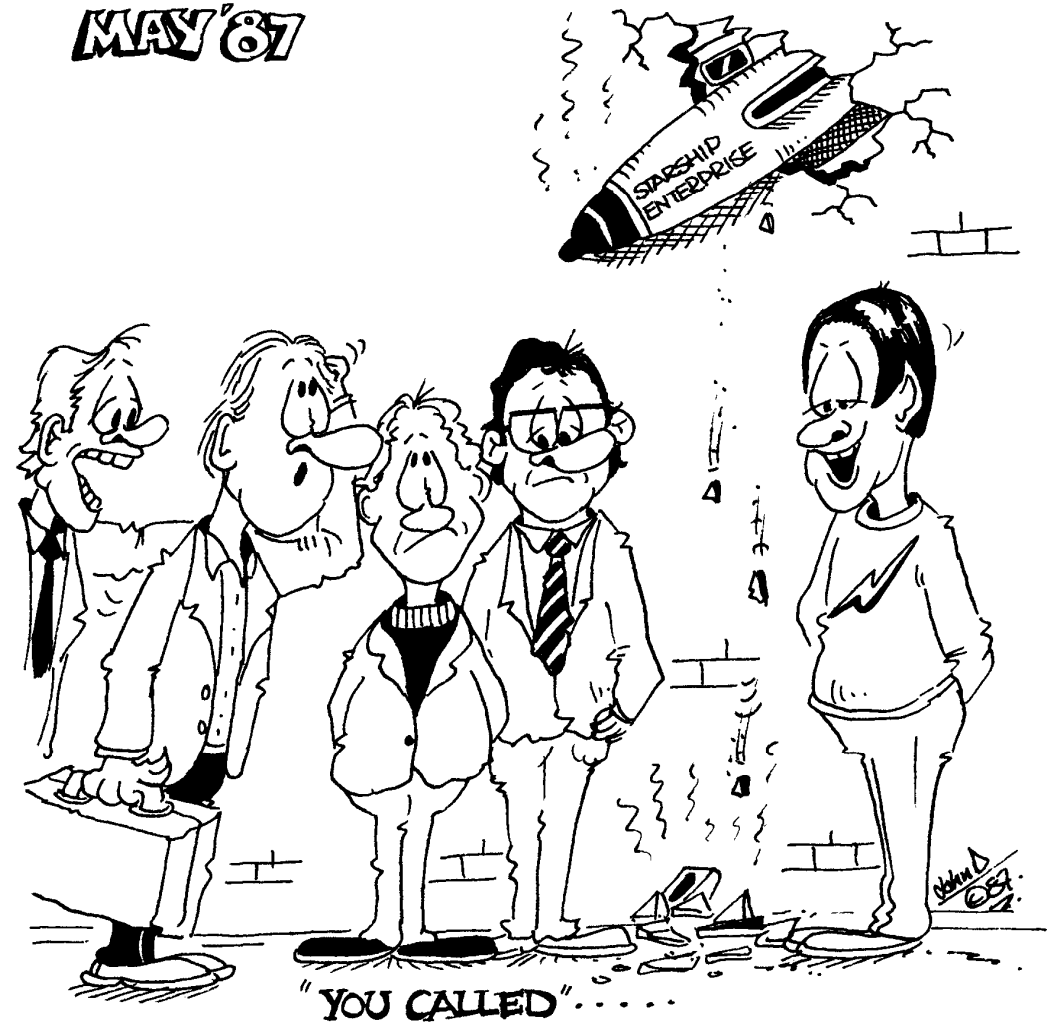
ORWELL ASTRONOMICAL SOCIETY (IPSWICH)

O.A.S.I.

MAY '87



SOCIETY NEWS

1. Open Weekend
   The annual fund raising open weekend will be between September 25 to 28th.
2. Committee Meeting
   Next meeting will be on Saturday 9th May at 7.30. Open to all members.

3. Astronomical Convention
   The Southern Area Group of Astronomical Societies will be holding a convention on Saturday 13th June at the Guildford Technical College. The days programme will include:- lectures, trade stands, films, various displays and demonstrations. Entrance fee is £1.50 for an adult and £1.00 for children, plus transport costs. Anyone interested in attending should contact Roy Gooding.

NIGHT SKY

(all times G.M.T.)

