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MANUAL OF

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MAP AND COMPASS READING

COMPILED BY

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ARMY EDUCATIONAL CORPS



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MANUAL OF MAP AND COMPASS READING.

INTRODUCTION.

This book is in THREE SECTIONS specially designed for MODERN WAR. These sections are as follows:—

Section I. "Map-sense, road-sense, and common-sense."

This is chiefly guidance and information for D.R.'s, drivers and other military road-users.

Section II. "Getting the lie of the land."

This tackles the problem of getting about difficult and unknown country with map and compass.

Section III. "Second Front Maps."

An introduction to French and German Military maps, backed up by French and German Language Vocabularies as applied to Map Reading and Direction Finding.

Finally, this book was written in answer to the challenge thrown out by the Axis.

"Blitzkrieg" demanded colossal Map Reading skill on the part of the German troops. And British troops who escaped from Hong Kong have testified to the excellent Map Reading ability of the Japanese soldier, who advanced to the attack map in hand.

SO WHAT ABOUT IT, CHAPS?

A. H. DICKSON.

Bristol.
17th April, 1943.

SECTION I. "Map-sense, Road-sense, and Common-sense."

CHAPTER 1.

Map-Handling.

Theory and practice.

Drivers and D.R.'s will no doubt appreciate that ROAD-SENSE is only gained through the hard school of experience.

The same thing applies to MAP-SENSE.

The essence of Map-reading is to be out on the road, map in hand.

So let us start with the district where you are stationed.

Get hold of a "One-inch" map of that district. Take it everywhere with you. Study it in odd moments.

Use it to find your way about with, even if you know all the roads backwards. Continually compare map with ground.

Remember that time spent in training yourself now will be well spent when the Second Front opens. Jerry is a good Map-reader and YOU have to be an even better Map-reader

Information from the Map.

Make good use of the information contained in the margins.

Carefully study the Table of Map-signs in the left bottom margin of your map.

These signs need to be treated with great respect. Indeed, a magnifying glass is often helpful when reading these signs on the map.

Here are a few of the signs that you need to be careful about:—

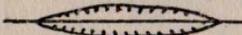
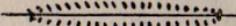
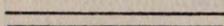
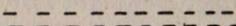
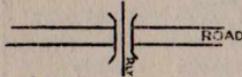
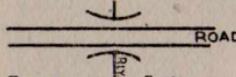
Map-sign No. 1	Map-sign No. 2	Remarks
 Church-with-Tower	 Church-with-Spire	Useful landmarks.
 Railway cutting	 Railway embankment	Tactical importance (Tank obstacles; cover)
 Fenced road	 Unfenced road	"Fence" might mean ditch, hedge, wall. Prevents vehicles making quick getaway from road.
 Railway over road. "Railway arch."	 Road over Railway. "Railway bridge."	Useful landmarks. Usually strong tactical points.

FIG. 2.

Here is the lay-out of a typical One-inch map:—

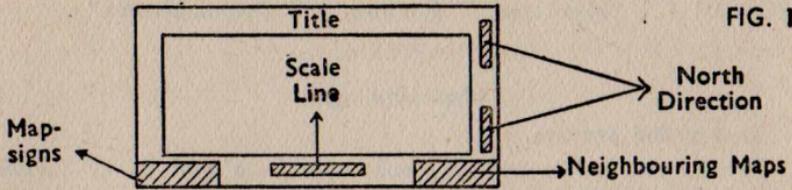


FIG. 1

GOLDEN RULES ABOUT MAP-SIGNS.

1. When in doubt refer to the Map-signs Table in the map-margin.
2. The best way to learn these Signs is through experience. Constant use of the map out-of-doors will soon teach you. Folding the Map for Road-use.

DIRECTIONS FOR FOLDING	MAP BEFORE FOLDING. DOTTED LINE SHOWS WHERE TO FOLD.	MAP AFTER FOLDING
Fold Back the Margins	Title	
Fold in Two Long-ways		
Fold in Two Broad-ways		
Fold each Half into Three Equal Parts	Left Half Right Half	Left Half Folded Both Halves Folded
Map Folded in Twelve Sections "Concertina-ways"		Map Ready for Use (1) Now only 1/12th original size (2) Each of the 12 Sections readily accessible

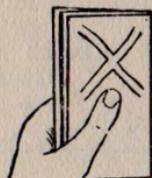
FIG. 3

Holding the Map Correctly.

Choose a nearby cross-roads that you can easily identify on the map.

Take your map there and carry out the following map-drill:—

1. Fold the map as directed. (Figure 3.)
2. Look for the section of the folded map that will show the cross-roads where you are standing.
3. Juggle the map-folds till this section comes on top and the sections you don't want are tucked away under it.
4. Now hold the map in your LEFT HAND, with your LEFT THUMB NAIL marking the cross-roads. (Figure 4.)



Left
Hand
FIG. 4.

Make a habit of ALWAYS carrying out the above map-drill when you take the map on the road for use. The advantages are:—

1. Saves much valuable time.
2. Map is now convenient size for stuffing into Battle Dress trouser pocket.
3. Your right hand is free for rifle or field-glasses (or cigarette!).
4. The map makes a much smaller target for enemy snipers.
5. The wind doesn't flap it about.

Setting the Map by Road Features.

Setting the map simply means TURNING the map to the correct direction where all the map-signs correspond exactly with the surrounding features.

When the map is set, North on the map will point to North.

Carefully study Figure 5:—

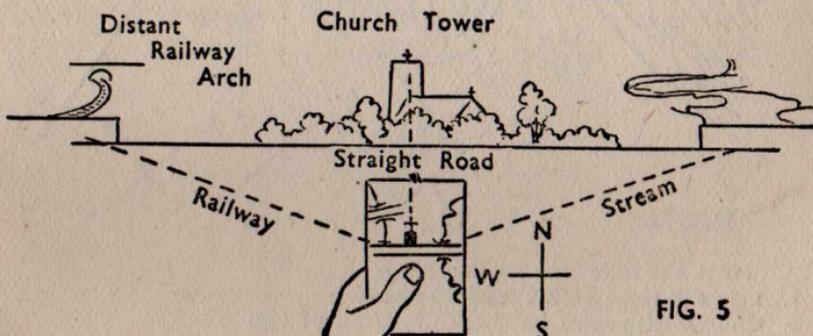


FIG. 5

Note the following points from Figure 5:—

1. Map is set by turning it till map-road is parallel with the actual straight road in front of you.
2. Your position is checked by the church tower.
3. The map-setting is checked by railway to left and stream to the right.
4. An additional check might well be the distant railway arch.
5. In Figure 5, by the luck of Old Harry, you so happen to be facing the North. You know this because:—
 - (a) Your map edges are dead upright.
 - (b) The map-sign for Church-with-tower is dead upright.
6. Remember that when setting a map it is one chance in a thousand that will find you facing due North as in Figure 5.

Now look at Figure 6.

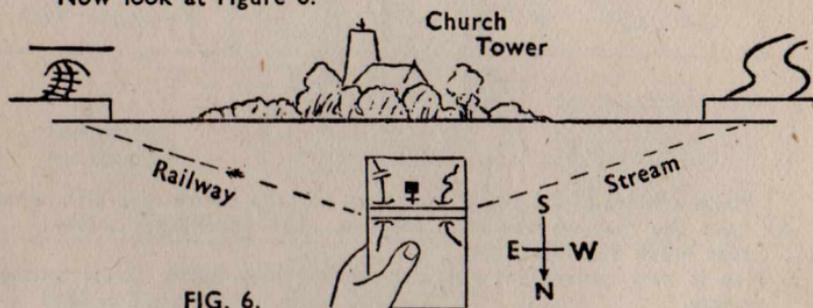


FIG. 6.

Here you are facing due South. You know this because:—

- (a) Your map edges are dead upright.
- (b) The map-sign for Church-with-tower is UPSIDE DOWN.
- (c) If there were any printed place-names on the map, these would be UPSIDE DOWN too. Now look at Figure 7.

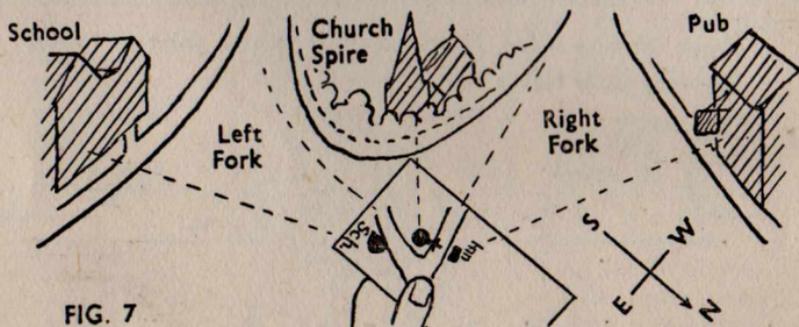


FIG. 7

Note the following landmarks:—

1. Left and right FORK ROADS ahead.
2. Church-with-spire on corner in front of you.

3. Pub over on right (an "Inn" in map-language).
4. School building over on left. (Shortened to "Sch." on most maps.)
Note that you are facing South-West this time.

An extremely careful study of Figures 5, 6 and 7 should give you all the information you want to know about setting the map by road features. Here are a few **GOLDEN RULES**:—

1. Check your map setting by every means possible. It is better to spend a few minutes at the outset of a journey setting your map properly, and studying your route carefully, than to get away in a hell of a hurry and finish up in Paris when you wanted to get to Berlin!
2. Don't get all hot and bothered if you set the map correctly and then find that the map-printing of signs and place-names is all about-face and upside down. This printing is only upright when you are facing North.

Reading a Map Reference.

Did you, in those piping days of peace, ever listen-in to a Cup Final Broadcast?

Perhaps you may recall the "Radio Times" plan of the football pitch, all carefully split into numbered squares; you know: "Jones has got the ball in Square 1, passed it to Brown in Square 2, . . . he's shooting . . . yes . . . good man . . . GOAL!"

Well, thanks to Adolf Hitler, we shall have to take regretful leave of the numbered squares of the football pitch, and come to the numbered squares of the One-inch map, this time for the brutal game of WAR.

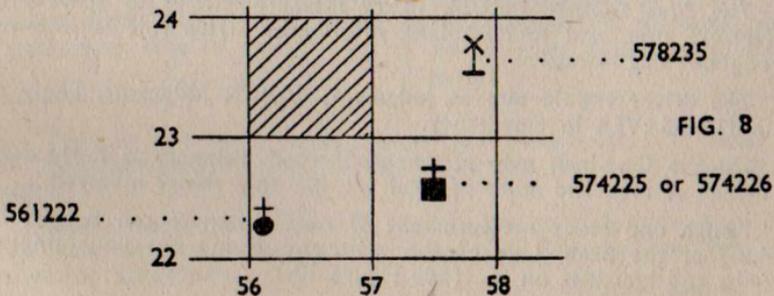
In the bottom margin of most One-inch maps there is a complete explanation of the Map Reference system.

In case your map has not got this explanation, let us see how the numbered "Grid" Squares work.

The squares are usually in violent purple.

Each line has a two-figure number.

To indicate a square, take the left-hand bottom corner of that square, and read off the number of the upright line, followed by the number of the horizontal line. (See Figure 8.)



The shaded square is called Sq. 5623.

To give a more exact indication of position, we use SIX-FIGURE MAP REFERENCES. Example:—

In Sq. 5722 there is a Church-with-tower.

To indicate its position by a Six-figure Map Reference, imagine that the upright lines 57 and 58 are really 570 and 580. Then halfway between these lines would be 575.

But in Figure 7 above the church is not at a point halfway between 570 and 580. It is slightly nearer to 570 than to 580.

Very well, call it 574.

What this extra four means, is four-tenths on the way to 580.

On the horizontal lines, the church lies between 220 and 230. It is slightly more than halfway, so call it 226.

Then we see that the six-figure map reference of this church is 574226. Study this very carefully indeed, and make sure you understand it.

Note that the BASE of the map-sign is taken as showing its exact map-position.

Similarly, in Sq. 5622, the Church with-spire is at Map Reference 561222; and in Sq. 5723 the Wind-pump is at Map Reference 578235.

Once you have got the hang of this, get hold of your friend and practice reading map references to each other until you are fairly QUICK and DEAD ACCURATE.

Measuring Road Distances.

Convoy work on the roads and despatch riding demand accurate measurement of road distances, from the point of view of estimated petrol consumption alone.

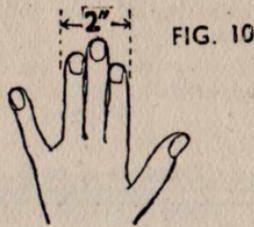
Let us start with short distances first. And from the point of view of the driver, not the quartermaster in charge of petrol.

The first GOLDEN RULE in all measurement is to JUDGE or ESTIMATE first, and to MEASURE afterwards. This rule is followed throughout this Manual.

The driver should aim at judgment, QUICK judgment, likely to be a TIME-SAVER in emergency.

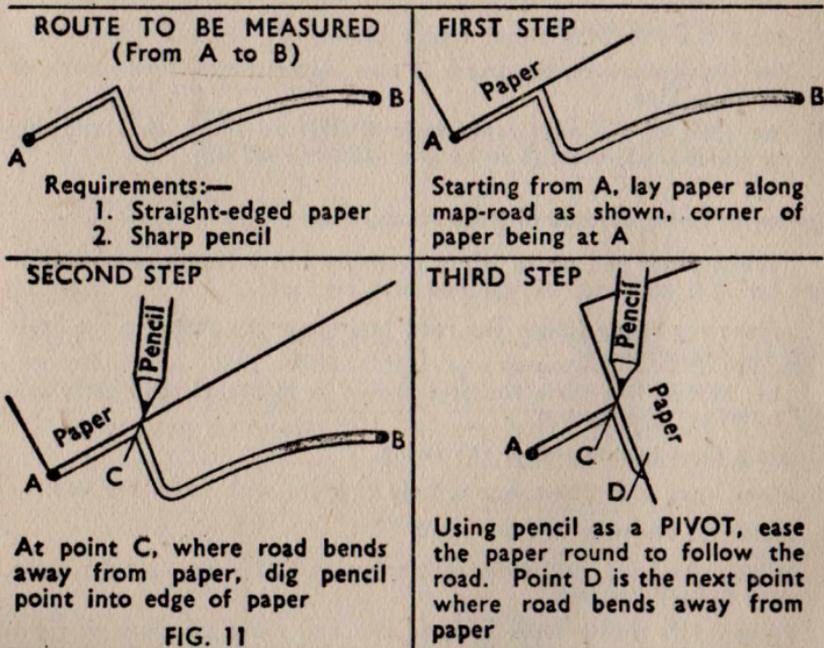
On the One-inch map judgment of road distances is fairly easy, as inches of map and miles of road are the only things involved.

Rough and ready measurement of road distances can be got by looking at the Scale Line of the map, and trying out your fingers, thumbs and knuckles on it. (See Figure 10.)



Here in Figure 10 the three big fingers of one hand measure two inches across. This is two miles of road on the map; something concrete for the driver to go on when he wants to quickly find out the length of a road. Try this method. See how it works.

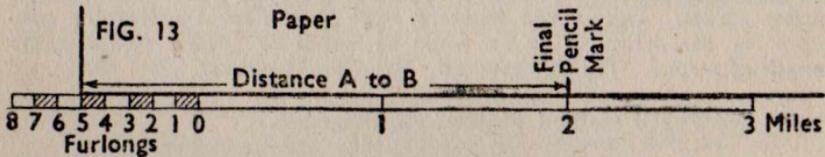
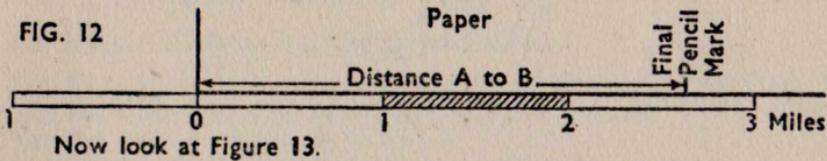
Paper and Pencil Method of Road Measurement.



Thus by alternately moving paper and pencil, the road-bends can be "straightened out" and the distance of the road transferred to the paper.

Now comes the question of applying the road-distance A to B to the Scale Line. Assume that the distance is between two and three miles (by judgment).

Figure 12 shows the checking of your judgment. The distance is between two and three miles.



Note the following about Figure 13:—

1. The pencil mark on the paper is now opposite the 2-mile mark of the Scale Line.
2. The Scale of Furlongs reads from RIGHT to LEFT, thus allowing the number of Furlongs to be immediately read off.

Cotton or String Method of Road Measurement.

When paper and pencil is not available, but a length of cotton or fine string is to hand, this method may be used.

Make the string follow the road, and apply the string to the Scale Line for measurement.

Let us take the same route as shown in Figure 11, and carry out the following thumb-drill:—

1. Tie a knot in one end of the string.
2. Place knot over point A, and hold it there with LEFT THUMB.
3. Hold rest of string in right hand.
4. With right hand, pull string out to point C, holding it tight there with RIGHT THUMB.
5. Release left thumb from knotted end and move up close to right thumb, at point C.
6. Hold string tight at point C with left thumb, moving right thumb on to point D.

And so the string is "paid out" with the right hand, and the left thumb continually moves up "one bound" behind the right.

In this way no slipping can occur, and much TIME can be saved.

