PERTH OBSERVATORY
Department of Conservation and Land Management

PERTH OBSERVATORY VOLUNTEER NEWSLETTER

April 1998

Editor: Bevan Harris

Editorial

A Happy Easter to all! A simple method of calculating the date of Easter is to determine when the first Full Moon occurs after the March equinox. Easter is then observed on the first Sunday to follow, which this year is the very same day, the 12th of April.

The first Sunday of next month is a busy one for the Observatory, as it will be a focus of attention during the annual National Science Week and the Bickley Valley Harvest Festival. Please see the notice in the adjoining column regarding how you can assist on this occasion.

Attached to the end of this newsletter is a list of procedures (courtesy of Greg Lowe) concerning the correct operation of the Meade 16" telescope. Would you please add this list to your Night Tour Manuals for future reference, as incorrect operation could result in damage to the instrument.

Highlights In The Sky

The Sun's recent passage northwards over the Equator means that there we now have more hours of darkness than hours of light, which is great for observing, so let's make the most of it! This month begins with Mercury, Mars and Saturn together in an apparent game of tag, buried deep in evening twilight just a few degrees from the Sun.

Speedy **Mercury** will be the first of the three to "catch" the Sun, passing through inferior conjunction on the 7th, to reappear in dawn twilight near mid month.

Mars remains out of sight, gradually closing on the Sun as it heads toward their meeting next month, while **Saturn** reaches conjunction on the 13th before reappearing low in the morning sky at the end of the month.

Venus remains a prominent object in the morning sky throughout the month, rising shortly before 0300 in the first week. As the month unfolds it rises progressively later, meeting and passing **Jupiter** which is rising out of morning twilight. This sets the stage for a spectacular pairing of the two planets as they pass through appulse (apparent close approach of two celestial bodies) a few days after last quarter.

Closest approach occurs on the 23rd, when the planets are separated by a mere 0.3°, however an attractive pairing will be visible for a couple of days either side of the event. The appulse will be highlighted by the presence of the waning crescent moon just 5° above, making it an event not to be missed!

If early mornings are not your style, why not try for a day time sighting of the appulse? It's easy enough to see Venus (mag -4.2) in daylight, especially with optical aid, but can you see Jupiter (mag -2.1) as well? Use the following table as a guide to locate them.

23/4	Altitude	Azimuth
0930	63°	0°
1200	46°	300°

The Sun will be at a safe distance more than 40° away, but if you do try, make sure you take common sense precautions and use a tree, building, or some other obstacle to obscure it (the Sun) from view.

Perth Observatory Open Day

The Perth Observatory Open Day is to be held in conjunction with the National Science Week and Bickley Valley Harvest Festival on Sunday 3rd May, 1998 from 10.00am to 10.00pm. Volunteers are required to assist us for 2-4 hour shifts. Please contact Jamie Biggs by Tuesday April 28th if you would like to be involved. If you are able to assist, or even if you are unable, why not involve your family in a day outing to explore our neighbours in the Bickley Valley?

Phases of the Moon	FQ: Saturday 4th	FM: Sunday 12th	LQ: Monday 20th	NM: Sunday 26th

Observatory News

Another Supernova was discovered on March 13th by Ralph Martin, Andrew Williams and UWA student Simon Woodings. It is called SN1998X and is located in the galaxy NGC6754, at RA 19h 11m, and Dec -50° 39m (2000.0). The discovery was confirmed on March 24th by astronomers at the European Southern Observatory, showing it to be a Type II, three months after explosion. This is the Observatory's third supernova discovery in 1998, after SN1998A and SN998E (which were reported in the February newsletter).

Hale Bopp: A Marathon Performance!

Comet Hale-Bopp is still visible up near the LMC - albeit around magnitude 9. This comet has broken all sorts of records - being brighter for the longest length of time than any other comet (although it wasn't the brightest comet ever) and it has been continuously observed for nearly 3 years.

Night Tour Attendance

Another creditable result was achieved with preliminary attendance figures for the March Night Tours totalling more than 500. Thank you to all staff, volunteer and full-time, who assisted us in attaining this result. Your efforts are sincerely appreciated.

Rewards for Superstar Performers

A reminder to those volunteers who are eligible for rewards under the Observatory incentive scheme. You only have until the end of the month (**30th April 1998**) to claim your reward. Details of rewards and those who are eligible to receive them are contained in the February newsletter. All the full-time Observatory staff thank you for your wonderful assistance and good company.

