

THE USE OF THE NEW GRID ON ORDNANCE SURVEY
MAPS: *A discussion at the Afternoon Meeting of the Society on 10 April*
1933, opened by

BRIGADIER H. STJ. L. WINTERBOTHAM

IN March of 1924 three of us met in prophetic vein to give you our views as to the choice of a grid for our national small-scale maps. The three statements are interesting and the discussion is one which well repays reading. We started with one or two premises. The grid was to be suitable for all national purposes, scientific and social, civil and military. It was to be kept properly in its place, and not to interfere with the convenience of the public or with the high standard of our national cartography. Lastly, it was to be founded on national units of length.

We are met again to discuss how this grid should be used by the man in the street, for it is now an accomplished fact, and appears on many of our small-scale maps. It is superimposed as revisions are completed, and in ten to twelve years' time it will be on every small-scale map of the Ordnance Survey.

A discussion on how to use the grid is not interesting to any soldier still upon the active list. He had, for long, used it in all geographical emergencies of life. It may help to discuss for a moment why he does so. We will suppose war, and we will take the case of a staff officer of a division which is just relieving another and taking over a section of the front at present unfamiliar. That staff officer will be the first man of his formation to reach the new headquarters, and he will be given tables of everything that affects that part of the front, from a list of the position of every unit down to one describing the licensed houses which are out of bounds. In each and every case the list is complete with full co-ordinate reference to the spot concerned. There is no room for misunderstanding.

Leaving divisional headquarters he settles into his car and proceeds to a brigade headquarters near the front. While he is lighting his pipe he wakes up to the fact that he has already lost his bearings in a strange country; stops at a signpost, and finds painted upon it the co-ordinates of that spot. He finds to his horror that he has left his 1-inch map behind, but he has a 1/4-inch, and the reference applies to it as well. Directing his chauffeur to follow a certain road, take the third turning to the right and then in 300 yards a track over the fields to the left, he finds the headquarters from its co-ordinates, without trouble. On leaving he goes farther forward by a sunken lane, where he gets hopelessly stuck. He sends his chauffeur back to telephone from brigade headquarters to division headquarters the co-ordinates of the point where his car is to be found and salved, and orders another car to be at certain co-ordinates at a certain time. Completing his inspection on foot, he finds the car where he has appointed, and returns to headquarters. We will follow him no longer, and take the analogies into civil life.

The tabular information concerning distributions is growing to considerable national significance. Let me take as a first instance the work of that exceedingly efficient body, the Committee on English Place Names. Names are listed and referred to in terms of the lettered and numbered squares of the

1-inch popular series. As a corollary these lists cannot be followed on the 1-inch district map of the neighbourhood (if one exists), nor upon $\frac{1}{2}$ -inch, $\frac{1}{4}$ -inch, or 10-mile, nor upon any map, in fact, which is bounded by different sheet-lines. Such a reference does its work in a poor sort of way, for it postulates a definite map, and it implies a search over a space of 4 square inches of crowded detail for the name in question. There are those who ask why they cannot be left in peace with the sheet-lines they were accustomed to. One has something of the same feeling in a church of advanced tendencies. The answer is that the critics themselves in their turn called for sheet-lines much more convenient than those of the early copper-printed 1-inch, and are now attempting to fasten their choice upon posterity. Sheet-lines are matters of convenience and fashion, and not ends in themselves.

New and better lists and gazetteers are beginning to appear on the new national grid in spite of its youth. The first one concerned the licensed premises under the jurisdiction of certain county authorities, whilst the latest is a Plant Survey of Studland, near Poole. There are so many uses for gazetteers and for tables of reference that it is a mere waste of time to speak further of them.

Now we will turn to the case of the signpost. Quite obviously those very efficient bodies, the R.A.C. and the A.A., will presently amplify their traffic signs and signposts by giving the position of the points at which they are erected. We are all agreed, probably, that a map is an indispensable companion to a wander through the countryside in order that we may direct our steps to the quiet and unspoilt, whilst at the same time becoming aware of local archaeological or historical interest. It is however easy, in moments of thought, to lose one's position on the map, and it will be remembered that the stranger from whom one asks the way generally replies, "I am sorry, sir, but I am a stranger here myself." The position of every signpost should be given on it.

Now let us turn to the accidents of life. Unfortunately they will occur. The broken-down car is, of course, a common one, but there may be many others, such, for example, as the depredations of a musk rat on the banks of a stream. These accidents demand attention and repair, and the first item of necessary information is where to get to, in order to effect that repair.

Now for the meeting-place with the second car. We are always meeting people, and we are always making arrangements which connect with this or that locality. Let me instance the fact that it is often valuable to know at what spot the motor bus of, shall we say, the Heliotrope Line, will stop on such-and-such a road. To the stranger within the gates it is not very helpful to be directed to the "Rose and Crown" or to the corner 100 yards or so beyond Mrs. Atkins's shop. All meeting-places can, and no doubt will, be described in terms of the grid so simply that no misconception is possible. Here is an every-day convenience.

Finally, let me refer to the co-ordinate address of that brigade headquarters. The other day my wife and I decided on a summer trip to a certain locality, and wrote for particulars, having a list of addresses of likely farms from local authorities. It was impossible however from the addresses to identify the positions of these farms on the 1-inch map, for no map is completely up to date, and many of the farm names do not appear on the existing sheet. It may seem to some of you ridiculous to foreshadow the day when a co-ordinate reference

will be on notepaper and visiting-card. Yet I have no doubt at all that it will come.

