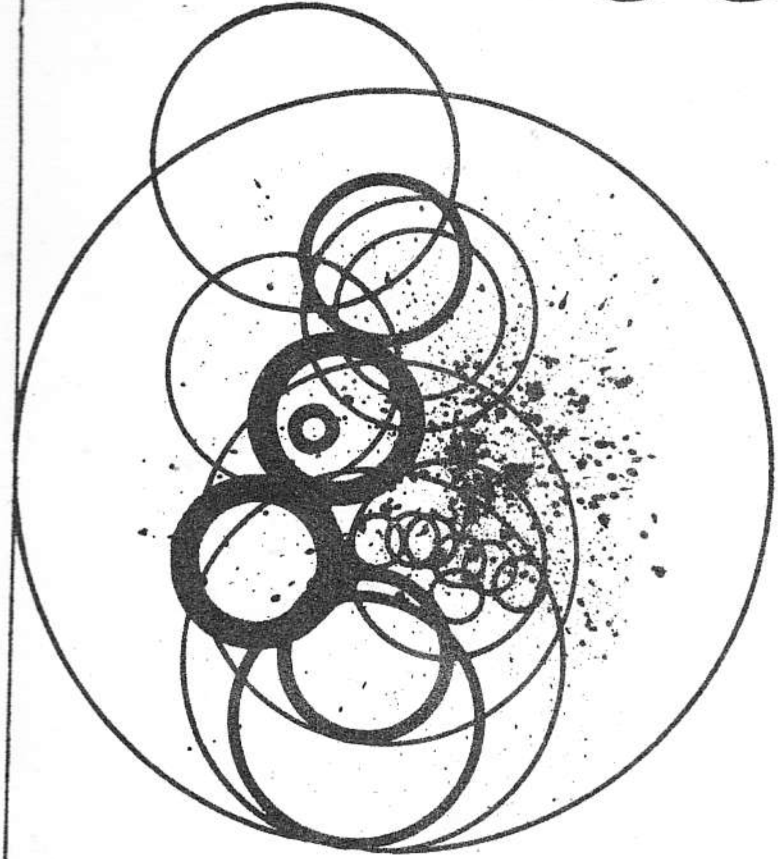
UFO HANDBOOK 1



BRITISH UFO ASSOCIATION

U. F. O. H A N D B O O K S

N u m b e r 1

Observing

Compiling and submitting reports

Interviewing witnesses

Investigating reports

Organised sighting expeditions

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by

F. Malcolm Bull

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O b s e r v i n g

There are three principal methods of obtaining data regarding the sightings of unidentified flying objects, each having its own advantages, usually in the accuracy with which some particular feature of the objects' appearance or behaviour can be observed or determined. We shall discuss these in order of decreasing cost

A. R a d a r

This is probably the most restricted of the three methods, being confined merely to the detection of flying objects, unidentified or otherwise.

One advantage of location by radar is that it can be carried out in misty or cloudy weather, although this is somewhat suspect since visual confirmation is advisable on account of the confusion which could arise between ufo's and conventional aircraft.

Reports have been published in which no visible objects were detected to verify images seen on radar screens. One such case is that in which a series of concentric circles was seen to emanate from London about dawn each morning, and a similar series was seen to close in on the city in the evening, the rings being separated by equal time lapses. This phenomenon remained unexplained for some time until it was discovered that the 'ring angels', as the occurrence was named, were caused by starlings flying out of the city at dawn, returning at night to roost. However, not all unexplained 'blips' have such mundane origins!

B. P h o t o g r a p h y

There are two possible subdivisions of the photographic method. The first, and so far almost exclusively used, is that which employs the camera as a device ancillary to the human observer, being used to film the ufo's once they have been located by the human operator.

The second application makes use of a camera of the type used for auroral and meteor studies. This consists of a convex mirror which reflects an image of the whole sky into a photographic unit supported above it (fig.1). The plate is then exposed for some time, during which any changes in the sky will have been recorded. It may be improved by means of a rotating shutter (not shown) which would make it possible to estimate ~~to estimate~~ the speed of any object travelling across the sky. Thus, if the shutter, which in its simplest form could be a revolving arm, rotates at the rate of one revolution per second, the trail left on the film by an object, meteor, aircraft or ufo, will be interrupted once every second. The image of the object on the plate will appear as a broken line from which the length of the path, both angular and in time, can be measured and the angular speed found.

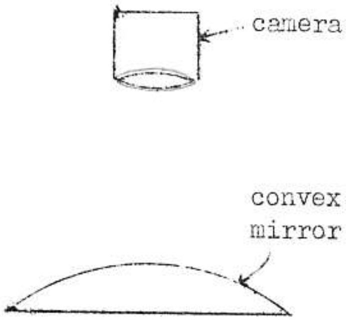

Fig.1

If a cine-camera were to be used in conjunction with an all-sky mirror, it would provide a valuable recording medium, and is possible the only device which could satisfactorily replace the human observer.

Continuous exposure of a still camera, with or without a convex mirror, can be successfully used for the present work provided that care is taken to ensure that any nearby lights and/or the moon do not fog the film by over exposure. A simple box camera has rather too small a field of view to be really useful, but its use should not be discouraged. The camera may be mounted upon a rotating axis if it is desired to eliminate the trails left by the stars as the earth rotates, but this will be found both difficult and unnecessary.

The best film for use in these applications can be determined by experiment and experience, but generally a fast, fine grain film is suitable. If the cine-camera is employed a low speed, of about 8 frames per second, coupled with a large aperture should be used, remembering that this will, of course, produce a speeded-up film.

C. Visual

We come now to the cheapest and best observing and recording system, the human observer (although its accuracy is often a little questionable).

Advantages over the two previous methods lie in our powers to differentiate between various objects, aircraft, birds etc., and also in the ease with which, even in a single glance, it is possible to obtain details of the shape, colour, brightness and apparent size of an object.

Reliable information of the several topics discussed below can only be produced if a specialised technique is employed by an experienced observer, since the objects are often visible for a few seconds only. But here, as with most things, practice makes perfect!

How and what to observe

Before giving details of what to record about a sighting here are a few general hints on observing without the aid of cameras or other equipment.

Most of the sightings brought to the notice of research organisations were made by people who were not looking for these objects at the time, and indeed, there are very few, if any, continuous watches kept up with the sole aim of observing 'flying saucers', although there is nowadays some interest in the field of organised sighting expeditions, and a short article on their organisation is included at the end of this booklet. If the observer has noticed an unusual object in the sky, whether found by accident or as the result of a prolonged wait, he should watch it carefully, noting its behaviour and other features mentioned below.

