

THE
ASTRONOMICAL SOCIETY
OF
SOUTHERN AFRICA

HANDBOOK FOR
1961

THE ASTRONOMICAL SOCIETY OF SOUTHERN AFRICA

1960 - 1961

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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). Particulars of the annual subscription and entrance fee payable by members of the Society are obtainable from the Honorary Treasurer.

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, Leeuwental 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 1961

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.

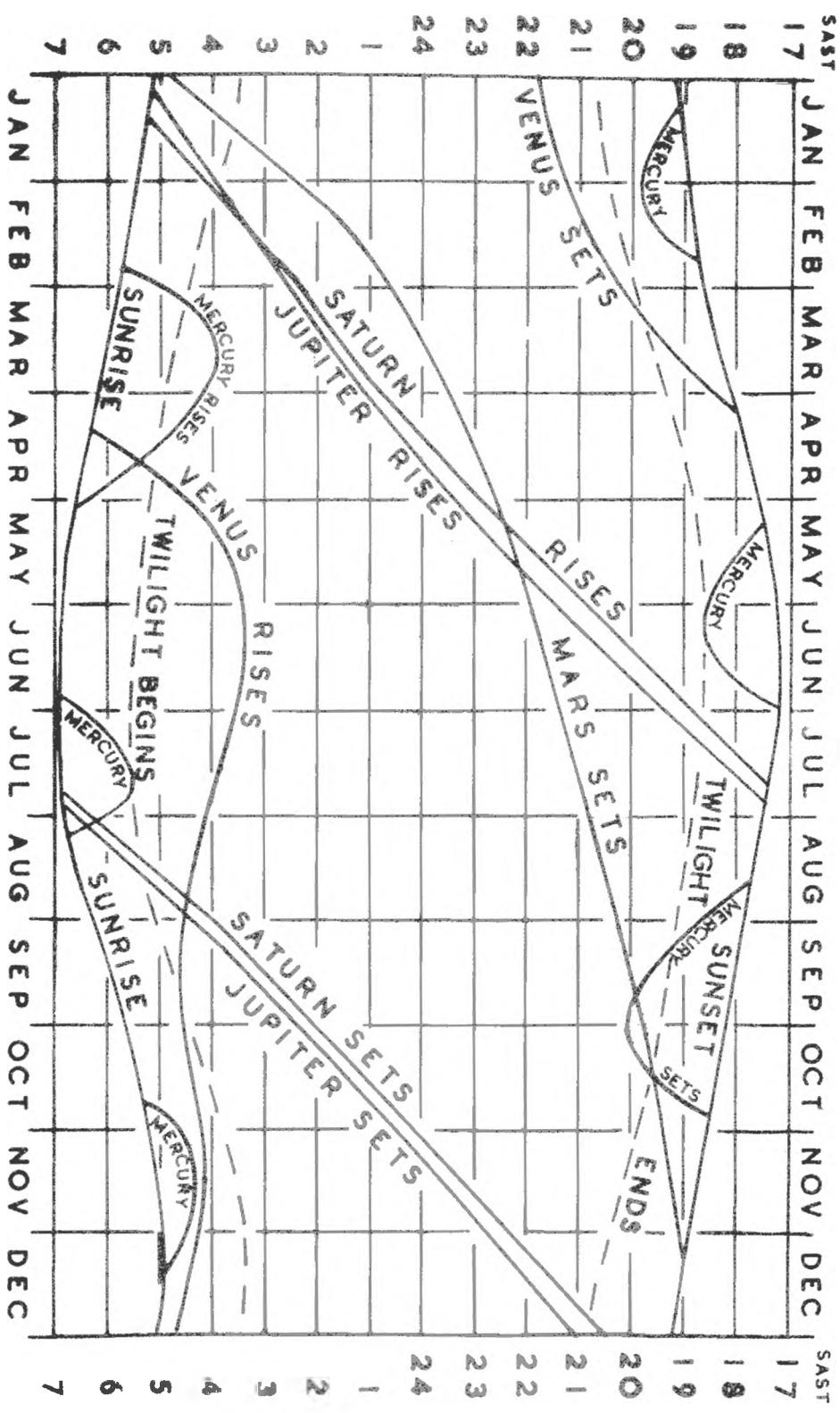
Nominations for Officers and Council by June 15.

Subscriptions due July 1.

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

THE PLANETS AS SEEN FROM SOUTH AFRICA

1961



LATITUDE 30°SOUTH

LONGITUDE 30°EAST

THE
HANDBOOK
OF THE
ASTRONOMICAL SOCIETY OF SOUTHERN AFRICA

1961

Computed and Prepared

by

The computing Section of the Transvaal Centre
and the Editorial board of MASST

Cape Town 1961

Price to Non-members : Two shillings

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Grateful acknowledgement is made to H. M. Nautical Almanac Office for the data included in the table of Occultations of Bright Stars.

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° , 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 Belgian Congo.

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 1961 November 1; is 12.03 S.A.S.T., found by applying the longitude correction of +18m to the tabulated value for 30° E, 30° 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 ^h .00 ^m S.A.S.T. on October 18	01 ^h 45 ^m
S.A.S.T. elapsed	20 15
	22 00
Correction for longitude	-18
Interval correction	+ 3
Required Sidereal Time.	21 45

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. For example, the co-ordinates of the radiants in the Meteor Calendar are expressed in this way.

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 1961	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.
January	1	2,437,301.0	12	03	34
"	11	311.0	12	07	57
"	21	321.0	12	11	22
"	31	331.0	12	13	31
February	10	341.0	12	14	19
"	20	351.0	12	13	51
March	2	361.0	12	12	16
"	12	371.0	12	09	53
"	22	381.0	12	07	01
April	1	2,437,391.0	12	03	59
"	11	401.0	12	01	07
"	21	411.0	11	58	45
May	1	421.0	11	57	05
"	11	431.0	11	56	18
"	21	441.0	11	56	29
"	31	451.0	11	57	32
June	10	461.0	11	59	16
"	20	471.0	12	01	23
"	30	481.0	12	03	29
July	10	2,437,491.0	12	05	12
"	20	501.0	12	06	15
"	30	511.0	12	06	21
August	9	521.0	12	05	27
"	19	531.0	12	03	37
"	29	541.0	12	00	57
September	8	551.0	11	57	43
"	18	561.0	11	54	13
"	28	571.0	11	50	44
October	8	2,437,581.0	11	47	38
"	18	591.0	11	45	14
"	28	601.0	11	43	51
November	7	611.0	11	43	43
"	17	621.0	11	44	59
"	27	631.0	11	47	36
December	7	641.0	11	51	25
"	17	651.0	11	56	04
"	27	661.0	12	01	01

DATE	CAPE TOWN				DURBAN				BLOEMFONTEIN				
	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	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	05	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
Jan 1	05 18	19 04	05 44	18 38	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 1961

PERIGEE				APOGEE			
Date	S. D.	H. P.		Date	S. D.	H. P.	
Jan 17 ^d 01 ^h	16° 45"	61° 28"		Jan 3 ^d 15 ^h	14° 42"	53° 58"	
Feb 14 13	16 41	61 13		Jan 30 15	14 42	53 58	
Mar 14 20	16 29	60 29		Feb 26 23	14 43	54 02	
Apr 11 10	16 15	59 37		Mar 26 17	14 45	54 10	
May 6 14	16 10	59 20		Apr 23 12	14 47	54 15	
Jun 2 05	16 21	60 02		May 21 07	14 47	54 14	
Jun 30 03	16 34	60 49		Jun 18 00	14 45	54 07	
Jul 28 11	16 42	61 19		Jul 15 13	14 42	54 00	
Aug 25 21	16 43	61 22		Aug 11 19	14 42	53 57	
Sep 23 06	16 36	60 57		Sep 7 22	14 43	53 59	
Oct 21 09	16 23	60 09		Oct 5 10	14 44	54 06	
Nov 17 07	16 10	59 19		Nov 2 04	14 46	54 13	
Dec 12 02	16 13	59 32		Nov 30 00	14 47	54 15	
				Dec 27 21	14 46	54 10	

