Computing Section

Longitudes of the central meridians of Jupiter and Saturn

The longitudes of the central meridians of Jupiter and Saturn given in the annual *Handbook* are based on the data below, which are all referred to the equinox J2000.0= JD 2451545.0= 2000 Jan.1.5. T is measured in centuries and d is measured in days, from J2000.0. All numerical values are given in degrees. In the equations W indicates the system (I, II, or III).

Observers of Jupiter should note that the rotation period for System III, in degrees per day, has recently been revised. As a result there is a discontinuity between the tables for 2006 and 2007 of about 1°.5.

The actual data for Saturn System II was obtained from the Association of Lunar & Planetary Observers as the equation: System II= System III +1.2061(JD–2447908) (degrees per day). This suggests that the rotation rate of System II has been measured relative to System III to four decimals of a degree, many times more precisely than for System I. However, the expression for W2 in the table above was derived from this equation.

Central meridians

Several options are open to those who calculate tables giving the actual figures for each day of the year. They may use Universal Time, Terrestrial Time or possibly even Atomic time. In addition they may choose to give the central meridian of the geometric disk or of the illuminated disk, though the difference between these two never amounts to more than 0°.6. As observers will be recording their observations in Universal Time it seems logical for Universal Time to be used as the time argument for the tables. Also the geometric disk is used rather than the illuminated disk. These facts are clearly stated in the *Handbook*. Observers should be very careful if they obtain data from sources which do not state clearly which time system is being used. Also, if the source does use Terrestrial Time then a correction would be necessary before using it with an observation made in Universal Time.

If observations can be made with a timing accuracy of better than 1 minute then it should be noted that the tables in the *Handbook* can be used to obtain increased accuracy in the longitude of the central meridian, particularly now that the table 'Change of longitude in intervals of mean time' gives values to two decimals of a degree.

G. E. Taylor, *Director*

Jupiter

Direction of N.pole, RA 268.05 –0.009T, Dec. 64.49 +0.003T

			Possible error (°) per rotation	*Possible error (°) per year*
W1 =	67.1	+ 877.90d	0.005	4.45
W2 =	43.3	+ 870.27d	0.005	4.41
W3 =	284.95	+ 870.536642d	0.0000005	0.00044

Saturn

Direction of N.pole, RA 40.859 –0.036T, Dec. 83.537 –0.004T

W1 =	227.2037	+ 844.3d	0.05	42.83
W2 =	105.4857	+ 812.0d	0.05	41.19*
W3 =	38.9	+ 810.7939024d	0.00000005	0.000041

*If a figure of 1.2061 degrees per day relative to System III is used then the possible error relative to that system is only 0°.0412.

mula used by Spencer Jones in his classic *General Astronomy* is:

Distance to the horizon in miles
$= \checkmark 1.5 \times H$

where H is the height above sea level in feet. An adjustment for atmospheric refraction increases the distance by approximately 8%. Taking refraction into account the height should be multiplied by 1.75 instead of 1.5. (This factor decreases slightly but progressively with increasing altitude, but is adequate for most estimations.) Applying the above to the peaks in question it is clear that Mt Aconcagua cannot be seen from Paranal.

Cerro Paranal is 8645ft [2635m] above sea level, so its horizon is therefore $\checkmark 1.75 \times 8645 = 123$ miles away (198km). Using the same formula, Volcan Llullaillaco at 22,057ft has a horizon 196 miles away (316km). The aggregate of 198+316= 514km would indicate that this mountain is well within Cerro Paranal's horizon.

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V2362 Cygni: a 2006 nova in Cygnus

Cygnus has proved a happy hunting ground over the years for nova searchers based in the northern hemisphere. However a new object found by H. Nishimura of Japan[1,4] in April 2006 has proved elusive to UK-based observers.

