

THE  
ASTRONOMICAL SOCIETY  
OF  
SOUTHERN AFRICA

---

HANDBOOK FOR  
1962

# THE ASTRONOMICAL SOCIETY OF SOUTHERN AFRICA

## 1961 - 1962

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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. H. E. Krumm, 3, Leeuwendaal Crescent, 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 1962

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.

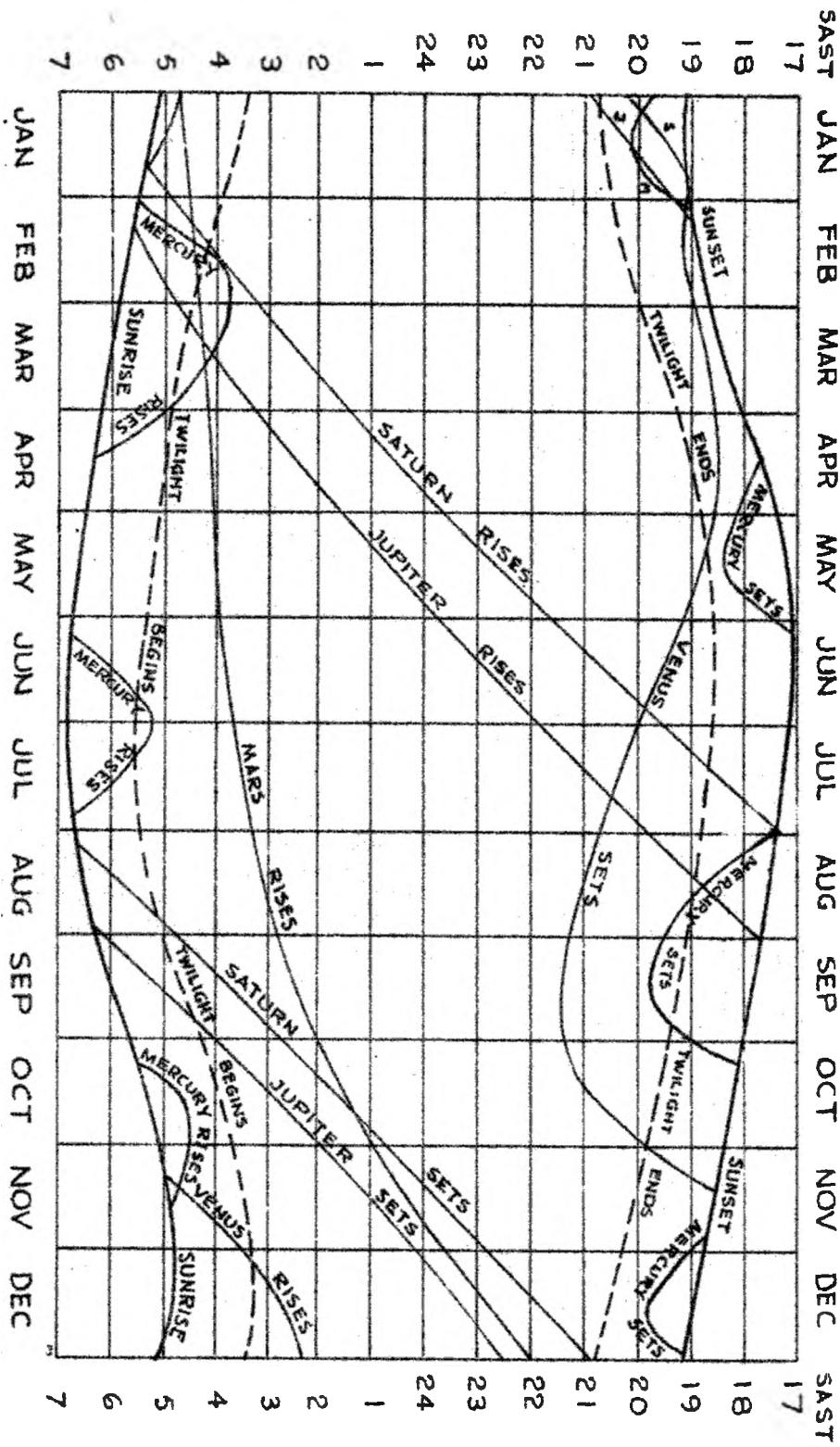
Nominations for Officers and Council by June 15.

Subscriptions due July 1.

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

# THE PLANETS AS SEEN FROM SOUTH AFRICA

1962.



LATITUDE 30° SOUTH

LONGITUDE 30° EAST

THE  
HANDBOOK  
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1962

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CAPE TOWN, 1962

Price to Non-Members: 25 cents

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Acknowledgement is made to the following Members of the Society, who have assisted in the preparation of the Handbook:- Mr. J. Churns, Dr. David S. Evans, Dr. K. G. Fuhr, Mr. R. P. de Kock, Mr. P. Smits, Mr. S. C. Venter and Mr. L. L. van Zyl: 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 this 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.

## INTRODUCTION

All the times given in this booklet are South African Standard Time, that is, mean solar time for a meridian  $30^{\circ}$ , or two hours, east of Greenwich. This is also the Standard Time in use in the Central African Federation, the Protectorates, Mozambique, and the eastern part of the Congo Republic.

To obtain the local mean time at other places the longitude differences shown in Table I must be applied to the ordinary S.A.S.T.

TABLE I

### CORRECTION FOR LONGITUDE

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

Conversely, to obtain the S.A.S.T. from the local mean time these longitude corrections must be applied with the sign reversed. Thus the S.A.S.T. of local mean noon ( i.e. 12h 00m local mean time ) at Port Elizabeth is 12h 18m.

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 ( i.e. the time shown by a sundial ) differs from the local 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 third column of Table II which gives the S.A.S.T. of apparent noon, that is, of the Sun's transit over the meridian.

For example, the S.A.S.T. of apparent noon at Port Elizabeth on 1962 November 17 is 12.03 S.A.S.T., found by applying the longitude correction of  $+18m$  to the tabulated value for  $30^{\circ}$  E,  $30^{\circ}$  S.

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 fourth 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 October 18 at Port Elizabeth.

Sid. Time at 00 <sup>h</sup> 00 <sup>m</sup>	S.A.S.T. on October 18	01 <sup>h</sup> 44 <sup>m</sup>
	S.A.S.T. elapsed	20 15
		—————
		21 59
Correction for longitude		-18
Interval correction		+ 3
		—————
Required Sidereal Time		21 44
		—————

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.

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. In fact 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. 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; 1' 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.

For considering the motions of the Sun, Moon, and Planets, the system of co-ordinates known as celestial latitude and longitude is very convenient. These co-ordinates define the position of a celestial body with reference to the ecliptic in exactly the same way as right ascension and declination define its position with reference to the celestial equator. The ( celestial ) latitude is the angular distance of the body north or south of the ecliptic, while the longitude is the distance from the Vernal Equinox as measured eastwards along the ecliptic. Celestial latitude and longitude are usually measured in degrees.

The ecliptic is defined by the apparent path of the Sun about the Earth. The latitude of the Sun is therefore always ( approximately ) zero, whilst its longitude increases by approximately 1° per day.

TABLE II

Date 1962	Julian Date at 14 hours	S. A. S. T. of Sun's transit Longitude 30°E	Sidereal Time for Longitude 30° E		
			S.A.S.T. 0 hours	S.A.S.T. 18 hours	
		h. m. s.	h. m.	h. m.	
January	1	2,437,666.0	12 03 26	6 40	0 43
"	11	676.0	12 07 51	7 20	1 23
"	21	686.0	12 11 17	7 59	2 02
"	31	696.0	12 13 27	8 39	2 42
February	10	706.0	12 14 19	9 18	3 21
"	20	716.0	12 13 .51	9 57	4 00
March	2	726.0	12 12 18	10 37	4 40
"	12	736.0	12 09 57	11 16	5 19
"	22	746.0	12 07 04	11 56	5 59
April	1	2,437,756.0	12 04 02	12 35	6 38
"	11	766.0	12 01 11	13 15	7 18
"	21	776.0	11 58 47	13 54	7 57
May	1	786.0	11 57 06	14 33	8 36
"	11	796.0	11 56 19	15 13	9 16
"	21	806.0	11 56 28	15 52	9 55
"	31	816.0	11 57 30	16 32	10 35
June	10	826.0	11 59 14	17 11	11 14
"	20	836.0	12 01 19	17 51	11 54
"	30	846.0	12 03 26	18 30	12 33
July	10	2,437,856.0	12 05 11	19 09	13 12
"	20	866.0	12 06 13	19 49	13 52
"	30	876.0	12 06 21	20 28	14 31
August	9	886.0	12 05 30	21 08	15 11
"	19	896.0	12 03 40	21 47	15 50
"	29	906.0	12 01 02	22 27	16 30
September	8	916.0	11 57 49	23 06	17 09
"	18	926.0	11 54 17	23 45	17 48
"	28	936.0	11 50 49	0 25	18 28
October	8	2,437,946.0	11 47 42	1 04	19 07
"	18	956.0	11 45 17	1 44	19 47
"	28	966.0	11 43 52	2 23	20 26
November	7	976.0	11 43 43	3 03	21 05
"	17	986.0	11 44 55	3 42	21 45
"	27	996.0	11 47 31	4 21	22 24
December	7	2,438.006.0	11 51 19	5 01	23 04
"	17	016.0	11 55 56	5 40	23 43
"	27	026.0	12 00 54	6 20	0 23

	CAPE TOWN				DURBAN				BLOEMFONTEIN				
DATE	SUNRISE		SUNSET		SUNRISE		SUNSET		SUNRISE		SUNSET		
	h	m	h	m	h	m	h	m	h	m	h	m	
Jan	05	38	20	01	04	58	19	01	05	21	19	18	
	11	05	46	20	02	05	06	19	02	05	29	19	18
	21	05	55	19	59	05	11	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.

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

Civil Twilight is defined as beginning or ending when the Sun's centre is  $6^{\circ}$  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  $12^{\circ}$  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  $18^{\circ}$  below the horizon, at which time there is no light from the Sun whatever.

