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Technical Manual TM 5-248, Foreign Maps, July 1946

Robert Bolin , depositor
University of Nebraska - Lincoln, rbolin2@unl.edu

TM 5-248

WAR DEPARTMENT TECHNICAL MANUAL

FOREIGN MAPS

RESTRICTED. DISSEMINATION OF RESTRICTED MATTER.—No person is entitled solely by virtue of his grade or position to knowledge or possession of classified matter. Such matter is entrusted only to those individuals whose official duties require such knowledge or possession. (See also AR 380–5.)

WAR DEPARTMENT • *JULY 1946*

W A R D E P A R T M E N T T E C H N I C A L M A N U A L

T M 5–248

This manual supersedes TM 5–250 (Tentative), Use of Foreign Maps, 5 November 1942

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W A R D E P A R T M E N T *J U L Y 1 9 4 6*

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TM 5–248, Foreign Maps, is published for the information and guidance of all concerned.

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Refer to FM 21–6 for explanation of distribution formula.

FOREWORD

Changes to this manual will be supplied on a page basis, and will be published as required. As change pages are received they will be inserted in their proper place, and the replaced pages destroyed.

Each changed page of the manual will bear a date of publication and number of the change in its upper inside corner.

Pages are numbered consecutively throughout the book. If new pages are added within the book the added pages will carry alphabetical suffixes "A," "B," "C," etc. For example, if a new page is added between 101 and 102, the page will be numbered 101A. A second additional page in the same place would be numbered 101B, etc.

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This manual supersedes TM 5–250 (Tentative), Use of Foreign Maps, 5 November 1942

CHAPTER I

INTRODUCTION TO FOREIGN MAPS

Section I. GENERAL

1. Purpose and Scope

This Technical Manual is written for use as a reference in reading foreign maps. It describes the military map series of European and Far East countries, including scales, coordinate systems, and characteristics. Foreign maps are rarely directly used in United States military operations; however, they are frequently used as a basis for the production of United States maps of foreign areas.

2. Military Maps

When military maps are classified according to their method of production, the data on which the map is based is considered. *Original surveys* are drawn directly from data obtained by actual ground surveys. *Compilations* are made from existing maps, aerial photographs, new surveys, reconnaissance, and intelligence reports. *Copies* are maps reproduced in original form, usually supplemented by military grids and additional marginal information.

3. Projections

Map projections are of extreme importance to cartographers, military surveyors, artillerymen, navigators, and others who compute and use various grid tables and trigonometric calculations. However, most military personnel in the field need not know this complex subject, because it is not necessary in ordinary point-designation methods or for obtaining practical terrain intelligence from United States or foreign maps.

Section II. MAP ANALYSIS

4. Method of Analysis

To avoid getting lost in the mass of interesting but disorganized detail often found on foreign maps, it is necessary to analyze them logically. In the method of analysis discussed below, the map study is divided into six parts: evaluation and orientation, scale, coordinate system, declination, relief, and conventional signs.

5. Evaluation and Orientation

Evaluation and orientation of maps provide answers to the questions: "How up-to-date and how accurate is the map?" and "What geographical area does the map cover?" The date of the map, the publishing agency, the way it was made, and the source of its information indicate the map's accuracy and reliability. Certain items of marginal information may provide a means of orienting a map in its approximate geographic position on the face of the earth.

a. DATES. (1) *Date of survey* indicates the time the essential data was obtained by actual ground survey.

(2) *Date of revision* is the most definite evidence of a map's up-to-dateness, if the extent of revision is known. Even though land forms change slowly, a map surveyed in the nineteenth century may not give a true picture of the terrain as it now exists. Highly industrialized areas and road classifications are particularly subject to rapid modification. The extent of revision may or may not be indicated in the marginal information.

(3) *Date of compilation* indicates when map data was collected, but does not show whether or not the information was up-to-date. However, the date of the sources from which the map is compiled may be helpful.

(4) *Date of copy* gives the time a map was reproduced in original form and amplified by additional data. It does not necessarily indicate that a map is up-to-date.

(5) *Date of publication* is the date most commonly found on maps. It indicates only the time at which a map was made available for general use.

(6) *Date of reprint* refers to the time at which a set of maps was printed from previously used plates. This date does not signify that changes were made on the map.

b. AGENCY. The type of agency responsible for preparing a map indicates its accuracy. Maps published by governmental or military agencies are generally the most accurate. Some civilian agencies produce accurate maps, but these are frequently of a general nature and do not contain the specific detail necessary for military purposes.

c. COMPOSITION. The composition of a map is a key to its reliability. Proper placing of place names and symbols, detail in which a coastline is represented, careful use of color, and other items of draftsmanship indicate the care used in preparing maps.

d. MARGINAL INFORMATION. Marginal information usually orients a map geographically, besides indicating its up-to-dateness and accuracy. Names of sheets adjacent to a map may be indicated in the centers of the four margins of that map, or in a small marginal diagram. The diagram may also include political boundaries.

6. Scale

a. Scales of most foreign maps are similar to our scales. Most foreign countries use the metric system of measurement, and their most common map scales are 1:200,000, 1:100,000, 1:50,000, and 1:25,000. These scales permit map distances to be converted quickly and easily into ground distances. For example, 1 centimeter on a map of 1:100,000 scale represents 1 kilometer on the ground. Similarly, 1 centimeter represents ½ kilometer on a 1:50,000 map or ¼ kilometer on a map of 1:25,000 scale.

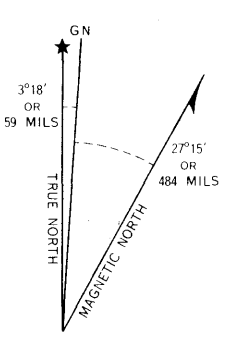
b. Map distances on 1:253,440 and 1:63,360 scales are readily converted into ground distances in the English system of measurement, as 1 inch equals 4 miles and 1 mile, respectively, on maps of these scales.

c. Troops operating in foreign countries should know the metric system and be able to convert without difficulty from the metric to the English system, and vice versa. Conversion graphs are printed on the newest editions of some Army Map Service series for convenience in changing distances and altitudes from one system to the other.

7. Coordinate System

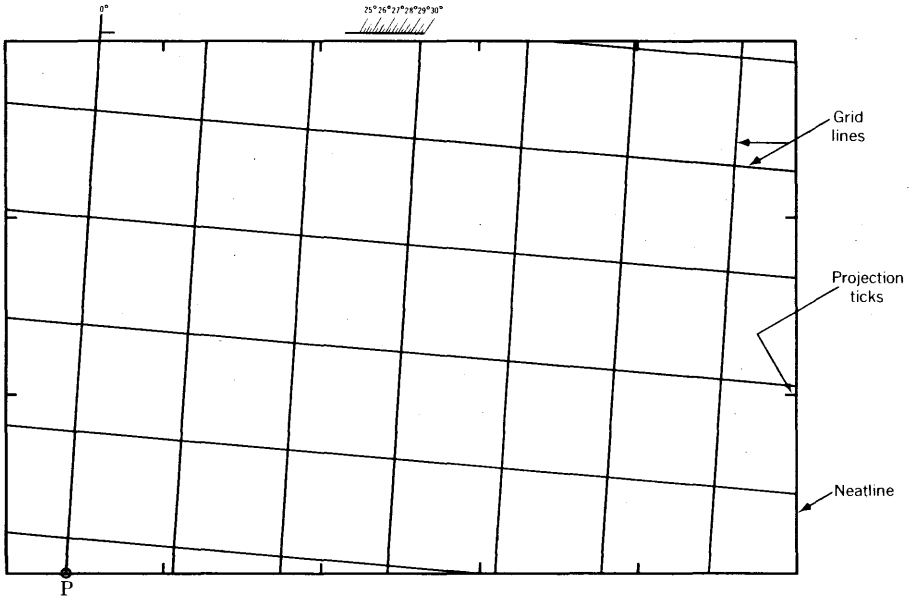
a. Considering coordinate systems used on maps is the third step in map analysis. Geographic coordinates are basically the same on all maps. Longitude is measured east and west from a prime meridian, and latitude is measured north and south from the Equator.

Figure 1. Appearance of a declination protractor oriented on a line of the grid from which the magnetic angle is given. Protractor is based on the data shown by the sample declination diagram on the left and is shown here as all protractors should appear ***when no border is used around the map.***



APPROXIMATE MEAN DECLINATION 1945
FOR CENTER OF SHEET
ANNUAL MAGNETIC CHANGE 6' WESTERLY

Use diagram only to obtain numerical values. To determine magnetic north line connect the pivot point "P" on the south edge of the map with the value of the angle between GRID NORTH and MAGNETIC NORTH, as plotted on the degree scale at the north edge of the map.



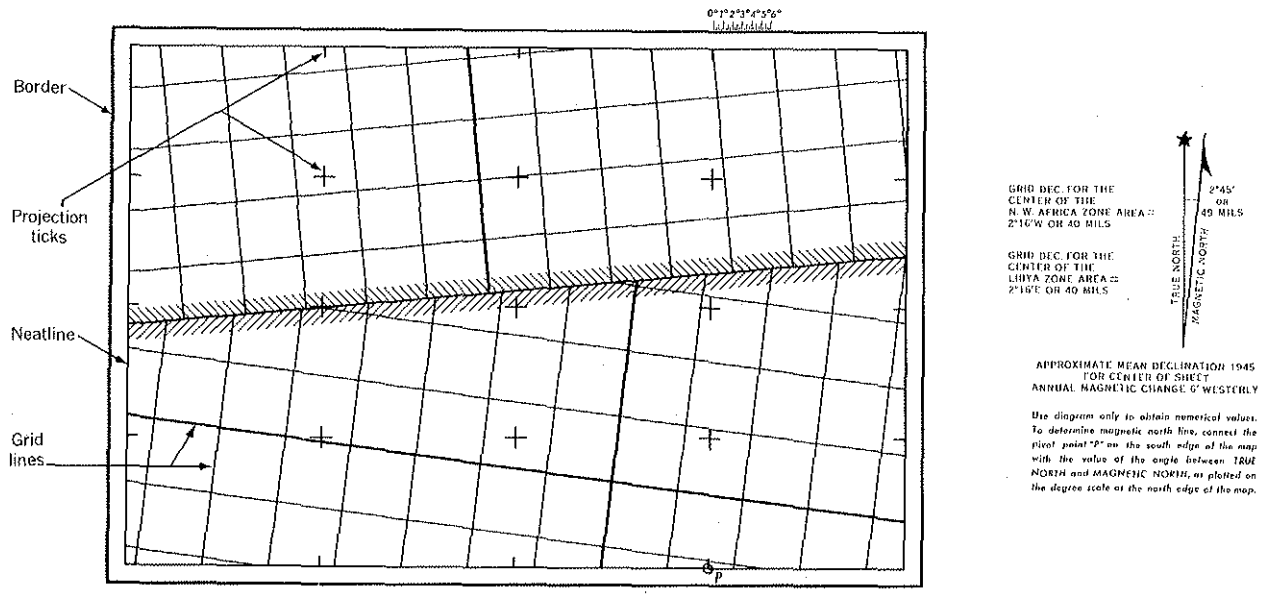


Figure 2. A declination protractor oriented on a meridian indicated here by ticks. Protractor is based on the data shown by the sample declination diagram on the right and is shown here as all protractors should appear ***on maps having borders.***

b. The degree or sexagesimal system is used almost universally. The principal variation on foreign maps is the use of prime meridians other than that of Greenwich. The prime meridian usually passes through the principal city of the country; for example, through Oslo on Norwegian maps.

c. The grade or centesimal system of geographic coordinates is used by France and Spain. In this system, longitude is measured east and west from prime meridians which pass through Paris and Madrid, respectively. Latitude is measured north and south from the Equator.

d. Most nations have their own military grid system in which grid squares represent meters on the ground. However, grid squares on most United States maps and many British maps (par. 14*a* (7) (*a*)) represent yards rather than meters.

8. Declination

a. Foreign and United States maps usually indicate declination similarly. However, declination symbols and abbreviations vary or may be omitted. If true north is not indicated in the margin, it can be determined from meridians of longitude; grid north can be determined from the military grid. Magnetic declination may be printed on the map, and magnetic north may be indicated by a diagram in the margin. However, since all angles between arrows in a declination diagram may not be drawn to scale, use the printed true value rather than scaling the angle.

b. Declination protractors are used on a few foreign maps. They are devices printed on the faces of maps to facilitate drawing magnetic north lines across maps. Each ground map on 1:250,000 and larger scales now published by the Army Map Service has a declination protractor. This protractor consists of a pivot point (P) at the bottom and a horizontal degree scale at the top of the map. A line drawn between the point P at the bottom of the map and the value of the G-M angle plotted on the degree scale at the top of the map represents the direction of magnetic north in the area covered by the map. (See figs. 1 and 2.) This magnetic north line is used for orienting the map with a compass and for determining magnetic azimuths between points on the map. Declination protractors on German maps are slightly different and are covered in chapter 4.

9. Relief

Relief is represented in many ways on foreign maps. Contours, hachures, spot elevations, hill shading, and layer tints are used, either alone or in combination.

a. CONTOURS. Contouring is the most common means of representing ground forms. Contour intervals are usually expressed in meters on foreign maps and more than one contour interval may be shown. For example, 5-, 10-, and 20-meter intervals may be used, each indicated by a different type of contour line. Form lines often supplement contour lines.

b. HACHURES. Hachures are found on many European maps. This system of representing relief shows clearly the direction and relative degree of slope, but does not accurately indicate elevations. Steep slopes are represented by relatively short hachures close together, while gentle slopes are shown by longer, thinner hachures.

c. SPOT ELEVATIONS. Spot elevations, bench marks, or triangulation stations are used to supplement other methods of representing relief and are rarely used alone.

d. HILL SHADING. Hill shading is another method of representing relief. It may be used to supplement hachuring and contouring. It assists in giving a clearer picture of topography and is used primarily on sheets covering hilly or mountainous territory.

e. LAYER TINTS. Layer or altitude tints indicate elevations above sea level by using color intensities. This method may be used with contouring to emphasize differences in elevation.

10. Conventional Signs

Conventional signs on maps published by one country differ from those on maps of other countries. Although the symbol for a particular object may vary on maps of different countries, and on different map series of the same country, these symbols possess a basic similarity. Conventional signs are intended to represent, as pictorially as possible, the actual appearance of terrain features and of objects on the ground.

CHAPTER 2

BRITISH MILITARY MAPS

11. General

British map-reproduction policies are established by the Directorate of Military Surveys, British Army and the Geographical Section, General Staff (G.S.G.S.) of the British War Office (W.O.). The mechanical processes of map making are performed by the Ordnance Survey (O.S.).

12. British Maps of Foreign Countries

Since 1940, British foreign-map policy has been to utilize existing maps of foreign countries in making British maps. However, numerous additions are made to the original maps. First editions published by G.S.G.S. are frequently identical with the original. Later editions are revised as information becomes available.

13. Reading Aids

British editions of foreign maps provide an extensive coverage of foreign countries. Reading of foreign maps is facilitated by adding a legend translation, British grid and accompanying data, glossary of foreign terms and abbreviations, graphic scales in miles and yards, index to adjoining sheets, declination diagrams, and a reliability diagram.

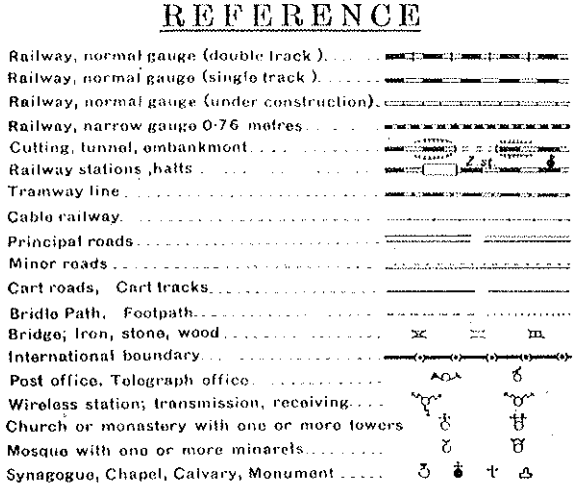


Figure 3. Legend translation from Yugoslavia series, 1:100,000, G.S.G.S. 4396.

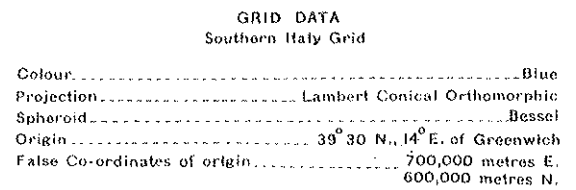


Figure 4. Grid data from Italy series, 1:100,000, G.S.G.S. 4164.

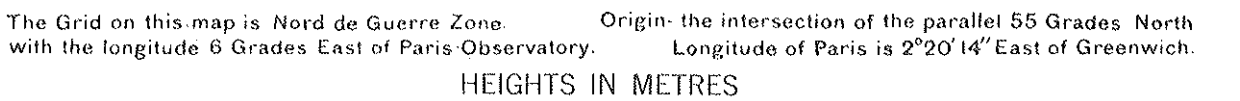


Figure 5. Grid data from France and Belgium series, 1:50,000, G.S.G.S. 4040.

a. LEGEND TRANSLATION. The legend translation gives the most common conventional signs used on the map. (See fig. 3.) Foreign terms for the features represented are often included. Revisions of maps may have the British system of road classification overprinted on the foreign road symbols.

b. BRITISH GRID AND DATA. The British grid of the area covered by the foreign map is printed on the British edition. Accompanying data may include grid data, grid reference box, and the incidence of grid letters.

(1) *Grid data,* in the color of the grid, is printed in the margin of the map. (Figs. 4, 5.)

(2) A *grid reference box* explains briefly how to read the British grid. (See fig. 6.)

TO GIVE A GRID REFERENCE ON THIS SHEET

Use only LARGER Grid figures viz. 280000

POINT	OLIG
LETTER *From face of map*	L
EASTINGS.	
Take figure of West edge of small square in which point lies	29
Estimate tenths eastwards	8
NORTHINGS.	298
Take figure of South edge of small square in which point lies	00
Estimate tenths northwards	7
REFERENCE	007
	L 298007

Unit ... metre. Square ... 1000 Reference to nearest ... 100

Nearest similar reference on this grid 500 Km distant

Figure 6. Grid reference box from Yugoslavia series, 1:100,000, G.S.G.S. 4396, sheet 79.

(3) The *incidence of grid letters* in the area covered by the map may be superimposed on an index to adjoining sheets. (See fig. 7.)

INCIDENCE OF GRID LETTERS AND INDEX TO ADJOINING SHEETS

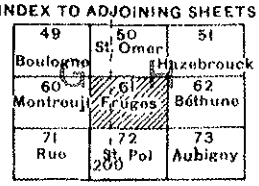


Figure 7. Incidence of grid letters and index to adjoining sheets from France and Belgium series, 1:50,000, G.S.G.S. 4040, sheet 61.

c. GLOSSARY. The glossary of foreign terms and abbreviations consists of English translations of foreign words and abbreviations used on the map. (See fig. 8.)

GLOSSARY

Alas	forest
Baai	bay
Decauville	narrow gauge railroad
Djatibosch	teakwood forest
Gebergte	range
Genting	defile, narrows
Goea	cave
Goenoeng: G	mountain
Hilir	hinterland
Igir	hill
Kali: K	river
Lebak: L	river
Oedjoeng: O	point
Onderneming: Og	plantation
Palaboehan	bay, anchorage
Poelo: P	island
Rawa: R	swamp, marsh
Solo: S	river
Straat	strait
Tandjoeng: Tg	cape
Tji	stream
Wadoek: W	irrigation pond
Wildhoutbosch	jungle
Zee	sea

Figure 8. Glossary of foreign terms and abbreviations from Java and Madura series, 1:50,000, G.S.G.S. 4202, sheets 51/XLIII–C and 51/XLIV–A.

d. GRAPHIC SCALES. Graphic scales in miles and yards are added to supplement the metric scales on foreign maps, since Britons and Americans are usually unfamiliar with the metric system of measurement. (See fig. 9.)

e. INDEX TO ADJOINING SHEETS. The index to adjoining sheets indicates graphically the sheet name or sheet number, or both, and the relative position of the sheets adjoining the one on which the index appears. Not all foreign maps have such diagrams. (See fig. 10.)

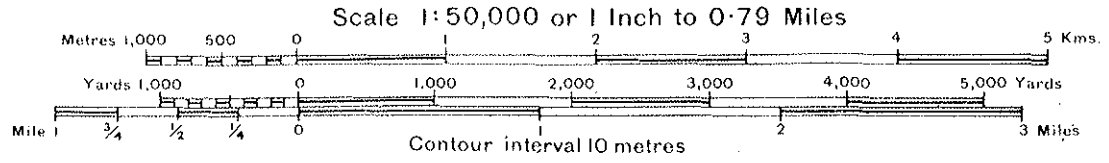


Figure 9. Graphic scales in miles and yards from France and Belgium series, 1:50,000, G.S.G.S. 4040.

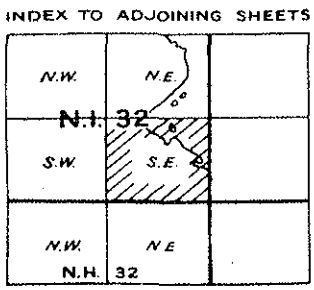


Figure 10. Index to adjoining sheets from French North Africa series, 1:500,000, G.S.G.S. 4175.

f. DECLINATION DIAGRAM. A declination diagram indicates grid declinations for the east and west edges of a sheet and magnetic declination for the center. (See fig. 11.) This information is lacking on some foreign maps. The term "convergence" is frequently used in referring to grid declinations.

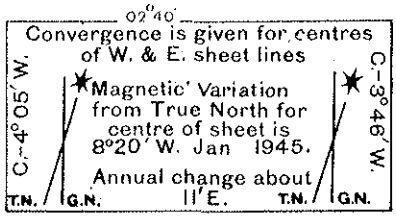


Figure 11. Declination diagram from France and Belgium series, 1:50,000, G.S.G.S. 4040, sheet 61.

g. RELIABILITY DIAGRAM. A reliability diagram indicates the area of revision and the sources from which the map was revised. (See fig. 12.)

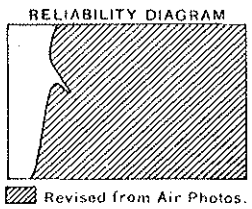


Figure 12. Reliability diagram from France and Belgium series, 1:50,000, G.S.G.S. 4040, sheet 60.

14. British Coordinate Systems

Two coordinate systems have been employed by British military mapping agencies, the British grid system, and the modified British grid system. The latter has been printed on maps published since 1927, while the British grid was placed on maps published before that time. Both systems of reference are basically the same. They differ only in small details.

a. MODIFIED BRITISH GRID SYSTEM. The modified British grid system is found on some map series issued by the United States Army Map Service. For example, the following directive from Allied Force Headquarters, North Africa, specifies the map series on which the modified British grid is to be placed:

> The War Department and the War Office have agreed that their respective Forces shall use the British systems of grid references within the British areas of responsibility for basic map production, and vice versa. Africa and Europe lie within the British area of this responsibility.
>
> In this theatre British military grids will be used exclusively.
>
> *Note.* British military grids are also used on maps covering a large part of the Pacific and Asiatic theaters of operations.

(1) *Use.* The modified British grid system permits the use of a military grid on a geographic area regardless of its size or shape. This is accomplished by dividing a major portion of the earth's surface into a number of grid zones (or belts) designated according to their geographic locations, as follows: South Italy Grid Zone, South Africa Belts, Northern European Zones I, II, and III, and so on. (See fig. 13.)

(2) *Differences between US and British grids.* British military grids, belts, and zones are characterized by four features: size and shape, overlap area, point of origin, and color of grid covering the zone. These differ from the corresponding features of United States military grids and zones as follows:

(*a*) The size and shape of United States grid zones are defined; each is 9° of longitude in width and extends roughly from the northern to the southern boundary of the area of United States responsibility. British grid zones do not have definite sizes and shapes, as shown in figure 13.

(*b*) The 9° of longitude include an overlap of 1° on each side of a United States grid zone. British grid zones do not overlap, except in the case of Australian grid belts.

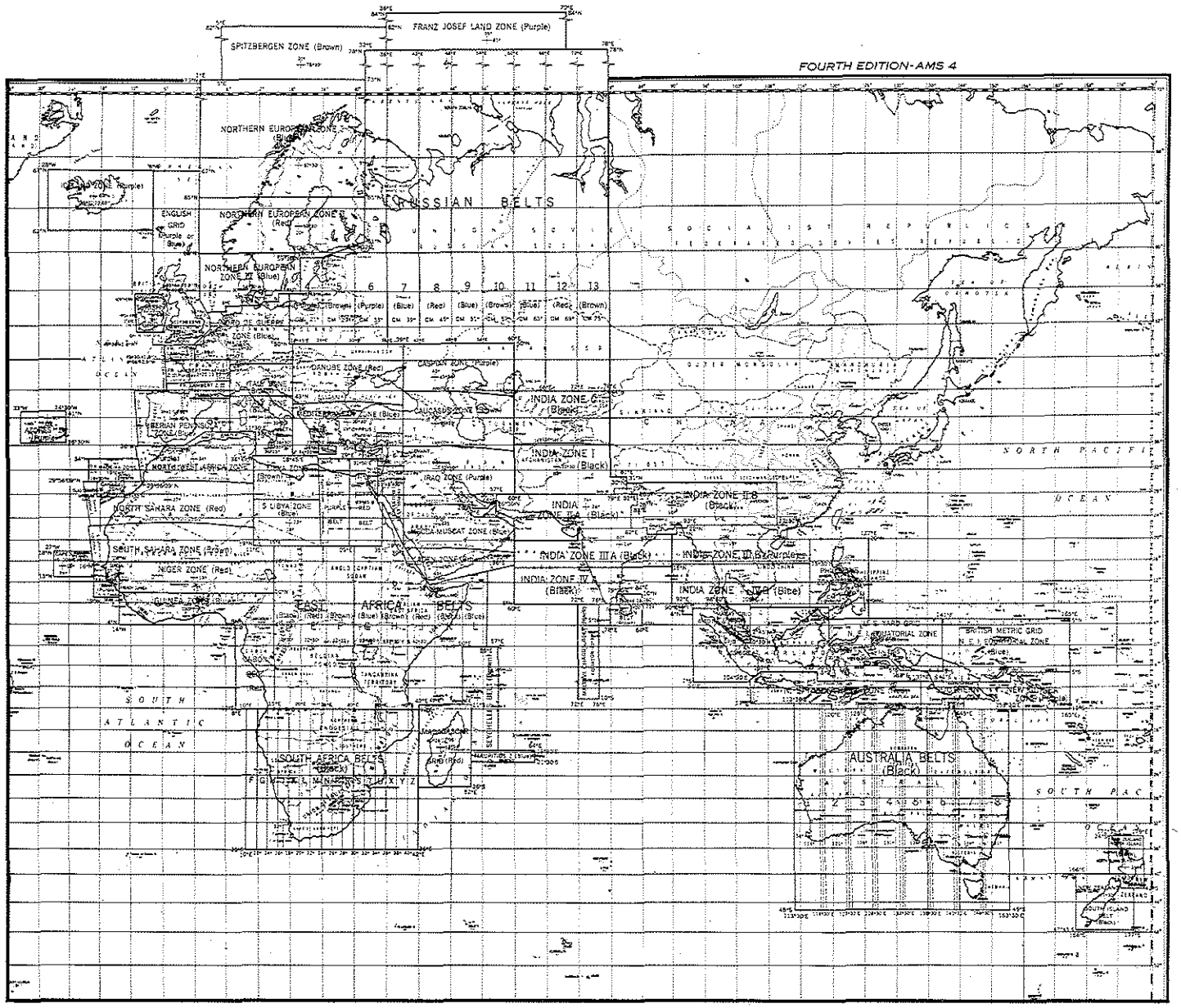
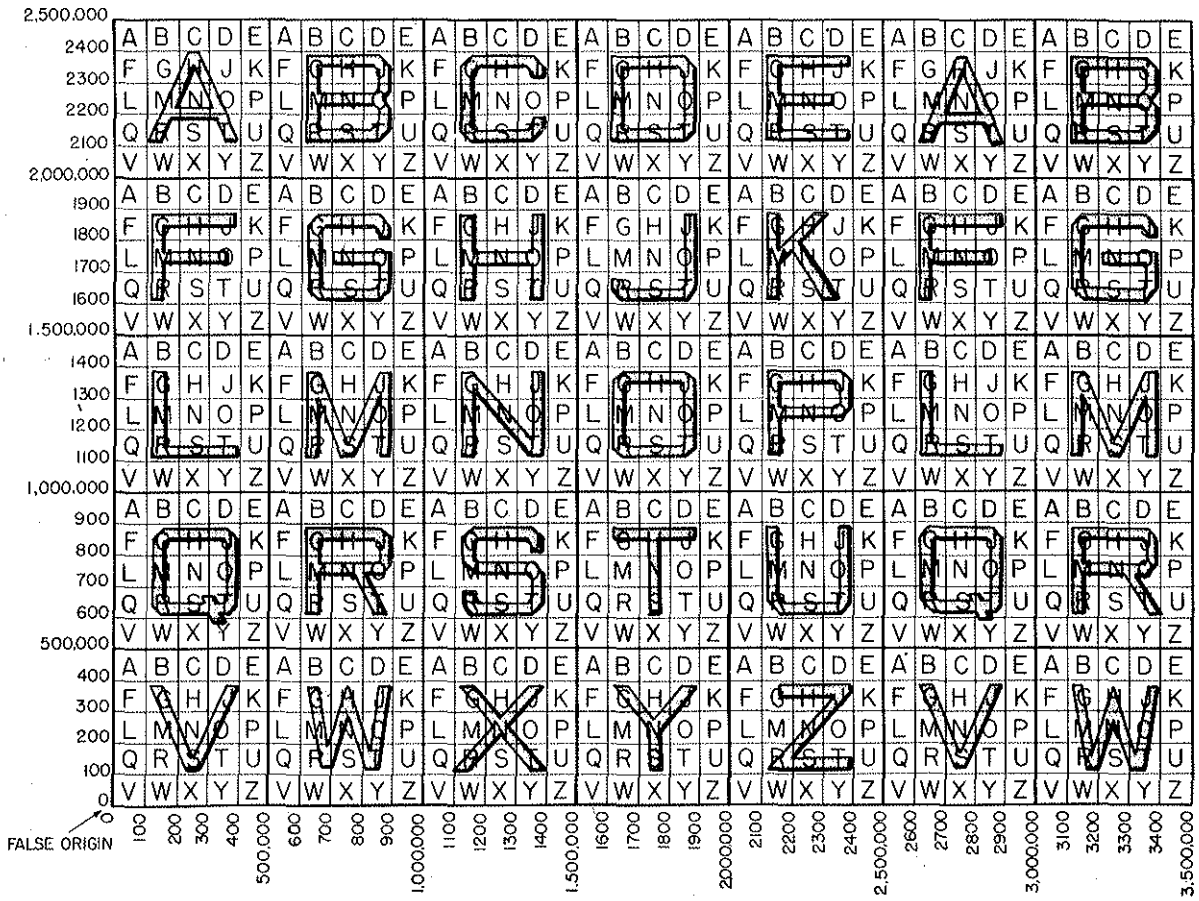


Figure 13. Diagram of British grid zones from Army Map Service Memorandum No. 425, "Grids and Magnetic Declinations," third edition, September 1943.



In the Normal lettering System the 500,000 unit Square letter V and the 100,000 unit Square letter V are both north and east of the false origin. This diagram can be used for bastard Systems of lettering by ignoring the values about the edge of the diagram and assigning appropriate values to the lines.

