august 2008

canopus

monthly newsletter of the johannesburg centre of assa

Old Republic Observatory, 18a Gill Street, Observatory, Johannesburg
PO Box 412 323, Craighall, 2024

Simon Walsh, winner of the ScopeX raffle, with his new GSO Dobsonian

contents

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notice of next meeting – assa johannesburg

The next monthly meeting of the Johannesburg Centre of the Astronomical Society of Southern Africa will be held at the old Republic Observatory, 18a Gill Street, Observatory, Johannesburg on Wednesday, 13 August 2008 at 20h00
Guest speaker:

Gary Els

Also featuring Professor Uwe Reimold

assa johannesburg calendar

Date	Event	Details
13 August	MONTHLY MEETING	Observatory @ 20:00 – Gary Els
6 September	Committee meeting	Observatory @ 14:00
10 September	MONTHLY MEETING	Observatory @ 20:00 – TBD
4 October	Committee Meeting	Observatory @ 14:00
8 October	MONTHLY MEETING	Observatory @ 20:00 – Trevor Gould
8 November	Committee Meeting	Observatory @ 14:00
12 November	MONTHLY MEETING	Observatory @ 20:00 – TBD

assa johannesburg committee members 2007/2008

Portfolio/Interest	Name	E-mail	Contact details
Chairman & Treasurer	Robert Groess	groess@gmail.com	083 365 8092 011 902 9293 (FAX)
Vice-chairman	Gary Els	gels@randwater.co.za	
Secretary	Alec Jamieson	arjam@iafrica.com	082 654 5336
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Editor of Canopus	Claire Lee	claire@cern.ch	084 508 6941
PR & Media Liaison	Sharon Tait	labelconnection@mweb.co.za	082 455 0819

ASSA Jhb. Library:

The library opens from 6 PM to 7:45 PM, before monthly meetings (8PM) held at the Observatory. The library is situated in the building behind the large telescope dome. Instead of parking in front of the telescope dome, one can drive round to the back of the telescope dome and park close to the library. The library is a good place for new members to come and introduce themselves and find out more about the society.

Telescope making classes:

ATM classes are held on the premises of Parktown Boys' High School on most Saturday afternoons.

chairman's report 2007/2008

by Robert Groess

In many ways this past year has been quite special. In many ways it has been quite exciting to be a part of the Johannesburg Centre of the Astronomical Society. We have had first rate guest speakers. A spectrum of activities. A dedicated committee. And much, much more.

Our tenuous relationship with our Landlords, SAASTA, continues on a very positive note. In what can be best described as a symbiotic relationship, we have offered the expertise of a number of our members which have done an absolutely stellar job of refurbishing the 26-inch Innes refractor, which now enjoys frequent use – weather and schedules permitting. The operational status of the historic instrument is due to the blood, sweat and tears of our members who have invested much passion and precious time in keeping the 26-inch operationally maintained.

Perennial highlights which this Centre offers to our members are activities to participate in and feel a closer sense of connection with the cosmos. No less than four "official" star-parties have been held over the past year to cater for this inexplicable sensation some of us get in wanting to look at the stars. With venues ranging from the convenient War Museum next to the Johannesburg Zoo – out to a private farm near the Suikerbosrand Nature Reserve, thanks to Mr. John Lee, who has a real gem of a property when it comes to star gazing in close proximity to town. These star viewing sessions reveal a real character unto their own. At the star party organised at the War Museum in July 2007, some interested hopeful star-gazers drove past the venue, saw the lights were turned off, and proceeded to head home again. Another thrill of adventure came in arriving at the Lee's farm, where the access road – better described as nothing more than a track – was so well camouflaged under the cover of night, army reconnaissance troops would have given it some of their best stealth ratings. The balance of the star parties were held at the War Museum, one later in 2007 and the forth was ScopeX itself on 24 May 2008.

