

JOURNAL of the
ORWELL ASTRONOMICAL SOCIETY (IPSWICH)

September, 1974

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*What's Up? The Solar System as seen from Ipswich (September 1974)

The Sun: will be in the constellations of Leo/Virgo.

Rotation No. 1618 commenced Aug. 11.95d
Rotation No. 1619 commences Sep. 8.20d
Rotation No. 1620 commences Oct. 5.47d

Heliographic co-ordinates as at noon U.T.

Sept 2	Sept 6	Sept 10	Sept 14
P + 21.4°	+ 22.3°	+ 23.2°	+ 24.0°
Bo + 7.2°	+ 7.2°	+ 7.2°	+ 7.2°
Lo 75.2°	22.4°	329.6°	276.8°
Sept 18	Sept 22	Sept 26	Sept 30
P + 24.6°	+ 25.2°	+ 25.6°	+ 26.0°
Bo + 7.1°	+ 7.0°	+ 6.9°	+ 6.7°
Lo 224.0°	171.2°	118.4°	65.6°

MERCURY: An evening star in the constellations of Leo/Virgo this month, will not be very well placed for observation, it will be in conjunction with Mars on Sept. 2nd at 01h UT and the Moon on Sept 17th at 21h UT. Magnitude - 0.6 at the start of the month falling off to + 0.2 by the end of the month.

VENUS: will be in the constellations of Cancer/Leo/Virgo, a brilliant object of - 3.4 magnitude rising about one and a half hours before the Sun and reaching approximately 15° altitude at Sunrise. The planet will be in close proximity to Regulus (Alpha Leonis) on the mornings of the 7th and 8th.

A word of warning for anyone making an observation with telescope or binoculars, do be very careful not to look accidentally at the Sun, not realising the Sun may have risen without you noticing.

EARTH: Autumnal Equinox occurs Sept. 23rd at 09h 59m UT.

SIDIERIAL TIME: On Sept. 21st Siderial time and Universal time coincide, you will unfortunately still have to correct for BST, from there onward siderial time will continue to gain by 3m56.555 sec. per day which you will have to correct for if using a transit telescope or circles for setting right ascension.

If however, you wish to keep track of siderial time for such a purpose you can obtain a Siderial wrist watch this being specially timed to give sufficient accuracy for most amateur purposes. Various styles are available graduated up to 24 siderial hours, prices are around £6., contact the Editor for further information.

MARS: Situated in the constellations of Leo/Virgo is too near the Sun for observation.

JUPITER: Now rises around sunset in the South East, easily recognised by its brilliance, magnitude - 2.5 visible in the constellation of Aquarius. Opposition occurs on Sept. 5th at 20h UT. Moon in the vicinity of the planet on the mornings of the 2nd and 29th passing approximately 7° to the North.

SATURN: Is a morning star in the constellation of Gemini, magnitude + 0.4 The Moon will be near Saturn on the mornings of the 11th & 12th. Last Feb/April the presence of the famous white spot was reported by Edinburgh University Astro. Soc., towards the end of the month of April reports were indicating that the spot was becoming larger and diffuse and it could well have disappeared by now. However, it is worth looking to see if it is still present in the South temperate zone. Anyone who does see the spot please make a note of the observation time (UT), position on the planet and notify the Editor as quickly as possible.

MOON PHASES:

Lunation 640 New Moon Sept. 16th 02h 45m
First quarter Sept 23rd 07h 08m
Full Moon Oct 1st 10h 38m
Last quarter Oct 8th 19h 46m

Occultations:

Sept 7th 0h 40.5m UT	36 Ari	mag. 6.5	Reappearance
" 7th 3h 26.8m Ut	40 Ari	mag. 6.0	"
8th 3h 42.0m UT	22H Tau	" 6.0	"
10th 2h 21.5m UT	ZC 851	" 6.3	"
12th 2h 09.9m UT	74 Gem	" 5.2	"
26th 23 16.8m UT	8 Aqr	" 6.6	Disappearance
27th 22 50.8m UT	117 G Cap	" 7.1	"
27th 22 48.2m UT	46 Cap	" 5.3	"

METEORS: No spectacular meteor showers this month but we have the Orionids to look forward to next month.