It was first recorded at magnitude 10.5 on 2006 April 2.807UT on twin photographs secured with a 200mm telephoto lens using Kodak T-Max 400 film, and was located at: RA 21h11m32s, Dec +44°48'02" (equinox 2000.0). This meant it was very badly placed for UK observers, sitting very low down in the northern sky in early evening. Even worse, as skies became dark much later each evening in the coming months, the object was under-observed. Aside from its position, many transient objects do seem to attract attention at outburst but follow-up observations rely on a small band of observers, including those associated with the UK Nova/Supernova Patrol. Cer-

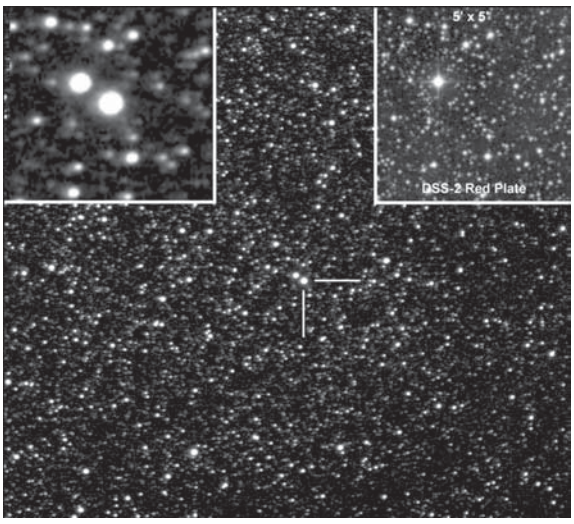

Figure 1. I-filter image of V2362 Cygni of 2006 April 5, with DSS-2 red plate for comparison. 6cm refractor with SXV-H9 CCD, integration 63 min. *Richard Miles*.

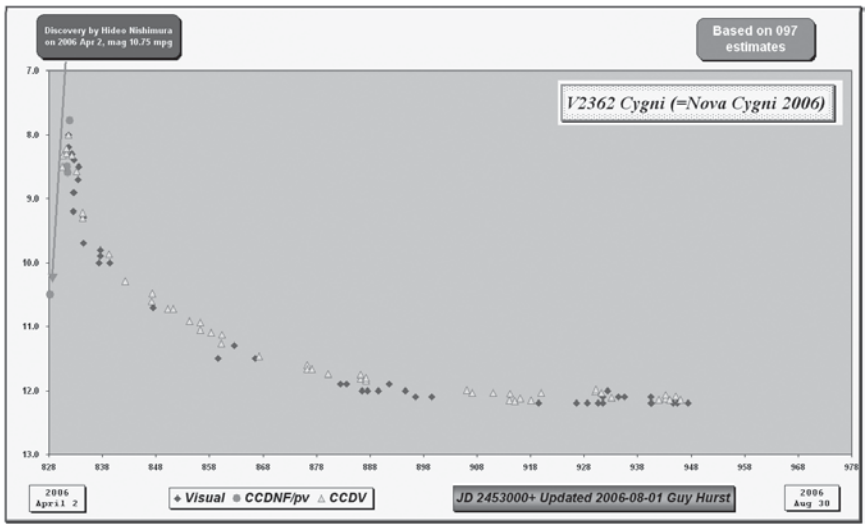

Figure 2. Lightcurve of V2362 Cygni from discovery to 2006 August 1.

tainly the lightcurves generated are of considerable value in the research of these objects.

Richard Miles confirmed the object on April 4.995UT and obtained a V value of magnitude 8.5. The precise position gave end figures of RA 32.34s Dec 03.9". There was a magnitude 14 star nearby but it seemed unlikely this was the progenitor; recent images by David Boyd confirm this.

K. Kinugasa, Gunma Astronomical Observatory, using a 1.5m telescope around April 5.8UT to obtain a spectrum,[2] confirmed it was a classical nova then near maximum light.

Although initially named 'Nova Cygni 2006', such objects normally receive permanent variable star designations quite quickly and N. N. Samus of the Russian Academy of Sciences assigned it as V2362 Cyg.

Further attempts to establish which star was the progenitor were made by Hitoshi Yamaoka of Kyushu University but when current images show an enlarged disk this often masks existing stars very close to the nova. Even with the benefit of numerous sky plates, comparison is very difficult. Provisionally a star of red magnitude 18 was found very close to the nova's position, inferring an amplitude of about 10 magnitudes, but whether this is the progenitor remains uncertain.[3] Richard Miles also investigated candidates from his image shown in Figure 1 but could not find a candidate on the DSS-2 red plate with any certainty.

At the time of writing, the lightcurve (Figure 2) is based on a compilation of 97 estimates reported by observers from *The Astronomer,* BAA and also some V-measures by Japanese observers listed on the *VSNET* newsgroup, primarily K. Nakajima and H. Maehara. During the latest 50 days plotted, the decline has virtually stopped near magnitude 12 so, coupled with Cygnus now being well placed in the northern sky, this presents an excellent opportunity for more people to monitor the next stage in this nova's activity.