On the topic of ScopeX, our premier public outreach event of the year, turned out to be another great success. Approximately 1500 visitors clocked in at this year's event which is some 35% more than last year's 1100. Our special guest, internationally renowned motivational speaker and world class astronomer, Professor David Block, delighted another capacity crowd in the main auditorium with his brand new presentation, Shrouds of the Night. More on ScopeX 2008 has been documented elsewhere and I won't go into further detail in this report, except to expressly thank the tireless Lerika Cross who has the time, commitment, energy and resolve to almost single-handedly coordinate an event of this magnitude. Special thanks also go out to our non-commercial sponsor SAASTA, who provide a great deal of the resources to conjure the event into reality. Many people and commercial sponsors all contribute to make the day greater than the sum of its parts – and

since the main focus of ScopeX is to let Astronomy come out tops, we will leave it to be exactly that.

Regular monthly meetings have acquired a loyal following and I would like to express on record that for every single meeting held since the beginning of 2008, I have had different people come up to me at each meeting complimenting the Centre for its smooth running as well as the calibre of invited guest speakers. It is feedback like this on which your society thrives. Furthermore, another diagnostic on the health of our society is the attendance register which gets circulated at every meeting. Please make sure your sign your name. We will not send you SPAM mail or harass you for doing so. Quite on the contrary, we use it to gauge how successful meetings are and then steer toward providing a better experience.

For the record, the following guest speakers have featured over the past 12 months. There are only 9, because December is the year-end party, the AGM did not boast a speaker, and one of our speakers fell ill:

Month	**Guest Speaker**	**Topic**
September	Dirk Vermeulen	Living among the stars at Jhb.
October	Dr. Cor Rademeyer	Chemical Spectroscopy
November	Prof. Carl Anhaeusser	The Setlagole Impact Crater
December		Year-end function
January	Prof. Roy Booth	Millimeter wave astronomy
February	Karel Nel	Astronomy & Art
March	Dr. Cecil Churms	From the outside looking in
April	Gil Jacobs	Astronomical odds and ends
May	Dr. Bob Argyle	The Webb Society, etc.
June	Michael Poll	The Origin of the Zodiac

Actions speak louder than words and at each of these events, your support has spoken loud and clear, averaging between 40 – 60 members at each meeting.

A further delight earlier this year was the popular beginners' course which was hosted by Gil Jacobs. Great feedback was received from this experience and also bolstered our membership with newcomers signing up. Oleg Toumilovitch also hosted a well attended astrophotography workshop where people learned how to get much more out of their little digital point and shoot cameras, by adopting tricks and techniques demonstrated by Oleg. Johan Smit, who we always welcome from Pretoria, has also given various enthralling presentations on how telescopes work, to audiences of various ages. Johan's talks are always well attended and his efforts are definitely noticed and commended.

To my outgoing committee, in no particular order, thank you Chris Stewart, Lerika Cross, Claire Lee, Alec Jamieson, Atze Herder, Oleg Toumilovitch, Kobie van Zyl, Chris Curry and Sharon Tait for your help and support to the Centre over the past year. Some of you

have decided not to run for re-election. Your presence will definitely be missed. We hope this does not mean goodbye, but merely "until next time".

And lastly, the only source of fun and fulfilment in the society comes from you. Membership for the year ended 30 June 2008 is summarized as follows:

Category	Number
Ordinary (incl. Family)	129
Pensioners	17
Corporate	2
Honourary	4
Gratuity	18
TOTAL	**170**

Whether you are on the committee, or simply support the society by virtue of your membership, the society lives and breathes through your input. I would like to thank you for having chosen me to chair this Centre of ASSA, and I offer myself for re-election to the committee for the new membership year.

Wishing you an astronomical 2008/2009!

Robert Groess ■

using the Innes telescope

by Bob Argyle

These are my personal impressions from a recent run on the telescope from May 15 to June 1 inclusive. The sky was clear most nights but bright, resulting from a combination of moonlight and neighbourhood lighting. Arrangements had been made with representatives of the Johannesburg Centre of the Astronomical Association of Southern Africa and SAASTA (Daphne Legwathi).

