
1-2 $-8.230 = -15.834\,a - 5.052\,b$
3-2 $-6.234 = -11.909\,a - 0.218\,b$
$-1.629 = -3.134\,a - b$
$-28.596 = -54.628\,a - b$
$+26.967 = +51.494\,a$
$+.5237 = +a$

$+1.629 - 1.641 = +b = -.012$
$+28.596 - 28.609 = +b = -.013$ } $-.012$

$+c = +.022 - 13.618 + .401 = -13.195$
$+c = +8.252 - 21.915 + .462 = -13.201$
$+c = +2.018 - 15.675 + .459 = -13.198$
-13.198

$a = +.524$ $a' = -.422$
$b = -.012$ $b' = -.164$
$c = -13.2$ $c' = +18''.4$

Note: — With computed coords. in equations

$a = +.526$
$b = +.012$

and c to be applied to computed $\frac{x}{100}$ & $\frac{y}{100} = +2.1$

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$+0.2 = +301.1\,a' + 233.9\,b' + 9\,c'$

$-801.1 = +11529.0\,a'$

~~$-2.661 = +3$~~ $+9007.0\,b' + 301.1\,c'$

$-1102.3 = +9007.0\,a' + 9782.5\,b' + 233.9\,c'$

$+.022 = +33.456\,a' + 25.989\,b' + c'$

$-2.661 = +38.290\,a' + 29.913\,b' + c'$

$-4.713 = +38.508\,a' + 41.823\,b' + c'$

1-2 $+2.683 = -4.834\,a' - 3.924\,b'$

3-2 $-2.052 = +0.218\,a' + 11.910\,b'$

$+.684 = -1.232\,a' - b'$

$-.172 = +.018\,a' + b'$

$+.512 = -1.214\,a'$

$-.422 = +a'$

$+b' = -.684 + .520 = -.164$

$+b' = -.172 + .008 = -.164$

$+c' = +.022 + 14.118 + 4.262 = +18.402$

$+c' = -2.661 + 16.158 + 4.906 = +18.403$

$+c' = -4.713 + 16.250 + 6.859 = +18.396$

$+18.400$

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D 4847 Cont. from page 99.

Check using star c

c x = 2119.9 y = 2282.1

a_x	−10.6	✓ 10.62	b_y	−10.8	✓ 10.84
f_y	−0.1	✓ 0.11	F_x	+3.4	✓ 3.39
c	+13.1	✓ 13.14	c'	+8.1	✓ 8.11
		+2.41			+0.66
	2122.3	.31		2282.8	.76
	−2981.7			−2985.6	
	−859.4	✓ −859.39		−702.8	✓ −702.84

f. 88

	X	Y	x	y	Δ_x	Δ_y	ΔX	ΔY
7980	−2668.0	+436.0	300.1	3427.5	−1819.8	+1145.4	−1808.6 ✓	+1138.8
etc.	−2656.4	−480.6	314.4	2506.6	−1805.5	+2245	−1797.0 ✓	+222.2
	−2424.1	+462.0	549.5	3454.2	−1570.4	+1172.1	−1564.7 ✓	+1164.8
	−1908.5	+1916.9	1064.1	4917.7	−1055.8	+2635.6	−1049.1 ✓	+2619.7
	−800.6	−2315.3	2179.6	664.7	+059.7	−1617.4	+58.8 ✓	−1612.5
	+938.9	+537.7	3930.1	3527.9	+1910.2	+1245.8	+1798.3 ✓	+1240.5 −3020.5
	+1587.5	−1680.8	4579.3	1296.2	+2459.4	−985.9	+2446.9 ✓	−978.0
	+1999.7	−1429.8	4990.6	1547.0	+2870.7	−735.1	+2859.1 ✓	−727.0
	+2489.7	−980.8	5485.9	1994.2	+3366.0	−287.9	+3349.1 ✓	−278.0
star c using adopt. val.	−859.4	−702.8	2119.9	2282.1				

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$\Delta x - \Delta X$ ($x=cx$)	$\Delta y - \Delta Y$ ($y=cx'$)	$\frac{\Delta X}{1000}$ ($a=af$)	$\frac{\Delta Y}{1000}$ ($b=bf$)	$\left(\frac{\Delta X}{1000}\right)^2$ (aa)	ab	bb	an	bn
- 11.2 ✓	+ 6.6	-1.81	+1.14	+3.28	- 2.06	+1.30	+ 20.27 ✓	- 12.77
- 8.5 ✓	+ 2.3	-1.80	+ .22	3.24	- .40	.40	+ 15.30 ✓	- 1.88
- 5.7 ✓	+ 7.3	-1.56	+1.16	2.43	- 1.81	1.35	+ 8.89	- 6.61
- 6.7 ✓	+15.9	-1.05	+2.62	1.10	- 2.75	6.86	+ 7.04	- 17.55
+ 0.9 ✓	- 4.9	+ .06	-1.61	.00	- .10	2.59	+ .05 ✓	- 1.45
+11.9 ✓	+ 5.3	+1.80	+1.24	3.24	+2.23	1.54	+ 21.42	+ 14.76
+12.5 ✓	- 7.9	+2.45	- .98	6.00	- 2.40	.96	+ 30.62	- 12.25
+11.6 ✓	- 8.1	+2.86	- .73	8.18	- 2.09	.53	+ 33.18	- 8.47
+16.9 ✓	- 9.9	+3.35	- .28	11.22	- .94	.08	+ 56.62	- 4.73
+53.8	+37.4	+10.52	+6.38	+38.69	+2.23	+15.26	+192.39	+14.76
- 32.1	- 30.8	- 6.22	- 3.60		-12.55			- 65.70
+21.7	+ 6.6	+4.30	+2.78		-10.32			- 50.94

$S = +16.08$

$a + 4.30$

$b + 2.78$

$c + 9. \quad +16.08$

$as = +32.67$

$aa + 38.69$

$ab - 10.32$

$ac + 4.30 \quad +32.67$

$bs = +7.74$

$ba - 10.32$

$bb + 15.26$

$bc + 2.78 \quad +7.72$

$sn = +164.14 \quad sn' = -14.95$

$an + 193.39 \quad an' \; -110.62$

$bn - 50.94 \quad bn' \; +89.04$

$cn + 21.7 \; +164.5 \quad cn' + 6.6 \; -14.98$

an'	bn'	$1 + \frac{X}{1000} + \frac{Y}{1000}$ (S)	as	bs	sn	sn'
- 11.95	+7.52	+0.33	- .60	+.38	- 3.70	+ 2.18
- 4.14	+ .51	- .58	+1.04	-.13	+ 4.93	- 1.33
- 11.39	+ 8.47	+ .60	- .94	+.70	- 3.42	+ 4.38
- 16.70	+ 41.616 16.70	+2.57	- 2.70	+6.73	- 17.22	+ 40.86
- .29	+ 7.89 41.66	- .55	- .03	+ .89	- 0.50	+ 2.70
+ 9.54	+6.57	+4.04	+7.27	+5.01	+48.08	+ 21.41
- 19.36	+7.74	+2.47	+ 6.05	- 2.42	+30.88	- 19.51
- 23.17	+5.91	+3.13	+ 8.95	- 2.28	+36.31	- 25.35
- 33.16	+2.77	+4.07	+13.63	- 1.14	+68.78	- 40.29
+ 9.54	+89.04	+17.21	+36.94	+13.71	+188.98	+ 71.35 53
-120.16		- 1.13	- 4.27	- 5.97	- 24.84	- 86.48
-110.62		+16.08	+32.67	+7.74	+164.14	- 14.95

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D 4847

Check using Mac

aa	ab	ac	as	an	
+38.69 ✓	−10.32 ✓	+4.30 ✓	+32.67 ✓	+193.39 ✓	
1.58760	1.01368n	0.63347	1.51415 ✓	2.28643	
	9.42608n	9.04587	9.92655	1.71251 n	
	(0.43976	0.05955n	0.94023n		
	bb	bc	bs	bn	
	+15.26 ✓	+2.78 ✓	+7.74 ✓	−50.94 ✓	
	+2.75	−1.15	−8.71	−51.58	
	+12.51	+3.93	+16.45	+0.64	
	1.09726	0.59439	1.21617	9.80618	
		9.49713	0.11891 ✓		
		(0.09142	0.71330	9.30331	9.92509
		9.67934	0.56002	1.33230	2.21298
		cc	cs	cn	sn
		+9.00	+16.08 ✓	+21.7	+164.14
		+.48	+3.63	+21.49	+163.30
		+8.52	+12.45	+0.21	+0.84
		+1.23	+5.17	+0.20	+0.84
		+7.29	+7.28	+.01	0.00
		0.86273		8.0000	
				7.13727	
			c =	+.01 ✓	
			as X	−859.4	
			X =	−859.40	

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	a_n'	
	-110.62 ✓	
	2.04384_n ✓	
	1.46992 ✓	
	b_n'	
	$+89.04$ ✓	
	$+29.51$	
	$+59.53$	
	1.77474	
	1.27187	1.89365
	1.08970_n	1.97038_n
	c_n'	d_n'
	$+6.6$ ✓	-14.95 ✓
	-12.29	-93.40
	$+18.89$	$+78.45$
	$+18.70$	$+78.28$
	$+.19$	$.17$
	9.27875	
	8.41662	
c'	$+.03$ ✓	*Sub. from last Vals
$\log \bar{Y}$	-702.8	
$\bar{Y}$	$= -702.83$	

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D4847

Check Computation using measures.

Reduction of Equations using $\frac{x}{100}$ & $\frac{y}{100}$

3 unknown quantities in equations.

$x-X = \frac{x}{100}a + \frac{y}{100}b + c$			$(x-X)\frac{x}{100} = \left(\frac{x}{100}\right)^2 a + \frac{xy}{100}b + \frac{x}{100}c$		
-13.6 ✓	+ 3.0 ✓	+ 34.3 ✓	-40.8	9.0	102.3
-10.9 ✓	3.1 ✓	25.1 ✓	-33.8	9.6	77.8
-8.1 ✓	5.5 ✓	34.5 ✓	-44.6	30.2	189.8
-9.1 ✓	10.6 ✓	49.2 ✓	-96.5	112.4	521.5
-1.5 ✓	21.8 ✓	6.6 ✓	-32.7	475.2	143.9
+9.5 ✓	39.3 ✓	35.3 ✓	+373.4	1544.5	1387.3
+10.1 ✓	45.8 ✓	13.0 ✓	+462.6	2097.6	595.4
+9.2 ✓	49.9 ✓	15.5 ✓	+459.1	2490.0	773.4
+14.5 ✓	54.9 ✓	19.9 ✓	+796.0	3014.0	1092.5
+43.3			+2091.1		
-43.2			- 248.4		
+ 0.1 =	+233.9a	+233.4b +9c	+18427 =	+9782.5a	+4883.9b +233.9c

$y-Y = \frac{y}{100}a' + \frac{x}{100}b' + c'$			$(y-Y)\frac{y}{100} = \left(\frac{y}{100}\right)^2 a' + \frac{xy}{100}b' + \frac{y}{100}c'$		
+ 5.9 ✓			+202.4 ✓		
+1.6 ✓			+ 40.2 ✓		
+6.6 ✓			+227.7 ✓		
+15.2 ✓			+747.8 ✓		
- 5.6 ✓			- 37.0 ✓		
+ 4.6 ✓			+162.4 ✓		
- 8.6 ✓			-111.8 ✓		
- 8.8 ✓			-136.4 ✓		
-10.6 ✓			-210.9 ✓		
+33.9			+1380.5 ✓		
-33.6			- 496.1 ✓		
+ 0.3 =	+233.4a'	+233.9b' +9c'	+ 884.4 =	+7512.2a'	+4883.9b' +233.4c'

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$(x-X)\frac{y}{100} = \frac{xy}{100}a + \left(\frac{y}{100}\right)^2 b + \frac{y}{100}c$

-466.5	11765
-273.6	630.0
-279.4	1190.2
-447.7	2420.6
- 9.9	43.6
+335.4	1246.1
+131.3	169.0
+142.6	240.2
+288.6	396.0
+897.9	
-1477.1	
-579.2	= +4883.9a + 7512.2b + 233.4c

$(y-Y)\frac{x}{100} = \frac{xy}{100}a' + \left(\frac{x}{100}\right)^2 b' + \frac{x}{100}c'$

+17.7 ✓	
+ 5.0 ✓	
+36.3 ✓	
+161.1 ✓	
-122.1 ✓	
+180.8 ✓	
-393.9 ✓	
-439.1 ✓	
-581.9 ✓	
+400.9 ✓	
-1537.0 ✓	
-1136.1 ✓	= +4883.9a' + 9782.5b' + 233.9c'

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D 4847

Check computation using Measures.
3 unknown quantities in equations.

Solution of Equations.

