

The British Sundial Society

BULLETIN

Nº 89.2

NOVEMBER 1989

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The British Sundial Society

BULLETIN

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NOVEMBER 1989



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HONORARY OFFICIALS OF THE BRITISH SUNDIAL SOCIETY

PATRON: THE RT. HON. THE EARL OF PERTH P.C.

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ADVISERS: MR. PETER I. DRINKWATER, MR. E. J. TYLER

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DIALOGUE - NEWS ITEMS

MEMBERSHIP

The number of members has so far exceeded the expectations of the provisional committee to the extent that a second printing of the *Bulletin* was necessary even though the number printed for the first issue was twice that of the members then enrolled. As a result the new Society is already assured of a viable future and has enough finances to publish a *Bulletin* on a regular basis. At the meeting of the Committee at Oxford on 15th September 1989 it was decided that three issues a year should be possible. The present A4 format will continue for the present until better facilities become available.

CONTINENTAL SUNDIAL STUDY GROUPS

In the first issue of the *Bulletin* several items were left out in the haste to show members that activities had already commenced. In particular Sr Eduard Farré i Olivé sent details of the new Catalan Sundial Society, of which he is the President, together with the first issue of their *Bulletin - La Busca de Paper*. This is very nicely printed and it seems that this will be an important source of information in the future. A second issue of this has just been received and contains an important article on a sundial described in the "Manuscript 225 de Ripoll" by Sr Farré i Olivé. It is hoped to reprint this in the *Bulletin*.

Sr José Luis Basanta Campos has also sent in details of other Continental sundial groups, these below can be added to the list printed in the first issue of the *Bulletin*.

SPAIN: Sr Eduard Farré i Olivé - President,

Josep Mañà i Ollier - Secretary.

Societat Catalana de Gnomònica, Atenes 3, 08006 BARCELONA.

Their *Bulletin La Busca de Paper* is published in the Catalan language.

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To all these groups we send fraternal greetings and we wish to exchange *Bulletins* and information. If the proposals of Lajos Bartha of Hungary are realised, we shall have an International Journal through which all Sundial Societies will be able to communicate with each other regardless of geographical and political boundaries. Because of the payment difficulties for those in Eastern bloc countries, it has been agreed that a nominated person in each of such Sundial Societies shall be made an honorary member of the British Sundial Society in order that an exchange of *Bulletins* may be made without payment on either side.

The Editor will be pleased to receive information on other Sundial Societies throughout the world, and thanks all those who have already sent much information and have corresponded with him.

It is hoped in future issues to publish short accounts of

each society, its beginnings and history so that we can learn more about each other and publicise the study of gnomonics which is about to enter a new period of enlightenment. The following is a short account of the Netherlands Sundial Group sent by their Secretary, Mr. F.J. de Vries:

In 1972 the book *Zonnenwijzers in Nederland* by Dr. J. G. van Cittert-Eymers was published. Her book attracted the interest of Mr. M. J. Hagen and gave him the idea of starting a society for those interested in sundials. In 1978 the group was formed with the same aims as those of the British Sundial Society. From the beginning Saturday afternoon meetings were organised two or three times per annum, the *Bulletin* was published and a yearly excursion to some part of the Netherlands arranged. At the start Mr. Hagen carried out all the functions of Chairman, Secretary, Treasurer, *Bulletin*-Editor, and so on. He was, and still is, very actively engaged in writing articles, advising on restorations, cataloguing dials in the Netherlands, and so on. In the meantime our Society has grown to about 150 members, of whom about 30 are active in writing articles and attending meetings.

Each year we publish three (sometimes four) *Bulletins* of approximately 50 pages. The activities for 1990 include meetings on 13/1, 17/3, 22/9 and an excursion 23 June. On the fifth anniversary of the Society an exhibition of sundials was organised, followed by others in all parts of the country. Not only were antique dials displayed, but simple examples of sundials made from paper, wood, plastics, etc, in order to show the great variety possible. Also many photographs of fine dials were exhibited.

During the period of the group's existence new dial forms have been developed, including bifilar dials with one thread curved. In 1984 Dr van Cittert-Eymers and M. J. Hagen produced a new edition of the book *Sundials in the Netherlands*. For the tenth anniversary we published the book *25 eeuwen tijdmeting (25 centuries of timekeeping)*, of which about one-third of the text is on sundials.

Several old sundials have been restored with the help of our members, however the most important activities of our Society are the *Bulletin* and the meetings. These two activities make the Society what it is today.

IN MEMORIAM

Sadly Dr Johanna Geertuida van Cittert-Eymers died in Utrecht on 22 October 1988, she was born at Rheden 19 June 1903. In a photograph taken in Vienna on 16 August 1988 she appeared in excellent spirits. There are two glowing tributes to her memory in *De Zonnewijzerkring*, *Bulletin* 89.1 for January 1989, one written by M. J. Hagen and the other by J. A. F. de Rijk. She had an enthusiasm which kindled the flame of interest in others. EDITOR

THE BRITISH SUNDIAL SOCIETY MEETING AT OXFORD

A full-day Committee Meeting was held Friday 15th September 1989 at the Museum of the History of Science, Oxford, where a room was kindly provided by the museum authorities. It was attended by Andrew Somerville. (Chairman), David Young (Treasurer), Charles Aked

(Editor), and Christopher Daniel, Mrs Somerville, Mrs Lilli Young and Ms Doreen Bowyer also attended. Among the items discussed were the financial position, the membership, the analysis of questionnaires by Mrs Somerville, a logo for the Society, and future plans for activities. The main purpose of the meeting was to prepare the ground for the Annual General Meeting in March 1989; and earlier the Committee had inspected the accommodation and facilities in Exeter College to confirm these were suitable for the AGM and proposed programme. The format for these is included in the present *Bulletin*. Members are requested to read this carefully. A separate form is enclosed for those who wish to register for the Meeting, which will be important in making the decisions which will determine the aims and future activities of the new Society. It will also provide a first opportunity for many diallists to meet enthusiasts of like mind. It is hoped that as many as possible will attend this historic event.

EDITOR'S NOTES:

Members are reminded that the Editor will be pleased to receive articles/items of news from all sources. A number

of foreign members have enquired whether they can submit articles, the answer is by all means do so. If the article can be in English, so much the better. A rough translation into English will be quite useful and can be transcribed into correct English far better than a verbatim translation from the original. Mr E J Tyler has kindly offered to deal with some of the European languages, particularly German, he has been a honorary member of the *Schriften de Freunde Alter Uhren* for about twenty years, and they have a particularly strong sundial section.

Letters from members on all subjects and points of view are especially welcome, here is an opportunity to say those things upon which you have been ruminating for years. A clear, concise, and pithy letter stands a much better chance of being read and understood; the Editor reserves the right to shorten those which would occupy too much space in a *Bulletin* where pressure on space is enormous. Letters reporting on items connected with gnomonics, such as articles in obscure periodicals, little known dials, anecdotes, and on are all grist to the mill. It is very much easier to write a letter than to write a complete article, so why not have a try, your information may be just what someone else has been wanting for a long time.

AN ANNALEMMATIC DIAL ON A VERTICAL PLANE

BY PETER I. DRINKWATER

The ornamental properties of the Annalemmatic Dial on its usual Horizontal Plane are well known and appreciated; but the application of its principle to other Planes remains largely unexplored. With only a little thought its effectiveness on a direct South-facing Plane can readily be envisaged; together with its possibilities for Vertically Declining Planes. To construct an Annalemmatic Dial on a Vertical Declining Plane, the same initial requisites are to be calculated as for an ordinary Vertical Decliner. For example a Dial on a Vertical Wall declining 33° East at Latitude 52° North, requires only three simple trigonometrical calculations to yield all that is necessary:

1. Sub-style to Meridian:

$$\sin 33^\circ \times \cot 52^\circ = \tan \text{ of Sub-style to Meridian } (23.05^\circ).$$

2. "Latitude" of Dial:

$$\cos 33^\circ \times \cos 52^\circ = \sin \text{ of "Latitude" of Dial } (31.09^\circ).$$

3. Difference of Meridians:

$$\cot 33^\circ \times \sin 52^\circ = \cot \text{ of Difference of Meridians } (34.49^\circ).$$

The initial setting out is also the same, see Figure 1. The Prime Circle is a-b-c-d on the centre e. Requisite 1, is set out as angle c-e-f. Requisite 2, is set out as angle f-e-g. Requisite 3, is set out as angle f-e-h.

Quarter the Circle relative to the Sub-stylar line by lines f-e-k and l-e-m. The line g-j, parallel to f-e-k, establishes e-j; the radius of the Minor Axis Circle. Draw this on the centre e.

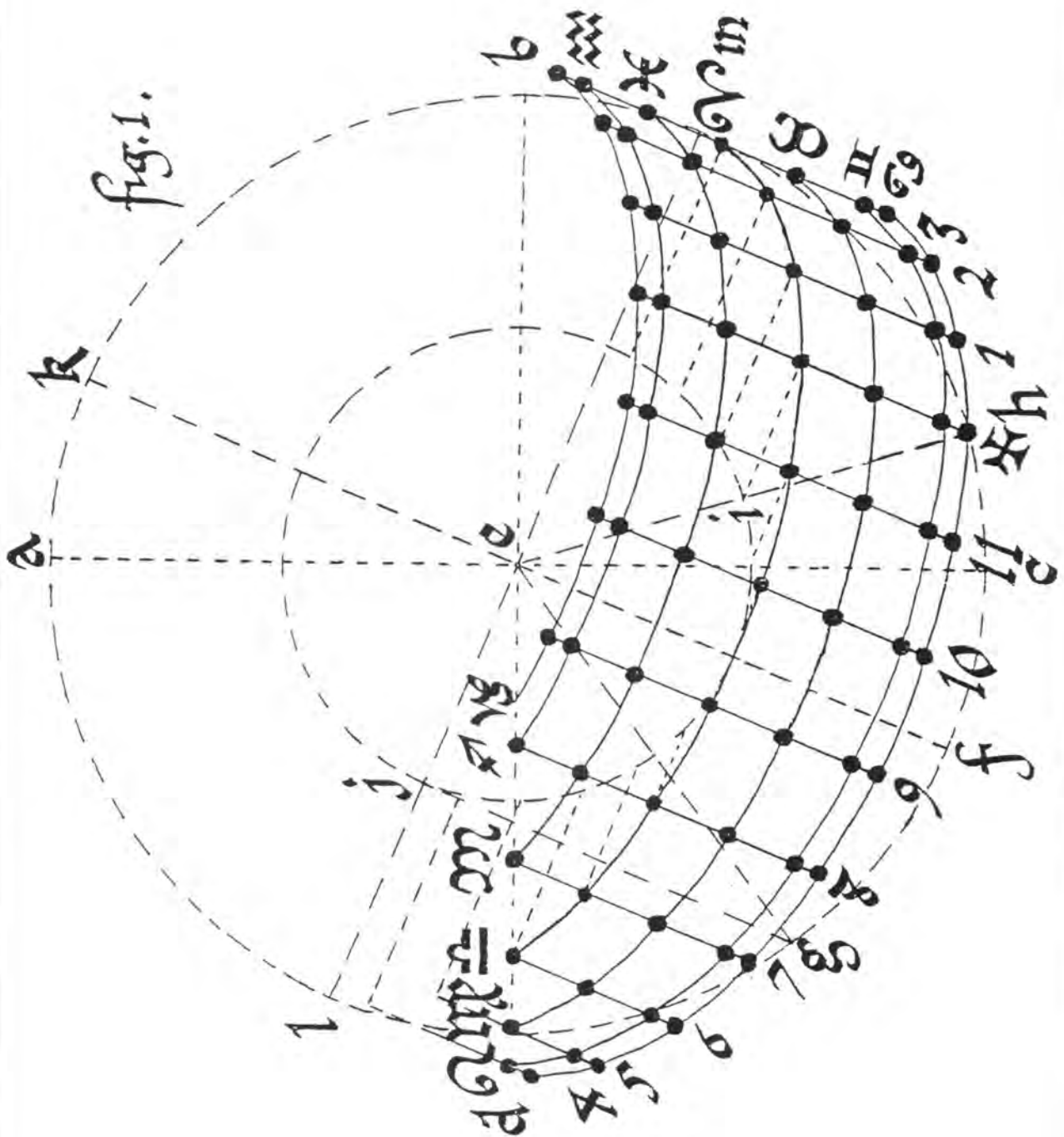
Commencing at point h, divide the Major Axis Circle (Prime Circle) into 24 equal parts. Likewise divide the Minor Axis Circle into 24 equal parts from its corresponding point j. Each of these points on the Minor Axis is to generate its own parallel to line l-j-e-m. For effectiveness only those lying below the line l-j-e-m are marked (as dotted lines) on the diagramme. Each of the 24

points on the Major Axis Circle is to generate a parallel to the line f-e-k. Again only those effectively requisite are marked on the diagramme. Where each pair of corresponding parallels cross, a dot is marked; to make up the elliptical arc of dots which touch the Minor Axis Circle, and is the effective arc of Hour points for the Æquinoxes.