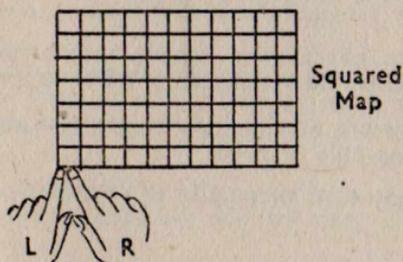
Map-drill for SPEED in Finding Map References.

Since RHYTHM enters so very much into our lives nowadays, the following drill attempts to put some useful, time-saving RHYTHM into a very necessary Map Reading process.

Jitterbug enthusiasts might call this "twitterbugging" with the forefinger of each hand.

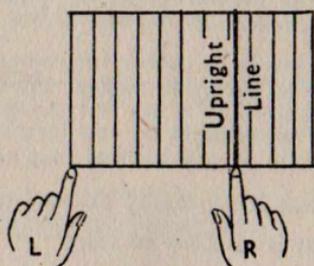
(Note that every fifth Grid line is numbered all along its length.)

STARTING POSITION



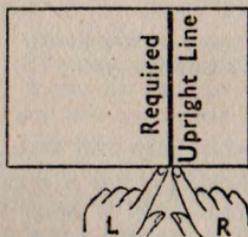
Left and right forefingers close together at LEFT BOTTOM CORNER of map

FIRST MOVEMENT



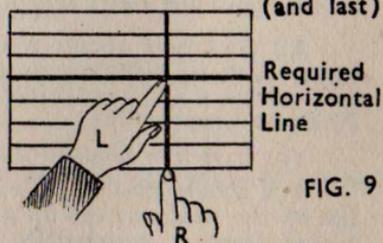
Left hand remains still. Right hand moves ACROSS to find the required UPRIGHT LINE

SECOND MOVEMENT



Left hand joins right at required UPRIGHT line

THIRD MOVEMENT



Left hand moves upwards to find required HORIZONTAL LINE

FIG. 9

Using a Route Meter.

A great deal of thought has been given to the problem of measuring road-distances on the map.

As a result, a useful little instrument has been evolved. This is the ROUTE METER. (See Figure 14.)

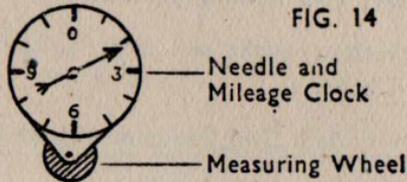


FIG. 14

A ROUTE METER

The measuring wheel is run along the map-road, and the mileage is clocked-up as it goes.

This is a useful instrument to check your vehicle speedometer readings with. It makes map-distances something very REAL to you.

The mileages on this instrument are usually made to conform with the scale of one inch of map to one mile of road

But it can easily be used on any scale of map in this fashion:—

1. Set it to Zero to start.
2. Run it along the required road.
3. Turn it about-face, and run it along the Scale Line till it goes back to Zero again.
4. The point on the Scale Line where it will have reached Zero will then give the exact length of the road.

All map-users should get one of these instruments. A watch-maker or Army "tiffy" could easily make one for you.

Finale to Chapter One.

You have now plodded through the chief map-drill that is required.

You should now be able to fold, hold, and set a map ready for use on the road; to read off a map reference, and to judge or measure a road distance. Incidentally, you will have learned a few of the most important Map-signs.

Speed in all these things will follow with practice. As with gear-changing on a vehicle, these operations will all become automatic and instinctive, leaving your "ACTIVE MIND" free to deal with other tasks in hand.

Now we are ready to use the map on the road.

CHAPTER 2.

"Map using."

Following a Route with the Map.

Five minutes outdoor map reading will teach you more than hours of indoor study.

All the theory in the world about First-Class roads, and Churches-with-Towers will not beat your ABSOLUTE knowledge when you have actually walked down a "main road," map in hand, and crossed over the road to have a closer squint at St. Michael's or what-not church over there, that is marked on the map as an ordinary Church-with-Tower.

It is a good thing to go slow at first, walking along country roads where curious folk won't stare at you and your map.

Later, try to speed yourself up. This can be done by riding in the front of a 'bus, map in hand, following the route as you go, or riding in an Army truck with a map.

Following a train route from the carriage window is good practice, provided there are not too many cuttings to spoil your view.

Whilst on the road with your map, get yourself thinking in terms of miles-per-gallon, miles-per-hour, North direction point, number of miles done, time you should arrive at your destination, and road signs or traffic signs you should meet on the way.

"I should be in Oxford by three o'clock."

"In another two minutes I should be going over a main cross-roads, with a pub on the far right, and there should be a railway arch visible up the left cross-road."

"I am coming to a rather dodgey bend in the road—followed immediately by a fork-roads."

These are the sort of things you should be saying to yourself.

Map-signs and Road-signs.

Let us now consider Map Reading in the light of the Highway Code. Look at the Table in Figure 15.

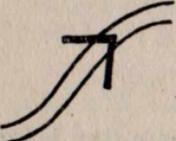
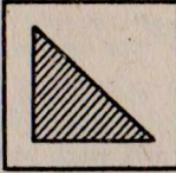
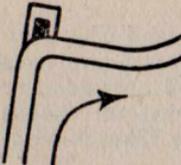
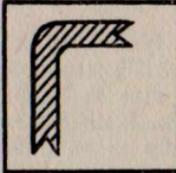
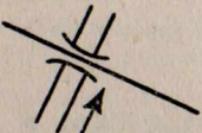
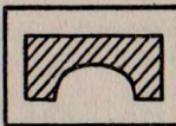
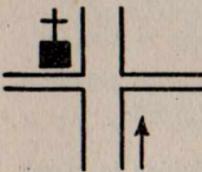
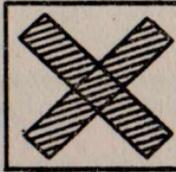
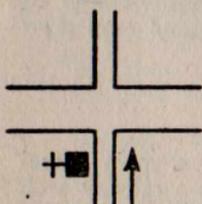
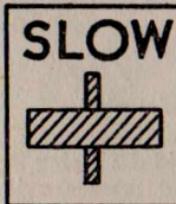
MAP-SIGN	ROAD-SIGN	REMARKS
		STEEP HILL. Map-sign shows a gradient steeper than 1 in 7. The arrow points down-hill.
		SHARP RIGHT-HAND BEND. The dotted white line on the road becomes continuous as a CAUTIONARY SIGN at night.
		LOW BRIDGE. Railway runs OVER road. Good landmark.
		CROSS-ROADS. Minor road crosses a Major road. You are on the Major road. RIGHT OF WAY.
		CROSS-ROADS. Major road crosses a Minor road. You are on the Minor road.

FIG. 15

The above examples can be greatly added to. They are merely an indication of the SPIRIT of Map Reading.

Further interest can be obtained by the examination of the white lines painted on the roads, and the white signs painted beside them. For they are practically your sole guide on a pitch-black night.

Now look at your map-roads and imagine yourself travelling along them, both by day and night.

Road Landmarks, Night and Day.

A road landmark is a prominent feature on or near the road that can be clearly seen from the road and easily found on the map.

Besides the features dealt with in the Table in Figure 15, prominent buildings beside the road are a great help as landmarks.

(It's a pity the One-inch map cannot print the names of country pubs, for they are excellent landmarks.)

Churches beside the road will not be good landmarks at night if they are screened by tall trees. However, on a pitch-black night, if you bend down low and look upwards, the tower or spire will usually be plainly visible against the background of the sky.

Telegraph poles are useful. They can tell you which are the main roads.

Road-bridges over streams are sometimes a snare and a snag. Often the streams are not visible from the road and the bridge-work escapes notice in the guise of a low brick wall.

House numbers in streets of large towns are useful. Most big streets radiate from the centre of the town. As the town grows larger, the streets are built longer, and so the numbers of the houses get bigger. Thus you can fairly safely say that the house number signs get bigger as you go out of town, and smaller as you come in to town.

Railways, rivers, the seashore, and distinctive ridges of hills that run beside the road, or maybe across the road, are useful landmarks.

It is useful to know the ups and downs of the route—how many hills and valleys you must cross. This, and the question of direction, will be more fully dealt with later on.

Selecting the Best Route.

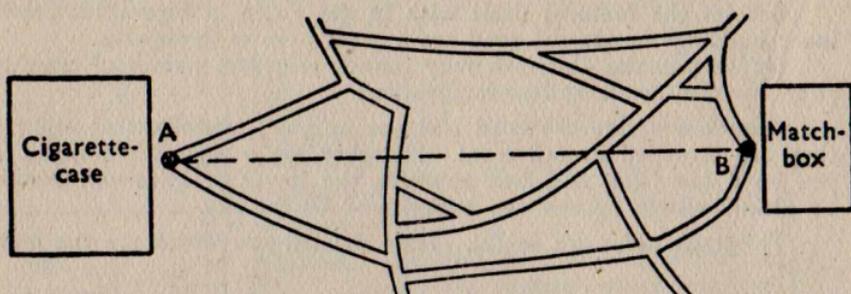
Here is some useful MAP-DRILL for when you have to go from one place to another along a strange route, and have to pick the best way:—

1. Find your starting position on the map.
2. Find on the map the place you have to get to.
3. Carefully examine the possible routes.
4. Consider such details as:—
 - (a) LOAD you are carrying. If heavy load on lorry, avoid steep hills; if important despatches on motor-cycle, QUICKEST route may be needed.
 - (b) SIMPLICITY OF ROUTE—easy to remember—no “dodgy” forks where you might go wrong; it may be better to make the journey a little longer and go by a main road where you won't get lost.
 - (c) WEATHER CONDITIONS. If ice or greasy roads, then avoid steep hills and sharp bends where skids likely.
5. Decide on best route.
6. If no Security question is involved, clearly mark this route on the map. **BUT NOT IN INK!**

Let us examine this Selection-drill a little closer.

Here is a way of examining the possible routes:—

1. Call the starting point A and the finishing point B.
2. Mark A and B clearly on the map—either by sticking pins in them or by laying your match-box and cigarette-case beside them. (See Figure following.)



3. Connect A and B with a straight line (or lay a piece of cotton or fine string along the map, keeping it down with match-box or cigarette-case).
4. Look along this line, searching intently for roads, towns, or villages lying on or close to it.
5. If there is a line of towns or villages, carefully examine the roads connecting these.
6. Mark in the possible routes by faintly ringing the towns, cross-roads, or by other landmarks.
7. Now consider your circumstances—vehicle, load, urgency, weather conditions, etc.
8. In the light of these circumstances, carefully search each possible route for gradient signs, sharp bends, low arches, or bridges unable to carry a heavy load. Some of the routes will thus be eliminated.
9. Now compare the remaining roads from the point of view of surface, distance, by-passing of congested areas or any possible contingencies not already taken into account.
10. As a result of this comparison, you should now have little trouble in selecting the best route for your purpose.

All this sounds complicated, but with a little practice you develop your own system for route-selecting.

Your map-sense, road-sense, and common-sense will do the job for you.

Memorizing the Route.

Ask yourself first, **WHY** do you want to memorize a route? Some probabilities may be:—

1. Having no map of your own, you may have to take a quick look at somebody else's map before setting out on a journey. In this case, if you have time, a route-card, route-panel, or sketch-map may help you. More of this later.
2. You may not wish to constantly refer to your map, or follow the route with your map. Indeed, if it were dark, or if you were motor-cycling, it would not be possible to follow your route with the map.

Let us deal with the second probability first of all.

You wish to memorize a route to save constant reference to the map. In this case the route has either been pointed out to you by a senior or you have selected it yourself.

Now if you have carefully selected it yourself, this fact will already have impressed the most important details of the route on your mind.

But if the route has been selected for you by another person, then its main features must be studied by you.

Here are some rules that may help you to memorize:—

1. Look at the route intently, trying to set the map and picture the roads as though you were travelling along them.
2. Try to get a general pattern of the route in your mind's eye. If you are very lucky your route may be shaped like a huge "W," or "V," or "N," or "U," or "M." Look for this type of thing. If the route has a distinctive pattern, a simple pencil sketch jotted on a scrap of paper will help to impress it in your mind.
4. Remember that routes consist of FOUR main elements—DISTANCE, DIRECTION, LANDMARKS, and TIME. Study the route in terms of these.
5. If your route goes through a series of towns, think of these towns in their correct order. If there are, say, five towns to be remembered, take the initial letter of each town in the order in which they occur, and see if they mean anything, or make a pattern. For instance, Lingfield, East Grinstead, Forest Row, Maresfield, Uckfield is fairly easy to remember because it makes L. E. F. M. U., *lefmU*.
6. If you are driving, or motor-cycling, or have some problem on your mind, don't try to remember too much at a time, but rather split the route up into stages or bounds, memorizing one bound at a time. In this case, five "directions" will probably be the most that you can remember at a time—"Left fork, straight over cross-roads, third on right, first left to round-about." In fact, you'll be very good if you can drive AND remember all this at the same time.
7. WHEN IN DOUBT, CONSULT THE MAP.

Route-cards, Route-panels and Sketch Maps.

A **Route-card** is a post-card or paper containing a clear lay-out of all essential information required for going from one place to another without using a map.

We have previously seen that a route consists of four main elements—Distance, Direction, Landmarks, and Time. Together, these four make a distinct pattern of shape and time.

In making out a Route-card, allowance must be made for the scale of map from which you are taking the route, for the length of the route itself, and for whether it is a simple route along main roads from one town to another, or a complicated route to a pin-point reference along tricky roads.

Since we have only so far been dealing with the One-inch map, here is a specimen Route-card taken from the One-inch map of Portsmouth and Southampton (Sheet 132). (Figure 16.)

Map Reference	Landmarks	Distances between Landmarks	Direction of Travel	Instructions
127307	COWPLAIN (main road)	Starting point	S.W.	Through WATER-LOOVILLE
117291	X-ROADS (minor road)	1¼ miles	N.W.	TURN RIGHT
099314	X-ROADS & WINDMILL	2½ miles	N.W.	KEEP STRAIGHT ON
095318	X-ROADS (main village street)	½ mile	W	TURN LEFT through DENMEAD VILLAGE
093318	FORK-ROADS	300 yards	W	Fork RIGHT
089319	Road-Junction	¼ mile	W	TURN RIGHT
086321	FORK-ROADS	¼ mile	N.W.	FORK RIGHT PASSING SCHOOL ON LEFT
085329	Fork-Roads	½ mile	N	Fork Right
084331	WOOD ON RIGHT	200 yards	N.W.	Destination

FIGURE 16

Now this Route-card (Figure 16), is rather elaborate. Here are a few explanatory notes:—

- Map References.** In this case they were put in because the driver had a faulty vehicle, liable to break down. He therefore wanted some idea of his position in case he had to telephone for help. Map references might be useful for reconnaissance purposes, where a driver could note items of importance along a road, such as bomb-craters, blown-up bridges, trees blown across roads, or flooded sections of road.
- Landmarks.** The WINDMILL was included in this case because it was daylight. But if it were a dark night it would probably not be seen from the road.
- Distances.** These can be a useful check as to your position.
- Direction of Travel.** In this case the driver had a good knowledge of sun-lore, and checked his route by the direction of the sun-shadows. (See Section II.)
- Instructions.** These were clear and simple.

But what about this Route-card as a whole?

Some drivers might have preferred it written out as a short account, like this:—

"Waterlooville. Main X-roads.

) Turn right, three miles, turning left at second X-roads.

Through DENMEAD, forking right at Inn.

Again fork right, passing School on left.

Half-mile further on, fork left.

Wood lies on right 200 yards past fork."

(Compare this with the Sketch-map, Figure 17.)

Supposing you wanted to make a Route-card for a really long road-journey, say of 200 miles.

In this case, of course, you would take your route from a Motoring Map. (The subject of Motoring Maps is dealt with later.)

Your Route-card might have these headings:—

1. Names of chief towns on route.
2. Mileages between these towns.
3. Estimated speedometer mileages for each town.
4. General direction in which travelling.
5. Any really big landmarks, such as Geographical features—rivers or ridges of hills crossed; well-known lakes or mountains passed; industrial belts of "Black Country" or Coal-mining areas passed through; or any other features of significance such as Fenlands or Forest Belts.
6. ESTIMATED TIMES OF ARRIVAL AT EACH TOWN. This is important as it gives you a target to aim at. "I should arrive at Coventry at 3 p.m."
7. Serial numbers of any Sketch-maps appended. These Sketch-maps may show tricky routes along side-roads, or give detailed instructions for getting to an exact destination in some obscure part of the country after you have left the last big town on the route.

For the purposes of getting about in the United Kingdom, all you would really want to know would be the names of the chief places on the route, and the estimated speedo-readings and times of arrival. The sign-posts and A.A. men would supply the rest.

Sketch-maps.

A Sketch-map is a simple yet clear sketch of the chief information you want concerning a route.

Drawing a Sketch-map will help you to memorize a route, because the PATTERN of the route is in this way emphasised.