$+0.1 = +233.9\,a + 233.4\,b + 9c$
$+1842.7 = +9782.5\,a + 4883.9\,b + 233.9\,c$
$-579.2 = +4883.9\,a + 7512.2\,b + 233.4\,c$

$+.011 = +25.989\,a + 25.933\,b + c$
$+7.878 = +41.823\,a + 20.880\,b + c$
$-2.482 = +20.925\,a + 32.186\,b + c$
$(1-2)\ -7.867 = -15.834\,a + 5.053\,b$
$(3-2)\ -10.360 = -20.898\,a + 11.306\,b$
$-1.557 = -3.134\,a + b$
$-.916 = -1.848\,a + b$
$-.641 = -1.286\,a$
$+.498 = +a$ ✓
$-1.557 = -1.561 + b$
$b = +.004$
$b = -.916 + .920 = +.004$ ✓

$c = +.011 - 12.943 - .104 = -13.036$
$c = +7.878 - 20.828 - .084 = -13.034$
$c = -2.482 - 10.421 - .129 = -13.032$ ✓

$a = +.498$ $\quad a' = +.471$
$b = +.004$ $\quad b' = -.159$
$c = -13.0$ $\quad c' = -8.0$

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$+0.3 = +233.4\,a' + 233.9\,b' + 9\,c'$
$+884.4 = +7512.2\,a' + 4883.9\,b' + 233.4\,c'$
$-1136.1 = +4883.9\,a' + 9782.5\,b' + 233.9\,c'$

$+.033 = +25.933\,a' + 25.989\,b' + c'$
$+3.789 = +32.186\,a' + 20.925\,b' + c'$
$-4.857 = +20.880\,a' + 41.823\,b' + c'$
(1-2) $-3.756 = -6.253\,a' + 5.064\,b'$
(3-2) $-8.646 = -11.306\,a' + 20.898\,b'$
$-.741 = -1.235\,a' + b'$
$-.414 = -.541\,a' + b'$
$-.327 = -.694\,a'$
$+a' = +.471$
$+b' = -.741 + .582 = -.159$
$+b' = -.414 + .255 = -.159$

$+c' = +.033 - 12.214 + 4.132 = -8.049$
$+c' = +3.789 - 15.160 + 3.327 = -8.044$
$+c' = -4.857 - 9.834 + 6.650 = -8.041$

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D 7042 Cont. from page 127.

* Use -y

Check using star c.

c	x = 2084.0 ✓		y = 3644.0 ✓	using fundamentals.
	ax − 8.4	840	a'y + 22.6 ✓	2256
	by + 9.8	9.80	b'x + 3.5 ✓	346
	c + 1.3 ✓	1.37	− 25.0 ✓	2497
		2.77		1.05
	+ 2086.7 ✓	.77	− 3642.9 ✓	2.95
	Comet. − 2947.0 ✓		+ 2939.8 ✓	
	X − 860.3 ✓	860.23	Y − 703.1 ✓	−703.15

f.100.	X	Y	x	y	Δx	Δy	ΔX	ΔY
					−1814.8 ✓	+1149.6 ✓	−1807.7 ✓	+1139.1 ✓
					−1801.8 ✓	+226.5 ✓	−1796.2 ✓	+222.5 ✓
					−1566.0 ✓	+1174.6 ✓	−1563.8 ✓	+1165.1 ✓
					−1046.0 ✓	+2637.8 ✓	−1048.2 ✓	+2620.0 ✓
					+56.1 ✓	−1621.5 ✓	+59.6	−1612.2 ✓
					+1811.5 ✓	+1248.0 ✓	+1799.2 ✓	+1240.8 ✓
					+2456.0 ✓	−987.0 ✓	+2447.8 ✓	−977.7 ✓
					+2866.1 ✓	−735.4 ✓	+2860.0 ✓	−726.7 ✓
					+3363.6 ✓	−288.1 ✓	+3350.0 ✓	−277.7 ✓

c −860.3 ✓ −703.1 ✓ 2084.0 −3644.0

using adopt. comet.

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$\Delta x - \Delta X$	$\Delta y - \Delta Y$	$\frac{\Delta X}{1000}$ (a)	$\frac{\Delta Y}{1000}$ (b)	aa	ab	bb	an	bn
− 6.3	+ 9.5	− 1.81	+ 1.14	+ 3.28	− 2.06	+ 1.30	+ 11.40	− 7.18
− 5.9	+ 4.0	− 1.80	+ .22	3.24	− .40	.05	+ 10.26	− 1.25
− 2.2	+ 9.5	− 1.56	+ 1.17	2.43	− 1.83	1.37	+ 3.73	− 2.57
+ 2.2	+ 17.8	− 1.05	+ 2.62	1.10	− 2.75	6.86	− 2.31	+ 5.76
− 3.8	− 9.3	+ .06	− 1.61	.00	− .10	2.59	− .22	+ 5.80
+ 12.8	+ 7.2	+ 1.80	+ 1.24	3.24	+ 2.23	1.54	+ 22.14	+ 15.25
+ 8.2	− 9.3	+ 2.45	− .98	6.00	− 2.40	.96	+ 20.09	− 8.04
+ 6.8	− 8.7	+ 2.86	− .73	8.18	− 2.09	.53	+ 17.76	− 4.38
+ 13.8	− 10.4	+ 3.35	− .28	11.22	− .94	.08	+ 45.56	− 3.81
+ 42.3	+ 48.0	+ 10.55	+ 6.39		+ 2.23		+ 130.04	+ 26.81
− 17.8	− 37.7	− 6.22	− 3.60		− 12.57		− 2.53	− 27.23
+ 24.5	+ 10.3	+ 4.30	+ 2.79	+ 38.69	− 10.34	+ 15.28	+ 127.51	− 0.42
							+ 130.91	27.65
							− 2.64	− 27.37
							+ 128.27	− 0.32

	a_n'	b_n'	s	as	bs	sn	sn'
s = + 16.09	− 17.20	+ 10.83	+ .33	− .60	+ .38	− 2.08	+ 3.14
a = + 4.30	− 7.20	+ .88	− .58	+ 1.04	− .13	+ 3.31	− 2.32
b = + 2.79	− 14.82	+ 11.12	+ .61	− .95	+ .71	− 1.34	+ 5.80
c = + 9 + 16.09	− 18.69	+ 46.64	+ 2.57	− 2.70	+ 6.73	+ 5.65	+ 45.75
as + 32.66	− .56	+ 14.97	− .55	− .03	+ .89	+ 1.98	+ 5.12
aa + 38.69	+ 12.96	+ 8.93	+ 4.04	+ 7.27	+ 5.01	+ 49.69	+ 29.09
ab − 10.34	− 22.78	+ 9.11	+ 2.47	+ 6.05	− 2.42	+ 20.25	− 22.97
ac + 4.30 + 32.66	− 24.88	+ 6.35	+ 3.13	+ 8.95	− 2.28	+ 18.78	− 27.23
bs + 7.75	− 34.84	+ 2.91	+ 4.04	+ 13.63	− 1.14	+ 55.35	− 42.33
ba − 10.34	+ 12.96		+ 17.22	+ 36.94	+ 13.72	+ 155.01	+ 88.90
bb + 15.28	− 140.77		− 1.13	− 4.28	− 5.97	− 3.42	− 94.65
bc + 2.79 + 7.73	− 128.01	+ 111.74	+ 16.08	+ 32.66	+ 7.75	+ 151.59	− 5.95
sn + 151.59	sn' − 5.95	− 12.91				+ 156.83	− 5.84
an + 127.51	a_n' − 128.01	− 12.91				− 3.36	
bn − 1.72	b_n' + 111.74					+ 153.47	
cn + 24.5 + 151.59	cn' + 10.3 − 5.97						

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D7042

Check using star e

aa	ab	ac	as	an	sn
+38".69 ✓	−10.34 ✓	+4".30 ✓	+32".66 ✓	+128".41	
+1.58760	1.01452 ✓	0.63347 ✓	1.51402	2.10860 ✓	
	9.42692n	9.04587 ✓	9.92642 ✓		
	0.44144	0.06039n	0.94094n	1.53552 ✓	

bb	bc	bs	bn	
+5.28 ✓	+2.79 ✓	+7.75 ✓	−0.32	
+2.76 ✓	−1.15 ✓	−8.73 ✓	−34.32 ✓	
+12.52 ✓	+3.94 ✓	+16.48 ✓	+34.00 ✓	
1.09760 ✓	0.59550 ✓	1.21696 ✓	1.53148 ✓	
	9.49790 ✓	0.11936 ✓		
	0.09340 ✓	0.71486 ✓	1.02938 ✓	1.65084 ✓ 2.03502
	9.67934 ✓	0.55989 ✓	1.15447 ✓	

cc	cs	cn	
+9.00 ✓	+16.09 ✓	+25.4	+53.49
+.48	+3.62	+14.27 ✓	+108.40
+8.52	+12.47	+11.13 ✓	+45.09
+1.24	+5.19	+10.70 ✓	+44.76
+7.28	+7.28	+0.43 ✓	+0.33
0.86213 ✓		9.63347 ✓	9.51851
		8.77134	8.65638
	−c	+0".06 ✓	+0.0453
	ass $\bar{X}$	−8602	
	$\bar{X}'$	−860.16 *	

*Note. Diff possibly due to c (p104); hund not used in reductions. See p158

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	a_n'	
	$-128.''01$	
	2.10724 n	
	1.53416)	
	b_n'	
	+111.74	
	+34.21	
	+77.53	
	1.88947	
	1.38737	2.00883
	1.15311 n	2.03366 n
	c_n'	s_n'
	+10.3	−5.95
	−14.23	−108.06
	+24.53	+102.11
	+24.40	+102.05
	+0.13	+0.06
	9.11394	
	8.25181	
$-c' =$	$+0.''02$	
$\text{arc}\,\gamma =$	−703.1	
$\gamma' =$	−703.12	

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D 7042 ✓

see f. 100.

Solution with three unknown quantities using Measures.

$\frac{x}{100}$	$x-\bar{X} = \frac{x}{100}a + \frac{y}{100}b + c$	$(x-\bar{X})\frac{x}{100} = \left(\frac{x}{100}\right)^2 a$
2.7	−9.0	−24.3 ✓ 7.3 ✓
2.8	−8.4	−23.5 ✓ 7.8 ✓
5.2	−4.9	−25.5 ✓ 27.0 ✓
10.4	−0.5	− 5.2 ✓ 108.2 ✓
21.4	−6.3	−134.8 ✓ 458.0 ✓
39.0	+9.6	+374.4 ✓ 1521.0 ✓
45.4	+5.5	+249.7 ✓ 2061.2 ✓
49.5	+3.3	+163.4 ✓ 2450.2 ✓
54.5	+10.9	+594.0 ✓ 2970.2 ✓
230.9 ✓	+29.3 ✓	+1381.5 ✓
	−29.1 ✓	− 213.3 ✓
	+0.2 = 230.9 a + 300.1 b + 9c ✓	+1168.2 = +9610.9 a

$\frac{y}{100}$	$y-\bar{Y} = \frac{y}{100}a' + \frac{x}{100}b' + c'$	$(y-\bar{Y})\frac{y}{100} = \left(\frac{y}{100}\right)^2 a'$
25.0	+8.4	+210.0 ✓
34.2	+2.9	+ 99.2 ✓
24.7	+8.4	+207.5 ✓
10.1	+16.7	+168.7 ✓
52.7	−10.4	− 548.1 ✓
24.0	+6.1	+146.4 ✓
46.3	−10.4	−481.5 ✓
43.8	− 9.8	−429.2 ✓
39.3	−11.5	− 452.0 ✓
300.1 ✓	+42.5 ✓	+831.8 ✓
	− 42.1 ✓	−1910.8 ✓
	+0.4 = 300.1 a' + 230.9 b' + 9c' ✓	−1079.0 = +11466.6 a'

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$+\frac{xy}{100}f$	$+\frac{x}{100}c$	$(x-\bar{X})\frac{y}{100}$	$=\frac{xy}{100}a$	$+\left(\frac{y}{100}\right)^2 f$	$+\frac{y}{100}c$
67.5 ✓		− 225.0 ✓		625.0 ✓	
95.8 ✓		−287.3 ✓		1169.6 ✓	
128.4 ✓		−121.0 ✓		610.1 ✓	
105.0 ✓		− 5.0 ✓		102.0 ✓	
1127.8 ✓		−332.0 ✓		2777.3 ✓	
936.0 ✓		+230.4 ✓		576.0 ✓	
2102.0 ✓		+254.6 ✓		2143.7 ✓	
2168.1 ✓		+144.5 ✓		1918.4 ✓	
2141.8 ✓		+428.4 ✓		1544.5 ✓	
		+1057.9 ✓			
		−970.3 ✓			
$+8872.4f$ ✓	$+230.9c$ ✓	+ 87.6 ✓	$=+8872.4a$ ✓	$+11466.6f$ ✓	$+300.1c$ ✓

$+\frac{xy}{100}f'$	$+\frac{y}{100}c'$	$(y-\bar{Y})\frac{x}{100}$	$=\frac{xy}{100}a'$	$+\left(\frac{x}{100}\right)^2 f'$	$+\frac{x}{100}c'$
		+ 22.7 ✓			
		+ 8.1 ✓			
		+ 43.7 ✓			
		+173.7 ✓			
		−222.6 ✓			
		+237.9 ✓			
		−472.2 ✓			
		−485.1 ✓			
		−626.8 ✓			
		+486.1 ✓			
		−1806.7 ✓			
$+8872.4f'$ ✓	$+300.1c'$ ✓	−1320.6 ✓	$=+8872.4a'$ ✓	$+9610.9f'$ ✓	$+230.9c'$ ✓

a'

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D4072

Reductions of Equations, p. 162-3.
3 unknown quantities
Measured Vals. in equations

$+0.2 = 230.9\,a + 300.1\,b + 9\,c$
$+1168.2 = +9610.9\,a + 8872.4\,b + 230.9\,c$
$+87.6 = +8872.4\,a + 11466.6\,b + 300.1\,c$

$-.022 = +25.667\,a + 33.344\,b + c$
$+5.059 = +41.624\,a + 38.425\,b + c$
$+.292 = +29.565\,a + 38.209\,b + c$

$(1-2)\ -5.037 = -15.957\,a - 5.081\,b$
$(3-2)\ -4.767 = -12.059\,a - 0.216\,b$

$-.991 = -3.141\,a - b$
$-22.069 = -55.828\,a - b$
$+21.078 = +52.687\,a$
$+0.40006 = +a$

$+.991 - 1.257 = +b = -.266$
$+22.069 - 22.334 = +b = -.265$

$+c = +.022 - 10.267 + 8.803 = -1.442$
$+c = +5.059 - 16.650 + 10.144 = -1.447$
$+c = +.292 - 11.826 + 10.087 = -1.447$

a $+.400$
b $-.266$
c -1.4

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Check comp.