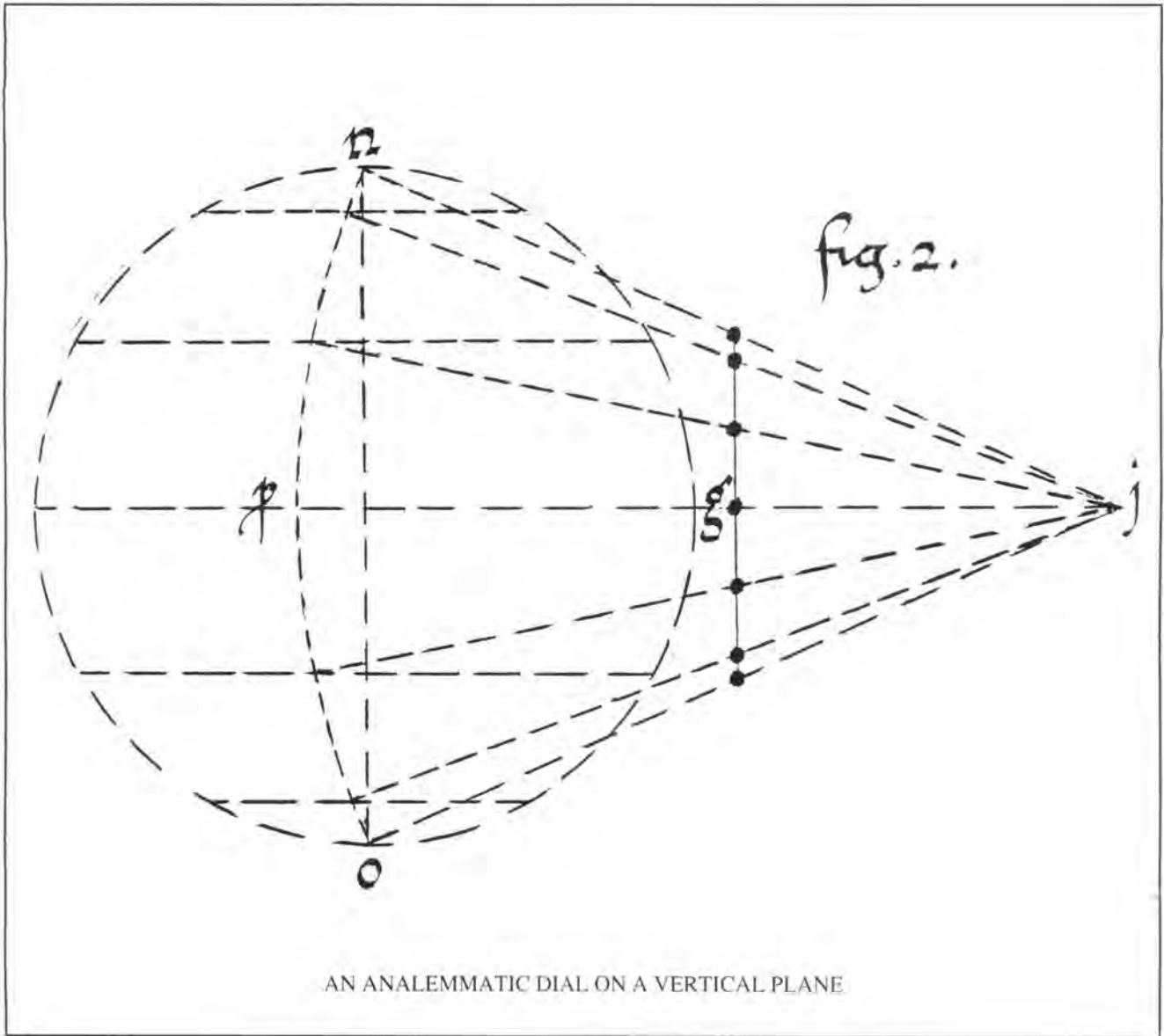
Although such might be contrived, a moveable Gnomon, such as would be provided on an Horizontal Annalemmatic Dial, is scarcely utilitous on an effective Vertical Plane: an Arc of Hour Points must therefore be provided for the Sun's entry into each of the Signs of the Zodiac (those who insist on using Calendar months will make a messy dial!) Prepare a simple Tangent Scale of Solar Declination to the Radius j-g. Figure 2 shews how this is done. Angles n-e-p and o-j-p both equal the angle of the Obliquity of the Ecliptic (about 23½°). the simple Spherical projection is surely sufficiently self-evident not to require verbal explanation. Set out the Tangent Scale thus generated on to the diagramme of Figure 1, along each of those parallels of the 24 points on the Major Axis Circle which is requisite to the effectiveness of the finished lay-out.

The Horizontal d-e-b forms a rational upper limit for all of the elliptical Arcs. The Hour Lines and Signs of the Zodiac are marked on as shewn; in the most utilitous fashion possible. The Gnomon is an Horizontal Rod of adequate but non-specific, length projecting at Right Angles from point e.

This dial is primarily suitable (from the point of view of construction) as a philosophical exercise; but would be useful as an effective dial in circles which still relate to the Idea of the Zodiac, or as a thought-provoking wall ornament in those circles which do not; the Æsthetic possibilities of such a Dial will readily present themselves to those who are open to such, in whichever of these circles they may move.



AN ANALEMMATIC DIAL ON A VERTICAL PLANE



NATIONAL SUNDIAL RECORDING

The **National Survey of Sundials** has now commenced! Over sixty-five of our members, who said they would like to take part, should be now have received their first batch of record sheets. These sheets are similar to the one illustrated in the last *Bulletin* but have been modified following the various suggestions received. The form has been extended to full A4 size and now includes space for

plinth details, size, gnomon angle and the position regarding access to view the dial. Any other member who wishes to take part in this **important survey**, but has not received a pad of forms, should write to me for full details.

DAVID YOUNG
Recording Liason Officer, B.S.S.

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THE CONSTRUCTION OF SUNDIALS (MAINLY FOR THE TYRO)

Several members of the Society have expressed a wish for information on the construction of sundials to be included in the *BULLETIN*. The provisional committee have considered this aspect and believe that the subject is so well covered in available literature that it would be attempting to gild the lily to repeat the information here for the simple forms. Instead it is proposed to give some details of the available books which are in print. The older works are now exceedingly expensive, and whilst it is true to say they were written to instruct readers how to set about the construction of dials, the presentation is apt to confuse rather than clarify. These books were written in the fashion of the day, and instead of casting a clear light upon dialling, were somewhat obfuscatory. It was intended that the proposed dials would be painted upon a suitable surface, they required constant maintenance, and if neglected soon decayed into obscurity, with the result that the vast majority of such dials disappeared long, long ago.

Naturally the broad principles of the foundations of dialling must be at least vaguely understood in order to select the type of sundial most suited to the intended site and purpose. For example a horizontal dial will indicate at all times when the sun shines, site limitations allowing; whereas a true south-facing sundial can only show twelve hours of the day at most, and even that is at the Equinoxes. Obvious you may think but the writer was once engaged in a dispute when an eminent diallist averred that such a dial would always indicate the hour of sunrise and sunset correctly because the sun's rays are always horizontal at dawn. In practice, at the height of summer, the sun is well into the sky before it falls upon the scale of a south-facing vertical dial to give an indication; with the reverse effect at the end of the day. For most of us obstructions at the site may severely limit the indicated hours on any dial that may be erected, few of us have a clear expanse of ground unaffected by the shadows of neighbours' buildings, trees and fences, etc, or an ideally oriented clear wall space. Many of the dial designs have limitations in use, these are implicit in the design and have to be accepted, such as just mentioned; whilst the equatorial dial does not indicate the hours at all the Equinox, and below the dial plate in winter, a rather inconvenient procedure at best. Sometimes these difficulties can be overcome, in the case of the equatorial dial the centre of the plate is removed to leave a thin ring marked with the scale of hours, and this can be read in comfort at any period of the year.

In 1975 Professor Winthrop W. Dolan published his book *A Choice of Sundials*. As he taught astronomy and mathematics at Linfield College in Oregon, he was well qualified to write on the subject of dials. The book is interesting to read and contains illustrations of some of the early works. The instructions to set out various dials is succinct and without frills; how to achieve the practical realisation is absent.

A brief, yet more than adequate guide, to the various types of dial, is that written by Christopher St. J. H. Daniel for the Shire Album series. As a designer of sundials, including the dolphin sundial at Greenwich to mark the Queen's Silver Jubilee Year (1977), the vertical dials on St Margaret's church in Westminster and others; he is in a better position than most to understand the subtleties of sundial design. Although the book hardly touches upon

construction, the clarity of the information makes it worthwhile reading. Mr Daniel is also the author of *Sundials - The Common Vertical in N. W. Kent*, first published in 1972, with several later editions; useful for the illustrations and list of references although not concerned with construction as such.

A work that is both cheap and excellent is that by Mr. Peter I. Drinkwater, *The Art of Sundial Construction*, the foreword to which was written by Mr. Daniel. It combines a flavouring of philosophy with a commonsense approach to the art of dialling, a list of reference works spiced with apposite comment. The section entitled Esthetics includes much on the how and why of the actual dial presentation. The book has already appeared in three editions and is well recommended as an addition to any library. For those who stand in reverse to us in the Northern hemisphere, there is a short section on how to use the existing constructions in the Southern part of the world.

Sundials Old and New by A P Herbert has a sub-title "or Fun with the Sun" which was Herbert's preference for the main title. When published in 1967, the price of 63 shillings (3 guineas) was relatively high in comparison to the average weekly pay then; now it is offered at £80. In this book the fundamentals of dialling are laid down on a foundation of humour, and one of its good features is that there are instructions for making models of various dials. Thus a model of an intended design can be constructed in cardboard and tested for its appropriateness at the site. The book has its critics but is one of the few on dialling which will elicit a smile or gaffaw of laughter at intervals during its reading. Herbert was famous for his APH-orisms, of which he was a great exponent, if not the initial innovator.

One of the best of modern dialling books, at the price, is *Sundials: Their Theory and Construction*, by Albert E. Waugh, first published in 1973. There are later editions which have been purged of the early errors and misprints. The accent is on dialling in the States, and some of Professor Waugh's ideas do not receive the approbation of Drinkwater.

A useful book with French text is *Midi au Soleil ... Comment Realiser un Cadron Solaire?*, (Noon by the Sun ... How to realise [construct] a Sundial?), published in 1985. This shows how to achieve all the usual designs, with examples of actual dials. The construction of a Shepherd's or Pyrenees sundial is given in full, with the appropriate scales for wrapping round a cylinder.

Whilst not new construction, restoration may be regarded as reconstruction. A book with French text, *Restauration de Cadrans Solaires*, published by Club du Vieux Manoir in 1987, has chapters from different contributors on the restoration of sundials, a neglected subject as far as English texts are concerned. It is remarkable how the apparently defunct dial may be resuscitated into glowing life by skilful sympathetic treatment, the dials are those painted upon stone or stucco. It was the practice to repaint dials at intervals, these were never regarded as permanent in the same way as a free-standing dial cut in stone. In any case some of the subsidiary indications change with the passing years, necessitating the removal of the old and repainting with the up to date information. The work is made much easier by the use of modern materials, for example loose stucco can

be permanently affixed to its support by the injection of resin between the wall and stucco to retain the original surface securely in place. It is the usual practice to leave original errors as they were perpetrated if investigation shows it is not a result of later over-painting. Even the great Thomas Tompion (or his workmen) was not perfect in his delineation of sundials, but often the minor errors made in the course of laying-out a sundial are tolerated to avoid the loss of a great deal of work, time, and more importantly, money. It happens even today when the graver slips in the last stages of engraving a brass or slate dial.

Dessinons Realisons Huit Cadrans by Marcel Collenot is again in French, it is a photocopied manuscript describing Equatorial, Horizontal, Vertical, Polar, Occidental, Oriental, Analemmatic, Cylindrical dials and lastly one in a glass (making nine basic models, not eight as in the title). Again the emphasis is on the design rather than the practical construction, in spite of the claim of the title.

Before one commences work at all it is necessary to know the orientation of the surface on which it is proposed to place a dial, just as it is necessary to know the true north/south line for a horizontal dial. The use of a magnetic compass is not usually recommended, it is necessary to know the precise position of the magnetic pole at the time the magnetic compass is used since this is altering year by year, and can be widely out if there are local masses of iron in the ground unknown to the dialler. The writer himself dug up a whole motorcycle from one of his flower borders on finding a complete reversal of the compass needle as he moved about (the magneto had been left in place on the motorcycle). The older method of equal shadows is outlined by all writers. A perfectly level board is marked with a number of concentric circles, at the centre of which is placed a thin vertical gnomon. As the shadow of the tip touches any circle it is marked, and again on the same circle later in the day. By having several circles any lapse of the sun at a critical point is not crucial, when the marks have been obtained the angle subtended by them is bisected (by measurement or more accurately by geometrical methods). The bisector then points due north and south within the limits required by the observer. If a square board is used, one edge may be placed against the wall on which the intended dial is to be placed, the observations made and the true meridian found, from which the angle of the wall with the meridian may be ascertained. Such observations are more accurate when the earth is at its solstice positions, worst at the equinoctial positions, and the sun should have risen some distance into the sky before commencing observations to avoid refractive errors and the use of a very large board to accommodate the large circles which would be necessary.

There are other simple methods of finding the meridian, these are outlined in dialling works. However many sundials, such as the horizontal type engraved on a brass plate, are capable of slight adjustment before the final fixing is completed; so these can be placed in situ temporarily until the accurate alignment is possible later. One cannot realign a wall, and whilst a panel placed upon it can be wedged out on one or other of the edges, it then becomes a "bodge".

