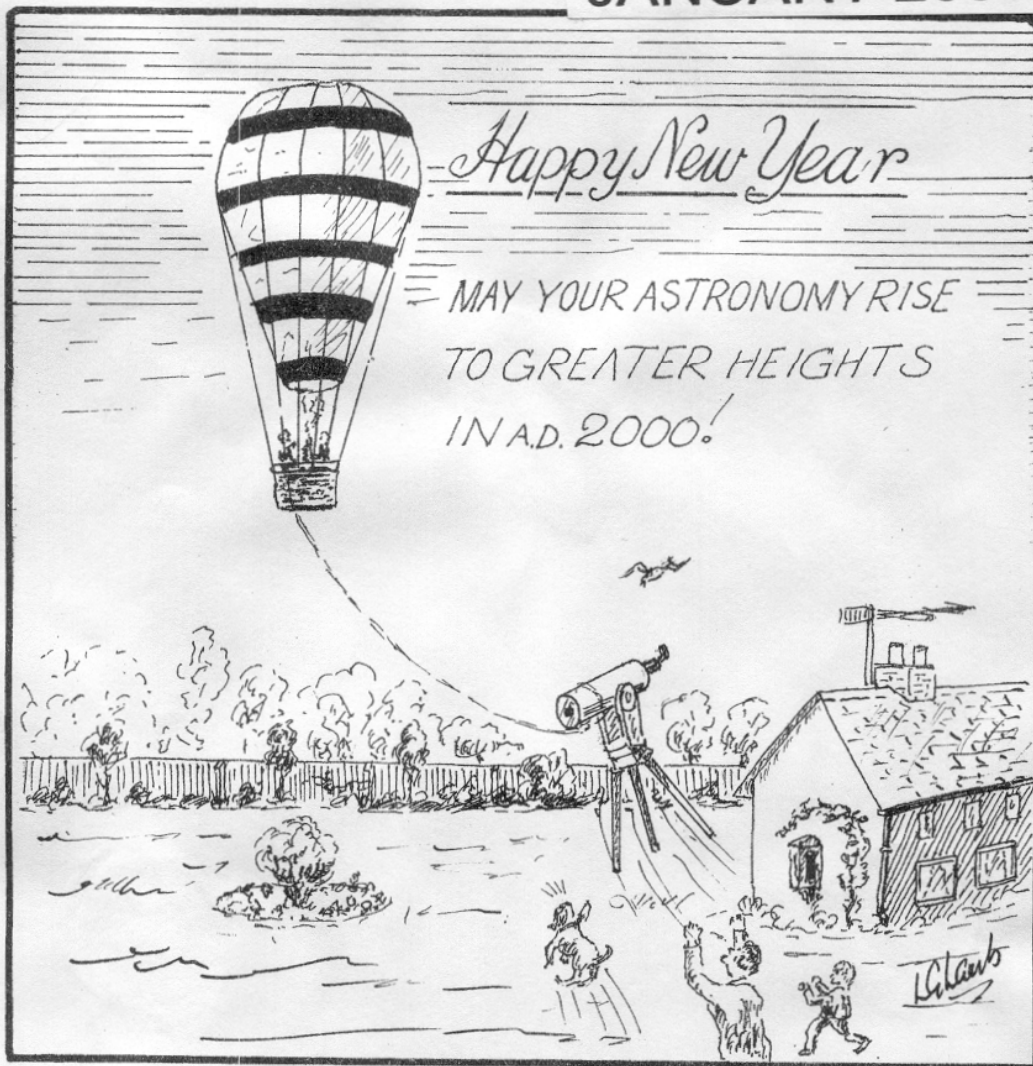


ORWELL ASTRONOMICAL

SOCIETY IPSWICH

Charity No 271313

JANUARY 2000



Society News

1

Annual General Meeting

The 2000 AGM will be held on Saturday 15th January form 20:00. The venue will be in the classroom behind the School library. If you are not sure where this is, please meet initially in the club room.

All members are invited to this meeting. The agenda will be the same as in previous years, with a review of the societies activities in 1999 and look forward to those in 2000.