It took several nights to get the telescope into acceptable working order for a programme of double star measurement using the Repsold micrometer. The mounting plate for the micrometer could not be located so a new mounting plate/spacer was organized by Brian Fraser and with the help of Rodney Hyman fitted to the telescope on May 16. The illumination for the micrometer was organized by Chris Curry. Two other systems on the telescope, such as the Tel-Rad finder and the Dec circle illumination run from a battery and these needed to be recharged occasionally. It would be better to run these systems from the power supply in the mounting. One of the dec circle reading periscopes needs to adjusted - the field lens has probably been moved as the image in the eyepiece is out of focus. The

difference between the circle declination and the catalogue declination was as much as 1 degree in places.

The RA circle was not used to locate stars because the circle does not read RA but ST. Moving the telescope appears to move the circle when it should not. Is there a second indicator for reading RA missing? This means that the biggest drawback of the current state of the telescope is that absolute setting directly onto a target using the circles is not possible. What can be done is to hop from one object to another by using circle differences in RA and Dec (and starting with a naked-eye star) but absolute setting would be better. Locating stars was done using star-hopping from the finder and a planetarium program on a laptop which mimicked the field of view of the finder. This resulted in measurements of no more than 3 stars per hour being possible.

The optics of the telescope appear to be in good condition - the seeing was never first-class so the limiting separation was at best 0.3 arc seconds - about half of this should be possible on the best nights. The micrometer is in excellent condition considering its age and both the PA and separation controls move smoothly and well. Using values for the PA and separation of gamma 2 Velorum from the Hipparcos and USNO catalogues I have obtained a formal value for the screw constant of the micrometer of 9.088 arc seconds with an uncertainty of about 0.04 arc seconds, whilst van den Bos found 9.089 and that value was used for many years. The dome rotation and platform operation worked correctly throughout.

During the period of observation 207 mean measures were made - each measure being 4 or 5 double distance and the same number of position angle settings and work has started on reducing these measures. Those binary systems with known orbits will be checked to see if the current observations satisfy the orbital elements. Many of the other pairs observed are in motion and have not been measured for 10 or 15 years. It is hoped to publish the results in Astronomische Nachrichten.

If I was to stress one area where the most significant improvements could be made it would be the pointing, as mentioned above.

The success of this project was largely due to the unstinting work and enthusiasm of the Johannesburg Centre of the ASSA - Brian Fraser, Chris Curry and Rodney Hyman on the technical side all of whom contributed a lot of evening spare time to making sure that the telescope was operating correctly, Alec Jamieson for putting the resources of the library at my disposal and Lerika Cross who from start to finish sorted out many of the logistical problems with great efficiency and kindness. I am also very grateful for much help and encouragement from Magda Streicher. I would also like to thank SAASTA for allowing me unfettered access to the telescope. I would have no hesitation in repeating this venture if the opportunity arose. ■

converting a webcam for astrophotography

by Chris Lee

Before I get down to the nitty-gritty of how I converted my Logitech Quickcam PRO 4000 to be used with my Telescope, let me explain why I did it the way I did.

One of my main reasons for getting the scope I did was for astrophotography, though not digital, which might be surprising reading this tutorial on how to convert a web cam for this exact purpose. I have an Olympus OM1 SLR, and despite everyone telling me that Digital was the way of the future, I'm stubborn and still love film.

Now, for film photography (and high end digital mind you) I realized I would need a way to "guide" my scope. This is because no matter how well your drives you use to track your telescope are, you can never trust them and can almost be certain that they will NEVER be 100% right. For digital where you're taking hundreds of pretty short exposure photographs and then stacking them together to get your image, this is not really much of a problem, since you can just throw any bad images away (which by the way I still firmly believe is cheating, but not the point). With film, though, when you're doing a 30 min to a 6 hour exposure, this can really destroy your photos.

So first up was a guide scope. That's the easy part, we had an old Tasco Telescope we could use and our mounting rings for our 8" Newtonian had places to piggyback this onto. So next was an Illuminated Eye Piece. Staying in South Africa, I nearly fell over and died when I found out the prices of these simple yet very effective little tools. Being way out of my budget I started checking up what else I could do.

In my daily searching the Internet I came across this website:
http://www.davidditch.com/astro/startrack/ (so by the way David Ditch, thanks so much for the idea and the software). Auto guiding was something I had never thought of, as it required more expensive equipment than the Eye Piece. But here was a quick simple way to make an auto guider. Total cost for the parts required worked out to be about $70.00 (or R500.00 for us South Africans). Though please read David's website if you want to find out how the guider can be made.