COMETS: On March 21st a new Comet was discovered by M. Lovas, it has been designated Comet Lovas 1974c. The comet was diffuse with condensation but without tail. Mag. 14. It will be at perihelion in August 1975, perihelion distance being 3.00530 A.U. Longitude of perihelion $261^{\circ}.292$. Longitude of ascending node $11^{\circ}.700$ and inclination $50^{\circ}.295$. The above elements suggest that the comet could be as bright as 9th magnitude when near opposition in 1975. In April/May the comet was in the constellation of Virgo R.A. 12h 10m. Dec. - 1° mag. 16.4.

ZODIACAL LIGHT: From around the 14th to 29th of this month before twilight commences, if you look in the eastern sky you may see the morning cone of the zodiacal light. This phenomenon is visible only in the absence of moonlight or artificial light.

GRAZING OCCULTATION: Don't forget Friday, Sept. 27th "The Chequers" Pub at Raydon 21h BST meeting place for the next dummy run. Your last chance to get clued-up on what is happening before the real thing in October.

JULY DELTA AQUARIDS: A meteor count took place on Saturday the 27th July at the heath to the rear of Foxhall Stadium and about 8 members turned up. To start with we were clouded out but as time went on the clouds blew away leaving a crystal clear sky. About one radiant meteor was observed and the rest were sporadic, there were plenty of satellites milling around and one member who shall remain nameless reckons he saw a U.F.O., it appeared to be travelling first in a northerly direction then in a southerly direction and then continuing northward again, all very strange.

COLOUR SLIDES: In the clubroom you will see displayed a list of transparencies for mounting up into 2" x 2" slides. The list totals approximately 256 covering the following features.

Various Lunar Craters and Landscapes.
Apollo expeditions 7 to 17 inclusive.
Mariner explorations 6, 7, 9 and 10.
Pioneer 10 pictures of Jupiter.
Skylab.

10" x 8" and 15" x 12" B/W Prints are also available. There is however a limit to the number that we can order at any time, this being 25 and the deliveries may take up to 2 months. So to make it fair, anyone wishing to order any of the above notify the Editor stating preferences and depending on the number of members wanting slides this will govern the number they actually will be able to receive.

QUESTIONNAIRE FORMS (Ed.) Many of you may remember that in June I circulated a questionnaire form designed to find out what the general interests were amongst the members. Having now received a reasonable number of these forms back I am in a position to publish an indication of the overall interests of our members, these are listed below in percentage form.

1. Sun Spots	42%
2. Lunar Observation	63%
3. Planetary Observation	79%
4. Variable Stars	26%
5. Double Stars	26%
6. Nebulae and other feint objects	58%
7. Comet seeking	16%
8. Artificial satellites	4%
9. Astro photography	53%
10. Interested in all aspects of astro.	69%
11. Group participation projects	42%
12. A project of one's own	21%
13. A useful project that would not be a commitment but could be done in the odd spare moment.	16%

Special interests not listed above include - Spectroscopy and photometry of short period binaries, Radio Astronomy, reception on the 21cm band, meteor watching, occultations and general interests in optical telescopes.

With regard to those members interested in Astro photography, I have cross referenced the other interests listed on their forms and arrived at the following conclusions which I feel it reasonable to assume. Of this group of members the percentage interests equate as follows:

Solar photography	50%
Lunar "	70%
Planetary "	90%
Variable star "	30%
Deep sky Nebulae and other feint objects	70%

Of the equipment possessed by our members the most widely used instrument is the 60 mm refractor. A couple of members possess 80mm refractors, one other member owns a 6" reflector and another a pair of 22 x 80 tripod mounted binoculars.

COMMENTS ON THE VARIOUS ASPECTS

Sun Spots This is a subject where anyone who owns a telescope irrespective of size can perform interesting and useful observation. In the July journal I started by publishing heliographic co-ordinates for those who are interested in recording positions of sun spots. I shall continue with this info. and hope that more members will join in. Last month's attempt at insipid some co-ordinated information in this field was disappointing, perhaps when the observation sections are reformed for the Autumn the Solar Section Director may wish to adopt a similar programme.

LUNAR OBSERVATION: The Society is now affiliated to the BAA Lunar Section and we are receiving their circulars, you will find these in the Library (not to be removed). The main observational programmes of the BAA are projects, Moonhole, South Polar mapping, Occultations and TLP observation, for information on these projects see the Lunar Section handbook, most gratefully received from Patrick Moore, you will find it in the library in the Lunar file (not to be removed).

