Occultation prediction for Frankfurt, Germany
E. Longitude 8 39 0.0, Latitude 50 8 30.0, Alt. 0m; Telescope dia 15cm; dMag 0.0
No messages for: Name, Doubles, Variables, Limb-nearby, Durations, Graze nearby

	day	Time	P	Star	Sp	Mag	Mag	%	Elon	Sun	Moon		CA	PA	VA	Libration		A	B	R.A. (J2000)			Dec		
y	m	d	h	m	s		No	D	v	r	V	ill		Alt	Alt	Az	o	o	o	L	B	m/o	m/o	h	m	s	o	m	s
13	Mar	4	2	37	38	d	2307	B1	3.9	4.0		59-	100		14	149	-40S	151	171	-1.1	-0.8	+0.6	-0.4	.16	6	48.4	-20	40	9
13	Mar	4	3	24	44	R	2307	B1	3.9	4.0		58-	100		17	160	41S	232	245	-1.2	-0.8	+1.9	+1.5	.16	6	48.4	-20	40	9
13	Mar	6	5	43	2	M	2633	SB2	3.8	3.7	e	35-	72	-3	18	165	-4S	175	185	+0.5	-3.7	+9.9	+9.9	.18	13	45.8	-21	3	32
13	May	29	5	24	45	d	2969	SA5	3.1	2.6		78-	124	17	20	212	-37N	21	0	+4.5	-5.9	+0.4	+0.9	.20	21	0.7	-14	46	53
13	May	29	6	10	24	R	2969	SA5	3.1	2.6		78-	123	24	15	223	48N	296	269	+4.5	-5.9	+1.5	-2.1	.20	21	0.7	-14	46	53
13	Jul	5	2	15	25	R	668	SK0	3.5	3.0		9-	35	-9	7	69	35N	313	352	+3.4	+3.4	+0.1	+0.5	. 4	28	37.0	19	10	50
13	Jul	18	23	55	57	d	2302	SB0	2.6	2.7	s	80+	127		1	237	35N	47	12	-5.3	-1.3	+0.2	-0.5	.16	5	26.2	-19	48	20
13	Aug	1	9	28	54	d	668	SK0	3.5	3.0		26-	61	50	49	233	-73N	63	30	+3.3	+3.3	+1.5	+0.0	. 4	28	37.0	19	10	50
13	Aug	1	10	38	6	R	668	SK0	3.5	3.0		25-	61	56	39	252	53N	296	256	+3.1	+3.4	+0.8	-2.3	. 4	28	37.0	19	10	50
13	Sep	8	14	10	17	D	1925	SB1	1.0	1.1	e	10+	38	33	28	188	63N	88	82	-4.5	+2.6	+1.7	-0.2	.13	25	11.6	-11	9	41
13	Sep	8	15	20	15	R	1925	SB1	1.0	1.1	e	11+	38	24	25	207	-69N	316	298	-4.6	+2.6	+1.2	-1.5	.13	25	11.6	-11	9	41
13	Sep	14	19	5	47	m	2826	cF0	3.9	3.8	v	73+	117		22	178	-7N	347	348	-0.4	-5.4	+9.9	+9.9	.19	21	40.4	-17	50	50
13	Sep	28	10	8	11	d	1106	SA3	3.6	3.5	s	39-	77	36	33	256	-71S	115	74	-0.9	+7.0	+0.5	-2.0	. 7	18	5.6	16	32	25
13	Sep	28	11	13	53	R	1106	SA3	3.6	3.5	s	38-	76	38	22	269	90N	277	234	-1.1	+7.1	+0.3	-1.7	. 7	18	5.6	16	32	25
13	Nov	2	5	30	15	D	1925	SB1	1.0	1.1	e	2-	16	-8	5	114	-33S	162	199	-4.3	+2.2	-0.1	-1.0	.13	25	11.6	-11	9	41
13	Nov	2	6	9	29	R	1925	SB1	1.0	1.1	e	2-	16	-2	10	121	46S	242	276	-4.4	+2.2	+1.1	+2.7	.13	25	11.6	-11	9	41
13	Nov	22	0	37	31	D	1106	SA3	3.6	3.5	s	83-	131		48	133	-37S	156	185	-0.3	+6.9	+1.5	-2.7	. 7	18	5.6	16	32	25
13	Nov	22	1	24	54	R	1106	SA3	3.6	3.5	s	83-	131		53	149	32S	225	245	-0.5	+6.9	+1.9	+3.7	. 7	18	5.6	16	32	25
13	Dec	5	14	12	15	d	2826	cF0	3.9	3.8	v	10+	36	8	22	186	49N	36	32	+1.6	-5.5	+1.1	+0.8	.19	21	40.4	-17	50	50
13	Dec	6	13	56	26	m	2969	SA5	3.1	2.6		18+	50	9	24	167	-1N	342	351	+3.4	-5.8	+9.9	+9.9	.20	21	0.7	-14	46	53

