

CHAPTER II

FRANCE AND BELGIUM, 1939-40

The following Maps and Plates are relative to this chapter:—

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| <i>Sketch Map</i> | 1. <i>N. France and the Low Countries, page 15</i> |
| <i>Plates at end of book</i> | 1. <i>N.W. Europe 1:250,000</i> |
| | 2. <i>France 1:250,000</i> |
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SECTION I. SURVEY ORGANIZATION

During the pre-war years before September, 1939, there were, as has already been pointed out, no R.E. survey units in existence other than one small depot (or training) company, and no survey representation at any staff level other than the Geographical Section of the General Staff at the War Office.

When considering probable survey requirements for a major continental war it was however realized that, in order to meet the survey and mapping needs of an Expeditionary Force, it would be necessary to arrange for the mobilization of Survey Directorates and field survey units. War establishments for these were therefore prepared, and were implemented during the latter part of August, 1939, the personnel being drawn primarily from the principal available source of military surveyors, the Ordnance Survey. Fortunately, there were known to be a number of civil survey officers employed on topographical survey duties in the Colonies, and their names had been registered as potential officers for survey units on mobilization. These individuals proved to be an asset of great strength to the Survey Service owing to their sound practical experience.

The British Expeditionary Force which proceeded to France during September, 1939, consisted of a General Headquarters and two army corps, each of two divisions. A third corps took the field in the spring of 1940, and others would have followed as mobilization proceeded but, although plans were in hand to create an army headquarters to assume executive control between G.H.Q. and the increasing number of corps, these had not been put into effect by the time that the B.E.F. was evacuated through Dunkirk in June, 1940.

The survey organization as mobilized to take its place with the B.E.F. was as under:—

GENERAL HEADQUARTERS

Survey Directorate. This was of modest dimensions, consisting of four officers and a small number of other ranks. The officer ranks allowed by establishment were:—

- Director of Survey (Colonel).
- Two Deputy Assistant Directors (Major).
- One Captain or Lieutenant.

For 8 months, from September, 1939, to the end of April, 1940, conditions were more or less static. During this time although there was plenty to keep this small Directorate fully occupied, there was no operational movement. However, the sorting out of the geodetic systems in Western Europe, the general control of field surveys, the acquisition of air photographs from the R.A.F. and the revision of existing maps therefrom, the preparation of new and special maps for planning and other G.H.Q. purposes, and the control of map supply to formations was a full-time job.

When the German offensive started on 10th May, the conditions that ensued, leading up to the evacuation from Dunkirk, were so confused that it was no fair test for judging the adequacy or otherwise of the Directorate organization. In the light of subsequent experience elsewhere, it seems safe to say that, though it sufficed for the small size of the B.E.F., it would have had to have been expanded as the size of the force increased and active operations were pursued.

G.H.Q. TROOPS

(a) *No. 1 Field Survey Depot.*

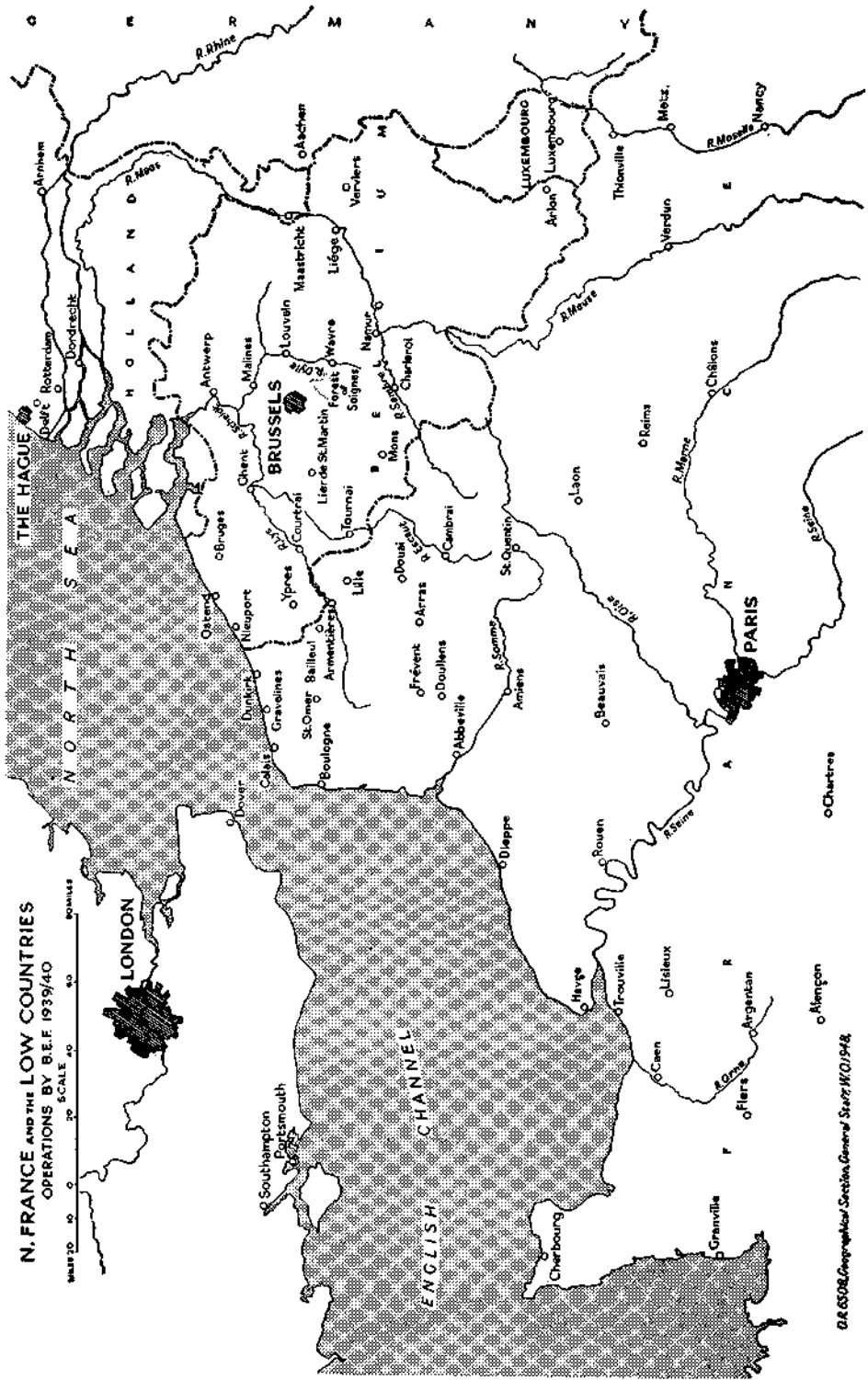
The authorized establishment allowed for one officer and 18 other ranks. The unit was designed on the assumption that, in accordance with policy existing at the time Survey held no responsibility for map distribution to units. It had, therefore, no transport for such a purpose, or for moving itself, and was completely immobile. Once established, the movement of the unit including its map stocks, was a considerable transportation problem.