The hand book gives an invaluable amount of information on Lunar work being handled by the BAA/LS anyone wishing to obtain a copy can do so by sending a 10"x8" SAE together with remittance of 40 pence to the Editor.

SOUTH POLAR MAPPING: Despite popular belief that the Orbiter serves now give 100% photographic coverage in detail of the lunar surface it is a fallacy, I have it on good authority. S.P.M. is a field where very useful work can be undertaken by the amateur who has had some experience in drawing lunar features. If you feel you would like to participate please see the information available in the BAA/LS handbook and letter from Mr. Harold Hill (BAA Lunar Section) explaining what is required to make a start. We could make a start this month by producing drawings of

formations along the Southern limb from Malapert to Drygalski, favourable conditions (weather permitting) will be from Aug. 31 - Sep. 7. From the Lunar Section circulars you can see that the BAA are in need of some more assistance, here, I hope we can help them out, please send any drawings to the Editor.

C.E.D. Another very interesting and useful project being handled by the BAA/LS is C.E.D. Crater Extinction Device. This employs the use of a Kodak step tablet No.3 for measuring relative brightness of certain lunar features. In the library you will find one of these No.3 step tablets (not to be removed) together with data on how to use it, there is also a list of lunar features that have been known to show observational changes. PLEASE if you use the step tablet treat it with respect, it is a delicate piece of transparent material and it should be held by the sides or ends to prevent grubby finger marks ruining the texture. Also it should be replaced in its tissue wrapping and stored safely back in its cover after use. If you want to obtain one of these step tablets you could try a photographic dealer, the price should be around 63 pence, if you don't have any luck you can write to Kodak at Kingsway London. Greatful thanks to Mr M E Ellis for donating the info and step tablet.

NEBULAE AND OTHER FEINT OBJECTS: Some members have taken the view that this is not worth bothering about, apart from M57, M13 and a couple of other nebulous objects there is not much to see. To a certain degree looking through the the eyepiece of a small telescope or binoculars they may in a sense be right. But very interesting photographic work can be undertaken here by the amateur and the results can be extremely inspiring. One such gentleman who appears to have reached his goal in this respect is Mr W E Pennel, those of you that are interested may care to look at the superb reproductions of the spiral nebula M101 and the Orion nebula in JAS photographic circulars Delta and Epsilon. These are just two examples of what can be achieved with patience and perseverance.

An extremely good book covering the complete Messier range is "Messiers' Nebulae And Star Clusters" by Ken Glyn Jones price £8-25p Having seen this book myself and wishing that I had the spare cash to buy it, I can honestly say that it is one of the best books on the market that I have seen, it has awrite up and photographic coverage on each object a trully magnificent book.

COMET SEEKING: This is where many people automatically think of fruitless long observations with very unrewarding efforts sweeping the sky with binoculars, well, this is the most common method of observation and I am not condemning it, a great number of comets have been discovered in this manner. Another aspect however, used by the professionals is an apparatus called a blink comparator or as sometimes termed, blink microscope, building a simple form of this apparatus is not beyond the capabilities of the amateur, I feel sure that building a telescope would be more difficult.

Systematic deep sky photographs of the heavens viewed in such an apparatus could reveal a comet and remember if you do discover one it would be named after you for all time sake.

DOUBLE STARS: To do any useful study of these we need an attachment for the 10" OG called a Bifilar micrometer, this is used in conjunction with the setting circles on the end of the telescope around the rack and pinion focusing section and together they determine separation and position angle of double star systems. It can still be quite interesting though to observe double stars, if not to see whether you can split close doubles there are some very interesting colour combinations to be seen.

METEOR OBSERVATION: Is something which can provide an interest photographically as well as visually.

Those members who have participated in the meteor counts during the past few months can I believe, say they have been both interesting and enjoyable socially.

Other aspects of meteor photography are spectroscopy with the use of a diffraction grating and another technique involving the use of a shutter in front of the camera lens, rotating at a fixed speed can provide a meteor velocity accurately enough for a reliable determination of orbit (see photographic info in the library).

Astrophotography: As a result of the large percentage interest in this subject I have obtained some information which should benefit all. This will be made available in the library for reference only (not to be removed). The various aspects covered are:-

Constellation photography: 1. Fixed camera/extended development
2. Driven Camera.

