

THE
ASTRONOMICAL SOCIETY
OF
SOUTHERN AFRICA

HANDBOOK FOR

1968

THE ASTRONOMICAL SOCIETY OF SOUTHERN AFRICA

1967-1968

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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 1968

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.

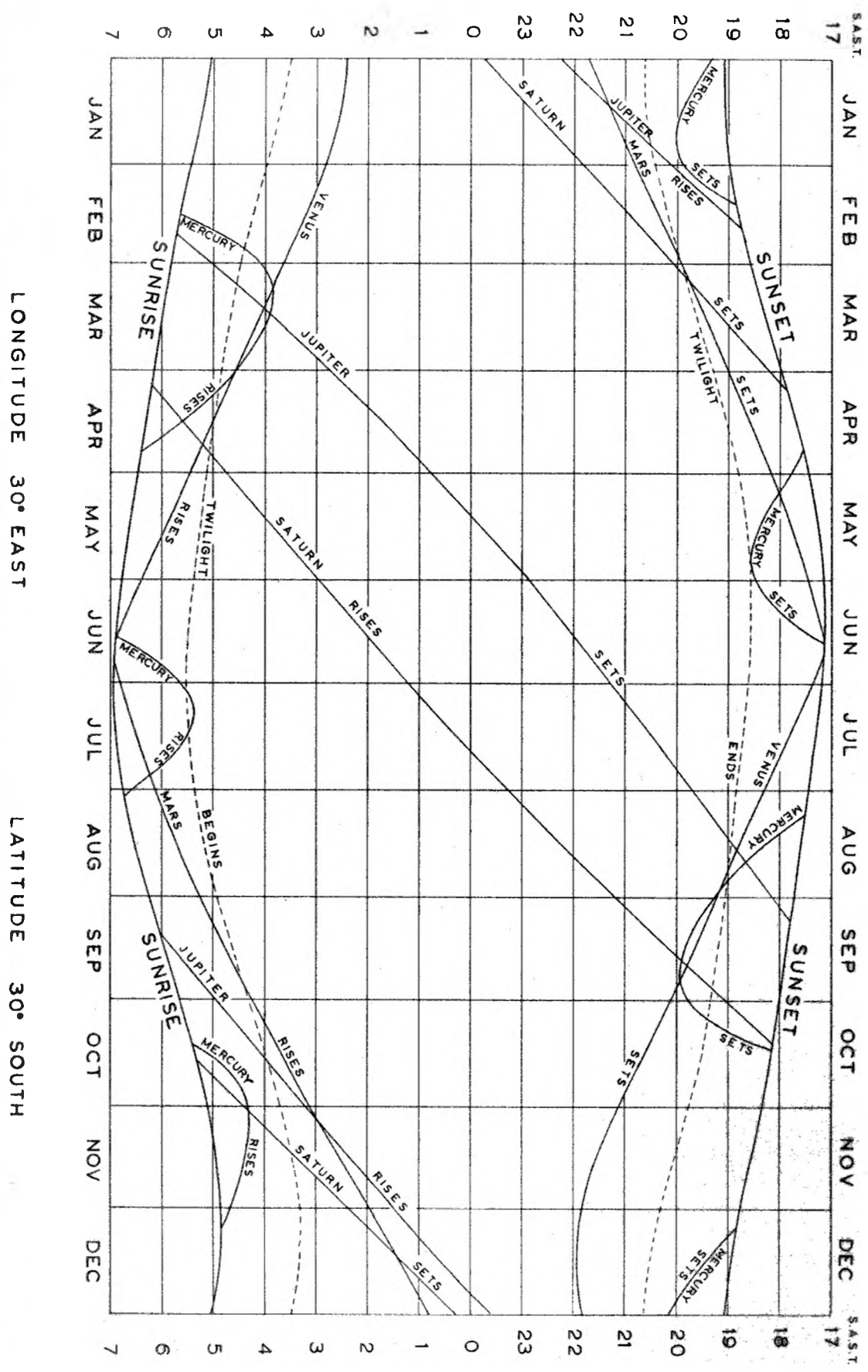
Nominations for Officers and Council by June 15.

Subscriptions due July 1.

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

THE PLANETS AS SEEN FROM SOUTH AFRICA 1968

(For explanation see notes on planets)



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HANDBOOK
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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 6 at Durban

Sidereal time at 00h 00m S.A.S.T. on November 6	3 01
S.A.S.T. elapsed	<u>20 15</u>
	23 16
Correction for longitude	+04
Interval correction	<u>+03</u>
Required sidereal time	23 23

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 (2.00 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 1968	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	14	6	39	0	42	2,439,857.0
" 11	12	07	40	7	18	1	21	867.0
" 21	12	11	08	7	57	2	00	877.0
" 31	12	13	24	8	37	2	40	887.0
February 10	12	14	18	9	16	3	19	897.0
" 20	12	13	53	9	56	3	59	907.0
March 1	12	12	24	10	35	4	38	917.0
" 11	12	10	04	11	15	5	17	927.0
" 21	12	07	12	11	54	5	57	937.0
" 31	12	04	11	12	33	6	36	947.0
April 10	12	01	19	13	13	7	16	2,439,957.0
" 20	11	58	53	13	52	7	55	967.0
" 30	11	57	11	14	32	8	35	977.0
May 10	11	56	20	15	11	9	14	987.0
" 20	11	56	26	15	51	9	53	997.0
" 30	11	57	27	16	30	10	33	2,440,007.0
June 9	11	59	08	17	09	11	12	017.0
" 19	12	01	13	17	49	11	52	027.0
" 29	12	03	21	18	28	12	31	037.0
July 9	12	05	07	19	08	13	11	2,440,047.0
" 19	12	06	11	19	47	13	50	057.0
" 29	12	06	23	20	26	14	29	067.0
August 8	12	05	33	21	06	15	09	077.0
" 18	12	03	45	21	45	15	48	087.0
" 28	12	01	10	22	25	16	28	097.0
September 7	11	57	57	23	04	17	07	107.0
" 17	11	54	27	23	44	17	47	117.0
" 27	11	50	58	0	23	18	26	127.0
October 7	11	47	49	1	02	19	05	2,440,137.0
" 17	11	45	21	1	42	19	45	147.0
" 27	11	43	54	2	21	20	24	157.0
November 6	11	43	40	3	01	21	04	167.0
" 16	11	44	49	3	40	21	43	177.0
" 26	11	47	22	4	20	22	23	187.0
December 6	11	51	07	4	59	23	02	197.0
" 16	11	55	43	5	38	23	41	207.0
" 26	12	00	41	6	18	0	21	217.0

	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 (mins)		
	SUNRISE		SUNSET		SUNRISE		SUNSET		CIVIL	NAUTICAL	ASTRON
Jan 1	05 ^h	18 ^m	19 ^h	04 ^m	05 ^h	44 ^m	18 ^h	38 ^m	27	59	94
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° 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 1968

PERIGEE			APOGEE		
Date	S. D.	H. P.	Date	S. D.	H. P.
Jan 25 ^d 02 ^h	16' 11"	59' 23"	Jan 9 ^d 15 ^h	14' 46"	54' 12"
Feb 18 18	16 12	59 28	Feb 6 12	14 47	54 15
Mar 17 04	16 27	60 21	Mar 5 09	14 46	54 11
Apr 14 09	16 39	61 05	Apr 2 01	14 44	54 03
May 12 19	16 44	61 25	Apr 29 11	14 42	53 58
Jun 10 05	16 42	61 16	May 26 14	14 42	53 56
Jul 8 11	16 32	60 40	Jun 22 21	14 43	54 01
Aug 5 05	16 19	59 51	Jul 20 11	14 45	54 08
Aug 31 04	16 09	59 18	Aug 17 05	14 47	54 14
Sep 25 22	16 18	59 49	Sep 14 00	14 47	54 14
Oct 23 17	16 32	60 41	Oct 11 19	14 45	54 08
Nov 21 02	16 43	61 20	Nov 8 11	14 43	54 00
Dec 19 14	16 45	61 28	Dec 5 17	14 42	53 56

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 3 +6.4	Jul 14 +7.0	Jan 1 +6.5	Jul 9 +6.5
Jan 16 -4.8	Jul 28 -5.0	Jan 15 -6.5	Jul 23 -6.6
Jan 31 +5.3	Aug 10 +6.0	Jan 28 +6.5	Aug 6 +6.6
Feb 12 -5.4	Aug 23 -4.6	Feb 11 -6.6	Aug 20 -6.7
Feb 27 +5.0	Sep 7 +5.4	Feb 24 +6.6	Sep 2 +6.7
Mar 11 -6.4	Sep 20 -5.3	Mar 10 -6.8	Sep 16 -6.8
Mar 24 +5.8	Oct 3 +5.6	Mar 22 +6.8	Sep 29 +6.7
Apr 8 -7.3	Oct 18 -6.4	Apr 6 -6.8	Oct 13 -6.8
Apr 21 +7.0	Oct 30 +6.7	Apr 19 +6.8	Oct 26 +6.7
May 6 -7.7	Nov 15 -7.3	May 3 -6.8	Nov 9 -6.7
May 18 +7.7	Nov 27 +7.8	May 16 +6.7	Nov 23 +6.6
Jun 3 -7.3	Dec 13 -7.6	May 30 -6.7	Dec 7 -6.6
Jun 16 +7.7	Dec 25 +7.9	Jun 12 +6.5	Dec 20 +6.5
Jul 1 -6.2		Jun 26 -6.6	

THE MOON IN JANUARY 1968

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	856.4	0.8	6 ^h 17 ^m	20 ^h 39 ^m	6 ^h 36 ^m	21 ^h 39 ^m
T 2	857.4	1.8	7 23	21 24	7 45	22 19
W 3	858.4	2.8	8 27	22 02	8 53	22 53
T 4	859.4	3.8	9 26	22 35	9 57	23 21
F 5	860.4	4.8	10 22	23 05	10 57	23 46
S 6	861.4	5.8	11 15	23 33	11 54	.....
S 7	862.4	6.8	12 07	.....	12 51	0 10
M 8	863.4	7.8	12 59	0 01	13 47	0 35
T 9	864.4	8.8	13 52	0 30	14 43	0 59
W 10	865.4	9.8	14 46	1 02	15 42	1 27
T 11	866.4	10.8	15 42	1 37	16 41	1 58
F 12	867.4	11.8	16 38	2 16	17 41	2 35
S 13	868.4	12.8	17 36	3 02	18 39	3 19
S 14	869.4	13.8	18 30	3 54	19 33	4 10
M 15	870.4	14.8	19 20	4 52	20 21	5 08
T 16	871.4	15.8	20 05	5 53	21 03	6 13
W 17	872.4	16.8	20 46	6 55	21 39	7 19
T 18	873.4	17.8	21 23	7 57	22 11	8 25
F 19	874.4	18.8	21 56	8 59	22 40	9 32
S 20	875.4	19.8	22 30	9 59	23 08	10 37
S 21	876.4	20.8	23 03	10 59	23 37	11 42
M 22	877.4	21.8	23 38	12 01	.....	12 49
T 23	878.4	22.8	.....	13 05	0 07	13 59
W 24	879.4	23.8	0 18	14 12	0 42	15 10
T 25	880.4	24.8	1 02	15 20	1 23	16 22
F 26	881.4	25.8	1 55	16 28	2 12	17 32
S 27	882.4	26.8	2 54	17 31	3 10	18 34
S 28	883.4	27.8	3 58	18 27	4 15	19 28
M 29	884.4	28.8	5 04	19 15	5 24	20 12
T 30	885.4	0.2	6 09	19 56	6 33	20 48
W 31	886.4	1.2	7 10	20 31	7 38	21 19