The L. of C. from the Belgian frontier back to the bases extended through Normandy and Brittany to Brest and Nantes. So far as maps were concerned, this necessitated splitting the Depot into two parts. The main base depot was installed at Rennes with a warrant officer in charge, and this depot, in addition to receiving and storing bulk stocks from the United Kingdom, sent forward consignments to the advanced depot at Doullens, just west of Arras. It served also as a map issuing store for units on the L. of C. The officer commanding the Depot was brought in to work with the G.H.Q. Survey Directorate near Arras, where he was well placed for dealing first hand with map requirements for G.H.Q. and for field formations, and was also in daily touch with his advanced depot at Doullens.

When active operations started in May, 1940, and the British forces moved forward into Belgium, an advanced echelon of the Field Survey Depot was sent forward to form a semi-mobile map store near Brussels.

During the confused fighting that ensued, the bulk map stocks near Doullens and at Rennes were cut off from the retreating British corps by German panzer thrusts, and the Field Survey Depot could no longer function. It was becoming quite obvious, however, that if normal active operations had continued, with an ever-lengthening L. of C., the existing machinery for map supply would not have been adequate. It must be remembered also that, at that time, the Depot was not handling survey stores. These latter were, according to current policy at the time, an Ordnance responsibility. Later operations, in other theatres, were to be experienced before there was any radical change in the organization of the Field Survey Depot.

SKETCH MAP I



N. FRANCE AND THE LOW COUNTRIES
OPERATIONS BY BELF 1939/40

0 20 40 60 80 100
KILOMETERS
SCALE

G.R. 6508, Geographical Section, General Staff W.O. 1948.

(b) *Army Field Survey Company R.E.*

The 19th (Army) Field Survey Company R.E. was mobilized to accompany the B.E.F. as a G.H.Q. troops unit. It was somewhat of a mixed formation, consisting of Headquarters, a mobile echelon of topographical sections for field survey work and an immobile echelon of drawing and reproduction sections. It was equipped with photographic plant and six double-demy static printing machines. Considerable difficulty was experienced in finding suitable accommodation in which to instal the printing equipment within the G.H.Q. area. Eventually two machines were erected in old saw mills at Frévent, near G.H.Q., for dealing with the considerable quantity of printing work required by the various headquarter branches, and the four remaining machines were installed in a Paris factory. All this equipment was lost.

The unit was not well designed for the purpose in view. It certainly was not suitable, owing to its immobility, to function, as its name seemed to imply, as an army unit during active operations. From the point of view of map reproduction, its immobile machines were suitable for a base printing installation but not for any other purpose.

CORPS SURVEY ORGANIZATION

When planning the organization of the Survey Service to accompany the B.E.F. it was decided that each corps should have a Survey Directorate at corps H.Q. and also a Corps Field Survey Company R.E. In view of the lack of previous co-operative training between Survey and the rest of the Army, and the lack of knowledge which each had about the other, this decision was probably a wise one. As events subsequently turned out it was most fortunate, as the corps themselves, in the course of their retreat from Belgium to Dunkirk, became more or less cut off from G.H.Q. assistance as regards map supply and were therefore fortunate in each having its own Survey Directorate and Field Survey Company. The latter, with their mobile printing equipment, were able to print supplies of large scale maps as they retreated from Belgium towards Dunkirk.

The Survey organization for each corps was as follows:—

Corps Survey Directorate, consisting of:—

Assistant Director of Survey—Lieutenant-Colonel.

Assistant to above—Captain.

Other ranks—five.

(Corps) Field Survey Company R.E. This unit, as originally designed, consisted of a headquarters, two topographical sections for field triangulation and other survey work, a small drawing section, and two printing sections, each of which was equipped with one double-demy printing machine mounted in a trailer and towed by a Scammel tractor. These tractors were provided by a Medium Regt. R.A. and their availability for moving the trailers was therefore dependent on whether they could be spared by that unit. This proved to be an intolerable source of anxiety to the Survey unit commanders, especially during the retreat from Belgium, and the lesson was soon learnt that these survey technical vehicles must be independently mobile. Although modified in detail during the subsequent war years, including the addition of a photographic section and

the substitution of smaller (demy) machines in specially designed lorries instead of trailers, this type of unit, in all its essentials, retained its original identity during the whole war and proved to be a very useful, well balanced unit for general service in the field.

The A.D. Survey, with his intimate daily contact with the corps H.Q. staff and easy access to divisions, was able to look after their mapping and survey requirements in a very thorough manner. He was in a good position to maintain very close liaison with the R.A. Survey Regt. (also corps troops), and the triangulation and other field work carried out for checking and establishing the survey data required by the gunners was done on a corps area basis. It was the responsibility of each A.D. Survey to co-ordinate the work on his own corps front with that in adjacent corps areas.

Under the circumstances prevailing at the very beginning of the war, it was probably a good thing that Survey staff representation and field survey units were on a corps basis. This policy was, however, subsequently altered so that normally there were no directorates or units below army level, which proved undoubtedly to be a decision correct in changed circumstances. Where, however, a corps was likely to be operating on its own, having no army troops immediately to its rear, Survey representation was usually added.

The short period during which the B.E.F. was in France and Belgium, and the conditions under which it operated, did not constitute a proper test of the Survey organization. Many lessons were, however, learnt and, when the Directorates and units returned from Dunkirk, having lost all their equipment except a few theodolites which were carried out by hand, there was opportunity to start afresh with a clean slate and rebuild anew.

The Survey order of battle with the B.E.F. in May, 1940 was as under:—

G.H.Q. Survey Directorate

Director of Survey—Colonel A. B. Clough.

G.H.Q. Troops

19 (Army) Field Survey Company R.E.

1 Field Survey Depot R.E.

1 Corps

Survey Directorate (A.D. Survey—Lt.-Col. R. E. Fryer).

13 (Corps) Field Survey Company R.E.

2 Corps

Survey Directorate (A.D. Survey—Lt.-Col. V. E. H. Sanceau).

14 (Corps) Field Survey Company R.E.

3 Corps

Survey Directorate (A.D. Survey—Lt.-Col. R. P. Wheeler).

514 (Corps) Field Survey Company R.E.

SECTION 2. MAPS AND MAP PRODUCTION

British military mapping policy

As a result of the experiences and lessons gained during the 1914–18 war, and the development of survey and mapping technique during the subsequent years, including especially the evolution of rapid methods of mapping from aerial photographs, it became possible, in 1931, for a statement of mapping policy to be laid down by the Chief of the Imperial General Staff.

It was therein postulated that, wherever possible, the scales of maps to be provided for operational purposes would be as follows:—

Small scale, 1/250,000, for strategical and general use.

Medium scale 1/50,000, for use as a tactical map and for general administrative purposes.

Large scale 1/25,000, for deliberate battle, and especially for use by the R.A.

It was stated that these military maps should normally be gridded and map references given on the Modified British System. It was also stated that, as any prospective European ally would be using a metric grid system, and as all existing European survey data were recorded in metres, the British maps would use a metric grid. The 1914–18 war had shown that a map on a scale of about 1/50,000 was much more suitable as a tactical map than one on the smaller scale of 1/100,000 which had been used up till then. Apart from any other consideration, the small size of a 1,000 metre grid square on the 1/100,000 scale was a decided disadvantage. For training purposes during the period between the two wars the 1-inch to 1 mile map of Great Britain had become the standard map for tactical use, and this approximated close enough to the basic 1/50,000 scale laid down.

