INTRODUCTION

A map is a representation of the whole or a part of the Earth's surface. It is not a picture, since it does not show objects in perspective, but in proportionate size, and because it represents its area in plan. The reasons for these differences are obvious. Perspective emphasises near objects at the expense of more distant ones, while in side views, as in pictures, elevated objects hide from the eye whatever lies behind them. The fact that objects are shown in plan must be borne in mind, for by it all distances which are not perfectly horizontal are more or less foreshortened and consequently all areas not in a horizontal plane are shown in some degree smaller than they really are (see Fig. 1).

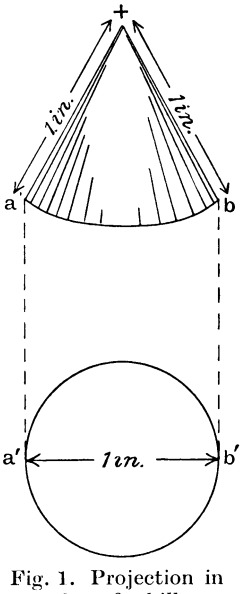

Fig. 1. Projection in plan of a hill.

Not only does the map show the ground from this unusual point of view, but it also shows the whole subject in reduced size. It is evident that but for this reduction, the map would have to be as big as the area represented. Hence, to show the area on a sheet of reasonable size, every part of it must be proportionately reduced. In some cases this procedure would reduce objects to an invisible point; so, in order that they may be seen, they are represented by signs large enough to be noticed (see below, sect. 5).

These characteristics make a map a conventional drawing and its interpretation an art. The skilful map reader is able to form from careful study of the map a good idea of the appearance of the country. But, to become skilful, constant practice with the map is necessary, and the imagination must be brought into play.

There are various kinds of maps, all intended for special purposes. The kind with which it is proposed to deal here is the topographical map, that is, one which shows minor features of the land relief. The chief topographical map of the British Isles is the one-inch map of the Ordnance Survey, on the Popular Edition of which the treatment in these pages will be based.

This map is produced by the Ordnance Survey, a department set up by the British Government in 1791 to compile a map of Great Britain. In the early maps relief was not shown, but after 1860 hill features were represented by various devices which will be dealt with later. The mapping of the country has long since been completed, but the results are constantly being revised and brought up to date. Generally speaking, the one-inch map is revised every 15 years, various areas being dealt with successively. But corrections, such as the insertion of new roads and railways, are made more frequently.

For convenience' sake the map is issued in numbered sheets, there being one series for Scotland and another for England and Wales. There are 92 sheets in the former series and 146 in the latter. An index on the cover or in the margin of each sheet shows the numbers of adjacent sheets.

CHAPTER I

PRELIMINARY

1. The Margin and the Frame of the Map

The Margin. On looking at a sheet of the Ordnance Survey one-inch Popular map, one sees a wide margin surrounding it. In this margin will be found:

(i) An index of the adjacent sheets,
(ii) the date up to which the sheet has been revised and corrected,
(iii) the direction of True and Magnetic North,
(iv) a scale of distances, and
(v) the height of the vertical interval.

The purpose of the first of these notes is obvious and has been referred to already. The importance of the date of last revision and correction is apt to be overlooked, however, unless it is realised that certain features, e.g. woods, buildings, etc., vary with time, and that therefore the older the map the less likely it is to be accurate in these matters. The meaning and use of the other three notes will be explained later in the proper place.

The Frame. Inside the margin is printed a narrow frame in which are shown:

(i) The latitude and longitude,
(ii) parts of place names which overflow from one sheet to another,
(iii) the destination of roads leading off the sheet, and
(iv) certain letters and figures which will be explained in the next section.

The indication of latitude and longitude is of little importance to the topographical reader, but the completion of place names and the note on the destination of roads are an obvious convenience.

2. The Squares

Turning to the map itself, one notices that it is covered with a network of lines dividing the surface into squares. As each pair of parallel lines is separated by an interval of two inches, the length of each side of the squares is two inches. Hence, each square represents an area of four square miles. Each space between lines running east and west is indicated by a letter (shown in the map frame), the topmost space being A, the next below B, and so on. Similarly, the spaces between north-and-south lines are indicated by numbers, the left-hand space being 1, the next on its right being 2, and so on.

These squares have three important uses: the indication of position, the judging and indication of direction, and the judging of distance.

Indication of Position. When the position of a place is to be communicated to a person or group of persons, as, for instance, a class or an assembly of officers, by another person who cannot indicate the point in question by a touch of the finger, the latter need only name the square in which the feature occurs and the feature itself. This narrows down the field of search. Thus, to find *X*, situated in square H7, as only one square occurs in both space H and space 7, *X* must lie in that square. Once the square is found the feature can usually be located.

