

KG
11365
204

H. 50

Equatorial
April 13 to June 4th
1863.

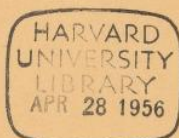
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KG 11365.204



KG-11365.204



Saturn and his Satellites

1863 Apr 21
JWS

By Saturn I II are denoted the extremities of the ring.
" III IV " " " limbs of the belt.

Both with regard to transits and differences of declination.

I am persuaded that the micrometer will give good results for difference of declination between Saturn and his satellites if sufficient care be taken.

I to vary the observation that no pre-occupation (about the numbers to result) take place.

There is no considerable inequality in my division of 10" so far as the last zone I observed (to night) would indicate.

There will be I suppose a personal equation in the transit of Saturn. The preceding edge of belt and following edge & the preceding and following area of ring will not necessarily be observed in the same manner as a star or Satellite.

When Iapetus is observed Titan should be also, for the following reasons. Iapetus grows fainter on the east side of Saturn, so that it may be impossible to observe it securely. Provided Saturn be observed ^{with} ~~without~~ personal equation, this circumstance would affect the areas between but if Titan be observed the series can be freed from this, even should Iapetus be invisible at its greatest eastern elongation.

over

Saturn and her Satellites

1863 Apr 24.

Saturn will be observed "regularly" as circumstances will permit as a sort of
check, and to "get my hand in" in observing Saturn. It is very evident that
the main difficulty lies in the ball and ring. See also on this point
Astr. Nachr. IX, 6 where Bessel finds a constant difference between
Saturn's coordinates whether observed in connexion with the ball or
ring.

Besides the following observations some attempts at observing angles
of position between γ and Saturn were made. These proved unsatisfactory.
The record opposite is a copy of an original by Mr. Loring, preserved in
the drawer; to which we of course add the times from the chronograph-sheets; these
last are with the meridian-transits; there being an observation of Polaris of
this date on the sheet.

1863 Apr 21

MHS.

MS.	γ	El. (At $172^{\circ}56'$ wire)	Reduced to -	Titian	Titian	Titian for Titian El.			
Titian	11 50	5.25	9.2	7.22	$\frac{I+IV}{2}$	$\frac{II+III}{2}$			
Saturn I		17.1	20.9	19.00	20.47	Ray	Ball		
" II	Second.	17.95	21.8	20.88	20.50	-13.25	-13.28	11 50 7	
" III		19.15	23.1	21.12					
" IV		20.0	23.9	21.95					
Titian	11 58	41.4	45.45	43.42					
Saturn I		53.15	57.1	55.12	56.59	-			
" II		54.1	57.9	56.00	56.62	-13.17	-13.20	11 58 43	
" III		55.3	59.2	57.25					
" IV		56.1	60.0	58.05					
Titian	11 52	1.2	5.9	3.55					
Saturn I		13.1	17.8	15.45	16.85	-13.30	-	11 52 4	
" II		13.95	16.6	16.28	16.86		-13.31		
" III		15.1	19.8	17.45					
" IV		15.9	20.6	18.25					
Titian	11 52	35.9	40.5	38.20					
Saturn I		47.6	52.3	49.95	51.41	-13.21		11 52 38	
" II		48.5	53.2	50.85	51.45		-13.25		
" III		49.7	54.6	52.05					
" IV		50.5	55.25	52.88					
Titian									
Saturn I									
" II	Not to be found on sheet.								
" III									
" IV									
							-13.232	-13.260	11 50 53

The wires were used at the position - wire - reading $172^{\circ}56'$

L.H.

Verte

Saturn.

1863 Apr 21
145

Second Set of *MR* (at 172° 56' on wires)

<i>J</i> <i>Tau</i>							<i>Ring</i>	<i>Ball</i>	
<i>Saturn I</i>	35	52.3	57.3	52.80					
" <i>II</i>	36	4.35	9.25	6.80	8.14		- 13.34		12 35 55
" <i>III</i>		5.2	10.0	7.60		8.14		- 13.34	
" <i>IV</i>		6.2	11.15	8.68					
		7.05	11.9	9.48					
<i>J</i> <i>Tau</i>	37	33	8.2	5.75					
<i>Saturn I</i>		15.05	20.7	17.58	18.96		- 13.21		12 37 6
" <i>II</i>		15.8	20.9	18.35		18.95		- 13.20	
" <i>III</i>		17.1	22.0	19.55					
" <i>IV</i>		17.8	22.9	20.35					
<i>J</i> <i>Tau</i>	38	52.85	58.15	55.50					
<i>Saturn I</i>	39	4.65	10.1	7.38	8.78		- 13.28		12 38 55
" <i>II</i>		5.5	10.85	8.18		8.75		- 13.25	
" <i>III</i>		6.7	11.95	9.32					
" <i>IV</i>		7.55	12.8	10.18					
<i>J</i> <i>Tau</i>	40	1.0	6.2	3.60					
<i>Saturn I</i>		12.8	18.0	15.60	16.86		- 13.26		12 40 4
" <i>II</i>		13.6	18.9	16.25		16.84		- 13.24	
" <i>III</i>		14.8	20.05	17.42					
" <i>IV</i>		15.7	20.95	18.32					
<i>J</i> <i>Tau</i>	41	38.1	43.5	40.80					
<i>Saturn I</i>		50.0	55.3	52.65	54.06		- 13.26		12 40 41
" <i>II</i>		50.75	56.0	53.38		53.98		- 13.18	
" <i>III</i>		51.9	57.25	54.58					
" <i>IV</i>		52.85	58.1	55.68					
							- 13.270	- 13.242	12 38 32

Saturn

1863 Apr 21
DHS.

Deduction on Side (174° 42')

Compared with	El.	Titan	Saturn	$T - \frac{T+IV}{2}$	$T - \frac{II+III}{2}$	El.
	(vs Titan)			Ring	Dist.	
Saturn I	12 44 3	5 26	5 38.5	13.50 5.00		12 44 18
" IV	46 32	6 24.5	6 39.0			
" III	46 57	5 46.5	5 51.0		-13.75	12 45 15
" III	45 33	6 25	6 38			1
" III	46 23	6 7	6 29		-13.25	12 46 39
" III	46 55	5 48.5	5 50			
" IV	47 23	5 17	5 30.5	-12.75		12 47 38
" I	47 52	5 57	6 9			

One of these is 10" in error.
In original notes by W.
Cory.

Saturn I IV as before
" III South Limb of Planet
" III North "

Saturn

1863 Apr 21
145.

						King	Ball.	
12	52	12.9	18.2	15.55				
		24.8	30.0	27.40	28.82	-13.27		12 52 16
		25.65	30.8	28.22	28.81		-13.26	
		26.8	32.0	29.10				
		27.6	32.9	30.25				
12	52	55.75	1.15	58.15				12
		7.55	12.9	10.22	11.67	-13.22		12 52 58
		8.4	13.7	11.05	11.64		-13.19	
		9.55	14.9	12.22				
		10.45	15.8	13.12				
12	53	32.8	38.2	35.50				
		44.7	50.0	47.35	48.61	-13.31		12 53 36
		45.6	50.9	48.15	48.82		-13.32	
		46.8	52.0	49.10				
		47.65	52.9	50.28				
12	54	14.2	19.5	16.85				
		25.95	31.25	28.60	30.05	-13.20		12 54 17
		26.8	32.0	29.40	30.00		-13.15	
		28.0	33.2	30.60				
		28.9	34.1	31.50				
12	54	47.3	52.65	49.98				12 54 50
		59.2	64.40	1.8	3.29	-13.31		
		55	0.0	5.3	2.65		-13.38	
		1.25	65	3.58				
		2.15	74	4.78				
						-13.262	-13.240	12 53 35

Saturn

1863 Apr 22
915.

Right-Ascension

						Long	Lat		
Titan	11 53	8.2	14.0	11.10		-12.70	-12.69	11 53 11	
Saturn I		19.5	25.4	22.45	23.60				
" II		20.3	26.1	23.20					23.79
" III		21.45	27.3	24.38					
" IV		22.2	28.1	25.15					
x		—	32.25	29.32		+ 5.52	- 5.53	11 53 32	

Titan	11 53	51.4	—	53.90		-12.70	-12.66	11 53 51	
Saturn I		—	7.7	8.70	6.60				
" II		5.55	8.5	6.02					6.56
" III		11.6	9.6	7.10					
" IV		5.55	10.45	8.00					
x		7.7	14.6					11 54 15	

I think the wire-intervals were not changed after this set. They were not in any case changed by a small quantity as 0.1 or 0.2 - Interval 5.50 -

Titan	11 54	33.9	36.9	36.40		-12.77	-12.75	11 54 36	
Saturn I		45.2	50.25	47.72	49.17				
" II		46.05	51.1	48.58					49.15
" III		47.25	52.2	49.72					
" IV		48.15	53.1	50.62					
x		—	57.15	5				11 54 57	

Titan	11 55	19.2	24.2	21.70		-12.68		11 55 22	Battery acting rather badly.
Saturn I		30.5	35.6	33.05	—				
" II		31.3	36.3	33.80	34.38				
" III		32.5	37.4	34.45					
" IV		—	—	—					
x		—	—	—					

Titan	11 56	4.5	9.55	7.02		-12.79	-12.73	11 56 7	
Saturn I		15.95	20.9	18.42	19.81				
" II		16.7	21.65	19.18					19.75
" III		17.8	22.55	20.32					
" IV		18.7	23.7	21.20					
x		—	27.8			-12.74.0	-12.702		

Saturn

1863 Apr 22,
1863

Sol JL,

Right - Ascension

Titan - centre
Ring BallThe declinations will
be found, sent of order
of time, collected
after the right ascension

12	4	26.6	31.3	28.95		-12.59	-12.59	12	4	29
		37.85	42.4	40.12	41.54					
		38.6	43.3	40.95	41.54					
		39.75	44.5	42.12						
		40.6	45.3	42.95						
		—	49.5							
12	5	6.8	11.4	9.10		-12.65	-12.66	12	5	9
		18.0	22.6	20.30	21.75					
		18.9	23.5	21.20	21.76					
		20.0	24.65	22.32						
		20.9	25.5	23.20						
		—	29.55							
		41.15	46.0	43.62		-12.76	-12.79	12	5	44
		52.55	57.3	54.92	56.38					
		53.5	58.15	55.82	56.41					
		54.7	59.3	57.00						
		55.5	60.2	57.85						
	6	—	6.25							
12	6	19.5	24.15	21.82		-12.76	-12.77	12	6	22
		30.6	35.5	33.15	34.58					
		31.7	36.3	34.00	34.59					
		32.8	37.55	35.18						
		33.7	38.3	36.00						
		—	42.45							
		57.5	62.15	59.82		-12.69	-12.70	12	7	0
7		8.7	13.4	11.05	12.51					
		9.6	14.2	11.90	12.52					
		10.8	15.5	13.15						
		11.7	16.25	13.98						
						-12.690	-12.702	12	7	65

Saturn

1863 Apr 22.
2145.

Sat III

Right Ascensions					Titan - center		
					Rise	Ball	
12	17	56.4	1.25	58.82	-12.70	-12.70	12 17 59
	18	7.8	12.4	10.10			
		8.6	13.3	10.95			
		9.8	14.4	12.10			
		10.65	15.25	12.95			
		—	19.4				
		37.85	42.55	40.20	-12.71	-12.78	12 18 40
		49.2	53.8	51.50			
		50.1	54.7	52.40			
		51.2	55.9	53.55			
		52.0	56.65	54.32			
19	—	0.8					
		13.15	17.95	15.55	-12.63	-12.62	12 19 16
		24.5	29.0	26.75			
		25.4	29.85	27.62			
		26.5	30.95	28.72			
		27.3	31.9	29.60			
		—	36.0				
20		14.55	19.3	16.92	-12.79	-12.78	12 20 17
		25.95	30.6	28.36			
		26.7	31.55	29.12			
		27.9	32.65	30.28			
		28.7	33.4	31.05			
		—	37.65				
21		13.6	18.3	15.95	-12.76	-12.74	12 21 16
		24.9	29.7	27.30			
		25.8	30.35	28.08			
		27.0	31.6	29.30			
		27.85	32.4	30.12			
		—	36.6				
					-12.718	-12.724	12 19 30