It may be noted here, however, that later in the course of the war the map requirements of fast-moving armoured forces and motorized infantry reintroduced the 1/100,000 map for use with quick-moving armoured troops.

The new mapping policy differed from that which existed before in that the latter would have supplied an Expeditionary Force only with reproductions of existing maps, whatever their scale or type, whereas the new policy aimed at producing maps of a scale and style which it was considered would be most helpful to the fighting troops. The effect of this was considerable. Not only did it entail the need for using extensive cartographic resources for the initial production of the various map series in preparation for a possible war, but it also made it necessary to draw up war establishments for adequate resources in survey units and equipment for the mapping and map production work that would be required in the field with an Expeditionary Force.

Map preparations for a European War

GENERAL POLICY

The increasingly aggressive attitude shown by Nazi Germany following Hitler's rise to power during the early 1930s indicated that at no great distant date there was a grave possibility that Great Britain and France as allies would be dragged into a conflict against Germany. The initiation of a mapping programme therefore became a matter of urgency and, during 1936, the General Staff indicated to the Geographical Section at the War Office (G.S.G.S.) an area in north-western Europe which should receive priority treatment for map preparation. This area, which was based on an appreciation of probable German offensive strategy, comprised the whole of Belgium and that portion of north-eastern France which was bounded on the north-east by the Belgian frontier from the sea to Luxembourg, in the west by the sea coast of the Pas de Calais and an extension of this line to the south, and in the south by a line running approximately from Paris to the Luxembourg frontier.

In accordance with the mapping policy laid down it was decided to begin

the preparation of map series covering this area on the standard scales of 1/250,000, 1/50,000 and 1/25,000. As a first measure the available basic mapping material had to be investigated, sorted out and selected, and in that connection staff liaison was established between G.S.G.S. and the French Service Géographique de l'Armée in Paris so as to obtain the best and most modern material and to agree on essential technical matters.

It should be noted that, on the principle of trying to preserve neutrality, neither Belgium nor Holland were prepared to co-operate before 1939 with regard to survey and mapping problems for a war which seemed imminent.

EXISTING BASIC MAP MATERIAL

The following is a brief summary of the principal national map series of France, Belgium and Holland which were available in varying stages of modernity as a basis for the preparation of British military maps:—

(a) *France.*

1/200,000. A good, clear, coloured map covering the whole of France.

1/80,000. An old staff map originating from Napoleon's day. It was the largest scale map that covered the whole of France. It was reasonably detailed, fairly accurate, and had received periodic revision. It was printed in black only and was *hachured* to show relief, becoming almost illegible in mountainous areas.

1/50,000 (black). This was a direct enlargement of the 1/80,000 map. The sheets were gridded, and the series formed the standard French military map outside those areas which were covered by the modern 1/50,000 described below.

1/50,000 (Type 1922). This was based on the new 1/20,000 series (see below) and was begun by the French after the 1914–18 war. With a view to future strategic requirements, they naturally gave priority to the eastern zones along the Belgian, German and Italian frontiers. The style was good, and the map was well detailed and reproduced in full colour. Only a portion of the potential operational area in the east was covered by sheets of this new series. The western part of the area was still uncovered by 1940.

1/20,000 (New). This series was produced from new surveys as the basic map for the new 1/50,000 series described above. They both therefore covered approximately the same area. It was a clear and accurate map, and was generally published in black only.

1/20,000 (Plans Directeurs de Guerre). These were produced before and during the 1914–18 war and were of very varying reliability, some of them being grossly inaccurate.

(b) *Belgium.* The principal map series, published by the Institut Cartographique Militaire in Brussels are given below. As the Belgian Government did not co-operate before 1940 the only material available was that which existed in the War Office Map Library, some of which was not fully up to date.

1/20,000. This covered the whole country. It was published both in black and colour and was a good accurate map.

- 1/40,000. This also covered the whole of Belgium, and was published both in black and colour. A clear and accurate map with latest editions dating from 1933.
- 1/100,000. Prepared (since 1931) from the 1/40,000 series. It was produced in colour and was a highly detailed but clear map.
- (c) *Holland*. A policy of neutrality placed Holland in the same category as Belgium as regards co-operation on mapping questions before the war.
- 1/25,000 (old). Covered the whole country and ranged in date from 1904 to 1934. It was a very detailed, clear and, where modern, accurate map.
- 1/25,000 (new). In 1934 a new series was started, very similar in style to the old series but on different sheet lines and gridded with the Dutch grid. Only a few sheets were available by 1939.
- 1/50,000 (old). Based on the old 1/25,000 map, and was very similar in style.
- 1/50,000 (new). Based on the new 1/25,000 series, and only very few sheets were available.
- 1/200,000. This was the principal Dutch series on a scale smaller than 1/50,000. The dates of the sheets ranged from 1927 to 1938.
- (d) *Germany*. As no British maps of Germany were prepared before the B.E.F. operations of 1939-40, any reference to existing German map series is deferred till later in this history.

BRITISH "REARMAMENT" MAP SERIES

The military maps on various scales which G.S.G.S. initiated in 1936 were known as the British "rearmament" series. The work of preparation was contracted out by the War Office to the Ordnance Survey where a special group of cartographers was employed from 1936 onwards on the compilation, drawing and reproduction of the maps required. Detailed specifications for style, design, etc., were supplied by G.S.G.S. Brief details of the principal map series are given below.

Small scale (1/250,000). This was in two series:—

- (a) *GSGS 4042 (Plate 1)*. A new series embracing the whole of Belgium and Luxembourg and that portion of north-eastern France lying approximately to the north-east of a line Havre-Paris. It purported to represent the ground as it was in 1936 and was based on the best material available at the time. The sheets, which were printed in four colours, were bounded by grid lines based on the Lambert Nord de Guerre grid, and had an overlap of 25 kms. on the north and east edges.
- (b) *GSGS 2738 (Plate 2)*. This consisted of 16 sheets of a 1914-18 series in which the communications were brought up to date. It covered an extension of the probable operational area to the west, south, and south-east of GSGS 4042. The series was originally produced by direct reduction from the French 1/200,000 map and was printed in four colours, the final result being somewhat unsatisfactory. It was not possible to extend the Lambert Nord de Guerre grid over this more westerly area without either introducing negative co-ordinates or altering the values of the eastings for the other map series further east. The sheets therefore carried a system of reference squares only, and no grid.

Medium scale (1/50,000). There were two series:—

- (a) *GSGS 4040 (Plate 3).* This series was built round the new French 1/50,000 map where it existed in the frontier zone. Some of the sheets were made by direct facsimile reproduction from the French printing plates fitted together into the British system of grid sheet lines. The remaining sheets were newly compiled and drawn from French, Belgian, British (1914–18 war), German and Dutch maps of varying dates. Some sheets consisted partly of facsimile reproduction from new French sheets, and partly of newly drawn detail, which gave a very patchy effect. It was generally considered that the newly drawn sheets were somewhat over-generalized, a good deal of important tactical detail having been omitted.
- (b) *GSGS 4040 A (Plate 4).* The series described above did not cover the south-west portion of the area covered by the small scale series (*GSGS 4042*). In view of the limited time that was probably available for preparation, it was decided to cover this missing area by direct enlargement from the all-black French 1/80,000 map and to add the Nord de Guerre grid. These sheets, which just overlapped *GSGS 4040* in the east extended only a short distance westwards to about the longitude of Le Havre. Further to the west, over the remainder of Normandy and Brittany, there was no British map coverage on a scale greater than 1/250,000.

