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CANADIAN ARMY

TRAINING PAMPHLET

No. 11

MAP USING

1942

Prepared under the direction of
The Chief of the General Staff, Canada

OTTAWA
EDMOND CLOUTIER
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1942

School of Inst

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CONTENTS

MAP USING

INTRODUCTION

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

The first rule is that **only the local map is to be used.** [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

When the student has completed the course and passed the tests, he must continue to practise [illegible]

Lesson 1

WHAT A MAP IS

O.H.T. Map reading charts in use:—

MR 8—Illustrating Air Photo

MR 3—Conventional Signs

A map is a picture of the ground [illegible]

[illegible]

[illegible]

(Instructor draws route on blackboard, using actual distances and directions, [illegible])

[illegible]

[illegible]

[illegible]

[illegible]

(If an air photograph of nearby ground can be obtained, it will illustrate the point in the first paragraph of this lesson.)

[illegible]

[illegible]

[illegible]

[illegible]

TEST: [illegible]

Lesson 9

MAP REFERENCES BY GRID COORDINATES

A means of describing the position of objects shown on the map.

D.O.T. Map-reading chart to use—

MR 10—Grid References

If we want to describe the location of any object, we can [illegible] point [illegible] For example, if we are describing a house in a town, we may say it is at [illegible] Hall.

[illegible]

For example, [illegible]

[illegible]

[illegible]

[illegible]

We usually want to locate objects more closely than to 1000 yds—[illegible]

[illegible]

(DO NOT [illegible] "Northings" [illegible])

[illegible]

[illegible]

[illegible]

(The class will now be practised in giving the map reference of objects, and in finding objects from map references. [illegible])

TEST

[illegible] out of 10 map references correctly, [illegible]

Lesson 10

SCALE

D.O.T. Map-reading chart to use—

MR 8—Scales

[illegible]

It is [illegible]

[illegible] of the local map. You may cut it out of the paper and use it to measure, or you may use another scale (which are engraved on the protractor), or you may mark off a paper strip by laying the edge close to the scale on the map, and marking off the distance.

A road's scale may also be described as one inch to one mile, or one inch to four miles. These maps are sometimes referred to as the one inch, and quarter-inch maps respectively, meaning one inch (or a quarter-inch) representing one mile. *When these scales make no sense use a protractor to measure distances between objects on a map, straight lengths of roads, etc.*

(The instructor then shows how the distance along a curving road may be measured with a piece of paper and pencil—ticking off the straight lengths of road on the edge of the paper, accumulating the curving line into straight one, which is measured by a scale. The class does several examples.)

(When distances by road have been so measured, the class can work out how long it would take to cover them at the rates of 15 miles in the hour, [illegible] rate for wheeled transport on 30 miles in 2 hours [illegible] for [illegible] on the road.)

For example—the distance over a route is measured as 17¼ miles. Time required at 15 m.p.h. . . . . . $\frac{17\frac{1}{4} \times 60 \text{ mins}}{15}$ = 69 mins.

Time required at 30 m.p.h. . . . . . $\frac{17\frac{1}{4} \times 120}{30}$ = 1 hr. 09 mins.

TEST:

To be able to state, within less than 3/8 miles, distance between places 10 miles apart over a twisting route; and to be able to measure distance between objects on maps of different scales, using the protractor, and by marking piece of paper and measuring with printed scale.

Lesson IV

MEASURING DISTANCE ON THE GROUND—PACING

Pacing is the means usually adopted to measure distance on the ground, when we only require an approximate result, or have no better means (such as a rangefinder, surveyor's chain or tape, etc.) Every soldier should be practised in pacing distances.

The first rule in pacing is to walk at your natural gait—don't try to pace up even yards. You just known distances several times, counting your paces carefully. Then you will see how many of your paces go to 100 yds., and you will be able to convert your paces into yards fairly correctly.

(Several distances of 100 yds are measured, and staked off. One should be on level ground, one uphill, one on rough ground (cross-

country). Each man paces the *level* distance 4 or 6 times, and takes the average. Say it is a distance taken in 116 paces ten times average. You make paces into yards—which is: 116 to one pace, or $\frac{10 \times 100}{116}$ = 13 to 100 paces.

Each man should calculate how many paces in each hundred—that is, what percentage—he should deduct to convert paces into yards.

