JOURNAL OF THE ORWELL ASTRONOMICAL SOCIETY (IPSWICH)

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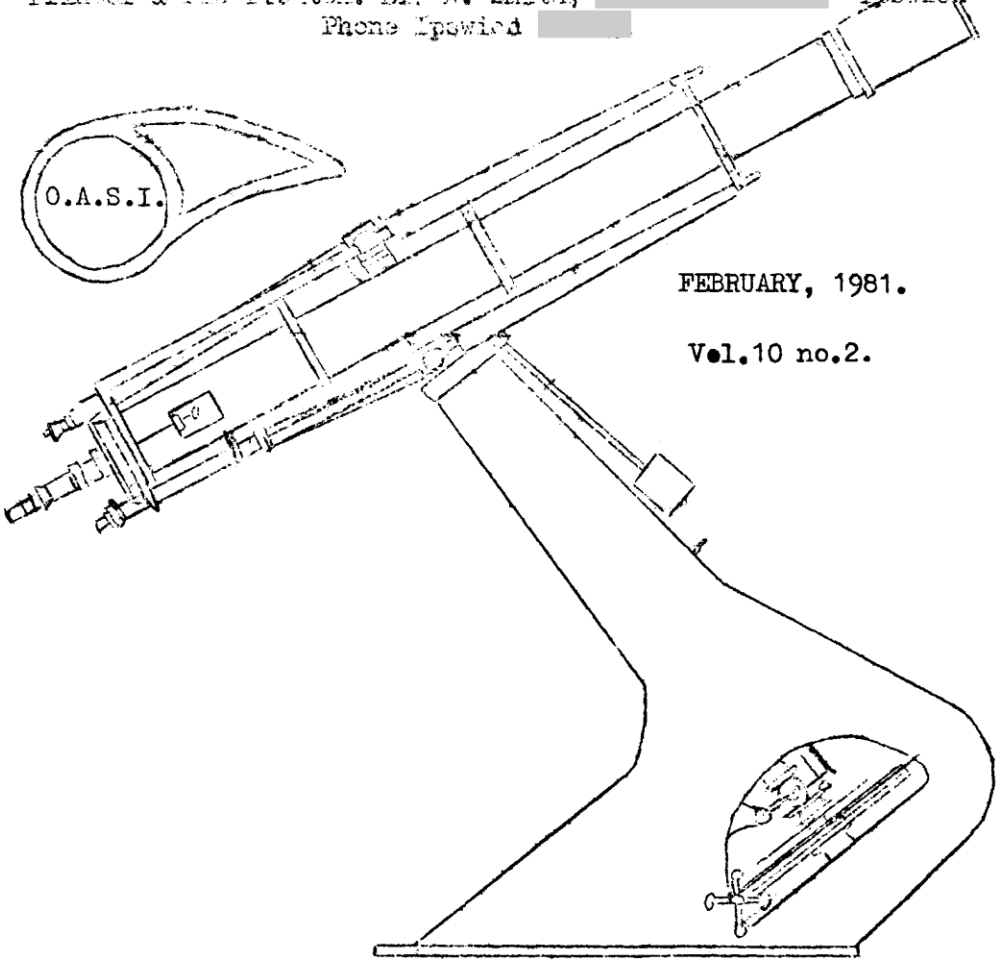
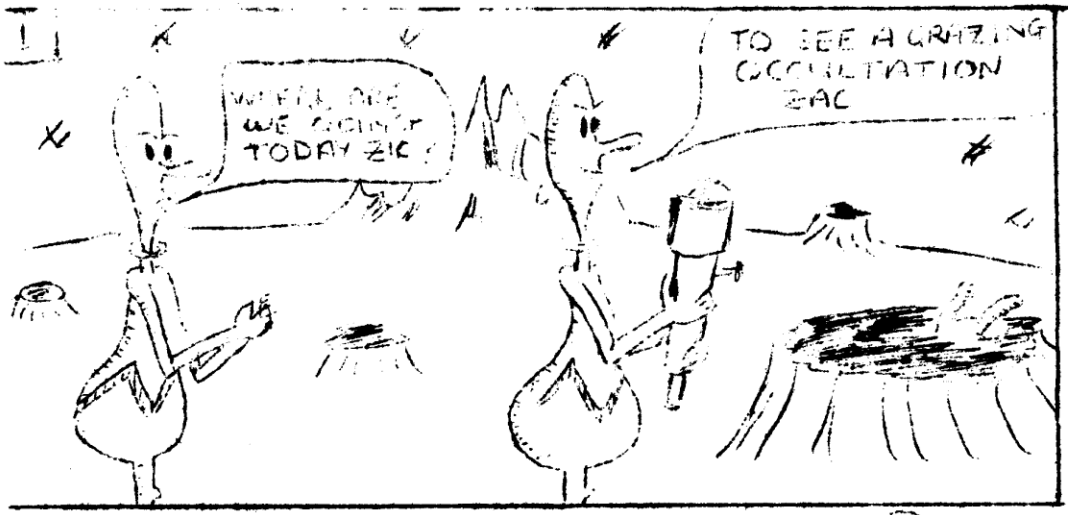