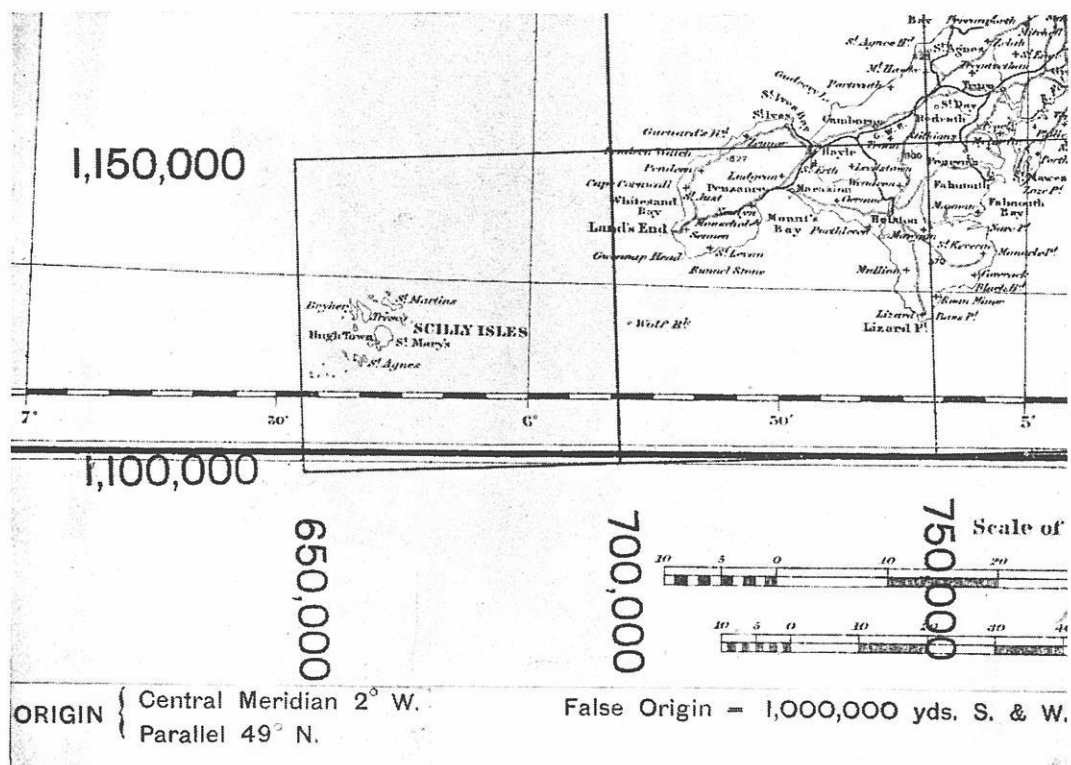
I would like to say here that one critic whose forthright sayings, like the little girl with a curl on her forehead, are either very good or very bad, calls us to order for militarizing the nation with this grid. I am not quite sure what he means. In a sense all charts and such small-scale maps as the 1-inch and $\frac{1}{4}$ -inch are a gift to the civilian from the sailor and the soldier, but in no other sense can the grid be called military. For many years map-makers have been anxious to evolve and to use a good system of map reference. The national grid as now in use is the highest form of reference so far evolved.

We must now consider how the grid is being shown upon the maps on which it appears. Obviously, for those who have with them scales and can make allowance for paper distortions, it would be sufficient to show the co-ordinates of the corners of the map. Such a system would certainly lack a good deal of convenience. The system of reference should be such that it can be used by eye, or in the worst possible case with the use of a small reference card; shall we say some 2 inches square. Eye measurement cannot be carried too far however, and lines of definite and progressive co-ordinate value must be shown over the face of the map if it is to be possible.

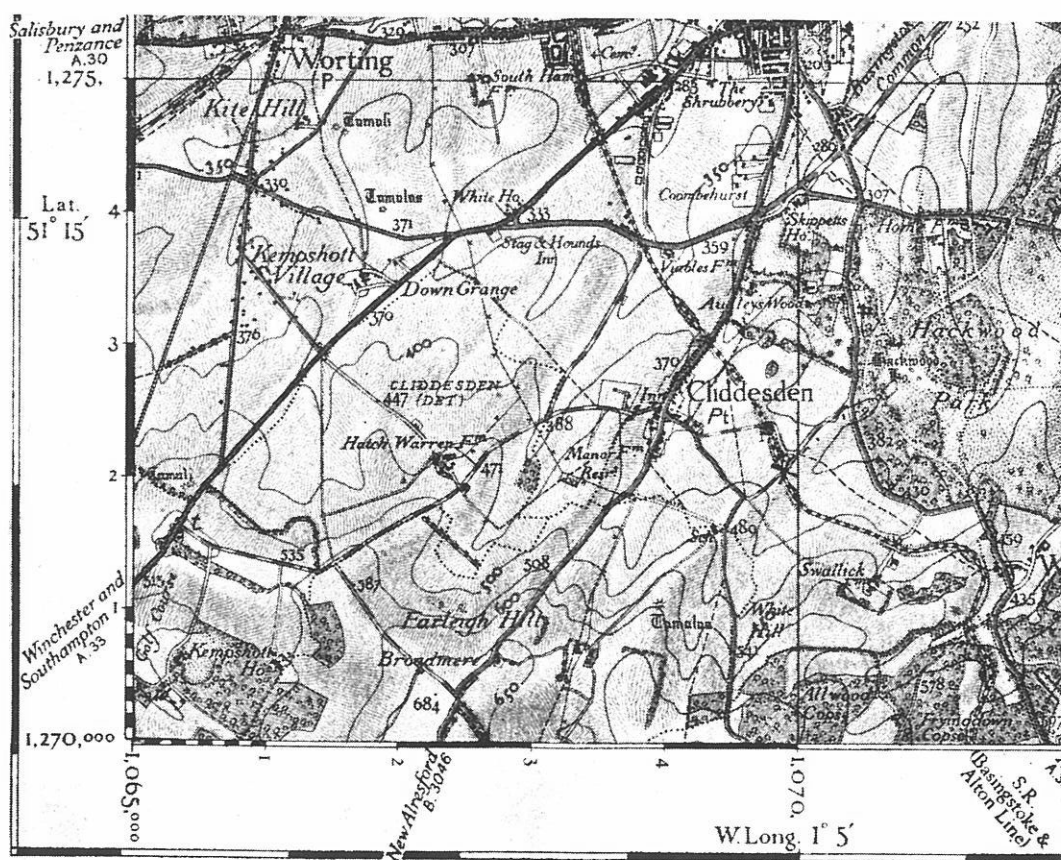
All national grids—and they are practically universal now—are decimal in this sense, that they rely on thousands, hundreds, and tens of units, and the co-ordinate lines which are shown are in multiples of thousands, hundreds, or tens, according to scale. As Brigadier Jack pointed out in 1924, the most convenient lines to use for reference purposes may not be the lines ultimately shown, for they may be so many as to interfere with the pleasant appearance, or, more important still, the legibility, of the map in question. A grid in yards—and that is the unit which we use—is rather awkward to manage on the 1-inch. A distance of 10,000 yards between co-ordinate lines is over long for practical convenience. A 1000-yard distance would imply too many lines over the map. We have therefore compromised on a distance of 5000 yards. But if the 5000-yard distance is convenient on the 1-inch, obviously 10,000 yards are equally convenient on the $\frac{1}{2}$ -inch; and if not convenient, at any rate not too bad upon the $\frac{1}{4}$ -inch. Having once printed these lines at right angles to each other over the face of the map we can now find the co-ordinates of any desired spot quickly and accurately.