THE MOON 1962

PERIGEE			APOGEE		
Date	S. D.	H. P.	Date	S. D.	H. P.
Jan 8 <sup>d</sup> 16 <sup>h</sup>	16° 28"	60° 27"	Jan 24 <sup>d</sup> 15 <sup>h</sup>	14° 44"	54° 03"
Feb 6 00	16 40	61 11	Feb 20	14 42	53 58
Mar 6 12	16 44	61 12	Mar 19	14 42	53 58
Apr 3 23	16 39	61 09	Apr 16	14 44	54 03
May 2 04	16 28	60 27	May 14	14 46	54 11
May 29 15	16 15	59 37	Jun 10	14 47	54 16
Jun 23 22	16 10	59 21	Jul 8	14 46	54 13
Jul 20 12	16 21	60 02	Aug 5	14 44	54 06
Aug 17 10	16 35	60 50	Sep 1	14 42	53 58
Sep 14 18	16 43	61 22	Sep 29	14 42	53 55
Oct 13 05	16 44	61 25	Oct 26	14 42	53 58
Nov 10 16	16 36	60 57	Nov 22	14 44	54 05
Dec 8 19	16 22	60 05	Dec 20	14 46	54 11

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.

MAXIMUM LIBRATION

Longitude			Latitude		
+ West Limb exposed	- East Limb exposed		+ North Limb exposed	- South Limb exposed	
Jan 3 -6.4	Jul 14 -5.7		Jan 2 -6.7	Jul 12 -6.8	
16 +6.0	28 +5.8		15 +6.8	25 +6.8	
31 -7.4	Aug 12 -6.6		30 -6.8	Aug 8 -6.9	
Feb 13 +7.2	24 +7.0		Feb 11 +6.8	21 +6.8	
28 -7.7	Sep 9 -7.3		26 -6.8	Sep 4 -6.8	
Mar 13 +7.6	21 +8.0		Mar 11 +6.7	17 +6.6	
28 -7.2	Oct 7 -7.4		25 -6.7	Oct 1 -6.6	
Apr 10 +7.4	19 +8.1		Apr 7 +6.6	15 +6.5	
25 -6.0	Nov 4 -6.6		21 -6.6	29 -6.5	
May 8 +6.5	16 +7.4		May 4 +6.5	Nov 11 +6.5	
21 -5.0	Dec 2 -5.3		18 -6.6	25 -6.6	
Jun 4 +5.5	14 +6.2		31 +6.6	Dec 8 +6.6	
17 -5.0	28 -4.7		Jun 15 -6.7	22 -6.8	
Jul 2 +5.2	32 -2.9		28 +6.7	32 +4.6	

## MOONRISE AND MOONSET

1962 JANUARY

DAY	At 0 <sup>h</sup> S.A.S.T.		JOHANNESBURG		CAPE TOWN			
	J.D. 2437000+	AGE	S.A.S.T.	MOONRISE	MOONSET	S.A.S.T.	MOONRISE	MOONSET
M 1	665.4	23.9	1 <sup>h</sup>	13 <sup>m</sup>	14 <sup>h</sup> 08 <sup>m</sup>	1 <sup>h</sup>	48 <sup>m</sup>	14 <sup>h</sup> 55 <sup>m</sup>
T 2	666.4	24.9	1	52	15 04	2	22	15 53
W 3	667.4	25.9	2	23	16 02	3	02	16 54
T 4	668.4	26.9	3	19	17 03	3	46	17 58
F 5	669.4	27.9	4	12	18 03	4	37	18 59
S 6	670.4	28.9	5	09	19 03	5	34	19 58
S 7	671.4	0.4	6	11	19 59	6	36	20 53
M 8	672.4	1.4	7	16	20 53	7	44	21 43
T 9	673.4	2.4	8	22	21 41	8	52	22 29
W 10	674.4	3.4	9	27	22 25	10	00	23 09
T 11	675.4	4.4	10	30	23 07	11	07	23 48
F 12	676.4	5.4	11	32	23 48	12	12	.....
S 13	677.4	6.4	12	32	.....	13	16	0 25
S 14	678.4	7.4	13	31	0 29	14	19	1 02
M 15	679.4	8.4	14	29	1 10	15	19	1 40
T 16	680.4	9.4	15	27	1 52	16	19	2 21
W 17	681.4	10.4	16	22	2 37	17	17	3 04
T 18	682.4	11.4	17	16	3 25	18	11	3 50
F 19	683.4	12.4	18	06	4 16	19	02	4 40
S 20	684.4	13.4	18	54	5 06	19	48	5 31
S 21	685.4	14.4	19	37	5 58	20	29	6 25
M 22	686.4	15.4	20	17	6 51	21	06	7 19
T 23	687.4	16.4	20	55	7 43	21	41	8 13
W 24	688.4	17.4	21	30	8 34	22	14	9 07
T 25	689.4	18.4	22	03	9 24	22	46	10 00
F 26	690.4	19.4	22	38	10 16	23	17	10 54
S 27	691.4	20.4	23	11	11 06	23	47	11 48
S 28	692.4	21.4	23	47	11 58	.....		12 42
M 29	693.4	22.4	.....		12 51	0	21	13 39
T 30	694.4	23.4	0	26	13 47	0	56	14 37
W 31	695.4	24.4	1	08	14 44	1	36	15 38

## PHASES OF THE MOON

New Moon	Jan 6 <sup>d</sup>	14 <sup>h</sup>	36 <sup>m</sup>
First Quarter	13	07	02
Full Moon	20	20	17
Last Quarter	29	01	37

## MOONRISE AND MOONSET

1962 FEBRUARY

DAY	At 0 <sup>h</sup> S.A.S.T.		JOHANNESBURG				CAPE TOWN			
	J.D. 2437000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
T 1	696.4	25.4	1 <sup>h</sup> 56 <sup>m</sup>	15 <sup>h</sup> 43 <sup>m</sup>	2 <sup>h</sup>	22 <sup>m</sup>	16 <sup>h</sup>	39 <sup>m</sup>		
F 2	697.4	26.4	2 49	16 43	3	14	17	39		
S 3	698.4	27.4	3 49	17 42	4	14	18	36		
S 4	699.4	28.4	4 53	15 37	5	19	19	29		
M 5	700.4	29.4	5 59	19 29	6	29	20	19		
T 6	701.4	0.9	7 07	20 17	7	39	21	03		
W 7	702.4	1.9	8 13	21 02	8	49	21	45		
T 8	703.4	2.9	9 20	21 47	9	57	22	23		
F 9	704.4	3.9	10 22	22 26	11	05	23	03		
S 10	705.4	4.9	11 24	23 08	12	09	23	40		
S 11	706.4	5.9	12 23	23 51	13	13	.....			
M 12	707.4	6.9	13 21	.....	14	14	0	21		
T 13	708.4	7.9	14 18	0 36	15	12	1	03		
W 14	709.4	8.9	15 12	1 23	16	07	1	48		
T 15	710.4	9.9	16 04	2 13	16	59	2	36		
F 16	711.4	10.9	16 51	3 03	17	46	3	26		
S 17	712.4	11.9	17 35	3 54	18	28	4	19		
S 18	713.4	12.9	18 17	4 45	19	06	5	13		
M 19	714.4	13.9	18 54	5 38	19	42	6	07		
T 20	715.4	14.9	19 30	6 29	20	15	7	01		
W 21	716.4	15.9	20 05	7 20	20	48	7	55		
T 22	717.4	16.9	20 38	8 11	21	18	8	49		
F 23	718.4	17.9	21 12	9 01	21	48	9	42		
S 24	719.4	18.9	21 47	9 52	22	21	10	35		
S 25	720.4	19.9	22 23	10 44	22	54	11	31		
M 26	721.4	20.9	23 03	11 37	23	32	12	27		
T 27	722.4	21.9	23 47	12 32	.....		13	25		
W 28	723.4	22.9	.....	13 29	0 14		14	24		

## PHASES OF THE MOON

New Moon	Feb 5 <sup>d</sup>	02 <sup>h</sup> 10 <sup>m</sup>
First Quarter	11	17 43
Full Moon	19	15 18
Last Quarter	27	17 50

## MOONRISE AND MOONSET

1962 MARCH

DAY	At 0 <sup>h</sup> S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2437000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
T 1	724.4	23.9	0 <sup>h</sup> 37 <sup>m</sup>	14 <sup>h</sup> 27 <sup>m</sup>	1 <sup>h</sup> 00 <sup>m</sup>	15 <sup>h</sup> 22 <sup>m</sup>
F 2	725.4	24.9	1 30	15 24	1 55	16 19
S 3	726.4	25.9	2 31	16 20	2 56	17 13
S 4	727.4	26.9	3 35	17 13	4 02	18 03
M 5	728.4	27.9	4 42	18 03	5 12	18 51
T 6	729.4	28.9	5 49	18 50	6 23	19 34
W 7	730.4	0.5	6 57	19 35	7 33	20 15
T 8	731.4	1.5	8 03	20 19	8 44	20 55
F 9	732.4	2.5	9 08	21 02	9 52	21 35
S 10	733.4	3.5	10 11	21 46	10 59	22 17
S 11	734.4	4.5	11 13	22 32	12 02	22 59
M 12	735.4	5.5	12 11	23 19	13 05	23 45
T 13	736.4	6.5	13 07	.....	14 02	.....
W 14	737.4	7.5	14 00	0 08	14 55	0 32
T 15	738.4	8.5	14 49	0 58	15 44	1 23
F 16	739.4	9.5	15 34	1 50	16 28	2 15
S 17	740.4	10.5	16 16	2 42	17 07	3 09
S 18	741.4	11.5	16 54	3 34	17 43	4 02
M 19	742.4	12.5	17 31	4 25	18 18	4 55
T 20	743.4	13.5	18 05	5 16	18 49	5 50
W 21	744.4	14.5	18 39	6 06	19 20	6 43
T 22	745.4	15.5	19 13	6 57	19 51	7 36
F 23	746.4	16.5	19 47	7 48	20 23	8 31
S 24	747.4	17.5	20 23	8 39	20 54	9 26
S 25	748.4	18.5	21 02	9 32	21 31	10 22
M 26	749.4	19.5	21 44	10 27	22 11	11 18
T 27	750.4	20.5	22 30	11 23	22 56	12 16
W 28	751.4	21.5	23 22	12 18	23 45	13 14
T 29	752.4	22.5	.....	13 14	.....	14 09
F 30	753.4	23.5	0 17	14 08	0 42	15 03
S 31	754.4	24.5	1 17	15 01	1 44	15 54

## PHASES OF THE MOON

New Moon	Mar 6 <sup>d</sup>	12 <sup>h</sup>	31 <sup>m</sup>
First Quarter	13	06	39
Full Moon	21	09	56
Last Quarter	29	06	11