PHASES OF THE MOON

First Quarter	Jan 7 ^d	16 ^h	23 ^m	
Full Moon	15	18	12	
Last Quarter	22	21	38	
New Moon	29	18	30	Lunation 558

THE MOON IN FEBRUARY 1968

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.
T 1	887.4	2.2	8 ^h 08 ^m	21 ^h 05 ^m	8 ^h 42 ^m	21 ^h 46 ^m
F 2	888.4	3.2	9 03	21 32	9 41	22 11
S 3	889.4	4.2	9 57	22 01	10 39	22 35
S 4	890.4	5.2	10 49	22 29	11 35	23 00
M 5	891.4	6.2	11 42	22 59	12 32	23 26
T 6	892.4	7.2	12 35	23 33	13 30	23 56
W 7	893.4	8.2	13 31	.....	14 29	.....
T 8	894.4	9.2	14 27	0 11	15 28	0 30
F 9	895.4	10.2	15 24	0 53	16 27	1 10
S 10	896.4	11.2	16 19	1 43	17 23	1 58
S 11	897.4	12.2	17 11	2 38	18 13	2 54
M 12	898.4	13.2	17 58	3 38	18 58	3 56
T 13	899.4	14.2	18 42	4 41	19 37	5 02
W 14	900.4	15.2	19 20	5 44	20 11	6 10
T 15	901.4	16.2	19 56	6 47	20 42	7 18
F 16	902.4	17.2	20 30	7 50	21 10	8 26
S 17	903.4	18.2	21 04	8 52	21 39	9 33
S 18	904.4	19.2	21 39	9 55	22 09	10 41
M 19	905.4	20.2	22 17	10 59	22 42	11 51
T 20	906.4	21.2	23 00	12 05	23 22	13 02
W 21	907.4	22.2	23 50	13 13	.....	14 13
T 22	908.4	23.2	.....	14 20	0 07	15 23
F 23	909.4	24.2	0 45	15 23	1 01	16 27
S 24	910.4	25.2	1 47	16 20	2 02	17 22
S 25	911.4	26.2	2 51	17 09	3 10	18 08
M 26	912.4	27.2	3 55	17 52	4 17	18 47
T 27	913.4	28.2	4 57	18 29	5 24	19 19
W 28	914.4	29.2	5 56	19 01	6 27	19 47
T 29	915.4	0.6	6 52	19 31	7 28	20 12

PHASES OF THE MOON

First Quarter	Feb 6 ^d	14 ^h	21 ^m	
Full Moon	14	08	43	
Last Quarter	21	05	28	
New Moon	28	08	56	Lunation 559

THE MOON IN MARCH 1968

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.
F 1	916.4	1.6	7 ^h 46 ^m	20 ^h 00 ^m	8 ^h 26 ^m	20 ^h 36 ^m
S 2	917.4	2.6	8 39	20 29	9 23	21 01
S 3	918.4	3.6	9 32	20 59	10 21	21 26
M 4	919.4	4.6	10 25	21 30	11 19	21 55
T 5	920.4	5.6	11 20	22 06	12 17	22 26
W 6	921.4	6.6	12 16	22 46	13 16	23 04
T 7	922.4	7.6	13 12	23 32	14 15	23 48
F 8	923.4	8.6	14 07	.....	15 12	.....
S 9	924.4	9.6	15 00	0 24	16 03	0 40
S 10	925.4	10.6	15 50	1 21	16 50	1 38
M 11	926.4	11.6	16 33	2 22	17 30	2 42
T 12	927.4	12.6	17 14	3 25	18 06	3 49
W 13	928.4	13.6	17 51	4 29	18 39	4 57
T 14	929.4	14.6	18 27	5 32	19 09	6 06
F 15	930.4	15.6	19 01	6 36	19 38	7 15
S 16	931.4	16.6	19 36	7 40	20 09	8 25
S 17	932.4	17.6	20 15	8 46	20 41	9 36
M 18	933.4	18.6	20 57	9 54	21 20	10 49
T 19	934.4	19.6	21 46	11 03	22 04	12 03
W 20	935.4	20.6	22 40	12 12	22 56	13 15
T 21	936.4	21.6	23 40	13 18	23 56	14 22
F 22	937.4	22.6	.....	14 17	.....	15 20
S 23	938.4	23.6	0 44	15 08	1 01	16 08
S 24	939.4	24.6	1 48	15 52	2 08	16 48
M 25	940.4	25.6	2 49	16 29	3 14	17 21
T 26	941.4	26.6	3 48	17 03	4 17	17 50
W 27	942.4	27.6	4 44	17 33	5 18	18 15
T 28	943.4	28.6	5 39	18 01	6 17	18 39
F 29	944.4	0.0	6 31	18 29	7 14	19 03
S 30	945.4	1.0	7 24	18 59	8 11	19 28
S 31	946.4	2.0	8 17	19 30	9 08	19 56

PHASES OF THE MOON

First Quarter Mar 7^d 11^h 21^m
 Full Moon 14 20 53
 Last Quarter 21 13 08
 New Moon 29 00 49 Lunation 560

THE MOON IN APRIL 1968

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	947.4	3.0	9 ^h 11 ^m	20 ^h 04 ^m	10 ^h 07 ^m	20 ^h 26 ^m
T 2	948.4	4.0	10 07	20 42	11 06	21 01
W 3	949.4	5.0	11 02	21 26	12 05	21 42
T 4	950.4	6.0	11 58	22 15	13 02	22 30
F 5	951.4	7.0	12 51	23 08	13 55	23 25
S 6	952.4	8.0	13 41	.....	14 42	.....
S 7	953.4	9.0	14 26	0 07	15 25	0 25
M 8	954.4	10.0	15 07	1 07	16 02	1 29
T 9	955.4	11.0	15 45	2 09	16 35	2 36
W 10	956.4	12.0	16 20	3 11	17 06	3 43
T 11	957.4	13.0	16 55	4 14	17 35	4 51
F 12	958.4	14.0	17 30	5 19	18 05	6 00
S 13	959.4	15.0	18 08	6 25	18 37	7 12
S 14	960.4	16.0	18 49	7 34	19 13	8 26
M 15	961.4	17.0	19 36	8 45	19 56	9 42
T 16	962.4	18.0	20 30	9 57	20 47	10 59
W 17	963.4	19.0	21 31	11 07	21 47	12 11
T 18	964.4	20.0	22 35	12 10	22 52	13 13
F 19	965.4	21.0	23 41	13 05	.....	14 06
S 20	966.4	22.0	.....	13 51	0 00	14 49
S 21	967.4	23.0	0 43	14 31	1 07	15 24
M 22	968.4	24.0	1 43	15 05	2 11	15 54
T 23	969.4	25.0	2 40	15 36	3 12	16 20
W 24	970.4	26.0	3 34	16 05	4 10	16 44
T 25	971.4	27.0	4 27	16 33	5 08	17 08
F 26	972.4	28.0	5 19	17 01	6 04	17 32
S 27	973.4	29.0	6 11	17 31	7 02	17 58
S 28	974.4	0.3	7 05	18 05	7 59	18 27
M 29	975.4	1.3	8 00	18 41	8 58	19 01
T 30	976.4	2.3	8 56	19 22	9 57	19 39

PHASES OF THE MOON

First Quarter	Apr 6 ^d	05 ^h	28 ^m	
Full Moon	13	06	52	
Last Quarter	19	21	35	
New Moon	27	17	22	Lunation 561

THE MOON IN MAY 1968

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	977.4	3.3	9 ^h 51 ^m	20 ^h 10 ^m	10 ^h 54 ^m	20 ^h 25 ^m
T 2	978.4	4.3	10 45	21 01	11 49	21 17
F 3	979.4	5.3	11 36	21 57	12 38	22 14
S 4	980.4	6.3	12 21	22 56	13 22	23 16
S 5	981.4	7.3	13 03	23 56	14 00	.....
M 6	982.4	8.3	13 41	.....	14 33	0 20
T 7	983.4	9.3	14 16	0 56	15 03	1 24
W 8	984.4	10.3	14 50	1 57	15 32	2 31
T 9	985.4	11.3	15 23	2 58	16 01	3 37
F 10	986.4	12.3	15 59	4 02	16 31	4 46
S 11	987.4	13.3	16 38	5 08	17 05	5 58
S 12	988.4	14.3	17 22	6 19	17 45	7 14
M 13	989.4	15.3	18 15	7 32	18 33	8 32
T 14	990.4	16.3	19 14	8 45	19 30	9 49
W 15	991.4	17.3	20 19	9 54	20 36	10 59
T 16	992.4	18.3	21 27	10 55	21 46	11 58
F 17	993.4	19.3	22 34	11 47	22 56	12 46
S 18	994.4	20.3	23 36	12 30	.....	13 25
S 19	995.4	21.3	.....	13 07	0 03	13 57
M 20	996.4	22.3	0 35	13 39	1 06	14 24
T 21	997.4	23.3	1 30	14 08	2 06	14 49
W 22	998.4	24.3	2 23	14 36	3 03	15 13
T 23	999.4	25.3	3 15	15 05	3 59	15 37
F 24	2440000.4	26.3	4 07	15 34	4 56	16 02
S 25	001.4	27.3	5 00	16 06	5 53	16 30
S 26	002.4	28.3	5 54	16 42	6 51	17 02
M 27	003.4	29.3	6 50	17 21	7 50	17 39
T 28	004.4	0.6	7 46	18 07	8 49	18 22
W 29	005.4	1.6	8 40	18 57	9 45	19 13
T 30	006.4	2.6	9 32	19 52	10 35	20 09
F 31	007.4	3.6	10 19	20 49	11 20	21 09

PHASES OF THE MOON

First Quarter	May 5 ^d	19 ^h 55 ^m	
Full Moon	12	15 05	
Last Quarter	19	07 45	
New Moon	27	09 30	Lunation 562

THE MOON IN JUNE 1968

DAY	At 0 ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2440000+	AGE	MOONRISE	MOONSET	MOONRISE	MOONSET
			S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.
S 1	008.4	4.6	11 ^h 02 ^m	21 ^h 48 ^m	11 ^h 59 ^m 8 ^s	22 ^h 11 ^m
S 2	009.4	5.6	11 39	22 47	12 33	23 14
M 3	010.4	6.6	12 15	23 45	13 04	.....
T 4	011.4	7.6	12 48	.....	13 32	0 18
W 5	012.4	8.6	13 20	0 45	14 00	1 21
T 6	013.4	9.6	13 54	1 45	14 28	2 27
F 7	014.4	10.6	14 30	2 48	14 59	3 35
S 8	015.4	11.6	15 11	3 55	15 35	4 47
S 9	016.4	12.6	15 58	5 05	16 19	6 03
M 10	017.4	13.6	16 54	6 19	17 11	7 21
T 11	018.4	14.6	17 57	7 31	18 13	8 35
W 12	019.4	15.6	19 07	8 37	19 24	9 41
T 13	020.4	16.6	20 16	9 35	20 36	10 35
F 14	021.4	17.6	21 22	10 24	21 47	11 20
S 15	022.4	18.6	22 24	11 04	22 54	11 55
S 16	023.4	19.6	23 22	11 38	23 56	12 25
M 17	024.4	20.6	.....	12 09	.....	12 51
T 18	025.4	21.6	0 17	12 38	0 55	13 16
W 19	026.4	22.6	1 10	13 06	1 53	13 40
T 20	027.4	23.6	2 02	13 36	2 50	14 05
F 21	028.4	24.6	2 55	14 07	3 46	14 33
S 22	029.4	25.6	3 49	14 41	4 45	15 03
S 23	030.4	26.6	4 44	15 20	5 43	15 38
M 24	031.4	27.6	5 40	16 04	6 42	16 20
T 25	032.4	28.6	6 36	16 53	7 39	17 08
W 26	033.4	0.0	7 28	17 47	8 32	18 04
T 27	034.4	1.0	8 17	18 45	9 18	19 03
F 28	035.4	2.0	9 01	19 43	10 00	20 05
S 29	036.4	3.0	9 40	20 42	10 35	21 08
S 30	037.4	4.0	10 16	21 40	11 07	22 11

