astronomical society
of southern africa

handbook
for
1970

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astronomical society of southern africa

1969 — 1970

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(1) The encouragement and stimulation of the study of Astronomy in Southern Africa;
(2) The association of observers and their organisation in the work of astronomical observation and research;
(3) The dissemination throughout Southern Africa of such current astronomical information as may be helpful to observers;
(4) The publication from time to time of the results of the work accomplished by the Society.

Membership is open to all who are interested in Astronomy. In addition to this Handbook, the Society issues twelve numbers of "The Monthly Notes of the Astronomical Society of Southern Africa" (MNASSA) each year, and distributes to each member, copies of "Sky and Telescope", an illustrated monthly astronomical magazine published in the United States.

Candidates for election as members of the Society must be proposed and seconded by two members (not associate or student members). The annual subscription for members is R6.00 with an entrance fee of R2.50.

MNASSA is also on sale to non-members of the Society. Enquiries concerning subscriptions and remittances by non-members should be addressed to the Circulation Manager, Mr. W. C. Bentley, P.O. Box 841, Cape Town.

All other communications for the Society should be addressed to the Hon. Secretary, Astronomical Society of Southern Africa, c/o The Royal Observatory, Observatory, Cape Province.

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contents

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* * *

time systems

All the times given in this booklet are South African Standard Time. This is also the Standard Time in use in Rhodesia, Zambia, Lesotho, Botswana and Mozambique.

Local Mean Time

Local mean time is a uniform time system taken from the local meridian. South African Standard Time (S.A.S.T.) is the local mean time for the meridian 30°, or two hours, east of Greenwich. The local mean time for points not on the 30° E meridian can be found by applying a longitude correction to S.A.S.T. as given in Table I.

TABLE I

Reduction From S.A.S.T. To Local Mean Time

Bloemfontein	- 15^m	Johannesburg	- 08^m
Bulawayo	- 06	Kimberley	- 21
Cape Town	- 46	Kitwe	- 07
Durban	+ 04	Port Elizabeth	- 18
East London	- 08	Pretoria	- 07
Grahamstown	- 14	Salisbury	+ 04

Conversely to obtain S.A.S.T. from local mean time, the same table can be used with the sign reversed. For example, at Johannesburg, local mean noon (i.e. 12h 00m local mean time) occurs at 12h 08m S.A.S.T.

Local Apparent Solar Time

This is the local time taken directly from the Sun (i.e. the time shown by a sundial). At noon in this system a shadow cast by the Sun will lie exactly in a north-south line.

The Equation of Time

Owing to the fact that the Earth does not go round the Sun with uniform circular motion in the plane of the Earth's equator, the local apparent solar time differs from the mean solar time by a quantity which is usually referred to as the "Equation of Time". The Equation of Time must be added to the mean solar time to give the apparent solar time. Its effect is shown in the second column of Table II which gives the S.A.S.T. of apparent noon, that is, of the Sun's transit over the 30° E meridian.

For example, on January 1, the S.A.S.T. of apparent noon at Longitude 30°E is 12.03; thus the S.A.S.T. of apparent noon at Johannesburg is 12.11, found by applying the longitude correction of Table I with the sign reversed.

Sidereal Time

For many purposes sidereal time, that is local time as measured by the stars, is extremely useful. The sidereal time can be found by applying the S.A.S.T. (on a 24 hour basis) to the corresponding "Sidereal Time at 0 hours S.A.S.T." which is given in the third column of Table II, and correcting for longitude by means of Table I. A further small correction is needed to allow for the four-minute difference in length between the solar and sidereal days.

The correction is +1m for times between 03.00 and 09.00 S.A.S.T., +2m between 09.00 and 15.00, +3m between 15.00 and 21.00, and +4m between 21.00 and 23.59.

Example: Find the sidereal time at 8.15 p.m. on August 9 at Bloemfontein

Sidereal time at 00h 00m S.A.S.T. on August 9	21 08
S.A.S.T. elapsed	20 15
	00 53
Correction for longitude	-15
Interval correction	+03
Required sidereal time	00 41

Had this final result exceeded 24 hours, then of course 24 hours would have had to be subtracted.

The position of a star in the sky is fixed by its right ascension and declination, much as the position of a point on the Earth is fixed by its longitude and latitude. Latitude and declination are always measured in degrees north or south of the equator. Longitude and right ascension are measured either in degrees or in time, 360° being equal to 24 hours (1° equals 4 minutes; 15' equals 1 minute). Right ascension is always measured eastwards from the zero celestial meridian, and thus is the equivalent of the longitude measured eastwards from the Greenwich meridian.

The right ascension and declination of any star are the longitude and latitude of the point on the Earth directly beneath it at zero hours sidereal time at Greenwich. Hence the right ascension of a star crossing the local meridian at a particular time is given by the corresponding local sidereal time.

The Julian Day Calendar

For recording the time of variable star observations, the Julian Day calendar is usually used. This numbers the days consecutively from the beginning of the Julian era in 4713 B.C. The Julian day begins at Greenwich mean noon, that is, at 14h 00m (2.00 p.m.) S.A.S.T.

Note

The tabulated data in the table are given at intervals of 10 days. It is necessary to interpolate to find values for intermediate days.

TABLE II

Date 1970		S. A. S. T. of Sun's transit Longitude 30° E	Sidereal Time for Longitude 30° E	
			S.A.S.T. 0 hours	S.A.S.T. 18 hours
		h. m. s.	h. m.	h. m.
January	1	12 03 28	6 41	0 44
	11	12 07 52	7 20	1 23
	21	12 11 18	7 59	2 02
	31	12 13 28	8 39	2 42
February	10	12 14 18	9 18	3 21
	20	12 13 50	9 58	4 01
March	2	12 12 16	10 37	4 40
	12	12 09 55	11 17	5 20
	22	12 07 02	11 56	5 59
April	1	12 04 00	12 36	6 38
	11	12 01 10	13 15	7 18
	21	11 58 46	13 54	7 57
May	1	11 57 06	14 34	8 37
	11	11 56 19	15 13	9 16
	21	11 56 28	15 53	9 56
	31	11 57 30	16 32	10 35
June	10	11 59 15	17 11	11 14
	20	12 01 21	17 51	11 54
	30	12 03 28	18 31	12 33
July	10	12 05 13	19 10	13 13
	20	12 06 14	19 49	13 52
	30	12 06 22	20 29	14 31
August	9	12 05 30	21 08	15 11
	19	12 03 39	21 47	15 50
	29	12 01 00	22 27	16 30
September	8	11 57 48	23 06	17 09
	18	11 54 16	23 46	17 49
	28	11 50 47	0 25	18 28
October	8	11 47 41	1 05	19 07
	18	11 45 15	1 44	19 47
	28	11 43 51	2 23	20 26
November	7	11 43 42	3 03	21 06
	17	11 44 55	3 42	21 45
	27	11 47 32	4 22	22 25
December	7	11 51 21	5 01	23 04
	17	11 55 58	5 40	23 43
	27	12 00 56	6 20	0 23

	CAPE TOWN		DURBAN		BLOEMFONTEIN	
	SUNRISE	SUNSET	SUNRISE	SUNSET	SUNRISE	SUNSET
Jan 1	05h 38m	20h 01m	04h 58m	19h 01m	05h 21m	19h 18m
11	05 46	20 02	05 06	19 02	05 29	19 18
21	05 55	19 59	05 14	19 00	05 37	19 17
Feb 1	06 07	19 52	05 24	18 55	05 46	19 13
11	06 17	19 44	05 32	18 48	05 54	19 06
21	06 26	19 33	05 41	18 39	06 02	18 57
Mar 1	06 33	19 23	05 46	18 30	06 08	18 48
11	06 41	19 11	05 53	18 19	06 13	18 38
21	06 49	18 58	05 59	18 08	06 18	18 27
Apr 1	06 58	18 41	06 06	17 53	06 25	18 13
11	07 04	18 30	06 11	17 43	06 30	18 03
21	07 13	18 17	06 17	17 31	06 35	17 52
May 1	07 20	18 05	06 24	17 22	06 42	17 44
11	07 28	17 57	06 31	17 14	06 49	17 36
21	07 34	17 50	06 36	17 08	06 54	17 30
Jun 1	07 43	17 45	06 43	17 04	07 01	17 27
11	07 48	17 44	06 48	17 03	07 05	17 26
21	07 51	17 44	06 51	17 04	07 08	17 27
Jul 1	07 53	17 48	06 53	17 07	07 10	17 30
11	07 51	17 52	06 51	17 11	07 08	17 34
21	07 47	17 58	06 48	17 16	07 05	17 39
Aug 1	07 39	18 06	06 42	17 22	07 00	17 45
11	07 30	18 13	06 34	17 29	06 53	17 51
21	07 19	18 20	06 24	17 35	06 42	17 55
Sep 1	07 06	18 27	06 12	17 40	06 31	18 01
11	06 52	18 34	06 00	17 46	06 19	18 06
21	06 38	18 41	05 48	17 51	06 07	18 10
Oct 1	06 25	18 48	05 37	17 57	05 57	18 16
11	06 12	18 55	05 25	18 03	05 45	18 22
21	05 58	19 04	05 12	18 09	05 33	18 27
Nov 1	05 46	19 13	05 02	18 17	05 24	18 35
11	05 38	19 23	04 55	18 26	05 17	18 44
21	05 31	19 33	04 49	18 34	05 12	18 52
Dec 1	05 29	19 43	04 48	18 42	05 11	19 00
11	05 28	19 50	04 48	18 50	05 11	19 07
21	05 32	19 57	04 52	18 57	05 15	19 14

The table gives for five typical places in Southern Africa the S.A.S.T. of Sunrise and Sunset, i.e. the times when the upper limb of the Sun, as affected by refraction, is on the horizon. The last three columns give the approximate duration of Twilight at Durban, Bloemfontein and Johannesburg. For Cape Town the durations given must be increased by 2, 4, and 6 minutes for Civil, Nautical and Astronomical Twilight respectively, while for Luanshya they must be decreased by 3, 6, and 9 minutes.

	JOHANNESBURG				LUANSHYA				DURATION OF TWILIGHT		
	SUNRISE		SUNSET		SUNRISE		SUNSET		CIVIL	NAUTICAL	ASTRON
Jan 1	05h	18m	19h	04m	05h	44m	18h	38m	27m	59m	94m
11	05	25	19	05	05	50	18	42	27	59	92
21	05	33	19	04	05	55	18	42	26	57	90
Feb 1	05	42	19	00	05	59	18	40	25	55	87
11	05	49	18	55	06	03	18	37	25	54	85
21	05	56	18	47	06	06	18	34	25	53	83
Mar 1	06	00	18	39	06	09	18	31	25	53	81
11	06	06	18	29	06	10	18	25	24	52	80
21	06	11	18	19	06	11	18	18	24	52	79
Apr 1	06	17	18	06	06	12	18	09	24	52	79
11	06	21	17	56	06	13	18	04	24	52	79
21	06	25	17	47	06	14	17	58	24	52	79
May 1	06	31	17	38	06	15	17	53	24	52	80
11	06	37	17	31	06	17	17	50	25	53	81
21	06	41	17	26	06	20	17	48	25	54	83
Jun 1	06	47	17	23	06	23	17	47	25	55	84
11	06	52	17	22	06	26	17	47	25	55	84
21	06	55	17	24	06	28	17	48	26	55	85
Jul 1	06	57	17	27	06	31	17	51	26	55	85
11	06	55	17	30	06	31	17	54	26	55	84
21	06	53	17	35	06	30	17	57	25	54	84
Aug 1	06	48	17	41	06	27	18	00	25	54	83
11	06	41	17	46	06	24	18	01	25	53	81
21	06	32	17	50	06	19	18	02	25	52	80
Sep 1	06	21	17	54	06	13	18	03	24	52	79
11	06	11	17	59	06	05	18	03	24	52	79
21	05	59	18	03	05	57	18	03	24	52	79
Oct 1	05	50	18	08	05	51	18	04	25	52	80
11	05	39	18	12	05	44	18	05	25	52	81
21	05	27	18	17	05	38	18	06	25	54	83
Nov 1	05	19	18	24	05	33	18	09	25	55	85
11	05	13	18	32	05	30	18	13	25	55	87
21	05	08	18	39	05	29	18	17	26	57	89
Dec 1	05	07	18	46	05	31	18	22	26	59	92
11	05	08	18	53	05	33	18	27	27	60	94
21	05	12	19	00	05	37	18	32	27	60	94

Civil Twilight is defined as beginning or ending when the Sun's centre is 6^{o} below the horizon and includes the time during which operations requiring daylight may still continue. Nautical Twilight begins and ends when the Sun's centre is 12^{o} below the horizon which, for all practical purposes, is the time when it is "dark". The limit of Astronomical Twilight corresponds to the Sun's centre being 18^{o} below the horizon, at which time there is no light from the Sun whatever.