For the actual dial design it is necessary to know the latitude of the site, this can be obtained from an Ordnance Survey map, sets of which may be available in the local library. From the map the distance east or west of the Greenwich Meridian may also be ascertained, allowing the

local solar time difference to be calculated; this latter may also be found from a set of tables such as those to be found in Britain's *Watch and Clockmakers' Handbook, Dictionary and Guide* which show the difference between Greenwich Mean Time and Local Time indicated by the sundial. These differences are rather greater than most people realise, for example Great Yarmouth is 7m 0s ahead of GMT, whilst Penzance is slow by as much as 22m 10s, a difference of almost half an hour from one side of England to the other.

Finally it is necessary to have an Equation of Time graph or table nearby to allow instant correction to the Mean Time of observers' watches, otherwise the errors of indication will be constantly pointed out to the owner, who will then have to launch into a long-winded explanation as to how the supposed error does not really exist. This means that for places not near the Greenwich meridian, the local difference in local time must also be taken into account if the closest accuracy is desired, plus the correction for Summer Time. It is possible to arrange for all these corrections on the dial itself, which will then give an indication which any cheap quartz crystal watch can do much better, plus work in the hours of darkness. We must therefore regard any dial we make as a form of Art rather than a scientific instrument, something to add a point of interest where perhaps none previously existed.

One of the easiest ways to personalise a sundial is to add a motto. Because the earliest such mottoes were moralistic, emphasizing the ephemeral shadow of life and sun, gloomy rather than a hopeful light, it does not follow that this tradition must be followed slavishly. The earliest books on sundials seized upon this aspect, indeed there are books devoted simply to Sundial Mottoes such as *A Book of Sundial Mottoes* by Alfred H Hyatt, or the mawkishly sentimental *Ye Sundial Book Mottoes and Verses for Sundials* of 1914 written by T. Geoffrey W. Henslow, accompanied by wildly imaginative scenes of the sundial locations. Amongst this vast store of mottoes in English, Latin and other languages there must be an apposite phrase for each and every situation, nevertheless there is no harm in trying to transcend all those that have gone before. Some of the old inscriptions have hidden subtleties with their play on words, often lost to us today as they are crystallised within Latin or Greek quotations.

Once the dial has been delineated with its hour, half-hour, quarter-hour and possibly even minute marks, there is no limit to the shape of its peripheral border, it does not have to be a circular, or straight, square or rectangular border, any play of fancy may be employed since it does not add to, or interfere with the basic function of indicating solar time by shadow any more than the customising a car adds to its performance. It adds further interest and can certainly make the sundial appear far more complicated than it really is. Adding many forms of indication such as Italian hours, Babylonian hours, Zodiacal signs, may eventually confuse the issue so much as to render the dial useless for its main purpose; a clear plain dial is preferable in the main. Such dials were intended to show the cleverness of the dialler rather than show the time, and generally only confuse the viewer. A clear plain dial, uncluttered with technical detail, but embellished with colour and design in the non-functional areas, is much to be preferred. Most of all it should be sufficient size to be meaningful even to those whose sight is not what it was, and it should, in some way, reflect the personality of its

designer or some aspect of his (or her) life. If it can be a memorial to someone, so much the better, for it will be a constant reminder when many others have vanished for ever.

Commonsense dictates that if time is spent upon the design of a sundial, it is desirable to use materials which will endure the rigours of the English climate, since it is certain it will be exposed to far more wind, rain, snow, hail frost, heat, moisture and dryness than it will ever be exposed to the working medium of sunlight. Modern materials are much better in this respect yet merely extend the period of freshness and utility. Professional dials make use of such permanent materials as bronze and enamel which only need a simple cleansing operation to remove the coating of soil that eventually encompasses every object, the amateur can never aspire to such expensive and elegant materials. The melancholy history of dialling is that many of the most elegant and beautiful sundials have

vanished through decay, accelerated by the choice of unsuitable materials in the first place. Stone may take much longer to decay than wood or even metal, yet sooner or later it too falls victim to repeated cycles of freezing and thawing, or the effects of the combustion of billions of tons of fossil fuel every year. More damage has been done to the ancient limestone sundials still in situ in Greece in the present century by exhaust fumes from cars, than in the previous two unsullied millennium.

To finish with a few words from *Heliotropum Sciothericum* written by Robert Hegge in 1630:

A Dial is the Visible Map of Time, till Whose Invention 'twas follie in the Sun to play with a Shadow. It is the Anatomie of the Day and a Scale of Miles for the Jorney of the Sun. It is the Silent Voice of Time and without it the Day were dumbe ... It is ye Book of ye Sun on which he writes the Storie of the Day. Lastly, Heaven itself is but a generall Dial, and a Dial it, in a lesser volume

HELIO-TROPES OR NEW POSIES FOR SUNDIALS

A commonplace book in the form of a closely written manuscript volume was kept by John Parmenter, Priest, and it contains thirty-three sundial mottoes. Most are Latin, to which Parmenter supplies the English translation and a short commentary upon what he calls "posies". He gives no hint as to how or where the posies were found, and because of his strong partisan Protestant beliefs, waxes most eloquent where the Popish views are concerned.

Little is known of the Parmenter family, it seems to be a French extraction, John Parmenter's grandfather came from Allhallows the Great in London and died in 1534. John Parmenter became a priest at Wingham in Kent, where he worked in a small collegiate chapel which was originally a Benedictine cell. After nearly sixty years there, he died about 1629. The manuscript bears the date of 1625, perhaps the original notes were brought together in a compilation in that year, the sundial mottoes are only a small part of the whole which is mainly devoted to religious matters. As a confirmed Protestant he naturally uses the Geneva Bible when quoting from the Scriptures, and he shows that he is proud of his scholarship in respect of this work.

In the following reproduction of Parmenter's text, the writer has transcribed his words into modern idiom since the original quaintness distracts the reader from the essence of Parmenter's comment.

1. WHAT'S RIGHT IN ROME IS WRONG AT HOME.

There by many men who may with joy think upon this Posie. For truly, the use in English of a dial reckoned and marked for service in Rome would be but a foolishness and a cause of stumbling to the wayfaring man, being as we are some ten degrees nearer Heaven, than they in the Papish City which men falsely call Eternal. There is no other city which is eternal save one, Jerusalem, and that is not the city to which men go on pilgrimage by ship, for truly, the body of the worm is a proper vehiculum for such as would set out upon so blessed and so dread a Journey ...

2. I SLEEP AT SUNSET AND I WORKE AT DAWN. TIS ONLIE IDLERS COME VPON THIS LAWN.

But a gardener may scythe the grass without accusation of idleness. Howbeit they are for the most part but do-nothings which walk on such plots, and even a gardener, though a scholar, should, (if need be), but regard the Time and not the Posie, for such time as he so spendeth belongeth rather to his master, than himself. Thus shall none be reproached without cause.

3. NEC LATET AETERNO TEMPUS NEC TEMPORA SUADENT - GOD MAKETH AND TAKETH HIS OWNE TIME.

As the Grecian schoolmen say, Ὀψέ θεῶν ἀλεονοσι μύλοι, ἀλεονοσι δὲ λεπτά: The millstones of the Gods grind late, but the flour is fine. Herein the meaning of Tempus at the first is rather occasion, and after, it signifieth lapse of time. There is a similar proverb in Sussex, - God flieth with wings of lead, but striketh with hands of iron ...

4. FOR ALL THOSE WHO HAVE WATCHED MY BOARDE IN PAIN, OR SIN OR SORROW, THY MERCIE AND THY QUITTANCE, LORD - DO I PRAY FOR YOU TOMORROW?

5. IF I AM WRONG, THE SUN AS CULPRIT NAME, YET WHY THE SUN? THE EARTHE IS MORE TO BLAME; YET WHY THE EARTHE? PRESUMPTUOUS MORTALL STAY: AND HUMBLY PUT YOUR CLOCKWORKE TOYE AWAY.

This may only be put upon a truly disposed Dial. At times, and especially on the first day of November, the Time shown by the shadow seemeth to be grievously out of the reckoning of the Clocke. But be you well assured there is no falsity in God. This is the reason and none other, that while men flout at the dial, they may suddenly be moved to remember what day it is and humbly take thought with good purposings for the time to come, that, when they too shall die, they may not fail of their place among the holy Saints beneath the Altar ... Therefore the Clocke is especially out by the Dial at Hallowmas, though on four

days of the year only are they truly reconciled, of which presently as followeth ...

[At this time the cause of the variation between solar time and the mean time of mechanical clocks was not known. Copernicus had published his book in 1543 stating that the earth moved round the Sun, but this was not accepted by the Church authorities in Parmenter's time.]

6. YOUR CLOCKES KEEP CHRISTMAS, I KEEP EVERY FEAST.

But at Christmas, alone at all Feasts, even the very Devil himself, who invented Clockes, doth confess with Gnashing of Teeth that Our Saviour is indeed Born of Our Lady, and doth Amend the pace of his Engines that at dawn they truly strike the very hour ... *Gloria in Excelsis Deo*, [Parmenter quotes no authority for priority of invention by the Devil].

7. FROM GOD TO MAN AT DAWN MY BIDDING FLIES: MAN TO GOD MY PRAYER AS DAYLIGHT DIES.

Note that the shadow of the Dial moveth as the message. Of old time, the East hath been held to be the especial Seat of God, while man hath his habitation in the West, as may be seen by our Galilee Porches in Cathedral and Collegiate Churches. For the North, it is the country of those who sit in ignorance and doubt, waiting for Death. Wherefore Gospel is read thither. The Epistle is read Southward, where they do well who have received the Perfection of the Faith, and do expect daily in contemplation and good works the fulfilling of the time, listening the while to the admonishments of St Paul, and ensuing the same with joy ... There is no man willingly buried on the North side of a Church except such as be Godless or Lunatic or suchlike.

8. NEMO NISI NOMEN - I AM NOTHING BUT A NAME.

For verily Time is but a fragment and a convenient method of man: in the eye of God *mille anni tanquam Custodia*, that is, a Thousand Years in His Sight are as a night-watch which lasteth but three hours ... Observe that the dial, speaking saith *Nemo* or No Man, rather than *Nil* which is No thing, for that Man alone of creatures hath mutuality of speech. For which reason, the Dial also professeth to be a man when it useth the privileges of men, though in his essence but a stock or engine of brass and stone. Moreover, from Heaven the diurnall passages of Man's life are seen to be no very thing, but are as the pragmatic discourse of philosophers, more names than Truth.

[Parmenter misses the points of this motto, first the alliterative play of Nomen and Gnomon, and secondly the Latin motto being a palindrome. To provide an English palindrome with the correct meaning is well-nigh impossible. The comment upon Time is very astute observation.]

9. WHEN THROUGH MY TEARS MY SHADE APPEARS, LOOK UP THE BOW IS SET.

God's justice goeth before His Mercy: so that before there was ever a rainbow there was sore need of an Ark. Be not therefore guilty of Wanhope or Accidie, for as our Kentish proverb saith, when need is highest, Heed is highest ... [Wanhope means despair, Accidie means sloth or torpor.]

Note that the line of the shadow pointeth ever truly to the mid-point of the arch which is set in Heaven to mind

[remind] folks of the Promise made to Noah four several times by God. And this redundancy of Covenant is not of chance: for truly he would have been a dull man which had needed less assurance and warranty after that he had been afloat more than a year, and now, being disengaged, saw but the salt slime and stinking carcasses of sea-monsters aground upon the fields of Armenia. Howbeit, Noah fainted not, having seen the surety of God for thirty score of years.

The colours of the Bow [Rainbow] are thus: Blue-purple to shew forth the Majesty of God: Green to put us in mind of the Resurrection, as the Earth rose again from under the Floods: Yellow, - a small piece - that is for the inconstancy and lewedness of men, wherefore the earth was drowned. There be many who pretend that there is also Red in the Bow: but it is manifestly an idle tale. Red is a very dim colour, most unfit to be used, for it has much Black in it.

[This last remark is of interest inasmuch it indicates that Parmenter, like many men, suffered from a partial colour-blindness, first rationalised by the chemist Dalton who also suffered from the same defect.]

10. WITHIN A GREATER GNOMON ALL THE NIGHT.

As to the eye of the figures on the dial, the Sun retires behind his wrie brass horizon, and all is thence-forth in shadow, so do we too see the Sun sink below the West, which is to us as a style and a gnomon. This thought is very full of comfort. It teacheth us that only as we follow the example of the handiwork of God may we achieve success on Earth, and also that as we still see the other figures of the dial illuminated by the Sun, so also, the Daye which hath left us to still fruitful and pleasant in our plantations and elsewhere ... And all men are with God when they do sleep.

[The meaning of the wrie in this context is not clear since it means to accuse, denounce or inform upon.]

11. HOW OFTEN GOOD FROM ILL ALIGHTES. MARK REZIN, KING OF ARAMITES.

The first man which invented a dial was the abominable Rezin, thinking thereby to glorify the Sun his God, and from Aram Ahaz, King of Juda brought the device, and worshipped it, making his sons to pass through the Fire to Moloch. Mark this carefully that Ahaz, knowing well the Devil hateth the light of day, having himself bowed before him in the Groves, still put up his new altars at the corners of streets and hilltops: meaning thereby Sundials. And the Great Altar which he so raised that the Sun should best strike upon it on the South side of the Temple of Jerusalem is none other than the very dial upon which the Lord afterwards made the Shadow to travel backwards: thus sanctifying to the use of the Godly a thing hellish and of its Nature horrifying and pagan. And the morning and evening sacrifices were in their original but the consultation of his mighty circle. Thus doth good come from evil ... The city of Damascus hath twice between destroyed utterly with all her inhabitants, save once ten Christians, for the wickedness of Rezin, King of the Aramites. Howbeit Our Saviour spoke the tongue of Aramic, which is a great marvel.