FEBRUARY, 1981.

Vol.10 no.2.

The Orwell Park 10 Inch Astronomical Telescope at Nacton Near Ipswich.



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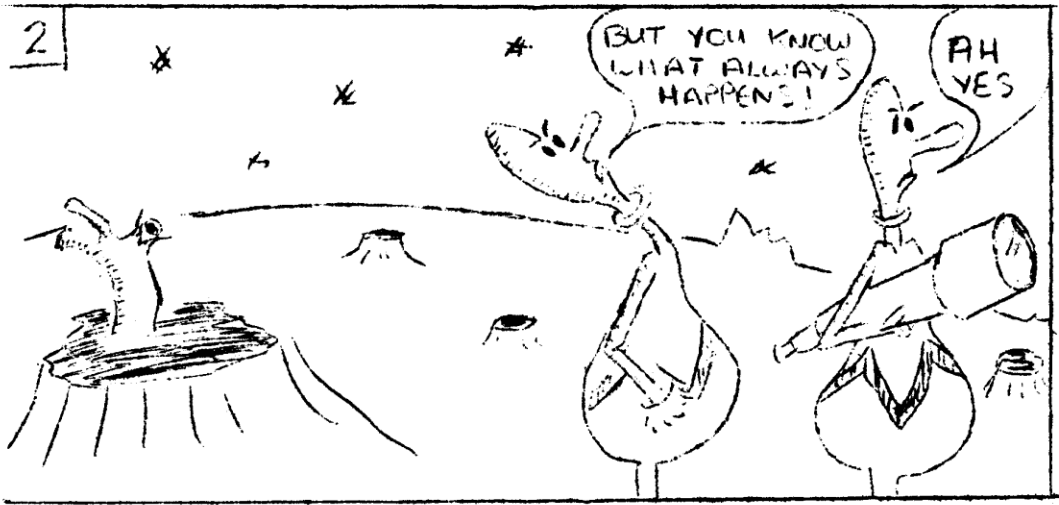


BY CRIS

CONT ON BACK

NIGHT SKY AS SEEN FROM ORWELL PARK DURING FEBRUARY:

by Paul Burt.

The inconspicuous Lynx constellation is in the zenith
s month, forming a line of stars in the north-west to
th-east direction, and flanked by Ursa Major in the east
Auriga to the west. Cancer is on the meridian at around
night, with Leo in the south-east and Gemini, Taurus and
on in the south-west. Canis Major and Sirius lie above
south-western horizon, while the 'upper' half of Hydra
kes up from the south-eastern horizon to it's head, just
ow the Praesepe cluster in Cancer. To the north-west
seus and Cassiopeia are still well above the horizon.
r to the north-east, Bootes containing Arcturus is now above
horizon by late evening.

SUN

Sunrise is at 07h 50m at the beginning of the month
nging to 06h 50m at month-end. Sunset changes from 16h 40m
17h 30m. The Sun moves from Capricornus to Aquarius during
month.

IPSE: If for some strange unknown reason you are in the
inity of the South Pacific Ocean below New Zealand on the
, watch out for an annular solar eclipse.