the moon 1970

DATE	At 0h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2440000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
Jan			h m	h m	h m	h m
1 T	587.4	22.5	.....	12 38	0 24	13 25
2 F	588.4	23.5	0 18	13 36	0 49	14 27
3 S	589.4	24.5	0 54	14 37	1 20	15 34
4 S	590.4	25.5	1 35	15 44	1 56	16 44
5 M	591.4	26.5	2 23	16 52	2 42	17 57
6 T	592.4	27.5	3 21	18 00	3 37	19 06
7 W	593.4	28.5	4 29	19 04	4 45	20 07
8 T	594.4	0.1	5 41	19 59	6 01	20 58
9 F	595.4	1.1	6 55	20 46	7 18	21 40
10 S	596.4	2.1	8 06	21 27	8 35	22 15
11 S	597.4	3.1	9 13	22 03	9 47	22 46
12 M	598.4	4.1	10 15	22 37	10 55	23 15
13 T	599.4	5.1	11 16	23 09	12 00	23 43
14 W	600.4	6.1	12 16	23 43	13 05	.....
15 T	601.4	7.1	13 14	.....	14 08	0 12
16 F	602.4	8.1	14 13	0 19	15 11	0 43
17 S	603.4	9.1	15 12	0 58	16 14	1 19
18 S	604.4	10.1	16 09	1 42	17 13	1 59
19 M	605.4	11.1	17 04	2 29	18 08	2 45
20 T	606.4	12.1	17 53	3 22	18 57	3 38
21 W	607.4	13.1	18 38	4 16	19 39	4 34
22 T	608.4	14.1	19 17	5 13	20 15	5 33
23 F	609.4	15.1	19 52	6 08	20 45	6 32
24 S	610.4	16.1	20 23	7 02	21 13	7 30
25 S	611.4	17.1	20 53	7 55	21 38	8 27
26 M	612.4	18.1	21 21	8 47	22 02	9 23
27 T	613.4	19.1	21 49	9 38	22 25	10 19
28 W	614.4	20.1	22 19	10 31	22 51	11 17
29 T	615.4	21.1	22 51	11 26	23 19	12 16
30 F	616.4	22.1	23 28	12 24	23 51	13 19
31 S	617.4	23.1	.....	13 26	.....	14 26
Feb						
1 S	618.4	24.1	0 11	14 32	0 31	15 34
2 M	619.4	25.1	1 03	15 38	1 20	16 43
3 T	620.4	26.1	2 04	16 42	2 20	17 47
4 W	621.4	27.1	3 13	17 41	3 31	18 43
5 T	622.4	28.1	4 26	18 32	4 47	19 29
6 F	623.4	29.1	5 39	19 17	6 05	20 08

Date	J.D.	Age	Johannesburg Rise	Johannesburg Set	Cape Town Rise	Cape Town Set
Feb			h m	h m	h m	h m
7 S	624.4	0.6	6 50	19 56	7 21	20 42
8 S	625.4	1.6	7 56	20 32	8 33	21 13
9 M	626.4	2.6	9 00	21 06	9 43	21 41
10 T	627.4	3.6	10 02	21 41	10 50	22 11
11 W	628.4	4.6	11 04	22 17	11 56	22 42
12 T	629.4	5.6	12 04	22 55	13 01	23 17
13 F	630.4	6.6	13 04	23 38	14 06	23 57
14 S	631.4	7.6	14 03	.....	15 06	.....
15 S	632.4	8.6	14 59	0 25	16 03	0 41
16 M	633.4	9.6	15 50	1 16	16 55	1 32
17 T	634.4	10.6	16 36	2 11	17 38	2 27
18 W	635.4	11.6	17 17	3 06	18 16	3 25
19 T	636.4	12.6	17 53	4 02	18 48	4 24
20 F	637.4	13.6	18 26	4 57	19 17	5 23
21 S	638.4	14.6	18 56	5 50	19 43	6 21
22 S	639.4	15.6	19 24	6 42	20 07	7 17
23 M	640.4	16.6	19 52	7 35	20 30	8 14
24 T	641.4	17.6	20 21	8 27	20 55	9 11
25 W	642.4	18.6	20 53	9 21	21 22	10 10
26 T	643.4	19.6	21 27	10 18	21 52	11 11
27 F	644.4	20.6	22 08	11 18	22 28	12 15
28 S	645.4	21.6	22 54	12 21	23 13	13 22
Mar						
1 S	646.4	22.6	23 50	13 24	.....	14 29
2 M	647.4	23.6	.....	14 28	0 06	15 33
3 T	648.4	24.6	0 53	15 27	1 10	16 30
4 W	649.4	25.6	2 03	16 19	2 21	17 19
5 T	650.4	26.6	3 13	17 06	3 37	18 01
6 F	651.4	27.6	4 24	17 47	4 53	18 36
7 S	652.4	28.6	5 32	18 25	6 06	19 08
8 S	653.4	0.2	6 38	18 60	7 17	19 38
9 M	654.4	1.2	7 42	19 35	8 27	20 08
10 T	655.4	2.2	8 45	20 11	9 35	20 39
11 W	656.4	3.2	9 49	20 50	10 44	21 13
12 T	657.4	4.2	10 51	21 32	11 51	21 52
13 F	658.4	5.2	11 52	22 18	12 55	22 35
14 S	659.4	6.2	12 51	23 09	13 55	23 25
15 S	660.4	7.2	13 45	.....	14 49	.....
16 M	661.4	8.2	14 33	0 03	15 36	0 19
17 T	662.4	9.2	15 16	0 59	16 16	1 17
18 W	663.4	10.2	15 53	1 54	16 50	2 16
19 T	664.4	11.2	16 27	2 50	17 20	3 15
20 F	665.4	12.2	16 58	3 44	17 46	4 12

Date	J.D.	Age	Johannesburg Rise	Johannesburg Set	Cape Town Rise	Cape Town Set
Mar						
21 S	666.4	13.2	17h 27m	4h 36m	18h 10m	5h 10m
22 S	667.4	14.2	17 55	5 29	18 35	6 07
23 M	668.4	15.2	18 25	6 21	19 00	7 04
24 T	669.4	16.2	18 55	7 16	19 26	8 03
25 W	670.4	17.2	19 29	8 13	19 55	9 04
26 T	671.4	18.2	20 07	9 11	20 29	10 08
27 F	672.4	19.2	20 52	10 14	21 11	11 15
28 S	673.4	20.2	21 45	11 18	22 01	12 21
29 S	674.4	21.2	22 44	12 20	23 00	13 25
30 M	675.4	22.2	23 50	13 19	.....	14 24
31 T	676.4	23.2	.....	14 12	0 08	15 13
Apr						
1 W	677.4	24.2	0 58	15 00	1 19	15 56
2 T	678.4	25.2	2 06	15 42	2 32	16 33
3 F	679.4	26.2	3 13	16 19	3 44	17 05
4 S	680.4	27.2	4 18	16 54	4 55	17 35
5 S	681.4	28.2	5 22	17 29	6 04	18 04
6 M	682.4	29.2	6 25	18 04	7 13	18 35
7 T	683.4	0.7	7 29	18 42	8 21	19 08
8 W	684.4	1.7	8 33	19 23	9 30	19 44
9 T	685.4	2.7	9 36	20 09	10 37	20 27
10 F	686.4	3.7	10 37	20 59	11 41	21 15
11 S	687.4	4.7	11 34	21 53	12 39	22 09
12 S	688.4	5.7	12 25	22 49	13 30	23 06
13 M	689.4	6.7	13 11	23 45	14 12	.....
14 T	690.4	7.7	13 51	.....	14 49	0 05
15 W	691.4	8.7	14 26	0 41	15 20	1 04
16 T	692.4	9.7	14 58	1 35	15 48	2 02
17 F	693.4	10.7	15 28	2 28	16 13	3 00
18 S	694.4	11.7	15 56	3 20	16 38	3 56
19 S	695.4	12.7	16 25	4 13	17 01	4 54
20 M	696.4	13.7	16 56	5 07	17 28	5 53
21 T	697.4	14.7	17 29	6 03	17 57	6 53
22 W	698.4	15.7	18 06	7 02	18 29	7 57
23 T	699.4	16.7	18 50	8 05	19 10	9 04
24 F	700.4	17.7	19 41	9 09	19 58	10 12
25 S	701.4	18.7	20 38	10 13	20 54	11 18
26 S	702.4	19.7	21 43	11 14	22 00	12 18
27 M	703.4	20.7	22 50	12 09	23 10	13 11
28 T	704.4	21.7	23 57	12 58	.....	13 55
29 W	705.4	22.7	.....	13 40	0 21	14 33
30 T	706.4	23.7	1 03	14 18	1 33	15 05

Date	J.D.	Age	Johannesburg Rise	Johannesburg Set	Cape Town Rise	Cape Town Set
May						
1 F	707.4	24.7	2h 06m	14h 53m	2h 41m	15h 35m
2 S	708.4	25.7	3 09	15 27	3 49	16 04
3 S	709.4	26.7	4 11	16 00	4 55	16 33
4 M	710.4	27.7	5 12	16 37	6 02	17 05
5 T	711.4	28.7	6 15	17 16	7 10	17 39
6 W	712.4	0.3	7 18	18 00	8 18	18 20
7 T	713.4	1.3	8 21	18 48	9 24	19 05
8 F	714.4	2.3	9 21	19 41	10 25	19 57
9 S	715.4	3.3	10 16	20 37	11 20	20 54
10 S	716.4	4.3	11 04	21 34	12 06	21 53
11 M	717.4	5.3	11 47	22 31	12 46	22 53
12 T	718.4	6.3	12 24	23 26	13 19	23 52
13 W	719.4	7.3	12 57	.....	13 48	.....
14 T	720.4	8.3	13 27	0 19	14 15	0 49
15 F	721.4	9.3	13 56	1 11	14 39	1 45
16 S	722.4	10.3	14 24	2 03	15 03	2 42
17 S	723.4	11.3	14 54	2 56	15 28	3 39
18 M	724.4	12.3	15 26	3 50	15 55	4 39
19 T	725.4	13.3	16 02	4 48	16 27	5 41
20 W	726.4	14.3	16 43	5 50	17 04	6 47
21 T	727.4	15.3	17 32	6 55	17 50	7 56
22 F	728.4	16.3	18 29	8 01	18 45	9 05
23 S	729.4	17.3	19 33	9 05	19 50	10 09
24 S	730.4	18.3	20 41	10 03	21 00	11 06
25 M	731.4	19.3	21 50	10 55	22 13	11 54
26 T	732.4	20.3	22 56	11 40	23 25	12 34
27 W	733.4	21.3	.....	12 19	.....	13 08
28 T	734.4	22.3	0 00	12 55	0 34	13 38
29 F	735.4	23.3	1 02	13 28	1 40	14 07
30 S	736.4	24.3	2 03	14 01	2 46	14 35
31 S	737.4	25.3	3 03	14 36	3 52	15 05
Jun						
1 M	738.4	26.3	4 04	15 13	4 58	15 38
2 T	739.4	27.3	5 06	15 54	6 04	16 15
3 W	740.4	28.3	6 09	16 40	7 10	16 58
4 T	741.4	29.3	7 09	17 31	8 12	17 48
5 F	742.4	0.8	8 06	18 26	9 10	18 43
6 S	743.4	1.8	8 57	19 23	10 00	19 41
7 S	744.4	2.8	9 42	20 20	10 42	20 42
8 M	745.4	3.8	10 21	21 16	11 18	21 41
9 T	746.4	4.8	10 56	22 10	11 49	22 38
10 W	747.4	5.8	11 27	23 02	12 15	23 35

Date	J.D.	Age	Johannesburg Rise	Johannesburg Set	Cape Town Rise	Cape Town Set
Jun			h m	h m	h m	h m
11 T	748.4	6.8	11 56	23 53	12 40	.....
12 F	749.4	7.8	12 24	.....	13 04	0 31
13 S	750.4	8.8	12 52	0 45	13 28	1 26
14 S	751.4	9.8	13 22	1 38	13 54	2 25
15 M	752.4	10.8	13 56	2 34	14 23	3 25
16 T	753.4	11.8	14 35	3 33	14 57	4 29
17 W	754.4	12.8	15 20	4 36	15 39	5 36
18 T	755.4	13.8	16 14	5 43	16 30	6 45
19 F	756.4	14.8	17 16	6 49	17 32	7 53
20 S	757.4	15.8	18 25	7 51	18 43	8 54
21 S	758.4	16.8	19 36	8 47	19 58	9 47
22 M	759.4	17.8	20 45	9 35	21 12	10 31
23 T	760.4	18.8	21 52	10 18	22 24	11 09
24 W	761.4	19.8	22 56	10 55	23 32	11 41
25 T	762.4	20.8	23 57	11 30	.....	12 10
26 F	763.4	21.8	.....	12 03	0 40	12 38
27 S	764.4	22.8	0 58	12 37	1 45	13 07
28 S	765.4	23.8	1 58	13 13	2 50	13 39
29 M	766.4	24.8	2 59	13 52	3 56	14 14
30 T	767.4	25.8	4 00	14 36	5 01	14 55
Jul						
1 W	768.4	26.8	5 01	15 25	6 04	15 42
2 T	769.4	27.8	5 58	16 19	7 03	16 35
3 F	770.4	28.8	6 51	17 15	7 55	17 32
4 S	771.4	0.3	7 38	18 12	8 39	18 32
5 S	772.4	1.3	8 19	19 08	9 17	19 31
6 M	773.4	2.3	8 55	20 03	9 49	20 30
7 T	774.4	3.3	9 27	20 55	10 17	21 27
8 W	775.4	4.3	9 56	21 47	10 42	22 22
9 T	776.4	5.3	10 24	22 38	11 07	23 18
10 F	777.4	6.3	10 52	23 29	11 29	.....
11 S	778.4	7.3	11 21	.....	11 54	0 14
12 S	779.4	8.3	11 52	0 22	12 22	1 11
13 M	780.4	9.3	12 28	1 19	12 52	2 12
14 T	781.4	10.3	13 09	2 19	13 29	3 17
15 W	782.4	11.3	13 58	3 22	14 16	4 24
16 T	783.4	12.3	14 55	4 28	15 11	5 32
17 F	784.4	13.3	16 01	5 32	16 19	6 37
18 S	785.4	14.3	17 13	6 32	17 33	7 35
19 S	786.4	15.3	18 25	7 25	18 50	8 23
20 M	787.4	16.3	19 36	8 11	20 05	9 04
21 T	788.4	17.3	20 43	8 51	21 18	9 39