Of course I had many of the required items already, which was why this was viable. So FINALLY... on to the webcam. I had one at home, but I actually used it for its intended purpose as a web cam. Reading the many internet sites about how to convert your web cam almost always entailed rebuilding it so that it could not be used as a web cam anymore. This would not help me.

I wanted a way to

a) Convert my web cam to be used with the scope.

b) It must look "half decent"
c) Still be able to use it for Video Conferencing afterwards
d) Must not cost me more than an Illuminated EP

After a few nights of thinking, stripping things in the house to get ideas and putting them back again, I finally came up with the following idea, which - including the drying paint and the glue - took a total of 25 min, or about 5 min with out the drying period.

What is required:

1. Web Cam (I used a Logitech Quickcam Pro 4000)
2. Eye Piece Barrel
3. Super Glue
4. Black Paint
5. Small star screwdriver
6. Ear bud / paint brush

Using the small screwdriver remove the screw on the side of the web cam.

With the screw out, carefully split the web cam in half.

Carefully remove the printed board and the camera, pulling off the *"focuser"*, which just slides onto the lens.

BE CAREFUL NOT TO TOUCH THE CIRCUITS OF THE BOARD!

Unscrew the Lens.

Next we move onto the Focuser you removed…

Carefully, pull off the rubber part around the focuser.

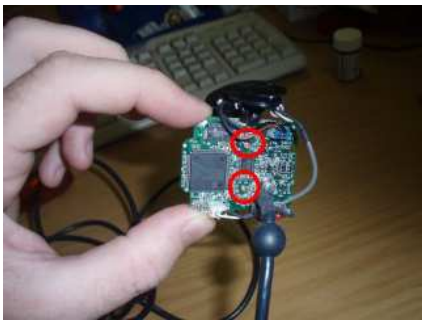
Now using your paint. paint the silver portion of the focuser until you cant see any more silver.

While we are waiting for the paint to dry, let's move back to the printed board and have a look at it.

When plugged in, That Green LED is going to be a problem. So CAREFULLY paint over it so that it doesn't glow anymore

OK now for the boring part. We have to wait for the paint to dry. So while that is happening have a look at the next two images.

Many people on the net actually remove this black tube. Around the CCD/CMOS Chip. Removing the two screws at the back of the board as showed in showed in red is all it requires.



Since I wanted to still use the webcam as a webcam, I will be leaving these in so that I can quickly screw the lens back into place when I need to use it

Depending on the paint, when it is dry we can move onto the next step. I unscrewed the plastic barrel (1.25”), off an old Tasco Barlow shown above in the first picture.

You can check to see that the Focuser should be a perfect fit for the inside of the Barrel.

Next, place a small amount of super glue around the whole edge of the Focuser and push the two together for a few second. Depending on the glue you used, wait for it to dry (the glue I used dried in 2 minutes).

Lets take a closer look at that image above though… There is a small little gap where we removed the rubber fitting from the focuser. I was able to just dab it slightly with the paint and it filled the hole up nicely

Again, once that has dried, we can put everything back together again. It now should look like this.

Finally, joining the two halves and replacing the screw, we end up with our modified webcam to look like this.

For me to still use the web cam, for normal use, I can quickly remove the screw, remove the Focuser with its barrel attached, and screw back in the lens. In total it takes about 45 seconds to do.

One more thing… the barrel that is now on your old focuser does have a slight bit of play. If you are planning on using the webcam as a permanent "astrocam", you can place a small amount of glue on the edge of the web cam where the focuser slots in (as shown to the right). This will keep it firmly in place. Or you can do what I did, I put some "prestik" on the sides. This can easily be removed when I want to remove the barrel, but it still gets rid of any play. ■

the discovery of the Megalithic Yard

article from "The Hiram Key" authored by Messrs Knight and Lomas

When the late Professor Alexander Thom surveyed over a thousand megalithic structures from Northern Scotland through England, Wales and Western France he was amazed to find that they had all been built using the same unit of measurement. Thom dubbed this unit a Megalithic Yard (MY) because it was very close in size to an imperial yard, being exactly 2 feet 8.64 inches (82.966 cm). As an engineer he could appreciate the fine accuracy inherent in the MY but he was mystified as to how such a primitive people could have consistently reproduced such a unit across a zone spanning several hundreds of miles.