[Parmenter does not state the source giving details of the first sundial, nor of the many dials concurrent with the dial of Ahaz.]

12. AS YOU WATCH MY SHADOW MOVING, PAST EACH MINUTE'S ORDERED GROOVING GOD'S

ALMIGHTY PURPOSE PROVING, REST IS
NEARER, NEARER AS YOU LOOK.

It is a great happiness to think upon the time when we shall cast off the mortal mould and employ that breath with which we have so often used here to take God's name vainly with all, in singing among the Angelic Choir, and those hands with which we have wrought naughtiness on Earth in plucking the twelve manner of fruits which grow upon the Tree of Life.

13. MOST MERCIFUL - MY FIRST WORD TELLS BUT
HALF THE TIME YOU COULD NOT SAVE LAST
NIGHT, MORE GRACIOUS STILL, MY LAST, BUT
HALF THE GOLDEN HOURS YOU WASTED
DURING LIGHT.

The hour of the uprising of the Sun and of the first coming of the shadow upon the dial, doth exactly equal the one half part of the hours of the past night. The hour of the setting of the same doth as truly equal the one half part of the hours of the past day. Thus, if the Sun rises at five, the darkness has been ten hours long: or if he do set at eight, the daylight has been sixteen hours upon the earth. Let us therefore so order our labour that without dismay or vain regret we may watch the shadow leave the dial at sunset, or if that may not be, go, light a candle and redeem the night.

14. I CANNOT ARGUE, WHILE YOU SPEAK I WORK.

This is the very argument of the elect. Let us always be at some work of the hands, that, though the occupation of the mind be silly, there shall yet be somewhat of good for all the words. Smoking of tobacco leadeth to disputings and vain talk, as doth also the sewing of women. It is best that a woman employ her head and a man his hands, thus is the worsor part of each made more perfect. The saying of Bede is to be remembered: So work as to offer Prayer: So Pray as to work not with thy lips alone.

15. IF I AM WRONG, 'TIS YOUR FAULT OR 'TIS
GOD'S

A boastful word indeed, but if we shall rightly regard it, of comfort and assurance. For to the godly mind the very naughtiness of the Posie shall make him to wonder for the forwardness of him who sets it up. There shall he see the true interpretation, that a man should bethink him whether it be his fault or no. If he shall acquit himself of the fault, then he shall remind himself that the ways of God are past finding out, and that he will justify himself within a while, as assuredly will the dial also.

16. A DARK HOUR'S LENGTH I CANNOT MEASURE
TRUE, CAN YOU?

He doth but mean that in time of sorrow the hours pass heavily ... The best remedy is then rightly to set a man's self to remembering of past heaviness and how it was presently removed: and so judge himself to work the more for the apparent length of the sad day. This is best, though empty ...

17. MY COOLER SIDE ALONE DOTHT USEFUL
WORK.

Marriages and enterprises have this in common (if indeed marriage be not the most adventuresome enterprise of all), that hotheaded men should have a care of either sort ... But it is well said that the cool side of the Style would be of little use where it not for the Sun on the warm side. Thus if

prudence were all, no man would do anything. [Brave words from an man untested by the trials and bondage of marriage.]

18. THE MOON MAKES SILLY WORK OF BOTH OF
US.

A man went to a sundial on a night, and said, "See 'tis but ten, and the silly dial maketh it past two. Whether was he who went to the dial by night, or the dial, more silly? And the silliness of the dial ceaseth at dawn.

19. DEATHE AND I CHIME NO BELL.

[Parmenter becomes more personal with this motto.]

My little sister died suddenly as she was at Ball (playing a game): and I am a very old man. When I was a child of eight years, I saw old Sir Henry Palmer (he who was so strangely born) two following Sundays at Mass. He was killed at Guines when the French took Calais in 1558. My good friend Dame Margaret (this month with God: I pray that He have mercy on her should) was ever fearful when her own time came, as she hath often told me ... But it is not painful to put off this Life, except it be by torture, and that is by exception: felons and such. A man should put his house in order (not being fearful of the end, but lest, his time being shorter, than he may believe, those that come after may be impoverished) and then, having cheerfully disposed of his stuff, he may await without haste or fear the coming of Mortality, well assured that as he hath done all that lay in him to set his peace with his neighbour, so also God, advised thereto by Our Saviour, shall find occasion to forget his wickedness towards himself.

[Triplets were born to Lady Alice Palmer in 1488, the eldest was born on Whit Sunday, and the others on the two following Sundays. Sir Henry Palmer mentioned here was the second of the triplets, the Palmer's family home was at Wingham, close to Parmenter's church.]

20. THE STARS MAY LIE TO YOU BUT NOT TO ME.

Sirius, men say, hath cast a shadow. But it is a vain tale. A fool will consort with Astrologers and fare as the son of Kish fared at Endor: he had better have come by day to the dial which prophesieth neither good nor ill. Sleep is better than foolishness ...

21. WE OWE TO MAN'S FULL NOONDAY ALL OUR
WORTH: HE PROFITS ONLY BY OUR DEATH OR
BIRTH.

The figuring of a dial is planned and worked upon the brass by grave men [engravers]. But it is only as the light visiteth or deserteth the Figures that they are profitable to man: those figures full in the sun, and those full in the dark are alike unregarded ... Thus also are there men who may redeem a naughty life by the manner of their death: and there are unhappy men whose birth hath been the sole cause of rejoicing to their fathers.

22. IN SUNNIE HOURES FROM MARKE TO MARKE
UNCONSTANTLY I LEAP: BUT, WOMANLIKE,
WHEN COMES THE DARKE, MY POLE-STAR'S
COURSE I KEEPE.

A pretty conceit: but in the main it is not so. Woman is but a barge save when the wind is astern, and then a very *Faselus*. But thus far he is right, that a style doth truly point to the Pole Star all the night, for a gnomon that did not point to the Pole would be a toy. For which reason, a man

from Aethiopia would not know a dial of the Laps to be a dial at all so different are they.

[There is probably more meaning here than Parmenter with his limited experience of women could envisage.]

23. NOT LEAST AMONG THY MANY DUTIES, SUN.
As the earth is in heavy debt to the Sun whereby men work and eat, so is the soul of Man debtor to the Ghost whereby men spiritually do live. Holy Church is as a Style raised aloft that men may judge of the Seasons ... And be it remembered that the very straightness of the Style of Brass is in mercy to Man's weakness a little blunted when his shadow lieth upon the dial ... Again, as it was with Moses in the evening of the day in the desert, it is but the back parts of the Sun which are seen and marked by the figures.

24. FOR MEE THE SUN IS GOD.
There is no profitable thought to be taken from this posie.
[It is surprising that Parmenter included this motto, but having done so, did not argue for its ambiguity as in Motto No. 15.]

25. AT DAWN, REST HOURS ARE BRIGHTENED BY THE SUN: AT EVE. HE GILDS THE WORK-HOURS PAST AND DONE.
The Sun arising shineth brightly on the hours of rest and refreshment after toil, making promise of reward. At night the remembrance of such toil should be an incitement to Godliness and all manner of seemly rejoicing when the light of the Sun doth especially fall upon the hours of past work ...

26. LOOK SOMETIMES ON THE DARKER SIDE OF THINGS.
A cheerful constancy of expectation is to be commended: but it is not therefore to be understood that we should live in a *Paradisus Stultorum* or Park of Fools. Rather take profit as Leeches do, in trafficking with what is ill, and so study the arbitrariness of Good and Evil so that we may mark their distinction as well ever a man who studieth the Shadow of the Dial maketh the Time. For to look only on the lighted side leaveth a man often in the adversaries' advantage.

27. *NE NEQUE SOL RADIIS PLACAT NEC PAENITET UMBRA.*
This was paraphrased by Rudyard Kipling as:
I HAVE KNOWN SHADOW: I HAVE KNOWN SUN,
AND NOW I KNOW THE TWO ARE ONE.
[It gives the meaning without being a strict translation. Parmenter's comments are on pain and pleasure for mankind which cannot be felt by a sundial.]

28. THE SUN SEETH NO SHADOWES ON THE EARTHE.
The remembrance of this should set us a-thinking that of his free will God would never see aught upon the world that doth not reflect the bright beam of His Righteousness and Glory. The Devil, as we know, sitteth under Branches and in the Dark. Whence we must scour him daily as doth the Sun from behind the alternate shelter of the Gnomon ...
[This is a rather astute observation that the shadows caused by the Sun would be invisible since they are hidden by the objects which cause them. Parmenter does not comment upon the fact that at noon the shadow is but a

mere line, although he mentions the haziness of the gnomon shadow in entry number 23.]

29. MAN LOOKS TOO CLOSELY AND MY VOICE IS DUMB.
For the interposition of his head keepeth away the light from the dial. So also where the brain of man cometh between the Voice of God and his earthy traffickings, the latter profit but little by the enquiry.
[One can hardly regard a sundial as possessing a voice, it would have been better to say the message fades.]

30. 'TIS NOT TRANSPARENCY THAT SERVES THE END: THE DOVE AND SERPENT BOTH ARE NEEDFUL, FRIEND.
A wordly saying, but justified by writ. Consider, if the Sun shone through brass, there would be an end of all attempt to guide ourselves timely. So also a man is bounden to act as he hath been given reason: and especially to hide another's secret, even as the Gnomon willingly sheltereth the louse from the heat of the day. And we do not Certainly know that his louse is worsen in the Eye of God than his Sparrow that eateth grain.

31. *HODIE DOMINICA.*
DON'T YOU THINK YOU HAD BETTER GO BACK AND DO IT AT ONCE?
As Tertullianus said, every day has two names, one Monday or Wednesday, (or as it may chance), the other today. And be you sure that today is God's day in a manner not less, than Sunday. For there should be on Monday an equal chance of serving God, and a greater chance of serving a man's neighbour, than on a Sunday: and a Sunday of Prayer is not better than a weekday of work and prayer ... There is a paranomasie, as the Schoolmen say, for Dominica is in Latin and among the French, as I found in Paris, the name for Sunday.

[Tertullianus (AD 160-220), Carthaginian theologian, was the creator of ecclesiastical Latin and a member of the Montanist sect which separated from the Catholic Church, which no doubt allowed Parmenter to be able to quote him. Paranomasie is Parmenter's obsolete (and erroneous spelling) for paronomasia, which merely means a play on words, especially a pun. Most of the creators of sundial mottoes endeavour to achieve paronomasia, or a double meaning for the phrase employed. It is of interest to note from this note of Parmenter that he had been to Paris, it must have been a great adventure for such a retiring man.]

32. *MUDA SOLARIA DANT, SED COR SOLARIA MUNDUM.*
[The double play on the Latin words cannot be reproduced in English, the gist of it is that ground rents provide earthly things, sundials with their admonitory mottoes provide the path to spiritual purity of heart. Parmenter could not make head or tale of this phrase with the double use of Solaria and Munda.]

33. *EX ORE PARVULO ... NIL VAL ...*
[On the last page of the manuscript are a few disjointed sentences, caused by damage to the leaf. The Latin above is part of a phrase to the effect that children cannot read a sundial because the dial is too high for them, which would only apply to a horizontal dial.]

Below the Latin Parmenter comments: For he, though of

evil ways, which shall prefer the night-prayer of one child to the benediction of bench of Bishops, hath still his fingers, though foul, upon the skirts of Christ. The manuscript ends with the Gnostic verse:

He that wandereth shall reigne:
And He that reigneth shall rest.

Thus persuing the attribution of a riddle to the phrase, to the very end of his work.

Many of the Latin mottoes presented here in the English form given by Parmenter have been given the general meaning but it is impossible to give the subtlety of the original, like yester-years' jokes, the shadowy meanings behind the phrases have faded into obscurity. At the time of their introduction, their piquancy would have been fully appreciated by any man of intellect; they would have been lost upon the average person of the period since, as today, the Latin phrases would be meaningless to him. Also the Latin of this period had become debased by clerical usage

into what is known as dog-Latin, just as the Norman French introduced into England drifted into strange forms with the assimilation of the invaders as the centuries passed.

There is nothing to indicate why Parmenter ever collected his "posies", perhaps any snippet with a moral or religious connotation appealed to him. A search through *The Book of Sun-dials* by H F K Eden and E Lloyd of 1900 has failed to find a single example quoted by Parmenter repeated within this work, in the main the authors dealt only with actual examples still existing at the time, or well known ones which had been lost by the destruction of buildings etc. It is notable that Parmenter had no liking for mechanical clocks, although at the time there cannot have been many in use where he lived.

John Parmenter's manuscript was edited by Perceval Landon in 1904, who produced the little book *Helio-tropes or New Posies for Sundials*. Copies of this little book are not often found today, although its editor evidently had hopes (alas not realised) of a second edition being called for by readers.

PHOTOGRAPHING SUNDIALS

BY ALAN PARTRIDGE

Although I am interested in technical photography the number of actual sundials I have photographed is very small, so these notes, written at the request of the Chairman, are very much open to correction from any fellow-member with more experience in this field. To start with I shall assume that the subject is a vertical dial well above eye level and that the photographer has a 35mm Single Lens Reflex camera, preferably with a number of interchangeable or complementary lenses.

ACCESS

Many dials are in public places where permission for photography is not required. In stately homes look out for notices and comply with these. Sometimes the use of a tripod is specifically forbidden, as evidence of commercial intent. Try to talk your way round it and offer to sign a disclaimer. You may need to write to the management and get a permit to return on a day of your choice when the sun is out again. On wholly private premises a friendly talk with the owner is the obvious preliminary, and a promise to send prints should not be broken.