Often, when an object is visible only as a faint light, it can best be seen by 'averted vision', that is, when the eye is directed slightly to one side of the object's true position. This is possible because the most sensitive part of the retina is not at the back of the eye but a little to one side. Also, the eye becomes more sensitive to faint images if the observer has been in the dark for some time. This is due to the formation of a substance, night purple, which increases the sensitivity of the retina to faint images. Should it be necessary to make notes during a sighting or to consult a chart to identify the stars, this should be done with the aid of a red lamp, since this colour does not affects the sensitivity of the eye.

We now come to the various details which are necessary in order to make a reasonably accurate assessment of the sighting of an unidentified flying object:

1. Situation
   - (a) date, time
   - (b) place
2. Details of the object(s)
   - (a) behaviour
   - (b) shape
   - (c) size
   - (d) distance
   - (e) colour
   - (f) brightness
3. Meteorological Conditions
4. Personal details about the observer

1. Situation

(a) Date, Time

Although often omitted from sighting reports both these items are extremely important if the report is to be of much use, for with their aid it is possible to compare and correlate reports coming in from several places.

Date This should be recorded in an unambiguous form such as

10th November, 1963,

and not as 10.11.63, since in the U.S.A. this would be interpreted as

11th October, 1963.

The rule is therefore:

i) DAY first in numerals

ii) MONTH second in letters

iii) YEAR last in numerals.

Time Information such as the statement 'the object was seen at three o'clock' is, alone, inadequate, since it might refer to any one of

0200, 0300, 1400 or 1500 G.M.T.,

depending upon whether it was 3 a.m. or 3 p.m., and whether or not summer (daylight saving) time was in operation. Data referring to the time of an event should contain the following information:

i) Greenwich Mean Time (preferably)

ii) Civil Time, with a.m. or p.m., or on the 24 hours clock

iii) Whether standard or summer (daylight saving) time

iv) Time Zone, if in a large country such as U.S.A.

To find the exact time of the sighting the following method may be employed quite successfully:

At the precise moment when the object is seen, set the hands of a watch or clock to 1200 (the second hand too, if possible), making sure that the clock is wound!

When the next Greenwich Time Signal is broadcast check the time shown by the clock as accurately as possible. Record this time. Check the time shown by the clock when the next Time Signal is broadcast, and record this time.

Let us suppose that the clock reads 6.45 when the 7 a.m. Time Signal is broadcast, then the sighting was made at

7 - 6.45 = 15 minutes past midnight,

this assumes that the clock has kept perfect time during the intervening period. To test if this is true we look at the time shown by our clock when the second time signal was heard. Let us suppose that at 8 a.m. our clock read 7.46, then clearly, the clock gains at the rate of one minute per hour. Therefore, in the period of 6.45 hours it will have gained six and three-quarter minutes, the true time of the sighting was actually six and three-quarter minutes easlier than our first estimate, at eight and one-quarter minute past midnight.

(b) Place

The true geographical position of the observer is employed to find the height, distance and size of an object seen from two or more places, and in order that reports may be of use for research purposes the following data is required:

i) postal address of location (if any)

ii) sketch map showing exact location of the observer

iii) nearest town.

The map references of the observer's position (National Grid) should also be given is these are know. A one-inch Ordnance survey map is ideal for most purposes.

Details should also be added of the whereabouts of the observer at the time of the sighting, e.g. in a car, in the house, etc., and also whether the object was viewed through glass, windows etc.

If the object was observed from a moving vehicle, car, train or aircraft details should be given of:

iv) observer's height above sea level

v) direction of motion

vi) speed of the vehicle.

Any optical apparatus used to observe the object, such as binoculars, telescope, etc., should be described fully giving the power of the instrument. If the observer wears spectacles of any kind these too should be mentioned.

2. Details of the object(s)

(a) Behaviour

As the heading implies, this section concerns the movements of the object(s) and it will be subdivided into:

i) speed

ii) direction

iii) number of objects

iv) duration of flight

v) any other features.

i) Speed The true velocity of an object is difficult for an inexperienced observer to estimate. What is much easier to judge is the 'apparent speed', usually expressed in the form of degrees per second.

If we observe that an object travels across the sky a distance of 45° in five seconds, then the apparent speed of the object is

$$\frac{45}{5} = 9 \text{ degrees per second, written } 9^{\circ} \text{ per sec.}$$

One degree is the angle subtended by a line of length s at a distance of 57s, or approximately half an inch at arm's length. It is possible construct a table giving the apparent sizes of various objects when held at arm's length. The values, which are necessarily only rough, are for an adult's arm:

TABLE I

the width of the index finger is approximately	1°
the width of a halfpenny is approximately	2°
the outstretched hand (thumb to little finger)	20°

The reader can add many more examples, and if he is equipped with a pocket ruler the measurement of angular distances is greatly simplified remembering that a half inch at arm's length subtends an angle of approximately one degree.

If we know the angular velocity and distance of an object we can find its linear (true) velocity quite simply by means of the formulae derived in section (c) below.

ii) Direction The direction of motion of an object should be noted and may be indicated by means of compass bearings,

e.g. 'the object flew NNE to SSW'.

But by far the best method of recording and reporting the movements of a ufo is to use a sketch showing its path amongst the stars. A very useful instrument for recognising and charting the stars is a PHILIPS" PLANISPHERE. This is a map of the entire heavens as seen from the latitude of London (but it can be used successfully anywhere in the British Isles), and it is adjusted to show the night sky and the stars visible at any hour, day or night. Costing about sixe shillings it is the ideal device for the present purpose. Alternatively, the stars may be identified and later drawn with the aid of a booklet, 'STARS

AT A GLANCE' also published by Philips. Using either of these it is possible to draw the path of a ufo relative to the stars. If a copy of NORTON'S STAR ATLAS, published by GALL & INGLIS, is available it is an excellent book for amateurs.

Should the object be seen during the day information should be given about the position of the sun, together with a sketch of the object's flight relative to houses, trees, etc., in the vicinity, showing if the object moved amongst the clouds.

The compass bearings of any unusual features of the object's movement, such as changing colour, breaking up, and so on , and position of the appearance and disappearance should be given as accurately as possible.

Mention should be made of how the object first came to the notice of the observer, and also the manner in which the object finally disappeared, whether by:

i) vanishing

ii) merging with another object

iii) receding into the distance

iv) disappearing behind trees, hills, etc.

v) fading away

vi) breaking up.

iii) Number of objects Except for those rare occasions when hundreds of ufo's are seen, in which case only a rough estimate of the number of objects is required, no specialised technique is called for here, other than the ability to count.