The answer that eluded the late Professor lay not in the rocks, but in the stars.

The MY turns out to be much more than an abstract unit such as the modern metre, it is a highly scientific measure repeatedly constructed by empirical means. It is based upon observation of three fundamental factors:

1. The orbit of the Earth around the sun
2. The spin of the Earth on its axis
3. The mass of the Earth

Making your own Megalithic Yard

These ancient builders marked the year by identifying the two days a year when the shadow cast by the rising sun was perfectly aligned with the shadow of the setting sun. We call these the spring equinox and the autumn equinox that fall around the 21st of March and 21st September respectively. They also knew that there were 366 sunrises from one spring equinox to the next and it appears that they took this as a sacred number.

They then scribed out a large circle on the ground and divided it into 366 parts. All you have to do is copy the process as follows:

Stage one - Find a suitable location

Find a reasonably flat area of land that has open views to the horizon, particularly in the east or the west. You will need an area of around forty feet by forty feet with a reasonably smooth surface of grass, level soil or sand.

Stage two - Prepare your equipment

You will need the following items:

1. Two stout, smooth rods approximately six feet long and a few inches diameter. One end should be sharpened to a point.
2. A large mallet or heavy stone.

3. A short stick with neatly cut ends of approximately 10 inches. To make life easier this should have small cuts made into it to mark out five equal parts.
4. A cord (a washing line will do) approximately forty feet in length.
5. A piece of string about five feet long.
6. A small, symmetrical weight with a hole in its centre (e.g. a heavy washer).
7. A straight stick about three feet long.
8. A sharp blade.

Stage three - Constructing a megalithic degree

A megalithic circle was divided into 366 equal parts, which is almost certainly the origin of our modern 360 degree circle. It seems probable that when mathematics came into use in the Middle East they simply discarded 6 units to make the circle divisible by as many numbers as possible. The megalithic degree was 98.36% of a modern degree.

For purposes of creating a Megalithic Yard you only need to measure one six part of a circle, which will contain 61 megalithic degrees. This is easy to do because the radius of a circle always bisects the circumference exactly six times. (Interestingly, the geometrical term for a straight line across a circumference is a 'chord').

So, go to a corner of your chosen area and drive one of the poles vertically into the ground. Then take your cord and create a loop that can be slipped over the rod.

Originally the megalithic builders must have divided the sixth part of the circle into 61 parts through trial and error with small sticks. It is highly probable that they came to realise that a ratio of 175:3 gives a 366th part of a circle without the need to calibrate the circle.

Your next step is to make sure that your cord is a 175 units long from the centre of the first loop to the centre of a second loop that you will need to make (the length of the units does not matter). For convenience use a stick of about 10 inches in length to do this, but to avoid an over-large circle mark the stick into five equal parts (you can cheat and use a ruler for this if you want). Next use the stick to measure out 35 units from loop to loop, which will give you a length of approximately thirty feet.

Now place the first loop over the fixed rod and stretch out the cord to its full length in either a westerly or easterly direction and place the second rod into the loop. You can now scribe out part of a circle in the ground. Because we are using the ratio method there is no need to make out an entire sixth part of a circle; a couple of feet will do.

Next take your piece of string and tie it neatly to the weight to form a plumb line.

You can then drive the rod into the ground using the plumb line to ensure that it is vertical. Then take your measuring stick and mark out a point on the curve that is three of the units away from the outer edge of the rod. Return to the centre and remove the first rod, marking

the hole with a stone or other object to hand. This rod has now to be placed on the spot that you have marked on the circle, making sure that it is vertical and that its outer edge is three units from the corresponding edge of the first rod.

Return to the centre of the circle and look at the two rods. Through them you will be able to see exactly one 366th part of the horizon.