VIEWS

I think that at least two shots of any dial are desirable, sometimes more. The first should be a general view of the building on which the dial is mounted, from ground level up to the dial at least. The camera must be aimed horizontally, the view being centred on the building at eye level, to avoid tilted verticals. This will often require the camera being turned to the vertical format. The foreground may include an expanse of lawn or gravestones, but these can be got rid of later. A wide-angle lens may be useful. A few makes, eg. Olympus, have a rising front wide-angle lens. Wide-angle front supplementary lenses are cheaper but may distort the scene: as always you must know your equipment. If the dial cannot be got into the view with a horizontal aim of the camera, do not tilt a little, tilt a lot!

Put the dial near the middle of the picture and include some tower or roofline details.

The second shot should be of the dial itself and not much else, taken with a long focus lens. A 2x or 3x supplement placed between the camera body and main lens is relatively cheap - and rarely of good enough quality. The best of them, stopped down to f22 or f32 may be passable. If a viewpoint can be found in another building, then a shot from level with the base of the gnomon is ideal for measurement of the hour lines, even if the dial is far from filling the picture. At ground level there may have to be a compromise between closing in to fill the picture and backing off to reduce the tilt. Try at least to keep square to the wall. Nearly all lenses lose definition at the corners of the picture, so a really sharp image on 50% of the negative is better than an inferior one on 90%. The hour angle can usually be computed, and a true drawing made, even from a tilted view, but a view in which the tilt is minimised by backing off to 3 or 4 times the frame-filling distance will be easier to work from. Tilted verticals can be corrected by 'rectification' in the enlarger, but a print thus made still has some distortion and should never be published without attention being drawn specifically to this point.

Additional shots may be needed to bring out detail especially of engraved metal or stonework. Light at a low angle to the face of the dial will show this up. The setting and main shots can be taken throughout mid-morning and mid-afternoon if the sun is out, but the detail shots may require further visits in the early morning or late afternoon, or both. Faded inscriptions may show better contrast with the use of colour filters. If you have a range of these, put them to the eye first before deciding which to put on the camera.

A garden dial, for all its apparent accessibility, is even more trouble to photograph. A step ladder with a tall handrail, and a camera are needed to get an undistorted over-head view.

EQUIPMENT

A zoom lens may need to be stopped down to f11 or f16 to produce as sharp an image as a fixed long focus lens at f8. You should know about yours by having photographed a test chart or a newspaper as soon as you bought it. The longer exposure and the magnification make the use of a tripod or a clamp essential. To prevent camera shake, a cable release is often recommended, but I think it is even better to use the delay device on the camera, alias 'self-timer'. If the camera has a built-in exposure meter, its reading may be accepted for the general view. For the other views an extra 1/2-1 stop may give better results. Better still, take several exposures - film is relatively cheap. An automatic camera is no help at all; better to override this facility so you are sure of the aperture setting. If the dial is on a slender tower so there is a lot of sky in the picture, or if there is no sky in it at all, the meter reading will be incorrect. Use the palm of your hand, tilted up at 45 degrees and in the same illumination, for a test object, and keep to the exposure indicated. Alternatively, buy a Kodak 'grey card' for this purpose.

ADDITIONAL LIGHTING

This section applies chiefly to a relatively small vertical dial not far above eye level, or to a garden dial. Additional lighting is useful if you can pay only a single visit, either on a dull day or when the sun is not well placed for bringing out the incised detail. Extra tripods or easels, or the help of assistants may be necessary.

Constant light source are to be preferred to flash because they allow one to study the effect in the view-finder beforehand. Possible sources include a quartz patio light, of the kind without a glass front for lightness; a 150 W bulb in a garage inspection lamp (both of these require sufficient cable to reach the nearest mains supply point); or a car spotlight with a narrow beam, as used for seeing house numbers from the road. Even a hand torch may be useful for studying effects which may be realised with the use of flash.

If the source can be held high enough, the effect of sunlight can be imitated. An assistant in bare or stockinged feet can stand on the roof of a car! The tube of a patio light should be parallel with the gnomon to cast a sharp shadow. For bringing up detail, light from any direction may be tried, although light from below may produce a rather unnatural result.

Artificial lighting of a garden will leave the background rather dark. A background rather dark. A backcloth or board may be used. It should be far enough back to prevent inclusion of the shadow of the dial in the picture. For black and white photography the backcloth should be white, preferably strongly lit by an additional concealed light source: if this is not done it may not be possible to produce a print with the dial in correct tones on white paper; although if the outline is bold, the printer may be prepared to cut round it. For colour films a white back-ground is the

worst choice: use buff or blue-grey. The latter is the more likely to result in correct rendering in colour prints. Use indoor type film with artificial lighting.

Flash is the easiest light source to carry, and the most difficult to use effectively! With colour film use daylight type and increase exposure by one stop since guide numbers are only correct for smallish indoor rooms, where the light reflected from the walls and ceilings adds significantly to that direct from the flash tube and reflector. If you use multiple flash, calculate on the basis of the strongest alone.

After the flash calculations if it is advisable to bracket the result with a range of exposures. Again an automatic camera will need to be returned to manual settings. Never aim your camera and flash straight at polished metal or gloss paint surfaces: you will get a bright reflection which will ruin the picture. Flash should, if at all possible, not be mounted on the camera at all, but be in one of the positions for constant sources. It can be set off by a cable from the camera or by a slave trigger. This is a tiny device stuck to the main flash and aimed at the camera where a smaller flash is mounted. To avoid getting two shadows of the gnomon, this should be masked or turned sideways towards the slave.

'Fill-in' is used to lighten harsh shadows produced by a strong sun in a cloudless sky or by a single lamp or flash. A newspaper or a constant light source held just out of the picture will do it. 'Fill-in' flash is calculated as follows. With a focal plane shutter the camera speed cannot be faster than 1/60 second, or 1/125 second on some models. So the aperture will be small; with a slow film say f11. The only variable remaining is the distance of the flash from the subject. With a guide number of 100, f11 suggests a distance of 9 feet. So as not bring the shadow up to full sunlight, back off to say 12-13 feet. If you want to avoid an extra shadow of gnomon, aim the flash away from the dial at a newspaper or a photographer's white umbrella - and close in again. It would be wise to bracket for both aperture and flash distance.

FILM AND PROCESSING

Colour transparency film is useful if you want lecture slides, or colour print film if the dial is unusually colourful. The slower '100 ASA' speed films are preferable. For scientific purposes and for journal publication a slow fine-grain black and white film is best. My favourite is Ilford Pan F. If you can develop it yourself, or get a friend to do so, use a fine-grain developer and process for fairly high contrast eg 20% or 30% longer than for normal negatives. Home enlargement will also be better than routine shop treatment. If you must have shop prints, have fairly large ones, mark the area of interest with masking tape and ask for selective enlargements. These will be expensive!

Make notes of everything you do. Keep a log of all your negatives, and lightly write the negative number of the back of every print you keep.

INSTALLATION OF DIALS AT PUERTA DE TOLEDO, MADRID

Early in 1988 there appeared, in a Madrid newspaper, a short description with an illustration of part of the series of non-mechanical clocks being installed at the Toledo Gate

(Puerta de Toledo) in the ancient Fish Market in old Madrid. The illustration shows two very large dials, over 5 metres in height judging by the height of the man working

on one of them. The sundials listed are a vertical, horizontal, equatorial-armillary, four polar dials with Equation of Time and two lunar dials for reading the night hours. On the left of the illustration is shown the lunar dial indicating from a quarter crescent moon to the full moon; above an inclined plane is a polar dial with the Equation of time; on the right in the perpendicular plane to the ground is a vertical dial with the signs of the Zodiac; and the curved scale of a equatorial dial below.

The dials were calculated by the mathematician Juan José Caurcel, and drawn by the artist Alberto Corazón. As the illustration sent is only a photocopy of the newspaper illustration, it is not possible to give further details of these substantial works which appear to have been drawn on a very large vertical surface erected especially for the purpose, possibly to hide some eyesore. This work illustrates the usefulness of modern designs of sundials to alleviate the monotonous appearance of a blank wall which is often a feature of a large scale building, and where the continuously changing aspect as the shadows move

throughout the day, helps to create a dynamic display from static forms. It is hoped to secure more information upon this unique installation of dials for a future issue of the *Bulletin*.

* * * * *

Members are reminded that articles on the subject of dialling in all its aspects are welcomed by the Editor. If these are submitted on one side of A4 paper ready for photocopying, so much the better, but clear handwritten manuscripts are also acceptable. At present the facilities of the Society do not allow the reproduction of illustrations other than line diagrams. It may be possible to prepare drawings from photographs, as one member has volunteered to do this for the *Bulletin*. The length of submission can be from a few lines to as long as the contributor feels necessary. Naturally there is no payment made, the reward is sharing the information with other members, the copyright and responsibility remain with the author.

EXTRACT FROM WILLIAM STUKELEY'S DIARY

William Stukeley (1687-1765) is best known for his archaeological studies of ancient monuments such as that of Stonehenge. At the age of forty he turned to religion, being ordained a priest in 1729. He became Rector of Stamford in Lincolnshire, where he practised until 1747, until he obtained the living of St George's, Queen's Square, Bloomsbury, London; remaining there for the rest of his life. Stukeley generated an enormous amount of writing and sketches during his lifetime, amongst which are twenty volumes of "diaries" and also "commonplace" books. In the MS Diary, Volume XI, page 77, is an account including some dialling:

Whilst Bishop Cumberland (1631-1718) lived at Stamford he busied himself much in making a meridian line, and at the same time lived there one Mr Gilbert Clark. His dwelling was the first house on the right hand going hence. He was a good mathematician, and was the inventor of that curious and useful instrument called the spot dial. This shows the hour of the day within a room: and may be occasionally set in any window, to the sun. The contrivance is that the sun's ray is transmitted through a small hole in a bit of brass placed on the back of the dial. Which hole is put in a point of the axis. A bright spot by this means falls on the hour lines drawn on a rough glass pane somewhat darkened. I have a couple of such dials, one whereof is exhibited before the society (Royal Society).

On this same principle I projected a curious dial on an horizontal plane, which now remains in my garden on Barnhill Stamford. I set an upright iron, on the plane. It is about 5 inches high, formed in the shape of an obelisk, with a small globe at top, of the bigness of a pea. This globe by its shade gives the time of the day, for it is placed in one point of the axis, and therefore answers the purpose of a whole axis, which is the edge of the gnomon. For want of knowing this principle, at least, not attending to it, we may observe in Kircher, how awkward a projection he has made in a dial of this nature: being that of Augustus formed in the Campus Martius, with a globe placed on top of that immense obelisk which he brought from Egypt. This dial of mine has hour lines drawn in a like manner with common horizontal dials and shows the sun's entering into

signs of the zodiac commodiously.

I thought fit to commit these matters to writings, as being under my own cognisance.

December 12, 1752

Whilst in Stamford, and Rector there, Stukeley founded a scientific society whimsically called the Brazen Nose Society. The very first entry in the Minute Book of the Society contains a reference to the same matter, dated 18th June 1736:

Mr Gilbert Clark a gentleman that lived in the house opposite to Mr Neal's in the St Martins, a good mathematician, was the inventor of that curious and useful dial, called the Spot dial, to show the hour of the day within side of a house, by a hole perforated in the back of the dial, in one point of the axis. He lived about 50 years ago.

In the same Minutes, November 1736, a Mr Lawrence communicated a letter from Mr George Graham which described his measurements of the right ascension of the Pole Star which, of course, was essential for determining the local meridian accurately, since deviation of the magnetic north pole made any compass determination of the local meridian liable to error, and hence errors in the alignment of sundials when being set up initially.

The passages quoted above have been tidied up by expanding abbreviations to make the understanding of the contents simpler; to the same end some of Stukeley's idiosyncracies such as commencing sentences with a lower case letter have been rectified. Those who wish to quote verbatim must refer to the original material preserved in the Bodleian Library, Oxford. In other works such as Professor E G R Taylor's *Mathematical Practitioners ...* Cambridge, 1954; the name Clark used by Stukeley is given as Clerke, and this is the spelling used in *A Preliminary Checklist of Dialling References*, by Charles K. Aked. Gilbert Clerke's own description is entitled *The Spot-Dial, very useful to shew the hour within the house, together with directions to find a true meridian, the azymuth and declination; and how to draw a dial upon a staff, upon the ceiling, upon any pillar or globe*. It was published in London in 1687.

STARTING TO LOOK FOR SUNDIALS

BY 'DIALHUNTER'

Sundial enthusiasts can be divided into a number of different categories – one thing most of us have in common is the joy we have of actually looking at that combination of art, science and craftsmanship that we call a sundial. However with the exception of the portables they tend to be rather scattered about the country and need searching out. This means that to go on a sundial expedition there is a need for some considerable forward planning. Whether one is considering a day's outing or a week or two's holiday, this part of the operation can be almost as interesting as the actual trip.

Where to find those elusive sundials? You probably know of one or two in your own neighbourhood and doubtless well meaning friends will tell you of others although they don't always remember exactly where! Most sundial books give reference to a few of the well known or unusual dials but sundial books are not exactly best sellers – you are much more likely to find the odd one or two on the shelves of the rare or specialist bookcases than at W H Smith! Your local public library should be able to get a copy of some books if you ask them and of course the little Shire book of sundials by one of our founder members, Christopher Daniel, is easily obtained.