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 11 -8°0	Jul 22 -7°6	Jan 0 +6°5	Jul 9 +6°7				
23 +7.5	Aug 4 +7.5	14 -6.6	23 -6.8				
Feb 8 -7.5	19 -7.4	26 +6.8	Aug 5 +6.8				
20 +7.1	Sep 1 +7.8	Feb 10 -6.8	20 -6.8				
Mar 8 -6.4	16 -6.6	23 +6.8	Sep 1 +6.8				
21 +6.2	29 +7.4	9 -6.8	16 -6.8				
Apr 3 -5.4	Oct 13 -5.3	22 +6.8	28 +6.7				
18 +5.2	27 +6.4	Apr 5 -6.7	Oct 13 -6.6				
30 -5.5	Nov 7 -4.7	18 +6.7	26 +6.6				
May 15 +4.7	24 +5.4	May 2 -6.5	Nov 9 -6.6				
27 -6.2	Dec 6 -5.3	15 +6.5	22 +6.5				
Jun 10 +5.3	21 +5.1	30 -6.5	Dec 6 -6.6				
24 -7.1	32 -5.9	Jun 11 +6.5	19 +6.6				
Jul 7 +6.5		26 -6.6	32 -6.4				

MOONRISE AND MOONSET

1961 JANUARY

At 0 ^h S.A.S.T.			JOHANNESBURG				CAPE TOWN			
DAY	J.D. 2437000+	AGE	MOONRISE		MOONSET		MOONRISE		MOONSET	
			S.A.S.T.		S.A.S.T.		S.A.S.T.		S.A.S.T.	
S 1	300.4	13.5	18 ^h	26 ^m	4 ^h	51 ^m	19 ^h	32 ^m	5 ^h	17 ^m
M 2	301.4	14.5	19	13	5	40	20	17	6	05
T 3	302.4	15.5	19	57	6	29	20	59	6	55
W 4	303.4	16.5	20	40	7	20	21	38	7	47
T 5	304.4	17.5	21	20	8	11	22	14	8	41
F 6	305.4	18.5	21	59	9	02	22	48	9	35
S 7	306.4	19.5	22	37	9	53	23	22	10	28
S 8	307.4	20.5	23	15	10	45	23	54	11	24
M 9	308.4	21.5	23	52	11	38	.....	.....	12	19
T 10	309.4	22.5	.....		12	33	0	29	13	18
W 11	310.4	23.5	0	30	13	30	1	04	14	17
T 12	311.4	24.5	1	12	14	29	1	43	15	19
F 13	312.4	25.5	1	58	15	32	2	27	16	24
S 14	313.4	26.5	2	50	16	36	3	17	17	30
S 15	314.4	27.5	3	48	17	39	4	13	18	33
M 16	315.4	28.5	4	51	18	39	5	16	19	33
T 17	316.4	0.0	5	56	19	36	6	24	20	28
W 18	317.4	1.0	7	04	20	28	7	34	21	16
T 19	318.4	2.0	8	09	21	15	8	43	22	00
F 20	319.4	3.0	9	14	21	58	9	50	22	41
S 21	320.4	4.0	10	16	22	40	10	55	23	18
S 22	321.4	5.0	11	15	23	18	11	58	23	55
M 23	322.4	6.0	12	11	23	59	12	57	.....	.....
T 24	323.4	7.0	13	07	.....	.....	13	56	0	31
W 25	324.4	8.0	14	01	0	40	14	52	1	09
T 26	325.4	9.0	14	54	1	21	15	46	1	48
F 27	326.4	10.0	15	45	2	03	16	38	2	30
S 28	327.4	11.0	16	34	2	49	17	28	3	14
S 29	328.4	12.0	17	21	3	36	18	15	4	02
M 30	329.4	13.0	18	05	4	25	18	58	4	52
T 31	330.4	14.0	18	47	5	16	19	38	5	42

PHASES OF THE MOON

Full Moon	Jan 2 ^d	01 ^h	06 ^m
Last Quarter	10	05	03
New Moon	16	23	30
First Quarter	23	18	14
Full Moon	31	20	47

MOONRISE AND MOONSET

1961 FEBRUARY

At 0^h S.A.S.T.

JOHANNESBURG

CAPE TOWN

DAY	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	331.4	15.0	19 ^h 26 ^m	6 ^h 06 ^m	20 ^h 15 ^m	6 ^h 36 ^m
T 2	332.4	16.0	20 04	6 58	20 50	7 30
F 3	333.4	17.0	20 41	7 50	21 24	8 23
S 4	334.4	18.0	21 16	8 41	21 57	9 18
S 5	335.4	19.0	21 53	9 34	22 30	10 13
M 6	336.4	20.0	22 30	10 27	23 04	11 10
T 7	337.4	21.0	23 09	11 21	23 41	12 07
W 8	338.4	22.0	23 52	12 18	.....	13 08
T 9	339.4	23.0	.....	13 17	0 22	14 09
F 10	340.4	24.0	0 39	14 19	1 07	15 11
S 11	341.4	25.0	1 31	15 19	1 58	16 13
S 12	342.4	26.0	2 29	16 19	2 55	17 13
M 13	343.4	27.0	3 32	17 17	3 59	18 10
T 14	344.4	28.0	4 38	18 11	5 06	19 01
W 15	345.4	29.0	5 45	19 02	6 17	19 49
T 16	346.4	0.6	6 52	19 48	7 27	20 32
F 17	347.4	1.6	7 57	20 32	8 34	21 12
S 18	348.4	2.6	8 59	21 14	9 40	21 51
S 19	349.4	3.6	9 59	21 55	10 43	22 28
M 20	350.4	4.6	10 57	22 36	11 44	23 06
T 21	351.4	5.6	11 52	23 17	12 43	23 46
W 22	352.4	6.6	12 46	.....	13 39	.....
T 23	353.4	7.6	13 40	0 01	14 33	0 28
F 24	354.4	8.6	14 30	0 45	15 23	1 11
S 25	355.4	9.6	15 17	1 32	16 11	1 58
S 26	356.4	10.6	16 02	2 20	16 56	2 47
M 27	357.4	11.6	16 45	3 11	17 37	3 37
T 28	358.4	12.6	17 26	4 01	18 15	4 30

PHASES OF THE MOON

Last Quarter	Feb 8 ^d	18 ^h	50 ^m
New Moon	15	10	11
First Quarter	22	10	35

MOONRISE AND MOONSET

1961 MARCH

At 0 ^h S.A.S.T.			JOHANNESBURG				CAPE TOWN			
DAY	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.
W 1	359.4	13.6	18 ^h 04 ^m	4 ^h 53 ^m	18 ^h 51 ^m				5 ^h 23 ^m	
T 2	360.4	14.6	18 41	5 45	19 26				6 17	
F 3	361.4	15.6	19 17	6 37	19 59				7 13	
S 4	362.4	16.6	19 53	7 29	20 32				8 08	
S 5	363.4	17.6	20 31	8 22	21 06				9 05	
M 6	364.4	18.6	21 10	9 17	21 42				10 02	
T 7	365.4	19.6	21 51	10 13	22 21				11 01	
W 8	366.4	20.6	22 35	11 11	23 04				12 02	
T 9	367.4	21.6	23 25	12 09	23 52				13 02	
F 10	368.4	22.6	.....	13 09	.....				14 02	
S 11	369.4	23.6	0 18	14 07	0 45				15 01	
S 12	370.4	24.6	1 17	15 04	1 43				15 57	
M 13	371.4	25.6	2 20	15 58	2 47				16 49	
T 14	372.4	26.6	3 25	16 49	3 54				17 37	
W 15	373.4	27.6	4 30	17 35	5 02				18 21	
T 16	374.4	28.6	5 35	18 20	6 10				19 03	
F 17	375.4	0.1	6 38	19 03	7 17				19 42	
S 18	376.4	1.1	7 41	19 45	8 23				20 21	
S 19	377.4	2.1	8 40	20 27	9 26				21 00	
M 20	378.4	3.1	9 39	21 10	10 28				21 40	
T 21	379.4	4.1	10 36	21 54	11 27				22 22	
W 22	380.4	5.1	11 30	22 39	12 23				23 05	
T 23	381.4	6.1	12 23	23 26	13 16				23 52	
F 24	382.4	7.1	13 12	.....	14 06				.....
S 25	383.4	8.1	13 58	0 14	14 52				0 40	
S 26	384.4	9.1	14 41	1 04	15 34				1 30	
M 27	385.4	10.1	15 23	1 55	16 14				2 22	
T 28	386.4	11.1	16 02	2 46	16 50				3 15	
W 29	387.4	12.1	16 40	3 37	17 25				4 09	
T 30	388.4	13.1	17 17	4 29	17 59				5 04	
F 31	389.4	14.1	17 53	5 22	18 32				6 00	

PHASES OF THE MOON

Full Moon	Mar 2 ^d	15 ^h 35 ^m
Last Quarter	10	04 58
New Moon	16	20 51
First Quarter	24	04 49

MOONRISE AND MOONSET

1961 APRIL

At 0^h S.A.S.T.