Sun Rises approximately between 04.40 - 03.50
Sets approximately between 19.30 - 20.10

Moon	6th	13th	20th	27th

Mercury	Superior conjunction on the 7th. Will be setting about 2 hours after the sun at the end of the month. Mag. -0.6 on 25th
Venus	Bright early morning object. Mag. -3.9
Mars	Sets between 23.00 and 22.00 during month. Mag. 1.7
Jupiter	Morning object rises about 1 hour before the sun. Mag. -2.1.
Saturn	Rises at about 21.30 in mid month. Mag. 0.1.
Uranus	Rises at about 22.00 in mid month. Mag. 5.8.
Neptune	Rises at about 23.00 in mid month. Mag. 7.7.

Roy Gooding

Choosing An Eyepiece **D Payne**

CONTINUED FROM APRIL

The exit pupil diameter is the diameter of the pencil of rays that emerge from the eyepiece when the telescope is pointed at a star and focused for infinity. The apparent field of the eyepiece is the angular diameter of the field stop observed when the eye is placed at the exit pupil position. The real field is the actual field of view of the sky observed to lie within the field stop.

For any given telescope there are bounds on the range of magnification that can be usefully employed. The minimum magnification of the telescope is determined by the diameter of the exit pupil. If this exceeds the diameter of the eye pupil then light collected by the objective is being lost and the telescope is not being used efficiently. The diameter of the eye pupil usually lies between 2 and 8mm depending on light levels and individual characteristics. If 8mm is assumed for a fully dark adapted eye then the maximum diameter of the exit pupil must also be 8mm.

Using M = D/d it follows that the minimum useful magnification M'must be:

$$M' = D/8$$

That is, the diameter of the objective in millimetres divided by 8.

There is also a corresponding upper limit of useful magnification determined by a combination of the resolving power of the objective, the increase of aberrations in short focal length eyepieces, reduction in eye relief and exit pupil diameter and reduction in image brightness for distended objects. An empirical expression for the maximum useful magnification, that takes into account these various effects is:

$$M'' = 29\sqrt{D}$$

This is fairly close to an often quoted limit of 2.5xD (D in milimetres) for small apertures but this latter expression is rather over optimistic for apertures of over 200mm.

These two curves are shown in fig. 1 and clearly the eyepiece being chosen should yield a magnification lying somewhere between these two extreme curves.

As a general guide, the highest magnifications as indicated by the upper curve in fig 1 would only occasionally be used when seeing conditions are very steady and the subject is high contrast such as observing close double stars. Planetary detail would generally require less magnification in order to increase contrast in the image. The lowest powers would be used against dark skies for large objects such as loose star clusters.

TABLE 1 Eyepiece Types

TYPE	POS OR NEG	APPARENT FIELD	EYE RELIEF	ABERRATIONS	TRANSMISSION	NOTES
Ramsden	Pos	40 - 50	0.25Fe	chromatic	83 - 90%	The Ramsden is not often used in the original form being largely superseded by the achromatic Ramsden.
Kellner/ achromatic Ramsden	Pos	45 - 60	0.3 to 0.45Fe	good	81 - 89%	The Kellner is often confused with the achromatic Ramsden but is not made today and differs slightly in design to the latter. A good relatively low cost eyepiece.
Plossl	Pos	40 - 50	up to 0.8Fe	good	79 - 87%	The Plossl has excellent eye relief, a flat field and good chromatic performance.
Orthoscopic	Pos	35 - 50	0.8Fe	excellent	83 - 90%	The Orthoscopic eyepieces are highly corrected with moderately wide fields. The excellent eye relief and freedom from aberrations combined with high light transmission make them highly suitable for high power work.
Erfle	neg	65 - 80	0.4 to 0.5Fe	good	70 - 84%	The Erfle eyepiece is best for low power, wide field work where they are unsurpassed. However the poorer light transmission can mean that a low power Orthoscopic should also be available if very faint objects are being searched for.