But here we come to another matter of practical convenience. A country doctor, for example, whose professional activities are confined within a radius of 10 miles from his front door, will naturally not desire to use every time a number of figures sufficient to cover, within their range, the whole of Great Britain. That is the first time we strike a doubtful point. Some practical technique of figure referencing will no doubt be invented. The question is, what?

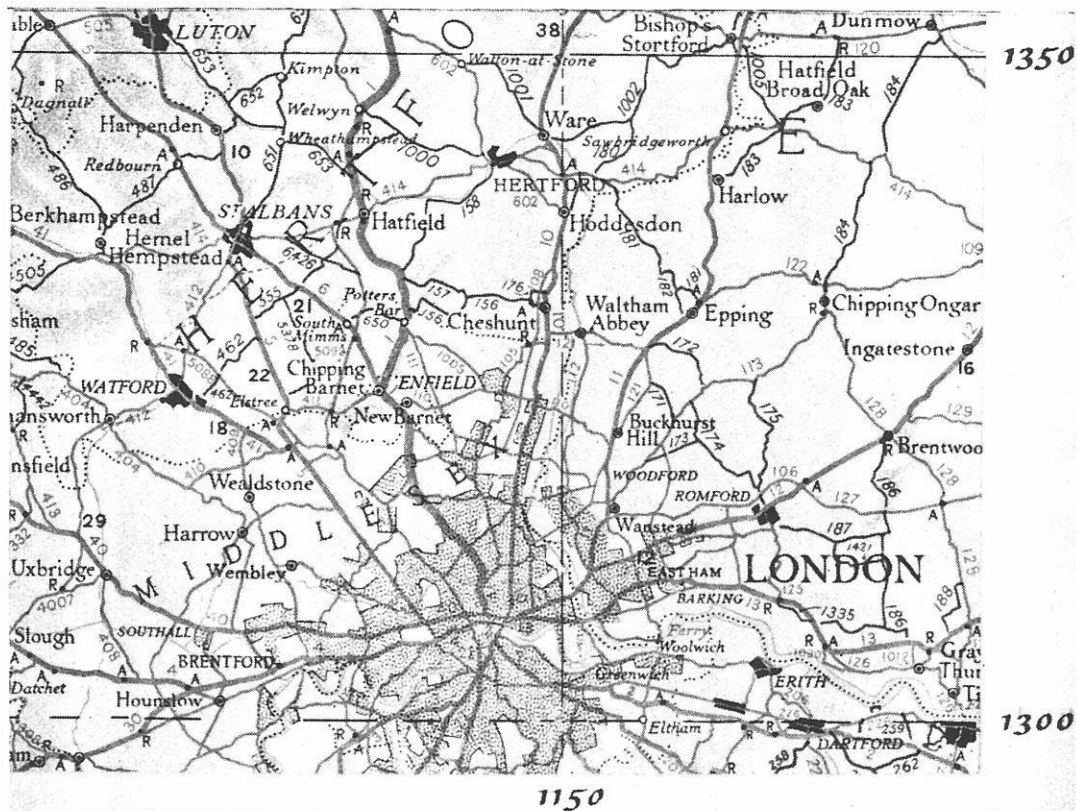
It is immaterial for the present to discuss the type of projection whose co-ordinates we use for the national grid, and it is equally immaterial to discuss the latitude and longitude of the origin, or the position of that point whose numbers run consecutively. It is enough to think of this origin of numbers as lying remote to our south-west coast in order that we may work eastwards and northwards in constantly increasing numbers, but always keeping to the same sign. For practical convenience it is obvious that we cannot contemplate



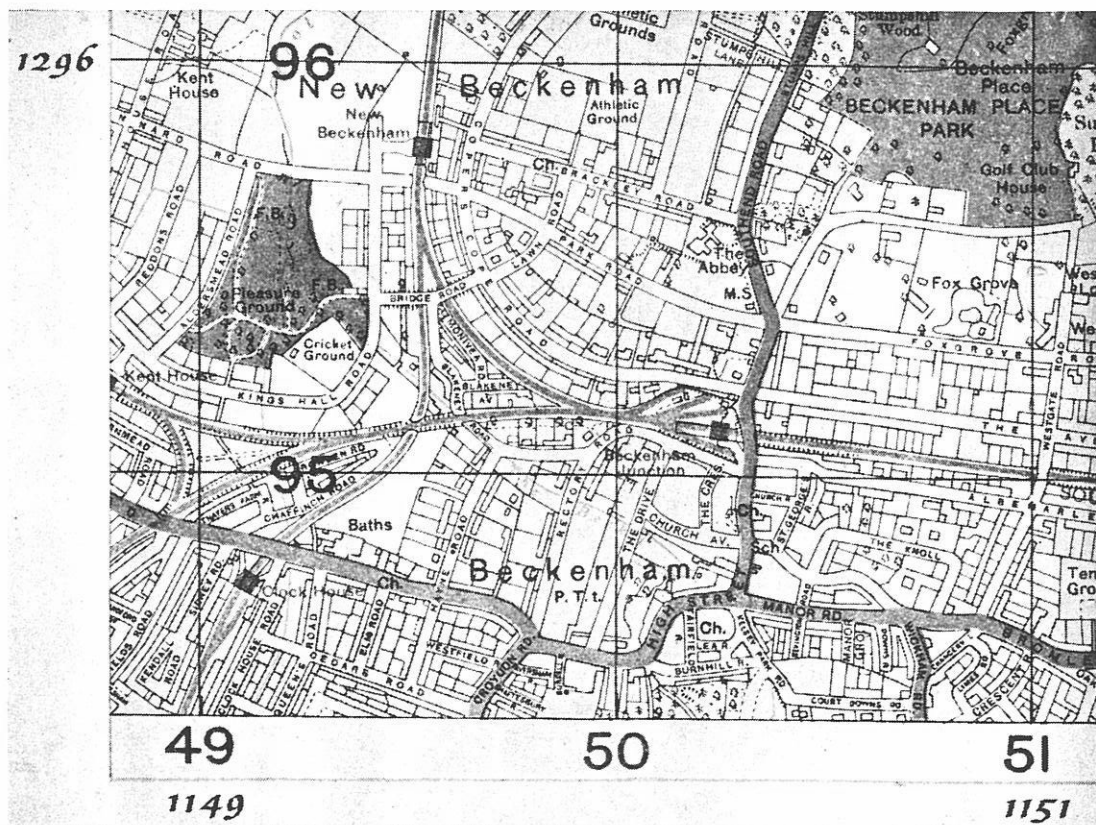
The National Grid overprinted on a portion (slightly reduced) of the 1/M outline of Great Britain



