AAE news

PUBLISHED BY THE ASSOCIATION FOR ASTRONOMY EDUCATION

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ASTROPHOTOGRAPHY

Since the call for material on Astrophotography was made (Vol. 1, No. 3), it has been decided to produce a small compendium on the subject. This is now being prepared and will be available on 1 Nov 1982.

It is hoped that the collection of articles will provide useful material for school projects and will help any teacher who is experimenting in this direction perhaps for the first time.

Depending on the response that it receives, the compendium will be updated and polished periodically, with the aim of stimulating the progress of teaching. Some five or six articles will be included in the first issue.

To cover production costs and postage the first issue will be available for £1.00.

Distribution will be from Glasgow University Observatory via the Editor (see address on back cover) Cheques and Postal Orders to be made payable to the Association for Astronomy Education.

Spacecharts

A widely acclaimed series of space wall charts

"Attractive ... well printed ... very inexpensive .. highly recommended." BAA Journal

These new charts present up-to-date information on astronomy and astronautics in an attractive format. The meticulously researched text is by Robin Kerrod, FRAS, FBIS, author of many books on science for children and the general reader. SPACECHARTS are illustrated by superb artwork and brilliant colour photographs. Measuring some 900 x 600mm - about 3 ft x 2 ft - they are printed on artpaper for the best possible reproduction.

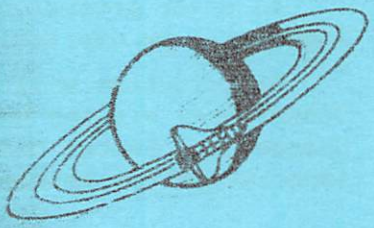
SPACE SHUTTLE features a colour cutaway of orbiter Columbia, together with pictures of its historic maiden flight.

MARS, JUPITER and SATURN include basic astronomical information about the planets and their moons and also the latest data and spectacular photographs returned by the Pioneer, Voyager and Viking probes.

SPACECHARTS are available direct from the publishers and cost only £1.95 each. To ensure that they reach you in perfect condition, they are posted rolled in a strong cardboard tube. Postage and packing costs 60p for 1 chart; 75p for 2-4 charts; and £1.20 for larger orders.

Send your orders, or write for further information to:

SPACECHARTS
Newton Tony
Salisbury
Wilts SP4 OHF



EDITORIAL

After taking a year to get over the shock of realising that it had given birth to itself, the AAE is now beginning to offer support to teachers by producing practical help. One such venture is the assembly of material on *ASTROPHOTOGRAPHY*.

It is hoped that other packages will eventually become available. Their contents, of course, will depend on the contributions which come from you. The next step is to decide on the choice of future topics. Examples might have titles such as *THE SUN, GETTING TO KNOW THE NIGHT SKY* or *PROJECTS FOR THE PRIMARY CLASS*. I should be pleased to hear your comments.

Mentioning the word Primary reminds me that I have the impression that most of the activity, or at least the material which is received for publication, is pitched for the Secondary School level. Yet from my own experience, there appear to be more cries for help from Primary teachers who are working on astronomical projects rather than from teachers of the older age groups. Is it because those Secondary teachers who offer astronomy are already experienced enthusiasts in the subject?

There appear to be lots of Primary school teachers who are very keen and willing to cover astronomy but who do need readily available support to be sufficiently committed to present class projects in the subject area. How can we get more Primary school teachers involved in the AAE and what is the best way the AAE can help the teacher who is being badgered by his/her class to "do some Astronomy"?

David Clarke.

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SAFETY WHEN OBSERVING THE SUN

Observing the sun can be dangerous, and looking at the sun through an optical aid without adequate precautions, or even with the naked eye, can result in permanent damage to the eye(s).

Probably all professional astronomers and most amateur astronomers are aware of the hazards but the general public (including many teachers) may not be so conscious of the real dangers. The following notes are intended to offer some guidance as to the dangers of naked eye observations and to suggest ways and means of avoiding them. A more detailed article is due to appear shortly in the BAA Journal.

The intensity of the solar radiation received at the top of the earth's atmosphere at the mean sun-earth distance is 140 $mW.cm^{-2}$. At the surface of the earth the figure is somewhat lower depending on the elevation of the sun and the transparency of earth's atmosphere. The eye is a lens which focusses the image of the sun down to a very small area, typically about 0.017 mm^2 thus effectively increasing the flux of the radiations reaching the retina many times, typically 2500X. This results in intensity levels of between 25 $W.cm^{-2}$ and 150 $W.cm^{-2}$. The question then arises: "What level of radiation will cause damage?" Authorities vary. The highest safe limit for a few seconds is quoted in one case as being 10 $mW.cm^{-2}$, whilst in another case 2.8 $W.cm^{-2}$ is quoted.

