

**THE
ASTRONOMICAL SOCIETY
OF
SOUTHERN AFRICA**

HANDBOOK FOR

1967

THE ASTRONOMICAL SOCIETY OF SOUTHERN AFRICA

1966-1967

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The Astronomical Society of South Africa was formed in July 1922, by the amalgamation of the Cape and Johannesburg Astronomical Associations which had been in active existence for several years. Its name was changed to the Astronomical Society of Southern Africa in 1956. The declared objects of the Society are:—

- (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. The Society issues, usually, eleven numbers of "The Monthly Notes of the Astronomical Society of Southern Africa" (M.N.A.S.S.A.) 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 R5.00 with an entrance fee of R2.50.

M.N.A.S.S.A. 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.

SOCIETY'S CALENDAR FOR 1967.

Material and Notes for M.N.A.S.S.A. by 20th of the month.

Nominations for Gill Medal by April 8.

Essay Competition closes May 31.

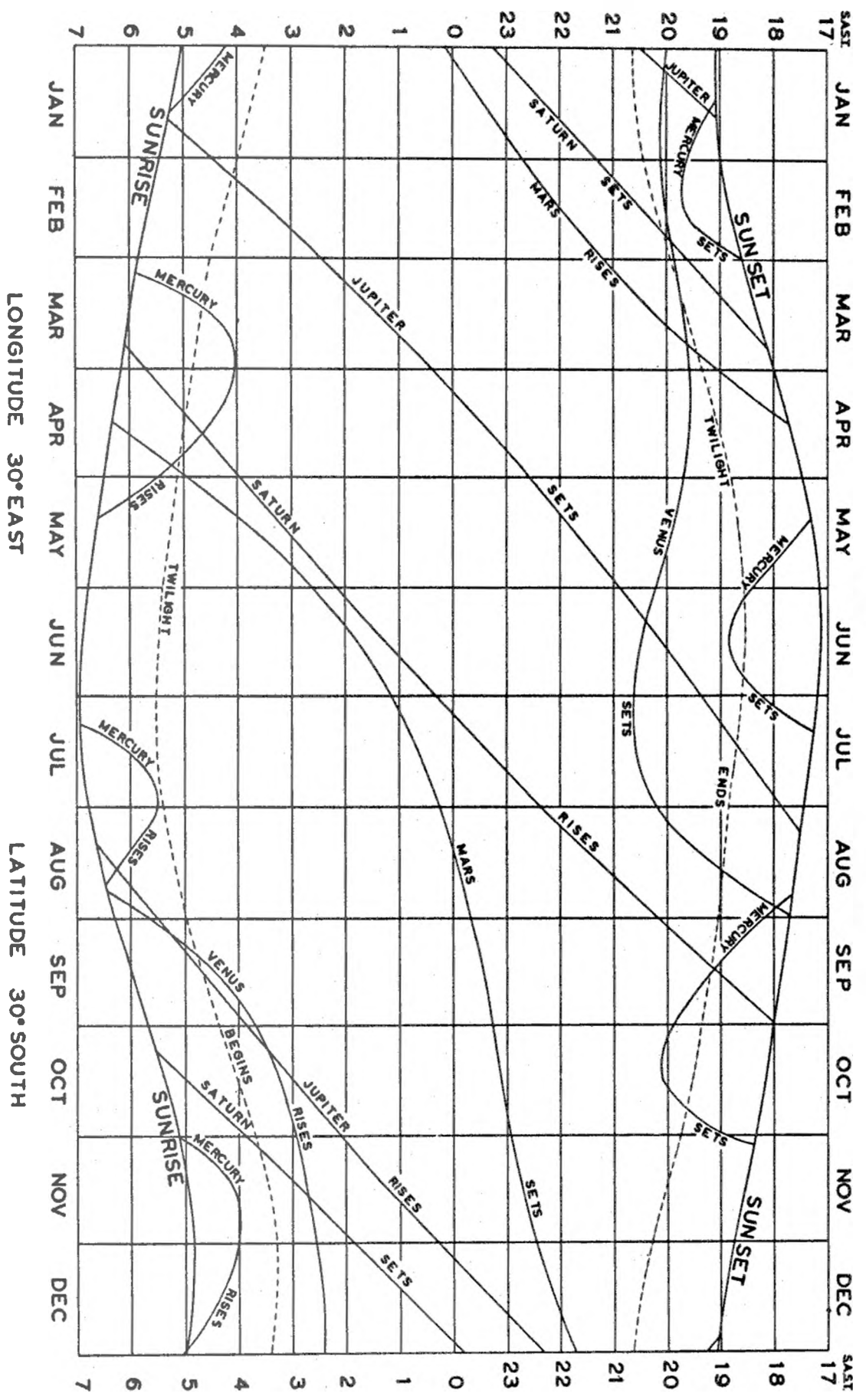
Nominations for Officers and Council by June 15.

Subscriptions due July 1.

Annual General Meeting at all Centres 4th Wednesday in July.

THE PLANETS AS SEEN FROM SOUTH AFRICA 1967

(For explanation see notes on planets)



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Price to Non-Members: 25 cents

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This Handbook was prepared by the Computing Section of the Society. Acknowledgement is made to Miss Y. Z. R. Thomas who typed the manuscript, and to H. M. Nautical Almanac Office for the occultation predictions.

Although every care has been taken in the compilation of the Handbook, it is distributed and sold on the explicit condition that neither the Astronomical Society of Southern Africa nor any of its members accepts any responsibility for errors.

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 November 7 at Durban

Sidereal time at 00h 00m S.A.S.T. on November 7	3 02
S.A.S.T. elapsed	<u>20 15</u>
	23 17
Correction for longitude	+04
Interval correction	<u>+03</u>
Required sidereal time	23 24

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 14.00 (2 p.m.) S.A.S.T. It is tabulated in the final column of Table II.

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 1967	S. A. S. T. of Sun's transit Longitude 30°E			Sidereal Time for Longitude 30° E				Julian Date at 14 hours
				S.A.S.T. 0 hours		S.A.S.T. 18 hours		
	h.	m.	s.	h.	m.	h.	m.	
January 1	12	03	19	6	40	0	42	2,439,492.0
" 11	12	07	44	7	19	1	22	502.0
" 21	12	11	12	7	58	2	01	512.0
" 31	12	13	24	8	38	2	41	522.0
February 10	12	14	17	9	17	3	20	532.0
" 20	12	13	52	9	57	4	00	542.0
March 2	12	12	20	10	36	4	39	552.0
" 12	12	09	59	11	15	5	18	562.0
" 22	12	07	07	11	55	5	58	572.0
April 1	12	04	05	12	34	6	37	2,439,582.9
" 11	12	01	14	13	14	7	17	592.0
" 21	11	58	50	13	53	7	56	602.0
May 1	11	57	07	14	33	8	36	612.0
" 11	11	56	19	15	12	9	15	622.0
" 21	11	56	27	15	51	9	54	632.0
" 31	11	57	28	16	31	10	34	642.0
June 10	11	59	11	17	10	11	13	652.0
" 20	12	01	17	17	50	11	53	662.0
" 30	12	03	24	18	29	12	32	672.0
July 10	12	05	10	19	09	13	12	2,439,682.0
" 20	12	06	14	19	48	13	51	692.0
" 30	12	06	22	20	27	14	30	702.0
August 9	12	05	32	21	07	15	10	712.0
" 19	12	03	43	21	46	15	49	722.0
" 29	12	01	05	22	26	16	29	732.0
September 8	11	57	53	23	05	17	08	742.0
" 18	11	54	22	23	45	17	48	752.0
" 28	11	50	53	0	24	18	27	762.0
October 8	11	47	46	1	03	19	06	2,439,772.0
" 18	11	45	19	1	43	19	46	782.0
" 28	11	43	53	2	22	20	25	792.0
November 7	11	43	42	3	02	21	05	802.0
" 17	11	44	52	3	41	21	44	812.0
" 27	11	47	26	4	21	22	24	822.0
December 7	11	51	13	5	00	23	03	832.0
" 17	11	55	50	5	39	23	42	842.0
" 27	12	00	47	6	19	0	22	852.0

	CAPE TOWN			DURBAN			BLOEMFONTEIN		
	SUNRISE	SUNSET		SUNRISE	SUNSET		SUNRISE	SUNSET	
Jan 1	05 ^h 38 ^m	20 ^h 01 ^m		04 ^h 58 ^m	19 ^h 01 ^m		05 ^h 21 ^m	19 ^h 18 ^m	
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 (min)		
	SUNRISE	SUNSET	SUNRISE	SUNSET	CIVIL	NAUTICAL	ASTRON
Jan 1	05 ^h 18 ^m	19 ^h 04 ^m	05 ^h 44 ^m	18 ^h 58 ^m	27	59	90
11	05 25	19 05	05 50	18 42	27	59	90
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	83
Aug 1	06 48	17 41	06 27	18 00	25	54	83
11	06 41	17 46	06 24	18 01	25	53	82
21	06 32	17 50	06 19	18 02	25	52	81
Sep 1	06 21	17 54	06 13	18 03	24	52	80
11	06 11	17 59	06 05	18 03	24	52	79
21	05 59	18 03	05 57	18 03	24	52	78
Oct 1	05 50	18 08	05 51	18 04	25	52	80
11	05 39	18 12	05 44	18 05	25	52	80
21	05 27	18 17	05 38	18 06	25	54	83
Nov 1	05 19	18 24	05 33	18 08	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	95

Civil Twilight is defined as beginning or ending when the Sun's centre is 6° 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° 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° below the horizon, at which time there is no light from the Sun whatever.

THE MOON 1967

PERIGEE			APOGEE		
Date	S. D.	H. P.	Date	S. D.	H. P.
Jan 1 ^d 12 ^h	16' 11"	59' 24"	Jan 16 ^d 23 ^h	14' 46"	54' 11"
Jan 28 17	16 26	60 17	Feb 13 17	14 44	54 04
Feb 25 23	16 39	61 05	Mar 13 03	14 42	53 58
Mar 26 10	16 45	61 27	Apr 9 05	14 42	53 56
Apr 23 21	16 42	61 16	May 6 13	14 43	54 00
May 22 04	16 32	60 40	Jun 3 04	14 45	54 08
Jun 18 22	16 18	59 51	Jun 30 22	14 47	54 15
Jul 14 22	16 10	59 18	Jul 28 16	14 47	54 16
Aug 9 17	16 17	59 47	Aug 25 11	14 45	54 10
Sep 6 10	16 31	60 37	Sep 22 02	14 43	54 02
Oct 4 16	16 41	61 15	Oct 19 10	14 42	53 58
Nov 2 04	16 44	61 26	Nov 15 10	14 43	53 59
Nov 30 16	16 38	61 04	Dec 12 20	14 44	54 05
Dec 28 21	16 25	60 16			

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			+ North Limb exposed		
- East Limb exposed			- South Limb exposed		
Jan 10 +4.7	Jul 7 -5.1	Jan 12 +6.6	Jul 9 -6.6		
23 -6.5	22 +5.1	26 -6.5	22 +6.6		
Feb 4 +5.5	Aug 3 -5.7	Feb 8 +6.5	Aug 5 -6.5		
20 -7.6	18 +5.3	23 -6.6	18 +6.6		
Mar 4 +6.7	31 -6.6	Mar 7 +6.7	Sep 1 -6.6		
20 -8.1	Sep 13 +6.4	22 -6.7	14 +6.7		
Apr 1 +7.3	28 -7.3	Apr 4 +6.8	28 -6.8		
17 -7.7	Oct 11 +7.5	18 -6.8	Oct 11 +6.8		
29 +7.3	26 -7.4	May 1 +6.8	26 -6.8		
May 15 -6.6	Nov 8 +7.9	15 -6.8	Nov 7 +6.8		
28 +6.6	23 -6.8	28 +6.7	22 -6.7		
Jun 10 -5.4	Dec 6 +7.4	Jun 12 -6.7	Dec 5 +6.7		
25 +5.7	21 -5.5	24 +6.6	19 -6.6		