A simple trick which can be used is that of the 'persistence of vision', whereby the observer fixes his gaze upon a group of objects, and then closes his eyes. In most instances it will be found that an image of the scene is retained by the brain and is visible for a few seconds afterwards; during this time the number of objects may be counted with relative ease.

The formation in which the objects move should be noted and sketched as accurately as possible, and any changes in formation, together with the direction of motion of the group, should be indicated thereon.

iv) Duration of flight It is unlikely that there will be any accurate device available for timing the duration of a ufo's flight, and to combat this the observer is recommended to practise counting at one-second intervals, rather than using a watch, for during the sighting this would distract his attention. In the event of a long sighting, however, the use of a watch as a timing device is preferable for reasons of accuracy.

When reporting the duration of a sighting it should be given hours, minutes and seconds, and should be accompanied by some statement as to the estimated accuracy of the timing.

v) Any other features Under this heading comes a variety of miscellaneous effects and observations connected with the object, or possibly connected with the object. By means of these factors it is possible to eliminate any chance of confusion between ufo's and conventional aircraft or natural phenomena.

The following effects should be looked for and noted:

i) disturbance of radio/television reception

ii) displacement of solid objects, stones, leaves, etc.

iii) burning or scorching of the ground

iv) any noise produced by, or accompanying the object

v) any smell coming from the object or from a side-effect

vi) any other magnetic, electrical, thermal or luminous effects.

(b) Shape

Many of the unidentified flying objects reported are described as having definite shapes, such as a domed disc or a cigar or a cylinder, and a greater number have circular or oval shapes, but by far the majority of cases involve 'starlike' objects. This is partly due to the inability of the human eye to distinguish between two objects less than five minutes of arc apart; or to put this another way, if an object's distance is over 1000 times its diameter it will present no detectable shape to the naked eye. The exact values differ for individual observers, and almost invariably the performances of the left and right eyes differ. The resolution, or power to resolve two close objects, also depends upon the size of the aperture through which the light passes; the resolution being greater for smaller apertures.

An experiment to find the resolution of the eyes may be carried out with the aid of two pea-lamps (small torch bulbs) fixed to a stand and separated by a known distance s. With one eye covered the observer moves away from the lapms until, at a distance d, both bulbs appear as one point of light. Measuring s and d in the same units, the resolution r is found by means of the formula:

$$r = s \times \frac{3437.75}{d} \text{ minutes of arc.}$$

If the lamps are viewed through a pin-hole pierced in a card it will be found that the resolution is much greater, that is, for a given value of s the two lamps can be separated at a greater distance d.

From all this we conclude that all those objects which appear as points of light are at a distance greater than one thousand times their diameter, since the eye is unable to resolve the edges of the object. Conversely, all objects which present a definite outline are relatively near compared to their diameter.

If an object does present a discernible shape to the observer, this should be drawn and any special features of marking, colouration or lighting should be indicated.

(c) Size

The relationship between size and distance has already been mentioned, and it will be self evident that the more distant an object is, the smaller it will appear.

If ϕ is the angle subtended at the observer's eye by an object, diameter D, then its distance is given by the formula:

$$\frac{D}{2d} = \tan.\frac{\phi}{2} \qquad \ldots (1)$$

$$D = 2d \tan.\frac{\phi}{2}$$

For cases in which ϕ is less than 14° the tangent of ϕ approximates to the value of ϕ in circular measure (radians), and we may reduce equation (1) to

$$D = 2d.\frac{\phi}{2} = \phi.d \qquad (\phi \text{ in radians})$$

Measuring ϕ in degrees, this becomes

$$D = \frac{\phi.d}{57} \qquad (\phi \text{ in degrees})$$

The dimensions of D will be the same as those of d. Details of how to estimate the angular size of an object are outlined under 2(a)i above. It is also possible to record the object as appearing about the same size as a certain object held at arm's length, e.g. the head of a pin, a named coin, and so on.

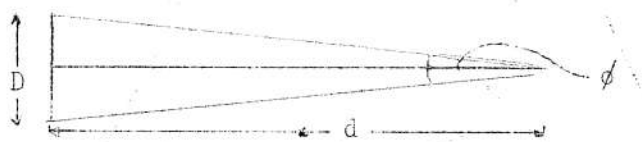

fig.2

(d) Distance

In equation (1) above was given the correlation between size and distance, and since the size of an object cannot be measured directly it follows that we must devise some means of finding its distance.

Unless the object actually lands exact measures of the distance are impossible to obtain. One approximate method of judging the distance is to watch the passage of the object in front of or behind the clouds. It is known that cumulus clouds, for example, are found at heights of about one mile, whilst the wispy cirrus clouds move higher at eight miles. If the angular elevation of an object as it passes the base of a certain cloud is e°, then its distance D is given by:

$$h = D \sin.e \quad \text{or} \quad D = h \operatorname{cosec}.e$$

where h is the height of the cloud

For cumulus clouds h is one mile, and for cirrus clouds h is eight miles, the corresponding formulae are therefore:

Cumulus cloud	distance	= cosec.e miles
Cirrus cloud	distance	= 8 cosec.e miles.

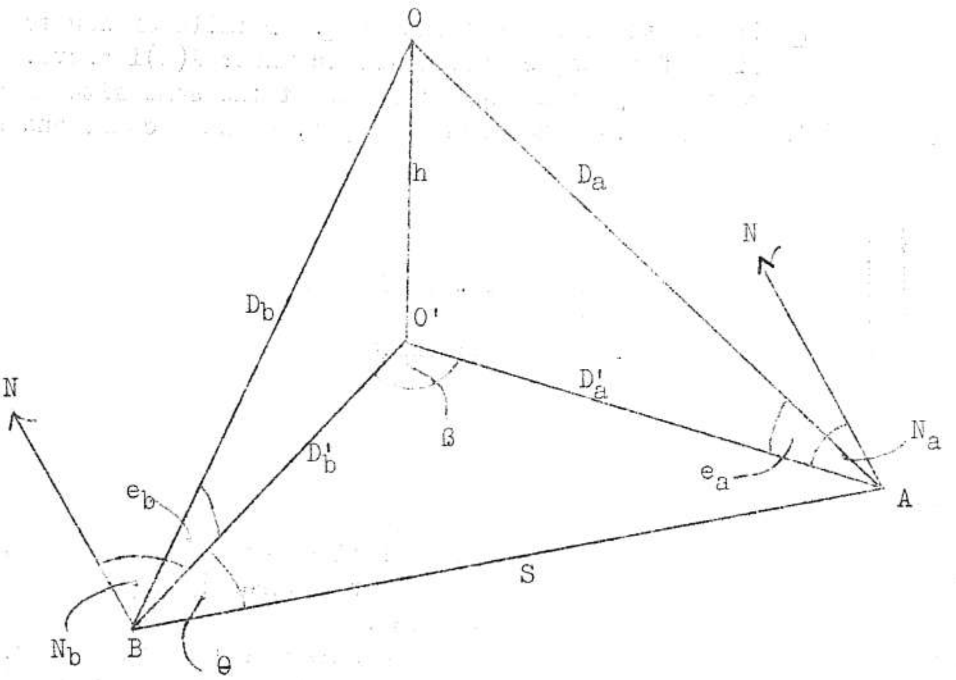

Fig.3

Another accurate, but complex, method involves taking measurements of the position of the object at two or more places simultaneously. For the benefit of the mathematically inclined reader we derive the relevant formulae as follows:

In fig.3 opposite, O is an object seen from two places A and B on the earth's surface, the angular elevation of O being e_a and e_b at the two places respectively.

The lines NA and NB are parallel, N being in the direction of north in both cases. N_a is the angle NAO' and N_b is the angle NBO'.

O' is the point on the earth's surface which lies vertically below the object (subobjective point), and h is the height of the object, OO'.

The angle ß is the angle AO'B, and since NA and NB are parallel

$$AO'B = NAO' + NBO'$$

or

$$ß = N_a + N_b \qquad \ldots (2)$$

The height of the object, h, is given by

$$h = D'_a \tan.e_a = D'_b \tan.e_b \qquad \ldots (3)$$

and the distance of O from A, D_a, is given by

$$D_a = D'_a \sec.e_a \qquad \ldots (4)$$

In the triangle AO'B we can apply the Sine Rule to obtain

$$\frac{D'_a}{\sin.\theta} = \frac{S}{\sin.ß}$$

$$D'_a = \frac{S.\ \sin.\theta}{\sin.ß}$$

Substituting this in (4), and using (2), we get

$$D_a = \frac{S.\ \sin.\theta\ \sec.e_a}{\sin.(N_a + N_b)} \qquad \ldots (5)$$

The angle θ is simply the bearing of A from B minus the bearing of O' from B,

or

$$\theta = A_b - N_b$$

Using this in (5) we get

$$D_a = \frac{S.\ \sin.(A_b - N_b)\ \sec.e_a}{\sin.(N_a + N_b)} \qquad \ldots (6)$$

From the diagram,

$$h = D_a \sin.e_a = D_b \sin.e_b$$

or, rearranging the terms,

$$D_b = D_a \frac{\sin.e_a}{\sin.e_b}$$

Substituting this in (6) we obtain the value for the distance of O from B

$$D_b = \frac{S.\ \sin.(A_b - N_b).\ \tan.e._a}{\sin.(N_a + N_b).\ \sin.e_b} \qquad \ldots (7)$$

The two explicit equations (6) and (7) for D_a and D_b, and for h, are then

$$D_a = \frac{S.\ \sin.(A_b - N_b)\ \sec.e_a}{\sin.(N_a + N_b)}$$

$$D_b = \frac{S.\ \sin.(A_b - N_b)\ \tan.e_a}{\sin.(N_a + N_b)\ \sin.e_b}$$

$$h = \frac{S.\ \sin.(A_b - N_b)\ \tan.e_a}{\sin.(N_a + N_b)}$$

The quantities on the right hand side of these equations are known, either by direct measurment at the time of the sighting, or by readings from a map:

A_b	the bearing of A from B
e_a	the angular altitude of the object O from A
e_b	the angular altitude of the object O from B
N_a	360^o minus the bearing of the object from A
N_b	the bearing of the object from B
S	the linear distance between A and B.

The first and the last of these quantities can be determined from a map after the sighting but the others must be determined at the time of the sighting, and in order to correlate the respective measurements from the two places A and B all such measurements must be accompanied with the exact time at which they were made.

Measuring N and e

N Found by means of a compass or from the position of a ufo relative to some landmark whose bearing can later be determined from a map.

e At places which have a clear view of the horizon (as distinct from the sky line) the elevation e can be found by means of a piece of string held in the hand with one end at the same elevation as the object, and the lowere end in line with the horizon. If s is the length of the string, and L the distance between the eye and the hand (fig.4), the elevation is given by

$$\sin.e = \frac{s}{L}$$

In built-up areas where the horizon is obscured the altitude of the object may be noted relative to some fixed point, e.g. a church spire, whose elevation may be later established.

There is a simple piece of apparatus which may be constructed to find the angular elevation of an object, and which is independent of the horizon. It consists of a piece of wood, such as a ruler, at the centre point of which is attached a protractor and a plumb line, as in fig.5.

The object is viewed along the ruler and the point at which the freely hanging plumb line passes the protractor scale is noted. The elevation e is 90^o minus this reading.

It is unlikely that the observer will be equipped with one of these instruments at the precise moment when he sees a ufo, it is therefore better employed to find the elevation of some landmark as mentioned earlier.

We shall repeat that the values for all readings and measurements connected with ufo's should be accompanied with the exact time at which they were made.

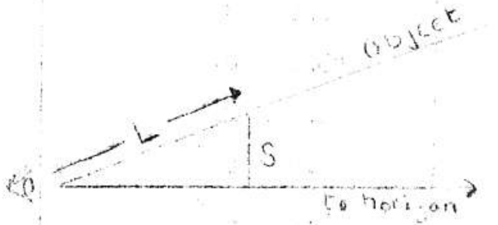

fig.4

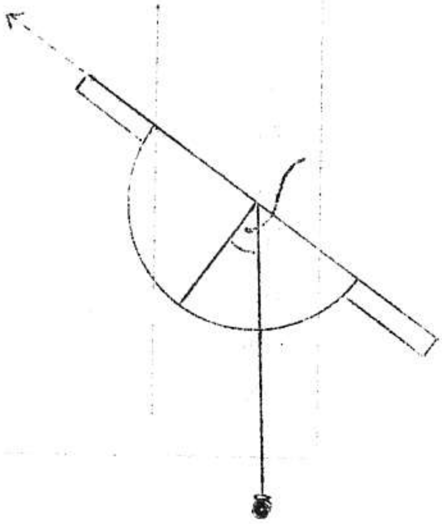

fig.5

TABLE II

Table of range of visibility of an object at a given height

Height	Separation of places	Area of visibility
1/4 mile	90 miles	6.2×10^3 sq.miles
1/2	125	1.2×10^4
1	180	2.5×10^4
2	250	5.0×10^4
3	300	7.5×10^4
4	350	1.0×10^5
5	400	1.2×10^5
6	435	1.5×10^5
7	470	1.7×10^5
8	500	2.0×10^5
9	530	2.2×10^5
10	560	2.5×10^5
15	690	3.7×10^5
20	800	5.0×10^5
25	890	6.2×10^5
30	980	7.5×10^5
35	1050	8.7×10^5
40	1130	1.0×10^6
45	1200	1.1×10^6
50	1260	1.3×10^6
75	1550	1.9×10^6
100	1790	2.5×10^6
200	2550	5.1×10^6
300	3140	7.7×10^6
400	3650	1.0×10^7
500	4100	1.3×10^7