Stage four - Measuring time
You have now split the horizon so that it has the same number of parts as there are sunrises in the course of one orbit of the sun. Now you need to measure the spin of the Earth on its axis.

You will have to wait for a clear night when the stars are clearly visible. Stand behind the centre point and wait for a bright star to pass between the rods. There are twenty stars with an astronomical magnitude of 1.5, which are known as first-magnitude stars.

The apparent movement of stars across the horizon is due to the rotation of the Earth. It follows that the time that it takes a star to travel from the trailing edge of the first rod to that of the second, will take a period of time exactly equal to one three hundred and sixty-sixth part of one rotation (a day).

There are 86400 seconds in a day and therefore a 366th part of the day will be 236 seconds, or 3 minutes 56 seconds. So your two rods have provided you with a highly accurate clock that will work every time.

When you see a first magnitude star approaching the first pole take your plumb line and hold the string at a length of approximately sixteen inches. Swing the weight like a pendulum and as the star appears from behind the first rod count the pulses from one extreme to the other.

There are only two factors that effect the swing of a pendulum; the length of the string and gravity - which is determined by the mass of the earth. If you swing a pendulum faster it will move outwards further but it will not change the number of pulses.

Your task now is to count the number of pulses of your pendulum whilst the star moves between the rods. You need to adjust the length until you get exactly 366 beats during this period of 3 minutes 56 seconds. It is likely to take you several attempts to get the length right so be prepared to do quite a bit of star gazing.

Stage five - Making your Megalithic Yard measure
Once you have the correct length of pendulum mark the string at the exact point that it leaves your fingers. Next take the straight stick and place the marked part of the string, place it approximately in the centre and pull the line down the stick. Mark the stick at the

point in the centre of the weight and then swing the pendulum over to the other side of the stick, ensuring that the marked part of the string stays firmly in place. Then mark the stick again to record the position of the centre of the weight.

Discard the pendulum and cut the stick at the two points that corresponded with the position of the weight.

Congratulations, you now have a stick that is exactly one Megalithic Yard long!

It is interesting to note that the curious British measurement unit known as a 'rod' or a 'pole' is equal to 6 megalithic yards to an accuracy of one percent. There are 4 rods to a chain and 80 chains to a mile. Could it be that the modern mile of 1760 yards is actually based on the prehistoric measure of the Megalithic Yard? ■

canopus classifieds

For Sale – Spaceflight magazine collection – R200 or near offer.

The Librarian has had an enquiry for the purchase of all 212 issues of Spaceflight magazine in the ASSA Jhb. Centre library. Spaceflight is a publication of the British Interplanetary Society. The library collection is not continuous and runs from 1958 to 1987.

Anyone who is interested in purchasing these magazines as a single lot will be able to inspect the magazines and give a written offer to the Librarian at the next monthly meeting on 13th August 2008. Results will be announced at the same meeting.

focus on: NGC 6134 – Norma

by Magda Streicher

The constellation Norma – the carpenter's level and square – was introduced by Lacaille in 1752. The constellation is snugly tucked away between Ara and Lupus at the edge of the Milky Way.

Norma contains just a handful of naked-eye stars, none of which bears an official name. NGC 6134, also known as Bennett 76, or Dunlop 412, Cr 303, is a special open cluster, approximately 4 000 light years away. The cluster members with various magnitudes in a sort of roundish shape. Faint stars randomly spread outwards in strings with obvious pairs to add to the delicate beauty. A number of stars, quite outstanding, can be seen forming a ring around the NW side of the cluster. At the southern end is a very lovely blue-white star of 9 magnitude, a little outstanding along with a long ray of faint stars just to the west pointing S. The star field is a sprinkling of faint stars, which shows that the Milky Way is not far away.