2

Events for 2000 Provisional List

Event	Details	Date
AstroFest	Kensington Town Hall Hornton Street London	4 th & 5 th February
Lecture Meeting	Deep sky Exotica Friends Meeting House 20:00	11 th February
Lecture Meeting	21 st Century Astronomy Short talks by members 20:00 Friends Meeting House 20:00	11 th March
BAA Winchester Weekend		14 th to 16 th April
Lecture Meeting	Twinkle Twinkle Little (Neutron) Star Friends Meeting House 20:00	19 th May
BAA Exhibition Meeting	London Guildhall University	24 th June
Summer Excursion	No date fixed yet	
Open Weekend	No date fixed yet	October
Equinox Star Party	Thetford Organiser; Loughton A.S	25 th October
Christmas Meal	No date fixed yet	

This events list will be updated through the year.

3

Membership subscription for 2000

Subscriptions for 2000 will be due from 1st of January, for members who have not already paid. The rates for 2000. The rates for the new year will be:-

Junior & OAP	£9.00
Adult	£13.00
Family	£15.00

A renewal form is included with the January newsletter. It would be appreciated if you could return this so that the society membership records can kept up to date.

Please make cheques & P.O.'s payable to the:-

ORWELL ASTRONOMICAL SOCIETY (IPSWICH)

Please return all subscriptions to

Martin Cook
Ipswich
IP4 5PZ

Sun

The sun will be rising approximately between 08:10 to 07:50

The sun will be setting approximately between 16:00 to 16:40

Moon

New Moon	1 st Quarter	Full Moon	3 rd Quarter
6 th	14 th	21 st	28 th

Mercury

Mercury starts the New Year in the predawn sky. It will be at superior conjunction on the 16th before moving back into the evening sky.

Venus

Venus remains visible in the morning sky at magnitude -4.0

Mars

Mars will be visible in the evening sky until June. During this period it will be moving eastwards, keeping it relative to the sun, in the same part of the sky. Magnitude 1.0

Jupiter

Jupiter will be visible in the evening sky this month. It will be setting at about midnight at the end of the month. Magnitude -2.1

Saturn

Saturn remains visible in the evening sky this month. At the end of the month Saturn will be setting at 01:00. Magnitude 0.2

Uranus

Uranus will be setting at about 18:20 in mid month. Magnitude 5.9

Neptune

Neptune will be setting at about 17:20 in mid month. Magnitude 7.8

Meteor Showers

Name	Limits	Max	ZHR
Quadrantids	January 1 st to 6 th	January 4 th 04:00	100?

Meteor source is the BAA Handbook

Committee Meeting Summary

The last Committee meeting of the year was held on Saturday 27th November

- Subscription for this next year, 2000, will remain unchanged from the 1999 rates.
- Millennium telescope. The back surface has been polished flat during the summer. Mike Harlow agreed to take the mirror home to finish polishing the front surface. If any members wish to continue mirror making, two alternatives were discussed, either members could bring along their own mirrors, or a new society project could be started in grinding a 6" or 8" mirror.
- Purchasing a new modern telescope was discussed. At present this beyond society funds. Ken Goward volunteered to make enquires about obtaining a grant.
- The total membership of the society has now reached 100, if the 3 honorary Trustees are included. This is the largest membership the OASI has ever had.
- It was decided to try to encourage some of these newer members to become more involved in society activities e.g. starting new observing evenings and to help to produce enhanced Open Weekend displays.

Roy Gooding

LUNAR OCCULTATIONS DURING 2000

by James Appleton

This article provides a summary of the lunar occultations visible from East Anglia during 2000. The Orwell Park Observatory holds a comprehensive listing, containing full observational details.

There are many hundreds of lunar occultations which are potentially observable from East Anglia during the year, although many involve very faint stars. There are also two grazing occultations visible from East Anglia. The Moon does not occult any planets during the year as seen from the region.

The remainder of this article summarises the circumstances of the best occultations during 2000. It provides details for the location of Orwell Park Observatory; however, differences will in general be negligible for locations throughout East Anglia.

OCCULTATION PREDICTIONS

I use a complex suite of computer software to predict occultation events. The software models the motion of the Moon through the sky in great detail, and by comparing the position of the Moon at each instant of time with the co-ordinates of all stars within a narrow band of the ecliptic, it evaluates the precise time at which occultation events occur. Once the time of an event is known, the software runs additional algorithms to calculate other key astronomical details.