Height of aerial objects

The height of an aerial object, including ufo's, is closely associated with its distance, and it will be clear that the higher an object flies the wider will be the area over which it is visible. Accordingly we give TABLE II opposite for the ranges of visibility of an object at various heights. The table may be used for eliminating various objects. If, for example, it is found that a certain object was at a height of one mile, then we find from TABLE II that the maximum distance between two places at which the object is simultaneously visible is 180 miles, or at a distance of 90 miles from the object; thus if we receive a report that at the same time an object was seen two hundred miles away, then clearly these are two distinct objects.

Separation of places is the maximum distance apart of two places from which the object is simultaneously visible. At the two places of maximum separation the object would appear to lie on the horizon, and the subobjective point (the point on the earth's surface vertically below the object) will lie on the great circle passing through the two places, and midway between them. Also the maximum distance of the object when it can be seen at the respective height is half of this figure as shown above.

Area of visibility is a circular area, with centre at the subobjective point, over which the object is visible. The term 'visible' here meaning 'above the true horizon'; since the true horizon and the physical horizon (sky line) only coincide in perfectly flat country or at sea these figures will vary slightly for hilly regions.

(e) Colour

The colour of an object is probably its only intrinsic feature, that is, it does not change with the position of the observer as do the apparent size, shape, brightness etc.

Little need be said about how the colour should be reported, except to point out that the use of paints and crayons as an aid is not recommended since exact shades are difficult to obtain. A much better way is to draw the object and indicate the colouring, and any variation, as in fig.6:

A metallic grey

B light blue

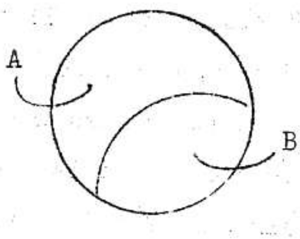

fig. 6

In addition to variations of colour upon the surface of a ufo, notes should be made of colour changes during its flight, and whether any coloured material, smoke, flame were ejected during the course of the sighting.

Practically every colour has been described in the volume of reports received in recent years, ranging from dark reds and oranges, through greens and blues to all shades of grey.

TABLE III

Table of Bright Stars visible in the Northern Hemisphere

Star	Magnitude	Remarks
Sirius	-1.58	brightest star in the sky
Vega	0.14	
Capella	0.21	
Arcturus	0.24	
Rigel	0.34	
Procyon	0.48	
Altair	0.89	
Betelgeuse	0.92	giant variable red star
Aldebaran	1.06	giant red star
Pollux	1.21	
Spica	1.21	
Antares	1.22	giant red star
Fomalhaut	1.29	always low in the South
Deneb	1.33	
Regulus	1.34	

One fact should be borne in mind when talking about stellar magnitudes, and that is that the magnitude of a star refers to its brightness and not to its size. The small the value for the magnitude of a star, the brighter that star appears; some stars, Sirius for example, are so bright that they have magnitudes less than zero. The sun has an apparent magnitude of -26.7, this is because it is relatively near to us in space. The term absolute magnitude is used in astronomy and is the value for the apparent magnitude of the particular star if it were viewed at a distance of 192 billion miles.

(f) Brightness

The reader will realise that the apparent brightness of an object depends upon its distance, being <u>inversely proportional to the square of the distance</u>. This means that if an object is viewed at a given distance and then again at twice that distance, then the brightness of the object will appear to have diminished to one quarter its former value. We can express this by the equation:

$$\frac{b_1}{b_2} = \frac{d_2^2}{d_1^2}$$

where b_1, b_2 and d_1, d_2 are the brightness and distance respectively at the positions 1 and 2.

Unless the observer is trained in estimating the brightness of objects, as would be a variable-star observer, exact measures of a ufo's brightness are best achieved by comparing it to one of the following:

i) the brightness of an electric light bulb at a given distance, e.g. "like a 100 watt bulb at 50 yards"

ii) the brightness of a particular star whose magnitude can be determined afterwards, either from TABLE III opposite, or from a star atlas.

Method (i) is the better system where the object presents a definite outline and form.

There are other quite complex methods to estimate the apparent magnitude (brightness) of variable stars. One such is the <u>step method</u>: this involves dividing the magnitude difference between two stars, one fainter and one brighter than the star or object under study, into a number of equal steps. The magnitude V of the variable star is then quoted as, for example:

A 2 V 3 B.

This indicates that the variable star is two steps fainter than A, and three steps brighter than B. If the magnitudes of A and B, as found from a star atlas, were 2.7 and 4.2, then the magnitude V would be given by

$$V = 2.7 + \frac{(4.2 - 2.7)}{2 + 3} \times 2 = 3.3$$

or

$$V = 4.2 - \frac{(4.2 - 2.7)}{2 + 3} \times 2 = 3.3$$

one <u>step</u> being equivalent to 0.3 magnitude.

Although this and other similar methods are excellent for their purpose, it is felt that the amount of practice required for their successful usage is not justified by the accuracy for which the present work calls, and the above description is given for reference only.

The step method and method (ii) above are only applicable if the ufo is quite small and starlike in appearance.

The human eye is not equally sensitive to all colours, a blue light will appear brighter than a red light of the same intensity. Thus, the colour of an object should always be stated when an estimate of the brightness is reported.

Under the heading 'Brightness' we may perhaps include the description of the luminous nature of the object; whether it was visible by self-luminosity or by reflecting the light of the sun/moon. The various appearances which the object may assume are pointed out in the list below:

i) self luminous

ii) reflecting sun/moon light

iii) transparent

iv) clearly defined shape

v) blurred shape

vi) dull surface

vii) brightly reflecting surface.

The Beaufort Scale of Wind Force

In addition to the direction of the wind at the time of a sighting the force of the wind is extremely useful in eliminating possibility of mistaken identity of balloons, kites, leaves etc., all of which are moved by the wind. The direction of the wind can be indicated by the use of compass bearings;

e.g. the wind was blowing from NNE
and was force 4.