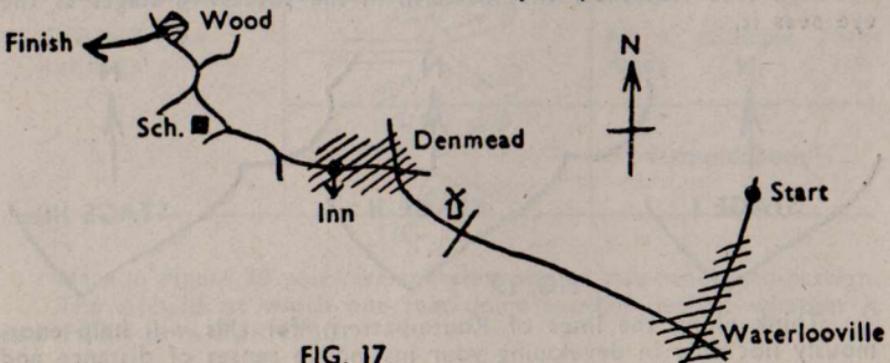


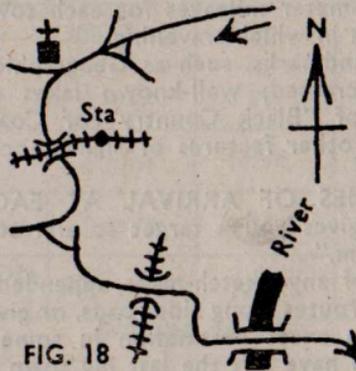
FIG. 17

Figure 16 is a Route-card for a route. Figure 17 is a rough Sketch-map of that same route. Look at it:—

Note the following:—

1. Roads are only drawn in as a SINGLE LINE.
2. Map-signs and map-abbreviations are used for clearness and to save printing.
3. Towns or villages are just shown by rough shading and the name.
4. All cross-roads, forks, and side-turnings are shown, but only as short lines, the main route being continuous and clear.
5. The following details are among those that may be shown if required: Distances, Map References, North Point.

Figure 18 is another Sketch-map taken from the One-inch map, this time showing a route through HALIFAX.

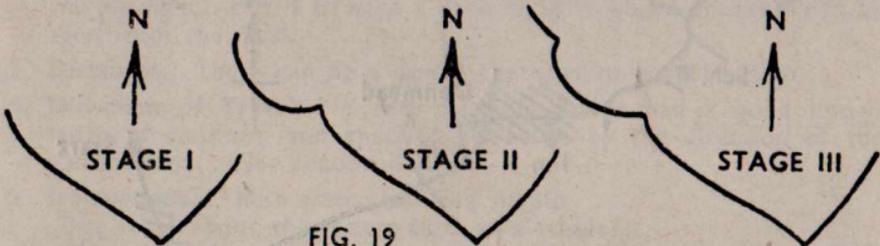


Main roads can be differentiated from minor roads simply by pressing the pencil down harder as you draw them.

Elaborate or artistic work is to be avoided. With thin drawing paper it is possible to trace the Sketch-map direct from the map. BUT QUICKNESS and CLEARNESS are the things to be aimed at.

Let us for a moment revert to the question of PATTERN. In Figure 17, for instance, we have a very distinctive pattern, which should help considerably in memorizing the route.

Figure 19 will show that pattern, in the successive stages as the eye sees it.



Think along the lines of Route-pattern, for this will help enormously not only in developing your instinctive senses of distance and

direction, and your memory for routes, but also your powers of observation and analysis.

Route-panels.

These are merely elaborate Sketch-maps, on which the Grid Lines are inserted for the sake of map-referencing places of importance. The same as on a Sketch-map, outstanding landmarks can be inserted, together with any detail that is not shown on the map from which it is copied. (Roundabouts and certain monuments, for instance.) Road distances are also shown.

Map-sense and Road-sense.

Look at Figure 20.

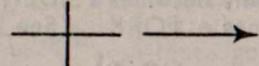
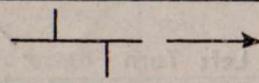
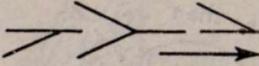
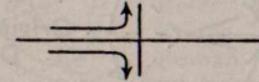
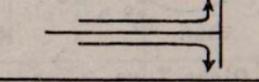
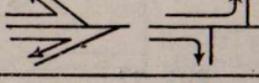
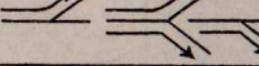
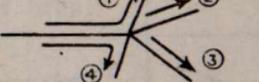
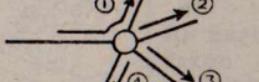
Things you can do on a road	Road-features	Remarks
1. Keep straight ahead		Over cross-roads
		Past side-turnings
		Over a "Y" junction
2. TURN left or right		At a cross-roads
		At a "T" junction
		Into side-turnings
3. FORK left or right		At a fork-roads
4. COUNT the turnings		At a multiple fork-roads
		At a roundabout

FIG. 20

Here in Figure 20 you have the elements of map- and road-pattern. The ANGLE at which one road joins another decides whether it is a FORK or a TURNING.

The word "JUNCTION" is rather vague, as there are both "T" and "Y" Junctions.

Let us be clear, and say that a **fork** is where you change your direction through an angle of 45 degrees or less; and a **turning** is where you change your direction through an angle greater than 45 degrees. (See Figure 21.)

The reason for going into this elaborate detail is:—

1. A clear conception of forks and turns on map and road will help you no end in memorizing and following routes.
2. It will also be of great value to you when thinking in terms of North, South, East and West.
3. Finally, it will eliminate the term "Junction."

(a) A "T" Junction automatically becomes a **TURNING**.

(b) A "Y" Junction, as shown in Figure 20, "Keeping Straight Ahead," automatically becomes a **SIDE-TURNING**; in the reverse direction it becomes a **FORK**. (See Figure 22.)

FIG. 21

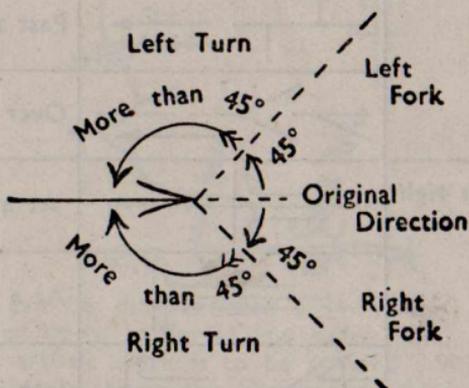
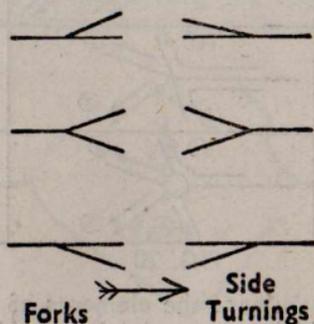


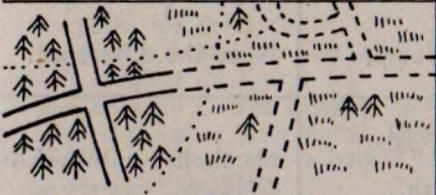
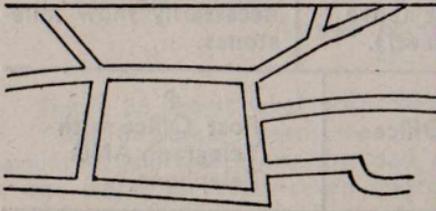
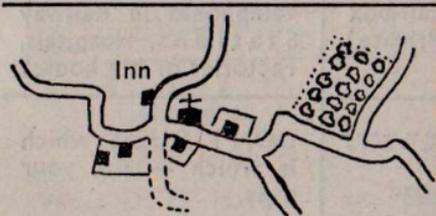
FIG. 22



Road-patterns Across Country.

Finally, to finish off this question of road-patterns, and by way of a change from tedious map-drill, let us have a look at Figure 23. The illustrations in this Table are taken from actual One-inch maps, but they are so utterly typical of road-patterns up and down the country that they deserve a measure of attention.

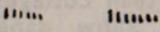
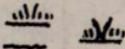
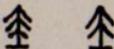
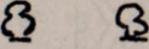
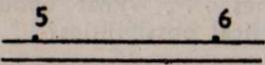
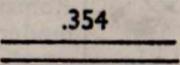
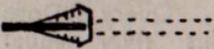
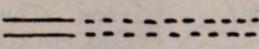
FIG. 23

ROAD PATTERN	REMARKS
 <p>“... upon the blasted heath”</p>	<p>Roads usually unfenced and fairly straight. “Main roads.” More golf courses than cottages? “Christmas” trees show sandy soil?</p>
 <p>“... and Horatius held the bridge”</p>	<p>Roads converge on bridge... River fairly deep and swift? Bridge probably goes back to Roman times... What about modern tactical possibilities?</p>
 <p>“... the moor-hen's haunt”</p>	<p>Roads straight, angular, parallel. Mind you don't go in that dike beside the road... for this is Fenland, damp and foggy in winter.</p>
 <p>“The rolling English drunkard made the rolling English road”</p>	<p>An English village... quaint old Saxon Church? Query: Does “ORCHARD” plus “INN” equal “CIDER”?</p>

Map-signs on the One-inch Map that You should Know.

The following are One-inch map-signs not so far mentioned, but which are of especial value to the driver or road-user (Figure 24):—

FIG. 24.

MAP-SIGN No. 1	MAP-SIGN No. 2	REMARKS
 Windmill	 Windpump.	Note the difference.
 Rough grass or heath.	 Marsh.	Marsh has a WATER-LINE.
 "Christmas" trees.	 "Bushy-top" trees.	Bushy-top shed their leaves in winter. Christmas provide good cover all year round.
 Mile-distance marks, along main roads.	 Spot-heights. (Height above sea-level).	Mile-marks do NOT necessarily show mile-stones.
P Post Office only	T Telegraph Office	P Post Office with Telegraph AND Telephone.
t Public telephone	t.c.b. Telephone call-box (Public or Private)	There are probably telephones in Railway Stations, Hospitals, Factories or big houses.
 Railway tunnel	 Unfenced road	DON'T GUESS which is which — use your eyes.

Military Classification of Roads.

Roads are classified by letters and numbers as follows:—

1. Letters, to show WIDTH.

A—Two traffic streams.

B—One line of traffic, but occasional vehicles can pass.

C—One traffic stream only. Vehicles can only pass at special points on road.

2. Numbers, to show SURFACE.

1—Can take heavy guns and 3-ton lorries.

2—Can take vehicles up to 30-cwt. trucks.

3—Can only take horse transport.

4—Can only take pack-transport. This is the case with bridle-paths for instance.

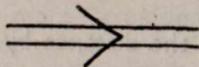
So that a road can be classified as A4 or B1—almost like a soldier's Medical Category.

But because a road happens to have a "low category," it is not to be sneezed at in an emergency. Tracked vehicles can get anywhere, as the Germans showed in the Balkan Mountains, and the Japanese showed in the Malay jungle.

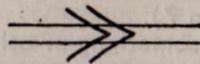
Bridges are the chief "soft-spots" of roads. Watch them!

Road-gradients.

The One-inch map shows two gradient signs for roads. (See Figure 25.) The "Lance-Corporal," or road with one arrow only, shows a gradient steeper than 1 in 7. The "Full-Corporal," or road with two arrows, shows gradients steeper than 1 in 5.



Gradient 1 in 7



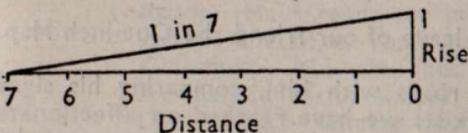
Gradient 1 in 5

Arrows point down-hill

FIG. 25

Figure 26 shows what both these gradients look like.

"One in Seven" means that you rise one foot in height for every seven feet you walk along the road; or one inch for every seven inches; or one metre for every seven metres. Whether you use inches, feet, metres, or what-not, does not matter two hoots.



Gradient 1 in 7

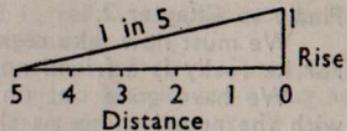


FIG. 26

Gradient 1 in 5

What DOES matter is the proportion between the DISTANCE and the RISE. As that proportion grows smaller, the slope becomes steeper. For instance, you can readily see that 1 in 5 is steeper than 1 in 7.

As a matter of interest, you will note that when you measure distances off the map they will not correspond exactly with the actual ground distances. The map-distances will be shorter, because the map is dead flat; the actual ground-distances will be bigger than the map-distances, owing to the ups and downs of the ground surface.

The difference in the map- and ground-distances are not very important, UNTIL YOU COME TO MOUNTAIN WARFARE.

But for all the explanations and sketches in the world, you really will not understand what a gradient of 1 in 7 means until you go out map in hand to a spot of actual road marked with the gradient-signs, and WALK UP that gradient, or drive your vehicle up, noting the gear changes that were necessary.

It is only THEN that you will have a realistic picture in your mind's eye when you look at the map-sign for a gradient.

Refer back to Figure 15, which gives a Table of Map-signs and Road-signs. The first of these signs is the gradient-sign 1 in 7, followed by the road-sign for a steep hill. Do not let the association of these two signs convey a wrong impression. For road-signs are put up by local authorities, and a sign for a steep hill does not necessarily mean that the hill has a gradient steeper than 1 in 7.

Should you ever wish to calculate gradients from a One-inch map, the mathematical procedure is easy.

1. Measure the road-distance IN YARDS. (Scale Line shows yards.)
2. RISE on the One-inch map is given in feet, either by means of spot-heights or red "Height-lines" (contours).
3. Convert the road-distance from yards to feet.
4. Remember that a gradient is always "1 in something-or-other" (such as 1 in 7).
5. The "something-or-other" is got by dividing the distance by the rise.

6. Thus a gradient is "1 in $\frac{\text{Distance}}{\text{Rise}}$." (See Figure 26.)

7. Example:—If the distance is 600 feet (200 yards), and the Rise is 50 feet, then Gradient is "1 in $\frac{600}{50}$," which is 1 in 12.

More about this in Section II, when we shall deal with contours.

Finale to Chapter 2.

We must now take regretful leave of our friend the One-inch Map. For he really is a friend now.

We have gone out on the roads with him, comparing his signs with the actual things as they exist; we have reached an affectionate understanding with him. We have learned that in many ways he shows the true character and unconquerable spirit of our land.

He has urged us to dabble in art and mathematics; and in psychology and poetry.

Now we must leave him, and turn to those road and motoring maps that bring back so many memories of happy peace-time holidays.

CHAPTER 3.

Road-maps and their Use.

General.

A road-map contains information necessary for motorists or road-users, and excludes other forms of information that are contained on general-maps, such as the One-inch.

The scale of a road-map is smaller than One-inch to the Mile, in order to cover a larger area of country.

Let us take, for instance, the Half-inch map, where a half-inch of map shows a mile of road. Look at Figure 27.

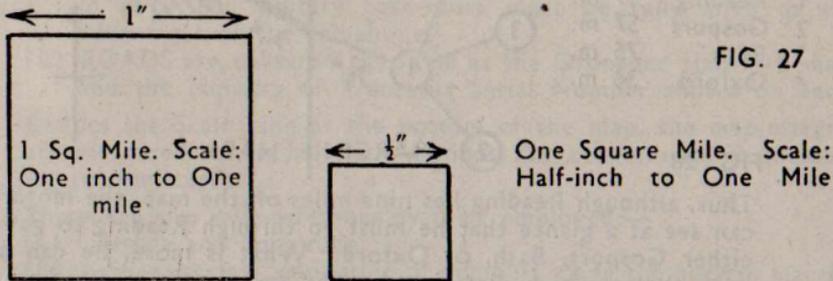


FIG. 27

Figure 27 compares the size of map needed to cover one square mile of country. It will be seen that the Half-inch map only needs ONE QUARTER of the map-space to cover the same area as the One-inch map. On the other hand, the information on the Half-inch map is much more "cramped" in space. But this "cramping" is remedied by leaving out information that is not necessary to the road-user.

Thus, a road-map has for its main job to give a clear cut pattern of roads, and the positions of towns and villages that lie along them.

The Half-inch Map.

This Manual will only deal with two types of Half-inch map, both non-military editions.

1. The Ordnance Survey Half inch Map.

Points of Interest:—

- (a) The map is already folded for road-use, and has good covers.
- (b) The map-signs are much the same as the One-inch map signs. The following points are worthy of note:—
 - i. **Roads.** Main roads are marked in red, secondary roads in yellow, and other roads are uncoloured.
 - ii. **Churches.** ALL churches, irrespective of tower or spire, are marked with a simple, plain cross. (In the same way as the One-inch "Church with neither spire nor tower.")
 - iii. **Telephone Information, Windmills and Windpumps.** As per One-inch map.
 - iv. **Level-Crossings.** Marked with a red "X."
 - v. **Woods.** Do not show the types of trees.
- (c) Where roads leave the map, the margin contains valuable information about where these roads lead to. Example: On the

Greater London (Special District) Sheet, the following information is given about the road leaving the map from Maidenhead (Bucks):—

1. Reading 9 miles
2. Gosport 57 miles
3. Bath 75 miles
4. Oxford 36 miles

Each of these routes is clearly indicated by an ingenious device. (See Figure 28.)

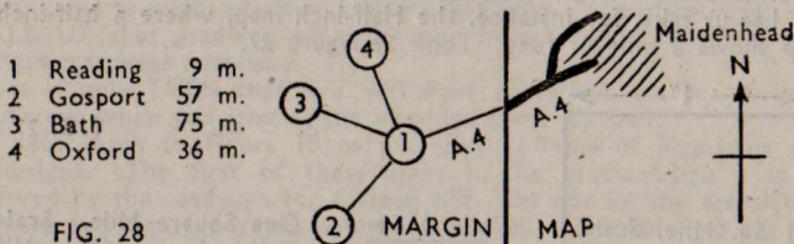


FIG. 28

Thus, although Reading lies nine miles off the map, the motorist can see at a glance that he must go through Reading to get to either Gosport, Bath, or Oxford. What is more, he can see at a glance which direction he has to take from Reading to get there, i.e., North, South, East or West. (Oxford is North-West, for example.)