Large scale (1/25,000).

GSGS 4041 (Plate 5) embraced the whole of Belgium and nearly the whole of the area of north-east France covered by *GSGS 4040 (1/50,000)*. There was, however, a gap in the west along the coast of the Pas de Calais, where no original basic material was available.

The series was produced by a compilation of the best available material into the British sheet lines. Although some of the original material was printed in colour, film negatives were made for each sheet which combined all colours together so that the maps could be rapidly printed in black only by Survey units in the field.

OTHER MAPS FOR GROUND, AIR, AND STAFF USE

In addition to the small, medium, and large scale maps of the “rearmament” series referred to above, the War Office had published sheets covering western Europe based on the 1/1 million International map. These were suitable for air use, for general strategical planning, and for use as wall maps, etc.

The pre-war expansion of the R.A.F., with special reference to Bomber Command, gave rise to a demand for specially designed maps for air navigational use in which certain topographical features such as water, woods, railways and certain roads were given special emphasis, and such detail as was considered superfluous to ordinary navigational requirements was omitted. This requirement led to the production of special air series on the 1/250,000 and 1/500,000 scales, with carefully chosen colouring, especially for the height layers, which would be legible in the special lighting conditions within the aircraft.

PRINTING OF OPERATIONAL STOCKS

As the compilation and drawing of the various sheets was completed they were photographed, and printing plates were prepared. Then, in accordance

with the policy laid down for map issues to an Expeditionary Force proceeding to the Continent, bulk stocks were printed at the O.S. of all maps other than the large scale (1/25,000), and duplicate printing plates were prepared for issue to the G.H.Q. Survey Directorate to enable stocks to be printed overseas in emergency. For the 1/25,000 maps, kodaline film negatives were issued to each of the Field Survey Companies accompanying the B.E.F. so that they could print stocks in the field as required on their mobile printing equipment.

Mapping with the B.E.F. overseas (1939-40)

The survey organization available to the B.E.F. for map production and printing within the theatre has been described earlier in this chapter. Briefly there were the following units:—

- (a) With G.H.Q.:—19 (Army) Field Survey Company R.E., with it topographical, drawing, photographic and printing sections, equipped with 6 non-mobile double-demy printing presses (auto-feed), and ancillary plant including camera. This unit worked under the direct control of the Survey Directorate.
- (b) With each Corps:—One (corps) Field Survey Company R.E., with its topographical, drawing and printing sections, equipped with 2 double-demy, hand-fed printing presses mounted in trailers, and ancillary plant, but no camera. These units worked under the direct control of the Corps Survey Directorates.

The G.H.Q. Survey Directorate went over to France in skeleton form on the day following the declaration of war, was soon completed to strength, and for a short period was the only survey representation overseas until the corps directorates and field survey companies arrived, followed by 19 Field Survey Company. There was a very early requirement for a simple and clear road map for use by convoys proceeding from their ports of disembarkation to the concentration area. A tracing was quickly made from the relevant Michelin sheets and this was reproduced by a firm of local printers in Rennes. Stocks were supplied to the base commandants at each of the principal ports so that every driver could have a copy. This was the first item of local map production overseas.

The concentration zone for the 1 and 2 Corps, which formed the original B.E.F., was the Rennes, Laval, Le Mans area and this was too far west to be covered by the British 1/50,000 series. For purposes of billeting and administration, and for training exercises while waiting to move forward towards the Belgian frontier, a 1/50,000 map was almost essential. By local contact with the French military authorities, and also with the Service Géographique in Paris, limited stocks of the French 1/50,000 sheets (plain enlargement from the standard 1/80,000 map) were obtained and issued. While G.H.Q. was back at Le Mans during September there were other special requirements of a minor nature which were met by means of utilizing local civilian resources.

MAPPING ACTIVITIES BY 19 (ARMY) FIELD SURVEY COMPANY R.E.

As soon as the B.E.F. moved forward to its allotted sector along the French-Belgian frontier to the east of Lille and Douai, an extensive reconnaissance was made to try and find suitable accommodation for the whole of 19 Field Survey Company in the B.E.F. area. The agricultural nature of the zone, and the fact

that full operational conditions had not yet arisen made it very difficult to find what was wanted. Factories, where they did exist, were still in full production. The result was that within a reasonable distance of G.H.Q. it was only possible to find accommodation suitable for installing two of the printing machines together with the drawing and photo sections. This was at Frévent, a few miles to the west of Hauteville, near Arras where the G.H.Q. Survey Directorate was located. Here the immobile echelon of the unit remained until it was forced to evacuate under German pressure in May, 1940. The two machines installed at Frévent, as also the remaining four which were operating in Paris, together with the rest of the technical equipment had to be left behind.

The following are typical examples of the tasks undertaken by this unit which, from the moment its machines were installed, was working at full pressure on almost continuous shifts:—

- (a) *Stock printing.* Stock printing of the standard 1/250,000 and 1/50,000 maps to meet emergency shortages in bulk stocks. The Base Map Depot was back at Rennes in Normandy with an Advanced Depot at Doullens, only a few miles from Frévent. Bulk stocks were shipped over from the United Kingdom, but there were occasions when large urgent issues had to be made and, for safety, the stock was replenished by 19 Field Survey Company, printing from the duplicate plates which had been supplied by the War Office.
- (b) *Revision of 1/250,000 and 1/50,000 sheets.* While awaiting developments along the Belgian frontier from October, 1939 until May, 1940, opportunity was taken to check up road classification within the British zone, and to revise topographical detail on the ground. Air photos taken over parts of north-eastern France were also used for revision purposes and, although not officially permitted owing to neutrality restrictions, a considerable amount of patchy photography from high altitude was obtained over Belgium.
Revision traces were prepared by the drawing sections of all survey units, and they were sent back to the United Kingdom so that revision work could be carried out on the original material under War Office arrangements. Meanwhile road and canal corrections were made on the printing plates so that new provisional editions could be printed.
- (c) *Preparation of special maps for the occupation of the R. Dyle position in Belgium.* As soon as a decision had been made to move forward to the R. Dyle, east of Brussels, in the event of a German offensive, special map preparation of all sorts was undertaken to meet G.H.Q. needs. To illustrate their planning directives and operational instructions, there was need for a variety of overprints on standard maps, and special productions such as route diagrams, administrative traffic maps, town plans, etc. For the actual defence position along the R. Dyle a special series of layered 1/50,000 sheets was issued.
- (d) *German defences along the Siegfried Line.* G.H.Q. (Intelligence) was paying constant attention to the German defence system along the Siegfried Line immediately to the east of the German frontier. No basic German mapping material had been taken over to France, so it was necessary to contact the French Service Géographique and obtain from them duplicate printing plates of their 1/25,000 sheets covering the western frontier zone of Germany. The French had already

prepared overprints showing some of the German defences, and these were brought up to date as far as was possible from air photos, and editions were published for intelligence purposes.

