ORWELL ASTRONOMICAL SOCIETY IPSWICH.....

NEW YEAR ISSUE

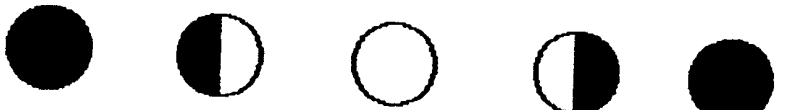
NIGHT SKY

All times GMT

SUN

Rises approximately at 08.00 to 07.50
Sets approximately at 16.00 to 16.40

MOON



1st 8th 16th 24th 30th

MERCURY Mercury will be at greatest eastern elongation on the 19th (19°). Brightest mag. -1.0

VENUS Venus will be at greatest western elongation on the 13th (47°). It will be rising at about 3 hours before the sun in mid month. Mag. -4.4

MARS Mars will be rising at about 1900 in mid month. Mag. -1.0

JUPITER Jupiter will be rising at about 04.00 in mid month. Mag. -1.

SATURN Saturn will be setting at about 20.00 in mid month. Mag. 1.0.

URANUS Uranus will be conjunction with the sun on the 17th.

NEPTUNE Neptune will be in conjunction with the sun on the 13th.

R.Gooding

NEW CAR PARKING FOR 1995

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* The society has been asked by the school to change our *
* present car parking arrangements. Will all members *
* and visitors please now park around the grass island *
* infront of the school and not near the school kitchens *
*
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1995 ANNUAL SUBSCRIPTIONS

The annual subscriptions are due on January 1st 1995.
Rates for 1995-

JUNIOR & OAP	£7.50	(under 18 or in full time education)
ADULT	£11.00	
FAMILY	£12.50	

Cheques & P.O.'s made payable to the ORWELL ASTRONOMICAL SOCIETY (IPSWICH) together with the included form. This should be sent to to Martin Cook, for checking the society membership records.

OCCULTATIONS DURING JANUARY 1995

The table lists disappearance times of stars of magnitude 7.5 or brighter which are occulted during the month. Only events taking place under favourable circumstances are listed. The data relates to Orwell Park Observatory, and timings, etc. will differ slightly for nearby locations.

Date	Time (UT)	Mag	Lunar Phase	Sun Alt (°)	Star Alt (°)	Star
Tue 10 Jan	18:39:53	5.7	0.70+	-23	52	ZC403 37 Ari
Thu 12 Jan	16:43:18	6.4	0.85+	-5	32	ZC639
Thu 12 Jan	19:33:40	6.4	0.85+	-31	54	ZC654
Thu 12 Jan	22:04:30	3.5	0.86+	-52	55	ZC668 Epsilon Tau
Fri 13 Jan	22:18:52	6.5	0.92+	-53	57	ZC796
Sat 14 Jan	23:01:01	7.3	0.96+	-57	57	PPM22107
Sun 15 Jan	00:27:12	5.6	0.97+	-59	50	ZC947 71 Ori
Sun 15 Jan	18:40:07	6.7	0.99+	-22	27	PPM23314

James Appleton

OCCULTATION PREDICTIONS FOR 1995

by James Appleton

Many more bright occultations are visible from East Anglia during 1995 than during 1994! A total of 319 occultations (of all observable magnitudes) and five grazing occultations are predicted to be visible from East Anglia during 1995. The total includes 13 occultations of stars of magnitude 4.0 or brighter.

The full set of predictions for 1995 is stored in the Orwell Park Observatory. This article details only the main highlights of the year. Additionally, the brightest occultations will be listed in the *Night Sky* section of the OASI journal (starting this month).

Due to improvements in the occultation prediction software, a table of predictions can now be generated with reasonable ease for any specified location and time period. The author is willing to generate a table of predictions, customised for any given location and observation period, for any member of OASI.

CALCULATION OF PREDICTIONS

The software used to predict occultations is based on the program *Occult* in *Astronomy On The Personal Computer* by O.Montenbruck and T.Pfleger. However, several enhancements have been made to improve accuracy, and to filter out predictions occurring under unfavourable circumstances.