(Incidentally, this is the Ministry of Transport Road numbered "A.4." It is better-known as the "Great West Road.")

Do not confuse the Ministry of Transport SERIAL NUMBERS of main roads with the Military Classification of roads dealt with in Chapter 2.)

- (d) Instead of a Military Grid Reference system, this map shows two other systems of map-referencing.
 - i. By Latitude and Longitude (show in the margins).
 - ii. The other system defines the position of a point on the map by its exact distance in yards from a starting point in S.W. England.
- (e) This Greater London sheet is well worthy of being added to your map-collection, as it gives an excellent picture of the whole of the Metropolitan Traffic Area, which is the veritable HUB of the great traffic routes of the British Isles.

2. Bartholomew's Half-inch Maps.

This is an excellent and useful series of delightfully clear and well-set-out maps.

Chief points of interest are:—

1. As on Geography Atlas maps, the hills and valleys are depicted by the "layer-tinting" method. A different tint of green shows every "100 foot layer" of ground from sea-level to 400 feet, then brown tints show further rises above sea-level in 200 foot layers. Thus the main geographical features that are useful for direction-checking stand out very clearly. For example, on Sheet 32 (B.3),

which takes in the whole of Sussex, the lines of the North and South Downs and the Weald are very clearly shown. This is especially valuable for night-driving.

2. The map-signs are rather different from the One-inch and Half-inch Ordnance Map-signs. Some good features are:—
 - (a) The more important Inns are named. This gives an invaluable guide to distance, direction, and position.
 - (b) County boundaries are clearly coloured. This is important. A question which is continually cropping up amongst troops is, "Which County is such-and-such a town in?"
 - (c) A.A. and R.A.C. roadside telephone boxes are clearly marked in red. All military road-users must be fully alive to the advantages of the telephone.
 - (d) ROADS are coloured the same as the Ordnance Half-inch map, and the Ministry of Transport Serial Number shown on each.
3. Besides the Scale Line at the bottom of the map, the map-margins are measured off in half-inch sections, for convenience in measuring road-mileages.
4. There are two map-reference systems employed:—
 - (a) Latitude and Longitude.
 - (b) A Sheet system, consisting of numbers along the bottom margin, and letters along the side margins. On Sheet 32, for instance, Horsham is 7h.

These Half-inch maps, and other equally good series of Half-inch maps, are a good introduction to the use of motoring maps of a smaller scale. In the same way as a good soldier should be readily adaptable for the use of weapons and vehicles other than those he customarily uses, so should he be readily adaptable at using other maps. This will apply with the greatest force on the opening of the Second Front, when many types of Continental maps will have to be used. Get your practice in now.

The Quarter-inch Ordnance Map, Military Edition.

Some experience should be gained in the use of the Half-inch map before you proceed to the Quarter-inch, otherwise it will put a bit of a strain on you to start with. Like the driver of a 3-ton lorry who is suddenly faced with the task of driving an 8-cwt. "Utility" vehicle.

Once you get accustomed to using this map, though, you will find it one of the handiest maps there is for getting about over large areas with.

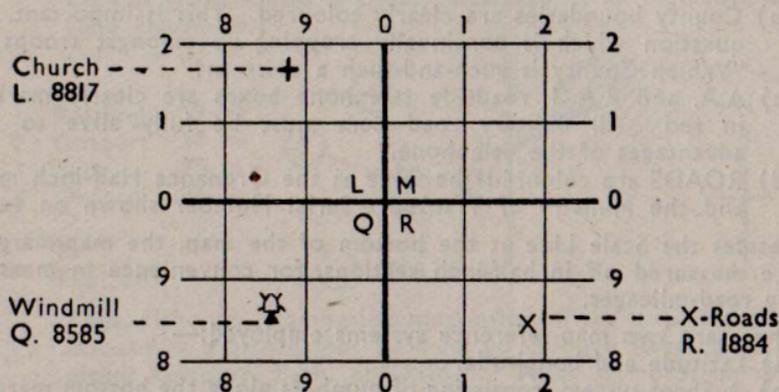
Here are some points of interest about it:—

1. **Map References.** The same Military Grid System that is used on the One-inch Ordnance map is used. But owing to the much smaller scale, six-figure map references are out of the question. Instead, four-figure map references are used, corresponding exactly to the four-figure references used to indicate the Grid Squares on the One-inch map (as explained in Chapter 1). Owing to the big area covered by one of these Quarter-inch maps

(get hold of one and see for yourself), a letter has to be placed in front of the four-figure reference to fix it in the correct area of country. (See Figure 29.)

As with the One-inch map, the system of map-referencing is fully explained on the bottom margin. Examples from the map are taken as illustrations.

FIG 29



Points to note about Figure 29:—

- (a) Each Grid Line has a SINGLE number. On the One-inch map it was a DOUBLE number.
 - (b) Note how the letters are placed at the corners of their respective squares, and how the lines separating these squares are drawn THICKER than the other lines.
2. **Map-signs.**
 - (a) **Roads.** Main roads are in red; other roads uncoloured.
 - (b) **Churches.** All churches are marked as a plain cross, like a "plus" sign in arithmetic. This applied also to the Half-inch map.
 - (c) **Windmills and Marsh** are marked, with the same signs as for the One-inch map. But no WINDPUMPS or ROUGH GRASS (HEATH) are marked. (Refer to Figure 24.)
 - (d) **Woods** are shown in green, but the type of tree is not shown.
 3. **Contour-lines.** ("Height-lines.")
These are shown to represent every 200 foot rise above sea-level.
 4. **Latitude and Longitude** is shown in the margins.
 5. **Size of Map.** This sized map is very awkward to fold to a convenient size for road-use like we folded the One-inch map, and like the civil motoring maps are all folded.
This is a very important point. A great deal of precious TIME can be wasted in fumbling about with a map whilst a life and death battle is in progress. Further time is wasted from the point of view of actual use on the road by the fact that when the map is completely unfolded a huge area has to be constantly scanned in order to find your position and route. You can now realize why this Manual stressed Map-Folding-Drill at the very outset.

Apart from the time when you are examining the map in order to select or memorize routes, remember that a good map-user keeps his map folded up small. Only Generals like their maps unrolled before them, for they have to get a clear picture of the complete military situation over a huge area.

6. **Road-patterns and Angles.** You have to be very pattern and angle-conscious when using the Quarter-inch map. A careful study of the question of forks and turns, as briefly outlined in Chapter 2, combined with the correct drill for setting the map by road-features, as shown in Chapter 1, will be your chief guides to direction and map-position.

You have not got the detailed map-signs of the One-inch and Half-inch maps to guide you now, and your judgment and measurement of road mileage must be greatly improved. Nor will the Gradient-signs help you now, for they don't exist. The contour lines will only help in mountainous areas. The fact that they only show rises of every 200 feet above sea-level is of no use to you at all. For even in a rise of, say, 20 feet there may occur a gradient of such steepness that your vehicle will not "take it." The question of contours will be fully dealt with in Section II.

The "Geographia" Three-Miles-to-the-Inch Map.

Here is a very useful and good series of road-maps, published at a very cheap price. Some practice in using this scale of map will certainly be an asset. The Scale is almost the same as that of the German Military Topographical Survey 1/200,000 series of maps.

The chief features of the map are:—

1. It is essentially a ROAD-MAP, containing scarcely any other information than that needed for getting about by road. Thus it is able to contain much detail regarding place names and minor roads.
2. **Map-signs.**
 - (a) **Roads.** Main roads are marked clearly in RED, secondary roads in GREEN. Minor roads are uncoloured. Fencing or otherwise of roads is no longer taken into account, all roads being shown by continuous double-line.
 - (b) **Churches,** irrespective of tower or spire, are shown as a plain +, the same as the Quarter and Half-inch maps.
 - (c) **Buildings.** Much unnecessary detail as regards houses or buildings has been left out. For instance, the map-sign for a church, and a tiny dot or two to represent houses, are all that is shown of a village. This is where the type of map-printing comes in handy, as the size of the village can be told by the type of print used in showing the name of it. In the case of big towns, the spacings between the streets are shaded to represent the houses.
 - (d) **Landmarks.** Outstanding landmarks such as Inns, Lime Works, Monuments, and Water-towers are clearly shown.

3. **General.**

The map is conveniently folded into 21 sections, pocket size. Road-patterns and the angles of forks and turns are clearly shown by the

main roads; but the minor roads may present the inexperienced map-user with a bit of a problem, until he gets thoroughly used to the idea of mileage and scale.

However, if you have carefully followed the directions given in this Manual, you should now be able to romp away with a map of this type.

The Michelin 1/200,000 Scale Road-maps.

This is an excellent series of maps that covers not only the British Isles, but also the Continent.

The scale is 3.15 miles to the inch.

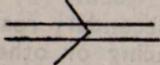
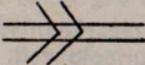
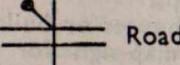
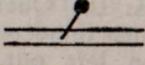
These maps were primarily intended for pleasure or business motoring in peace-time. But they can very easily be adapted to the grim business of war.

As an example of this, there are special map-signs to indicate stretches of road from which good views of the surrounding country can be obtained. These stretches of road are of prime tactical importance, both in attack and defence. (See Figure on next page).

As another example, road gradients are marked with very great accuracy, and as Figure 30 will show, they vary from gradients of 1 in 20 to 1 in 10 and above. What was useful information to the commercial heavy-lorry driver in peace time, is certainly useful information to the soldier in this modern War.

The Michelin Guides are also excellent, showing special town-plans with numbered exit-roads.

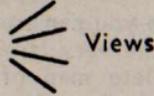
FIG. 30.

Map-sign No. 1	Map-sign No. 2	Map-sign No. 3	Remarks
 1 in 20 to 1 in 14	 1 in 14 to 1 in 10	 1 in 10 and steeper	Gradient-signs. Arrows point UP-HILL. BLACK.
 Road Level-crossing	 Gate across road	 Bad bump or Gully	Black dot and line are CAUTIONARY signs.
 Church	 Castle	 Ruins	Only interesting as CURIOSITIES.
 Church	 Castle	 Ruins	Of importance as LANDMARKS.

In figure 30, the last differentiation of Churches, Castles and Ruins is very interesting and of the utmost military value.

A few final points of interest about these maps are:—

1. **Roads** are red, yellow, or uncoloured; broad or narrow; according to their importance. Mileages along roads are shown in red.
2. Picturesque roads have a green line running beside them. Thus beauty finds her way from the road-side to the map.
3. Good views are shown in BLUE as



4. The "plus" sign that usually means a church on other motoring maps means a Cemetery here.
5. PRACTICE in the use of these maps in England will help no end in getting about on the Continent. For these maps are an International series, specially designed for peace-time tourists.

Bacon's "Eight Miles to the Inch" Motoring Map.

On one map, in 27 neatly folded sections, the whole of England and Wales is shown. It is a truly amazing map.

Roads are shown RED or UNCOLOURED, broad or narrow, according to their importance. Mileages are clearly marked on main roads.

Place-names are clearly marked, the size of the printing showing the size of the place represented.

Ministry of Transport road-numbers are clearly shown.

Railways and Railway Stations are shown.

Road-pattern and Road-angles of forks and turns stand out quite clearly. The new By-passes are clearly shown in BLUE.

Have you ever thought of the immense amount of painstaking and thorough labour involved in the production of such a map?

The only map-signs used are those representing roads, railways, places, important rivers and mountain peaks. Names of forests are given, as are also the names of ranges of hills, which are written across the map where the hills are met, and in such size printing, and so spread out as to truly show the LENGTH and HEIGHT of the hills.

All this is very interesting, for this map is the "Half-Way House" between the large scale One-inch and Half-inch Maps, and the maps of England and Wales found in Geography Atlases.

Practice in using this type of map is invaluable for drivers and road-users involved in a swift war of rapid movement over long distances in the "Western European" type of country. Ideal for Second Front purposes against Germany in other words.

Finale to Chapter 3.

In this Chapter, a new experiment in Military Map-reading has been tried. The tapping of peace-time road, touring, and motoring experience in the using of maps; this tapping having for its object the requirements of Modern War.

In Field Service Regulations, Vol. II, it is written:—" . . . every individual soldier must be restlessly inquisitive in his quest for information . . ."

Information about maps is only to be got through the actual seeing and handling of maps. Knowledge about Map-Reading only comes through actual use of maps, and COMPARING and CONTRASTING one map with another; and comparing ALL maps with the actual ground.

To the enthusiastic Map-Reader, ALL is grist for the mill, cheap maps, dear maps, small maps, big maps, British maps, Foreign maps.

It is only when you can trace the whole process of maps upwards or downwards from the very large-scale Six-inches to One Mile Ordnance Map to the complete map of a country or Continent, as seen in a Geography Atlas; it is only then that you are beginning to get a TRUE CONCEPTION of what a map really is.

In Chapter 3, no mention has been made of the excellent A.A. Maps, or of many more highly reputable maps produced by civilian firms and organizations. Only a few maps were taken at random, from a field so wide in range and choice that few other countries can compare . . .

If you would increase your map-reading knowledge and ability, then, widen your field of maps. Use 'em all!

. . . and so we come to the end of Section I, "Map-sense, Road-sense, and Common-sense." Perhaps it may be timely to say a word about a very important subject, that of ASKING THE WAY.

Asking the Way.

This is a dangerous practice in War-time. Reasons:—

1. The Fifth-Columnist, or enemy in disguise—when Continental warfare starts again, he will try his best to misdirect you.
2. The Language problem—if the peasant you ask doesn't speak English, do YOU know his language?
3. The "stupid person" problem—"stupid persons" exist everywhere who cannot for the life of them direct you to a place situated more than a mile from their own locality.

Methods of tackling these problems:—

1. DON'T ask the way—rely on Map-sense, Road-sense, and Common-sense.
2. If you really have lost the way, then keep to "YES AND NO" questions, that only demand ONE WORD in reply. Example:—
"Is this place called POTSDAM?"
What is the name of this village?"

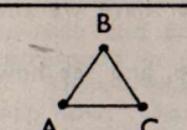
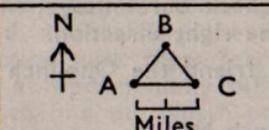
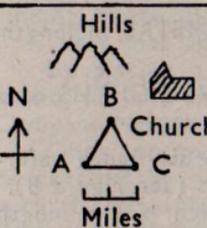
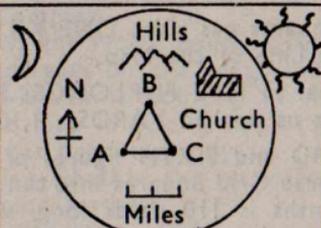
SECTION II.

"GETTING THE LIE OF THE LAND."**Introductory.**

The time has now come for us to leave our vehicles by the roadside, and strike out on foot across country, taking forest, mountain, and cultivated plain into our stride . . .

What do we mean by "getting the lie of the land?" Look at Figure 31.

FIG. 31.

Diagram I	Diagram II	Remarks
 <p>Route "Pattern"</p>	 <p>Distance and Direction</p>	<p>"Pattern" has now been partly framed by Distance and Direction.</p>
 <p>Landmarks</p>	 <p>"Time"</p>	<p>The "Distance-Direction" Pattern has now been placed in a complete framework of Landmarks and Time.</p>

Notes on Figure 31.

1. A triangle has been chosen to represent the general SHAPE or PATTERN of a route. Every Route has its own distinctive pattern of course.
2. Distance and Direction are shown by the Scale Line and North Point.
3. GOD'S Landmarks are shown by the hills; MAN'S Landmarks are shown by a church. (Man's tribute to God.)
4. The Sun and Moon not only represent TIME taken to cover a route; but they also make you consider whether it is DAYLIGHT or DARKNESS.

Get this picture clearly in your mind's eye when you think of a route; for whether you are driving a vehicle along a road, or striking out across country, or steering a ship across the watery wastes, or piloting a plane across the starry skies, the same general PRINCIPLES apply.

A map will give you the LIE OF THE LAND; and if you treat it with respect, and keep the TIME-FACTOR in mind, it will get you about from place to place without fear of losing the way.

CHAPTER 4.

DISTANCE AND DIRECTION.

We have seen in Figure 31, that next to the general pattern of a route, DISTANCE and DIRECTION take their places.

We instinctively treat Distance and Direction as inseparable companions when for instance we say, "20 miles to the South-East"; or when we give a fire-order, "Number three Section—Five Hundred—Quarter right—Gap in hedge . . ." The one is no good without the other.

Our sense of distance and direction must be developed side-by-side. Now that we have left our vehicles on the road, we no longer have the speedo readings to check our mileage; neither have we the broad tarmac to keep us in the right direction.

So let us turn to our old friend the One-inch map, and see how he can help us.

Distance-Judging on the One-inch Map.

Think of how you read a map-reference.

Each of the "Grid" Squares has sides ONE KILOMETRE in length. Check this from the Scale Line of the Map.

One Kilometre is equal to FIVE FURLONGS; FIVE-EIGHTHS of a MILE; or 1,100 yards. Let us deal in YARDS. 1,100 yards.

To read off the THIRD and SIXTH figures of a six-figure reference you have to divide these Grid Squares into tenths (see Figure 8). So that each of these tenths is 110 yards long, which is the length of a football pitch. (Funny how football keeps getting mixed with map references!)