The chart (Figure 3) shows stars to about magnitude 14 and the sequence in Table 1 is from V measures by Richard Miles and David Boyd. A regularly-updated lightcurve is being maintained on the website of *The Astronomer* to act as feedback to observers, and can be found at **http://www.theastronomer.org/vars/2006/V2362CygLC.gif**

Please send monthly reports, preferably by e-mail, quoting dates, times, full estimate, magnitude, class and instrument, together with your full name to the undersigned.

Table 1. Sequence (V measures) of V2362 Cygni

A	10.15	E	12.51
B	10.90	F	12.79
C	11.27	G	12.91
D	11.63	H	13.13

BAAVSS reference for this sequence: N/051.01

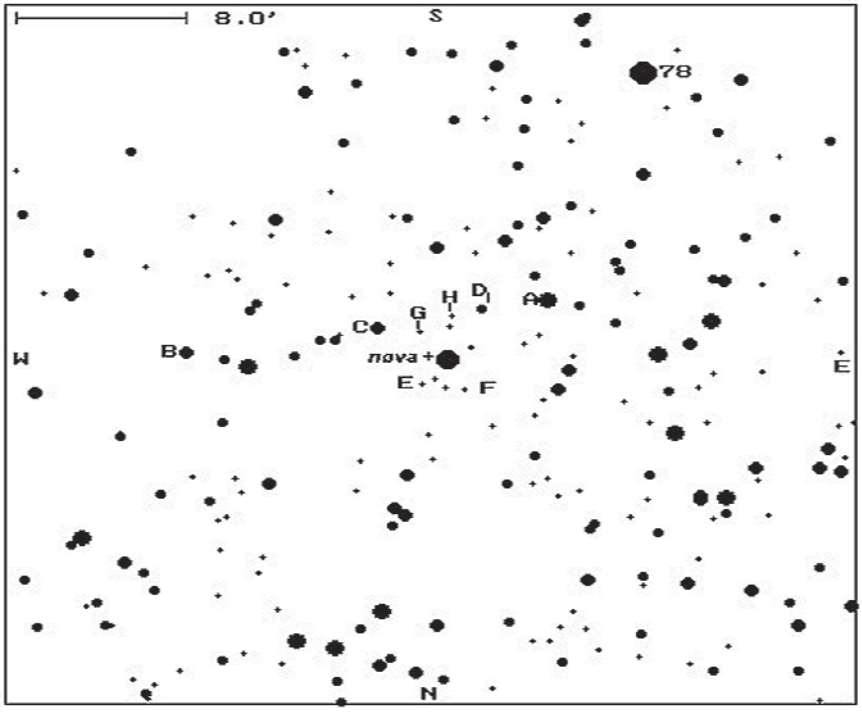

Figure 3. V2362 Cygni field chart prepared by Guy Hurst from a V sequence by Richard Miles and David Boyd.

Guy M. Hurst, *Co-ordinator, UK Nova/Supernova Patrol. [guy@tahq.demon.co.uk]*

1 Green D. W. E., *IAUC* 8697 (2006 April 5)
2 Green D. W. E., *IAUC* 8698 (2006 April 5)
3 Green D. W. E., *IAUC* 8702 (2006 April 13)
4 Hurst G. M., *The Astronomer Electronic Circular* 2216 (2006 April 5)

Observing the galaxies of the 'Local Group'