Saturn

1863 Apr 22
175,

12	29	23.55	28.25	25.90		-12.76	-12.70	12 29 26
		34.9	34.55	37.22	38.66			
		35.75	40.3	38.02	38.60			
		36.85	41.5	39.17				
		37.85	42.35	40.10				
		—	46.6					
12	30	3.4	8.0	5.70		-12.71	-12.68	12 30 6
		14.6	19.35	16.98	18.41			
		15.5	20.1	17.80	18.38			
		16.6	21.3	18.95				
		17.55	22.15	19.85				
		—	26.35					
		38.35	43.0	40.68		-12.74	-12.73	12 30 41
		49.65	54.4	52.02	53.42			
		50.5	55.2	52.85	53.41			
		51.65	56.3	53.98				
		52.5	57.15	54.82				
		37	61.3					
12	31	16.8	21.5	19.15		-12.70	-12.71	12 31 19
		28.0	32.8	30.40	31.85			
		28.9	33.6	31.25	31.86			
		30.15	34.8	32.48				
		31.0	35.6	33.30				
		—	39.8					
12	32	0.5	5.2	2.85		-12.74	-12.70	12 32 3
		11.85	16.5	14.18	31.59			
		12.6	17.3	14.95	31.55			
		13.8	18.5	16.15				
		14.7	19.3	17.00				
		—	23.35					
						-12.730	-12.704	12 30 43

Saturn

1863 Apr 22
7115.

12	41	51.15	60.80	56.48		-12.67	-12.72	12 41 58
	42	7.4	12.1	9.75	11.15			
		8.3	12.9	10.60	11.20			
		9.4	14.2	11.80				
		10.2	14.9	12.55				
		—	19.2					
		36.25	40.85	38.55		-12.73	-12.71	12 42 39
		47.55	52.15	49.85	51.28			
		48.3	53.0	50.15	51.26			
		49.6	54.15	51.88				
		50.4	55.0	52.70				
		—	59.2					
<i>ft</i>								
12	43	33.7	38.3	36.00		-12.69	-12.75	12 43 36
		44.9	49.8	47.35	48.69			
		45.8	50.5	48.15	48.75			
		47.0	51.7	49.35				
		47.85	52.4	50.12				
		—	56.6					
12	44	10.1	14.75	12.42		-12.74	-12.70	12 44 12
		21.4	26.15	23.78	25.16			
		22.2	26.9	24.55	25.12			
		23.35	28.05	25.70				
		24.2	28.9	26.55				
		—	33.0					
12	44	53.9	58.55	56.22		-12.66	-12.72	12 44 56
	45	5.1	9.8	7.45	8.88			
		6.0	10.7	8.35	8.94			
		7.2	11.85	9.53				
		8.0	12.6	10.30				
		—	16.7			-12.68	-12.720	12 45 28

Saturn

863 Apr 22

1145

At angle $174^{\circ}42'$

Time El	Object for time	Pointing Saturn	Titan	Saturn	α
11 59 17	I	I	6 30.5	6 39.	6 47.5
12 0 9	S	II	5 45.	5 44.	6 1.
1 42	$X+10^{\circ}$	III	6 20	6 37	6 34.5
1 2 16	I	IV	5 44	5 55	6 1
12 11 45	$2F10^{\circ}$	IV	5 46.5	5 58	6 2.5
12 22	α	III	6 27.5	6 45.5	6 44.
12 50	S	II	5 31.	5 32.	5 46.5
13 29	S?	I	4 47	4 58	5 3.
12 24 7	S	IV	5 16	5 26.5	5 32.
24 47	S	III	5 31	5 38.	5 36
25 39	S	II	5 26	5 25.5	5 40
26 16	S	I	5 49.5	5 57.	6 5
12 33 36	S	I	5 50.5	5 58.	6 6
34 22	S	II	4 54.5	4 54.5	5 57.5
35 21	S	III	5 51.5	6 8.5	6 6.5
35 40	S	IV	6 6.5	6 16.0	6 21.5

I. should be 5 21

 α should be 5 7.5?

	$Titan - \frac{I+IV}{2}$	$Titan - \frac{II+III}{2}$
12 0 46	-9.75	"
0 56		-8.00
12 37	9.75	
12 36		9.50
25 12	9.00	
25 13		8.25
34 38	8.50	
34 42		8.50

Times not right exactly

Saturn

1863 Apr 23,

	Subst ^m				Ring	Ball	Ald 1 ^m Thurs
Titan	9 51	29.85	34.55	32.20	-10.76	-10.78	9 51 32
Saturn I		39.2	43.85	41.52			
" II		40.0	44.7	42.35			
" III		41.2	46.0	43.60			
" IV		42.1	46.7	44.40			
Titan	9 52	12.05	16.7	14.38	-10.76	-10.83	9 52 14
Saturn I		21.3	26.15	23.72			
" II		22.15	27.1	24.62			
" III		23.5	28.1	25.80			
" IV		24.2	28.9	26.55			
Titan		46.0	50.7	48.35	-10.73	-10.80	9 52 48
Saturn I		55.3	60.0	57.65			
" II		55.9	60.9	58.40			
" III		57.5	62.3	59.90			
" IV		58.1	62.9	60.50			
Titan	9 53	26.1	31.2	28.80	-10.62	-10.64	9 53 29
Saturn I		35.7	40.3	38.00			
" II		36.4	41.25	38.82			
" III		37.6	42.5	40.05			
" IV		38.1	43.2	40.85			
Titan	9 53	58.25	62.9	60.58	-10.63	-10.63	9 54 1
Saturn I	54	7.6	12.0	9.80			
" II		8.25	12.8	10.52			
" III		9.6	14.2	11.90			
" IV		10.3	14.95	12.62			
					-10.700	-10.736	9 54 49

Return

1863 Apr 23.
7.18

<i>Sub 2^m</i>				<i>Ring</i>	<i>Ball.</i>	
10	36.1	40.9	36.50	-10.74	-10.73	10 4 38
	45.5	50.1	47.80			
	46.3	50.85	48.58			
	47.55	52.2	49.88			
	48.4	52.75	50.68			
			49.24			
			49.23			
5	34.1	38.9	36.50	-10.65	-10.70	10 5 36
	43.4	47.95	45.68			
	44.3	48.9	46.60			
	45.45	50.15	47.80			
	46.25	51.0	48.62			
			47.15			
			47.20			
6	20.05	24.55	22.30	-10.64	-10.63	10 6 22
	29.2	33.85	31.52			
	29.95	34.65	32.30			
	31.2	35.9	33.55			
	32.0	36.7	34.35			
			32.94			
			32.92			
7	13.0	17.55	15.28	-10.58	-10.63	10 7 15
	22.1	26.65	24.38			
	22.9	27.6	25.25			
	24.15	29.0	26.58			
	24.9	29.8	27.35			
			25.91			
7	54.6	59.2	56.90	-10.68	-10.62	10 7 57
8	3.9	8.4	6.15			
	4.6	9.2	6.90			
	5.8	10.5	8.15			
	6.65	11.05	9.00			
			7.52			
				-10.658	-10.660	10 6 22
						-2
						10 4 22

1^m has been added
instead of subtracted
With the last set of
A.R.

Error

Saturn

513 Apr. 23
7115,Subtr 2nd

70	14	51.2	560	53.60	-10.70	-10.70	10 14 54
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15	0.6	5.2	2.90	4.30			
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1.5	6.0	3.75	4.30				
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2.5	7.2	4.85					
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3.3	8.1	5.70					
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23.95	28.7	26.32			-10.64	-10.66	10 15 26
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33.3	37.85	35.58	36.96				
------	-------	-------	-------	--	--	--	--

34.1	38.6	36.35	36.98				
------	------	-------	-------	--	--	--	--

35.3	39.9	37.60					
------	------	-------	--	--	--	--	--

36.0	40.7	38.35					
------	------	-------	--	--	--	--	--

16	0.7	5.45	3.08		-10.68	-10.68	10 16 3
----	-----	------	------	--	--------	--------	---------

10.0	14.6	12.30	13.76				
------	------	-------	-------	--	--	--	--

10.8	15.1	13.15	13.76				
------	------	-------	-------	--	--	--	--

12.05	16.7	14.38					
-------	------	-------	--	--	--	--	--

12.85	17.6	15.22					
-------	------	-------	--	--	--	--	--

30.35	35.1	32.72			-10.72	-10.68	10 16 33
-------	------	-------	--	--	--------	--------	----------

39.75	44.3	42.02	43.44				
-------	------	-------	-------	--	--	--	--

40.5	45.15	42.62	43.40				
------	-------	-------	-------	--	--	--	--

41.65	46.3	43.98					
-------	------	-------	--	--	--	--	--

42.5	47.2	44.85					
------	------	-------	--	--	--	--	--

17	5.7	10.4	8.05		-10.64	-10.74	10 17 8
----	-----	------	------	--	--------	--------	---------

15.0	19.7	17.35	18.72				
------	------	-------	-------	--	--	--	--

15.85	20.5	18.18	18.79				
-------	------	-------	-------	--	--	--	--

17.1	21.7	19.40					
------	------	-------	--	--	--	--	--

17.8	22.4	20.10					
------	------	-------	--	--	--	--	--

-10.682	-10.692	10 16 1	Calc. Error
		2	
		10 14 1	

(More Right Ascensions)
of Saturn in.

Saturn

1863 Apr 23^d
2115
~~2115~~

<u>Sub 2^m</u>	<u>Lat</u>	<u>Long</u>	<u>Part</u> <u>of S</u>	<u>Tit</u> <u>Ring</u>	<u>Saturn</u> <u>Bulk</u>	<u>Time</u> <u>Sub 2^m</u>
9 58 39	6 14.5	6 15.5	I	-3"0		10 0 16
10 0 41	5 46.0	5 39.0	II		-4.0	1 0
1 19	7 45.	8 0.	III			
1 54	5 19.5	5 24.5	IV			
10 10 6	5 50	5 51.5	I	-3.25		10 10 48
28	7 0	6 53	II		-3.50	10 42
57	5 35	5 49	III			
11 29	5 28.5	5 33.5	IV			
10 19 28	6 54	6 56	I	-3.75		10 20 18
20 5	6 1.5	5 58.5	II		-3.00	20 16
20 28	6 0.5	6 12.5	III			
21 7	5 46.5	5 52.0	IV			

Saturn

1863 Apr. 23
1845.

10 20	34.85	39.6	37.22		-10.58	-10.63	10 20 37
	44.0	48.85	46.42	47.80			
	44.9	49.65	47.28	47.85			
	46.0	50.88	48.43				
	46.75	51.6	49.18				
21	2.25	7.1	4.68		-10.68	-10.61	10 21 5
	11.65	16.3	13.98	45.36			
	12.3	17.1	14.70	15.29			
	13.45	18.3	15.88				
	14.3	19.2	16.75				
21	40.6	45.25	42.92		-10.67	-10.62	10 21 43
	49.85	54.5	52.18	53.59			
	50.6	55.15	52.92	53.54			
	51.8	56.5	54.15				
	52.7	57.3	55.00				
22	18.75	23.35	21.05		-10.66	-10.68	10 22 21
	27.9	32.65	30.28	31.71			
	28.8	33.55	31.18	31.73			
	29.95	34.6	32.28				
	30.8	35.5	33.15				
	55.85	60.65	58.25		-10.60	-10.63	10 22 58
23	5.1	9.8	7.45	8.85			
	5.9	10.65	8.28	8.88			
	7.15	11.8	9.48				
	7.9	12.6	10.25				
					-10.636	-10.624	10 23 45

Saturn

1863
Apr 23
M.S.

Some transits were taken to identify the other satellites; v, w, x denote three visible ones; x is the same (apparently) as was observed last night, and v is an object supposed to be Iapetus.

These observations are not reliable for anything but rough estimates of position.

Decl.

v	6 34
Titan	6 17
w	6 21
x	6 19

v	11 26	3.4	5.2
Titan		12.2	13.8
w		19.21	20.9
Saturn		20.9	—
" II		22.0	23.8
" III		23.1	24.8
" IV			
x			26.6?

v	11 27	11.3	17.2	14.25	$v - T_2$	-19.21	$+18''$
Titan		20.0	26.0				
w		27.2	33.1		$w - T_2$	-3.31	$+1''$
Sat. I		29.1	34.9	33.45			
" II		30.0	35.9	33.68			
" III		31.05	36.95				
" IV		31.8	38.0				
x		32.5	38.7		$x - T_2$	$+2.14$	$-1''$

Saturn

1863 Apr 26th Lundgren

2145 obs. rec.