MOON - Phases

New Moon	4d 22h 14m	Full Moon	18d 22h 58m
First Quarter	11d 17h 49m	Last Quarter	27d 01h 14m

OCCULTATIONS

Star	Phase	Mag.	Time d.	h.	m.
508	D	4.3	11	18	35.3
526	D	6.9	11	23	11.2
*667	D	5.3	12	18	44.3
1025	D	7.4	15	2	22.1

= Disappearance. Stars listed according to Zodiacal Catalog (ZC) numbers. * denotes double star.

THE PLANETS:-

Mercury will be an evening object, at greatest elongation of 18° on the 1st, setting two hours after the Sun at mag. -0.3 decreasing. Inferior conjunction is on the 17th.

Venus is drawing towards the rising sun at mag. -3.4, but will not be visible at the end of the month.

Mars is lost in the Sun-set.

Jupiter rises at around 2100hours in Virgo at Mag. -1.9, and is in retrograde motion.

Saturn is rising alongside Jupiter, also in retrograde motion at mag. +0.8. Saturn and Jupiter are in conjunction on the 19th.

Minor Planets - VESTA reaches greatest magnitude of +6.9 on the 25th in Leo. R.A. 10h 30m Dec. +19° 30'.

Source - B.A.A. Handbook, 1981. All times are U.T.

From other Journals:

Celestial Christmas Lights: Christmas night provided an unusual feast of activity, with no less than three fireballs (one of them man-made), and of course the discovery of a new comet by Roy Panther of Northampton. The first of the fireballs came at 19.20 visible over southern England at mag -4, and the last came at 02h45m Boxing Day morning, at about mag -6.5

The most spectacular display was the re-entry of the Russian rocket which launched Cosmos 749 in 1975. The burnup became visible at 21h 08m over the English Channel at mag. -9, in the form of six white fragments travelling in a line towards the coast at Newhaven. The fragments then disintegrated into 20 smaller pieces, fading away over Sussex. Any surviving pieces probably landed in the Medway or Thames estuaries. The B.A.A. received 250 fireball reports. almost all from non-astronomical members of the public (which says little for the dedication of us skywatchers when confronted with more earthly liquid temptations!).

One man however who was well rewarded for his Yuletide abstinence is Mr. Panther, whose 33 years of patient skywatching has brought him well deserved fame. Comet Panther, the first comet to be found by a British amateur for 15 years, can be seen in Lyra at mag. 10, gradually fading over the next few weeks.

- New Scientist.

Articles to read:

'New stars for old' - New Scientist 18th Dec. 1980.

An account of our present knowledge of the various types of Novae

'A new decade of science and Astronomy in space'

- New Scientist 8th Jan. 1981.

A look at what the 1980's hold in store in the way of proposed Space probes and orbiting observatories.

METEOR NOTES: by David Barnard.

The Quadrantids Meteor Watch held on the 3rd January which was the night of the maximum was called off after an hour because of thick cloud and cold winds and with the prediction of a cloudy night ahead.

There are no major meteor streams to observe during February so by the time of the next meteor watch the weather might be better for us.

Experiments on a photoelectric Guidance System and Photometer Element

by Roy Adams.

PART II -- 'up the Dome with a Bucket of Lights'

The obvious thing we do was to take my test circuitry with the phototransistor in a set of extension tubes that would fit on the end of the Orwell Park Telescope. The light-gathering power of the big 10" lens is about 25 times that of my Prinzgalaxy telephoto lens which I had originally fitted the sensor to. So with the telescope alined on Betelgeuse in Orion, on went the 'magic eye' and with all the dome lights out, the sensor was connected.

It was not an easy job getting the pin-point of light onto the minute sensitive area of the transistor - with a total area of only 12mm^2 and possible only 2mm^2 for the pick-up zone, a deviation of only 1 minute of arc putting the star image right off the transistor's 'pupil' But eventually, we got a 'flash' reading of 4 microamps more more than the 1 microamp dark current, on 10volts supply (my Prinz telescope independent power supply). Unscrewing theextension tube mount from the adaptor enabled careful moving about the dome, and effective defocus so the star image was no longer than a point and more distributed over the sensitive area of the transistor. In this 'Heath Robinson' fashion, a peak reading of 15 microamps was attained.