Sometimes, however, the feature is not prominent, has no name, or is one of several similar features on the same square. In such cases, the position of the feature can be indicated in one of the following ways:

(i) By naming a point of reference which is easily found and then by stating the direction of the feature from that point. E.g. 'H7; find the village of *X*. Due east is a windmill'.

(ii) By using the letters in prominent place names in the following way: 'H10; find the corner of the wood just south of the h in Northolt'.

(iii) By using a system of coordinates, in which the sides of the square named are imagined to be divided into ten equal parts, as in Fig. 2. The south-western corner of the square is taken as zero and the divisions numbered consecutively from one to nine. To describe the position of a point *P*, the eastward divisions are reckoned first, and then the northward. The position of *P* is then described as G2—34 (read as 'G two—three four', since the figures have no numerical significance). This is naturally the most accurate method.[1]

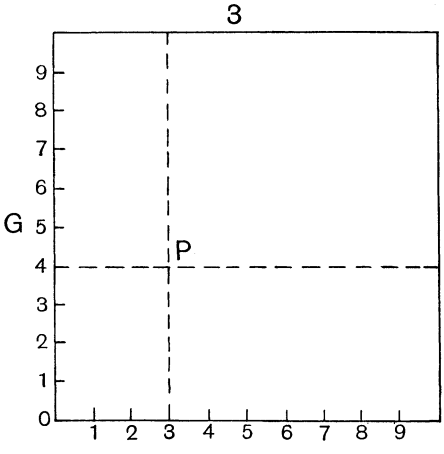

Fig. 2. Use of map squares.

Judging and Indication of Direction. As the square lines run due north and south, or due east and west, their presence assists the eye in judging direction, whether in observing or in indicating the position of places.

Judging Distance. Since the square lines are all two inches apart, they help the eye to judge the distance from one point to another.

Exercises on Map References

(*References are to* Map III)

1. Square A2, find Wendover, Upper Icknield Way.
2. Square B2; find Smalldean Farm. To the west is an inn.
3. Square B2; find the point on the main road at the first n in Little London.
4. Find the following points: B2—23; C3—64; A2—33; A2—39.

[1] The military grid system secures even greater accuracy. It is described on p. 97.

5. Using each method in turn, describe the positions of Great Missenden, Lee, and Little Hampden.

6. Using a suitable method, describe the positions of Dunsmore, Scrubs, Moat Farm.

7. In what way is Question 6 a practical illustration of the use of map squares for the indication of position?

3. Bearings

There are many ways of indicating the direction of a point from a known position, but the method commonly used by map readers is to give an angular measurement known as a bearing. The nature of a bearing and the method of measuring it will best be understood from a diagram. In Fig. 3 let *P* be the point of reference. With *P* as centre and any convenient radius, describe a circle. Draw the radius *PN*. Imagine the circle to be graduated like a protractor, with the degrees numbered in a clockwise direction from *PN* right round the circle. Now, a straight line joining *P* and any point *A* cuts the graduations at (say) *C*. The angle *NPA*, whose measurement in degrees may be read at *C*, is the bearing of *A* from *P*. Mark *P* and *A* on the figure, draw the straight line *PA*, and measure the angle *NPA*.

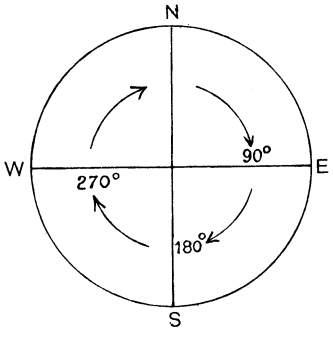

Fig. 3. Measurement of bearings.

N, it should be noted, is north of *P*, and *PN* is a north-and-south line. Hence, a bearing is an angular measurement from the north taken in a clockwise direction.

Exercises

1. Take a point *P* on a north-and-south line *PN*. Assuming *N* to be north of *P*, draw straight lines from *P* showing the direction of places with bearings of 25°, 32°, 108°, 143°, 289°, 330°, respectively from *P*. (N.B. This process is known as *laying off a bearing*.)

2. Let *PN* be a north-and-south line with *P* south of *N*. Lay off bearings of 90°, 180°, 270°, respectively from *P*. What names are commonly given to these directions?

3. In the accompanying figure, find the bearings of *A*, *B*, *C*, *D*, and *E* from *P*.

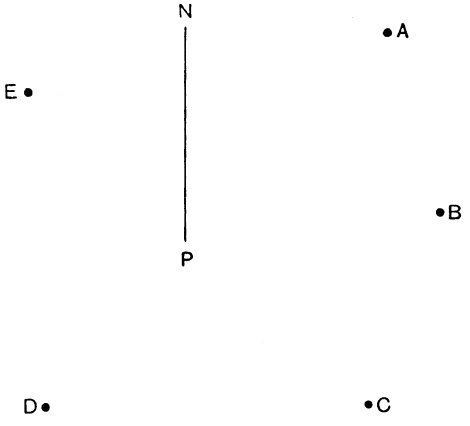

Fig. 4. Exercise on finding bearings.