Figure 14. Diagram of the lettering system of the modified British grid.

(*c*) The point of origin of a United States grid zone lies at the intersection of the central meridian of the zone and 40° 30′ north latitude. The true origin of a British grid zone, is at the intersection of a specific meridian of longitude and a parallel of latitude usually located in the approximate center of the zone.

(*d*) The grid covering a United States grid zone is usually printed in black. Every British grid zone is given a distinctive grid color. Grid lines, their numerical values, grid letters, and marginal data pertaining to the grid for a particular zone are shown in the color characteristic of that zone. However, any one or all of the above three features are often printed in black for clarity or convenience.

(3) *Grid squares.* (*a*) The zone on which a grid is to be placed is subdivided into squares by vertical and horizontal lines at 500-kilometer intervals, beginning at or beyond the southwest corner of the zone. These squares are lettered alphabetically from left to right and from top to bottom as shown in figure 14. If the number of 500-kilometer squares within a given zone is greater than 25, the lettering system is repeated. (See fig. 14.) Each 500-kilometer square is subdivided by vertical and horizontal grid lines at 100-kilometer intervals. These grid squares are lettered as shown in figure 14. The actual position of adjacent grid zones and lettered squares within grid zones is illustrated in figure 15.

(*b*) The 100-kilometer squares are subdivided by vertical and horizontal grid lines at 1-kilometer intervals, every tenth grid line being accentuated. These lines are numbered consecutively from west to east and from south to north, beginning at or beyond the southwest corner of the grid zone. On maps of smaller scale than 1:100,000, only the accentuated 10-kilometer lines are shown; on maps with larger scales, the grid interval is 1 kilometer.

(*c*) In the Nord de Guerre zone where the British modified lettered grid failed to coincide exactly with the zone boundaries, arbitrary portions of the lettered grid were used to fill out near the boundaries. This situation may occur near boundaries of areas covered by the modified British grid.

(4) *Grid lines.* The numerical value of a grid line depends on its distance from a false origin located at or beyond the southwest corner of the grid zone. The values printed on the grid lines are abbreviated numbers indicating distances in thousands of meters. (See fig. 16.) The complete distances from which these grid values are derived are shown in the corners of the map. These full numbers are the distances from the false origin to the grid lines nearest the corners of the sheet. Only the abbreviated numbers printed on the grid lines are used in reading grid coordinates.

(5) *Grid coordinates.* Complete British grid coordinates consist of four parts: letter of the 500-kilometer square, letter of the 100-kilometer square, easting, and northing.

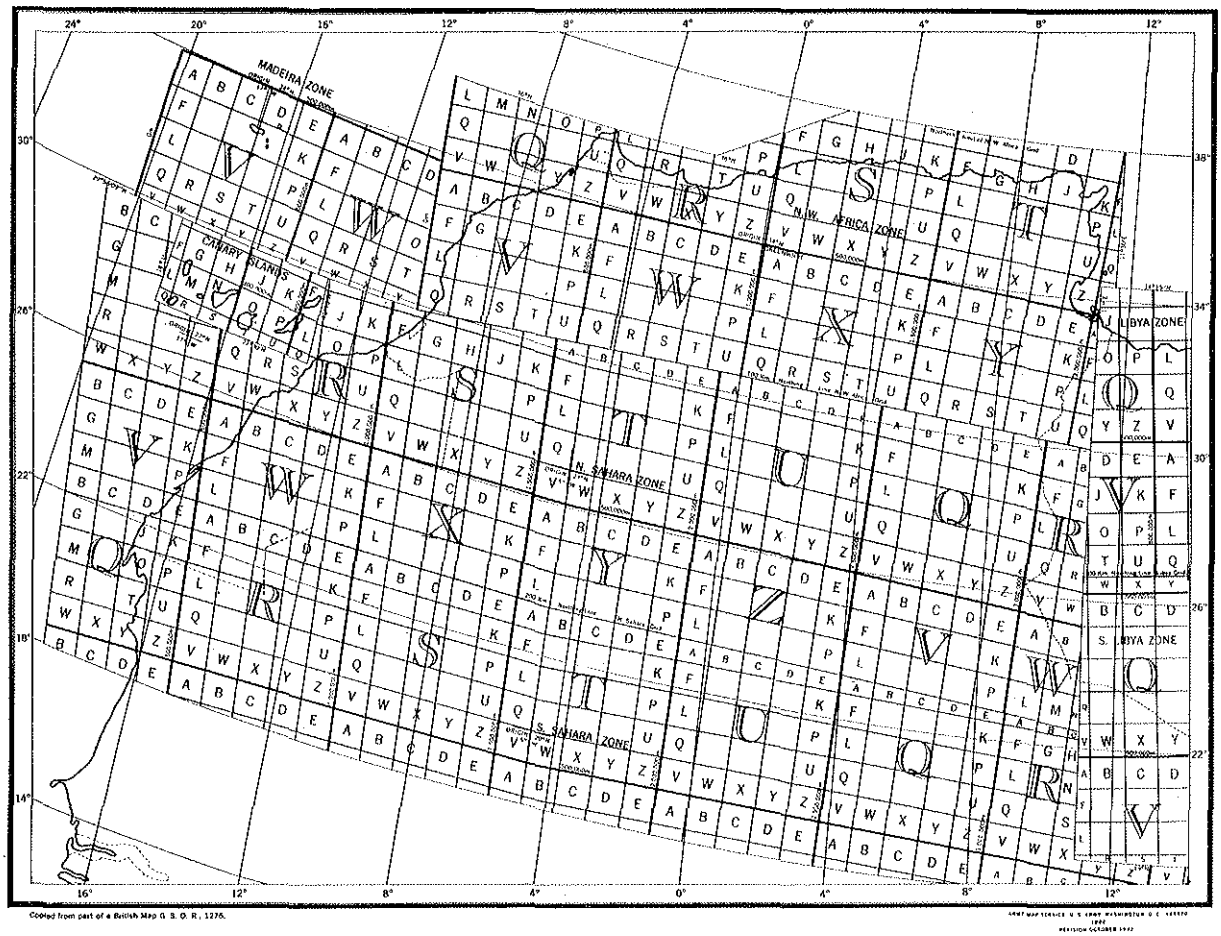


Figure 15. Diagram of British grid zones of NW Africa, approximate scale 1:7,874,000.

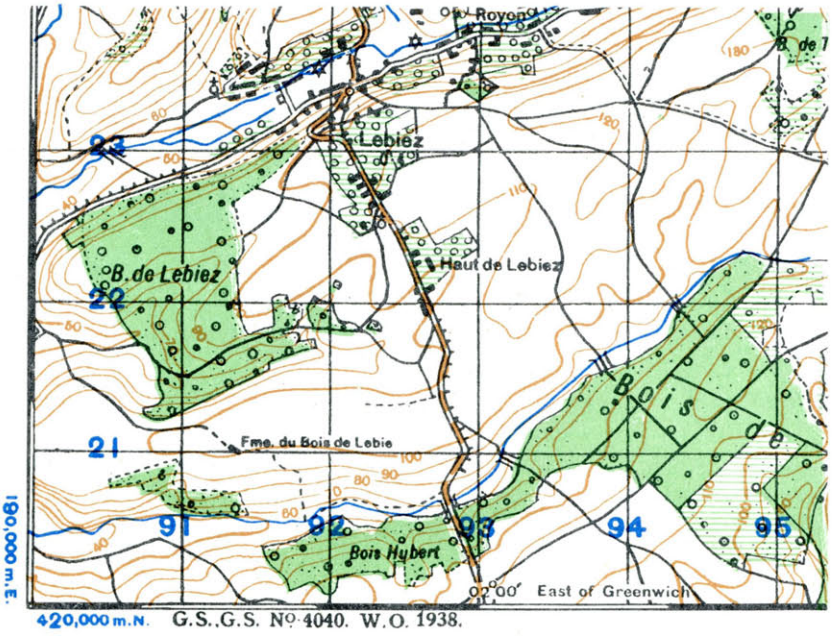


Figure 16. Section of map with modified British grid from France and Belgium series, 1:50,000, G.S.G.S. 4040, sheet 61.

(*a*) The letter of the 500-kilometer square is written as a small capital and is inclosed in parentheses. It may be printed on the face of a map or in a marginal diagram.

(*b*) The letter of the 100-kilometer square is indicated by a large capital, which may be printed on the face of a map or in a marginal diagram.

(*c*) Easting is the British term for a west-east or X-coordinate.

(*d*) Northing is the British term for a south-north or Y-coordinate.

(6) *Writing coordinates.* (*a*) In writing British coordinates,* no parentheses, dashes, or decimal points are used with the easting and the northing. For example, coordinates may appear as (s)B5784.

(*b*) To designate a point accurately, it is not always necessary to include the two letters which are used in complete British coordinates. If all references apply to a particular 500-kilometer square, the letter representing that square may be omitted. For example, the coordinates in the paragraph above might then appear as B5784. When references apply to an area within a 100-kilometer square, the letter for that square may also be omitted. Thus, B5784 becomes 5784.

(*c*) An equal number of digits must be included for both the easting and the northing. The United States military grid coordinates (34.5–28.4), (36.73–43.20), and (3.47–13.90) would appear as 345284, 36734320, and 03471390, if written in British form.

(7) *Variations.* Three variations of the modified British grid system are as follows:

(*a*) The kilometer is not always the basis for subdividing grid zones. Some zones are subdivided using 1,000-yard intervals, instead of 1-kilometer (1,000-meter) intervals. Other than this, the system of subdivision, lettering, numbering, and designating points is the same. The 1,000-yard interval is used on British-gridded maps covered by the South Africa Belts, India Zones, Ceylon Belt, Maldive-Chagos Belt, Malay Grid, Johore Grid, New Zealand Belts, Australian Belts, Mauritius Zone, English Grid, and Malta Belt. (See fig. 13.)

(*b*) Since some grid zones are not large enough for subdivision into 500-kilometer lettered squares, they are divided into 100-kilometer lettered squares. The complete coordinates of points within these zones include only

*The rule of thumb used in United States map reading, "read right—up," applies when using British grids.

the letter of the 100-kilometer square, the easting and the northing. Zones in this category are the Canary Island Zone, Cyprus Grid, Crete Zone, French Lambert Zone I, and Johore Grid. (See fig. 13.)

(*c*) Other zones have neither 500-kilometer nor 100-kilometer squares. There are no letters in coordinates taken from grids of Egypt Belts, Palestine Belt, Malta Belt, Australia Belts, and Madagascar Grid. No letters are used in coordinates read from the grid of the Levant Zone north of the 310,000-meter line. South of this line, the letters LL precede all references. (See fig. 13.)

b. BRITISH GRID SYSTEM. In the older British grid system, an area 50 kilometers square is covered by a grid composed of vertical and horizontal lines at 10-kilometer intervals. The 25 grid squares so formed are lettered alphabetically from left to right and from top to bottom, the letter I being omitted. (See fig. 17.) Each of the 10-kilometer lettered squares is subdivided by grid lines at 1-kilometer intervals. These grid lines are numbered from left to right and from bottom to top. Since the lettering system of grids on adjoining 50-kilometer squares is the same, references are duplicated on maps covering an area one side of which measures more than 50 kilometers. The method of reading coordinates in the British grid system is the same as that used in the modified British grid system. Arbitrary systems of point designation, such as templates and thrust lines, are not used by the British Army.

A	B	C	D	E
F	G	H	J	K
L	M	N	O	P
Q	R	S	T	U
V	W	X	Y	Z

Figure 17. Diagram of 50-kilometer square of the British Grid System.

CHAPTER 3

FRENCH MILITARY MAPS

15. General

French military maps are published by the *Institut Geographique Nationale* (National Geographic Institute), formerly the *Service Geographique de l'Armee* (Geographic Institute of the Army), the military mapping agency of France. This agency provides the French General Staff with topographic maps for planning and operations. It is responsible for surveys of metropolitan France, North Africa, and Syria. Maps of other French colonies are published by the local agencies of each.

16. Military Map Series of France

a. FRENCH MAPS. The principal series of French military maps are described below:

(1) The *Michelin Road Maps*, of 1:200,000 scale, are a series originally published by the Michelin Tourist Company. (See fig. 20.) Military editions of these maps are used by the armies of various countries in logistics and operations involving large units. They are neither contoured nor hachured, differences in elevation being indicated by road gradients and spot elevations.

(2) The *Carte d'Etat-Major* (General Staff Map), of 1:80,000 scale, is a series of French maps on which many maps of other scales are based. (See fig. 22.) Surveys were conducted between 1818 and 1866, and revisions were made approximately every 20 years up to World War I. Relief is represented by hachures. Enlargements of this series (1:50,000) covering all of France are now available.

(3) The *1:50,000 Contoured Series* was published rather recently and covers only a small part of eastern and northeastern France. It is a colored series with relief represented by contours.

(4) The *Plans Directeurs* are on two scales, 1:20,000 (fig. 25) and 1:10,000. These tactical series are contoured. The surveys from which these sheets were drawn form the basis for the 1:50,000 Contoured Series.

(5) *Other French military maps* are 1:50,000 photographic enlargements of some of the 1:80,000 General Staff sheets, and 1:200,000 reductions from the same series, but contoured and colored instead of hachured.

b. US AND BRITISH MAPS. The following US and British maps of France have been compiled jointly by the US Army Map Service and the Geographical Section, General Staff, British War Office:

(1) A 1:250,000 colored and contoured series.

(2) A 1:100,000 colored, layer tinted, and contoured series. (See fig. 21.)

(3) A 1:50,000 colored and contoured series. (See fig. 23.)

(4) A 1:25,000 colored and contoured series. (See fig. 24.)

17. French Coordinate Systems

The degree system and the grade system of geographic coordinates are used on French military maps. The Lambert Grid, the French military grid, is superimposed on some military editions.

a. DEGREE SYSTEM. The degree system is the same as that used by most countries. Latitude is measured in degrees, minutes, and seconds north and south from the equator. Longitude is measured in the same units from the prime meridian of Paris instead of the prime meridian of Greenwich. Paris is 2°20′14″ (2°20′13.95″) east of Greenwich, and by using this longitudinal value, longitude can be converted from the Greenwich to the Paris meridian, and vice versa. (See fig. 18.) The geographic coordinates, latitude 40°45′30″ N and longitude 4°30′45″ E (measured from Greenwich), would be latitude 40°45′30″ N and longitude 2°10′31″ E if measured from the Paris meridian. Similarly, a point on a French map having the geographic coordinates, latitude 35°15′55″ N and longitude 3°30′30″ W, would be designated as latitude 35°15′55″ N and longitude 1°10′16″ W if located on a British map of the same area.

b. GRADE SYSTEM. (1) The grade system of measurement is based on an angular unit of measure equal to 1/100 of a quadrant. Thus, a

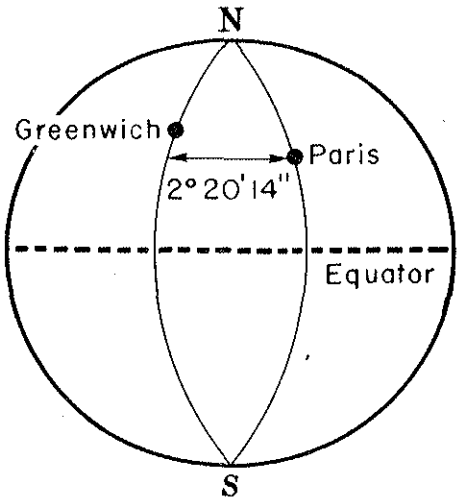


Figure 18. Paris and Greenwich meridans.

circle contains 400 grades, each of which is subdivided into 100 centigrades (grade minutes), each centigrade being composed of 100 decimilligrades (grade seconds). The symbol for the grade is G or g. Coordinates read to the nearest centigrade have the centigrade symbol (') at the end; those read to the nearest decimilligrade, the symbol for decimilligrade (''). Since the system is based on the division of units into 100 parts, coordinates are written in decimal form, for example, 4.^{G}7550'' or 4.^{G}75', 9.^{G}3725'' or 9.^{G}37', and so on.

(2) Latitude is measured north and south from the Equator. Longitude is measured east and west from the prime meridian of Paris. Coordinates read to the nearest decimilligrade are written as follows: latitude 46.^{G}7925'' N, longitude 3.^{G}5560'' E. Coordinates read to the nearest centigrade are written in this form: latitude 37.^{G}75' N, longitude 2.^{G}25' W.

c. MAPS WITH BOTH SYSTEMS. Some French maps have both the degree and grade scales around the edge of the sheet. (See fig. 19.) These scales can be identified by: the numbers on them, the comparative size of subdivisions of the scales, and the symbol for minutes. The meridians and parallels of the degree system are numbered up to, but not including, 60; those of the grade system are numbered up to, but not including, 100. The degree, being the larger of the two units, has larger subdivisions than the grade scale. The minute in the degree system is identified by the symbol ('), while the centigrade can be recognized by the symbol (').

Usually the degree scale is the outer scale; the grade scale, the inner one.

d. CONVERSION FACTORS. Geographic coordinates or azimuths and declinations can be changed from one system to the other by using conversion factors. This is often necessary because the standard unit of angular measurement of the French Army is the grade, though mils and degrees may be used. Since a quadrant is composed of 90 degrees or 100 grades, 1 degree equals 10/9 grades. Conversely, 1 grade equals 9/10 degree. (For the relationship between corresponding values of the two systems, see app. I.) The following is one method of conversion.

(1) To convert grades into degrees, multiply the grade value by 9/10; then change the decimal part of the degree value into minutes and seconds. For example, 2.^{G}5969'' = 2°20'14". The conversion is done as follows:

$$2.^{G}5969'' \times 9/10 = 2.3372°$$
$$0.3372° \times 60 = 20.2326'$$
$$0.2326' \times 60 = 13.95'' \text{ or } 14''$$
$$2° + 20' + 14'' = 2°20'14''$$

(2) To convert degrees into grades, multiply the degree value, expressed in decimal form, by 10/9. For example, 2°20'14" — 2.^{G}5969''. This conversion is done as follows:

$$14'' \div 60 = 0.2333'$$
$$(20' + 0.2333') \div 60 = 0.3372°$$
$$(2° + 0.3372°) \times 10/9 = 2.^{G}5969''$$

e. MILITARY GRID. (1) The French military grid system is known as the Lambert grid system (Quadrillage Lambert). France is covered by four Lambert zones: North Lambert Zone, Central Lambert Zone, South Lambert Zone, westernmost portion of Nord de Guerre Zone. The Nord de Guerre Zone also covers the Netherlands, Belgium, and almost all of Germany. These zones are used by the British on their maps of France, the first three being renamed Lambert Zones I, II, and III. Also, the British extended the Nord de Guerre Zone 100 kilometers to the west.

(2) Grids on these zones are based on 1-kilometer intervals. Grid lines are numbered from an origin in the southwest corner of the zone. The coordinates are read to the right and up and may be written as either 141,8/328,8 or 14183288. Other systems of point designation, similar to those of the US and German armies, are used by the French.

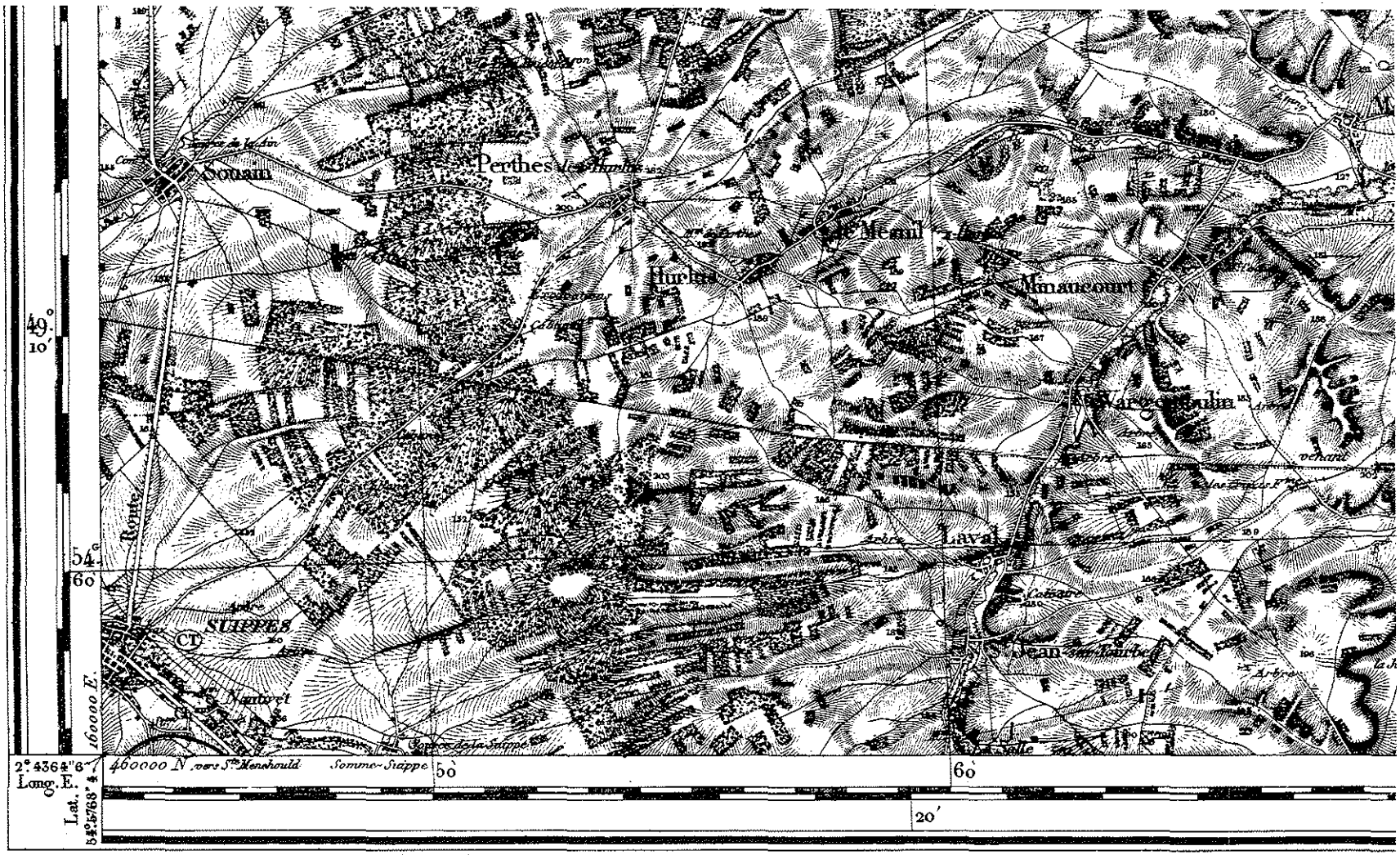


Figure 19. Section of map from Carte d'Etat-Major series, 1:80,000, sheet 35.

18. Characteristics of French Military Maps

a. REPRESENTATIVE FRACTIONS. 1:80,000 is peculiar to the Carte d'Etat-Major series. With this exception, the scales on French maps are the same as other European map scales based on the metric system of measurement.

b. DECLINATION DIAGRAMS. Declination diagrams are not usually found in the margins of sheets of the Carte d'Etat-Major series. They may be given on maps of other scales. True north on French maps is known as *nord géographique* (geographic north) and is abbreviated NG in declination diagrams. *Nord magnetique* is the French expression for magnetic north and is abbreviated NM. Grid north is called *nord Lambert* (Lambert north) and is abbreviated NL.

Table I. Glossary of French map expressions

Authorities

Institut Cartographique Militaire	Military Cartographic Institute.
Institut Géographique de Paris	Geographic Institute of Paris.
Ministeré de la Guerre	Ministry of War.
Service Cartographique	Cartographic Service.
Service Géographique de l'Armée	Geographic Service of the Army.
Service Géographique de l'Indo-Chine	Geographic Service of Indo-China.
Société d'Editions Géographique, Maritimes et Coloniales	Society of Geographic, Maritime, and Colonial Editions.

Key terms for identifying map dates

dessiné (e)	drawn.
dressé (e)	prepared.
exécuté (e)	executed.
gravé (e)	engraved.
héliogravé (e)	photoengraved.
impression	printing.
imprimé (e)	printed.
levé (e)	surveyed.
mis (e) à jour en	brought up-to-date in.
publié (e)	published.
rectifié (e)	corrected.
rédaction	editing.
rédigé (e)	edited.
revisé (e)	revised.
revision en	revision in.
revision partielle en	partial revision in.
tirage	issue, printing.

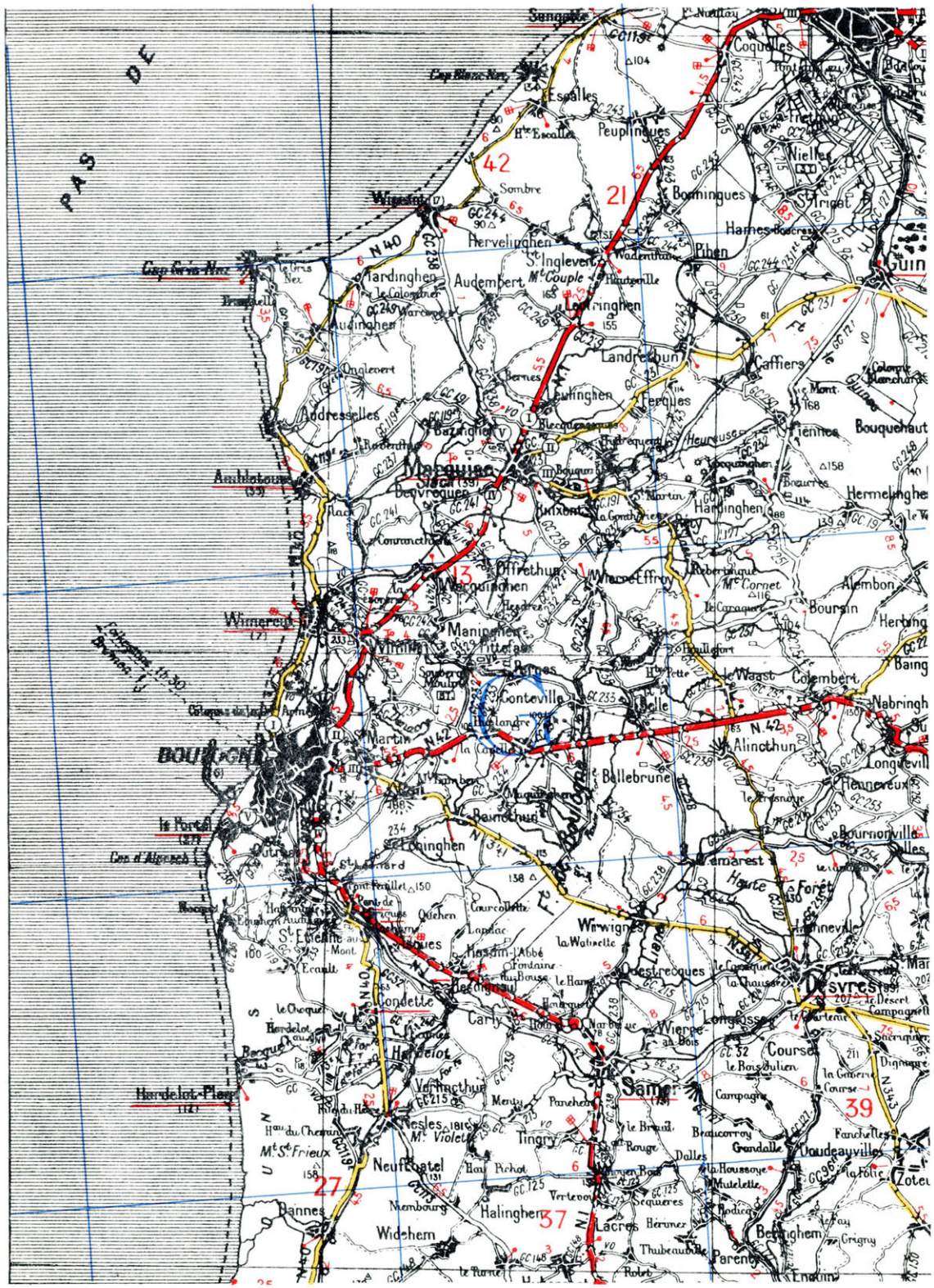


Figure 20. Section of map from Europe road map series, 1:200,000, G.S.G.S. 4238, sheet 51.

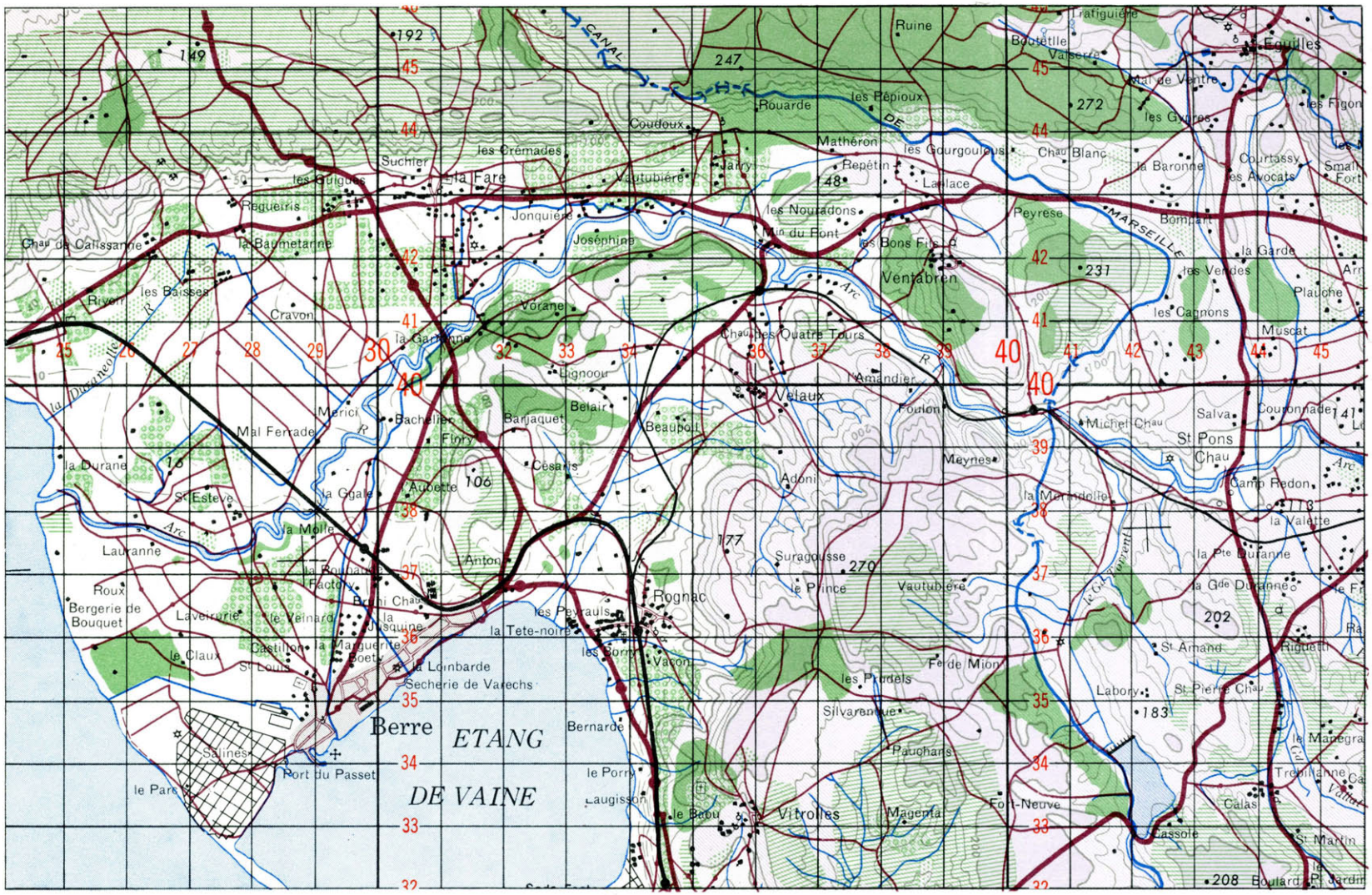


Figure 21. Section of map from France series, 1:100,000, AMS M661, G.S.G.S. 4249, sheet 14Q.