Such a wide range (~ a factor of 100) really does not make sense, but one thing is certain - experiments to improve the accuracy of our knowledge in this domain should NEVER be performed in the classroom! Precautions should always be taken to reduce radiation levels to well below the lower limit given above.

It must also be noted that it is the near infrared component of the sun's radiation that does most of the damage. Just because the visual image is sufficiently reduced it does not mean that the damaging radiation is sufficiently reduced. Infrared is invisible.

Consider naked eye observations. Do not stare at the sun with the naked eye. It is far better to observe a projected image. If means of projection are not available then some form of attenuator must be used. A few of the more commonly used attenuators are:

1. Sunglasses
2. Exposed film
3. Smoked glass
4. Photographic colour filters
5. Welders goggles.

NONE OF THESE IS COMPLETELY SAFE.

1. Sunglasses are downright dangerous. They are designed to reduce the general daylight level and not to allow direct viewing of the Sun.

2. Exposed film may be dense enough but there is no guarantee, and in any case the piece of film is likely to be very small and it is only too easy to look round the edge.

3. Smoked glass is safe if the density of the carbon coating is sufficient and is free from pinholes or blemishes and if the glass is evenly smoked. The danger here is that the carbon coating is fragile and may be easily brushed away. Here again, the piece of glass is not likely to be large enough.

4. Coloured photographic filters alone do not attenuate sufficiently. Combinations of filters may be safe if assembled by a knowledgeable person. Once again the size is likely to be too small.

5. Welders goggles are available in 18 different densities about half of which are inadequate. They should not be used before checking with BS 679:1959.

Other materials such as metallised mylar films should be treated with great caution until transmission figures become available.

What about viewing a partial solar eclipse when the light is reduced? The image produced at the retina still has the same intensity per unit area as the uneclipsed sun - it is just that the area of damage is reduced. Observations of a partial eclipse must be treated in the same way as for observing the whole sun, and it is far better to project the image of the sun through a pinhole on to white card and observe the image. *Do not directly look through the pinhole*.

Observations of a partial eclipse through an optical aid such as a telescope or binoculars require specialised ancillary equipment and unless this is available, the projection method should be used.

A partial eclipse of the sun is due for 15th December 1982 and teachers who encourage pupil activity should give the strongest of warnings about the dangers. If a damaged eye results from observations made on school premises, the teacher may find himself held legally responsible.

J C D Marsh
Hatfield Polytechnic.

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A DAY OUT AT GREENWICH

Report on the Annual Meeting, Saturday, 15 May 1982.

Those who managed to attend the AAE annual meeting at the National Maritime Museum were rewarded with a beautiful day, attractive surroundings and stimulating discussion.

The excellent organisation ensured that a great deal was packed into the available time and during the forenoon it was possible, with some nifty footwork, to attend a performance at the Greenwich Planetarium, visit Flamsteed House, hear a talk about the 28-inch refractor and crawl inside the portable inflatable planetarium dome (brought from Armagh) to the accompaniment of "Ouch!", "Get off my foot!" and much giggling.

In addition to these attractions, there was the usual exhibition and credit is due to those who participated and who brought interesting material, in some cases from a considerable distance.

Among those exhibits noted was a very professional presentation (what else?) from the ROE and a display from the Jeremiah Horrocks Observatory, Moor Park, which included a photograph of our Editor as a schoolboy. Preston Polytechnic showed off its practical degree courses and there was an interesting exhibit from the Astronomy Club of Hastings High School, Burbage - especially a series of colour photographs of spectra produced by one keen lad.

Other exhibits were from Southmead Junior School and Comber Grove Primary. Mr Mills demonstrated some of his home-made astronomical equipment and another DIY planetarium dome was also on show.

A highlight of the day's outing proved to be the opportunity to sample the hospitality of certain eating (and drinking) places in Greenwich. It was noted that the start of the Annual Meeting was rather generously timed to allow for this.

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When the meeting commenced, the first speaker was the President. He commented that the AAE was gradually becoming known, but hoped for an increase in membership among primary and secondary school teachers. He also touched on the need to link up resource centres and to improve on preparation and follow-up when classes have field trips, e.g. a visit to a planetarium.