## MOONRISE AND MOONSET

1962 APRIL

DAY	At 0 <sup>h</sup> S.A.S.T.		JOHANNESBURG				CAPE TOWN			
	J.D. 2437000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
S 1	755.4	25.5	2 <sup>h</sup> 21 <sup>m</sup>	15 <sup>h</sup> 50 <sup>m</sup>	2 <sup>h</sup>	49 <sup>m</sup>	16 <sup>h</sup>	40 <sup>m</sup>		
M 2	756.4	26.5	3 26	16 37	3	57	17	42		
T 3	757.4	27.5	4 33	17 22	5	08	18	06		
W 4	758.4	28.5	5 39	18 06	6	18	18	45		
T 5	759.4	0.1	6 45	18 50	7	28	19	26		
F 6	760.4	1.1	7 50	19 35	8	37	20	07		
S 7	761.4	2.1	8 55	20 21	9	44	20	50		
S 8	762.4	3.1	9 57	21 10	10	44	21	36		
M 9	763.4	4.1	10 57	22 00	11	50	22	24		
T 10	764.4	5.1	11 52	22 51	12	48	23	15		
W 11	765.4	6.1	12 45	23 42	13	40	.....			
T 12	766.4	7.1	13 31	.....	14	26	0	07		
F 13	767.4	8.1	14 15	0 35	15	07	1	01		
S 14	768.4	9.1	14 55	1 28	15	44	1	56		
S 15	769.4	10.1	15 32	2 20	16	19	2	50		
M 16	770.4	11.1	16 07	3 11	16	51	3	43		
T 17	771.4	12.1	16 40	4 01	17	23	4	37		
W 18	772.4	13.1	17 14	4 52	17	53	5	31		
T 19	773.4	14.1	17 48	5 44	18	24	6	25		
F 20	774.4	15.1	18 24	6 35	18	56	7	20		
S 21	775.4	16.1	19 02	7 28	19	31	8	17		
S 22	776.4	17.1	19 43	8 23	20	10	9	13		
M 23	777.4	18.1	20 27	9 19	20	53	10	12		
T 24	778.4	19.1	21 17	10 14	21	42	11	10		
W 25	779.4	20.1	22 11	11 10	22	36	12	06		
T 26	780.4	21.1	23 09	12 04	23	35	12	59		
F 27	781.4	22.1	.....	12 56	.....	13	49			
S 28	782.4	23.1	0 10	13 45	0	38	14	36		
S 29	783.4	24.1	1 13	14 31	1	42	15	19		
M 30	784.4	25.1	2 16	15 15	2	49	15	59		

## PHASES OF THE MOON

New Moon	Apr	4 <sup>d</sup>	21 <sup>h</sup>	45 <sup>m</sup>
First Quarter		11	21	51
Full Moon		20	02	34
Last Quarter		27	15	00

## MOONRISE AND MOONSET

1962 MAY

DAY	At 0 <sup>h</sup> S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2437000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
T 1	785.4	26.1	3 <sup>h</sup> 21 <sup>m</sup>	15 <sup>h</sup> 57 <sup>m</sup>	3 <sup>h</sup> 56 <sup>m</sup>	16 <sup>h</sup> 39 <sup>m</sup>
W 2	786.4	27.1	4 25	16 40	5 05	17 17
T 3	787.4	28.1	5 30	17 24	6 13	17 57
F 4	788.4	29.1	6 34	18 10	7 22	18 40
S 5	789.4	0.7	7 39	18 57	8 29	19 24
S 6	790.4	1.7	8 41	19 47	9 35	20 12
M 7	791.4	2.7	9 40	19 39	10 35	21 03
T 8	792.4	3.7	10 35	21 32	11 31	21 56
W 9	793.4	4.7	11 26	22 26	12 21	22 51
T 10	794.4	5.7	12 12	23 20	13 05	23 46
F 11	795.4	6.7	12 54	.....	13 44	.....
S 12	796.4	7.7	13 32	0 13	14 20	0 42
S 13	797.4	8.7	14 07	1 04	14 53	1 35
M 14	798.4	9.7	14 40	1 55	15 24	2 29
T 15	799.4	10.7	15 14	2 46	15 54	3 23
W 16	800.4	11.7	15 48	3 37	16 25	4 17
T 17	801.4	12.7	16 23	4 29	16 57	5 12
F 18	802.4	13.7	17 00	5 21	17 30	6 08
S 19	803.4	14.7	17 40	6 15	18 08	7 05
S 20	804.4	15.7	18 21	7 12	18 50	8 05
M 21	805.4	16.7	19 13	8 09	19 38	9 04
T 22	806.4	17.7	20 06	9 06	20 31	10 02
W 23	807.4	18.7	21 03	10 01	21 29	10 57
T 24	808.4	19.7	22 03	10 54	22 31	11 49
F 25	809.4	20.7	23 05	11 44	23 35	12 36
S 26	810.4	21.7	.....	12 30	.....	13 19
S 27	811.4	22.7	0 08	13 13	0 40	13 59
M 28	812.4	23.7	1 10	13 55	1 43	14 38
T 29	813.4	24.7	2 13	14 37	2 49	15 14
W 30	814.4	25.7	3 15	15 18	3 59	15 53
T 31	815.4	26.7	4 18	16 01	5 05	16 32

## PHASES OF THE MOON

New Moon	May 4 <sup>d</sup>	06 <sup>h</sup>	25 <sup>m</sup>
First Quarter	11	14	45
Full Moon	19	16	32
Last Quarter	26	21	06

## MOONRISE AND MOONSET

1962 JUNE

DAY	At 0 <sup>h</sup> S.A.S.T.		JOHANNESBURG				CAPE TOWN			
	J.D. 2437000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
F 1	816.4	27.7	5 <sup>h</sup> 21 <sup>m</sup>	16 <sup>h</sup> 46 <sup>m</sup>	6 <sup>h</sup>	11 <sup>m</sup>	17 <sup>h</sup>	15 <sup>m</sup>		
S 2	817.4	28.7	6 24	17 34	7	17	18	01		
S 3	818.4	0.3	7 24	18 26	8	19	18	50		
M 4	819.4	1.3	8 22	19 19	9	18	19	42		
T 5	820.4	2.3	9 16	20 13	10	11	20	38		
W 6	821.4	3.3	10 05	21 08	10	58	21	34		
T 7	822.4	4.3	10 48	22 02	11	41	22	30		
F 8	823.4	5.3	11 29	22 55	12	18	23	25		
S 9	824.4	6.3	12 06	23 47	12	53	.....			
S 10	825.4	7.3	12 41	.....	13	25	0	20		
M 11	826.4	8.3	13 14	0 38	13	55	1	14		
T 12	827.4	9.3	13 47	1 28	14	25	2	07		
W 13	828.4	10.3	14 21	2 19	14	57	3	02		
T 14	829.4	11.3	14 57	3 12	15	28	3	57		
F 15	830.4	12.3	15 36	4 05	16	04	4	54		
S 16	831.4	13.3	16 18	5 01	16	45	5	52		
S 17	832.4	14.3	17 06	5 59	17	31	6	53		
M 18	833.4	15.3	17 59	6 56	18	22	7	52		
T 19	834.4	16.3	18 55	7 54	19	19	8	50		
W 20	835.4	17.3	19 56	8 49	20	21	9	44		
T 21	836.4	18.3	20 59	9 42	21	26	10	35		
F 22	837.4	19.3	22 01	10 29	22	32	11	19		
S 23	838.4	20.3	23 04	11 14	23	39	12	01		
S 24	839.4	21.3	.....	11 56	.....		12	40		
M 25	840.4	22.3	0 06	12 38	0	44	13	16		
T 26	841.4	23.3	1 07	13 18	1	50	13	53		
W 27	842.4	24.3	2 09	13 59	2	54	14	31		
T 28	843.4	25.3	3 10	14 42	4	00	15	12		
F 29	844.4	26.3	4 11	15 27	5	03	15	55		
S 30	845.4	27.3	5 12	16 17	6	06	16	41		

## PHASES OF THE MOON

New Moon	Jun 2 <sup>d</sup>	15 <sup>h</sup>	27 <sup>m</sup>
First Quarter	10	08	22
Full Moon	18	04	03
Last Quarter	25	01	43

## MOONRISE AND MOONSET

1962 JULY

DAY	At 0 <sup>h</sup> S.A.S.T.		JOHANNESBURG			CAPE TOWN		
	J.D. 2437000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
S 1	846.4	28.3	6 <sup>h</sup> 10 <sup>m</sup>	17 <sup>h</sup> 09 <sup>m</sup>	7 <sup>h</sup> 06 <sup>m</sup>	17 <sup>h</sup>	33 <sup>m</sup>	
M 2	847.4	29.3	7 05	18 02	8. 01	18	25	
T 3	848.4	0.9	7 57	18 57	8. 52	19	22	
W 4	849.4	1.9	8 43	19 51	9. 37	20	18	
T 5	850.4	2.9	9 25	20 45	10. 16	21	15	
F 6	851.4	3.9	10 04	21 38	10. 52	22	10	
S 7	852.4	4.9	10 39	22 29	11. 25	23	04	
S 8	853.4	5.9	11 13	23 20	11. 55	23	57	
M 9	854.4	6.9	11 46	.....	12. 25	.....	.....	
T 10	855.4	7.9	12 20	0 10	12. 55	0	51	
W 11	856.4	8.9	12 54	1 02	13. 26	1	45	
T 12	857.4	9.9	13 31	1 54	14. 01	2	41	
F 13	858.4	10.9	14 11	2 48	14. 39	3	38	
S 14	859.4	11.9	14 55	3 44	15. 32	4	37	
S 15	860.4	12.9	15 46	4 42	16. 10	5	37	
M 16	861.4	13.9	16 41	5 41	17. 05	6	37	
T 17	862.4	14.9	17 42	6 38	18. 06	7	34	
W 18	863.4	15.9	18 45	7 33	19. 12	8	27	
T 19	864.4	16.9	19 50	8 23	20. 21	9	15	
F 20	865.4	17.9	20 55	9 11	21. 28	10	00	
S 21	866.4	18.9	21 59	9 55	22. 36	10	40	
S 22	867.4	19.9	23 01	10 37	23. 42	11	18	
M 23	868.4	20.9	.....	11 19	.....	11	55	
T 24	869.4	21.9	0 03	12 00	0 47	12	33	
W 25	870.4	22.9	1 04	12 41	1 52	13	12	
T 26	871.4	23.9	2 05	13 25	2 56	13	53	
F 27	872.4	24.9	3 05	14 12	3 58	14	38	
S 28	873.4	25.9	4 02	15 02	4 58	15	26	
S 29	874.4	26.9	4 58	15 54	5 54	16	18	
M 30	875.4	27.9	5 51	16 48	6 46	17	12	
T 31	876.4	28.9	6 38	17 42	7 32	18	09	

## PHASES OF THE MOON

New Moon	Jul 2 <sup>d</sup>	01 <sup>h</sup>	53 <sup>m</sup>
First Quarter	10	01	40
Full Moon	17	13	41
Last Quarter	24	06	19
New Moon	31	14	24