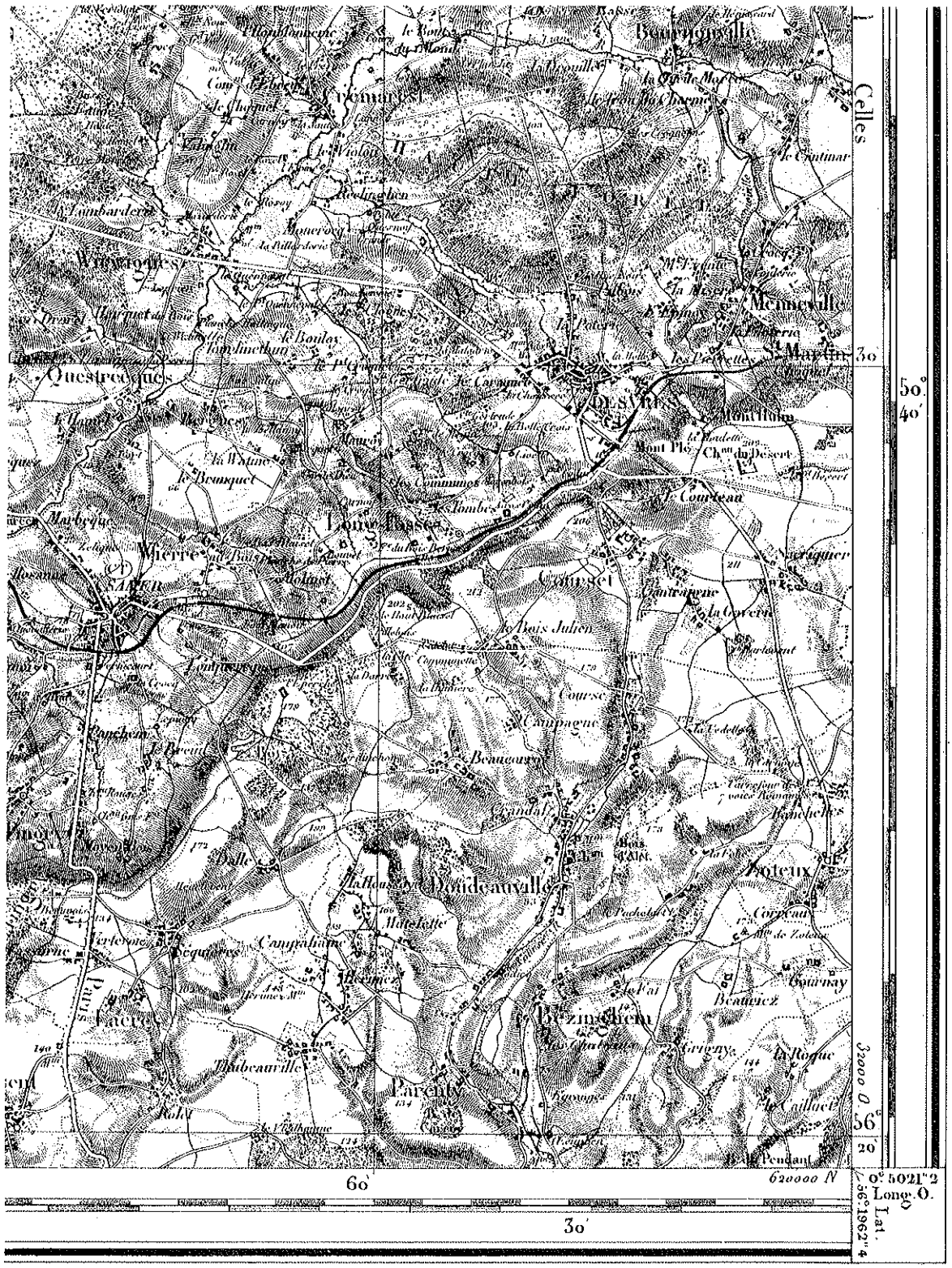


Figure 22. Section of map from Carte d'Etat-Major series, 1:80,000, sheet 3.

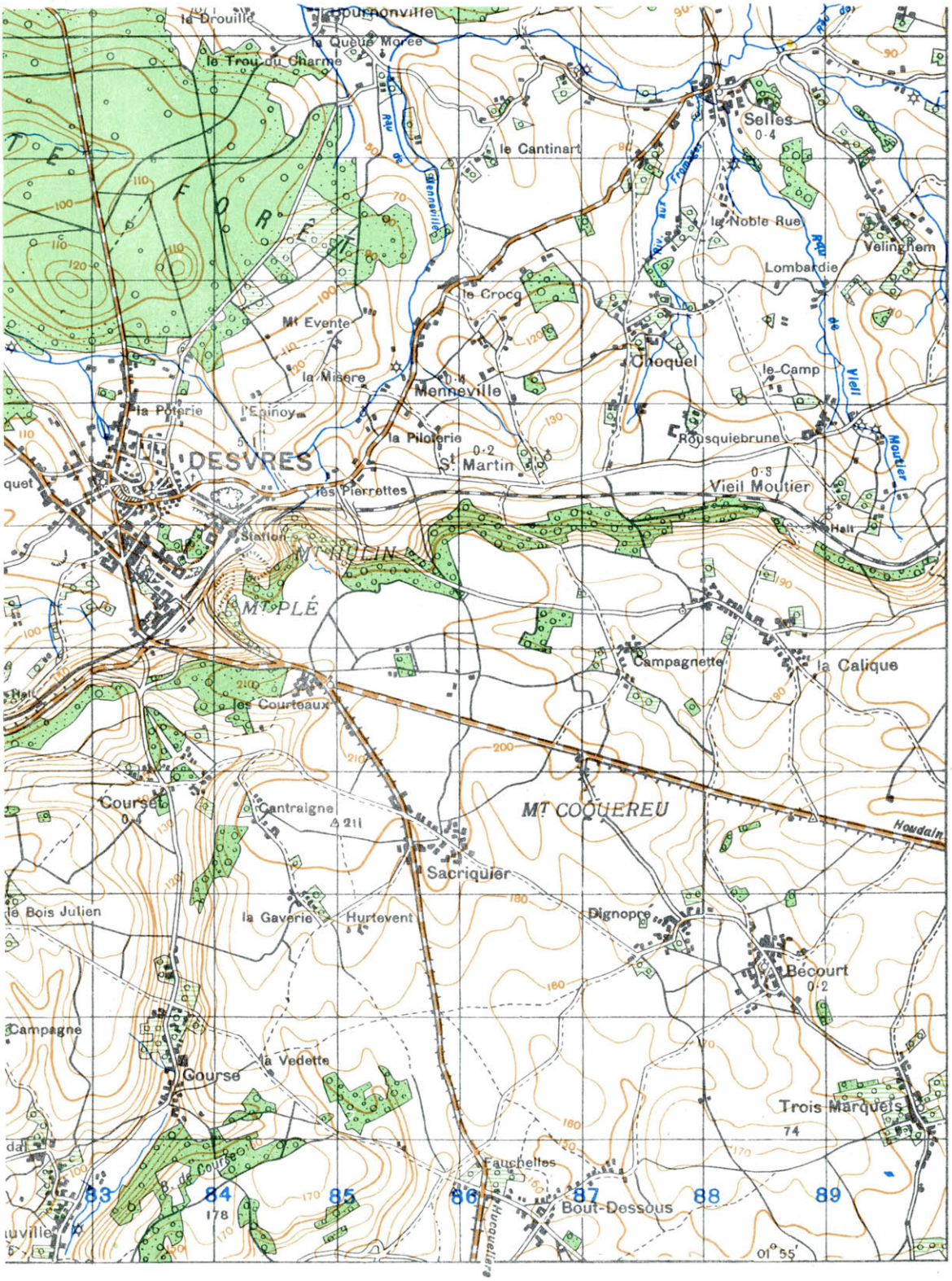


Figure 23. Section of Map from France and Belgium series, 1:50,000, G.S.G.S. 4040, sheet 49.

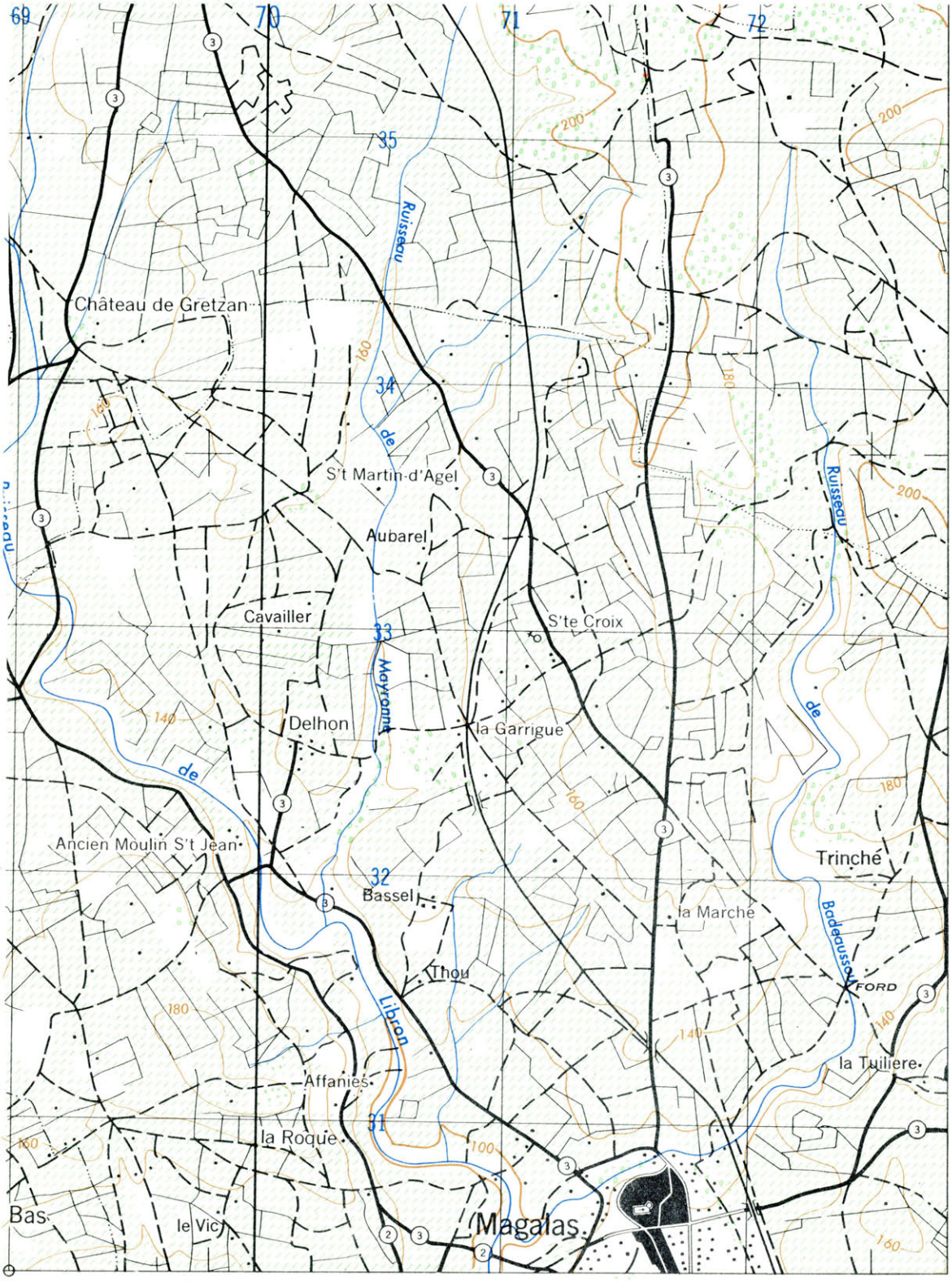


Figure 24. Section of map from Southern France series, 1:25,000 AMS M861, G.S.G.S. 4411, sheets XXV–44 3 and 4

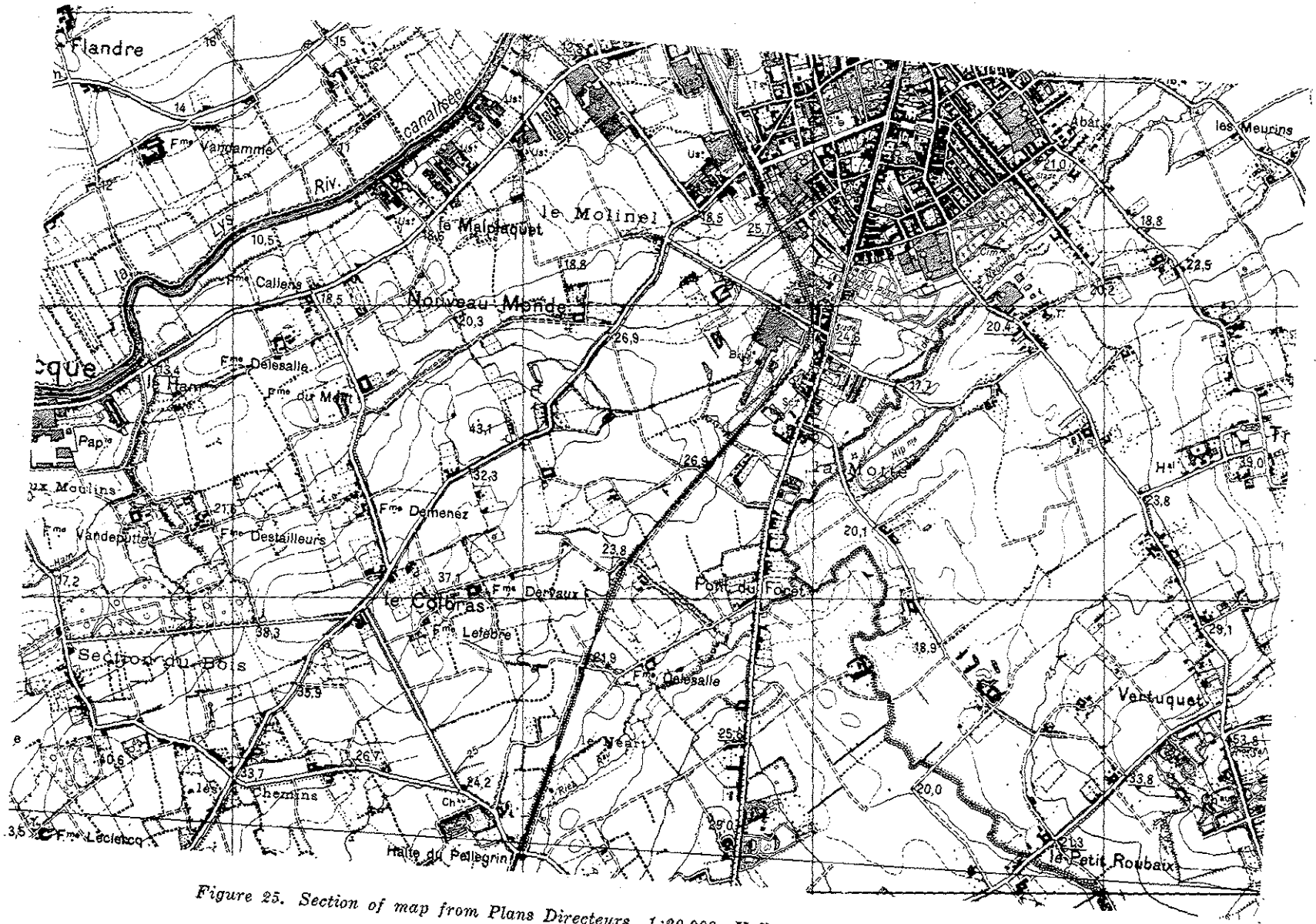


Figure 25. Section of map from Plans Directeurs, 1:20,000, Halluin sheet No XXV-3, Lille No 7.

CHAPTER 4

GERMAN MILITARY MAPS

19. General

German military maps were published by the *Reichsamt für Landesaufnahme* (Government Bureau for Land Survey). Some editions were published by various agencies which were later incorporated into the *Reichsamt für Landesaufnahme*. Certain editions of military series were produced by authorized civilian agencies.

20. Military Map Series of Germany

a. GERMAN MAPS. The principal series of German military maps are briefly described below:

(1) The *1:300,000 Deutsche Motorfahrer* (German Tourist) series was published in Germany before World War II for use by motorists and bicyclists. A late edition of this series includes German express routes. This hachured series was printed in four colors.

(2) The *Übersichtskarte* (General Survey Map) series is on a scale of 1:200,000. The 1:100,000 series mentioned in (3) below is the basis for this series.

(3) The *Reichskarte* (Federal Map) series, also called the *Karte des Deutschen Reiches*, of 1:100,000 scale (fig. 37), has fine engraving and a great amount of detail. This General Staff map was printed in black and white, with relief shown by hachures.

(4) The *1:50,000 Deutsche Karte* (German Map) series is a comparatively recent series of maps. Relief is shown either by contours or by hachures.

(5) The *1:25,000 Topographische Karte* (Topographic Map) series is the most important large-scale series of German tactical maps. (See fig. 39.) These maps were formerly known as *Messtischblätter* (Plane Table Sheets). They are usually printed in black and white and are elaborately contoured.

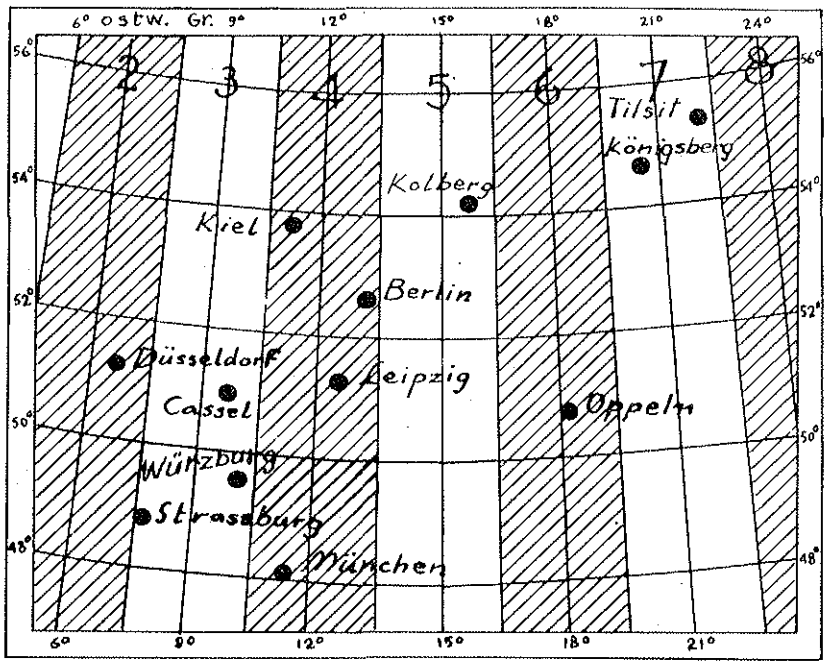


Figure 26. Diagram of German grid zones, from Major Uebe, Soderleins Leitfaden zum Geländezeichnen und Kartenlesen (eighth edition, Berlin: R. Eisenschmidt, 1935, page 23).

b. UNITED STATES MAPS. United States maps of Germany consist of a 1:100,000 colored and contoured series prepared under a joint agreement between United States and British agencies. (See fig. 38.) These maps were compiled from existing maps of central Europe and from air photographs. They are gridded with modified British grids and are available with or without altitude tints.

c. BRITISH MAPS. British maps of Germany are copies of the German 1:25,000 series. British grids are superimposed on copied German maps and marginal information provided in English. (See fig. 40.) Since the maps are copied, conventional signs are German. Declinations are indicated on a three-pronged marginal diagram.

21. German Coordinate Systems

The Geographic coordinates on German maps are expressed in degrees. (See fig. 26.) Before 1921, the Germans measured longitude from Ferro, approximately 17°40′ west of Greenwich. Since then, they have used the prime meridian of Greenwich. Some older sheets have longitude from both Ferro and Greenwich indicated in their corners. Methods of point designation used on German military maps are given below.

a. GAUSS-KRÜGER GRID SYSTEM. The *Gauss-Krüger* grid system (*Gauss Krüger Gitternetz*) consists of a series of 3° zones or belts (*Gitterstreifen*) oriented on specific meridians of longitude. The grid lines of each zone are spaced at 1-kilometer intervals.

(1) *Grid zones.* German grid zones are 3° wide and are centered on the 6°, 9°, 12°, 15°, 18°, 21°, and 24° meridians. (See fig. 26.) The zoning system is extended westward to cover France and England. These grid zones do not overlap. Maps bearing grids of two adjoining zones have tick marks along their borders so that the grid of one zone can be extended over a portion of the other. The boundary between zones is indicated on the border of a map as shown in figures 27 and 28.

Ostgrenze des Gitterstreifens 9°	Westgrenze des Gitterstreifens 12°

(translated as:)

East boundary of 9° Zone	West boundary of 12° Zone

Figure 27. Designation of zone boundaries on German maps.

(2) *Grid lines.* (*a*) *Vertical.* Vertical grid lines within a zone are parallel to the central meridian of that zone and are spaced at 1-kilometer intervals. All grid lines of a zone are given one identification number (*Kennziffer*). The identification number for each zone is determined by dividing the degree value of the central meridian by 3. Thus, the number of each vertical grid line in the 9° zone is preceded by the figure 3. The grid line coinciding with the central meridian of a zone is given a value of _500 kilometers. Lines west of the central meridian are numbered below 500, for example _497, _498, and _499. Those east of the central meridian are numbered above 500, for example _501, _502, _503, and so on. Each of these numbers is preceded by the identification number of the zone in which it lies; thus, the grid-line numbers above become 6497, 6498, 6499 and 6501, 6502, 6503, assuming that the grid lines are in the 18° zone. Grid lines coinciding with the central meridians of the German grid

zones are given values in kilometers as follows:

6° zone—2,500 km.
9° zone—3,500 km.
12° zone—4,500 km.
15° zone—5,500 km.
18° zone—6,500 km.
21° zone—7,500 km.
24° zone—8,500 km.

Because meridians converge, a zone gradually widens as it extends to the south. To cover the wider area, the western boundary of each zone is extended 10 kilometers to the west at specified intervals. This results in irregularities along the western boundary of each zone.

(*b*) *Horizontal.* Horizontal grid lines are perpendicular to the central meridian of a grid zone and are spaced at 1-kilometer intervals.

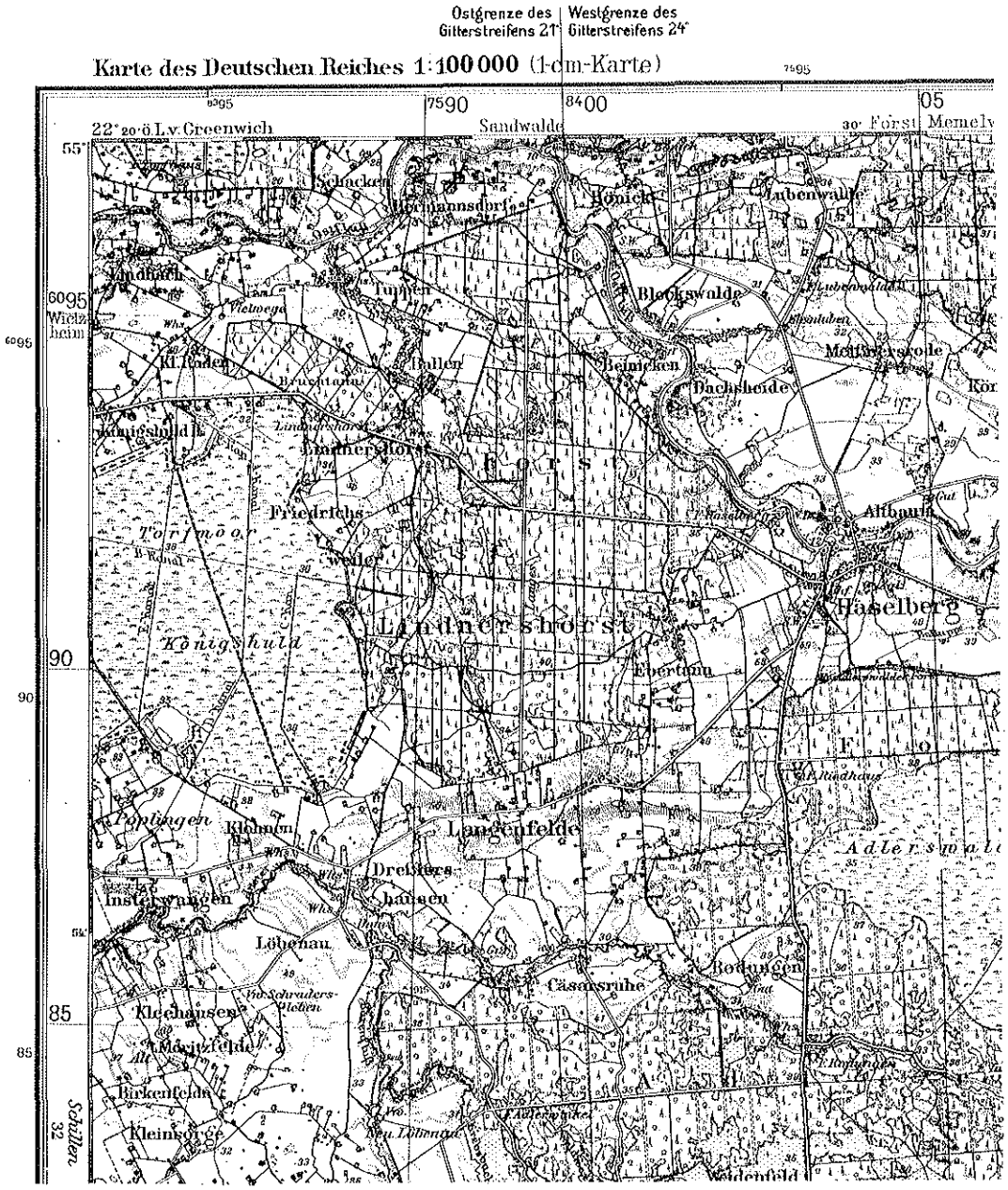


Figure 28. Section of map from Reichskarte series, 1:100,000, sheet 33. Notice the boundary between grid zones, the numbering system, and the tick marks used to extend the grids of the two zones.

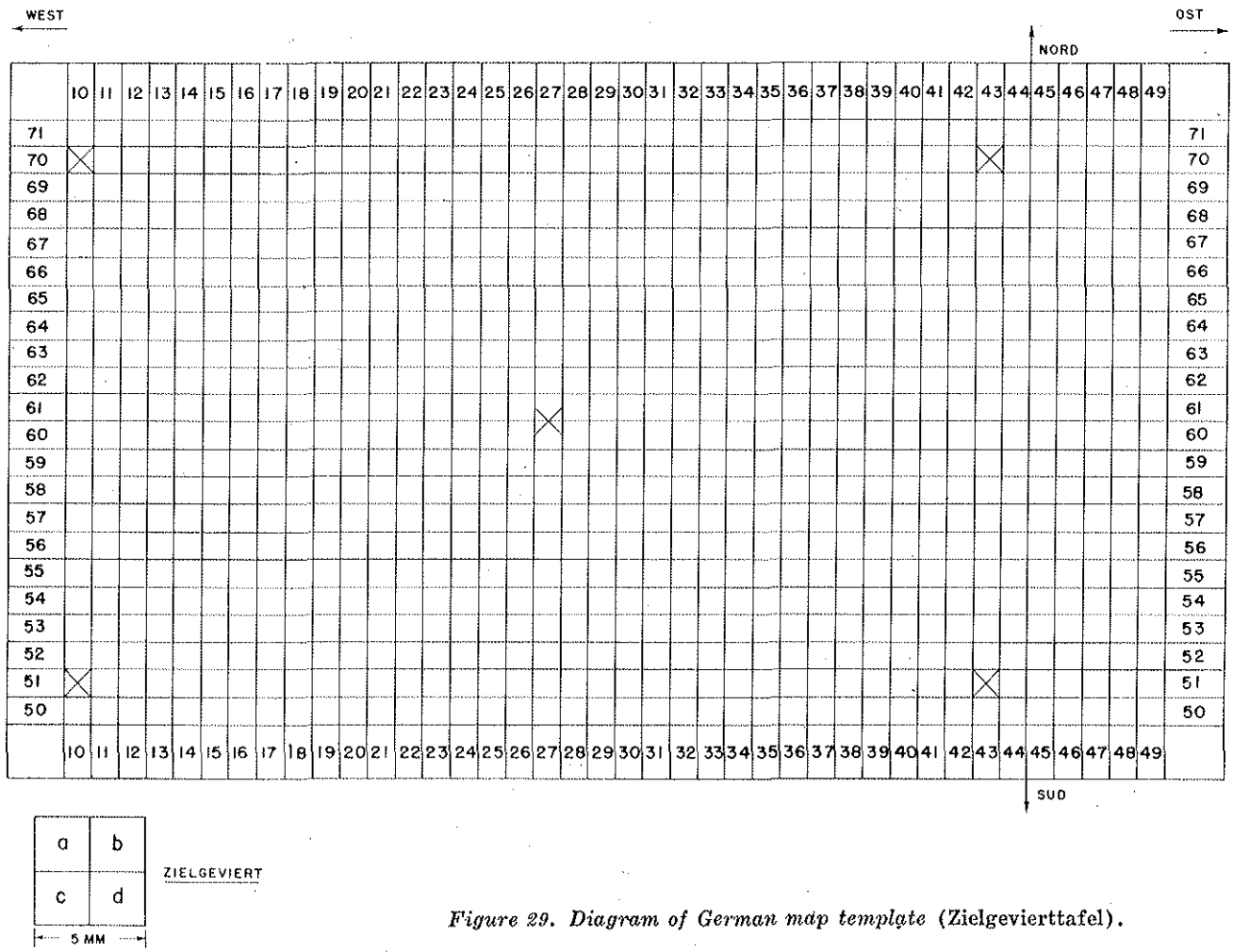


Figure 29. Diagram of German map template (Zielgevierttafel).

They are numbered from the equator. Therefore, the horizontal line numbered 3650 is 3,650 kilometers north of the point at which the central meridian crosses the equator. Horizontal grid lines of all zones are numbered similarly, and do not have other identification numbers.

(3) *Coordinates.* Coordinates in the Gauss-Krűger system are read and written in a manner similar to that used in US map reading. A coordinate scale (*Planzeiger*) in the margin of German maps is used to interpolate values between grid lines. The first two digits of the complete grid-line number are printed in smaller figures within the borders of a map. These are omitted when reading and writing coordinates. For example, in expressing a grid line numbered 5497, only the larger figure 97 is used. In figure 28, the coordinates of the road junction in the 24° zone are 02,87–87,70 (full coordinates: 8402,87–6087,70). Similarly, a road junction in the 21° belt has the coordinates 89,10–87,25 (full coordinates: 7589,10–6087,25).

b. MAP TEMPLATE. A transparent map template (*Zielgevterttafel*) was used by the Germans for point designations, usually on maps having no grid system. (See fig. 29.) It can be used on maps of any scale.