So that in Figure 8 for example, if the map reference of the Church-with-Tower had been given as 573226, instead of 574226, the church would have been nearer to the 57 Grid Line, by 110 yards, or the length of a football pitch.

This is a very useful piece of knowledge, for it means that if we can read a map reference, we can also judge hundreds-of-yards on the map. Which means that we can also judge march-paces on the map. For in 110 yards there are 132 paces, each of 30 inches.

Direction-judging on the One-inch Map.

In Figures 5, 6 and 7 we have seen how to set a map by road features, and thus be able to determine the North point.

Although we are no longer on the roadside now, we can still use this same method, for there are still straight features to go by such as railway-lines, canals, and certain straight-edges of distinctly-shaped and easily-recognized woods.

Failing this, there are still PROMINENT BUILDINGS or WORKS, such as Windmills, Church-spires in the distance, Collieries, and distant Railway Arches. (See Figure 32.)

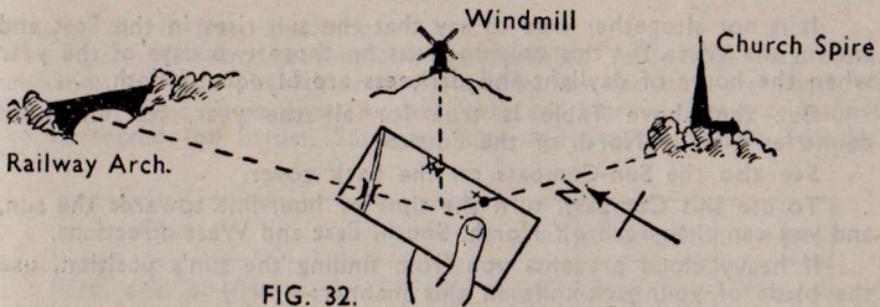


FIG. 32.

Finally, we could set our map by main Geographical Features, such as rivers, ridges of hills, or the sea-shore.

But so far we have only set the map by recognizing features both on map and ground, and turning the map round till the map-signs correspond in direction with these features.

There remains a fundamentally different method of setting the map now. That is to find the North point of the map, and turn the map round till that North point actually points in the direction of North. We shall now see some methods of finding this North point.

Finding North by Compass.

Every map shows the North point in the margin. (See Figure 1.)

By placing a compass on the map, and gently turning the map round till the map-North is pointing in the same direction as the Compass North, the map is quickly set. (See Figure 40 and detail.)

Once the map has been correctly set in this way, the setting can be checked by noting whether the map-signs correspond in direction with the actual ground features.

Finding North from the Sun.

Here is a Table of simple rules about the sun:—

Normal Time	British Summer Time	Double British Summer Time	Position of Sun in Sky
6 a.m. or 0600	7 a.m. or 0700	8 a.m. or 0800	EAST
9 a.m. or 0900	10 a.m. or 1000	11 a.m. or 1100	SOUTH-EAST
Noon or 1200	1 p.m. or 1300	2 p.m. or 1400	SOUTH
3 p.m. or 1500	4 p.m. or 1600	5 p.m. or 1700	SOUTH-WEST
6 p.m. or 1800	7 p.m. or 1900	8 p.m. or 2000	WEST

FIG. 33

It is not altogether true to say that the sun rises in the East and sets in the West, for this only happens on those two days of the year when the hours of daylight and darkness are of equal length.

But the above Table is true for all the year, for all those countries that lie North of the Equator.

See also the Sun-Compass on the back cover.

To use this Compass, turn the time or hour-line towards the sun, and you can then read off North, South, East and West directions.

If heavy cloud prevents you from finding the sun's position, use the blade of your jack-knife in this manner:—

1. Hold it upright on a piece of white paper or map.
2. Slowly twist it round.

It will reflect light on to the paper when it is turned towards the sun. Try it and see.

If you set your map, and so find North, you can test out the accuracy of the Magnetic Compass, and the Sun-Compass. You will find this very interesting work.

A popular method of finding direction from the sun is by means of a WATCH. The watch is used as a sun-compass. The drill is as follows:—

1. Point the hour hand to the sun.
2. Note the point that lies half-way between the hour-hand and the 12 o'clock mark.
3. A line from this point, through the centre of the watch, and so behind you, will point NORTH.
4. A line from the centre of the watch, through the point mentioned above, will point due SOUTH. (See Figure 34.)

But remember to first of all make allowance for British Summer Time and British Double Summer Time.

British Summer Time is one hour in advance of Normal Time.

British Double Summer Time is two hours in advance.

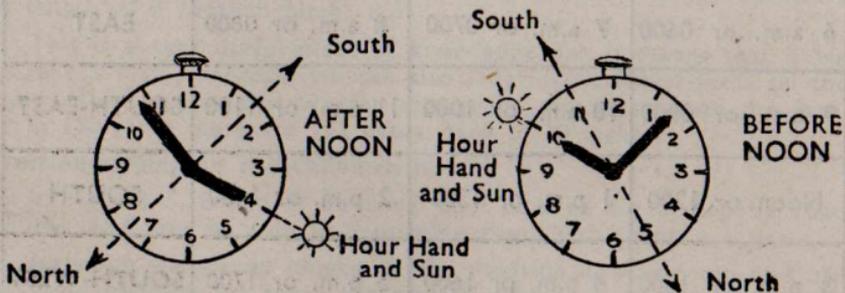


FIG. 34.

One final interesting point about the sun. If you can find a SUN-DIAL, whether it be night or day, the 12 o'clock mark on the Sun Dial always points to the North. There are no figures on the South Side of the Sun-Dial.

Finding North from the Moon.

Figure 35 shows a simple moon-direction Table that may come in handy at night when the moon is visible, but the stars are obscured by cloud. The times given in the Table are Normal Times and must be corrected for British Summer Time and Double British Summer Time.

Moon Phase	6 p.m.	Midnight	6 a.m.
First quarter—Horns to LEFT 	South	West	North
Full Moon 	East	South	West
Last Quarter—Horns to RIGHT 	North	East	South

FIG. 35.

Try this Table out, and see for yourself whether it is correct. Check it against other methods of Finding North.

Finding North from the Stars.

At night the stars appear to revolve round the sky as though they were fixed to a huge wheel. The centre, or hub, of this wheel is marked by the Pole Star, which appears to keep in the same position all the time.

The Pole Star marks the True North point very accurately. If you can find this star at night, and point to it, you are pointing to True North. But the Pole Star is not very bright, and in order to find it we have to look for other stars that will act as "Sign-posts" to it.

There are two star-groups, easily found in the sky, that act as Sign-posts to the Pole Star. One is called The Plough, and the other Cassiopeia (or the "W" Plan). (The Plough has many other names, such as Charles's Wain, The Waggon, The Great Bear, and Ursa Major.)

These Star-groups will be found in the sky at different positions for different times; and never in quite the same position at, say, 10 o'clock on successive nights. Get hold of a person who knows these Star-groups, and ask him to point them out to you. Once seen, never forgotten.

Figure 36 shows the two Star-groups in relation to the Pole Star. Note the following:—

1. The two bright stars of The Plough that point to the Pole Star are called the "pointers."
2. The distance from the nearest "pointer" to the Pole Star is about $5\frac{1}{2}$ times the length of the "pointers."
3. The Plough and the "W" Plan are on dead opposite sides of the Pole Star. This is very convenient, for if one of these Star-groups is obscured by cloud, the other may still be visible.
4. If you do not already know these Star-groups, LEARN them with the least possible delay.

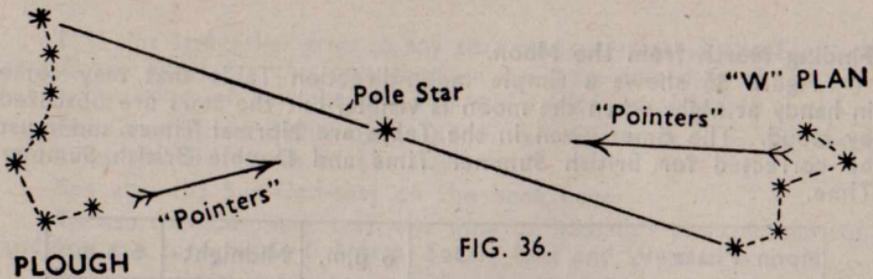


FIG. 36.

Finally, the planet VENUS is to be found just before sunrise in the East, and just after sunset in the West. Hence its names, "The Morning Star" and "The Evening Star."

Get hold of a good book on Astronomy. It will be a revelation to you.

Finding the North Point by other Means.

Other means of finding the North Point are not so reliable as the foregoing ones, but nevertheless they may be of use on occasions.

1. **Weather-Cocks** on buildings. These are often overlooked.
2. **Old Churches.** These are usually built in the form of a Cross, with the Altar facing the East. (See Figure 37.)

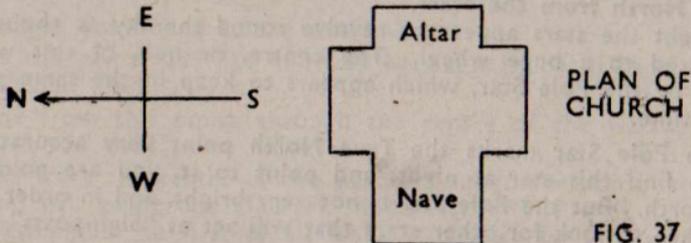
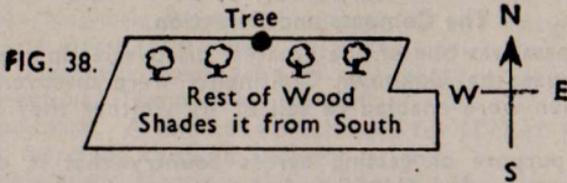


FIG. 37

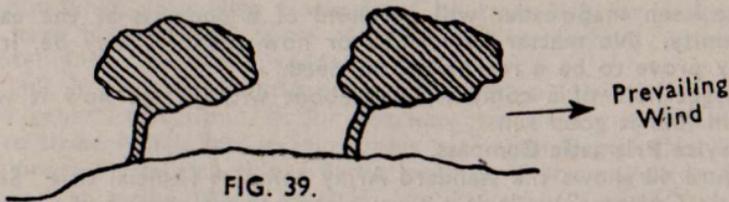
3. **Old Tomb-stones.** These usually point to the East.
4. **Names of Main Roads.** "London Road," "Brighton Road," "Sheffield Road." These usually point in the direction of the town after which they are named. From this information, plus a map, the North Point can be found.
5. **Names of Town-districts.** "Westgate" in Wakefield, and "Eastville" in Bristol lie respectively to the West and East of these places.
6. **Direction of Prevailing Winds.** Beware of these, for winds vary in direction according to the season of the year, according to whether it is day or night ("Land and Sea Breezes" for instance), and according to how they have been diverted from their original course by ranges of hills, or streets of houses.
7. **Effect of Wind and Sun on Plant Life, and Buildings.** This is another thing to beware of.

(a) It is a popular fallacy that MOSS always grows on the North side of trees and buildings. The truth is that moss grows on the damp side. This side is not necessarily the North side, although it is true that the North side lies in the sun-shadow. Figure 38 shows the example of a tree, growing in a wood, where the moss will be on the SOUTH side; or growing all round it.



(b) In open, wind-swept areas, the growth of trees will be affected by any strong prevailing winds. This gives them a distinctive appearance. (See Figure 39.)

But make sure that it is not merely the growth of ivy or some other parasite-plant on them that has prevented their balanced growth.



(c) In towns, buildings become caked with a black, sooty substance. Where there is a prevailing, rain-bearing wind, this substance will be washed off on that side. Look out for this sort of thing, and check up on its usefulness.

(d) A large number of old English country houses, that stand back from the main roads, are built with the fronts facing the South, or "sunny" side. The curious thing is that the "front doors" are not necessarily found on the "front," which is, however, unmistakable from the architectural design. Beware of houses that have been built to conform with the direction of main roads.

This list is by no means exhaustive. A further point worthy of investigation, for instance, is that concerning TELEGRAPH POLES. It is said that the cross-bars are fixed on to the main pole so that the cross-bar stands on that side of the road or railway that points to London.

The main thing is, that you should not leave a stone unturned in the checking of any items of information that you can gather from farmers, fishermen, shepherds or lighthouse-keepers on this vital question of DIRECTION.

Our Tommies who were out in the Greek mountains, and the Libyan desert, and the Malayan jungle, know exactly how difficult it is to find one's way about in mountains, desert, and jungle.

CHAPTER 5.

The Compass and Direction.

The Compass was one of the greatest discoveries in the history of Man. By its use the Unknown Continents were discovered and explored; and men were enabled to sail or fly whither they liked across the globe.

For our purpose of getting across country that is difficult and strange, the compass has THREE main uses:—

1. It can give us the North Point at any hour of the day or night, and irrespective of weather conditions.

This is an invaluable help, whether you possess a map or not.

2. It provides a quick and sure method of setting the map, thus enabling us to quickly "get the lie of the land."

3. It enables us to march in a STRAIGHT LINE or FIXED DIRECTION through thick forest, or thick fog, or on a pitch-black night.

The keen map-reader will get hold of a compass at the earliest opportunity. No matter how small or how cheap it may be, it may one day prove to be a real friend in need.

So get hold of a compass, play about with it, see how it works. You will find it good fun.

The Service Prismatic Compass.

Figure 40 shows the standard Army compass (official title "Service Prismatic Compass"). It is a very elaborate affair, and the numbers on the diagram show the chief parts that you should know. The names and uses of these parts are as follows (compass is shown open for use):—

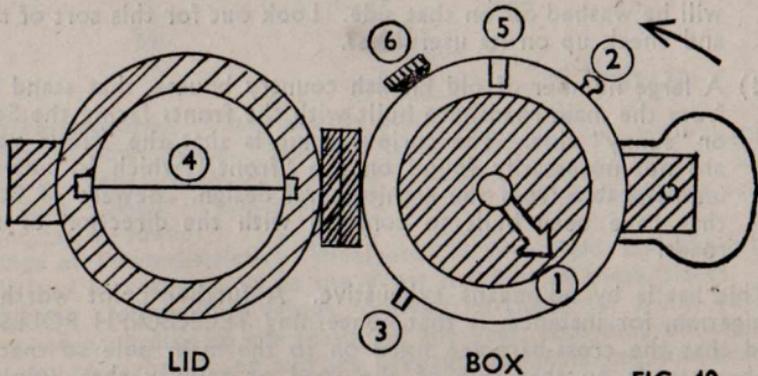


FIG. 40.

1. **Compass Needle.** When allowed to swing freely, this will come to rest in the direction of MAGNETIC NORTH. The needle is LUMINOUS (shows up clearly in the dark—but expose it well to the light before you use it in the dark).
2. **Stop.** Push this forward in the direction of the arrow, and the needle will swing freely. Push it back, and the needle is then clamped or stopped. (Shutting the compass lid will do this automatically.)
3. **Check-stud.** If the needle swings too violently, gently press this stud, which will act as a brake.

4. **Hair-line.** This is used for setting the map. The Hair-line is laid along the Magnetic North Line shown in the margin of the map. The map is then gently turned till the compass needle, the Hair-line, and the Magnetic North Line of the map are all pointing in the same direction. The map is now set.
5. **Direction-mark.** A luminous patch used for NIGHT MARCHING or daylight marching through a forest or fog.
6. **Clamping-screw.** Unclamp this screw and the glass cover containing the Direction-mark can be twisted round till the Direction-mark is in the position you require for your march.

Marching in a Fixed Direction.

As far as possible, you should march by the map, keeping the map set and your left-thumb marking your position, as shown in Figure 4. You can practise this every time you go for a walk in the country.

But when your view is obscured by trees, fog, or darkness, you will have to march by some of the direction-methods mentioned in Chapter 4, i.e., stars, sun, moon, or compass.

This is pretty straightforward when you only want a rough-and-ready general direction. If, for instance, you were near Hamburg and had to strike North-East to join forces with some Russian Marines landing along a big stretch of the Baltic coast; or if you were near Salonika and had to strike North towards the Bulgarian frontier. (In these cases a Geography Atlas map would be very useful.) Or perhaps, by a chance in a million, if your pin-point objective lay due North, South, East or West.

But supposing we have to keep in a dead-straight line along a very exact direction that is neither North, South, East or West, nor even South-West, or North-East, nor any of the other points? This brings us to the question of BEARINGS.

Bearings.

Because the Compass Points were too cumbersome for exact navigation, the idea of BEARINGS was evolved.

A Bearing is an ANGLE, measured clock-wise from North.

By means of Bearings, direction is measured in degrees, the same as an angle. But the counting of those degrees starts from North, which is 0 degrees, and goes round the points of the compass in the same way as the hands of a clock. Figure 41 shows quite clearly that all directions lying between North and East, for instance, lie between 0 and 90 degrees.

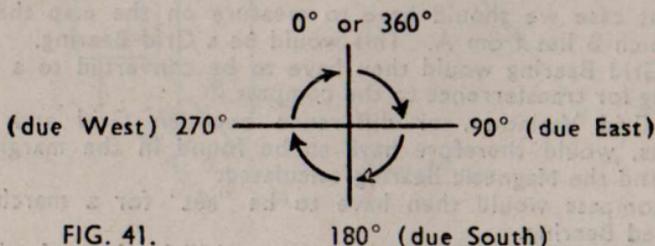


FIG. 41.

The Service Prismatic Compass has every Bearing from 0 to 360 degrees marked on the dial. Thus Bearings are easily measured with the compass.