THE MOON IN JANUARY 1967

DAY	At 0 ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2439000+	AGE	MOONRISE	MOONSET	MOONRISE	MOONSET
			S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.
S 1	491.4	19.8	23 ^h 05 ^m	9 ^h 56 ^m	23 ^h 51 ^m	10 ^h 28 ^m
M 2	492.4	20.8	23 41	10 59	.....	11 35
T 3	493.4	21.8	.....	12 01	0 21	12 42
W 4	494.4	22.8	0 15	13 03	0 51	13 49
T 5	495.4	23.8	0 50	14 06	1 21	14 57
F 6	496.4	24.8	1 28	15 09	1 54	16 05
S 7	497.4	25.8	2 09	16 14	2 32	17 14
M 8	498.4	26.8	2 56	17 18	3 15	18 19
T 9	499.4	27.8	3 48	18 18	4 06	19 21
T 10	500.4	28.8	4 45	19 14	5 02	20 14
W 11	501.4	0.2	5 44	20 01	6 03	21 00
T 12	502.4	1.2	6 43	20 43	7 05	21 39
F 13	503.4	2.2	7 41	21 20	8 07	22 12
S 14	504.4	3.2	8 37	21 53	9 06	22 40
S 15	505.4	4.2	9 30	22 22	10 03	23 05
M 16	506.4	5.2	10 21	22 50	10 59	23 30
T 17	507.4	6.2	11 12	23 18	11 53	23 53
W 18	508.4	7.2	12 03	23 47	12 48	.....
T 19	509.4	8.2	12 56	.....	13 46	0 18
F 20	510.4	9.2	13 51	0 18	14 44	0 45
S 21	511.4	10.2	14 48	0 53	15 46	1 17
S 22	512.4	11.2	15 49	1 33	16 50	1 54
M 23	513.4	12.2	16 50	2 21	17 53	2 39
T 24	514.4	13.2	17 51	3 16	18 54	3 33
W 25	515.4	14.2	18 47	4 18	19 48	4 36
T 26	516.4	15.2	19 38	5 25	20 35	5 46
F 27	517.4	16.2	20 23	6 34	21 15	6 59
S 28	518.4	17.2	21 03	7 42	21 50	8 12
S 29	519.4	18.2	21 40	8 49	22 22	9 23
M 30	520.4	19.2	22 15	9 53	22 53	10 33
T 31	521.4	20.2	22 51	10 56	23 23	11 42

PHASES OF THE MOON

Last Quarter	Jan 3 ^d	16 ^h	19 ^m
New Moon	10	20	06
First Quarter	18	21	42
Full Moon	26	08	41

THE MOON IN FEBRUARY 1967

DAY	At 0 ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2439000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
W 1	522.4	21.2	23 ^h 28 ^m	12 ^h 00 ^m	23 ^h 56 ^m	12 ^h 49 ^m
T 2	523.4	22.2	.....	13 03	.....	13 57
F 3	524.4	23.2	0 08	14 07	0 32	15 06
S 4	525.4	24.2	0 53	15 11	1 13	16 12
S 5	526.4	25.2	1 42	16 11	2 00	17 14
M 6	527.4	26.2	2 37	17 07	2 54	18 09
T 7	528.4	27.2	3 35	17 57	3 52	18 57
W 8	529.4	28.2	4 34	18 40	4 54	19 37
T 9	530.4	29.2	5 31	19 18	5 55	20 11
F 10	531.4	0.5	6 28	19 52	6 56	20 41
S 11	532.4	1.5	7 22	20 22	7 53	21 07
S 12	533.4	2.5	8 14	20 51	8 50	21 32
M 13	534.4	3.5	9 05	21 18	9 45	21 55
T 14	535.4	4.5	9 56	21 47	10 40	22 20
W 15	536.4	5.5	10 47	22 16	11 35	22 45
T 16	537.4	6.5	11 41	22 49	12 32	23 14
F 17	538.4	7.5	12 36	23 26	13 32	23 48
S 18	539.4	8.5	13 34	.....	14 34	.....
S 19	540.4	9.5	14 34	0 09	15 36	0 28
M 20	541.4	10.5	15 34	0 59	16 37	1 16
T 21	542.4	11.5	16 31	1 57	17 33	2 14
W 22	543.4	12.5	17 25	3 01	18 24	3 20
T 23	544.4	13.5	18 12	4 10	19 07	4 32
F 24	545.4	14.5	18 55	5 19	19 45	5 46
S 25	546.4	15.5	19 35	6 28	20 19	7 00
S 26	547.4	16.5	20 12	7 35	20 50	8 13
M 27	548.4	17.5	20 48	8 42	21 22	9 25
T 28	549.4	18.5	21 26	9 48	21 55	10 36

PHASES OF THE MOON

Last Quarter	Feb 2 ^d	01 ^h	03 ^m
New Moon	9	12	44
First Quarter	17	17	57
Full Moon	24	19	44

THE MOON IN MARCH 1967

DAY	At 0 ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2439000+	AGE	MOONRISE	MOONSET	MOONRISE	MOONSET
			S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.
W 1	550.4	19.5	22 ^h 07 ^m	10 ^h 54 ^m	22 ^h 30 ^m	11 ^h 47 ^m
T 2	551.4	20.5	22 50	11 59	23 11	12 57
F 3	552.4	21.5	23 39	13 05	23 57	14 06
S 4	553.4	22.5	.....	14 07	.....	15 09
S 5	554.4	23.5	0 32	15 04	0 49	16 07
M 6	555.4	24.5	1 29	15 55	1 46	16 56
T 7	556.4	25.5	2 27	16 40	2 47	17 38
W 8	557.4	26.5	3 25	17 19	3 48	18 13
T 9	558.4	27.5	4 21	17 53	4 48	18 44
F 10	559.4	28.5	5 16	18 24	5 46	19 11
S 11	560.4	29.5	6 10	18 53	6 43	19 35
S 12	561.4	0.7	7 00	19 21	7 38	19 59
M 13	562.4	1.7	7 50	19 49	8 33	20 23
T 14	563.4	2.7	8 42	20 18	9 28	20 48
W 15	564.4	3.7	9 34	20 49	10 25	21 15
T 16	565.4	4.7	10 28	21 24	11 23	21 47
F 17	566.4	5.7	11 24	22 04	12 23	22 23
S 18	567.4	6.7	12 23	22 50	13 24	23 07
S 19	568.4	7.7	13 21	23 42	14 25	23 59
M 20	569.4	8.7	14 18	.....	15 21	.....
T 21	570.4	9.7	15 12	0 42	16 12	1 00
W 22	571.4	10.7	16 01	1 47	16 57	2 07
T 23	572.4	11.7	16 45	2 55	17 37	3 19
F 24	573.4	12.7	17 25	4 03	18 13	4 32
S 25	574.4	13.7	18 04	5 11	18 45	5 46
S 26	575.4	14.7	18 41	6 18	19 17	6 59
M 27	576.4	15.7	19 18	7 26	19 50	8 11
T 28	577.4	16.7	19 59	8 34	20 25	9 25
W 29	578.4	17.7	20 42	9 43	21 05	10 39
T 30	579.4	18.7	21 32	10 51	21 50	11 51
F 31	580.4	19.7	22 25	11 57	22 42	12 59

PHASES OF THE MOON

Last Quarter	Mar 3 ^d	11 ^h	11 ^m
New Moon	11	06	30
First Quarter	19	10	32
Full Moon	26	05	21

THE MOON IN APRIL 1967

DAY	At 0 ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2439000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
S 1	581.4	20.7	23 ^h 23 ^m	12 ^h 58 ^m	23 ^h 39 ^m	14 ^h 01 ^m
S 2	582.4	21.7	.....	13 53	.....	14 54
M 3	583.4	22.7	0 21	14 40	0 40	15 39
T 4	584.4	23.7	1 19	15 20	1 41	16 16
W 5	585.4	24.7	2 17	15 56	2 42	16 48
T 6	586.4	25.7	3 11	16 28	3 41	17 15
F 7	587.4	26.7	4 06	16 57	4 37	17 40
S 8	588.4	27.7	4 57	17 25	5 33	18 04
S 9	589.4	28.7	5 46	17 52	6 28	18 27
M 10	590.4	0.0	6 38	18 20	7 22	18 52
T 11	591.4	1.0	7 29	18 51	8 19	19 18
W 12	592.4	2.0	8 23	19 24	9 17	19 48
T 13	593.4	3.0	9 19	20 03	10 16	20 23
F 14	594.4	4.0	10 17	20 46	11 17	21 04
S 15	595.4	5.0	11 14	21 36	12 17	21 52
S 16	596.4	6.0	12 11	22 32	13 14	22 49
M 17	597.4	7.0	13 05	23 33	14 06	23 52
T 18	598.4	8.0	13 54	.....	14 52	.....
W 19	599.4	9.0	14 38	0 38	15 33	1 00
T 20	600.4	10.0	15 19	1 44	16 08	2 10
F 21	601.4	11.0	15 56	2 49	16 41	3 21
S 22	602.4	12.0	16 33	3 55	17 12	4 32
S 23	603.4	13.0	17 09	5 01	17 44	5 44
M 24	604.4	14.0	17 49	6 09	18 18	6 57
T 25	605.4	15.0	18 31	7 19	18 55	8 12
W 26	606.4	16.0	19 19	8 29	19 39	9 27
T 27	607.4	17.0	20 12	9 39	20 29	10 40
F 28	608.4	18.0	21 10	10 44	21 27	11 47
S 29	609.4	19.0	22 10	11 44	22 28	12 47
S 30	610.4	20.0	23 11	12 35	23 31	13 36

PHASES OF THE MOON

Last Quarter	Apr 1 ^d	22 ^h	59 ^m
New Moon	10	00	21
First Quarter	17	22	48
Full Moon	24	14	04

THE MOON IN MAY 1967

DAY	At 0 ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2439000+	AGE	MOONRISE	MOONSET	MOONRISE	MOONSET
			S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.
M 1	611.4	21.0	.....^h ^m	13 ^h 19 ^m	.....^h ^m	14 ^h 16 ^m
T 2	612.4	22.0	0 10	13 57	0 33	14 50
W 3	613.4	23.0	1 06	14 30	1 34	15 19
T 4	614.4	24.0	1 59	15 00	2 31	15 45
F 5	615.4	25.0	2 51	15 28	3 27	16 09
S 6	616.4	26.0	3 42	15 55	4 22	16 32
S 7	617.4	27.0	4 33	16 23	5 17	16 56
M 8	618.4	28.0	5 24	16 53	6 13	17 21
T 9	619.4	29.0	6 18	17 26	7 10	17 51
W 10	620.4	0.3	7 14	18 02	8 10	18 24
T 11	621.4	1.3	8 11	18 44	9 11	19 03
F 12	622.4	2.3	9 09	19 32	10 12	19 49
S 13	623.4	3.3	10 06	20 27	11 10	20 44
S 14	624.4	4.3	11 01	21 26	12 03	21 44
M 15	625.4	5.3	11 51	22 28	12 51	22 49
T 16	626.4	6.3	12 36	23 32	13 32	23 58
W 17	627.4	7.3	13 16	.....	14 08	.....
T 18	628.4	8.3	13 54	0 36	14 40	1 06
F 19	629.4	9.3	14 29	1 39	15 10	2 14
S 20	630.4	10.3	15 04	2 43	15 41	3 23
S 21	631.4	11.3	15 40	3 48	16 12	4 34
M 22	632.4	12.3	16 20	4 55	16 47	5 46
T 23	633.4	13.3	17 05	6 04	17 28	7 00
W 24	634.4	14.3	17 52	7 15	18 15	8 14
T 25	635.4	15.3	18 52	8 24	19 09	9 26
F 26	636.4	16.3	19 54	9 28	20 10	10 31
S 27	637.4	17.3	20 56	10 24	21 15	11 26
S 28	638.4	18.3	21 58	11 13	22 20	12 12
M 29	639.4	19.3	22 56	11 54	23 22	12 49
T 30	640.4	20.3	23 52	12 30	.....	13 20
W 31	641.4	21.3	.....	13 01	0 21	13 48

PHASES OF THE MOON

Last Quarter	May 1 ^d	12 ^h	33 ^m
New Moon	9	16	56
First Quarter	17	07	18
Full Moon	23	22	23
Last Quarter	31	03	52