The Secretary then presented his report, commencing with a brief history of the AAE (this shortly to be published). The membership was growing but would improve with more publicity. Application has been made for a setting-up grant.

The Treasurer's report (reprinted on the centre pages of this issue of AAEnews) was introduced next, and all Reports were then adopted.

It had been hoped to ratify the constitution of the AAE at this meeting, but unfortunately there had not been time to circulate members with copies of the proposed constitution and collate their comments. Also, some of those present were not members, so a vote did not prove practicable. It was agreed, however, that as the AAE was so recently formed, the present officers should stay on until the 1983 Annual Meeting when proper elections will be held. It is requested that members should give the draft constitution their consideration and write to Dr Seymour with suggestions and comments. (Address on page 11)

Another point raised in discussion was that the Council was not representative of secondary education and you will see that this has been temporarily taken care of by the co-opting of several new Council Members (full list on page 23 of this issue).

The short talks which then followed were presented according to the programme published in AAEnews for April 1982, and proved to be varied and interesting.

All speakers were asked to send a précis to the Editor for publication in this issue of AAEnews, however it is understood that no such reports have been received. *(Where are they? Ed.)*

Due to the late start, there was not time at the close of the meeting to thank properly those who had put so much work and thought into the organisation of the event, so this report may be an opportunity to rectify the omission and to ask Heather Couper to accept and to pass on appreciation where due.

Anon.
(Editor's Spy)

ANNUAL AAE MEETING - GLASGOW

1983 April 8/9

The form of next year's annual meeting will be slightly different from its predecessors. Details have not been finalised and suggestions concerning its content and style might still be incorporated. Please let your feelings be known in good time.

It is provisionally planned to have a celebrity talk/lecture at the University on the evening of Friday 8th April. This will also be open to the public on a limited ticket basis and encouragement will be given for local teachers and education administrators to attend. If it can be arranged, the core of the talk will be video recorded for possible distribution by loan.

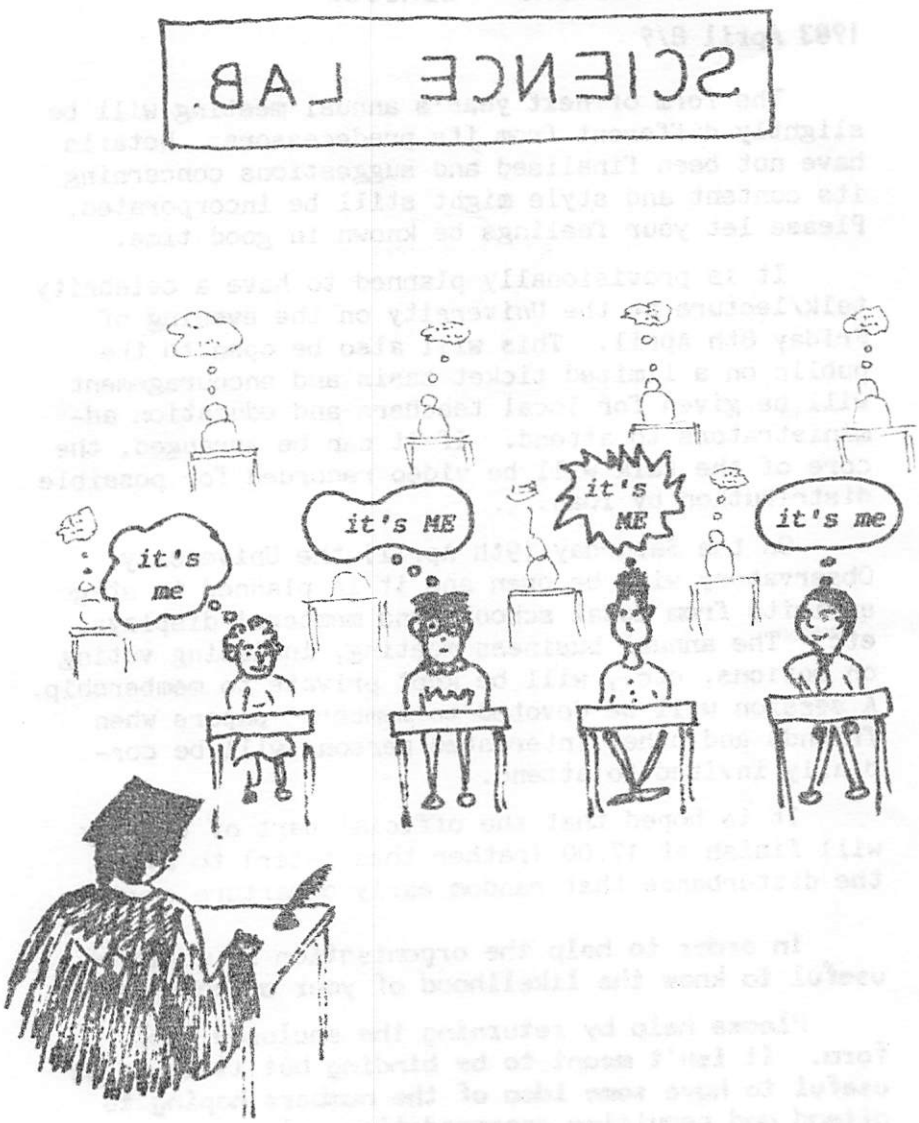
On the Saturday (9th April) the University Observatory will be open and it is planned to stage exhibits from local schools and members' displays, etc. The annual business meeting, including voting on motions, etc., will be kept private to membership. A session will be devoted to members' papers when friends and other interested persons will be cordially invited to attend.