(After calculating this for level ground, he paces the 100 yds distances laid out on rough or hilly ground, and notes how the ratio of paces to yards varies.)

(The students then pace several distances between objects, which are marked on the map, turn their paces into yards, and then compare the result with scaled distances.)

(This lesson can be dovetailed with "Judging Distance" which is important to all weapon training.)

Lesson V

USING A MAP OVER A SIMPLE ROUTE ON FOOT

(Start at a well-defined landmark—such as the road junction [illegible] Point out buildings. Estimate distance to them. Scale distance off map. Compare.)

(Now group march to bridge [illegible]. Compare distance paced with distance scaled. Note distance to bridge of woods in the [illegible].)

(Continue march to road junction [illegible]. Ask group to check location. Place pick out church to [illegible]. Advance to high ground [illegible]. Identify farms and roads.)

Group is now told to proceed to road junction [illegible]. Has at leg to act as guides. [illegible] carry two hundred yards—identify landmarks. Note their distances, and scale. Make members of group spot their position on the map.)

(Similar lessons, following different routes are repeated until every man is able to follow his progress on a map on foot and find his position from detail. He should be able to pick out those features which will make good landmarks and note the distance between them by road, and any changes in direction.)

TEST:

Student to identify his position to 100 yds approx. at various points along 2 miles of road he does not know.

Lesson VI

FOLLOWING A ROUTE IN A MOTOR VEHICLE

[illegible]

[illegible]

[illegible]

Let us work out a simple example on our sample map:

ROUTE CARD

Starting point—road junction [illegible]

(A) Distance from last landmark	(B) Distance from start point	(C) Remarks and Instructions
[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

TEST:

[illegible]

Lesson VII

CONTOURS:—OR THE REPRESENTATION OF THE SHAPE OF THE GROUND

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

TEST:

[illegible]

Lesson VIII

USING A PROTRACTOR TO TAKE A BEARING FROM A MAP

B.M.T. Map-reading charts to use:—

MR 6 — North Points

MR 7 — Bearings

MR 21 — Practical Application of Prismatic Compass

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Three sides of one face of the rectangular protractor are marked off in degrees. [illegible] North, 90° East, and 180° South.

If we want to measure the bearing between two objectives of a road, railway or other linear feature, and it is to the **East** of the North and South line [illegible] as on the face of bearing. [illegible] protractor [illegible] the number of degrees [illegible].

If we want to measure a bearing to the **West** of the North-South line, [illegible] 180° to 360°.

(The class will now practise taking all bearings in from 180° to 360°.)

Note.—In measuring bearings, note if the bearing of "B" from "A" [illegible] "back bearing", and will always be 180 greater or less than the "forward" bearing.

All the bearings measured so far are "grid bearings", because the bearing of [illegible] North and South [illegible] grid bearings.)

Note.—Do not confuse students at this stage by dwelling too much on the difference between "True" and "Grid" North. Say that they are for practical purposes, the same, and that we shall deal only with "Grid" and "Magnetic" North.

To find our way [illegible] the ground. [illegible] magnetic [illegible] "Magnetic North is [illegible] West of Grid North at [illegible]."

In magnetic (or compass) bearings, the Magnetic North is our reference direction, instead of grid North. We will have to convert the grid bearing, measured off the map, to the magnetic bearing which we must to march on, when using the compass. The best way to do this correctly is to make a little sketch.

We see here that the angle between our position O, the place "A" we are going to (or object we are looking at) and grid North is 60°—i.e., that is, the grid bearing which we measure on the map from O to "A" is 60°; the magnetic variation or declination is 20° West, and so the magnetic bearing is 80°.

In the second sketch the grid bearing is 260°, the Magnetic declination 20°, and the magnetic bearing 280°.

Suppose now we have a declination of the compass of 15° East—which means the direction of magnetic North is 15° East of grid North. Using the same grid bearings as before we get:—

The grid bearing is 60°, and the magnetic bearing 45°.

The grid bearing is 250°, the magnetic bearing is 235°.

Maps that are printed for use by the Air Force have "Compass roses" shown on them for convenience in plotting true and magnetic bearings in navigation. Examine it and you will note that the True North differs slightly from grid North. Neglect this difference, however, and note how magnetic bearings and true bearings may be readily [illegible] the magnetic bearing is always greater by the amount of the magnetic variation.