The transistor (from data on it) can accept at least 40 volts, yet the total test supply was only 10 volts. The voltage across the phototransistor was expectedly rather less than 10 volts, and for a very little increased dark current, the amount of microamps from a given light signal can be increased to at least twice the 15 microamps, if a 40 volt supply is connected instead of the 10volt one. (The reading increased compared with voltage, is not fully proportional to voltage increase). It is also presumed that with some better means of 'locking on', the light signal will be more continuous, and a little higher reading can result; also that optimum rackout was not quite achieved.

B.

Betelgeuse's magnitude is nominally 0.92, 1/10th the brighness of Sirius. A servo-mechanism can operate on a very small current quite effectively, but obviously it must not operate until dark current is well exceeded. With a dark current of 1.5 microamps, a 'bring-in-mechanism' operative currenet of about 4 microamps is about right, with 'switch-off' at about 2.5 to 2 microamps. If Betelgeuse would give enough light with 40 volts applied to the circuit, to make a 40 microamp signal on a 10" aperture telescope, then with some give-and-take over spectral match, star or other object to sensing element, any object, be it a star, planet, Moon or Sun or even a bright comet, of mag. 3.5 or brighter could be used as a guide. This with two or more sensing elements suitably arranged at the eyepiece end, and with filters to stop excessive light from brighter objects such as the Sun or Moon, and of course with a telenegative amplifier like a Barlow lens in train to much increase the effective focal length of the primary (lens or mirror) of the telescope used as the guide 'scope'.

The principle of operation of the phototransistors in a guide 'scope is basically quite simple - once the guide object image is nestled between the four transistors of the system, where four transistors are used, and not some other number, the servo circuitry can be switched in and once the image encrouches considerably over any one of the cells, the appropriate over-ride or basic drive motor is switched in, so getting the image off the particular cell (transistor) and thus making the light signal so small as to switch off the motor once the correction is made.

Two motors, one for R A. and one for Dec. can both operate independently, and if they are reversible, in either direction. It is conceivable that four seperate, non-reversible motors could also be used. Another method is to use what I call the 'operative edge' principle, in which only two cells may be sufficient, speeding up or reducing the speed of the motors, one for each side of the axis, for example, according as how much the sensing cells or transistors are covered by the object image, and by the object's brightness.

To aid setting the guidance group of elements on the guide object, and to make the necessary deviation angles before operation less, the cells having a finite diameter or width, beam-splitting diagonals could be used. The closer the 'tuning' can be - the smaller the play between operation of motors in opposite directions - the closer will be the guidance for a given effective focal length.

There are at least 30 stars above mag. 2.2, including Polaris, and possibly about 60 guide stars usable, from results of these initial crude experiments, in English skies. With an area of sky throughout the year, of about $25000^{\circ 2}$ down to about -15° declination, this is, for stars alone, somewhere in the region of on average, 1 guide star available per $500^{\circ 2}$, or 1 guide star for every circle 12.5° radius. Without going into the technics of probability throry, we could possible get away with a guide 'scope-pointing to camera-telescope-pointing angle of as much as this 12.5° with little inconvenience. But then, further improvements in sensitivity of circuitry using op-amps (printed-circuit amplifiers) and other devices, such as bridge circuit increment which could allow motor working from currents much smaller than 2.5 micro-amps over dark current are possible, so allowing stars much dimmer than about 3.3 mag to be used, and correspondingly many more guide stars would be available, and less deviation from the main photographic axis would be needed.

In some cases, the object itself being photographed could be used, via a split-beam arrangement, as the guide object.

Anyway, the results so far seemed promising enough to bear consideration of involement in the new drive system for the Orwell Park 10", in which case we may eventually be able touse a shorter focal-length camera on the main telescope, to make our own photographic star atlas, as well as effectively lock-on to planets, and do narrow-band photography of solar or Lunar events or features.

Regarding photometry, the lock-on/guidance control would be a great boon in conjection with a further sensor, more rigorously compensated for temperature and humidity, and otherwise duly cared for. In photometry, the demands are far more stringent than for just guiding, as several factors such

.. as sky brightness, atmospheric absorption (this means also by light haze) and spectral quality of the object whose light is to be measured, must be taken into account, together with the matching of the image area to the cell area, with certain wandering factor allowed for. Also, any non-linearity in the circuitry as well as in the cell itself, in response to different light intensities. But here, a straight metering can be used, and currents as low as 0.2 microamps, or lower with certain circuitry additions, could be useful, above dark current. This would get us down to as far as the naked can see - about 6.5 mag.