JOHANNESBURG

CAPE TOWN

DAY	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	390.4	15.1	18 ^h 29 ^m	6 ^h 16 ^m	19 ^h 07 ^m	6 ^h 57 ^m
S 2	391.4	16.1	19 09	7 11	19 42	7 56
M 3	392.4	17.1	19 50	8 08	20 20	8 55
T 4	393.4	18.1	20 33	9 05	21 02	9 56
W 5	394.4	19.1	21 22	10 04	21 49	10 56
T 6	395.4	20.1	22 14	11 04	22 40	11 57
F 7	396.4	21.1	23 10	12 03	23 36	12 56
S 8	397.4	22.1	.....	12 58	.....	13 52
S 9	398.4	23.1	0 11	13 52	0 37	14 45
M 10	399.4	24.1	1 13	14 42	1 42	15 32
T 11	400.4	25.1	2 16	15 28	2 47	16 16
W 12	401.4	26.1	3 19	16 13	3 53	16 57
T 13	402.4	27.1	4 21	16 55	4 58	17 36
F 14	403.4	28.1	5 23	17 37	6 04	18 15
S 15	404.4	29.1	6 24	18 19	7 08	18 53
S 16	405.4	0.7	7 23	19 01	8 11	19 32
M 17	406.4	1.7	8 21	19 44	9 12	20 14
T 18	407.4	2.7	9 17	20 30	10 10	20 57
W 19	408.4	3.7	10 12	21 18	11 06	21 43
T 20	409.4	4.7	11 04	22 06	11 58	22 31
F 21	410.4	5.7	11 52	22 56	12 47	23 21
S 22	411.4	6.7	12 37	23 46	13 30	.....
S 23	412.4	7.7	13 19	.....	14 11	0 12
M 24	413.4	8.7	13 59	0 36	14 49	1 05
T 25	414.4	9.7	14 38	1 28	15 24	1 59
W 26	415.4	10.7	15 14	2 20	15 58	2 53
T 27	416.4	11.7	15 50	3 12	16 31	3 49
F 28	417.4	12.7	16 27	4 05	17 05	4 45
S 29	418.4	13.7	17 05	5 01	17 40	5 44
S 30	419.4	14.7	17 45	5 57	18 17	6 43

PHASES OF THE MOON

Full Moon	Apr 1 ^d	07 ^h	48 ^m
Last Quarter	8	12	16
New Moon	15	07	38
First Quarter	22	23	50
Full Moon	30	20	41

MOONRISE AND MOONSET

1961 MAY

At 0 ^h S.A.S.T.			JOHANNESBURG				CAPE TOWN			
DAY	J.D. 2437000+	AGE	MOONRISE		MOONSET		MOONRISE		MOONSET	
			S.A.S.T.		S.A.S.T.		S.A.S.T.		S.A.S.T.	
M 1	420.4	15.7	18 ^h	29 ^m	6 ^h	56 ^m	18 ^h	59 ^m	7 ^h	45 ^m
T 2	421.4	16.7	19	17	7	56	19	44	8	47
W 3	422.4	17.7	20	09	8	56	20	35	9	50
T 4	423.4	18.7	21	05	9	57	21	30	10	51
F 5	424.4	19.7	22	05	10	55	22	31	11	49
S 6	425.4	20.7	23	07	11	49	23	34	12	43
S 7	426.4	21.7	.....		12	41	.....		13	31
M 8	427.4	22.7	0	09	13	27	0	38	14	16
T 9	428.4	23.7	1	11	14	11	1	44	14	56
W 10	429.4	24.7	2	12	14	53	2	48	15	35
T 11	430.4	25.7	3	12	15	34	3	52	16	12
F 12	431.4	26.7	4	12	16	15	4	55	16	49
S 13	432.4	27.7	5	10	16	56	5	57	17	27
S 14	433.4	28.7	6	08	17	38	6	58	18	08
M 15	434.4	0.2	7	05	18	22	7	57	18	49
T 16	435.4	1.2	8	01	19	08	8	54	19	34
W 17	436.4	2.2	8	55	19	57	9	49	20	22
T 18	437.4	3.2	9	45	20	47	10	39	21	12
F 19	438.4	4.2	10	32	21	36	11	26	22	03
S 20	439.4	5.2	11	15	22	28	12	08	22	55
S 21	440.4	6.2	11	57	23	20	12	47	23	49
M 22	441.4	7.2	12	35	.....		13	23	.....
T 23	442.4	8.2	13	11	0	10	13	57	0	43
W 24	443.4	9.2	13	47	1	02	14	30	1	37
T 25	444.4	10.2	14	23	1	55	15	02	2	33
F 26	445.4	11.2	15	00	2	47	15	37	3	29
S 27	446.4	12.2	15	39	3	43	16	12	4	28
S 28	447.4	13.2	16	20	4	41	16	51	5	29
M 29	448.4	14.2	17	07	5	41	17	36	6	31
T 30	449.4	15.2	17	58	6	43	18	25	7	36
W 31	450.4	16.2	18	54	7	45	19	19	8	40

PHASES OF THE MOON

Last Quarter	May 7 ^d	17 ^h	58 ^m
New Moon	14	18	55
First Quarter	22	18	19
Full Moon	30	06	38

MOONRISE AND MOONSET

1961 JUNE

At 0^h S.A.S.T.

JOHANNESBURG

CAPE TOWN

DAY	J.D. 2437000+	AGE	MOONRISE		MOONSET		MOONRISE		MOONSET	
			S.A.S.T.		S.A.S.T.		S.A.S.T.		S.A.S.T.	
T 1	451.4	17.2	19 ^h	55 ^m	8 ^h	46 ^m	20 ^h	20 ^m	9 ^h	41 ^m
F 2	452.4	18.2	20	58	9	44	21	25	10	38
S 3	453.4	19.2	22	02	10	38	22	30	11	30
S 4	454.4	20.2	23	05	11	27	23	36	12	16
M 5	455.4	21.2	.....		12	12	.....		12	58
T 6	456.4	22.2	0	06	12	54	0	41	13	38
W 7	457.4	23.2	1	07	13	35	1	45	14	14
T 8	458.4	24.2	2	05	14	15	2	48	14	51
F 9	459.4	25.2	3	03	14	55	3	48	15	27
S 10	460.4	26.2	4	00	15	36	4	49	16	06
S 11	461.4	27.2	4	57	16	18	5	48	16	46
M 12	462.4	28.2	5	53	17	03	6	45	17	29
T 13	463.4	29.2	6	46	17	50	7	41	18	15
W 14	464.4	0.7	7	38	18	40	8	32	19	04
T 15	465.4	1.7	8	27	19	29	9	21	19	55
F 16	466.4	2.7	9	12	20	21	10	05	20	47
S 17	467.4	3.7	9	54	21	12	10	45	21	40
S 18	468.4	4.7	10	33	22	03	11	23	22	34
M 19	469.4	5.7	11	10	22	54	11	57	23	27
T 20	470.4	6.7	11	46	23	45	12	30	.....
W 21	471.4	7.7	12	21	.....		13	02	0	22
T 22	472.4	8.7	12	57	0	37	13	35	1	16
F 23	473.4	9.7	13	34	1	30	14	08	2	13
S 24	474.4	10.7	14	13	2	25	14	45	3	11
S 25	475.4	11.7	14	56	3	24	15	26	4	13
M 26	476.4	12.7	15	45	4	24	16	12	5	16
T 27	477.4	13.7	16	39	5	27	17	05	6	20
W 28	478.4	14.7	17	38	6	29	18	03	7	24
T 29	479.4	15.7	18	42	7	30	19	08	8	25
F 30	480.4	16.7	19	48	8	28	20	15	9	21

PHASES OF THE MOON

Last Quarter	Jun 5 ^d	23 ^h	19 ^m
New Moon	13	07	17
First Quarter	21	11	02
Full Moon	28	14	38