The lunar ephemeris used by the program is the NASA JPL[1] (Jet Propulsion Laboratories) ephemeris DE-200. This is a standard reference ephemeris, and is

[1]The ephemeris DE-200, the PPM catalog, and a wealth of other astronomical data are obtainable from the JPL ADC (Astronomical Data Centre). Data can be obtained over the Internet, or on CD-ROM.

extremely accurate. The software uses an iterative approach to ensure that the full accuracy of the DE-200 ephemeris is employed to calculate every circumstance predicted.

The star catalog used is the Position And Proper Motion (PPM) Catalog, recently compiled by the NASA JPL and made available in July 1994. The PPM catalog provides a dense and accurate net of reference stars which is designed to match accurately the FK5 co-ordinate system. (This is the system used for astrometric studies since approximately 1984; it defines the co-ordinate system upon which the DE-200 ephemeris is based.) The PPM Catalog represents a considerable improvement over its predecessor, the SAO (Smithsonian Astrophysical Observatory) Catalog. The PPM Catalog is based on an average of six observations per star, whereas the SAO catalog is based on only two per star.

The software employs four filters to eliminate predictions of occultation events occurring under unfavourable observing circumstances. The filters restrict prediction of occultations tailored for each of the following types of phenomenon: any occultation, bright limb events, dark limb reappearance events and potential grazes. The parameters of the filters are dependent on the lunar phase; three sets of parameters are defined, corresponding to lunar phases of up to 1/3, between 1/3 and 2/3, and over 2/3. The parameters are set based on prior experience to exclude occultation events which cannot usefully be observed.

TOTAL OCCULTATIONS

Three hundred and nineteen occultations are predicted for 1995. This covers most stars down to approximately magnitude 10.0 (a few fainter stars are also included). The 13 events involving stars of magnitude 4.0 or brighter are detailed in table 1.

The circumstances detailed in table 1 have been calculated for the location of Orwell Park Observatory. However occultation times for nearby observers (say in Ipswich and Felixstowe) should differ by only a few minutes at most.

The first two columns of table 1 give the date and time (UT) of the occultation. Times are expressed to the nearest minute. (In the full set of predictions stored at Orwell Park Observatory, times are given to the nearest second.) 'D' denotes a disappearance event and 'R' a reappearance event. Both D and R times are listed for most occultations; however, where an event occurs under unfavourable observing circumstances, it is omitted.

Date	Time (UT)	Lunar Phase	Min Dist	Solar Alt (°)	Star Alt (°)	Star Mag	Star
12 Jan	D. 22:05 R. 23:11	0.86+	0.58N	-55	51	3.5	Epsilon Tauri
26 Jan	D. 05:34 R. 06:45	0.27-	0.05S	-15	15	2.6	Beta Scorpii
11 Mar	D. 22:53 R. 24:00	0.73+	0.31S	-40	36	3.6	Lambda Geminorum
18 Mar	D. 23:06 R. 23:46	0.95-	0.81S	-37	21	1.0	Spica
18 Apr	D. 03:58	0.90-	0.05N	-9	16	3.8	Nu Scorpii
12 May	D. 19:22	0.94+	0.89S	1	18	1.0	Spica
01 Jun	D. 21:13	0.11+	0.55N	-8	7	3.6	Lambda Geminorum
12 Jun	D. 00:56 R. 02:02	0.98+	0.08N	-12	10	3.8	Nu Scorpii
14 Jun	D. 23:06 R. 23:43	0.95-	0.84N	-14	13	4.0	Rho Sagittarii
08 Aug	R. 20:18	0.95+	0.82N	-7	16	4.0	Rho Sagittarii
19 Aug	D. 02:19 R. 03:00	0.40-	0.80S	-16	33	3.8	Delta Tauri
09 Nov	D. 03:52 R. 05:04	0.97-	0.15S	-23	37	3.8	Delta Tauri
09 Dec	D. 20:51 R. 21:58	0.93-	0.14S	-50	26	3.6	Lambda Geminorum

Table 1. Occultations during 1995 of stars of magnitude 4.0 or brighter.

The third to sixth columns of the table detail information relating to the time midway between D and R events, or relating to the D event only or the R event only when the other is omitted. The lunar phase (topocentric) is expressed as a fraction of unity; '+' implies waxing and '-' implies waning. The column labelled Min Dist lists the minimum distance, in lunar radii, of the star from the centre of the Moon, at the time of closest approach (midway between D and R events). Here 'N' indicates a North passage of the star and 'S' a South passage. The altitude of the Sun below the horizon and the star's altitude above the horizon are given in degrees, calculated as topocentric quantities. The final two columns of the table list the star's visual magnitude and name.