(1) *Description.* The template is divided into 5-millimeter squares, with rows numbered horizontally from 10 to 49, inclusive, and vertically from 50 to 71 inclusive. These squares are divided by inspection into quadrants (*Zielgevierte*), lettered a, b, c, and d. Five reference points (*Festpunkte*), in the corners and center, are shown by X's. These reference points are designated by their position on the template. For example: middle (*Mitte*), northeast (*Nordost*), northwest (*Nordwest*), southeast (*Sűdost*), and southwest (*Sűdwest*); or middle

(*Mitte*), upper right (*Rechts Oben* or *RO*), upper left (*Links Oben* or *LO*), lower right (*Rechts Unter* or *RU*), and lower left (*Links Unter* or *LU*). Arrows on the template indicate north, south, east, and west.

(2) *Use.* To locate map points with the template, place a template reference point (*Festpunkt*) on a map reference point (*Kartenpunkt*). Then orient the template on the map, by placing the north and south edges of the template parallel to the corresponding edges of the sheet. Read the coordinates up and to the right (not right and up), estimating the quadrant of the square in which the point lies. If the point is located in quadrant c of square 63/45, the coordinates are written 63/45 c. A German way of reading *Zielgevierttafel* coordinates follows: "*Punkt y liegt Festpunkt Mitte WT* (*Wartturm*) *hart ostwärts X.—Stadt im Zielgeviert 64/22 a* (point y lies in Zielgeviert 64/22 a middle reference point, watchtower due east of X city)."

c. THRUST LINE. The German thrust line (*Stosslinie*) system of point designation is basically the same as that of the US Army.

(1) *Description.* A thrust line is a straight line plotted on a map to designate the location of a given point. (See fig. 30.) It runs either through two specified points on a map, or extends from a specified point along a given azimuth. For example, the thrust line might run from a crossroads through a road junction, or extend from a crossroads on an azimuth of 200 mils. Although thrust lines can extend in any direction, they usually extend in the direction of anticipated movement.

(2) *Use.* To give a map reference with the *Stosslinie*, a perpendicular is drawn from the point in question to the thrust line. (See Pt. A, fig. 30.) Measure the distance forward from the point of origin (*Ausgangspunkt*) to the perpendicular. Centimeters are ordinarily used although ground distances may be specified. Then measure the distance to the right (*R*) or left (*L*) along the perpendicular to the point in question. Thrust-line coordinates are the distance from the point of origin to the perpendicular, the direction, either right or left, from the thrust line, and the distance from the thrust line to the point in question. The thrust-line coordinates in figure 30 are 9R3.5.

(3) *Security.* For security, the point of origin is usually given an initial value. If the *Ausgangspunkt* in figure 30 were given an initial value of 23 centimeters, the first figure of the coordinates would be 23 plus 9, or 32, the coordinates 9R3.5 becoming 32R3.5. Dummy figures may be used for security purposes. The first, third, and fifth figures of coordinates may be designated as dummies. In this case, the coordinates 32R3.5 would become 83726R73954.

d. GERMAN ARMY GRID. The German Army grid (*Deutsches Heeresgitter*) is a grid system which was printed by the Germans on maps of countries other than Germany. This grid system is basically the same as the Gauss-Krüger grid. It is a metric grid with a basic 1-kilometer grid interval. However, the system of grid zones of the German Army grid differs from the Gauss-Krüger grid.

e. ARBITRARY GRID SYSTEM. An arbitrary grid system was used on German maps of

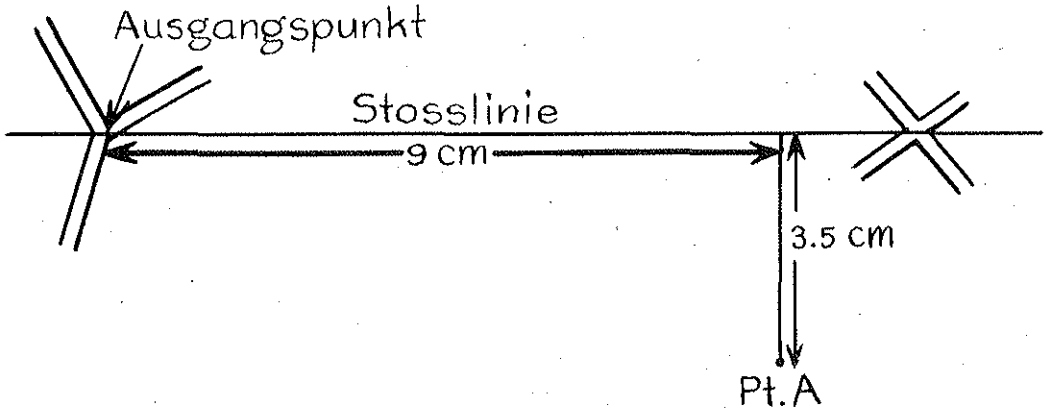


Figure 30. Diagram of German thrust line (Stosslinie).

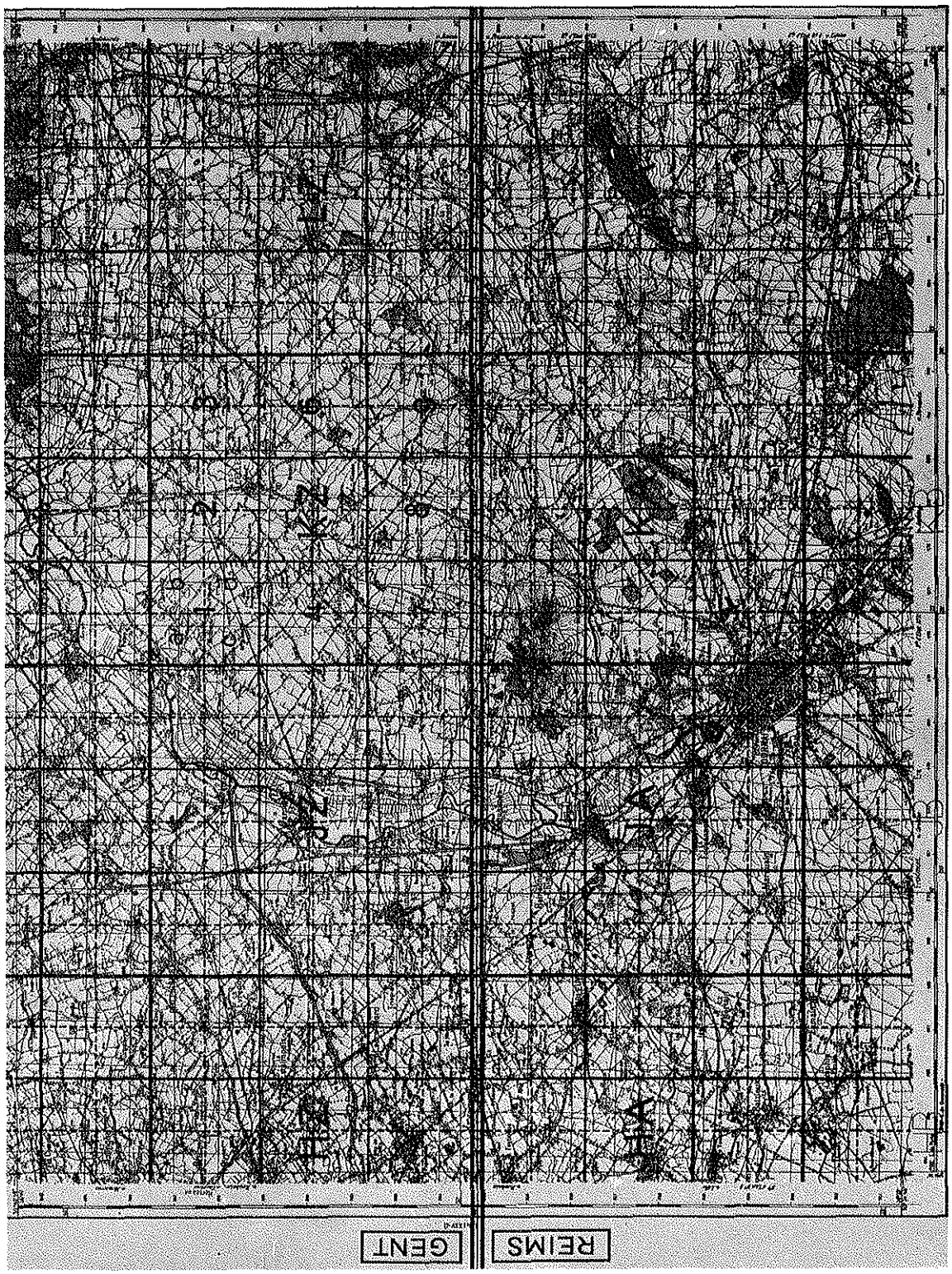


Figure 31. Photographic copy of arbitrary grid found on German maps of France.

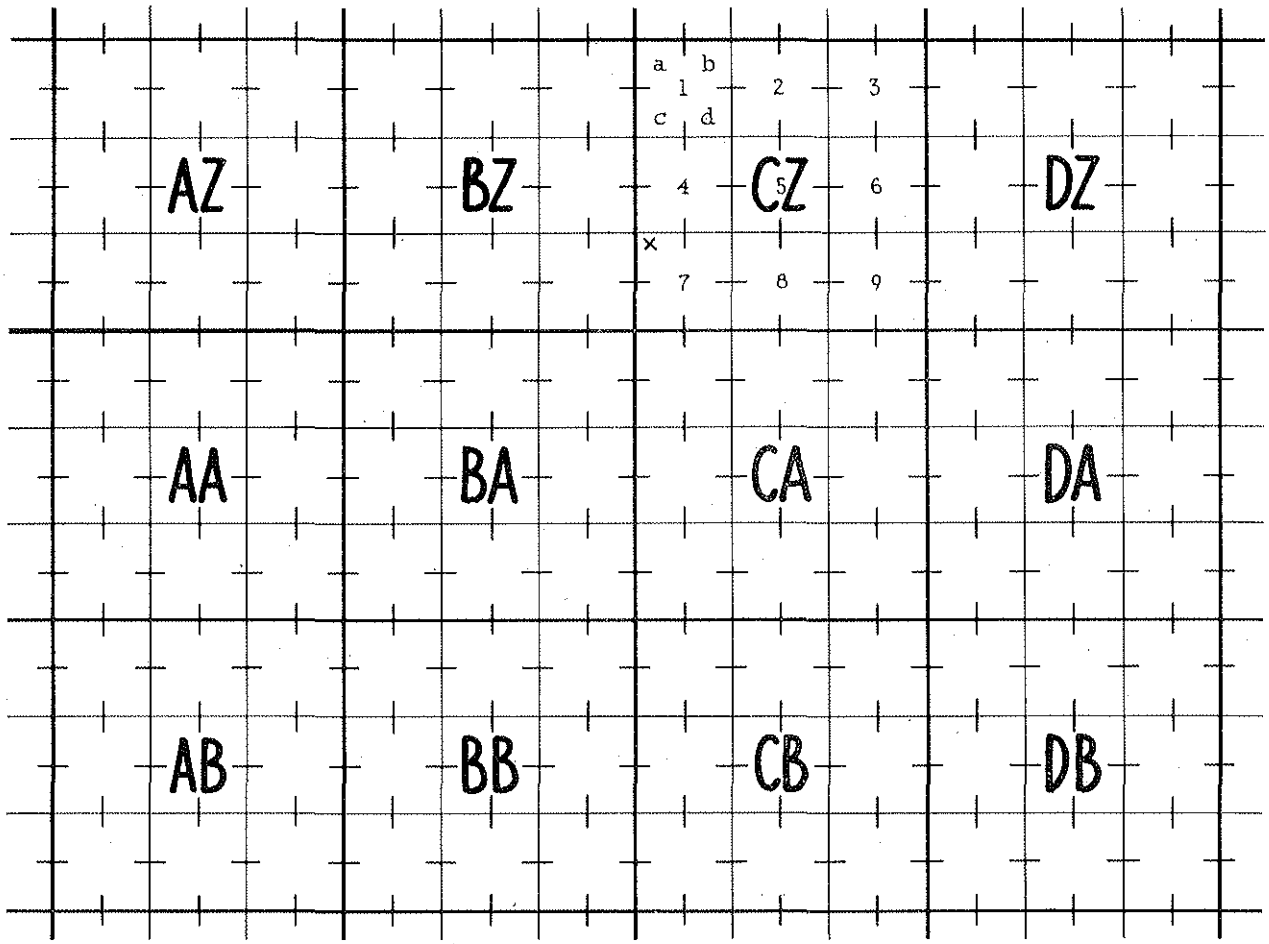


Figure 32. Diagram of arbitrary grid system found on German maps of Italy.

France and Italy. The general pattern of the grids and their method of use are the same on the maps of both countries.

(1) *Grid squares.* (*a*) A large area on which a grid is to be placed is established. This area is square and may vary in size on maps of different countries. On the maps of France, the large squares have sides measuring approximately 180 kilometers. Adjoining squares are separated by double grid lines and are identified by the name of a large city within the area. (See fig. 31.) On the maps of Italy, the sides of the large squares measure 150 kilometers. No distinctive lines separate these squares, neither are they identified by name. (See fig. 32.)

(*b*) Each area is subdivided into rows of 25 smaller squares. Squares in the horizontal rows are lettered from A to Z, the letter I being omitted; those in the vertical rows are lettered downward from A to Z, the letter I being omitted. Thus, each square is identified by two capital letters. (See figs. 31 and 32.) The lettered squares above are subdivided into 9 smaller squares numbered from 1 to 9. Numbered squares are further subdivided into quarters lettered a, b, c, and d. The small lettered quarters are subdivided into tenths by interpolation.

(2) *Coordinates.* Component parts of coordinates given in terms of this arbitrary grid system are read in the following order:

(*a*) Letters of the lettered square.

(*b*) Number of the next smallest square.

(*c*) Letter of the small lettered quarter.

(*d*) Numbers representing the location of a point within the small lettered quarter (read to the right and up).

The coordinates of the bridge at 0 in figure 31 are JA 9a Brücke, or JA 9a 77.

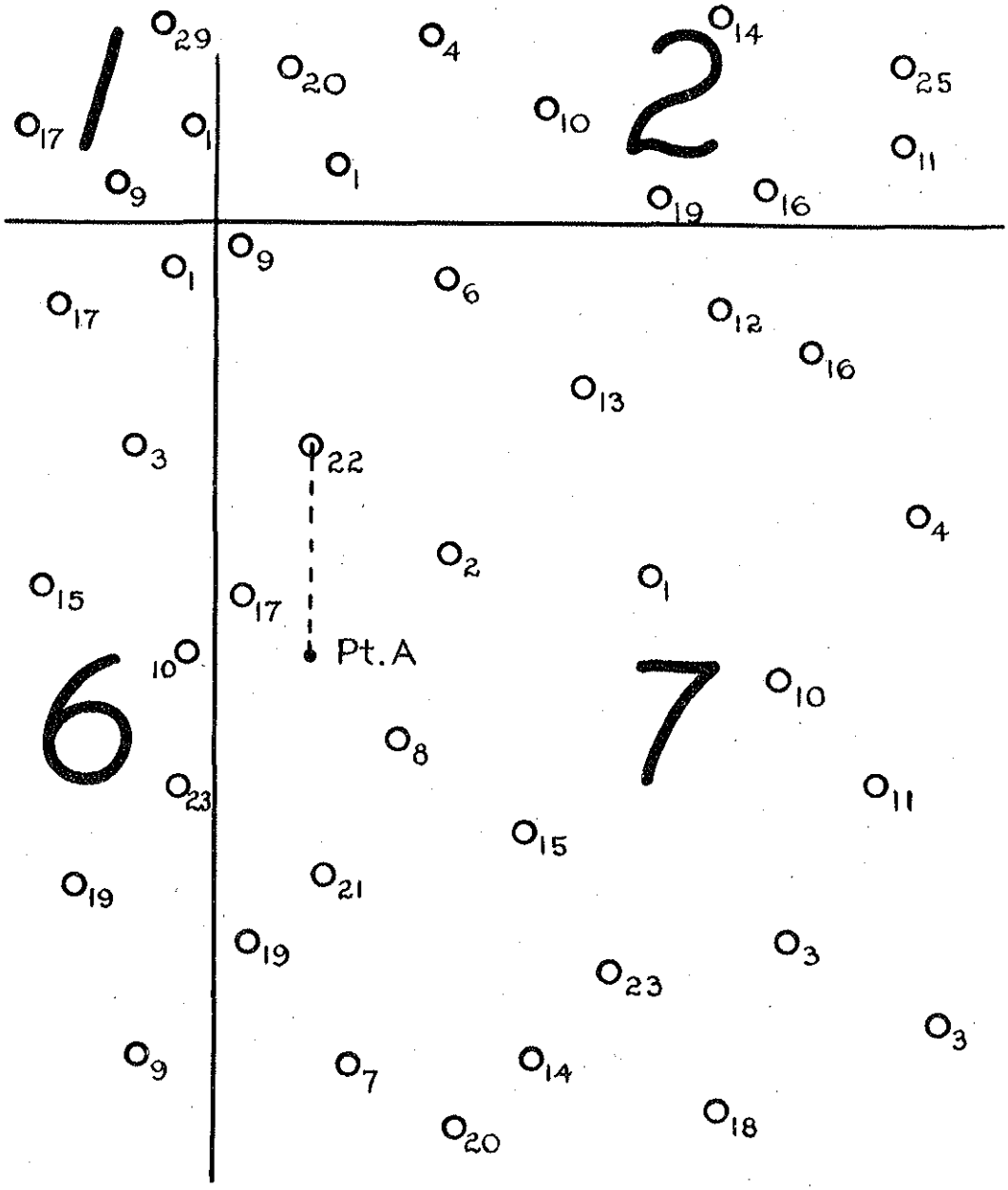


Figure 33. Diagram of a German polar coordinate system.

f. POLAR COORDINATES. Polar coordinates were frequently employed by German troops as a method of point designation. Two methods of application are given below.

(1) One method of application is similar to the US system of polar coordinates. The German soldier was taught to measure azimuths or direction in mils (*Striche*) counterclockwise from north with his military compass (*Marsh-kompass*). Distance is almost always measured in meters or 80-centimeter (approximately 32-inch) paces (*Schritte*). The polar coordinates of a point might be given as follows: *Schönebeck Bf., 1575 Striche, 1.7 km, WT (Schönebeck* railway station, 1575 mils, 1.7 km, watchtower).

(2) The second method of application was found on a French map used by the German Army. It is a less accurate means of point designation than that described above. A series of squares with 60-kilometer sides was drawn

on the face of a map and each square numbered. Within each square, prominent terrain features and easily recognized objects were circled and numbered for use as reference points. In expressing the location of an object or point, a five-step sequence was followed:

(*a*) Number of the 60-kilometer square in which the reference point lay.

(*b*) Number of the reference point.

(*c*) Direction of the point in question from the reference point, stated approximately; that is, north, south, east, or west.

(*d*) Distance from the reference point to the point in question.

(*e*) Identification of the point in question. The reference for point A in figure 33 is: 7/22 S 1,000m Whs (square 7, reference point 22, south 1000 meters, inn).

22. Characteristics of German Military Maps

a. SCALES. Scales of German military maps are based on the metric system of measurement. The commonly used European map scales, 1:300,000, 1:100,000, 1:50,000, 1:25,000, are characteristic of German maps. A stride (*Schritt*) scale is also typical. This is a graphic scale based on the German military pace, 80 centimeters long.

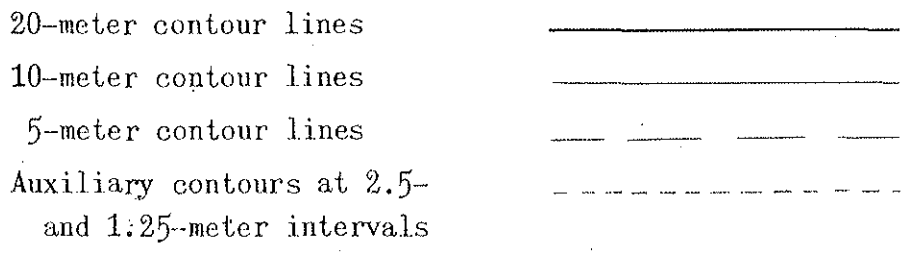


Figure 34. Contour intervals and symbols used on German maps.

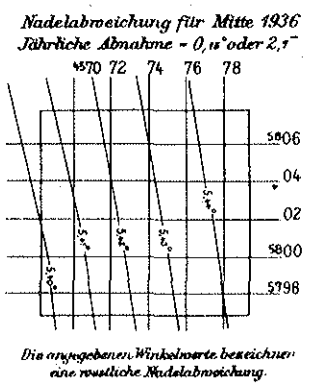


Figure 35. Annual change in G-M angle (angle between grid north and magnetic north) indicated by a Nadelabweichung diagram from Messtichblatt series 1:25,000, sheet 1974.

b. RELIEF. Relief is represented by hachures on most series of German military maps. The 1:300,000, 1:100,000, and 1:50,000 sheets are hachured. The 1:100,000 series may have hachures supplemented by contours at 100-meter intervals. Sheets of the 1:50,000 series may be hachured or contoured. Large-scale contoured maps have more than one contour interval, each represented by a different type of symbol. (See fig. 34.) Small arrows are employed on some large-scale maps to indicate slight depressions and downhill slopes.

c. G-M ANGLE. The G-M angle for a sheet is indicated in the margin by a small diagram of the entire sheet. Lines of equal magnetic declination from grid north are shown. The annual change in the G-M angle (*Nadelabweichung*) is given with this diagram. (See fig. 35.) German maps of other countries use the conventional two-pronged diagram to indicate this declination.

d. DECLINATION PROTRACTORS. Declination protractors similar to those on recent US maps are found at the edges of most gridded maps. The pivot point (*M-Punkt*) is printed at the

top and the degree scale at the bottom of German sheets. West declinations are indicated by negative values; east declinations, by positive values. (See fig. 36.)

e. CONVERSION TABLE. A table for the conversion of mils (*Striche*) into grades (*Neugrade*) was found in the marginal information of recent German maps of Italy.

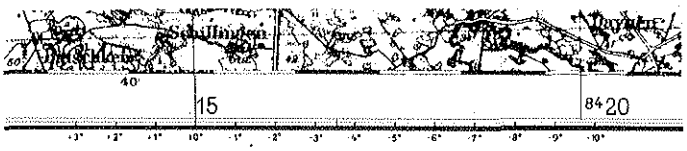


Figure 36. Degree scale of German declination protractor from Reichskarte series, 1:100,000, sheet 33.

Table II. Glossary of German map expressions

Authorities

Bibliographisches Institut	Bibliographic Institute.
Geogr. Verlagsanstalt u. Drückerei	Geographic Printing and Publishing House.
Kartendienst der Raumforschung	Map Service of the Land Survey Department.
Kartographisches Institut	Cartographic Institute (Austria).
Königl. Preuss. Landesaufnahme	Royal Prussian Office for Land Survey.
Reichsamt für Landesaufnahme	Government Bureau for Land Survey.
Vermessungskommissar für die Reichschauptstadt	Land Survey Commissioner for the Capital.

Key terms for identifying map dates

Abdruck	reproduction.
aufgenommen	surveyed.
Auflagedruck	edition, impression, printing.
Aufnahme	survey.
Ausgabe	edition, issue.
bearbeitet	compiled, prepared.
berichtigt	corrected.
Druck	impression, printing.
einzelne Nachträge	single supplements.
ergänzt bis	complete as of.
freigegeben durch	issued by.
gezeichnet	drawn.
herausgegeben	published.
kleine Nachträge	slight revisions.
Lieferung	press run, series.
Nachdruck	reprint.
Nachträge	revisions, supplements.
Nadelabweichung	G-M angle.
neuse Ausgabe	new edition.
rekognosziert	reconnoitered.
teilweise	partial.
Umdruck	reprint.
Umdruckausgabe	reprint edition (implies corrections).
Vervielfältigungs-recht vorbehalten	copyrighted.
vorläufig	provisional.
zeitweilig	temporary.
zweite (IIte) Auflage	second edition.

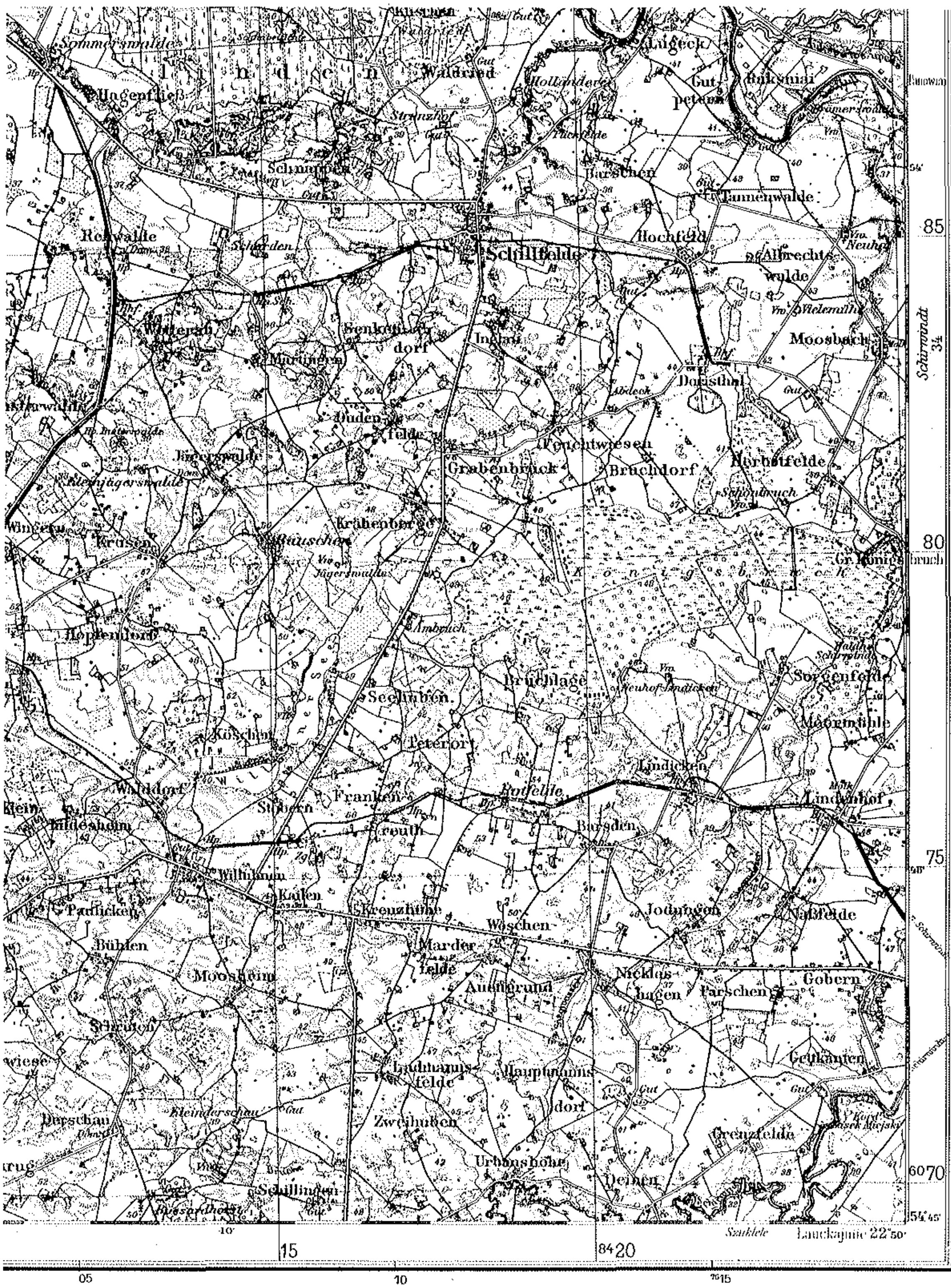


Figure 37. Section of map from Reichskarte *series, 1:100,000, sheet 33.*

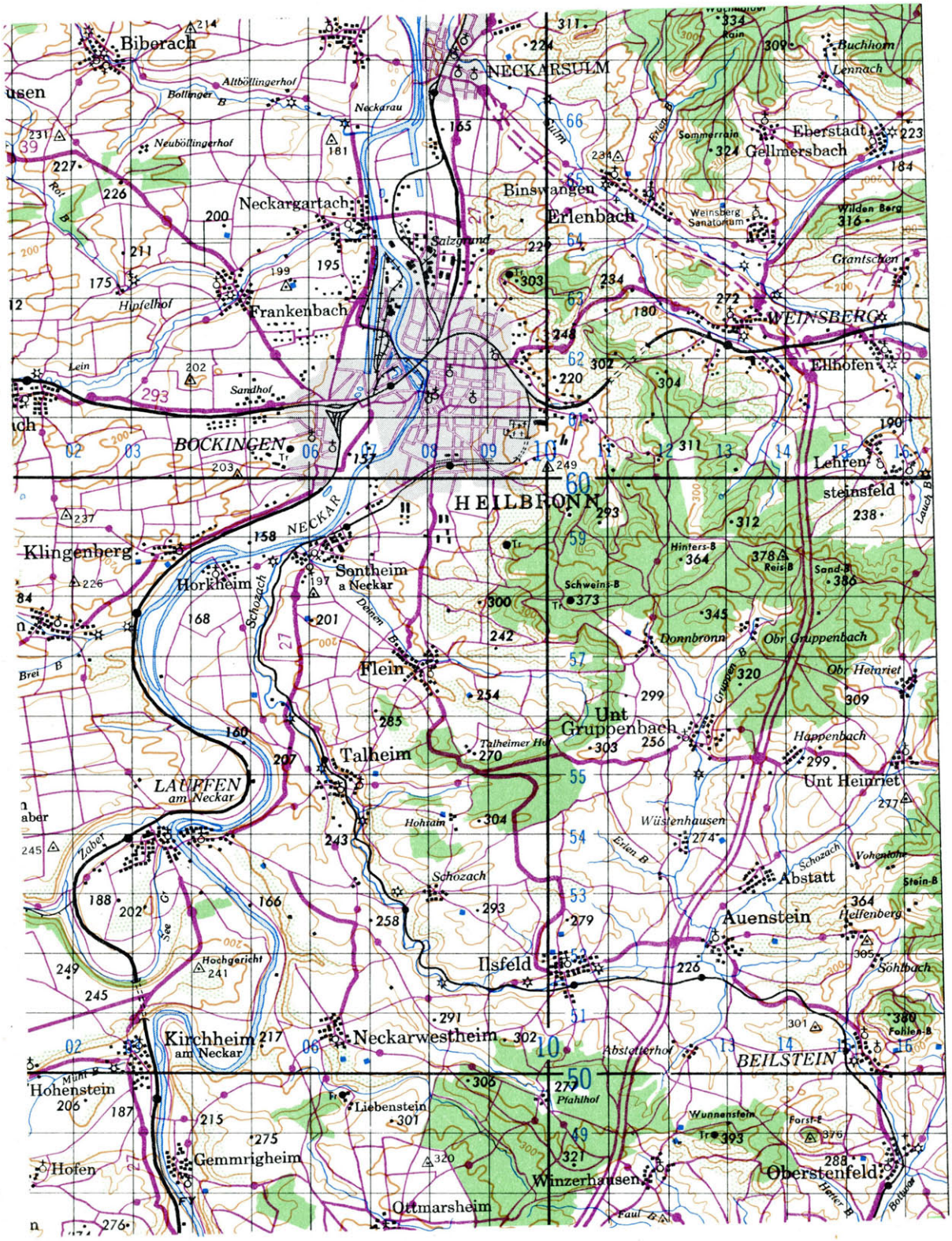


Figure 38. Section of map from Germany series, 1:100,000, AMS M641, sheet V–3.