9

D7042 Sol. 3 unknown granules

Mass in Eq. Jans form of Sol.

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1896phaeproj.167OW

Sol. D7042 — Sol with 3 unknown quant. — Meas in Equations

$aa = \frac{x^2}{100}$ — $ab = \frac{xy}{100}$ — $ac = \frac{x}{100}$ — $an = (x-\bar{x})\frac{x}{100}$

+9610.9 ✓ — +8872.4 ✓ — +230.9 ✓ — +1168.2 ✓

3.98276 — 3.94804 — 2.36342 — 3.06752

$\frac{ab}{aa}$ $\frac{ac}{aa}$ $\frac{an}{aa}$ omit

9.96528 — 8.38066 — 9.08476

(3.91332) — (2.32870) — (3.03280)

+1168.2 — $bb = \frac{y^2}{100}$ — $be = \frac{y}{100}$ — $bn = (x-\bar{x})\frac{y}{100}$

log ac 2.36342 — +11466.6 ✓ — +307.1 ✓ — +87.6 ✓

z 0.13796

2.50138 ✓ +317.2

+8190.4 $\frac{ab}{aa}$ ab — +213.2 ✓ $\frac{ab}{aa}$ ac — +1078.5 $\frac{ab}{aa}$ an

log ab 3.94804 — +3275.9 ✓ — +86.9 bc1 — −990.9 bn1

y 9.42484

3.37288 +2359.8 — 3.57533 ✓ — 193902 ✓ — 299603 n

+3845.2

3.58492

3.98276

9.60216

8.42369 ✓

(0.36271) $\frac{bc1}{bb1}$ bc1 — (1.41972 n)

(0.74408) $\frac{ac}{aa}$ ac — (1.44818) $\frac{ac}{aa}$ an

x = a ± .400 — −990.9 — CC = wdb — Cn = (x − X̄)

log bc' 1.93902 — +119.4 — +9.00 ✓ — +0.2 ✓

z 0.13796

2.07698 — −871.5 — +5.55 sub — +28.07

2.94027 n — +3.45 CC1 — −27.87 Cn1

log bb1 — 3.51533 — +2.30 — −26.29

9.42484 n — +1.15 CC2 — −1.58 Cn2

−.266 — 0.06070 ✓ — 0.19866 ✓

0.13796 n ✓

x = +400 = a — x' = −165 = b'

y = −.266 = b — y' = −613 = a' — Subtrm Meas

z = −1".4 = c — z' = +24".7 = c' — − z = −1.37 is to be sub. from meas.

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$a_{11}' = (y-\bar{y})\frac{x}{100}$

$-1320.6''$ ✓

3.12077_n ✓

9.13801_n $\frac{a_{11}'}{aa}$

(3.08605_n) ✓

$b_{11}' = (y-\bar{y})\frac{y}{100}$

-1079.0 ✓

-1219.1 ✓

$+140.1$ ✓

2.14644 ✓

(0.57013) ✓ $\frac{bc_1'}{bb_1'}\,b_{11}'$

(1.50143_n) ✓ $\frac{ac}{aa}\,a_{11}'$

$C_1'(y-\bar{y})$

$+0.4$ ✓

-31.73 ✓

$+32.13$ ✓ C_1'

$+3.72$ ✓

$+28.41$ ✓ C_2'

1.45347 ✓

0.06070 cc_2

1.39277 ✓

$-C' = -z' = +24.70''$ ✓

$-1320.6'' \rightarrow -1320.6$

2.36342

1.39277_n

3.75619_n

-57041

$+54349$

-1589.8

$\frac{bc}{y}$ 3.94804

9.78715

3.73519

3.20134_n

3.98276

9.21858_n

$x' = b' = -.1654$

$+140.1$

1.93902 ✓

1.39277_n ✓

3.33179_n ✓

-2.468 ✓

-2006.7 ✓

3.30248_n ✓

3.51533 ✓

9.78715_n ✓

$y' = a' = -.618$ ✓

mean.

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$a' = .616$
$b' = -.165$
$c' = +24.8$

for $b = 165$

$+0.4 = 300.1\,a' + 230.9\,b' + 9\,c'$

$-1079.0 = +11466.6\,a' + 8872.4\,b' + 300.1\,c'$

$-1320.6 = +8872.4\,a' + 9610.9\,b' + 230.9\,c' = -5465.4 - 1585.8 + 5726.3 = -1324.9$

$+.044 = +33.344\,a' + 25.667\,b' + c'$

$-3.595 = +38.209\,a' + 29.565\,b' + c'$

$-5.719 = +38.425\,a' + 41.624\,b' + c'$

$+3.639 = -4.865\,a' - 3.898\,b'$

$-2.124 = +0.216\,a' + 12.059\,b'$

$+.934 = -1.248\,a' - b'$

$-.176 = +.018\,a' + b'$

$+.758 = -1.230\,a'$

$-.616 = +a'$

$+b' = -.934 + .769 = -.165$

$+b' = .176 + .011 = -.165$

$+c' = +.044 + 20.540 + 4.235 = +24.819$

$+c' = -3.595 + 23.537 + 4.878 = +24.820$

$+c' = -5.719 + 23.670 + 6.868 = +24.819$

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Lf. 164

D 7042 3 unknown quantities

Reduction of Equations.

Meas. ii Eq

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a +.400
b −.264
c −1.4

7042

+0.2 = 230.9 a + 300.1 b + 9 c

+1168.2 = +9610.9 a + 8872.4 b + 230.9 c +1168.2 = +3844.4 − 2342.3 − 323.3 = +1178.8

+87.6 = +8872.4 a + 11466.6 b + 300.1 c +87.6 = +3549.0 − 3027.2 − 420.1 = +101.7

+0.22 = +25.667 a + 33.344 b + c

±5.059 = ±41.623 a ± 38.425 b ± c

+.292 = +29.565 a + 38.209 b + c

2) −5.037 = −15.957 a − 5.081 b

2) −47.67 = −12.059 a − 0.216 b

−.991 = −3.141 a − b

∓22.069 = ∓55.828 a ∓ b

+22.078 = +52.687 a

+0.400 = +a

+.991 − 1.256 = +b = −.265 } −.264

+22.069 − 22.337 = +b = −.265 }

+c = +.022 − 10.267 + 8.803 = −1.442

+c = +5.059 − 16.650 + 10.144 = −1.447

+c = +.292 − 11.822 + 10.087 = −1.453

−1.4

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1178.8

+101.7

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D6980 Cont. from page 139.

Check using star c *Use −x, −y

c $x = {}^{*}-3818.3$ ✓ $y = {}^{*}-3654.1$ ✓

ax	+ 15.7	✓ 15.69	$a'y$	+ 22.0	✓ 21.96
by	+ 7.9	✓ 7.89	$b'x$	− 7.1	✓ 7.10
c	− 20.9	✓ 20.93	c'	− 13.8	✓ −13.84
					+ 1.02
Σ	+ 2.7	✓ 2.65	Σ	+ 1.1	✓
	−3815.6	✓ 5.65		−3653.0	✓ 3.08
	+2956.3	✓		+2949.4	✓
X	− 859.3	+859.35		− 703.6	✓ −703.68

X	Y	x^{*}	y	Δx^{*}	Δy^{*}	ΔX	ΔY
				−1815.8	+1152.1	−1808.7	+1139.6
				−1803.7	+ 226.7	−1797.1	+ 223.0
				−1567.6	+1175.5	−1564.8	+1165.6
				−1047.7	+2636.2	−1049.2	+2620.5
				+ 56.3	−2621.4	+ 58.7	−1611.7
				+1809.6	+1248.1	+1798.2	+1241.3
				+2456.2	− 987.2	+2446.8	− 977.2
star c,, using adopt. const.	− 859.3 ✓	−703.6 ✓	−3818.3 ✓	−3654.1 ✓	+2866.4	− 7359	+2859.0	− 726.2
					+3362.4	− 2867	+3349.0	− 277.2

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$\Delta x - \Delta X$	$\Delta y - \Delta Y$	$\frac{\Delta X}{1000}$	$\frac{\Delta Y}{1000}$	aa	ff	ff	an	bn
−7.1	+12.5	−1.81	+1.14	+3.28	−2.06	+1.30	+12.85	−8.09
−6.6	+3.7	−1.80	+.22	3.24	−.40	.05	+11.88	−1.45
−2.8	+9.9	−1.56	+1.17	2.43	−1.83	1.37	+4.37	−3.28
+1.5	+15.7	−1.05	+2.62	1.10	−2.75	6.86	−1.58	+3.93
−2.4	−9.7	+.06	−1.61	.00	−.10	2.59	−.14	+3.86
+11.4	+6.8	+1.80	+1.24	3.24	+2.23	1.54	+20.52	+14.14
+9.4	−10.0	+2.45	−.98	6.00	−2.40	.96	+23.03	−9.21
+7.4	−9.7	+2.86	−.73	8.18	−2.09	.53	+21.16	−5.40
+13.4	−9.5	+3.35	−.28	11.22	−.94	.08	+44.89	−3.75 ✓
+43.1	+48.6	+10.52	+6.39	+38.69	−10.34	+15.28	+138.70	+21.93
−18.9	−38.9	−6.28	−3.60				−1.72	−31.18 ✓
+24.2	+9.7	+4.30	+2.79				+136.98	−9.25 ✓

s = +16.09

as = +4.30

bs = +2.79

cs = 9 +16.09

as = +32.66

aa = +38.69

ab = −10.34

ac = +4.30 + 32.65

bs = +7.75

ba = −10.34

bb = +15.28

bc = +2.79 + 7.73

sn = +151.94 sn' −12.55

an = +136.98 an' −133.60

bn = −9.25 Bn' +111.36

cn = +24.2 + 15.93 cn' + 9.7 − 12.54

an'	bn'	s	as	bs	sn	sn'
−22.62	+14.25	+.33	−.60	+.38	−2.34	+4.12
−6.66	+.81	−.58	+1.04	−.13	+3.83	−2.15
−15.44	+11.58	+.68	−.95	+.71	−1.71	+6.04
−16.48	+41.13	+2.57	−2.70	+6.73	+3.86	+40.35
−.58	+15.62	−.55	−.03	+.89	+1.32	+5.34
+12.24	+8.43	+4.04	+7.27	+5.01	+4.06	+27.47
−24.50	+9.80	+2.47	+6.05	−2.42	+23.22	−24.70
−27.74	+7.08	+3.13	+8.95	−2.28	+23.16	−30.36
−31.82	+2.66	+4.07	+13.63	−1.14	+54.54	−38.66
+12.24		+17.22	+36.94	+13.72	+155.99	+83.32
−145.84	+111.36	−1.13	−4.28	−5.97	−4.05	−95.87
−133.60		+16.09	+32.66	+7.75	+151.94	−12.55

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06980

Check using Star c

aa	ab	ac	as	an	Sn
+38".69 ✓	−10".34 ✓	+".430 ✓	+32".66 ✓	+136".98 ✓	
1.58760	1.01452$_n$	0.63347	1.51402 ✓	2.13666 ✓	
	9.42692$_n$ ✓	9.04587 ✓	9.92642 ✓		
	0.44144	0.06039$_n$	0.94094$_n$	1.56358$_n$	

bb	bc	bs	bn		
+15.28 ✓	+2.79 ✓	+7.75 ✓	−9.25		
+2.76 ✓	−1.15	−8.73	−36.61		
+12.52 ✓	+3.94 ✓	+16.48 ✓	+27.36		
1.09760 ✓	0.59550 ✓	1.21696 ✓	1.43712		
	9.49790 ✓	0.11936 ✓			
	(0.09340 ✓	0.71486 ✓	0.98502	1.55648 ✓	
	(9.67934	0.55989 ✓	1.18253 ✓	2.06308 ✓	

cc	cs	cn		
+9.00 ✓	+16.09 ✓	+24.2 ✓	+157.94 ✓	
+.48 ✓	+3.62	+15.22 ✓	+115.63 ✓	
+8.52	+12.47	+8.98 ✓	+36.31	
+1.24	+5.19	+8.68	+35.98 602	
+7.28	+7.28	+0.37	+0.33 29	
0.86213 ✓		9.56820	9.46240	
		8.70607	8.60027	
	−c =	+".0508	+.04	
	am. X =	−8553		
	X =	−8559.35		