NGC 6134 shares the field of view with Hogg 19, only 10 arc minutes to the NE. It shows only a few 11-magnitude stars, relatively close together and only 4' in size. In the course of my studies around the Hogg cluster project a few years ago I did some research on the person I believed to be behind the list of Hogg numbered objects. Helen Swayer Hogg was well known during her lifetime, and attached to the University of Canada. I made contact with her son, David, and so even I got to know his mother quite well through his letters. Well, I'm also only human, and later found out through Auke Slotegraaf that I had the wrong Hogg! The "real Hogg" who compiled the list of 23 objects was Arthur Robert Hogg, who was born in Victoria, Australia in 1903. He became an astronomer only at the age of 43, then worked at Mount Stromlo Observatory in Australia for the rest of his professional life. He was a quiet, well-liked man who was prepared to work slowly and carefully. His list of 23 clusters is a nice observing project to undertake. So in the end, to have made contact with various amateurs and also a little bit of history in the mix, which made it all worthwhile. ■

Name	**Object**	**RA:**	**DEC:**	**Magnitude**	**Size**
NGC 6134	Open Cluster	16h27m.7	-49°09'24"	7.2	7'
Hogg 19	Open Cluster	16h28m.8	-49o07'25"	9	4'

the sky this month

site location: lat. **26.0 deg S** long. **28.0 deg E** local time = UT **+2.0 hrs**.

august 2008

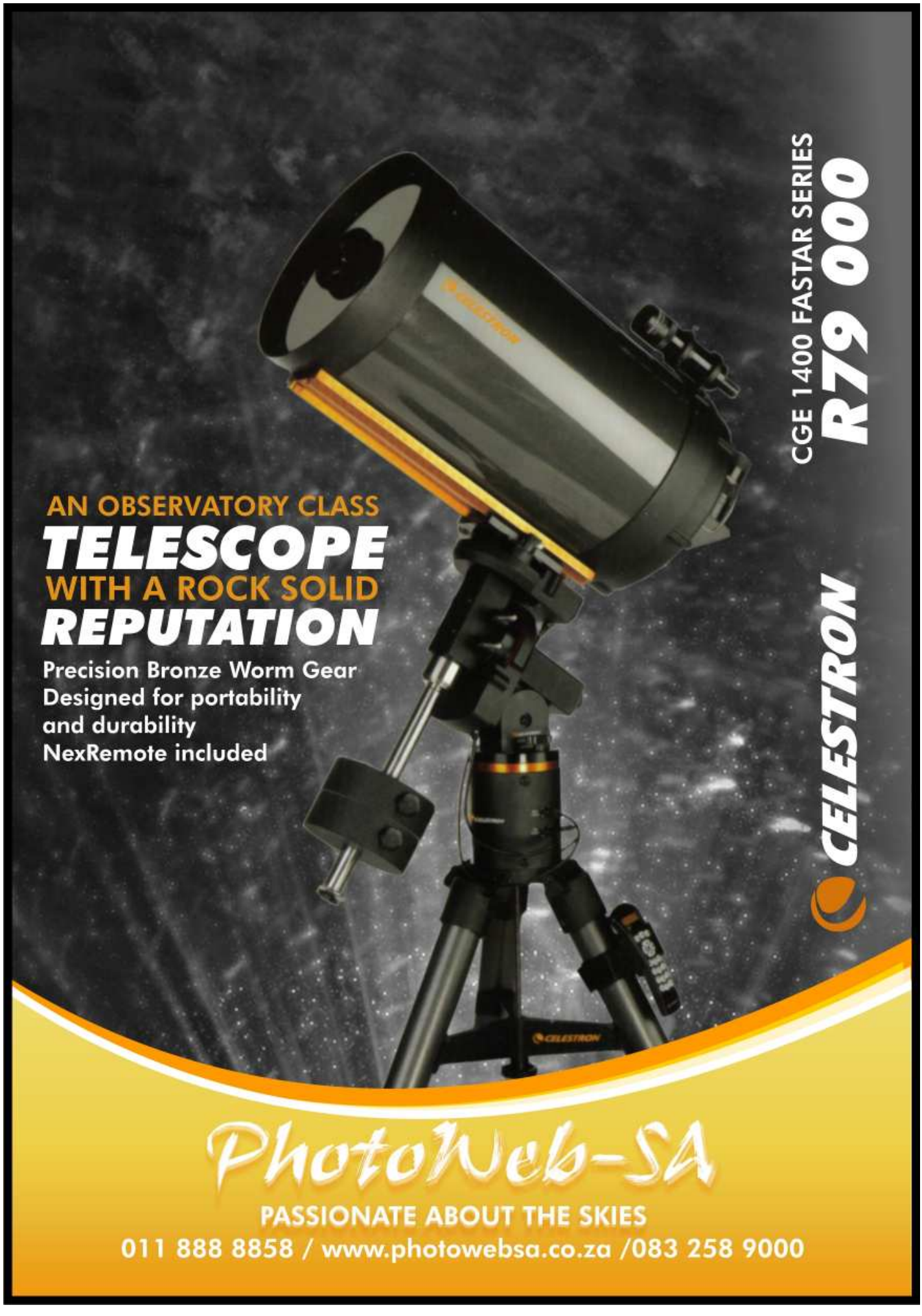
dd hh		dd hh	
1 11	NEW MOON - Solar Eclipse (not visible in SA)	13 18	Venus 0.2S of Saturn
1 17	Mercury 1.2N of Moon Occn	15 08	Neptune at opposition
2 14	Venus 2.1N of Moon	15 21	Mercury 0.6S of Saturn
2 22	Regulus 1.5N of Moon	16 19	Neptune 0.7S of Moon Occn
3 12	Saturn 3.4N of Moon	16 22	FULL MOON - Lunar Eclipse
4 10	Mars 3.5N of Moon	18 24	Uranus 3.6S of Moon
6 04	Venus 1.0N of Regulus	21 19	Mercury 1.0S of Venus
7 00	Spica 2.7N of Moon	24 00	LAST QUARTER
8 21	FIRST QUARTER	26 08	Moon at perigee
10 11	Mercury 1.0N of Regulus	27 16	Pollux 4.5N of Moon
10 20	Antares 0.3N of Moon Occn	30 07	Regulus 1.5N of Moon
10 23	Moon at apogee	30 21	NEW MOON
13 15	Jupiter 2.7N of Moon	31 03	Saturn 3.7N of Moon