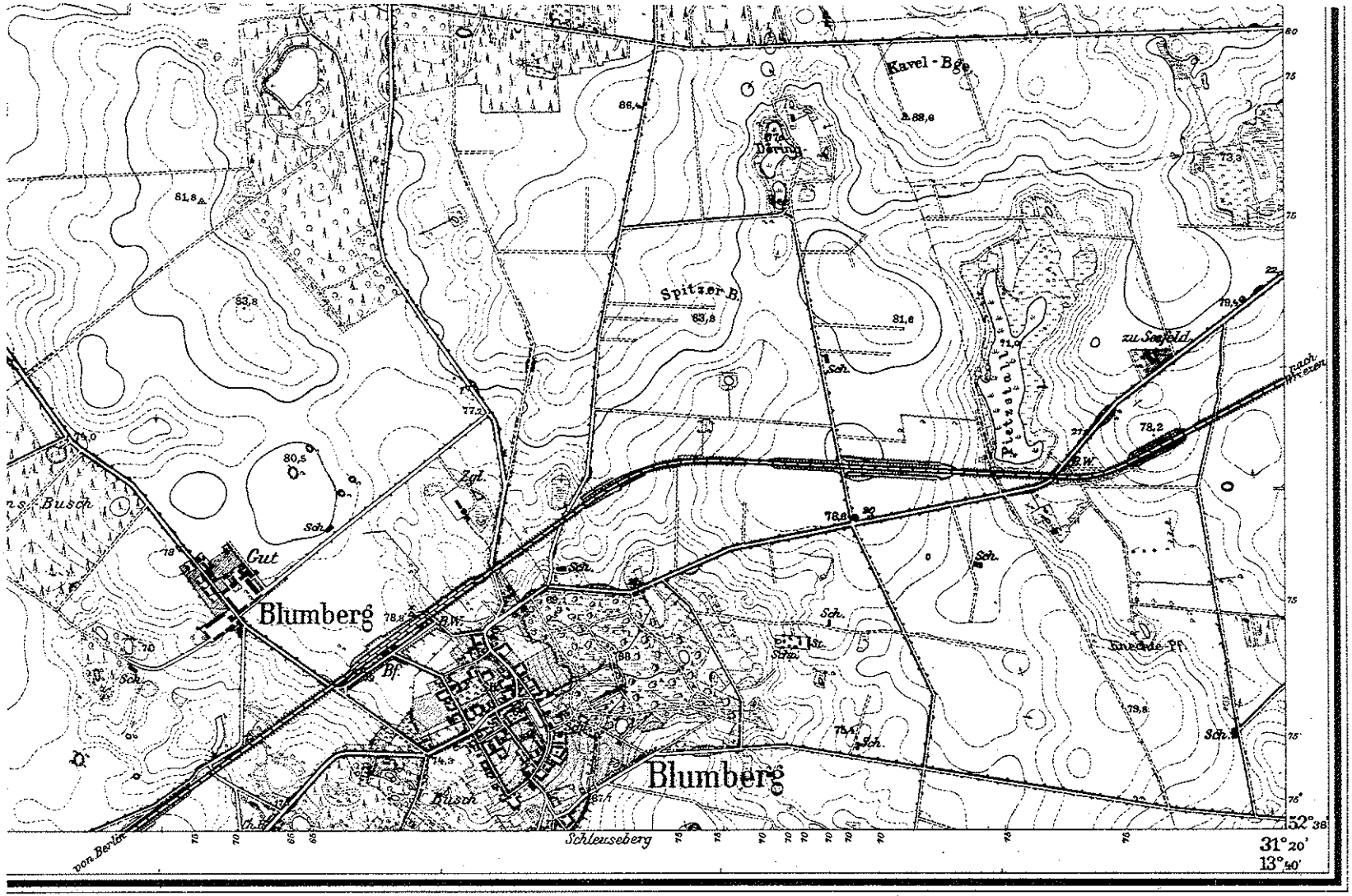


Figure 39. Section of map from Topographische Karte *series, 1:25,000, sheet 1766.*

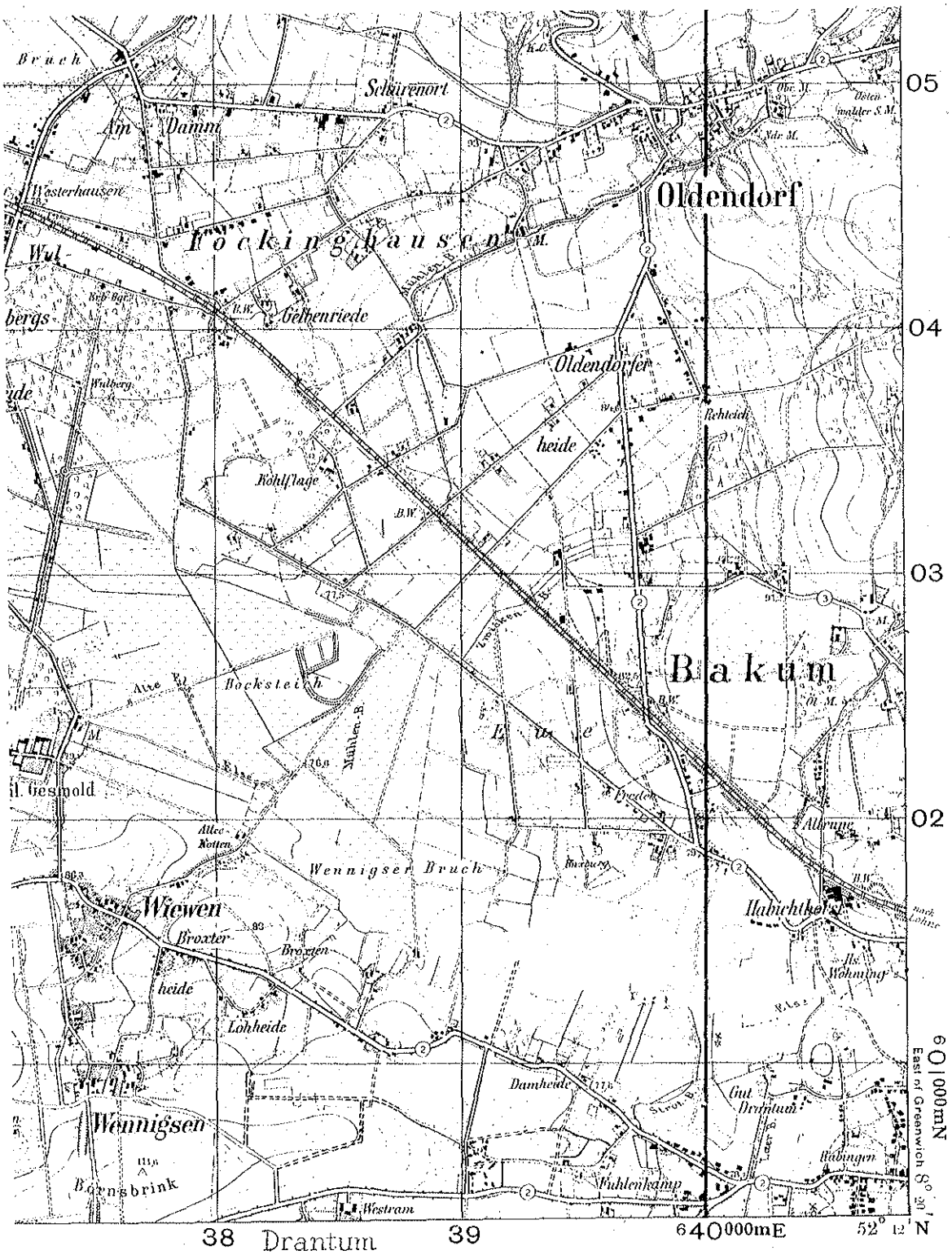


Figure 40. Section of map from Germany series, 1:25,000, G.S.G.S. 4414, sheet 3715.

CHAPTER 5

ITALIAN MILITARY MAPS

23. General

The *Istituto Geografico Militare* (Military Geographic Institute) was the agency responsible for topographic surveys and publication of military and certain other topographic maps of Italy. It printed and distributed Italian military maps for training and operations and was responsible for special surveys and technical services.

24. Military Map Series of Italy

a. GRANDE CARTA. *La Grande Carta Topografica del Regno d'Italia* (The Great Topographic Map of the Kingdom of Italy) is the military map series covering Italy and the islands of Sicily and Sardinia. The survey on which this series is based was made before 1900.

(1) *Fogli.* The *Grande Carta* was published on 1:100,000 sheets (*fogli*), measuring 20′ latitude by 30′ longitude. It consisted of 277 *fogli*, designated by Arabic numerals and numbered consecutively in horizontal rows from west to east and from north to south. For example, *Foglio 4* covers part of extreme northern Italy, *Fogli 149* and *150* cover Rome, and *Foglio 270* covers part of the eastern coast of Sicily. At the end of World War I, Italy acquired from Austria territory to the north and northeast of Italy. Approximately 40 additional *fogli* were necessary to cover this territory. These *fogli* are designated by Roman numerals. Foglio XXVII is in the vicinity of Trieste.

(2) *Quadranti.* To produce maps on larger scale, each *foglio* is divided into quadrants (*quadranti*). Each *quadrante* is on 1:50,000 scale, its geographic dimensions being half those of a *foglio*, or 10′ latitude by 15′ longitude. The *quadranti* within any *foglio* are designated by Roman numerals, numbered clockwise beginning with the upper right quadrant. (See fig. 41.) Thus, *Foglio 5 II* indicates the lower right quadrant of *Foglio 5*.

(3) *Tavolette.* Each *quadrante* is further subdivided into quadrants (*tavolette*). (See fig. 41.) Each *tavoletta* is on 1:25,000 scale, its geographic dimensions being half those of a *quadrante*, or 5′ latitude by 7′ 30″ longitude. The *tavolette* within any *quandrante* are designated by the directions N.E., S.E., N.O., and S.O. (The Italian word for west is ovest.)

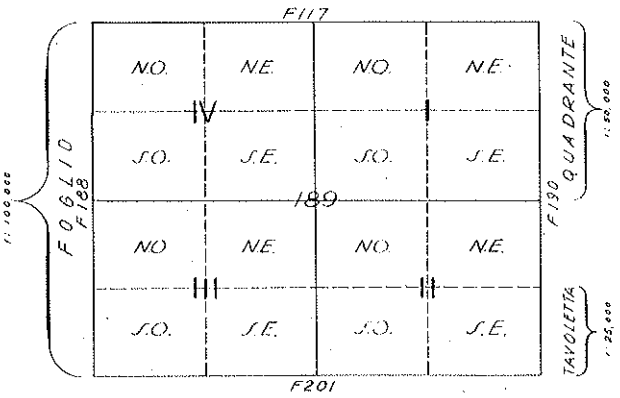


Figure 41. Diagram of division of 1:100,000 foglio into quadranti and tavolette.

(4) *Sezioni.* There is one further subdivision into *sezioni.* (See fig. 42.) Each *sezione* is a quadrant of a *tavoletta.* It is on 1:10,000 scale, its geographic dimensions being half those of a *tavoletta,* or 2′ 30″ latitude by 3′ 45″ longitude. Within a *tavoletta,* the four *sezioni* are designated by the letters a, b, c, and d, lettered clockwise beginning with the upper right quadrant. Only a small portion of Italy is covered by these *sezioni.* (See fig. 42.)

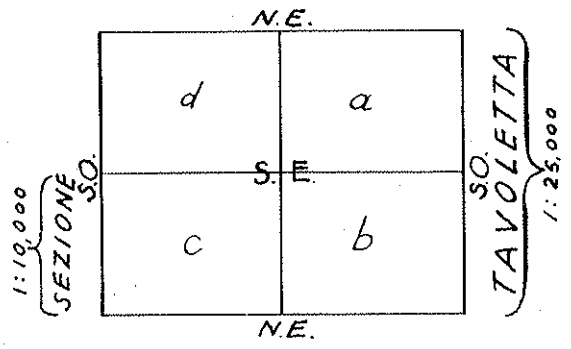


Figure 42. Diagram of division of tavoletta into sezioni.

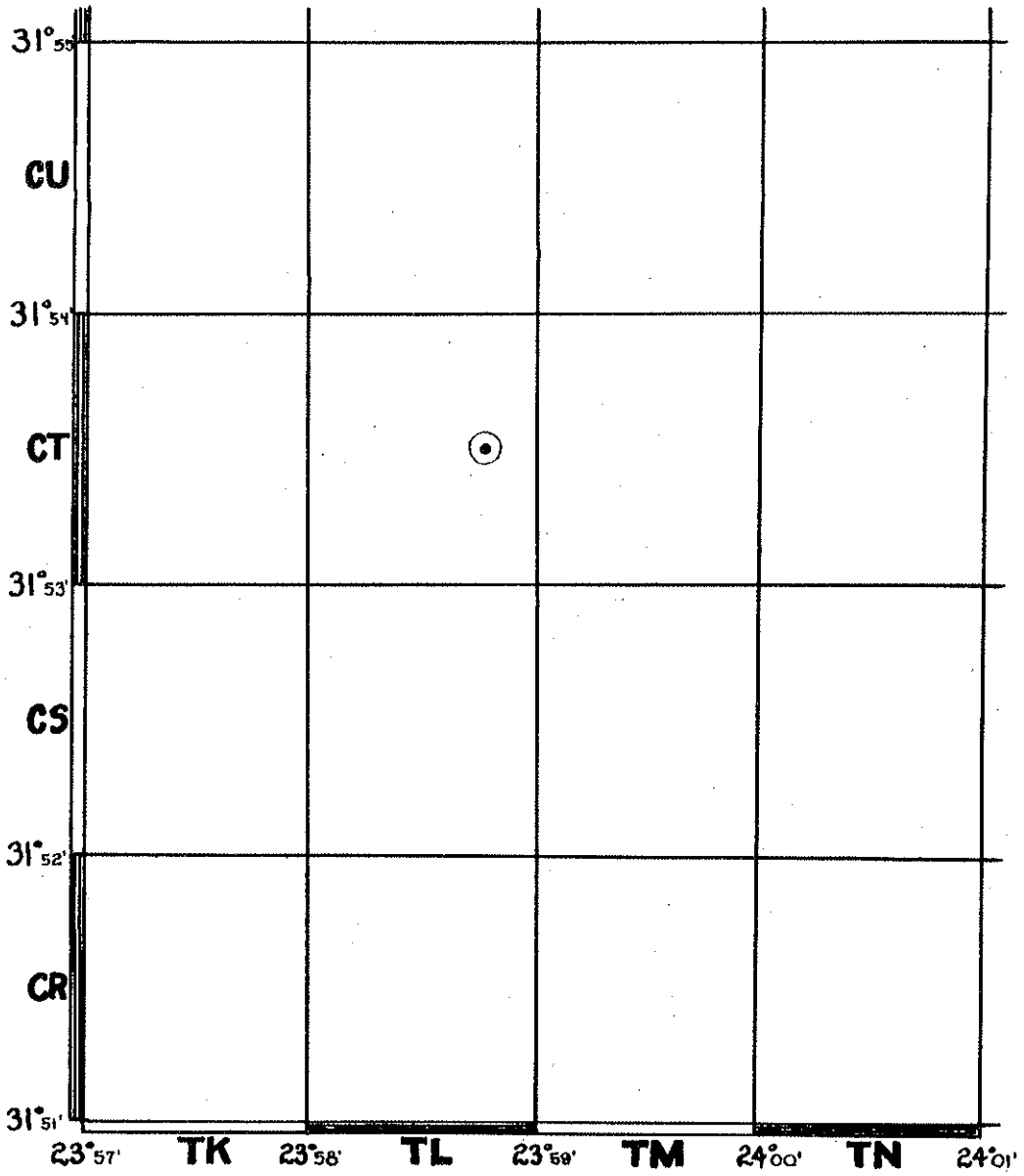


Figure 43. Diagram of Italian map-reference system.

(5) *Characteristics.* Although the above series of maps are on different scales, all use the same system of conventional signs. The 1:100,000 series (the *fogli*) is colored. The 1:50,000 (the *quadranti*) and the 1:25,000 series (the *tavolette*) were originally black and white but have since been printed in color. Relief is expressed by a combination of contours, spot elevations, and hill shading. These three series are the basis for United States, British, and German military maps of Italy. (See figs. 44, 46, and 47.)

b. OTHER MAPS. A 1:250,000 and a 1:200,000 series of road maps published by the *Consociazone Turistica Italiana** (Italian Touring Club) are two excellent series of unofficial maps used as the basis for a recent British 1:250,000 series. (See fig. 45.)

*This organization was called the Touring Club Italiano until 1936.

25. Italian Coordinate Systems

Geographic coordinates on Italian maps are measured in degrees. Longitude is measured from the prime meridian of Rome (Monte Mario), 12°27'07.1" east of Greenwich. Meridians and parallels are used as the basis for a lettered system of reference. One-minute intervals of longitude and latitude are assigned a pair of letters. (See fig. 43.) The system of lettering is complex and is not described here.

a. COORDINATES. In giving coordinates of a point, letters of the minute of longitude are given first, followed by the letters of the minute of latitude; that is, read right and up. A point within any 1-minute graticule is located by giving the seconds east, then north of its southwest corner. The coordinates of the point in figure 43 are TLCT4530.

b. COORDINATE SCALE. A coordinate scale graduated in seconds of longitude and latitude is printed in the corner of Italian maps to aid in reading geographic coordinates accurately. It is also used with the map-reference system described in the preceding paragraph.

c. GRID SYSTEM. Rectangular grid systems of the type on United States, British, French, and German maps have not been found on Italian maps.

Table III. Glossary of Italian map expressions

Authorities

Consociazone Turistica Italiana (formerly, Touring Club Italiano)	Italian Touring Club.
Istituto Geografico Militare	Military Geographic Institute.
Istituto Italiano d'Arti-Grafiche	Institute of Graphic Arts.
Laboratorio Foto-litografico del Ministero della Guerra	Lithographic Laboratory of the Ministry of War.
R. Commissione per la Toponomastica	Royal Place Name Commission.
R. Ufficio Geologico	Royal Geological Bureau.

Key terms for identifying map dates

aggiornamento del	corrected to.
aggiornato	revised to date.
aggiunta	addition.
anno	year.
con le aggiunte e varianti	with the additions and variations.
correzione	correction.
editi	published.
editore	publisher.
edizione	edition.
edizione nuova	new edition.
eseguito	executed.
impresso	printed.
l'angolo di declinazione e valevole per l'anno	magnetic declination for the year.
legge	law (authorizing surveys).
levata	survey.
levat (o, i, a, e)	surveyed.
parziale	partial.
proprieta riservata	copyrighted.
ricognizione per le strade rotabili e ferrovie nel	reconnaissance for highways and railroads in.
ricognizioni generali	general reconnaissance.
ricognizioni parziali	partial reconnaissance.
ridisegno	redrawn.
rilevamento	survey.
rilievo del	survey of the.
riproduzione	reproduction.
riproduzione vietata	all rights reserved.
riveduto	revised.
stampato	printed.
tutti i diritti di riproduzione riservati	all reproduction rights reserved.

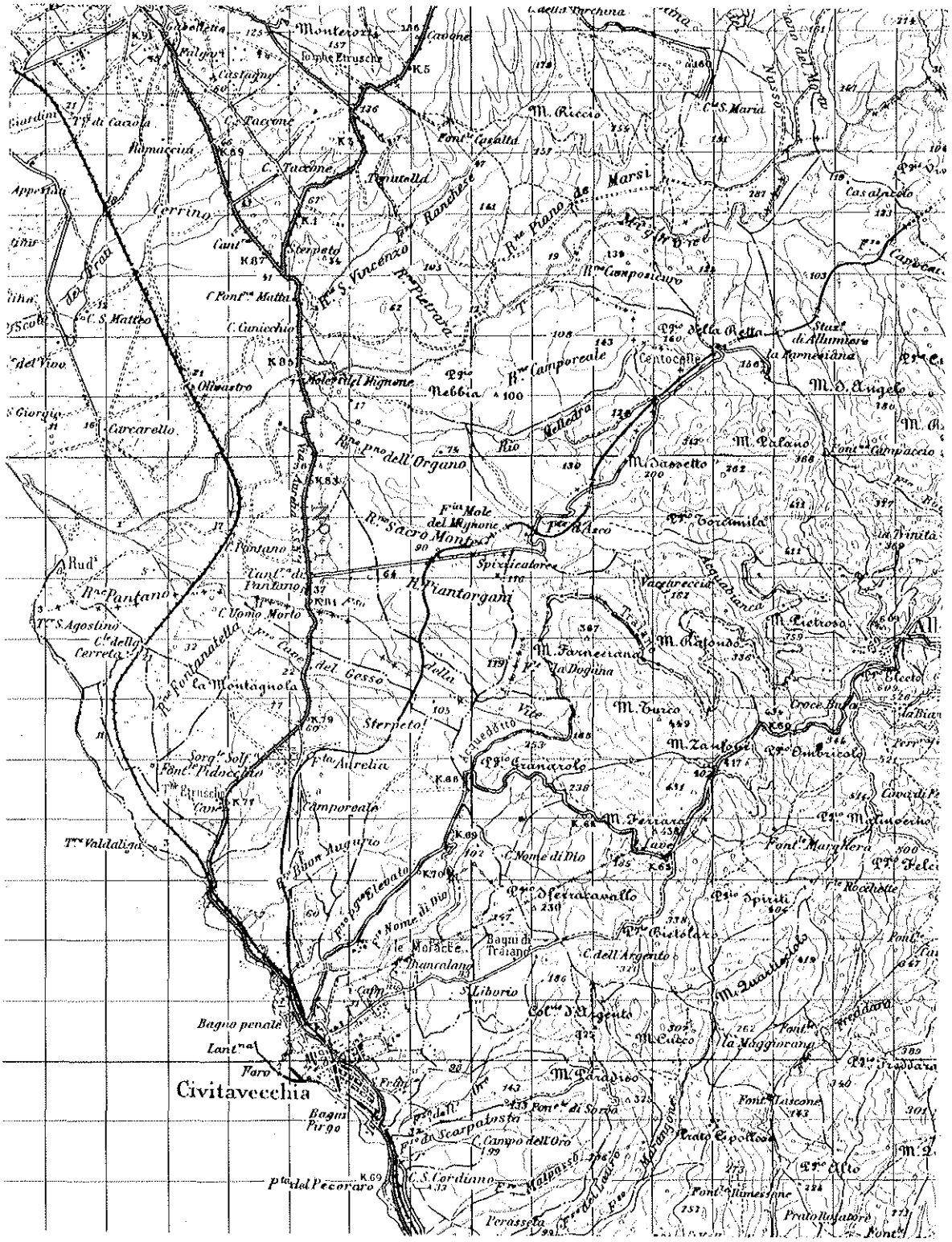


Figure 44. Section of map from Italy series, 1:100,000, G.S.G.S. 4164, sheet 142.

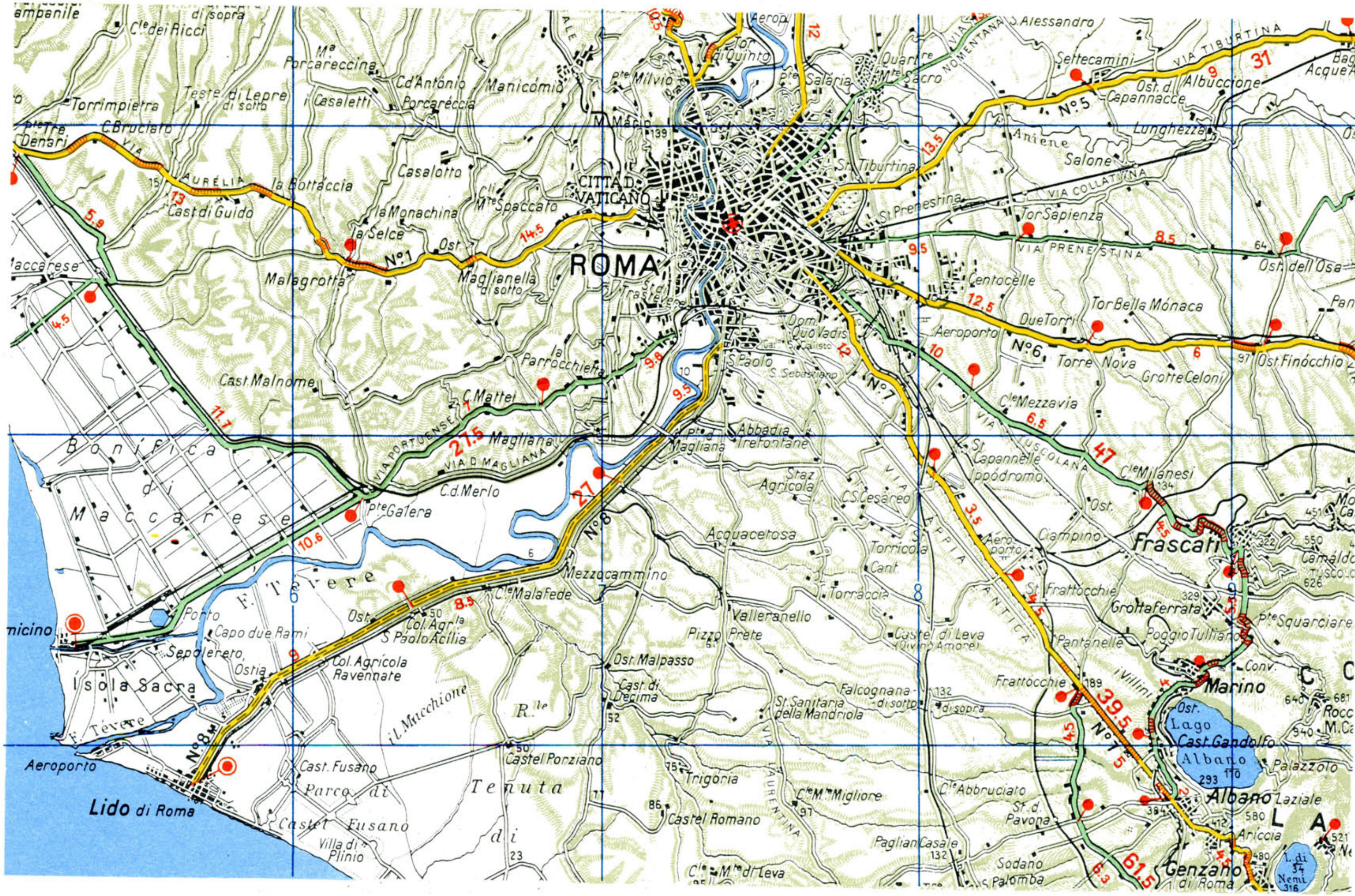


Figure 45. Section of map of Italy road map, 1:200,000, AMS M592, sheet 17.

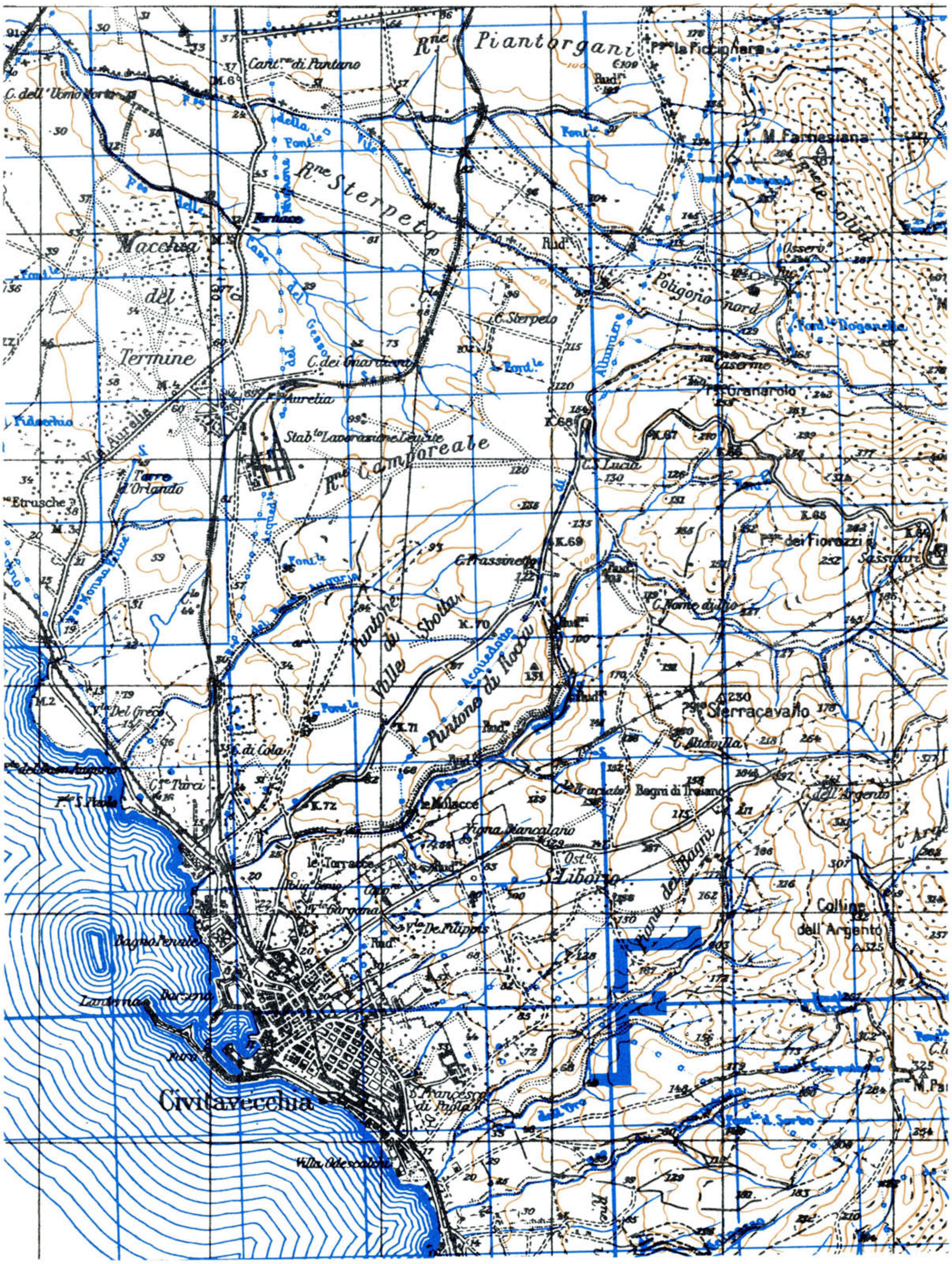


Figure 46. Section of map from Italy series, 1:50,000, G.S.G.S. 4229, sheet 142 II.