THE MOON IN JUNE 1967

DAY	At 0 ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2439000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
T 1	642.4	22.3	0 ^h 45 ^m	13 ^h 30 ^m	1 ^h 19 ^m	14 ^h 12 ^m
F 2	643.4	23.3	1 36	13 57	2 14	14 36
S 3	644.4	24.3	2 27	14 25	3 09	14 59
S 4	645.4	25.3	3 18	14 54	4 04	15 24
M 5	646.4	26.3	4 11	15 25	5 01	15 53
T 6	647.4	27.3	5 05	16 01	6 01	16 24
W 7	648.4	28.3	6 03	16 42	7 01	17 01
T 8	649.4	29.3	7 02	17 28	8 03	17 46
F 9	650.4	0.7	8 00	18 21	9 04	18 38
S 10	651.4	1.7	8 56	19 20	9 59	19 37
S 11	652.4	2.7	9 48	20 22	10 49	20 43
M 12	653.4	3.7	10 35	21 26	11 32	21 50
T 13	654.4	4.7	11 17	22 29	12 09	22 57
W 14	655.4	5.7	11 54	23 32	12 42	.....
T 15	656.4	6.7	12 29	.....	13 12	0 05
F 16	657.4	7.7	13 03	0 33	13 42	1 12
S 17	658.4	8.7	13 38	1 36	14 11	2 19
S 18	659.4	9.7	14 15	2 40	14 43	3 28
M 19	660.4	10.7	14 56	3 46	15 20	4 39
T 20	661.4	11.7	15 43	4 54	16 03	5 52
W 21	662.4	12.7	16 37	6 03	16 54	7 04
T 22	663.4	13.7	17 36	7 10	17 52	8 12
F 23	664.4	14.7	18 38	8 10	18 56	9 13
S 24	665.4	15.7	19 41	9 03	20 02	10 03
S 25	666.4	16.7	20 43	9 48	21 07	10 44
M 26	667.4	17.7	21 40	10 26	22 09	11 18
T 27	668.4	18.7	22 36	10 59	23 08	11 47
W 28	669.4	19.7	23 28	11 30	.....	12 14
T 29	670.4	20.7	.....	11 58	0 05	12 38
F 30	671.4	21.7	0 19	12 26	1 00	13 01

PHASES OF THE MOON

New Moon	Jun 8 ^d	07 ^h	14 ^m
First Quarter	15	13	12
Full Moon	22	06	57
Last Quarter	29	20	40

THE MOON IN JULY 1967

DAY	At 0 ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2439000+	AGE	MOONRISE	MOONSET	MOONRISE	MOONSET
			S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.
S 1	672.4	22.7	1 ^h 10 ^m	12 ^h 54 ^m	1 ^h 55 ^m	13 ^h 26 ^m
S 2	673.4	23.7	2 02	13 25	2 52	13 52
M 3	674.4	24.7	2 56	13 58	3 49	14 22
T 4	675.4	25.7	3 52	14 37	4 49	14 57
W 5	676.4	26.7	4 51	15 21	5 51	15 39
T 6	677.4	27.7	5 50	16 12	6 52	16 29
F 7	678.4	28.7	6 48	17 10	7 51	17 27
S 8	679.4	0.2	7 43	18 13	8 44	18 32
S 9	680.4	1.2	8 32	19 17	9 30	19 40
M 10	681.4	2.2	9 16	20 22	10 10	20 49
T 11	682.4	3.2	9 54	21 25	10 44	21 58
W 12	683.4	4.2	10 32	22 28	11 15	23 05
T 13	684.4	5.2	11 05	23 30	11 45	.....
F 14	685.4	6.2	11 39	.....	12 13	0 11
S 15	686.4	7.2	12 14	0 32	12 45	1 19
S 16	687.4	8.2	12 53	1 37	13 18	2 29
M 17	688.4	9.2	13 37	2 43	13 58	3 39
T 18	689.4	10.2	14 26	3 49	14 45	4 49
W 19	690.4	11.2	15 23	4 55	15 40	5 58
T 20	691.4	12.2	16 23	5 55	16 40	7 00
F 21	692.4	13.2	17 26	6 53	17 46	7 54
S 22	693.4	14.2	18 28	7 41	18 51	8 39
S 23	694.4	15.2	19 28	8 22	19 55	9 16
M 24	695.4	16.2	20 24	8 57	20 55	9 47
T 25	696.4	17.2	21 18	9 29	21 54	10 14
W 26	697.4	18.2	22 11	9 58	22 50	10 39
T 27	698.4	19.2	23 02	10 26	23 46	11 03
F 28	699.4	20.2	23 53	10 53	.....	11 27
S 29	700.4	21.2	.....	11 23	0 41	11 52
S 30	701.4	22.2	0 46	11 55	1 38	12 21
M 31	702.4	23.2	1 41	12 31	2 37	12 53

PHASES OF THE MOON

New Moon	Jul 7 ^d	19 ^h	01 ^m
First Quarter	14	17	53
Full Moon	21	16	40
Last Quarter	29	14	15

THE MOON IN AUGUST 1967

DAY	At 0 ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2439000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
T 1	703.4	24.2	2 ^h 38 ^m	13 ^h 13 ^m	3 ^h 37 ^m	13 ^h 31 ^m
W 2	704.4	25.2	3 37	14 01	4 39	14 18
T 3	705.4	26.2	4 35	14 56	5 39	15 13
F 4	706.4	27.2	5 31	15 57	6 34	16 15
S 5	707.4	28.2	6 24	17 02	7 24	17 23
S 6	708.4	29.2	7 10	18 09	8 04	18 34
M 7	709.4	0.8	7 52	19 15	8 43	19 45
T 8	710.4	1.8	8 30	20 19	9 16	20 54
W 9	711.4	2.8	9 05	21 22	9 46	22 03
T 10	712.4	3.8	9 40	22 26	10 16	23 12
F 11	713.4	4.8	10 15	23 30	10 47	.....
S 12	714.4	5.8	10 53	.....	11 19	0 21
S 13	715.4	6.8	11 35	0 35	11 57	1 31
M 14	716.4	7.8	12 22	1 42	12 41	2 41
T 15	717.4	8.8	13 15	2 47	12 32	3 49
W 16	718.4	9.8	14 13	3 50	14 30	4 52
T 17	719.4	10.8	15 15	4 46	15 33	5 48
F 18	720.4	11.8	16 17	5 36	16 36	6 35
S 19	721.4	12.8	17 17	6 19	17 42	7 15
S 20	722.4	13.8	18 15	6 56	18 44	7 47
M 21	723.4	14.8	19 09	7 29	19 43	8 16
T 22	724.4	15.8	20 02	7 58	20 40	8 41
W 23	725.4	16.8	20 53	8 27	21 36	9 05
T 24	726.4	17.8	21 45	8 54	22 32	9 28
F 25	727.4	18.8	22 39	9 23	23 28	9 53
S 26	728.4	19.8	23 31	9 54	.....	10 20
S 27	729.4	20.8	.....	10 28	0 26	10 50
M 28	730.4	21.8	0 27	11 06	1 25	11 25
T 29	731.4	22.8	1 24	11 51	2 25	12 08
W 30	732.4	23.8	2 21	12 42	3 25	12 58
T 31	733.4	24.8	3 18	13 40	4 22	13 56

PHASES OF THE MOON

New Moon	Aug 6 ^d	04 ^h 49 ^m
First Quarter	12	22 45
Full Moon	20	04 27
Last Quarter	28	07 35

THE MOON IN SEPTEMBER 1967

DAY	At 0 ^h S.A. S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2439000+	AGE	MOONRISE	MOONSET	MOONRISE	MOONSET
			S.A.S.T.	S.A.S.T.	S.A. S.T.	S.A.S.T.
F 1	734.4	25.8	4 ^h 12 ^m	14 ^h 42 ^m	5 ^h 13 ^m	15 ^h 02 ^m
S 2	735.4	26.8	5 01	15 48	5 58	16 12
S 3	736.4	27.8	5 45	16 55	6 38	17 23
M 4	737.4	28.8	6 25	18 01	7 13	18 34
T 5	738.4	0.4	7 01	19 07	7 45	19 46
W 6	739.4	1.4	7 38	20 12	8 16	20 57
T 7	740.4	2.4	8 13	21 19	8 46	22 08
F 8	741.4	3.4	8 51	22 26	9 19	23 20
S 9	742.4	4.4	9 32	23 34	9 55	.....
S 10	743.4	5.4	10 19	.....	10 39	0 32
M 11	744.4	6.4	11 11	0 40	11 28	1 42
T 12	745.4	7.4	12 08	1 44	12 24	2 48
W 13	746.4	8.4	13 08	2 43	13 25	3 46
T 14	747.4	9.4	14 10	3 34	14 30	4 35
F 15	748.4	10.4	15 09	4 18	15 33	5 15
S 16	749.4	11.4	16 07	4 56	16 35	5 49
S 17	750.4	12.4	17 03	5 30	17 34	6 18
M 18	751.4	13.4	17 55	6 00	18 31	6 44
T 19	752.4	14.4	18 47	6 28	19 27	7 09
W 20	753.4	15.4	19 38	7 56	20 23	7 32
T 21	754.4	16.4	20 30	7 24	21 20	7 56
F 22	755.4	17.4	21 23	7 54	22 17	8 21
S 23	756.4	18.4	22 18	8 26	23 15	8 51
S 24	757.4	19.4	23 15	9 03	.....	9 23
M 25	758.4	20.4	.....	9 44	0 15	10 02
T 26	759.4	21.4	0 12	10 32	1 14	10 48
W 27	760.4	22.4	1 08	11 25	2 11	11 42
T 28	761.4	23.4	2 01	12 25	3 03	12 43
F 29	762.4	24.4	2 51	13 28	3 50	13 49
S 30	763.4	25.4	3 36	14 33	4 32	14 59

PHASES OF THE MOON

New Moon	Sep 4 ^d	13 ^h 38 ^m
First Quarter	11	05 06
Full Moon	18	19 00
Last Quarter	26	23 44

THE MOON IN OCTOBER 1967

DAY	At 0 ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2439000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
S 1	764.4	26.4	4 ^h 16 ^m	15 ^h 39 ^m	5 ^h 08 ^m	16 ^h 10 ^m
M 2	765.4	27.4	4 54	16 45	5 41	17 21
T 3	766.4	28.4	5 31	17 51	6 11	18 32
W 4	767.4	0.1	6 07	18 58	6 43	19 45
T 5	768.4	1.1	6 45	20 07	7 15	20 59
F 6	769.4	2.1	7 26	21 18	7 51	22 15
S 7	770.4	3.1	8 12	22 28	8 33	23 29
S 8	771.4	4.1	9 03	23 36	9 21	.....
M 9	772.4	5.1	10 00	.....	10 17	0 39
T 10	773.4	6.1	11 01	0 37	11 17	1 41
W 11	774.4	7.1	12 03	1 32	12 22	2 33
T 12	775.4	8.1	13 04	2 18	13 26	3 16
F 13	776.4	9.1	14 02	2 58	14 29	3 52
S 14	777.4	10.1	14 57	3 32	15 28	4 22
S 15	778.4	11.1	15 51	4 03	16 26	4 49
M 16	779.4	12.1	16 42	4 32	17 21	5 13
T 17	780.4	13.1	17 33	5 00	18 18	5 37
W 18	781.4	14.1	18 26	5 27	19 13	6 01
T 19	782.4	15.1	19 18	5 56	20 09	6 25
F 20	783.4	16.1	20 12	6 28	21 08	6 53
S 21	784.4	17.1	21 08	7 02	22 07	7 24
S 22	785.4	18.1	22 04	7 42	23 07	8 00
M 23	786.4	19.1	23 01	8 27	.....	8 43
T 24	787.4	20.1	23 54	9 18	0 04	9 34
W 25	788.4	21.1	.....	10 14	0 57	10 31
T 26	789.4	22.1	0 43	11 14	1 44	11 34
F 27	790.4	23.1	1 29	12 16	2 26	12 40
S 28	791.4	24.1	2 10	13 20	3 03	13 47
S 29	792.4	25.1	2 48	14 24	3 37	14 57
M 30	793.4	26.1	3 24	15 28	4 08	16 06
T 31	794.4	27.1	4 00	16 34	4 38	17 17

PHASES OF THE MOON

New Moon	Oct 3 ^d	22 ^h	24 ^m
First Quarter	10	14	11
Full Moon	18	12	11
Last Quarter	26	14	04