Opportunity was taken to start building up a comprehensive collection of reproduction material from which to print maps of Germany in the event of an allied move through Belgium into Germany.

- (e) *Miscellaneous jobs.* As always happens at any headquarters, there were innumerable requests from Engineer, Signal and other staff branches for the reproduction of technical diagrams, sketches and other such documents, and this work was also done by 19 Field Survey Company.

THE WORK OF THE CORPS FIELD SURVEY COMPANIES R.E.

- (a) *Revision.* The topographical and drawing sections of these units were employed from the early days of the waiting period from October to May on the revision of the 1/25,000 maps of their respective corps areas. This was done both by ground and air photo methods. Deletion and addition traces, registered closely to the grid, were drawn up and sent back to the War Office, and in the case of those sheets of special operational importance, local corrections were made to the kodelines carried by the units.
- (b) *Printing (1/25,000).* No printed stocks of 1/25,000 maps had been taken overseas, so the corps field survey companies were entirely responsible for printing stocks of these to meet the total corps requirements.
- (c) *Defences.* As the defence works along the British sector grew and developed, a complete record of them was maintained by each corps in the form of defence work overprints on the standard 1/25,000 maps and also on larger scales (1/10,000) for which printing plates were obtained from the French.
- (d) *Staff requirements.* With a Survey Directorate at Corps H.Q., and a field survey company at its disposal, it was inevitable that there should be a constant demand for all sorts of special maps, overprints, etc., to satisfy the needs of the various staff branches. The corps' Christmas cards naturally took their place amongst the many tasks!
- (e) *The move forward into Belgium.* When the German offensive started on 10th May, 1940, and the allied forces moved forward to the R. Dyle the field survey companies accompanied their corps, ready to print on their mobile equipment whatever 1/25,000 maps should be wanted. One topographical section of 13 Field Survey Company was at this time on detached duty in the Saar where French and German forces were in contact. To this area each British division in turn was being sent for a short tour of duty to gain experience of actual battle conditions in contact with the enemy. Foreseeing the possibility of a German attack A.D. Survey 1 Corps had asked for the loan of a topographical section from 19 Field Survey Company and this section went forward to the R. Dyle with 13 Field Survey Company. The absent topographical section was recalled from the Saar and, after a forced march across the line of the German Panzer thrust, arrived in Brussels in time to take part in the operations in that area and during the subsequent retreat.

- (f) *The retreat.* The swift German thrusts towards the coast along the southern flank of the B.E.F. cut off the British force from its main L. of C. including both the Advanced Map Depot near Doullens and the Base Map Depot back at Rennes. As the B.E.F. retreated towards Dunkirk it entered an area for which no 1/50,000 maps had previously been issued, and for which no stocks could now be obtained from the map depots, though they were available there in large numbers. Under these circumstances the only maps available to the troops were the small scale sheets (1/250,000) already issued and the 1/25,000 maps which the corps field survey companies were able to print and issue as they moved back with their corps through Belgium to Dunkirk.

Except while actually on the road, their machines hardly stopped day or night, in an attempt to keep pace with the rapidly changing situations. Their work was invaluable, and did not end until they had to destroy and abandon their printing vehicles just outside Dunkirk.

Miscellaneous comments

- (a) *Sheet lines and overlaps.* All the newly compiled maps of the "Re-armament Series" covering north-eastern France and Belgium were made up on grid sheet lines, and bore therefore no direct relation to the sheet lines of the national maps (French and Belgian) from which they had been compiled. The result of this was that, if and when a more modern edition of a French 1/50,000 or Belgian 1/40,000 sheet should be obtained, it was liable to affect the detail on as many as four sheets of the British GSGS 4040 series, and could not be directly reproduced as a sheet by itself to take its place in the British series.

The policy governing the selection of sheet lines for a military map series is one which deserves most careful consideration. References to this matter will be found in this history under other theatres (e.g., Chapter XII, Section 3, Greece). When the national sheet lines are retained unaltered it is obviously simpler and quicker to make use of a newly obtained edition of any sheet. In emergency it can be reproduced in facsimile and used without delay, fitting naturally into its place in the series.

The sheets both of the 1/250,000 (4042) and 1/50,000 (4040) series were compiled with overlaps on their north and east edges. Though helpful in some respects, these overlaps involved a lot of trouble and extra work in connection with revision. The revision of the overlap area on one sheet might affect eight adjoining sheets, and, unless they were all revised at the same time, there would be discrepancies of detail in any one specific area between one sheet and another. Later in the war these overlaps were eliminated.

- (b) *Communications and road classification.* One of the most constant and serious criticisms which was heard regarding the British maps issued to the B.E.F. concerned the showing of roads and tracks and their classification. Conditions of transport in modern war demand the most up-to-date and accurate information regarding road communications, to facilitate movement control, and to avoid congestion and chaos leading possibly to tactical disaster. There is no doubt that there was a lack of accurate and timely knowledge regarding road widths, surface

conditions and modern road development in north-eastern France and Belgium when the new British military map series were in preparation, and a certain lack of judgment and imagination in portraying the known information.

There was also a lack of up-to-date information regarding canal development, especially in Belgium, and as the principal canal systems formed topographical features of great tactical significance, this was a serious matter. The acquisition of modern information regarding roads and waterways was, therefore, one of the most important tasks confronting the Survey Directorate with the B.E.F., and this was rendered especially difficult owing to the maintenance of neutrality by Belgium until the German offensive was launched.

On the first edition of the 1/50,000 (4040) sheets, the roads carried no colour filling to denote their classification. The latter was indicated solely by the weight of the black lines and their distance apart. The adoption of the French system of classification into "Routes Nationales," "Grandes Communications," etc., indicated little of importance with regard to the traffic value of the roads from the military aspect as, though a road might have a good pavé surface of granite sets, the actual width of the pavé might be small, with an unmetalled verge on either side. After reaching their sectors on the Belgian frontier the corps field survey companies were therefore given a priority task of checking up the road classification on a system of single and double convoy capacity, and new editions were printed showing this by means of colour road fillings.

It is desirable that the General Staff should enunciate a clear policy of the system of road classification which should be adopted for any particular theatre and agree on the method by which it should be shown on the military maps. Different theatres will probably require different treatment owing to the diversity of topographical character.

SECTION 3. TRIANGULATION AND FIELD SURVEYS

Amongst the various duties of the Survey Service are the following:—

- (a) Surveys for, and the production of, new maps.
- (b) The establishment and maintenance of a triangulation framework on which maps and all field and artillery surveys can be based.

Before a satisfactory map of any area can be produced, it is necessary to establish a framework of points whose relative positions on the earth's surface can be determined. This framework is usually provided by undertaking a programme of triangulation over the entire area. Starting off with a base line, whose length is accurately measured, a series of triangles is built up, the angles of which are very accurately measured by theodolite observations. If, then, the position of one of these points is known and if the length and bearing of one of the sides is also known, then the triangles can be computed, and the positions of all the points can be determined with relation to each other. These positions can be calculated in terms of latitude and longitude referred to the earth's surface but, for military purposes, it is more convenient to compute them in terms of easting and northing co-ordinates based on a rectangular system of grid squares and referred to an origin whose co-ordinates are zero.