Saturn I 10		38	18.85	24.60	21.72	23.16			
" II			19.7	25.55	22.62		23.17		
" III			20.8	26.65	23.72				
" IV			21.15	27.85	24.60				
Titan			23.1	28.9	26.00		+2.84	+2.83	10 38 26
39			3.05	8.85	5.95	7.39			
			3.9	9.8	6.85		7.44		
			5.15	10.9	8.02				
			5.95	11.7	8.82				
			7.4	13.2	10.30		2.91	2.86	10 39 10
			32.65	38.4	35.52	36.99			
			33.55	39.35	36.45		37.04		
			34.8	40.65	37.62				
			35.65	41.25	38.45				
			37.2	42.8	40.00		3.11	2.96	10 39 40
40			46.7	52.5	49.60	51.01			
			47.55	53.25	50.15		51.01		
			48.85	54.5	51.58				
			49.5	55.35	52.42				
			50.95	56.8	53.88		2.87	2.87	10 40 54
41			14.9	20.7	17.60	19.19			
			15.7	21.5	18.60		19.19		
			16.9	22.65	19.78				
			17.7	23.45	20.58				
			19.2	25.0	22.10		2.91	2.91	10 41 22
50			46.05	51.85	48.95	50.35			
			46.95	52.75	49.85		50.41		
			48.05	53.9	50.98				
			48.8	54.7	51.75				
			50.15	56.2	53.32		2.97	2.91	10 50 53

Sat II 10.1

Part of the tot
ht. by printing
of wire

+2.918 +2.890

10 41 44

Station

1863 Apr 26
2145.

10	59	58.6	63.7	60.65	2.01				
		58.55	64.4	61.68		2.05			
		59.7	65.55	62.62					
11	0	0.5	6.25	3.38					
		2.1	7.95	5.02		+3.01	+2.97	11	0.5
		17.15	23.1	20.18	2.56				
		18.1	23.9	21.00		2.56			
		19.0	24.95	22.12					
		20.0	25.9	22.95					
		21.65	27.4	24.52		2.96	2.96	11	1.25
		35.95	42.0	38.98	40.38				
		36.8	42.8	39.80		40.36			
		37.95	43.9	40.92					
		38.85	44.7	41.78					
		40.4	46.3	43.35		2.97	2.99	11	0.43
		58.3	4.1	1.28	2.60				
		59.1	5.0	2.05		2.69			
1		0.25	6.1	3.18					
		1.1	6.9	4.00					
		2.65	8.5	5.58		2.98	2.97	11	1.6
		17.9	23.9	20.90	22.35				
		18.8	24.7	21.75		22.34			
		20.0	25.85	22.92					
		20.9	26.7	23.80					
		22.3	28.2	25.25		2.90	2.91	11	1.25
						+2.964	+2.960	11	0.45

Saturn

1863 Apr 26
175.

11	85	7.0	12.85	9.92	11.35				
	7.9	13.7	10.80		11.35				
	7.0	14.8	11.90						
	9.8	15.75	12.78						
	11.4	17.25	14.22			+2.97	+2.97	11	8 14
	40.6	46.65	43.62	45.05					
	41.5	47.5	44.50		45.08				
	42.7	48.6	45.65						
	43.5	49.45	46.48						
	45.1	51.0	48.15			3.00	2.97	11	8 48
9	2.3	8.1	5.20	6.60					
	3.1	9.0	6.05		6.59				
	4.25	10.0	7.12						
	5.7	10.9	8.00						
	6.65	12.5	9.58			2.98	2.99	11	9 10
9	24.8	30.7	27.45	29.19					
	25.7	31.6	28.65		29.19				
	26.85	32.6	29.72						
	27.7	33.55	30.62						
	29.2	35.1	32.15			2.96	2.96	11	9 32
9	49.9	55.65	52.78	54.19					
	50.75	56.45	53.60		54.20				
	51.9	57.7	54.80						
	52.7	58.5	55.60						
	54.2	60.05	57.12			2.93	2.92	11	9 57
						+2.968	+2.962	11	9 8

P
Return

1863 Apr 26
J.H.

11	13	21.4	27.35	24.38	25.74				
		22.25	28.2	25.22	25.76				
		23.4	29.2	26.90					
		24.2	30.0	27.10					
		25.85	31.8	28.82		+3.08	3.06	11 13 29	
13	42.25	48.0	45.12	46.56					
	42.0	48.9	45.95	46.55					
	44.15	50.15	47.15						
	45.1	50.9	48.00						
	46.55	52.4	49.48		2.92	2.93	11 13 49		
14	0.5	6.3	3.40	4.85					
	1.4	7.15	4.28	4.85					
	2.5	8.35	5.42						
	3.35	9.25	6.30						
	4.9	10.85	7.88		3.03	3.03	11 14 11		
14	20.4	26.25	23.32	24.76					
	21.2	27.1	24.15	24.70					
	22.3	28.2	25.25						
	23.25	29.15	26.20						
	24.9	30.8	27.85		3.09	3.15	11 14 28		
14	38.6	44.5	41.55	42.98					
	39.5	45.3	42.40	42.94					
	40.55	46.4	43.48						
	41.5	47.3	44.40						
	43.0	48.9	45.95		2.97	3.01	11 14 46		
					3.078	3.036	11 14 9		

Saturn (Titan)

1863 Apr 26

Destination (Gps)

Alanya 19° 42'

El.	Saturn	Titan	Ratio	El Titan - Saturn	El Saturn	El
10 42 45	6 0.5	6 14	I	+12"50		10 43 42
43 26	5 6	5 28.5	II		+13.50	43 44
44 2	6 17.5	6 22	III			
44 39	5 26	5 37.5	IV			
10 55 -	5 30.5	5 45	I	+13.00		10 55 -
55 -	6 29	6 53	II		+14.00	55 -
55 -	5 18.5	5 22.5	III			
55 -	6.52	7 3.5	IV			
11 2 36	5 46	6 1.5	I	+14.25		11 3 36
3 16	5 39	6 2	II		+13.50	3 39
4 2	6 49.5	6 53.5	III			
4 35	5 50.5	6 3.5	IV			
11 10 46	5 49.5	6 5	I	+14.25		11 11 39
11 34	6 39	7 3.5	II		+15.00	11 48
12 3	5 32.5	5 38	III			
12 33	6 41.5	6 54.5	IV			

Saturn

1863 Apr 27
115.

H.C. record (Copy)

At any given position		173°56' as all MR's of this date					
12 53	5.79	11.3	8.60	9.98			
	6.8	12.1	9.45	9.99			
	7.85	13.2	10.52				
	8.7	14.0	11.35				
	15.2	20.6	17.90		+7.92	+7.91	12 53 18
	31.6	37.0	34.30	35.69			
	32.4	37.8	35.10	35.68			
	33.6	38.9	36.25				
	34.4	39.75	37.08				
	40.9	46.3	43.60		7.91	7.92	12 53 44
54	10.1	15.45	12.78	14.20			
	10.9	16.3	13.60	14.19			
	12.1	17.45	14.78				
	12.95	18.3	15.62				
	15.4	24.8	22.10		7.90	7.91	12 54 22
	35.25	40.7	37.98	39.39			
	36.15	41.5	38.82	39.37			
	37.25	42.6	39.92				
	38.1	43.5	40.80				
	44.5	49.9	47.20		7.81	7.83	12 54 42
54	59.4	4.85	2.12	3.51			
55	0.25	5.65	2.95	3.48			
	1.3	6.7	4.00				
	2.2	7.6	4.90				
	8.7	14.05	11.38		7.87	7.90	12 55 11
	24.0	29.5	26.75	28.17			
	24.9	30.3	27.60	28.14			
	25.95	31.4	28.68				
	26.9	32.25	29.58				
	33.3	38.8	36.05		7.88	7.91	12 55 36
					+7.882	+7.897	12 54 30

Return

1863 April 27
H.S.

All (recovery)

Copy.

12	59	27.75	32.0	29.88	31.25				
		28.6	32.7	30.65		31.22			
		29.8	33.8	31.80					
		30.6	34.65	32.62					
		37.2	41.1	39.15			+7.90	+7.93	12 59 39
		57.1	55.2	53.15	54.51				
		57.95	56.0	53.98		54.50			
		53.0	57.05	55.02					
		53.8	57.95	55.88					
13	0	0.3	4.75	2.32			7.81	7.82	13 0 2
0		16.5	22.6	20.55	21.95				
		19.3	23.45	21.38		21.90			
		20.4	24.45	22.42					
		21.3	25.4	23.35					
		27.8	31.85	29.82			7.87	7.92	13 0 30
		41.7	45.4	43.35	44.74				
		42.1	46.2	44.15		44.72			
		43.2	47.3	45.30					
		44.1	48.15	46.12					
		50.6	54.65	52.62			7.88	7.90	13 0 53
1		1.85	5.9	3.88	5.31				
		2.65	6.7	4.68		5.26			
		3.85	7.85	5.85					
		4.7	8.8	6.75					
		11.15	15.25	13.20			7.89	7.94	13 1 13
							7.970	7.902	13 0 27

Saturn

1863 Apr 27
H.C. Currier & Co. N.Y.

13 4 49.45 53.4 51.12 52.84
50.3 54.25 52.28 52.65
51.5 55.35 53.42
52.25 56.15 54.25
58.7 62.7 60.70 +7.86 -7.85 13 5 1

5 14.3 18.25 16.28 17.74
15.35 19.15 17.25 17.81
16.55 20.2 18.38
17.3 21.1 19.20
23.75 27.6 25.68 7.94 7.87 13 5 26

5 36.3 40.2 38.25 39.70
37.2 41.1 39.15 39.69
38.25 42.2 40.22
39.15 43.15 41.15
45.65 49.55 47.60 7.90 7.91 13 5 48

5 59.7 3.55 1.62 3.04
6 0.6 4.35 2.48 3.05
1.65 5.6 3.62
2.5 6.4 4.45
9.05 12.9 10.98 7.94 7.93 13 6 11

6 23.1 27.0 25.05 26.42
24.0 27.85 25.92 26.45
25.05 28.9 26.98
25.9 29.7 27.80
32.4 36.3 34.35 7.93 7.90 13 6 34

7.914 +7.892 13 5 48

Saturn

1863 Apr 27th
G.H.S.

13	10	28.4	32.3	30.35	31.79				
		29.3	33.2	31.25		31.80			
		30.45	34.25	32.35					
		31.3	35.15	33.22					
		32.8	41.6	39.70		+7.91	+7.90	13	10 40
		50.0	54.0	52.00	53.39				
		50.85	54.8	52.82		53.40			
		52.0	55.95	53.98					
		52.85	56.7	54.78					
10		59.25	63.25	61.25		7.86	7.85	13	11 1
11	10.9	14.8	12.85	14.29					
	11.75	15.7	13.72		14.29				
	12.9	16.8	14.85						
	13.8	17.65	15.72						
	20.3	24.1	22.20			7.91	7.91	13	11 22
11	37.55	41.65	39.50	40.90					
	38.3	42.25	40.28		40.86				
	39.6	43.3	41.45						
	40.4	44.2	42.30						
	46.85	50.7	48.78			7.88	7.92	13	11 49
12	1.95	5.9	3.92	5.36					
	2.8	6.7	4.75		5.36				
	4.1	7.85	5.98						
	4.9	8.7	6.80						
	11.3	15.25	13.28			7.92	7.92	13	12 13
						+7.896	+7.900	13	11 25

Saturn (Titan)

1863 Apr 27
 1863
 HCC record
 Copy

El	Saturn	Titan	Parity	Saturn R.	Saturn B.	Time by El
12 51 39	5 34	5 51.5	I	+ 15 ^m 45		12 57 32
57 21	6 27	6 53	II		+ 17 ^m 00	idem
57 42	5 46	5 54	III			
58 24	6 55	6 19.5	IV			
13 1 58	6 14.	6 18.5	I	+ 14.25		13 2 50
2 25	6 4	6 28	II	1	15.50	idem
3 16	5 4	5 11	III			
3 43	5 55	6 9	IV			
13 8 3	5 53.5	6 9.5	I	+ 15.25		13 8 36
8 27	5 12.	5 37.	II		16.00	37
8 48	6 40.5	6 47.5	III			
9 8	5 17.5	5 32.0	IV			

El by Bar. changed to 14^m 5^s.
 (10" error)

These were taken at the angle 174° 62'

Saturn (Titan)

1863 May 1
 2145.46
 (Wile record 5 HCC)

Saturn I
 II
 III
 IV
 Titan

R. A.				$\frac{I+IV}{2}$	$\frac{II+III}{2}$	Titan-Saturn		
						R.	B.	
12	27	6.5	10.35	8.42	9.84			
		7.3	11.15	9.22	9.81			
		8.5	12.3	10.40				
		9.3	13.2	11.25				
		17.1	20.9	19.00		+9.16	+9.19	12 27 19
27	38.05	41.9	49.98	41.41				
	38.9	42.65	41.78	41.36				
	40.0	43.9	41.95					
	40.9	44.8	42.85					
	48.6	52.4	50.50			9.09	9.14	12 27 50
28	6.1	10.0	8.05	9.46				
	7.1	10.8	8.95	9.50				
	8.2	11.9	10.05					
	9.05	12.7	10.84					
	16.7	20.6	18.65			9.19	9.15	12 28 19
28	35.15	39.0	37.08	38.48				
	36.0	39.9	37.95	38.52				
	37.2	41.0	39.10					
	37.95	41.8	39.88					
	45.7	49.5	47.60			9.12	9.08	12 28 48
29	6.1	10.0	8.05	9.45				
	7.0	10.9	8.95	9.48				
	8.05	11.95	10.00					
	8.95	12.75	10.65					
	16.75	20.6	18.68			9.23	9.20	12 29 19
						+9.158	+9.152	12 28 19

Saturn (Titan)