Note: The difference between am X and X is probably due to c' being (.132) between −13".8 and +3".9 (−13.8 = adopted value), because hundredths have not been used in reductions, see p 166

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	$a_{n'}$	$s_{n'}$
	−133.60 ✓	
	2.12581 n ✓	
	1.55273) ✓	
	$b_{n'}$	
	+111.36 ✓	
	+35.70 ✓	
	+75.66 ✓	
	1.87887 ✓	
	1.37677 ✓	1.99823 ✓
	1.17168 n ✓	2.05223 n ✓
	$c_{n'}$	
	+9.7 ✓	−12.55 ✓
	−14.85 ✓	−112.78 ✓
	+24.55 ✓	+100.23 ✓
	+23.81 ✓	+99.57 ✓
	+0.74 ✓	+0.64
	9.86923	9.80618
	9.00710	8.94405
$-c' =$	+0.10	+09
$\log T =$	−703.6	
$T =$	−703.7	

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D 6980

Check computation using measures

Solution with – 3 unknown quantities nine equations

$\frac{x}{100}$	Gillis $\frac{x}{100}$	$x-X = \frac{x}{100}a + \frac{y}{100}b + c$	$(x-X)\frac{x}{100} = \left(\frac{x}{100}\right)^2 a$	$\frac{xy}{100}b + \frac{x}{100}c$
56.3	7980	−9.8	−551.7	3169.7	1407.5
56.2	8714	−9.3	−522.7	3158.4	1927.7
53.9	7923	−5.5	−296.4	2908.2	1336.7
48.7	6508	−1.2	−58.4	2371.7	496.7
37.6	11113	−5.1	−191.8	1413.8	1985.3
20.1	4034	+8.7	+174.9	404.0	4844
13.6	13902	+6.7	+91.1	185.0	631.0
9.5	14603	+4.7	+44.6	90.2	417.0
4.6	15462	+10.7	+49.2	21.2	181.2
300.5		+30.8	+359.8		
		−30.9	−1621.0		
		$-0.1 = 300.5a + 300.9b + 9c$	$-1261.2 = +13719.2a + 8867.5b + 300.5c$	

$\frac{y}{100}$	$y-Y = \frac{y}{100}a' + \frac{x}{100}b' + c'$	$(y-Y)\frac{y}{100} = \left(\frac{y}{100}\right)^2 a' + \frac{xy}{100}b' + \frac{y}{100}c'$
25.0	+11.4	+285.0
34.3	+2.6	+89.2
24.8	+8.8	+218.2
10.2	+14.6	+148.9
52.8	−10.8	−570.2
24.1	+5.7	+137.4
46.4	−11.1	−515.0
43.9	−10.8	−474.1
39.4	−10.6	−417.6
300.9	+43.1	+878.7
	−43.3	−1976.19
	$-0.2 + 300.9a' + 300.5b' + 9c'$	$-1098.2 = +11521.7a' + 8867.5b' + 300.9c'$

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$$(x-X)\frac{y}{100} = \frac{xy}{100}a + \left(\frac{y}{100}\right)^2 b + \frac{y}{100}c$$

−245.0	625.0
−319.0	1176.5
−136.4	615.0
− 12.2	104.0
−269.3	2787.8
+209.7	580.8
+310.9	2153.0
+206.3	1927.2
+421.6	1552.4
+1148.5	
− 981.9	
+166.6 =	+8867.5a + 11521.7b + 300.9c

$$(y-Y)\frac{x}{100} = \frac{xy}{100}a' + \left(\frac{x}{100}\right)^2 b' + \frac{x}{100}c'$$

+641.8	
+146.1	
+474.3	
+711.0	
−406.1	
+114.6	
−151.0	
−102.6	
− 48.8	
+2087.8	
− 708.5	
+1379.3 =	+8867.5a' + 13719.2b' + 300.5c'

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See also pp 174-5

Check computation using measures.

Solution of Equations 3 unknown quantities

$$-0.1 = +300.5a + 300.9b + 9c$$
$$-1261.2 = +13719.2a + 8867.5b + 300.5c$$
$$+166.6 = +8867.5a + 11521.7b + 300.9c$$

$$-.011 = +33.389a + 33.433b + c$$
$$-4.197 = +45.655a + 29.509b + c$$
$$+.554 = +29.470a + 38.291b + c$$

1-2 $+4.186 = -12.266a + 3.924b$

3-2 $+4.751 = -16.185a + 8.782b$

$$+1.067 = -3.126a + b$$
$$+.541 = -1.843a + b$$
$$+.526 = -1.283a$$
$$-.410 = +a$$

$$+b = +1.067 - 1.282 = -.215$$
$$+b = +.541 - .756 = -.215$$

$$+c = -.011 + 13.689 + 7.188 = +20.866$$
$$+c = -4.197 + 18.719 + 6.344 = +20.866$$
$$+c = +.554 + 12.083 + 8.233 = +20.870$$
$$\} +20.9$$

$a = -.410$ $\quad a' = -.598$

$b = -.215$ $\quad b' = +.184$

$c = +20.9$ $\quad c' = +13.8$

check Gauss form

$a = -.411$ $\quad a' = -.600$

$b = -.217$ $\quad b' = +.184$

$c = +20.96$ $\quad c' = +13.9$

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$$-0.2 = +300.9\,a' + 300.5\,b' + 9\,c'$$
$$-1098.2 = +11521.7\,a' + 8867.5\,b' + 300.9\,c'$$
$$+1379.3 = +8867.5\,a' + 13719.2\,b' + 300.5\,c'$$

$$-.022 = +33.433\,a' + 33.389\,b' + c'$$
$$-3.650 = +38.291\,a' + 29.470\,b' + c'$$
$$+4.590 = +29.509\,a' + 45.655\,b' + c'$$
1-2 $+3.628 = -4.858\,a' + 3.919\,b'$
3-2 $+8.240 = -8.782\,a' + 16.185\,b'$
$$+.926 = -1.240\,a' + b'$$
$$+.509 = -.543\,a' + b'$$
$$+.417 = -.697\,a'$$
$$-.598 = +a''$$

$$+b' = +.926 - .742 = +.184$$
$$+b' = +.509 - .325 = +.184$$

$$+c' = -.022 + 19.993 - 6.144 = +13.827$$
$$+c' = -3.650 + 22.898 - 5.422 = +13.826$$
$$+c' = +4.590 + 17.646 - 8.401 = +13.835$$
$$+13.8$$

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Solution for 3 unknown quantities, using measures

Check Comp, Gauss form, same as on pp 173-174

$aa=\frac{x^2}{100}$	$ab=\frac{xy}{100}$	$ac=\frac{x}{100}$	$an=(x-\bar{X})\frac{x}{100}$
+137".92 ✓	+886".5 ✓	+30".5 ✓	−126".2 ✓
4.13733 ✓	3.94780 ✓	2.47784 ✓	3.10078$_n$ ✓
	9.81047 ✓	8.34051 ✓	
	(375827 ✓	2.28831 ✓	2.91125$_n$ ✓

		$bb=\frac{y^2}{100}$	$bc=\frac{y}{100}$	$bn=(x-\bar{X})\frac{y}{100}$
log ac 2.47784	−126".2			
.. 2 1.32130$_n$	−629".0	+11521.7 ✓	+30".9 ✓	+166.6 ✓
3.79914$_n$	+1920.6	+5731.5 ✓	+194.2 ✓	−815.2 ✓
log ab 3.94780	−5637.6	+5790.2 ✓	+106.7 ✓	+981.8 ✓
.. y 9.33564	3.75109$_n$	3.76269 ✓	2.02816 ✓	2.99202 ✓
3.28344	4.13733		8.26547 ✓	
	9.61376		(0.29363 ✓	1.25749 ✓
	−.411		(0.81835 ✓	1.44129$_n$ ✓

	+981".8	cc	$c=x-\bar{X}$
log c 2.02816	−2235.9	+9.00 ✓	−0.1 ✓
.. 2 1.32130$_n$	−1254.1	+6.58	−27.62 ✓
	3.09833$_n$	+2.42	+27.52 ✓
	3.76269	+1.97	+18.09 ✓
	9.33564$_n$	+0.45	+9.43 ✓
	−.217	9.65321	0.97451 ✓
			1.32130 ✓
		−c=−z=	+20".96 ✓

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

+1379.3 ✓

3.13966 ✓

2.95013$_n$) ✓

2.47784 +1379.3

1.14336$_n$ −4180.3

362120$_n$ +5320.3

+2519.3

3.54780 3.40128 ✓

9.77814 4.13733 ✓

3.72594 9.26395

+184

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

−1098.2 ✓

+891.5 ✓

~~−~~1989.7 ✓

3.29879$_n$ ✓

1.56426$_n$)

1.48017) ✓

−1989.7 ✓

−1484.3

−3474.0

3.54083$_n$

3.76269

9.77814$_n$

−600

$c_n' = y-Y$

2.02816 −0.2 ✓

1.14336$_n$ +30.21

3.17152$_n$ −30.41

−36.67

+6.26

0.79657

1.14336

$-c' = -z' =$ +13.91

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South Pole. Magnitudes.

E.F.L. Bk. 16, p. 124 etc.

	D4851.		4847	D7042	6980		4851 | 4847 | 7042 | 6980			
Gillies 7980	B	B	B	B	B	B				
8714	B	B	B	B	B	B				
7923	B	B	B	B	B	B				
6508	8.0	7.3	8.0	8.2	8.2	7.9	0.1	0.6	0.1 | 0.3	0.3
11113	7.0	7.2	7.2	7.3	7.5	7.2	0.2	0.0	0.0	0.1	0.3
e	9.0	9.0	9.0	9.0	9.2	9.0	0.0	0.0	0.0	0.0	0.2
d	8.4	8.8	8.5	8.5	8.3	8.5	0.1	0.3	0.0	0.0	0.2
c	8.0	8.0	8.0	8.0	8.0	8.0	0.0	0.0	0.0	0.0	0.0
g	10.0	10.0	9.8	10.0	10.0	10.0	0.0	0.0	0.2	0.0	0.0
f	14.5	14.0	15.0	13.8	14.9	14.4	0.1	0.4	0.6	0.6	0.5
k	11.0	11.0	11.0	11.0	11.0	11.0	0.0	0.0	0.0	0.0	0.0
m	12.0	12.0	15.0	12.0	12.2	12.0	0.0	0.0	0.0	0.0	0.2
n	14.6	14.7	15.0	14.5	14.8	14.7	0.2	0.0	0.3	0.2	0.1
h	10.8	10.0	10.8	10.1	11.1	10.6	0.2	0.6	0.2	0.5	0.5
o	13.5	13.4	11.8	13.0	13.3	13.3	0.2	0.1,0.2,	0.3	0.0
l	11.2	12.4	13.5	12.0	11.8	11.8	0.6	0.6,	0.0	0.2	0.0
g	16.3	16.0	16.0	16.0	16.0	16.2	0.2	i	i	i	i
f	9.5	9.0	9.8	9.2	10.0	9.5	0.0	0.5	0.3	0.3	0.5
y	16.3	16.0	~~16.0~~	N.S.	N.S.	16.1	0.2	0.1	~~0.1~~	—	—
x	16.0	15.9	15.8	15.9	15.9	15.9	0.1	0.0	0.1	0.0	0.0
t	15.7	15.5	15.2	15.7	15.8	15.6	0.1	0.1	0.4	0.1	0.2
q	14.5	14.0	15.0	14.0	14.8	14.5	0.0	0.5	0.5	0.5	0.3
w	12.3	12.3	12.5	11.8	12.8	12.3	0.0	0.0	0.2	0.5	0.5
u	15.7	15.8	15.9	15.7	15.8	15.8	0.1	0.0	0.1	0.1	0.0
s	15.0	15.0	15.0	15.0	15.0	15.0	0.0	0.0	0.0	0.0	0.0
b	7.4	7.3	7.3	7.5	7.5	7.4	0.0	0.1	0.1	0.1	0.1
w	16.0	15.8	15.8	15.9	15.5	15.8	0.2	0.0	0.0	0.1	0.3
4034 = a	7.0	7.0	7.0	7.0	7.0	7.0	0.0	0.0	0.0	0.0	0.0

* Tw

Nov. 24 1902
* Miss Leland says est. mags l & o interchanged on 4847.

Defect.