Date	J.D.	Age	Johannesburg Rise	Johannesburg Set	Cape Town Rise	Cape Town Set
Jul						
22 W	789.4	18.3	21h 47m	9h 28m	22h 28m	10h 10m
23 T	790.4	19.3	22 50	10 03	23 35	10 40
24 F	791.4	20.3	23 52	10 37	.....	11 09
25 S	792.4	21.3	.....	11 14	0 42	11 41
26 S	793.4	22.3	0 53	11 52	1 49	12 15
27 M	794.4	23.3	1 55	12 35	2 55	12 54
28 T	795.4	24.3	2 55	13 22	3 58	13 39
29 W	796.4	25.3	3 54	14 14	4 58	14 30
30 T	797.4	26.3	4 47	15 09	5 52	15 25
31 F	798.4	27.3	5 36	16 06	6 38	16 24
Aug						
1 S	799.4	28.3	6 18	17 02	7 17	17 24
2 S	800.4	29.3	6 56	17 57	7 51	18 23
3 M	801.4	0.7	7 29	18 50	8 20	19 20
4 T	802.4	1.7	7 59	19 42	8 47	20 16
5 W	803.4	2.7	8 28	20 33	9 10	21 11
6 T	804.4	3.7	8 55	21 23	9 33	22 06
7 F	805.4	4.7	9 23	22 15	9 57	23 03
8 S	806.4	5.7	9 53	23 10	10 23	.....
9 S	807.4	6.7	10 25	.....	10 51	0 02
10 M	808.4	7.7	11 03	0 07	11 25	1 03
11 T	809.4	8.7	11 47	1 07	12 06	2 08
12 W	810.4	9.7	12 39	2 11	12 56	3 13
13 T	811.4	10.7	13 40	3 14	13 56	4 18
14 F	812.4	11.7	14 48	4 15	15 06	5 18
15 S	813.4	12.7	15 59	5 10	16 22	6 10
16 S	814.4	13.7	17 11	5 59	17 38	6 55
17 M	815.4	14.7	18 21	6 43	18 54	7 34
18 T	816.4	15.7	19 28	7 22	20 06	8 07
19 W	817.4	16.7	20 34	7 58	21 17	8 38
20 T	818.4	17.7	21 38	8 34	22 28	9 09
21 F	819.4	18.7	22 42	9 11	23 37	9 40
22 S	820.4	19.7	23 46	9 50	.....	10 14
23 S	821.4	20.7	.....	10 35	0 44	10 52
24 M	822.4	21.7	0 48	11 18	1 51	11 36
25 T	823.4	22.7	1 49	12 09	2 52	12 25
26 W	824.4	23.7	2 44	13 04	3 48	13 20
27 T	825.4	24.7	3 34	14 00	4 37	14 18
28 F	826.4	25.7	4 18	14 56	5 19	15 18
29 S	827.4	26.7	4 57	15 52	5 54	16 16
30 S	828.4	27.7	5 31	16 45	6 24	17 14
31 M	829.4	28.7	6 02	17 38	6 50	18 11

Date	J.D.	Age	Johannesburg Rise	Johannesburg Set	Cape Town Rise	Cape Town Set
Sep			^{h} ^{m}	^{h} ^{m}	^{h} ^{m}	^{h} ^{m}
1 T	830.4	0.0	6 31	18 29	7 15	19 06
2 W	831.4	1.0	6 58	19 20	7 39	20 01
3 T	832.4	2.0	7 26	20 12	8 02	20 58
4 F	833.4	3.0	7 55	21 05	8 27	21 55
5 S	834.4	4.0	8 27	22 00	8 54	22 55
6 S	835.4	5.0	9 02	22 58	9 25	23 57
7 M	836.4	6.0	9 43	23 59	10 03	.....
8 T	837.4	7.0	10 31	.....	10 48	1 02
9 W	838.4	8.0	11 26	1 01	11 42	2 05
10 T	839.4	9.0	12 29	2 01	12 46	3 05
11 F	840.4	10.0	13 36	2 57	13 56	3 59
12 S	841.4	11.0	14 47	3 48	15 11	4 46
13 S	842.4	12.0	15 56	4 33	16 26	5 26
14 M	843.4	13.0	17 05	5 13	17 40	6 01
15 T	844.4	14.0	18 12	5 51	18 53	6 33
16 W	845.4	15.0	19 18	6 27	20 04	7 04
17 T	846.4	16.0	20 23	7 05	21 15	7 36
18 F	847.4	17.0	21 30	7 43	22 26	8 10
19 S	848.4	18.0	22 35	8 25	23 36	8 47
20 S	849.4	19.0	23 38	9 11	.....	9 30
21 M	850.4	20.0	.....	10 02	0 41	10 19
22 T	851.4	21.0	0 37	10 57	1 41	11 13
23 W	852.4	22.0	1 29	11 53	2 33	12 10
24 T	853.4	23.0	2 16	12 50	3 17	13 10
25 F	854.4	24.0	2 57	13 46	3 54	14 09
26 S	855.4	25.0	3 33	14 40	4 26	15 08
27 S	856.4	26.0	4 04	15 33	4 54	16 04
28 M	857.4	27.0	4 33	16 24	5 20	17 00
29 T	858.4	28.0	5 01	17 15	5 44	17 56
30 W	859.4	29.0	5 29	18 07	6 07	18 52
Oct						
1 T	860.4	0.3	5 58	19 00	6 31	19 49
2 F	861.4	1.3	6 29	19 55	6 59	20 49
3 S	862.4	2.3	7 04	20 53	7 28	21 50
4 S	863.4	3.3	7 42	21 53	8 04	22 55
5 M	864.4	4.3	8 28	22 54	8 46	23 57
6 T	865.4	5.3	9 20	23 54	9 37	.....
7 W	866.4	6.3	10 19	.....	10 36	0 58
8 T	867.4	7.3	11 23	0 49	11 42	1 53
9 F	868.4	8.3	12 30	1 40	12 53	2 40
10 S	869.4	9.3	13 38	2 26	14 05	3 22
11 S	870.4	10.3	14 44	3 07	15 16	3 57

Date	J.D.	Age	Johannesburg Rise	Johannesburg Set	Cape Town Rise	Cape Town Set
Oct						
12 M	871.4	11.3	15h 50m	3h 45m	16h 27m	4h 30m
13 T	872.4	12.3	16 55	4 21	17 38	5 01
14 W	873.4	13.3	18 01	4 56	18 49	5 31
15 T	874.4	14.3	19 07	5 35	20 01	6 03
16 F	875.4	15.3	20 15	6 16	21 13	6 40
17 S	876.4	16.3	21 20	7 00	22 22	7 21
18 S	877.4	17.3	22 22	7 51	23 27	8 08
19 M	878.4	18.3	23 20	8 45	.....	9 01
20 T	879.4	19.3	.....	9 42	0 24	9 59
21 W	880.4	20.3	0 10	10 40	1 12	11 00
22 T	881.4	21.3	0 54	11 38	1 53	11 59
23 F	882.4	22.3	1 31	12 33	2 27	12 59
24 S	883.4	23.3	2 04	13 26	2 56	13 56
25 S	884.4	24.3	2 35	14 18	3 23	14 52
26 M	885.4	25.3	3 04	15 09	3 47	15 48
27 T	886.4	26.3	3 32	16 00	4 10	16 43
28 W	887.4	27.3	4 00	16 53	4 35	17 40
29 T	888.4	28.3	4 30	17 48	5 01	18 40
30 F	889.4	29.3	5 04	18 46	5 30	19 42
31 S	890.4	0.6	5 42	19 46	6 04	20 46
Nov						
1 S	891.4	1.6	6 26	20 47	6 45	21 50
2 M	892.4	2.6	7 17	21 48	7 34	22 52
3 T	893.4	3.6	8 14	22 45	8 30	23 49
4 W	894.4	4.6	9 17	23 38	9 35	.....
5 T	895.4	5.6	10 23	.....	10 44	0 38
6 F	896.4	6.6	11 28	0 24	11 53	1 20
7 S	897.4	7.6	12 33	1 05	13 03	1 56
8 S	898.4	8.6	13 36	1 42	14 12	2 29
9 M	899.4	9.6	14 40	2 18	15 20	2 59
10 T	900.4	10.6	15 43	2 52	16 29	3 29
11 W	901.4	11.6	16 47	3 29	17 39	4 00
12 T	902.4	12.6	17 53	4 07	18 49	4 34
13 F	903.4	13.6	19 00	4 50	20 00	5 12
14 S	904.4	14.6	20 05	5 38	21 08	5 57
15 S	905.4	15.6	21 05	6 31	22 09	6 48
16 M	906.4	16.6	21 59	7 28	23 03	7 44
17 T	907.4	17.6	22 47	8 27	23 47	8 45
18 W	908.4	18.6	23 27	9 26	.....	9 46
19 T	909.4	19.6	.....	10 23	0 25	10 47
20 F	910.4	20.6	0 03	11 17	0 55	11 45
21 S	911.4	21.6	0 34	12 09	1 23	12 42

Date	J.D.	Age	Johannesburg Rise	Johannesburg Set	Cape Town Rise	Cape Town Set
Nov						
22 S	912.4	22.6	1h 04m	13h 00m	1h 48m	13h 37m
23 M	913.4	23.6	1 32	13 51	2 12	14 32
24 T	914.4	24.6	2 00	14 43	2 36	15 29
25 W	915.4	25.6	2 29	15 37	3 01	16 27
26 T	916.4	26.6	3 02	16 33	3 29	17 28
27 F	917.4	27.6	3 37	17 33	4 01	18 32
28 S	918.4	28.6	4 20	18 36	4 40	19 38
29 S	919.4	0.0	5 09	19 38	5 27	20 42
30 M	920.4	1.0	6 06	20 38	6 22	21 42
Dec						
1 T	921.4	2.0	7 08	21 33	7 26	22 35
2 W	922.4	3.0	8 15	22 22	8 35	23 20
3 T	923.4	4.0	9 21	23 05	9 46	23 58
4 F	924.4	5.0	10 27	23 43	10 56	.....
5 S	925.4	6.0	11 30	.....	12 04	0 31
6 S	926.4	7.0	12 32	0 18	13 11	1 02
7 M	927.4	8.0	13 33	0 53	14 18	1 31
8 T	928.4	9.0	14 35	1 27	15 25	2 00
9 W	929.4	10.0	15 39	2 03	16 34	2 32
10 T	930.4	11.0	16 44	2 43	17 43	3 07
11 F	931.4	12.0	17 48	3 28	18 50	3 48
12 S	932.4	13.0	18 50	4 19	19 54	4 36
13 S	933.4	14.0	19 47	5 14	20 51	5 30
14 M	934.4	15.0	20 37	6 13	21 39	6 30
15 T	935.4	16.0	21 21	7 12	22 20	7 32
16 W	936.4	17.0	22 00	8 10	22 54	8 33
17 T	937.4	18.0	22 33	9 07	23 23	9 34
18 F	938.4	19.0	23 03	10 00	23 49	10 31
19 S	939.4	20.0	23 31	10 52	.....	11 27
20 S	940.4	21.0	23 59	11 42	0 14	12 22
21 M	941.4	22.0	.....	12 33	0 37	13 17
22 T	942.4	23.0	0 27	13 26	1 01	14 13
23 W	943.4	24.0	0 58	14 19	1 28	15 12
24 T	944.4	25.0	1 32	15 17	1 57	16 14
25 F	945.4	26.0	2 11	16 18	2 33	17 20
26 S	946.4	27.0	2 57	17 22	3 16	18 24
27 S	947.4	28.0	3 51	18 24	4 07	19 27
28 M	948.4	29.0	4 52	19 22	5 09	20 25
29 T	949.4	0.5	5 59	20 15	6 18	21 15
30 W	950.4	1.5	7 08	21 01	7 31	21 56
31 T	951.4	2.5	8 16	21 42	8 44	22 32

LUNAR OCCULTATIONS

Occultations of all stars down to magnitude 7.5, visible from the three stations whose coordinates are tabulated below, are given in the following lists.

	Longitude	Latitude
Cape Town	-18°.475	-33°.933
Johannesburg	-28.075	-26.182
Salisbury	-31.040	-17.788

Explanation:

Z.C. - is the number in the "Catalogue of 3539 Zodical Stars for the equinox 1950.0" by James Robertson (U.S. Naval Observatory 1939). This is the catalogue most generally used by occultation observers. An "m" after the Z.C. number indicates that a star is not single.

Sp - is the spectral classification of the star.

Mag - is the visual magnitude.

Dec - is the Declination in 1950.0 coordinates.