MOONRISE AND MOONSET

1961 JULY

At 0 ^h S.A.S.T.			JOHANNESBURG				CAPE TOWN			
DAY	J.D. 2437000+	AGE	MOONRISE		MOONSET		MOONRISE		MOONSET	
			S.A.S.T.		S.A.S.T.		S.A.S.T.		S.A.S.T.	
S 1	481.4	17.7	20 ^h 54 ^m		9 ^h 21 ^m		21 ^h 24 ^m		10 ^h 11 ^m	
S 2	482.4	18.7	21 58		10 09		22 32		10 57	
M 3	483.4	19.7	23 00		10 54		23 37		11 38	
T 4	484.4	20.7	.....		11 36		.....		12 16	
W 5	485.4	21.7	0 00		12 16		0 41		12 53	
T 6	486.4	22.7	0 58		12 56		1 42		13 30	
F 7	487.4	23.7	1 56		13 36		2 43		14 07	
S 8	488.4	24.7	2 52		14 17		3 43		14 46	
S 9	489.4	25.7	3 47		15 01		4 40		15 28	
M 10	490.4	26.7	4 41		15 47		5 35		16 12	
T 11	491.4	27.7	5 34		16 35		6 28		16 59	
W 12	492.4	28.7	6 23		17 24		7 18		17 49	
T 13	493.4	0.1	7 09		18 15		8 03		18 41	
F 14	494.4	1.1	7 52		19 06		8 44		19 34	
S 15	495.4	2.1	8 33		19 57		9 23		20 27	
S 16	496.4	3.1	9 10		20 48		9 58		21 21	
M 17	497.4	4.1	9 46		21 39		10 32		22 14	
T 18	498.4	5.1	10 21		22 30		11 03		23 08	
W 19	499.4	6.1	10 56		23 22		11 35		.....
T 20	500.4	7.1	11 31		.....		12 08		0 03	
F 21	501.4	8.1	12 09		0 15		12 42		0 59	
S 22	502.4	9.1	12 49		1 10		13 20		1 57	
S 23	503.4	10.1	13 33		2 07		14 02		2 58	
M 24	504.4	11.1	14 23		3 07		14 50		4 00	
T 25	505.4	12.1	15 19		4 09		15 44		5 04	
W 26	506.4	13.1	16 20		5 11		16 46		6 06	
T 27	507.4	14.1	17 26		6 11		17 53		7 05	
F 28	508.4	15.1	18 33		7 07		19 02		7 59	
S 29	509.4	16.1	19 40		8 00		20 13		8 48	
S 30	510.4	17.1	20 46		8 47		21 21		9 33	
M 31	511.4	18.1	21 49		9 32		22 29		10 14	

PHASES OF THE MOON

Last Quarter	Jul 5 ^d	05 ^h 33 ^m
New Moon	12	21 12
First Quarter	21	01 14
Full Moon	27	21 51

MOONRISE AND MOONSET

1961 AUGUST

At 0 ^h S.A.S.T.			JOHANNESBURG				CAPE TOWN			
DAY	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	512.4	19.1	22 ^h 50 ^m	10 ^h 14 ^m	23 ^h 33 ^m	10 ^h	52 ^m			
W 2	513.4	20.1	23 49	10 55	.....	11	30			
T 3	514.4	21.1	.....	11 36	0	36	12 08			
F 4	515.4	22.1	0 47	12 17	1	36	12 47			
S 5	516.4	23.1	1 43	13 00	2	34	13 28			
S 6	517.4	24.1	2 37	13 45	3	30	14 11			
M 7	518.4	25.1	3 30	14 32	4	24	14 57			
T 8	519.4	26.1	4 20	15 21	5	14	15 46			
W 9	520.4	27.1	5 07	16 11	6	01	16 37			
T 10	521.4	28.1	5 51	17 02	6	44	17 29			
F 11	522.4	29.1	6 33	17 53	7	23	18 22			
S 12	523.4	0.5	7 11	18 44	7	59	19 16			
S 13	524.4	1.5	7 47	19 35	8	33	20 09			
M 14	525.4	2.5	8 23	20 26	9	06	21 03			
T 15	526.4	3.5	8 57	21 17	9	37	21 57			
W 16	527.4	4.5	9 32	22 09	10	09	22 52			
T 17	528.4	5.5	10 08	23 02	10	42	23 48			
F 18	529.4	6.5	10 46	23 57	11	18	.....		
S 19	530.4	7.5	11 27	.....	11	57	0 47			
S 20	531.4	8.5	12 14	0 54	12	41	1 46			
M 21	532.4	9.5	13 05	1 54	13	30	2 47			
T 22	533.4	10.5	14 01	2 53	14	26	3 48			
W 23	534.4	11.5	15 03	3 53	15	29	4 47			
T 24	535.4	12.5	16 10	4 50	16	37	5 43			
F 25	536.4	13.5	17 16	5 44	17	47	6 35			
S 26	537.4	14.5	18 24	6 35	18	58	7 22			
S 27	538.4	15.5	19 31	7 21	20	08	8 05			
M 28	539.4	16.5	20 35	8 06	21	16	8 46			
T 29	540.4	17.5	21 37	8 48	22	21	9 26			
W 30	541.4	18.5	22 37	9 31	23	25	10 04			
T 31	542.4	19.5	23 35	10 13	.....		10 44			

PHASES OF THE MOON

Last Quarter	Aug 3 ^d	13 ^h	48 ^m
New Moon	11	12	36
First Quarter	19	12	52
Full Moon	26	05	14

MOONRISE AND MOONSET

1961 SEPTEMBER

At 0 ^h S.A.S.T.			JOHANNESBURG				CAPE TOWN			
DAY	J.D. 2437000+	AGE	MOONRISE S.A.S.T.		MOONSET S.A.S.T.	MOONRISE S.A.S.T.		MOONSET S.A.S.T.		
F 1	543.4	20.5	.....	h m	10 ^h 57 ^m	0 ^h	26 ^m	11 ^h 25 ^m		
S 2	544.4	21.5	0 31		11 42	1	24	12 09		
S 3	545.4	22.5	1 25		12 29	2	19	12 54		
M 4	546.4	23.5	2 17		13 17	3	11	13 42		
T 5	547.4	24.5	3 05		14 07	3	59	14 33		
W 6	548.4	25.5	3 49		15 00	4	43	15 24		
T 7	549.4	26.5	4 31		15 48	5	23	16 17		
F 8	550.4	27.5	5 11		16 40	6	00	17 11		
S 9	551.4	28.5	5 49		17 31	6	35	18 04		
S 10	552.4	29.5	6 24		18 21	7	08	18 58		
M 11	553.4	0.8	6 58		19 13	7	40	19 52		
T 12	554.4	1.8	7 33		20 06	8	12	20 48		
W 13	555.4	2.8	8 09		20 58	8	44	21 43		
T 14	556.4	3.8	8 46		21 52	9	18	22 41		
F 15	557.4	4.8	9 27		22 48	9	56	23 39		
S 16	558.4	5.8	10 09		23 45	10	37	.....	
S 17	559.4	6.8	10 58		.....	11	24	0 38		
M 18	560.4	7.8	11 51		0 43	12	16	1 37		
T 19	561.4	8.8	12 48		1 40	13	13	2 35		
W 20	562.4	9.8	13 50		2 37	14	17	3 30		
T 21	563.4	10.8	14 55		3 31	15	24	4 23		
F 22	564.4	11.8	16 01		4 21	16	33	5 10		
S 23	565.4	12.8	17 07		5 09	17	43	5 55		
S 24	566.4	13.8	18 13		5 54	18	52	6 37		
M 25	567.4	14.8	19 17		6 38	20	00	7 17		
T 26	568.4	15.8	20 20		7 21	21	07	7 57		
W 27	569.4	16.8	21 21		8 05	22	11	8 37		
T 28	570.4	17.8	22 20		8 49	23	12	9 19		
F 29	571.4	18.8	23 17		9 35	.....		10 02		
S 30	572.4	19.8	.....		10 22	0	10	10 48		

PHASES OF THE MOON

Last Quarter	Sep 2 ^d	01 ^h	06 ^m
New Moon	10	04	50
First Quarter	17	22	24
Full Moon	24	13	34

MOONRISE AND MOONSET

1961 OCTOBER

At 0 ^h S.A.S.T.			JOHANNESBURG				CAPE TOWN		
DAY	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	573.4	20.8	0 ^h 10 ^m	11 ^h 12 ^m	1 ^h 04 ^m	11 ^h 36 ^m			
M 2	574.4	21.8	1 00	12 02	1 54	12 26			
T 3	575.4	22.8	1 47	12 .52	2 .41	13 18			
W 4	576.4	23.8	2 29	13 42	3 22	14 10			
T 5	577.4	24.8	3 10	14 34	4 00	15 04			
F 6	578.4	25.8	3 47	15 25	4 35	15 58			
S 7	579.4	26.8	4 24	16 17	5 09	16 52			
S 8	580.4	27.8	4 59	17 08	5 41	17 47			
M 9	581.4	28.8	5 34	17 59	6 13	18 42			
T 10	582.4	0.1	6 09	18 53	6 46	19 38			
W 11	583.4	1.1	6 47	19 47	7 20	20 35			
T 12	584.4	2.1	7 26	20 43	7 57	21 34			
F 13	585.4	3.1	8 08	21 41	8 37	22 33			
S 14	586.4	4.1	8 54	22 .38	9 21	23 33			
S 15	587.4	5.1	9 46	23 .35	10 11	.....		
M 16	588.4	6.1	10 40	.....	11 05	0 30		
T 17	589.4	7.1	11 39	0 .30	12 06	1 25			
W 18	590.4	8.1	12 42	1 .24	13 10	2 17			
T 19	591.4	9.1	13 45	2 .14	14 15	3 04			
F 20	592.4	10.1	14 50	3 .00	15 23	3 48			
S 21	593.4	11.1	15 53	3 .45	16 31	4 29			
S 22	594.4	12.1	16 57	4 29	17 39	5 09			
M 23	595.4	13.1	18 00	5 11	18 45	5 49			
T 24	596.4	14.1	19 02	5 .54	19 51	6 28			
W 25	597.4	15.1	20 04	6 .39	20 54	7 09			
T 26	598.4	16.1	21 02	7 24	21 .56	7 52			
F 27	599.4	17.1	21 59	8 12	22 53	8 38			
S 28	600.4	18.1	22 51	9 02	23 .47	9 26			
S 29	601.4	19.1	23 41	9 .52	.....	10 17		
M 30	602.4	20.1	.....	10 43	0 36	11 09		
T 31	603.4	21.1	0 26	11 35	1 19	12 01			