63 May 1
1945

Saturn I
II
III
IV
Titan

	12	34	35.1	39.05	37.08	36.49
I			36.0	39.8	37.90	38.50
II			37.2	41.0	39.10	
III			37.95	41.85	39.90	
IV			45.7	49.6	47.65	

Titan - Sat
Ring Path
Time for
Satellite

+9.16 +9.15 12 34 48

Saturn I
II
III
IV
Titan

	35	2.0	5.95	3.98	5.35
I		2.8	6.7	4.75	5.35
II		1.0	7.9	5.95	
III		1.8	8.65	6.72	
IV		12.6	16.5	14.55	

9.20 9.20 12 35 15

	35	27.1	31.05	29.08	30.68
I		26.0	31.85	29.92	30.49
II		29.2	32.9	31.05	
III		29.95	33.8	31.88	
IV		37.6	41.5	39.55	

9.07 9.06 12 35 40

	35	54.0	57.65	55.92	57.36
I		54.85	58.7	56.78	57.35
II		56.0	59.85	57.92	
III		56.9	0.7	58.80	
IV		36	1.5	8.4	6.45

9.09 9.10 12 36 6

	36	—	25.2	23.28	24.69
I		22.2	25.95	24.08	24.69
II		23.4	27.2	25.30	
III		24.25	27.95	26.10	
IV		32.0	35.8	33.90	

9.21 9.21 12 36 34

9.146 9.144 12 35 41

Saturn (Star)

1863 Aug 1
JWS

Saturn I

II

III

IV

Titan

12	59	44.9	48.65	46.88	48.19				
		45.75	49.5	47.62		48.20			
		46.85	50.7	48.78					
		47.65	51.55	49.60					
		55.5	59.3	57.40		+9.21	9.20	12	59 57
13	0	12.9	16.6	14.75	16.18				
		13.7	17.55	15.62		16.21			
		14.9	18.7	16.80					
		15.65	19.55	17.60					
		23.3	27.25	25.28		9.10	9.07	13	0 25
	0	37.25	41.1	39.12	40.56				
		38.15	42.0	40.08		40.65			
		39.3	43.15	41.22					
		40.1	43.9	42.00					
		47.8	51.75	49.78		9.22	9.13	13	0 50
	0	58.4	62.25	60.32	61.75				
		59.25	63.2	61.22		61.80			
	1	0.5	4.25	2.38					
		1.25	5.1	3.18					
		8.95	12.8	10.88		9.13	9.08	13	1 18
	1	21.3	24.2	22.28					
		22.3	25.1	23.20	23.70				
		22.3	26.2	24.25		23.72			
		23.2	27.05	25.12					
		24.0							
		30.85	34.65	32.75		9.05	9.03	13	1 35
	1	43.0	47.05	45.02	46.45				
		43.9	47.9	45.90		46.58			
		45.2	48.9	46.05					
		45.9	49.65	47.68					
		53.65	57.55	55.60		9.15	9.12	13	1 58
	2	6.55	10.4	8.45	9.89				
		7.4	11.2	9.70		9.85			
		8.5	12.3	10.40					
		9.4	13.2	11.30					
		17.0	20.9	18.95		9.08	9.10	13	2 19
						9.16	9.12	13	2 41

Lat Series

32.09 32.08

30.68 31.55 32.60 33.50 41.25

32.6 32.5 34.5 35.5 43.15

28.75 29.6 30.7 31.55 39.35

13 2

Saturn I II III IV

Titan

Saturn [Titan]

1863 May 1
1865
H.C. Mc.
Vide H.C.'s original
notes

El	Saturn	Titan	Part of Saturn
12 30 27	6 22	6 25.5	I
32 41	4 55	4 16.	II
33 5	6 37.5	6 30.	III
33 34	5 9.5	5 10	IV
Between	5 53	5 56	I
12 57 and 12 59	6 47.5	6 56.5	II
	5 58.5	5 41.5	III
	6 17	6 17	IV
	6 34	6 37	I
Between	5 34	5 44.5	II
12 57 and 12 59	6 19.5	6 12.5	III
	5 44.	5 44.5	IV

Saturn (Titan)

1863 May 9
1875.

							Titan Ring	-Saturn Ball	Line for Titan
Titan	11	45	59.3	62.25	128		-10.07	-10.06	11 46 1
Saturn I	46	8.0	12.0	12.10	12.35				
II		8.8	12.7	12.75		12.34			
III		9.9	12.95	11.92					
IV		10.7	14.7	12.70					
	23.2	27.25	25.22				-10.08	-10.14	11 46 25
	32.0	35.9	33.95	35.30					
	32.9	36.7	34.80		35.36				
	34.0	37.85	35.72						
	34.7	38.6	36.65						
	51.0	55.05	53.05				-10.20	-10.17	11 46 53
	59.9	3.8	4.65	3.22					
47	0.6	4.55	2.58		3.19				
	1.85	5.75	3.80						
	2.6	6.6	4.60						
							-10.117	-10.123	11 46 26

Saturn (Titan)

63 May 9
145.

12	2 57.6	61.55	59.58	
	135	10.3	8.32	9.70
	7.25	11.2	9.22	9.76
	8.4	12.2	10.30	
	9.1	13.05	11.08	

$\frac{J_{\text{star}}}{P.}$	$\frac{J_{\text{star}}}{P.}$	$J_{\text{star}}(C)$
-10.12	-10.18	12 3 0

3	20.0	24.0	22.00	
	28.7	32.55	30.62	32.02
	29.5	33.4	31.45	32.01
	30.65	34.5	32.58	
	31.45	35.4	33.42	

10.02	10.04	12 3 22
-------	-------	---------

3	43.05	46.9	44.98	
	51.65	55.6	53.62	55.02
	52.45	56.4	54.42	55.02
	53.7	57.55	55.62	
	54.5	58.35	56.42	

10.04	10.04	12 3 45
-------	-------	---------

4	5.1	9.15	7.12	
	13.95	17.8	15.88	17.25
	14.8	18.65	16.72	17.28
	15.9	19.8	17.85	
	16.65	20.6	18.62	

10.13	10.16	12 4 7
-------	-------	--------

4	28.6	32.4	30.50	
	37.25	41.1	39.18	40.56
	38.1	41.95	40.02	40.60
	39.2	43.15	41.18	
	40.0	43.9	41.95	

10.06	10.10	12 4 30
-------	-------	---------

-10.074	-10.098	12 3 45
---------	---------	---------

Saturn (Titan)

1863 May 9
J.H.S.

					Titan - Saturn		
					Rap	Ball.	
12	10	36.35	40.2	38.28	-10.11	-10.12	12 10 38
		45.1	48.95	47.02			
		45.9	49.85	47.88			
		46.95	50.9	48.92			
		47.8	51.7	49.75			
11	10.9	14.8	12.85		10.06	10.09	12 11 13
	19.5	23.55	21.52	22.91			
	20.5	24.25	22.38		22.94		
	21.6	25.4	23.50				
	22.35	26.25	24.30				
11	35.25	39.15	37.20		10.12	10.15	12 11 37
	46.0	49.85	45.92	47.32			
	44.9	48.7	46.80		47.35		
	45.9	49.9	47.90				
	46.75	50.7	48.72				
11	59.5	3.35	1.42		10.12	10.13	12 12 1
12	8.2	12.05	10.12	11.54			
	9.1	12.9	11.00		11.55		
	10.2	14.0	12.10				
	11.0	14.9	12.95				
12	24.4	28.25	26.32		10.14	10.13	12 12 26
	33.2	36.95	35.08	36.46			
	34.0	37.8	35.90		36.45		
	35.1	38.9	37.00				
	35.9	39.8	37.85				
					-10.110	-10.124	12 11 35

Saturn (Titan) L

1863phae.proj..204S

1863 May 9.
25.

Titan
Saturn I
II
III
IV

12 20 19.4 23.3 21.35 70.08 -10.05 12 20 21

28.15 22.0 30.08 31.43

28.9 22.8 30.85 31.40

30.0 30.9 31.95

30.65 30.7 32.78

20 16.85 50.7 48.78 10.10 10.08 12 20 49

55.5 59.5 57.50 58.88

56.3 60.25 58.28 58.86

57.5 61.4 59.45

58.35 62.15 60.25

21 11.65 15.55 13.60 10.04 10.00 12 21 14

20.9 20.2 22.25 23.64

21.1 25.0 23.05 23.60

22.2 26.1 24.15

23.05 27.0 25.02

21 37.75 41.7 39.72 10.10 10.09 12 21 40

46.45 50.45 48.45 49.82

47.3 51.2 49.25 49.81

48.4 52.35 50.38

49.3 53.1 51.20

22 3.0 7.0 5.11 10.04 10.04 12 22 5

11.7 15.65 13.68 15.04

12.5 16.4 14.45 15.04

13.7 17.55 15.62

14.5 18.3 16.40

-10.072 -10.052 12 21 14

Saturn (J)

1863 May 9
2450h
1400 m (Cape)
~~50~~

<i>Venus</i> <i>EC</i>	<i>Star</i>	<i>Saturn</i>	<i>Partly</i> <i>Saturn</i>
11 42 <i>Circu</i>	6 15	6 17	I
" "	7 25.5	7 19.5	II
" "	5 2.5	5 14.5	III
" "	7 18	7 53	IV
11 55 <i>Circu</i>			
" "			
" "			
" "			
12 7 54	6 42	6 45	<i>Saturn</i>
8 16	6 12.5	6 7.5	<i>order</i>
8 14	5 14	5 25.5	
9 2	7 9	7 15.5	
12 15 25	6 39.5	6 41	<i>Saturn</i>
15 57	5 56.5	5 48	<i>order</i>
16 14	6 56	7 7	
16 43	5 25	5 30	
12 18 ?	6 59.5	7 5	<i>Saturn</i>
12 18 19	6 27	6 45*	<i>order</i>
18 53	5 51.5	5 46	
19 24	5 54.5	5 56	

* probably 6 40.5

63 May 9
MS.

Nebula

Nebula

1863 May 9
H.K.

1A^L

89	5.2	1.2	Above
91	2.7	1.1	below
92	4.0	1.1	below
93	3.0	1.4	Above
94	5.7	271.3	At angle
95	4.4	39.19	Right
96	4.9	46.70	Left
97	4.0	40.84	Left
98	1.0	39.50	Right
99	4.6	39.74	Right
100	1.6	40.86	Left
101	1.8	0.6	Above
102	2.5	1.6	Below

Time probably 35.50

Comet 19. 1st -

The AR 19^h 52^m Dec + 55° 58' has a star - 1st 51' - 1st 7"

Only (the above proved to be a small nebula) (Merrill II. 378)

Telegram received from Dr. Perkins - Good found.

New comet Perkins

North Declination 69° 8'

Right ascension 19^h 5^m 8^s

AR 19^h 3^m

Count 1863 II

1863 May 9

1362 May 9

h	m	s
16	0	47
16	2	42
16	4	50
"	"	"
16	6	0
"	"	"

Angle of horizon 257.7 } on the river —
 " " " 256.2 }

Comet result — 71 21
 Star " — 6 26
 Comet " — 7 28
 Star " — 6 43

May 10	Ed	6.50.10
206	46.53.27	
	116.7	
	21.2	

Difference of Right Ascension —

Comet	m	s
Star	8	31.5
Star	9	14.4
Comet	10	9.7
Star	10	31.0

By Latitude

Comet - Star	
15.36	-29.0
15.39	-29.3
15.42	-11.3
16.5	+0.26
16.8	+0.43
16.8.5	43.6
16.10	-44.3

$\frac{1}{2} = \frac{1}{2} + \frac{1}{2}$
 15.58 - 31.65 - 0.362
 15.58 - 0.36 + 0.36
 - 31.6 - 0.158