Ph - is the Phase. D = Disappearance; R = Reappearance.

h.m. - is the time of the occultation in S.A.S.T.

The approximate time of an occultation at a place $\Delta\lambda$ degrees west and $\Delta\phi$ degrees north of one of the standard stations given above may be found from:

$$\text{Approximate time} = \text{predicted time} + a.\,\Delta\lambda + b.\,\Delta\phi$$

where a and b are in minutes of time.

P.A. - the position angle measured from the Moon's north point eastward around the limb.

Index of occulted stars, brighter than magnitude 5.0

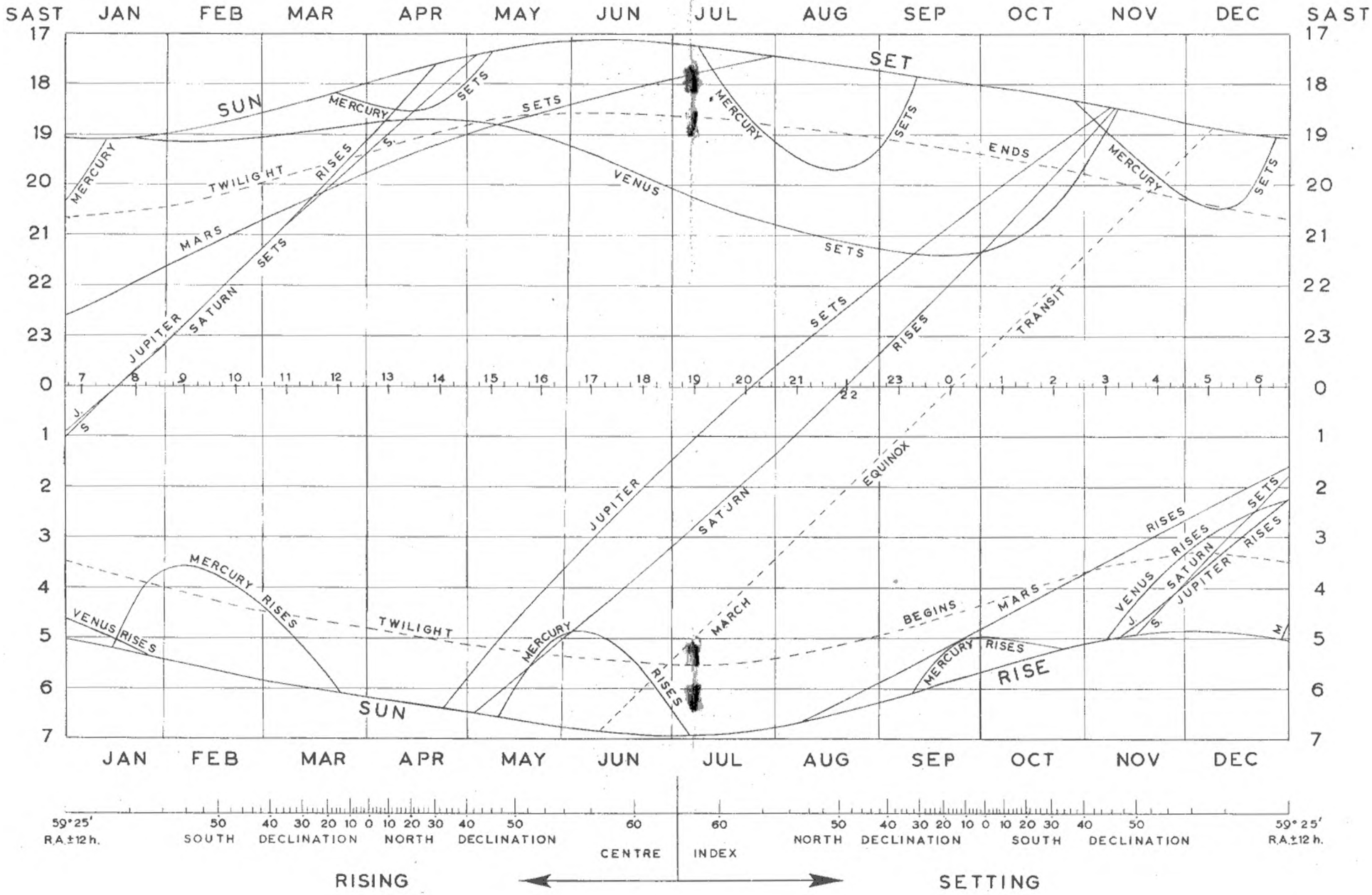
Z.C.			Z.C.		
221	η	Psc	2287	π	Sco
810	β	Tau	2366	α	Sco
1008	49	Aur	2554	χ	Sgr
1308	γ	Can	2721	ϕ	Sgr
1487	α	Leo	2864	h	Sgr
2263	b	Sco	3079	θ	Cap
2268	A	Sco	3126	ι	Cap

Date	Z.C	Sp	Mag	(1950.0) Dec.	Ph	Cape Town				Johannesburg				Salisbury			
						P.A.	h. m.	a	b	P.A.	h. m.	a	b	P.A.	h. m.	a	b
Jan																	
4	2183	K2	5.7	-22°17'	R	-	-	-	-	-	-	-	-	5°	04 04.0	+1.7	-4.3
10	3253	B5	5.4	-11 43	D	-	-	-	-	23°	19 28.6	+0.1	+2.3	2	19 49.0	+0.6	+3.0
11	3385	G0	6.6	-04 57	D	-	-	-	-	2	19 46.5	+0.2	+3.1	-	-	-	-
14	233	B9	6.2	+14 31	D	66°	20 47.8	-1.9	+1.4	61	21 16.7	-1.5	+1.7	43	21 36.9	-1.3	+2.1
24	1493	F5	6.4	+13 30	R	323	22 25.9	-1.0	-2.4	343	22 15.2	-1.1	-3.2	-	-	-	-
28	1787	F2	6.0	-04 27	R	359	02 59.2	+0.1	-3.4	-	-	-	-	-	-	-	-
29	1888	K2	6.2	-10 10	R	-	-	-	-	275	01 25.0	-1.6	-1.2	300	01 17.3	-1.2	-1.6
Feb																	
3	2583	A3	5.8	-28 04	R	241	03 30.8	-0.3	-0.3	277	03 27.2	0.0	-0.9	306	03 17.1	+0.4	-1.4
8	3467	K0	6.5	-01 15	D	-	-	-	-	-	-	-	-	40	19 00.8	-0.4	+1.8
11	311	A3	6.5	+17 53	D	-	-	-	-	122	20 27.1	-1.4	-0.5	96	20 31.8	-1.3	+0.5
12	443	G5	7.4	+22 43	D	112	20 17.3	-2.3	+0.2	96	20 40.1	-1.7	+0.7	74	20 53.1	-1.7	+1.2
12	448	G0	7.1	+22 57	D	105	22 05.3	-1.0	+0.8	-	-	-	-	-	-	-	-
15	864	K0	6.7	+29 11	D	-	-	-	-	98	19 17.3	-3.0	-0.6	80	19 24.8	-3.2	+0.3
16	1026	K0	6.5	+28 14	D	-	-	-	-	-	-	-	-	153	22 15.6	-1.1	-2.6
23	1663	K0	5.2	+03 01	R	-	-	-	-	-	-	-	-	279	00 15.3	-3.4	-0.8
Mar																	
1	2366	M0,A3	1.2	-26 22	D	41	01 44.9	-	-	-	-	-	-	-	-	-	-
1	2366	M0,A3	1.2	-26 22	R	359	02 06.7	-	-	-	-	-	-	-	-	-	-
13	674	G5	6.6	+28 04	D	52	20 19.2	-2.2	+1.9	-	-	-	-	-	-	-	-
14	824	F5	6.2	+29 10	D	84	21 57.4	-1.5	+1.2	-	-	-	-	-	-	-	-
16	1108	K0	6.9	+26 53	D	-	-	-	-	150	23 00.3	-0.1	-1.3	119	22 55.3	-1.0	-0.4
29	2470	B9	6.1	-27 44	R	286	01 06.6	-0.4	-1.5	326	00 53.8	+0.1	-2.6	-	-	-	-
30	2644	F8	6.3	-28 18	R	-	-	-	-	229	01 57.9	-2.0	+1.0	265	02 04.2	-1.4	-0.4
30	2660	A2	6.1	-28 27	R	-	-	-	-	205	04 11.7	-	-	250	04 38.6	-2.8	+0.8
Apr																	
1	2991	K5	6.2	-22 30	R	216	05 50.4	-1.6	+1.6	-	-	-	-	-	-	-	-
14	1308	A0	4.7	+21 35	D	155	22 43.2	-0.2	-1.2	113	22 45.5	-1.0	+0.1	77	22 54.7	-1.9	+1.4
15	1402	K0	7.5	+17 47	D	82	21 29.2	-3.3	+0.8	-	-	-	-	-	-	-	-

Apr																				
16	1501	G5	7.3	+11°49'	D	-	-	-	-	-	-	-	-	174°	23	29.0	+0.2	-2.9
18	1600	A5	5.1	+06 16	D	-	-	-	-	146°	00	21.3	-0.8	-1.4	115	00	16.7	-1.5	-0.5
19	1708	F8	6.2	-00 09	D	132°	03	20.7	-0.5	-0.4	-	-	-	-	-	-	-	-	-
24	2268	B3	4.8	-25 15	R	-	-	-	-	274	00	13.4	-2.3	-0.7	306	00	08.5	-1.7	-1.8
24	2273	B8	5.9	-25 10	R	273	00	36.8	-1.9	-0.9	313	00	42.2	-1.6	-2.2	353	00	18.1	-	-
24	2287	B2	3.0	-26 02	D	-	-	-	-	-	-	-	-	-	169	02	58.6	-	-	
24	2287	B2	3.0	-26 02	R	-	-	-	-	-	-	-	-	218	03	37.2	-	-		
24	2298	K0	5.1	-25 47	R	262	05	56.3	-1.3	+1.3	-	-	-	-	-	-	-	-		
25	2583	A3	5.8	-28 04	R	235	23	30.3	-1.1	+0.1	276	23	34.7	-0.8	-1.0	307	23	24.8	-0.3	-1.8
May																				
1	3360	K0	6.3	-07 22	R	-	-	-	-	-	-	-	-	199	03	14.8	-0.5	+2.2		
8	810	B8	1.8	+28 35	D	144	11	53.6	-	-	136	11	58.3	-	-	111	11	48.6	-2.7	-1.5
8	810	B8	1.8	+28 35	R	190	12	23.9	-	-	198	12	43.5	-	-	224	13	05.7	-2.0	+1.7
9	1008	A0	5.0	+28 03	D	168	19	39.5	-	-	121	19	33.5	-0.4	-0.1	90	19	37.9	-1.0	+0.6
10	1131	A2	7.2	+26 17	D	186	18	49.6	-	-	134	18	38.3	-1.1	-0.8	106	18	39.0	-1.8	-0.1
17	1754	F5	6.9	-03 37	D	-	-	-	-	173	00	31.7	-0.4	-3.1	136	00	17.7	-1.0	-1.2	
21	2366	M0,A3	1.2	-26 22	D	106	20	37.5	-0.3	-1.4	68	20	38.6	-1.5	0.0	-	-	-	-	
21	2366	M0,A3	1.2	-26 22	R	294	21	40.5	-0.7	-1.6	335	21	27.6	0.0	-3.1	-	-	-	-	
23	2545	A5	6.4	-27 52	R	310	02	48.0	-2.4	-2.1	-	-	-	-	-	-	-	-		
23	2554	F8	4.4-5.0	-27 49	D	46	04	09.6	-1.4	+2.7	26	04	43.7	-0.1	+4.0	-	-	-	-	
23	2554	F8	4.4-5.0	-27 49	R	298	05	12.4	-2.0	-0.4	313	05	26.9	-2.3	-1.4	-	-	-	-	
24	2721	B8	3.3	-27 01	D	53	00	08.4	-1.8	+0.6	-	-	-	-	-	-	-	-		
24	2721	B8	3.3	-27 01	R	305	01	08.9	-1.4	-2.5	-	-	-	-	-	-	-	-		
25	2907	K0	6.3	-24 01	R	300	04	09.2	-3.0	-2.3	-	-	-	-	-	-	-	-		
27	3181	A5	5.9	-14 53	R	265	00	48.7	-0.3	-0.9	306	00	38.3	-0.3	-3.3	-	-	-	-	
27	3206	F0	5.2	-13 42	R	255	06	31.9	-2.2	+0.7	-	-	-	-	-	-	-	-		
29	3474	A2	6.0	-01 25	R	213	04	40.4	-0.8	+1.1	225	04	58.7	-1.3	+1.1	245	05	11.5	-2.1	+0.7
Jun																				
8	1329	F8	6.8	+20 05	D	150	20	28.7	0.0	-0.9	-	-	-	-	-	-	-	-		
10	1522	K0	6.8	+10 44	D	119	19	58.0	-1.6	-0.3	66	20	25.1	-	-	-	-	-	-	
12	1708	F8	6.2	-00 09	D	127	18	37.3	-1.8	-1.6	81	18	58.2	-	-	-	-	-	-	
14	1913	A2	7.1	-11 31	D	59	19	18.0	-	-	-	-	-	-	-	-	-	-		
14	1919	K5	7.1	-12 26	D	148	21	40.8	-1.4	-2.1	108	21	49.4	-2.3	-0.3	67	22	04.9	-	-