The software is based on the algorithm *Occult in Astronomy On The Personal Computer*, 2nd edition by O.Montenbruck and T.Pfleger, Springer-Verlag, ISBN 0-387-57700-9. However, I have added numerous enhancements to improve accuracy and to filter out predictions occurring under unfavourable circumstances. The software now uses the ephemeris DE-405 to provide the position of the Moon and the Hipparcos star catalogue to provide stellar positions. DE-405 is the latest high-accuracy reference ephemeris created by the NASA Jet Propulsion Laboratories. The European Space Agency used data from the Hipparcos stellar mapping mission to create the Hipparcos star catalogue; at the present time, it represents the last word in astrometric accuracy.

The software uses IOTA's electronic Watts charts to correct predicted timings for the local lunar limb profile. (This typically makes a difference of several seconds.)

BRIGHT OCCULTATIONS

Seventeen of the favourable occultations during the year are brighter than magnitude 5.0, and so should be readily visible in small telescopes or binoculars. Table 1 lists the circumstances of these events.

D or R	Date & Time (UT)	Lunar Phase	Sun Alt (°)	Star Alt (°)	Min Dist (rad)	Star Name / Catalogue No.	Mag
D R	11 Jan 18:08 18:45	0.22+ 0.22+	-18 -24	22 18	0.85N	psi 1 Aqr	4.2
D R	11 Jan 18:49 19:53	0.22+ 0.22+	-24 -34	18 10	0.34S	psi 2 Aqr	4.4
D R	15 Jan 21:52 22:41	0.64+ 0.65+	-50 -55	36 29	0.68N	mu Cet	4.3
D R	11 Feb 20:10 21:11	0.37+ 0.37+	-29 -38	32 23	0.38S	ksi 2 Cet	4.3
D R	16 Feb 00:20 26 Feb 01:36	0.82+ 0.60-	-51 -43	37 9	0.22S 0.62N	nu Gem gamma Lib	4.1 3.9
D R	12 Mar 22:16 23:15	0.45+ 0.46+	-36 -40	27 18	0.02S	104 Tau	4.9
D R	13 Mar 20:28 21:35	0.56+ 0.57+	-23 -32	51 42	0.27S	chi 2 Ori	4.6
D R	14 Mar 19:49 21:02	0.67+ 0.68+	-18 -28	58 54	0.11N	zeta Gem	4.0
D R	09 Apr 22:43 23:24	0.31+ 0.32+	-28 -30	15 9	0.63N	chi 1 Ori	4.4
D	10 May 00:01	0.40+	-20	9	0.27S	delta Cnc	3.9
D	11 Jul 23:53	0.82+	-16	8	0.05N	theta Lib	4.1
D R	21 Aug 02:29 03:37	0.68- 0.68-	-18 -11	41 45	0.39S	ksi 2 Cet	4.3

Cont...

-5-

D R	23 Aug 23:58 24 Aug 00:10	0.36- 0.36-	-27 -27	7 8	0.97S	104 Tau, m Tau	4.9
D R	13 Nov 02:05 02:58	0.98- 0.98-	-46 -38	52 47	0.68S	delta 1 Tau	3.8
D R	01 Dec 16:40 17:40	0.27+ 0.27+	-8 -16	18 16	0.69N	eta Cap	4.8
D	08 Dec 17:20	0.91+	-14	25	0.21S	87 Cet, mu Cet	4.3

Table 1. Occultations of stars brighter than magnitude 5.0.

The first column of table 1 denotes the phenomenon: 'D' denotes a disappearance and 'R' a reappearance. Both D and R times are listed for all occultations except where one or the other would occur at too low an altitude to be easily visible. Column two gives the date and time (UT) of the occultation. Column three details the lunar phase as a fraction of unity ('+' denoting waxing and '-' denoting waning). Columns four and five give the altitude of the Sun and the star, both in degrees. (A negative solar altitude implies that the sun is below the horizon.) Column six gives 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. Columns seven and eight provide the star's name, catalogue number and magnitude.

OCCULTATION SEASONS

The Moon's orbit is defined by a range of periodicities, both short and long term. The short term periodicities mean that the Moon's path through the sky tends to follow a pattern whereby it almost repeats itself every month. However, the longer term periodicities gradually shift the orbit so that no particular pattern of approximate repetition can last more than a few years. This results in so called "occultation seasons", lasting for some years, during which particular stars are repeatedly occulted. We have recently left an occultation season of Aldebaran (α Tauri) and are now in a season of several years where no first magnitude stars are occulted.