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	D4851		D4847	7042	6980		4851	4847	7042	6980
13902	6.7	B	7.0	7.0	6.8	6.9	0.2	: 0.1	0.1	0.1
14603	B	B	B	B	B	B				
15462	8.2	8.5	8.2	8.5	8.0	8.3	0.1	0.2	0.1	0.2 0.3
N.S. Meas'prg Bk 16 p 146	..	..	16.0	n.s			4851	7042	deefect.	
1	15.0			15.2		15.1	0.1	0.1		
2	14.5			14.5		14.5	0.0	0.0		
3	15.7			15.5		15.6	0.1	0.1		
* 3a										
4	16.0			15.8		15.9	0.1	0.1		
5	16.0			16.0		16.0	0.0	0.0		
6	15.2			15.0		15.1	0.1	0.1		
7	15.0			15.3		15.2	0.2	0.1		
8	14.5			14.7		14.6	0.1	0.1		
9	15.9			15.8		15.8	0.1	0.0		
10	14.0			13.8		13.9	0.1	0.1		
11	9.0			8.8		8.9	0.1	0.1		
12	10.2			10.5		10.4	0.2	0.1		
13	16.0			15.8		15.9	0.1	0.1		
14	13.9			13.7		13.8	0.1	0.1		
next page * 14a+										
15	15.0			15.0		15.0	0.0	0.0		
16	15.7			15.5		15.6	0.1	0.1		
17	16.0			15.8		15.9	0.1	0.1		
18	15.0			14.5		14.8	0.2	0.3		
19	10.0			9.8		9.9	0.1	0.1		
20	15.1			15.0		15.0	0.1	0.0		
21	16.0			15.9		16.0	0.0	0.1		
22	11.0			10.9		11.0	0.0	0.1		
23	15.7			15.7		15.7	0.0	0.0		
24	12.2			12.0		12.1	0.1	0.1		
25	15.8			15.7		15.8	0.0	0.1		
* 3a	15.8			16.0		15.9	0.1	0.1		

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	D4851	7042				
26	15.5	15.8	15.6	0.1	0.2	
27	15.3	15.5	15.4	0.1	0.1	
28	16.0	16.0	16.0	0.0	0.0	
29	12.9	12.5	12.7	0.2	0.2	≠
30	14.0	13.8	13.9	0.1	0.1	
31	10.5	10.5	10.5	0.0	0.0	
32	16.1	15.9	16.0	0.1	0.1	
* 32a&b						
33	10.0	10.0	10.0	0.0	0.0	
34	15.5	15.1	15.3	0.2	0.2	
35	7.2	7.5	7.4	0.2	0.1	
36	14.0	14.0	14.0	0.0	0.0	
37	15.7	15.5	15.6	0.1	0.1	
38	13.8	13.2	13.5	0.3	0.3	
39	11.0	10.5	10.8	0.2	0.3	
40	13.9	13.8	13.8	0.1	0.0	
41	11.0	11.0	11.0	0.0	0.0	
42	13.2	13.5	13.4	0.2	0.1	
43	15.9	15.8	15.8	0.1	0.0	
44	15.0	14.5	14.8	0.2	0.3	
45	15.8	15.5	15.6	0.2	0.1	
46	13.5	13.8	13.8	0.0	0.0	≠
47	15.5	15.5	15.5	0.0	0.0	
48	15.8	15.7	15.8	0.0	0.1	
49	15.8	15.9	15.8	0.0	0.1	
50	15.5	15.5	15.5	0.0	0.0	
14a	15.5	16.0	15.7	0.2	0.2	
14b	15.8	16.0	15.9	0.1	0.1	
32a	16.0	15.9	16.0	0.0	0.1	
32b	15.7	15.9	15.8	0.1	0.1	
32c	16.0	16.0	16.0	0.0	0.0	

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	D4851		7042			
			15.9	4	0.4	0.4
51	15.8		~~A.0.~~	15.8	~~0.~~	~~1~~
52	15.5		15.5	15.5	0.0	0.0
53	13.2		13.3	13.2	0.0	0.1
54	15.0		15.0	15.0	0.0	0.0
55	14.9		14.7	14.8	0.1	0.1
56	15.0		15.0	15.0	0.0	0.0
57	15.8		15.8	15.8	0.0	0.0
58	15.8		15.8	15.8	0.0	0.0
59	14.8		14.0	14.4	0.4	0.4
60	12.8		13.2	13.0	0.2	0.2
61	10.5	10.5	12.7	10.6	0.1	0.2
62	10.3		11.0	10.6	0.3	0.4
63	10.0		10.3	10.2	0.2	0.1
64	10.2		10.4	10.3	0.1	0.1
65	16.0		15.8	15.9	0.1	0.1
66	10.8		11.0	10.9	0.1	0.1
67	16.0		16.0	16.0	0.0	0.0
68	11.2		11.0	11.1	0.1	0.1
69	11.0		11.0	11.0	0.0	0.0
70	10.2		10.5	10.4	0.2	0.1
71	15.5		15.5	15.5	0.0	0.0
72	15.0		15.0	15.0	0.0	0.0
73	15.0		15.0	15.0	0.0	0.0
74	14.0		13.5	13.8	0.2	0.3
75	16.0		16.0	16.0	0.0	0.0

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	D4851		7042				
76	16.0		16.0	16.0	0.0	0.0	
77	15.1		14.5	14.8	0.3	0.3	
78	14.0		13.8	13.9	0.1	0.1	
79	15.2		15.5	15.4	0.2	0.1	
80	11.0		11.0	11.0	0.0	0.0	
81	13.5		13.5	13.5	0.0	0.0	
82	11.0	10.8	13.0	10.9	0.2	2.1	0.1
83	15.8		15.5	15.6	0.2	0.1	
84	14.3		13.8	14.0	0.3	0.2	
85	13.0		13.0	13.0	0.0	0.0	
86	14.9		14.5	14.7	0.2	0.2	
87	15.2		15.0	15.1	0.1	0.1	
88	15.3		15.0	15.2	0.1	0.2	
89	12.5		12.0	12.2	0.3	0.2	
90	14.8		14.0	14.4	0.4	0.4	
91	11.0		11.0	11.0	0.0	0.0	
92	10.2		10.5	10.4	0.2	0.1	≠
93	13.9		14.0	14.0	0.1	0.0	
94	16.0		16.0	16.0	0.0	0.0	
95	13.2		13.0	13.1	0.1	0.1	
96	13.0		12.8	12.9	0.1	0.1	
97	15.5		15.2	15.4	0.1	0.2	
98	13.3		13.0	13.2	0.1	0.2	
99	10.8		11.0	10.9	0.1	0.1	
100	13.9		14.0	14.0	0.1	0.0	

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	D4851	7042			
101	14.0	14.1	14.0	0.0	0.1
102	12.5	12.9	12.7	0.2	0.2
103	14.2	14.0	14.1	0.1	0.1
104	13.0	13.0	13.0	0.0	0.0
105	14.9	15.0	15.0	0.1	0.0
106	15.2	15.5	15.4	0.2	0.1
107	15.8	15.9	15.8	0.0	0.1
108	12.8	N.S.	12.8	a	..
109	15.5	15.0	15.2	0.3	0.2
110	15.7	15.5	15.6	0.1	0.1
111	16.1	16.0	16.0	0.1	0.0
112	15.5	15.2	15.4	0.1	0.2
113	8.9	8.7	8.8	0.1	0.1
114	10.9	11.0	11.0	0.1	0.0
115	15.8	15.7	15.8	0.0	0.1
116	14.5	14.0	14.2	0.3	0.2
117	14.0	13.5	13.8	0.2	0.3
118	15.7	16.0	15.8	0.1	0.2
119	16.0	16.0	16.0	0.0	0.0
120	11.5	12.0	11.8	0.3	0.2
121	14.2	14.0	14.1	0.1	0.1
122	15.8	16.0	15.9	0.1	0.1
123	16.0	N. S.	16.0	a	..
124	9.5	9.5	9.5	0.0	0.0
125	11.8	12.2	12.0	0.2	0.2

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D4851 7042

126	13.0	13.2	13.1	0.1	0.1
127	15.8	15.5	15.6	0.2	0.1
128	15.8	15.9	15.8	0.0	0.1
129	15.8	15.8	15.8	0.0	0.0
130	15.0	14.8	14.9	0.1	0.1
131	7.3	7.2	7.2	0.1	0.0
132	14.5	14.3	14.4	0.1	0.1
133	10.0	9.8	9.9	0.1	0.1
134	15.8	15.8	15.8	0.0	0.0
135	15.0	14.9	15.0	0.0	0.1
136	15.8	15.8	15.8	0.0	0.0
137	15.2	N.S.	15.2	Ot	..
138	12.0	11.8	11.9	0.1	0.1
139	10.8	11.0	10.9	0.1	0.1
140	14.0	13.7	13.8	0.2	0.1
141	16.0	15.8	15.9	0.1	0.1
142	15.8	15.8	15.8	0.0	0.0
143	13.8	13.6	13.6	0.2	0.1
144	12.0	12.5	12.2	0.2	0.3
145	15.0	15.5	15.2	0.2	0.3
146	15.7	15.7	15.7	0.0	0.0
147	13.0	12.8	12.9	0.1	0.1
148	15.2	15.5	15.4	0.2	0.1
149	15.5	15.7	15.6	0.1	0.1
150	8.5	8.5	8.5	0.0	0.0

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	II D4851	IV 7042				
151	16.0	16.0	16.0	0.0	0.0	
152	14.9	16.2	15.0	0.1	0.2	
153	15.0	15.3	15.2	0.2	0.1	
154	16.0	~~N.S.~~	16.0	~~0.0~~ a	..	Defect 2. p 198
155	15.9	16.0	16.0	0.1	0.0	
156	14.0	13.7	13.8	0.2	0.1	
157	16.0	N.S.	16.0	a	..	
158	15.8	N.S.	15.8	a	..	
159	16.0	15.8	15.9	0.1	0.1	
160	10.8	11.2	11.0	0.2	0.2	0
J257= 161	10.5	✓ 11.0	11.0 (16.0) ✓	10.8	0.3	0.2
162	16.0	N.S.	16.0	a	..	
163	15.7	N.S.	15.7	a	..	
164	14.2	13.7	14.0	0.2	0.3	
165	10.6	N.S.	10.6	a	..	
166	15.0	15.0	15.0	0.0	0.0	
167	14.7	15.7	15.2	0.5	0.5	
168	15.8	15.8	15.8	0.0	0.0	
169	15.8	N.S.	15.8	a	..	
170	16.0	16.0	16.0	0.0	0.0	
171	16.0	16.0	16.0	0.0	0.0	
172	9.2	9.0	9.1	0.1	0.1	
173	16.0	15.7	15.8	0.2	0.1	
174	15.7	15.7	15.7	0.0	0.0	
175	13.0	13.5	13.2	0.2	0.3	

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1896phae.proj.1670W

	D4851	7042			
176	10.5	10.9	10.7	0.2	0.2
177	12.0	11.5	11.8	0.2	0.3
178	14.0	14.0	14.0	0.0	0.0
179	16.0	N.S.	16.0	a	..
180	16.0	16.0	16.0	0.0	0.0
181	15.2	15.7	15.4	0.2	0.3
182	15.9	N.S.	15.9	a	..
183	9.0	8.5	8.8	0.2	0.3
184	16.0	N.S.	16.0	a	..
185	10.2	10.6	10.4	0.2	0.2
186	15.8	15.7	15.8	0.0	0.1
187	16.0	16.0	16.0	0.0	0.0
188	16.0	16.0	16.0	0.0	0.0
189	16.2	16.0	16.1	0.1	0.1
190	16.0	16.2	16.1	0.1	0.1
191	15.9	16.0	16.0	0.1	0.0
192	16.0	15.8	15.9	0.1	0.1
193	15.8	15.8	15.8	0.0	0.0
194	16.1	16.2	16.2	0.1	0.0
195	14.5	14.0	14.2	0.3	0.2
196	11.0	11.0	11.0	0.0	0.0
197	14.0	14.0	14.0	0.0	0.0

W.S meas for 3 see p182 — Defect

Cape 17	8.3	8.0	8.2	0.1	0.2
Additional Star 2	14.8	15.0	14.9	0.1	0.1
" " 3	15.5	15.2	15.4	0.1	0.2
" " 4	~~15.5~~ 14.9	15.0	~~15.8~~ 14.8	~~0.0~~ 0.3	~~0.0~~ 0.2
Jacoby 265	10.0	9.8	9.9	0.1	0.1

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1896phae.proj.1670w

* Diffs 2 end. exceeded 3.0"