THE PLANETS AS SEEN FROM SOUTH AFRICA 1970

FOR EXPLANATION SEE NOTES ON PLANETS



Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town P.A.	h.	m.	a	b
Jun										
15	2039	B9	5.6	-18°04'	D	117°	23	59.3	-1.7	-0.3
16	2045	G5	6.4	-18 27	D	173	01	32.8	-	-
16	2051	A0p	5.7	-18 35	D	177	02	26.8	-	-
17	2298	K0	5.1	-25 47	D	183	20	53.1	-	-
21	2864	B9	4.7	-24 57	R	195	06	20.3	+0.6	+3.0
22	3126	K0	4.3	-16 58	R	-	-		-	-
25	3416	A2	5.6	-03 39	R	220	01	15.0	-0.5	+0.7
30	529	A0	6.2	+25 14	R	259	06	25.1	-1.0	-0.7
Jul										
7	1487	B8	1.3	+12 07	D	170	19	16.1	+0.1	-2.0
7	1487	B8	1.3	+12 07	R	263	20	07.2	-1.1	+1.7
13	2108	G0	6.4	-21 03	D	130	23	40.0	-1.4	-0.6
14	2109	K2	6.1	-21 12	D	151	00	25.8	-1.3	-1.7
14	2220	A3	7.0	-24 24	D	-	-		-	-
15	2251	K0	7.5	-24 38	D	34	01	32.9	+0.4	+4.4
15	2366	M0,A3	1.2	-26 22	D	98	15	57.3	0.0	-1.2
15	2366	M0,A3	1.2	-26 22	R	299	16	53.2	-0.1	-1.7
15	2405	A0	6.4	-27 24	D	122	23	49.9	-2.1	-0.8
16	2545	A5	6.4	-27 52	D	68	20	16.9	-1.9	+0.1
16	2554	F8	4.4-5.0	-27 49	D	32	22	51.4	-	-
17	2583	A3	5.8	-28 04	D	-	-		-	-
17	2721	B8	3.3	-27 01	D	105	18	28.2	-0.1	-1.4
17	2721	B8	3.3	-27 01	R	258	19	26.7	-0.8	-0.7
22	3380	K0	6.2	-04 52	R	233	03	58.4	-1.6	+1.3
23	3508	A2	5.8	+00 55	R	165	00	15.3	-	-
23	3515	A0	6.2	+01 56	R	231	03	26.1	-1.5	+0.9
25	233	B9	6.2	+14 31	R	189	03	04.3	+0.2	+2.0
27	490	K0	5.7	+24 37	R	306	04	45.0	-	-
28	638	K0	5.1	+27 17	R	-	-		-	-
29	810	B8	1.8	+28 35	D	-	-		-	-
29	810	B8	1.8	+28 35	R	-	-		-	-

Johannesburg					Salisbury				
P.A.	h.	m.	a	b	P.A	h.	m.	a	b
85°	24	18.5	-1.4	+1.2	39°	24	43.9	-	-
138	01	29.1	-1.0	-1.0	108	01	27.9	-0.8	0.0
143	02	20.2	-0.7	-1.1	114	02	17.0	-0.4	-0.2
129	20	31.7	-1.3	-2.0	98	20	25.1	-2.2	-0.7
-	-	-	-	-	-	-	-	-	-
283	22	00.3	-0.2	-1.4	-	-	-	-	-
242	01	25.2	-1.0	+0.2	270	01	27.6	-1.6	-0.7
-	-	-	-	-	-	-	-	-	-
126	19	10.8	-0.6	-0.4	93	19	13.7	-1.1	+0.6
304	20	17.2	-0.2	-0.2	337	20	09.2	+0.2	-1.8
106	23	51.0	-1.0	+0.3	78	23	59.3	-0.6	+1.1
127	00	29.3	-0.9	-0.4	100	00	31.0	-0.5	+0.3
158	18	16.4	-0.4	-3.3	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
62	15	55.5	-1.0	+0.1	-	-	-	-	-
338	16	35.6	+0.6	-2.9	-	-	-	-	-
101	24	07.6	-1.8	+0.3	76	24	18.4	-1.3	+1.1
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	130	03	39.7	-1.2	-1.0
68	18	26.1	-0.9	-0.1	18	18	42.0	-	-
296	19	25.4	-0.7	-1.8	347	18	59.7	-	-
230	04	25.8	-1.6	+1.7	242	04	44.2	-1.9	+1.4
194	00	39.3	-0.4	+2.2	219	00	56.0	-1.1	+1.4
230	03	50.8	-1.8	+1.4	243	04	08.3	-2.3	+1.3
194	03	19.7	-0.2	+2.1	212	03	37.1	-1.0	+1.7
310	04	53.6	-	-	-	-	-	-	-
273	05	09.0	-1.8	-0.9	295	05	04.8	-3.0	-1.9
-	-	-	-	-	143	10	15.1	-	-
-	-	-	-	-	230	11	21.3	-	-

Aug										
4	Mercury		0.2	+09°18'	D	148°	14	25.8	-1.5	-2.2
4	Mercury		0.2	+09 18	R	303	16	07.1	-1.9	-0.7
6	1744	K0	6.5	-02 58	D	59	20	23.2	-	-
12	2470	B9	6.1	-27 44	D	58	18	46.5	-2.6	+1.1
12	2474	F2	6.6	-27 46	D	50	19	46.1	-2.8	+2.3
13	2505	K2	5.4	-28 07	D	157	01	03.6	-	-
13	2512	B9	7.4	-27 35	D	37	02	06.7	+0.6	+2.5
13	2643	K0	6.7	-27 44	D	-	-		-	-
13	2644	F8	6.3	-28 18	D	-	-		-	-
15	2861	A3p	5.7	-24 47	D	72	02	02.8	-0.9	+1.4
15	2864	B9	4.7	-24 57	D	126	02	27.4	-2.3	-0.7
22	311	A3	6.5	+17 54	R	185	00	58.5	+0.6	+2.2
Sep										
6	2138	F5	7.5	-22 17	D	160	19	56.3	-1.8	-3.2
7	2263	B3	4.8	-25 40	D	-	-		-	-
7	2268	B3	4.8	-25 15	D	36	19	55.0	-	-
9	2583	A3	5.8	-28 04	D	92	20	57.2	-2.1	+0.5
10	2601	K0	6.7	-27 50	D	104	00	08.2	-0.8	+0.7
10	2781	K2	7.4	-26 11	D	63	23	49.5	-0.8	+1.7
12	3069	A0p	6.2	-19 09	D	-	-		-	-
18	266	A0	5.7	+16 49	R	287	03	52.5	-3.0	-0.1
20	529	A0	6.2	+25 14	R	-	-		-	-
23	1008	A0	5.0	+28 03	R	-	-		-	-
27	1487	B8	1.3	+12 07	D	144	13	47.9	-0.5	-0.8
27	1487	B8	1.3	+12 07	R	289	14	54.5	-0.6	+0.5
Oct										
3	2108	G0	6.4	-21 03	D	132	19	43.2	-0.9	-0.4
3	2109	K2	6.1	-21 12	D	163	20	29.3	-1.3	-2.5
6	2545	A5	6.4	-27 52	D	136	22	55.9	-1.2	-0.6
8	2864	B9	4.7	-24 57	D	-	-		-	-
9	3014	G5	7.3	-21 06	D	-	-		-	-
10	3035	F5	6.8	-19 22	D	69	00	59.6	-0.3	+1.5
10	3167	G5	7.1	-15 03	D	85	20	51.8	-2.4	+0.1

108°	14	36.3	-3.3	-0.7	59°	15	02.5	-	-
346	16	06.6	-0.4	-2.7	40	15	20.2	-	-
-	-		-	-	-	-		-	-
-	-		-	-	-	-		-	-
-	-		-	-	-	-		-	-
140	01	08.5	-1.7	-1.4	112	01	07.2	-0.8	-0.1
-	-		-	-	-	-		-	-
22	19	12.7	-	-	-	-		-	-
-	-		-	-	127	19	12.7	-2.1	-2.4
70	02	20.6	-0.5	+1.3	55	02	33.1	-0.1	+1.4
124	02	42.3	-1.7	-0.6	101	02	45.5	-0.8	+0.2
195	01	10.4	+0.1	+1.9	215	01	24.6	-0.7	+1.4
129	19	59.3	-1.5	-0.8	101	20	01.3	-1.2	+0.2
143	18	38.3	-2.4	-2.6	109	18	33.8	-2.6	-0.6
-	-		-	-	-	-		-	-
78	21	22.4	-1.6	+1.2	56	21	39.2	-1.0	+1.9
99	00	19.4	-0.4	+0.6	81	00	25.8	0.0	+0.8
60	24	07.8	-0.3	+1.6	43	24	22.3	+0.2	+1.8
53	18	48.6	-1.6	+0.8	20	19	09.0	-1.6	+3.2
290	04	19.1	-2.7	-0.2	-	-		-	-
-	-		-	-	198	02	42.3	-0.8	+2.7
236	03	10.3	-0.8	+0.3	255	03	14.5	-1.5	-0.1
103	13	53.5	-0.9	+0.4	56	14	10.4	-	-
326	14	55.0	+0.1	-1.0	14	14	33.9	-	-
114	19	48.5	-0.4	+0.1	-	-		-	-
-	-		-	-	-	-		-	-
-	-		-	-	-	-		-	-
-	-		-	-	24	18	39.2	-1.4	+3.6
-	-		-	-	104	19	36.0	-3.8	-0.9
67	01	11.9	0.0	+1.3	-	-		-	-
82	21	19.3	-2.5	+0.7	66	21	34.6	-2.1	+1.3

Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town P.A.	h.	m.	a	b	Johannesburg P.A.	h.	m.	a	b	Salisbury P.A.	h.	m.	a	b
Oct																				
10	3173	G5	5.3	-14°11'	D	40°	23	25.2	-0.8	+2.1	42°	23	48.0	-0.6	+2.0	28°	24	06.6	-0.2	+2.2
17	616	F0	5.6	+26 25	R	-	-	-	-	-	-	-	-	-	-	178	23	50.3	-	-
18	771	A3	6.1	+28 00	R	-	-	-	-	-	-	-	-	-	-	198	23	21.9	+0.8	+2.6
19	810	B8	1.8	+28 35	D	107	08	06.6	-0.8	+0.6	71	08	22.9	-1.0	+1.5	-	-	-	-	-
21	1088	A2	5.6	+26 54	R	264	03	19.6	-1.7	-0.8	275	03	33.6	-2.5	-0.8	295	03	33.0	-2.9	-1.4
Nov																				
2	2512	B9	7.4	-27 35	D	131	21	28.9	-0.6	-0.1	-	-	-	-	-	-	-	-	-	-
3	2673	A3	6.3	-26 47	D	61	21	54.5	+0.2	+1.6	-	-	-	-	-	-	-	-	-	-
3	2669	A5	6.2	-26 39	D	25	21	58.6	+0.8	+2.6	-	-	-	-	-	-	-	-	-	-
3	2676	A0	6.5	-26 36	D	32	22	25.2	+0.8	+2.2	-	-	-	-	-	-	-	-	-	-
5	2988	A0	6.8	-21 00	D	-	-	-	-	-	137	23	16.8	-	-	-	-	-	-	-
6	3118	K0	6.9	-16 18	D	5	20	07.8	0.0	+3.7	6	20	34.3	+0.2	+3.4	339	21	07.4	-	-
7	3252	K0	7.0	-10 58	D	-	-	-	-	-	-	-	-	-	-	346	18	58.0	-	-
7	3255	M0	7.4	-11 13	D	-	-	-	-	-	-	-	-	-	-	104	19	18.1	-	-
21	1487	B8	1.3	+12 07	D	185	02	38.7	-	-	157	02	19.9	-1.1	-3.0	135	02	01.8	-1.2	-2.2
21	1487	B8	1.3	+12 07	R	229	03	06.8	-	-	262	03	25.4	-2.3	-0.7	286	03	23.8	-2.2	-1.3
Dec																				
1	2792	B9	6.8	-25 08	D	18	20	20.7	+0.8	+2.8	12	20	32.7	+1.2	+2.9	-	-	-	-	-
3	3079	A0	4.2	-17 21	D	60	20	00.9	-0.9	+1.7	61	20	21.1	-0.6	+1.6	47	20	35.9	-0.2	+1.7
3	3091	K2	6.9	-16 44	D	42	22	00.9	0.0	+1.9	37	22	13.4	+0.3	+1.8	-	-	-	-	-
9	221	G5	3.7	+15 12	D	32	00	27.0	-1.2	+2.3	12	00	58.2	-1.1	+3.4	-	-	-	-	-
13	810	B8	1.8	+28 35	D	80	02	10.6	-2.3	+0.8	48	02	45.5	-2.9	+2.6	-	-	-	-	-
13	810	B8	1.8	+28 35	R	292	03	30.2	-1.2	+0.4	330	03	34.5	+0.1	-1.5	-	-	-	-	-
16	1239	A2	6.4	+23 14	R	331	01	28.2	-1.9	-2.4	-	-	-	-	-	-	-	-	-	-
19	1550	A0	5.8	+08 48	R	299	02	45.1	-1.6	-1.8	325	02	44.0	-1.5	-2.4	350	02	23.4	-0.9	-3.6
24	2039	B9	5.6	-18 04	R	-	-	-	-	-	260	02	33.9	-0.3	-0.6	284	02	27.6	-0.1	-1.0
24	2045	G5	6.4	-18 27	R	-	-	-	-	-	-	-	-	-	-	247	03	19.5	-1.4	+0.4
24	2051	A0p	5.7	-18 35	R	-	-	-	-	-	-	-	-	-	-	276	04	19.8	-1.3	-0.9
26	2366	M0,A3	1.2	-26 22	D	59	15	09.8	-0.4	+2.2	46	15	27.4	+0.3	+2.3	-	-	-	-	-
26	2366	M0,A3	1.2	-26 22	R	298	16	05.9	-0.7	+0.2	308	16	12.1	-0.6	-0.4	-	-	-	-	-
30	3038	G5	6.7	-18 19	D	5	20	31.5	+0.8	+2.8	-	-	-	-	-	-	-	-	-	-
31	3186	F5	6.7	-12 55	D	-	-	-	-	-	65	20	39.8	-0.1	+1.3	-	-	-	-	-