Tour Rosters

The tours for April are nearly fully rostered, with the exception of a newly allocated night - Tuesday April 21st. If you can slot into this night, please call the Observatory and get in your roster booking. There are also roster vacancies for volunteers on the nights of May 2nd, 5th, 6th, and (new night) 19th. The May tours will be the last until next October. Schedules for these are not yet available.

Practice Nights

Thanks to Greg for the training night on Monday March 23rd This was the last training night for this season. Tune in to later newsletters to find out when the training nights will be scheduled for next summer's run.

Night Tour Volunteer Meeting

An informal meeting will be conducted toward the end of May to discuss matters that have arisen this season. More details in the next newsletter

New Solar Telescope

As announced in the March newsletter, Technical Manager Arie Verveer has constructed a neat small solar telescope. Using redundant equipment, a 2" refractor has been mounted onto an 8" Meade fork mount so that it can be run to track the Sun. The image of the Sun is displayed on a screen behind the system. It has been safeguarded so that little heads cannot get behind the eyepiece, and also so that the Sun cannot be focused to a point. Both events could have disastrous consequences. This equipment was used by those who attended the Yanchep Festival - volunteer Lynley Hewett spent several hours showing off the sunspots to children.

Sunspots are easily visible - so long as there are some on the Sun - as is the limb darkening and scintillation around the edge of the image. As we approach solar maximum (in the year 2000), there will be ever more interest in looking at the Sun. Let's hope we get some aurorae to match those of 1989.

A Sense of Scale

According to Douglas Adams' *The Hitch Hiker's Guide to the Galaxy*, "Space is big. Really big." To put things simply, we call space "space" because it consists largely of, well... space. The concept of the incomprehensible distances of space was reinforced by the Apollo astronauts who were struck by how the Earth and Moon seemed tiny specks in an infinite, empty void.

So large are the voids that separate celestial bodies, that

it is necessary for most illustrations to exaggerate the size of the objects to avoid rendering them as invisible dots. Compared to most other moons in the Solar System (Pluto's moon Charon is a notable exception), the Earth's Moon is very large in relation to the planet it orbits, making it just barely possible to draw the Earth-Moon system to scale in a form that will fit on a single page.

The accompanying image (shown at a scale of 1:2,000,000,000) depicts the Earth at the left and the Moon at the right, as they would appear to an observer looking from the direction of the Sun when the Moon is at first quarter. Both worlds are fully illuminated (as is always the case when viewing from sunward, of course), and the Moon it at its maximum elongation from the Earth. Earth's orbital motion is toward the left, with the arrow at the top showing how far the Earth and Moon travel along their common orbit about the Sun every hour.

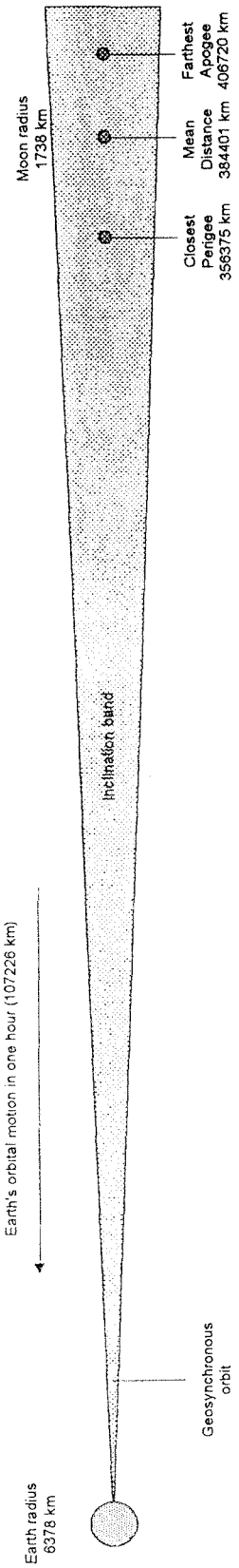
On this scale, all human spaceflight with the exception of the Apollo lunar missions has been confined to a region of 0.6mm surrounding the Earth. Even the orbit which geosynchronous communications satellites occupy is only a little more than a tenth of the way to the Moon.