Having established this fixed framework, the topographical detail can then be surveyed, either by ground methods (*e.g.*, the plane table), or by plotting from air photographs, all the detail being fixed in position with reference to the triangulation framework. Thus, on the finished map, when it is provided with the military grid, the co-ordinates of any point marked on the map can be measured off in relation to the grid, and this gives its map reference.

There is another requirement for this triangulation framework apart from its necessity for mapping purposes. During the 1914-18 war a new artillery technique was developed which utilized survey principles. If the position of a gun, with reference to the map grid, can be determined by survey methods, and if the map reference of an enemy target can also be found with reference to the same grid, then it is easy to work out the range and bearing from gun to target and, by survey methods, lay the gun accordingly. It will be obvious that, as the map grid extends over the whole battle area, it is possible by these methods to lay an indefinite number of guns, even though widely dispersed, on to any selected target. This not only gives intense concentrations of fire, but enables such fire to be brought down on to a target without previous registration, thus giving the element of surprise.

A technique has been developed for plotting topographical detail from air photographs. For the making of a new map it is necessary that the photographs shall be taken in a certain manner, the area being covered by a series of longitudinal flights or strips, each strip consisting of a number of overlapping photographs, and each strip having a lateral overlap with its neighbour. The photographs themselves must have a minimum of tilt from the vertical. From these survey photographs the detail is plotted in relation to control points of fixed detail which can be recognized on the photographs and whose co-ordinates are known, either from existing trig lists, or by actually surveying their positions on the ground. In most countries it will be found that many of the national trig points are church spires, and these can usually be located on the photographs and used as control points.

Methods have also been evolved whereby the positions of enemy gun positions, defence works, etc., which are visible on air photographs, can be accurately transferred to a large scale map, and it is normal practice for the Survey Service, when so required, to produce special maps overprinted in colour, which show this information. The Artillery can then measure off on the maps the map references of their targets, and the Infantry and other arms can plan their tactical movements based on a knowledge of the enemy dispositions.

It will thus be realized that the existence of a triangulation framework in a theatre of operations is essential for several purposes. Fortunately most countries have established such a framework in their own homeland and also, to a greater or lesser degree, in their colonial possessions. Unfortunately, however, the quality of some of the work is poor, and as each country has established its own triangulation system independently, there are usually discrepancies of position along the frontiers between adjacent systems. In some countries, as for example in France during the last war, complications may arise owing to the fact that a newly observed triangulation system to replace the old one is only partially completed, and there are two systems in existence, side by side, with discordant values.

The above introductory notes may help to clarify the references in this and subsequent chapters to the triangulation and other survey systems which were

either in existence in the various operational theatres or were created by the Survey Service after its arrival.

The outbreak of war in 1914 had found the European nations unprepared in a survey and mapping sense for the requirements of modern war. Little serious study had been given to the national survey systems of potential friend or foe, and few large scale maps existed of any potential theatre of operations. The long period of trench warfare between 1914 and 1918, and the rapid development in accuracy and range of modern artillery led, naturally, to a demand for accurate large scale maps. Also a close system of fixed survey points was required for many purposes, above all for the determination of position and bearing for indirect artillery fire and accurate shooting by the map. The demand was so insistent and urgent during 1914-18 that little opportunity was available, amid the stress of operations, to study fully the geodetic problems concerning the various national surveys, or to initiate in the field a new comprehensive survey and mapping system adequate to the needs of the situation. The solution of the problem in western Europe during the 1914-18 war was achieved, in the case of the British Army, by the acceptance of the Belgian triangulation system and its extension southwards to cover the areas of France in which the British forces were operating. This procedure, though apparently straightforward and simple, produced many complications owing to various factors such as a discontinuity between the French and Belgian triangulations, and the varying quality of the French work within itself, much of which was old and of doubtful accuracy. On the whole, however, the system proved fairly satisfactory and served its purpose.

The experience of the combatant nations in the 1914-18 war gave a great impetus to survey and mapping during the years between the two great wars, and extensive programmes of work were initiated and vigorously pursued, partly to meet the needs of ordinary civil development, but also to provide reliable data and maps for a future war if this should arise.

The survey position in western Europe at the outbreak of war in 1939 was, therefore, very different from what it was in 1914, but the survey records and data referring to the pre-1914 and post-war periods were considerably intermingled, a fact which produced many difficulties.

It will be apparent that a comprehensive knowledge of the triangulation systems existing in a potential war theatre is an indispensable asset to the armed forces of a nation which may be involved in war. It is therefore an urgent responsibility of the Survey Directorate at the War Office to collect and tabulate the geodetic data referring to such areas, and to hold it ready in convenient form for issue to the Director of Survey of any Expeditionary Force proceeding overseas on active service.

There were two triangulation systems in France, an old one dating back nearly 150 years, and the new, which was begun in 1870. These two systems, which contained many points in common, were on different scales. This was not only because of a discrepancy in the measurements of the old and new base lines, but was also due to the fact that the systems were based on different values for the length of the earth's radius of curvature, a factor which enters largely into the computation of the spherical triangles which make up the triangulation. There was also the fact that the common point of origin for the new system was given a different value from what it had held for the old, and there was a discrepancy in the observed azimuths of the basic sides.

Between the two wars the French resumed work on observations for the

new triangulation and, by September 1939, the area of north-eastern France in which it seemed likely that British forces would operate had been completed on the new system. With an eye to future possible trouble with Germany, the French had naturally concentrated their efforts along the frontier regions facing Belgium, Luxembourg, and Germany, comprising roughly that part of France lying to the east of a line running southwards from Gravelines near the Belgian frontier to Perpignan near the Spanish frontier. To the west of this general line there was little new triangulation completed by the autumn of 1939, and the situation as a whole was therefore patchy, incomplete, and confusingly inconsistent. For the probable operational area in north-eastern France, the War Office had obtained triangulation data from the French Service Géographique, and had prepared lists of co-ordinates (trig lists) of the French national trig points in that area in the form of rectangular co-ordinates referred to the Lambert projection and the "Nord de Guerre" military grid. This latter, which was a relic of the 1914-18 war, had been adopted by the French, and the British War Office agreed to accept and use it to preserve essential uniformity in map referencing between the Allied Armies.

The triangulation of Belgium was more modern, dating from the middle of the nineteenth century. Having been observed later than the old French system, it had the advantage of more modern instruments and methods in accordance with the growing necessity for greater precision. The War Office trig lists covering Belgium were made up by transforming the co-ordinates from the national Belgian grid system to the "Nord de Guerre" grid, so as to have the trig values of points in France and in Belgium all on the same system.

As soon as the B.E.F. had landed in France in September, 1939, and while the two British corps were concentrating back in Normandy, the G.H.Q. Survey Directorate at once started to examine the lists and found that considerable errors and discrepancies existed in them. These were partly owing to faulty transcription and transformation from the original lists, and partly to a lack of sympathy between the values of common points along the frontier between France and Belgium. With the possibility of having to fight astride the frontier region, it was considered desirable to ensure a homogeneous system of co-ordinates which would enable the R.E. and R.A. survey organizations to carry forward from France into Belgium and well into the forward areas without encountering the difficulties due to discordant values when crossing the frontier.