NIGHTS WITH MANY OCCULTATION EVENTS

During the year, the Moon traverses some rich star fields. When this happens, a large number of occultations can occur during a single evening. Table 2 lists all evenings throughout the year when the Moon occults more than 10 stars; many of

-6-

these evenings are associated with the passage of the Moon through the rich star fields of Taurus.

Date	No. occs.	Date	No. occs.	Date	No. occs.
Tue 11 Jan	12	Wed 12 Jan	12	Thu 13 Jan	15
Thu 10 Feb	11	Fri 11 Feb	23	Sat 12 Feb	15
Thu 09 Mar	11	Fri 10 Mar	14	Sat 11 Mar	23
Sun 12 Mar	16	Mon 13 Mar	11	Sat 08 Apr	15
Sun 09 Apr	58	Mon 10 Apr	54	Wed 12 Apr	14
Sat 06 May	13	Sun 07 May	37	Mon 08 May	34
Tue 09 May	36	Mon 05 Jun	18	Thu 08 Jun	11
Wed 04 Oct	19	Thu 02 Nov	13	Fri 03 Nov	23
Wed 29 Nov	11	Fri 01 Dec	16	Sun 03 Dec	17
Sun 31 Dec	13				

Table 2. Evenings with more than 10 occultations.

GRAZING OCCULTATIONS

The paths of two grazing occultations pass close to Ipswich during 2000. Table 3 summarises the circumstances.

Date	Time (UT)	Lunar Phase	Sun Alt (°)	Star Alt (°)	Star Azi (°)	Limb	Star	Mag
30 Jan	04:03	0.33-	-33	10	133	N	ZC2280	6.5
08 May	21:34	0.29+	-15	24	190	S	ZC1150	5.1

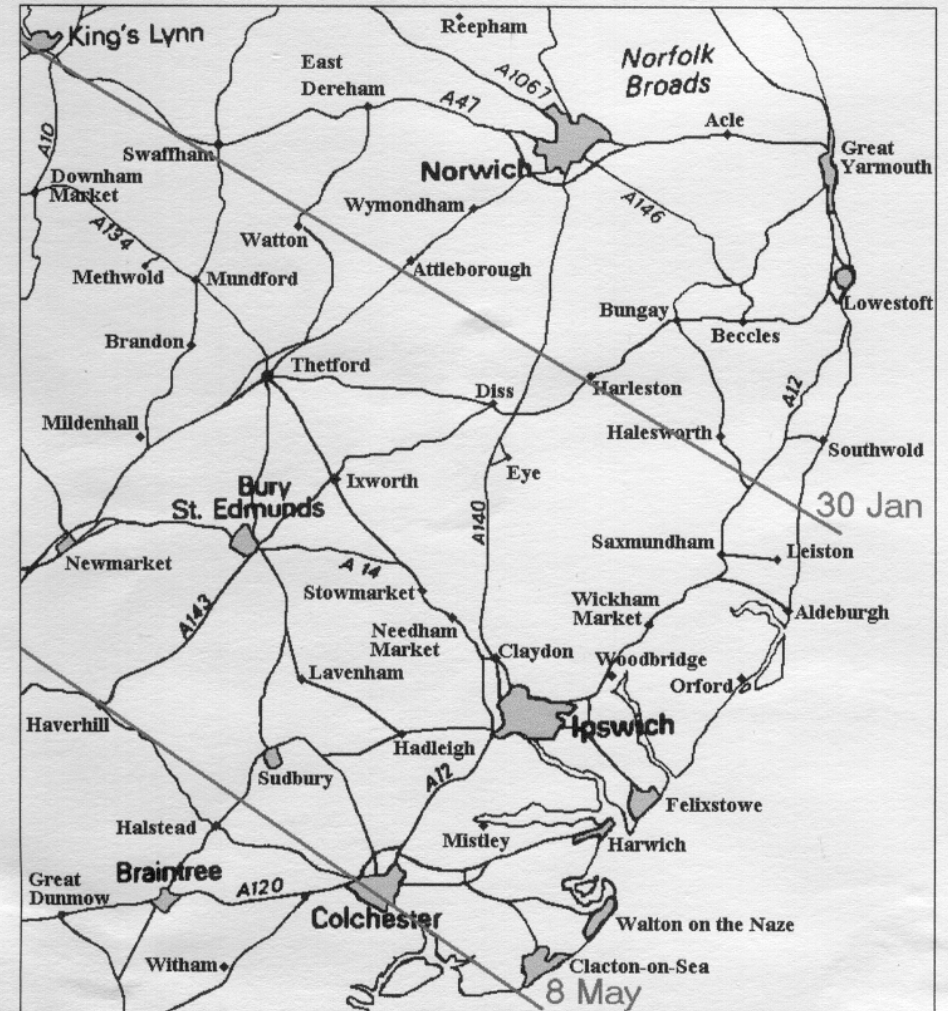
Table 3. Grazing occultations.