On the map a Protractor must be used for measuring Bearings. Figure 42 shows a Protractor for use on a map.

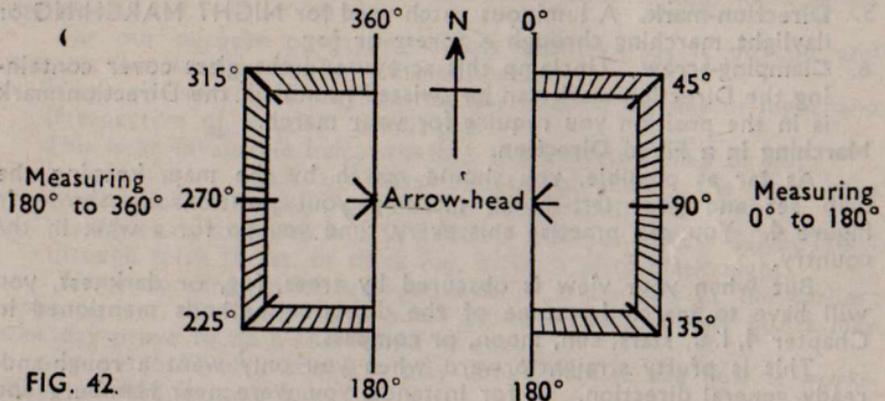


FIG. 42.

Magnetic and Grid Bearings.

The compass measures Magnetic Bearings, because these Bearings are taken from Magnetic North.

But on the map the Grid Lines are used for convenience in measuring Bearings with the Protractor. Now these Grid Lines point to what we call Grid North. Therefore all Bearings measured with the aid of Protractor and Grid Lines are called GRID BEARINGS.

The snag lies in the fact that Grid North and Magnetic North are not quite the same. The difference is called the Grid Variation, and is clearly marked in the margin of the map. (See Figure 1.)

Map- and Compass-drill.

Supposing we look at our map, and decide that we have to march in a straight direction between the points A and B, FROM A TO B. The Map- and Compass-drill would be as follows:—

1. Connect A and B on the map with a straight pencil line. This line shows the direction of our march.

If it were daylight, and we marched map in hand, keeping the map set, we ought to arrive at B all right.

If it were dark, or if we had to go through forest or fog, the compass would have to be used.

2. In that case we should have to measure on the map the Bearing on which B lies from A. This would be a Grid Bearing.
3. This Grid Bearing would then have to be converted to a Magnetic Bearing for transference to the compass.

The Grid Variation, or difference between Grid and Magnetic Norths, would therefore have to be found in the margin of the map, and the Magnetic Bearing calculated.

4. The compass would then have to be "set" for a march on the required Bearing.

Let us examine this Map- and Compass-drill in closer detail.

1. Measurement of Grid Bearings.

The **GOLDEN RULE** of all measurement is to **JUDGE or ESTIMATE** first, and measure afterwards. So we must **first estimate** the Bearing on which B lies from A. Look at Figure 41 again. Now look at Figure 43, which shows the relative positions of A and B on the map.

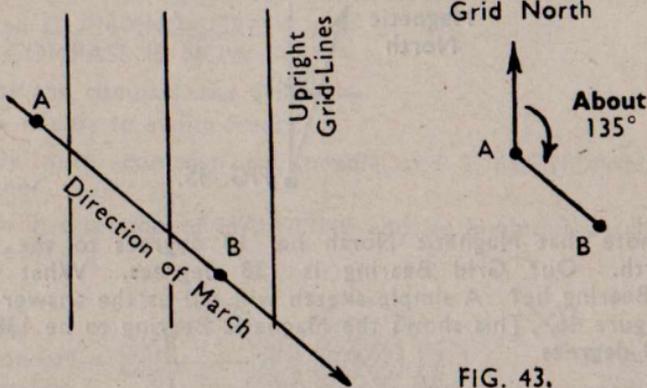


FIG. 43.

What do you judge to be the Bearing on which B lies **FROM** A? About 135 degrees? All right, then take a Protractor and measure it.

But first of all look at Figure 42, and note the following:—

- The Arrow-head of the Protractor must go on the "FROM" point. (Bearing of B **FROM** A—in this case the FROM point is A.)
- The Protractor must be upright, parallel with Grid North, because you are measuring **GRID BEARINGS**.
- We judged the Bearing to be about 135 degrees. Therefore the Protractor must be turned as shown in Figure 42. "Measuring 0 to 180 degrees."

Figure 44 shows the measurement of the Grid Bearing.

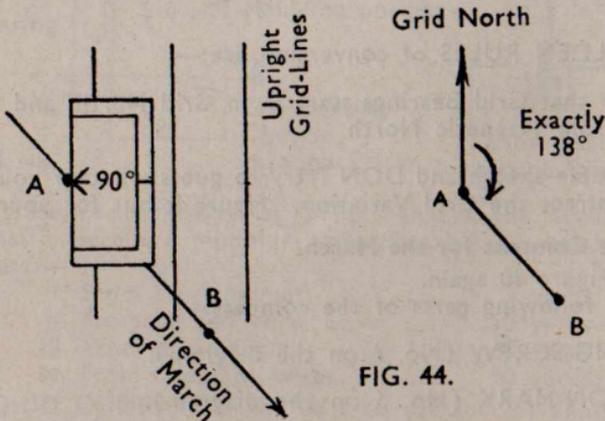
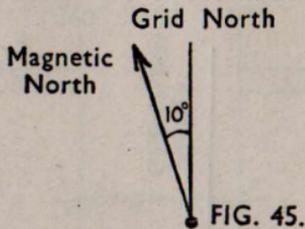


FIG. 44.

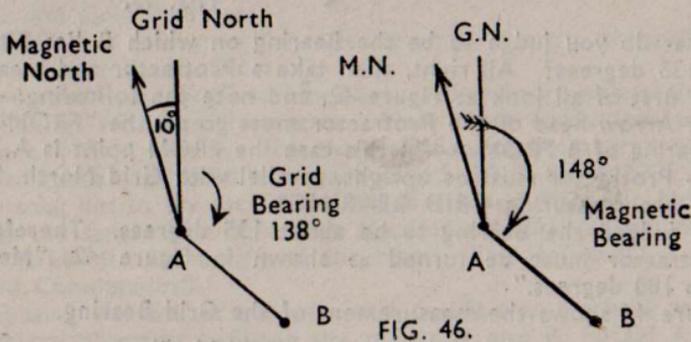
B is found to be on a Bearing of 138 degrees from A.

2. Conversion of Grid Bearings to Magnetic Bearings.

Looking in the right-hand margin of the map, we see the Magnetic and Grid North points marked something like is shown in Figure 45.



We note that Magnetic North lies 10 degrees to the West of Grid North. Our Grid Bearing is 138 degrees. What will the Magnetic Bearing be? A simple sketch will tell us the answer at once. Look at Figure 46. This shows the Magnetic Bearing to be 138 plus 10 equals 148 degrees.



Two GOLDEN RULES of conversion are:—

1. Remember that Grid Bearings start from Grid North; and Magnetic Bearings from Magnetic North.
2. Draw a simple sketch and DON'T try to guess whether you have to add or subtract the Grid Variation. Figure it out for yourself.
3. **Setting the Compass for the March.**

Look at Figure 40 again.

Note the following parts of the compass:—

- (a) CLAMPING-SCREW (No. 6 on the diagram).
- (b) DIRECTION-MARK (No. 5 on the diagram).
- (c) HAIR-LINE (No. 4 on the diagram). On either side of the Hair-line is a LUMINOUS PATCH, not numbered in the diagram.

We want to set the compass so that we can march from A on a Magnetic Bearing of 148 degrees in the direction of B. The drill is as follows:—

- (a) Loosen CLAMPING-SCREW.
 - (b) Turn DIRECTION-MARK round to 148 degrees. (These "setting" degrees are found marked on the brass rim of the compass-box.)
 - (c) Tighten CLAMPING-SCREW.
- THE COMPASS IS NOW "SET."

To use the compass, the drill is:—

- (a) Allow needle to swing freely.
- (b) Gently turn compass till needle and DIRECTION-MARK are together.
- (c) March in direction of HAIR-LINE and its luminous patches. (See Figure 47.)

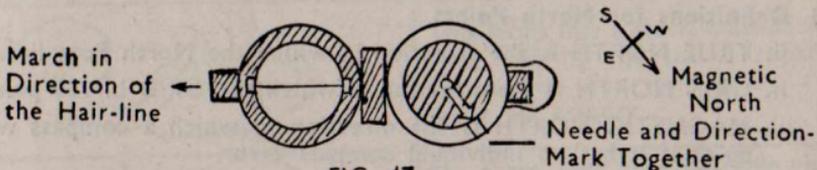


FIG. 47.

4. Miscellaneous Points about the Compass.

- (a) The Bearing of an outstanding landmark, or an enemy position, can be instantly read with the Service Prismatic Compass. The Hair-line is used as a "fore-sight," simply by folding up the compass lid as shown in Figure 48. The Glass-Prism, from which the compass takes its name, is used as the "back-sight." The Bearing is read off straight from the "back-sight."

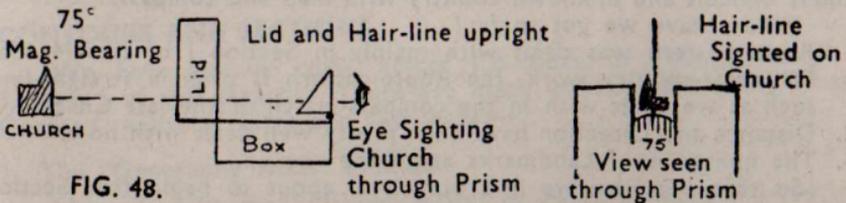


FIG. 48.

- (b) The presence of IRON or STEEL affects the accuracy of the compass. Here are minimum safe distances at which to use the compass:—

- i. From steel helmet 3 yards
- ii. From barbed wire 10 yards
- iii. From a field gun 40 yards
- iv. From telegraph wires 40 yards

- (c) A LIQUID COMPASS is the best to use for marching in a fixed direction, for on this type of compass the needle does not swing so violently.

- (d) True North and Grid North are not quite the same. The difference between these two directions is rarely more than two degrees. Consult the map-margin for further information on this point.
- (e) **COMPASS ERROR.** Most compasses have an individual compass error of a degree or two to the East or West of Magnetic North. You can test your compass for error in this way:—
- i. Carefully measure the Grid Bearing between two objects.
 - ii. Convert this to Magnetic Bearing.
 - iii. Stand at one object and take the Bearing with your compass.
 - iv. Note the difference.
 - v. Repeat this operation with other objects until you are satisfied about the individual error of your compass.
 - vi. When taking "precision" bearings, take compass error into account. When taking "rough and ready" bearings, leave it.
- (f) **Definitions for North Points.**
- i. **TRUE NORTH** is the direction in which the North Pole lies.
 - ii. **GRID NORTH** is the direction in which the GRID LINES point.
 - iii. **MAGNETIC NORTH** is the direction in which a compass will point if it has no individual compass error.

Learn this Compass Section thoroughly, and you will have at your finger tips one of the most valuable means of finding direction.

CHAPTER 6.

Hills and Valleys as Landmarks.

For a brief moment glance back at Figure 31. For we must continually bear in mind the sequence and significance of this picture if we are to attain useful knowledge and practice in "Finding our way about difficult and unknown country with map and compass."

Where have we got so far?

1. Route-pattern was dealt with mainly in Section I of this Manual. For cross-country work, the Route-pattern is often a straight-line, such as we dealt with in the compass-march of the last Chapter.
2. Distance and Direction have been pretty well dealt with now.
3. The questions of Landmarks and Time remain.

So that is where we find ourselves, about to begin that Section which in Figure 31 is represented by HILLS, the solid Landmarks of God (or Nature, if you like to call Him that).

WATER, AND GROUND-FORMS.

Rivers, streams, lakes and ponds are a valuable guide as to the shape of the ground, and the general directions of its "ups and downs," or slopes.

When searching the map for clues as to the shape of the ground, hills or valleys, up-hill slopes, or down-hill slopes, the water-clues should be the first to be examined. But be careful. For you would be surprised at the number of apparently sensible persons who make rivers run up-hill, and ponds gather on mountain-peaks. . . .

Study Figure 49. All the examples given were taken from One-inch maps of the British Isles.

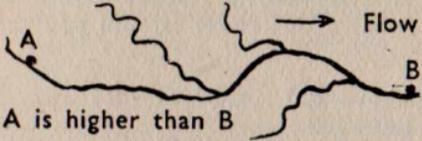
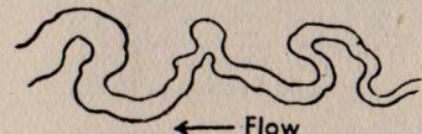
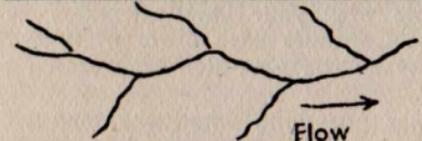
"WATER-PATTERN"	REMARKS
	<p>The tributary streams form "V" shaped arrow-heads with the main stream. These arrow-heads point in the direction of flow.</p>
	<p>The network of water around this Canal suggests the drainage dikes and streams of a flat, marshy area. Compare with Figure 23 "Fenlands."</p>
	<p>This looks like a slow, meandering river nearing the sea. Probably has a big, flat river-valley and fairly big estuary.</p>
	<p>Ah, these look like swift-flowing mountain streams, straight and swift, rolling rocky boulders down their course. . .</p>

FIG. 49.

Study your maps and see if you can add to these types of Water-patterns, or find examples of the above. . . .

CONTOURS AND SECTIONS.

We have already come across Contours, or "Height-lines," in Section I of this Manual. There are many ways of explaining what a Contour really is. Here are two ways:—

1. The "Geography Atlas" Method.

Maps showing the hills and valleys of England, when printed in a Geography Atlas, have the different heights of the ground tinted in different colours. (See Chapter 3, "Bartholomew's Half-inch Maps.") The lower ground is usually tinted green, and the higher ground is brown.

These colour-tints show different "layers," or "height-layers," of ground. For instance, the very lightest green may mean ground between Sea-level and 100 feet above Sea-level. The LAYER-TINT (this is the technical term for it) for ground lying between 100 and 200 feet above Sea-level will be a darker green.

If the Atlas map is not coloured, the different layers may be shaded, as in Figure 50.

Now if we take the lines that SEPARATE these different "height-layers" of ground, we find that they connect all the places that are at the same height above Sea-level. So we could really call them, say, a 100 foot height-line, or a 200 foot height-line. THE TECHNICAL NAME FOR THESE HEIGHT-LINES is CONTOURS. Study Figure 50 well, for it also shows quite clearly what a SECTION is, and you can see how a Section is drawn.

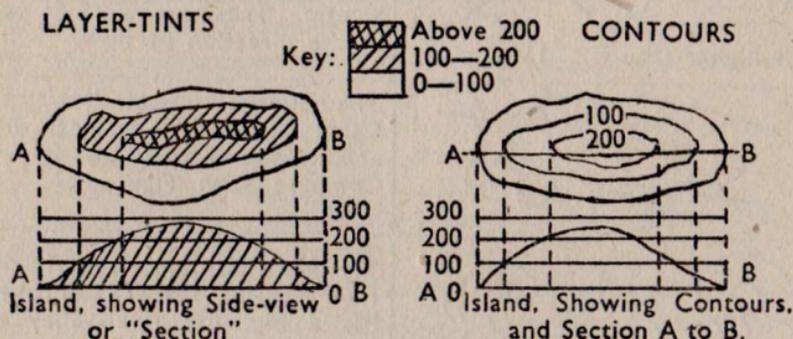


FIG. 50.

If you went to a lot of trouble with your One-inch map, you could fill up the spaces between the Contours with different tints to represent different heights, and so make the One-inch map look like a Geography Atlas map.

Why do you think that this was not done when the map was printed? Why did the printers leave out the colours, and just put the Contours in, a lot of wiggly, red lines wandering all over the map? We'll leave you to answer that one!

2. The Rise in Sea-level Method.

The other method of explaining Contours is to take an island, such as in Figure 50.

If the Sea-level rose 100 feet, where would the new coast-line now be?

If the Sea-level rose another 100 feet, where would the coast-line be now?

And so we see that the Contours are like successive coast-lines as the sea rises to certain levels.

HOW TO DRAW A SECTION OF THE GROUND.

Figure 50 explains fairly clearly what is meant by a Section. Compare the island in Figure 50 with a fruit-cake. If you cut this cake through with a knife, the slice you have cut is a "Section," showing a clear view of the SHAPE.

Try drawing a Section of the ground from your One-inch map. Here is the drill:—

1. Assume that you want to draw a Section from A to B on your map.
2. Connect A and B with a thin pencil line, faintly ringing A and B.
3. Lay the straight-edge of a piece of paper along the line AB, and carefully mark the exact spots where Contours on the map cross the paper.

4. Mark in the heights of these Contours on the paper. Be very careful that you get the correct heights. (On the One-inch map there is a red Height-line for every 50 foot rise, but every one of these Height-lines has not necessarily got a number printed on it. The NUMBERED lines are actual Contours, having been very accurately surveyed. The UNNUMBERED Height-lines are called FORM-LINES. These have not been surveyed, but have been sketched in by eye.)
5. Note the highest and lowest points on the Section.
6. Construct the "frame-work" for your Section, showing the different heights above Sea-level by straight lines. If the lowest point on your Section is 500 feet above Sea-level, there is no need for your frame-work to show heights lower than 500 feet. Similarly, if the highest point is 750 feet, there is no need to build the frame-work to contain higher ground than 750.
7. Now apply the straight paper edge to the frame-work, marking off on the appropriate Height-lines the Contours that fell across the paper between A and B.
8. Connect these the same as you would the marks on a curved graph.