One might say, "why not go for a special photomultiplier tube and similar stuff?", but the idea here is to use simple and readily available components at very low cost. If anyone would like to contact me with any ideas on improvements for such systems, oranything similar, I should be glad to hear from them. These ideas, of course, apply equally to members' individual telescopes or projected ones, as to our Society ones, particularly the Orwell Park Telescope.

In order for the Society to do useful work in the overall astronomical community, accurate photography is very desirable, and accurate photometric readings, to add to this, if not to supplant, naked-eye drawings and estimates concerning observational programs of very wide variety. Nova and supernova search and monitoring work, variable star plotting and cometary observing are just three broad lines needing accurate lower-threshold magnitude measurement, so there is always room for improvement.

To show how sensitive even the initial test apparatus was, we swithced on the Dome lights on dim and the small amount of light getting through the paper view ring in the back of the sensor mount, was enough to give substantial readings. On full lighting, the meter went overscale at 50 micro-amps. We had a little fun moving about the dome between the lights and the business end of the telescope, and seeing the needle flick wildly about in unison.

Certain precautions have to be adopted when using such sensitive apparatus, such as keeping power disconnected from the circuit whilst a sensitive meter is switched on, or disconnecting the sensor or the meter, or switching-in by-passes to the meter.

continued on page 5.

The readings are quite stable, it appears, of the particular sensor used, although a high initial surge occurs on the simple apparatus for a second or two needing to be left to get down to the very small dark current, when power is connected.

For guiding, a very long effective focal length is desirable to get the best out of the primary lens or mirror the guide 'scope is to be used with, this long focal length being confined to the guide 'scope, or to the guidance head if the smae objective is used, and not to the camera part or observing part. This gives a very large 'leverage' over the camera optics (or the telescope in visual use) and therefore great accuracy of working, but only if the whole of the base mount, bearings, motor/drive transmissions, telescope tubes and their fixings are VERY RIGID. If anything is not rigid, some of the capability of the objective and guide 'scope, and film, for that matter, will be lost, and if the effective focal length is too long for the rigidity of the whole, loss of synch could occur (if in fact, it could ever be gained). Guidance systems on these principles can be used on less rigid telescopes, but beyond a certain amount of 'micro-swingabout' it is useless to attempt exacting photography anyway, that needs long exposures. And it is the exposures longer than 1/20 second or so that we are talking about.

With a guidance system of the kind mooted here, it could be that exposures of the order of two or more hours could be achieved with nothing else but casual monitoring. It may even be possible to make long-period multi-exposures for one hour one night, and lock on again on another night much later. Small periodic drive errors would be corrected by such guide system, but there is no guarantee that one could use the telescope in a seventy-kilometres-an-hour gale and have no worries, of course. The best telescope tube would tend to vibrate so fast that the guidance system would not be able to cope. But for a wide range of operating conditions on a decent telescope, the ideas seem very promising with photography of really deep-sky objects possible to as low as mag. 16 or 17, with the Orwell Park Telescope.

ROY ADAMS.

SOCIETY NEWS:

MR. MICHEAL BARRISKILL has a fine selection of membership subscriptions for 1981 and is still looking forward to improving his collection. If you would like to re-new your membership subscription to our Society please send your cheque made out to 'Orwell Astronomical Society (Ipswich) and send it off to Micheal Barriskill, IPSWICH.

If you have forgotten the rates (which are the same as last year!) are:-

Junior Membership (those under 18 years of age or students still in full time education	£2.00
Full Membership	£3.00
Family Membership	£4.00

JOURNAL PRINTING:

As you can see from this month's Journal we are only printing, as far as possible) one side of the paper. This is because the duplicating machine which the Society owns seems to pump too much ink through and the ink seeps through to the other side of the paper. We will be trying this system this month to see how we get on but since starting typing this Journal up I understand that the Society has been offered a dry-paper duplicator at a very reasonable price. This duplicator is still under investigation to see if it a) works and b) will do what the Society wants to do with it. So, as has happened over the last heaven knows how many years at this time, things might change again by the time the next Journal comes out.

S.B.S. -1 Now in Orbit:

Report by Simon Harvey.