PHASES OF THE MOON

First Quarter Jun 4^d 06^h 47^m
 Full Moon 10 22 14
 Last Quarter 17 20 14
 New Moon 26 00 25 Lunation 563

THE MOON IN JULY 1968

DAY	At 0 ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2440000+	AGE	MOONRISE	MOONSET	MOONRISE	MOONSET
			S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.
M 1	038.4	5.0	10 ^h 49 ^m	22 ^h 38 ^m	11 ^h 35 ^m	23 ^h 13 ^m
T 2	039.4	6.0	11 21	23 37	12 02	.....
W 3	040.4	7.0	11 53	.....	12 29	0 17
T 4	041.4	8.0	12 27	0 36	12 58	1 22
F 5	042.4	9.0	13 04	1 40	13 30	2 30
S 6	043.4	10.0	13 47	2 46	14 09	3 42
S 7	044.4	11.0	14 37	3 56	14 56	4 56
M 8	045.4	12.0	15 37	5 08	15 53	6 12
T 9	046.4	13.0	16 43	6 17	16 59	7 21
W 10	047.4	14.0	17 53	7 19	18 12	8 21
T 11	048.4	15.0	19 02	8 11	19 25	9 10
F 12	049.4	16.0	20 07	8 56	20 35	9 50
S 13	050.4	17.0	21 09	9 34	21 41	10 23
S 14	051.4	18.0	22 06	10 07	22 43	10 52
M 15	052.4	19.0	23 02	10 38	23 43	11 18
T 16	053.4	20.0	23 55	11 07	.....	11 42
W 17	054.4	21.0	.....	11 36	0 41	12 07
T 18	055.4	22.0	0 48	12 07	1 38	12 34
F 19	056.4	23.0	1 42	12 40	2 36	13 03
S 20	057.4	24.0	2 37	13 17	3 35	13 37
S 21	058.4	25.0	3 33	13 59	4 34	14 16
M 22	059.4	26.0	4 29	14 47	5 32	15 02
T 23	060.4	27.0	5 22	15 39	6 26	15 56
W 24	061.4	28.0	6 13	16 36	7 15	16 54
T 25	062.4	29.0	6 59	17 36	7 59	17 57
F 26	063.4	0.4	7 40	18 36	8 37	19 00
S 27	064.4	1.4	8 17	19 35	9 09	20 04
S 28	065.4	2.4	8 51	20 33	9 38	21 08
M 29	066.4	3.4	9 23	21 31	10 06	22 11
T 30	067.4	4.4	9 55	22 31	10 33	23 15
W 31	068.4	5.4	10 28	23 32	11 01	.....

PHASES OF THE MOON

First Quarter	Jul 3 ^d	14 ^h	42 ^m	
Full Moon	10	05	18	
Last Quarter	17	11	12	
New Moon	25	13	50	Lunation 564

THE MOON IN AUGUST 1968

DAY	At 0 ^h 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.
T 1	069.4	6.4	11 ^h 03 ^m	.....^m	11 ^h 31 ^m	0 ^h 21
F 2	070.4	7.4	11 43	0 36	12 07	1 30
S 3	071.4	8.4	12 29	1 43	12 48	2 42
S 4	072.4	9.4	13 23	2 53	13 40	3 55
M 5	073.4	10.4	14 25	4 01	14 41	5 05
T 6	074.4	11.4	15 32	5 04	15 50	6 07
W 7	075.4	12.4	16 41	6 00	17 02	7 00
T 8	076.4	13.4	17 48	6 48	18 13	7 44
F 9	077.4	14.4	18 52	7 28	19 22	8 20
S 10	078.4	15.4	19 52	8 04	20 27	8 50
S 11	079.4	16.4	20 49	8 35	21 29	9 17
M 12	080.4	17.4	21 44	9 06	22 28	9 42
T 13	081.4	18.4	22 38	9 35	23 27	10 08
W 14	082.4	19.4	23 32	10 05	.....	10 33
T 15	083.4	20.4	.....	10 38	0 25	11 02
F 16	084.4	21.4	0 27	11 14	1 24	11 34
S 17	085.4	22.4	1 23	11 54	2 24	12 11
S 18	086.4	23.4	2 19	12 39	3 22	12 55
M 19	087.4	24.4	3 14	13 30	4 18	13 45
T 20	088.4	25.4	4 06	14 26	5 09	14 42
W 21	089.4	26.4	4 54	15 24	5 55	15 44
T 22	090.4	27.4	5 37	16 25	6 34	16 47
F 23	091.4	28.4	6 16	17 25	7 09	17 52
S 24	092.4	29.4	6 51	18 24	7 40	18 57
S 25	093.4	0.9	7 24	19 24	8 08	20 02
M 26	094.4	1.9	7 56	20 24	8 36	21 07
T 27	095.4	2.9	8 30	21 25	9 04	22 13
W 28	096.4	3.9	9 04	22 29	9 33	23 23
T 29	097.4	4.9	9 42	23 35	10 07	.....
F 30	098.4	5.9	10 26	.....	10 47	0 34
S 31	099.4	6.9	11 17	0 44	11 34	1 45

PHASES OF THE MOON

First Quarter	Aug 1 ^d	20 ^h	35 ^m	
Full Moon	8	13	33	
Last Quarter	16	04	14	
New Moon	24	01	57	Lunation 565
First Quarter	31	01	35	

THE MOON IN SEPTEMBER 1968

DAY	At 0 ^h S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 244.0000+	AGE	MOONRISE	MOONSET	MOONRISE	MOONSET
			S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.
S 1	100.4	7.9	12 ^h 15 ^m	1 ^h 51 ^m	12 ^h 31 ^m	2 ^h 56 ^m
M 2	101.4	8.9	13 19	2 55	13 36	3 59
T 3	102.4	9.9	14 27	3 52	14 46	4 54
W 4	103.4	10.9	15 33	4 42	15 56	5 40
T 5	104.4	11.9	16 37	5 24	17 05	6 17
F 6	105.4	12.9	17 38	6 01	18 11	6 49
S 7	106.4	13.9	18 36	6 34	19 13	7 17
S 8	107.4	14.9	19 32	7 04	20 14	7 43
M 9	108.4	15.9	20 27	7 34	21 14	8 08
T 10	109.4	16.9	21 21	8 04	22 13	8 34
W 11	110.4	17.9	22 17	8 36	23 13	9 02
T 12	111.4	18.9	23 13	9 10	.....	9 32
F 13	112.4	19.9	.....	9 48	0 12	10 07
S 14	113.4	20.9	0 09	10 32	1 11	10 48
S 15	114.4	21.9	1 04	11 20	2 08	11 35
M 16	115.4	22.9	1 57	12 13	3 01	12 29
T 17	116.4	23.9	2 46	13 10	3 48	13 28
W 18	117.4	24.9	3 31	14 09	4 30	14 31
T 19	118.4	25.9	4 11	15 09	5 07	15 36
F 20	119.4	26.9	4 48	16 10	5 39	16 40
S 21	120.4	27.9	5 22	17 11	6 08	17 46
S 22	121.4	28.9	5 55	18 11	6 36	18 52
M 23	122.4	0.5	6 28	19 14	7 04	20 00
T 24	123.4	1.5	7 03	20 18	7 34	21 10
W 25	124.4	2.5	7 41	21 26	8 07	22 22
T 26	125.4	3.5	8 24	22 35	8 45	23 36
F 27	126.4	4.5	9 13	23 44	9 31	.....
S 28	127.4	5.5	10 09	.....	10 25	0 48
S 29	128.4	6.5	11 12	0 50	11 28	1 54
M 30	129.4	7.5	12 18	1 49	12 36	2 52

PHASES OF THE MOON

Full Moon Sep 7^d 00^h 08^m
 Last Quarter 14 22 32
 New Moon 22 13 09 Lunation 566
 First Quarter 29 07 07

THE MOON IN OCTOBER 1968

DAY	At 0 ^h 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.
T 1	130.4	8.5	13 ^h 24 ^m	2 ^h 40 ^m	13 ^h 46 ^m	3 ^h 39 ^m
W 2	131.4	9.5	14 28	3 23	14 54	4 18
T 3	132.4	10.5	15 28	4 01	15 59	4 51
F 4	133.4	11.5	16 26	4 34	17 01	5 20
S 5	134.4	12.5	17 22	5 05	18 02	5 46
S 6	135.4	13.5	18 17	5 34	19 01	6 10
M 7	136.4	14.5	19 11	6 04	20 00	6 36
T 8	137.4	15.5	20 07	6 35	21 01	7 02
W 9	138.4	16.5	21 02	7 08	22 00	7 31
T 10	139.4	17.5	21 59	7 45	23 00	8 04
F 11	140.4	18.5	22 55	8 26	23 58	8 43
S 12	141.4	19.5	23 48	9 12	.....	9 27
S 13	142.4	20.5	.....	10 03	0 53	10 18
M 14	143.4	21.5	0 38	10 58	1 41	11 15
T 15	144.4	22.5	1 24	11 55	2 25	12 15
W 16	145.4	23.5	2 06	12 54	3 03	13 17
T 17	146.4	24.5	2 43	13 53	3 36	14 21
F 18	147.4	25.5	3 18	14 53	4 06	15 26
S 19	148.4	26.5	3 51	15 53	4 35	16 31
S 20	149.4	27.5	4 24	16 55	5 03	17 38
M 21	150.4	28.5	4 58	17 59	5 32	18 48
T 22	151.4	0.0	5 35	19 07	6 03	20 01
W 23	152.4	1.0	6 16	20 18	6 39	21 17
T 24	153.4	2.0	7 05	21 30	7 24	22 33
F 25	154.4	3.0	8 00	22 39	8 17	23 44
S 26	155.4	4.0	9 03	23 43	9 18	.....
S 27	156.4	5.0	10 10	.....	10 27	0 46
M 28	157.4	6.0	11 17	0 37	11 37	1 37
T 29	158.4	7.0	12 22	1 23	12 47	2 19
W 30	159.4	8.0	13 22	2 02	13 52	2 54
T 31	160.4	9.0	14 20	2 36	14 55	3 23

PHASES OF THE MOON

Full Moon	Oct 6 ^d	13 ^h 47 ^m	
Last Quarter	14	17 06	
New Moon	21	23 45	Lunation 567
First Quarter	28	14 40	