PHASES OF THE MOON

Last Quarter	Oct 1 ^a	16 ^h	10 ^m
New Moon	9	20	53
First Quarter	17	06	35
Full Moon	23	23	31
Last Quarter	31	10	59

MOONRISE AND MOONSET

1961 NOVEMBER

At 0 ^h S.A.S.T.			JOHANNESBURG				CAPE TOWN			
DAY	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.
W 1	604.4	22.1	1 ^h 08 ^m	12 ^h 26 ^m		1 ^h 59 ^m	12 ^h 55 ^m		12 ^h 55 ^m	
T 2	605.4	23.1	1 47	13 18		2 35	13 49		13 49	
F 3	606.4	24.1	2 23	14 09		3 09	14 42		14 42	
S 4	607.4	25.1	2 58	15 00		3 42	15 37		15 37	
S 5	608.4	26.1	3 33	15 52		4 13	16 32		16 32	
M 6	609.4	27.1	4 08	16 45		4 46	17 29		17 29	
T 7	610.4	28.1	4 45	17 39		5 19	18 26		18 26	
W 8	611.4	29.1	5 24	18 35		5 55	19 26		19 26	
T 9	612.4	0.5	6 05	19 34		6 34	20 26		20 26	
F 10	613.4	1.5	6 51	20 33		7 18	21 27		21 27	
S 11	614.4	2.5	7 43	21 31		8 07	22 26		22 26	
S 12	615.4	3.5	8 36	22 28		9 00	23 23		23 23	
M 13	616.4	4.5	9 34	23 22		9 59	.....		.....
T 14	617.4	5.5	10 35	.....		11 02	0 16		0 16	
W 15	618.4	6.5	11 37	0 12		12 06	1 03		1 03	
T 16	619.4	7.5	12 39	0 59		13 12	1 48		1 48	
F 17	620.4	8.5	13 42	1 43		14 17	2 28		2 28	
S 18	621.4	9.5	14 43	2 25		15 23	3 07		3 07	
S 19	622.4	10.5	15 44	3 07		16 28	3 44		3 44	
M 20	623.4	11.5	16 45	3 48		17 33	4 23		4 23	
T 21	624.4	12.5	17 47	4 30		18 37	5 01		5 01	
W 22	625.4	13.5	18 47	5 14		19 39	5 43		5 43	
T 23	626.4	14.5	19 45	6 01		20 39	6 27		6 27	
F 24	627.4	15.5	20 40	6 50		21 36	7 15		7 15	
S 25	628.4	16.5	21 33	7 40		22 27	8 05		8 05	
S 26	629.4	17.5	22 20	8 33		23 14	8 57		8 57	
M 27	630.4	18.5	23 03	9 25		23 56	9 51		9 51	
T 28	631.4	19.5	23 44	10 17		.....	10 44		10 44	
W 29	632.4	20.5	.....	11 09		0 34	11 39		11 39	
T 30	633.4	21.5	0 21	11 59		1 08	12 32		12 32	

PHASES OF THE MOON

New Moon	Nov 8 ^d	11 ^h	59 ^m
First Quarter	15	14	13
Full Moon	22	11	44
Last Quarter	30	08	19

MOONRISE AND MOONSET

1961 DECEMBER

At 0^h S.A.S.T.

JOHANNESBURG

CAPE TOWN

DAY	J.D. 2437000+	AGE	MOONRISE		MOONSET		MOONRISE		MOONSET	
			S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.	S.A.S.T.
F 1	634.4	22.5	0 ^h 57 ^m	12 ^h 50 ^m	1 ^h 42 ^m	13 ^h 26 ^m				
S 2	635.4	23.5	1 21	14 41	2 13	14 20				
S 3	636.4	24.5	2 05	14 34	2 45	15 15				
M 4	637.4	25.5	2 41	15 27	3 17	16 12				
T 5	638.4	26.5	3 18	16 22	3 51	17 11				
W 6	639.4	27.5	3 59	17 21	4 29	18 12				
T 7	640.4	28.5	4 43	18 21	5 11	19 14				
F 8	641.4	29.5	5 32	19 21	5 58	20 16				
S 9	642.4	0.9	6 26	20 20	6 51	21 15				
S 10	643.4	1.9	7 25	21 16	7 50	22 11				
M 11	644.4	2.9	8 27	22 10	8 53	23 02				
T 12	645.4	3.9	9 30	22 58	9 59	23 48				
W 13	646.4	4.9	10 33	23 44	11 05	.....			
T 14	647.4	5.9	11 36	.....	12 11	0 30				
F 15	648.4	6.9	12 37	0 26	13 15	1 09				
S 16	649.4	7.9	13 37	1 07	14 19	1 46				
S 17	650.4	8.9	14 37	1 47	15 22	.2 23				
M 18	651.4	9.9	15 36	2 28	16 25	.3 00				
T 19	652.4	10.9	16 36	3 10	17 26	.3 40				
W 20	653.4	11.9	17 34	3 54	18 27	.4 22				
T 21	654.4	12.9	18 29	4 41	19 24	.5 07				
F 22	655.4	13.9	19 23	5 30	20 18	.5 55				
S 23	656.4	14.9	20 13	6 22	21 08	.6 46				
S 24	657.4	15.9	20 58	7 14	21 52	.7 40				
M 25	658.4	16.9	21 40	8 07	22 31	.8 33				
T 26	659.4	17.9	22 19	8 59	23 08	.9 28				
W 27	660.4	18.9	22 55	9 51	23 41	10 22				
T 28	661.4	19.9	23 30	10 42	.....	11 15				
F 29	662.4	20.9	.....	11 32	0 13	12 09				
S 30	663.4	21.9	0 04	12 23	0 44	13 03				
S 31	664.4	22.9	0 38	13 15	1 15	13 58				

PHASES OF THE MOON

New Moon	Dec 8 ^d	01 ^h	52 ^m
First Quarter	14	22	06
Full Moon	22	02	42
Last Quarter	30	05	57