Star - Comet 1096/8

Comet - Star	h	m	s
15.36	19	3.15.46	69 12 12.0
15.39	19	3.16.55	69 11 12.11
15.42	19	3.17.00	- 0.32
15.45	19	3.17.02	3.03
15.48	19	3.17.05	3.03
15.51	19	3.17.08	3.03
15.54	19	3.17.11	3.03
15.57	19	3.17.14	3.03
15.60	19	3.17.17	3.03
15.63	19	3.17.20	3.03
15.66	19	3.17.23	3.03
15.69	19	3.17.26	3.03
15.72	19	3.17.29	3.03
15.75	19	3.17.32	3.03
15.78	19	3.17.35	3.03
15.81	19	3.17.38	3.03
15.84	19	3.17.41	3.03
15.87	19	3.17.44	3.03
15.90	19	3.17.47	3.03
15.93	19	3.17.50	3.03
15.96	19	3.17.53	3.03
15.99	19	3.17.56	3.03
16.02	19	3.17.59	3.03
16.05	19	3.18.02	3.03
16.08	19	3.18.05	3.03
16.11	19	3.18.08	3.03
16.14	19	3.18.11	3.03
16.17	19	3.18.14	3.03
16.20	19	3.18.17	3.03
16.23	19	3.18.20	3.03
16.26	19	3.18.23	3.03
16.29	19	3.18.26	3.03
16.32	19	3.18.29	3.03
16.35	19	3.18.32	3.03
16.38	19	3.18.35	3.03
16.41	19	3.18.38	3.03
16.44	19	3.18.41	3.03
16.47	19	3.18.44	3.03
16.50	19	3.18.47	3.03
16.53	19	3.18.50	3.03
16.56	19	3.18.53	3.03
16.59	19	3.18.56	3.03
17.02	19	3.18.59	3.03
17.05	19	3.19.02	3.03
17.08	19	3.19.05	3.03
17.11	19	3.19.08	3.03
17.14	19	3.19.11	3.03
17.17	19	3.19.14	3.03
17.20	19	3.19.17	3.03
17.23	19	3.19.20	3.03
17.26	19	3.19.23	3.03
17.29	19	3.19.26	3.03
17.32	19	3.19.29	3.03
17.35	19	3.19.32	3.03
17.38	19	3.19.35	3.03
17.41	19	3.19.38	3.03
17.44	19	3.19.41	3.03
17.47	19	3.19.44	3.03
17.50	19	3.19.47	3.03
17.53	19	3.19.50	3.03
17.56	19	3.19.53	3.03
17.59	19	3.19.56	3.03
18.02	19	3.19.59	3.03
18.05	19	3.20.02	3.03
18.08	19	3.20.05	3.03
18.11	19	3.20.08	3.03
18.14	19	3.20.11	3.03
18.17	19	3.20.14	3.03
18.20	19	3.20.17	3.03
18.23	19	3.20.20	3.03
18.26	19	3.20.23	3.03
18.29	19	3.20.26	3.03
18.32	19	3.20.29	3.03
18.35	19	3.20.32	3.03
18.38	19	3.20.35	3.03
18.41	19	3.20.38	3.03
18.44	19	3.20.41	3.03
18.47	19	3.20.44	3.03
18.50	19	3.20.47	3.03
18.53	19	3.20.50	3.03
18.56	19	3.20.53	3.03
18.59	19	3.20.56	3.03
19.02	19	3.20.59	3.03
19.05	19	3.21.02	3.03
19.08	19	3.21.05	3.03
19.11	19	3.21.08	3.03
19.14	19	3.21.11	3.03
19.17	19	3.21.14	3.03
19.20	19	3.21.17	3.03
19.23	19	3.21.20	3.03
19.26	19	3.21.23	3.03
19.29	19	3.21.26	3.03
19.32	19	3.21.29	3.03
19.35	19	3.21.32	3.03
19.38	19	3.21.35	3.03
19.41	19	3.21.38	3.03
19.44	19	3.21.41	3.03
19.47	19	3.21.44	3.03
19.50	19	3.21.47	3.03
19.53	19	3.21.50	3.03
19.56	19	3.21.53	3.03
19.59	19	3.21.56	3.03
20.02	19	3.21.59	3.03
20.05	19	3.22.02	3.03
20.08	19	3.22.05	3.03
20.11	19	3.22.08	3.03
20.14	19	3.22.11	3.03
20.17	19	3.22.14	3.03
20.20	19	3.22.17	3.03
20.23	19	3.22.20	3.03
20.26	19	3.22.23	3.03
20.29	19	3.22.26	3.03
20.32	19	3.22.29	3.03
20.35	19	3.22.32	3.03
20.38	19	3.22.35	3.03
20.41	19	3.22.38	3.03
20.44	19	3.22.41	3.03
20.47	19	3.22.44	3.03
20.50	19	3.22.47	3.03
20.53	19	3.22.50	3.03
20.56	19	3.22.53	3.03
20.59	19	3.22.56	3.03
21.02	19	3.22.59	3.03
21.05	19	3.23.02	3.03
21.08	19	3.23.05	3.03
21.11	19	3.23.08	3.03
21.14	19	3.23.11	3.03
21.17	19	3.23.14	3.03
21.20	19	3.23.17	3.03
21.23	19	3.23.20	3.03
21.26	19	3.23.23	3.03
21.29	19	3.23.26	3.03
21.32	19	3.23.29	3.03
21.35	19	3.23.32	3.03
21.38	19	3.23.35	3.03
21.41	19	3.23.38	3.03
21.44	19	3.23.41	3.03
21.47	19	3.23.44	3.03
21.50	19	3.23.47	3.03
21.53	19	3.23.50	3.03
21.56	19	3.23.53	3.03
21.59	19	3.23.56	3.03
22.02	19	3.23.59	3.03
22.05	19	3.24.02	3.03
22.08	19	3.24.05	3.03
22.11	19	3.24.08	3.03
22.14	19	3.24.11	3.03
22.17	19	3.24.14	3.03
22.20	19	3.24.17	3.03
22.23	19	3.24.20	3.03
22.26	19	3.24.23	3.03
22.29	19	3.24.26	3.03
22.32	19	3.24.29	3.03
22.35	19	3.24.32	3.03
22.38	19	3.24.35	3.03
22.41	19	3.24.38	3.03
22.44	19	3.24.41	3.03
22.47	19	3.24.44	3.03
22.50	19	3.24.47	3.03
22.53	19	3.24.50	3.03
22.56	19	3.24.53	3.03
22.59	19	3.24.56	3.03
23.02	19	3.24.59	3.03
23.05	19	3.25.02	3.03
23.08	19	3.25.05	3.03
23.11	19	3.25.08	3.03
23.14	19	3.25.11	3.03
23.17	19	3.25.14	3.03
23.20	19	3.25.17	3.03
23.23	19	3.25.20	3.03
23.26	19	3.25.23	3.03
23.29	19	3.25.26	3.03
23.32	19	3.25.29	3.03
23.35	19	3.25.32	3.03
23.38	19	3.25.35	3.03
23.41	19	3.25.38	3.03
23.44	19	3.25.41	3.03
23.47	19	3.25.44	3.03
23.50	19	3.25.47	3.03
23.53	19	3.25.50	3.03
23.56	19	3.25.53	3.03
23.59	19	3.25.56	3.03
24.02	19	3.25.59	3.03
24.05	19	3.26.02	3.03
24.08	19	3.26.05	3.03
24.11	19	3.26.08	3.03
24.14	19	3.26.11	3.03
24.17	19	3.26.14	3.03
24.20	19	3.26.17	3.03
24.23	19	3.26.20	3.03
24.26	19	3.26.23	3.03
24.29	19	3.26.26	3.03
24.32	19	3.26.29	3.03
24.35	19	3.26.32	3.03
24.38	19	3.26.35	3.03
24.41	19	3.26.38	3.03
24.44	19	3.26.41	3.03
24.47	19	3.26.44	3.03
24.50	19	3.26.47	3.03
24.53	19	3.26.50	3.03
24.56	19	3.26.53	3.03
24.59	19	3.26.56	3.03
25.02	19	3.26.59	3.03
25.05	19	3.27.02	3.03
25.08	19	3.27.05	3.03
25.11	19	3.27.08	3.03
25.14	19	3.27.11	3.03
25.17	19	3.27.14	3.03
25.20	19	3.27.17	3.03
25.23	19	3.27.20	3.03
25.26	19	3.27.23	3.03
25.29	19	3.27.26	3.03
25.32	19	3.27.29	3.03
25.35	19	3.27.32	3.03
25.38	19	3.27.35	3.03
25.41	19	3.27.38	3.03
25.44	19	3.27.41	3.03
25.47	19	3.27.44	3.03
25.50	19	3.27.47	3.03
25.53	19	3.27.50	3.03
25.56	19	3.27.53	3.03
25.59	19	3.27.56	3.03
26.02	19	3.27.59	3.03
26			

1362 May 9

1863 May 9.

Parker's Comet -

Star of Companion = α 1362 May 9 - to 2247

Comet	7' 28"	$\frac{29.6}{50.6}$	$\frac{1}{15}$	20	29.6
Star	9 8				53.6
Comet	5' 58"			38	44.5
Star	7 25			39	14.2

At 15^h 42^m the difference of Sec ~~11~~
was " 13" at the meridian 27" in Comets -

at 15^h 45^m 16^s angle position 279.9 to left -

" 15^h 46^m 49^s " " 279.0 " right

" 15^h 47^m 43^s " " 278.5 " "

" 15^h 49^m 42^s " " 278.6 " left

Not lost at angle 0.0 -

" 15^h 30^m 21^s 41.761 below

" 15^h 35^m 19^s 40.871 above 336.2 = angle position -

" 15^h 36^m 26^s 40.771 above " " "

" 15^h 37^m 34^s 40.831 below 338.9 " "

Rec'd of angle = 61.44

" " " 61.27

" " " 61.45

" " " 61.25

16 0 47

18 - *Corrected values of elements - a. H. Lafford*
 Comet compared with star x

on	at		W	R
29	36	110 2'	W	
41	22	112 32'	W	
43	45	113 27'	W	
44	9	116 22'	W	
45	32	49.57 Nov	30°	49.97
51	21		35 26	49.65
53	3		37 36	49.76
54	30		42 2	49.67
56	1		45 15	49.63
57	39		51 49	49.55
58	30		53 23	49.39
59	17	151° 8'		
60	19	153 50		
61	40	156. 3		
62	1			

one count is on full star. The angle of P.S. "

Go to T-W at 70°-71° W

is about 4 1/2 inch. arc.

T is here about 265.56' or 24' 56' arc.

The distances observed are the projected upon

line whose angle of position is T-W, which as all

seen is nearly the line joining comet and star. The arc

from L-R is revolution of micrometer

and without division head has not been touched since

last obs. of comet on May 9th 1875.

61.45
61.30
61.30
61.30
61.30
61.28

61.39

Comet n.g. star -

18.27 = 63.7

18.27 9 18.27

4.46
7 1

12 45 18

14 13 2 Sky 12 25.5 Comet follows.

14 15 14 71° 40' Declination

Declination of star 71° 39'

" " Comet 71 41

Hour angle 22 49 26 -

17 25 47

19 22 5 Bright star -

Sun 72° 42' -

Hour angle 19 59 28 -

AK of x = 12° 25' 48" + 2 20 77° 39' + 2'

" or 18 22 37 + 2 20 72 42 + 2'

α - x 20.27 18 23 37 72 40.5
+ 0.56

AK of x 17 26 42 20 72° 38' 50

Quite right by Lefay's observation which is
 itself correct.

Comet 1863 II

1863 May 15th
1175

Saturn (Titan)

1863phae.proj..204S

1863 May 18
1863

Dir. Record by HCC

EL

				$\frac{T+IV}{2}$	$\frac{III+VII}{2}$	Titan Ring	Titan Belt		
Saturn I	14	52	47.8	58.05	52.32				
II			48.6	57.9	52.60				
III			49.65	52.9					
IV			50.4	53.6					
Titan			51.05	56.7		+4.38	+4.30	14 52 57	Half wt
Saturn I	53	45.25	?	x	46.62				
II		46.0	47.4		46.58				
III		47.15	—						
IV		48.0	—						
Titan		49.4	—			+4.33	+4.37	14 53 57	Half wt
	52	15.2	22.35	18.78	20.16				
		15.95	23.2	19.58	20.15				
		17.15	24.3	20.72					
		17.95	25.15	21.55					
		19.3	26.5	22.90					
		20.85	28.05	24.45		+4.29	+4.30	14 54 28	
	54	42.8	50.1	41.45	47.85				
		43.7	50.9	47.30	47.88				
		44.9	52.0	48.35					
		45.6	52.9	49.25					
		47.0	54.15	50.58					
		48.6	55.8	52.20		+4.35	+4.32	14 54 52	
	55	13.25	20.4	16.82	18.26				
		14.15	21.4	17.76	18.31				
		15.3	22.4	18.85					
		16.15	23.25	19.70					
		17.6	24.6	21.10					
		19.1	26.2	22.65		+4.39	+4.34	14 55 23	
						+4.346	+4.324	14 54 32	4 sets

Saturn (Titan)

1863 Aug 18

J.H.S.

View recorded by H.C.C.