Solar photography

Lunar "

Meteor "

Planetary "

Spectral photography of meteors

Photography with the 10" OG

Colour astrophotography

The techniques of eyepiece projection, prime focus, barlow projection are also covered. There is also some information on processing and extended development techniques together with literature on developing and printing equipment. (See also BAA Journal Dec.1973 page 58, article by Ian Ridpath, Editor of JAS Hermes, very informative).

If you have a simple camera there is some information on the use of this for astrophotography.

CAMERAS: Thinking of participating in astrophotography? Don't rush out and buy an Instamatic type camera because the amount of useful photography you can perform with this type of camera will be nil. Instead you could do far worse than invest in something like a Zenith 'B' which appears to be one of the lower priced SLR cameras on the market. For those interested in purchasing a SLR camera which is essential for prime focus work there is some information on the following cameras in the library, again, not to be removed.

ZENITH

PRINZFLEX

CHINON

PRAKTIKA

MINOLTA

MIRANDA

ASAHI PENTAX

NIKON

CANON

OLYMPUS

CAMERA ADAPTORS: various adaptors are available on the market, bellows type for eyepiece or barlow projection and RAS or 24.5mm push fit to Pentax/Praktica thread for prime focus work, for further information contact the editor.

Recommended Books on astrophotography appear to be T. Rackham's "Astrophotography at the Telescope", but this apparently does not cover astrophotography without a telescope and "Outer Space Photography for the Amateur" by Dr. Henry E. Paul, the latter selling at about £3 - £4.

Appreciation: Much of the above information has been obtained with the assistance of Mr. G.S. Pearce of the J.A.S. photographic section to whom I am extremely grateful. We are now on the mailing list of the JAS photographic section and will receive their circulars. A large amount of the data obtained so far by the section has been through trial and error and photographs sent in by members giving details of film speeds exposures and development techniques. In this manner one can learn where mistakes occur, they can be recorded and avoided by other members, so all benefit. Anyone wishing to send in photographs/negatives please do this through the editor so we can keep track of what is happening. I feel sure that Mr. Pearce would like to see something from our Society. He might even publish it if it is good enough.

VARIABLE STARS: Here is an interest which can provide a lot of very useful information it is also one whereby the extent that one devotes one's time is largely governed by what particular type of variable stars you are observing eg. long term variables obviously do not warrant the degree of observation that short period ones would. It is also interesting to note that a lot of useful information can be obtained from constellation photography by making magnitude comparisons of a particular variable with the other stars in the photographic field.

cont'd.....

BINOCULAR members may be interested to know that the BAA variable star section has merged with the Binocular Sky Society to form the V.S.S. Binocular Group. The aims of the group are:-

1. To encourage observation of variable stars which can be studied using binoculars and small telescopes, including stars on the main programme of the V.S.S.
2. To help newcomers to the field of variable star work with the techniques of observation.
3. To maintain a programme of observation related to the requirements of current astronomy - including professional research.
4. To publish observations and analysis of the stars observed.

Of the 174 variables listed on the B.C. programme there are 48 on the priority list. Anyone wanting to participate should see VSS circular No. 19 July 1974 for further details, this will be found in the library. (not to be removed). Also available are binocular star charts for use when making observations, these can be obtained through the VSS at 3p each, for telescopic stars requiring two or more charts 2p per sheet plus postage.

SPACE NEWS

Saljut 3 - Soyuz 14 link up

On June 25th the Russians launched Salyut 3, an orbiting space station similar to America's Skylab. The vehicle about 66ft long and weighing approximately 42,000 lb. was put into an 89.7min orbit inclined at 51.6° with perigee of 164 miles and apogee of 173 miles.

On July 3rd at 18h 51m UT two Russians, Col Popovich and Lt. Col. Yuri Artyukhin were launched from the Baikonur space centre aboard the Soyuz 14 craft which after a 35,000 km orbital chase lasting about 30 hrs. successfully docked with Salyut 3, the cosmonauts entered the space station and began checking it out. For the next 14 days they performed various experiments involving observations of Earth resources, atmospheric observations, examination of the biological effects of prolonged weightlessness and studies of radiation and particle fields. The crew re-entered Earth's atmosphere on July 20th, there was some speculation that a maritime recovery might have been attempted but the craft was brought down safely on land just 2 km from the selected landing site of Dzhezkazgan.