Corrected values. Remeasures. All cases of more than

	no.	Corrected values		Remeasures		n	Mean	All cases of more than ... Kords
* x	32c	−1069.7	−1070.0	−1066.4	−1066.4	4	−1068.1	16 19 17 17
		x D14851	x	x D7042				4851, 7042
	7	−1639.1	−1639.3	−1638.5	−1638.5	4	−1638.8	3 5, 2 3
* x see p201	13	−1513.8	−1513.6	−1510.3	−1511.1	5	−1512.0	18 16, 17 9 9
	27	−1135.9	−1135.7	[erroneous −1168.5]	−1134.6	3	−1135.4	5 3, 331 8
* x	32a	−1038.1	[−1069.7 false entry] 1038.1	−1034.8	−1035.6	4 6	−1036.7	45 45 18 10 1 335, 14 8
extra = Add. 1. v. p174+114	34	−885.3	−886.5	−884.2	−884.2	4	−885.0	3 15, 8 8
	40	[erroneous −736.0]	−777.6	−774.9	−775.1	3	−775.9	399 17, 10 8
	52	−610.9	−611.3	−610.2	−608.4	4	−610.2	7 11, 0 18
	53	−585.4	−586.2	−584.2	−585.8	4	−585.4	0 8, 12 4
* x	59 (new no. Table VI S/Mss)	−444.0	−443.8	−440.7	−440.7	4	−442.3	17 15, 16 16
* y	118 (151)	+552.3	+552.8	+554.3	+554.3	4	+553.4	11 6, 9 9
* x	121 (150)	+536.1	+535.7	+539.4	+539.4 6	4	+537.7 6	16 19 20, 18 18
* y	139	+805.9	+806.1	+805.5	+807.3	4	+806.2	3 1, 7 11
	142	+840.5	....	+842.1	....	2	+841.3	8 .., 8 ..
	148	+973.0	....	+974.9	....	2	+974.0	10 .., 9 ..
	150	+1039.4	+1041.0	[+1041.6]	+1040.5	3	+1040.3	9 7, 13 2
order ↙ * Defect 4851	164	+1104.7	+1104.5	(+1100.1 = 155. q p124		3	+1103.1	* 16 14, 30 ..
extras in IV by mistake p161	160	+1124.7	....	+1125.4	meas for 161 +1125.6 +1125.4	4 6	+1125.4	350 6 .., 1 3 3 2 2 0 0
	»	....	....	+1125.4	+1125.4			
J257 =	161	+1148.4	+1148.4	+1149.6	meas for 154. +1150.0	4	+1149.1	* 8.8 = mean 3 * Used July 1902 7 7, 5 9
* x	188	+1498.5	+1498.7	+1502.4	+1500.6	4	+1500.0	15 13, 24 6
* x by y	189	+1502.9	+1504.3	+1506.2	+1506.3	4	+1504.9	20 6, 13 14
* x	190	+1530.3	+1530.1	+1534.3	+1532.5	4	+1531.8	15 17, 25 7
* y	197	+1759.2	+1759.2	+1760.9	+1761.1	4	+1760.1	9 9, 8 10
* y	Add. 2	+816.4	+816.0	+818.8	+819.0	4	+817.6	12 16, 12 14
Meas for 3 Defect on 4847 See p98		−99.1 p86(1)	4847 −100.3 = 99.5 −99.3	99.5 7042 (mean 4847 −99.7 (3))		4	−99.6	5 .., ... 4847 mean 1 7 1 3
see order ↙	155	+1098.7	....	+1100.9	meas for 154. +1099.9	3	+1099.8	11 .. 11 1
	191	+1542.2	....	+1543.8	+1544.0 meas for 192	3	+1543.3	11 .. 5 7

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√ = Retain all, resids do not exceed 2.5

	1 measure	32 c +365.3	+365.1	+365.4	+366.3	4	+365.8	5 7 5 5	
						no.	Mean y	Resids y	
		D4851=II		D7042=IV				4851, 7042	
7	+668.0	+668.6	+668.9	+668.3	4	+668.4	4 2, 5 1		√
13	+649.2	+649.2	+648.9	+649.3	5	+649.1	1 1, 2 0 2		√
27	+1286.2	+1286.6	[+1294.0] erroneous	+1285.3	3	+1286.0	2 6, 8 0 7		√
32a	+3548	[+365.3] rej +353.5	+353.8	+352.2	3 4.	+353.6	12 17, 2 14		√
34	+1526.6	+1526.6	+1525.2	+1525.2	4	+1525.9	7 7, 2 7		√
40	[+1486.8] erroneous	+1516.8	+1516.9	+1516.5	3	+1516.7	299 1, 2 2		√
52	+1220.4	+1220.4	+1219.3	+1219.1	4	+1219.8	6 6, 5 7		√
53	−536.2	−536.2	−537.2	−537.6	4	−536.8	6 6, 4 8		√
59	+1037.3	+1037.3	+1036.2	+1036.4	4	+1036.8	5 5, 6 4		√
118	−1530.2	−1530.4	−1533.4	−1534.0	4	−1532.0	18 16, 14 20		√
121	−600.0	−600.0	−599.5	−600.1	4	−599.9	1 1, 4 2		√
139	+623.4	+623.2	[+619.2] v. p203	+624.2	3	+623.6	2 4, 4 4	6	Rej 1st IV Prof. P. Neely
142	−1167.9	. . .	[−1168.7] Scale B erroneous	−1170.7	2	−1169.3	14 .., 14 ..		√
148	+1373.3	. . .	+1373.9 Scale B error, 1 ass. Q	1372.9	3	+1373.0	13 .., 11 1		√
150	−1268.6	−1269.6	[−1229.0] erroneous	−1270.4	3	−1269.5	9 1, 405 9		√
~~154~~	~~−734.9~~	~~−734.3~~	−735.6	=155 wt 1 error in both	3	−734.9	3.8 3.2 0 6, 7 5 4 6 6		√
160	−1272.3	. . . .	−1274.2	−1274.4 −1274.4	4	−1274.1	18 .., 1 3 3 4 4		√
~~27~~		. . . .	−1274.7	−1274.7					
								Put remark for 4 or 5 meas.	
	in Sept Sp Sols.	Jack, comparison					5.6 *		
161	−758.4	−758.2	−759.2	−758.6	4	−758.6	2 4, 6 0		√
188	−795.6	−795.8	−796.5	−796.7	4	−796.2	6 4, 3 5		√
189	−715.7	−715.9	−719.3	−717.7	4	−717.2	15 13, 21 5		√
190	−745.9	−745.5	−747.1	−747.2	4	−746.4	5 9, 7 8		√
197	+198.7	+198.5	+195.3	+197.3	4	+197.4	13 11, 21 1		√
Add 2	+1585.0	+1584.6	+1581.5	+1583.3	4	+1583.6	14 10, 21 3		√
	Meas for 3 in 4847	−91.3		M. S.					
			4847 −92.4 −91.0 −92.4	(mean 4847 −91.9 (3)) not used	4	−91.8	5 .., ...		47 myal
							6 8 6		
155	−675.2	. . .	−676.2	−676.0	3	−675.8	6 .. 4 2		
191	−750.1	. . .	−752.9	−751.9	3	−751.6	15 .. 13 3		

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Notes on Positions.

Notes: Cases not measured on D 4851.

No.		
3a	Measured on D4851	Bk 16 p186 (mid's)
14a	"	" "
14b	"	" "
32a	"	" "
32b	"	" "

June 10th 1902 All found & measured D4851

Examination made of:

142 on 7042 in y, Scale. B was wrong (corrected)

148 " " " y, B & D remeasured.

" Wonderly meas from 4847 found & meas on 4851 (48.5 48.7 Est x+y)

7042 N.S. Originals
A 1903 + A 2235 to be exam.

Defect mens
Nov 21 1902
Miss L + Miss L & N.

Cases not measured on D7042

No.		
51	N.S.	Meas on 7042 Bk 16 p190
108	N.S.	= Defect on 4851
123	N.S.	" "
137	N.S.	" "
154	N.S.	Meas on 7042 Bk 16 p190
157	N.S.	Defect "
158	N.S.	" "
162	N.S.	" "
163	N.S.	" "
165	N.S.	" "
169	N.S.	" "
179	N.S.	" "
182	N.S.	" "
184	N.S.	7042 defective in the y
y	N.S.	7042 also 6980 N.S.

Remeasured on both plates 4851 II + 7042 IV Sm Bk 16 pp 188 + 190

27 because 1st meas. IV erroneous, rejected x and y

40 " 1st " II " " "

52 Est x 39.5 y 38.5 7042

53 " x 39.8 " 38.8 "

150 because 1st meas. y IV erroneous, rejected x and y.

161 = J257 1st meas made on IV + struck out was the star marked.

Jacoby 54 near 125 } dbl, centre measured.
Cahe 17 " 55 }

(Est x 77.6 Est y 60.1 / 57.1 7042 Miss L Bk 16. p192)

" 265 near 193 Ident on D4851 Clked by Miss Wells.

All stars within new Circle 30 S.P. to include Cahe 17 + J 265 / June 6 (1902)

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S.P.

Exam. of original plates for z, W.S. meas for z' + for y

A1903

z found

"WS meas for z" = defect on cals. it does not appear on A1903.

y = defect on original, image does not look like a star.

A2235 shows faint star y, not not y.

Nov 21 1902

Miss Wells

Navigator For

Def on A1903

y I, 2 Rem. wanted only 1 meas given Bk16 p186

Note on y + z.

4847 I, y meas. by mistake for z, but z not = y, y meas. Bk16 p186

4851 II, y + z meas. correctly

6980 III y meas. by mistake for z y not seen.

7042 IV y not seen z meas. correctly.

(June 6 1902 note)

Case 17 dbl. -89° The two images could not be separated on A4851 and A7042 because of long exposure, a plate of shorter exposure y 71 = x 3914 showed the two components.

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Twelve
~~Thirteen~~ cases, differences between the 2nd
D4851 and 7042 exceeded 3."0

omit 1 Error in reduction not found before 1st meas. 4851 Bk16 p126
There was no need of remeasures.
13 Diff 2nd and x = 3."5 A third measure on IV because scale
of 2° meas. was erroneous, an
assumed value used in reduction

Ex Rem. II = 32C
See p574+114
32a " " x = 3.3
59 " " x = 3.3
118 " " y = 3.2
121 " " x = 3.3
Ex 1st IV. See p203 Rem.
139 " " y = 4.2 Revds from 4 meas = 3.3+C
154 Defect II. " x = 4.6 2° meas IV - Bk16 p196 = 161 = J257
188 " " x = 3.9
189 " " x = 3.3 y = 3.6
190 " " x = 4.0
197 " " y = 3.4
Add. 2 " " y = 3.5
32C " " x = 3.3

Nov 1902 For Final exam:
32a II because 2° meas of very ft. object on II erroneous. ~~Rejected~~, 1 Rem. wanted
139 IV " 1st " on IV erroneous, scale to be put on.
154 IV " 2 " on IV was J257 154 on II = defect 1st on IV = 155
orig. examined Both error 1 division
Def on I 1903 y I, 2 Rem. wanted only 1 meas given Bk16 p186. 60.8 not 61.8.

Note on y + z:
4847 I, y meas by mistake for z, but z not = y, y meas. Bk16 p186
4851 II, y + z meas. correctly
6980 III y meas by mistake for z y not seen.
7042 IV y not seen z meas. correctly.

(June 6 1902 note)
Case 17 dbl. -89° The two images could not be separated on
D4851 and D7042 because of long exposure, a plate
of shorter exposure J71 = x 3914 showed the two components.

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Notes on Magn: II IV

61 4851 7042 ✓ to be est again.

82 " " ✓ " "

0 4847 } interchange ? ✓

l " }

Defect y " not est. Note Nov 25 "Throw out y and make z = y" WPF

Cape 17 4851 + 7042 not est. This change of notation made on Mss. only, old designation z retained here

additional 2 " " "

" 3 " " "

" 4 " " "

Defect 154 " " "

Magns. differ more than half a unit for:

		Residuals II	Residuals IV	
Gillis 6508 ✓	1	6	3	→ see p180 Thus
p ✓	1	4	6	
h ✓	2	6	5	
q ✓	0	5	5	III 6980
p180 R w ✓	0	0	5	5 = R not w or W.
38 ✓	3	3	4	
59 ✓	4	4		Nuis L found not variable
p186 p188 61 ✓	11	11		see p186 " " "
62 & 77 ✓ ← 82 ✓	10	10		see p188 " " "
90 ✓	4	5		" " "
167 ✓	5	5		" " "

Single Ests of Magn II IV Est on these pl. to be made. Nov 26 1902

3a = . A in Table VI

14a = . A

14b = . A

32a = . A

32b = . A

51 = A

161 = A.

Defect W.S Nuis q = R. because magn est on 4847 only.

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Pos. examined ♃ 7042.

Nov 26 1902 139 B=145 d=5 confirms 2° meas. y Bk 16 p 196. The discordant measure y rejected (Bk 16 p 168) from mean.

Original sequence lettered stars apparently marked by — ? on ♃ 7042

For Sun:

The estimated magnitudes on the two plates II & V differ by more than a unit for two of the faint stars No 61 & 82 (=errors of column one) (new nos 75 & 101) and by more than half a unit for 6 other ft. stars (new) 38 54 59 74 80 62 95 73 73 90 112 44 (122) 65 16 193 67 11 (101) 128 & for Galileo = no 44 6508 & for 5 lettered stars O. p. q. r. s. t. Plates examined for 59 74 61 75 82 101 90 112 16 193 the 5 ft stars having largest residuals.

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Remeasure of ten Lettered Stars – five brightest and five faintest.

D 4851

See Book 16 – see p. 200. Position of plate reversed.