Explanations

Total or grazing lunar occultations are among the events with the longest tradition in occultation astronomy.

The table of Bright Lunar Total Occultations has a lot of abbreviations, which are explained in the following. Many of the information is given by WINOCCULT, the program, which also has been used to generate the predictions.

First informations about the time of the event:

Item	Meaning
Day	The day of the event. Occult searches for events on the basis of geocentric conjunctions that occur within a 24hr - with that period starting at the UT indicated in the date selection box. Users should ensure that the period starts near the middle of their day.
Time	The predicted UTC, in hours, mins and secs.

This is followed by the kind of event, marked with a P

P ... the Phase (or kind) of the event.

- **D** - disappearance
- **d** - disappearance, but star is less than 1 mag brighter than the predicted visibility limit.
- **R** - reappearance
- **r** - reappearance, but star is less than 1 mag brighter than the predicted visibility limit.
- **Gr** - grazing occultation at site. At mid-occultation, or closest approach, the star is less than 4" from the limb of the moon (either above or below).

- **gr** - grazing occultation at site, but star is less than 1 mag brighter than the predicted visibility limit.
- **M** - miss. At closest approach, the star is more than 4" above the limb of the moon
- **m** - miss, but star is less than 1 mag brighter than the predicted visibility limit.

STAR is the the star identifier. Three formats are used:

- nnnn - A ZC star. When reporting occultations, the catalogue is identified with 'R'.
- nnnnn, or nnnnnn - An SAO star. When reporting occultations, the catalogue is identified with 'R'.

X nnnnnn - an XZ star. When reporting occultations, the catalogue is identified with 'X'.

D is the double star code, SP the Star's spectral type (only basic infos are supplied.

Mag v ist the star's visual magnitude

%ill is the percent illumination of the moon. If followed by a +, values are for a waxing moon; - for a waning moon; and E for illumination during a lunar eclipse.

Many angles and values, which give a lot of informations are given in the following columns as follows:

Item	Meaning
Elon	the elongation of the moon from the sun, in degrees. [Strictly, the quantity is calculated as the elongation of the star from the sun]
Sun Alt	the altitude of the sun. The field is blank if the sun is lower than -12 deg. (Nautical twilight)

Moon Alt	the altitude of the moon
Moon Az	the azimuth of the moon
CA	Cusp Angle - the angle of the event around the limb of the moon, measured from the nearest cusp. -'ve values indicate a bright limb event. The cusps are usually N (north) or S (south), but near full moon can be E (East) or W (west). If a lunar eclipse is in progress, CA gives is the % distance from the centre of the umbra, and is followed by a 'U'. Values up to 103% are possible. Where an event occurs more than 103% of the umbral radius, the usual Cusp Angle value is displayed.
PA	Position Angle - the angle of the event around the limb of the moon, measured from true north.
VA	Vertex Angle - the angle of the event around the limb of the moon measured anticlockwise from the vertex of the lunar limb - i.e. the point on the limb highest from the horizon
Libration L	the libration of the moon in longitude, as seen from the site at the time of the event
Libration B	the libration of the moon in latitude, as seen from the site at the time of the event
A	coefficient for correcting the prediction for changes in site location. The units are minutes of time per degree (or seconds of time per minute of arc). The correction to the prediction for a change in site, in seconds of time, is found by multiplying A by the change in site longitude (+'ve for changes towards the East) from the prediction site.
B	same as for A, but for changes in latitude (+'ve to the north).
RA	The J2000 RA of the star. For planets and asteroids, the position is for an integral hour closest to the time of geocentric conjunction - although the prediction includes full allowance for the object's motion...
Dec	The J2000 Declination of the star.- as for Right Ascension.