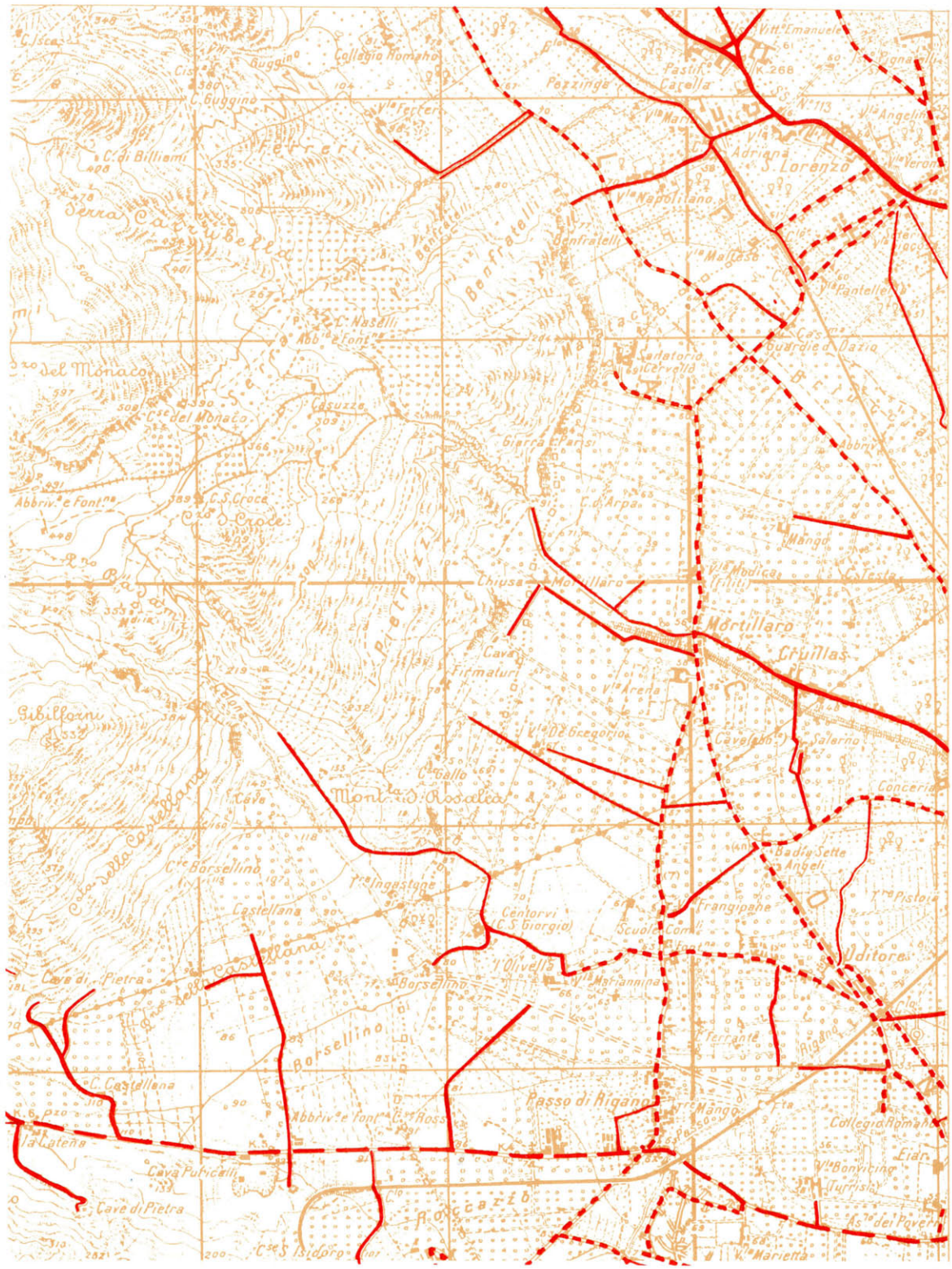


Figure 47. Section of map from Italy series, 1:25,000, G.S.G.S. 4228, sheet 249 II NW.

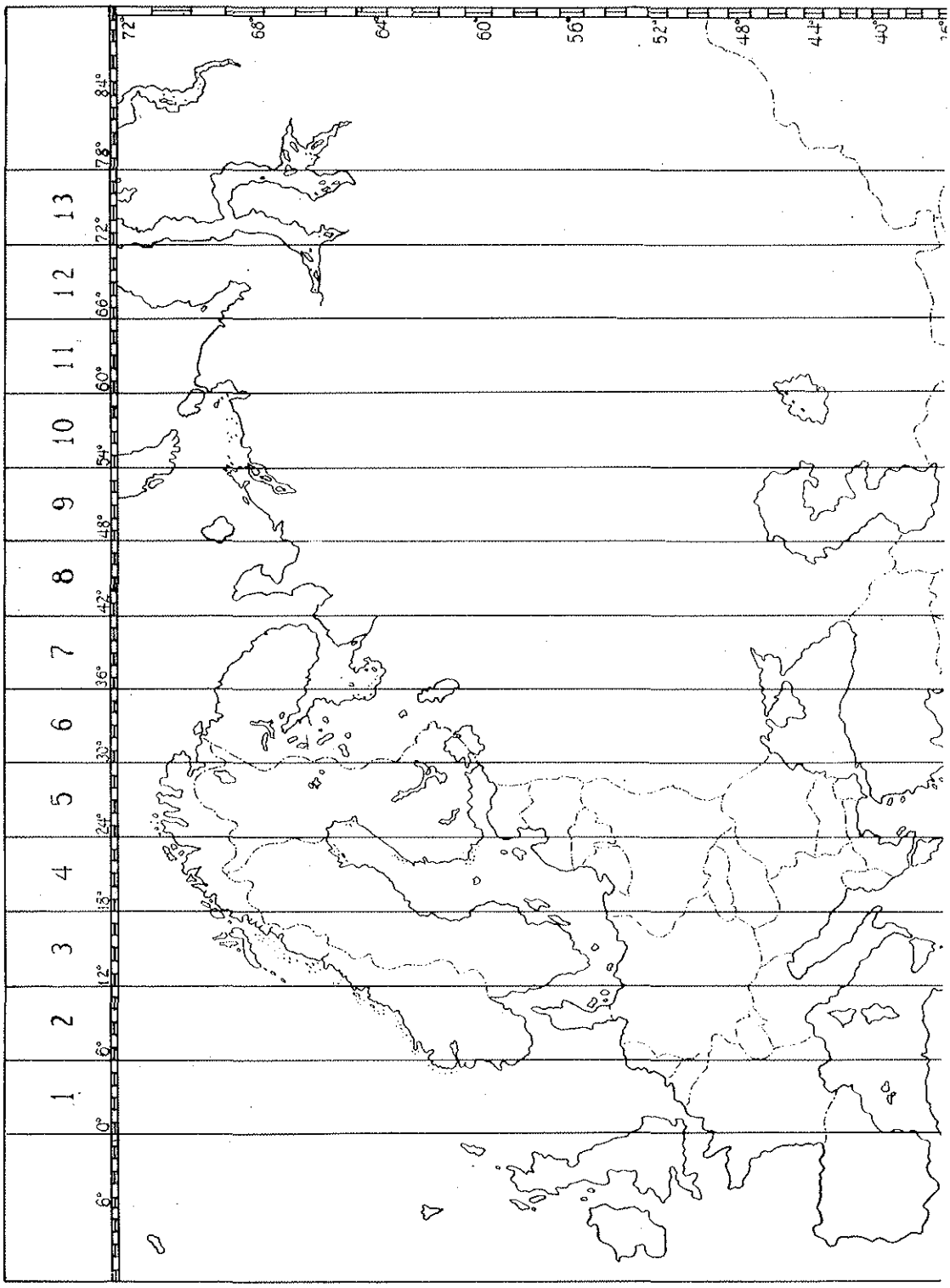


Figure 48. Diagram of Russian grid zones.

CHAPTER 6

RUSSIAN MILITARY MAPS

26. General

The *Voyenno-Topograficheskoye Upravleniye* (Military Topographic Bureau) is the Russian military mapping agency. This bureau compiles, publishes, and revises military maps, publishes captured foreign maps, and is responsible for the dissemination and distribution of such documents.

27. Military Map Series of Russia

Large-scale Russian maps are published on scales of 1:100,000, 1:50,000, 1:25,000, and 1:10,000. The 1:50,000 series is the basic tactical series covering the whole area of military operations. (See fig. 56.) These large-scale maps are supplemented by the 1:100,000 series. (See figs. 54 and 55.) The latter series is the basic tactical series in sparsely populated districts. Maps printed before 1919 on scales of 1:420,000, 1:84,000, and 1:42,000 are still standard for large areas of Russia. Smaller-scale maps are published on scales of 1:1,000,000, 1:500,000, and 1:200,000.

28. Russian Coordinate Systems

Geographic coordinates and a military grid are used on Russian maps for point designation.

a. GEOGRAPHIC COORDINATES. Geographic coordinates on Russian topographic maps are expressed in the degree (sexagesimal) system. Longitude may be measured east and west from the meridian of Pulkovo, Moscow, Paris, or Greenwich. (See app. I.) Modern military maps measure longitude from the prime meridian of Greenwich. Latitude, as on maps of all other countries, is measured from the equator.

b. MILITARY GRID SYSTEM. The Russian military grid system consists of a series of longitudinal zones on which kilometric grids are placed. Coordinates are read up and to the right.

(1) *Grid zones.* Russian grid zones are 6° wide. The western boundary of the first zone is formed by the Greenwich meridian, successive zones occurring at 6° intervals to the east. There is no overlapping of zones. Thirteen grid zones cover western Russia; these zones are numbered consecutively to the east starting with the westernmost zone. (See fig. 48.) The origin of each grid zone is at the intersection of its central meridian and the equator. This point is given the arbitrary value of 500 kilometers east, 0 kilometers north.

(2) *Grid lines.* (*a*) *Vertical.* Vertical grid lines within a zone are parallel to the central meridian of that zone. The grid line tracing the central meridian is given a numerical value of 500 kilometers. Successive vertical lines to the east are numbered upward from 500; for example, 501, 502, 503, and so on. Those to the west are numbered downward, 499, 498, 497, and so on. The numerical values of vertical grid lines are preceded by a fourth digit which corresponds to the number of the grid zone. Thus, the number of each vertical grid line in the zone bounded by the 18° and 24° meridians (zone 4) would be preceded by the number 4. (See fig. 48.)

(*b*) *Horizontal.* Horizontal grid lines are perpendicular to the central meridian of a grid zone. All horizontal grid lines are numbered consecutively northward from the Equator. No distinctive number, such as the first digit in the number of the vertical grid lines, is used.

(3) *Grid interval.* The basic grid interval of the Russian military grid is 1 kilometer. This interval is found on maps of 1:50,000 scale or larger. On series having scales smaller than 1:50,000, other intervals may be found; for example, a 2-kilometer interval is used on the 1:100,000 sheets.

(4) *Coordinates.* Coordinates are read up and to the right. Complete numerical values are indicated on grid lines nearest the corners of the map. Other grid lines show abbreviated numerical values in large type. These abbreviated numbers are ordinarily used in writing coordinates. For example, in expressing the grid line having a value of 7,355 kilometers, only the 55 is ordinarily used. (See fig. 49.)

c. VERST GRID SYSTEM. A second type of grid system was observed on a Russian map

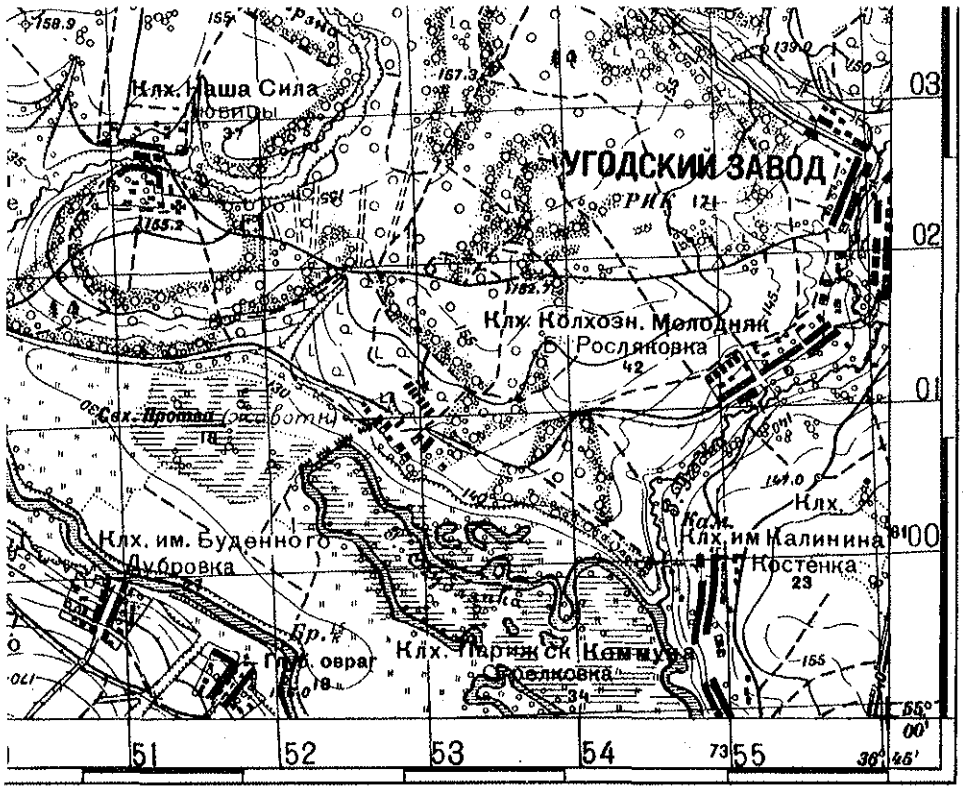


Figure 49. Section of map from Russia series, 1:50,000.

of 1:42,000 scale, dated 1926. This grid is composed of vertical and horizontal lines spaced at 1-*verst* intervals. Every second grid line is numbered, the vertical lines from west to east and horizontal lines from north to south. Coordinates are read to the right and down.

29. Characteristics of Russian Military Maps

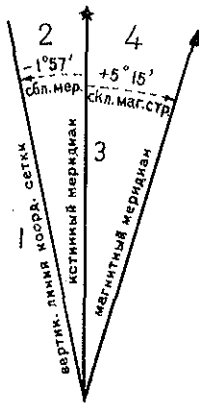
a. SCALES. Scales of older Russian maps are based on the old Russian system of linear measure. These scales are 1:126,000, 1:84,000, 1:42,000 and so on. Map distances measured in *duims* (see app. I) on maps of these scales are easily converted into ground distances in *versts* (see app. I). For example, a map distance of 7.75 *duims* represents a ground distance of 7.75 *versts* on a map of 1:42,000 scale. While the U.S.S.R. has officially adopted the metric system of measure, the older Russian linear units may be encountered. Maps drawn on scales based on the older system may likewise be found.

b. DECLINATION. Declinations are indicated by three-pronged diagrams and by isogonic lines.

(1) *Three-pronged diagram.* The three-pronged diagram is similar in construction to US and British diagrams. True north is indicated by a star; magnetic north, by a double-headed arrow. The arm of the diagram indicating grid north has no identifying symbol. Each of the three directions is further identified by name. (See fig. 50.) Declinations on a three-pronged diagram may be expressed in artillery mils as well as degrees. The artillery mil is an angle subtending an arc equal to 1/6000 of the circumference of a circle. It is equivalent to 3.6'. Thus, an angle of 70 artillery mils is equal to an angle of 4°12'.

(2) *Isogonic diagram.* Magnetic declination is shown in a small isogonic diagram in the map's margin. Isogonic lines indicate magnetic declinations at 30-minute intervals for the entire area of the map. Positive values indicate east declinations; negative values, west declinations. (See fig. 51.)

c. RELIEF. Relief is indicated on various Russian maps by contour lines, hachures, and spot elevations. Hypsometric diagrams and slope scales are also used.



Translation. *1. Vertical line of the grid coordinate (grid north).*
2. From meridian (G-M angle).
3. True meridian.
4. Magnetic deviation.
5. Magnetic meridian.

Figure 50. Three-pronged declination diagram from Russia series, 1:50,000.

the distance between contour lines with the distance between the lower and upper edges of the scale. The measurement of distance may be taken between adjacent contour lines or between every fifth or every tenth contour line.

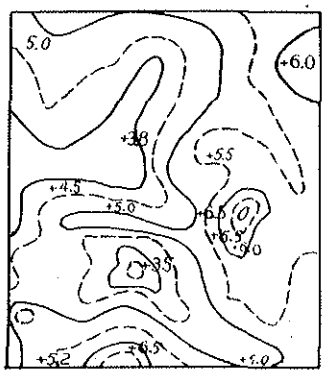


Figure 51. Isogonic diagram from Russia series, 1:50,000.

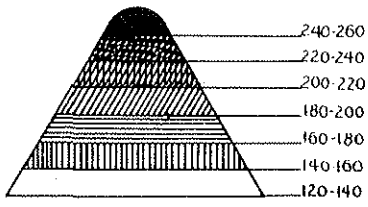
(1) *Contour lines.* Contours are shown at 10-, 20-, 50-, and 100-meter intervals, depending on the scale of the map. Form lines or approximate contours are used to represent relief more accurately.

(2) *Hypsometric diagram.* Stated levels of elevation for a specific map are indicated in a hypsometric diagram in the margin. Reference to this diagram and to the key beside it gives a general picture of the topography without making a detailed study of the map itself. (See fig. 52.)

(3) *Slope scale.* A scale for determining degrees of slope is provided in the marginal information of contoured Russian maps. To determine the steepness of slope in degrees, compare the slope scale in figure 53 was constructed on a map of 1:50,000 scale with a 10-meter contour interval. If, for example, the distance between two adjacent contours on that map were equal to the length of the second vertical line from the left side of the scale in figure 53, the slope for that area would be 1°. Similarly, if the distance between two contours representing a difference in elevation of 50 meters corresponded to the length of the second vertical line in the center section of the scale, the slope for that area would be 6°

(4) *Hachures.* Hachures are used to represent topography on small-scale Russian maps.

(5) *Spot elevations.* Spot elevations supplement hachures and contours.



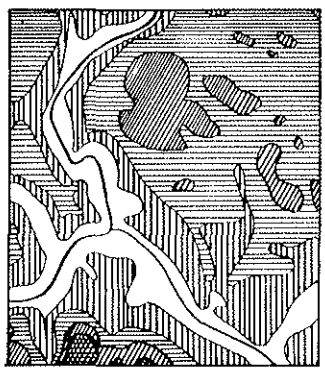
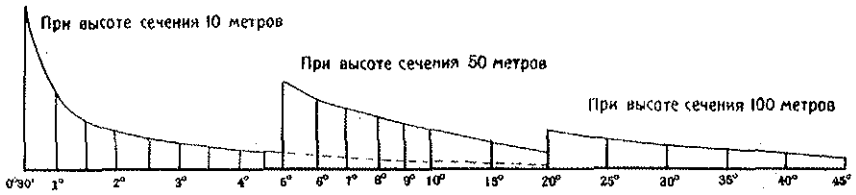


Figure 52. Hypsometric diagram from Russia series, 1:50,000.



Translation. 1. For levels of contour interval 10 meters.
2. For levels of contour interval 50 meters.
3. For levels of contour interval 100 meters.
Figure 53. Slope scale from Russia series, 1:50,000.

Table IV. Glossary of Russian map expressions.

Key terms for identifying map dates

временный (vremennyi). . . . . provisional.
второе издание (vtoroye izdaniye). . . . . second edition.
высота сечения (visota secheniya). . . . . contour interval.
глазомерные с'емки полевых поездок (glazomernye siemki polevykh poezdok). . . . . field reconnaissance survey (hasty sketch).
градус (gradus). . . . . degree.
долгота (dolgota). . . . . longitude.
дополнена и вычерчена (dopolnena i vicherchena). . . . . revised and drawn.
издание (izdaniye). . . . . edition.
лист (list). . . . . sheet.
масштаб (masshtab). . . . . scale.
первое издание (pervoye izdaniye). . . . . first edition.
печатано (pechatano). . . . . printed.
проверялось (proverialos) . . . . . verified.
рекогносцировка (recognostzirovka). . . . . reconnaissance, reconnoitering.
сближение меридианов (sblizheniye meridianov). . . . . meridional convergence.
сдано в производство (zdano v proizvodstvo). . . . . released for publication.
составлял (sostavlyal). . . . . compiled by.
с'емка (siemka). . . . . survey.
широта (shirota). . . . . latitude.

Authorities

Военно-Топографическое Управление (Voyenno-Topograficheskoye Upravleniye). . . . . Military Topographic Bureau.
Генеральный Штаб Красной Армии (Generalny Shtab Krasnoy Armii). . . . . General Staff of the Red Army.
Управление Военных Топографов (Upravleniye Voyennykh Topografov). . . . . Bureau of Military Topographers.

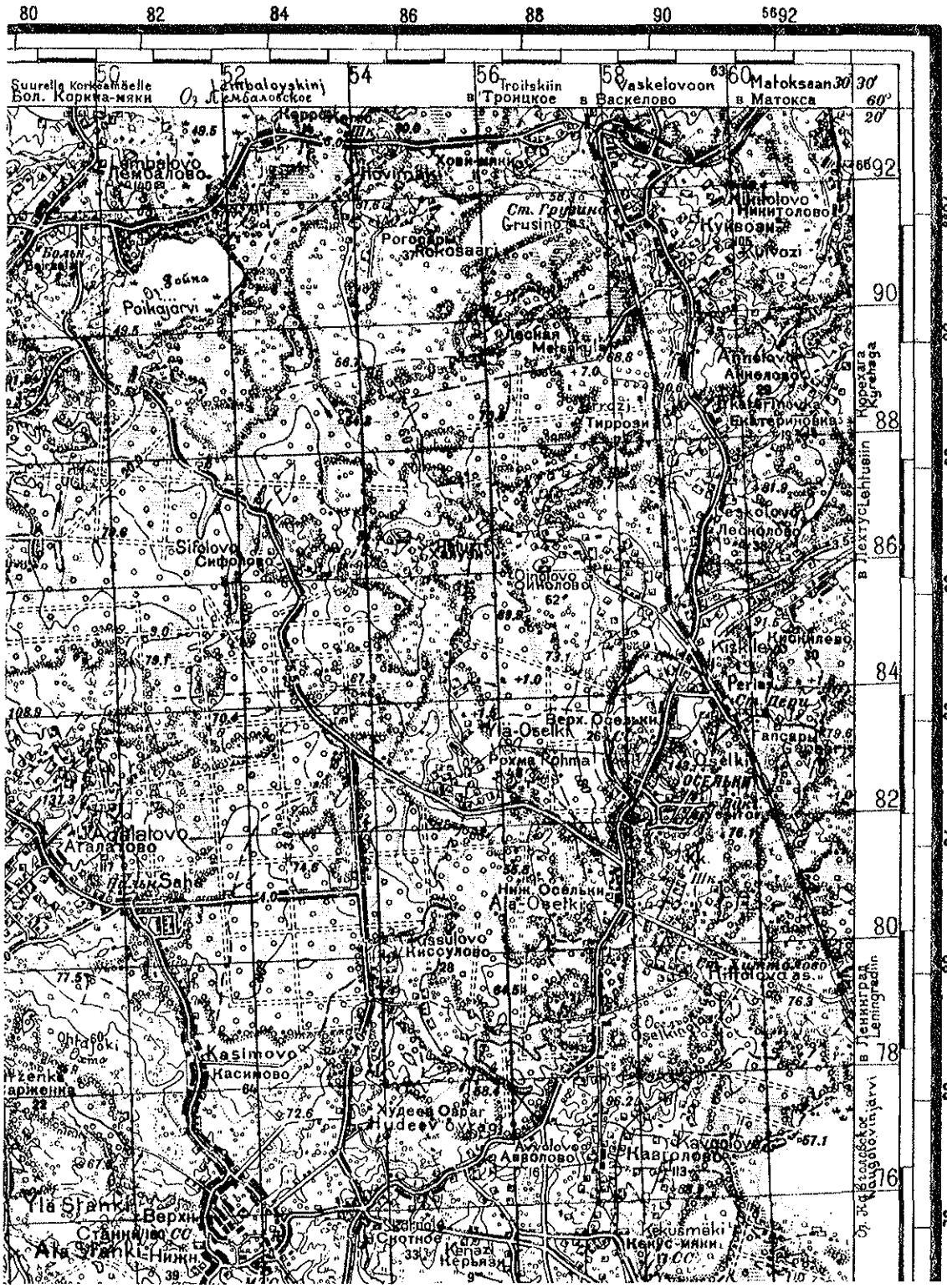


Figure 54. Section of map from Russia series, 1:100,000, sheet P36–133.

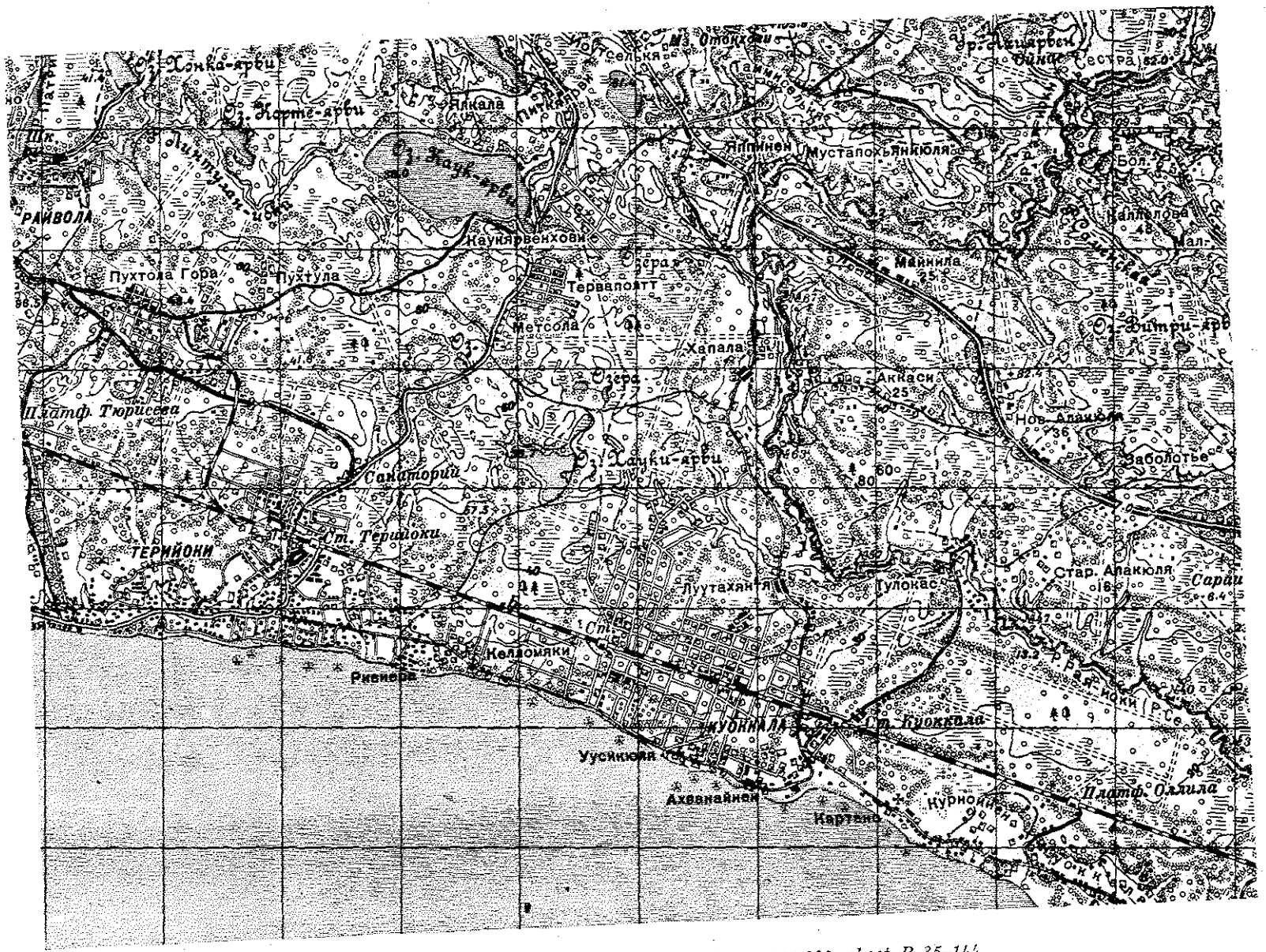


Figure 55. Section of map from Russia series, 1:100,000, sheet P–35–144.

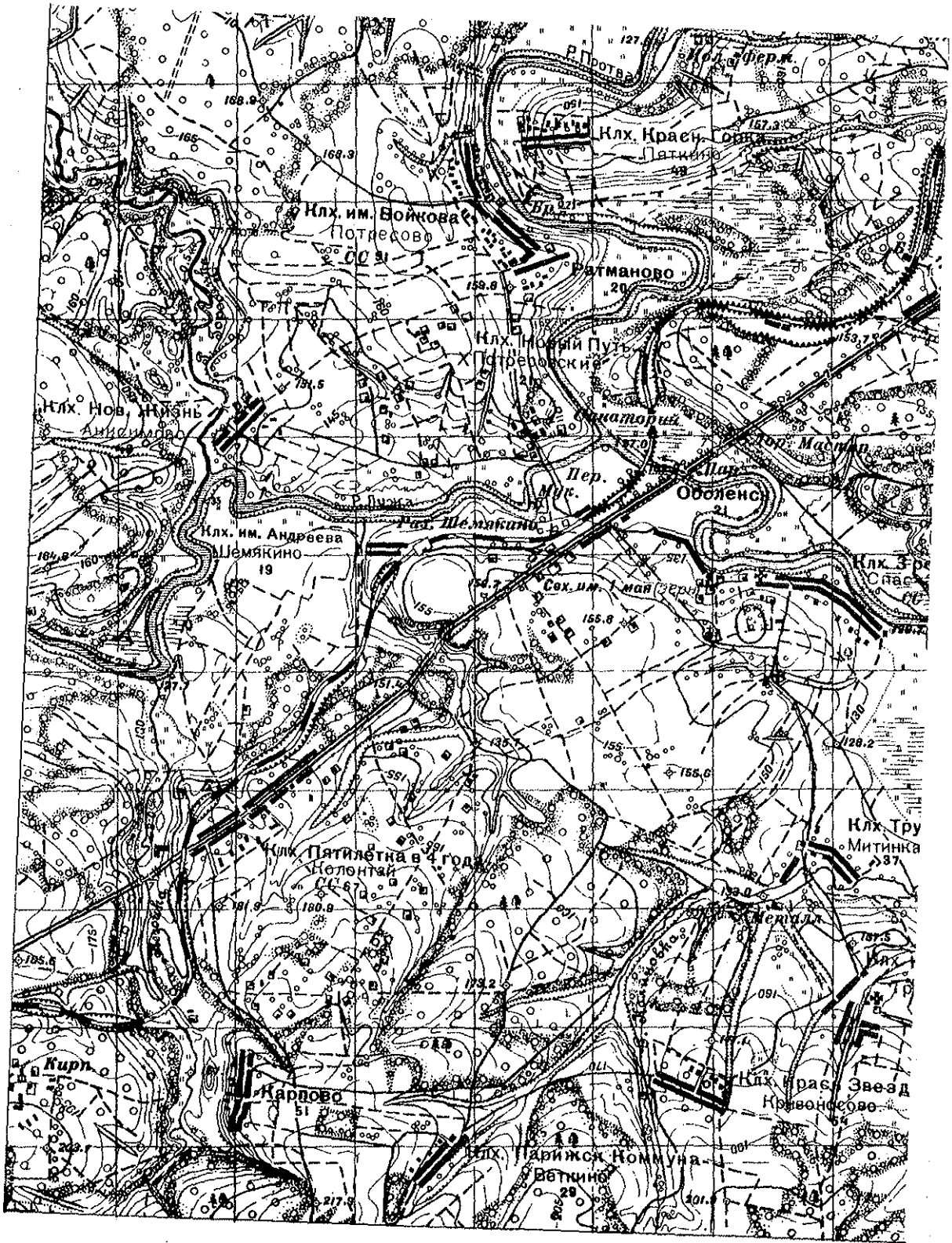


Figure 56. Section of map from Russia series, 1:50,000, sheet N–37–26–B.

CHAPTER 7

JAPANESE TOPOGRAPHIC MAPS

30. General

Japanese maps are only considered here generally, because of difficulty in obtaining information concerning them. Furthermore, Japanese characters are so complex that it is impossible to present enough of the written language to make one an accomplished reader of Japanese maps. Much of the material presented here was obtained from a careful study of many Japanese maps. The purpose of this chapter is to give some of the characteristics of such maps and to explain the Japanese characters pertaining to numbers, dates, and representative fractions. Field sketches were used to a great extent by the Japanese Army in its operations, but are not discussed here. Commercial maps used by the Japanese Army were published by the *Imperial Japanese Land Survey Bureau.* This bureau was a government monopoly. Other mapping agencies could not produce maps without its consent.