OCCULTATIONS OF BRIGHT STARS

Date	Z.C.	Mag	Sp	Dec	Ph	Cape Town			Johannesburg			Luanshya		
						P.A.	h.	m.	P.A.	h.	m.	P.A.	h.	m.
Jan														
4	1375	5.6	K0	+15°09'	R	335°	23	03.8	-	-	-	-	-	-
13	2279	6.2	A0	-14 41	R	-	-	-	233°	02	55.5	-	-	-
22	219	5.1	K2	+ 5 53	D	90	22	44.8	-	-	-	-	-	-
24	454	5.8	G5	+13 00	D	-	-	-	37	20	10.6	-	-	-
24	464	6.4	G5	+12 52	D	-	-	-	-	-	-	105°	23	32.0
27	862	7.5	K0	+18 58	D	132	22	53.0	107	23	10.9	68	23	19.9
27	863	6.7	B9	+18 57	D	136	23	14.2	108	23	30.0	69	23	38.9
28	871	6.9	K5	+18 41	D	-	-	-	-	-	-	126	01	19.5
Feb														
4	1749	6.1	K0	+ 2 11	R	-	-	-	254	22	33.6	293	22	22.7
24	947	5.2	F5	+19 10	D	156	20	33.6	126	20	40.6	86	20	33.8
26	1192	7.4	K2	+18 14	D	-	-	-	81	19	48.5	31	20	07.6
27	1207	5.8	K0	+17 27	D	-	-	-	-	-	-	142	01	03.2
28	1323	6.3	GO	+15 32	D	-	-	-	-	-	-	132	01	43.7
Mar														
5	1950	5.8	K0	- 5 09	R	-	-	-	250	23	56.3	291	23	48.2
11	2640	6.1	A2	-18 41	R	-	-	-	216	03	45.7	272	03	53.6
11	2647	6.4	Oe5	-18 29	R	246	04	54.4	282	05	07.9	338	04	37.1
11	2653	6.4	BO	-18 38	R	205	05	16.6	-	-	-	-	-	-
12	2826	4.0	A5	-17 57	D	79	05	34.3	-	-	-	-	-	-
19	352	7.3	K0	+10 03	D	-	-	-	-	-	-	12	18	58.6
19	360	6.8	A3	+10 20	D	56	19	36.6	-	-	-	-	-	-
20	475	7.4	AO	+13 40	D	-	-	-	46	18	57.2	-	-	-
23	904	7.1	K0	+18 49	D	-	-	-	-	-	-	133	21	56.2
27	1375	5.6	K0	+15 09	D	-	-	-	53	18	38.8	-	-	-
28	1476	7.0	AO	+11 52	D	186*	19	45.5	145	19	26.8	106	19	00.6
Apr														
3	2137	6.4	AO	-10 57	R	-	-	-	306	20	43.5	-	-	-
3	2141	6.0	K0	-10 57	R	-	-	-	323	20	56.9	-	-	-
4	2278	6.4	F5	-14 15	R	309	22	46.8	348	22	26.1	-	-	-
4	2279	6.2	AO	-14 41	R	-	-	-	253	23	01.0	293	22	51.1
6	2433	6.5	K0	-16 44	R	318	00	27.5	-	-	-	-	-	-
7	2578	6.4	AO	-18 48	R	-	-	-	-	-	-	224	01	11.4
8	2764	6.3	G5	-18 38	R	200	03	09.4	252	03	40.6	299	03	31.3
10	3066	6.0	A3	-14 41	R	313	03	43.9	-	-	-	-	-	-
12	3360	6.3	K0	- 7 28	R	267	04	49.4	302	04	40.4	-	-	-

Mar 28 Graze

Date	Z.C.	Mag	Sp	Dec	Ph	Cape Town			Johannesburg			Luanshya		
						P.A.	h.	m.	P.A.	h.	m.	P.A.	h.	m.
Apr														
22	1236	5.1	GO	+17° 48'	D	110	20	52.0	73°	21	17.0	-	°	-
22	1241	6.4	F0	+17 50	D	67	22	15.8	-	-	-	-	-	-
23	1337	5.6	A5	+15 46	D	-	-	-	156	18	40.3	-	-	-
26	1644	4.1	AO	+ 6 18	D	170	18	49.3	137	18	37.0	101	18	14.6
27	1749	6.1	KO	+ 2 11	D	186	19	41.8	144	19	21.4	108	18	56.5
May														
5	2715	6.5	M3	-19 20	R	-	-	-	-	-	-	222	02	45.1
5	2731	6.5	AO	-18 39	R	282	06	17.9	-	-	-	-	-	-
5	2865	5.9	KO	-18 21	R	-	-	-	-	-	-	247	23	28.9
7	3019	5.9	KO	-16 18	R	-	-	-	209	01	22.2	264	01	31.2
11	55	6.4	G5	- 0 20	R	-	-	-	226	04	19.9	275	04	20.3
22	1487	1.3	B8	+12 13	R	280	13	39.5	295	13	33.4	347	13	00.2
23	1609	4.7	FO	+ 7 36	D	-	-	-	144	20	04.9	105	19	47.6
25	1825	6.1	GO	- 1 18	D	-	-	-	-	-	-	176	23	48.0
27	1950	5.6	KO	- 5 09	D	112	00	27.4	75	00	49.3	-	-	-
Jun														
1	2814	5.0	KO	-19 03	R	-	-	-	-	-	-	230	22	37.6
2	2828	6.0	KO	-18 24	R	295	00	54.1	-	-	-	-	-	-
6	3432	6.3	G5	- 6 11	R	177	03	32.7	213	04	04.4	259	04	18.2
16	1260	7.0	F5	+17 21	D	-	-	-	163	19	25.0	111	19	11.3
16	1262	6.2	F2	+17 13	D	-	-	-	-	-	-	122	19	51.7
17	1371	6.4	G5	+15 12	D	-	-	-	-	-	-	137	18	26.8
17	1375	5.6	KO	+15 09	D	176	20	20.1	127	20	09.5	80	20	12.5
18	1476	7.0	AO	+11 52	D	-	-	-	-	-	-	151	21	25.9
23	2005	7.0	G5	- 6 41	D	118	19	28.1	77	19	48.1	-	-	-
24	2113	7.5	F8	-10 37	D	167	18	52.6	127	18	40.3	88	18	24.8
24	2133	5.6	KO	-11 13	D	112	23	41.5	80	24	02.7	-	-	-
26	2279	6.2	AO	-14 41	D	79	02	15.7	54	02	36.7	-	-	-
Jul														
1	3100	6.4	A5	-14 41	R	259	06	19.1	-	-	-	-	-	-
4	3514	6.1	KO	- 3 26	R	-	-	-	285	00	04.0	-	-	-
9	650	5.7	A2	+16 40	R	224	06	27.2	-	-	-	-	-	-
11	Mercury	1.4		+19 18	D	-	-	-	-	-	-	109	06	13.2
11	Mercury	1.4		+19 18	R	-	-	-	-	-	-	227	07	16.4
17	1644	4.1	AO	+ 6 18	D	-	-	-	-	-	-	142	20	04.9
17	1645	6.6	F8	+ 6 55	D	88	19	30.5	-	-	-	-	-	-
20	1965	6.5	AO	- 5 15	D	59	21	38.1	-	-	-	-	-	-
24	2365	7.1	F5	-16 06	D	92	01	26.3	72	01	40.6	-	-	-
24	2485	7.4	G5	-17 52	D	121	19	14.0	85	19	20.5	-	-	-

Date	Z.G.	Mag	Sp	Dec	Ph	Cape Town			Johannesburg			Luanshya		
						P.A.	h.	m.	P.A.	h.	m.	P.A.	h.	m.
Jul														
24	2495	6.0	A0	-17°42'	D	43°	21	12.6	- °	-	-	- °	-	-
25	2508	6.3	A0	-18 24	D	-	-	-	150	00	33.1	94	00	22.4
25	2553	6.4	B0	-18 38	D	56	19	25.1	-	-	-	-	-	-
25	2658	5.4	F5p	-18 53	D	92	20	41.7	55	21	04.3	-	-	-
Aug														
16	1923	7.1	K0	- 4 03	D	-	-	-	159	18	18.2	-	-	-
17	2035	7.1	K0	- 8 13	D	-	-	-	-	-	-	136	18	53.3
19	2279	6.2	A0	-14 41	D	-	-	-	98	18	50.1	-	-	-
21	2454	7.2	G5	-17 25	D	115	01	28.2	-	-	-	-	-	-
21	2573	7.3	A0	-19 07	D	-	-	-	-	-	-	131	19	38.9
21	2578	6.4	A0	-18 48	D	126	21	30.1	99	21	47.5	49	22	04.2
22	2596	7.3	B3	-19 06	D	-	-	-	-	-	-	150	01	19.9
22	2745	6.9	K0	-18 42	D	53	18	58.4	-	-	-	-	-	-
22	2755	6.6	G5	-18 47	D	65	20	40.4	26	21	22.0	-	-	-
22	2758	7.0	BCp	-19 13	D	-	-	-	142	22	04.7	86	21	51.7
22	2763	6.7	M0	-19 21	D	-	-	-	-	-	-	129	23	08.8
22	2764	6.3	G5	-18 38	D	38	22	46.7	-	-	-	-	-	-
23	2774	6.3	F5	-19 11	D	-	-	-	-	-	-	127	01	07.9
23	2787	6.4	B8	-18 49	D	153	02	45.8	130	02	46.7	-	-	-
27	3535	5.2	B8	- 3 18	R	-	-	-	-	-	-	230	21	42.5
Sep														
3	836	5.5	B3p	+18 30	R	-	-	-	-	-	-	202	02	13.2
14	2113	7.5	F8	-10 37	D	-	-	-	-	-	-	46	18	28.9
15	2240	6.8	B9	-13 49	D	-	-	-	66	18	47.0	-	-	-
18	2685	7.0	K0	-18 57	D	-	-	-	44	19	38.0	-	-	-
18	2687	7.3	F8	-19 10	D	124	19	29.0	96	19	46.7	45	20	04.4
18	2699	7.2	M3	-19 19	D	-	-	-	-	-	-	98	22	02.9
19	2865	5.9	K0	-18 21	D	84	22	15.2	70	22	40.1	21	23	10.6
20	2997	7.1	F0	-16 47	D	-	-	-	50	19	15.5	-	-	-
20	3005	6.2	A5	-16 42	D	89	20	37.8	69	21	03.2	17	21	35.9
20	3019	5.9	K0	-16 18	D	79	23	39.6	69	24	02.8	27	24	28.9
21	3029	6.9	F0	-15 59	D	88	02	02.9	78	02	15.1	-	-	-
29	650	5.7	A2	+16 40	R	-	-	-	-	-	-	232	04	24.7
Oct														
1	940	5.7	B9	+19 48	R	240	04	31.9	252	04	56.3	290	04	54.0
15	2649	6.6	B5	-18 49	D	26	20	47.6	-	-	-	-	-	-
15	2658	5.7	F5p	-18 53	D	66	22	17.8	53	22	31.7	-	-	-
16	2814	5.0	K0	-19 03	D	139	21	14.5	120	21	26.3	75	21	31.7
16	2816	6.8	B9	-18 57	D	118	21	24.3	104	21	39.8	63	21	51.5