## MOONRISE AND MOONSET

1962 AUGUST

DAY	At 0 <sup>h</sup> S.A.S.T.			JOHANNESBURG		CAPE TOWN		
	J.D. 2437000+	AGE		MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	
W 1	877.4	0.4		7 <sup>h</sup> 21 <sup>m</sup>	18 <sup>h</sup> 35 <sup>m</sup>	8 <sup>h</sup> 13 <sup>m</sup>	19 <sup>h</sup> 05 <sup>m</sup>	
T 2	878.4	1.4		8 01	19 29	8 50	20 00	
F 3	879.4	2.4		8 39	20 22	9 24	20 55	
S 4	880.4	3.4		9 13	21 13	9 57	21 49	
S 5	881.4	4.4		9 45	22 03	10 27	22 43	
M 6	882.4	5.4		10 19	22 53	10 56	23 36	
T 7	883.4	6.4		10 52	23 45	11 28	.....	
W 8	884.4	7.4		11 27	.....	11 59	0 30	
T 9	885.4	8.4		12 06	0 38	12 34	1 26	
F 10	886.4	9.4		12 47	1 31	13 14	2 23	
S 11	887.4	10.4		13 34	2 27	13 58	3 21	
S 12	888.4	11.4		14 27	3 24	14 50	4 20	
M 13	889.4	12.4		15 23	4 22	15 47	5 18	
T 14	890.4	13.4		16 26	5 18	16 52	6 13	
W 15	891.4	14.4		17 31	6 11	18 00	7 05	
T 16	892.4	15.4		18 37	7 01	19 09	7 51	
F 17	893.4	16.4		19 43	7 48	20 20	8 35	
S 18	894.4	17.4		20 49	8 32	21 30	9 15	
S 19	895.4	18.4		21 54	9 15	22 38	9 54	
M 20	896.4	19.4		22 57	9 57	23 45	10 32	
T 21	897.4	20.4		23 58	10 40	.....	11 11	
W 22	898.4	21.4		.....	11 24	0 49	11 53	
T 23	899.4	22.4		0 59	12 10	1 52	12 37	
F 24	900.4	23.4		1 58	12 59	2 53	13 24	
S 25	901.4	24.4		2 54	13 51	3 50	14 14	
S 26	902.4	25.4		3 47	14 43	4 43	15 07	
M 27	903.4	26.4		4 35	15 37	5 30	16 02	
T 28	904.4	27.4		5 20	16 30	6 12	16 58	
W 29	905.4	28.4		6 01	17 23	6 50	17 54	
T 30	906.4	29.4		6 38	18 16	7 26	18 48	
F 31	907.4	0.8		7 13	19 08	7 58	19 43	

## PHASES OF THE MOON

First Quarter	Aug 8 <sup>d</sup>	17 <sup>h</sup>	55 <sup>m</sup>
Full Moon	15	22	10
Last Quarter	22	12	27
New Moon	30	05	09

## MOONRISE AND MOONSET

1962 SEPTEMBER

DAY	At 0 <sup>h</sup> S.A.S.T.		JOHANNESBURG				CAPE TOWN			
	J.D. 2437000+	AGE	MOONRISE S.A.S.T.		MOONSET S.A.S.T.		MOONRISE S.A.S.T.		MOONSET S.A.S.T.	
S 1	908.4	1.8	7 <sup>h</sup> 46 <sup>m</sup>		19 <sup>h</sup> 57 <sup>m</sup>		8 <sup>h</sup> 29 <sup>m</sup>		20 <sup>h</sup> 36 <sup>m</sup>	
S 2	909.4	2.8	8 19		20 47		8 58		21 30	
M 3	910.4	3.8	8 52		21 38		9 28		22 23	
T 4	911.4	4.8	9 26		22 30		9 59		23 18	
W 5	912.4	5.8	10 03		23 22		10 32		.....	
T 6	913.4	6.8	10 42		.....		11 09		0 13	
F 7	914.4	7.8	11 25		0 16		11 50		1 09	
S 8	915.4	8.8	12 14		1 11		12 38		2 07	
S 9	916.4	9.8	13 07		2 07		13 30		3 03	
M 10	917.4	10.8	14 06		3 03		14 30		3 58	
T 11	918.4	11.8	15 09		3 57		15 36		4 51	
W 12	919.4	12.8	16 14		4 48		16 45		5 39	
T 13	920.4	13.8	17 21		5 36		17 56		6 25	
F 14	921.4	14.8	18 29		6 22		19 06		7 06	
S 15	922.4	15.8	19 35		7 07		20 18		7 47	
S 16	923.4	16.8	20 41		7 50		21 27		8 26	
M 17	924.4	17.8	21 47		8 33		22 36		9 06	
T 18	925.4	18.8	22 50		9 19		23 42		9 49	
W 19	926.4	19.8	23 51		10 06		.....		10 33	
T 20	927.4	20.8	.....		10 55		0 46		11 20	
F 21	928.4	21.8	0 49		11 47		1 45		12 10	
S 22	929.4	22.8	1 43		12 40		2 40		13 02	
S 23	930.4	23.8	2 34		13 33		3 29		13 57	
M 24	931.4	24.8	3 19		14 26		4 13		14 53	
T 25	932.4	25.8	4 01		15 19		4 51		15 49	
W 26	933.4	26.8	4 39		16 12		5 27		16 43	
T 27	934.4	27.8	5 14		17 03		6 00		17 38	
F 28	935.4	28.8	5 48		17 54		6 31		18 31	
S 29	936.4	0.1	6 21		18 44		7 01		19 25	
S 30	937.4	1.1	6 54		19 35		7 30		20 18	

## PHASES OF THE MOON

First Quarter	Sep	7 <sup>d</sup>	08 <sup>h</sup>	45 <sup>m</sup>
Full Moon		14	06	12
Last Quarter		20	21	36
New Moon		28	21	40

## MOONRISE AND MOONSET

1962 OCTOBER

DAY	At 0 <sup>h</sup> S.A.S.T.		JOHANNESBURG				CAPE TOWN			
	J.D. 2437000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
M 1	938.4	2.1	7 <sup>h</sup> 27 <sup>m</sup>	20 <sup>h</sup> 26 <sup>m</sup>	8 <sup>h</sup> 01 <sup>m</sup>	21 <sup>h</sup> 13 <sup>m</sup>				
T 2	939.4	3.1	8 02	21 18	8 32	22 07				
W 3	940.4	4.1	8 40	22 11	9 08	23 03				
T 4	941.4	5.1	9 21	23 04	9 47	23 59				
F 5	942.4	6.1	10 07	23 59	10 31	.....				
S 6	943.4	7.1	10 58	.....	11 21	0 55				
S 7	944.4	8.1	11 52	0 53	12 15	1 49				
M 8	945.4	9.1	12 51	1 46	13 17	2 42				
T 9	946.4	10.1	13 54	2 37	14 22	3 29				
W 10	947.4	11.1	14 59	3 24	15 30	4 14				
T 11	948.4	12.1	16 04	4 10	16 40	4 57				
F 12	949.4	13.1	17 11	4 54	17 50	5 38				
S 13	950.4	14.1	18 18	5 38	19 02	6 17				
S 14	951.4	15.1	19 26	6 22	20 13	6 57				
M 15	952.4	16.1	20 32	7 08	21 23	7 39				
T 16	953.4	17.1	21 38	7 56	22 31	8 23				
W 17	954.4	18.1	22 39	8 46	23 35	9 11				
T 18	955.4	19.1	23 36	9 38	.....	10 02				
F 19	956.4	20.1	.....	10 32	0 33	10 55				
S 20	957.4	21.1	0 30	11 26	1 25	11 50				
S 21	958.4	22.1	1 17	12 20	2 12	12 47				
M 22	959.4	23.1	2 00	13 14	2 53	13 43				
T 23	960.4	24.1	2 40	14 07	3 28	14 38				
W 24	961.4	25.1	3 16	14 59	4 02	15 32				
T 25	962.4	26.1	3 49	15 50	4 34	16 25				
F 26	963.4	27.1	4 23	16 40	5 04	17 19				
S 27	964.4	28.1	4 55	17 30	5 33	18 13				
S 28	965.4	29.1	5 28	18 22	6 04	19 08				
M 29	966.4	0.4	6 04	19 14	6 34	20 03				
T 30	967.4	1.4	6 40	20 07	7 09	20 59				
W 31	968.4	2.4	7 21	21 01	7 47	21 55				

## PHASES OF THE MOON

First Quarter	Oct 6 <sup>d</sup>	21 <sup>h</sup>	55 <sup>m</sup>
Full Moon	13	14	33
Last Quarter	20	10	48
New Moon	28	15	05

## MOONRISE AND MOONSET

1962 NOVEMBER

DAY	At 0 <sup>h</sup> S.A.S.T.		JOHANNESBURG				CAPE TOWN			
	J.D. 2437000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
T 1	969.4	3.4	8 <sup>h</sup> 04 <sup>m</sup>	21 <sup>h</sup> 55 <sup>m</sup>	8 <sup>h</sup> 29 <sup>m</sup>		22 <sup>h</sup> 51 <sup>m</sup>			
F 2	970.4	4.4	8 53	22 49	9 16		23 45			
S 3	971.4	5.4	9 47	23 42	10 09		.....			
S 4	972.4	6.4	10 42	.....	11 08		0 38			
M 5	973.4	7.4	11 41	0 32	12 08		1 26			
T 6	974.4	8.4	12 44	1 19	13 13		2 10			
W 7	975.4	9.4	13 46	2 03	14 20		2 52			
T 8	976.4	10.4	14 51	2 46	15 27		3 30			
F 9	977.4	11.4	15 56	3 28	16 37		4 09			
S 10	978.4	12.4	17 01	4 11	17 47		4 47			
S 11	979.4	13.4	18 08	4 54	18 58		5 28			
M 12	980.4	14.4	19 14	5 41	20 08		6 11			
T 13	981.4	15.4	20 20	6 30	21 16		6 57			
W 14	982.4	16.4	21 22	7 23	22 19		7 47			
T 15	983.4	17.4	22 19	8 18	23 16		8 41			
F 16	984.4	18.4	23 12	9 14	.....		9 38			
S 17	985.4	19.4	23 58	10 11	0 07		10 35			
S 18	986.4	20.4	.....	11 06	0 51		11 33			
M 19	987.4	21.4	0 40	12 00	1 29		12 30			
T 20	988.4	22.4	1 17	12 53	2 04		13 25			
W 21	989.4	23.4	1 51	13 44	2 36		14 19			
T 22	990.4	24.4	2 24	14 34	3 06		15 12			
F 23	991.4	25.4	2 56	15 25	3 36		16 07			
S 24	992.4	26.4	3 29	16 16	4 05		17 00			
S 25	993.4	27.4	4 03	17 08	4 36		17 56			
M 26	994.4	28.4	4 40	18 01	5 09		18 52			
T 27	995.4	29.4	5 19	18 56	5 46		19 49			
W 28	996.4	0.6	6 02	19 51	6 27		20 47			
T 29	997.4	1.6	6 50	20 45	7 13		21 42			
F 30	998.4	2.6	7 42	21 39	8 05		22 35			