It is hoped that the official part of the day will finish at 17.00 (rather than later) to avoid the disturbance that random early departure causes.

In order to help the organisation it would be useful to know the likelihood of your attendance.

Please help by returning the enclosed reply form. It isn't meant to be binding but it would be useful to have some idea of the numbers hoping to attend and requiring accommodation, etc.

PLEASE RETURN THE FORM EVEN IF YOU THINK THAT YOU WILL DEFINITELY NOT ATTEND.



"Now it is very unlikely that many of you will get get into astronomy as a professional - perhaps just one out of the whole class ..... "

COUNCIL NEWS

To spread the load of running the AAE, two members of Council have taken on responsibilities as follows:

Membership Secretary:

Capt Peter Richards-Jones, FRAS, MRIN
London Schools Planetarium
Wandsworth School
Sutherland Grove
Southfields
LONDON SW18

Publicity Officer:

Dr Percy A H Seymour
School of Maritime Studies
Plymouth Polytechnic
PLYMOUTH PL4 8AA

It is planned to produce some kind of publicity brochure shortly.

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The general administration of the AAE is performed by the Secretary. Information about the AAE may be obtained from him as below:

Mr Julian Ravest
Liverpool Planetarium
Merseyside County Museums
William Brown Street
LIVERPOOL L3 8EN

Tel: 051-207 0001

THE ASSOCIATION FOR A

Income and Expenditure for th

INCOME	£
Registration Fees for Inaugural Meeting, Liverpool	159.00
Subscriptions	390.00
Advertising Revenue	57.00
	£ 606.00

Balance Sheet as a

GENERAL FUND

Excess of Income over Expenditure for the year 1981/2	280.73
	£ 280.73

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TRONOMY EDUCATION

Year Ending 30 April 1982

EXPENDITURE	£
Inaugural Meeting, Liverpool	92.05
Production & Despatch AAEnews (issues 1 & 2)	47.54
" " " (issue 3) (estimate)	48.00
Production & Distribution of Constitution and Bye-Laws (estimate)	28.00
Stationery	84.13
Postage	9.61
Telephone	.94
Hire of Rooms for Council Meetings	15.00
	325.27
Excess of Income over Expenditure	280.73
	£ 606.00

30 April 1982

ASSETS	
Cash at Bank	357.39
LIABILITIES	
Sundry Creditors	76.66
	£ 280.73

J Butt, BSc, MSc, FRAS (signed) M J Layton, FAAI
Treasurer *Hon. Auditor*

ASTRONOMY IN PUBLIC EXAMINATIONS (1982)

GCE Examining Boards:

University of London School Examinations Department

- O Astronomy - only national examination exclusively on astronomy.
- O Navigation - contains the necessary astronomy.

University of Cambridge Local Examinations Syndicate

- O Environmental Science - small section on astronomy.
- O Navigation & Astronomy - section on astronomy.

Southern Universities Joint Board for School Examinations

- O General Science - brief mention of astronomy.

Joint Matriculation Board

- O Navigation - section on nautical astronomy.
- A Physics - optional topic on physics of astronomy.