The force of the winds is given in the following table

TABLE V

0	Calm	smoke rises vertically	less than 1
1	Light air	wind direction shown by smoke drift, not by vanes	1 - 3
2	Slight breeze	wind felt on face, leaves rustle	4 - 7
3	Gentle breeze	leaves and small twigs in constant motion	8 - 12
4	Moderate breeze	raises dust and loose paper	13 - 18
5	Fresh breeze	small trees sway	19 - 24
6	Strong breeze	telegraph wires whistle	25 - 31
7	Moderate gale	whole trees in motion	32 - 38
8	Fresh gale	impedes progress, twigs broken off trees	39 - 46
9	Strong gale	chimney pots blown off	47 - 54
10	Whole gale	trees uprooted	55 - 63

The force of the wind is given in the first column and the official description appears in the second column. The various criteria by which each wind force can be recognised appears in the third column; finally the wind speed, in miles per hour is given.

3. Meteorological Conditions

Although not necessarily connected directly with ufo-research it would be useful to have details of the weather at the time of a sighting.

The weather conditions may be given in the form of a short description of the sky, seeing conditions, and other information which would help to convey a picture of the situation and of the visibility of the object. Alternatively, they might be given in terms of the abridged Beaufort's Codes given opposite and below.

In addition to those eventualities provided for in the tables any unusual meteorological phenomena observed at the time should be described. Rare occurrences such as haloes around the sun or moon, sun- or moon-dogs, etc., should be mentioned, as also should any unusual cloud formations with details of their shape, size, colour, direction of movement, speed and so on. Such information will be of much use in eliminating sightings which may be attributable to these phenomena.

TABLE IV

Beaufort Weather Codes

b	blue sky, cloudless or not more than one quarter covered
bc	combination of blue sky and detached clouds
c	cloudy sky, but with some openings between the clouds
o	sky completely overcast
d	drizzle
f	fog
g	gloom
h	hail
l	lightning
m	mist
p	passing showers
r	continuous rain
s	snow
t	thunder
v	unusual visibility
z	dust haze

If an estimate of the air temperature at the time is possible this should be quoted

4. Personal details about the observer

Finally we come to the personal details which are almost as important as the facts about the sighting. These should include:

i) Name

ii) Address

iii) Telephone number

iv) Age

v) Sex

vi) Occupation

vii) Visual defects

viii) Educational background.

Mention should be made of any specialised training which might increase the accuracy of the estimates, such as R.A.F., or similar qualifications.

In (vii) should be stated if the observer suffers from any eye defects, colour blindness, short- or long-sight, etc., and if he wears spectacles it should be reported of what type these are, and whether he was actually wearing them at the time of the sighting.

The names and addresses of any other witnesses should be included in the final report, and if possible individual written reports should be submitted by each witness.

There is one important note to be added to those given above:

never omit ANY information which might be at all relevant to the report,

even negative results may be of importance!

Compiling and submitting the report

Let us suppose that the reader has seen an unusual object in the sky, and, after following the foregoing instructions on how and what to observe, has a list of various details about the object, preferably in written form. What should he do next?

He may feel disposed to notify the Police and/or the newspapers, this is up to himself, but what we do want him to do is to write a report of the sighting and send it to a ufo-research organisation as soon as possible.

A good way to prepare the report is to get a sheet of paper and head it with the name and address and telephone number of the witness, giving any details which will help in contacting him later. Then all the information possible should be given about the sighting in the form of a narrative describing the event. There is no great need for grammatical perfection, but it is better that the facts should be reported in a clear, unambiguous form. All measurements should be identified beyond all doubt.

As much detail as possible should be given, and it must be left to the research organisations to sift the report and extract the material useful for their work. Better too much, than too little!

Finally the report should be signed by the witness, giving the date of the signature, and forwarded without delay to:

G. N. P. STEPHENSON Esq.,
(Sighting Report)
12 DORSET ROAD
C H E A M
S u t t o n
S u r r e y

or to the local ufo-research organisation responsible for investigating sighting reports in your area.

<u>Subjects for questions to be asked of persons claiming to have seen a ufo</u>

Witness: Name

Address, telephone number

Age, sex

Occupation, any special training in observing

Visual defects

Sightings: Date; time

Place, with a sketch if possible

Location, indoors, in a car - speed, direction

Meteorological Conditions

Object(s): Shape, with a sketch if possible

Size, like a ... at arm's length

Colour

Brightness

Number of objects, formation

Speed

Direction, direction of motion

Height (angular)

Distance, compared with trees, hills, clouds, etc.

Othereeffects: Noise

Heat

Smell

Disturbance of radio/t.v. reception

Displacement of solid objects, leaves, stones, etc.

Psychological or physiological effects felt by witness

Other electrical, magnetic, thermal or luminous effects

Any other eye witnesses: Names and addresses

By suitably repeating his questions in a varied form the investigator should be able to obtain some impression of the good faith of the witness

Interviewing eye witnesses

Investigating reports of ufo's and associated phenomena

The manner in which an eye witness is approached to give an interview, whether by letter, telephone or personal call from the investigator, depends upon the particular circumstances. If the witness is forewarned there is a danger that he may prepare and fabricate his account, whereas if the investigator visits him unannounced there is a better chance of more truthful answers. On the other hand, the witness may feel under a strain if he is surprised by the investigator and his statement may be adversely affected, or he may even refuse to say anything.

The questioning should be carried out in an informal manner, particularly where children and old people are involved, and every attempt should be made to avoid causing the witness any discomfort or embarassment, and to avoid his losing his temper or failing to co-operate.

The information to be asked of the witness is tabulated opposite, and this should be used to guide the lines along which the interview is run. It will be seen that the arrangement of the topics is rather different to that employed in the earlier part of the booklet. It is felt that this arrangement will appear more logical to the witness and will help him to reconstruct his story.

It is assumed that the investigator is fully conversant with the instructions given in the earlier part of the booklet, and that he will know the form in which the various facts are to be reported.

The witness's answers should be recorded in ink and completed with a descriptive account of the sighting which should then be signed by the witness as being a true account of the sighting on a given date, and the date of the signature should be given and witnessed by the investigator.

If it is more convenient, the narrative account may be tape recorded.

Character of the eye witness

This is a most important factor in deciding whether or not the sighting is a hoax, and a short statement as to the honesty of the witness, as felt by the interviewer, should be written at the end of the report.