Another source of information for the dial sleuth is the many thousands of topographical books dealing with the British countryside, the counties and tourist areas, look out for books such as 'Curiosities of old Borsetshire' they may well include pictures or articles about sundials. Books about churches or church architecture will be useful and as many dials are in the grounds of historic houses a perusal of guidebooks such of those of the National Trust and others could be productive. The above are just some of the possibilities. There are many others and I have no doubt that members will have their own ideas.

Having made your list of dials to visit it is time to get the maps out and plan a route – my advice is to allow about twice as long as you first thought. Apart from the extra time it may take you to actually find the dial you are looking for, if you want to photograph the dial you may have to wait for the right conditions.

Having plenty of time too means that you can very often discover dials en route; an unusual dial found in this way can be the highlight of your tour; look for it in the church or churchyard that you pass, in public parks, on the face of older buildings - you can even ask the 'locals' (at the local, or more hopefully at the public library or town museum), but be prepared for a rather blank stare or just a straightforward negative.

It will greatly add to your interest if you keep a record of what you see, by photography, by a written record or both.

In this respect use of B.S.S. recording sheets which should be available shortly from the society will be a distinct advantage; it is easy to forget essential points without a written reminder in front of you – more importantly your recording can be kept for posterity and it may well lead to the restoration of some 'forgotten' dials that are in poor condition. If you decide to take your recording seriously you will need to take with you a 'sundial kit', which, apart from your list of dials and a selection of maps (1" OS if possible) should include a notebook, a rule or tape measure, a compass, a protractor, cleaning cloth, a dilute mild detergent and some french chalk. It goes without saying that if you are taking pictures you will need your camera, preferably with telephoto lens and plenty of film.

A word about some of the above items. Any compass used should have a straight edge so that the orientation of dials can be checked easily, the 'SILVA' compass made for orienteering is good and easily obtainable but any simple compass can be mounted on a piece of wood with its N-S line parallel to a straight edge, you can even set it to allow for magnetic variation so that your compass needle will point to a true reading. You may suspect that the dial has been moved from its original location; it could help to prove the point if you checked the gnomon angle with an inclinometer or protractor although the school type is rather small - better to make one yourself by carefully marking out the angles on stiff card or piece of ply, use some elementary trigonometry to do this rather than trying to extend the range of a small protractor. Needless to say dials on buildings will generally be impossible to do this way but on the other hand they are less likely to have been moved from their original position.

Birds seem to find the gnomon of a horizontal dial an attractive resting place and in consequence leave their mark on the dial; you may well find the need to clean up the dial before photographing it, or even to decipher the inscriptions. Do this very carefully however – the owner may not appreciate you rubbing off the delicate patina built up over many decades! The french chalk of course will be used to enliven engraved lines and figures (or text) for photography. One final thing - if you are travelling by car and have room in the boot a small folding stepladder will prove useful, it may only be two or three rungs high but for taking good pictures of freestanding dials it will be invaluable.

While on your tour, whether it is for a day, a week or more, you will be going to places which you otherwise may never have thought worth your while, almost certainly however you will find interesting sights to see ... another reason for looking for sundials!

A GEOMETRICAL PUZZLE

In the British Library there is a manuscript headed "The uses of Tetraedron transformation garnished with dyalls" (Lansdowne MS 724). It is annotated "belonged to Lord Burghley, who intitled it 'The use of the Dyall, 1576'".

The dial is described as follows:

'This geometrical body being framed of 8 plaines triangular and hexagonall hath only 3 of either sorts with dyalls furnished, the other 2 serving for the Pedestall and Capitall. The triangular in respect of their small quantity are not capable of more than the ordinary howers without confusion. The other hexagonall [superficies?] are of two Sortes one directly respecteth the meridian and yet is neither Murale, Æquinoctiall nor Polare but hath an inclination peculiare different from all vulgare dyalls and therefore for distinction may be termed the Meridionall Inclinatorye'.

'The other 2 Hexagonalls are neither Occidentall nor Orientall but bind their extraordinary inclination they are Declinatory also and therefore of all other most difficile and conteynge most art in their construction, as they best knowe that have most travelled in Horologiographye. Those be named declinatory Hexagonalls.'

The 'Meridionall Hexagonall [is marked with] ... vulgar howers ... signes of the [zodiac] ... Azimuths ... Almicanteras ... and the Declinatory Hexagonalls with: 'howers vulgare ... of black cullour ... the Signes redd ... the Planet howers [the old unequal hours] in greene ...'

The general uses of the dial are given as:

'[To know the time of] ... the rysing and setting of the Soonne ...

To know how high the Soonne shall be at noone or any other hower of the day and tyme of the yeare ...

To know how many grades Horizontall the Soonne shall be distant from the Meridiane at any hower or moment assigned ...

To know what planet reigneth and ruleth according to the antique observation of the Chaldayans ...

To know exactly at what instant the Soonne or Moone passeth any of the Cuspides of the Celestiall howses or in what howse of the heaven they are ...'

Readers may like to puzzle out the shape of this dial for themselves (it helps to have a wife who is experienced at patchwork!), and if anyone can produce a good perspective drawing of it we shall print it in our next edition!

The MS carries the date 1576, apparently written by Lord Burghley himself, and in 1574 the mathematician Thomas Digges had written to him:

Righ Honorable, - As in your Lordshippes fframe astronomicall, for ornament the figures of the most notable constellations in this our visible hemisphere are pourtrayed, adjoynd with due number of heavenly lights; so, in the tables adjoyninge, are impressed sutch numbers as deliver by methode not vulgare the situations and habite which our moovable horizon and meridian, together with the two cheefe lights. Whereupon sundry conclusions, both pleasant for varietye of knowledge and necessary ffor common use, are grounded. Whereof I have in 50 conclusions digested the greater part, with ther historyes poetically, and judgements astronomicalle; the which, into a little treatize reduced, I am bould to offer unto your Lordship, hopinge, ere it bee longe, to flinishe a columnne sustayning a regular body platonically, garnished with solar dialls, sutch as I thinke hitherto in this land hath not bene seene, to be placed in soome of your Lordshippes gardeynes, as aptly serving for uses diurnall as that outer frame for conclusions doon by night; whose archetype was long sithens in mind

conceyved, and have now at the last also attayned the hand of an hable workman to exsequite the same in the floorme materiall. In the meane, I shall humble desire your Lordshipp in good part to accept this triflinge testimony of a carefull mind desirouse soom waye to signifye the reverent affection I have and shall duringe life beare toward you, no lesse for private than publike respectes; Always, as becommeth mee, restinge,

At your Lordshippes commandment,
T. Digges.

A footnote to the printed text of this letter (in *A Collection of letters illustrative of the progress of Science in England from the reign of Queen Elizabeth to that of Charles II*, ed Halliwell, London, 1841, - [I am indebted to Anthony Turner for drawing my attention to it] says that the work alluded to, if a printed one, is probably an edition of his father's *Prognostications Everlasting*, one of which was published in 1574 and contained an addition by himself. MS 724 may be a supplement to this work prepared after the dial was completed. Could the dial described in it be the 'regular body platonically, garnished with solar dialls?' Since the dial of the MS has both triangular and hexagonal surfaces it is not, strictly speaking a platonic solid, but he may have been using the term loosely. I would welcome comments from our mathematical members!

ANDREW SOMERVILLE

EDITOR'S NOTE:

For many years the Old Ashmolean Museum sold "*Digges Prognostication*" or "Prognostication of Leonard Digges for 1555" which was prepared for Members of the British Association meeting at Oxford in 1926. The editor was R. T. Gunther, the work being No III in the Old Ashmolean Reprints series. There is nothing in this little book of 76 pages hinting at such complicated dialling work, although Gunther remarks that "The original work doubtless supplied Humphrey Cole, the greatest English instrument-maker of the Elizabethan Age, with 'copy' for several of his scientific instruments. That is sufficient praise for endorsement of the quality of Digges work, in spite of it all seeming very quaint in style and content today. No example of the 1553 Prognostications has survived.

Most of Leonard Digges written work remained in manuscript form but, because he joined in Sir Thomas Wyatt's rebellion against Queen Mary the First, he was attainted for treason [extinction of a person's civil rights], and no printer would work for him except Thomas Gemini from Flanders, who settled in London as a Mathematical Instrument-Maker, and who supplied instruments which Digges recomended in his "Prognostications" which were issued at intervals until 1635, although Leonard Digges died in 1571. Leonard Digges was restored to the blood [ie. recovered his civil rights] after the Protestant Queen Elizabeth acceded to the English throne in 1558, an Act for this purpose being put before Parliament in the fifth year of her reign, but it is not printed in the Statutes.

The son, Thomas Digges, edited much of his father's work and added to it, publishing such works as *A Geometrical Practise Named Pantometria ... with sundry strange conclusions both by instrument and without, and also by Perspective glasses ... lately finished by Thomas Digges*. Incidentally the entry on the two Digges in E G R Taylor's *The Mathematical Practitioners of Tudor ... England 1485-1714* contains some errors, confusing father and son.

A REMOTE READING SUNDIAL

Whilst the world may not be waiting anxiously for a remote reading sundial, the description of a sundial utilising a fibre optic system for remote display may perhaps be of interest to members of the British Sundial Society.

The sundial is composed of two main parts:

1. A sensor unit sited in any position receiving unobstructed sunlight daily.
2. A display unit which may position some distance away within a building.

The sensor and display units are linked by fibre optics. Fibre optics confound the accepted rule of nature that light can only travel in straight lines. A single fibre optic looks very much like a sturdily insulated electric cable but within the outer casing is a bundle of fine filaments of glass which allow this remarkable optical trick to occur. These fibre optics are highly flexible and will carry light by any irregular route over long distances with little loss.

In the sensor unit fibre optics are individually arranged to collect the light signals at five minute intervals throughout twelve hours of the day, the light being transmitted, without further intensification, to the display unit. As with all other sundials, readings must be taken in conjunction with the Equation of Time to obtain Mean Time. Suitable adjustment can be made on a day-to-day basis as the sun indications move in and out of phase with an accurate timepiece.

THE SENSOR UNIT

The sensor unit has two main parts:

1. A 3 inch diameter clear acrylic lens. The light from the sun is focussed to a 'wedge' of light on the other side of the lens.
2. A concentric semi-circular screen, of $4\frac{1}{2}$ inches internal diameter coinciding with the line of focus of the cylindrical lens.

This screen has a series of apertures designed to accept the ends of the fibre optics placed corresponding to five minute intervals of the path traversed by the line of light focussed by the cylindrical lens in response to the sun's diurnal motion.

The sensor unit is so designed that only one fibre optic is in full use at any particular time (except on the hour). To achieve this it is necessary to adopt the layout shown in Fig 3, since space considerations make it impossible to place the fibre optics in the preferred single continuous straight line. The layout adopted to overcome this physical restraint is six rows of primary fibre optics, with a seventh row to illuminate an extra fibre optic on the hour. These rows of fibre optics are set in an oblique formation (except No 7), one oblique line of six for each half hour of the twelve hour day. An important feature of the design is the introduction of opaque black baffles between the oblique lines of fibre

optics which serve to reduce light spread and also cut out any unwanted reflections from the polished surface of the lens.

The sensor unit is so mounted that its angle of presentation may be adjusted to suit any particular latitude of use, this being an essential feature if accurate indication is to be achieved, as with any sundial. The semi-circular screen has secondary adjustment on the adjustment on the axis of the cylindrical lens which allows an hour's displacement for the change from Greenwich to Summer-time and vice-versa.

The whole sensor unit is housed in a clear acrylic cylindrical case. It is of some interest to note that this case, despite its circular form, has no effect on the optical behaviour of the acrylic cylindrical lens.

THE DISPLAY UNIT

This is housed in a hardwood case of ten inches cube, slightly tilted backwards on its base for easy observation and reading. The black display screen is set back from the face of the protective glass to reduce the effect of ambient lighting within the room to a minimum and enhance the contrast of the display.

Hours are marked by opaque white studs set out on the screen in a full circle for the twelve hours, resembling a conventional clock. No other sundial has achieved such a circular display before.