Date	Z.C.	Mag	Sp	Dec	Ph	Cape Town			Johannesburg			Luanshya		
						P.A.	h.	m.	P.A.	h.	m.	P.A.	h.	m.
Oct														
16	2828	6.0	KO	-18° 24'	D	30°	23	26.5	-	°	-	-	°	-
18	3108	5.5	MO	-15 23	D	-	-	-	-	-	-	138	21	40.5
18	3120	7.0	AO	-14 14	D	15	23	48.1	357	24	15.2	-	-	-
19	3253	5.4	B5	-11 49	D	-	-	-	82	18	58.9	36	19	14.6
19	3255	7.4	MO	-11 19	D	33	20	05.3	15	20	41.3	-	-	-
20	3286	7.3	KO	-10 27	D	123	02	43.3	-	-	-	-	-	-
20	3412	4.4	MO	- 6 19	D	7	23	33.9	355	24	07.2	-	-	-
Nov														
11	2596	7.3	B3	-19 06	D	-	-	-	84	19	50.6	37	20	10.7
12	2763	6.7	MO	-19 21	D	-	-	-	85	19	10.3	41	19	31.3
12	2773	6.1	G5	-19 19	D	128	20	51.2	114	20	59.2	73	21	06.3
12	2774	6.3	F5	-19 11	D	93	20	45.9	82	20	58.3	40	21	16.7
14	3064	6.0	A3	-16 13	D	-	-	-	98	19	18.2	57	19	31.7
17	3514	6.1	KO	- 3 26	D	75	23	23.6	68	23	47.0	31	24	11.5
24	940	5.7	B9	+19 48	R	-	-	-	-	-	-	244	21	29.3
27	1217	6.1	AO	+18 59	R	182*	00	37.7	222	01	10.5	266	01	18.5
28	1331	*	N3	+17 25	R	294	01	18.0	309	01	16.7	-	-	-
28	1335	6.3	KO	+17 20	R	287	02	28.6	305	02	35.2	-	-	-
Dec														
12	3173	5.3	G5	-14 16	D	-	-	-	-	-	-	127	19	52.0
13	3324	7.2	GO	-10 17	D	-	-	-	-	-	-	118	20	23.6
13	3325	6.7	GO	- 9 37	D	45	20	30.5	39	20	55.3	-	-	-
16	202	7.0	G5	+ 4 29	D	39	21	21.4	33	21	52.9	-	-	-
17	212	7.3	GO	+ 5 06	D	32	00	38.4	-	-	-	-	-	-
17	327	4.5	G5	+ 8 37	D	-	-	-	32	19	49.0	-	-	-
18	464	6.4	G5	+12 52	D	126	22	49.4	112	23	11.2	73	23	16.5
21	764	5.0	GO	+18 35	D	-	-	-	-	-	-	113	03	46.8
24	1275	5.6	MO	+18 16	R	-	-	-	-	-	-	284	21	42.3

Nov 27 Graze

Nov 28 Irregular variable, about mag. 6.5

ECLIPSES

There will be four eclipses, two of the Sun and two of the Moon.

1. February 15 Total eclipse of the Sun, invisible in Southern Africa.
2. March 2 Partial eclipse of the Moon, invisible in Southern Africa.
3. August 11 Annular eclipse of the Sun, visible in Southern Africa as a partial eclipse.
4. August 26 Partial eclipse of the Moon, the beginning visible, the end invisible in Southern Africa.

Local Prediction of Solar Eclipse

August 11

STATION	BEGINNING		MAXIMUM		ENDING		MAGNITUDE
	S.A.S.T.	P.A.	S.A.S.T.	P.A.	S.A.S.T.	P.A.	
Bloemfontein	11 ^h 44. ^m 9	263°	13 ^h 24. ^m 4	14 ^h 56. ^m 7	144°	0.514	
Cape Town	11	22.5	278	13	09.6	134	0.683
Durban	12	01.1	262	13	37.6	146	0.474
Johannesburg	11	52.1	259	13	27.2	150	0.414
Port Elizabeth	11	43.4	270	13	26.9	136	0.609
Salisbury	12	19.2	241	13	26.4	171	0.201
Windhoek	11	12.4	259	12	53.2	146	0.468

Circumstances of the Lunar Eclipse

August 26

Moon enters penumbra	02 ^h 36. ^m 1	S.A.S.T.
Moon enters umbra	03 34.9	
Middle of the eclipse	05 08.2	
Moon leaves umbra	06 41.5	
Moon leaves penumbra	07 40.4	

First contact of umbra with limb of Moon : P.A. 46° to E from North Point.
 Last contact of umbra with limb of Moon : P.A. 77° to W from North Point.

Magnitude of the Eclipse : 0.992

THE PLANETS

The chart (frontispiece) shows the S.A.S.T. of the rising and setting of the Sun and the planets at a place whose latitude and longitude are 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 most easily seen just after sunset near the times of greatest (evening) elongation in May/June and September/October, and just before sunrise in March. The magnitudes at these greatest elongations will be +0.7, +0.3 and +0.5, respectively.

Venus can be seen as an evening star from January to March. For the rest of the year it will be a morning star. It reaches its maximum brightness at magnitude -4.3 in February/March.

Mars can be observed in the evenings from January to the middle of November. In December it rises just before sunrise. Its brightness decreases steadily during the first eight months of the year from magnitude +1.3 in January to +1.9 in August/September, while its apparent diameter decreases from 15'3 in January to 3'8 in October.

Jupiter will be near the Sun during January. From February to April it will be visible in the morning sky. In July, near the time of opposition, Jupiter will be visible right through the night. For the rest of the year it remains a fine object in the evening sky.

Saturn will be in the morning sky from February onwards. Near the time of opposition to the Sun in July, it will be visible all night. For the rest of the year it can be observed in the evening sky.

Neither Uranus, magnitude 5.7, nor Neptune, magnitude 7.7, is readily visible to the naked eye, but both are easy telescopic objects. They can easily be found during the first part of the year in the evening sky by means of the following ephemeris. Their respective times of opposition to the Sun are February 12 and April 30.

Ephemeris for Uranus and Neptune 1961

		Uranus				Neptune			
		R.A.	Decl.			R.A.	Decl.		
Jan	1	9 ^h 51. ^m 6	+ 13° 46'			14 ^h 35. ^m 9	- 13° 25'		
"	21	9 49.1	+ 14 00'			14 37.3	- 13 31		
Feb	10	9 45.8	+ 14 17			14 37.8	- 13 32		
Mar	2	9 42.4	+ 14 34			14 37.5	- 13 29		
"	22	9 39.6	+ 14 48			14 36.3	- 13 23		
Apr	11	9 37.7	+ 14 57			14 34.6	- 13 14		
May	1	9 37.1	+ 14 59			14 32.5	- 13 03		
"	21	9 37.9	+ 14 55			14 30.4	- 12 54		
Jun	10	9 40.0	+ 14 43			14 28.7	- 12 46		
"	30	9 43.3	+ 14 26			14 27.5	- 12 41		
Jul	20	9 47.4	+ 14 05			14 27.0	- 12 40		
Aug	9	9 52.0	+ 13 41			14 27.4	- 12 43		
"	29	9 56.9	+ 13 15			14 28.5	- 12 50		
Sep	18	10 01.5	+ 12 51			14 30.4	- 13 00		
Oct	8	10 05.6	+ 12 29			14 32.9	- 13 12		
"	28	10 08.8	+ 12 12			14 35.7	- 13 26		
Nov	17	10 10.9	+ 12 02			14 38.6	- 13 40		
Dec	7	10 11.5	+ 11 59			14 41.4	- 13 52		
"	27	10 10.8	+ 12 04			14 43.7	- 14 02		

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

METEOR CALENDAR 1961

Date	Shower	Radiant	Maximum		
			Date	Hourly Rate	Transit of Radiant
		1 b			
Jan 3	Quadrantids	227° + 46°	Jan 3	40	08 ^h 30 ^m
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					
Dec 5	Leonids	151 + 21	Nov 16	6	06 32
Dec 12					
Dec 5	Geminids	113 + 30	Dec 12	30	02 00
Jan 7					
Dec 5	Velaids	149 - 51	Dec 29	?	03 30
Jan 7					

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

METEOR CALENDAR 1961

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

ASTRONOMICAL DIARY

JANUARY 1961

Mercury is close to the Sun at the beginning of the month. Venus is an evening star. Mars, just past opposition is visible most of the night. Jupiter and Saturn are too near the Sun for observation.

d. h.

