

# The Canadian Engineer

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## Field Survey Troops: Their Work at the Front

Draughtsmen, Photographers, Lithographers and Topographers Assisted Artillery Commanders—Typical Reduction of Survey of Observation Post—Flash-Spotting and Sound-Ranging—Paper Read at Annual Meeting of Dominion Land Surveyors' Association

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IN the warfare of positions it became necessary to have large scale maps showing minute detail as a key to the tangled maze of trenches and other defence works. The development of aerial photography made it possible to secure the necessary information. The modern practice of artillery firing from concealed positions at unseen targets was only possible when the required data were available for orienting and ranging the guns. These were among the reasons for the formation of the field survey troops.

At first there was a company attached to each of the five British armies. These were later increased to battalion strength. Each company consisted of four groups: (1) Draughtsmen, photographers, lithographers, etc.; (2) topographers; (3) flash-spotters; (4) sound-rangers.

### Ordnance Survey Maps

A sketch of the various duties of each group follows, but first it is necessary to refer to the maps supplied by the Ordnance Survey, which were the basis of all field work. These were divided into two classes: Small scale, under 1:40,000; and large scale, 1:40,000 and over.

The small scale maps were on scales of six miles to an inch, with relief shown to hundred-metre intervals by layers of color; 1:250,000, with 50-metre contours; and 1:100,000, with contours at intervals of 10 metres. The small scale maps showed clearly all routes by rail and road, and the quality of these. They also contained a good deal of detail of towns and villages and other features. It is with the large scale maps, however, that we are chiefly concerned.

The latter were issued on scales of 1:40,000, 1:20,000 and 1:10,000. The area covered by Belgium and Northern France was plotted on Bonne's projection. The central meridian passed through Brussels (longitude  $2^{\circ}02'4''.03$  east of Paris) and the standard parallel was  $50^{\circ}24'$  north. The map was divided into sheets 32 kilometres by 20 kilometres in the case of the 1:40,000 scale. The sheet edges were respectively parallel and perpendicular to the meridian of Brussels. At the corner of each sheet were printed the distances of the sheet lines from the origin.

For purposes of reference, the sheets were divided into rectangles by grid lines parallel to the sheet edges. The larger divisions represented 6,000 by 5,000 yards in the case of the northern and southern tiers of a sheet and 6,000 yards square for the two central tiers, and were designated by the capital letters A to X successively from the N.W. to the S.E. of the sheet. These lettered divisions were further subdivided into squares of 1,000-yard sides, numbered 1 to 30 for the rectangles A to F and S to X, and 1 to 36 for the two central rows of squares. The 1,000-yard squares were split by dotted lines into quarters, designated a, b, c and d, respectively. The capitals and numbers were printed on the map, but the small letters were usually omitted.

Any point was described by its distance east and north of the S.W. corner of the smallest subdivision, in units of one-hundredth of the side of one of these squares—i.e., 5 yards. Thus, a point referred to as "K.16.d.25.02," would be 125 yards east and 10 yards north of the S.W. corner of the S.E. quarter of section 16, square K.

As the grid system measured 35,000 yards by 22,000 yards, there was some overlap around the sheet edges. The area covered by one sheet on a scale of 1:40,000 was represented by four sheets on the 1:20,000 scale, the same areas being indicated by the same grid notation in every case.

As the meridians and parallels of Bonne's projection were curved lines, it followed that the difference between true and grid north increased with the distance from the origin. Everything was referred to grid bearings, however, so this caused no inconvenience. Lists of

rectangular co-ordinates, referred to the origin of the projection, of points that had been fixed trigonometrically either before or during the war, were also furnished to the survey troops. These were in metres. For convenience in converting metre co-ordinates to grid

co-ordinates, conversion tables were used, one table giving the metre co-ordinates of each line of the grid, and a further table reducing the residue in metres to decimals of a square side.

The material used in compiling the maps seems to have been collected from various sources. Among these were French civil and military maps, cadastral maps prepared by the commune, and the plans and surveys of canals, railways and mining areas. A large part of the field was also resurveyed by the British.

### Draughtsmen, Photographers and Lithographers

At the headquarters of the field survey company was located a complete organization for producing maps. The ordnance maps were overprinted in colors with the latest information secured from every available source. Aeroplane photographs furnished the means of plotting details of the

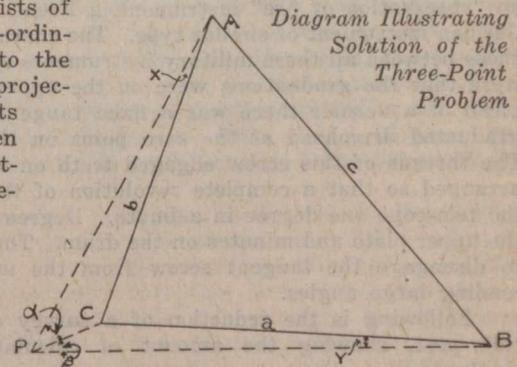


FIG. 1—A, FOUQUIERES, FOSSE 14; B, BREBIERES CHIMNEY; C, BAILLEUL CHURCH; P, OBSERVATION POINT