The brightest star occulted during 1995 is the magnitude 1.0 Spica (Alpha Virgo). It is in fact subject to two occultations, the first on 18th March and the second on 12th May. The second occultation will present a challenge for observers with large telescopes, as the sun will be slightly above the horizon at the time of disappearance.

All of the stars listed in table 1 are subject to at least two occultations during 1995. This offers the interesting prospect of investigating the effect of different lunar limb profiles (due to different libration angles) on the accuracy of predicted disappearance times.

Table 2 lists disappearance events predicted for faint stars with a very young Moon. These traditionally represent a challenge for observers with large telescopes. The table covers all disappearance events for which the following criteria hold:

- sun 10° or more below horizon,
- star 10° or more above horizon,
- lunar phase at most 10%.

The interpretation of the columns of the table is the same as for table 1, except that all the stars are too faint to be given proper names, and are therefore identified by their PPM Catalog numbers.

In addition to the events of table 2, the evenings of Christmas Eve and Christmas Day also offer many disappearance events of faint stars with a relatively young Moon (23 events over the two evenings with a phase less than 20%).

Date	Time (UT)	Lunar Phase	Min Dist	Solar Alt (°)	Star Alt (°)	Star Mag	Star PPM No
01 Feb	D. 17:43	0.04+	0.95S	-10	11	8.0	206268
01 Feb	D. 17:51	0.04+	0.87S	-11	10	7.8	206276
01 Feb	D. 17:53	0.04+	0.39N	-11	10	9.4	206275
03 Jun	D. 17:35	0.07+	0.25S	-14	11	8.6	238154
02 May	D. 20:31	0.08+	0.82N	-10	12	10.6	20476
02 Feb	D. 18:19	0.09+	0.49S	-15	17	10.7	81593

Table 2. Disappearance events with young Moon.

GRAZING OCCULTATIONS

Five grazing occultations are predicted to be visible from East Anglia during 1995, four of which take place during the last three months of the year. Astronomical circumstances of the grazes are detailed in table 3.

All data in the table relates to the time at which the graze track passes approximately closest to Ipswich. The first column gives the date of the graze, and the second details the approximate time (UT), to the nearest minute. The column headed 'L' indicates whether the graze is a North limb or South limb event. Column four details the topocentric lunar phase expressed as a fraction of unity; '+' implying waxing and '-' implying waning. The Sun's altitude, and the altitude and azimuth of the star are expressed in degrees in columns five to seven. The final two columns of the table list the star's visual magnitude and catalog number or name.

The brightest graze during 1995 concerns the star Alpha Cancri, of magnitude 4.3. This should be quite spectacular (weather permitting). More detailed plots of graze tracks will be produced nearer the date of each event.

Date	Time (UT)	L	Lunar Phase	Sun Alt (°)	Star Alt (°)	Star Azi (°)	Star Mag	Star
Fri 03 Feb	20:34	N	0.17+	-35	8	266	7.8	ZC6
Sat 14 Oct	05:15	N	0.73-	-10	54	212	6.7	ZC832 119 Tau
Mon 30 Oct	18:42	S	0.49+	-20	22	194	7.4	PPM 237425
Sun 19 Nov	05:22	N	0.15-	-18	18	127	7.0	ZC1817
Mon 11 Dec	23:30	N	0.80-	-60	27	107	4.3	ZC1341 Alpha Cnc

Table 3. Astronomical circumstances of grazing occultations.

Figure 1 illustrates the five graze tracks over East Anglia. The main towns passed by each are:

03 Feb: In direction due East, passing through South Norwich, then south of Brundall, and out to sea at Great Yarmouth.

14 Oct: In direction due East, passing through Silver End, Kelvedon, South edge of Abberton Reservoir, south of Brightlingsea, and out to sea at Clacton.

30 Oct: Through Clare, south of Bury St. Edmunds, through Beyton, south east of Norwich, east of Acle, and out to sea at Ormesby St. Margaret.