S.W. corner of a new 1 inch to the mile sheet. Grid squares 5000 yards; grid lines figured in kiloyards with full figures of yards at corner



Piece of the Ministry of Transport 10 miles to the inch map of Great Britain. Grid squares 50,000 yards; grid lines numbered on figure in kiloyards



A piece of the 3 inches to the mile map of London. Grid numbered in kiloyards, omitting first two figures; the full grid number added in the margin

a mixture of minuses and pluses. A point which we might have thought of in fixing the position of the origin of numbers was to secure some round number for a central point in London. That central point might have been Big Ben or the Dome of St. Paul's or the front door of this Society, according to balance of opinion. Unfortunately we made no such provision, and as the co-ordinates run in London there is nothing of importance which coincides with an easily remembered number.

Co-ordinate lines will be understood best by reference to the corners of sheets of the different series. There is shortly to appear a 3-inch-to-1-mile map of London which is designed to facilitate the work of visitors as well as of residents. It will be accompanied by a full gazetteer, and its marginal grid directions consist of two figures, the last of which indicates the number of thousands of yards. The two figures are necessary for this small area because the area concerned is more than 10,000 yards and less than 100,000 yards in either sense. For local use in Greater London we can consider the origin of numbers to lie close at hand. For the moment we are concerned neither with John o' Groats nor with Lands End, but the system is really the same and the full co-ordinates can be given if required. Ultimately then the use of the grid will sometimes be local, sometimes (for Great Britain) universal.

With regard to the 1-inch, I have already called your attention to the fact that the distance between co-ordinate lines must for convenience be 5000 yards and not 10,000 yards, as the decimal system would seem to suggest. It has been suggested that the intermediate fives should be left in the form of thin lines, but should not be numbered in the margin. The consequence of this step would be to work in a square of 10,000 yards, or about $6\frac{3}{4}$ inches on paper. This is too large for practical convenience in my opinion, and I prefer to retain the fives. I shall show you presently a type of "Romer" which goes very well with this division and makes sub-division simple and quick.

It has been suggested that we should employ the word "kilo-yard" to express a unit of 1000 yards, and that additional figures should be given after the decimal point (if required). The idea is a good one. Its adoption would diminish the risk of losing grip on distance among so many figures. I would however like to draw your attention to the fact that the last three figures which would be after the decimal point if we adopted a kilo-yard system are always shown by us about half the size of previous figures. In effect, we have by symbol adopted a kilo-yard unit.

Passing to the $\frac{1}{2}$ -inch we come to a 10,000-yard square and return to more normal decimal practice. One further remark I would make about this $\frac{1}{2}$ -inch. We have at present a staff too small to make it possible to redraw and reletter our $\frac{1}{2}$ -inch series. I am sorry that such is the case, for this old $\frac{1}{2}$ -inch, useful map as it is, is not modern in the legibility of its names and tends to be overcrowded. As a consequence when in Scotland we make up a special $\frac{1}{2}$ -inch district map such as that rather beautiful production the Island of Skye, we are using material which was drawn on Bonne's Projection from a central meridian which makes an angle of nearly 2° with that of the grid lines of the new national system. Now 2° is enough to upset the look of the principal names. To have a name which, by hypothesis, should be written along a horizontal line running at a visible angle to the grid would be so unpleasant as to be impossible. On the

$\frac{1}{2}$ -inch of Skye therefore and on any adaptation of the old $\frac{1}{2}$ -inch of Scotland, the new national grid is not shown.

The $\frac{1}{4}$ -inch margins are being rapidly adapted to the grid principle. There is little fresh to say about this scale, but it will be seen that the grid numbering is plain, and that the grid scales suggested in the first instance by Mr. Hinks are given here, as elsewhere.

In the case of the 10-mile map the grid is not given so much prominence. I am not sure whether we were wise or not in our thoughts. It must be remembered however that the smaller the scale of the map, the more do we turn to a latitude and longitude division, and the less do we think precisely of the position of any one spot.

If any one thinks that we are being singular in the introduction of a grid

SHEET GAZETTEER

OF THE

ONE-INCH 5th RELIEF EDITION

Sheet No. 144 (Plymouth).

Bilminster	...	...	...	806,800	1,168,400
KILN WOOD	...	...	...	806,400	1,169,600
Big Doniert's Stone	...	...	...	807,100	1,184,700
Kingsand	...	...	...	828,800	1,164,700
Kingseat	...	...	Devonshire	844,300	1,185,800
KINGSMILL LAKE	...	...	Cornwall	827,800	1,176,000
King's Tamerton	...	...	Devonshire	830,800	1,173,600
Kingston	...	...	...	851,000	1,161,700
King Tor Halt	...	...	...	843,100	1,189,400
KIT HILL	...	...	Cornwall	822,300	1,187,400
Kitley	...	...	Devonshire	842,500	1,165,700
Knighton	...	...	...	839,300	1,163,700
Knowle	...	...	Cornwall	810,800	1,188,800
Ladye Park	...	...	...	807,400	1,180,200
Laira	...	...	Devonshire	836,400	1,170,600
Laira Bridge	...	...	...	836,100	1,168,700
Lake	...	...	...	839,300	1,184,000
Lambest	...	...	Cornwall	815,000	1,178,800

Full grid references in yards

system let me amend his judgment. We are one of the last in Europe to come to it. I will show you the way in which national grids are shown and numbered in the margins of some foreign maps, but I would go on to say that this illustration, taken from the 1929 text-book of Map and Photo Reading, may already be out of date. I have not followed developments in foreign maps as closely as I should have done. I think it will be agreed that we are taking more trouble in England to make the purpose and the use of the grid plain than these foreign maps are doing.