## PHASES OF THE MOON

First Quarter	Nov	5 <sup>d</sup>	09 <sup>h</sup>	15 <sup>m</sup>
Full Moon		12	00	04
Last Quarter		19	04	10
New Moon		27	08	30

## MOONRISE AND MOONSET

1962 DECEMBER

DAY	At 0 <sup>h</sup> S.A.S.T.		JOHANNESBURG		CAPE TOWN	
	J.D. 2438000+	AGE	MOONRISE S.A.S.T.	MOONSET S.A.S.T.	MOONRISE S.A.S.T.	MOONSET S.A.S.T.
S 1	* 999.4	3.6	8 <sup>h</sup> 37 <sup>m</sup>	22 <sup>h</sup> 30 <sup>m</sup>	9 <sup>h</sup> 00 <sup>m</sup>	23 <sup>h</sup> 25 <sup>m</sup>
S 2	000.4	4.6	9 35	23 18	10 01	.....
M 3	001.4	5.6	10 36	.....	11 05	0 10
T 4	002.4	6.6	11 37	0 02	12 09	0 51
W 5	003.4	7.6	12 39	0 44	13 15	1 30
T 6	004.4	8.6	13 41	1 26	14 21	2 08
F 7	005.4	9.6	14 44	2 06	15 28	2 44
S 8	006.4	10.6	15 49	2 47	16 36	3 22
S 9	007.4	11.6	16 54	2 30	17 44	4 01
M 10	008.4	12.6	17 59	4 17	18 53	4 45
T 11	009.4	13.6	19 03	5 08	19 59	5 32
W 12	010.4	14.6	20 03	6 01	21 00	6 24
T 13	011.4	15.6	20 58	6 58	21 55	7 21
F 14	012.4	16.6	21 48	7 55	22 44	8 19
S 15	013.4	17.6	22 34	8 52	23 26	9 19
S 16	014.4	18.6	23 14	9 48	.....	10 17
M 17	015.4	19.6	23 51	10 43	0 03	11 14
T 18	016.4	20.6	.....	11 36	0 36	12 10
W 19	017.4	21.6	0 24	12 27	1 08	13 03
T 20	018.4	22.6	0 56	13 17	1 37	13 57
F 21	019.4	23.6	1 29	14 08	2 06	14 51
S 22	020.4	24.6	2 03	15 00	2 36	15 46
S 23	021.4	25.6	2 37	15 52	3 07	16 41
M 24	022.4	26.6	3 15	16 46	3 43	17 39
T 25	023.4	27.6	3 56	17 41	4 22	18 37
W 26	024.4	28.6	4 43	18 37	5 07	19 34
T 27	025.4	29.6	5 35	19 32	5 56	20 29
F 28	026.4	0.9	6 29	20 26	6 53	21 22
S 29	027.4	1.9	7 28	21 16	7 53	22 09
S 30	028.4	2.9	8 30	22 02	8 57	22 52
M 31	029.4	3.9	9 32	22 45	10 02	23 33

## PHASES OF THE MOON

First Quarter	Dec 4 <sup>d</sup>	18 <sup>h</sup>	48 <sup>m</sup>
Full Moon	11	11	28
Last Quarter	19	00	43
New Moon	27	00	59

## ECLIPSES

There are five eclipses, two of the Sun and three of the Moon.

1. February 4-5. Total eclipse of the Sun, invisible in Southern Africa.
2. February 19. Penumbral eclipse of the Moon, invisible in Southern Africa.
3. July 17. Penumbral eclipse of the Moon, invisible in Southern Africa.
4. July 31. Annular eclipse of the Sun. The path of the annular eclipse passes over the Atlantic Ocean, West and Central Africa. Visible in Southern Africa as a partial eclipse.
5. August 15. Penumbral eclipse of the Moon, visible in Southern Africa.

### Local Predictions of the Solar Eclipse

July 31

STATION	BEGINNING		MAXIMUM		ENDING		MAGNITUDE
	S.A.S.T.	P.A.	S.A.S.T.		S.A.S.T.	P.A.	
Bloemfontein	15 <sup>h</sup> 05 <sup>m</sup> .1	334°	16 <sup>h</sup> 07 <sup>m</sup> .9		17 <sup>h</sup> 03 <sup>m</sup> .6	67°	0.315
Cape Town	15 17.6	355	15 57.0		16 34.0	47	0.102
Durban	15 08.8	331	16 11.1		17 06.4	69	0.347
Johannesburg	15 01.4	326	16 10.3		17 11.2	74	0.409
Port Elizabeth	15 15.8	344	16 04.5		16 49.2	55	0.182
Salisbury	14 52.5	310	16 13.5		17 21.8	92	0.671
Windhoek	14 43.4	331	15 58.9		17 04.0	72	0.364

### Circumstances of the Lunar Eclipse

August 15

Moon enters Penumbra	20 <sup>h</sup> 15 <sup>m</sup> .6	S.A.S.T.	in P.A. 25° East of North Point.
Middle of eclipse	21 56.9		
Moon leaves Penumbra	23 38.3		in P.A. 52° West of North Point.
Penumbral magnitude	0.621		

## OCCULTATIONS OF BRIGHT STARS

Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town				
						P.A.	h.	m.	a	b
Jan										
2	2137*	AO	6.4	-10° 57'	R	-	-	-	-	-
2	2141*	KO	6.0	-10 57	R	-	-	-	-	-
3	2266	G0	6.2	-13 59	R	315°	04 29.1	+0.1	-2.0	
10	3422	F0	6.7	- 7 26	D	-	-	-	-	
13	298	F2	7.2	+ 7 37	D	62	20 40.1	-1.9	+1.4	
13	303	K0	6.6	+ 7 30	D	-	-	-	-	
13	308	M3	6.7	+ 8 01	D	76	23 23.2	-0.9	+1.5	
18	995*	B5	4.1	+20 15	D	146	20 22.4	-	-	
Feb										
10	393	K0	6.8	+10 25	D	-	-	-	-	
10	398	K0	6.7	+10 20	D	-	-	-	-	
10	401	AO	6.3	+10 32	D	-	-	-	-	
15	971	G5	7.3	+19 55	D	-	-	-	-	
17	1217	AO	6.1	+18 59	D	-	-	-	-	
24	2049	G0	6.5	- 7 19	R	312	23 22.8	-0.1	-2.0	
Mar										
1	2578	AO	6.4	-18 48	D	22	04 42.0			
1	2578	AO	6.4	-18 48	R	2	04 54.4	Graze		
2	2733	AO	6.4	-19 12	R	303	03 02.7	+0.3	-1.8	
3	2902	G5	6.0	-19 10	R	-	-	-	-	
10	464	G5	6.4	+12 52	D	-	-	-	-	
11	609	B9	7.5	+16 24	D	-	-	-	-	
12	764*	G0	5.0	+18 35	D	-	-	-	-	
13	915	B2p	4.7	+20 08	D	124	22 57.1	-0.8	0.0	
16	1186	K0	6.1	+19 27	D	158	00 40.1	+0.1	-1.9	
25	2133	K0	5.6	-11 13	R	-	-	-	-	
25	2137	AO	6.4	-10 57	R	295	03 07.8	-2.2	-1.3	
25	2141*	K0	6.0	-10 57	R	314	03 31.5	-1.8	-2.0	
27	2399	K0	5.0	-17 39	R	-	-	-	-	
31	2981*	B8	5.2	-18 23	R	-	-	-	-	
31	2987*	F0	5.0	-17 59	R	208	03 23.9	-1.1	+1.8	

\* denotes stars which are double or components of double stars  
 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

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

where a and b are in minutes of time.

## OCCULTATIONS OF BRIGHT STARS

Date	Z.C.	Johannesburg					Luanshya				
		P.A.	h.	m.	a	b	P.A.	h.	m.	a	b
Jan											
2	2137	236°	03	50.6	-1.5	+0.7	281°	03	47.0	-0.7	-0.8
2	2141	261	04	20.1	-1.2	-0.6	299	04	06.9	-0.7	-1.4
3	2266	355	04	05.5	+0.9	-4.2	-	-	-	-	-
10	3422	-	-	-	-	-	114	19	10.5	-2.4	-0.9
13	298	54	21	09.9	-1.6	+1.9	12	21	45.3	-1.0	+4.3
13	303	-	-	-	-	-	105	23	04.0	-0.9	-0.1
13	308	-	-	-	-	-	-	-	-	-	-
18	995	128	20	23.2	-2.8	-2.6	84	20	07.3	-2.1	-0.2
Feb											
10	393	89	20	24.0	-1.7	+0.9	53	20	41.5	-1.5	+1.8
10	398	-	-	-	-	-	123	22	20.2	-0.4	-1.0
10	401	-	-	-	-	-	83	22	29.9	-0.5	+0.7
15	971	-	-	-	-	-	123	01	18.8	-0.3	-0.8
17	1217	-	-	-	-	-	127	00	17.8	-1.9	-1.4
24	2049	340	23	04.5	+0.1	-3.0	-	-	-	-	-
Mar											
1	2578	-	-	-	-	-	-	-	-	-	-
1	2578	-	-	-	-	-	-	-	-	-	-
2	2733	-	-	-	-	-	-	-	-	-	-
3	2902	-	-	-	-	-	221	03	43.6	-1.0	+1.7
10	464	-	-	-	-	-	57	19	06.7	-1.7	+1.7
11	609	77	19	26.4	-2.0	+1.1	37	19	50.6	-2.1	+2.9
12	764	-	-	-	-	-	111	22	11.7	-0.7	-0.3
13	915	91	23	08.3	-0.8	+0.9	42	23	28.8	-1.6	+2.9
16	1186	116	00	38.3	-0.6	0.0	70	00	46.4	-1.3	+1.4
25	2133	228	02	10.7	-	-	285	02	21.7	-3.1	-1.0
25	2137	336	03	09.6	-1.5	-3.4	-	-	-	-	-
25	2141	-	-	-	-	-	-	-	-	-	-
27	2399	-	-	-	-	-	238	04	37.4	-	-
31	2981	-	-	-	-	-	200	02	27.1	-	-
31	2987	251	03	36.4	-0.9	-0.2	299	03	25.8	-0.4	-1.6

Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town				
						P.A.	h.	m.	a	b
Apr										
2	3307	AO	4.9	-10° 56'	R	278°	05 24.6	-0.3	-1.3	
2	3310	FO	6.4	-11 10	R	216	05 40.1	-0.6	+0.9	
11	1127	FO	5.9	+20 22	D	-	-	-	-	
11	1138	GO	7.1	+19 55	D	-	-	-	-	
12	1259	FO	5.9	+18 30	D	-	-	-	-	
15	1481	A5	7.4	+13 02	D	-	-	-	-	
15	1576	AO	5.3	+10 49	D	67	21 33.8	-	-	
16	1684	KO	7.0	+ 6 23	D	163	23 28.3	-0.9	-2.8	
24	2629*	A2	6.3	-19 51	D	182	23 49.8			
24	2629*	A2	6.3	-19 51	R	200	23 59.5			Graze
26	2798*	KO	6.3	-19 53	R	243	01 06.9	-1.0	-0.2	
May										
7	935	B5	6.9	+20 55	D	76	18 52.7	-1.6	+1.4	
9	1205	KO	6.3	+19 57	D	-	-	-	-	
10	1331†	N3	Var	+17 25	D	-	-	-	-	
10	1335	KO	6.3	+17 20	D	-	-	-	-	
14	1741	KO	7.2	+ 3 51	D	-	-	-	-	
16	1856*	F5	6.6	- 0 41	D	95	01 53.5	-1.2	+1.0	
17	1965	AO	6.5	- 5 15	D	138	03 11.2	-0.7	-0.7	
22	2591	KO	6.5	-20 20	R	-	-	-	-	
22	2734*	KO	5.4	-20 23	R	-	-	-	-	
23	2757	AO	5.1	-20 43	R	-	-	-	-	
24	2902	G5	6.0	-19 10	R	311	00 09.7	-0.3	-2.6	
27	3347	FO	6.2	-10 49	R	-	-	-	-	
Jun										
7	1395	KO	6.3	+16 48	D	82	18 54.1	-2.4	+1.1	
8	1506	GO	7.1	+12 52	D	-	-	-	-	
9	1603	AO	7.1	+ 9 27	D	-	-	-	-	
10	1709	KO	6.7	+ 5 28	D	-	-	-	-	
14	2133	KO	5.6	-11 13	D	162	23 20.5	-1.2	-3.5	
14	2137	AO	6.4	-10 57	D	67	23 58.7	-2.7	+2.4	
15	2141*	KO	6.0	-10 57	D	30	00 47.4			
15	2141*	KO	6.0	-10 57	R	10	01 02.0			Graze
16	2399	KO	5.0	-17 39	D	161	23 46.5	-	-	
20	2994*	A2	6.1	-18 45	R	-	-	-	-	
21	3017	MO	5.3	-18 19	R	202	03 04.6	-1.6	+4.1	
22	3177	A5	6.0	-14 38	R	277	06 25.7	-2.1	+0.4	
22	3181	A5	5.9	-14 59	D	150	05 58.0			
22	3181	A5	5.9	-14 59	R	162	06 05.8			Graze

\* 5.9 to 7.5, 130d

Date	Z.C.	Johannesburg				Luanshya			
		P.A.	h. m.	a	b	P.A.	h. m.	a	b
Apr									
2	3307	322°	05 09.9	-	-	- °	-	-	-
2	3310	-	-	-	-	-	-	-	-
11	1127	118	18 29.8	-2.7	-1.0	81	18 26.2	-3.5	+0.5
11	1138	-	-	-	-	141	21 21.3	-0.8	-1.9
12	1259	-	-	-	-	154	22 06.8	-0.4	-2.6
15	1481	-	-	-	-	128	01 25.4	-0.3	-0.9
15	1576	-	-	-	-	-	-	-	-
16	1684	122	23 29.5	-2.1	-0.9	77	23 29.2	-4.0	+1.3
24	2629	-	-	-	-	-	-	-	-
24	2629	258	24 21.9	-1.4	-0.4	301	24 09.3	-0.7	-1.6
26	2798	279	01 10.8	-1.0	-1.2	330	00 45.1	+0.2	-3.5
May									
7	935	35	19 26.3	-2.1	+3.9	-	-	-	-
9	1205	97	18 34.4	-2.4	+0.3	49	18 52.7	-	-
10	1331	-	-	-	-	155	21 04.8	-0.2	-2.5
10	1335	-	-	-	-	133	22 00.3	-0.4	-1.1
14	1741	184	21 58.6	-	-	135	21 17.9	-2.2	-2.2
16	1856	49	02 20.4	-	-	-	-	-	-
17	1965	108	03 16.0	-0.5	+0.3	50	03 32.0	-0.3	+3.2
22	2591	-	-	-	-	241	02 57.6	-3.0	+2.0
22	2734	-	-	-	-	261	21 56.2	-0.7	-0.1
23	2757	-	-	-	-	231	02 21.6	-3.2	+2.5
24	2902	-	-	-	-	-	-	-	-
27	3347	-	-	-	-	181	02 34.0	-	-
Jun									
7	1395	-	-	-	-	-	-	-	-
8	1506	-	-	-	-	86	22 14.2	-0.6	+0.7
9	1603	179	21 05.2	-	-	126	20 37.8	-1.5	-1.2
10	1709	154	21 34.1	-0.7	-2.1	109	21 18.7	-2.0	-0.5
14	2133	121	23 22.2	-2.1	-0.9	71	23 25.5	-3.3	+1.8
14	2137	-	-	-	-	-	-	-	-
15	2141	-	-	-	-	-	-	-	-
15	2141	-	-	-	-	-	-	-	-
16	2399	119	23 46.2	-2.5	-1.3	70	23 46.5	-3.5	+1.5
20	2994	194	21 30.7	-	-	258	21 45.2	-0.7	0.0
21	3017	225	03 44.1	-1.8	+2.4	270	04 01.9	-2.8	+0.2
22	3177	-	-	-	-	-	-	-	-
22	3181	-	-	-	-	-	-	-	-
22	3181	-	-	-	-	-	-	-	-

Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town				
						P.A.	h.	m.	a	b
Jun										
24	3463	KO	6.4	- 6° 34'	R	308°	03	27.5	-	-
25	49	KO	6.3	- 2 30	R	-	-	-	-	-
28	464	G5	6.4	+12 52	R	271	06	20.2	-1.4	-1.0
Jul										
5	1459	G5	7.5	+14 58	D	87	18	41.8	-1.7	+1.2
14	2352	FO	6.7	-16 54	D	-	-	-	-	-
18	3079	AO	4.2	-17 26	R	-	-	-	-	-
20	3268	KO	5.6	-13 05	R	-	-	-	-	-
21	3421	M3	5.1	- 8 00	R	238	04	35.9	-1.8	+1.4
23	150*	FO	6.2	+ 1 06	R	-	-	-	-	-
Aug										
7	2048	KO	7.2	- 7 44	D	112	20	16.8	-1.8	-0.1
12	2571	FO	6.9	-19 31	D	79	01	46.1	-0.6	+1.4
12	2710	A5	6.8	-20 07	D	67	19	39.5	-2.0	+0.2
13	2734*	KO	5.4	-20 23	D	136	01	40.9	-1.9	-1.2
13	2886	KO	5.1	-19 53	D	122	23	25.3	-2.6	-1.7
14	3017	MO	5.3	-18 19	D	141	19	25.4	-0.1	-3.5
20	249	KO	4.7	+ 5 14	R	246	02	25.5	-1.5	+0.1
21	401	AO	6.3	+10 32	R	201	05	51.3	-1.1	+2.5
23	684*	B8	6.2	+17 55	R	253	06	04.1	-2.0	+0.1
Sep										
4	2113*	F8	7.5	-10 37	D	157	20	11.3	-1.2	-2.4
5	2231	KO	6.9	-14 21	D	-	-	-	-	-
7	2497*	GO	6.6	-19 17	D	-	-	-	-	-
8	2639*	B1	6.0	-20 24	D	151	19	34.6	-	-
8	2638	BO	5.4	-20 45	D	-	-	-	-	-
8	2642*	G5,A5	7.1	-20 34	D	-	-	-	-	-
10	2963*	KO	5.5	-19 17	D	-	-	-	-	-
11	2981*	B8	5.2	-18 23	D	97	03	16.4	-0.3	+0.9
16	192	A2	5.3	+ 3 21	R	256	02	08.7	-2.1	+0.4
18	464	G5	6.4	+12 52	R	245	01	24.1	-1.2	-0.1
19	620	G5	6.3	+17 09	R	292	03	43.3	-2.7	-1.5
Oct										
4	2448	KO	6.4	-18 49	D	-	-	-	-	-
5	2591	KO	6.5	-20 20	D	168	21	45.5		
5	2591	KO	6.5	-20 20	R	186	21	56.4		Graze
6	2757	AO	5.1	-20 43	D	-	-	-	-	-
6	2760*	Oe5	6.7	-20 30	D	98	22	39.6	-1.1	+0.8

Date	Z.C.	Johannesburg					Luanshya				
		P.A.	h.	m.	a	b	P.A.	h.	m.	a	b
Jun											
24	3463	-	0	-	-	-	-	02	56.4	-1.0	-1.8
25	49	-	-	-	-	-	216				
28	464	-	-	-	-	-	-	-	-	-	-
Jul											
5	1459	-	-	-	-	-	-	01	53.4	-1.0	-1.3
14	2352	-	-	-	-	-	132				
18	3079	-	-	-	-	-	227	20	12.7	-0.8	+1.2
20	3268	190	02	40.1	-0.7	+4.4	238	03	14.7	-2.2	+1.6
21	3421	244	05	04.4	-1.8	+1.5	284	05	14.3	-3.2	-0.5
23	150	-	-	-	-	-	205	02	14.2	-0.9	+2.4
Aug											
7	2048	75	20	40.8	-1.8	+1.8	-	-	-	-	-
12	2571	65	02	00.6	0.0	+1.6	-	-	-	-	-
12	2710	-	-	-	-	-	-	-	-	-	-
13	2734	118	01	51.3	-1.2	-0.2	75	01	57.4	-0.6	+1.0
13	2886	100	23	44.0	-2.5	-0.1	54	23	57.1	-2.0	+2.0
14	3017	99	19	14.2	-0.9	-1.2	51	19	13.4	-1.5	+1.2
20	249	254	02	44.6	-2.2	+0.3	-	-	-	-	-
21	401	-	-	-	-	-	-	-	-	-	-
23	684	-	-	-	-	-	-	-	-	-	-
Sep											
4	2113	123	20	12.9	-1.1	-0.4	74	20	18.2	-1.0	+1.4
5	2231	-	-	-	-	-	116	21	16.7	-1.0	-0.6
7	2497	141	20	39.1	-2.4	-2.5	89	20	29.8	-2.5	+0.4
8	2639	113	19	39.2	-2.7	-1.1	64	19	43.3	-3.1	+1.8
8	2638	-	-	-	-	-	146	19	59.9	-	-
8	2642	-	-	-	-	-	97	20	38.9	-2.9	-0.1
10	2963	-	-	-	-	-	119	23	48.9	-2.8	-1.3
11	2981	-	-	-	-	-	-	-	-	-	-
16	192	261	02	34.6	-2.4	+0.6	-	-	-	-	-
18	464	253	01	38.5	-1.9	+0.1	302	01	28.2	-	-
19	620	301	04	01.0	-3.7	-2.0	-	-	-	-	-
Oct											
4	2448	137	19	01.6	-2.2	-1.8	86	18	56.6	-2.1	+0.6
5	2591	135	21	43.7	-1.4	-1.1	87	21	43.0	-0.7	+0.6
5	2591	-	-	-	-	-	-	-	-	-	-
6	2757	140	22	41.0	-1.8	-1.7	89	22	38.2	-0.7	+0.5
6	2760	87	22	54.2	-0.5	+1.0	45	23	12.2	+0.2	+1.9