19 Nov: In direction from NW to SE, passing north of Eye, and north of Leiston, then out to sea.

11 Dec: In direction due East, passing north of Reepham, south of Aylsham, and out to sea south of Eccles-On-Sea.

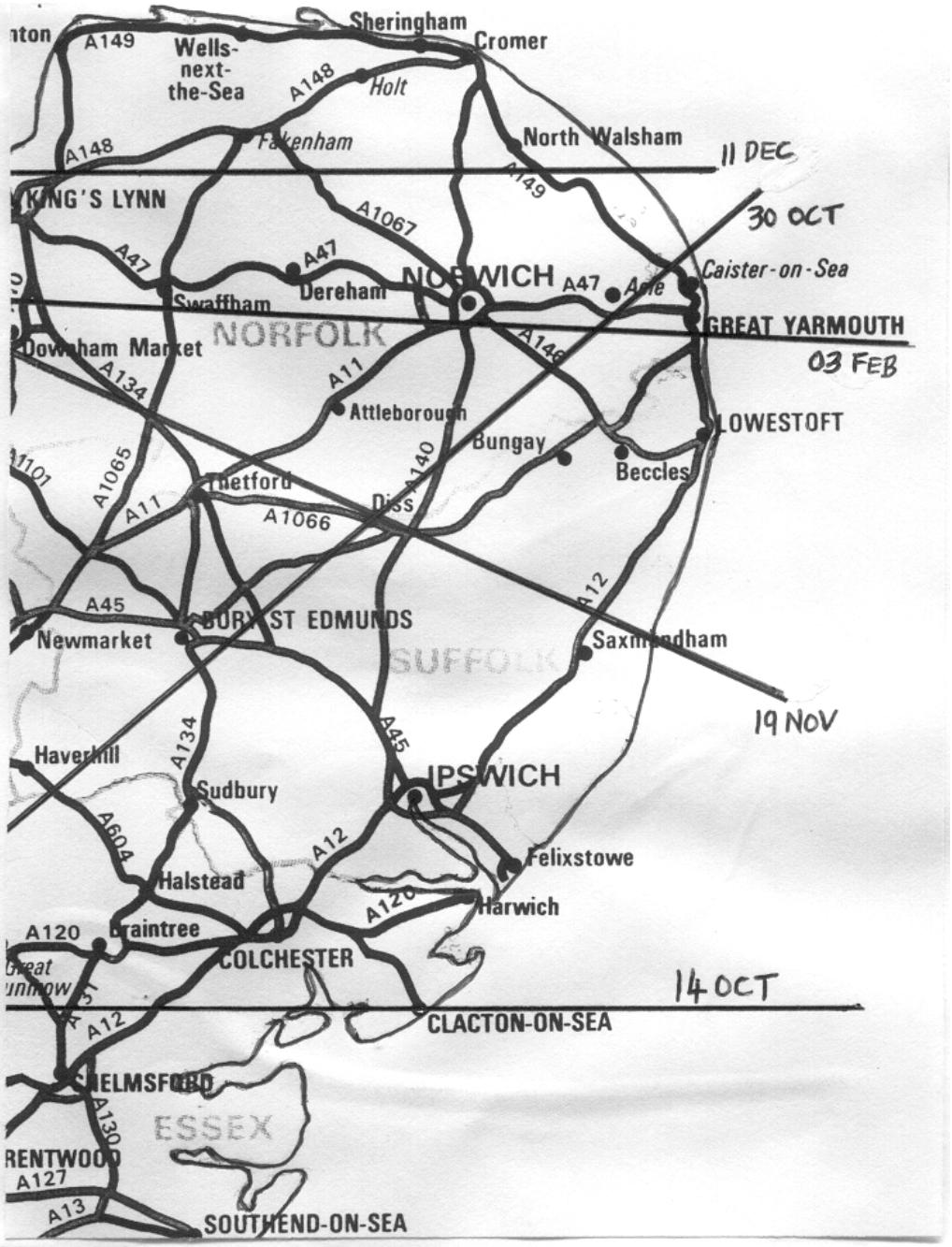

Figure 1. Tracks of grazing occultations during 1995.