THE MOON IN NOVEMBER 1967

DAY	At O ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2439000+	AGE	MOONRISE	MOONSET	MOONRISE	MOONSET
			S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.
W 1	795.4	28.1	4 ^h 36 ^m	17 ^h 42 ^m	5 ^h 09 ^m	18 ^h 31 ^m
T 2	796.4	29.1	5 15	18 52	5 43	19 47
F 3	797.4	0.7	5 59	20 05	6 22	21 04
S 4	798.4	1.7	6 49	21 17	7 09	22 19
S 5	799.4	2.7	7 46	22 24	8 03	23 27
M 6	800.4	3.7	8 48	23 23	9 04	.....
T 7	801.4	4.7	9 52	.....	10 10	0 26
W 8	802.4	5.7	10 55	0 15	11 16	1 14
T 9	803.4	6.7	11 55	0 57	12 21	1 53
F 10	804.4	7.7	12 52	1 34	13 21	2 26
S 11	805.4	8.7	13 46	2 06	14 20	2 53
S 12	806.4	9.7	14 38	2 35	15 16	3 19
M 13	807.4	10.7	15 29	3 03	16 12	3 43
T 14	808.4	11.7	16 20	3 31	17 07	4 05
W 15	809.4	12.7	17 12	3 59	18 03	4 30
T 16	810.4	13.7	18 06	4 29	19 01	4 56
F 17	811.4	14.7	19 02	5 03	20 00	5 26
S 18	812.4	15.7	19 59	5 41	21 00	6 01
S 19	813.4	16.7	20 55	6 25	21 58	6 42
M 20	814.4	17.7	21 50	7 14	22 53	7 30
T 21	815.4	18.7	22 40	8 09	23 42	8 25
W 22	816.4	19.7	23 26	9 07	.....	9 25
T 23	817.4	20.7	.....	10 08	0 25	10 30
F 24	818.4	21.7	0 08	11 09	1 03	11 35
S 25	819.4	22.7	0 46	12 10	1 36	12 41
S 26	820.4	23.7	1 20	13 12	2 06	13 47
M 27	821.4	24.7	1 54	14 14	2 35	14 55
T 28	822.4	25.7	2 29	15 18	3 05	16 05
W 29	823.4	26.7	3 06	16 26	3 36	17 18
T 30	824.4	27.7	3 45	17 37	4 12	18 34

PHASES OF THE MOON

New Moon	Nov 2 ^d	07 ^h	49 ^m
First Quarter	9	03	00
Full Moon	17	06	53
Last Quarter	25	02	24

THE MOON IN DECEMBER 1967

DAY	At 0 ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2439000+	AGE	MOONRISE	MOONSET	MOONRISE	MOONSET
			S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.
F 1	825.4	28.7	4 ^h 33 ^m	18 ^h 49 ^m	4 ^h 54 ^m	19 ^h 50 ^m
S 2	826.4	0.2	5 26	20 00	5 45	21 04
S 3	827.4	1.2	6 28	21 06	6 44	22 09
M 4	828.4	2.2	7 33	22 03	7 50	23 04
T 5	829.4	3.2	8 39	22 51	8 59	23 48
W 6	830.4	4.2	9 42	23 32	10 06	.....
T 7	831.4	5.2	10 43	.....	11 10	0 24
F 8	832.4	6.2	11 39	0 06	12 11	0 54
S 9	833.4	7.2	12 32	0 37	13 08	1 21
S 10	834.4	8.2	13 24	1 05	14 05	1 46
M 11	835.4	9.2	14 15	1 33	15 00	2 09
T 12	836.4	10.2	15 07	2 01	15 56	2 33
W 13	837.4	11.2	16 00	2 30	16 53	2 59
T 14	838.4	12.2	16 55	3 03	17 51	3 27
F 15	839.4	13.2	17 51	3 40	18 52	4 00
S 16	840.4	14.2	18 49	4 21	19 52	4 39
S 17	841.4	15.2	19 45	5 09	20 48	5 26
M 18	842.4	16.2	20 37	6 03	21 39	6 20
T 19	843.4	17.2	21 25	7 01	22 25	7 19
W 20	844.4	18.2	22 08	8 02	23 04	8 23
T 21	845.4	19.2	22 46	9 03	23 38	9 28
F 22	846.4	20.2	23 21	10 04	.....	10 34
S 23	847.4	21.2	23 55	11 04	0 08	11 39
S 24	848.4	22.2	.....	12 04	0 37	12 44
M 25	849.4	23.2	0 27	13 05	1 05	13 50
T 26	850.4	24.2	1 02	14 09	1 34	14 58
W 27	851.4	25.2	1 39	15 15	2 07	16 10
T 28	852.4	26.2	2 21	16 25	2 44	17 24
F 29	853.4	27.2	3 10	17 37	3 30	18 39
S 30	854.4	28.2	4 07	18 45	4 24	19 48
S 31	855.4	29.2	5 10	19 46	5 26	20 49

PHASES OF THE MOON

New Moon	Dec 1 ^d	18 ^h	10 ^m
First Quarter	8	19	58
Full Moon	17	01	22
Last Quarter	24	12	48
New Moon	31	05	39

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
Luanshya	-28.400	-13.127

Explanation:

Z.C. - is the number in the "Catalogue of 3539 Zodiacal 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:

<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 15%;">Z.C.</td><td style="width: 10%;"></td><td style="width: 10%;"></td><td style="width: 15%;"></td></tr> <tr><td>465</td><td>δ</td><td>Ari</td><td></td></tr> <tr><td>1122</td><td>ι</td><td>Gem</td><td></td></tr> <tr><td>1189</td><td>ϕ</td><td>Gem</td><td></td></tr> <tr><td>1702</td><td>ν</td><td>Vir</td><td></td></tr> <tr><td>1821</td><td>γ</td><td>Vir</td><td></td></tr> <tr><td>1891</td><td>θ</td><td>Vir</td><td></td></tr> <tr><td>2118</td><td>α</td><td>Lib</td><td></td></tr> <tr><td>2290</td><td>δ</td><td>Sco</td><td></td></tr> </table>	Z.C.				465	δ	Ari		1122	ι	Gem		1189	ϕ	Gem		1702	ν	Vir		1821	γ	Vir		1891	θ	Vir		2118	α	Lib		2290	δ	Sco		<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 15%;">Z.C.</td><td style="width: 10%;"></td><td style="width: 10%;"></td><td style="width: 15%;"></td></tr> <tr><td>2347</td><td>19</td><td>Sco</td><td></td></tr> <tr><td>2554</td><td>χ</td><td>Sgr</td><td></td></tr> <tr><td>2784</td><td>τ</td><td>Sgr</td><td></td></tr> <tr><td>3164</td><td>ϵ</td><td>Cap</td><td></td></tr> <tr><td>3175</td><td>κ</td><td>Cap</td><td></td></tr> <tr><td>3419</td><td>ψ^1</td><td>Aqr</td><td></td></tr> <tr><td>3425</td><td>ψ^2</td><td>Aqr</td><td></td></tr> </table>	Z.C.				2347	19	Sco		2554	χ	Sgr		2784	τ	Sgr		3164	ϵ	Cap		3175	κ	Cap		3419	ψ^1	Aqr		3425	ψ^2	Aqr	
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Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town			
						P.A.	h. m.	a	b
Jan									
21	624	K0	7.0	+23° 34'	D	-	-	-	-
22	762	B5	6.6	+26 22	D	-	-	-	-
23	780	G5	6.8	+26 24	D	-	-	-	-
31	1869	K0	6.1	-03 06	R	260°	01 48.5	-1.7	-0.8
31	1875 _m	F0	6.5	-03 24	R	323	03 47.7	-1.1	-2.0
Feb									
2	2118	A3	2.9	-15 50	D	105	03 37.7	-1.1	-1.4
2	2118	A3	2.9	-15 50	R	324	04 44.6	-0.8	-2.3
2	2117	F5	5.3	-15 47	D	-	-	-	-
2	2117	F5	5.3	-15 47	R	326	04 35.5	-0.7	-2.4
4	2398	A5	6.1	-24 22	R	234	04 02.5	-1.7	+0.3
15	325	K0	7.4	+13 41	D	-	-	-	-
17	563	B9	6.9	+22 23	D	104	20 31.0	-2.4	+0.4
17	566	B9	5.9	+22 06	D	-	-	-	-
18	717	A0	7.5	+25 57	D	65	22 38.7	-1.7	+1.6
20	1022 _m	B8	5.8	+28 19	D	-	-	-	-
20	1026	K0	6.5	+28 15	D	116	20 45.8	-2.4	-0.9
21	1035	K0	6.8	+27 44	D	-	-	-	-
26	1702	M0	4.2	+06 49	D	61	00 17.8	-	-
26	1702	M0	4.2	+06 49	R	14	00 46.8	-	-
27	1821 _m	F0	2.9	-01 11	D	185	02 06.7	+0.3	-3.4
27	1821 _m	F0	2.9	-01 11	R	257	02 50.9	-3.3	+0.7
27	1825	G0	6.1	-01 18	R	310	04 06.7	-1.5	-1.0
Mar									
14	290	A2	6.1	+12 03	D	103	19 39.6	-0.9	+0.9
20	1103	M0	5.9	+27 59	D	126	19 35.9	-2.3	-1.2
21	1252	K2	7.4	+25 30	D	164	22 29.9	-0.4	-1.8
29	2290	B0	2.5	-22 29	D	191	24 41.2	-	-
30	2290	B0	2.5	-22 29	R	226	01 00.9	-	-
30	2305	B8	5.9	-23 28	R	-	-	-	-
31	2458	A0	6.2	-26 27	R	-	-	-	-
Apr									
2	2784	K0	3.4	-27 45	D	-	-	-	-
2	2784	K0	3.4	-27 45	R	-	-	-	-
14	750 _m	F5	6.9	+26 36	D	-	-	-	-
17	1189	A2	5.0	+26 54	D	-	-	-	-
21	1586	K0	7.5	+12 38	D	81	00 39.9	-1.9	+1.5
23	1821 _m	F0	2.9	-01 11	D	123	00 20.1	-1.6	-0.8
23	1821 _m	F0	2.9	-01 11	R	316	01 32.2	-1.1	-0.9
27	2524	B9	6.0	-26 14	R	357	21 52.7	-	-
28	2545	A5	6.4	-27 52	R	-	-	-	-

Date	Z.C.	Johannesburg				Luanshya			
		P.A.	h. m.	a	b	P.A.	h. m.	a	b
Jan									
21	624	149°	23 59.4	-	-	99°	23 50.0	-1.4	+0.1
22	762	83	20 16.0	-2.6	-0.1	51	20 25.1	-2.3	+1.5
23	780	138	00 42.9	-0.5	-1.1	97	00 39.1	-1.4	+0.2
31	1869	293	01 54.9	-1.5	-1.5	323	01 32.5	-0.9	-2.1
31	1875 _m	8	03 32.3	+0.6	-4.0	-	-	-	-
Feb									
2	2118	55	03 54.4	-	-	-	-	-	-
2	2118	18	04 18.8	-	-	-	-	-	-
2	2117	49	03 49.9	-	-	-	-	-	-
2	2117	24	04 05.5	-	-	-	-	-	-
4	2398	278	04 10.4	-1.1	-1.1	313	03 52.1	-0.3	-1.8
15	325	10	20 37.3	-1.1	+3.8	-	-	-	-
17	563	90	20 57.0	-1.9	+0.9	56	21 14.3	-2.1	+1.8
17	566	-	-	-	-	133	21 30.3	-	-
18	717	-	-	-	-	-	-	-	-
20	1022 _m	87	19 55.2	-2.6	-0.2	53	20 03.0	-2.8	+1.6
20	1026	100	21 05.6	-2.6	-0.2	67	21 10.8	-3.2	+1.1
21	1035	-	-	-	-	146	00 05.7	-0.2	+1.8
26	1702	-	-	-	-	-	-	-	-
26	1702	-	-	-	-	-	-	-	-
27	1821 _m	141	01 54.6	-1.4	-1.8	108	01 36.2	-2.6	-1.0
27	1821 _m	304	03 11.3	-1.8	-1.1	341	02 48.0	-0.9	-2.6
27	1825	354	04 02.5	-0.3	-3.0	-	-	-	-
Mar									
14	290	-	-	-	-	-	-	-	-
20	1103	106	19 53.2	-2.6	-0.4	73	19 55.7	-3.4	+0.9
21	1252	124	22 31.5	-1.4	-0.5	88	22 30.9	-2.6	+0.4
29	2290	139	24 14.6	-0.4	-2.1	105	23 54.7	-1.0	-0.9
30	2290	280	01 20.9	-1.7	-1.1	316	01 01.7	-0.9	-2.0
30	2305	-	-	-	-	262	05 11.7	-2.9	+0.7
31	2458	229	04 37.6	-	-	284	04 49.3	-2.9	-0.7
Apr									
2	2784	-	-	-	-	124	02 34.5	-0.5	-1.8
2	2784	-	-	-	-	249	03 45.2	-2.4	+0.6
14	750 _m	120	19 34.2	-0.7	-0.1	82	19 39.2	-1.3	+0.8
17	1189	132	18 27.0	-2.2	-1.3	100	18 15.8	-3.1	-0.4
21	1586	-	-	-	-	-	-	-	-
23	1821 _m	74	00 42.6	-3.2	+1.9	-	-	-	-
23	1821 _m	4	01 23.6	+0.2	-3.8	-	-	-	-
27	2524	-	-	-	-	-	-	-	-
28	2545	-	-	-	-	212	04 17.4	-	-

Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town			
						P.A.	h. m.	a	b
May									
1	3018	G5	6.3	-23° 57'	R	239°	02 55.4	-1.3	+0.1
2	3158	F5	5.8	-20 18	R	-	-	-	-
2	3164	B5 _p	4.7	-19 41	R	261	06 31.3	-2.5	-0.1
13	1022 _m	B8	5.8	+28 19	D	163	18 36.4	-	-
13	1026	K0	6.5	+28 15	D	156	19 32.4	+0.3	-1.4
16	1416	K0	7.2	+20 16	D	164	21 13.7	0.0	-1.6
17	1544	M0	5.7	+14 24	D	-	-	-	-
18	1647	A2	6.7	+09 27	D	118	19 58.6	-1.9	-1.0
19	1669	F5	6.7	+07 53	D	129	01 19.1	-0.2	-0.2
19	1758	G5	7.0	+02 32	D	156	20 20.2	-0.9	-2.1
20	1891	A0	4.4	-05 16	D	200	23 23.7	-	-
23	2290	B0	2.5	-22 29	D	158	21 23.3	0.0	-2.7
23	2290	B0	2.5	-22 29	R	259	22 15.5	-2.0	-0.4
25	2479	K0	5.3	-26 32	R	253	04 45.8	-1.3	+1.6
25	2480	K0	5.3	-26 32	R	253	04 45.8	-1.3	+1.6
30	3228 _m	A2	6.5	-17 12	R	289	01 54.2	-0.7	-2.2
31	3356	B9	5.9	-11 53	R	247	04 59.8	-1.9	+0.2
Jun									
11	1252	K2	7.4	+25 30	D	-	-	-	-
13	1499	K0	7.3	+16 23	D	187	20 20.5	+1.0	-3.3
14	1612	F8	7.3	+10 29	D	191	20 45.6	-	-
15	1728	M0	6.9	+03 46	D	-	-	-	-
15	1733	A0	5.2	+03 56	D	145	21 25.1	-0.9	-1.2
16	1849	F5	6.2	-03 17	D	161	23 12.1	-0.6	-1.8
19	2212	A2	6.1	-20 33	D	-	-	-	-
19	2214	A5	6.2	-20 00	D	91	18 45.0	-1.1	-1.1
19	2228	K0	5.9	-20 51	D	82	22 39.5	-2.6	+0.5
25	3164	B5 _p	4.7	-19 41	R	-	-	-	-
26	3175	G5	4.8	-19 06	R	239	01 28.7	-1.7	+0.5
27	3304	A0	6.4	-14 51	R	-	-	-	-
28	3419	K0	4.5	-09 22	R	-	-	-	-
28	3425	B5	4.6	-09 27	R	-	-	-	-
29	3535	B8	5.2	-03 18	R	226	02 13.7	-0.7	+0.5
Jul									
1	214	K0	6.4	+07 42	R	-	-	-	-
4	566	B9	5.9	+22 06	R	-	-	-	-
11	1578	K0	6.8	+11 51	D	-	-	-	-
13	1802	K2	7.1	-01 08	D	-	-	-	-
15	1948 _m	F8	7.4	-08 22	D	57	00 21.4	-0.1	+3.2
16	2069	F5	7.3	-14 37	D	91	00 25.7	-0.6	+1.1
16	2175	A2	6.0	-19 28	D	-	-	-	-

Date	Z.C.	Johannesburg				Luanshya			
		P.A.	h. m.	a	b	P.A.	h. m.	a	b
May									
1	3018	273°	03 06.1	-1.7	-1.0	-	-	-	-
2	3158	203	04 34.3	-1.8	+3.2	253°	04 56.1	-2.7	+0.5
2	3164	-	-	-	-	-	-	-	-
13	1022 ^m	120	18 35.6	-0.9	-0.1	82	18 39.6	-1.8	+0.8
13	1026	-	-	-	-	72	19 39.7	-1.4	+1.1
16	1416	121	21 12.7	-0.9	-0.2	77	21 16.9	-2.3	+1.2
17	1544	184	23 12.0	+0.9	-3.4	132	22 50.2	-0.5	-1.0
18	1647	71	20 23.5	-	-	-	-	-	-
19	1669	-	-	-	-	-	-	-	-
19	1758	119	20 21.1	-2.1	-1.2	80	20 15.0	-4.4	+0.7
20	1891	143	23 06.3	-1.3	-1.6	102	22 53.5	-2.6	-0.4
23	2290	119	21 11.7	-1.0	-1.6	81	21 00.0	-2.0	0.0
23	2290	300	22 24.4	-1.6	-1.6	341	21 55.8	-0.3	-3.0
25	2479	270	05 06.2	-1.0	+0.8	319	05 02.9	-2.2	-2.0
25	2480	269	05 06.3	-1.0	+0.8	318	05 03.1	-2.2	-2.0
30	3228 ^m	-	-	-	-	-	-	-	-
31	3356	258	05 24.6	-2.9	+0.3	-	-	-	-
Jun									
11	1252	93	18 07.0	-1.6	+0.7	-	-	-	-
13	1499	136	20 09.3	-0.6	-0.7	94	20 05.9	-1.7	+0.3
14	1612	139	20 33.0	-0.8	-1.0	98	20 26.7	-2.0	+0.1
15	1728	-	-	-	-	150	20 49.9	-0.9	-2.0
15	1733	104	21 33.1	-1.5	+0.2	-	-	-	-
16	1849	122	23 12.1	-0.9	-0.4	69	23 18.6	-1.6	+2.0
19	2212	-	-	-	-	157	18 28.8	0.0	-2.5
19	2214	-	-	-	-	-	-	-	-
19	2228	-	-	-	-	-	-	-	-
25	3164	231	22 09.9	-0.7	+0.5	279	22 07.8	-0.3	-0.8
26	3175	261	01 49.6	-2.5	-0.1	-	-	-	-
27	3304	-	-	-	-	221	00 21.7	-1.4	+1.7
28	3419	216	00 24.8	-0.8	+1.3	264	00 31.3	-1.0	-0.3
28	3425	-	-	-	-	176	01 11.4	-	-
29	3535	245	02 26.6	-1.4	+0.2	306	02 12.0	-	-
Jul									
1	214	177	02 49.2	+0.5	+3.6	228	03 14.4	-0.8	+1.2
4	566	-	-	-	-	229	04 44.2	-0.2	+0.9
11	1578	-	-	-	-	150	19 00.2	-0.4	-1.7
13	1802	163	19 43.6	-0.6	-2.3	120	19 23.7	-1.8	-1.0
15	1948 ^m	-	-	-	-	-	-	-	-
16	2069	63	00 40.6	+0.1	+2.1	-	-	-	-
16	2175	188	19 31.6	-	-	138	18 48.3	-1.6	-2.1

Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town			
						P.A.	h. m.	a	b
Jul									
17	2336	B8	6.6	-24° 10'	D	-	-	-	-
17	2347	A3	4.8	-24 03	D	98°	23 41.9	-1.8	+0.4
18	2479	K0	5.3	-26 32	D	138	19 46.1	-0.7	-2.5
18	2480	K0	5.3	-26 32	D	138	19 46.2	-0.7	-2.5
22	3106	K0	5.4	-20 52	R	316	21 15.5	+0.1	-4.0
26	55	G5	6.4	-00 20	R	-	-	-	-
27	167	F0	5.7	+05 23	R	-	-	-	-
28	184	K0	6.2	+06 44	R	198	04 43.2	-0.7	+2.2
30	402	K0	6.5	+17 33	D	339	05 18.2	-	-
30	402	K0	6.5	+17 33	R	306	05 42.6	-	-
Aug									
13	2283	B9	6.7	-23 23	D	-	-	-	-
14	2305	B8	5.9	-23 28	D	131	00 08.8	-1.0	-0.3
14	2314	B9	5.8	-23 33	D	131	01 17.9	-0.5	-0.2
15	2458	A0	6.2	-26 27	D	124	00 27.3	-1.3	-0.2
15	2601	K0	6.7	-27 50	D	120	21 15.0	-2.3	-1.6
16	2621	K0	7.4	-27 48	D	129	00 45.1	-2.0	-0.8
16	2634	B9	7.4	-27 31	D	103	03 02.3	-0.3	+0.7
16	2784	K0	3.4	-27 45	D	-	-	-	-
17	2784	K0	3.4	-27 45	R	-	-	-	-
17	2796	K0	6.8	-27 12	D	72	00 28.3	-1.5	+1.5
17	2805	F0	7.0	-26 58	D	81	02 40.3	-0.6	+1.3
19	3089	A0	5.3	-21 24	D	94	03 24.6	-1.5	+1.0
27	465	K0	4.5	+19 32	D	-	-	-	-
27	465	K0	4.5	+19 32	R	-	-	-	-
28	598	F5,A	5.7	+23 58	R	172	04 55.0	-	-
30	885	K0	5.6	+27 57	R	-	-	-	-
Sep									
6	1850	K0	6.5	-03 57	D	133	18 58.2	-0.6	-0.4
8	2104	K5	7.5	-17 29	D	-	-	-	-
8	2111m	G0	7.0	-17 08	D	66	21 47.3	-0.1	+2.1
9	2249	K0	6.9	-22 36	D	-	-	-	-
11	2545	A5	6.4	-27 52	D	159	19 13.2	-	-
11	2554	F8	4.4-5.0	-27 49	D	129	21 27.5	-2.3	-1.2
12	2575	A2	6.8	-27 16	D	22	00 36.9	+1.2	+3.7
12	2727	B9	7.2	-28 20	D	-	-	-	-
12	2743m	A5	7.4	-27 49	D	137	23 47.6	-2.7	-1.6
14	3037	F8	7.3	-22 55	D	57	23 58.2	-1.3	+1.9
15	3164	B5p	4.7	-19 41	D	-	-	-	-
15	3164	B5p	4.7	-19 41	R	-	-	-	-
28	1122	K0	3.9	+27 54	D	-	-	-	-

Date	Z.C.	Johannesburg				Luanshya			
		P.A.	h. m.	a	b	P.A.	h. m.	a	b
Jul									
17	2336	149°	21 54.6	-2.0	-2.9	100°	21 36.3	-2.9	-0.4
17	2347	73	24 05.5	-1.3	+1.6	-	-	-	-
18	2479	98	19 45.7	-2.0	-0.9	41	19 55.7	-	-
18	2480	98	19 45.8	-2.0	-0.9	42	19 55.2	-	-
22	3106	-	-	-	-	-	-	-	-
26	55	-	-	-	-	173	23 45.7	-	-
27	167	-	-	-	-	237	23 55.1	-0.4	+0.7
28	184	194	05 09.8	-0.8	+2.9	-	-	-	-
30	402	-	-	-	-	-	-	-	-
30	402	-	-	-	-	-	-	-	-
Aug									
13	2283	-	-	-	-	136	19 59.8	-2.4	-2.1
14	2305	114	00 15.5	-0.5	+0.1	-	-	-	-
14	2314	-	-	-	-	-	-	-	-
15	2458	111	00 38.0	-0.8	+0.2	69	00 46.7	-0.1	+1.1
15	2601	92	21 34.2	-2.6	+0.2	40	21 55.6	-2.1	+3.5
16	2621	117	00 58.4	-1.4	-0.1	76	01 04.5	-0.6	+0.9
16	2634	-	-	-	-	-	-	-	-
16	2784	-	-	-	-	100	23 17.1	-2.9	-0.2
17	2784	-	-	-	-	224	00 31.2	-0.7	+2.2
17	2796	65	00 52.7	-1.0	+1.7	21	01 22.2	+0.5	+3.2
17	2805	78	02 53.7	-0.2	+1.1	42	03 11.4	+0.5	+1.7
19	3089	94	03 43.9	-1.0	+0.8	62	03 57.8	-0.3	+1.3
27	465	-	-	-	-	116	02 01.8	-	-
27	465	-	-	-	-	168	02 37.3	-	-
28	598	171	05 17.3	-	-	-	-	-	-
30	885	-	-	-	-	214	03 47.0	0.0	+1.7
Sep									
6	1850	101	19 03.8	-0.4	+0.5	-	-	-	-
8	2104	176	21 11.8	-	-	115	20 54.0	-0.6	-0.4
8	2111 _m	-	-	-	-	-	-	-	-
9	2249	-	-	-	-	120	21 52.7	-0.7	-0.6
11	2545	118	19 14.6	-2.6	-1.2	69	19 15.9	-3.0	+1.3
11	2554	110	21 43.6	-1.8	0.0	67	21 53.1	-1.1	+1.4
12	2575	-	-	-	-	-	-	-	-
12	2727	-	-	-	-	127	21 03.1	-3.8	-2.3
12	2743 _m	127	24 00.6	-1.8	-0.7	84	24 02.8	-0.7	+0.6
14	3037	57	24 24.0	-0.9	+1.9	22	24 52.8	+0.2	+2.7
15	3164	129	21 47.8	-	-	71	21 37.3	-3.0	+1.0
15	3164	163	22 14.6	-	-	-	-	-	-
28	1122	114	03 03.5	-1.4	-1.6	76	02 52.7	-0.8	0.0

Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town			
						P.A.	h. m.	a	b
Sep									
28	1122	K0	3.9	+27° 54'	R	-	-	-	-
28	1119	F0	5.7	+27 44	R	-	-	-	-
Oot									
8	2512	B9	7.4	-27 33	D	169°	20 17.1	-	-
8	2512	B9	7.4	-27 33	R	189	20 29.4	-	-
10	2848	K0	5.6	-27 05	D	-	-	-	-
11	2984	G0	6.9	-24 20	D	37	20 08.2	-1.6	+2.7
13	3150	F2	6.5	-19 22	D	26	01 47.3	+0.3	+2.3
14	3271	F8	7.1	-14 54	D	20	00 49.7	-0.1	+2.7
20	487	K0	5.2	+20 34	R	-	-	-	-
22	647	B9	5.5	+25 31	R	210	04 47.1	-2.2	+2.5
25	1081	B9	6.2	+28 15	R	-	-	-	-
Nov									
5	2601	K0	6.7	-27 50	D	-	-	-	-
5	2621	K0	7.4	-27 48	D	94	21 10.5	-0.4	+0.9
6	2784	K0	3.4	-27 45	D	-	-	-	-
6	2784	K0	3.4	-27 45	R	222	19 22.5	-0.8	+2.6
6	2796	K0	6.8	-27 12	D	20	20 11.4	+0.3	+3.8
6	2805	F0	7.0	-26 58	D	33	22 01.7	+0.5	+2.4
7	2939	F0	7.2	-25 26	D	-	-	-	-
8	3089	A0	5.3	-21 24	D	46	21 34.8	-0.7	+2.2
11	3463	K0	6.4	-06 34	D	79	20 58.8	-2.7	+0.6
12	22	K0	7.3	-01 30	D	-	-	-	-
27	1749	K0	6.1	+02 11	R	-	-	-	-
Dec									
7	3303	F0	6.2	-13 10	D	347	21 32.8	-	-
8	3421	M3	5.1	-08 00	D	84	21 13.1	-2.0	+1.3
9	3528	F0	7.5	-02 08	D	7	21 03.8	-0.3	+3.1
13	326	K5	6.0	+15 03	D	11	00 36.0	-1.1	+3.2
15	556	B8	5.5	+23 16	D	143	00 30.5	-	-
15	556	B8	5.5	+23 16	R	177	00 57.6	-	-
15	564	B8	6.1	+23 34	D	86	01 13.4	-2.1	+1.0
18	1122	K0	3.9	+27 54	D	-	-	-	-
18	1122	K0	3.9	+27 54	R	268	23 26.1	-1.5	-0.9
19	1137	K0	5.1	+28 01	R	316	01 49.2	-2.3	-1.5

Date	Z.C.	Johannesburg				Luanshya			
		P.A.	h. m.	a	b	P.A.	h. m.	a	b
Sep									
28	1122	242°	04 13.2	-1.3	+0.1	277°	04 10.3	-2.0	-0.7
28	1119	-	-	-	-	243	03 25.1	-0.9	+0.5
Oct									
8	2512	137	20 17.9	-2.0	-1.4	89	20 15.4	-1.2	+0.5
8	2512	-	-	-	-	-	-	-	-
10	2848	62	19 45.2	-1.9	+1.7	12	20 23.2	-	-
11	2984	26	20 43.7	-0.8	+3.3	-	-	-	-
13	3150	22	02 00.5	+0.6	+2.3	-	-	-	-
14	3271	21	01 10.1	+0.1	+2.6	-	-	-	-
20	487	-	-	-	-	196	21 24.6	+0.5	+2.2
22	647	-	-	-	-	-	-	-	-
25	1081	-	-	-	-	234	04 44.7	-3.6	+2.0
Nov									
5	2601	54	18 55.1	-0.5	+2.1	-	-	-	-
5	2621	89	21 18.8	0.0	+0.8	-	-	-	-
6	2784	96	18 38.5	-2.0	+0.4	55	18 53.5	-1.1	+1.7
6	2784	230	19 46.6	-0.5	+2.1	267	20 04.0	-1.1	+0.5
6	2796	11	20 33.8	+1.2	+4.0	-	-	-	-
6	2805	28	22 13.1	+0.9	+2.3	-	-	-	-
7	2939	87	20 04.1	-1.7	+0.9	51	20 21.9	-0.8	+1.7
8	3089	47	21 56.3	-0.3	+2.0	11	22 26.6	+0.7	+2.9
11	3463	84	21 32.5	-3.0	+0.9	54	21 52.0	-2.0	+1.9
12	22	-	-	-	-	98	19 59.8	-	-
27	1749	-	-	-	-	238	03 34.4	-	-
Dec									
7	3303	348	21 52.9	-	-	-	-	-	-
8	3421	87	21 40.4	-1.6	+1.1	58	21 58.6	-0.9	+1.6
9	3528	12	21 31.2	-0.4	+3.1	-	-	-	-
13	326	-	-	-	-	-	-	-	-
15	556	120	00 46.6	-2.3	-0.5	83	00 49.3	-2.5	+0.7
15	556	-	-	-	-	-	-	-	-
15	564	70	01 41.7	-1.8	+1.5	31	02 10.2	-2.2	+3.3
18	1122	84	22 13.5	-1.3	-0.7	45	22 16.4	-0.6	+1.5
18	1122	276	23 37.3	-2.3	-0.9	312	23 19.4	-3.0	-2.4
19	1137	346	01 51.7	-	-	-	-	-	-

THE PLANETS

The Chart (frontispiece) 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. The approximate positions of the planets in the constellations, given in the table opposite, are intended for identification purposes.

Mercury will best be seen shortly after sunset near the greatest elongations on June 12 (magnitude 0.7) and October 9 (magnitude 0.2). The best morning visibility just before sunrise will occur near the greatest western elongation on March 31 (magnitude 0.5) and possibly on July 30 (magnitude 0.4).

Early in the year Venus sets about an hour after sunset. It reaches its greatest brilliancy on July 24 (magnitude -4.2). It overtakes the Earth in its orbit on August 29, thus changing from an evening to a morning object. The planet reaches its maximum brilliancy on October 6 in the eastern morning sky (magnitude -4.3).

Mars will be a prominent object in 1967. At the beginning of the year it rises at midnight and begins its retrograde motion on March 8. Opposition is on April 15 (magnitude -1.3) while the closest approach to the Earth occurs on April 21 when the planet will be 56,000,000 miles distant and its disc will have an angular diameter of $15''.6$. The retrograde motion ends on May 27 and by December the magnitude would have declined to 1.3.

Jupiter is at opposition on January 20 (magnitude -2.2). The equatorial disc will then subtend an angle of $46''$ and the planet will be 4.28 astronomical units distant. Conjunction with the Sun takes place in August, after which Jupiter will rise before sunrise.

At the beginning of the year, Saturn sets about an hour before midnight. It remains an evening object till March, conjunction with the Sun taking place on the 23rd of that month, after which it is a morning object. It continues to increase in brightness until opposition is reached on October 2 (magnitude 0.6). Its equatorial diameter will then be $19''.7$ and it is 8.45 astronomical units distant. The planet's rings display their widest opening for the year early in August ($6''.2$).

THE PLANETS IN THE CONSTELLATIONS

	Venus	Mars	Jupiter	Saturn
January	Aquarius	Libra	Leo	Pisces
February	Pisces	Libra	Cancer	Pisces
March	Aries	Libra	Cancer	Aries
April	Taurus	Libra	Cancer	Aries
May	Cancer	Libra	Leo	Aries
June	Leo	Libra	Leo	Aries
July	Virgo	Libra	Leo	Aries
August	Virgo	Scorpio	Leo	Aries
September	Leo	Sagittarius	Leo	Aries
October	Virgo	Sagittarius	Virgo	Aries
November	Libra	Capricornus	Virgo	Aries
December	Scorpio	Aquarius	Virgo	Aries

EPHEMERIDES FOR URANUS AND NEPTUNE

	Uranus		Neptune	
	R.A.	Dec.	R.A.	Dec.
Jan 1	11 ^h 40 ^m .7	+ 2° 56'	15 ^h 26 ^m .4	- 17° 01'
21	11 40.0	+ 3 02	15 28.3	- 17 07
Feb 10	11 38.0	+ 3 15	15 29.5	- 17 10
Mar 2	11 35.2	+ 3 34	15 29.7	- 17 10
22	11 32.0	+ 3 54	15 29.1	- 17 06
Apr 11	11 29.0	+ 4 13	15 27.7	- 17 00
May 1	11 26.8	+ 4 27	15 25.7	- 16 53
21	11 25.6	+ 4 33	15 23.5	- 16 45
Jun 10	11 25.7	+ 4 32	15 21.5	- 16 37
30	11 27.1	+ 4 22	15 19.8	- 16 32
Jul 20	11 29.7	+ 4 04	15 18.8	- 16 29
Aug 9	11 33.2	+ 3 41	15 18.5	- 16 29
29	11 37.5	+ 3 14	15 19.2	- 16 33
Sep 18	11 42.0	+ 2 44	15 20.7	- 16 39
Oct 8	11 46.6	+ 2 14	15 22.8	- 16 49
28	11 50.9	+ 1 47	15 25.5	- 16 59
Nov 17	11 54.4	+ 1 24	15 28.5	- 17 10
Dec 7	11 56.9	+ 1 09	15 31.6	- 17 21
27	11 58.2	+ 1 01	15 34.3	- 17 30

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
- II - Europa
- III - Ganymede
- IV - Callisto

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

Ec - Eclipse: the satellite passes through 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

Date	S.A.S.T.	Sat	Phen.
Jan 1	22 ^h 01 ^m	I	Ec D
2	21 35	I	Sh E
2	22 00	I	Tr E
6	20 50	IV	Ec D
7	21 16	III	Tr I
7	23 34	III	Sh E
8	23 55	I	Ec D
9	21 12	I	Sh I
9	21 27	I	Tr I
9	21 52	II	Sh E
9	22 25	II	Tr E
9	23 28	I	Sh E
9	23 44	I	Tr E
10	20 57	I	Oc R
14	24 00	III	Sh I
16	21 35	II	Sh I
16	21 45	II	Tr I
16	23 06	I	Sh I

Date	S.A.S.T.	Sat	Phen.
Jan 16	23 ^h 11 ^m	I	Tr I
17	22 40	I	Oc R
23	24 00	II	Tr I
24	22 06	I	Oc D
25	21 35	III	Ec R
25	21 36	I	Tr E
25	21 45	I	Sh E
25	21 46	II	Ec R
31	22 06	IV	Tr I
31	23 50	I	Oc D
Feb 1	20 44	III	Oc D
1	20 52	II	Oc D
1	21 04	I	Tr I
1	21 22	I	Sh I
1	23 20	I	Tr E
1	23 39	I	Sh E
2	20 54	I	Ec R
8	22 48	I	Tr I

Date	S.A.S.T.	Sat	Phen.
Feb 8	23 ^h 06 ^m	II	Oc D
8	23 16	I	Sh I
9	22 49	I	Ec R
10	20 36	II	Tr E
10	21 41	II	Sh E
16	21 46	I	Oc D
17	21 16	I	Tr E
17	21 24	II	Sh I
17	21 56	I	Sh E
17	22 54	II	Tr E
17	23 14	IV	Sh E
19	20 34	III	Tr E
19	23 29	III	Sh E
23	23 33	I	Oc D
24	20 46	I	Tr I
24	21 34	I	Sh I
24	22 21	II	Tr I
24	23 02	I	Tr E
24	23 50	I	Sh E
25	21 08	I	Ec R
25	23 21	IV	Oc R
26	20 28	III	Tr I
26	21 22	II	Ec R
26	23 55	III	Sh I
26	24 00	III	Tr E
Mar 3	22 33	I	Tr I
3	23 29	I	Sh I
4	23 03	I	Ec R
5	20 13	I	Sh E
5	23 57	II	Ec R
5	23 59	III	Tr I
9	21 35	III	Ec R
11	21 37	I	Oc D
12	19 52	I	Sh I
12	21 05	I	Tr E
12	21 33	II	Oc D
12	22 08	I	Sh E
14	20 59	IV	Ec D
14	21 28	II	Sh E
16	21 02	III	Oc R
16	21 59	III	Ec D
18	23 28	I	Oc D
19	20 39	I	Tr I
19	21 47	I	Sh I
19	22 55	I	Tr E
19	23 58	II	Oc D
20	21 23	I	Ec R
21	21 13	II	Sh I
21	21 44	II	Tr E
22	20 00	IV	Tr I