UFO's and associated phenomena

Together with reports of sightings of ufo's themselves there are often reports of other phenomena which have certain characteristics leading us to suspect that they are in some way connected with ufo's. The most noteworthy amongst these are:

i) craters, holes and other marks on the ground

ii) angels' hair falling from the skies

iii) alleged 'contact' with inhabitants from 'flying saucers'

iv) disappearance of aircraft

and it is to these which we shall turn here.

i) Craters, holes and other marks on the ground

This category may be further subdivided

a) craters and holes in the ground

b) tracks and marks centred on the craters

c) damaged vegetation in the vicinity of the craters

d) burn or scorch marks on the ground and buildings

All these should be investigated in the same general manner, having first obtained permission from the landowner to go near the scene and carry out any investigations.

Photographs should be taken of the area and the marks from several directions. Drawings should be made to show any features or points which may not be apparent on the photographs.

Measurements of the dimensions of the disturbance should be taken, including length, depth, breadth, and these may be related to the disturbance by means of diagrams and sketches.

Position and alignment of the marks are best indicated on a map, an Ordnance Survey map is best for this purpose. Alternatively, a sketch of the district could be drawn showing the marks.

Samples of soil and other ofreign matter should be taken and stored in small airtight jars or bottles, labelled with the place and the depth below the surface at which they were found. These samples should later be examined and compared with samples taken from the same district but away from the markings to detect any unusual material.

A short description of the scene should be made in the report and this, together with details of the damage caused, might accompany eye witness accounts of any related phenomena, such as noises, lights in the sky, and so on, which were noticed at the time when the marks first appeared.

No doubt, if the holes are notable enough the press and the Army Bomb Disposal Unit will appear on the scene, and because of the real need for this latter group it is wise that the investigator should exercise caution when working on or near such sites, since unexploded bombs are not the ideal toy!

Specimens of soil and other objects found deeper in the earth will be brought up by the bomb disposal unit, and any foreign matter in this should be noted by the investigator.

The form of the final report will simply give the above information, interviews, etc., and might include the possible solution of the cause of the disturbance e.g. meteorite, unexploded bomb, or cause unknown!

ii) Angels' Hair falling from the skies

This unusual material is often found in direct connection with ufo's, having been seen to fall to the ground after displays of cylindrical and other types of ufo's. It is usually described as looking like a fibrous substance, and as it drifts down festoons telegraph poles, trees etc. On closer examination it looks gelatinous and is said to vaporise rapidly.

If an observer is fortunate enough to witness the fall of some of this substance he should try to collect a sample and, if possible, store it in an airtight jar. If the Angels' Hair evaporates under such conditions he should not open the jar, but take it to an analyst and have it investigated. The reactions of the material, how it vaporises, how it reacts with water, and so on, should all be studied and noted. There is one theory that Angels' Hair is a type of fuel which for some reason has been jettisoned, and for this reason it should be observed whether the substance is inflammable.

Although not connected with Angles' Hair we might mention here another substance which has been seen to fall from the skies on several occasions - ice! Blocks of ice varying in sise from lumps several feet long to pieces as big as a fist are occasionally reported in the newspapers. Attempts to explain them away invariably call for the presence of aircraft at the time, and only rarely is this so. We shall not theorise on their origin, but simply ask the investigator of such incidents to collect the facts, and a sample of the ice for analysis if he is able.

iii) Alleged 'contact' with inhabitants from 'flying saucers'

Again we shall make no attempt to assess the authenticity of these claims, but we ask the interviewer to obtain as much information as he can about the contact, about the 'people' who were met, about their space craft, and any other information which relates to the incident.

It is possibly here more than elsewhere that the character of the witness is important (see above p.19).

iv) Disappearance of aircraft

In this category there is possibly least scope for the amateur worker, all relevant information being obtainable by the Air Forces, and because of the nature this is trated secretly.

Of the many cases which have come to thenotice of the public, that of Capt. Thomas Mantell is surely the most notable and need not be repeated here. Such cases of disappearance of aircraft haveoften been detected on radar screens when the 'blip' produced by the aircraft has been approached and seen to coalesce with that of an unidentified object.

Let us hope that the investigator never has occasion to be called upon to look into cases of this type, for in almost every instance there has been loss of life. However, a report of one of these incidents should, as with all reports, give as much factual information as possible with little or no guesswork as to the cause.

ORGANISED SIGHTING EXPEDITIONS

During recent years there has been much ineterest aroused in, and by, organised parties setting out with the sole aim of observing and reporting unidentified flying objects. In view of these activities this final section is devoted to a few hints which may help and guide anyone considering such a venture.

The information to be reported by such groups is exactly the same as that deatiled above, but the fact that the sightings are anticipated increases the accuracy and volume of information which can be obtained. Several parties simultaneously stationed at various parts of the country should produce some fairly reliable quantitative records for ufo-research.

The notes given here will be grouped under the following headings:

1. Organisation
2. When
3. Where
4. How.

The cynic may like to add Why to these, but this booklet is not written for him.

After reading these it is hoped that the reader may feel disposed to try to organise a sighting expedition for himself - and others, of course!

1. Organisation

The first step in the organisation of a sighting expedition is to elect a director, who, whilst participating in the work done by the group, shall be responsible for preparing for the expedition, coordinating the work, and also for collating the reports and assembling them into a final summary. He should have authority over the others, but in this almost entirely amateur field of research his control is unlikely to be forcible.

A director elected, the group should decide how they can best utilise the facilities at their disposal (see 4. below) and delegate duties accordingly.

In 3. below the choice of a site for the excursion will be discussed, and the outcome of this will affects many points of organisation. If it is decided to set up camp at an isolated place, the director will have to arrange for transportation of members and equipment to and from the location. This should present very little difficulty if members posses cars and will assist with this problem.

Accommodation at the site is again dependant upon where and when the group chooses to set up operations. A tent or some form of windbreak may be advisable to protect those engaged on observations (a suitably supported clothes-horse draped with a cloth would serve), whilst those not observing (if a shift system is employed) might sit in the cars.

The ladies of the group may be imposed upon to supply the food and drinks for the members, although everyone will contribute towards the cost of this. Vacuum flasks will probably be used to carry liquids, soups, coffee, tea and the like. Food may be taken in the form of soups, biscuits, fruit, chocolate and the inevitable sandwich.

Exactly how the members are amused during the watch depends upon their individual tastés, and no doubt the ubiquitous transistor radio will feature strongly amongst these. Thoseewho do use a portable radio will find that the continental radio stations, particularly Radio Luxembourg, provide programmes of music during the small hours of the morning. Care should be taken to see that radio sets, and the activities as a whole, do not disturb any nearby householders. A pack of cards might also be taken, although this is liable to take the mind off the matter in hand, distracting the attention away from the sky.