september 2008

dd hh		dd hh	
1 17	Venus 4.7N of Moon	14 20	Mercury 3.6S of Venus
1 22	Mercury 2.5N of Moon	15 06	Uranus 3.6S of Moon
2 05	Mars 4.5N of Moon	15 10	FULL MOON
3 09	Spica 2.7N of Moon	19 05	Venus 2.4N of Spica
4 02	Saturn at conjunction	20 04	Moon at perigee
7 04	Antares 0.3N of Moon Occn	22 06	LAST QUARTER
7 15	FIRST QUARTER	22 16	Equinox
8 04	Jupiter stationary	23 03	Mercury 4.0S of Mars
8 19	Mercury 2.6S of Mars	23 22	Pollux 4.6N of Moon
9 07	Pluto stationary	24 03	Mercury stationary
9 21	Jupiter 2.7N of Moon	25 05	Mars 2.3N of Spica
11 03	Mercury greatest elong E(27)	27 17	Saturn 4.1N of Moon
12 03	Venus 0.3N of Mars	29 09	NEW MOON
13 02	Neptune 0.7S of Moon Occn	30 11	Mercury 1.0N of Moon Occn
13 03	Uranus at opposition	30 17	Spica 2.6N of Moon

local times of rise and set for the sun & major planets

Date	Sun		Mercury		Venus		Mars		Jupiter		Saturn	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
Aug 08	06.52	17.27	07.28	18.11	07.47	18.44	08.38	20.25	14.45	5.13	08.05	19.15
Aug 18	06.40	17.35	07.33	18.59	07.40	19.05	08.14	20.16	14.01	4.31	07.28	18.42
Aug 28	06.28	17.42	07.28	19.34	07.31	19.25	07.50	20.07	13.19	3.49	06.52	18.08
Sep 07	06.14	17.50	07.15	19.58	07.21	19.45	07.27	19.59	12.39	3.09	06.16	17.35
Sep 17	05.59	17.57	06.53	20.04	07.12	20.05	07.04	19.51	12.00	2.30	05.40	17.01
Sep 27	05.45	18.05	06.17	19.36	07.04	20.25	06.42	19.44	11.22	1.52	05.03	16.28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