Date	S.A.S.T.	Sat	Phen.
Mar 23	21 ^h 11 ^m	III	Oc D
26	22 30	I	Tr I
26	23 42	I	Sh I
27	19 27	III	Sh E
27	19 47	I	Oc D
27	23 19	I	Ec R
28	20 26	I	Sh E
28	21 22	II	Tr I
28	23 50	II	Sh I
30	21 00	II	Ec R
31	19 41	IV	Ec R
Apr 3	19 53	III	Sh I
3	21 40	I	Oc D
3	23 27	III	Sh E
4	20 05	I	Sh I
4	21 07	I	Tr E
4	22 21	I	Sh E
4	23 55	II	Tr I
5	19 43	I	Ec R
6	23 36	II	Ec R
10	22 15	III	Tr E
10	23 34	I	Oc D
11	20 45	I	Tr I
11	22 00	I	Sh I
11	23 01	I	Tr E
12	21 38	I	Ec R
13	20 45	II	Oc D
15	21 17	II	Sh E
16	20 53	IV	Oc D
17	22 42	III	Tr I
18	22 40	I	Tr I
19	19 58	I	Oc D
20	19 24	I	Tr E
20	20 40	I	Sh E
21	21 35	III	Ec R
22	21 01	II	Sh 1
22	21 19	II	Tr E
25	18 55	IV	Sh I
26	21 55	I	Oc D
27	19 04	I	Tr I
27	20 19	I	Sh I
27	21 20	I	Tr E
27	22 35	I	Sh E
28	19 58	I	Ec R
28	20 26	III	Oc R
28	21 58	III	Ec D
29	21 06	II	Tr I
May 1	20 42	II	Ec R
3	19 48	IV	Oc R
4	21 01	I	Tr I

Date	S.A.S.T.	Sat	Phen.
May 4	22 ^h 14 ^m	I	Sh I
5	20 59	III	Oc D
5	21 53	I	Ec R
6	18 59	I	Sh E
9	19 27	III	Sh E
12	20 19	I	Oc D
13	18 38	I	Sh I
13	19 44	I	Tr E
13	20 55	I	Sh E
15	20 40	II	Oc D
16	18 44	III	Tr E
16	19 51	III	Sh I
17	18 44	II	Tr E
17	21 02	II	Sh E
20	19 26	I	Tr I
20	20 33	I	Sh I
20	21 14	IV	Ec D
21	20 12	I	Ec R
23	19 26	III	Tr I
24	20 46	II	Sh I
28	18 46	I	Oc D
29	19 14	I	Sh E
Jun 2	20 25	II	Ec R
5	18 52	I	Sh I

Date	S.A.S.T.	Sat	Phen.
Jun 5	20 ^h 12 ^m	I	Tr E
6	18 30	I	Ec R
6	20 06	IV	Ec R
12	19 55	I	Tr I
18	19 09	II	Tr E
20	19 16	I	Oc D
21	18 43	I	Tr E
21	19 27	III	Sh E
21	19 28	I	Sh E
25	19 03	II	Tr I
28	19 05	I	Sh I
29	18 43	I	Ec R
Jul 1	18 59	IV	Sh I
Dec 6	23 51	I	Tr E
10	23 44	III	Tr E
13	23 26	I	Tr I
16	23 16	II	Sh I
17	24 00	III	Tr I
18	23 35	II	Oc R
24	23 11	III	Sh I
28	23 08	I	Ec D
29	22 46	I	Sh E
29	23 48	I	Tr E
32	23 33	II	Ec D

BRIGHT VARIABLE STARS

Name	Position (1950)		Range	Period Days	Expected Maxima 1967
	R.A.	Dec.			
o Ceti (Mira)	02 ^h 16 ^m .8	- 3° 12'	2 ^m .6-9 ^m .4	331	Oct 20
R Doradus	04 36.2	-60 11	5.3-6.4	Irr.	
R Pictoris	04 44.8	-49 20	6.9-9.2	172?	May 17, Nov 5
L ₂ Puppis	07 12.0	-44 33	3.1-6.3	140?	Apr 1, Aug 19
R Carinae	09 31.0	-62 34	4.5-9.4	309	Feb 7
S Carinae	10 07.8	-61 18	5.7-8.3	149	Mar 8, Aug 4
R Hydrae	13 27.0	-23 01	4.7-9.6	386	Jul 10
T Centauri	13 38.9	-33 21	6.0-8.2	90	Feb 7, May 9, Aug 8, Nov 7
R Centauri	14 12.9	-59 41	5.7-12.0	547	
R Aquarii	23 41.2	-15 34	6.7-11.6	387	Jul 11

ECLIPSES

During 1967 there will be four eclipses, two of the Sun and two of the Moon.

1. April 24 Total eclipse of the Moon. Invisible in South Africa.
2. May 9 Partial eclipse of the Sun. Invisible in South Africa.
3. October 18 Total eclipse of Moon. Invisible in South Africa.
4. November 2 Total eclipse of the Sun. Partial phase visible in South Africa.

Total Eclipse of the Sun

November 2

The eclipse begins near Monze in Zambia at 5.38 S.A.S.T. at local sunrise. The penumbral shadow travels due south. It crosses the Antarctic and ends at local sunset in the Pacific Ocean south of New Zealand at approximately 9.40 S.A.S.T.

The closest approach of the Earth to the axis of shadow is approximately 14 miles and occurs at 7.38 S.A.S.T. at longitude 28° latitude -62° .

The total phases of this eclipse will be seen from a small semi-circular area situated in the south Atlantic Ocean near the Antarctic continent.

Predicted circumstances are given below for Johannesburg and Cape Town.

	Beginning		Mid-eclipse		End	
	Time	P.A.	Time	Mag	Time	P.A.
Cape Town	05 ^h 52 ^m .31	278	06 ^h 40 ^m .90	67.6%	07 ^h 32 ^m .87	140
Johannesburg	05 42.91	268	06 27.91	47.7%	07 16.09	154

METEOR CALENDAR 1967

Date	Shower	Radiant R.A. Dec	M a x i m u m		
			Date	Hourly Rate	Transit of Radiant
Jan 3	Quadrantids	227° + 46°	Jan 3	40	08 ^h 30 ^m
Mar 12	Hydraids	184 - 27	Mar 25	?	00 00
-Apr 25					
Mar 1	Virginids	200 - 6	Apr 3	?	00 00
-May 10					
Apr 2	Lyrids	273 + 35	Apr 21	12	04 00
-Apr 24					
Apr 29	Eta Aquarids	338 - 1	May 6	10	07 36
-May 21					
Apr 20	Sco - Sgr System	270 - 30	Jun 14	?	00 30
-Jul 30					
Jul 25	Delta Aquarids	343 - 17	Jul 28	20	02 00
-Aug 10					
Jul 18	Alpha Capricornids	304 - 12	?	?	-- --
-Jul 30					
Jul 20	Perseids	43 + 56	Aug 12	50	05 36
-Aug 19					
Aug 16	Piscids	0 + 14	Sep 12	?	00 30
-Oct 8					
Oct 11	Orionids	94 + 16	Oct 22	20	04 24
-Oct 30					
Sep 24	Taurids	58 + 21	Nov 13	6	00 36
-Dec 10					
Nov 16	Leonids	151 + 21	Nov 16	6	06 32
Dec 5	Geminids	113 + 30	Dec 12	30	02 00
-Dec 12					
Dec 5	Velaids	149 - 51	Dec 29	?	03 30
-Jan 7					

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 1967

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

** Although the maximum of this shower was in 1966, a close watch as regards this shower is still recommended for this year.

ASTRONOMICAL DIARY

JANUARY 1967

	d.	h.	
Jan	3	21	Mars $0^{\circ}.4$ S of Moon.
	12	02	Venus 4° N of Moon.
	16	01	Saturn 2° N of Moon.
	18	04	Mercury in superior conjunction.
	18	10	Mars 5° N of Spica.
	20	07	Jupiter at opposition.
	25	20	Jupiter 4° S of Moon.
	27	06	Juno in opposition.
	31	23	Mars 1° N of Moon.

FEBRUARY 1967

	d.	h.	
Feb	2	23	Neptune 3° N of Moon.
	10	20	Mercury 5° N of Moon.
	11	11	Venus 3° N of Moon.
	12	15	Saturn 1° N of Moon.
	16	18	Mercury at greatest elongation 18° W.
	22	01	Jupiter 4° S of Moon.
	23	14	Venus $1^{\circ}.1$ N of Saturn.
	25	22	Uranus 3° S of Moon.
	28	17	Mars 2° N of Moon.

MARCH 1967

	d.	h.	
Mar	2	05	Neptune 3° N of Moon.
	4	10	Mercury in inferior conjunction.
	8	21	Mars stationary.
	10	00	Mercury 8° N of Moon.
	10	17	Pluto at opposition.
	13	18	Uranus at opposition.
	13	23	Venus 1° N of Moon.
	21	09	Jupiter 5° S of Moon.
	21	10	Equinox.
	23	21	Saturn in conjunction with Sun.

MARCH 1967

	d.	h.	
Mar	28	00	Mars 2° N of Moon.
	31	18	Mercury greatest elongation 28° W.

APRIL 1967

	d.	h.	
Apr	7	11	Mercury 2° N of Moon.
	8	17	Saturn $0^{\circ}.8$ N of Moon.
	13	08	Venus $0^{\circ}.8$ S of Moon.
	15	14	Mars at opposition.
	17	18	Jupiter 5° S of Moon.
	18	05	Mercury $0^{\circ}.5$ S of Saturn.
	21	20	Mars nearest Earth.
	23	08	Venus 7° N of Aldebaran.
	23	09	Mars 4° N of Spica.
	23	19	Mars $0^{\circ}.4$ N of Moon.
	24	14	Total eclipse of the Moon. Not visible in Southern Africa.
	25	23	Neptune 3° N of Moon.

MAY 1967

	d.	h.	
May	6	06	Saturn $0^{\circ}.5$ N of Moon.
	9	17	Partial eclipse of the Sun. Not visible in Southern Africa.
	11	18	Mercury in superior conjunction.
	13	09	Venus 2° S of Moon.
	14	14	Neptune at opposition.
	15	06	Jupiter 5° S of Moon.
	15	23	Vesta at opposition.
	18	23	Uranus 3° S of Moon.
	20	18	Mars 2° S of Moon.
	21	03	Mercury 7° N of Aldebaran.
	27	17	Mars stationary.
	31	15	Venus 4° S of Pollux.

JUNE 1967

	d.	h.	
Jun	2	19	Saturn $0^{\circ}.1$ N of Moon.
	9	04	Venus $1^{\circ}.8$ N of Jupiter.
	10	07	Mercury 3° S of Moon.
	11	19	Jupiter 5° S of Moon.
	12	00	Venus 3° S of Moon.
	12	12	Mercury greatest elongation 24° E.
	15	05	Uranus 3° S of Moon.
	17	05	Mars 2° S of Moon.
	21	02	Venus greatest elongation 45° E.
	22	04	Solstice.
	30	06	Saturn $0^{\circ}.4$ S of Moon.

JULY 1967

	d.	h.	
Jul	3	09	Mars $1^{\circ}.4$ N of Spica.
	8	07	Venus $0^{\circ}.2$ S of Regulus.
	9	12	Jupiter 5° S of Moon.
	9	14	Mercury in inferior conjunction.
	11	02	Venus 5° S of Moon.
	15	03	Mars 2° S of Moon.
	16	23	Neptune 4° N of Moon.
	24	12	Venus at greatest brilliancy.
	27	16	Saturn $0^{\circ}.9$ S of Moon.
	30	05	Mercury at greatest elongation 20° W.

AUGUST 1967

	d.	h.	
Aug	4	17	Mercury 6° S of Moon.
	5	06	Mercury 7° S of Pollux.
	8	03	Venus 10° S of Moon.
	8	21	Jupiter in conjunction with Sun.
	8	21	Uranus 3° S of Moon.
	12	10	Mars $0^{\circ}.4$ S of Moon.
	13	04	Neptune 4° N of Moon..
	23	22	Saturn 1° S of Moon.
	24	18	Mercury in superior conjunction.
	29	15	Mars 3° S of Neptune.
	30	00	Venus in inferior conjunction.