It should be arranged for at least two people to be continually on watch.

2. <u>When</u>

The chief difficulty with such activities is found in the choice of a date on which to carry them out. Because of the very nature of the objects involved it is unlikely that one can ever choose a night and say that there will definitely be a sighting at a given place. Thus, we come to one of the major requirements of anyone taking part in a sighting expedition - hope! But apart from this the following may be of some guidance in the selection of a date:

i) Do not plan for a date too far ahead. The British weather is prone to rapid and severe changes. Previous experience of local weather changes is of some, but not too much, assistance.

ii) Choose a date when all involved are on holiday, weekends for example, otherwise the night may be spoilt by the thought of having to get up for work after the expedition.

iii) It is not imperative that an expedition should operate at night, and a daytime watch would be very useful, but it is after dark that objects in the sky are most easily detected, and for this reason it would perhaps be wiser to select a date during the long winter nights, for during the summer months there are very few, if any, hours of complete darkness.

iv) Avoid nights on which there is any great meteor activity. Although this will undoubtably add to the enjoyment of the proceedings it will also increase the possibility of confusion between ufo's and natural phenomena.

Meteors, like ufo's, are unpredictable to some extent, and it is difficult to say that on any particular night there will be no meteors. Indeed, it is estimated that on average about eight meteors per hour can be seen by one naked-eye observer. However, there are dates on which meteor activity is at a maximum, and on these dates <u>meteor streams</u> are responsible for the displays which are to be seen on about the same dates every year, see TABLE VI below

TABLE VI

Name		Max$^{\underline{m}}$	H.R.
Quadrantids		Jan 3	28
Lyrids		Apr 21	10
Eta Taurids		May 4	12
Arietids	*	Jun 7	50
Zeta Taurids	*	Jun 7	40
Beta Taurids	*	Jul 1	24
Delta Aquarids		Jul 28	20
Alpha Piscid Australids		Jul 29	26
Perseids		Aug 12	56
Giacobinids		Oct 9	14
Orionids		Oct 20	20
Taurids		Nov 7	10
Leonids		Nov 15	20
Andromedids		Nov 23	10
Geminids		Dec 12	30
Ursids		Dec 222	10

Name: the name given to a meteor stream is derived from the area of the sky from which the meteors seem to emanate. Thus, the LYRIDS appear to come from the direction of the constellation LYRA.

Max$^{\underline{m}}$: this figure indicates the date on which the activity of the particular stream reaches its maximum. Activity is usually increased on a few nights either side of this date.

H.R.: this gives an approximate value for the hourly rate of the stream at maximum, and is the figure for the number of meteors per hour which a single observer may expect to see at that time.

The three displays marked * are daytime streams which have their maximum during the day, otherwise the period of maximum activity occurs between midnight and dawn.

3. Where

The recent results produced by Aimé Michel and his theory of Orthoteny might prove quite useful in the selection of a location for a sighting expedition. A particularly active area has been shown to lie along a band a few miles wide on either side of a line from Southend-on-Sea, Essex to the Sound of Barra, Outer Hebrides. This may give some suggestions for places at which to expect ufo's, but of course they can be seen and have been seen from all parts of the country, so people living some distance from this line should not feel too cut off. It is extremely doubtful that there can be any areas of the world from which ufo's have not been seen.

The actual site at which the expedition operates depends upon several factors, but all groups would be well advised to move away from the bright lights, neon signs and other hallmarks of the towns and cities, and set up camp in the country where the occasional gas lamp is the only intruder upon the darkness. Although this may not always be practicable it should be held as an ideal when looking for a location.

Activity of unidentified flying objects has often been reported near industrial regions and airfields, and this may indicate possible grounds for the location of an expedition.

Only by correlating from all parts of these islands, and eventually the whole world, can we collect sufficient material for such theories as that of Aimé Michel, and every report whether it be collected by a sighting expedition in Bristol, or by a casual observer in Timbuctoo will be of some use if it gives the details in a clear, concise and true form.

4. How

A good way to decide how best the group can tackle the various details to be included in their report is to read through the following list, in which all the information from the earlier part of the booklet is summarised, and jot down notes on how the facilities at the group's disposal can be employed with most success in each case. Most of these points have been treated fully above and the numbers in brackets indicate the relevant page, but any special notes which may be applicable to a group expedition have been added.

Radar (1) it is unlikely that this will be used by amateur groups

Photography (1) cine camera: use as mentioned, if possible with an all-sky mirror. A good plan would be to expose one frame every quarter-hour to record the sky conditions (remember to allow a time exposure in most instances), and to run the film continuously when there is any ufo activity.

Visual (2) with binoculars, telescopes etc. Unless the optical instruments are specially adapted for night use it may be found that the images of stars and other small bodies are distorted or surrounded by concentric rings of light. Remember to state power of lenses, magnification and so on in the report.

Date (4) essential to the report.

Time (4) essential. It is a good plan to check all watches before and after the expedition.

Place (5) plot the location on a map, indicating any landmarks, churches etc., which can be seen from the site, this will be useful for determining the direction of an object. All six points mentioned in the article should be noted.

Behaviour of the object(s) (6)

speed (6)

direction (6) best determined by means of landmark, see note on 'place' above. Star maps are handy for indicating the direction.

number of objects (7) draw the formation

duration (7) a stopwatch is useful

other features (7).

Shape (8) small sketch blocks are convenient.

Size (8)

Distance (9) results of this work should be extremely interesting. Two or more groups must be set up to enable these measures to be used to find the distance, height. This could be achieved by two parties of the same group stationed at places separated by at least fifteen miles, but anything up to fifty miles apart would be advisable. An alternative is for two separate groups or societies to set up parties at the various places. The more parties there are the more accurate will be the results.

It is worthwhile to construct the inexpensive instrument shown in fig.5 (page 12). Only N and e need be measured at the time of the sighting. It may be useful for two people to be specially versed in the measuring of these two quantities. Remember to record the exact time at which any measurements are taken.

Brightness (14) star map would again be useful for finding the brightnesses of stars.

Meteorological Conditions (16)

Personal details (17).

A good plan is to keep a log book for the expedition and enter details of anything and everything seen in the sky, including meteors, aurorae, aircraft, satellites, even notes about the moon and planets, giving the times at which they were observed. This would be helpful in clearing up any doubtful reports coming from other sources and other parties stationed at other sites. Weather details, clouds, haloes round the moon, etc. might also be recorded here. A portable tape recorder would be ideal for recording a commentary on any activity, when time for writing would be at a premium, and could be transcribed later.