There was relief expressed to a degree by the Russians as the previous Soyuz 11 vehicle launched in 1971 ended with the tragic death of three cosmonauts and Soyuz 12 and 13 launched in September and December last year were flown to test new designs of the Soyuz vehicle, Soyuz 14 was the third of these modified spacecraft.

The fact that the Soyuz 14 craft has been used for the Salyut link up probably indicates that the design has now been cleared for operational use. Salyut 3 was visible from Great Britain but its orbit has now drifted making it invisible. However, in a few months time its orbit should drift back into view, predictions for the visibility are obtained from C. Radley.

APOLLO-SOYUZ LINK UP: The time and date for the ASTP Apollo - Soyuz test project has been set for July 15th 1975. Lift off of the Soyuz rocket will be at 12.30 UT. Seven and a half hours later when it has been cleared that the Russian vehicle is functioning satisfactorily, the three man Apollo craft will blast off from Cape Kennedy. Should the first Soyuz flight go wrong a duplicate rocket and crew will be standing by. Once in orbit the Apollo team will have 32 hrs. to locate and dock with the Soyuz craft. To assist in the location of the Soyuz vehicle US transponders are being built into the Soyuz craft. Having docked with Soyuz the Apollo commander, Tom Stafford will then crawl through the air lock systems to greet Alexei Leonov and Valery Kubasov in Russian. There are no special experiments planned but the mission will signify the first internationally manned space flight. The Soyuz-Apollo may be visible from Britain but more details will be published nearer the time.

PIONEER 11 TO VISIT SATURN: Pioneer 11 emerged safely from crossing the Asteroid belt last March, it is now speeding towards Jupiter with all equipment functioning satisfactorily. During April, N.A.S.A. announced that a mid course trajectory adjustment had been made which will result in Pioneer 11 approaching Jupiter on December 4th this year, its velocity being greatly increased by the gravitational attraction of Jupiter. The craft will then swing round in a tight curve behind the planet and head off at almost right angles to its original course on its way to rendezvous with Saturn on September 5th 1979. Pioneer 11 will make a much closer approach to Jupiter than did Pioneer 10 which is now heading out of the Solar System.

PIONEER TO VENUS: N.A.S.A. is currently planning for two Pioneer type space probes they plan to launch in 1978. Previous expeditions to the inner solar system have employed the use of Mariner type craft. But it appears that from information received back from Pioneer 10 and 11 N.A.S.A. is extremely pleased with the performance of these probes. The plan is for the first Pioneer craft (i) to be launched in May 1978 three months later a second Pioneer (ii) will be launched which will overtake the first and go into orbit around Venus in the December, about 10 - 20 days before the first Pioneer (i) reaches Venus it will launch one large probe and three small probes which will enter Venus's atmosphere about one week after the second Pioneer (ii) has been placed in orbit. The probes will transmit information back to Earth about the composition of the cloud layers which surround the planet and the characteristics of the magnetic field. Then the first Pioneer (i) will itself enter the Venusian atmosphere and transmit back information before burning up or crashing into the planet.

LUNA 22: In a previous edition of the newsletter, there was a short article about the Russian moonprobe Luna 22. It is still orbiting the Moon. On June 9th it made manoeuvre which brought its orbit sweeping to within 25km of the lunar surface. For four days, high resolution photographs of the lunar surface were obtained. On June 13th, the orbit was raised to 299 x 181 km. Possibly the probe was making high resolution pictures of a future moonprobe landing site. C.F. Radley

SKYLAB: was visible during August, predictions for Skylab are also obtained from C.F. Radley. Sometimes satellite predictions are published in the Evening Star Newspaper.

FORTHCOMING EVENTS

INSTITUTE OF MECHANICAL ENGINEERS MEETING

Dr. Simon Mitton of Cambridge University Institute of Astronomy will be speaking to the Ipswich Institute of Mechanical Engineers on Wednesday September 11th at 7.30p.m. at the Ballroom of the Great White Horse Hotel, Ipswich. He will be speaking on Radio Astronomy. Everyone is invited to come along. C.F. Radley

September 21st N.A.S. will be holding a public meeting when a speaker from the University of East Anglia will be talking on artificial satellites and hopes also to tune into a weather satellite and obtain a television picture, for details of who is going and what time etc. contact C. Radley.