SEPTEMBER 1967

	d.	h.	
Sep	3	02	Jupiter 4° S of Moon.
	4	02	Venus 10° S of Regulus.
	6	05	Mercury 0° .3 N of Uranus.
	9	23	Mars 1° N of Moon.
	10	14	Antares 1° S of Moon.
	20	02	Saturn 1° S of Moon.
	23	09	Mars 3° N of Antares.
	23	20	Equinox.
	24	23	Mercury 0° .8 N of Spica.
	30	22	Jupiter 4° S of Moon.
	30	23	Venus 10° S of Moon.

OCTOBER 1967

	d.	h.	
Oct	2	22	Uranus 2° S of Moon.
	3	00	Saturn in opposition.
	4	07	Venus 5° S of Regulus.
	5	16	Mercury 2° S of Moon.
	6	04	Venus at greatest brilliancy.
	6	20	Neptune 4° N of Moon.
	7	22	Antares 1° S of Moon.
	8	15	Mars 3° N of Moon.
	9	06	Mercury at greatest elongation 25° E.
	15	03	Jupiter 0° .3 N of Regulus.
	17	04	Saturn 1° S of Moon.
	18	12	Total eclipse of Moon. Invisible in Southern Africa.
	28	15	Jupiter 4° S of Moon.
	29	22	Venus 4° S of Moon.

NOVEMBER 1967

	d.	h.	
Nov	1	17	Mercury in inferior conjunction.
	2	08	Total eclipse of the Sun. Partial phases visible in South Africa.
	4	07	Antares 1° S of Moon.
	6	11	Mars 3° N of Moon.
	7	12	Venus $0^{\circ}.1$ S of Uranus.
	9	17	Venus at greatest elongation 47° W.
	13	06	Saturn $0^{\circ}.8$ S of Moon.
	17	23	Mercury at greatest elongation 19° W.
	25	05	Jupiter 4° S of Moon.
	26	23	Uranus 2° S of Moon.
	28	13	Venus 2° N of Moon.
	30	03	Venus 5° N of Spica.
	30	18	Mercury 4° N of Moon.

DECEMBER 1967

	d.	h.	
Dec	2	05	Mercury $0^{\circ}.6$ S of Neptune.
	5	10	Mars 4° N of Moon.
	10	12	Saturn $0^{\circ}.8$ S of Moon.
	22	13	Jupiter 3° S of Moon.
	22	15	Solstice.
	28	07	Venus 5° N of Moon.
	29	01	Mercury in superior conjunction.
	29	04	Venus $0^{\circ}.7$ N of Neptune.
	29	05	Antares 1° S of Moon.

THE GILL MEDAL

Medallists

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

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.

SOUTHERN AFRICAN OBSERVATORIES

Private observatories are listed separately

Name	Place	E. Long.	S. Lat.	Alt.	Director
		1h+		ft	
Public	Johannesburg	52m 18s.0	26°10'55"3	5925	J. H. Hers (acting)
Public Annexe	Hartebeespoort	51m 30s	25°46'22"	4002	
Royal Observatory	Cape Town	13m 54s.6	33°56'02"5	26	R. H. Stoy
Adcliffe	Pretoria	52m 54s.9	25°47'18"	5059	A. D. Thackeray
Gyden	Bloemfontein	45m 37s.4	29°02'20"	4550	A. D. Andrews
Holden	Hartebeespoort	51m 30s	25°46'22"	4002	D. F. Stevenson
Mont-Hussey	Bloemfontein	44m 56s.8	29°05'46"1	4825	F. Holden
Smithsonian Astro- nomical Observation Station	Olifantsfontein	52m 59s.6	25°57'33"9	5066	S. S. Tischler
Radio Space Research Station	Krugersdorp	48m 16s.3	25°53'14"5	4515	D. Hogg
Urban Satellite Tracking Station	Durban	64m 00s.1	29°50'39"5	250	G. Roberts A. Arnold

PRIVATE OBSERVATORIES

Owner	Address	Alt.
R. C. Allen	29 Frara Drive, Pinetown, Natal	1125
W. Bell	133, 16th Street, Parkhurst, Johannesburg	5210
J. C. Bennett	90 Malan Street, Riviera, Pretoria	4280
J. H. Botham	94 Ascot Road, Judith's Paarl, Johannesburg	5605
Chaplin School	P. O. Box 140, Gwelo, Rhodesia	4650
B. Conradie	Nou-toe-nou, Windellstraat 7, Durbanville, K.P.	485
J. Finch	9 Troutbeck Road, Greenhill, P. O. Morningside, Bulawayo, Rhodesia	4480
K. G. Fuhr	13 Smith Road, Rosebank, Cape	25
N. M. Hoogenhout	46 Lawley Street, Waterkloof, Pretoria	4725
C. R. Jacobs	"Broadacres", P. O. Bryanston, Transvaal	
G. F. G. Knipe	83 Ascot Heights, Quartz Street, Hillbrow, Johannesburg.	5915
M. Lipshitz	10 Carnarvon Place, Durban North, Durban	330
J. McBain	15, 26th Avenue, Fama, Bulawayo, Rhodesia	4400
C. Mollink	P. O. Box 1206, Pretoria	4545
A. G. F. Morrisby	P. O. Box 8099, Causeway, Salisbury, Rhodesia	4900
M. D. Overbeek	60 Edward Drive, Glendower, Edenvale, Transvaal	5380
C. Papadopoulos	22 Waterfall Road, Westcliff, Johannesburg	5585
People's Observatory Society	The Port Elizabeth People's Observatory, Society, c/o Mr. R. Maasdorp, 3 Lucas Street, Newton Park, Fort Elizabeth	330
Prince Edward School	P. O. Box 8076, Causeway, Salisbury, Rhodesia	4850
R. F. Smith	P. O. Box 10031, Pretoria	4455
K. J. Sterling	5 Hekla Road, Valhalla, Pretoria	4720
S. C. Venter	P. O. Box 1416, Pretoria	4050
C. N. Williams	P. O. Box 5, Cleveland, Transvaal	5600
W. H. Wood	P. O. Box 1226, Salisbury, Rhodesia	4850

PRIVATE OBSERVATORIES

E. Long.	S. Lat.	Details of Telescopes	Specialised Observations
2 ^h 03 ^m 20 ^s	29°43' "	12" Refl. (Cass)	Lunar
1 52 05.8	26 08 10.6	12" Refl.	Planetary
1 52 50.8	25 43 43.5	3" Refr.; 5" Refr.	
1 52 17.3	26 11 23.3		
1 57 49.9	19 27 28	9" Refl.	
1 14 36.9	33 49 55.8	8" Refl.	Occultations, Variable stars
1 54 30	20 07	50 mm Refr.	Solar, Lunar, Planetary
1 13 54.5	33 57 09	80 mm Refr.	Occultations
1 52 58.6	25 46 46	12" Refl.; 3" Camera	
		12" Refl.	Planetary, Lunar
1 52 11.6	26 11 18.3	6" Refl.	
2 04 10	29 46 30	12" Refl.	
1 55 40	20 02	3" Refr.	Lunar, Planetary
1 52 57.1	25 45 34	12" Refl. (Coude)	
2 04 27.8	17 45 31.7	4" Refr.	Occultations
1 52 35.0	26 10 17.0	12" Refl. (Cass)	Variable stars
1 52 05.1	26 10 19.5	12" Refl.(Cass); 3" Refr.	Photography
1 42 19.2	33 57 11	8" Refr.	
2 04 08.9	17 49 04.8	12" Refl.; 6" Refl.; 3" Refr.	
1 53 14.3	25 44 57.5	10" Refl.	
1 52 37.1	25 48 08	6" Refl.	
1 52 46.9	25 40 14.8	12" Refl.; 2 $\frac{3}{4}$ " Refr.	Variable stars, Occultations, Comets, Sunspots
1 52 36.2	26 10 39	12" Refl.; 6" Refr.	Planetary
2 04 00	17 50	4 $\frac{1}{2}$ " Refl.	

Details of instruments and specialised observations for optical observatories are as follows:

Observatory	Instruments	Specialised Observations
Republic	26 $\frac{1}{2}$ " Refr.; 9" Refr.; 6"/7" Refr.	Double star measurements, photoelectric photometry (eclipsing variables), and planetary observations
Republic Annexe	10" Franklin-Adams star camera.	Minor planets, comets and variable star fields.
Royal Observatory	6" Reversible Transit Circle; 40" Refl. (Newt., Cass. and Corr. plate); Twin Refr. 24" and 18" with 8" guide Refr. and 5" camera; Twin Refr. 13" and 10"; 30" Refl.; 18" Refl.; 8" and two 5" camera array; Lyot H-alpha Heliograph; 4" Heliograph; 6" Refr.; Danjon prismatic astrolabe.	Meridian observations, photography, proper motion and parallax measurements, photoelectric photometry, variable stars, solar observations and spectroscopy.
Radcliffe	74" Refl. (Newt., Cass., and Coude).	Spectroscopy, direct photography and photoelectric photometry.
Boyden	60" Refl.; 32"/36" Baker-Schmidt; 36cm Schmidt; 16" Refl.; 13" Refr.; 10" Refr.; Damon Patrol cameras; Remeis Patrol cameras; 3" Camera; 1" Camera.	Photography, photoelectric photometry, Southern Sky Patrol and variable star survey.
Leiden	36" Light Collector; Twin 16" Refr.	Photoelectric photometry and photography.
Lamont-Hussey	27" Refr.	Double Stars measurements.
Durban Satellite-Tracking Station	12" Refl.; 10" Refl.; 6" Refl. (Cass); Two 6" Refls. (Newt); Three 5" Apogee Refrs.; 2 $\frac{1}{2}$ " Refr. and cameras.	Satellite tracking, lunar and planetary observations, photography, photoelectric photometry and comet observations.

PAST PRESIDENTS

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

HONORARY MEMBERS

Prof. Ch. Fehrenbach	Dr. J. H. Oort	Dr. H. Shapley
Dr. W. S. Finsen	Dr. R. O. Redman	Dr. W. H. van den Bos
Dr. H. Haffner	Dr. J. Schilt	Dr. A. G. Velghe
Dr. H. Knox Shaw		Sir Richard Woolley

HONORARY SECRETARIES

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

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. S. C. Venter, P.O. Box 1416, Pretoria.

Variable Stars:

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

Nova Search Section:

Mr. D. H. Grant, P.O. Box 113, Honeydew, Transvaal.

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. J. S. Bondiotti.
Vice-Chairman: Mr. A. P. Fairall.
Hon. Secretary: Mr. H. B. Molyneux.
Hon. Treasurer: Mr. N. Saville.
Hon. Auditor: Mr. A. Menzies.
Members of Committee: Messrs. G. R. Atkins, R. F. Horn, H. C. Lagerweij, W. B. West and I. Weinberg.

Centre Representative on Council:

Mr. W. C. Bentley.

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. R. Jacobs.
Vice-Chairman: Mr. W. Bell.
Hon. Secretary: Mr. B. J. C. Maurick.
Hon. Treasurer: Mrs. P. W. J. Maurick.
Members of Committee: Messrs. C. Mollink, C. Papadopoulus, E. F. von Malitz, J. R. Brickett and F. D. Bateman.

Republic Observatory Representative:

Mr. J. A. Bruwer.

Centre Representative on Council:

Mr. W. Bell.

Curator of Instruments: Mr. T. E. Geary.

Hon. Librarian: Mrs. M. M. FitzGerald.

Observing and lecture meetings in alternate months.

Secretarial address, 8, Eider Road, Florida Lake, Transvaal.

BLOEMFONTEIN CENTRE:

Chairman: Mr. J. I. Mahaffey.
Hon. Secretary: Mr. N. Lincoln.
Hon. Treasurer: Mr. P. Keuris.
Member of Committee: Mr. G. N. Walker.

Centre Representative on Council:

Mr. N. Lincoln.

Secretarial address, Bloemfontein Club, P.O. Box 83, Bloemfontein.

NATAL CENTRE:

For information apply to:

Mr. Gregory Roberts, P.O. Box 3644, Durban.

PRETORIA CENTRE :

Chairman : Mr. K. J. Sterling.
Hon. Secretary: Mrs. J. A. Sterling.
Hon. Treasurer: Mr. C. Mollink.
Members of Committee: Messrs. J. Wolterbeek-Muller, R. Smith, J. de Villiers and C. A. van der Neut.
Centre Representative on Council: Mr. S. C. Venter.
Telescope Design and Maintenance: Mr. J. Jacobs.

Secretarial address, 5, Hekla Road, Valhalla, Pretoria.