The first two columns of table 3 give the date and time of the graze. Column three gives the lunar phase (- for waning and + for waxing), while column four gives the altitude of the Sun (below the horizon). Columns five and six give the position of

the star. Column seven details the lunar limb which grazes the star, while the final two columns detail the star and its visual magnitude.

The graze of 30th Jan occurs with the star at relatively low altitude, which will cause the usual observational difficulties. The graze of 8th May appears more promising.

The following figure illustrates the graze tracks in outline. I will calculate more detailed tracks later if there is any interest in mounting observing expeditions.



OCCULTATIONS DURING JANUARY 2000

The table lists stellar occultations which occur during the month under favourable circumstances. The data relates to Orwell Park Observatory, but will be similar at nearby locations.

D or R	Date & Time (UT)	Lunar Phase	Sun Alt (°)	Star Alt (°)	Min Dist (rad)	Star	Mag
D	11 Jan 18:08	0.22+	-18	22	0.85N	psi 1 Aqr	4.2
R	18:45	0.22+	-24	18			
D	11 Jan 18:49	0.22+	-24	18	0.34S	psi 2 Aqr	4.4
R	19:53	0.22+	-34	10			
D	15 Jan 21:52	0.64+	-50	36	0.68N	mu Cet	4.3
R	22:41	0.65+	-55	29			
D	16 Jan 20:25	0.75+	-38	51	0.07S	ZC 526	6.7
D	17 Jan 18:34	0.84+	-21	47	0.61N	Hip 21365	6.7
D	19 Jan 01:34	0.93+	-54	37	0.42N	ZC 888	6.0
D	19 Jan 02:37	0.93+	-47	28	0.00S	57 Ori	5.9
D	20 Jan 22:37	1.00+	-54	55	0.93N	85 Gem	5.4
D	30 Jan 03:56	0.32-	-34	9	0.98N	ZC 2280	6.5
R	04:09	0.32-	-32	11			
D	30 Jan 05:44	0.32-	-18	18	0.26N	49 Lib	5.5
R	07:03	0.31-	-6	21			

The occultation of ZC2280 on 30th Jan is in fact visible as a northern limb graze from a track passing through King's Lynn → Swaffham → Watton → Attleburgh → Harleston → south of Halesworth → Dunwich. I will calculate a more detailed graze track if there is interest in mounting an observing expedition.

James Appleton

Binoculars - the balanced view.

The Astronomy Workshop for October and November set, and followed up an observing project. Members were invited to observe four objects, and report on their attempts, with equal interest given to difficulties as to success, as follows:

1. Jupiters moons - using the chart and information in Astronomy Now.
2. Mizar and companions in Ursa Major.
3. Epsilon Lyrae, in Lyra - the harp.
4. Beta Cygnai - Alberio - in Cygnus the Swan.

As these are potentially binocular objects, it raised the debate as to basic requirements, including information on suitable targets. This debate was carried through in theory and practice to the small telescopes nights, which take place on the Monday following the Wednesday workshop.

-9-

The choice of binoculars has to strike a balance between light gathering capacity [the object glass], magnification, weight, and cost. The weight factor introduces the question of a tripod. This is almost essential to do more than a sweep of the sky for a quick look, as even a little hand shaking over such distances makes detailed viewing impossible. And the arms ache less! If you have yet to buy the binoculars, it is worth seriously considering getting the tripod at the same time, and importantly, the means to mount the one on the other. A good camera/binocular shop will help you buy a suitable set-up. Ensure the tripod suits your standing height. Viewing from a seated position is possible, but can be more strain on the back and neck, and awkward to fit the tripod around your chair. [Any tips on seated viewing techniques would be welcome.]