II

Sec 168 for constants

Estimates x	y			ax	by	c	Σ		Orig Pos. 1870	Orig Rev. = contr	Corr Rev OC
		(C–A)	24.2					-2981.5			
57.6	60.8	b	34 15.8	-18.0	-0.5	+13.2	-5.3	34 10.5	+429.0	+437.4	+438.9	+1.5	+438.2
35.8	38.5	c	20 80.1	-11.2	-0.3		+1.9	20 82.0	-899.5	-859.9	-859.2	+0.7	-859.1
35.6	37.7	d	20 94.0	-11.2	-0.3		+1.9	20 95.9	-885.6	-873.7	-873.0	+0.7	-872.9
26.1	35.4	e	15 86.4	-8.4	-0.3		+4.8	15 91.2	-1390.3	-1443.4	-1443.1	+0.3	-1442.6
50.9	44.4	f	30 27.9	-15.7	-0.3		-2.8	30 24.8	-12.2	+43.3	+44.1	+0.8	+44.1
53.7	41.9	t	31 90.0	-16.7	-0.3		-3.8	31 86.2	+184.7	+204.6	+205.2	+0.6	+205.4
55.8	46.9	u	32 79.4	-17.3	-0.4		-4.5	32 74.6	+293.1	+334.7	+335.7	+1.0	+335.5
57.4	46.1	w	34 28.2	-18.1	-0.4		-5.3	34 22.9	+441.4	+425.1	+425.9	+0.8	+425.9
51.9	46.4	x	30 32.3	-16.9	-0.4		-3.2	30 29.1	+47.6	+102.7	+103.3	+0.6	+103.5
50.5	48.6	y	30 02.0	-15.8	-0.4		-3.0	29 98.9	+17.5	+13.5	+14.6	+1.1 +0.8	+14.3

same ↑ opposite ↓ –3

to those in Table I in orig. pos. of pl.

Comparison of C–A and B–D in Original and Reversed Positions

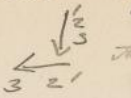
I

Star	Bk 16 pp +24	Orig Pos C–A	Orig Pos B–D	Rev Pos Bk 16 p. 200 C–A	Rev Pos Bk 16 p. 200 B–D	Diff x	Diff y	Diffs (with sign reversed) applied to Orig Pos = Rev. Pos x	Rev. Pos y
		mean of 3 meas		1 meas.					
b	124, 134, 144	+4.9	+24.3	-4.2	-23.9	+7	+4	+438.2	+634.6
c	" 132, 142	+19.8	+1.9	+19.9	-2.2	-1	-3	-859.1	-703.7
d	" " "	+5.9	+17.2	-6.0	-17.3	-1	-1	-872.9	-748.4
e	" " "	-27.2	-10.1	+26.7	+10.1	-5	0	-1442.6	-896.1
f	" 134 "	+28.0	-5.9	-27.9	+6.0	+1	+1	+44.0	-351.7
t	" " "	+5.9	+28.1	-10.0	-28.1	-1	0	+205.3	-496.8
u	" " 144	+21.1	+26.2	-20.9	-25.9	+2	+3	+335.5	-200.1
w	" " "	-8.2	-28.0	+8.2	+27.9	0	-1	+425.9	-253.5
x	" " 142	+27.5	-8.0	-27.7	+7.8	-2	-2	+103.5	-233.9
y=z	" " "	-1.7	+11.9	+2.0	-12.1	+3	-2	+14.3	-94.8

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use −(C−A) and −(B−D) because C and B on side greatest read.



−(B−D)	y	ay	bx	c	Σ	+29537 (Rev)	Orig pos. p70	Orig Rev	Corr to Rev. y	= Corr to c′ for rev. pos.
							"			
b	3623.9	−15.3	+5.7	−18.5	−28.1	3595.8	+642.1	+635.0	∓7.1	+634.55
c	2282.2	−9.6	+3.5		−24.6	2257.6	−696.1	−704.0	7.9	−703.65
d	2237.3	−9.4	+3.5		−24.4	2212.9	−740.8	−748.5	7.7	−748.35
e	2089.9	−8.8	+2.6		−24.7	2065.2	−888.5	−896.1	7.6	−896.05
f	2634.0	−11.1	+5.1		−24.5	2609.5	−344.3	−351.6	7.4	−351.75
t	2488.1	−10.5	+5.3		−23.7	2464.4	−489.3	−496.8	7.5	−496.85
u	2785.9	−11.8	+5.5		−24.8	2761.1	−192.6	−199.8	7.2	−200.15
w	2732.1	−11.5	+5.7		−24.3	2707.8	−245.9	−253.6	7.7	−253.45
x	2752.2	−11.6	+5.2		−25.0	2727.2	−226.3	−234.1	7.8	−233.95
y	2892.1	−12.2	+5.0		−25.7	2866.4	−87.3	−95.0	7.7	−94.85
=(3)									55 / 7.6	

of Plates II (4851) and IV (4042) 5 brightest and 5 faintest stars

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Remeasure of ten lettered stars.

Position of plate reversed. II

D 7042

See p108 for constants.

	Y	ax	by	c	Σ_i		Orig Pos	Orig-Rev. = contr	Corr Rev
						-2947.0	p110		x
b	3447.9	-13.9	-9.8	+1.4	-21.8	34256	+478.6	+423.0	+438.0 +15.0 +438.7
c	2115.7	-8.5	-6.2		-12.8	21024	-847.6	-875.9	-8602 +15.7 -8602
d	2069.8	-8.3	-6.2		-12.5	20567	-890.3	-889.8	-8740 +15.8 -8741
e	1502.0	-6.1	-5.7		-8.7	14946	-1455.4	-1459.3	-14434 +15.9 -14436
f	3006.4	-12.1	-7.1		-18.8	29886	+41.6	+28.8	+443 +15.5 +445
t	3203.9	-12.9	-6.7		-20.1	31855	+236.7	+191.1	+207.0 +15.9 +206.8
u	3312.1	-13.3	-7.5		-20.8	32927	+345.7	+321.5	+337.2 +15.7 +337.2
w	3342.1	-13.5	-7.4		-21.1	33226	+375.6	+411.3	+427.3 +16.0 +427.0
x	3064.8	-12.4	-7.4		-19.2	30464	+99.4	+89.9	+105.1 +15.2 +105.6
y	2965.9	-12.0	-7.8		-18.6	2947.5	+0.5	+0.5	+16.5 +16.0 +16.2

+15.7

Comparison of b-A and B-D w. Orig and Rev. Pos. Pls II + IV 5 brightest + 5 faintest #'s

Star	Bk 16h Orig	b-A mean 3 meas.	B-D mean 3 meas.	b-A Rev. Pos 1 meas.	B-D Rev. Pos	Bk 16h 200 Diff'c	Rev. Pos. = Orig - Diff'c x	I y
* b	156, 164, 174	-28.9	-20.6	+27.9	+21.1	x -10 + y 5	+435.0	+633.5
c	154 " "	-16.0	+16.0	+15.7	-15.5	-3 +5	-859.9	-703.6
d	" " "	0.0	+29.2	-0.2	-29.3	-2 -1	-873.8	-749.7
e	" " "	-2.1	+2.0	+2.0	-2.4	-1 -4	-1443.3	-8965
f	156 " "	-6.9	+8.7	+6.4	-9.0	-5 -3	+44.8	-350.8
t	" " "	-24.0	-18.8	+23.9	+19.5	-1 +7	+207.1	-4982
u	" " "	-12.4	-20.0	+12.1	+19.9	-3 -1	+337.5	-200.2
w	" " "	+17.9	-13.8	-17.9	+13.9	0 +1	+427.3	-283.7
x	" " "	-5.5	+6.0	+4.8	-6.0	-7 0	+105.8	-2345
y=z	" " "	+25.9	+26.0	-25.9	-25.9	0 +1	+16.5	-95.6

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Orig Pos. | II

P110 Orig Rev. | Corr Rev.

−235=−654 over 1 div. of y

(I−II)		y	∆y	b'y	c'		+2939.8 (Rev.)	=Cent to c'	y
	b	3638.9	−22.5 +5.6	−250	−41.6	3597.0	+657.2	+634.0 −23.2	+633.7
	c	2295.5	−14.2 +3.5		−35.7	2259.8	−680.0	−703.1 −23.1	−703.5
−1 div	d	2809.3	−14.3 +3.4		−35.9	2273.4	−666.4	−749.8 −23.8	−749.5
	e	2102.4	−13.0 +2.5		−35.5	2066.9	−872.9	−896.9 −24.0	−896.4
	f	2649.0	−16.4 +5.0		−37.0	2612.6	−327.2	−351.1 −23.9	−350.7
	t	2500.5	−15.5 +5.8		−36.3	2465.3	−474.6	−497.5 −22.9	−498.1
	u	2800.1	−17.3 +5.5		−37.7	2763.3	−176.5	−200.3 −23.8	−200.0
	w	2746.1	−17.0 +5.6		−37.4	2709.6	−230.2	−253.6 −23.5	−253.6
	x	2766.0	−17.1 +5.1		−37.0	2729.0	−210.8	−234.5 −23.7	−234.3
							7542.0	−95.5 −235/54	−95.5
								−23.5	

Examine Rev. No. 7542.0

2 Σ's over 1 div y when Corr to c' added is −654

SP Bk 6 207

I − II x y Corr to Constants −2947.0 +2939.8 Rev.

+.3	−.2
+.3	−.1
+.3	−.2
+.3	−.1
+.3	−.1
+.3	−.1
+.3	−.2
+.3	−.1
+.2	−.2
+.3	−.1

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Obs Pos. — II

(1-2)	y	ay	by	c′		+2939.8 (Rev.)	Corr to c′	Corr Rev. y
b	3638.9	-22.5	+5.6	-25.0	-41.6	3597.1	+657.2	+634″0	-23.2	+633.7
c	2295.5	-14.2	+3.5		-35.7	2259.8	-680.0	-703.1	-23.1	-703.5
d	2889.3	-14.3	+3.4		-35.9	2853.4	-666.4	-749.8	-23.8	-749.5
e	2102.4	-13.0	+2.5		-35.5	2066.9	-872.9	-896.9	-24.0	-896.4
f	2649.0	-16.4	+5.0		-37.0	2612.6	-327.2	-351.1	-23.9	-350.7
t	2500.5	-15.5	+5.8		-36.3	2465.3	-474.6	-497.5	-22.9	-498.1
u	2800.1	-17.3	+5.5		-37.7	2763.3	-176.5	-200.3	-23.8	-200.0
w	2746.1	-17.0	+5.6		-37.4	2709.6	-230.2	-253.6	-23.5	-253.6
x	2766.0	-17.1	+5.1		-37.0	2729.0	-210.8	-234.5	-23.7	-234.3
y	2905.9	-18.0	+4.9		-38.1	2867.8	-72.0	-95.5	-23.5	-95.5

-235 = -654 one division

I — II (x, y) — no parts carried to p 208

Corr to Constants: -2947.0 +2939.8 Rev.

+.3	-.2
+.3	-.1
+.3	-.2
+.3	-.1
+.3	-.1
+.3	-.1
+.3	-.2
+.3	-.1
+.2	-.2
+.3	-.1

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Rev. pos. Check on c + c'

4851

	ax+by to x	Rev pos. without c	Orig − Rev = Rev c
	mo4 −2981.5		+14.7
b	−18.5	3405.7	+424.2 +14.7
c	−11.5	2108.4	−873.1 +13.9
d	−11.4	2094.6	−886.9 +13.9
e	−8.4	1524.9	−1456.6 +13.5
f	−16.3	3011.6	+ 30.1 +14.6
t	−17.1	3172.9	+191.4 +13.8
u	−17.9	3303.0	+321.5 +14.2
w	−18.4	3393.4	+411.9 +14.8
x	−16.7	3071.0	+89.5 +13.8
y=3	−16.2	2981.8	+ 0.3 +14.3

Orig c +13.2
corr to c + .8
+14.0

+14.0

7042

	ax+by to x	Orig − Rev = Rev c
	h06 −294.0	
	−23.5	3368.6 +421.6 +16.4
	−14.6	2069.7 −877.3 +17.1
	−14.4	2055.8 −891.2 +17.2
	−11.7	1486.3 +460.7 +17.3
	−19.2	2974.4 +27.4 +16.9
	−19.4	3136.7 +189.7 +17.3
	−20.8	3267.1 +320.1 +17.1
	−21.0	3356.9 +409.9 +17.4
	−19.7	3035.5 +88.5 +16.6
	−19.8	2946.1 − 0.9 +17.4

Orig c = +1.4
Corr to c +15.7 h06
+17.1

+17.1

4851

	a'y+b'x to y	Rev without c'	Orig − Rev = Rev c'
	h05	+295.7	
b	−9.6	3614.3	+660.6 −25.6
c	−6.1	2276.1	−677.6 −26.4
d	−5.9	2231.4	−722.3 −26.2
e	−6.2	2083.7	−870.0 −26.1
f	−6.0	2628.0	−325.7 −25.9
t	−5.2	2482.9	−470.8 −26.0
u	−6.3	2779.6	−174.1 −25.7
w	−5.8	2726.3	−227.4 −26.2
x	−6.4	2745.8	−207.9 −26.2
y=3	−7.2	2884.9	− 68.8 −26.2