You will remember that in practice the grid will be used for eye measurement in the majority of cases, and exact measurement only where precision is particularly desirable, as for example in the compilation of gazetteers. Where this precise measurement is required it can be obtained rapidly and easily by the use of a small rectangular scale. The pattern used by the French in the War consisted of a small rectangular bit of zinc in which the two arms were so

graduated that one edge was read along the grid line from the corner, while the other, at right angles, read upwards to the point in question. The one we ourselves used was exactly the same in principle, but differed in this minor particular that a corner of it was put actually on the point whose position was to be determined, while the scales at right angles to each other and along the edges of the little card were placed by eye parallel to grid lines and read against them. Its use is extraordinarily simple when shown pictorially, but difficult to understand perhaps when described in words.

As a corollary to this Romer, as it was called after the gentleman who invented it, it is easy to make one for use with the grid in which the interval is 5 instead of 10. In such a case the marginal scales are duplicated, one reading from 0 to 5, and the other, below and parallel to it, from 5 to 10. Here again it is easy to explain the thing by illustration but difficult to do so in words.

Last of all, I should like to refer to the gazetteers which are in the making. The London 3-inch-to-1-mile will have its gazetteer so that the position of any street can be found at once from the co-ordinates of the centre of the written name of that street. This map is constructed on exactly the same principles as the War Office edition of 1926. It is a most amazingly useful production, and for years past I have relied on it for the identification of any place in London which I may happen to have to visit, from that of a dressmaker to that of a Department of State.

The gazetteers of the individual 1-inch sheets are compiled during the drawing of those same sheets. When they are complete for Great Britain they will provide the material for a general gazetteer which will show not only the position of every place, but the actual type in which the name is written.

And now, Ladies and Gentlemen, I have done my part in explaining to you what is being done, leaving the gentlemen who follow me to point out how to improve upon it.

DISCUSSION

Before the paper the PRESIDENT (Admiral Sir WILLIAM GOODENOUGH) said: The paper that was to have been read this afternoon on "The extinct water-courses of the Fens" has had to be postponed on account of the illness of Major Fowler, and Brigadier Winterbotham has come at short notice to read a paper on "The use of the new grid on Ordnance Survey maps." Some of us may be asking what a grid is, others will ask what it is good for, and all will ask whether it is the best method for producing what it professes to produce. Concerning this Brigadier Winterbotham will tell us, and I will now ask him to read his paper.

GAZETTEER TO ACCOMPANY THE 3-INCH MAP OF LONDON

Abbeville Rd.	...	415	002
Abbeyfield Rd.	...	477	049
Abbey Gars.	...	380	037
Abbey Gro. ...	...	607	050
Abbeyhill ...	...	608	985
Abbey La., Kilburn ...	...	372	103
Abbey La., West Ham	...	517	099
Abbey Rd., East Ham	...	574	103
Abbey Rd., Newbury Park	...	582	157
Abbey Rd., Notting Hill	...	354	069
Abbey Rd., Park Royal	...	310	096
Abbey Rd., St John's Wood	...	377	103
Abbey Rd., South Wimbledon	...	380	954
Abbey Rd., West Ham	...	520	098
Abbey St., Bermondsey	...	522	101
Abbey St., Bethnal Green Rd.	...	461	055
Abbey St., Plaistow, E.	...	468	090
Abbey St., Woolwich	...	535	088
Abbey Wood	...	588	047
Abbey Wood Rd.	...	608	046
Abbotsbury Rd.	...	606	049
	...	363	057

Abbreviated grid references in hundreds of yards. The references in kiloyards would be: Abbeville Road 41.5 00.2

Brigadier Winterbotham then read the paper printed above, and the discussion continued as follows:

The PRESIDENT: We had hoped to have Sir CHARLES CLOSE with us this afternoon, but he has been unable to come and has sent a short note as follows: "The establishment of a uniform projection for the small-scale maps of Great Britain, the choice of the Transverse Mercator for this projection, and the selection of the origin of co-ordinates well to the south-west, so that co-ordinates shall all have the same sign, are all steps in the direction of progress, and I, for one, warmly welcome them. And I think that we shall, most of us, approve of the grid lines being drawn at intervals of 5000 yards, an interval which, on the 1-inch scale, gives a network of squares of a little less than 3-inch side. Another good feature is that the size of the 1-inch sheets includes a definite number of the grid squares, so that we no longer have the rather awkward arrangement of sheets 27 inches long, provided with a 2-inch grid. All the above alterations are, I think, improvements. But there is one difficulty with the new system, and this deserves consideration, though it is not insuperable.

"The difficulty is that of indexing. Let me give two examples. In the Quarter-Inch Atlas of England and Wales, one of the most useful features is the Index. This is exceedingly simple, for each folio of the Atlas is covered with 2-inch squares, with letters down the sides of the folio and numbers along the top and bottom. A reference is very straightforward: thus, Salthouse, Folio 12, F 10.

"Another example of the use of the present system of indexing is to be found in the employment of the 1-inch sheets of the Popular Edition by the English Place-Name Society. In the volumes published by this Society every place-name is referred to the appropriate sheet of this edition of the 1-inch map, and the grid square in which it falls. Thus in the latest volume, No. X, published by that Society, 'The Place-Names of Northamptonshire,' there will be found hundreds of entries such as the following, Glendon, 74 E 1; which being interpreted means that that place-name will be found on 1-inch sheet 74, and in square E 1. Nothing could be simpler.