OPEN DAY: The big event of the year Saturday, September 28th, 2.00 pm. onward, please come along, lots of volunteers wanted to organise raffle, exhibits etc. Also please detach poster and display somewhere prominent, the car window, ye olde village shoppe etc., the more people that know about the Open Day the better for the Society.

Before I begin, I would like to express my thanks and appreciation to Mr. C. Mumford for his time and effort spent in conversations about variables. With these conversations and the book by J.E. Sidgwick entitled Observational Astronomy for Amateurs, I was able to put together these thoughts so that other members might benefit as well.

Variable stars that have been studied include several thousand, and the majority of these have been very inadequately observed. There are, in addition, the thousands of stars whose suspected variability has never been confirmed. This leaves also numerous cases where variation has been established but has never been classified due to insufficient observation. For this reason variable stars provide one of the best examples of a field in which the amateur can give valuable assistance to the professional astronomer. Even the most modest types of amateur equipment can be turned to valuable work, and the technique of observation is within the reach of just about everyone.

Observations however accurate and however needed are wasted if they never get further than the observing book. The value of pooling observations cannot be emphasized enough. If you decided to enter into this field, I strongly suggest joining such groups as the British Astronomical Society, or the American Association of Variable Star Observers (AAVSO). With both organizations, upon request, you can receive star charts with comparison star fields worked out in advance. This is very important, and will be explained a little further in this article.

Some preliminary remarks of a general and ground clearing nature may be helpful at this point. To some extent all branches of observation is an art as well as a science. Proficiency involves mental processes of which the observer is largely unconscious, and this is the case of visual estimations of stellar magnitudes more than of most. There are a few who appear to be able to estimate the brightness of a star to one tenth of a magnitude, such feats are not really inspired shots in the dark, but really the result of unconsciously applied experience through years of observing according to the "RULES".

In astronomical observations there are no short cuts; proficiency can only come from experience in the use of those techniques which trial has proved to be the most reliable. Variable star observation techniques have been worked out in detail, but although the rule may be more numerous than in some other branches of observation, this is simply because they represent the most efficient and reliable means of attaining the desired goal---Accurate Results.

As mentioned in this article, comparison star charts are specially constructed for variable star observers, and issued by the BAA and the AAVSO. These charts show the area of sky containing the variable in question; those field stars suitable for use as comparison stars are indicated by letters, numbers, or according to a system whereby they are denoted on the chart in a table by their magnitude.

All variables should have a set of comparison stars whose mags are accurately known and which are distributed in not more than half-magnitude steps over the whole of the variables amplitude plus 0.5 mag at each end. They should be included in the same telescopic field which shows the variable clearly, but should be neither too close to one another, or too close to any much brighter star. Finally, they should be of the same color as the variable. Needless to say, all these conditions cannot be fulfilled in most cases.

When using these charts you must orientate yourself with the chart itself. The reason I say this is because depending on what kind of telescope, eyepiece, or attachment you use will in turn govern which is the proper orientation of the chart. This expressed in a different way means knowing whether your field is terrestrial or astronomical. This you must know before you can use the charts effectively. On all charts, north and south are designated clearly for your convenience. These headings on the chart will have to be orientated to your system for the field to look the same. Usually the BAA'S 9° field chart has north on the top where as the 3° and 1° field charts have north on the bottom as would be seen in an astronomical telescope.

When locating a variable that has just been added to your observing list a great deal of time can be wasted trying to locate it unless a rational procedure has been adopted. Although after it has been observed a number of times the observer will start to become familiar with the field and the immediate surroundings. Also as with the particular course that has been adopted in locating the field. This will of course reduce the time spent on finding it to just a matter of seconds in most cases, and at worst to two or three minutes.

What the observer is trying to locate is not the variable but the field, whether using circles or the visual method. For this reason it is useful to study the field chart before hand and memorise the positions of its brighter stars. Armed with this information on the onset the field will be recognised immediately when it enters the field of the telescope of finder.

Visual comparisons consist of nothing more than the use of star atlas, starting with the whole visible hemisphere of sky and narrowing in the position of the variable to within smaller and smaller areas. At this stage it should be possible to direct the finder at the field with sufficient accuracy for it to be picked up with little or no sweeping. The field having been located, identify all the visible comparison stars from the charts furnished by the above mentioned organizations, making yourself so familiar with the pattern of stars that the field's identification will be even quicker next time.