31. Military Map Series of Japan

a. 1:200,000 SERIES. The 1:200,000 series of Japanese topographic maps covers a large part of the Japanese Empire. Topography is represented on these maps by green contours and green hill shading. Important settlements are shown in red, water features in blue, and all other objects in black.

b. 1:50,000 SERIES. The 1:50,000 series published by the Imperial Japanese Land Survey Bureau covers practically all of the Japanese Empire. (See fig. 64.) This is a black-and-white contoured series containing a greater amount of detail than is usually found on United States maps of the same scale.

c. 1:25,000 SERIES. A few maps of 1:25,000 scale provide partial coverage of Japan. These sheets are dependable as of their date of publication.

d. UNITED STATES MAPS OF JAPAN. United States maps of Japan are prepared on scales of 1:250,000, 1:50,000, and 1:25,000. The 1:250,000 series is compiled from Japanese 1:200,000 and 1:50,000 sheets. The 1:50,000 United States series consists of maps copied in black and white from Japanese sheets of the same scale. (See fig. 65.) A world polyconic grid is superimposed; transliterations are provided in purple, and the Japanese legend is translated into English. Colored editions at 1:50,000 scale are also available. These have 1,000-yard world polyconic grids and use modified symbols patterned after the original Japanese. Several sheets of a 1:25,000 United States series, intended to cover the entire Japanese Empire, are available.

32. Japanese Coordinate Systems

a. GEOGRAPHIC COORDINATES. Geographic coordinates are used on Japanese maps in the conventional manner. Longitude is measured east and west from the Greenwich meridian, latitude, north and south from the Equator. Meridians and parallels are not drawn on the face of the map, but the edges of the map are meridians and parallels. In this respect, Japanese maps are similar to German maps. Arabic numerals are used for the numerical values of meridians and parallels.

b. MILITARY GRID SYSTEM. A standardized military grid system, similar to grids placed on United States, British, French, and German maps, was used by the Japanese. This grid system uses a metric grid and consists of seven grid zones.

(1) *Grid zones.* Five zones cover Japan; one, Korea; and another, Formosa. Each zone is 4° wide. Those covering Japan are centered on the 132°, 136°, 140°, 144°, and 148° meridians; the zone covering Korea, on the 128° meridian; and that covering Formosa, on the 121° meridian. The origin of each zone is the intersection of its central meridian with the 36° parallel, except the zone covering Formosa which has its origin at the intersection of the 121° meridian and the 24° parallel.

(2) *Grids.* Grids on the Japanese zones are printed in brown and have a basic interval of

1 kilometer. Grid lines are numbered to the right and up, with only the 1,000- and 10,000-meter digits printed on the lines. Full values of grid lines are printed only on lines nearest the corners of the map and on those at even 100-kilometer intervals.

(3) *Coordinates.* Japanese grid coordinates are read to the right and up. Ordinarily only the abbreviated numerical values printed on the grid lines are used in giving grid references. A point whose full coordinates are 4553.7 E, 3979.8 N may be located by the abbreviated references 53.7/79.8 or 53779.8.

c. POLAR COORDINATES. (1) Polar coordinates are used by the Japanese for point designation. Azimuths are measured clockwise in degrees or in mils. Elements of polar coordinates are given in the following order:

(*a*) Reference or base point.
(*b*) Azimuth.
(*c*) Distance.

(2) An object 500 meters from a triangulation point 102 meters high on an azimuth of 1800 mils would be indicated as follows:

$$\text{Base point} \quad 102\ \frac{1800}{500\text{m}}$$

33. Characteristics of Japanese Topographic Maps

a. MARGINAL INFORMATION. Marginal information may be placed on Japanese maps as shown in figure 57. However, positions of marginal information vary on different maps and map series, and certain items may not be given. The question: "How up-to-date and how accurate is the map?" can be answered by identifying the characters representing dates and the publishing agency. (See figs. 57, 62, and table VII.) Variations in place names are found on Japanese maps of different scales, because names of small individual settlements are indicated on large-scale maps, but only those of village groups are shown on maps of small scale.

b. GRAPHIC SCALE. On Japanese maps, a graphic scale graduated in metric units usually is found above the graphic scale in *ri*. The *shaku*, the *cho*, and the *ri* are the most important units of Japanese linear measurement. English and metric equivalents of these units are shown in table V.

c. RELIEF. Relief is represented on Japanese maps by contour lines, spot heights, and hill shading. These are employed singly or in combination.

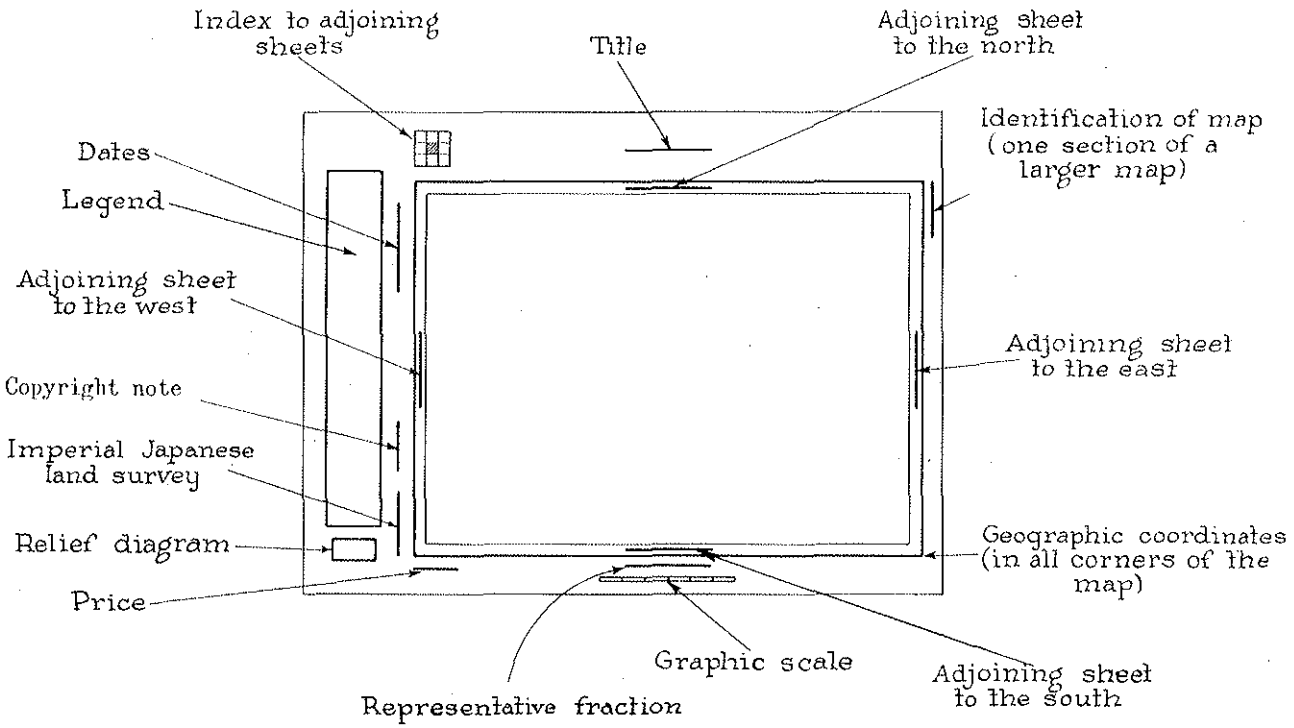


Figure 57. Diagram showing approximate positions of various items of marginal information on Japanese maps.

Table V. English and metric equivalents of Japanese units of linear measure.

Japanese		English	Metric
	1 shaku	0.994 ft....	30.3 cm.
360 shaku	= 1 cho	119.0 yd...	109.0 m.
36 cho	= 1 ri	2.44 mile..	3.93 km.

(1) *Contours.* Contours indicating elevation in meters are printed in green on small-scale colored maps and brown or orange on large-scale colored maps. Information on contour intervals may be found in a relief diagram under the legend at the lower left corner. Elevations of contour lines, expressed in Arabic numerals, are given on some maps at points where contour lines meet the edges of the sheet. Every fifth contour line may be accentuated to give a clearer picture of land forms. Broken (auxiliary) contours represent smaller intervals than do contours shown by solid lines. Craters or depressions are indicated on a topographic map by small arrows. The Japanese contouring system is similar in several respects to the German.

(2) *Spot heights.* Elevations indicated by spot heights, bench marks, and triangulation points are printed in Arabic numerals; for example, 23,4. A figure with a horizontal line above it may be found on rivers and streams to indicate the depth of water; for example, $\overline{23,4}$.

(3) *Hill shading.* Hill shading in green supplements contours on colored maps.

34. Japanese Characters

a. SYSTEM OF WRITING NUMBERS. The basic characters in the Japanese system of writing numbers are illustrated in figure 58. These were used on maps published by the Imperial Japanese Land Survey Bureau. More intricate symbols for numbers are sometimes used on other maps, for example the symbol representing 10,000.

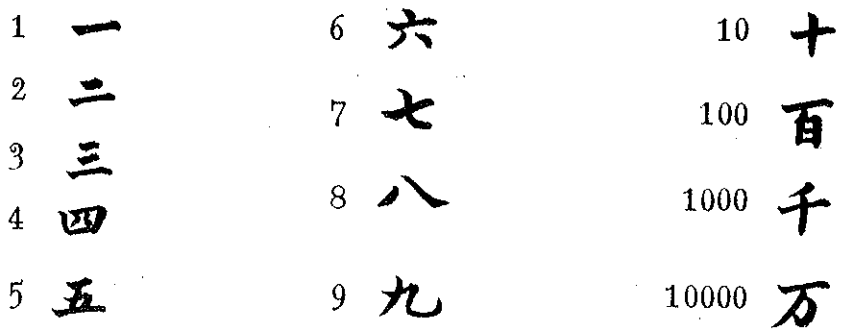


Figure 58. Basic characters of Japanese number system.

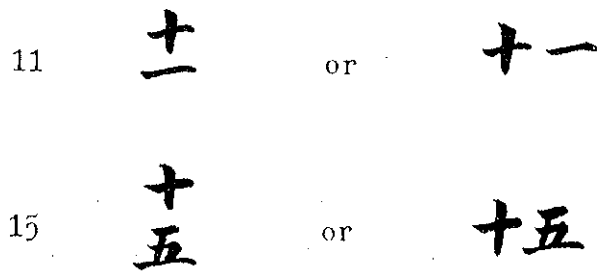


Figure 59. Examples of Japanese numbers formed by addition.

Combinations of numbers may be written in either of two ways: top to bottom, or left to right. In the examples in figures 59 and 60, read the left column of symbols from top to bottom; the right column, from left to right. Japanese characters may be formed by addition. In the examples in figure 59, the second character is added to the first.

Japanese numbers are also formed by multiplication and addition. In the examples in figure 60, the second character is multiplied by the first, and the third character is added; that is, three times ten plus seven, or thirty-seven.

Although it is not often found on their maps, the Japanese also use Japanese characters written as in the Arabic system. The number 3794, for example, is written horizontally as shown in figure 61. Contour numbering in figures 64 and 65 also follows this system.

37 三十七 or 三十七

94 九十四 or 九十四

Figure 60. (Right) Examples of Japanese numbers formed by multiplication and addition.

ENGLISH			JAPANESE		
ARABIC NUMERALS	WRITTEN TEXT	LITERAL TRANSLATION	FORMAL CHARACTERS	JAPANESE CHARACTERS IN ARABIC SYSTEM	ARABIC NUMERALS
37	Thirty-seven	Three tens seven	三十七	三 七	37
			(Also may be written horizontally as)		
			三十七	三七	
3794	Three thousand, seven hundred and ninety-four	Three thousands, seven hundreds, nine tens, and four	三千七百九十四	三 七 九 四	3794
			(Also may be written horizontally as)		
			三千七百九十四	三七九四	

Figure 61. English and Japanese equivalents in examples of forming numbers.

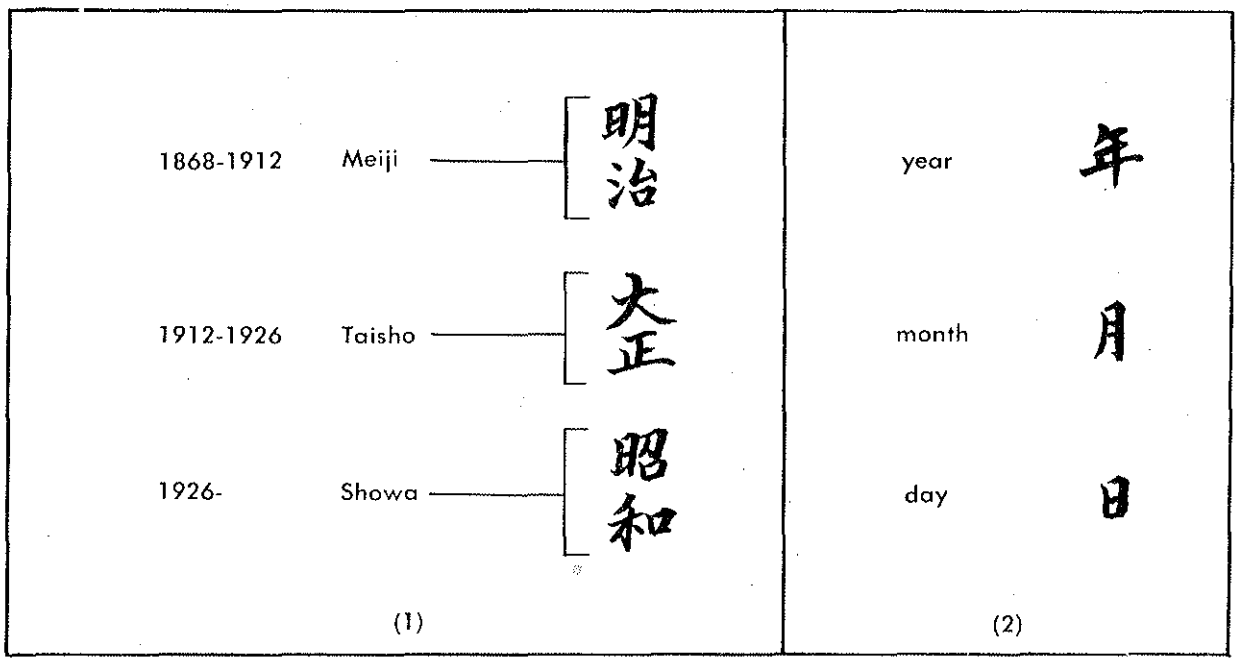
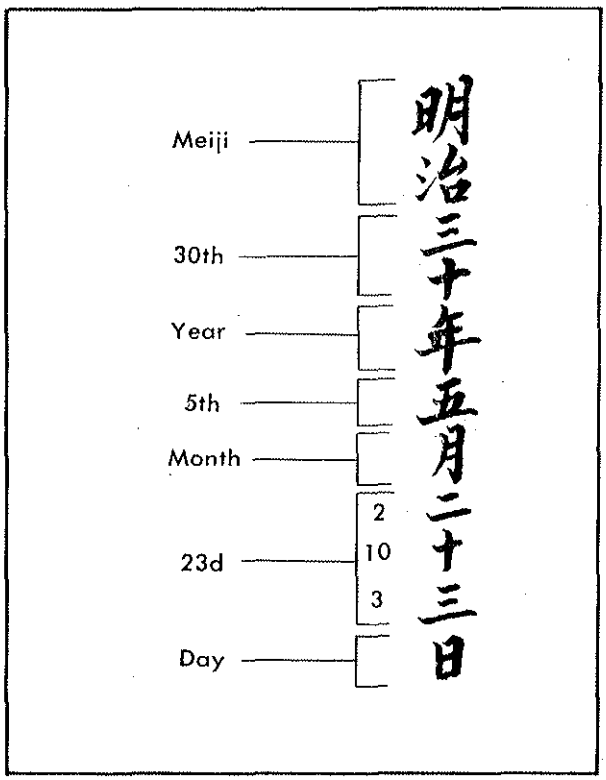


Figure 62. Japanese characters representing (1) reigns and (2) year, month, and day.

Figure 63. (Lower right) Combination of characters to form entire date. In this case, the date is Meiji 30, 5th month, 23d day or 23 May 1897.



b. DATES. Japanese dates are calculated from the beginning of one of three reigns: Meiji (1868–1912); Taisho (1912–26); Showa (1926–). To convert the Japanese year to our calendar, add to the number of the Japanese year one of the following amounts: Meiji, 1867; Taisho, 1911; Showa, 1925. For example: Meiji 40th year equals 1907 (40 plus 1867); Taisho 9th year, 1920 (9 plus 1911); and Showa 16, 1941 (16 plus 1925). Japanese dates are preceded by characters representing the reign. These characters and those for year, month, and day are shown in figure 62. Characters are combined to form complete date as shown in figure 63.

c. REPRESENTATIVE FRACTIONS. Characters indicating representative fractions appear on Japanese maps above the graphic scales. The three Japanese characters shown on first line of table VI are equivalent to "representative fraction equals 1:____." The characters which precede them in the next three lines indicate the denominator of the representative fraction.

Table VI. English representative fractions and Japanese equivalents.

ENGLISH	JAPANESE EQUIVALENT
Representative fraction equals 1:	分之一
Representative fraction equals 1:200,000	二十万分之一
Representative fraction equals 1:50,000	五万分之一
Representative fraction equals 1:25,000	二万五千分之一

Table VII. Glossary of Japanese map expressions.

Authorities

大日本帝國陸地測量部 ..... Imperial Japanese Land Survey Bureau

陸地測量部 ..... Land Survey Bureau

Key Terms for Identifying Map Dates

測量 or 測圖 ..... survey

製版 ..... engraving made

發行 ..... published

Table VII. Glossary of Japanese map expressions—Continued.

印刷	printed
再版 or 改版	reprint
修正	revised
部分	part, section
要部	important section
第二回	second time
同	ibid., the same reference (refers to reign, reign and year last stated, or entire date last stated)

Units of Linear Measurement

粍	millimeter
糎	centimeter
米	meter
粁	kilometer
尺	shaku
町	cho
里	ri

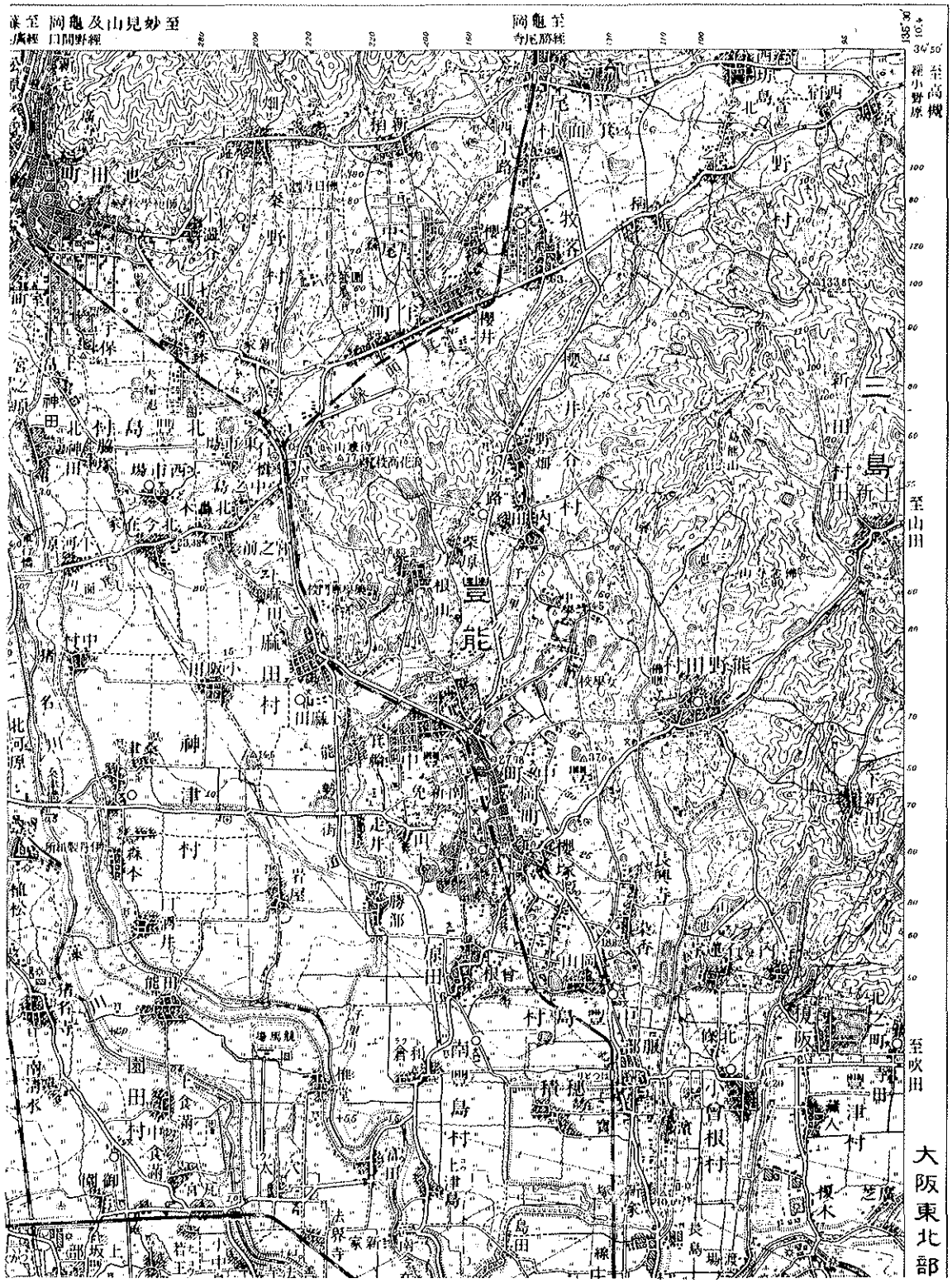


Figure 64. Section of map from original Japanese series, 1:50,000, sheet 12.

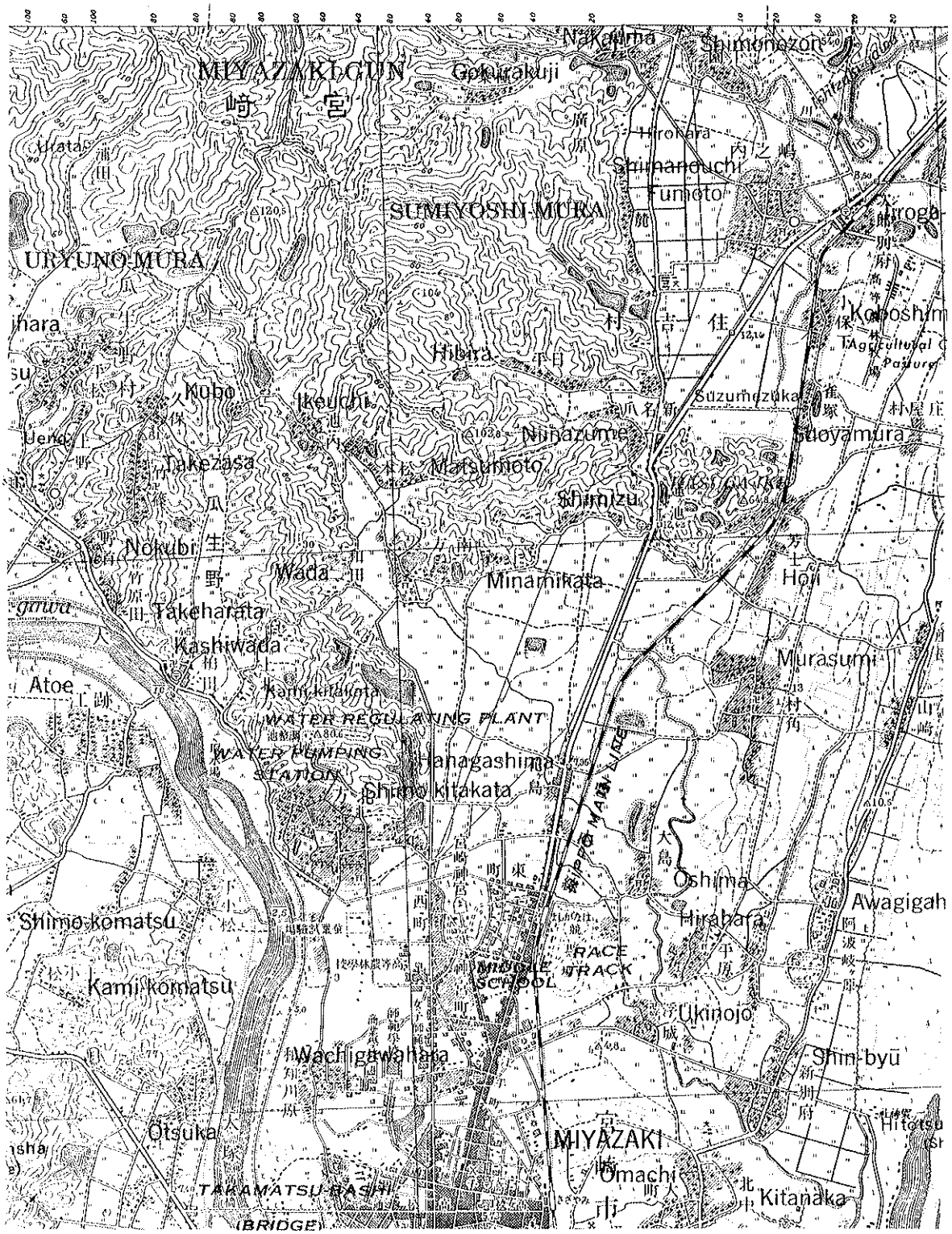


Figure 65. Section of map from Kyushu series, 1:50,000, AMS L772, sheet 133.

CHAPTER 8

CHINESE MILITARY MAPS

35. General

Chinese military maps are published by the *Chinese Central Land Survey*, part of the Survey Department of the Chinese General Staff. The Central Land Survey not only conducts field surveys, but also establishes cartographic standards and directs the activities of its units in the various provinces. Despite the efforts of this agency, the map series of the various provinces differ.

36. Military Maps of China

Chinese General Staff map series are published on scales of 1:100,000, 1:50,000, 1:25,000, and 1:10,000. (See figs. 70 and 71.) These may be encountered in two styles. Maps published before 1935 are classified old style maps and the forms are inconsistent. The sheets were made from sources of varying accuracy, and boundaries on maps of adjoining provinces often disagree. The new style sheets, published since

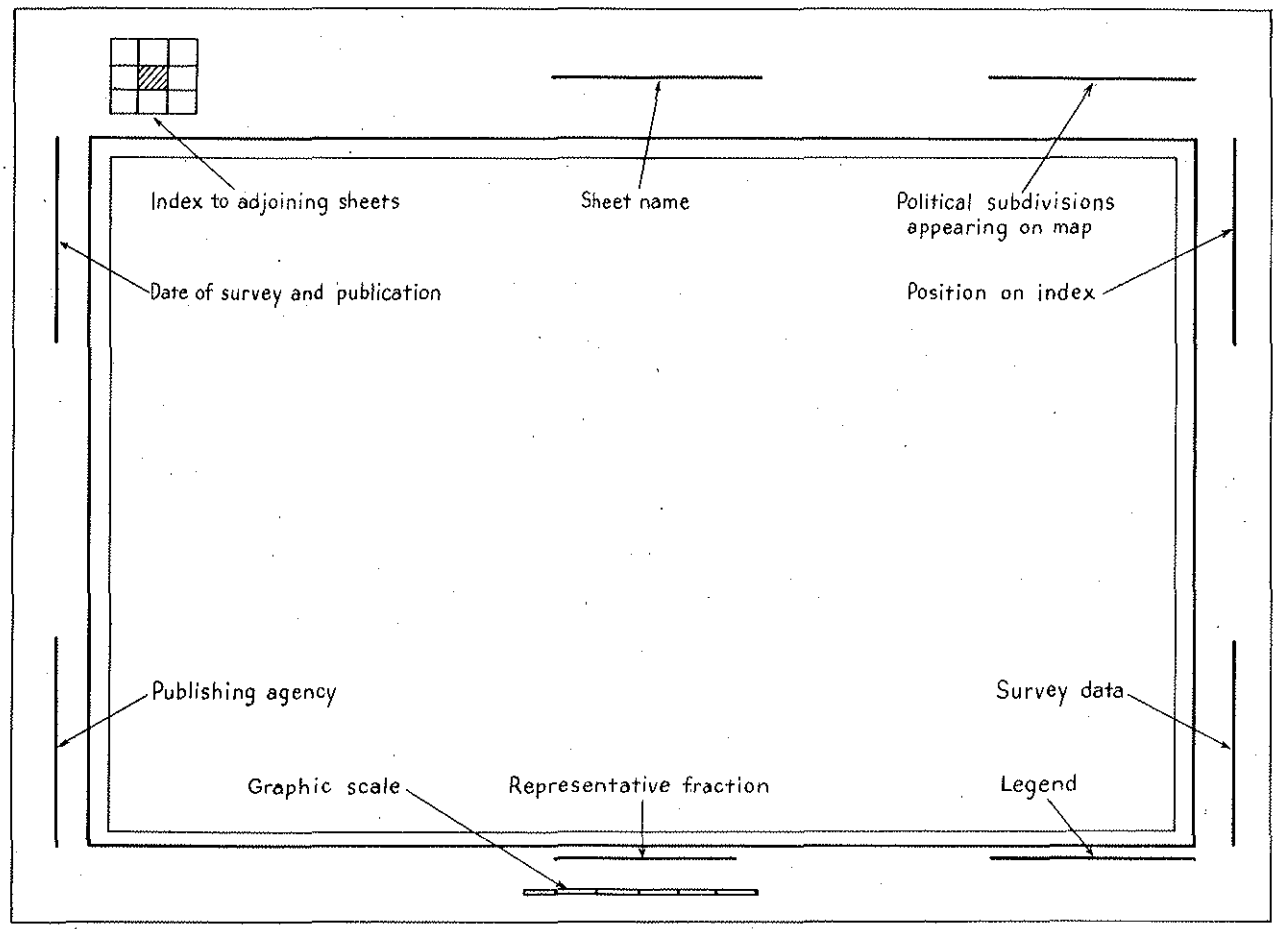


Figure 66. Diagram showing position of marginal information on Chinese maps.

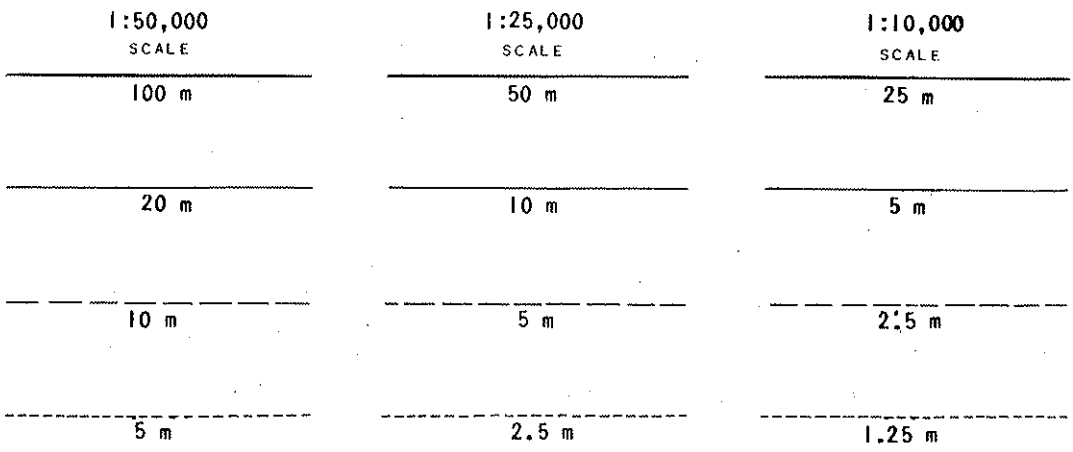


Figure 67. Contours used on Chinese maps.