Date	Z.C.	Sp	Mag	(1950.0) Dec.	Ph	Cape Town				
						P.A.	h.	m.	a	b
<b>Oct</b>										
7	2908	F0	6.9	-19° 26'	D	31°	22	57.2	-0.3	+3.2
8	3038 *	G5	6.7	-18 23	D	-	-	-	-	-
8	3041	K0	6.4	-18 13	D	147	20	16.3	-	-
10	3347	F0	6.2	-10 49	D	-	-	-	-	-
12	3526 *	K0	5.1	- 3 50	D	68	04	33.5	-0.3	+1.5
17	718	K0	6.1	+18 39	R	191	02	21.3	-	-
18	881 *	B9	5.9	+20 51	R	221	04	31.3	-1.9	+1.5
22	1395	K0	6.3	+16 48	R	-	-	-	-	-
30	2280 *	MO	6.8	-15 53	D	-	-	-	-	-
<b>Nov</b>										
2	2697	A5	6.5	-20 53	D	-	-	-	-	-
2	2708	G5	5.9	-21 06	D	-	-	-	-	-
4	2993 *	A3	6.6	-18 45	D	-	-	-	-	-
4	2994 *	A2	6.1	-18 45	D	-	-	-	-	-
8	3449	K2	7.3	- 6 53	D	27	00	23.6	-0.5	+2.6
8	3463	K0	6.4	- 6 34	D	69	02	25.0	-0.2	+1.5
8	37	K2	7.5	- 2 18	D	24	21	41.5	-1.0	+2.3
9	170	K0	6.2	+ 2 11	D	-	-	-	-	-
9	192	A2	5.3	+ 3 21	D	71	23	18.5	-2.0	+0.8
10	327	G5	4.5	+ 8 37	D	20	22	14.5	-0.7	+2.0
14	793 *	K0	6.2	+20 05	R	-	-	-	-	-
29	2666 *	KO, AO	5.0	-20 34	D	56	20	08.7	+0.2	+2.0
30	2829	K0	6.9	-20 44	D	115	20	47.4	-0.6	+0.4
<b>Dec</b>										
1	2963 *	K0	5.5	-19 17	D	66	21	00.6	-0.3	+1.7
2	3118	K0	6.9	-16 23	D	22	23	11.0	+0.6	+2.6
3	3237	B8	4.4	-14 07	D	-	-	-	-	-
3	3245	F5	6.9	-13 33	D	-	-	-	-	-
6	128	G5	7.3	+ 1 31	D	43	23	52.5	-0.9	+2.1
8	401 *	AO	6.3	+10 32	D	-	-	-	-	-
13	1047 *	AO	5.2	+21 49	R	-	-	-	-	-
14	1298 *	G5	6.5	+19 51	R	-	-	-	-	-
14	1299 #	A2	6.3	+19 43	R	-	-	-	-	-
22	2049	GO	6.5	- 7 19	R	299	04	16.2	-0.4	-1.8
29	Saturn		0.9	-18 34	D	105	15	26.1	-2.7	-0.7
29	Saturn		0.9	-18 34	R	218	16	36.9	-1.2	+2.8
29	3071	K0	6.5	-17 44	D	83	20	42.5	-0.2	+1.2
31	3347	F0	6.2	-10 49	D	-	-	-	-	-
31	3355	F8	6.8	-10 19	D	63	21	14.2	-0.5	+1.7

# in Praesepe

Date	Z.C.	Johannesburg					Luanshya				
		P.A.	h.	m.	a	b	P.A.	h.	m.	a	b
Oct											
7	2908	16°	23	22.7	+0.7	+3.9	- °	-	-	-	-
8	3038	-	-	-	-	-	86	19	43.5	-3.0	+0.2
8	3041	.115	20	24.5	-3.2	-1.4	67	20	26.9	-2.6	+1.3
10	3347	-	-	-	-	-	87	21	46.1	-3.0	+0.2
12	3526	-	-	-	-	-					
17	718	203	02	50.8	-1.4	+2.7	244	03	15.6	-2.7	+1.1
18	881	-	-	-	-	-	-	-	-	-	-
22	1395	-	-	-	-	-	213	03	24.1	-	-
30	2280	-	-	-	-	-	126	18	31.9	-0.8	-0.9
Nov											
2	2697	-	-	-	-	-	32	18	49.1	-0.7	+3.8
2	2708	-	-	-	-	-	114	20	36.2	-1.1	-0.5
4	2993	6	20	10.6	-	-	-	-	-	-	-
4	2994	5	20	11.9	-	-	-	-	-	-	-
8	3449	18	00	47.0	-0.1	+2.9	-	-	-	-	-
8	3463	--	-	-	-	-	-	-	-	-	-
8	37	19	22	11.5	-0.9	+2.9	-	-	-	-	-
9	170	-	-	-	-	-	32	19	01.0	-0.9	+1.9
9	192	68	23	45.8	-1.9	+1.3	33	24	09.6	-1.4	+2.4
10	327	14	22	40.1	-0.7	+2.9	-	-	-	-	-
14	793	-	-	-	-	-	233	03	39.0	-2.6	+1.9
29	2666	-	-	-	-	-	-	-	-	-	-
30	2829	-	-	-	-	-	-	-	-	-	-
Dec											
1	2963	58	21	14.4	+0.1	+1.6	-	-	-	-	-
2	3118	-	-	-	-	-	-	-	-	-	-
3	3237	-	-	-	-	-	31	19	00.8	-1.2	+2.8
3	3245	13	20	39.7	0.0	+3.5	-	-	-	-	-
6	128	33	24	17.0	-0.6	+2.4	-	-	-	-	-
8	401	101	19	39.5	-2.5	-1.2	59	19	39.8	-1.7	+1.0
13	1047	228	03	13.7	-2.9	+2.4	271	03	31.4	-2.4	+0.3
14	1298	282	23	19.7	-1.2	-1.2	329	22	54.4	-2.0	-3.6
14	1299	254	23	21.9	-1.0	-0.4	293	23	11.8	-1.4	-1.3
22	2049	325	04	03.6	-0.3	-2.5	-	-	-	-	-
29	Saturn	90	15	50.8	-2.5	+0.5	48	16	08.7	-1.7	+2.2
29	Saturn	228	17	07.2	-1.0	+2.3	267	17	26.3	-1.7	+0.6
29	3071	-	-	-	-	-	-	-	-	-	-
31	3347	-	-	-	-	-	9	19	44.7	+0.2	+3.7
31	3355	54	21	30.4	-0.1	+1.7	-	-	-	-	-

## THE PLANETS

The chart ( frontispiece ) shows the S.A.S.T. of the rising and setting of the Sun and the planets for position 30°S, 30°E. 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 in latitude will, in general, be sufficiently small to be ignored, and in no case will it exceed 15 minutes.

Mercury will be best seen just after sunset near the times of greatest eastern elongation in January, May, and August/September, and just before sunrise in February/March, June/July, and October.

Venus can be seen in the evening from February to the beginning of November, when it is at inferior conjunction. Greatest brilliancy is attained during the first half of October, and again in December, when Venus can be observed before sunrise.

Mars is close to the Sun at the beginning of the year, and can be observed in the morning hours until November, after which it rises in the late evening. Its western elongation increases steadily from 4° on January 1 to 134° on December 31.

Jupiter is an evening object during January; after conjunction in February it becomes a morning object in March, and rises progressively earlier each morning until the end of May, when it rises at midnight; thereafter, Jupiter rises during the evening, and is visible in the evening sky until December, when it sets at 22.30 S.A.S.T.

Saturn precedes Jupiter throughout the year, their separation varying from 10° in January to 30° in December.

Uranus and Neptune are not readily visible to the naked eye but are easy telescopic objects, and can be found by means of the following ephemeris.

Ephemeris for Uranus and Neptune 1962

	Uranus				Neptune			
	R.A.	Decl.	R.A.	Decl.				
Jan 1	10 <sup>h</sup> 10 <sup>m</sup> .4.	+ 12° 07'	14 <sup>h</sup> 44 <sup>m</sup> .2	- 14° 04'				
21	10 08.1	+ 12 20	14 45.7	- 14 10				
Feb 10	10 05.0	+ 12 37	14 46.3	- 14 11				
Mar 2	10 01.7	+ 12 55	14 46.1	- 14 09				
22	9 58.7.	+ 13 11	14 45.0	- 14 03				
Apr 11	9 56.5	+ 13 22	14 43.3	- 13 55				
May 1	9 55.6	+ 13 26	14 41.3	- 13 45				
21	9 56.0	+ 13 23	14 39.2	- 13 35				
Jun 10	9 57.8	+ 13 13	14 37.3	- 13 27				
30	10 00.8	+ 12 56	14 36.1	- 13 22				
Jul 20	10 04.7	+ 12 35	14 35.5	- 13 21				
Aug 9	10 09.1	+ 12 10	14 35.7	- 13 23				
29	10 13.9	+ 11 44	14 36.8	- 13 29				
Sep 18	10 18.6	+ 11 17	14 38.6	- 13 39				
Oct 8	10 22.8	+ 10 54	14 41.1	- 13 51				
28	10 26.2	+ 10 35	14 43.9	- 14 04				
Nov 17	10 28.6	+ 10 22	14 46.8	- 14 18				
Dec 7	10 29.6	+ 10 17	14 50.9	- 14 35				
27	10 29.2	+ 10 20	14 52.0	- 14 40				

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

## METEOR CALENDAR 1962

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	Unfavourable	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	Unfavourable	Ecliptical	
02h30m - 04h30m	Unfavourable	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	

## METEOR CALENDAR 1962

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

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

## ASTRONOMICAL DIARY

JANUARY 1962

The Earth is at perihelion on January 2 when its distance from the Sun is 0.9833 astronomical units.

d. h.