Oxford Delegacy of Local Examinations

- O Physics - optional topic on astronomy.
- AO Elementary Aeronautics - brief mention of cosmography.
- A Geology - brief mention of earth/moon system, meteorites.
- A General Studies - occasional mention of astronomical topics.

Oxford and Cambridge Schools Examinations Board

- AO Astronomy - available to only two schools.
- AO Navigation - contains the necessary astronomy.
- AO History of Science - contains a large amount on the history of astronomy and cosmology. (Joint with Cambridge Local Board).

continued...

A History - optional topic on growth of the scientific world, c. 1500 → c. 1640: Copernicus, Kepler, Galileo.

O Nuffield Physics - very small section on planetary astronomy. (Inter-board examination).

Associated Examining Board

O Sea Navigation - brief mention of necessary astronomy.

O Air Navigation - brief mention of necessary astronomy.

Welsh and Northern Ireland Examining Boards

No astronomy included in syllabuses.

SCOTTISH CERTIFICATE OF EDUCATION Examination Board:

O Geology - nature and composition of solar system, origin of earth.

O Nautical Studies - celestial sphere, hour angle, etc.

H Navigation - celestial sphere, time, star recognition, etc. (Deeper than O level).

CSE Regional Examining Boards:

Associated Lancashire

Physics - optional topic on astronomy and space travel.

East Midland

Environmental Studies - brief mention of solar system and space.
(NB. Astronomy option in Physics has been withdrawn due to lack of demand.

West Midland

Physics - optional topic on the physics of astronomy and space.

North

Science - compulsory and optional topics on the universe.

North Western

Science - optional topic on astronomy.
Physics - optional topic on astronomy and space.

Yorkshire

General Science - very brief mention of solar system.

West Yorkshire and Lindsey

Physics - optional topic on astronomy.

In addition, a couple of Boards operate Mode 3 CSE examinations containing astronomy.

No astronomy is included in the syllabuses of the South Western, London, East Anglian, Southern, South East, Welsh and Northern Ireland Boards.

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Details of astronomy containing syllabuses may be obtained from the appropriate Examining Board.

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A W Lintern-Ball
(Loughborough Grammar School)

"SCHOOL ASTRONOMY"

A workshop in conjunction with the DES

Alston Hall, Longridge, Preston

1982 November 2nd - 4th

This course is intended as an experience in Astronomy for teachers in all types of schools. There will be a series of common core lectures on various aspects of Astronomy, with workshop sessions in small groups when members will study topics at their desired level.

In structuring the course this way, we invite both Primary and Secondary teachers to attend. This assists us to provide a low cost course, yet one which is capable of providing personal satisfaction at any academic standard desired.

Speakers:- Mr P Smith, HMI
Prof V Barocas
Capt P Richards-Jones
Mr J Ravest

Topics covered will include THE SKY AT NIGHT, SUN MOON AND PLANETS, WHAT THE STARS CAN TELL US, PHOTOGRAPHY, RESOURCES and SIMPLE TELESCOPE BUILDING.

Opportunity will also be given for practical observations.

Cost approx. £30. Residential places limited to 36. Non-residents welcome.

Course organiser: D J Harris.

Accommodation enquiries:- Mrs A Lightfoot
Principal, Alston Hall.

Enquiries + enrolment details from D J Harris, Bilston College of FE, Westfield Road, Bilston, WOLVERHAMPTON WV14 6ER.

REVIEWS:

"POSITIONAL ASTRONOMY AND ASTRO-NAVIGATION MADE EASY"
by H R Mills. Stanley Thornes (Publishers) Ltd., Cheltenham, England.
267 pp with many photographs and diagrams. £11.50.

This is a very useful book, written by a man of great enthusiasm for and understanding of the methods of positional astronomy.

The geometry of the celestial sphere, with its apparently difficult discipline of spherical trigonometry, has been an obstacle course to countless generations of would-be navigators and astronomy students, many of whom have tripped over the hurdles of seemingly complicated trigonometric formulae and endless computations. The enthusiasm for taking observations with sextant or telescope has withered, faced by the desert of mathematical reduction to be traversed before the promised land of results is reached.

Mr Mills shows how the advent of the small pocket calculator has changed all this. From being a drudgery with log tables, lasting the best part of an hour, most computational tasks in positional astronomy now at worst require a minute or two. The desert has been removed and the fruits of the promised land may be sampled unexhausted.