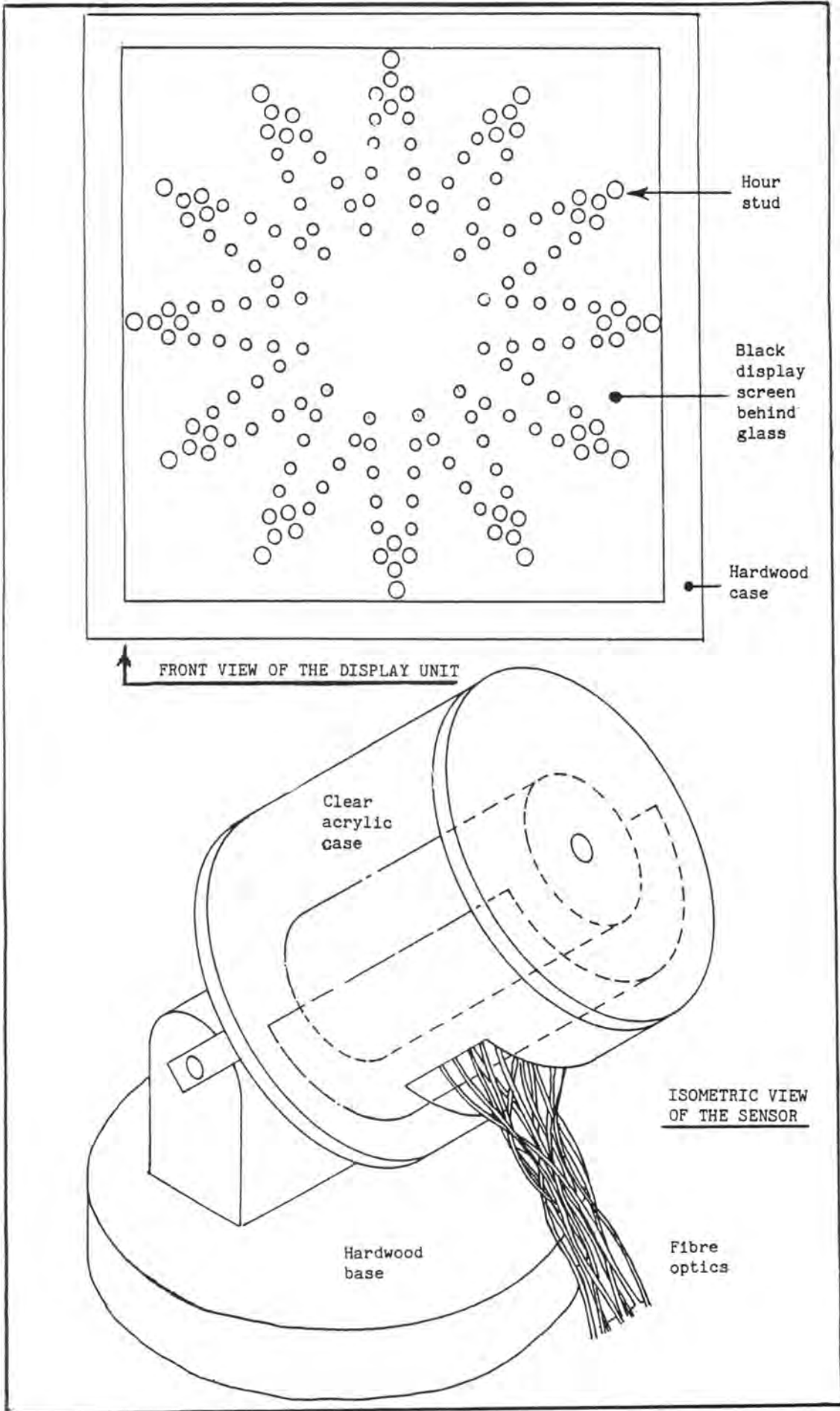
As with the sensor arrangement, space considerations prevent a single line of optics being used as the circumference resulting from these of such a layout would be too great. The configuration shown in Fig 1 has therefore been adopted with a series of triangles having half-hour points approaching the centre of the dial.

In use the display unit shows a clear point of light moving in a clockwise direction with the motion of the sun. On the hour, the additional fibre optics come into operation to give a double spot indication for an enhanced indication.

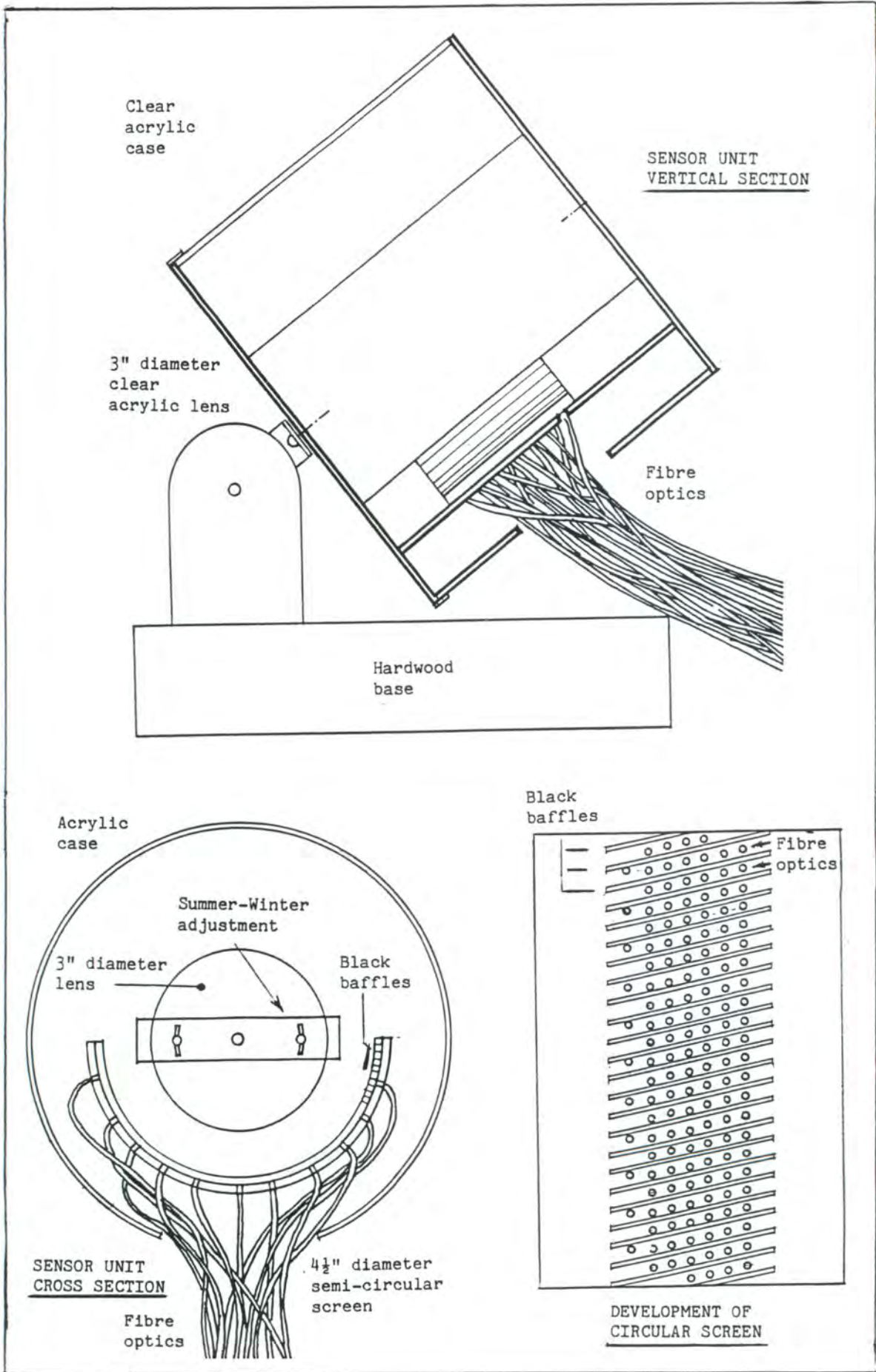
W. G. Benoy O.B.E., R.I.B.A.

EDITOR'S NOTE

The remotely indicating sundial described by Mr. Benoy is based upon his earlier optical sundial described in his Patent Specification 1,445,146 upon which it is hoped he may write at a later date to complement this article. This optical type of sundial has already taken its place in the field of time indication by the sun, and has the advantage that even hazy sunshine will give an indication where the ordinary shadow dial is unable to do so. Furthermore, by concentrating the light to a focus, the sharpness of indication allows an increased accuracy of indication to be achieved, and the contrast is greater than with a fuzzy shadow line resulting from the sun not being a point source of light, especially so in a dial of small proportions.



A REMOTE READING SUNDIAL



A REMOTE READING SUNDIAL

BOOK REVIEW

L'Horloge Solaire DV Lycée Stendhal 1673. Written by three pupils of the Lycée Stendhal as an exercise in an Educational Project. 20 pages, 7 plates some in full colour, plus b & w figures in the text. 1984. Soft covers.

This little pamphlet tells the story of one of the most unusual sundials in the world, set totally within the stairwell of a college building.

The designer of this dial was born in Nimes in 1638 and became a novitiate with the Jesuits at Avignon before being assigned to theology and mathematics, becoming known as Father Bonfa. When he arrived at the college, the principal building had already been completed. Helped by his pupils he designed the dial and traced it on the stairwell which had a pair of large windows on the first floor landing, each was fitted with a small mirror to reflect a spot of light upon the wall surfaces. The sundial proper covers 100m² of the wall from which the solar time to within a few seconds can be read at suitable points, the number of hours since sunrise, the hours to sunset, the approximate day, the month, the season, zodiacal sign and other indications. Many tables are painted on the walls to form a universal clock which give the time in different parts of the world, a Lunar Calendar which with a table of the Epacts allows the calculation of the age of the moon; a new clock which determines the time of the moon as a function of the sun and reciprocally. The hours are given in Black for French hours, Red for Italian hours, and Yellow for Babylonian hours. About the year 1500 French hours were counted from midnight, on the dial the morning hours are painted in Roman figures, Arabic for those after noon. The Italian hours commence at sunset and are shown in Arabic figures 1-24; the Babylonian commence at the rising of the sun, shown on the dial in Arabic figures 1-24.

On the underside of the staircase leading to the second floor (a sloping ceiling) is a scale showing the Zodiacal signs, months, seasons and the rising and setting of the sun. On the right wall as one mounts the first flight of stairs is the *Calendarium Marianum*, the Virgin Mary's Calendar, showing the different feast days, Visitation 2 July, Assumption 15 August, Nativity 8 September, and so on. On this wall is the Universal Clock consisting of 24 columns, divided horizontally into seven parts, supposedly giving the number of Jesuit establishments in the world and the

time at these for a given hour at Grenoble. Going round the landing, the wall on the right shows the Celestial Houses for determining horoscopes and the King's Calendar which shows the principal events in the first part of the reign of Louis XIV, plus a table showing the Epact since 1674. The Epact is the age of the Moon on the eve of 1st January, thus the Epact for 1989 is 22. On the opposite wall is the New Civil Moon Calendar which is a table to give the moon's date, and lines which show the morning hours.

Returning to the first flight of stairs, on the left wall is a colourful display which is the Society of Jesuits' Calendar, it has a number of possible uses such as finding the position of the moon knowing that of the sun, or that of the sun knowing the day and hour of the moon.

The many figures make the above brief description much easier to understand. Naturally the work described here has had to be restored several times, from the pamphlet it appeared that a new restoration was about to take place, the previous had been 1918. During previous restorations there had been loss of information, it was hoped to correct this.

A previous article on this unique sundial "Le cadran de Lyée de jeunes filles de Grenoble" by J De Rey Pailharde, A Rome and A Favot, was published in - Bulletin de la Societé de Statistique de l'Isère, 4th series, Volume XV, in 1920. In 1955 it was decided to honour the most illustrious pupil of the College, hence the establishment is now know as the Lycée Stendhal, rue Neuve de Bonne, Grenoble. Another article is "Le cadran solaire monumental du Lycée Stendhal à Grenoble" in *Revue "Ingénieur Rhône-Alpes"*, No 22, 4th quarter, 1976. This article is based upon that previously mentioned.

Possibly this dial gives us a direct link with Father P Athanasius Kircher, author of *Ars Magna Lucis et Umbrae*. 1646, one of the largest treatises on dialling ever produced, for Kircher was also assigned to Avignon whilst Father Bonfa was there. By publishing his astronomical observations in liaison with such great men as Cassini, Bonfa was well known in scientific circles. He died in his 87th year in 1724 at Avignon, his great work lives on.

There is an article in *Journal des Scavants*, published Paris 1679, "Nouvelle invention de faire pendules de carton" - (New invention of making clocks of cardboard), by J Bonfa.

LETTERS TO THE EDITOR

Dear Editor,

Peter Drinkwater may have unusual views on life but as he said, persuasively and poetically, something that many members of our society may have been thinking too. Together we might even do something about it "at a steady unforced pace, with frequent 'pastoral' pauses" (felicitous phrase).

Western civilization neglects the truth and beauty of the sun-earth relationship of which the shadow on the dial is a 'statement in miniature'. Consider our human origins: it was surely the sun which evoked consciousness of past, present and future, distinguishing man from other creatures; first the consciousness of a day - each successive sunrise a rebirth - then of more than one day, of a year, of the calendar of the seasons, history, planning and living in a comprehensive time, holding in the mind 'the past, the present and the future' (Samuel Johnson).

Sun and shadow imposed their rhythm on our concept of time, nights and days and seasons, but our human contribution to time measurement have detracted from the broad pattern. Clocks do not keep in step with the sun. Here in the south-west corner of Brittany natural rhythms are strongly marked and clocks are woefully out of step. Sun noon occurs at 12 + 1 hour for Central European Time + 1 hour for French Summer Time + 16 minutes for longitude 4° West + 5 minutes for the Equation of Time (July) = 2 hours 21 minutes ahead of Sun Time!

Like Peter Drinkwater restoring a church doorway inscription, one can try to live the natural rhythms of dawn and dusk, family life, the garden, the slow crumbling of stone, the nesting of swallows, getting old and all the rest. The sun ray and the shadow are the co-ordinates of living. We should work towards bringing conventional time, and our conventional selves in step with them.

The first move would be to introduce dawn-chiming clocks, and thus make better use of cool bright early mornings in summer.

Yours sincerely,
G.P. WOODFORD.
France, 28.7.89

COMMENTS ON THE FIRST BULLETIN (A short selection)

Our first *Bulletin* is a fine beginning. It denotes a good lot of work ... My Lambert's dials looks quite fit as a beginning, yet M Somerville's dial article (and those to come in the future will always be a first class contribution ...).

Yours sincerely,
RENÉ R.-J. ROHR
Vice President
France, 11.7.89

* * * * *

I received the *Bulletin* of the British Sundial Society with many thanks and great pleasure. I think that the organizing of the British Sundial Society is of great importance not only for the British sundial culture, but for the study of their general history. The British Isles has the oldest sundial culture in the north-western part of Europe, the British Collections contain the largest number of portable dials, and the greatest number of medieval dials have survived on old buildings.