"But how are we going to index such names by the use of co-ordinates? Well, it can of course be done. We can use, say, four figures for each co-ordinate. Instead of the simplicity of the present system we shall have something like this: 7698. 8524, with the addition, I suppose, of the sheet number. We shall have eight figures to remember instead of one letter and one figure, and this will add greatly to the labour of looking out the place-name required. Now I am in no way objecting to the use of co-ordinates for what may be called official purposes, and I see a good many advantages in the unified system which will apply to the whole of Great Britain. But I think that the convenience of the general public and of such bodies as the English Place-Name Society should also receive consideration. And to meet this, to my mind, reasonable contention, I would venture to suggest that letters and numbers should be printed round the margins of each sheet as heretofore. This would not interfere with the use of co-ordinates for official purposes; but the provision of such letters and numbers would add greatly to the comfort of the non-technical public; and the addition of these letters and numbers would carry on the century-old tradition of the Ordnance Survey, which has always striven to produce maps which should be equally useful to the public and to the Army."

The PRESIDENT: Brigadier JACK also could not come this afternoon, but has sent a note which I will also read: "I have read Brigadier Winterbotham's paper on the new grid on O.S. maps with great interest, and am sorry that it is impossible for me to be in London to-morrow to take part in the discussion. I agree with Brigadier Winterbotham's objection to the critic who spoke of 'militarizing' the

nation with this grid. It is absurd to apply such a word to the case. Most maps have some method of locating points. The grid is merely an improvement on certain of these methods; it enables one to fix a point with more exactness, and with no loss of simplicity. The fact that it has been adopted for use by soldiers does not make it military.

"While welcoming the application of a scientific grid to our maps, and agreeing that it will be invaluable for defining positions simply and accurately for most purposes, I think it perhaps a mistake to push its use too far. Those who travel by road from Southampton to London, for example, think necessarily of the journey in terms of the road, in other words, in terms of one dimension; and I cannot think that any advantage will be gained by saying that the bus stops at 4863. 2389, or whatever the co-ordinates may be, as compared with saying that it stops at the Post Office, Hartley Wintney. On the other hand there are most obvious advantages in being able to describe a point, without fear of mistake or confusion, by two numbers, instead of by its position with relation to the 'second l in Pwlheli,' or as lying somewhere in square B.8. And it is for these advantages that we are grateful to the producers of the new grid."

Colonel MACLEOD: Brigadier Winterbotham, I think, has made out a very good case for the introduction of the grid system as a method of defining position. But I think that, to complete the picture, it is necessary to remind you that the grid can be used for other purposes as well, not only by the soldier but by the civilian. The co-ordinate can be, and is, used for calculating bearings and distances, and I have little doubt that the grid system will ultimately be required or brought into use also in connection with the defining and calculating of areas for the compilation of such information as Brigadier Winterbotham alluded to in his remarks about the lesser-crested grebe.

In dealing with the question of a grid for "map-referencing," as the soldier calls it, the principal point to consider is to secure a grid square of suitable size. The military history of this question is interesting, I think, because in France, where the grid system was applied first, the maps in use were on a scale of 1 : 20,000, or about 3 inches to the mile. On that scale the 1000-yard square worked out very nearly at the 2-inch square which Brigadier Winterbotham has suggested as being about the right size.

When the Great War was over and the Army returned, "glad," as some people said, "to get back to real soldiering," it was decided that it would be necessary to retain a grid system, and it was decided to adopt that used by our Allies, a system based upon the kilometre, and not the 1000-yard square. British maps in the war had the 1000-yard square on them, but the French used the kilometre square, and this had led to inconvenience when British and French troops were interchanged in different parts of the line. It was decided therefore to adopt the kilometre square, and the attempt was made to apply the kilometric grid on the $\frac{1}{2}$ -inch map, which before the war had been used for training in England. The result was that the grid square was so small that the map was practically buried in squares, and something had to be done about it. Curiously enough the Army, instead of scrapping this new-fangled foreign grid, decided to scrap its training map. It decided to scrap the $\frac{1}{2}$ -inch map and to adopt the 1-inch. That decision is rather interesting, because the scale of map used by the soldier is not a matter of indifference. Some scales are definitely better than others. Moreover, the soldier cannot now get along with only one scale to the map, he requires two, and probably three, and, as Brigadier Winterbotham has explained, directly you are unable to limit your operations to one scale of map, the difficulty arises that the grid square may be, and probably will be, of a different size on different maps.

It happens that the soldier does not require many scales, and very often he has

a choice of scales; he can use what scales suit him best, and if he can choose, say, a scale of 1/25,000 for one map and one of 1/250,000 for another, scales which are exact multiples of one another, he can by this sort of device keep his grid squares to the same size on all maps. It is the intention of the Army in future to try as far as possible to put that principle into operation.

The civilian of course cannot do this. The civilian map user has a great variety of scales offered for his use, on which it is impossible to maintain a uniform size of grid square. Brigadier Winterbotham has shown various devices by which a co-ordinate can be measured when the grid square is of something other than tens of units. That gets over the difficulty to a certain extent, but not completely, because, as he himself mentioned, there are many occasions where it is desirable to be able to divide the square into tenths by the eye, and if one divides a square of 5000 yards into tenths by the eye, one will get a different figure from that which is given by the Romans of which he spoke. There is an obvious source of confusion in this respect which I think Brigadier Winterbotham has under-estimated.

I will not elaborate this point however because I want to get to another point, namely, the selection of the grid unit. Brigadier Winterbotham opened his lecture by describing the yard as a perfectly good unit. I agree that the yard is a perfectly good unit, but at the same time I am not at all certain that it is the best unit for the purposes of a grid. Admittedly it is the military unit, but, as Brigadier Winterbotham has explained, he is not anxious that this grid should receive the brand of "militarism." It is perhaps academic of me to discuss the grid unit at this stage, because the yard has been adopted, and a change would undoubtedly, even now, be difficult. At the same time, the decision as to what unit should be adopted has very far-reaching results indeed, and before the yard grid has been woven into the administrative and economic fabric of the country, I myself think that the merits of the metre deserve more consideration than perhaps they have yet had. I might add that for every purpose specified by Brigadier Winterbotham the metre would do just as well as the yard.

I know that this question of introducing the metre into this country is one on which opinions differ very strongly, and I took the precaution, before coming to this meeting, of turning up the proceedings of the Conjoint Board of Scientific Societies, which went into this question a good many years ago. The result of their deliberations was rather interesting. The Board, you may remember, was definitely against any sort of compulsion. It was against the compulsory introduction of the metric system into this country, but it did say this, that it "freely admitted that on the whole it would have been an advantage if we had adopted the metric system a hundred years ago before industry and commerce had reached their present complexity." The Board however was not convinced that compulsion was required to secure the principal advantage of such a change. The change, it said, might perhaps be more readily secured by an enlightened extension of the practice already existing.