Looking at objects directly overhead is still difficult even with a tripod. Les Lamb has made a binocular holder on a tripod using a mirror. To look up you look down through the bins to a mirror mounted on a pivot to see what is overhead. We hope to repeat an article on the construction in a later journal.

If you already own a suitable pair of binoculars, then the device to mount them on a tripod will depend upon the design of the former. Some have a tapped thread on the front into which an adapter can be screwed. If not, some can be secured via an adapter which grips the centre pivot. Otherwise you may need to be a bit inventive, or know someone else who is! A shop however may have a device on the shelf if you take your bins to try it.

Regarding magnification and size of object glass: Typical descriptive figures for binoculars are 7x50 or 8x40. The first number is the magnification, and the second the diameter of the object glass in millimetres. A magnification greater than 10 needs a large objective glass and will be big. Any objective below 40 will not gather enough light, and even with large magnification not efficient. A good pair of 7x50 is a fair compromise.

In practice it may be easy to pick out bright objects using bins, but less bright in a busy sky not so. Try experimenting with some white paint or thin tape on the front and rear of the pivot or the prism to give a sighting line.

-10-

When new to the game, some guidance on what looks good in binoculars helps. There are many books. Those which look at constellations one at a time, indicating double stars and nebulae give a structured approach. Patrick Moore's 'Exploring the Night Sky with Binoculars' is honest in saying what is possible and what may be more difficult. He also gives advice on choice of instrument.

Binoculars of course show objects as the eye sees them:- eg Mare Crisium on the moon is top right - whereas telescopes reverse things. Thus it may take some mental adjustment to use a telescope after mastering binocular viewing. But Binoculars have many advantages, and when you wish to see an object telescopically, then make a visit to the observatory on a Wednesday night, or on one of the monthly Mondays. See you there. Ted Sampson

Observing Programme For January

Dates	Observing Director	Activities
Mondays from 7.30pm	T Sampson	General Observation
Tuesdays from 7.30pm	G Coleman	Group Visits
Wednesdays from 8.00pm	M Cook D Payne	Nebular & Faint Objects
Thursdays from 7.30pm	G Coleman	Group Visits
Fridays from 7.30pm		Double Stars

All members are welcome on any night, but on nights other than Wednesday please check with the appropriate director that the observatory will be open.

Special Events

1. Annual General Meeting

The Annual General Meeting is to be held on Saturday 15th of January at 8.0pm in the room behind the school library. All members are welcome to attend.

2. Workshop

Wednesday January 12th 7.30pm Telescope making - an introduction; Neither difficult nor expensive!

3. Workshop

Wednesday February 9th 7.30pm. The mysterious moon - its movement and features.

4. Lecture Meeting

Nick Hewitt B.A.A. President "Deep Sky Exotica" at the Friends Meeting House Fonnereau Road, on Friday 11th February 2000 at 8.00pm. Admission free.

1999 COMMITTEE

	Home Phone	Work Phone
CHAIRMAN	D Payne	
SECRETARY & WORK PARTY ORGANISER	R Gooding	
TREASURER	M Harlow	
MECHANICS	M Cook	
NEWSLETTER CO-ORDINATOR	E Sims	
BEGINNERS MEETING CO-ORD	T Sampson	
DARK SKIES & VISIT CO-ORD	G Coleman	
EQUIPMENT CURATOR	J Walsh	
LIBRARIAN	J Appleton	
CO-OPTED MEMBER		
LECTURE CO-ORDINATOR	P Richards	
JOURNAL ARTICLES TO	E Sims	Ipswich Suffolk IP1 4HA
CORRESPONDENCE ADDRESS	R Gooding OASI Secretary	Ipswich Suffolk IP1 6AE
MEMBERSHIP	M. Cook	Ipswich IP4 5PZ

Society Contact Details

	Home Phone	Work Phone
Chairman	D Payne	
Secretary	R Gooding	
Contact details for the full committee are on the inside back page.		

e-mail queries: ipswich@ast.cam.ac.uk
 WWW address: <http://www.ast.cam.ac.uk/~ipswich/>