A comprehensive adjustment of triangulation values was therefore undertaken, extending from the French side of the frontier right through Belgium, to link up smoothly with the values already available for Holland and Germany. As a result of much intensive investigation a new series of trig lists was published by G.H.Q. Survey Directorate. A full explanation and description of the work completed under Colonel Hotine's direction can be read in a pamphlet entitled "Triangulation situation in Northern France, Belgium, Holland and Western Germany 1944" (Second Edition), which was compiled by Lieutenant-Colonel W. E. Browne, R.E. and published by the Survey Directorate, S.H.A.E.F., at the time of the Normandy invasion in 1944.

When the B.E.F. had taken up its allotted position in the Lille sector of the Belgian frontier in October, 1939, the topographical sections of the R.E. field survey companies at once began their check surveys of the local French triangulation to test the accuracy of the published trig lists, and to extend the survey, where necessary; the latter to provide the R.A. survey regiments with any

extra control points which they might require for fixing the gun positions of the two corps on to the map grid. In many cases they found that there was a significant and disturbing lack of sympathy between the co-ordinate values of certain adjacent points, as shown on the published trig lists, and the values obtained by direct observation on the ground. It was found that this was due to the French method of adjustment which, for the lower category of triangulation, was apparently done on a patchy map sheet basis instead of on a regular comprehensive system. In most areas there were, however, a large number of points available in the trig lists and, by the application of normal common-sense methods in the use of the available data, adequate results could generally be obtained, taking into account the purpose for which the work was required. While 13 and 14 Corps Field Survey Companies were engaged on this work in their corps areas, 19 (Army) Field Survey Company was undertaking similar work in the back areas, checking up and thickening the existing triangulation. Several special tasks were undertaken in connection with the establishment of triangulation at base ports, the fixation of anti-aircraft gun positions, the establishment of fixed ranges for gun calibration, and the surveys of base depots, etc.

During the seven months' occupation of the frontier sector a large amount of defensive development work was undertaken. This included an organized system of anti-tank ditches, pill-boxes, gun emplacements, obstacles, etc., and it was decided that all these should be surveyed and plotted on large scale maps, not only as a means of recording progress, but also to facilitate the handing over of a sector from one formation to another. Some of this work was plotted from air photographs, but a considerable amount was surveyed by normal ground methods by the Corps Field Survey Companies.

In view of a probable German offensive through Belgium, the High Command prepared a plan whereby British and French forces would move forward into Belgium and occupy a position along the R. Dyle, to the east of Brussels, as soon as the German armies should cross the frontier into Belgium. Anticipating such a move, the possible trig situations which might arise in the event of operations along the river lines in Belgium were carefully considered in co-operation with the R.A. survey regiments. Paper schemes for the establishment of triangulation along such lines were worked out beforehand. Arrangements were also made whereby the topographical sections of the field survey companies would move forward in close touch with the R.A. survey regiments, so that work on the ground could begin in complete liaison and with the least possible delay.

On 10th May, 1940, the German offensive was launched. 13 and 14 Field Survey Companies moved with 1 and 2 Corps respectively to the R. Dyle, where they immediately began their check surveys of the local triangulation by ground observation, and the fixing of extra points as required by the gunners. This work extended both east and west of the river so as to cover both the gun and target areas. Meanwhile, 514 Field Survey Company remained on the line of the R. Escaut, where it undertook similar work for 3 Corps. This was to prove of much value a few days later when the British force retired through that position.

Up forward on the R. Dyle, the original paper schemes for the trig plan were carried out in the face of many difficulties. The country was close and difficult for resection methods. The shortage of despatch riders and motor-cycles was found to delay the sending in of results to the report centres.

However, the trig work done on the position was on the whole successfully completed according to plan by the night of 13/14th May, in spite of considerable disturbance due to enemy shelling and low flying air attacks.

The next few days were confused. Topographical sections of 13 Company worked in the Forest of Soignes revising roads and tracks on the 1/50,000 maps, as much trouble and confusion had been caused by troops losing their way in this area. They were then instructed to carry out a triangulation to cover the ground between the Charleroi Canal and the Forest of Soignes, in case that area had to be held to protect Brussels from the south but, before any work could be started, they received orders to retire to the west of Brussels on the evening of the 15th. Orders for further survey work along the line of the Charleroi Canal were received on the 16th and, by daybreak on the 17th, the topographical sections were out on the job. Orders for a further retirement put an end to this work, however, and their next task was to provide the gunners of 1 Corps with survey fixations along the R. Escaut defence line on the southern flank of the British area. All this work checked in very well and, when the Germans eventually came up against this position, the artillery fire laid down on the enemy concentrations was most effective.

After finishing its task on the R. Escaut 13 Company retired further to the north-west, and was engaged in a series of jobs for artillery control along the R. Lys and in the vicinity of Lille and Armentières. After assisting in the defence of Nieuport 13 Field Survey Company was ordered to proceed to the beach at La Panne where it embarked and crossed over to Dover on 31st May.

Meanwhile 14 Field Survey Company completed its share of the survey on the R. Dyle position in the neighbourhood of Louvain, and then retired to the R. Escaut where, in conjunction with the Corps Survey Regiment R.A. it completed the survey for artillery fixation at the northern end of the river line. Subsequently it carried out further work of a similar nature in the area Bailleul, Kemmel, Messines and Ploegsteert, and in due course embarked from the Dunkirk beaches.

The role of 3 Corps had been to remain on the line of the R. Escaut pending the development of operations further forward. 514 Field Survey Company surveyed the front in order to provide control for fixing both gun and target areas in conjunction with the R.A. Survey Regt. When the corps eventually came into action the guns, using predicted shooting, were hitting their targets with remarkable accuracy. In the words of A.D. Survey 3 Corps:—"this part of the survey duties was so successful that it is difficult to offer comment except that it must not be forgotten that the careful adjustment of the triangulation during the winter of 1939-40 was probably responsible for such good results."

So ended the field work of the survey units with the B.E.F. in 1939-40. Once battle had been joined to the east of Brussels, it was a case of rush jobs carried out on a succession of rearguard positions, all of them against time, and in face of great difficulties. The seven months of static conditions between September and May had given the units the opportunity of learning many valuable lessons of a practical nature, the most important of which was a growing knowledge of what an army in the field requires in the way of survey, how to provide it, and how best to co-operate with the artillery survey regiments, none of which can be learnt except by constant practical experience. The field survey companies and the Field Survey Map Depot had done excellent work and had developed into good efficient units. It is well that the crisis did not happen early after their arrival in France in 1939. With so little previous

practical training they could not possibly have rendered at that time the valuable service which they undoubtedly gave during the short campaign in May, 1940.

With regard to the available triangulation data and records, there seems little doubt that more attention could have been paid to the sorting out and adjustment of the French and Belgian material before the outbreak of war. There is no doubt also that it would have been helpful if the Director of Survey (designate) for the B.E.F. had been brought into the picture early during the planning stage so that he could have had some say in the preparation of the material which would be placed at his disposal.