Now, if that committee was right in saying that the metric system could "with advantage" have been introduced into this country a hundred years ago, I feel certain that the advantages must be very much greater now. The world has been knit together since then far more closely than was the case when the metric system was introduced. The metric system has won its way into the economic fabric of the world very much on its merits, and in the use of statistics and so forth it has made it possible to undertake compilation in a form which is of world-wide and not only local application.

I cannot help thinking that if the committee were writing that report now they would say that the advantages—which unfortunately they did not specify—had greatly increased. I entirely agree that the difficulties of the introduction of the

metric system have also increased, and it is a matter of opinion which of those two has increased in the greater ratio. But if one concedes the desirability of introducing the metric system into this country, I suggest that the introduction of this grid system into British cartographic practice presents as good an opportunity of doing so as is ever likely to occur.

Capt. G. T. McCaw: I should like to speak of one aspect of this question which I think is worth mentioning, and that is the fact that this grid system under discussion this evening is by no means new. It has been going on for very many years. I think that sailors were the first to introduce it. We are all very well acquainted with the maps of the world that we see in atlases—maps which are covered with peculiar curved lines. Those curved lines are very interesting, but extremely difficult to use in practice; the sailor, navigating the oceans, very quickly found that he was unable to take his bearings with any sort of accuracy from lines of this order. Therefore he set himself at once to think of squares, and his first map was known as a *plate carrée* projection, on which he showed rectilinear meridians and parallels, the scales of latitude and longitude being the same. But it became very quickly obvious that a map of that kind was far from being correct because, as he sailed with his compass, he found himself pursuing a different line from what the map had shown him. The consequence was that his navigational troubles were serious until Gerardus Mercator came along and suggested that these lines should be drawn not to form squares, but to form rectangles increasing in meridional dimension towards the Poles. Under those conditions the sailor could have the directions given by his compass shown truly as straight lines on the map. That represented very great progress, but the whole idea was to get straight-line working, graphically simple.

Two hundred years or so ago the same idea was applied by Jacques Cassini for the purpose of land surveying. There was nothing military about it in the first instance. The idea was to have something which surveyors could use comfortably, since surveyors were up against the same difficulty of using curvilinear co-ordinates as the sailor had experienced. The consequence was that surveyors also wanted a rectangular system; in other words, they wanted a grid such as a child could understand on a draughtboard.

That is a very old story, and what Brigadier Winterbotham has shown to-day is simply a modern form of the same thing. That grid system of projection is now so universal that in a number of our Dominions and Colonies a plan of any property must have the rectangular co-ordinates annexed. The grid which Brigadier Winterbotham has shown on the screen is nothing more than a linear representation of the co-ordinates about which he has been speaking, and the consequence is that the ordinary surveyor in dealing with property is able to make surveys in a simple manner, without having to introduce the difficulties of latitude and longitude. That really is the great function of the grid; to regard it as an essentially military system is merely to display ignorance.

May I suggest that in place of the ugly word "kilo-yard" the word "mille-yard" would be more suitable?

Mr. A. R. HINKS: It must be about twenty-five years ago that an old friend of mine, who was then Savilian Professor of Astronomy at Oxford, referred to the time when every lamp-post in London would have on it its rectangular co-ordinates, so that if one was lost in a fog or anything of that sort, one would be enabled to discover one's exact locality. I am glad to hear that his idea is at last on the way to realization.

The question as to how this grid can be used for civil purposes seems to me to have got a little bit mixed up with the question as to what is the convenient size of square. If you are going to project any map originally referred to latitude and

longitude, you naturally calculate the rectangular co-ordinates of the intersections of the meridians and parallels and plot on squared paper. The squared paper on which you plot is in effect the grid. The number of lines on the squared paper in the actual sheet depends upon a variety of circumstances and has nothing to do with the merits of the grid as a grid.

In order to examine those merits closely at home I ventured to ask the Director General of the Ordnance Survey to give us the grid co-ordinates of the front door of the house of this Society in Kensington Gore. Our front door is 1,138,583 yards east of the point of origin—that is, the south-west of the Scillies—and it is 1,305,808 yards north of the point of origin (I leave out the decimals of the yards). Now, I think we do not want in the case of an ordinary house like this to put on our notepaper this position of the house to the exact yard, but to have it within the nearest hundred yards might be useful. Also, we do not want to know its position in regard to that fictitious point of origin at the Scillies. Therefore one can eliminate what is uninteresting at the beginning and unnecessary at the end. I take it therefore that for ordinary purposes if we wanted to use this grid reference in London we should cut off the first two figures, and certainly the last figure, leaving the position to the nearest 10 yards. But I would suggest that it is necessary for civilian use always to work in decimals of a figure representing 1000 yards. We want to think, not in yards, but in thousand yards, in another word, in the kilo-yard. We use the yard rather than the metre, and I believe there is a sufficient reason for this in the fact that the yard is, after all, our national standard of length.

I was a member of the committee to which Colonel MacLeod referred that reported it would have been an advantage if a hundred years ago we had adopted a metric system. It would have been a practical advantage to have the same weights and measures as other people. But it certainly would not be a desirable thing to make a compulsory change of this kind now. We can use metres now when convenient, but I do not find myself in agreement with Colonel MacLeod on the point of introducing the metric grid upon our maps. It is entirely logical to use the yard as the unit of length, because it is the national unit.

The word "kilo-yard" has been called a bastard word; it is certainly not a pretty word, but it is not fair to dislike it because it has the appearance of a hybrid. Before taking up this matter, I took the precaution to consult two classical scholars, and I wondered whether the word "kilo-yard" would shock them. To my surprise they were neither of them shocked. One of them pointed out that "kilo" is not Greek, the Greek word being *χίλιοι*, meaning one thousand. If the proposed word had been "chilio-yard" that would have been horrible; but "kilo" is a mere convention, meaning one thousand, and is not Greek nor any other language. Therefore to such terms as "kilogram" and "kilowatt" there can be no objection. As for talking about "mille-yard," I would differ from Captain McCaw, because the Latin prefix is used commonly for the sub-division of the unit, and therefore to talk about "mille-yard" as meaning a thousand yards would be in practice confusing.