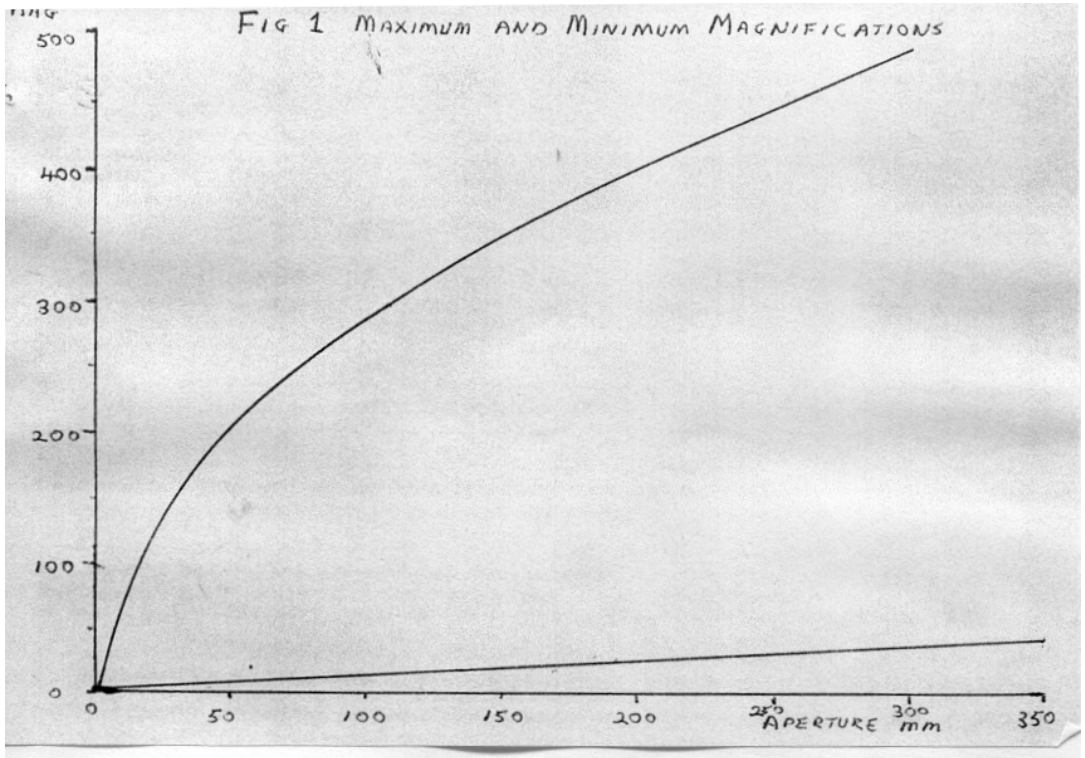


FIG 1 MAXIMUM AND MINIMUM MAGNIFICATIONS

Field of View.

The area of sky seen through the eyepiece is related to the magnification by:

$$M = Af/Rf,$$

Where Af is the apparent field and Rf is the real field.

The apparent field of an eyepiece usually lies between 40 and 70 degrees and depends on the eyepiece focal length and the diameter of the field lense or stop (the stop can limits the effective aperture of the field lense). The diameter of the field lense directly determine how much sky can be seen through the eyepiece for a given focal length objective.

Two stars lying angle Rf apart are separated by an amount:

$$d = Fo \tan(Rf) = Fo \times Rf \quad \text{(for small Rf)},$$

in the focal plane of the telescope objective. To see these stars within the field of view the field lense must be at least as large as d. It should be noted that the field of view Rf is dependant only on the focal length of the objective and, for a given size field lense (diameter d), the real field increases as the 06 focal length decreases (This is the real reason for short focal length rich field telescopes not the 'photoghaphic speed').

Eye Relief

The eye relief is the distance of the exit pupil or Ramsden disc from the eye lense and is the optimum position for the eye to be placed for observing. The eye relief can never be greater than the focal length of the eyepiece and hence reduces as the eyepiece focal length increases. This can become a problem when using high magnifications with short focal length objectives particularly for spectacle wearers. The use of a Barlow lens to increase the effective focal length of the objective can be used to over come this problem and allow the use of longer focal length eyepieces and still achieve high magnifications.

Eyepiece Types

Table 1 is a short list of the more readily available types of eyepiece with a brief discription of their properties:

Choosing an Eyepiece

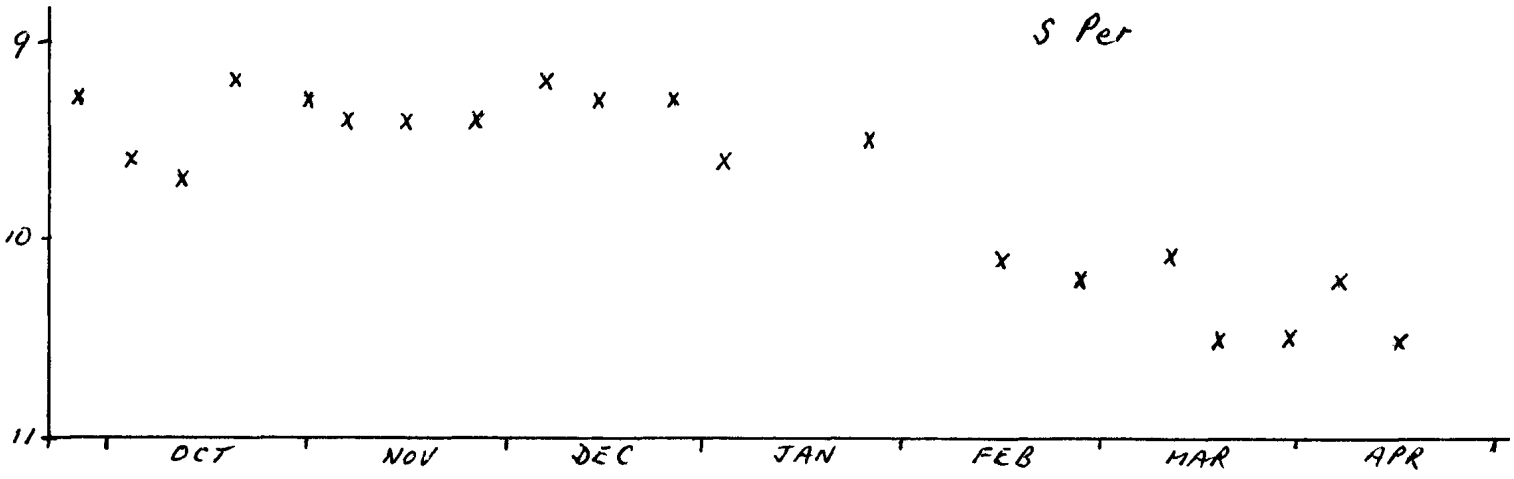
There is really no such thing as a general purpose eyepiece. Therefore when buying one the application should be carfully considered, the magnification and field of view required balanced against the various features of the different designs.

It is difficult if not impossible to give hard and fast recommendations for eyepieces but for what it is worth these are my opinions. Firstly spend as much as you can afford on a good quality eyepiece, remember it will last many years, if looked after, and can be considered an investment. I would recommend a low power Erfle for wide field work giving 3/4 degrees or more real field of view. For the medium to high power work I find orthoscopics give the best results of those listed in Table 1. Also a good Barlow lens (around 5cm negative focal length)is a useful addition. to an eyepiece set.

VARIABLE STAR OBSERVATIONS

by Mike Nicholls

This light curve is that of S Persei from September 1986 to April 1987. This is a semi-regular variable with a period of over 800 days, although it is thought that there are at least two periods present, superimposed on each other. The light curve shows that the period must be quite long; the star is becoming fainter over the seven month time scale shown.
S Persei is a large red supergiant associated with the sword handle cluster although not a true member of either. It has a light range of between about magnitudes 8.0 and 11.5.
All the observations were made using an 8" reflector.



PROGRAMME FOR MAY

MONDAYS from 8pm — 4, 11, 18, 25

DOUBLE STAR & PLANETS SECTION
Mr N Taylor, Farlands, Trimley, Tel:Fel.
Mr T Gillan, Bardwell, Bury St.Edmunds. Tel:0359
Miss M Edwards, Felixstowe, Tel:Fel.

TUESDAYS from 8pm — 5, 12, 19, 26

GENERAL OBSERVATION SECTION
Mr N Gage, Trimley, Tel: Fel.
Mr R Newman, Felixstowe, Tel: Fel.
Mr J King, Felixstowe, Tel: Fel.

WEDNESDAYS from 8pm — 6, 13, 20, 27

NEBULEA & FAINT OBJECTS SECTION
Mr M Cook, Ipswich, Tel: Ips.
Mr D Payne, Wickham Market, Tel:W.Mkt

FRIDAYS from 8pm — 8, 22

GENERAL OBSERVATION SECTION
Mr R A Lobbett, Felixstowe, Tel:Fel.
Mr J Hood, Ipswich. Tel:Ips.
Mr M Harlow, Felixstowe Tel:Fel.

On nights other than Wednesday please contact directors to confirm dates.

1987 COMMITTEE

CHAIRMAN	D Payne	Work:
		Home: Wickham Market, IP13 0SD
VICE CHAIRMAN /P.R.O	D Barnard	Home:
		Work: Ipswich, IP4 5PP
		Extn 2 Essex SS17 9BU
SECRETARY	R Gooding	Work: Ipswich
		IP1 6AE
TREASURER	M Nicholls	Home:
		Work: Capel St. Mary,
		Home: Ipswich, IP9 2EX
MAINTENANCE	M Cook	Home:
		Work: Ipswich, IP4 5PZ
JOURNAL CO-ORD	E Sims	Home:
		Ipswich, IP1 4HA
SOCIETY EVENTS	R Lobbett	WORK:
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LIBRARIAN	P Richards	Home: Rushmere St. Andrews