The first in a series of three satellites being built for Business Systems is now in orbit having been launched on the 15th November from Cape Canaveral aboard a McDonnell Douglas Delta 3910 vehicle. When S.B.S.-1 becomes fully operational during January the digital satellite will provide telephone, computor, teleconferencing and electronic mail services to S.B.S. customers. On November 16th the satellite's antenna platform was de-spun, the antenna deployed and the solar cell drum deployed. The drum took about an hour to fully deploy. On November 19th orbital operations were transferred from COMSAT'S new tracking centre in Washington D.C. to Satellite Business Systems ground station at Castle Rock, Colorado. The satellite, the first of many based on the same design, is now on station at 106° West longitude in line with El Paso.

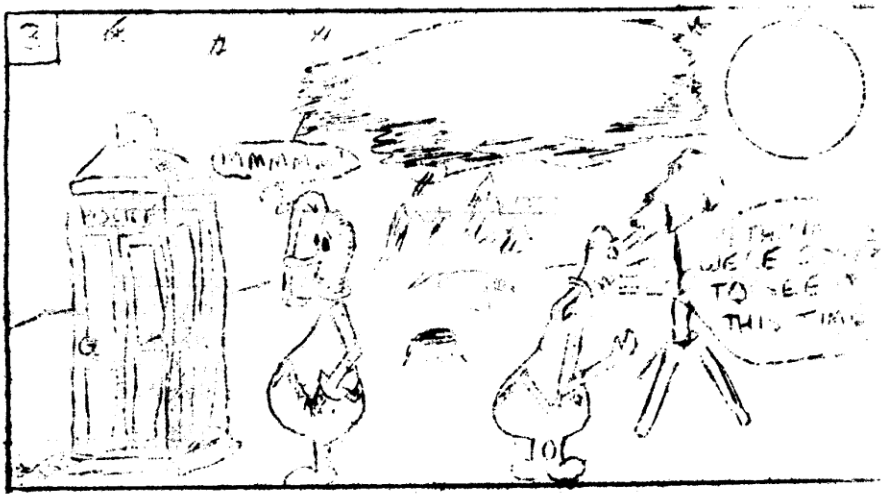
S.B.S.-1 is the first of fifteen orders placed for Hughes Aircraft's HS 376 design satellite. Already work is assured through to 1986, with such companyies as Western Union, Perumtel and Telesat on the order books. The unique solar panel skirt configuration provides the spacecraft with over 900 watts of power. Satellite Business Systems was the first customer to order such a satellite from Hughes. In addition to the three spacecraft, Hughes are building 100 Earth terminals for use on customer premises. S.B.S. is a private company jointly owned by COMSAT General, I.B.M. Corporation and Actna Life and Casualty.

- Hughes Space and Telecommunications.

DEADLINE FOR MARCH JOURNAL:

All items for inclusion in the March Journal should be sent A.S.A.P with the dealine at February 19th to

Mr. R.M. Cheesman, [redacted],
WEST HANNINGFIELD, Chelmsford, Essex.
CM2 8LQ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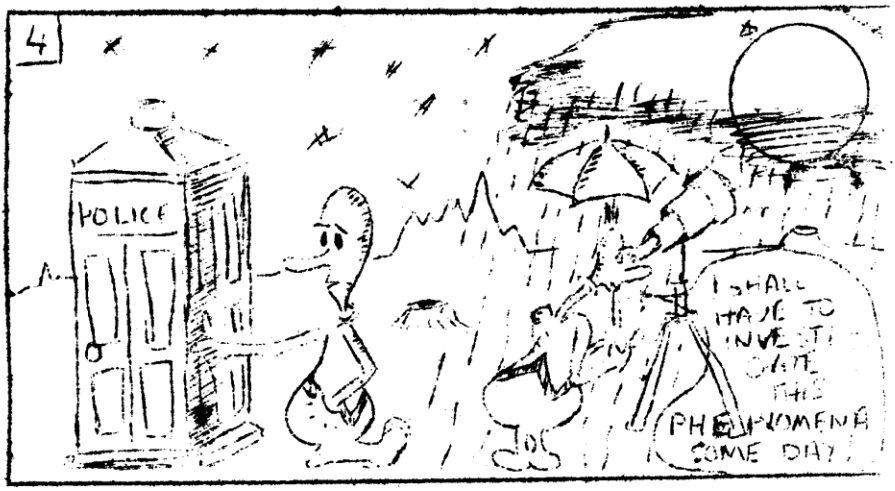
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POLICE
I SHALL
HAVE TO
INVESTI
GATE
THIS
PHENOMENA
SOME DAY

ORWELL ASTRONOMICAL SOCIETY (IPSWICH)

MEETINGS FOR FEBRUARY, 1981.