(The class will now convert a number of grid bearings, which they take from the map by protractor, to magnetic bearings, drawing a diagram in each case. After about 10 examples, using the actual declination marked on the map, a few more may be done, using an imaginary "East" declination. Explain that in Western Canada, the declination is East.)

(Finally, the class measures on the map, the magnetic bearings of several objects from a suitable observation point nearby, and in the next lesson will go to that observation point and take bearings by compass to these objects, and compare results.)

TEST:

Students to compute four grid bearings on map and convert to magnetic bearings correctly in 10 minutes.

Lesson IX

THE PRISMATIC COMPASS

D.O.T. Map-reading charts to use:—

KB 17—Prismatic Compass Mk. IX.

KB 18— " " "

KB 19—Bearing with Prismatic Compass—Correction

KB 20— " " " " "

KB 21—Marching on Magnetic Bearing

The prismatic compass consists of a compass card, attached to a needle which points to the magnetic north when held in a horizontal position; a sighting device (the hairline being the notch in the hinged prism casing and the foresight being the hairline on the window); and a prism to enable the user to see the figures on the compass card at the same time as a sight is being taken.

The card is fixed when not in use, and released by the stud (stop) on the right hand side. The pin (check spring) on the left side is used to steady the compass, and bring it to a standstill, so that a reading can be made. Both these devices should be handled gently, to avoid damage to the pivot of the card, on which the compass' accuracy depends.

To take a sight with the compass—open the cover to a vertical position, and turn up the hinged prism. It may be necessary to adjust the prism by moving it up or down in the groove, so that the figures on the card may be distinctly seen.

Putting the left thumb through the ring, sight towards the distant object, and release the stop. The compass will usually oscillate through quite a wide [illegible] Note the relevant figures — say 135 and 315 — take the mean (225) and [illegible] the card down with the clockwise [illegible] to come to [illegible] the mean reading (180). Verify the sight, and read the bearing [illegible].

To fix a direction on the ground by magnetic bearing, close the card [illegible] and then [illegible] the figure of the bearing in question [illegible] line of sight, and [illegible] features of landmarks [illegible] which you can march.

(Students should practise reading bearings, which they have previously measured on the map, using the protractor and correcting for magnetic declination. They should then move across country between points which are not intervisible by determining the bearing between point of departure and destination from the map, and using the compass as indicated above to follow that direction. The distance to be covered should be about 100-1500 yds. (It may be necessary to read bearings several times en route, depending on the land marks which will serve as guides.)

A bearing can be followed by night, using the luminous arrow on the card, [illegible] [illegible]

Night sighting should, whenever possible, be done by an officer who has had training and experience in the art.

Compasses are deflected from the magnetic North if any quantity of iron is near them [illegible] should be about 40 yds away [illegible] If compass readings [illegible] ground.

Compasses are all liable to have small errors peculiar to themselves, which are [illegible] individual variation, or index errors. These may be discovered by taking a number of compass bearings between accurately identifiable points, and comparing them with the calculated magnetic bearings. The average of the differences [illegible] individual variation, which must be taken into account [illegible] This is, the compass reading [illegible] the individual variation. The sketch should make it clear which you do.

With [illegible] compasses, bearings read will always be greater than they should be by [illegible] If you want to march on [illegible] you are [illegible]

TEST:

Students should traverse 800-1000 yds cross country, guiding themselves by compass, and should arrive at the allotted destination.

Lesson 5

FINDING THE NORTH BY SUN AND STARS

E.D.T. (Supporting charts to use:—

MN 8—North by a Watch

MN 11—North by Stars at Night.

If you haven't a compass, the Cardinal Points (North, South, East and West) may be found approximately by the sun, more accurately by the stars.

Everyone knows the sun rises in the East and sets in the West, and [illegible] [illegible] [illegible]

It is done as follows:—[illegible] [illegible]

At night, the North Star (POLARIS) is very close to True North. You can find it by its position relative to the two well-marked constellations of the DIPPER (Great Bear) and CASSIOPEIA—as the sketch shows.

Every soldier should make a habit of orienting himself, wherever he is, by finding the direction of North, either from the sun, or by means of one of the means described above. This develops the sense of direction, and helps you to find your way around.

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