Yours sincerely,
LAJOS BARTHA
Hungary, 27.7.89

* * * * *

Mr Bartha, who is a chief librarian in Budapest, is more conscious of the wealth of sundials in the British Isles than the majority of us. This wealth of material has been sadly neglected as a research source in the past - Editor.

* * * * *

We heartily congratulate you with the start of the 'British Sundial Society' and we thank you for sending us the first *Bulletin* ...

Yours faithfully,
F J de VRIES
Secretary
De Zonnewijzerkring
Netherlands, 8.9.89

ANNUAL GENERAL MEETING & CONFERENCE, EXETER COLLEGE, OXFORD, MARCH 1990

PROVISIONAL PROGRAMME

- Friday 23rd** (evening) Registration and informal get-together for those who have arrived early.
- Saturday 24th** 10.00 am - 11.00 am
Registration, coffee.
11.00 am Welcome by the Chairman.
11.10 am Business meeting: adoption of constitution and election of officers, Treasurer's report.
1.00 pm Lunch
2.15 pm Talk on Oxford sundials (lecture theatre) followed by a tour on foot.
4.30 pm Tea and informal discussions.
7.00 pm Dinner
8.30 pm Talks, including opportunity for members to give short (about 10 min) presentations on their own interests. Projector facilities will be available.
- Sunday 25th** 8.00 am - 9.00 am
Breakfast
9.15 am Talks in lecture theatre
10.45 am Coffee
11.00 am Talk on the Museum of the History of Science, followed by a visit to its sundial collection.
1.00 pm Lunch.
2.15 pm Talks in lecture theatre.
3.30 pm Final summing-up followed by tea and departure.

If there is sufficient interest, we shall set aside time for members to display their own handiwork. Please indicate on the form if you are interested.

One of the objects of the meeting, of course, is to adopt a constitution and elect a committee. The following draft constitution is recommended by the present committee and complies with the requirements for registering as a charity, should we wish to do so. Suggestions for amendments should be sent to Andrew Somerville, preferably well in advance of the meeting.

DRAFT CONSTITUTION

1. TITLE

The name of the Society shall be The British Sundial Society, hereinafter referred to as the Society.

2. OBJECTS

The objects of the Society shall be:

- a) to promote the science of gnomonics and the knowledge of all types of sundial
- b) to catalogue the dials which still exist in the British Isles and research their history
- c) to advise on the preservation and restoration of old sundials and the construction of new ones

d) to publish and circulate to members periodically, a Bulletin or Journal containing original articles, reports from other societies, news and other items of interest to members.

3. MEMBERSHIP

The members of the Society shall be those persons who pay the annual subscription at the appropriate rate or rates as shall be determined by the committee, the subscription being payable in advance.

4. OFFICERS AND COMMITTEE

The management of the Society shall be in the hands of a committee consisting of a Chairman, Secretary, Treasurer, Editor and at least 3 other members; the Officers and the other committee members shall be elected by and out of the Society's members at the Annual General Meeting; they shall hold office for one year and be eligible for re-election. The committee shall have powers to co-opt others from the membership of the Society for special purposes and on a temporary basis.

5. FINANCE

- a) The financial year shall end on 28th February.
- b) A bank or building society account shall be opened in the name of the Society and cheques may be signed by any designated officer of the Society.
- c) The Society may receive donations, grants in aid and financial guarantees.
- d) The income and property of the Society whencesoever derived shall be applied solely towards promoting the objects of the Society as set forth above and no portion thereof shall be paid or transferred either directly or indirectly to any member of the Society except in payment of legitimate expenses incurred on behalf of the Society.

e) In the event of the winding-up or dissolution of the Society any remaining assets after all liabilities have been discharged shall not be paid or transferred to any members of the Society but shall be transferred to a charitable organisation whose objects are similar to those of the Society and whose rules preclude the distribution of income and assets among its members.

6. GENERAL MEETING

The Annual General Meeting shall take place as soon as convenient after the end of the financial year and all members shall be given at least one month's notice in writing.

7. AUDITED ACCOUNTS

The financial accounts shall be audited and submitted to the members at the Annual General Meeting.

8. AMENDMENTS

The constitution may be amended by a two-thirds majority of the members present at an Annual or Special General Meeting provided that one month's notice of the proposed amendment has been sent to all members and provided also that nothing therein contained shall authorise any amendments which shall have the effect of the Society

ceasing to be eligible for charity status.

* * * * *

The present committee offer themselves for election: Andrew Somerville as Chairman, David Young as Treasurer, Charles Aked as Editor and Christopher Daniel as ordinary member. Nominations or offers of service for all offices may be sent to Andrew Somerville, preferably before the meeting with a brief biographical sketch which can be circulated beforehand, but will also be accepted at the meeting. As yet, few members will have had the opportunity to meet each other in advance, so proposers and seconders may be arranged at the meeting. Elections will be by vote of those present. It is envisaged that committee meetings need be no more than 4 per year, but it may be necessary to travel some distance to them.

A separate registration form giving details of costs is included with this Bulletin and should be returned by 31st January. Late registration can be accepted only if accommodation is available. Car parking is a problem in Oxford and city centre parks charge up to £4 per day, though free "park & ride" places are available on the outskirts. The College can reserve some places nearby at £1.78 per day, but these will be limited and allocated on a "first come first served" basis. Please indicate on the form if you are interested.

MEMBERSHIP LIST

A list of members' names and addresses is being sent with this Bulletin to members only. It is hoped that members may be able to form local groups where the numbers are sufficient within a reasonable distance, and anyone who wishes to know of others with special interests should write

NOTES:

to the Chairman. This could be especially valuable in relation to our survey programme.

CHAIRMAN'S NEWS

The Society has continued to grow rapidly: at the end of September we had 131 members, but by the time this reaches you I predict that we shall number over 150, which I find quite amazing. I have had letters with good wishes from the Dutch and German groups, both saying they started with much smaller numbers! Thank you for returning your questionnaires so promptly and an analysis of them is included in this Bulletin. Clearly top of the list of specific interests are dial construction and recording of dials, and it is very striking that the latest analysis, with 85 questionnaires returned, differs very little from an earlier one when only 43 had been received - the order of preferences is almost exactly the same. Many of you have added suggestions for society activities to your replies and I am sorry if I have not managed to answer each of you individually, but your comments have been noted for future reference! If you feel strongly about a topic or have queries you would like answered, write a letter to the Editor of the *Bulletin*: members' letters rate high in the list of items you wish to read, but if you don't write any ...!

Arrangements for the meeting in Oxford next March are now well advanced and an application form is enclosed with this *Bulletin*. Please return it as soon as possible because, with no previous experience to go on, it is difficult to estimate the numbers to be catered for. The charge for accommodation is very reasonable, so bring the family along and make a long weekend of it! There is much in Oxford to interest visitors.

A. R. SOMERVILLE

ANALYSIS OF QUESTIONNAIRES

	24.6.1989 (43 returned)		11.9.1989 (85 returned)	
	No	Order	No	Order
A. INTERESTS				
Dial construction/amateur (A7)	31	1	51	2
General interest (A14)	29	2	59	1
Recording of dials (A2)	27	3	45	3
Historical research (A1)	24	4	45	3
Photography (A3)	23	5	40	5
Gnomonics/dialling (A5)	22	6	39	6
Portable dials (A10)	18	7	31	7
Restoration/preservation (A13)	14	8	26	8
Book collection (A12)	13	9	24	9
Writing/publication (A8)	12	10	20	11
Talks/lecturing (A9)	12	10	20	11
Inscriptions (A4)	11	12	22	10
Dial construction/professional (A6)	7	13	16	13
Scratch dials (A11)	6	14	13	14
B. ITEMS FOR BULLETIN				
Curious/unusual dials	36	1	68	1
Members' letters*	35	2	65	3
Articles on new dials	34	3	67	2
Papers on historical research	30	4	63	4
Book articles and reviews	30	4	60	5
Book exchange and sales	29	6	48	6
Beginners' gnomonics **	26	7	44	7
Paper on mathematical research	25	8	42	8
Foreign Society news	22	9	39	9
C. ACTIVITIES				
Tours in UK/day (Ca1)	34	1	57	1
Regional meetings (Cc)	31	2	53	2
Tours in UK/weekend (Ca2)	20	3	33	3
Tours abroad (Cb)	13	4	16	4
Tours in UK/longer (Ca3)	4	5	6	5
D. PARTICIPATION				
Building National Record (Dnatrec)	32	1	62	1
Working for the society (Dsoc)	12	2	28	2
Speakers' Panel (Dspeak)	9	3	13	3

* To include queries and answers (M. Gait).

**A. A. Mills suggest that such information is readily available elsewhere.

OTHER SUGGESTIONS

Educational material (Basil O'Fee)
Dialogue with bodies such as Public Arts Commission Agency, Common Ground, etc, who through their work in propagating sculpture in public places might well increase the opportunities for the commission of dials (Mark Evans).

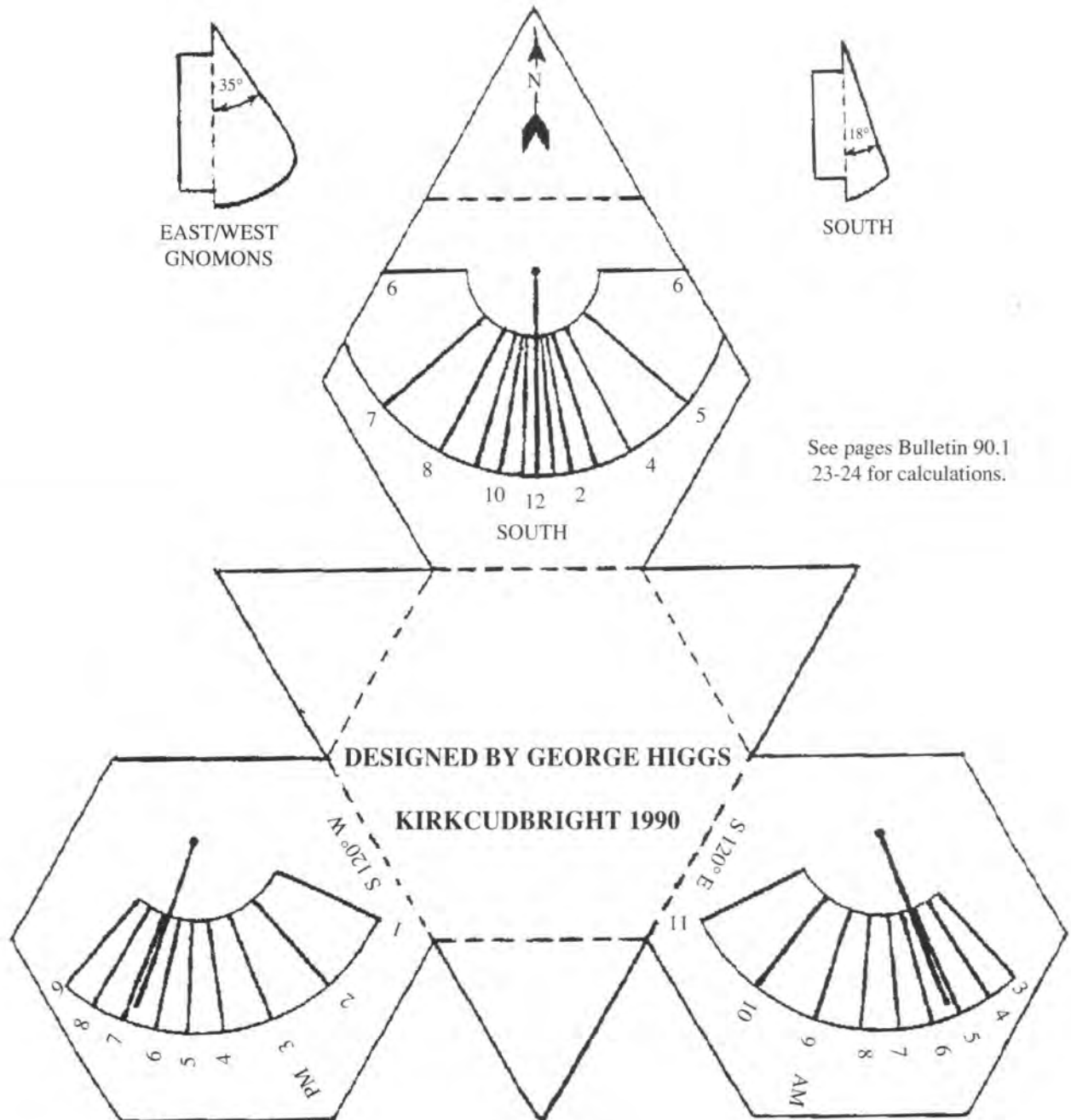
Notices section for communication between members.
Articles on construction of dials (W. Smith), and of simple and readable dials (M. J. Kenn).

MRS. ANNE SOMERVILLE

DIGGES SUNDIAL LAT. 52° LONG. 1°W

PASTE ON THIN CARD, CUT ROUND EDGES, FOLD PARTS AWAY ON DOTTED LINES, STICK MEETING EDGES WITH LOCTITE CLEAR GLUE OR SIMILAR.

Note: Dial hour lines must be calculated for your own location.



THIS CUT-OUT DESIGN HAS BEEN PLACED ON THE LAST PAGE SO YOU MAY PHOTOCOPY IT IF YOU WISH TO KEEP IT WITH YOUR *BULLETIN*.

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NOTE: THESE ADDRESSES ARE CURRENT IN 1994