SECTION 4. MAP SUPPLY AND DISTRIBUTION

It is a platitude to state that, to be of any value, maps must be in the hands of the users in plenty of time for the operation or other purpose for which they will be used. On the other hand it is important to remember, from the security standpoint, that the issue of maps before an operation could give a fair indication of where such an operation is likely to take place. A well thought out and well controlled organization for map supply and distribution is therefore essential, full consideration being given to the proper provision of personnel and transport, and not forgetting the important security aspect.

In those pre-war official manuals which referred in any way to Survey activities, it was quite clearly laid down as existing policy that the Survey Service was not responsible for the detailed distribution of maps to formations and units. Its duty was to produce the maps required for a campaign in accordance with General Staff policy, and to assemble the necessary stocks ready for issue, either in Map Depots in the United Kingdom for issue to an Expeditionary Force before embarkation, or in Map Depots within the overseas theatre. Experience during the war has generally shown, however, that in order to ensure the safe and proper receipt of maps by the troops, especially in mobile operations, the Survey Service should as a rule accept responsibility for distribution down to headquarters of divisions. It is indicated, therefore, that future policy and war establishments should fully allow for this, so that there may be adequate personnel and transport allotted for the task.

At the outbreak of war, the Geographical Section at the War Office controlled a map store at Alperton (N.W. London), and a small detail issue store in Whitehall for the use of the War Office staff. Both of these remained in the same location throughout the war. Their commitments, however, steadily increased, both had to be considerably reinforced, and other depots were opened up.

The first operational map issues that the War Office had to make were those for the B.E.F. in September, 1939. The provision of these stocks was dependent on the following policy that had been agreed by the General Staff:—

- (a) That all units should have an issue of small scale (1/250,000) maps before proceeding overseas.
- (b) That issues of medium scale (1/50,000) maps should only be made in the theatre of overseas operations.
- (c) That no large scale (1/25,000) maps would be printed except in the battle area.
- (d) That issues would be made in accordance with a table of unit entitlement which was prepared by the War Office before the war.

To put this policy into effect, stocks of small scale maps of the concentration and probable operational areas were issued to the Home Commands during the emergency period, for distribution by them to the units before embarkation. The medium scale (1/50,000) stocks were packed in wooden cases and sent to a store depot near Portsmouth, so as to be ready for shipment overseas as soon as the G.H.Q. Survey Directorate and Depot should be ready to receive them. No stocks of the 1/25,000 maps were printed, but kodak negatives were prepared for each sheet of the series, and a complete set was issued to each of the field survey companies so that they could print them in the field on their mobile printing equipment as and when required. Printing plates of all the map series on all scales were issued to the army field survey company which would be working at the direct disposal of the Director of Survey at G.H.Q.

To receive, hold, and issue the bulk map stocks overseas, No. 1 Field Survey Depot was assigned to the B.E.F. which, as already stated, consisted of General Headquarters and G.H.Q. Troops, L. of C. Troops, and two corps (subsequently increased to three). The Depot had an establishment of one officer, two warrant officers, and 16 other ranks, together with one 3-ton lorry. It was installed first at Le Mans, alongside G.H.Q. in the concentration area. The bulk stocks arrived from the United Kingdom a few days after G.H.Q. had reached Le Mans. The consignment amounted to over 500 tons, and at that time little transport or labour was available to move it from the station to the depot. There was also considerable difficulty in requisitioning a suitable building for the Depot, no allowance having been made for this item in the key plan drawn up by the War Office. As soon as the B.E.F. moved forward to occupy its allotted sector along the Belgian frontier, it was necessary to split the Depot in two parts. A small rear party of one warrant officer and four other ranks moved back from Le Mans to Rennes with the main stocks to set up a Base Map Depot, where they would receive and hold further map supplies from the United Kingdom, and despatch consignments forward as required. The remainder of the unit went forward with stocks of the operational area to Doullens, where an Advanced Map Depot was set up within easy reach of the G.H.Q. Survey Directorate which was at Hauteville, near Arras. This split of the Depot immediately caused a shortage to be felt in personnel, and of course one lorry could not be in two places at once. With the main supply base ports back in Brittany there was no other course.

During the seven months leading up to the German offensive in May, 1940, conditions within the British Zone were more or less static. At that time there was a Corps Survey Directorate with each of the corps, and the A.D.s Survey were able to look after the map requirements of their own corps H.Q., corps troops and divisions. They co-ordinated the demands and sent back indents to the Advanced Map Depot, through G.H.Q. Survey Directorate. Corps transport was then sent back direct to the Depot to collect the maps. The corps H.Q. staff, usually through a junior intelligence staff officer, was officially responsible for distribution down to divisions, the latter then making their own arrangements for further distribution to brigades. In actual fact, the A.D. Survey at corps H.Q. took most of the responsibility for seeing that the distribution to corps troops and divisions was properly effected, though he had no direct responsibility for this, nor had he any transport at his own disposal for getting it done.

The one 3-ton lorry belonging to the Field Survey Depot was quite inadequate. It could not serve both the rear and advanced echelons, it was extrava-

gant and quite unsuitable for the daily domestic requirements such as drawing rations, mail, etc., and it was not sufficient for the task of moving bulk map stocks. In May, when the B.E.F. moved into Belgium to meet the German offensive, it was necessary to organize a mobile map depot detachment to supply the corps which were operating east of Brussels. With considerable difficulty some lorries were borrowed from a G.H.Q. transport pool, and this forward echelon installed itself at Lierde St. Martin, just west of Brussels. At this time, the map stocks within the theatre were divided between this mobile detachment, the Advanced Map Depot near Doullens, and the Base Map Depot at Rennes. With the rapid German advance, Lierde St. Martin soon had to be evacuated. To save transport the stocks covering eastern Belgium were scuttled, and the remaining stocks of western Belgium and north-eastern France were soon exhausted during the retreat. Owing to the swift enemy armoured thrusts further south to Amiens and the Channel ports, the B.E.F. was soon cut off from its main L. of C., and the Advanced Map Depot near Doullens was lost. Thus, while the British force was fighting its way back towards the Dunkirk perimeter, map stocks of that vital area ceased to be available from normal map depot channels, and except for the small rear party at Rennes, the Field Survey Depot, to all intents and purposes, ceased to function as such. The B.E.F. then became entirely dependent on the stocks of large scale maps which could be printed by the corps field survey companies with each corps during the retreat. A last minute attempt to obtain stocks by sea from Rennes *via* Cherbourg and Dunkirk provided small quantities, which were, however, insufficient and too late. The French liaison officer attached to the G.H.Q. Survey Directorate who sailed from Boulogne on this mission in a small motor boat in a very rough sea to Cherbourg, will no doubt retain many unhappy memories of this episode.

No real opportunity occurred during these early operations in France and Belgium to test out map distribution arrangements under normal mobile field conditions, but it was quite obvious that the organization of the Field Survey Depot, both in personnel and transport, was not adequate to deal with a field formation equivalent to an army. It was also clear that, if map supplies were to reach divisions in the field without fear of failure, it was desirable that the Survey Service should take a hand in the distribution problem and be properly organized and equipped to do the job.