26

14	55	41.9	49.1	45.50	46.82			
		42.7	49.9	46.30	46.88			
		43.9	50.0	47.45				
		44.6	51.7	48.15				
		47.65	52.8	51.22		+4.40	+4.34	14 55 57

56	9.6	16.8	13.20	14.61				
	10.35	17.7	14.02	14.60				
	11.6	18.75	15.18					
	12.4	19.65	16.02					
	13.85	20.9	17.38					
	15.55	22.5	19.02		+4.41	+4.42		14 56 19

56	57.85	58.95	55.40	56.99				
	52.65	59.8	56.22	56.97				
	53.8	60.55	57.32					
	54.6	61.75	58.18					
	56.0	63.2	59.60					
	57.55	64.7	1.12		+4.33	+4.35		14 57 1

57	22.3	29.65	25.98	27.60				
	23.3	30.5	26.90	27.42				
	24.3	31.6	27.95					
	25.25	32.4	28.82					
	26.6	33.85	30.22					
	28.15	35.3	31.72		+4.32	+4.30		14 57 32

57	44.5	51.7	46.10	49.50				
	45.4	52.5	48.95	49.49				
	46.4	53.65	50.02					
	47.3	54.5	50.90					
	48.6	55.7	52.15					
	50.3	57.4	53.85		+4.35	+4.36		14 57 54
					+4.362	+4.354		14 58 55

Saturn (Titan)

1863 May 18
145.

14	58	5.5	12.6	9.05	10.41				
		6.35	13.6	9.98	10.48				
		7.35	14.6	10.98					
		8.15	15.4	11.78					
		9.55	16.8	13.18					
		11.05	18.35	14.70		+4.29	+4.22	14.58	15
58		33.6	40.75	37.18	38.55				
		34.3	41.6	37.95	38.50				
		35.5	42.6	39.05					
		36.3	43.55	39.92					
		37.7	44.9	41.30					
		39.25	46.55	42.90		4.35	4.40	14.58	43
58		56.9	4.15	0.52	1.89				
		57.7	5.0	1.35	1.88				
		58.8	6.0	2.40					
		59.65	6.85	3.25					
59		1.0	8.2	4.60					
		2.55	9.8	6.18		4.29	4.30	14.59	6
20.0		27.3	23.65	25.02					
20.8		28.1	24.45	25.02					
22.0		29.2	25.60						
22.75		30.05	26.40						
24.2		31.4	27.80						
25.85		33.0	29.42			4.40	4.40	14.59	29
12.0		19.1	15.55	16.91					
12.9		19.9	16.40	16.95					
14.0		21.0	17.50						
14.8		21.75	18.28						
16.1		23.25	19.68						
17.7		24.8	21.25			4.34	4.30	15.0	21
						4.334	4.324	14.59	11

Saturn (Titan)

1863 May 18

JMS

With original record
of Acc.

Object	El	Titan	Saturn	W'	Titan in south of Saturn
I	14 42 50	57.44	[57.64]	82° 56'	To be rejected - vide original
Titan	43 36	57.44			
II	44 25	57	56.95		
Titan	44 49	57.46			
III	45 14		58.60		
Titan	46 0	57.53			
IV	46 21		58.09		
Titan	46 56	57.56			
I	49 13		57.89		
Titan	50 1	57.62			

Right-ascension, taken in the interval

Titan	15 9 5	54.12		82° 56'	
I	9 43		54.48		
Titan	10 53	54.21			54.153 15 10 42
II	11 26		53.73		
Titan	12 8	54.13			
IV	14 9	54.36			
Titan III	14 41		55.76		
IV	15 11	54.38			
Titan IV	15 54		54.99		
Titan	16 27	54.44			

(Clock ran down)

I is denoted the first or preceding end of the ring (which is innermost)
 IV " " last or following " "

II denotes the south limb of Saturn
 III " " north " "

The observations are made with the clock going, and the position circle at the angle W'
 The movable wire

Saturn (Titan)

Wed May 18th
1895

Method of Reduction

To bring on the instrument is set without any change, and the clock is going, we shall find

1st that in general the star will pass slowly through the field

2^d that the direction reading for any ^{slowly moving} fixed object will change

- 1) by motion of the object itself
- 2) by change of refraction
- 3) by slow motion (if such there be) of the telescope

All these changes of direction reading are to be assumed as proportional to the

Time.

Mean, as

(b. 20)

Thus we find that at the times T the reading for Titan was found equal to R , nothing being changed in the instrument

T			$R_{(obs)}$	R_c	$9.8(R_c - R_o)$
14	43	36	57.44	57.422	-0.17
	44	47	57.46	57.468	+0.08
	46	0	57.53	57.512	-0.18
	46	56	57.56	57.547	-0.17
	50	1	57.62	57.663	+0.42

Exact copy

Saturn (Titan)

1863 May 18th
G.H.S.

Hence we find by least squares that at this position of the instrument, if the reading corresponding to $14^h 46^m 16^s + a$ (minutes) be $R^0 + ax$ we shall

$$\text{have } R^0 = 57.522$$

$$x = 0.0374$$

which gives the values R^0 on the preceding page; and the following values for the times of

conjunction with Saturn; to which are annexed the corresponding numbers for Saturn

		Titan	Saturn		Titan-Sat	Ray	Ball
14	42 50	57.393	[57.66]	I	-0.247		
	44 25	57.452	58.95	II	+0.502	-0.407	
	45 14	57.483	58.80	III	-0.317		-0.406
	46 21	57.525	58.09	IV	-0.565		
	49 13	57.632	57.89	V	-0.258		
						-3.99	-3.98

The times for the diff. of decl. R is

14 44 50 R
14 47 47 B

The remaining obs. of this day give by simple interpolation

El	Titan	Saturn		El	Titan-Saturn
15 9 47	54.155	54.480	I	$R.$	$B.$
11 26	54.175	53.730	II	15 12 50	-0.450
14 41	54.370	55.760	III	13 4	-0.472
15 54	54.414	54.990	IV		-4.41 -4.63

Paul 1863 II

1863 May 8
715.

1863 May 8
M.S.

The Hermit Precursor x. on the East of it - x is 10.5.

1st 3 sets of Right Ascension
2nd. Angle of Position -

3 sets of Dec.,

13

34	3	253	33
36	19	253	16
38	34	253	17
40	34	262	58
42	3	252	59

x y z
 58.5 57.5 56 32.0 56. 54.5
 57 38.3 68 11.8 65 33.0
 9 65.4 3' 15.1 3' 33"

2nd set of Dec -

1st set

2nd set

3d. set

4th set

D. B.

5th set

of and to near center of 12

2) 50 20 in the hour angle -

Declination 79° 37' -

Aug 16 1863 79.3 May 18.63 good 621
 18.12 79.33 as June
 18.9 79.43 Long

- Long's phenomenon - not far away. -

Aut. 1863 II

1863 May 18
JMS

Saturn (Titan)

863 May 23
7145

Titan	EB				Titan - Saturn		
	12	29	39.1	44.2	41.65	<u>Run</u> -12.66	<u>Back</u> -12.70
Tahim I			50.4	55.5	52.95	54.31	12 29 42
<u>II</u>			57.25	56.3	53.78	54.25	
<u>III</u>			52.45	57.4	54.92		
<u>IV</u>			53.2	58.15	55.68		
30	12.6	17.7	15.15			-12.67	-12.71
	23.9	29.0	26.45	27.82			12 30 15
	24.75	29.75	27.25		27.86		
	25.95	31.0	28.48				
	26.65	31.75	29.20				
30	45.3	Plot.	47.83			-12.71	-12.71
	56.6	61.8	59.20	60.54			12 30 45
	57.8	62.4	59.95	60.54			Half weight
	58.6	63.65	61.12				
	59.35	64.40	61.88				
31	15.05	20.15	17.60			-12.75	-12.76
	26.45	31.5	28.98	30.35			12 31 18
	27.25	32.2	29.72	30.36			
	28.5	33.5	31.00				
	29.15	34.3	31.72				
31	46.4	51.5	48.95			12.75	12.75
	57.9	62.9	0.40	1.70			12 31 49
	58.55	63.7	1.12	1.70			
	59.7	64.85	2.28				
32	0.4	5.6	3.00				
						-12.708	-12.728
							12 30 46
							4 1/2

Saturn (Titan)

1863 May 23
JHS.

Titan	12	46	6.3	10.1	8.20			-12.68	-12.66	12	46	8
Saturn I		46	17.2	21.5	19.60	20.88						
II			18.4	22.15	20.28		20.86					
III			19.6	23.3	21.45							
IV			20.3	24.0	22.15							
Titan		46	35.75	39.5	37.64			-12.76	-12.78	12	46	38
Saturn I			47.2	51.0	49.10	50.44						
II			48.0	51.8	49.90		50.46					
III			49.15	52.9	51.02							
IV			49.95	53.6	51.78							
Titan		47	12.15	15.85	15.00			-12.67	-12.67	12	47	14
			22.5	—	15.37	26.67						Wt 0.8
			26.15	—	26.02		26.67					
			25.65	—	27.32							
			26.1	—	27.78							
Titan		52	42.95	46.75	44.85			-12.59	-12.65	12	52	45
			54.4	57.95	56.18	57.44						
			55.05	58.6	56.92		57.50					
			56.2	59.95	58.08							
			56.8	0.6	58.70							
Titan		53	11.15	15.0	13.08			-12.61	-12.61	12	53	13
			22.5	24.25	24.38	25.69						
			23.25	24.9	25.08		25.69					
			24.4	25.2	26.30							
			25.1	25.9	27.00							
Titan		53	35.4	39.0	37.20			-12.65	-12.59	12	53	37
			46.7	50.4	48.55	49.85						
			47.35	51.1	49.22		49.79					
			48.5	52.2	50.35							
			49.3	53.0	51.15							
								-12.660	-12.660	12	50	2
												5.8

Saturn (Titan)

1863 May 23.
1863

N ^o 2	Titan	13	10	50.65	51.95	52.80			-12.69	-12.70	13 10 53
			11	2.15	6.3	4.22	549				
				2.4	7.0	4.90		550			
				4.0	8.2	6.10					
				4.7	8.8	6.75					

N ^o 1	Titan	10	17.5	21.65	19.58				-12.63	-12.63	13 10 20
			28.7	33.0	30.65	32.21					
			29.55	33.75	31.65		32.21				
			30.7	34.85	32.78						
			31.5	35.65	33.58						

		11	17.0	21.25	19.12				-12.63	-12.68	13 11 19
			28.35	32.5	30.42	31.75					
			29.10	33.25	31.18		31.80				
			30.35	34.5	32.42						
			31.0	35.15	33.08						

-12.650 -12.670 13 10 51

wt.

2

Saturn (Titan)

1863 May 23
JHS.

N'	EC	Titan	Latrum	Part of Latrum	Titan is south of Tr
82° 56'	12 36 42	55°.62		.	
	37 27		56.83	I	
	38 11	55.61			
	38 46		56.05	II	
	39 26	55.53			
	40 9		57.91	III	
	40 57	55.61			
	41 57		57.15	IV	
82° 56'	42 39	55.61			
	57 19	54.87		I	
	58 32		56.14	I	
	59 30	54.88			Driving clock ran down
	13 1 16	54.92			
	1 56		55.41	II	
	3 9	54.88			
	3 44		57.18	III	
	4 34	54.95			
	5 35		56.57	IV	
	6 36	55.00			

Saturn (Titan)

1863 May 25.
JH5.Titan
Saturn I

" II

" III

" IV

12 38 33.55 37.8 35.68 -9.62 -9.62 12 38 36

41.95 46.0 43.92 45.30

42.7 46.8 44.75 45.30

43.75 47.95 45.65

44.6 48.75 46.68

39 49.9 52.65 50.78 -9.77 -9.78 12 39 51

57.2 61.1 59.15 0.55

58.15 61.85 0.00 0.56

59.25 63.0 1.12

40 0.1 63.8 1.95

40 13.4 17.2 15.30 -9.74 -9.78 12 40 15

21.4 25.5 23.65 25.04

22.65 26.5 24.48 26.08

23.8 27.55 25.68

24.55 28.3 26.42

40 38.05 41.9 39.98 -9.71 -9.70 12 40 40

46.5 50.2 48.35 49.69

47.3 51.0 49.15 49.68

48.4 52.0 50.20

49.2 52.85 51.02

41 2.0 5.8 3.90 -9.68 -9.65 12 41 4

10.3 14.1 12.20 13.58

11.1 14.85 12.98 13.55

12.3 15.95 14.13

13.15 16.75 14.95

9.704 9.706 12 40 5

Saturn (Titan)

1863 May 25.
716.

Titan	12	53	28.8	34.5	31.65		-9.670	-9.66	12	53	32
Saturn I			37.15	42.85	40.00	41.32					
" II			37.95	43.15	40.60	41.31					
" III			39.0	44.65	41.82						
" IV			39.8	45.5	42.65						
J.	13	1	57.6	63.35	60.68		-9.67	-9.67	13	2	0
		2	6.0	11.6	8.80	10.15					
			6.75	12.35	9.55	10.15					
			7.9	13.6	10.45						
			8.7	14.3	11.50						
	2		35.95	41.65	38.80		-9.64	-9.69	13	2	39
			44.2	50.0	47.10	48.44					
			45.1	50.8	47.95	48.49					
			46.2	51.95	49.02						
			47.0	52.55	49.78						
	3		1.7	7.45	4.58		-9.72	-9.74	13	3	5
			10.15	15.75	12.95	14.30					
			10.95	16.55	13.75	14.32					
			12.05	17.75	14.90						
			12.7	18.6	15.65						
	3		28.4	34.5	31.65		-9.63	-9.59	13	3	32
			37.0	42.8	39.90	41.28					
			37.8	43.5	40.65	41.24					
			38.95	44.7	41.82						
			39.8	45.5	42.65						
							-9.666	-9.670	13	0	58