THE MOON IN NOVEMBER 1968

DAY	At 0 ^h 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.
F 1	161.4	10.0	15 ^h 16 ^m	3 ^h 07 ^m	15 ^h 55 ^m	3 ^h 49 ^m
S 2	162.4	11.0	16 10	3 36	16 53	4 14
S 3	163.4	12.0	17 04	4 05	17 52	4 39
M 4	164.4	13.0	17 59	4 36	18 51	5 04
T 5	165.4	14.0	18 54	5 08	19 50	5 33
W 6	166.4	15.0	19 50	5 43	20 50	6 04
T 7	167.4	16.0	20 46	6 23	21 49	6 41
F 8	168.4	17.0	21 41	7 07	22 45	7 23
S 9	169.4	18.0	22 32	7 57	23 36	8 12
S 10	170.4	19.0	23 19	8 50	.....	9 06
M 11	171.4	20.0	.....	9 46	0 21	10 04
T 12	172.4	21.0	0 02	10 43	1 00	11 05
W 13	173.4	22.0	0 40	11 40	1 34	12 06
T 14	174.4	23.0	1 14	12 37	2 05	13 08
F 15	175.4	24.0	1 47	13 36	2 33	14 11
S 16	176.4	25.0	2 19	14 35	3 00	15 16
S 17	177.4	26.0	2 51	15 37	3 27	16 23
M 18	178.4	27.0	3 26	16 42	3 57	17 34
T 19	179.4	28.0	4 05	17 52	4 31	18 49
W 20	180.4	29.0	4 51	19 06	5 12	20 06
T 21	181.4	0.6	5 44	20 18	6 02	21 22
F 22	182.4	1.6	6 46	21 28	7 02	22 32
S 23	183.4	2.6	7 54	22 28	8 10	23 30
S 24	184.4	3.6	9 04	23 19	9 23	.....
M 25	185.4	4.6	10 12	.....	10 35	0 17
T 26	186.4	5.6	11 16	0 02	11 43	0 55
W 27	187.4	6.6	12 15	0 38	12 48	1 26
T 28	188.4	7.6	13 11	1 10	13 49	1 54
F 29	189.4	8.6	14 06	1 40	14 48	2 19
S 30	190.4	9.6	14 59	2 09	15 46	2 43

PHASES OF THE MOON

Full Moon	Nov 5 ^d	06 ^h 25 ^m	
Last Quarter	13	10 54	
New Moon	20	10 02	Lunation 568
First Quarter	27	01 31	

THE MOON IN DECEMBER 1968

DAY	At 0 ^h 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.
S 1	191.4	10.6	15 ^h 53 ^m	2 ^h 38 ^m	16 ^h 44 ^m	3 ^h 08 ^m
M 2	192.4	11.6	16 48	3 09	17 44	3 36
T 3	193.4	12.6	17 44	3 43	18 43	4 06
W 4	194.4	13.6	18 40	4 21	19 42	4 40
T 5	195.4	14.6	19 35	5 05	20 39	5 21
F 6	196.4	15.6	20 28	5 52	21 31	6 07
S 7	197.4	16.6	21 16	6 44	22 18	7 00
S 8	198.4	17.6	21 59	7 39	22 59	7 57
M 9	199.4	18.6	22 39	8 36	23 35	8 57
T 10	200.4	19.6	23 13	9 33	.....	9 57
W 11	201.4	20.6	23 46	10 29	0 06	10 58
T 12	202.4	21.6	.....	11 25	0 33	11 59
F 13	203.4	22.6	0 17	12 22	1 00	13 00
S 14	204.4	23.6	0 48	13 20	1 26	14 03
S 15	205.4	24.6	1 20	14 21	1 54	15 09
M 16	206.4	25.6	1 56	15 26	2 24	16 20
T 17	207.4	26.6	2 37	16 37	3 00	17 35
W 18	208.4	27.6	3 25	17 50	3 45	18 53
T 19	209.4	28.6	4 23	19 02	4 39	20 07
F 20	210.4	0.2	5 29	20 09	5 44	21 12
S 21	211.4	1.2	6 40	21 06	6 58	22 06
S 22	212.4	2.2	7 52	21 54	8 14	22 50
M 23	213.4	3.2	9 00	22 35	9 26	23 25
T 24	214.4	4.2	10 04	23 10	10 36	23 55
W 25	215.4	5.2	11 04	23 41	11 39	.....
T 26	216.4	6.2	12 00	.....	12 41	0 22
F 27	217.4	7.2	12 55	0 10	13 40	0 46
S 28	218.4	8.2	13 49	0 40	14 39	1 12
S 29	219.4	9.2	14 43	1 11	15 37	1 38
M 30	220.4	10.2	15 38	1 44	16 36	2 07
T 31	221.4	11.2	16 34	2 21	17 35	2 40

PHASES OF THE MOON

Full Moon Dec 5^d 01^h 08^m
 Last Quarter 13 02 50
 New Moon 19 20 19 Lunation 569
 First Quarter 26 16 15

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:

Z.C.	Z.C.
146 ϵ Pis	1484 η Leo
440 ϵ Ari	1772 η Vir
537 17 Tau	2172 ι Lib
539 q Tau	2349 σ Sco
541 20 Tau	2366 a Sco
552 η Tau	2371 22 Sco
560 27 Tau	2617 38B Sgr
810 β Tau	2784 τ Sgr
948 κ Aur	3412 ϕ Aqr
1122 ι Gem	

Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town			
						P.A.	h. m.	a	b
Jan									
6	50	G5	6.0	+01° 46'	D	-	-	-	-
8	279	F5	7.1	+12 32	D	-	-	-	-
10	493	A0	6.9	+21 56	D	-	-	-	-
12	647	B9	5.5	+25 33	D	157°	01 01.4	-	-
12	647	B9	5.5	+25 33	R	187	01 22.3	-	-
17	1363	G5	5.2	+22 11	R	342	04 55.2	0.0	-1.4
24	2172	A0p	4.7	-19 40	R	306	05 08.3	-0.9	-1.9
25	2305	B8	5.9	-23 31	R	274	02 44.5	0.0	-1.1
25	2314	B9	5.8	-23 36	R	310	03 43.9	0.0	-1.8
26	2479	K0	5.3	-26 33	R	353	05 13.5	+1.4	-4.1
26	2480	K0	5.3	-26 34	R	352	05 13.8	+1.3	-4.0
Feb									
5	348	A0	6.8	+16 44	D	8	21 56.6	-	-
6	459	K2	6.7	+20 39	D	-	-	-	-
7	587	K0	6.4	+24 22	D	130	20 40.7	-	-
10	1032	K0	5.5	+29 00	D	68	22 15.7	-2.6	+0.6
16	1749	K0	6.1	+02 05	D	-	-	-	-
16	1749	K0	6.1	+02 05	R	344	22 33.7	-0.3	-2.5
17	1772	A0	4.0	-00 29	D	185	05 45.5	+0.2	-3.6
23	2583	A3	5.8	-28 04	R	-	-	-	-
24	2784	K0	3.4	-27 43	D	129	05 33.3	-0.3	-2.5
Mar.									
4	411	G0	7.3	+19 14	D	-	-	-	-
5	521	A0p	6.7	+23 07	D	-	-	-	-
7	810	B8	1.8	+28 35	D	87	22 21.4	-1.5	+1.2
8	967	F0	6.9	+29 23	D	35	22 03.3	-	-
9	1103	M0	5.9	+27 57	D	-	-	-	-
10	1232	K0	6.7	+25 56	D	-	-	-	-
11	1252	K2	7.4	+25 26	D	90	01 26.4	-1.2	+1.1
11	1363	G5	5.2	+22 11	D	153	21 12.8	-1.6	-2.1
11	1365	G5	6.1	+22 08	D	139	21 44.5	-1.7	-1.5
12	1373	A0	6.1	+21 25	D	-	-	-	-
12	1484	A0p	3.6	+16 55	D	96	23 28.9	-2.5	-0.2
19	2227	K0	5.8	-23 02	R	-	-	-	-
19	2371	B3	4.9	-25 03	R	322	23 30.2	+0.5	-1.8
21	2545	A5	6.4	-27 52	R	305	03 59.0	-1.0	-2.1
Apr									
3	756	A2	6.5	+27 39	D	-	-	-	-
4	897	A2	6.4	+28 57	D	-	-	-	-

Date	Z.C.	Johannesburg				Luanshya			
		P.A.	h. m.	a	b	P.A.	h. m.	a	b
Jan									
6	50	14°	20 17.9	-0.6	+3.0	-	-	-	-
8	279	-	-	-	-	95°	21 06.0	-3.2	+0.2
10	493	33	19 47.4	-1.5	+1.8	351	20 30.3	-	-
12	647	114	01 00.8	-0.8	+0.1	77	01 08.1	-1.4	+1.0
12	647	-	-	-	-	-	-	-	-
17	1363	-	-	-	-	-	-	-	-
24	2172	347	04 55.6	0.0	-3.2	-	-	-	-
25	2305	302	02 34.3	+0.1	-1.5	-	-	-	-
25	2314	347	03 24.1	+0.8	-2.9	-	-	-	-
26	2479	-	-	-	-	-	-	-	-
26	2480	-	-	-	-	-	-	-	-
Feb									
5	348	-	-	-	-	-	-	-	-
6	459	-	-	-	-	99	22 01.2	-1.4	+0.2
7	587	114	21 02.8	-2.5	-0.3	80	21 07.7	-2.7	+0.9
10	1032	34	23 00.5	-	-	-	-	-	-
16	1749	37	22 00.2	-	-	-	-	-	-
16	1749	28	22 05.3	-	-	-	-	-	-
17	1772	-	-	-	-	92	05 30.9	-2.1	+0.3
23	2583	250	03 09.4	-1.0	-0.2	289	03 01.2	-0.2	-1.0
24	2784	90	05 28.2	-1.3	-0.8	37	05 35.4	-3.0	+2.9
Mar									
4	411	-	-	-	-	8	19 18.1	-	-
5	521	139	19 46.7	-	-	94	19 40.4	-2.2	+0.3
7	810	50	22 49.4	-1.8	+2.5	-	-	-	-
8	967	-	-	-	-	-	-	-	-
9	1103	-	-	-	-	154	21 19.1	-1.3	-3.0
10	1232	-	-	-	-	137	18 59.5	-2.7	-2.4
11	1252	-	-	-	-	-	-	-	-
11	1363	127	21 17.2	-2.2	-1.3	96	21 05.2	-3.2	-0.4
11	1365	111	21 55.4	-2.4	-0.7	76	21 54.4	-4.2	+0.9
12	1373	149	00 38.2	-0.5	-1.2	112	00 27.6	-1.6	-0.5
12	1484	-	-	-	-	-	-	-	-
19	2227	-	-	-	-	266	04 59.5	-3.0	+0.4
19	2371	-	-	-	-	-	-	-	-
21	2545	-	-	-	-	-	-	-	-
Apr									
3	756	-	-	-	-	114	20 50.1	-0.4	-0.4
4	897	133	19 19.0	-1.5	-0.9	97	19 14.1	-2.5	+0.1

Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town			
						P.A.	h. m.	a	b
Apr									
6	1189	A2	5.0	+26° 51'	D	123°	22 23.3	-1.0	0.0
9	1435	K0	6.6	+19 01	D	95	00 02.7	-1.6	+0.8
9	1436	K0	6.9	+18 50	D	85	00 54.3	-1.4	+1.4
9	1535	K0	7.1	+14 30	D	-	-	-	-
9	1544	M0	5.7	+14 18	D	98	20 36.3	-2.3	-0.9
10	1553	A0	7.5	+13 02	D	156	00 43.4	-0.4	-1.3
12	1772	A0	4.0	-00 30	D	-	-	-	-
15	2311	B8	6.2	-24 23	R	246	23 26.8	-1.6	-0.2
16	2332	B9	6.2	-25 24	D	-	-	-	-
16	2332	B9	6.2	-25 24	R	-	-	-	-
16	2349	B1	3.1	-25 31	D	137	05 39.4	-1.9	-1.5
16	2349	B1	3.1	-25 31	R	244	06 39.5	-1.1	+2.1
17	2505	K2	5.4	-28 07	R	-	-	-	-
17	2644	F8	6.3	-28 18	R	-	-	-	-
18	2660	A2	6.1	-28 27	R	-	-	-	-
19	2848	K0	5.6	-27 03	R	269	02 54.6	-1.2	-1.0
May									
3	1132	K0	6.6	+27 37	D	-	-	-	-
3	1137	K0	5.1	+27 59	D	96	18 23.0	-2.4	+0.3
4	1263	A3	7.1	+24 39	D	-	-	-	-
4	1270	A5	6.1	+24 15	D	-	-	-	-
6	1484	A0 _p	3.6	+16 55	D	-	-	-	-
7	1596	A2	7.0	+10 06	D	-	-	-	-
7	1603	A0	7.1	+09 21	D	-	-	-	-
9	1732	K0	7.0	+02 00	D	195	02 41.1	-	-
10	1945	G5	5.4	-10 00	D	-	-	-	-
14	2554	F8	4.4-5.0	-27 49	D	130	20 41.3	+0.6	-1.6
14	2554	F8	4.4-5.0	-27 49	R	255	21 27.7	-0.4	-0.7
15	2583	A3	5.8	-28 04	R	297	01 25.5	-1.5	-1.7
15	2586	B5	6.0	-28 46	R	-	-	-	-
16	2784	K0	3.4	-27 43	D	92	01 42.7	-1.6	-0.9
16	2784	K0	3.4	-27 43	R	263	03 02.4	-2.1	-0.1
18	3089	A0	5.3	-21 19	R	265	03 05.8	-1.5	-0.8
31	1232	K0	6.7	+25 57	D	88	19 06.5	-1.7	+1.1
31	1233	G5	5.8	+25 36	D	154	19 39.2	+0.1	-1.0
Jun									
5	1770	A3	5.9	-00 37	D	-	-	-	-
5	1772	A0	4.0	-00 29	D	206	19 40.7	-	-
7	1911	F8	7.1	-08 34	D	193	00 30.5	-	-
7	2021	M3	6.7	-14 03	D	173	20 33.0	-0.1	-3.2
13	3018	G5	6.3	-23 53	R	-	-	-	-
16	3303	F0	6.2	-13 05	R	257	00 46.7	-0.6	-0.7
23	587	K0	6.4	+24 22	R	-	-	-	-

Date	Z.C.	Johannesburg				Luanshya			
		P.A.	h. m.	a	b	P.A.	h. m.	a	b
Apr									
6	1189	83°	22 38.9	-1.5	+1.2	-	-	-	-
9	1435	-	-	-	-	-	-	-	-
9	1436	-	-	-	-	-	-	-	-
9	1535	133	18 37.5	-1.5	-1.9	-	-	-	-
9	1544	-	-	-	-	-	-	-	-
10	1553	114	00 45.8	-1.1	-0.1	55°	00 59.6	-	-
12	1772	151	00 43.4	-1.0	-1.8	113	00 26.7	-2.3	-0.8
15	2311	288	23 33.3	-1.1	-1.3	323	23 12.4	-0.3	-2.0
16	2332	186	03 00.2	-	-	-	-	-	-
16	2332	216	03 22.1	-	-	280	03 44.3	-2.7	-0.3
16	2349	110	05 51.6	-1.7	-0.1	-	-	-	-
16	2349	-	-	-	-	-	-	-	-
17	2505	227	04 58.0	-2.2	+3.2	279	05 14.5	-2.6	-0.2
17	2644	236	22 56.5	-0.7	+0.2	-	-	-	-
18	2660	248	00 56.3	-1.5	0.0	291	00 48.6	-0.8	-1.1
19	2848	309	02 52.7	-1.1	-2.8	-	-	-	-
May									
3	1132	176	18 47.5	-	-	130	18 19.8	-1.9	-1.4
3	1137	57	18 58.5	-	-	-	-	-	-
4	1263	183	21 21.5	-	-	132	20 58.3	-0.6	-1.0
4	1270	-	-	-	-	162	22 24.6	+0.7	-2.1
6	1484	94	17 45.5	-2.7	-0.7	-	-	-	-
7	1596	-	-	-	-	179	20 10.7	0.0	-3.6
7	1603	-	-	-	-	191	22 55.7	+1.1	-4.4
9	1732	-	-	-	-	-	-	-	-
10	1945	-	-	-	-	205	19 09.4	-	-
14	2554	98	20 28.3	+0.1	-0.9	-	-	-	-
14	2554	290	21 22.7	-0.1	-1.3	332	21 01.3	+0.8	-2.3
15	2583	350	01 12.0	-	-	-	-	-	-
15	2586	-	-	-	-	243	02 50.8	-2.8	+1.5
16	2784	57	02 02.5	-2.5	+1.2	-	-	-	-
16	2784	292	03 20.0	-2.7	-1.3	-	-	-	-
18	3089	298	03 11.5	-2.4	-2.8	-	-	-	-
31	1232	-	-	-	-	-	-	-	-
31	1233	112	19 39.7	-0.6	+0.2	66	19 50.0	-2.0	+1.9
Jun									
5	1770	-	-	-	-	193	18 51.4	-	-
5	1772	151	19 17.2	-1.2	-2.2	119	18 54.1	-2.4	-1.4
7	1911	143	00 17.5	-0.9	-1.2	95	00 11.8	-1.3	+0.3
7	2021	130	20 23.7	-1.6	-1.7	93	20 09.5	-3.1	-0.3
13	3018	-	-	-	-	194	23 24.2	-	-
16	3303	290	00 44.2	-1.0	-2.2	-	-	-	-
23	587	247	05 59.4	-0.7	-0.1	-	-	-	-

Date	Z.C.	Sp	Mag	(1950.0) Dec	Ph	Cape Town			
						P.A.	h. m.	a	b
Jul									
1	1645	F8	6.6	+06° 49'	D	141°	21 57.0	-0.3	-0.6
2	1746	F2	7.1	+00 48	D	119	21 01.5	-1.2	-0.2
3	1865	A2	7.2	-05 55	D	81	22 23.7	-1.5	+1.7
4	1971	K0	5.8	-12 16	D	-	-	-	-
6	2227	K0	5.8	-23 02	D	-	-	-	-
6	2235	A0	6.2	-23 03	D	-	-	-	-
7	2257	A0	6.7	-23 44	D	170	00 26.8	-	-
7	2270	B3	5.4	-23 53	D	138	02 44.0	-0.9	-0.6
9	2617	K0	4.7	-28 28	D	-	-	-	-
11	3089	A0	5.3	-21 19	R	-	-	-	-
12	3106	K0	5.4	-20 47	R	-	-	-	-
15	3505	K0	5.6	-02 56	R	245	01 52.0	-1.3	0.0
20	537	B5p	3.8	+24 01	D	78	06 30.9	-1.8	-0.5
22	810	B8	1.8	+28 35	D	-	-	-	-
22	810	B8	1.8	+28 35	R	303	05 47.8	-1.7	-2.6
Aug									
3	2349	B1	3.1	-25 31	D	121	18 29.6	-1.4	-1.7
3	2349	B1	3.1	-25 31	R	285	19 48.2	-2.1	-0.8
3	2366	MO,A3	1.2	-26 22	D	-	-	-	-
4	2366	MO,A3	1.2	-26 22	R	-	-	-	-
4	2373	K0	6.2	-26 28	D	-	-	-	-
5	2536	F5	7.4	-28 24	D	-	-	-	-
5	2545	A5	6.4	-27 52	D	92	03 03.8	-0.2	+0.9
11	3461	K2	6.4	-04 42	R	299	02 46.6	-	-
11	3465	F8	6.5	-04 15	R	293	04 32.7	-	-
12	35	G5	6.4	+01 31	R	203	04 03.0	-1.0	+2.2
13	146	K0	4.4	+07 43	D	38	02 59.5	-1.2	+1.3
13	146	K0	4.4	+07 43	R	236	04 22.7	-1.9	+1.2
15	371	G5	6.4	+17 34	R	213	01 25.5	0.0	+0.8
18	756	A2	6.5	+27 39	R	-	-	-	-
30	2332	B9	6.2	-25 24	D	123	23 47.1	-0.6	+0.1
31	2470	B9	6.1	-27 44	D	94	20 58.2	-2.0	+0.4
31	2474	F2	6.6	-27 46	D	99	21 50.8	-1.7	+0.5
Sep									
1	2644	F8	6.3	-28 18	D	51	21 00.8	-1.9	+2.4
1	2645	A3	6.0	-28 40	D	135	21 03.6	-2.6	-2.6
1	2660	A2	6.1	-28 27	D	115	23 24.5	-1.9	-0.1
3	2848	K0	5.6	-27 03	D	-	-	-	-
4	2985	K0	6.9	-24 05	D	-	-	-	-
11	435	F0	5.8	+20 33	R	-	-	-	-
12	552	B5p	3.0	+24 01	R	-	-	-	-

Date	Z.C.	Johannesburg				Luanshya			
		P.A.	h. m.	a	b	P.A.	h. m.	a	b
Jul									
1	1645	-	-	-	-	-	-	-	-
2	1746	74°	21 21.0	-1.7	+2.1	-	-	-	-
3	1865	-	-	-	-	-	-	-	-
4	1971	173	20 22.8	-0.6	-3.5	129°	19 52.6	-2.1	-1.6
6	2227	-	-	-	-	173	18 22.4	+0.4	-3.6
6	2235	172	19 24.6	0.0	-4.1	129.	18 50.6	-1.4	-1.7
7	2257	134	00 26.2	-1.6	-1.1	86	00 24.7	-1.4	+0.6
7	2270	122	02 48.2	-0.5	-0.1	-	-	-	-
9	2617	-	-	-	-	128.	03 41.7	-1.6	-1.1
11	3089	209	21 20.7	-1.3	+1.8	261.	21 29.4	-1.0	-0.1
12	3106	176	01 11.5	-	-	229.	01 52.8	-2.1	+1.9
15	3505	257	02 07.5	-2.2	-0.1	-	-	-	-
20	537	-	-	-	-	-	-	-	-
22	810	11	05 10.3	+1.4	+2.7	-	-	-	-
22	810	311	05 46.3	-2.9	-3.4	-	-	-	-
Aug									
3	2349	80	18 42.1	-2.8	+0.2	-	-	-	-
3	2349	324	19 54.9	-1.9	-2.7	-	-	-	-
3	2366	-	-	-	-	118	23 41.0	-1.5	-0.7
4	2366	-	-	-	-	246.	00 41.0	-0.2	+1.2
4	2373	-	-	-	-	142.	00 43.9	-1.6	-1.9
5	2536	-	-	-	-	143	01 52.7	-2.0	-2.3
5	2545	-	-	-	-	-	-	-	-
11	3461	289	03 22.2	-	-	-	-	-	-
11	3465	285	05 04.6	-2.8	+0.1	-	-	-	-
12	35	197	04 30.8	-0.8	+2.8	225.	05 03.0	-1.6	+2.1
13	146	41	03 24.6	-1.6	+1.7	10.	03 56.8	-0.6	+3.3
13	146	231	04 53.1	-2.0	+1.8	259.	05 12.7	-3.1	+0.9
15	371	222	01 33.6	-0.5	+0.8	262.	01 38.9	-1.6	-0.1
18	756	-	-	-	-	215.	03 33.0	0.0	+1.5
30	2332	-	-	-	-	-	-	-	-
31	2470	74	21 23.1	-1.5	+1.4	-	-	-	-
31	2474	83	22 11.2	-1.2	+1.1	33.	22 35.9	+0.2	+3.3
Sep									
1	2644	24	21 40.9	-0.6	+4.6	-	-	-	-
1	2645	110	21 18.6	-2.5	-0.5	64.	21 26.5	-2.0	+1.5
1	2660	106	23 41.0	-1.3	+0.3	67	23 50.9	-0.6	+1.2
3	2848	-	-	-	-	123	01 41.6	-1.5	-1.0
4	2985	-	-	-	-	93	00 30.2	-2.1	+0.3
11	435	278	23 49.2	-1.5	-1.4	-	-	-	-
12	552	-	-	-	-	244.	23 43.2	-0.3	+0.4

Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town			
						P.A.	h. m.	a	b
Sep									
12	560m	B8	3.8	+23° 58'	D	-	-	-	-
13	560m	B8	3.8	+23 58	R	-	-	-	-
13	561	B8p	5.2	+24 03	R	-	-	-	-
15	850	B5	6.0	+29 12	R	290°	03 49.3	-2.1	-1.7
16	1018	A0	5.5	+29 01	R	205	06 04.0	-	-
17	1137	K0	5.1	+27 59	R	-	-	-	-
25	2115	A3	7.1	-19 47	D	-	-	-	-
26	2269	B5	5.4	-24 27	D	161	21 32.3	-1.6	-2.5
28	2586	B5	6.0	-28 46	D	152	19 51.8	-	-
29	2784	K0	3.4	-27 43	D	91	21 31.2	-1.8	+0.7
29	2784	K0	3.4	-27 43	R	233	22 39.9	-0.6	+2.1
29	2796	K0	6.8	-27 10	D	9	23 27.0	+1.2	+4.1
30	2805	F0	7.0	-26 56	D	31	01 03.8	+0.7	+2.2
30	2939	F0	7.2	-25 23	D	-	-	-	-
Oct									
1	3090	K0	6.9	-20 19	D	345	24 19.8	-	-
1	3092	F0	6.2	-20 41	D	76	23 38.7	-1.5	+1.3
2	3225	G5	7.1	-15 46	D	72	22 47.3	-2.1	+1.1
3	3236	F5	7.1	-15 03	D	101	02 00.7	-1.3	+0.9
3	3240	A0	6.6	-14 39	D	63	02 51.4	-0.3	+1.6
3	3347	F0	6.2	-10 43	D	123	20 33.8	-	-
9	501	G5	6.1	+22 42	R	-	-	-	-
12	810	B8	1.8	+28 35	D	-	-	-	-
12	810	B8	1.8	+28 35	R	-	-	-	-
13	948	K0	4.4	+29 31	D	58	02 57.6	-1.2	-0.1
13	948	K0	4.4	+29 31	R	288	04 20.8	-2.6	-1.0
14	1081	B9	6.2	+28 14	R	-	-	-	-
24	2366	M0,A3	1.2	-26 22	D	137	18 16.9	-1.7	-1.1
24	2366	M0,A3	1.2	-26 22	R	234	19 07.9	-0.3	+2.5
24	2373	K0	6.2	-26 28	D	-	-	-	-
25	2536	F5	7.4	-28 24	D	140	19 43.7	-2.2	-1.5
25	2545	A5	6.4	-27 52	D	41	21 30.7	+0.5	+2.3
26	2727	B9	7.2	-28 19	D	-	-	-	-
26	2743m	A5	7.4	-27 48	D	118	22 56.8	-0.6	+0.3
28	3037	F8	7.3	-22 51	D	-	-	-	-
31	3332	K0	7.2	-10 16	D	35	02 08.2	+0.1	+2.0
31	3432	G5	6.3	-06 05	D	-	-	-	-
Nov									
1	3461	K2	6.4	-04 42	D	133	02 04.8	-	-
2	24	K0	6.9	+01 13	D	-	-	-	-
9	897	A2	6.4	+28 56	R	-	-	-	-

Date	Z.C.	Johannesburg				Luanshya			
		P.A.	h. m.	a	b	P.A.	h. m.	a	b
Sep									
12	560m	-	-	-	-	121°	23 35.5	-1.8	-2.6
13	560m	-	-	-	-	179	00 07.4	+1.6	+3.7
13	561	-	-	-	-	203	00 24.5	+0.4	+1.9
15	850	293°	04 00.2	-2.9	-1.7	-	-	-	-
16	1018	-	-	-	-	-	-	-	-
17	1137	314	04 08.7	-2.1	-2.5	-	-	-	-
25	2115	-	-	-	-	139	19 29.7	-1.0	-1.4
26	2269	140	21 31.7	-0.8	-0.9	-	-	-	-
28	2586	124	20 00.9	-2.5	-1.1	77	20 02.4	-1.8	+0.9
29	2784	85	21 53.3	-1.3	+1.0	47	22 11.7	-0.4	+1.8
29	2784	236	22 58.3	-0.2	+1.7	272	23 12.6	-0.8	+0.4
29	2796	1	23 44.6	-	-	-	-	-	-
30	2805	-	-	-	-	-	-	-	-
30	2939	-	-	-	-	133	23 05.3	-	-
Oct									
1	3090	348	24 37.9	-	-	-	-	-	-
1	3092	78	24 01.6	-1.1	+1.2	48	24 20.7	-0.4	+1.7
2	3225	75	23 16.6	-2.0	+1.3	44	23 38.3	-1.1	+2.0
3	3236	100	02 17.0	-0.8	+0.7	68	02 28.8	-0.2	+1.1
3	3240	59	03 04.4	+0.1	+1.5	-	-	-	-
3	3347	102	20 46.1	-3.6	-1.6	57	20 49.9	-2.3	+1.4
9	501	184	22 09.9	+1.1	+2.7	230	22 29.4	-0.5	+0.9
12	810	-	-	-	-	126	07 23.9	-1.0	-1.0
12	810	-	-	-	-	249	08 33.8	-1.4	+1.3
13	948	53	03 15.0	-1.9	+0.7	-	-	-	-
13	948	299	04 40.7	-3.1	-1.2	-	-	-	-
14	1081	-	-	-	-	226	02 31.5	-0.9	+1.6
24	2366	117	18 27.2	-1.3	-0.2	72	18 33.8	-0.7	+1.1
24	2366	249	19 25.3	-0.1	+1.5	292	19 33.5	-0.7	-0.3
24	2373	138	19 25.1	-1.2	-1.0	91	19 23.4	-0.5	+0.4
25	2536	126	19 53.9	-1.4	-0.5	82	19 56.5	-0.6	+0.7
25	2545	-	-	-	-	-	-	-	-
26	2727	-	-	-	-	113	20 59.8	-1.4	-0.4
26	2743m	-	-	-	-	-	-	-	-
28	3037	-	-	-	-	85	19 31.0	-2.9	+0.5
31	3332	-	-	-	-	-	-	-	-
31	3432	14	19 35.9	-0.8	+2.9	-	-	-	-
Nov									
1	3461	116	02 12.8	-0.6	0.0	-	-	-	-
2	24	-	-	-	-	91	01 57.4	-1.1	+0.5
9	897	-	-	-	-	224	03 52.3	-	-

Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town			
						P.A.	h. m.	a	b
Nov									
12	1279	K0	6.4	+24° 12'	R	-	-	-	-
16	Jupiter		-1.4	+01 01	D	105°	11 09.2	-1.9	+0.2
16	Jupiter		-1.4	+01 01	R	333	12 16.6	-0.6	-1.4
22	2644	F8	6.3	-28 18	D	-	-	-	-
22	2645	A3	6.0	-28 40	D	-	-	-	-
22	2645	A3	6.0	-28 40	R	-	-	-	-
24	3009	F5	7.1	-22 33	D	72	23 06.8	+0.2	+1.3
26	3275	K0	6.1	-13 28	D	-	-	-	-
27	3412	M0	4.4	-06 13	D	52	23 45.8	-0.5	+1.9
28	3530	M0	7.0	-00 27	D	121	23 41.2	-	-
30	201	G5	7.5	+10 13	D	-	-	-	-
Dec									
1	313	K0	7.5	+15 40	D	-	-	-	-
2	435	F0	5.8	+20 33	D	99	20 27.8	-2.4	-1.5
2	440	A2	4.6	+21 13	D	349	22 23.6	-	-
3	536	B5	5.4	+24 12	D	-	-	-	-
3	537	B5p	3.8	+24 01	D	-	-	-	-
3	539	B5	4.4	+24 22	D	-	-	-	-
3	541	B5	4.0	+24 17	D	-	-	-	-
7	1119	F0	5.7	+27 42	R	246	24 12.2	-1.4	-0.4
7	1122	K0	3.9	+27 52	D	78	23 37.3	-1.2	-0.8
8	1122	K0	3.9	+27 52	R	289	01 00.5	-2.2	-1.3
10	1373	A0	6.1	+21 25	R	4	04 00.2	-	-
14	1770	A3	5.9	-00 37	R	-	-	-	-
14	Jupiter		-1.5	-00 26	R	-	-	-	-
18	2366	M0A3	1.2	-26 22	D	-	-	-	-
22	3081	K0	6.7	-20 19	D	-	-	-	-
26	53	B8	6.9	+03 39	D	-	-	-	-

Date	Z.C.	Johannesburg				Luanshya			
		P.A.	h. m.	a	b	P.A.	h. m.	a	b
Nov									
12	1279	-	-	-	-	259°	01 02.3	-1.0	-0.1
16	Jupiter	-	-	-	-	-	-	-	-
16	Jupiter	-	-	-	-	-	-	-	-
22	2644	-	-	-	-	60	18 48.9	-0.2	+1.3
22	2645	-	-	-	-	163	19 06.5	-	-
22	2645	-	-	-	-	171	19 10.9	-	-
24	3009	-	-	-	-	-	-	-	-
26	3275	40°	19 08.9	-1.3	+2.2	6	19 45.2	+0.1	+3.5
27	3412	46	24 03.5	-0.1	+1.8	-	-	-	-
28	3530	113	23 59.3	-1.3	+0.1	75	24 08.3	-0.8	+1.0
30	201	-	-	-	-	24	18 48.1	-0.8	+2.3
Dec									
1	313	-	-	-	-	353	19 12.5	+1.1	+4.1
2	435	99	20 45.1	-3.4	-1.2	62	20 45.7	-2.2	+0.9
2	440	354	22 48.7	-	-	-	-	-	-
3	536	49	19 02.3	-0.3	+0.4	1	19 23.3	+1.3	+3.5
3	537	87	18 55.1	-1.0	-0.9	47	18 56.4	-0.3	+1.0
3	539	21	19 33.9	+0.2	+1.6	-	-	-	-
3	541	60	19 36.5	-0.8	+0.1	21	19 50.3	+0.1	+2.2
7	1119	256	24 28.0	-2.4	-0.2	288	24 21.0	-2.9	-1.2
7	1122	70	23 47.3	-1.8	-0.1	18	24 10.0	-	-
8	1122	302	01 14.3	-2.8	-1.5	352	00 33.4	-	-
10	1373	-	-	-	-	-	-	-	-
14	1770	340	01 53.2	-0.2	-2.5	-	-	-	-
14	Jupiter	0	01 15.6	0.0	-3.4	-	-	-	-
18	2366	-	-	-	-	112	16 20.7	-0.5	-0.2
22	3081	97	20 36.0	-0.3	+0.7	-	-	-	-
26	53	40	20 30.7	-1.3	+2.2	10	21 05.5	-0.6	+3.3

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 can best be seen near its greatest elongation, the times of which are listed in the Astronomical Diary. The largest eastern elongation occurs on September 20 when the planet sets about two hours after sunset (magnitude 0.3). The best morning visibility will occur near the greatest western elongation of March 13, (magnitude 0.4) the planet rising about two hours before sunrise, and July 11 (magnitude 0.6).

Early in the year Venus rises about 2 hours 40 minutes before sunrise. It continues to recede from the earth until superior conjunction on June 20 when it passes round the far side of the Sun to reappear in the evening western sky. It then moves eastward relative to the Sun while its magnitude varies between -3.3 and -3.8.

Mars will not be particularly prominent during the year. It can be seen in the western sky during January and February (magnitude 1.4) and is thereafter lost in the evening twilight. Conjunction with the Sun is reached on June 21. It will then start to appear in the morning eastern sky and will be clearly seen after September when it rises before twilight begins. The next opposition takes place in 1969.