Orig c' −18.5
corr c' −7.55
−26.05

−26.05

7042

	a'y+b'x to y	Orig − Rev = Rev c'
	h07	+293.8
	−16.9	3629.0 +682.2 +48.2
	−10.7	2284.8 −655.0 +48.1
	−10.5	2238.8 −701.0 +48.8
	−10.5	2091.9 −847.9 +49.0
	−11.4	2637.6 −302.2 +48.9
	−10.3	2490.2 −449.6 +47.9
	−11.8	2788.3 −151.5 +48.8
	−11.4	2734.7 −205.1 +48.5
	−12.0	2754.0 −185.8 +48.7
	−13.1	2892.8 −47.0 +48.5

54

Orig c' −25.0
−23.5
−48.5

−48.5

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D7042 Independent Check using Gillen 15462 See p108

Star	Gillen No.	$\bar{X}$ Comp.	$\bar{X}-\bar{X}' = \Delta\bar{X}$ $\bar{X}'=+2490.6$	x Meas.	Δx 5447.6	$n=c'n$ $\Delta x-\Delta X$
7980		−2668.0 ✓	− 5158.6	269.9 ✓	−5177.7	−19.1
8714		−2656.4 ✓	− 5147.0	282.2 ✓	−5165.4	−18.4
7923		−2424.1 ✓	− 4914.7	518.0 ✓	−4929.6	−15.9
6508		−1908.5 ✓	−4399.1	1038.0 ✓	−4409.6	−10.5
11113		− 820.6 ✓	−3291.2	2140.1 ✓	−3307.5	−16.3
4034		+938.9 ✓	−1551.7	3895.5 ✓	−1552.1	−0.4
13902		+1587.5 ✓	− 903.1	4540.0 ✓	− 907.6	−4.5
14603		+1999.7 ✓	− 490.9	4950.1 ✓	− 497.5	− 6.6
15462		+2489.7 ✓	− 0.9	5447.6 ✓	0.0	+0.9
						−91.7
						+0.9
						−90.8

*Use −y

Star	Gillen No.	$\bar{Y}$ Comp.	$\bar{Y}-\bar{Y}' = \Delta\bar{Y}$ $\bar{Y}'=-984.0$	*y Meas.	Δy −3932.1	$n'=c'n'$ $\Delta y-\Delta Y$
7980		+436.0 ✓	+ 1420.0	−2495.4 ✓	+1436.7	+16.7
8714		−480.6 ✓	+ 503.4	−3417.5 ✓	+ 514.6	+11.2
7923		+462.0 ✓	+1446.0	−2469.4 ✓	+1462.7	+16.7
6508		+1916.9 ✓	+2900.9	−1006.2 ✓	+2925.9	+25.0
11113		−2315.3 ✓	−1331.3	−5265.5 ✓	−1333.4	− 2.1
4034		+537.7 ✓	+1521.7	−2396.0 ✓	+1536.1	+14.4
13902		−1680.8 ✓	− 696.8	−4631.0 ✓	− 698.9	− 2.1
14603		−1429.8 ✓	− 445.8	−4379.4 ✓	− 447.3	− 1.5
15462		− 980.8 ✓	+ 3.2	−3932.1 ✓	0.0	− 3.2
						+84.0
						− 8.9
						+75.1

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a = ac

$\frac{\Delta X}{1000}$	$aa = \frac{\Delta X^2}{1000}$	$ab = \frac{\Delta X \Delta Y}{1000}$	$bb = \frac{\Delta Y^2}{1000}$	an	bn
−5.16 ✓	+26.63 ✓	−7.33 ✓	+2.02	+98.56	−27.12
−5.15 ✓	+26.52 ✓	−2.58 ✓	+.25	+94.76	−9.20
−4.91 ✓	+24.11 ✓	−7.12 ✓	+2.10	+78.07	−23.06
−4.40 ✓	+19.36 ✓	+2.76 ✓	+8.41	+46.20	−30.45
−3.29 ✓	+10.82 ✓	+4.38 ✓	+1.77	+53.63	+21.68
−1.55 ✓	+2.40 ✓	−2.36 ✓	+2.31	+.62	−.61
−.90 ✓	+.81 ✓	+.63 ✓	+.49	+4.05	+3.15
−.49 ✓	+.24 ✓	+.22 ✓	+.20	+3.23	+2.97
cc	cc	cc	cc	cc	cc
−25.85 ✓	+110.89 ✓	+5.23 ✓ −32.15 ✓ −26.92 ✓	+17.55	+379.12 ✓	+27.80 −90.44 −62.64

b = bc

ΔY	an′	bn′	s	as	bs	sn	sn′
+1.42 ✓	−86.17	+23.71	−2.74 ✓	+14.14 ✓	−3.89	+52.33	−45.76 ✓
+.50 ✓	−57.68	+5.60	−3.65 ✓	+18.80 ✓	−1.82	+67.16	−40.88 ✓
+1.45 ✓	−82.00	+24.22	−2.46 ✓	+12.08 ✓	−3.57	+39.11	−41.08 ✓
+2.90 ✓	−110.00	+72.50	−.50 ✓	+2.20 ✓	−1.45 ✓	+5.25	−12.50 ✓
−1.33 ✓	+6.91	+2.79	−3.62 ✓	+11.91 ✓	+4.81 ✓	+59.01	+7.~~58~~ 69
+1.52 ✓	−22.32	+21.89	+.97 ✓	−1.50 ✓	+1.47	−0.39	+13.97 ✓
−.70 ✓	+1.89	+1.47	−.60 ✓	+.54 ✓	+.42	+2.70	+1.26 ✓
−.45 ✓	+.74 ✓	+.68	+.06 ✓	−.03 ✓	−.03	−.40	−.09 ✓
cc	cc	cc	+1.cc	cc	cc	+.90	−3.20
+7.79 ✓	+9.54	+52.86	+~~20~~3 ✓	+59.67	+6.70 ✓	+226.46	+228.~~1~~3
−2.48 ✓	−358.17		−13.57 ✓	−1.53	−10.76	−.79	−143.51
+5.31 ✓	−348.63		−11.54 ✓	+58.14	−4.06 ✓	+225.67	−120.~~70~~ 68

an +379.12
bn −62.64
cn −90.80
+225.68

an′ −348.63
bn′ +52.86
cn′ +75.10
−120.67

aa +110.89
ab −26.92
ac −25.85
+58.12

bb +17.55
bc +5.31
ab −26.92
−4.06 ✓

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D7042

Independent Check using Star 15462

aa	ab	ac	as	an
+110.89 ✓	−26.92 ✓	−25.85 ✓	+58.14 ✓	+379.12
2.0449 ✓	1.4301$_n$ ✓	1.4125$_n$	1.7645 ✓	2.5788 ✓
	9.3852$_n$ ✓	9.3676 ✓	9.7196 ✓	
	0.8153 ✓	0.7976 ✓	1.1497$_n$ ✓	1.9641$_n$
	bb	bc	bs	bn
	+17.55 ✓	+5.31 ✓	−4.06 ✓	−62.64
	+6.54 ✓	+6.28 ✓	−14.11 ✓	−92.06
	+11.01 ✓	−0.97 ✓	+10.05 ✓	+29.42
	1.0418 ✓	9.9868$_n$ ✓	1.0022 ✓	1.4683
		8.9450$_n$ ✓	9.9604 ✓	
		8.9318 ✓	9.9472 ✓	0.4136$_n$ 1.4287
		0.7800 ✓	1.1320$_n$	1.9465$_n$ 2.2983
		cc	cs	cn	sn
		9.00 ✓	−11.54 ✓	−90.8	+225.67
		6.03 ✓	−13.55 ✓	−88.40	+198.75
		+2.97 ✓	+2.01 ✓	−2.40	+26.92
		+.09 ✓	−.8855	−2.59 ✓	+26.83
		+2.88 ✓	+2.89	+.19	+.07
		0.4594 ✓		9.2788	9.0000
				8.8194	8.5406
				+0.09	+.03

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a_{II}'
-348.63
2.5424_n

1.9277

b_{II}'
$+152.86$
$+84.66$
$+6820$
1.8338

0.7788_n 1.7937
1.9108 2.2679_n

c_{II}' s_{II}'
$+75.1$ -120.70
$+81.30$ -182.8
-6.20 $+62.12$
-6.01 $+62.19$
$-.19$ $-.07$
9.2788_n
8.8794_n
-0.06

$b_{II}+s_{II}$ do not agree well.
$c_{II}'+s_{II}'$ need 5th logs?

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Results Independent Checks

see pp 210–213 and Suppl. Eno 4

South Pole

Paper sheets	Star Gillis	Plate No.	Corr to be subtracted from Σ′ Υ′ adopted Vals. x″	y″	
1–2	15462	7042	0.″0	−.1	Comp. Vals used got −0.″9 +3.″1 (sub. adopted) +.″9 −3.″2 (O−C)
3–4	14603	"	+0.1	−0.1	" " " " +3.5 −0.6 −3.4 +0.5
1a–2a	15462	"	+.07	−.07	see 212–213
3a–4a	14603	"	+.02	−.04	
5–6	13902	"	+.11	.00	
8–9	15462	4847	−.13	+.06	
10–11	7980	4851	−.01	−.10	
13–14	15462	"	−.11	+.03	
15–16	13902	"	−.10	.00	
17–18	14603	"	−.07	−.11	
19–20	15462	6980	+.02	+.19	
21–22	7923	4851	−.02	−.07	

also tried

North Pole

Star +89° 1 = 386	VI / III		−.05	.00

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Notes: S. P. Mss.

Table I = Meas. data
" II + III = Stand. Stars
" IV = Plate constants
" V = Lettered Stars
" VI = General Table
" VII = Discordant Magns.
" VIII = Data for Mag. Corr.
" IX = Mag. Correction

Table X = H.C.O. Table VI = u − r − Jacoby + c 63 Hrs
" XI = VI − J. data for Mag. corr.
" XII = Least Sq. results
" XIII = Vol. 18 − Cals
" XIV = Additional data + Stars Vol. 18 S. Mss.
" XV = North Pole. Prof. Barnard series
" XVI = Data Mag. corr. N. P.
" XVII = Mag. Corr. N. P.
" XVIII = Corr. Reads of Vol 48 no. 1 N.P.

Contact prints are like original negatives i.e. stars dark
S.P. Mss Pls I + III are positives, II + IV negatives.

60 Gillis 14603, Size of image very large = 16 div of BD in Dr. to East.
(20 x 20 = (div = 4) runs) eyepiece scale 16 x 4" = 6'. Pl 4851 = B p 182 Thes
(15 div = diam sq = 60'.) Pl 4851 Gillis 13502 = 7 div about = 28" = 69 " "
(Stand Stars 70-72 range from 8.3 to 13) 15462 = 4 " " = 16" = 8.3 faintest Stand star
Jacoby compared with Pls II + IV 42 stars 45 meas
not counting Cat. + Let. Stars. J confirms x of Pl IV and
y of Pl. II. x Pl IV 28 meas agree with J, y Pl II 33
" II 14 " " " " IV 9
" II + IV 3 " same 1 blank
45 II + IV 2 same
45

Of the 63 stars in Table X 66 meas. made
Jacoby's results in x agree better with Pl IV 41 cases
" " " " " " II 20 "
" " " equally " II + IV 5 " 66
in y agree better with Pl II 46 cases
" " " " IV 15 "
" " equally II + IV 4 "
blank 1 "
66
Again Jacoby's results confirm x of Pl IV + y of Pl II

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SP Mass p87 The Gillis Cat 1850 is apparently not based on Cordova
XIV = 100-123 Sct. Nw. Stars in Gillis. 1850, collected with in 2° S Pole = 144 of these
Set I = 6 stars with pos not in Vol 18 X, 14 = Set II, 105. 10 G Stand
SP. Mass) 38 III fall outside 2°, by Squares x + y 1900
∴ Sct. Nw. in Table XIV = 106 stars. 28 = Sct Nw = Vol 18
95 Vol 18. X. Nos 1. 15. 16. 17 1822 = errors Brisbane, none
found in Cats examined for Table XIV.
Of the 28 stars on p301 Vol 18 X 19 are in Gillis + G not.
G Pole has 62 stars within 1° S Pole in 1900 + 13 within ½°.

Mag Corr NP Eqw.
134 Eq. Zero. N. Pole Pole III V III V
Sm Mag Corr Eqw. 5 " " ±0.38 ±0.39 ±0.45 ±0.46 } Table VI
Suppl. G 67 " " S Pole ±0.68 ±0.67 ±0.52 ±0.51 } mid II III + IV
SP. " " "
Eq. Zero after Corr for Mag: Pole III V III V
p 162 " N. Pole ±0.35 ±0.34 ±0.35 ±0.34 ∴ XVIII
p 67 " S Pole ±0.36 ±0.37 same in y ∴ VI
Pole II IV mid II + V

Mag 30 1903 for p 61 On Pl 4847 Gillis 14603 (1) image larger than 7923, (4)
7980, (2) and 8714. (3)

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