Saturn (Titan)

Titan	13	21 14.9	20.7	17.80			-9.61	-9.60	13	21 18
Saturn I		23.2	28.9	26.05	27.41					
II		24.0	29.7	26.85		27.40				
III		25.2	30.7	27.95						
IV		25.95	31.6	28.78						
	21	43.2	49.0	46.10			-9.54	-9.52	13	21 46
		57.45	57.1	54.28	55.64					
		52.25	57.8	55.02		55.62				
		53.35	59.1	56.22						
		54.15	59.85	57.00						
	22	11.6	17.3	14.45			-9.70	-9.67	13	22 14
		19.95	25.7	22.82	24.17					
		20.75	26.45	23.65		24.12				
		21.85	27.45	24.65						
		22.7	28.35	25.52						
	22	35.6	41.4	38.50			-9.54	-9.59	13	22 38
		43.8	49.5	46.65	48.04					
		44.7	50.25	47.48		48.09				
		45.9	51.5	48.70						
		46.65	52.2	49.42						
	23	0.95	6.6	3.78			-9.62	-9.59	13	23 4
		9.2	14.95	12.08	13.40					
		10.0	15.65	12.82		13.37				
		11.1	16.75	13.92						
		11.85	17.6	14.72						
							0			
							-9.606	-9.594	13	23 12

Saturn (Titan)

1863 Aug 25
1112

Titan	13	36	16	7.85	4.72		-9.58	-9.52	12	38	5
Saturn I			9.95	16.0	12.98	14.30					
II			10.65	16.7	13.68	14.24					
III			11.8	17.8	14.80						
IV			12.6	18.65	15.62						
	41	17.1	23.4	20.25			-9.50	-9.51	12	41	20
		25.5	31.5	28.50	29.75						
		26.2	32.25	29.22	29.76						
		27.3	33.3	30.30							
		28.0	34.0	31.00							
	41	44.9	50.9	47.90			-9.48	-9.46	12	41	48
		53.05	59.15	56.10	57.38						
		53.85	59.9	56.85	57.36						
		54.85	0.9	57.88							
		55.65	1.65	58.65							
	42	11.85	17.9	14.88			-9.53	-9.55	12	42	15
		20.1	26.0	23.05	24.41						
		20.85	26.9	23.88	24.43						
		22.0	27.95	24.98							
		22.8	28.75	25.78							
	42	35.7	41.9	38.80			-9.60	-9.59	12	42	39
		44.05	50.1	47.08	48.40						
		44.85	50.9	47.88	48.39						
		45.9	51.9	48.90							
		46.7	52.75	49.72							
	43	0.1	6.3	3.20			-9.57	-9.59	12	43	3
		8.35	14.5	11.42	12.77						
		9.2	15.25	12.22	12.79						
		10.3	16.4	13.35							
		11.1	17.15	14.12							
							-9.543	-9.537	12	41	12

Saturn (Titan)

1863 Aug 25

N.H.

[See original notes]

H.C.

W.	26.	Titan	Saturn	Party	Titan	S. of Saturn
82° 56'	12 45 8	52.44	"	I		
	45 43		52.75	I		
	46 13	52.45				
	46 42		52.03	II		
	47 6	52.50				
	47 33		53.86	III		
	48 9	52.53				
	48 37		53.13	IV		
	49 4	52.59				
82 56	13 25 58	51.94				
	26 42	.	52.22	I		
	27 16	51.98				
	27 49		51.50	II		
	28 12	52.01				
	28 33		53.28	III		
	28 51	51.99				
	29 27		52.59	IV		
	30 6	52.04				

Chart 1863 II

1863 May 25
745.

Comet 1863 II

1863 May 18th

Obs. of Polaris Comet -

I. Comet Comet Time 236 Comet is South preceding Star -
Declination -

172° 56' 57.26 14^h 17^m 13.7
81.42 18 35.5 F.M. omitted -

I. Star
172° 56' 54.88 14^h 21^m 44.8
68.72 22 32.6
87.07 23 35.0 F.M. omitted -

II. Comet R. Time -
172° 56' 40.00 14^h 28^m 9.5
52.40 28 31.0
68.32 29 45.0

II. Star
172° 56' 40.00 14^h 32^m 35.7
51.47 33 35.4
65.69 34 23.8
80.63 35 15.5

I. Comet R. Time
172° 56' 55.90 14^h 38^m 30
82° 56' 55.97 39 8
56.23 39 42

I. Star R. Time
50.44 42 57
50.56 43 52
50.52 44 30

II. Comet R. Time
46.88 46 20
47.23 47 17
47.04 48 00

II. Star R. Time
40.32 51 18
40.44 52 00
40.46 53 4

Let of Right Ascension -

III. Comet 39.74 14^h 55^m 10.2
56.46 56 6.0 55.26 56 11.5
78.57 57 21.3

III. Star R. Time
42.0 15^h 02^m 24.5
55.55 1 11.3 17.2 17.9
75.00 2 18.0

Hour angle for last Let 1^h 43^m 20
Declination 79° 0' -

Chart 1863 II

1863 May 25
715.

Comet 1863 II

Comet 1863 II

Cont 1863 II

Saturn (Titan)

1863 June 1
7115.

Saturn I	12	26	36.7	42.9	39.80	41.10			
II			37.5	43.15	40.58		41.14		
III			38.6	44.8	41.70				
IV			39.3	45.5	42.40				
Titan			49.1	55.25	52.18		+11.08	+11.04	12 26 52

27	2.3	8.6	5.45	6.80					
	3.2	9.3	6.25		6.84				
	4.3	10.55	7.42						
	5.1	11.2	8.15						
	14.9	21.25	18.08			11.28	11.24	12 27 18	

27	36.2	42.5	39.35	40.68					
	36.9	43.15	40.02		40.60				
	38.1	44.25	41.18						
	38.85	45.15	42.00						
	48.65	54.9	51.78			11.10	11.18	12 27 52	

28	4.75	11.15	7.95	9.26					
	5.6	12.8	8.70		9.28				
	6.65	13.05	9.85						
	7.45	13.7	10.58						
	17.2	23.45	20.32			11.06	11.04	12 28 20	
						+11.130	+11.125	12 27 36	

Clouded before completing the next set.

Saturn Titan etc

1863 June 2
7145

Saturn	I	14	17	09	4.0	3.95	5.20				
	II			17	7.7	4.70		5.22			
	III			2.8	8.7	5.75					
	IV			3.35	9.55	6.45					
Titan				10.5	16.7	13.60		+8.40	+8.38	14 17 14	
α				37.1	43.2	40.15					Jupiter?
				57.6	3.5	0.55	1.91				
				58.25	4.4	1.32		1.92			
				59.5	5.55	2.52					
		18		0.25	6.3	3.28					
				7.2	13.4	10.30		+8.34	+8.38	14 18 10	
				23.0	29.0	26.00	27.35				
				23.8	29.7	26.45		27.35			
				24.9	31.0	27.95					
				25.7	31.7	28.70					
				32.65	38.7	35.68		+8.33	+8.33	14 18 36	
				52.3	58.0	55.15	56.54				
				53.1	58.8	55.95		56.52			
				54.3	59.9	57.10					
				55.2	0.65	57.92					
		19		57.1	7.6	4.85		+8.31	+8.33	14 19 5	
				13.95	19.4	16.68	17.96				
				14.6	20.25	17.42		17.99			
				15.8	21.3	18.55					
				16.5	22.0	19.25					
				23.5	29.15	26.32		+8.36	+8.33	14 19 26	
Saturn	I			44.65	50.2	47.42	48.74				
	II			45.5	50.9	48.20		48.74			
	III			46.55	52.0	49.28					
	IV			47.3	52.8	50.05					
	V			54.2	57.8	54.00		+8.26	+8.26	14 20 24	
	α	20		20.95	25.6	23.78					
								+8.342	+8.335	14 18 49	
α - Saturn				+34.94							
				+35.04							

Saturn (Titan)

1863 Form 2
7445

14	18	34.98
14	39	34.94
		<u>34.96</u>

14	38	0.35	4.58	2.45	3.74			
		1.1	5.1	3.25		3.75		
		2.15	6.35	4.25				
		2.9	7.15	5.02				
		4.9	14.2	12.05		+8.31	+8.30	14 38 12
		36.4	41.0	38.70				

		57.05	61.3	59.18	0.49			
		57.9	62.1	6.00		0.57		
		58.9	63.15	1.02				
		59.65	63.95	1.80				
39	6.6	10.95	8.78			+8.29	+8.27	14 39 9

		20.55	25.15	23.00	24.29			
		21.15	25.85	23.75		24.32		
		22.7	27.1	24.90				
		23.4	27.75	25.58				
		30.4	34.7	32.55		+8.26	+8.23	14 39 33

		44.15	48.35	46.25	47.64			
		45.05	49.2	47.12		47.66		
		46.1	50.3	48.20				
		46.85	51.2	49.02				
		53.65	58.1	55.88		+8.24	+8.22	14 39 56

40	11.35	15.5	13.42	14.72				
	12.0	16.25	14.12		14.72			
	13.25	17.4	15.32					
	13.95	18.1	16.02					
	20.85	25.1	22.98		+8.26	+8.26		14 40 50
	47.4	51.9	49.65					

+8.272	+8.256	14 39 32
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Saturn (Titan)

1863 June 2
JMS.

14	57	41.5	45.05	43.28	44.56				
		42.25	45.85	44.05		64.55			
		43.3	46.40	45.05					
		44.0	47.7	45.85					
		—	54.9	53.12		8.56	8.57	14 57 53	Half wt
58	9.4	12.8	11.10	12.30					
	10.05	13.55	11.80		12.34				
	11.15	14.6	12.88						
	11.75	15.25	13.50						
	19.0	22.6	20.60			8.50	8.46	14 58 21	
	39.25	42.85	41.05	42.35					
	40.0	43.7	41.65		42.38				
	41.1	44.7	42.90						
	41.4	45.5	43.65						
	48.95	52.4	50.68			8.33	8.30	14 58 51	
59	0.2	3.65	2.02	3.24					
	0.95	4.55	2.75		3.24				
	1.95	5.5	3.22						
	2.7	6.2	4.45						
	9.6	13.25	11.42			8.18	8.18	14 59 11	
	20.5	24.1	22.30	23.60					
	21.3	24.9	23.10		23.66				
	22.5	25.95	24.22						
	23.1	26.7	24.90						
	30.0	33.7	31.65			8.25	8.19	14 59 32	
	45.4	49.1	47.25	48.50					
	46.2	49.7	47.95		48.48				
	47.25	50.75	49.00						
	48.0	51.5	49.75						
	55.2	58.6	56.90			8.40	8.42	14 59 57	
	22.65	26.3	24.48	25.75					
	23.5	27.05	25.28		25.78				
	24.55	28.0	26.28						
	25.3	28.75	27.02						
	32.35	35.9	34.12			8.37	8.34	15 0 34	
	46.5	50.1	48.30	49.54					
	47.25	50.4	49.02		49.56				
	48.3	51.9	50.10						
	49.0	52.55	50.78						
	56.1	—	54.88			8.34	8.32	15 0 58	Half wt

18 347 + 8 331 14 59 25

NT = 7

Saturn (Titan)

63 June 2^d,
1895,
See original record
by Heli.

SV'	CB	Titan	Saturn	Part of Titan is north of T
52° 56'	14 24 47	70.265		I
	25 41		70.606	I
	26 45	70.175		II
	27 33		71.272	II
	28 2	70.118		III
	28 38		69.402	III
	29 20	70.139		IV
	29 47		70.252	IV
	30 27	70.050		

Clock released

14 32 7	70.172	x
32 38	79.028	T

Titan
x. south .. doubtful.

Clock in again

82 56	14 46 47	55.713		I
	47 41		55.375	I
	48 14	55.761		II
	49 5		54.676	II
	49 54	55.766		III
	50 57		55.579	III
	52 4	55.852		IV
	53 1		55.829	IV
	54 7	55.869		

The position of the micrometer screw was reversed before the second set.