Jupiter is at opposition on February 20 (magnitude -2.1). The equatorial disc will then subtend an angle of $45''$ and the planet will be 4.39 astronomical units distant. Thereafter the planet appears to move closer to the Sun and towards the end of August will be lost in the evening twilight. Conjunction with the Sun takes place on September 9, after which it rises before sunrise. The planet will be occulted by the Moon at approximately 3 a.m. on December 14.

At the beginning of the year, Saturn is an evening object in the western sky. Towards the end of March it will be lost in the evening twilight, conjunction with the Sun taking place on April 5. After this it rises before sunrise and continues to increase in brightness reaching a maximum of 0.3 at opposition on October 15. The equatorial diameter will then subtend an angle of $20''$ and the planet will be 8.34 astronomical units away. The planet's rings display their widest opening at the end of August $10.20''$. The visible southern surface of the rings are then tilted 13.6° towards the earth.

Optical aid is required to observe Uranus and Neptune. The opposition of the former occurs on March 17 (magnitude 5.7) and the opposition of the latter occurs on May 16 (magnitude 7.7).

THE PLANETS IN THE CONSTELLATIONS

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

EPHEMERIDES FOR URANUS AND NEPTUNE

	Uranus		Neptune	
	R.A.	Dec.	R.A.	Dec.
Jan 1	11 ^h 58 ^m .3	+ 1° 01'	15 ^h 34 ^m .9	- 17° 32'
21	11 57.9	+ 1 04	15 37.0	- 17 38
Feb 10	11 56.2	+ 1 16	15 38.2	- 17 41
Mar 1	11 53.5	+ 1 34	15 38.6	- 17 42
21	11 50.4	+ 1 54	15 38.0	- 17 39
Apr 10	11 47.3	+ 2 14	15 36.7	- 17 33
30	11 44.9	+ 2 29	15 34.8	- 17 26
May 20	11 43.4	+ 2 38	15 32.6	- 17 18
Jun 9	11 43.2	+ 2 39	15 30.5	- 17 11
29	11 44.3	+ 2 31	15 28.8	- 17 06
Jul 19	11 46.6	+ 2 15	15 27.6	- 17 03
Aug 8	11 49.9	+ 1 53	15 27.3	- 17 03
28	11 53.9	+ 1 26	15 27.9	- 17 06
Sep 17	11 58.4	+ 0 56	15 29.2	- 17 12
Oct 7	12 03.0	+ 0 26	15 31.4	- 17 20
27	12 07.4	- 0 02	15 34.0	- 17 31
Nov 16	12 11.2	- 0 26	15 37.0	- 17 41
Dec 6	12 14.0	- 0 43	15 40.1	- 17 51
26	12 15.6	- 0 53	15 42.9	- 18 00

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	23 ^h 33 ^m	II	Ec D
3	22 30	II	Tr E
5	22 23	I	Sh I
5	23 20	I	Tr I
6	22 44	I	Oc R
10	22 04	II	Tr I
10	22 29	IV	Oc R
10	23 07	II	Sh E
13	21 23	I	Ec D
14	21 49	I	Tr E
17	22 51	II	Sh I
18	23 12	IV	Sh E
19	22 14	II	Oc R
20	23 17	I	Ec D

Date	S.A.S.T.	Sat	Phen.
Jan 21	21 ^h 18 ^m	I	Tr I
21	22 55	I	Sh E
21	23 35	I	Tr E
22	21 16	III	Tr E
26	20 33	II	Ec D
28	22 31	I	Sh I
28	23 03	I	Tr I
29	21 08	III	Tr I
29	22 28	I	Oc R
29	22 36	III	Sh E
Feb 2	23 07	II	Ec D
4	20 29	IV	Tr E
4	20 56	II	Tr E
5	21 33	I	Ec D

Date	S.A.S.T.	Sat	Phen.
Feb 5	22 ^h 58 ^m	III	Sh I
6	21 10	I	Sh E
6	21 29	I	Tr E
11	20 20	II	Tr I
11	22 47	II	Sh E
11	23 12	II	Tr E
12	21 29	IV	Ec D
12	23 27	I	Ec D
13	20 47	I	Sh I
13	20 56	I	Tr I
13	23 04	I	Sh E
13	23 13	I	Tr E
14	20 22	I	Oc R
16	20 48	III	Oc R
18	22 32	II	Sh I
18	22 37	II	Fr I
20	20 22	II	Ec R
20	22 40	I	Tr I
20	22 40	I	Sh I
23	20 34	III	Oc D
27	22 56	II	Ec R
28	21 33	I	Oc D
29	20 05	IV	Ec R
29	21 06	I	Tr E
29	21 20	I	Sh E
Mar 1	23 50	III	Oc D
5	22 00	II	Oc D
6	23 17	I	Oc D
7	19 54	II	Sh E
7	20 34	I	Tr I
7	20 57	I	Sh I
7	22 50	I	Tr E
7	23 14	I	Sh E
8	20 26	I	Ec R
8	20 39	IV	Tr I
12	20 20	III	Tr E
12	22 24	III	Sh E
14	19 40	II	Sh I
14	21 23	II	Tr E
14	22 18	I	Tr I
14	22 31	II	Sh E
14	22 51	I	Sh I
15	22 21	I	Ec R
16	19 36	I	Sh E
19	20 10	III	Tr I
19	22 50	III	Sh I
19	23 42	III	Tr E
21	20 52	II	Tr I
21	22 17	II	Sh I
21	23 42	II	Tr E

Date	S.A.S.T.	Sat	Phen.
Mar 22	21 ^h 14 ^m	I	Oc D
23	19 55	II	Ec R
23	20 47	I	Tr E
23	21 30	I	Sh E
25	22 54	IV	Sh E
26	23 35	III	Tr I
28	23 13	II	Tr I
29	23 01	I	Oc D
30	20 17	I	Tr I
30	20 20	III	Ec R
30	21 08	I	Sh I
30	22 30	II	Ec R
30	22 34	I	Tr E
30	23 25	I	Sh E
31	20 39	I	Ec R
Apr 2	23 18	IV	Oc R
6	20 20	II	Oc D
6	20 23	III	Oc R
6	20 47	III	Ec D
6	22 05	I	Tr I
6	23 03	I	Sh I
7	19 16	I	Oc D
7	22 34	I	Ec R
8	19 41	II	Sh E
8	19 47	I	Sh E
13	20 26	III	Oc D
13	22 43	II	Oc D
13	23 54	I	Tr I
14	21 06	I	Oc D
15	19 26	I	Sh I
15	19 29	II	Sh I
15	20 06	II	Tr E
15	20 38	I	Tr E
15	21 42	I	Sh E
15	22 19	II	Sh E
19	21 40	IV	Ec D
21	22 57	I	Oc D
22	19 44	II	Tr I
22	20 12	I	Tr I
22	21 21	I	Sh I
22	22 07	II	Sh I
22	22 28	I	Tr E
22	22 35	II	Tr E
22	23 36	I	Sh E
23	20 53	I	Ec R
24	19 30	II	Ec R
24	22 15	III	Sh E
27	19 14	IV	Tr I
27	23 44	IV	Tr E
29	22 04	I	Tr I

Date	S.A.S.T.	Sat	Phen.
Apr 29	22 ^h 15 ^m	II	Tr I
29	23 15	I	Sh I
30	19 17	I	Oc D
30	22 49	I	Ec R
May 1	18 48	I	Tr E
1	19 59	I	Sh E
1	21 19	III	Tr E
1	22 05	II	Ec R
1	22 44	III	Sh I
6	20 02	IV	Ec R
6	23 56	I	Tr I
7	21 10	I	Oc D
8	19 22	II	Oc D
8	19 39	I	Sh I
8	20 41	I	Tr E
8	21 38	III	Tr I
8	21 54	I	Sh E
9	19 13	I	Ec R
10	19 29	II	Sh E
12	20 15	III	Ec R
14	23 05	I	Oc D
15	20 19	I	Tr I
15	21 33	I	Sh I
15	21 55	II	Oc D
15	22 34	I	Tr E
15	23 49	I	Sh E
16	21 08	I	Ec R
17	19 18	II	Sh I
17	19 33	II	Tr E
17	22 07	II	Sh E
19	19 08	III	Oc R
19	20 44	III	Ec D
22	21 23	IV	Oc D
22	22 13	I	Tr I
23	19 29	I	Oc D
23	23 03	I	Ec R
24	18 58	I	Tr E
24	19 21	II	Tr I
24	20 12	I	Sh E
24	21 56	II	Sh I
24	22 11	II	Tr E
26	19 06	II	Ec R
26	19 35	III	Oc D
26	23 10	III	Oc R
30	21 25	I	Oc D
31	18 36	IV	Sh I
31	18 38	I	Tr I
31	19 52	I	Sh I
31	20 54	I	Tr E
31	22 01	II	Tr I

Date	S.A.S.T.	Sat	Phen.
May 31	22 ^h 07 ^m	I	Sh E
31	22 40	IV	Sh E
Jun 1	19 28	I	Ec R
2	21 41	II	Ec R
6	18 41	III	Sh I
6	22 07	III	Sh E
7	20 35	I	Tr I
7	21 46	I	Sh I
8	20 39	IV	Oc R
8	21 23	I	Ec R
9	19 05	II	Oc D
11	19 17	II	Sh E
13	21 26	III	Tr E
15	19 50	I	Oc D
16	19 18	I	Tr E
16	20 25	I	Sh E
16	21 46	II	Oc D
18	19 07	II	Sh I
18	19 38	II	Tr E
18	21 54	II	Sh E
23	19 00	I	Tr I
23	20 04	I	Sh I
23	21 16	I	Tr E
24	19 41	I	Ec R
24	20 09	III	Ec R
25	19 33	II	Tr I
27	18 44	II	Ec R
30	20 59	I	Tr I
Jul 1	20 06	III	Oc R
1	20 41	III	Ec D
2	18 43	I	Sh E
8	20 18	I	Oc D
8	20 51	III	Oc D
9	19 44	I	Tr E
9	20 38	I	Sh E
11	19 19	II	Oc D
12	19 55	IV	Ec R
13	19 02	II	Sh E
16	19 27	I	Tr I
16	20 17	I	Sh I
17	19 55	I	Ec R
19	18 52	III	Tr E
20	18 51	II	Sh I
20	20 06	II	Tr E
24	18 49	I	Oc D
25	18 56	I	Sh E
26	19 43	III	Tr I
27	20 04	II	Tr I
Dec 27	23 56	III	Ec D

ECLIPSES

During 1968 there will be four eclipses, two of the Sun and two of the Moon.

1. March 28 - 29 Partial eclipse of the Sun.
2. April 13 Total eclipse of the Moon.
3. September 22 Total eclipse of the Sun.
4. October 6 Total eclipse of the Moon.

Except for the total eclipse of the Moon on April 13, all these will be invisible in South Africa.

Total Eclipse of the Moon

April 13

Moon enters penumbra	04 ^h 11 ^m .1
Moon enters umbra	05 10.0
Total eclipse begins	06 22.5
Middle of eclipse	06 47.4
Total eclipse ends	07 12.3
Moon leaves umbra	08 24.8
Moon leaves penumbra	09 23.6
Magnitude of the eclipse	1.117

Moon enters umbra at position angle 93° to E of N Point
Moon leaves umbra at position angle 39° to W of N Point

Totality begins as the Moon sets in Johannesburg and ends as it sets in Cape Town. Owing to these circumstances the eclipsed Moon should appear very red.

The path of the total solar eclipse on September 22 begins in the Arctic Ocean, continues into Russia and ends in North West China.

The maximum duration of the totality is 39.7 seconds.