With a calculator, concepts and calculations needed by amateur astronomers, yachtsmen and students can now be performed quickly and accurately. Mr Mills' book is packed full of fascinating aspects of positional astronomy such as the celestial sphere, spherical triangles and early devices for their solution, astro-navigation with a calculator, altitude and azimuth lines, the mediaeval astrolabe, projects with sundials and the calculator, the equation of time, precession of the earth's axes, artificial satellites and so on. Many of the projects

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are suitable for schools; much of the simple apparatus described is cheap to build and reliable to use.

This book can be highly recommended therefore to schoolteachers, yachtsmen, astronomers, students and all those who suspected that behind the thicket of mathematical drudgery, positional astronomy hid lands of real interest and value. Mr Mills' book shows the way through.

A E Roy
Glasgow University.

"PROJECTS AND DEMONSTRATIONS IN ASTRONOMY":
D Tattersfield. Stanley Thornes (Publishers) Ltd., 331 pp, £7.25, paperback.

Most Astronomy books can be classed as descriptive texts or observational handbooks. This is an unusual book, since it fits neither category. There is indeed a good deal of descriptive text, but this exists to back up the core of the book, which consists of (about 60) mathematical assignments most of which can be done on A4 paper using basic geometry equipment. There are also a few demonstration experiments and models.

Professional astronomers, despite their star-gazing image, spend much of their time applying mathematics to observational data. This book is intended to allow the reader to emulate this process, but at a reasonable mathematical level - mainly O level or less.

The book is an excellent addition to the enthusiast's library. Apart from being fun to use, it gives a real appreciation of how astronomers use their observations. Some of the projects are very straightforward - little more than plotting observations onto a graph. Others show how observations can be used to derive information about the universe - I especially liked the assignment to measure the distance to a dark nebula by estimating the amount of dimming from a photograph.

Teachers and students of O level Astronomy will find this book useful - I counted 42 projects directly or indirectly related to the GCE syllabus.

Two criticisms: More use of calculus (surely familiar to most who have reached the mathematical standard of this book) would have allowed more scope in calculation, especially in the section on stellar interiors. Secondly, it is irritating that the projects are listed in the contents by number rather than name.

These apart, this is an unusual and highly interesting book for those enthusiasts who want to dig deeper into the techniques of the subject than most descriptive texts do, and also for those who want to do some Astronomy on a rainy evening.

Colin R. Jack
Warrington, Cheshire.

"MARS": Published by Spacecharts. Printed on art paper in full colour. Approximately 3 ft. x 2 ft. £1.95. (Post & packing details on page 2 this issue).

MARS is the latest addition to the series of Spacecharts. Like its predecessors it is a blend of text (in very clear typeface) and illustrative material consisting of drawings and colour photographs from space. The colouring is carefully rendered and this chart is a worthy companion to the three already published, although it is noted that the style of writing is slightly drifting towards the mid-Atlantic.

The price of these charts has increased by 25p but they are well worth their cost. It should be interesting to watch this series building up. Meanwhile MARS and its companion charts are unhesitatingly recommended for the classroom.

MDM

"THE VERSATILE ASTROLABE AND PLANISPHERE" by H R Mills. Stanley Thornes (Publishers) Limited. £4.75.

Most readers are no doubt familiar with the use of a planisphere, and many are probably at least acquainted with astrolabes and nocturnals. But I wonder what number have used a single device that can tackle lots of the problems these three instruments are capable of solving? In fact, H R Mills' versatile astrolabe and planisphere can be employed to provide a great deal of information. This includes: which bright stars are visible at any particular time, the times and positions of risings and settings of the Sun, stars and planets, and an observer's local time.

In addition to the neatly made instrument itself - consisting of a polar star map on an 8-inch white plastic disc, a transparent disc carrying lines of equal altitude and azimuth and a cursor - there is also a user's manual. Here one finds clearly written explanations of how to use the versatile astrolabe and planisphere. However, the description of the instrument as an astrolabe is a little misleading as there is no alidade, and to determine the altitudes of objects one requires a subsidiary device.

An important point is that the versatile astrolabe and planisphere can be easily adapted for use with an overhead projector, an invaluable aid to classroom demonstrations.

At a most reasonable price of £4.75, this instrument and its accompanying manual can be heartily recommended, and should be especially worthwhile for teachers and students concerned with astronomy at O-level and above.

Robert Smith
Liverpool Planetarium.

AAE Council

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Contents

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