1863 June 3.
1145.

Saturn I	13.	30	36.9	41.0	42.25	42.75				
II			37.8	41.8		42.70	42.40			
III			38.55	43.0						
IV			39.7	43.7						
Titan			—	46.9		+4.55	+4.50	13	30	67
										wt ½
Saturn I	31	1.9	8.25	5.08	6.48					
II		2.7	9.10	5.90		6.44				
III		3.8	10.15	6.98						
IV		4.6	10.95	7.78						
Titan		7.6	[14.07] stat	10.60		+4.37	+4.36	13	31	8
										Station
Saturn I	31	32.0	39.0	35.50	36.78					
		32.4	39.65	36.22		36.76				
		32.9	40.7	37.20						
		34.15	41.65	38.05						
		37.75	44.6	41.14		+4.40	+4.42	13	31	41
Saturn I	32	0.2	8.0	4.10	5.44					
		1.05	8.55	4.95		5.46				
		2.15	9.8	5.98						
		2.95	10.6	6.78						
		6.0	13.8	9.90		+4.46	+4.44	13	32	10
Saturn I	32	23.4	31.25	27.32	28.70					
		24.3	32.0	28.15		28.71				
		25.4	33.15	29.28						
		26.15	34.0	30.08						
		29.2	37.15	33.18		+4.48	+4.47	13	32	33
						+4.435	+4.431	13	31	45 ⁴⁵

Saturn (Titan)

1863phae.proj..204S

863 June 3.
745

Saturn I
II
III
IV

Titan

Saturn I
II
III
IV

Titan

S I

J.

S I

J.

S I

II

III

IV

S I

J.

13	50	42.7	51.0	46.85	48.22				
		43.6	51.8	47.70		48.26			
		44.65	53.0	48.82					
		45.5	53.7	49.60					
		46.55	56.7	52.62			+4.40	+4.36	13 50 53

51	17.9	26.0		19.15					
	18.6	26.9			19.18				
	19.75	27.8							
	20.4	28.1							
	23.6	31.75					+4.45	+4.42	13 51 24

48.4	57.55	52.48	53.83						
49.25	57.35	53.20		53.81					
50.25	58.4	54.32							
51.1	59.25	55.18							
51.1	2.3	58.20					+4.37	+4.39	13 51 58

52	10.15	18.95	14.80	16.19					
	11.5	19.7	15.60		16.12				
	12.55	20.75	16.65						
	13.5	21.65	17.58						
	16.4	24.65	20.52				+4.33	+4.40	13 52 21

52	35.6	43.9	39.75	41.08					
	36.5	44.7	40.60		41.12				
	37.6	45.7	41.65						
	38.3	46.5	42.40						
	41.4	49.6	45.50				+4.42	+4.38	13 52 46

58.85	67.1	2.98	4.33						
59.7	67.9	3.80		4.32					
0.8	68.9	4.85							
1.6	69.75	5.88							

53	4.5	12.75	8.62				+4.29	+4.30	13 53 9
----	-----	-------	------	--	--	--	-------	-------	---------

							+4.370	+4.371	13 52 10
--	--	--	--	--	--	--	--------	--------	----------

All these numbers
doubtful by original
hand of H.C.

Half wt.

1863 June 3
M_h

Saturn I	14	3	24.15	30.85	27.50	28.88				
" II			25.1	31.65	28.38		28.90			
" III			26.2	32.65	29.47					
" IV			27.0	33.5	30.25					
Titan			30.0	36.55	33.28		+4.40	+4.38	14	3 33

Saturn I			46.15	52.7	49.42	50.75				
" II			47.0	53.5	50.25		50.75			
" III			48.0	54.5	51.25					
" IV			48.85	55.3	52.08					
Titan			51.9	58.25	55.08		+4.33	+4.33	14	3 55

Saturn I	4		9.5	16.25	13.88	15.24				
" II			10.3	17.1	14.70		15.25			
" III			11.4	18.2	15.80					
" IV			12.15	19.05	16.60					
Titan			15.2	22.0	19.60		+4.36	+4.36	14	4 20

Saturn I	4		30.35	37.2	33.78	35.14				
" II			31.2	38.0	34.60		35.10			
" III			32.25	39.15	35.70					
" IV			33.1	39.9	36.50					
Titan			36.0	42.9	39.45		+4.31	+4.35	14	4 39

Saturn I	4		50.95	57.8	54.38	55.74				
" II			51.8	58.6	55.20		55.74			
" III			52.9	59.65	56.28					
" IV			53.7	60.5	57.10					
Titan			56.75	63.55	60.15		+4.41	+4.41	14	5 0

+4.362 +4.366 14 4 17

Add the end of this
series

Saturn (Saturn)

1863 June 3
145.

14	5	11.1	18.0	14.55	15.91				
		11.95	18.65	15.30		15.89			
		13.1	19.85	16.48					
		12.95	20.6	17.28					
		16.8	23.5	20.15			+4.24	+4.26	14 5 20

5	32.9	39.55	36.38	37.74					
	33.85	40.6	37.22		37.77				
	24.95	41.7	38.32						
	35.7	42.5	39.10						
	38.7	45.55	42.12				+4.38	+4.35	14 5 42

5	52.35	59.2	55.78	57.14					
	53.15	59.95	56.55		57.12				
	54.3	61.1	57.70						
	55.1	61.9	58.50						
	58.0	64.85	61.42				+4.28	+4.30	14 6 1

Mean of these 3

5 previous
all

+4.300	+4.313	14	5	41
4.362	4.366	14	4	17
+4.339	+4.342	14	4	58

Saturn (Titan)

1863 Jan 3
J.H.S.

<i>W</i>	<i>El.</i>	<i>Latn</i>	<i>Latn</i>	<i>Height</i>
82° 56'	13 35 34	49.280		
	36 17		48.989	I
	37 3	49.165		
	38 0		49.754	II
	39 19	49.192		
	41 54	49.077		
	42 51		47.673	III
	43 29	49.043		
	45 2		48.453	IV
	45 37	48.964		
	46 29		48.696	I
	47 13	48.913		
52° 56'	55 33	55.022		
	56 0		55.254	I
	56 21	55.038		
	56 51		54.555	II
	57 23	55.108		
	57 50		56.314	III
	58 27	55.076		
	59 5		55.690	IV
	59 41	55.136		

*Microscope head above
Titan south of Saturn*

Clock rainbow

Microscope head below

Saturn (Titan)

863 mm 4
450h

Vier record by H.C.

I-Sat
RingTaken inadvertently at $W' = 83^{\circ} 33'$

Saturn I	13 29	49.55	56.3	52.92			
Titan		50.6	57.5	54.05	54.26	-0.21	13 29 54
Saturn IV		52.1	59.1	55.60			
I	30	10.6	17.5	14.05			
T		11.6	18.5	15.05	15.39	-0.34	13 30 15
IV		13.3	20.15	16.72			
I		29.1	35.8	32.65			
I		30.0	36.85	33.42	33.76	-0.34	13 30 34
IV		31.7	38.45	35.08			
I		46.0	57.6	51.80			
I		47.15	58.6	52.88	53.18	-0.30	13 30 53
IV		48.75	60.25	54.55			
I	31	7.35	14.35	10.85			
T		8.5	15.45	11.98	12.22	-0.24	13 31 12
IV		10.1	17.1	13.60			
I		32.9	39.8	36.35			
I		34.1	40.75	37.12	37.70	-0.28	13 31 39
IV		35.55	42.45	39.05			
I	32	1.55	8.3	4.92			
I		2.55	9.45	5.00	6.24	-0.24	13 32 6
IV		4.05	11.05	7.55			

-0.279 Must be corrected for error in W!

13 30 56

18
17
16.5
15.5
14
13
2.681

Saturn (Titan)

1863 June 4
2 Hrs.

						χ Saturn Ring	
I	13 47	7.4	12.65	10.02			
I		8.6	13.7	11.15	11.60	-0.25	13 47 11
IV		10.25	15.3	12.78			
I		30.9	36.0	33.45			
I		32.0	32.05	34.52	34.82	-0.30	47 35
II		33.65	36.35	36.20			
I		46.5	51.7	49.10			
I		47.5	52.7	50.10	50.44	-0.34	47 50
IV		49.2	54.35	51.78			
I	48	2.45	7.9	5.38			
I		2.85	9.0	6.42	6.72	-0.30	48 7
IV		5.5	10.6	8.05			
I		17.85	22.95	20.40			
I		18.95	23.9	21.42	21.71	-0.29	48 22
IV		20.5	25.55	23.02			
I		36.6	41.6	39.10			
I		37.6	42.65	40.12	40.42	-0.30	48 40
IV		39.25	44.25	41.75			
I		58.3	63.55	60.92			
I		59.4	64.55	61.98	2.29	-0.31	49 2
IV	49	61.15	61.15	62.65			
I		18.2	23.35	20.78			
I		19.3	24.25	21.78	22.11	-0.33	49 22
IV		20.9	26.0	23.45			
	50	21.5	26.4	23.95			
		22.3	27.4	24.85	25.25	-0.40	50 25
		24.0	29.1	26.55			
					-0.313		13 48 30

Saturn. Mon Jupiter

363 km 4th
1945,

						Tita-Saturn Ring			
141	7	12.7	16.9	15.60					
		12.7	19.65	16.78	17.10	-0.32	14	7	17
		15.3	21.5	18.40					
		31.65	37.75	34.70					
		32.7	38.65	35.68	36.01	-0.33	14	7	36
		34.35	40.2	37.32					
		49.4	55.55	52.48					
		50.35	56.5	53.42	53.81	-0.39	14	7	54
		52.1	58.2	55.15					
8	8.6	14.7	11.65						
	9.5	15.6	12.55	12.95	-0.40		14	8	13
	11.15	17.35	14.25						
	28.95	35.1	32.02						
	29.95	36.05	33.08	33.36	-0.36		14	8	33
	31.6	37.8	34.70						
	48.0	54.0	51.00						
	48.95	54.8	51.88	52.26	-0.38		14	8	52
	50.55	56.5	53.52						
P Town changed to 206 for Jupiter						-0.363	14	8	4
									26.

Ring
Ball

Transit of Jupiter	Saturn	Jupiter
	$\frac{1}{2}(I+IV)$	
14 19 17	54.986	64.588
20 71	62.645	73.100

Observed with clock out.

Titan (Declinations)

663 Jan 4
1745.

El	Telan	Latitud	Part	W.	Screw-head below
14 35 54		54.209	I		
37 48	53.464				
39 3		54.232	I		
39 32	53.484				
40 27		53.584	II		
40 56	53.514				
41 17		53.468	III		
41 47	53.636				
42 26		54.725	IV		
42 58	53.600				

14 0 12	48.952				
1 2		49.680	I		
1 31	48.950				
1 59		48.952	II		
2 22	49.024				
3 4		50.908	III		
3 30	49.018				
4 0		49.996	IV		
4 29	48.948				

Screw head below (apparently)

Satellites of Saturn

The observations of differences of ΔR in this Volume between Saturn and its satellites were made on the wires with the position circle at the reading ^{unless otherwise mentioned} ~~(mostly)~~ of $172^{\circ}56'$ or $352^{\circ}56'$; both verniers being read off.

The differences of declination were taken until May 9th inclusive with the scale at the reading $77^{\circ}42'$, ^{unless otherwise mentioned} by Transit across the scale.

After that date the micrometer was used ^{for declinations only}; the telescope was here moved by the clock work, the micrometer set at $82^{\circ}56'$ (any exceptions to this are mentioned) and the movable wire set alternately on Titan and the part of the planet denoted by I II III IV; namely the preceding area, the south limb, the north limb, the following area. The times for these observations were indicated by holding down the break-circuit key of the telegraph wires until the vision or contact was made.

The observations of other satellites afterwards made will be described at the end of the next book. The only such ones in this volume are ~~only~~ merely rough observations for identification except those of Tefelus on June 4th. These last were taken with the power 206; all those of Titan with 313.

Note here, the obs'd diff^s ΔR are to be corrected for refraction and motion of Saturn.

Diana (78)

1863 Nov 15	13 25 14.4	150° 12' 6".9	-7° 20' 3".4	Bick.
— 25	10 12 37.5	152 44 5.4	7 1 24.3	0.89. Parit.
— 27	11 29 23.6	157 14 27.	6 56 30.4	Gleason

Ephemeris from Lili's elements

0^h Berlin

May 10	11 24 46 ³	-5° 48' 9"	0.2167
" 14	30 36	52.2	.2242
" 18	31 51	57.6	.2416
" 22	33 31	6 5.1	.2562
" 26	35 31	14.3	.2667
" 30	37 52	25.8	.2791
June 3	11 40 32	39.0	0.2913

Comet 1863 II.

12^h Washin

day 16	254° 2' 2"	258 40' 3"	9.9694
18	260 24.2	79 47.9	.9907
20	226 0.8	80 9.8	0.0114
22	212 50.5	79 56.6	.0318
24	201 52.6	+79 17.1	-0.0515

By a rough investigation I find the mean error of a complete
 or less wires
 diff. ΔP between Titan and Saturn $\frac{(P+B)}{2}$ to be ± 0.0495

~~There~~ is no sign that the separate sets of 5 differ more than their
 intra se.

The power used for Saturn's satellites has been throughout
316 excepting on June 4th when the object α
 supposed to be Tapes was observed with 206
 See June 2 for a previous obs. of (Tapes?)

Comet 1863 II May 9
 15
 The originals of them 18
 are on two sheets, recorded 25
 in general by W. H. C. Levy }

1953: 1953, 1953, 1953