The mean distance to the moon, 384401 km, is the semimajor axis of its elliptical orbit. The closest perigee in the years 1750 through 2125 was 356375 km on 4th January 1912; the most distant apogee in the same period will be 406720 km on 3rd February 2125 (have your camera ready!). These extrema are marked on the chart, although in reality extreme perigees and apogees always occur close to a new or full Moon, not at a quarter phase as illustrated here. The mean distance is not equidistant between the minimum and maximum because the Sun's gravity perturbs the orbit away from a true ellipse. Although the absolute extremes are separated by many years, almost every year has a perigee and apogee close enough to the absolute limits to be indistinguishable at this scale.

The Moon's orbit is inclined 5.145396° with regard to the ecliptic (the plane in which the Earth's orbit around the Sun lies or, more precisely, the plane in which the centre of gravity of the Earth-Moon system [its barycentre] orbits the Sun), so as seen from the centre of the Earth the Moon drifts up and down slightly more than five degrees in the course of each orbit. The grey wedge shows the limits of the Moon's excursion above and below the plane of the ecliptic.

The Moon's orbital inclination, combined with the inclination of the Earth's axis of rotation, causes the Moon's declination, as observed from the Earth, to vary between ±28.5° when the Moon's inclination adds to that of the Earth, and ±18° when the two inclinations oppose one another; the maxima and minima of declination repeat every 18.6 years, the period in which the ascending node of the Moon's orbit precesses through a full circle.

Adapted wholly from The Inconstant Moon, *a public domain document located on the Web at : http://www.fourmilab.ch /earthview/moon_ap_per.html*



If you have something to contribute to the newsletter, you can submit it to me via fax on (08) 9250 8240 or e-mail to <bmh@bigpond.com>. Alternatively, submissions may be pinned to the volunteer notice board for collection.

Thanks, Bevan

Setting Up and Shutting Down the 16-inch MEADE

Setting-up

a. Mains switch on, telescope power switch on.

b. Wait for display on hand paddle to show:

```
→   TELESCOPE
    OBJECT LIBRARY
```

.... and press ENTER.

c. Display on paddle should now be:

```
→   SITE
    ALIGN
```

.... select ALIGN
and press ENTER.

[n.b. If the cursor (→) is not against the option you want, you move it with the PREV (up) OR NEXT (down) key.]

*** Ensure the telescope mount is positioned so that there is slack in the umbilical cord (the power cable), i.e. both ends of the cable are on the north (control panel) side. Disaster can result if the 'scope was previously left parked 180° or so away from "home", with the cable extended. If necessary, use the E or W button to bring 'scope to correct starting position. ***

d. Display should be:

```
→   ALTAZ   √
    POLAR
```

.... press ENTER.

e. Display should be:

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1 Star or
2 Star Alignment
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.... press 1 to do a
one-star alignment, or 2
for a two-star alignment.

One-star alignment is faster and easier. Two-star alignment gives more accurate location of objects - recommended for use on faint objects, e.g. Centaurus A (NGC 5128), Sombrero Galaxy (M 104), etc.

From this point on, you ought to be able to work it out for yourself. Locating and centering your reference star/s, e.g. Sirius, Betelgeuse, Canopus, Acrux, etc. is a skill that comes with practice. Note that if you do a two-star alignment and INCORRECTLY identify one of the two reference stars, the 'scope won't find objects for you!

Shutting-down

To park the 'scope -

a. Set the altitude (N/S) to about 80° or so, **NOT** to 90° (the zenith)!! Peculiarities of the software and the altaz mount can cause bad hiccups if the 'scope points at the zenith!!!

b. Park the 'scope in azimuth (E/W) with the umbilical cord hanging free on the north side of the mount - the control panel side. This is VERY IMPORTANT - the cable must NOT be stretched out when you shut down, because it could then be *hyper*-stretched the next time the 'scope is turned on.

c. Turn off power switch on control panel, and turn off mains power.

Afterthoughts

If the telescope seems to be about to do something bad, like turn through more than 360° and tear out its umbilicus, SWITCH IT OFF!!!

The MODE button can be used to back-step through the menu, e.g. if you find you've lobbed into some field/ option/ function that you don't want.

With this type of computer-driven altazimuth mount, power failure means end of observing. You can't operate it manually in the way that you could with the 14-inch or the Calver. Don't undo the azimuth clamp! If the power goes off, just turn off both the power switches and tell one of the staff, and/or leave a prominent note on the 'scope.

..... that should just about keep you out of mischief, for now -

Fair skies, clear eyes - Greg Lowe.