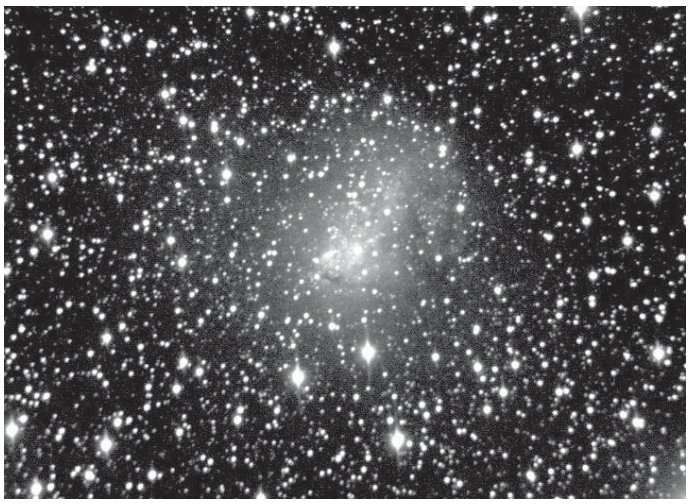

Image of IC10 by Grant Privett, Lower Eccleton, Herefordshire. 10-inch (25.4cm) f4.3 Newtonian and Starlight Xpress MX716 CCD camera. 150×30s exposures taken in batches of 50 with 10 dark frames between each batch. Each batch median stacked with resulting images added. Processing in Astro Art 3 and Paintshop Pro.

The Deep Sky Section has a programme to observe Local Group galaxies. This has something for everyone, from the visual binocular observer to the imager with a large telescope and sophisticated CCD equipment. Although there are over 40 galaxies in the group, the majority will probably be beyond the reach of amateurs. However, many are easy: M31 is a naked eye object from most rural locations, and M33 can be from a dark site. Other target galaxies in the programme include M32, M110, IC 10, NGC 6822, NGC 3109, NGC 185, IC 1613, NGC 147, the challenging Leo 1 and the even more challenging Leo II.

IC 10 is a good example of a galaxy that is challenging to observe but not impossible. It was discovered by Lewis Swift in 1889 from Warner Observatory, Rochester, New York with a 16-inch (40.6cm) refractor. Swift was a prolific discoverer of 'nebulae' and found over 700. He was also something of an inventor and invented a horse hay rake and an oxyhydrogen microscope before turning his inventive skills to improving the telescope.

IC 10 lies in Cassiopeia, so is well positioned in the northern autumn sky. Its coordinates are RA 00h20m 24.5s, Dec +59° 17'33" (2000.0). The visual magnitude of this irregular galaxy, which is very obscured by the Milky Way, varies in the literature from 11.2 to 13. It has a size of 6.6×5.3 arcminutes. It is this heavy obscuration that makes observing IC 10 an interesting challenge. Luginbuhl and Skiff in their *Handbook and Catalogue of Deep Sky Objects* (Cambridge 1989) find it faintly visible in a 15cm telescope. Maybe from Arizona, but almost certainly not from the UK. The Director and Owen Brazell, observing visually from Tenerife with a 24-inch (61cm) telescope last November, recorded it as a faint but distinct patch of grainy nebulosity.

An image of IC 10 by Section member Grant Privett is shown above. This was taken through a 10-inch (25.4cm) f4.3 Newtonian. Grant adds that from previous experience he expects the limiting magnitude of the image to be approaching 20.

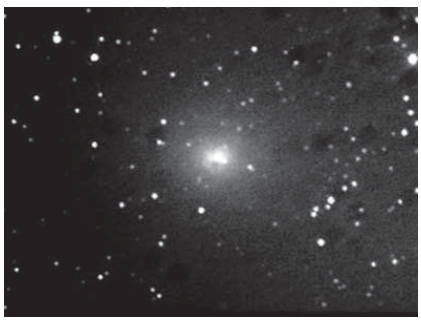

Image of NGC 185 by Bob Garner of Greenford, Middlesex. 25cm f6.0 Newtonian with home built CG245 CCD camera. This image is a summation of 60×120s exposures.

Drawing of NGC 185 by Stewart Moore, Thorpe-le-Soken, Essex. 30cm f5.3 Newtonian ×106. Field 38 arcmin. South up.

An easier local group target for the visual observer is mag 9.2 elliptical galaxy NGC 185. Discovered in 1787 November by William Herschel, it also resides in Cassiopeia, lying less than 1° west of mag 4.5 omicron Cass. Its position is RA 00h39m19s, Dec +48°22'10" (2000.0). Clearly visible in a 20cm telescope, it will appear very slightly elongated with a bright central core and diffuse edges – but smaller than its quoted size of 8×7 arcminutes. The image shown here was obtained by Bob Garner with a 25cm f6.0 Newtonian. As Bob lives in Greenford, Middlesex and only a few miles from Heathrow airport, it shows that you do not always need pristine sky to do deep sky astronomy. Also included here is a sketch by the Director showing the visual appearance of the galaxy through a 30cm Newtonian.

Stewart L. Moore, *Director, Deep Sky Section*