When comparing by eye the brightness of a variable and a comparison star the observer is performing an exercise in point photometry. The image of each star must be allowed in turn to fall upon the same spot on his eye. Also as essential is to be quite clear in one's mind the precise nature of the step and fractional methods, and the manner in which they differ from one another. Observation by a step method involves 2 stars and the light interval between them. Many comparison stars can be used but each comparison is an entirely independent operation in itself. Each involves the same three elements--2 stars and 1 interval--then forming a correct light interval between them in terms of a scale of steps.

The Fractional method involves a greater number of elements--3 stars and 2 intervals. The assessment consists of weighing these two intervals against each other and not against a known scale of "steps". Estimates using the fractional method are to this extent longer and more complicated.

The Pogson's Step method is a true step method and is the step method used by the BAA and AAVSO variable star sections. It can be used with a single comparison star, and in ignorance of any actual magnitudes. Pogson's method is based upon a scale of subjective units, by which consciously memorised differences of 0.1 mag is used. The Pogson method involves a preliminary training of the eye to recognize intervals of 0.1 mag, 0.2 mag, and so forth as it sees them. For this reason it is best to use other methods until such time the eye has been able to adapt itself to seeing 0.1 mag.. The most convenient objects to use when memorising the differences are the comparison stars themselves. The best reason for this is simply because they are easily found using your charts and their magnitudes cover a wide range of accurately determined magnitudes.

The Fractional method utilizes two comparison stars which are chosen, one slightly brighter and one slightly fainter than the variable. This immediately fixes the magnitude of the variable between two definite limits. It cannot be any brighter than the brightest one chosen and as well not any dimmer than the fainter one.

The brightness of the two stars is divided mentally into any convenient number of parts depending on the size of the interval. The position of the variable within this interval is estimated in terms of the fractional part of the total interval separating it from each star. Interval assessments of from 1:1 up to about 1:5 can be made with sufficient accuracy to justify placing reasonable confidence in them. To divide a light interval into 7 parts or more and to place the variable correctly within this range, is too difficult for much weight to be attached to such an observation. Also using this method it is best not to know the magnitudes of the comparison stars before hand.

When making comparisons the most important condition for consistency is that the images being compared should be received by the same spot on the observers eye. This point cannot be stressed enough and if any accuracy at all is going to be achieved then this rule will have to be followed to the letter. In practise each star must be brought in turn to the center of the telescopic field, and there looked at for not more than 2 to 3 seconds by "Direct Vision". Simultaneous observation of two stars by averted vision, the eye fixed on a point midway between them, results in large and unsystematic errors due to the enormous range of sensitivity of different regions of the eye. When the two stars are looked at directly the image of each is known to fall on the same spot of the eye each time. In the case of indirect vision there is no such guarantee. The physiological sources of error are very important, and is the reason why direct vision has been universally adopted by variable star observers. The danger to be constantly on guard against when using this method is the unconscious use of averted vision. Also, allowing the fixation point to wander from the star whose brightness is being impressed upon the visual memory.

The only time the use of averted vision is justified is when no observation at all would be possible without it. This is to say when either the variable or the comparison star is very near the magnitude threshold of the instrument. That even with magnification pushed to the limit, to increase the stars visibility by darkening the sky background, it is still not seen using direct vision. Every effort must be made to fix the eye on the same point in the field when each star is at the field center. When using this method the observation has to be recognised as make shift, and of doubtful accuracy.

If the mag difference between each comparison star is kept the smallest as possible then the more the brightnesses are distributed on either side of the variable. In so doing the better the derived magnitude will be.

P.T.O

This thought is intended to be used in conjunction with the fractional method. One important fact that cannot be over emphasised enough is the comparison stars magnitudes do not have to be known at the time of observation. This includes both methods.

One last important fact about observing is the observation of RED colored variables. The eye's adaptation to red light is slow. Thus, as a red star is stared at, it appears to grow brighter over a period of a few seconds. This problem can be avoided in two ways. First, try to select your comparison stars of the same color as the variable, or secondly, don't look at the variable for long steady periods. Instead look at it with quick short glances until the impression is gathered on the mind then go to your selected comparison star or stars.

With the information given in this article, you as a prospective Variable Star observer, should be able to get off to a good start in the field. If you are, I believe these are the basic prerequisite's to take on this sort of observation. In future articles such subjects as, how to record your findings and what to do with them once you have, and the different types of variables know will be discussed.