Captain McCaw: "Millennium."

Mr. HINKS: Millennium is not a unit of length.

It does seem to me that when we get this map of London it will be the best possible demonstration of the value of the grid, and I hope that it will be possible to engrave the grid reference on the Society's notepaper. Of course our own House is relatively easy to find, but if we take some Gardens, for example, in the Kensington neighbourhood, the grid reference might well be very useful. It would be useful also for post offices, police stations, and theatres, enabling them

to be found without wasting time. I should like to express my own personal opinion that in ten years' time we shall find the grid reference in London of the very greatest importance. I think that is all that I have to trouble the meeting with at the moment.

The PRESIDENT: One would, of course, like much more time for the consideration of this subject, for the necessary criticism of it—I mean criticism in the proper sense, not destructive. All of us will agree with one of the opening sentences of Brigadier Winterbotham's paper when he said how useful this grid might be in the hands of the man in the street. By "the man in the street," I presume he meant the man in the country or on the country road. I will come to the question of its application in the streets of London later. Then Brigadier Winterbotham went on to indicate how it would be applicable in making a meeting-place, and so on, about which there could be no mistake. It was a great surprise to me when I heard Brigadier Winterbotham and also when I read to you just now Sir Charles Close's notes to find that they both spoke of the 1-inch map, the $\frac{1}{2}$ -inch map, and then suddenly leaped—or the Brigadier did—to what he called the 10-mile map. I presume that what he meant was the one-tenth map. It is just as well to be consistent in this matter. A 10-mile map would presumably be 10 miles to the inch. If you use a grid, the side of which is 5000 yards, and put it on to the map, the miles do not, and indeed cannot, coincide with the squares; but I do not know that that matters. I am of opinion that, as Sir Charles Close has said, though it may spoil the aesthetic form of that beautiful map, for instance, that has been produced of Plymouth, it is a distinct advantage to the present map reader that he should have a number and a letter to mark the different sections. At the same time I have to realize, as Brigadier Winterbotham has pointed out, that difficulties arise when it comes to the use of different scales of maps. What is necessary, if this grid is coming in as a national grid, is that we should start at the bottom and see that the children in schools are taught how to read it. I do not suppose that any of us here this afternoon found difficulty in reading the grid; it is a thing we could learn to use in five minutes. But it is absolutely necessary, and a part of the business of such a Society as ours, that if this is coming in, the children should be taught to use it, and just as much what it means. I am entirely against the standardization of children's minds, but there are certain things in which uniform teaching is necessary, and this is one of them.

I must say that I cannot think that this grid would be useful inside a town. I should dine very early if I was going to trust to a taxi driver getting me to the theatre by the method of directing him in such numbers. Speaking seriously, I cannot imagine that if every street were labelled and properly planned you would be able to find your way from place to place in a town by the use of a grid system of this kind so well as you would find it by the ordinary reference to the names of the streets. We have been told that this grid will be in common use in London in ten years, but I should think it will be a much longer time than that.

I hope no one will use either the word "kilo-yard" or "mille-yard." Mr. Hinks has pointed out that "kilo-yard" is not even a word which combines elements from two languages—it seems to belong to no language at all. The prefix "kilo" is a bastard in itself. Why not say a thousand yards?

With regard to the military business, I think that must be a mistake. What the objector must have meant was military precision, and not what is usually called militarism.

But what Brigadier Winterbotham has done has been to bring before us something which is being made use of, which is coming in very largely, and which in many respects will be of the very greatest use. I hope that it will be ensured that the Education Department, and such other departments as have to do with

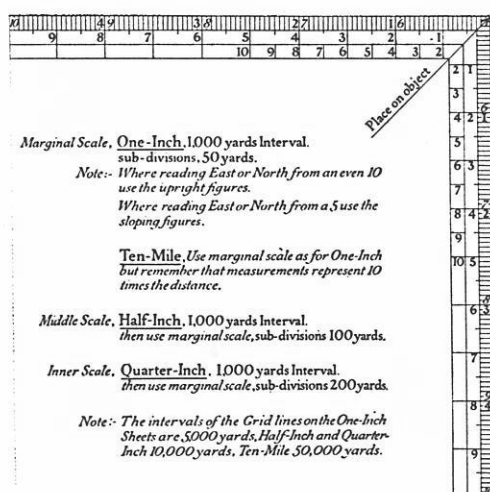
teaching, will have a chance of seeing how they may make use of it. But, having got this admirable fox to run, I will express a purely personal opinion, the hope that Brigadier Winterbotham and his colleagues will not run it to death by making use of it in every conceivable measurement and place and line.

I hope that Brigadier Winterbotham will accept our very best thanks for coming, especially at such short notice, and giving us a most interesting account of what to most of us must have been quite new.

Brigadier WINTERBOTHAM: I would break one metric lance. It might have been perhaps a good thing if one hundred years ago we had adopted the metre, but it is a blessed thing that we have not. The yard however decimally divided, would be a much greater boon than the metre.

The PRESIDENT: I should like to break many lances with the Brigadier, but I will come down to Southampton and see him there one day.

N.B. -- The background to the writing and delivery of this paper is to be found in Public Record Office file OS 1/111.



A "romer"; reduced to about 62% of original size

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THE NATIONAL GRID ON THE MAP OF LONDON

ORDNANCE SURVEY 3-INCH MAP OF LONDON. With Gazetteer (7 × 5 inches; 132 pages). Southampton: Ordnance Survey Office. 10s

THE 3-inch Map of London with Gazetteer recently published by the Ordnance Survey is the first to show on an adequate scale the National Grid as applied to London, and it is therefore of particular interest to study it in connection with the paper by Brigadier Winterbotham on "The Use of the New Grid on Ordnance Survey Maps," published in the *Journal* for July last. The grid is over-printed in red in squares of a kiloyard (1000 yards) and numbered in figures of two digits, the first two digits of the complete grid reference being omitted except at the corners of the map. The accompanying gazetteer gives the grid reference in three figures, that is to say, to one decimal place of a kiloyard; and it would, we think, have been well if the decimal point had been inserted as a guide to the user of the new system.