Jan	7 18	Mercury $1^{\circ}.7$ S of Saturn.
	16 19	Aldebaran $0^{\circ}.6$ S of Moon.
	16 19	Mercury $0^{\circ}.4$ S of Jupiter.
	21 02	Mercury greatest elongation East ( $19^{\circ}$ ), magnitude -0.3.
	22 20	Saturn in conjunction with the Sun.
	23 06	Regulus $0^{\circ}.6$ S of Moon.
	27 12	Venus in superior conjunction.

FEBRUARY 1962

At the beginning of the month all the bright planets and the Moon will be close to the Sun.

d. h.

Feb	7 01	Mars $0^{\circ}.7$ S of Saturn.
	8 20	Jupiter in conjunction with the Sun.
	13 00	Aldebaran $0^{\circ}.5$ S of Moon.
	17 18	Uranus at opposition, ( magnitude 5.7 ).
	28 00	Pluto at opposition, ( magnitude 15 ).

MARCH 1962

d. h.

Mar	3 07	Mercury at greatest elongation West ( $27^{\circ}$ ), ( magnitude +0.4 ).
	5 04	Mars $0^{\circ}.5$ S of Moon.

	d. h.	
Mar	5 05	Jupiter $0^{\circ}.1$ S of Moon.
	6 16	Mars $0^{\circ}.4$ S of Jupiter.
	13 06	Mercury $1^{\circ}.0$ S of Jupiter.
	18 19	Regulus $0^{\circ}.6$ S of Moon.
	21 04	Equinox.
	24 21	Neptune $3^{\circ}$ S of Moon.

APRIL 1962

	d. h.	
Apr	2 01	Jupiter $0^{\circ}.5$ N of Moon.
	8 16	Aldebaran $0^{\circ}.8$ S of Moon.
	14 20	Uranus $0^{\circ}.2$ S of Moon.
	15 01	Regulus $0^{\circ}.8$ S of Moon.
	21 02	Neptune $3^{\circ}$ S of Moon.
	27 23	Saturn $0^{\circ}.8$ S of Moon.

MAY 1962

	d. h.	
May	3 03	Neptune at opposition, ( magnitude 7.7 ).
	6 20	Venus $6^{\circ}$ N of Aldebaran.
	14 00	Mercury at greatest elongation East, ( $22^{\circ}$ ), ( magnitude + 0.6 ).
	25 05	Saturn $0^{\circ}.6$ S of Moon.
	27 06	Jupiter $2^{\circ}$ N of Moon.

JUNE 1962

	d. h.	
Jun	11 21	Venus $5^{\circ}$ S of Pollux.
	21 23	Solstice.
	30 08	Mercury $0^{\circ}.8$ N of Moon. Occultation visible in South Africa.

JULY 1962

The Earth is at aphelion on July 4 when its distance from the Sun is 1.0167 astronomical units.

d. h.

Jul	1	14	Mercury at greatest elongation West, ( $22^{\circ}$ ), ( magnitude + 0.7 ).
	11	22	Neptune $4^{\circ}$ S of Moon.
	20	20	Jupiter $2^{\circ}$ N of Moon.
	27	02	Aldebaran $0^{\circ}.9$ S of Moon.
	27	06	Mars $4^{\circ}$ N of Moon.
	31	14	Annular eclipse of the Sun, visible in Southern Africa as a partial eclipse.
	31	21	Saturn at opposition, ( magnitude + 0.4 ).

AUGUST 1962

d. h.

Aug	14	21	Saturn $0^{\circ}.9$ S of Moon.
	15	22	Penumbral eclipse of Moon, visible in Southern Africa.
	17	01	Jupiter $1^{\circ}$ N of Moon.
	24	16	Uranus in conjunction with the Sun.
	31	17	Jupiter at opposition, ( magnitude - 2.4 ).

SEPTEMBER 1962

d. h.

Sep	2	22	Pluto in conjunction with the Sun.
	3	21	Venus at greatest elongation East, ( $46^{\circ}$ ).
	11	01	Mercury at greatest elongation East, ( $27^{\circ}$ ), ( magnitude + 0.4 ).
	11	05	Saturn $1^{\circ}$ S of Moon.
	13	06	Jupiter $1^{\circ}$ N of Moon.
	22	20	Venus $6^{\circ}$ S of Neptune.
	23	15	Equinox.

## OCTOBER 1962

	d. h.	
Oct	9 00	Venus at greatest brilliancy, ( magnitude - 4.3 ).
	21 03	Mars 1° N of Moon.
	22 06	Mercury at greatest elongation West, ( 18° ), ( magnitude - 0.3 ).

## NOVEMBER 1962

	d. h.	
Nov	4 21	Saturn 0°.6 S of Moon.
	6 05	Neptune in conjunction with the Sun.
	6 20	Jupiter 1° N of Moon.
	12 22	Venus in inferior conjunction.

## DECEMBER 1962

	d. h.	
Dec	19 02	Venus at greatest brilliancy, ( magnitude - 4.4 ).
	22 10	Solstice.
	27 11	Mars stationary.
	29 16	Saturn 0°.2 N of Moon. Occultation visible in Southern Africa.

## BRIGHT VARIABLE STARS

Name	Position R.A.		(1950)		Range	Period Days	Expected Maxima 1962	
			Dec.					
o Ceti (Mira)	02	<sup>h</sup> 16 <sup>m</sup> .8	- 3° 12'		2.6-9.4	331	May 16	
R Doradus	04	36.2	-60 11		5.3-6.4	Irr.	.....	
R Pictoris	04	44.8	-49 20		6.9-9.2	172?	Apr 9, Sep 28	
L2 Puppis	07	12.0	-44 33		3.1-6.3	140?	Jan 8, Apr 28, Oct 15	
R Carinae	09	31.0	-62 34		4.5-9.4	309	Oct 7	
S Carinae	10	07.8	-61 18		5.7-8.3	149	Apr 8, Sep 4	
R Hydrae	13	27.0	-23 01		4.7-9.6	386	Mar 26	
T Centauri	13	38.9	-33 21		6.0-8.2	90	Mar 6, Jun 5, Sep 4, Dec 4	
R Centauri	14	12.9	-59 41		5.7-12.0	547	Oct 23	
R Aquarii	23	41.2	-15 34		6.7-11.6	387	Mar 11	

## SOUTH AFRICAN OBSERVATORIES

Name	Place	E. Long.	S. Lat.	Alt.	Director
		1h+		ft	
Republic	Johannesburg	52m 18s.0	26°10'55".3	5925	
Republic Annexe	Hartebeespoort	51m 30s	25°46'22"	4002	
Royal Observatory	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	H. Haffner
Leiden	Hartebeespoort	51m 30s	25°46'22"	4002	P. Th. Walraven
People's	Port Elizabeth	42m 19s.2	33°57'14".5	330	P. E. Centre
Lamont-Hussey	Bloemfontein	44m 56s.8	29°05'46".1	4825	No resident director
Smithsonian Satellite-Tracking Station	Olifantsfontein	52m 59s.6	25°57'33".9	5066	R. Citron
Radio Space Research Station	Krugersdorp	48m 16s.3	25°53'14".5	4515	D. Hogg
E.S.O. Station	Zeekoeagat	29m 52s	33°04'	3200	Mme M. Duflot
W. Bell	Johannesburg	52m 05s.8	26°08'10".6	5210	
J. H. Botham	Johannesburg	52m 17s.3	26°11'23".3	5605	
N. M. Hoogenhout	Pretoria	52m 58s.6	25°46'46"	4725	
J. L. Jooste	Pretoria	52m 47s.2	25°45'14"	4359	
G. F. G. Knipe	Johannesburg	52m 11s.6	26°11'18".3	5915	
H. C. Lagerweij	Johannesburg	52m 20s.2	26°08'37".2	5487	
M. D. Overbeek	Germiston	52m 33s.7	26°11'42"	5605	
S. C. Venter	Pretoria	52m 46s.9	25°40'14".8	4050	
C. N. Williams	Johannesburg	52m 28s.4	26°12' 00"	5590	
L. L. van Zyl	Boksburg	52m 58s.9	26°12'05"	5429	

PAST PRESIDENTS

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

HONORARY MEMBERS

Dr. R. O. Redman	Dr. W. H. van den Bos	Dr. J. H. Oort
Dr. R. v. d. R. Woolley	Dr. J. Schilt	Dr. H. Shapley
Dr. H. Haffner	Dr. H. Knox Shaw	Mr. D. G. McIntyre
	Dr. H. L. Alden	

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

## 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:—

### Variable Stars:

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

### Nova Search Section:

Dr. R. A. Pelletier, P.O. Box 1167, Johannesburg.

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 : Dr. A. W. J. Cousins.  
Vice-Chairman : Mr. H. E. Krumm.  
Hon. Secretary : Mr. N. Saville.  
Hon. Treasurer : Mr. I. Rodger.  
Hon. Auditor : Mr. A. Menzies.  
Council Representative : Mr. W. C. Bentley.  
Members of Committee : Messrs. J. Bondietti, T. W. Russo, J. Simenhoff and P. Smits.

Meetings in winter on 2nd Wednesday of month at the Royal Observatory.

**Secretarial address, c/o The Royal Observatory, Observatory, Cape.**

### TRANSVAAL CENTRE:

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Curator of Instruments : Dr. P. Kirchhoff.  
Pretoria Representative : Mr. J. C. Bennett.  
Council Representative : Mr. H. C. Lagerweij.  
Centre Representative at Republic Observatory : Mr. G. F. C. Knipe.  
Members of Committee : Messrs. J. C. Bennett, N. Malan, B. J. C. Maurick, Dr. M. W. Feast and Rev. L. B. Malan.

Observing and lecture meetings in alternate months.

**Secretarial address, c/o Republic Observatory, Gill Street, Observatory, Johannesburg.**

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Hon. Secretary : Mr. D. McLuckie.  
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**Secretarial address, 8, Seventh Avenue, Newton Park, Port Elizabeth.**

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

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**Secretarial address, Ansell May Hall, Howard College, University of Natal, Durban.**