As for anyone wishing to participate in an organized section of this type, the Society is presently outfitting itself with forms, charts, and necessary gear to undertake this kind of study. Those wishing to participate should ring Mr. T. Cardot at Ipswich 59887 or call at the dome on thursday Nights.

Mr. Thomas J. Cardot
Variable Star Director
Orwell Astronomical Society

PROGRAMME FOR SEPTEMBER, 1974.

MONDAYS: from 7.30p.m. WEATHER PERMITTING.
GENERAL OBSERVATION PERIOD.

Directors. G. Collier, [REDACTED] Church St. Chelmondiston
Phone Woolverstone [REDACTED]
and P. Carroll, [REDACTED], Ipswich.

Sept. 30th

MONDAY: 16th September. Visit to Observatory by Ipswich Round Table
organised by Mr. G. Collier at 8.30p.m.

TUESDAYS: from 7.45p.m. PLANETARY SECTION.

Director. D. Bearcroft, [REDACTED], Ipswich, Phone [REDACTED]

Sept. 3rd.
" 17th
Oct. 1st.

WEDNESDAYS: from 7.p.m. SOLAR & LUNAR SECTION.

Director: R.M. Cheesman, [REDACTED], Ipswich.

Sept. 11th
" 25th

from 8.30p.m.

" 4th
" 18th
Oct. 2nd.

THURSDAYS: from 9.p.m. VARIABLE STARS SECTION.

Directors: T. Cardot, [REDACTED] Ipswich, Phone [REDACTED]
and S. Flory, [REDACTED] Ipswich, Phne [REDACTED]

Sept. 5th
" 12th
" 19th
" 26th
Oct. 3rd.

FRIDAYS: from 7.30 p.m.

Directors: J. Deans, [REDACTED], Capel St. Mary, Ipswich
Phone GT. Wenham [REDACTED]

and K. Dye, [REDACTED], Ipswich, Phone [REDACTED]

Sept. 6th
" 20th

FRIDAYS: from 7.30 p.m. NEBULAR & CLUSTER SECTION.

Directors: M. Stow, [REDACTED], Ipswich

and R. Hazlewood, [REDACTED], Ipswich, Phone [REDACTED]

Sept. 13th.

FRIDAY: 27th September. OCCULTATION SECTION.

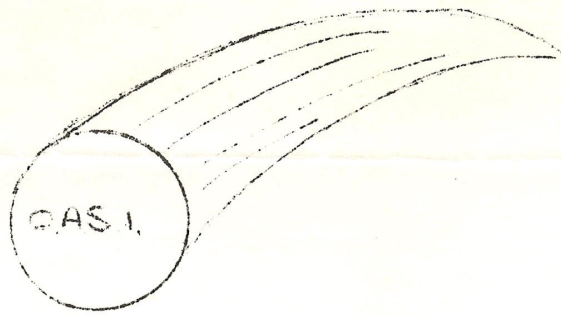
Director. C. Radley, [REDACTED] Bourne Hill Wherstead,
Phone Ipswich [REDACTED]

Meet at Chequers Inn Raydon at 9p.m. Occultation of 2 stars .

SATURDAY: FROM 2 P.M. OPEN DAY AT OBSERVATORY. 28th SEPTEMBER.
All members required to help on this day please.

SATURDAY: 21st September, Talk by Norwich Astro Soc. on Artificial Satellites
If you wish to go contact C. Radley Ipswich, [REDACTED]

SUNDAYS 9a.m -12noon. Sept 8th, 15th & 22nd Help required at Observatory to get
ready for the OPEN DAY on 28th September.



ORWELL ASTRONOMICAL SOCIETY (IPSWICH)
ORWELL PARK OBSERVATORY,
NACTON, NE IPSWICH.

GIANT TELESCOPE OPEN DAY

ON
SATURDAY 28TH SEPTEMBER 1974 FROM 2 PM

FILM & SLIDE SHOWS - 2.30 PM & 5.30 PM

REFRESHMENTS

OPEN DURING THE EVENING FOR VIEWING THE
HEAVENS THROUGH THE 10" O.G. TELESCOPE -
(WEATHER PERMITTING)

ADMISSION

ADULTS 15p
CHILDREN 5p

For further details contact: The Secretary, Mr. P. Carroll,
30 Defoe Road,
Ipswich.
or Mr. S. Flory,
11 Canberra Close,
Ipswich, Tel: 73207