SOCIETY NEWS

1995 AGM 14th January

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* The 1995 AGM will be held on saturday 14th January. All *
* members are invited to attend. The meeting will be held *
* in the room at the rear of the school library, *
* starting at 8.00 pm. *
*
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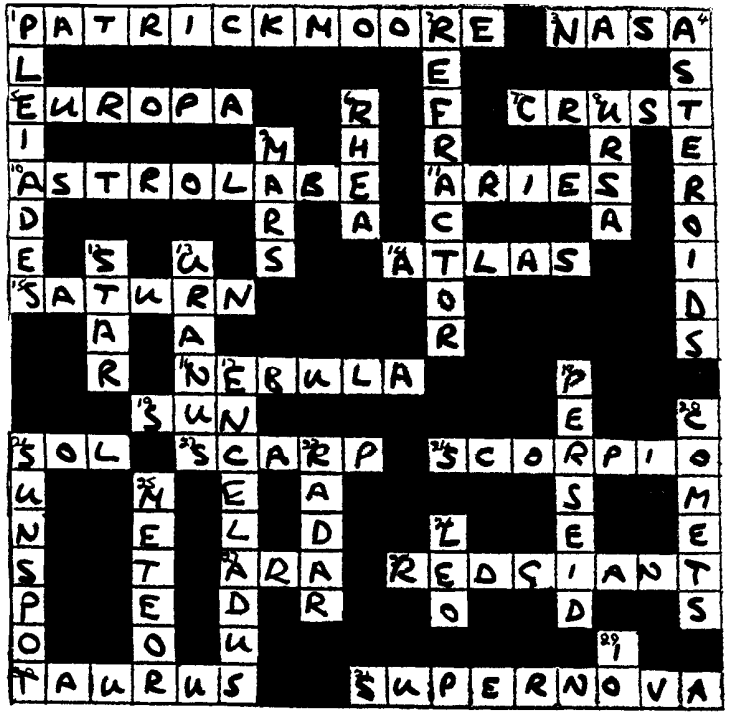
Answers For Last Months Crossword



PROGRAMME FOR JANUARY

DAYS & DATES	DIRECTORS	SECTION & ADDRESSES	PHONE INC. STD CODE
Mondays	from 7.30pm	GENERAL OBSERVATION SECTION	
2-9-16 23-30	Mr J King	Felixstowe, IP11 9LQ	
Tuesdays	form 7.30pm	GENERAL OBSERVATION SECTION	
3-10-17 24-31	Mr D Barnard	IP3 8RN	
	Mr J King	(Address above.)	(Number above)
Wednesdays	from 8.00pm	NEBULA & FAINT OBJECTS SECTION	
4-11-18 25	Mr M Cook	, Ipswich, IP4 5PZ	
	Mr D Payne	, Wickham Market, IP13 0SD	
Thursdays	from 7.30pm	OBSERVATORY VISITS FROM OUTSIDE GROUPS	
5-12-19 26	Mr P Richards	, Nacton, Ipswich, IP10 0HS	
Fridays	from 7.30pm (may be postponed to Saturday)	PLANETARY & LUNAR SECTION	
6-13-20 27	Mr P Richards	(Address above.)	(Number above)
	Mr G Marriott	Ipswich IP4 4JB	

All members are welcome to come but, on nights other than Wednesdays please check with directors that the observatory will be open. Directors will also be able to tell you if a group visit is taking place. All of the sections observe anything of interest but the title of each section suggests a popular subject.

Lectures and other events: **The 1995 Annual General Meeting**
The 1995 AGM will be held on Saturday 14th January 1995 , starting at 8.00pm. The venue will be in the class room at the rear of the schools library. All members are invited to attend this meeting.
Only one visit that I know of for this month and that is for January the 8th.

1994 COMMITTEE

			Home Phone:	Work Phone:
CHAIRMAN	D Payne	(Address above)		
MEMBERSHIP RENEWALS	M.Cook	(Address above)		
MEMBERSHIP SECRETARY	R.Gooding			
SECRETARY	R Gooding	, Ipswich, IP1 6AE		
TREASURER	M Nicholls	, Capel St Mary, Ipswich, IP9 2EX		
MAINTENANCE CO-ORD	M Cook	(Address above)		
JOURNAL CO-ORDINATOR	E Sims	, Ipswich, IP1 4HA		
PUBLICITY & VISIT CO-ORD	P Richards	(Address above)		
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