PERIGEE

Date	S. D.	H. P.
Jan 8d 12h	16' 43"	61' 22"
Feb 6 01	16 44	61 26
Mar 6 12	16 36	60 56
Apr 3 13	16 22	60 06
Apr 30 06	16 10	59 21
May 25 10	16 14	59 35
Jun 21 20	16 27	60 24
Jul 20 00	16 39	61 05
Aug 17 09	16 44	61 24
Sep 14 19	16 41	61 15
Oct 13 03	16 31	60 38
Nov 9 22	16 17	59 45
Dec 5 08	16 08	59 13
Dec 31 12	16 20	59 56

APOGEE

Date	S. D.	H. P.
Jan 22d 22h	14' 42"	53' 57"
Feb 19 00	14 42	53 59
Mar 18 14	14 44	54 05
Apr 15 08	14 46	54 13
May 13 04	14 47	54 16
Jun 9 22	14 46	54 12
Jul 7 14	14 44	54 04
Aug 4 00	14 42	53 58
Aug 31 03	14 42	53 57
Sep 27 10	14 43	54 02
Oct 25 00	14 45	54 09
Nov 21 20	14 47	54 15
Dec 19 17	14 46	54 13

S.D. = Semi-diameter

H.P. = Horizontal Parallax

The distance of the Moon from the Earth in miles may be found by dividing 817,500,000 by the H.P. in seconds of arc. The Moon is at Perigee when it is closest to the Earth in its orbit, and at Apogee when it reaches its furthest point.

MAXIMUM LIBRATION

Longitude				Latitude			
+ West Limb exposed - East Limb exposed				+ North Limb exposed - South Limb exposed			
Jan 2	-7°.8	Jun 29	+5°.8	Jan 5	+6°.6	Jun 30	-6°.6
Jan 14	+7.3	Jul 13	-7.4	Jan 18	-6.7	Jul 15	+6.7
Jan 30	-7.9	Jul 26	+7.0	Feb 2	+6.7	Jul 27	-6.8
Feb 12	+7.4	Aug 11	-7.6	Feb 14	-6.8	Aug 11	+6.8
Feb 27	-7.1	Aug 23	+7.7	Mar 1	+6.8	Aug 24	-6.8
Mar 12	+6.8	Sep 8	-7.1	Mar 13	-6.8	Sep 7	+6.8
Mar 26	-5.8	Sep 20	+7.7	Mar 28	+6.7	Sep 20	-6.8
Apr 9	+5.7	Oct 5	-6.0	Apr 10	-6.7	Oct 5	+6.7
Apr 22	-5.3	Oct 19	+7.0	Apr 24	+6.6	Oct 17	-6.6
May 7	+4.9	Nov 1	-4.9	May 7	-6.6	Nov 1	+6.6
May 19	-5.8	Nov 15	+5.9	May 21	+6.5	Nov 14	-6.5
Jun 2	+4.9	Nov 28	-4.9	Jun 3	-6.5	Nov 28	+6.5
Jun 15	-6.6	Dec 13	+5.1	Jun 18	+6.6	Dec 11	-6.6
		Dec 25	-5.8			Dec 25	+6.6

PHASES OF THE MOON

Lunation	New Moon	First Quarter	Full Moon	Last Quarter
582	Jan 7^{d} 22^{h} 36^{m}	Jan 14^{d} 15^{h} 18^{m}	Jan 22^{d} 14^{h} 55^{m}	Jan 30^{d} 16^{h} 39^{m}
583	Feb 6 09 13	Feb 13 06 10	Feb 21 10 19	Mar 1 04 33
584	Mar 7 19 43	Mar 14 23 16	Mar 23 03 53	Mar 30 13 05
585	Apr 6 06 09	Apr 13 17 44	Apr 21 18 21	Apr 28 19 18
586	May 5 16 51	May 13 12 26	May 21 05 38	May 28 00 32
587	Jun 4 04 21	Jun 12 06 07	Jun 19 14 28	Jun 26 06 01
588	Jul 3 17 18	Jul 11 21 43	Jul 18 21 59	Jul 25 13 00
589	Aug 2 07 58	Aug 10 10 50	Aug 17 05 15	Aug 23 22 34
590	Sep 1 00 01	Sep 8 21 38	Sep 15 13 10	Sep 22 11 42
591	Sep 30 16 32	Oct 8 06 43	Oct 14 22 21	Oct 22 04 47
592	Oct 30 08 28	Nov 6 14 47	Nov 13 09 28	Nov 21 01 13
593	Nov 28 23 14	Dec 5 22 36	Dec 12 23 03	Dec 20 23 09
594	Dec 28 12 43	-	-	-

the planets 1970

The Chart (Centre pages) shows the S.A.S.T. of the rising and setting of the Sun and planets for position 30° E, 30° S. The approximate times for other places can be found by applying the longitude differences shown in Table I with the sign reversed, e.g. for Cape Town add 46 minutes, for Durban subtract 4 minutes. The correction for latitude will, in general, be sufficiently small to be ignored and in no case will it exceed 15 minutes.

Along the midnight line are numerals that indicate the sidereal time at midnight; in other words, the right ascension of an object on the meridian at midnight on the date in question.

The scale at the bottom of the chart is for finding rising or setting times of any object whose right ascension and declination are known. Set dividers or a strip of

paper from the index at the centre of the scale to the object's declination and in the direction desired for either rising or setting. Measure this same distance and direction along the midnight line, beginning at the object's right ascension indicated by the numerals. Should this end point fall outside the chart, 12 hours should be added to or subtracted from the right ascension. Reset the dividers using the end of the scale instead of the centre index, and measuring in the opposite direction to that first used. Through the point established draw a line parallel to the March Equinox transit line (indicated by the dashed line on the chart). This line will show the time of rising or setting of the object at latitude 30° South. The approximate positions of the planets in the constellations, given in the table overleaf, are intended for identification purposes.

Mercury can best be seen near its greatest elongation (see Astronomical diary for details). The best morning visibility occurs on February 5 when the planet will rise about two hours before sunrise (magnitude 0.1). It is best seen as an evening object on August 16 (magnitude +0.6) when it sets about 2 hours after sunset. At its inferior conjunction on May 9 a transit over the Sun's disc will be visible in South Africa. (See note).

Venus is at superior conjunction on January 24 when it rises at sunrise, after which it begins to appear as an evening object setting progressively later than the Sun. On September 1 the planet is at greatest elongation east setting $3\frac{1}{2}$ hours after sunset. It continues to increase in brightness, reaching maximum on October 6 (magnitude -4.3). On November 10 it overtakes the Earth in its orbit round the Sun and thereafter becomes a morning object, reaching greatest brilliancy on December 16 (magnitude -4.4).

At the beginning of the year Mars sets about 3 hours after sunset. It continues to recede from the Earth until August 2 when it sets with the Sun. Thereafter it becomes a morning object rising progressively earlier than the Sun. By the end of the year it will rise about $3\frac{1}{2}$ hours before the Sun, steadily increasing its brightness to magnitude 1.6.

During the first few months of the year Jupiter rises at almost the same time as Saturn sets, hence the planetary diagram shows one line for both phenomena. The retrograde motion of Jupiter begins on February 20 and ends June 24. Opposition is reached on April 21 (magnitude -2.0) when the planet will be 4.436 astronomical units distant, and the polar disc will subtend an angle of 41". Thereafter Jupiter appears to move closer to the Sun and at the end of October will be lost in the evening twilight. Conjunction with the Sun takes place on November 9 after which it rises before sunrise. By mid-December it will be clearly visible as a morning object.

During January Saturn sets about midnight. It continues to move closer to the Sun until it reaches conjunction on May 2, after which it becomes a morning object. It starts to increase in brightness and towards the end of the month will be clearly visible. Opposition is reached on November 11 (magnitude -0.1) when the planet will be 8.153 astronomical units away. The polar diameter will then subtend an angle of 9".15. The rings will appear widest (17".12) towards the end of October their southern surface being observed.

Optical aid is required to observe Uranus and Neptune. The opposition of the former occurs on March 27 (magnitude 5.7) distance 17.32 astronomical units. The opposition of the latter occurs on May 21 (magnitude 7.7) distance 29.31 astronomical units.

THE PLANETS IN THE CONSTELLATIONS

MONTH	VENUS	MARS	JUPITER	SATURN
January	Sagittarius	Pisces	Virgo	Aries
February	Aquarius	Pisces	Virgo	Aries
March	Pisces	Aries	Virgo	Aries
April	Aries	Taurus	Virgo	Aries
May	Taurus	Taurus	Virgo	Aries
June	Cancer	Gemini	Virgo	Aries
July	Leo	Cancer	Virgo	Aries
August	Virgo	Cancer	Virgo	Aries
September	Virgo	Leo	Virgo	Aries
October	Libra	Leo	Libra	Aries
November	Libra	Virgo	Libra	Aries
December	Libra	Virgo	Libra	Aries

EPHEMERIDES FOR URANUS AND NEPTUNE

DATE	URANUS		NEPTUNE	
	R.A.	Dec.	R.A.	Dec.
	h m		h m	
Jan 1	12 33.2	- 2° 48'	15 52.3	- 18° 31'
21	12 33.4	- 2 48	15 54.5	- 18 37
Feb 10	12 32.2	- 2 40	15 55.9	- 18 40
Mar 2	12 29.9	- 2 25	15 56.5	- 18 41
22	12 26.9	- 2 06	15 56.1	- 18 39
Apr 11	12 23.8	- 1 45	15 54.9	- 18 34
May 1	12 21.0	- 1 28	15 53.0	- 18 28
21	12 19.1	- 1 16	15 50.9	- 18 21
Jun 10	12 18.2	- 1 11	15 48.7	- 18 15
30	12 18.7	- 1 15	15 46.8	- 18 09
Jul 20	12 20.5	- 1 28	15 45.6	- 18 06
Aug 9	12 23.3	- 1 47	15 45.1	- 18 06
29	12 27.0	- 2 12	15 45.4	- 18 08
Sep 18	12 31.4	- 2 40	15 46.7	- 18 13
Oct 8	12 36.0	- 3 10	15 48.7	- 18 21
28	12 40.6	- 3 39	15 51.3	- 18 30
Nov 17	12 44.7	- 4 04	15 54.3	- 18 39
Dec 7	12 48.0	- 4 25	15 57.4	- 18 48
27	12 50.1	- 4 38	16 00.3	- 18 56

The coordinates are apparent geocentric positions for the equinox of date.

THE SATELLITES OF JUPITER

Details of phenomena, occurring between the end of Astronomical Twilight and Midnight, and when the planet is above the horizon in Southern Africa, are tabulated below. The predicted times are for mid-phenomena and are not instantaneous.

Explanation of Table:

The date and time of the phenomenon are given.

Sat. - is the satellite concerned: I - Io III - Ganymede
II - Europa IV - Callisto

Phen. - is the particular phenomenon. The first column gives the type.

Ec. - Eclipse: the satellite passes throught the shadow of Jupiter.

Oc. - Occultation: the satellite is obscured by the disc of Jupiter.

Tr. - Transit: the satellite crosses the disc of Jupiter.

Sh. - Shadow transit: the shadow of the satellite transits the disc.

The second column gives the phase of the phenomenon.