In taking bearings off a map there is the practical difficulty that there is no north-and-south line drawn through the point of reference. For rough purposes the north may be guessed, but for accurate work a north-and-south line is necessary. Here it may be noted that the lines of the map squares run north and south or east and west. Consequently, a north-and-south line may be drawn through the point of reference by making the line parallel to the nearest north-and-south line of the network.

But the best method is to join the point of reference and the objective by a straight line and produce this, if necessary, to cut a north-and-south square-line, as in Fig. 5. Thus, to find the bearing of *A* from *P*: *SL* is the square-line and *AZ* the production of *PA*, cutting *SL* at *C*. Then the angle *SCZ* is the required bearing.

This may be proved geometrically by drawing through *P* a straight line *NR* parallel to *SL*. Since *NR* and *SL* are parallel and

PZ is a straight line cutting them, $\angle NPZ = \angle SCZ$. And since $\angle NPZ$ is the bearing of ***A*** from ***P***, $\angle SCZ$ also gives the required bearing.

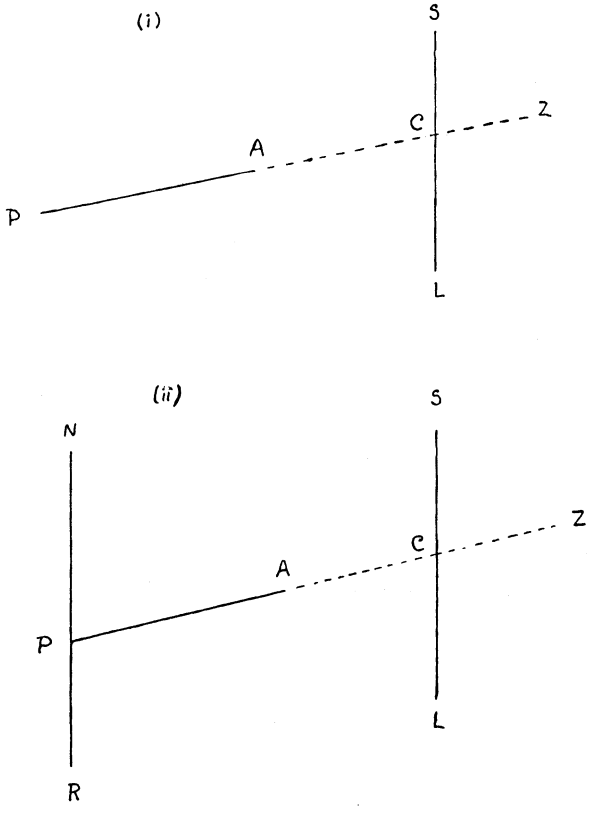

Fig. 5. Measurement of a bearing from map squares.

Once the principle is understood, it will be possible to work from the east-and-west square-lines as well as from the north-and-south.

Map I. Exercises on bearings.

Exercises on Map I

1. From *B* find the bearings of *G*, *A*, *E*, *D*.
2. Find the bearing of *B* from *G*, *A*, *E*, *D*.
3. Find the bearings of *G*, *B*, *C* from *P*.
4. Find the bearing of *P* from *G*, *B*, *C*.
5. Through *D* draw a straight line running due east and west and with its help find the bearing of *R*.
6. The bearing of *P* from *A* is 61°. Join *AP* and with the help of this line draw a north-and-south line through *A*.
7. The bearing of *TB* is 113°. Join *TB* and with the help of this line draw a north-and-south line through *T* and one through *B*.

4. Measurement of Distance

The shortest distance between any two points on a map can easily be measured with a ruler. The actual distance on the ground may

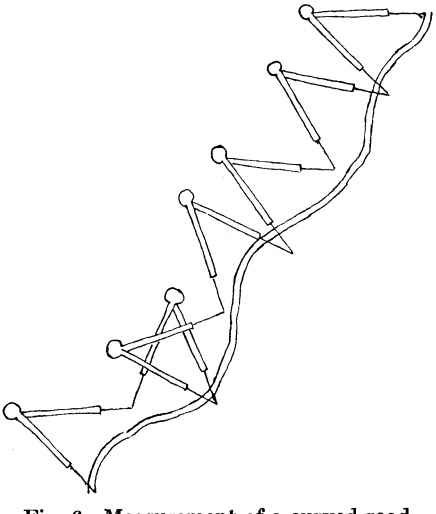

Fig. 6. Measurement of a curved road.

then be calculated. By the scale, 1 in. on the map represents 1 mile on the ground; hence, 3 in. on the map represent 3 miles; 4·5 in. on the map represent $4\frac{1}{2}$ miles, and so on.