And now we come to the question: Of what use is a Section?

A partial answer will be obtained by referring back to the last Section of Chapter 2, that on GRADIENTS.

A good method of checking whether you are on the right route or not is by the UPS and DOWNS of that route. And this is exactly what a Section is. But you may say, well, a Road-route bends and twists about, but a Section shows a STRAIGHT CUT across country from A to B.

A "Section" of a bendy, twisty route can easily be done. Such a "Section" is called a PROFILE, to differentiate it from the STRAIGHT Section across country.

Refer back to Figure 11, which shows you how to measure a Road-distance with paper and pencil. If you went over a route in the same manner, marking the Contours as they crossed the road, you could make a PROFILE in the same way as a Section was made.

AND THIS WOULD BE A DECIDED HELP IN FOLLOWING A STRANGE ROUTE AT NIGHT, OR IN FOG, OR THROUGH A FOREST.

Connecting up a Section, or a Profile, with a Compass march, is just giving a FURTHER DIMENSION to our ROUTE-PATTERN.

What is more, LANDMARKS can be added to this Section or Profile. If you pass a church at some place on the straight route from A to B, even if that church isn't dead on your route, its position can be marked on the Section, perhaps with a brief note that you would pass it on YOUR LEFT or RIGHT.

To help with the picture, a Scale Line could be added, perhaps to give a Scale of Miles, or Hundreds of Yards, or Paces.

Let us get down to practical examples.

1. Start with the ROUTE-CARDS mentioned in Chapter 2. Here are some suggestions:—

You may find a further column of this Route-card useful, a column containing brief information about the ups and downs of the route. Or in the briefer form of this Route-card, in which the directions were not tabulated at all, you might mention any outstanding features in the way of steep hills, or so many hilltops and valleys to cross.

2. If you were going on a night-march, marching dead straight on a compass bearing, a SECTION of the route, on which would be marked streams crossed, or hill-tops or dangerous sky-lines to be crossed, together with any buildings such as farms, churches, lone houses or windmills, might prove to be very useful. If you had time to prepare it, a Scale Line showing paces would be very handy too. (Simply take the scale showing yards, to be found in the bottom margin of the map, and take 120 paces to every 100 yards, each pace being 30 inches, of course.)

SECTION OF COMPASS-MARCH ROUTE

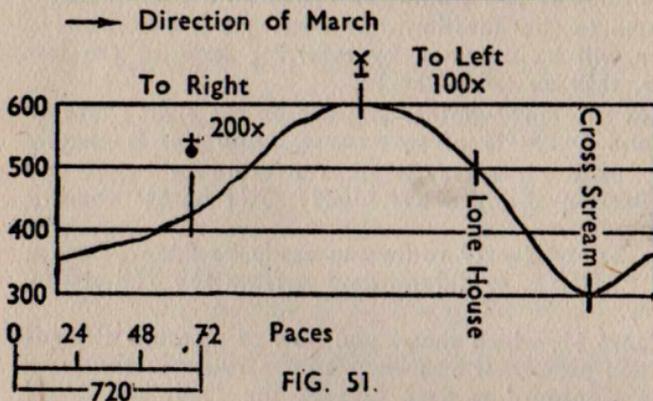
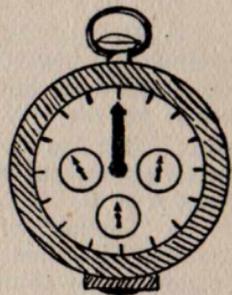


FIG. 51.



Paceometer

FIG. 52.

The number of paces you march could be checked either by detailing a couple of your men to count as you march, or by using a natty little instrument called a PACEOMETER. (See Figure 52.) This instrument will record every pace you take. It is pinned to the breast and allowed to hang vertically, but it must not be shaken about, as this will affect its accuracy.

Well, so much for Sections, except to say this. That when Map Reading is seen in its true perspective, namely as a branch of GEOGRAPHY, then the full value of Section-drawing is brought to light. For Geographers, the Section is invaluable, as Geography Atlases and Text-books will show. So try to connect your Map-reading with Geography. This will be especially useful when the Second Front starts, and Continental warfare recommences.

QUICK JUDGING OF GRADIENTS ON THE ONE-INCH MAP.

A careful examination of the One-inch map will show that Contours or Form-lines represent every 50 foot rise above Sea-level. Thus they go 50, 100, 150, 200, 250 feet, and so on.

Now connect this fact with two other facts that we have already seen:—

1. That if you can judge a six-figure map-reference on the One-inch map, then you can also judge distances on the One-inch map; this is because every tenth of a Kilometre Grid Square is 110 yards long, or the length of a football pitch.
2. That a GRADIENT is calculated by the formula:—

$$\text{Gradient equals 1 in } \frac{\text{Distance}}{\text{rise}}$$

Now if we look on the map, and see a whole bunch of Contours very closely-spaced, that means a steep slope. If we want to find out EXACTLY how steep is the steepest part of the slope, then look at the two Contours that stand closest together.

If they are 100 yards apart, the GRADIENT is 1 in 6.

(Gradient equals 1 in $\frac{100 \text{ yards}}{50 \text{ feet}}$; or $\frac{300 \text{ feet}}{50 \text{ feet}}$; equals 1 in 6.)

Keep this in mind as a UNIT OF MEASURE.

If the Contours are 200 yards apart, the gradient is 1 in 12.

If the Contours are 50 yards apart, the gradient is 1 in 3.

Say the Contours are about 150 yards apart, then the gradient is 1 in 9. DO YOU GET THE IDEA?

You can now look at a map, and instantly judge the gradient between any two Contours, simply by judging the distance they are apart. AND IF YOU CARRIED OUT THE INSTRUCTIONS IN SECTION I of this Manual, and actually went out on the ground to see what a gradient of 1 in 7 looked like, or a gradient of 1 in 5, then you have an instantaneous mental picture of the steepness of the ground as shown by the Contours on the map.

When you go out walking, map in hand, try out this idea and see how it works. And when you have a map that is of a Scale different from the One-inch map, try the scheme out on that map too.

CONTOURS AND SLOPES.

Besides being useful as Landmarks, and thus as a general guide to direction. Contours have the additional important advantage that they can often tell us whether a Point A can be seen from a Point B, assuming that it is daylight, and no trees or buildings are tall enough to intervene along the "line of sight."

Remembering what has been said about the quick-judging of gradients, look at the Contour-patterns in Figure 53:—

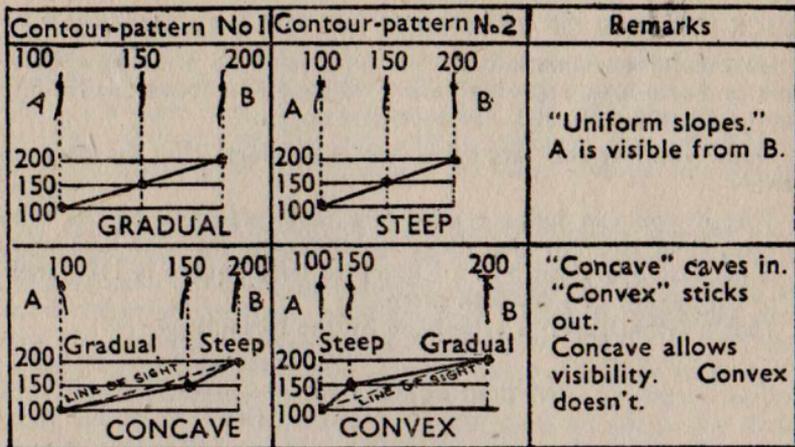


FIG. 53.

Note the following about Figure 53:—

- This Figure contains all the ELEMENTS that go to make up SLOPES. Pure Uniform Concave, and Convex Slopes are rarely found in Nature. Most slopes of hill-sides or mountain-sides are a mixture of these elements of uniformity, concavity, and convexity.
- A "Line of Sight" is a dead-straight line (for light travels in a straight line); so is a dead-Uniform Slope. This is a piece of knowledge of the utmost importance, for we can now picture a line of sight on the map, simply by trying to picture the Contour-pattern for a Uniform Slope—all the Contours evenly spaced. Grasp this idea before you go any further.
- In the cases of the Concave and Convex Slopes, note how the 150 Contour steps across to the right and to the left respectively. The following simple rules emerge from this:—
 - When it steps to the right, nearer to the highest point (B), it drops BELOW the line of sight, thus allowing A to be seen from B.
 - When it steps to the left, nearer to the lowest point (A), it sticks ABOVE the line of sight, and thus prevents A being seen from B.
- Figure 53 shows the importance of a Section in solving problems of visibility. But you haven't always got the time for drawing a Section. A method of solving visibility is needed when you can instantaneously JUDGE whether A is visible from B or not.

CONTOURS AND VISIBILITY.

Here is a drill for deciding whether one place on the map can be seen from another place.

- Call the two points A and B.
- Connect them on the map with a pencil line.
- Carefully look for any Water-patterns along the line AB.
- Carefully examine the Contour-pattern to see if it is a "YES OR NO" case.

- (a) "YES" cases are Uniform Slopes; Concave Slopes; and when you are looking across a valley.
- (b) "NO" cases are Convex Slopes; or when you have a hill intervening (with ground higher than either A or B). (SEE FIGURE 54.)
5. If it is neither a "Yes" nor "No" case, then it is a DOUBTFUL CASE. To start with, draw a Section; this is a lengthy process, but every time you draw a Section, remember the GOLDEN RULE about measurement—JUDGE first and MEASURE after. In this way you will practise yourself in drawing ROUGH SECTIONS of the ground first, checking your rough Section with an accurately drawn Section. When you have become sufficiently practised at this, you can often solve visibility problems by rough Sections.
6. If your rough Section shows that only one or two points are liable to interfere; or in other words, if your rough Section and judgment tell you that there are only one or two DOUBTFUL points, then draw a SKELETON SECTION. A skeleton Section only shows the following details:—
- The points A and B.
 - The line of sight between A and B.
 - The exact positions of any doubtful points.
- If these doubtful points rise above the line of sight, then A cannot be seen from B; and vice versa. (See Figure 55.)

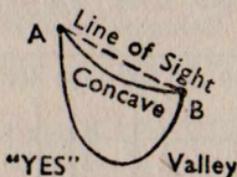
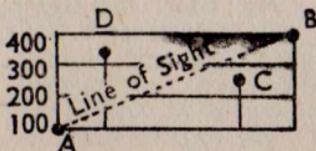
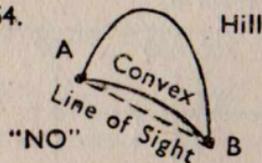


FIG. 54.



Point D intervenes.
Point C allows visibility.

SKELETON SECTION.

FIG. 55.

7. Finally, look back again at Figure 53, and the Notes. We see that a Line of Sight can be pictured on the map, or even inserted on the map, by simply using the CONTOUR-PATTERN of a UNIFORM SLOPE; both being dead-straight lines.
- In Figure 53, in the cases of the Concave and Convex Slopes, carry out the following drill:—
- Judge the point that will lie half-way between A and B, and mark it in with a pencil.
 - Call it 150 feet.
 - Compare the respective positions of this 150 feet point with the actual 150 foot Contour.

This point represents the **LINE OF SIGHT** from A to B, and by comparing the judged position of this line of sight with the actual Contours, you can immediately see **WHETHER THE CONTOURS RISE ABOVE THE LINE OF SIGHT OR NOT**. Once you have thoroughly grasped this principle, you now have at your finger-tips the essentials of the **VERY QUICKEST** method of judging visibility that there is. Learn this method, and try it out on your maps, checking it at first by actually drawing Sections to prove your answers. Practice will make you an expert Contour-reader.

Look at Figure 56. Here you see some further examples of how to quickly judge whether A is visible from B by this "Line of Sight" method.

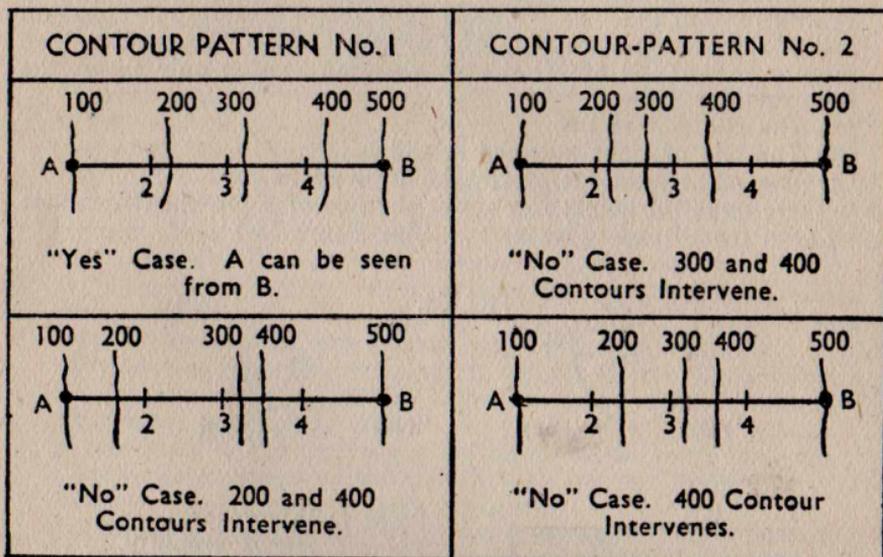


FIG. 56.

Notes on Figure 56:—

1. Marks 2, 3, and 4 on line AB stand for 200, 300 and 400 feet Line of Sight marks. These can be **JUDGED** with the eye, but may be measured off in millimetres or some **FINE** measurement for greater accuracy. **QUICK JUDGMENT IS THE THING TO BE AIMED AT.**
2. All this judging can be done straight away on the map—no need for fine paper-work. Fifty foot Contours can only give a **ROUGH** picture of the ground, anyway.

To finish off this question of Contours, Figure 57 shows a few more Contour-patterns, the first two taken from One-inch maps of England, and the third taken from the German 1/50,000 map (1½ inches to the mile), of the Black Forest area.

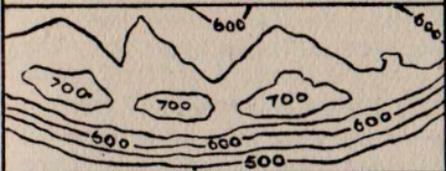
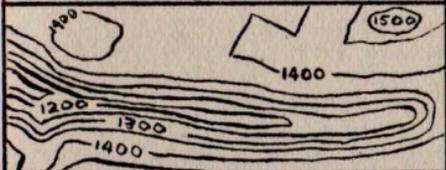
CONTOUR-PATTERN	REMARKS
	<p>Typical CHALK HILLS. Note the steep escarpment to the South, and the gradual slope away to the North. Ringed Contours show the summits of the hills.</p>
	<p>Typical LIMESTONE HILLS. Note the angular, square, patterns, and the long, narrow, steep-sided valleys. Look out for Limestone CAVES in these hills.</p>
	<p>Typical MOUNTAIN Contours. Scale $1\frac{1}{4}$ inches to one mile. Contours show 20 metre rises (20 metres is 66 feet approx.)</p>

FIG. 57.

Finale to Chapter 6.

Turn back to Figure 31, and let us see where we have now got to.

1. Route-pattern is now firmly fixed in our mind's eye.
2. The same applies to distance and direction.
3. Landmarks have been dealt with—
 - (a) God's Landmarks—the hills, mountains, valleys, rivers, and streams have been found to be a good help for memorizing and checking a route—and incidentally for the selection of COVERED approaches and routes, where the enemy will not be so liable to spot you (Visibility Drill is applied for this).
 - (b) Man's Landmarks have been pretty extensively dealt with right throughout this Manual.
4. TIME has to be applied. Well, in Section I we got ourselves thinking of routes in terms of Miles-per-Hour, and Time taken to arrive at destination. The only things that remain to be mentioned are TIME-SCALES and the question of NIGHT and DAY.

These are easily disposed of. First, Time-scales are simply Scale Lines that show TIME instead of Distance. For instance, instead of showing three miles on a Scale Line, you could show ONE HOUR (3 m.p.h. marching-time). Or on a road-map, 30 miles could be shown as one hour (30 m.p.h. average speed).

Night and day has been taken into consideration throughout, both in the selection and memorization of routes, and taking into account landmarks and direction-finding methods.

So now that we have the complete picture, let us apply it to the War-effort by training ourselves up to a higher standard of Map-reading and Direction-finding than ever the Axis troops could possibly do.

And don't forget the great names of our race who have done all this before us—John Cabot and the Merchant Venturers; Francis Drake and the Elizabethan Sea-dogs; the soldiers of Wolfe and Clive; the great Pioneers of Canada, Australia, and New Zealand; the great explorers, Livingstone, Scott, and the conquerors of Mount Everest; Lawrence of Arabia and Lord Baden-Powell, those great men. . . . Yes, the Germans would have a hell of a headache trying to produce a set of names like these, AND THE THOUSANDS OF OTHERS LIKE THEM.

SO IT IS UP TO YOU. . . .