D - Disappearance R - Reappearance
I - Ingress E - Egress

		S.A.S.T.		Sat	Phen
Jan	27	23^h	40^m	I	Ec D
	29	23	46	III	Tr E
Feb	5	00	00	I	Tr I
	5	23	22	I	Oc R
	12	22	36	II	Sh I
	13	22	28	I	Tr E
	14	22	13	II	Oc R
	19	23	46	I	Ec D
	20	22	09	I	Tr I
	20	23	13	I	Sh E
	23	22	56	III	Oc D
	27	22	55	I	Sh I
	27	23	58	I	Tr I
	28	22	26	II	Ec D
	28	23	18	I	Oc R
Mar	2	21	23	II	Tr E
	2	22	18	III	Ec D
	7	22	00	I	Ec D
	8	21	28	I	Sh E
	8	22	22	I	Tr E

		S.A.S.T.		Sat	Phen
Mar	9	21^h	19^m	II	Tr I
	9	22	01	II	Sh E
	9	23	44	II	Tr E
	13	21	48	III	Tr E
	14	23	54	I	Ec D
	15	21	11	I	Sh I
	15	22	00	I	Tr I
	15	23	22	I	Sh E
	16	21	18	I	Oc R
	16	22	03	II	Sh I
	16	23	38	II	Tr I
	18	21	01	II	Oc R
	20	20	19	III	Sh I
	20	22	39	III	Sh E
	20	23	28	III	Tr I
	22	23	04	I	Sh I
	22	23	46	I	Tr I
	23	20	15	I	Ec D
	23	23	03	I	Oc R
	24	19	44	I	Sh E

		h	m					h	m		
Mar	24	20	21	I	Tr E	May	1	20	50	I	Ec R
	25	19	31	II	Ec D		2	19	14	III	Tr I
	25	23	19	II	Oc R		2	20	09	III	Sh I
	30	22	08	I	Ec D		2	21	11	III	Tr E
	31	19	27	I	Sh I		2	22	26	III	Sh E
	31	19	57	I	Tr I		3	21	15	II	Oc D
	31	21	38	I	Sh E		7	23	04	I	Tr I
	31	22	06	I	Tr E		7	23	26	I	Sh I
Apr	1	22	07	II	Ec D		8	20	10	I	Oc D
	3	19	45	II	Tr E		8	22	45	I	Ec R
	7	21	21	I	Sh I		9	19	39	I	Tr E
	7	21	32	III	Oc R		9	20	05	I	Sh E
	7	21	41	I	Tr I		9	22	31	III	Tr I
	7	23	32	I	Sh E		10	23	31	II	Oc D
	7	23	50	I	Tr E		12	20	06	II	Tr E
	8	20	58	I	Oc R		12	21	07	II	Sh E
	10	19	33	II	Tr I		15	21	55	I	Oc D
	10	21	32	II	Sh E		16	19	15	I	Tr I
	10	22	00	II	Tr E		16	19	49	I	Sh I
	14	22	04	III	Ec D		16	21	25	I	Tr E
	14	23	15	I	Sh I		16	22	00	I	Sh E
	14	23	25	I	Tr I		17	19	08	I	Ec R
	15	20	24	I	Ec D		19	19	54	II	Tr I
	15	22	42	I	Oc R		19	21	09	II	Sh I
	16	19	54	I	Sh E		19	22	24	II	Tr E
	16	20	01	I	Tr E		19	23	42	II	Sh E
	17	21	33	II	Sh I		20	20	14	III	Ec R
	17	21	47	II	Tr I		21	18	52	II	Ec R
	19	19	15	II	Oc R		22	23	41	I	Oc D
	22	22	17	I	Oc D		23	21	01	I	Tr I
	23	19	35	I	Tr I		23	21	44	I	Sh I
	23	19	37	I	Sh I		23	23	11	I	Tr E
	23	21	44	I	Tr E		23	23	54	I	Sh E
	23	21	48	I	Sh E		24	21	02	I	Ec R
	24	18	56	I	Ec R		26	22	12	II	Tr I
	25	00	00	II	Tr I		26	23	45	II	Sh I
	26	19	00	II	Oc D		27	18	46	III	Oc D
	26	21	48	II	Ec R		27	20	57	III	Oc R
	30	00	00	I	Oc D		27	21	56	III	Ec D
	30	21	19	I	Tr I		28	21	27	II	Ec R
	30	21	32	I	Sh I		30	22	48	I	Tr I
	30	23	29	I	Tr E		30	23	39	I	Sh I
	30	23	43	I	Sh E		31	19	54	I	Oc D

May	31	22h 57m	I	Ec R	Jul	1	22h 24m	I	Sh E
Jun	1	19 25	I	Tr E		2	19 34	I	Ec R
	1	20 17	I	Sh E		2	20 06	III	Ec R
	3	22 13	III	Oc D		4	23 34	II	Tr I
	4	19 38	II	Oc D		6	18 39	II	Oc D
	7	21 42	I	Oc D		6	23 41	II	Ec R
	8	19 03	I	Tr I		7	23 34	I	Oc D
	8	20 02	I	Sh I		8	20 55	I	Tr I
	8	21 13	I	Tr E		8	22 10	I	Sh I
	8	22 11	I	Sh E		8	23 05	I	Tr E
	9	19 20	I	Ec R		9	19 06	III	Oc R
	11	22 01	II	Oc D		9	21 29	I	Ec R
	13	18 41	II	Tr E		9	21 51	III	Ec D
	13	20 48	II	Sh E		10	18 47	I	Sh E
	14	20 03	III	Sh I		13	21 12	II	Oc D
	14	22 15	III	Sh E		15	20 33	II	Sh E
	14	23 31	I	Oc D		15	22 49	I	Tr I
	15	20 53	I	Tr I		16	19 56	I	Oc D
	15	21 57	I	Sh I		16	20 34	III	Oc D
	15	23 02	I	Tr E		16	23 02	III	Oc R
	16	21 15	I	Ec R		16	23 25	I	Ec R
	17	18 35	I	Sh E		17	19 27	I	Tr E
	20	18 34	II	Tr I		17	20 42	I	Sh E
	20	20 51	II	Sh I		20	23 46	II	Oc D
	20	21 08	II	Tr E		22	23 10	II	Sh E
	20	23 24	II	Sh E		23	21 51	I	Oc D
	21	19 22	III	Tr I		24	19 13	I	Tr I
	21	21 40	III	Tr E		24	20 28	I	Sh I
	22	22 43	I	Tr I		24	21 22	I	Tr E
	22	23 52	I	Sh I		24	22 36	I	Sh E
	23	19 49	I	Oc D		25	19 49	I	Ec R
	23	23 10	I	Ec R		27	19 58	III	Sh I
	24	19 20	I	Tr E		27	22 08	III	Sh E
	24	20 29	I	Sh E		29	20 39	II	Tr I
	27	21 03	II	Tr I		29	23 13	II	Sh I
	27	23 27	II	Sh I		29	23 16	II	Tr E
	27	23 37	II	Tr E		31	20 43	II	Ec R
	28	23 05	III	Tr I		31	21 08	I	Tr I
	29	21 06	II	Ec R		31	22 23	I	Sh I
	30	21 41	I	Oc D		31	23 18	I	Tr E
Jul	1	19 03	I	Tr I	Aug	1	21 44	I	Ec R
	1	20 15	I	Sh I		2	19 00	I	Sh E
	1	21 12	I	Tr E		3	21 15	III	Tr E

Aug	5	23h	19m	II	Tr I	Aug	23	21h	30m	I	Tr I
	7	23	05	I	Tr I		24	21	58	I	Ec R
	7	23	18	II	Ec R		25	19	12	I	Sh E
	8	20	13	I	Oc D		28	21	20	III	Oc D
	9	19	44	I	Tr E		30	20	53	II	Tr I
	9	20	54	I	Sh E		31	20	39	I	Oc D
	10	22	55	III	Tr I	Sep	1	20	08	I	Tr E
	14	20	01	III	Ec R		1	20	18	II	Ec R
	14	20	59	II	Oc D		1	21	07	I	Sh E
	15	22	11	I	Oc D		8	19	52	III	Sh I
	16	19	32	I	Tr I		8	19	57	I	Tr I
	16	20	21	II	Sh E		8	20	53	I	Sh I
	16	20	41	I	Sh I		9	20	17	I	Ec R
	16	21	41	I	Tr E		15	20	15	III	Tr I
	17	20	03	I	Ec R		17	19	25	I	Sh E
	21	19	36	III	Oc R		17	20	10	II	Sh E
	21	21	48	III	Ec D		24	20	11	II	Sh I
	23	20	24	II	Sh I		24	20	36	I	Tr E
	23	20	46	II	Tr E		26	19	55	III	Ec R

bright variable stars

Date	Star	Max Mag	Period	R.A.	Dec.
Jul 21	Mira	3.5	332	02h 18m	-03° 07'
Apr 9	R Hor	6.3	402	02 53	-50 02
Apr 9	R Dor	5.3	?	04 36	-62 09
Apr 9	L_2 Pup	3.4	?	07 12	-44 35
Jun 11	R Car	4.6	308	09 31	-62 38
Mar 12	S Car	5.8	149	10 08	-61 22
Aug 8	"	"	"	"	"
Aug 8	R Hya	4.3	470	13 28	-23 06
Mar 6	T Cen	6.1	91	13 40	-33 45
Jun 5	"	"	"	"	"
Sep 4	"	"	"	"	"
Dec 4	"	"	"	"	"

eclipses 1970

During 1970 there will be four eclipses, two of the Sun and two of the Moon.

1. February 21 — Partial eclipse of the Moon not visible in South Africa.
2. March 7 — Total eclipse of the Sun visible in the Eastern Pacific Ocean, Mexico, Eastern coast of the U.S.A., Newfoundland and the North Atlantic.
3. August 17 — Partial eclipse of the Moon visible in South Africa.
4. August 31/ September 1 — Annular eclipse of the Sun not visible in South Africa.

Partial Eclipse of the Moon August 17th

Moon enters penumbra	$3^h\ 06.4^m$
Moon enters umbra	4 17.2
Middle of eclipse	5 23.4
Moon leaves umbra	6 29.6
Moon leaves penumbra	7 40.3

Magnitude of the eclipse 0.413

transit of mercury

A transit of Mercury over the disc of the Sun will occur on May 9.

In southern Africa ingress occurs before sunrise and will not be visible. The exterior contact of ingress occurs 15 minutes before sunrise at Johannesburg and 65 minutes before sunrise at Cape Town. The S.A. standard times of sunrise, least angular distance and egress are as follows:

Sunrise	$06^h\ 36^m$ s	$07^h\ 26^m$ s
Least angular distance	10 17	10 17
Egress interior contact	14 09 51	14 10 12
Egress exterior contact	14 12 50	14 13 11
Position angle of point of egress	237°	237°

The geocentric least angular distance is 1' 53".7.

The approximate duration of the transit from ingress, exterior contact to egress, exterior contact is $7^h\ 52^m$.

meteor calendar 1970

Date	Shower	Radiant R.A.	Radiant Dec	Maximum Date	Maximum Hourly Rate	Maximum Transit of Radiant
Jan 3	Quadrantids	227°	+ 46°	Jan 3	40	08h 30m
Mar 12 -Apr 25	Hydraids	184	- 27	Mar 25	?	00 00
Mar 1 -May 10	Virginids	200	- 6	Apr 3	?	00 00
Apr 2 -Apr 24	Lyrids	273	+ 35	Apr 21	12	04 00
Apr 29 -May 21	Eta Aquarids	338	- 1	May 3	10	07 36
Apr 20 -Jul 30	Sco - Sgr System	270	- 30	Jun 14	?	00 30
Jul 25 -Aug 10	Delta Aquarids	343	- 17	Jul 28	20	02 00
Jul 18 -Jul 30	Alpha Capricornids	304	- 12	?	?	.....
Jul 20 -Aug 19	Perseids	43	+ 56	Aug 12	50	05 36
Aug 16 -Oct 8	Piscids	0	+ 14	Sep 12	?	00 30
Oct 11 -Oct 30	Orionids	94	+ 16	Oct 21	20	04 24
Sep 24 -Dec 10	Taurids	58	+ 21	Nov 1	6	00 36
Nov 16	Leonids	151	+ 21	Nov 17	6	06 32
Dec 5 -Dec 15	Geminids	113	+ 30	Dec 13	30	02 00
Dec 5 -Jan 7	Velaids	149	- 51	Dec 29	?	03 30

The hourly rates would apply if the radiants were in the observer's zenith. The orbits of the cometary currents are closely related to the orbits of the comets named: the orbits of ecliptical currents to those of certain minor planets.

meteor calendar 1970

Recommended SAST of watch	Conditions at Maximum	Nature of current	Appearance
Difficult in SA.			
00h - 02h	Unfavourable	Unknown	
22h - 24h	Favourable	Ecliptical	
02h - 04h	Unfavourable	Cometary: Comet 1861 I	Swift with streaks
03h - dawn	Favourable	Cometary: Halley	Very swift, long paths
20h - 24h	Unfavourable	Ecliptical	
24h - 02h	Favourable	Ecliptical	Slow, long paths
22h - 02h	-	Cometary: Comet 1881 IV	Very slow, bright
03h - dawn	Favourable*	Cometary: Comet 1862 III	
22h - 24h	Unfavourable	Ecliptical	
02h30m - 04h30m	Unfavourable	Cometary: Halley	Swift, with streaks
22h - 24h	Favourable	Ecliptical	
03h - dawn	Unfavourable	Cometary: Comet 1866 I	
23h - 02h	Unfavourable	Ecliptical	Medium speed, white
23h - 03h30m	Favourable	Unknown	

* In view of the high northern declination of its radiant, this shower is difficult to observe from South Africa, and then only from low latitudes.