METEOR CALENDAR 1968

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	Veluids	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 1968

Recommended SAST of watch	Conditions at Maximum	Nature of current	Appearance
Diffiouldt in SA.			
22h - 24h	Unfavourable	Unknown	
22h - 24h	Favourable	Ecliptical	
02h - 04h	Favourable	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	Unfavourable*	Cometary: Comet 1862 III	
22h - 24h	Favourable	Ecliptical	
02h30m - 04h30m	Favourable	Cometary: Halley	Swift, with streaks
22h - 24h	Unfavourable	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.

** 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 1968

	d.	h.	
Jan	3	12	Mars 3° N of Moon
	6	21	Saturn 1° S of Moon
	8	22	Venus 7° N of Antares
	18	17	Jupiter 3° S of Moon
	20	12	Uranus 1° S of Moon
	25	13	Antares $0^{\circ}.9$ S of Moon
	27	00	Venus 6° N of Moon
	31	03	Mercury 5° N of Moon
	31	06	Mercury greatest elongation 18° E

FEBRUARY 1968

	d.	h.	
Feb	1	16	Mars 2° N of Moon
	3	10	Saturn 1° S of Moon
	14	19	Jupiter 3° S of Moon
	15	17	Mercury in inferior conjunction
	16	18	Uranus 1° S of Moon
	20	13	Jupiter at opposition
	20	23	Neptune 5° N of Moon
	21	18	Antares $0^{\circ}.7$ S of Moon
	25	21	Venus 5° N of Moon
	26	14	Mercury 7° N of Moon

MARCH 1968

	d.	h.	
Mar	1	21	Mars $0^{\circ}.4$ N of Moon
	2	00	Saturn 2° S of Moon
	4	07	Mars 2° N of Saturn
	5	09	Jupiter $0^{\circ}.8$ N of Regulus

MARCH 1968

d. h.

Mar	7	07	Mercury 1° N of Venus
	12	03	Pluto at opposition
	12	23	Jupiter 3° S of Moon
	13	03	Mercury greatest elongation 28° W
	15	01	Uranus 1° S of Moon
	17	19	Uranus at opposition
	20	00	Antares 0°.5 S of Moon
	20	15	Equinox
	26	21	Mercury 1° N of Moon
	27	00	Venus 2° N of Moon
	29	01	Partial eclipse of the Sun not visible in South Africa
	31	01	Mars 1° S of Moon
	31	13	Mercury 1°.1 S of Venus

APRIL 1968

d. h.

Apr	5	04	Saturn in conjunction with Sun
	9	05	Jupiter 3° S of Moon
	13	07	Total eclipse of the Moon. Visible in South Africa
	16	08	Antares 0°.5 S of Moon
	19	12	Ceres at opposition
	22	08	Jupiter stationary
	23	14	Venus 0°.8 N of Saturn
	25	01	Mercury in superior conjunction
	25	17	Juno at opposition
	26	04	Saturn 2° S of Moon
	26	11	Venus 2° S of Moon
	29	03	Mars 3° S of Moon

MAY 1968

d. h.

May	6	08	Mercury 1°.2 N of Mars
	6	14	Jupiter 3° S of Moon
	12	20	Mercury 8° N of Aldebaran
	13	18	Antares 0°.5 S of Moon

MAY 1968

	d.	h.	
May	16	02	Neptune at opposition
	23	17	Saturn 3° S of Moon
	24	03	Mercury greatest elongation 23° E
	29	09	Mercury 4° S of Moon

JUNE 1968

	d.	h.	
Jun	3	01	Jupiter 3° S of Moon
	9	11	Jupiter $0^{\circ}.7$ N of Regulus
	10	05	Antares $0^{\circ}.5$ S of Moon
	18	18	Mercury in inferior conjunction
	20	04	Saturn 3° S of Moon
	20	12	Venus in superior conjunction
	21	10	Solstice
	21	18	Mars in conjunction with Sun
	30	14	Jupiter 3° S of Moon

JULY 1968

	d.	h.	
Jul	6	16	Neptune 5° N of Moon
	7	15	Antares $0^{\circ}.5$ S of Moon
	11	14	Mercury greatest elongation 21° W
	17	15	Saturn 4° S of Moon
	24	05	Mercury 5° S of Moon
	27	06	Mars 6° S of Pollux
	28	05	Jupiter 2° S of Moon
	28	07	Mercury 6° S of Pollux
	28	19	Mercury $0^{\circ}.2$ S of Mars
	31.	16	Spica 1° S of Moon

AUGUST 1968

	d.	h.	
Aug	3	23	Antares $0^{\circ}.3$ S of Moon
	7	13	Mercury in superior conjunction
	8	05	Venus $1^{\circ}.1$ N of Regulus
	8	05	Saturn stationary
	14	00	Saturn 4° S of Moon
	18	09	Venus $0^{\circ}.5$ N of Jupiter
	21	23	Mercury $0^{\circ}.1$ N of Jupiter
	22	11	Mars 4° S of Moon
	25	08	Mercury 1° S of Moon
	25	12	Venus $0^{\circ}.5$ S of Moon
	27	22	Spica $0^{\circ}.9$ S of Moon
	31	04	Antares $0^{\circ}.1$ S of Moon
	31	19	Venus $0^{\circ}.5$ N of Uranus
	31	21	Mercury $0^{\circ}.8$ S of Uranus

SEPTEMBER 1968

	d.	h.	
Sep	1	06	Mercury $1^{\circ}.4$ S of Venus
	9	02	Jupiter in conjunction with Sun
	10	07	Saturn 5° S of Moon
	20	06	Mars 2° S of Moon
	20	09	Mercury $0^{\circ}.7$ S of Spica
	20	10	Mars $0^{\circ}.8$ N of Regulus
	20	14	Venus 3° N of Spica
	20	18	Mercury greatest elongation 26° E
	21	05	Mercury 4° S of Venus
	22	13	Total eclipse of the Sun invisible in South Africa
	23	01	Equinox
	24	05	Spica $0^{\circ}.9$ S of Moon
	24	11	Mercury 2° S of Moon
	24	13	Venus 2° N of Moon
	27	10	Antares $0^{\circ}.003$ S of Moon

OCTOBER 1968

	d.	h.	
Oct	6	14	Total eclipse of the Moon invisible in South Africa
	7	11	Saturn 4° S of Moon
	15	11	Saturn at opposition
	15	18	Mercury in inferior conjunction
	17	19	Venus 2° S of Neptune
	19	01	Mars $0^{\circ}.8$ S of Moon
	19	15	Jupiter $0^{\circ}.3$ S of Moon
	20	02	Uranus $0^{\circ}.1$ S of Moon
	20	19	Vesta at opposition
	24	10	Venus 3° N of Moon
	24	18	Antares $0^{\circ}.04$ S of Moon
	28	12	Venus 3° N of Antares
	31	10	Mercury greatest elongation 19° W

NOVEMBER 1968

	d.	h.	
Nov	2	11	Mercury 5° N of Spica
	3	14	Saturn 4° S of Moon
	6	10	Mars $0^{\circ}.3$ N of Jupiter
	13	03	Mars $0^{\circ}.7$ N of Uranus
	16	11	Jupiter $0^{\circ}.4$ N of Moon
	16	19	Mars 1° N of Moon
	18	02	Spica $0^{\circ}.8$ S of Moon
	23	04	Venus 3° N of Moon
	30	16	Saturn 4° S of Moon

DECEMBER 1968

	d.	h.	
Dec	7	05	Mercury in superior conjunction
	9	10	Jupiter $0^{\circ}.5$ N of Uranus
	14	03	Jupiter 1° N of Moon. Occultation visible in South Africa
	15	11	Mars 3° N of Moon
	15	12	Spica $0^{\circ}.6$ S of Moon
	16	05	Mars 4° N of Spica
	18	15	Antares $0^{\circ}.1$ S of Moon
	21	21	Solstice
	22	15	Saturn stationary
	22	23	Venus 2° N of Moon
	27	22	Saturn 4° S of Moon

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.

SOUTHERN AFRICAN OBSERVATORIES

Private observatories are listed separately

Name	Place	E. Long.	S. Lat.	Alt.	Director
		1h+		ft	
Republic	Johannesburg	52m 18s.0	26°10'55".3	5925	J. H. Hers
Republic Annexe	Hartebeespoort	51m 30s	25°46'22"	4002	(acting)
Royal	Cape Town	13m 54s.6	33°56'02".5	26	R. H. Stoy
Radcliffe	Pretoria	52m 54s.9	25°47'18"	5059	A. D. Thackeray
Boyden	Bloemfontein	45m 37s.4	29°02'20"	4550	Th. Schmidt
Leiden	Hartebeespoort	51m 30s	25°46'22"	4002	D. F. Stevenson
Lamont-Hussey	Bloemfontein	44m 56s.8	29°05'46".1	4825	F. Holden
Smithsonian Astro-physical 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
Durban Satellite Tracking Station	Durban	64m 00s.1	29°50'39".5	250	G. Roberts

PRIVATE OBSERVATORIES

Owner	Address	Alt.
J. Barker	27 High Road, Berea, Durban	
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	
H. Kanowitz	102 Berea Street, Muckleneuk, Pretoria	4410
M. Lipshitz	10 Carnarvon Place, Durban North, Durban	330
J. MoBain	15, 26th Avenue, Famona, 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, Port 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
G. J. Walboom	P. O. Box 2065, Bismarckstraat, 29, Windhoek, S.W.A.	5662

PRIVATE OBSERVATORIES

E. Long.	S. Lat.	Details of Telescopes	Specialised Observations
h m s	° ' "		
1 52 05.8	26 08 10.6	12" Cass.; 8" Cass.; 6" Newt.	Lunar, Planetary
1 52 50.8	25 43 43.5	12" Refl.	Planetary
1 52 17.3	26 11 23.3	3" Refr.; 5" Refr.	
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	
1 52 47.5	25 45 33	12" Refl. 3" Refr.; 2½" Refr.	Planetary, Lunar Occultations, Variable Stars
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.; 2¾" Refr.	Variable stars, Occultations, Comets, Sunspots
1 52 36.2	26 10 39	12" Refl.; 6" Refr.	Planetary
2 04 00	17 50	4½" Refl.	
1 08 19.5	22 34 19	4" Refr.	Lunar, Comets

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	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; 36 cm 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" Newt.; 12" Cass.; 10" Cass.; 6" Cass., 6" Newt.; Three 5" Apogee Refrs.; 3" Refr.; 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
	1966 - 67	G. R. Atkins	

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 Dutten
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. I. Weinberg.
Vice-Chairman: Mr. J. S. Bondiotti.
Hon. Secretary: Mr. H. B. Molyneux.
Hon. Treasurer: Mr. N. Saville.
Hon. Auditor: Mr. G. Orpen.
Members of Committee: Messrs. G. R. Atkins, R. F. Horn, G. H. Larmuth, N. O. Neale and Dr. P. A. T. Wild.

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. W. Bell.
Vice-Chairman: Mr. C. R. Jacobs.
Hon. Secretary: Mrs. M. M. Fitzgerald.
Hon. Treasurer: Mrs. M. M. Fitzgerald.
Members of Committee: Messrs. C. Papadopoulos, E. F. von Malitz, J. R. Brickett, F. D. Bateman, M. D. Overbeek and P. R. Smith.

Republic Observatory

Representative:

Mr. J. Hers.

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, c/o The Planetarium, Milner Park, Johannesburg.

BLOEMFONTEIN CENTRE:

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

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.
Vice-Chairman : Mr. H. Kanowitz.
Hon. Secretary : Mrs. J. A. Sterling.
Hon. Treasurer : Mr. C. Mollink.
Members of Committee : Messrs. J. Wolterbreek-Muller, R. Smith, J. Bennett, A. Delen and J. G. Fletcher.
Centre Representative on Council : Mr. H. Kanowitz.
Telescope Design and Maintenance : Mr. J. Jacobs.

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