Jan	1	19	Mars 8° N of Moon.
	5	20	Jupiter in conjunction with the Sun.
	11	8	Saturn in conjunction with the Sun.
	29	9	Venus at greatest elongation East (47°).

FEBRUARY 1961

Mercury reaches its greatest elongation East at the beginning of the month and is an evening star not readily visible. Venus is an evening star increasing in brilliancy throughout the month. Mars sets in the small hours and Jupiter and Saturn rise just before dawn.

d. h.

Feb	6	14	Mercury at greatest elongation East (18°).
	12	19	Uranus at opposition.
	15	10	Eclipse of Sun, not visible in South Africa.
	22	22	Aldebaran $0^{\circ}.2$ S of Moon.
	24	19	Mars 8° N of Moon.

MARCH 1961

Mercury is a morning star at the end of the month and will be well seen just before sunrise. Venus is an evening star, approaching the Sun and reaching greatest brilliancy on March 5. Mars sets at midnight and Jupiter and Saturn rise in the small hours.

	d. h.	
Mar	2 16	Partial eclipse of Moon, not visible in South Africa.
	5 19	Venus at greatest brilliancy (magnitude -4.3).
	13 2	Jupiter 3° S of Moon.
	18 21	Venus 12° N of Moon.
	20 22	Mercury at greatest elongation West (28°).
	20 23	Equinox.
	24 20	Mars 7° N of Moon.
	28 23	Regulus 1° N of Moon.

APRIL 1961

Mercury is a morning star at the beginning of the month. Venus is in conjunction with the Sun on April 11 and becomes visible as a morning star at the very end of the month. Mars sets, and Jupiter and Saturn rise, about an hour before midnight.

	d. h.	
Apr	11 2	Venus in inferior conjunction.
	23 5	Mars 5° S of Pollux.
	30 15	Neptune at opposition.

MAY 1961

Mercury is in conjunction at the beginning of the month and becomes an evening star at the end of the month. Venus is a morning star reaching greatest brilliancy at the middle of the month. Mars sets and Jupiter and Saturn rise at about 10 p.m.

	d. h.	
May	7 2	Jupiter 3° S of Moon.
	16 22	Venus at greatest brilliancy (-4.2).
	20 20	Mars 4° N of Moon.
	22 15	Occultation of Regulus by Moon.

JUNE 1961

Mercury is an evening star at the beginning of the month and moves back to conjunction with the Sun at the end. Venus is a prominent morning star rising more than three hours before the Sun and reaching greatest elongation West towards the end of the month. Mars sets soon after 9.00 p.m. and Jupiter and Saturn rise in the early evening.

	d.	h.	
Jun	1	6	Mercury at greatest elongation East (23°).
	16	2	Mars $0^\circ.6$ N of Uranus.
	20	4	Venus at greatest elongation West (46°).
	21	18	Solstice.
	30	2	Saturn 3° S of Moon.

JULY 1961

Mercury is a morning star reaching greatest elongation West on July 19. Venus is still a bright morning star. Mars sets about 9.00 p.m. Jupiter and Saturn are both close to opposition and visible all night.

	d.	h.	
Jul	11	8	Occultation of Mercury by the Moon.
	19	11	Mercury at greatest elongation West (20°).
	19	13	Saturn at opposition.
	25	13	Jupiter at opposition.
	27	19	Jupiter 3° S of Moon.
	31	21	Mercury 6° S of Pollux.

AUGUST 1961

Mercury is in conjunction at the middle of the month. Venus is a morning star. Mars sets soon after 8.00 p.m. Jupiter and Saturn set an hour or two before sunrise.

	d. h.	
Aug	11 13	Annular eclipse of Sun, visible in South Africa as a partial eclipse.
	14 20	Mars 2° S of Moon.
	23 17	Saturn 3° S of Moon.
	24 13	Venus 7° S of Pollux.
	26 5	Partial eclipse of Moon, visible in South Africa.

SEPTEMBER 1961

Mercury reaches greatest elongation East at the end of the month and is an evening star. Venus is a morning star rising an hour and a half before the Sun. Mars sets two and a half hours after the Sun and Jupiter and Saturn set about 3.00 a.m.

	d. h.	
Sep	2 1	Aldebaran 0°.3 S of Moon.
	20 0	Saturn 3° S of Moon.
	22 5	Venus 0°.1 N of Uranus.
	23 1	Venus 0°.4 N of Regulus.
	23 9	Equinox.
	28 12	Mercury at greatest elongation East (26°).

OCTOBER 1961

Mercury is at first an evening star but moves towards the Sun to reach conjunction towards the end of the month. Venus rises an hour before the Sun. Mars sets at the end of evening twilight. Jupiter and Saturn set just after midnight.

	d. h.	
Oct	11 22	Mercury 4° S of Mars.

NOVEMBER 1961

Mercury is a morning star reaching greatest western elongation on November 7. Venus rises in morning twilight. Mars sets in evening twilight and Jupiter and Saturn just before midnight.

d. h.

Nov	2	7	Regulus $0^{\circ}.0'$ N of Moon (geocentric).
	4	19	Venus 4° N of Spica.
	7	17	Mercury at greatest elongation West (19°).
	20	18	Venus $0^{\circ}.5$ S of Neptune.
	23	5	Aldebaran $0^{\circ}.7$ S of Moon.

DECEMBER 1961

Mercury and Venus are too close to the Sun for observation. Mars is in conjunction at the middle of the month and is invisible. Jupiter and Saturn set soon after the Sun.

d. h.

Dec	14	20	Mars in conjunction with the Sun.
	22	4	Solstice.
	26	23	Regulus $0^{\circ}.5$ S of Moon.
	27	1	Uranus $0^{\circ}.3$ S of Moon.

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BRIGHT VARIABLE STARS

Name	Position R.A.	(1950) Dec.	Range	Period Days	Expected Maxima 1961
o Ceti (Mira)	02 ^h 16. ^m 8	$-3^{\circ} 12'$	2.6-9.4	331	Jun 12
R Doradus	04 36.2	$-60^{\circ} 11'$	5.3-6.4	Irr.	Jun 1
R Pictoris	04 44.8	$-49^{\circ} 20'$	6.9-9.2	172?	Jun 16, Dec 5
L2 Puppis	07 12.0	$-14^{\circ} 33'$	3.1-6.3	140?	Mar 8, Jul 26, Dec 13
R Carinae	09 31.0	$-62^{\circ} 34'$	4.5-9.4	309	Jan 29, Dec 3
S Carinae	10 07.8	$-61^{\circ} 18'$	5.7-8.3	149	Jan 22, Jun 20, Nov 16
R Hydræ	13 27.0	$-23^{\circ} 01'$	4.7-9.6	386	Feb 20
T Centauri	13 38.9	$-33^{\circ} 21'$	6.0-8.2	90	Mar 3, Jun 2, Sep 1, Dec 1
R Centauri	14 12.9	$-59^{\circ} 41'$	5.7-12.0	547	.....
R Aquarii	23 41.2	$-15^{\circ} 34'$	6.7-11.6	387	Feb 15

SOUTH AFRICAN OBSERVATORIES

Name	Place	E. Long.	S. Lat.	Alt.	Director
		1h+		ft	
Union	Johannesburg	52m 18s.0	26°10'55".3	5925	W. S. Finsen
Union Annex	Hartebeespoort	51m 30s	25°46'22"	4002	
Cape	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	A. G. P. Velghe
Leiden	Hartebeespoort	51m 30s	25°46'22"	4002	P. Th. Malraven
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		
J. H. Botham	Johannesburg	52m 17s.3	26°11'23".3	5605	
K. Fuhr	Germiston	52m 45s.6	26°14'11".5	5370	
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	

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
1926 - 28	A. W. Roberts	1946 - 47	W. P. Hirst
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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

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	Dr. H. L. Alden	

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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

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