astronomical diary 1970

Jan	2d	03h	Spica 1° N of Moon
	2	22	Jupiter 5° N of Moon
	4	22	Saturn stationary
	5	10	Antares 0.5° N of Moon
	12	06	Mars 1° S of Moon
	13	11	Mercury in inferior conjunction
	15	11	Saturn 7° S of Moon
	24	22	Venus in superior conjunction
	24	22	Regulus 0.8° S of Moon
	28	07	Uranus 3° N of Moon
	30	11	Jupiter 6° N of Moon
Feb	1d	20h	Antares 0.7° N of Moon
	4	13	Mercury 5° N of Moon
	5	22	Mercury greatest elongation 26° W
	10	05	Mars 3° S of Moon
	11	20	Saturn 7° S of Moon
	20	09	Jupiter stationary
	21	04	Regulus 0.7° S of Moon
	24	12	Uranus 3° N of Moon
	26	18	Jupiter 6° N of Moon
Mar	1d	03h	Antares 0.7° N of Moon Occultation visible in Southern Africa
	11	03	Mars 4° S of Moon
	11	10	Saturn 7° S of Moon
	17	04	Pluto at opposition
	17	10	Mars 3° N of Saturn
	20	11	Regulus 0.7° S of Moon
	21	03	Equinox
	23	17	Mercury in superior conjunction
	25	21	Jupiter 6° N of Moon
	27	23	Uranus at opposition
	28	09	Antares 0.7° N of Moon
Apr	7d	11h	Mercury 3° S of Moon
	7	18	Venus 5° S of Moon
	8	01	Saturn 7° S of Moon
	9	01	Mars 5° S of Moon
	11	15	Venus 2° N of Saturn
	13	00	Mercury 5° N of Saturn
Apr	16d	18h	Regulus 0.6° S of Moon
	18	10	Mercury greatest elongation 20° E
	21	17	Jupiter at opposition
	21	22	Jupiter 6° N of Moon
	24	15	Antares 0.5° N of Moon
May	3d	01h	Saturn in conjunction with Sun
	3	23	Mars 6° N of Aldebaran
	6	09	Venus 6° N of Aldebaran
	7	19	Venus 4° S of Moon
	7	21	Mars 4° S of Moon
	9	10	Mercury in inferior conjunction. Transit over Sun visible in Southern Africa
	9	12	Venus 0.2° N of Mars
	14	03	Regulus 0.4° S of Moon
	17	20	Mercury 0.2° S of Saturn
	19	01	Jupiter 6° N of Moon
	21	02	Neptune at opposition
	21	22	Antares 0.4° N of Moon Occultation visible in Southern Africa
	29	05	Mercury 1.7° S of Saturn
Jun	2d	06h	Saturn 7° S of Moon
	2	10	Mercury 9° S of Moon
	5	05	Mercury greatest elongation 24° W
	5	17	Mars 4° S of Moon
	7	00	Venus 2° S of Moon
	10	11	Regulus 0.1° S of Moon
	11	11	Venus 5° S of Pollux
	15	07	Jupiter 6° N of Moon
	18	08	Antares 0.5° N of Moon
	20	00	Mercury 4° N of Aldebaran
	21	22	Solstice
	24	02	Jupiter stationary
	29	18	Saturn 7° S of Moon
Jul	7d	01h	Mercury in superior conjunction

Jul	7[d]	07[h]	Venus 0.9° N of Moon
	7	18	Regulus 0.1° N of Moon
			Occultation visible in Southern Africa
	11	18	Venus 1.1° N of Regulus
	12	16	Jupiter 6° N of Moon
	15	18	Antares 0.6° N of Moon
			Occultation visible in Southern Africa
	27	03	Saturn 8° S of Moon
	30	21	Mercury 0.3° N of Regulus
Aug	2[d]	14[h]	Mars in conjunction with Sun
	4	01	Regulus 0.2° N of Moon
	4	15	Mercury 0.5° N of Moon
			Occultation visible in Southern Africa
	6	12	Venus 3° N of Moon
	9	04	Jupiter 6° N of Moon
	12	03	Antares 0.7° N of Moon
	14	23	Venus 1.4° S of Uranus
	16	17	Mercury greatest elongation 27° E
	23	12	Saturn 8° S of Moon
	31	07	Venus 0.2° S of Spica
Sep	1[d]	09[h]	Venus greatest elongation 46° E
	2	13	Mercury 2° S of Moon
	5	04	Saturn stationary
	5	06	Venus 2° N of Moon
	5	18	Jupiter 6° N of Moon
	8	10	Antares 0.7° N of Moon
	12	20	Mercury in inferior conjunction
	14	12	Venus 5° S of Jupiter
	19	20	Saturn 8° S of Moon
	23	13	Equinox
	27	13	Regulus 0.2° N of Moon
			Occultation visible in Southern Africa
	28	16	Mercury greatest elongation 18° W
	29	01	Mars 3° N of Moon
	29	04	Mercury 3° N of Moon
Oct	3[d]	10[h]	Jupiter 6° N of Moon
	4	04	Venus 0.7° S of Moon
	5	16	Antares 0.6° N of Moon
	6	12	Venus at greatest brilliancy
	13	07	Mercury 1.2° N of Uranus
	17	04	Saturn 8° S of Moon
	20	17	Venus stationary
	24	20	Regulus 0.3° N of Moon
	27	12	Mercury in superior conjunction
	27	22	Mars 4° N of Moon
	31	15	Venus 1° S of Moon
Nov	1[d]	22[h]	Antares 0.4° N of Moon
	7	02	Mars 0.5° N of Uranus
	9	09	Jupiter in conjunction with Sun
	10	11	Venus in inferior conjunction
	12	01	Saturn at opposition
	13	11	Saturn 8° S of Moon
	19	00	Mercury 3° N of Antares
	21	04	Regulus 0.6° N of Moon
			Occultation visible in Southern Africa
	24	12	Mars 3° N of Spica
	25	19	Mars 6° N of Moon
	27	02	Venus 5° N of Moon
	27	22	Jupiter 6° N of Moon
	29	08	Venus stationary
	30	10	Mercury 2° N of Moon
Dec	10[d]	16[h]	Saturn 8° S of Moon
	11	01	Mercury greatest elongation 21° E
	16	16	Venus at greatest brilliancy
	18	13	Regulus 0.9° N of Moon
	22	09	Solstice
	24	15	Mars 6° N of Moon
	25	07	Venus 9° N of Moon
	25	17	Jupiter 6° N of Moon
	26	14	Antares 0.4° N of Moon
			Occultation visible in Southern Africa
	28	16	Mercury in inferior conjunction

THE GILL MEDAL

Medallists

1956	H. Knox Shaw	1960	W. H. van den Bos
1957	W. P. Hirst	1963	A. W. J. Cousins
1958	J. Jackson	1965	R. H. Stoy
		1967	W. S. Finsen

The Gill Medal commemorates Sir David Gill, H.M. Astronomer at the Cape (1879-1907) renowned for his numerous researches, especially in positional and mathematical astronomy and geodesy, and for his part in consolidating astronomical science in Southern Africa.

The medal was designed by Dr. P. Kirchhoff, President of the Society at the time, in 1955. The obverse carries a bas-relief portrait of Gill: the reverse incorporates a representation of the heliometer with which Gill undertook much of his positional work including a determination of the solar parallax. The medal which is struck in silver is awarded by Council for services to astronomy with special consideration to services in Southern Africa.

PAST PRESIDENTS

1922 - 23	S. S. Hough	1945 - 46	R. H. Stoy
1923 - 24	R. T. A. Innes	1946 - 47	W. P. Hirst
1924 - 25	J. K. E. Halm	1947 - 48	J. Jackson
1925 - 26	W. Reid	1948 - 49	A. E. H. Bleksley
1926 - 27	H. Spencer Jones	1949 - 50	W. S. Finsen
1927 - 28	A. W. Roberts	1950 - 51	H. E. Krumm
1928 - 29	A. W. Long	1951 - 52	A. D. Thackeray
1929 - 30	H. E. Wood	1952 - 53	J. C. Bentley
1930 - 31	D. Cameron-Swan	1953 - 54	David S. Evans
1931 - 32	H. L. Alden	1954 - 55	P. Kirchhoff
1932 - 33	H. Spencer Jones	1955 - 56	W. H. van den Bos
1933 - 34	D. G. McIntyre	1956 - 57	S. C. Venter
1934 - 35	J. K. E. Halm	1957 - 58	M. W. Feast
1935 - 36	J. Jackson	1958 - 59	H. Haffner
1936 - 37	H. E. Houghton	1959 - 60	P. Smits
1937 - 38	J. S. Paraskevopoulos	1960 - 61	G. G. Cillie
1938 - 39	T. Mackenzie	1961 - 62	M. D. Overbeek
1939 - 40	R. A. Rossiter	1962 - 63	A. J. Wesselink
1940 - 41	E. B. Ford	1963 - 64	A. G. F. Morrisby
1941 - 42	H. Knox Shaw	1964 - 65	H. C. Lagerwey
1942 - 43	A. F. I. Forbes	1965 - 66	A. Menzies
1943 - 44	W. H. van den Bos	1966 - 67	G. R. Atkins
1944 - 45	A. W. J. Cousins	1967 - 68	J. Hers
		1968 - 69	J. C. Bennett

HONORARY MEMBERS

Prof. A. E. Bleksley	Dr. J. H. Oort
Mr. R. P. de Kock	Dr. R. O. Redman
Dr. D. S. Evans	Dr. J. Schilt
Prof. Ch. Fehrenbach	Dr. H. Shapley
Dr. W. S. Finsen	Dr. R. H. Stoy
Dr. H. Haffner	Dr. W. S. van den Bos
Dr. H. Knox Shaw	Dr. A. G. Velghe

Sir Richard Woolley

HONORARY SECRETARIES

1922	H. W. Schonegevel	1930 July	S. Skewes
1922 August	T. Mackenzie	1931	H. Horrocks
1923	C. L. O'Brien Dutten	1934 November	H. W. Schonegevel
1923 October	H. E. Houghton	1935	A. Menzies
		1965	T. W. Russo

society's calendar for 1970

Material and Notes for MNASSA by	15th of the month.
Nominations for Gill Medal by	April 8.
Essay Competition closes	May 31.
Nominations for Officers and Council by	June 15.
Subscriptions due	July 1.
Annual General Meeting at all Centres	4th Wednesday in July.

OBSERVING SECTIONS

The Observing Sections exist to encourage amateurs in carrying out useful research. Enquiries about their activities should be addressed to the Directors of the Observing Sections, whose names and addresses are given below:

Comets and Meteors
Mr. J. C. Bennett, 90 Malan Street, Riviera, Pretoria

Variable Stars
Mr. R. P. de Kock, The Royal Observatory, Observatory, Cape

A number of autonomous local Centres of the Society exists, which hold regular meetings. Information on local activity in fields such as "Moonwatch" (observation of artificial satellites), and telescope construction can be obtained through Centre Secretaries. Details of Centre organisation are as follows:

CAPE CENTRE

Chairman:	Mr. W. G. Grimwood
Vice-Chairman:	Mr. H. C. Lagerwey
Hon. Secretary:	Mr. H. B. Molyneux
Hon. Treasurer:	Mr. N. Saville
Hon. Auditor:	Mr. G. Orpen
Members of Committee:	Messrs. G. R. Atkins, P. W. Corben, G. H. Larmuth, N. O. Neale, and L. Posniak.
Centre Representative on Council:	Mr. J. S. Bondietti

Meetings in winter on 2nd Wednesday of month at the Royal Observatory.
Secretarial Address, c/o The Royal Observatory, Observatory, Cape.

TRANSVAAL CENTRE

Chairman:	Mr. C. J. Poole
Vice-Chairman:	Mr. F. Bateman
Hon. Secretary:	Mrs. M. M. FitzGerald
Hon. Treasurer:	Mrs. M. M. FitzGerald
Members of Committee:	Messrs. B. Armstrong, W. Bell, J. H. Botham, C. R. Jacobs, C. Papadopoulus, P. R. Smith, E. F. von Maltitz and Dr. M. Coleman
Republic Observatory Representative:	Mr. J. Hers
Centre Representative on Council:	Mr. C. J. Poole
Curator of Instruments:	Mr. T. E. Geary
Hon. Librarian:	Mrs. M. M. FitzGerald

Observing and Lecture meetings in alternate months.
Secretarial Address, c/o The Planetarium, Milner Park, Johannesburg.

BLOEMFONTEIN CENTRE

Chairman:	Mr. G. J. Muller
Vice-Chairman:	Mr. G. N. Walker
Hon. Secretary:	Mr. A. W. E. Schultz
Hon. Treasurer:	Mr. A. W. E. Schultz
Member of Committee:	Mr. D. B. de Leeuw
Centre Representative on Council:	Mr. G. J. Muller

Secretarial Address, 3 Glennton Court, King Edward Road, Bloemfontein

PRETORIA CENTRE

Chairman:	Mr. H. Kanowitz
Vice-Chairman:	Dr. R. P. Skoberla
Hon. Secretary:	Mr. J. A. Sterling
Hon. Treasurer:	Mr. J. C. Bennett
Members of Committee:	Messrs. A. Delen, A. Ernyes, J. G. Fletcher and J. Grobler.
Centre Representative on Council:	Mr. H. Kanowitz
Directory of Observatory	Mr. K. J. Sterling
Hon. Librarian:	Mr. J. Wolterbeek
Editor of Urania:	Mr. R. Mattheus

Secretarial Address, 5 Hekla Road, Valhalla, Pretoria

NATAL CENTRE

Chairman:	Mr. G. D. E. Davidson
Hon. Secretary:	Mr. S. H. White
Hon. Treasurer:	Mr. M. I. Burns
Members of Committee:	Messrs. J. Barker, S. S. Booysen, E. G. Hobson, H. Lell and D. S. Neave.
Centre Representative on Council:	Mr. S. S. Booysen

Secretarial Address, 23 Eleventh Avenue, Durban, Natal

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