SECTION III. "Second-Front Maps."

CHAPTER 7.

"Getting the Right Atmosphere."

In Sections I and II we have had plenty of practice in reading and using British maps of different scales and types. But we have done most of the map-drill on the One-inch map.

The time has now come for us to adapt our Map-reading skill to the maps of the enemy and enemy-occupied countries of Europe. For this purpose this Manual only takes the French and German maps into account. Other useful maps would be Belgian, Dutch, Norwegian, Italian, Greek and other Balkan maps. But let us stick to the French and German as examples.

To learn to speak the French and German languages really well, we have to try and kid ourselves that we REALLY ARE French or German. This gives us the right atmosphere.

The same applies to learning the language of the French and German maps. We have to try and imagine ourselves as actually being IN FRANCE or IN GERMANY when we are reading them. But if we have never been to France or Germany, how can we do this? Here are a few ways:—

1. Get hold of a good Geography Atlas and Geography Text-book and swot up as much as you can about these countries—the type of landscape you would see—the main routes by river, canal, road and rail—the old battlefields, and so on.
2. Study as many PICTURES as you can of these countries. The Army Landscape Targets for Musketry Practice, for instance, contain several of the "Continental" type of Landscapes. And there are scores of paintings, picture-cards and whatnot that you can get hold of.

3. Get hold of some Guide-books from a second-hand bookshop. Baedeker's Guides are dirt-cheap when they are second-hand. Study these intently, searching for detail of military importance.
4. Get as many VERBAL DESCRIPTIONS as you can—soldiers who were at Dunkirk, or in the Great War, for instance, can tell you all about the cobbled, poplar-lined roads of France; or people who have been to Germany can tell you all about the scenery of the Rhineland and the Black Forest.
5. Try to recall all the novels or travel books you have read that gave good descriptions of France and Germany.
6. Get hold of any French or German maps if you can—start with some International series such as the Michelin, that uses the same map-signs on both British and Continental maps. Then get hold of tourist, motoring, ski-ing or mountaineering maps of France and Germany. There are plenty of these on sale.

You are NOT a good soldier if you cannot scrounge at least some of these things.

GET YOURSELF FEELING VERY BITTER AND ANGRY ABOUT IT ALL. For German "tourists" were doing just this sort of work in those piping days of peace when you had not a thought of harming a single hair of anybody's head—except that goalie who let that dead-easy shot through . . . and NOW, well now it is left to you to throw Jerry out of France "and restore him to his place in the Animal Kingdom" (to quote Ian Hay).

AND NOW THAT YOU'RE GETTING INTO THE RIGHT ATMOSPHERE; THE RIGHT SPIRIT OF THE THING, WELL, LET'S GET CRACKING!

Continental Map-Scales.

These are different from British map-scales, because kilometres and metres are used instead of miles and yards.

When we dealt with reading map-references on the One-inch map, we said that ONE KILOMETRE is five-eighths of a mile; five furlongs, or 1,100 yards. Get that firmly into your heads. Eight kilometres make five miles.

So when we look at the Scale Line on the bottom margin of a French or German map, look at eight kilometres, and that is five miles. Here is a simple way of marking the French or German Scale Line with good old English miles:—

1. Take a piece of paper, a pencil, and something with which to rule a straight line.
2. Rule a straight line on the paper, and on this line mark off the distance of eight kilometres as shown on the Scale Line of the map. This line has now to be equally divided into five parts, each to represent ONE MILE. (See Figure 58.)
3. From the left-hand end of the eight kilometre line, rule another straight line down at any angle convenient, as shown in the diagram. Call this line a diagonal if you like.

4. Mark off this diagonal into five equal sections, say ONE INCH for each section. Any unit of measure will do, within reason.
5. Let point A be the point where the last of the five INCH marks were made.
6. Connect A with the eight kilometre mark. This is line "a."
7. Now draw lines "b," "c," "d" and "e" parallel to line "a."
8. If you do this accurately, your eight kilometre line will be accurately divided into five equal parts, each of which will represent one mile.
9. Transfer these paper mile-marks to the French or German Scale Line.

There is no need to bother about yards at all. For one kilometre equals 1,100 yards, and on the Scale Line the left-hand kilometre will be shown sub-divided into ten parts. Each of these parts will be 110 yards in length. And 110 yards is as convenient a unit of measure as 100 yards is. More convenient, in fact. For two of these will make ONE FURLONG exactly (220 yards). And so 16 of them will make one mile.

GET THIS QUITE CLEAR, AND TRY OUT THE METHOD SHOWN IN FIGURE 58. You have a good chance of learning this NOW, and it is better to be safe than sorry.

Calculating Gradients.

We have already seen that a good picture of what gradients mean can go a long way towards understanding the workings of Contours. On Continental maps, the working of gradients is easy.

On the One-inch map, the CONTOUR-INTERVAL is 50 feet (0, 50, 100, 150, 200, 250, and so on).

On Continental maps the Contour-interval is usually 10 metres (33 feet), or 20 metres (66 feet). There are 1,000 metres in one kilometre. So remember the formula for gradients:—

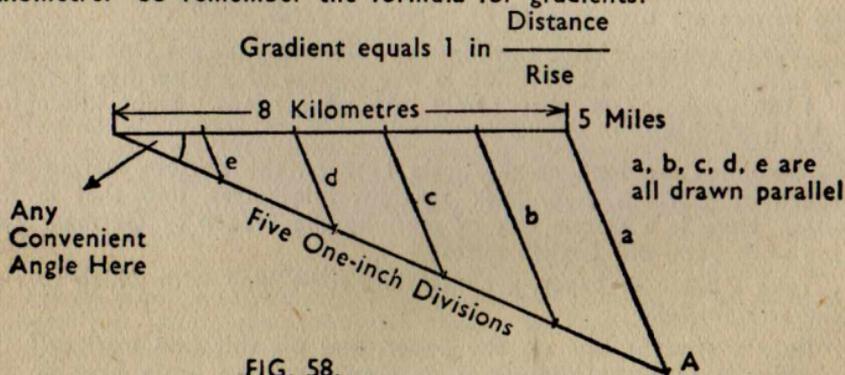


FIG. 58.

So if in a distance of 100 metres, there is a rise of 10 metres, the gradient is 1 in $\frac{100}{10}$; or 1 in 10.

This is far easier than working gradients on our British maps.

French and German Map-Scales.

We can talk about our British maps as being "the One-inch map," or the "Half-inch," or "Quarter-inch"; or the "Eight miles to the Inch" maps. But the French and Germans do NOT talk about their maps in that way.

They don't, for instance, talk about the "One Centimetre" map, where one centimetre of map shows one kilometre of ground. Instead of this, they talk about the proportion of map to ground. Like we do in gradients, when we talk about a gradient of 1 in 7.

So, since there are 100,000 centimetres in one kilometre, the French and Germans would call a "ONE CENTIMETRE" map the 1 in 100,000. Do you get the idea? One centimetre distance on the map equals 100,000 centimetres distance on the ground.

Since this, like a gradient, is only a proportion, we could also say that on the 1 in 100,000 map, one inch of map equals 100,000 inches of ground.

Some people prefer to call this map-scale proportion a FRACTION. It is easier to write $1/100,000$ than what it is to write 1 in 100,000. This map-scale fraction has the technical name of "REPRESENTATIVE FRACTION," and is abbreviated to R.F.

Here are a few of the more frequent R.F.'s met with on Continental maps:— $1/200,000$ (3.15 miles to the inch); $1/100,000$ (1.58 miles to the inch); $1/50,000$ ($1\frac{1}{2}$ inches to the mile); $1/25,000$ ($2\frac{1}{2}$ inches to the mile); and $1/10,000$ (6.33 inches to the mile).

CHAPTER 8.

French and German Map-Signs and Word-Lists.

The map-signs of the French and Germans are very little different from our own. If you have taken the warnings of this Manual to heart, and got down to the serious study and handling of as many different types of map as possible, you will find the French and German maps are very simple and interesting play-things.

Figure 59 is a Table of French and German map-signs, words, and terms that may come in handy when that Second Front opens:—

ENGLISH	FRENCH	GERMAN
Barracks	Caserne (Cas.)	Kaserne (Kas.)
Bridge	Pont	Brücken
Canal	Canal	Kanal
— Lock	— Ecluse	— Schleuse
Castle	Chateau	Schloss
Church	Eglise ○ (Red circle)	Kirche
— Tower	— Avec Tour	— Mit Einem Turm
Compass	Boussole	Kompass
Contours	Contours	Höhenlinien
Cross-roads	Carrefour	Kreuzweg
Cutting	Deblai	Einschnitt
Day	Jour	Tag
East	Est	Osten
Electric Cable	Cable Transporteur De Force Electrique	Starkstromleitung
Embankment (Rly.)	Remblai	Bahndamm
Factory	Etablissement Industrielle	Fabrik (Fbr.)
Footpath	Sentier	Fusspfad
Ford	Bac	Furt
Garden	Jardin	Garten
Grid	Grille	Gitternetz
Hill	Colline	Hügel
House	Maison	Haus
How many kilometres?	Combien de Kilometres?	Wieviele kilometer?
Inn	Auberge	Wirtshaus (Wrtshs.)
Lake	Lac	See
Map	Carte	Karte
Map-reading	Cartographie	Kartenlesen
Map-signs	Legende	Kartenzeichen
Marsh	Marais	Bruch, Sumpf
Meadow	Pres	Wiese
Moon	Lune	Mond
Night	Nuit	Nacht
No	Non	Nein
North	Nord	Nord
North-East	Nord-Est	Nord-Osten

ENGLISH	FRENCH	GERMAN
North-West	Nord-Ouest	Nord-West
Orchard	Verger	Apfelgarten
Plantation	Plantation	Anpflanzung
Pole Star	L'Etoile Polaire du Nord	Polarstern
Post Office	Bureau de Poste	Postamt
Quarry (Stone)	Carriere de Pierres	Steinbruch
Railway	Chemin de Fer	Eisenbahn
Road	Route: Chemin	Strasse: Weg
Main Road	Route	Strasse
Minor Road	Chemin	Weg
River	Riviere	Fluss
Scale	Echelle	Maszstab
Section	Section	Vertikalschnitt
Set a Map	Orienter une Carte	Kartenorientierung
South	Sud	Sud
South-East	Sud-Est	Sud-Osten
Spot Height	Cote d'Altitude	Höhenpunkt
Star	Etoile	Stern
Station (Rly.)	Gare	Bahnhof (Bhf.)
Stream	Ruisseau	Strom
Sun	Soleil	Sonne
Telegraph	Telegraphe	Telegraph
Telephone	Telephone	Telephon
Town	Ville	Stadt
Tree	Arbre	Baum
Valley	Vallee	Tal
View Point	Point de Vue	Aussichtspunkt
Village	Village	Dorf
Vineyard	Vignes (Purple Patches)	Weingarten
Water	Eau	Gewässer: Wasser
Watermill	Moulin-a-Eau	Wassermühle
West	Ouest	West
What is the name of this place?	Comment s'appelle cette endroit-ci?	Wie heisst dieser Ort?
Where?	Ou?	Wo?
Wind	Vent	Wind
Windmill	Moulin-a-Vent	Windmühle
A Wood	Bois	Wald
Yes	Oui	Ja

FIG. 59.

Points to note on Figure 59:—

1. Map-signs are only put in where they differ from ours.
2. Remember what was said at the end of Section I about "Asking the Way."
3. If you MUST use these words for asking the way, and you do NOT know how to pronounce them, POINT THEM OUT in this book, and thus SHOW THEM to the person you are asking.

4. When asking somebody the way, make that person write down the names of places, or the number of kilometres; unless you speak a language pretty well, of course. Remember that the Continental number 7, when written, has a tail something like a letter "F."
5. With the help of this word-list, and your knowledge of British map-signs, you should be able to decipher all the more important map-signs on the French and German maps.

GRAND FINALE.

Well, chaps, if you have carefully followed this Manual all through to now, and have really put your backs into studying and practising map-drills, you should be able to knock the German map-reading systems into a cocked hat.

But don't say to yourself, well, that's that; I know all about Map-reading now . . . BECAUSE YOU JUST DON'T. . . .

Map-reading is a LIFE STUDY; as the Germans say, "Man lernt sie nie aus"; "One never ceases to learn her."

So have a look through the following Book-list, and see if you can borrow any from the Public Library, and have a nibble at them; for there are Maps and Map-reading books to suit all tastes and professions, from farming to history; from mining to building; from seamanship to religion; and from road-making to ski-ing. . . .

Some Interesting Map-reading Books to Read.

1. Reference Books.

War Office Manual of Map-reading and Field Sketching.

The Interpretation of Ordnance Survey Maps and Geographical Pictures. Lockey. (G. Philip and Sons.)

The Complete Guide to Military Map-reading. (Gale and Polden.)

2. Popular Books on Military Map-reading.

Military Map-reading for the New Army. Capt. W. S. Lewis.

Map-reading for the Home Guard. Lewis and Morgan. (Wheaton and Co.)

Map-reading Made Easy. Capt. C. Esson. (G. Philip and Sons.)

A Guide to Map-reading. James Walker. (W. and A. K. Johnston, Ltd.)

Map-reading in a Nutshell. Major Bramley Moore. (Pearson.)

Map-reading. F. F. Crossley. (MacMillan.)

Maps and Map Work. J. W. Cameron. (Harrap.)

Map-reading. Thomas Pickles. (J. M. Dent and Sons.)

3. Background to Map-reading.

Signpost to the Stars. (G. Philip and Sons.)

A Guide to the Languages of Europe. Lyall. (Twenty-five Second Front Languages.)

The Map and Compass—Practical Guide to Map-reading and the Day and Night Use of Modern Compasses. J. Noel, F.R.G.S.

Ask the Map—Books I and II. Duce and Heester. (Pitman.)

A Key to Maps. H. S. L. Winterbottom.

Popular Map-reading. E. D. Laborde. (Cambridge University Press.)

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" 30	Manual of Radio Valves, British and American with Characteristics and Data equivalents and alternatives ...	3/6
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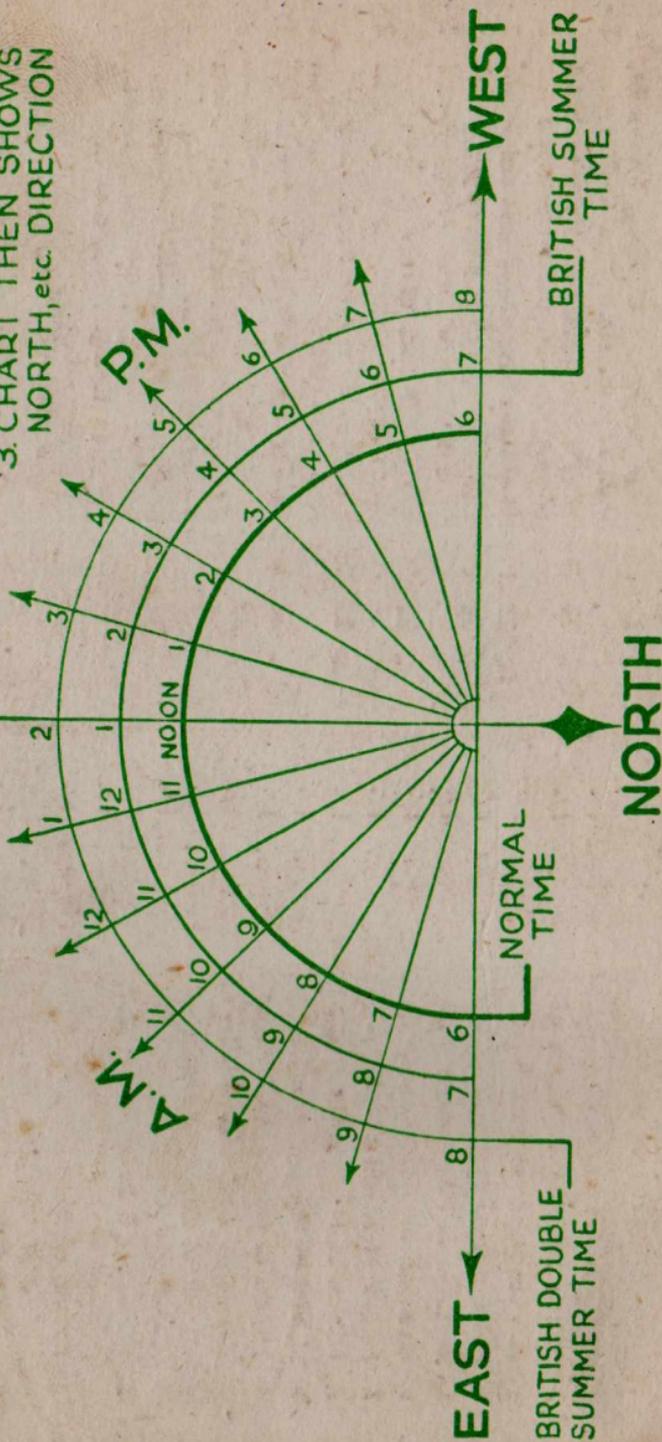
SUN COMPASS

for DIRECTION FINDING

TO USE:

1. NOTE THE TIME
2. TURN TIME-LINE TO SUN
3. CHART THEN SHOWS NORTH, etc. DIRECTION

SOUTH



EAST

BRITISH DOUBLE
SUMMER TIME

NORMAL
TIME

NORTH

WEST

BRITISH SUMMER
TIME