At the Observatory, Orwell Park School Nacton:-

TUESDAYS from 7p.m. Solar, Lunar & Planetary Section
Directors. Mr. J. Hood, [redacted]. Ipswich
Mr. J. Ranson, [redacted], Ipswich
Tel. Ipswich [redacted]
Mr. M. Barritt, [redacted]. Ipswich.

February 3rd, 10th 17th & 24th

WEDNESDAYS from 8p.m. Nebulae & Faint Objects Section
Directors. Mr. D. Payne, [redacted],
Wickham Market, Tel. Wickham Mkt. [redacted]
Mr. M. Cook, [redacted]. Ipswich
Tel Ipswich [redacted]

February 4th 11th 18th & 25th

SUNDAYS from 8p.m. General Observations Section.
Directors. Mr. M. Barriskill, [redacted]. Ipswich
Mr. R. Adams, [redacted], Ipswich
Tel. Ipswich [redacted]

February 8, 22

VISITS TO THE OBSERVATORY:

Saturday 7th February at 7.30p.m.
Lloyds Bank Social Club, organised by
Messrs. Barnard & Cook.

SATURDAY 14 FEBRUARY at 8 p.m.

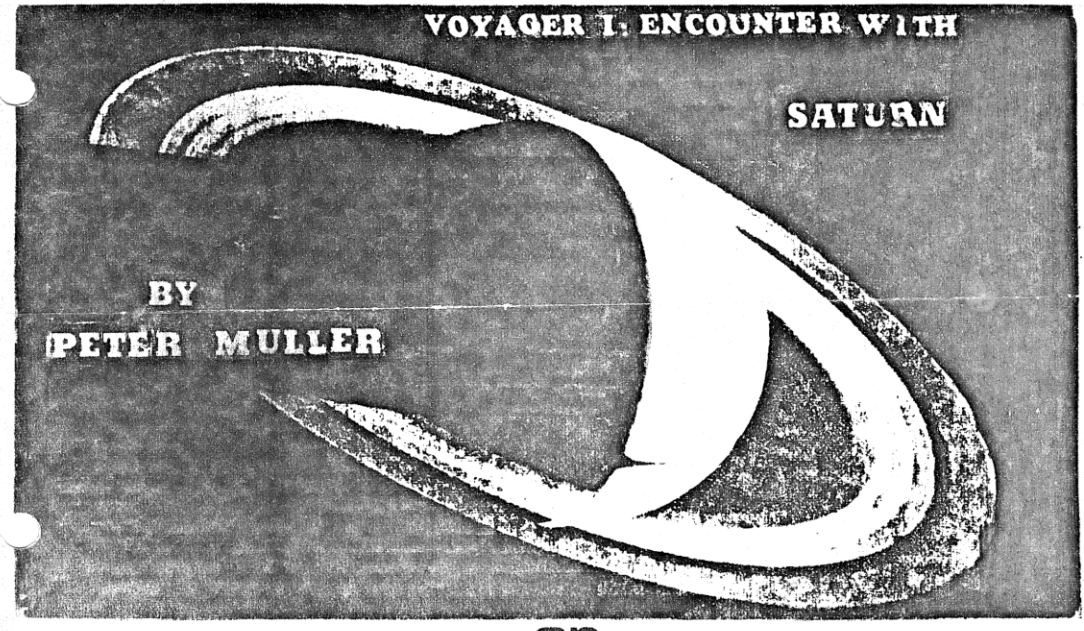
Committee meeting.

O.A.S.I.

Orwell Astronomical Society (Ipswich)

presents

a lecture entitled



on

FRIDAY 20th. FEBRUARY 1981

at 8p.m.

at

The Friends Meeting House

Fonnereau Road, Ipswich

REFRESHMENTS

ADMISSION FREE

Secretary: Mr. J. Ranson