1935, follow a more definite form than the older maps; they have a military grid and are fairly reliable.

37. Chinese Coordinate Systems

a. GEOGRAPHIC COORDINATES. Geographic coordinates are used by the Chinese on their topographic maps. The degree system is used exclusively. Latitude and longitude are based on the Equator and the Greenwich meridian. On a few old Chinese maps, longitude is measured from the meridian of Peking. Old style sheets are on a grid without coordinates. New style sheets are on a geographic lay-out with positions identified.

b. CHINESE MILITARY GRID. The Chinese military grid is used on Chinese maps published since 1935. A series of latitudinal overlapping zones was established. These zones cover 3° 30′ of latitude and extend east and west across China. The origin of each zone is the intersection of the 105° meridian and the parallel forming its southern limit. The grid on each zone is a metric grid with a basic interval of one kilometer. Grid lines are numbered from west to east and from south to north. As on maps of other countries, the full numerical value of grid lines is indicated on those lines nearest the corners of the map, and abbreviated values are found on the remaining lines.

38. Characteristics of Chinese Military Maps

a. MARGINAL INFORMATION. The marginal information on Chinese maps is scanty compared to that on the maps of other countries. Figure 66 shows the type and approximate position of marginal information on Chinese maps. The exact nature and position of the various items may vary.

b. GRAPHIC SCALES. Graphic scales in kilometers and in *shi li* are found in the lower margin of a Chinese map. The kilometer scale is usually the upper one. The *shi li* on Chinese General Staff maps is equal to 500 meters. However, on other maps, this unit may vary in length in the different Chinese provinces. Although the metric system was officially adopted in China, the older Chinese units still may be encountered. (See app. I.)

c. RELIEF. Relief is shown on Chinese maps by contours, supplemented by shading and spot heights. However, vertical data is not consistent in all provinces, nor are all elevations necessarily measured from sea level. The elevations appearing on maps of any one province do little more than show relative differences in altitude.

(1) *Contour lines.* Four types of contour lines are found on maps of China. Symbols are the same for maps of all scales. However, the symbol representing a particular interval on a map of one scale represents a different interval on a map of another scale. (See fig. 67.)

(2) An unusual type of shading, combining both hachuring and hill shading, is also used on Chinese maps to represent topography. It is found on contoured maps in many areas having steep slopes or rough terrain. (See fig. 68.)

(3) *Spot heights.* Spot heights supplement other methods of indicating relief. Elevations are given in meters.

39. Chinese Characters

a. SYSTEM OF WRITING NUMBERS. Chinese characters for numbers and representative fractions are the same as those of the Japanese described in chapter 7. About the eighth century, the Chinese system of characters was adopted by the Japanese. This explains the similarity between the written language of the two countries.

b. DATES. Dates on maps published by the Chinese Central Land Survey are calculated from the first year of the Chinese Republic (Chung Hua Ming Kuo), 1912. To convert a Chinese year to our calendar, add 1911 to the number of the Chinese year. Thus, Chung Hua Ming Kuo 1 is 1912, and Chung Hua Ming Kuo 30 is 1941. Two other eras may be used as starting points in converting Chinese dates before 1912. These are the Kuan Tsui Tzi, 1875, and Hsuan Tung Tzi, 1908. Dates earlier than 1875 are calculated from other eras not listed here. See figure 69 for characters for the three eras and those for year, month, and day. Figure 69 also shows characters combined to form a complete date.

Figure 68. Section of Chinese map, 1:50,000. Note method of representing rough terrain.

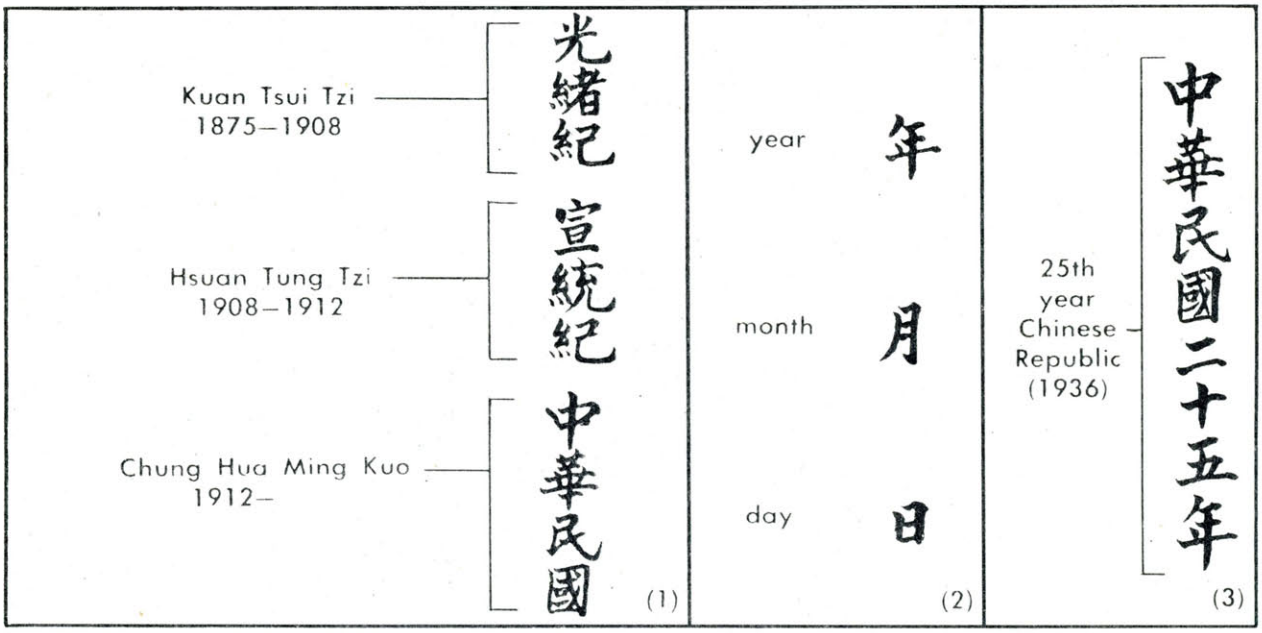


Figure 69. Chinese characters representing (1) era, (2) year, month, and day, and (3) combination of characters to represent 25th year (1936) of the Chinese republic.

Table VIII. Glossary of Chinese Map Expressions.

Authorities

參謀本部陸地測量總局 ..... Head Office, Land Survey, General Staff

測量分局 ..... Branch Survey Office

Key Terms for Identifying Map Dates

版權 ..... copyright

再版 or 重印 ..... reprinted

軍用本 ..... official edition

測量 ..... surveyed

寫真石印 ..... photolithographed

印刷 ..... printed

修正 ..... revised

Directions

北 ..... north

西 ..... west

東 ..... east

南 ..... south

Units of Linear Measure

公里 ..... kilometer

公尺 ..... meter

公分 ..... centimeter

市里 ..... shi li

丈 ..... chang

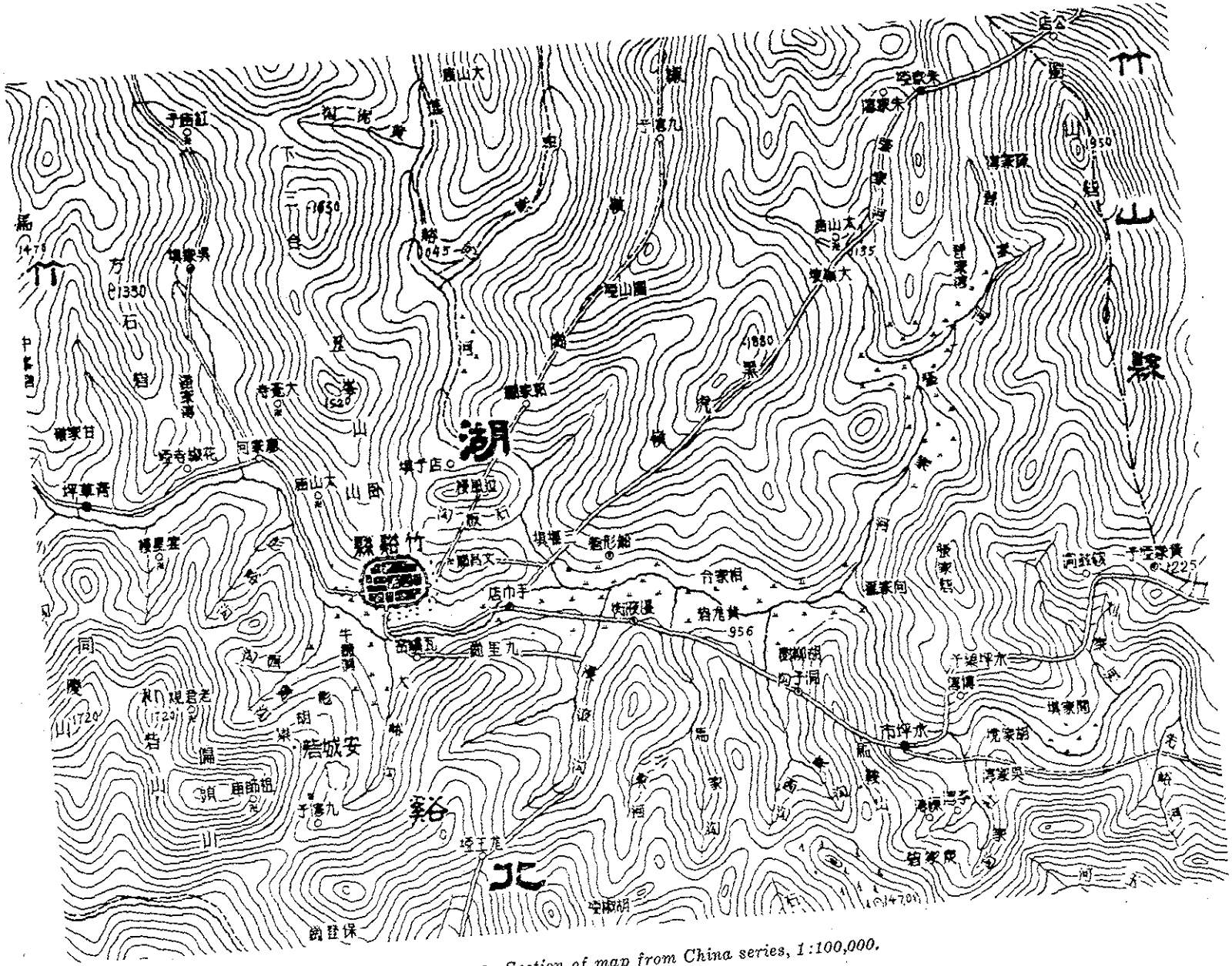


Figure 70. Section of map from China series, 1:100,000.

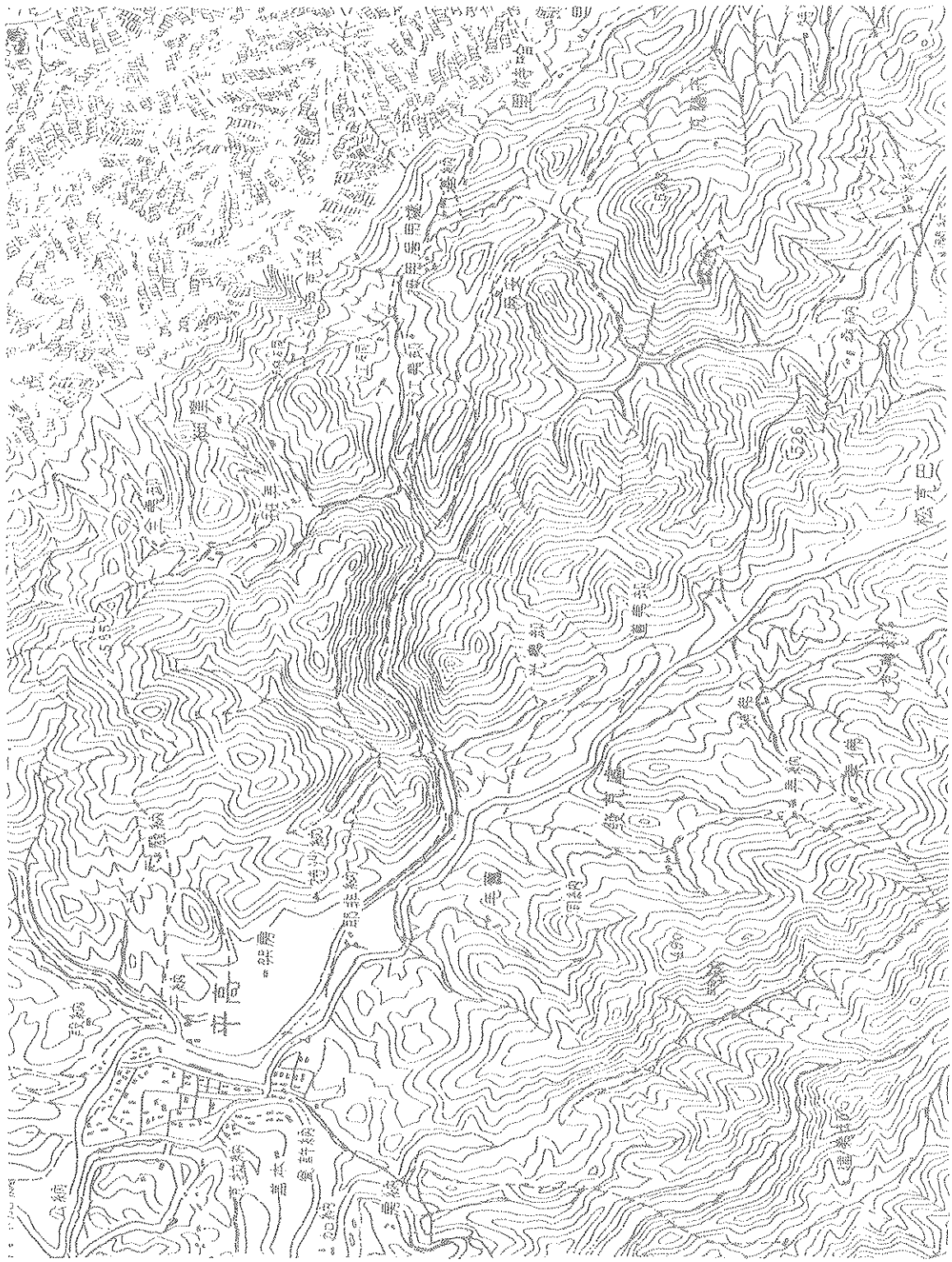


Figure 71. Section of map from China series, 1:50,000.

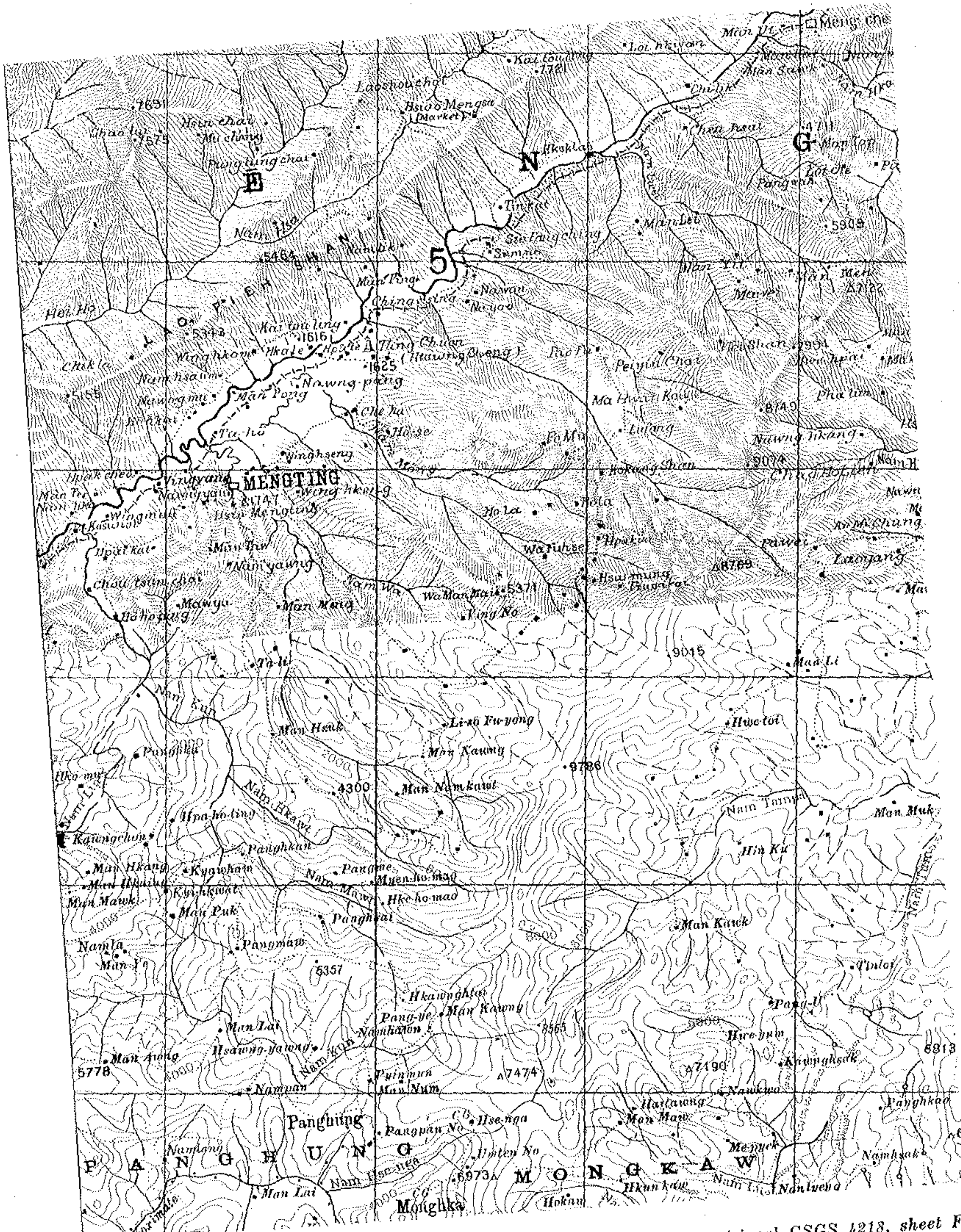


Figure 72. Section of map from Burma and Thailand series, 1:253,440, provisional GSGS 4218, sheet F-47D.

CHAPTER 9

MISCELLANEOUS MILITARY MAPS

Section I. FAR EAST

40. Burma, India, and Malaya

a. Military maps of Burma and India are published by the Survey of India. This agency, directed by the Surveyor General of India, also publishes maps of Tibet, Indo-China, Thailand, Iran, Iraq, and Arabia.

b. Burma and India are adequately covered by maps scaled at 1:253,440, 1:126,720 (figs. 72 and 73), and 1:63,360. Burma is covered by an additional series of 1:25,000 scale. Geographic coordinates are expressed in degrees, and longitude is measured from Greenwich. British grids in yards are found on most of the maps. Relief is shown by contours, hachures, and spot elevations. In many areas, particularly those mapped at a very early date, the contours are only approximate. Hachures are used on many maps. All elevations are given in feet.

c. Topographic maps of Malaya are published under the direction of the Surveyor General of the Federated Malay States and Straits Settlements. These maps are drawn to scales of 1:63,360 and 1:25,000. They have British yard grids, and longitude is measured in degrees from Greenwich.

41. French Indo-China

a. The *Service Geographique de l'Indo-Chine* (Geographic Service of Indo-China) publishes military maps of French Indo-China. The east coastal region and the southern part of the country are covered by a 1:100,000 series of maps. (See fig. 74.) Strategic areas are further mapped on a scale of 1:25,000. Geographic coordinates are expressed in the grade (centesimal) system with longitude based on the meridian of Paris. A Lambert grid is used on some maps.

b. British maps of French Indo-China are based on the original 1:100,000 series published by the *Service Geographique de l'Indo-Chine.* Geographic coordinates in degrees and minutes supplement the grade system, and a British grid is superimposed.

42. Netherlands Indies

The original surveying and mapping of the Netherlands Indies was done by the *Topografische Dienst.* All of Sumatra, Bali, and Java, except for the interior, was surveyed trigonometrically; the remainder of the Netherlands Indies was mapped from reconnaissance surveys. Hydrographic surveys and systematic charting of the waters and coastlines were conducted by the *Afdeeling Hydrografische van het Ministerie van Defensie* (Hydrographic Division of the Defense Ministry) (Netherlands) and the British Admiralty. Extensive use of aerial photography in mapping was begun in 1931, and since then, areas of Borneo, Netherlands New Guinea, and the remainder of Sumatra were mapped from air photos.

a. MILITARY MAP SERIES OF NETHERLANDS INDIES. (1) *Types.* Six types of maps were produced by the Dutch in the Netherlands Indies. Maps printed before 1916 were usually black and white editions, although some were printed in colors. The newer sheets are more detailed and accurate and are printed in colors.

(*a*) *Militaire Kart.* The *Militaire Kart* (Military Maps) have a minimum scale of 1:50,000 and, since they were compiled from full surveys, are accurate for artillery fire control. (Fig. 75.)

(*b*) *Topografische Kart. Topografische Kart* (Topographic Maps) are compiled from partial surveys and are accurate for all military purposes except artillery fire. Minimum scale is 1:200,000.

(*c*) *Topografische Schetskaart. Topografische Schetskaart* (Reconnaissance Topographic Maps) are compiled from incomplete surveys and have a minimum scale of 1:200,000.

(*d*) *Verkenningskaart. Verkenningskaart* (Reconnaissance Maps) were compiled from uncontrolled data with little or no survey material. The scale is generally larger than 1:200,000.

(*e*) *Overzichtskaart. Overzichtskaart* (General Maps) and *Schetskaart* (Reconnaissance

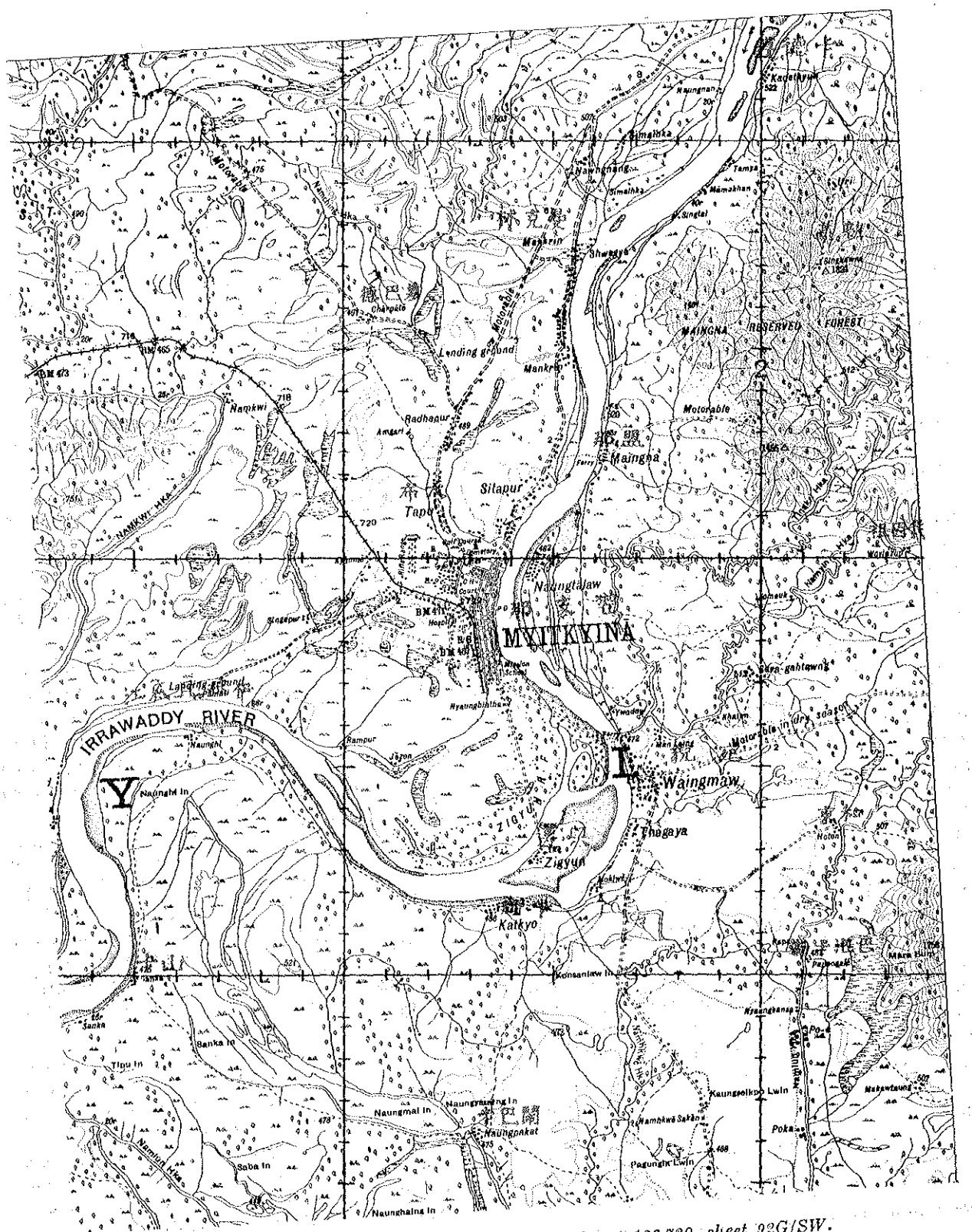


Figure 73. Section of map from Burma series, 1:126,720, sheet 92G/SW.

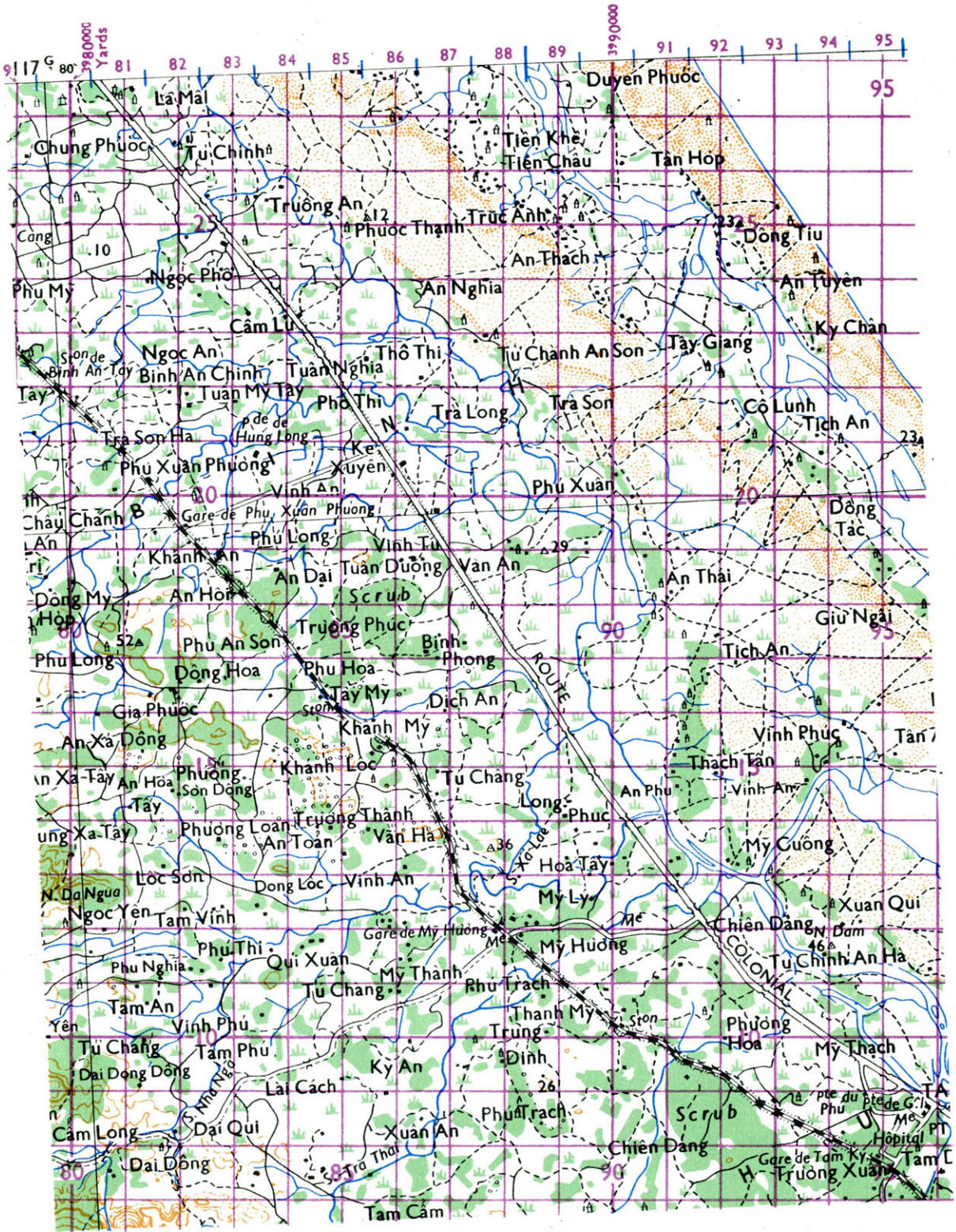


Figure 74. Section of map from Indo-China series, 1:100,000, HIND, sheet 137 (East).

Figure 75. Section of map from Java and Madura series, 1:50,000, G.S.G.S. 4202, sheets 51/XLIII–C and 51/XLIV–A.

Maps) are compiled from topographic maps, the latter from less reliable data than the former.

(2) *Revisions.* (*a*) *Types.* Three types of revision may be found on maps of the Netherlands Indies.

1. Simple revisions of reprinted maps, such as changes in road classifications or place names, are identified by the Dutch word *Herdruk.*
2. A more extensive revision is identified by the term *Gewijzigde Herdruk.*
3. A complete revision or entirely new edition, *Hermeten,* constitutes the third type.

(*b*) *Dates.* The date of revision is used by the *Topografische Dienst* for indicating the date of a map wherever possible. If a Dutch map contains no date of revision in its marginal information, the date of reproduction may be found in the lower left corner. The date of survey may be found in the center of the upper margin if the first two dates are lacking.

b. COORDINATE SYSTEMS. (1) *Geographic coordinates.* Geographic coordinates are expressed in the degree (sexagesimal) system. The following prime meridians are used by the Topografische Dienst:

Batavia	106°48′28″ E of Greenwich.
Padang	100°22′02″ E of Greenwich.
South Sumatra	103°33′28″ E of Greenwich.
Singkawang	108°59′41″ E of Greenwich.
Middle Celebes	121°48′28″ E of Greenwich.

(2) *Military grid system.* The Dutch use their own military grid on maps of the Netherlands Indies. This grid is a metric grid but exact boundaries and details of various zones are unknown. The grid interval on large-scale maps is 1 kilometer. Coordinates are read to the right and up.

c. CHARACTERISTICS. (1) *Scales.* The most commonly used scales for maps of the Netherlands Indies are 1:200,000, 1:100,000, 1:50,000, 1:40,000, 1:25,000, and 1:20,000. Other scales may be used.

(2) *Relief.* Relief on Dutch maps of this area is shown by contours and spot heights; elevations are measured in meters. The contour interval is 1/2000 of the denominator of the scale. For example: the contour interval on a 1:100,000 map is 50 meters; on a 1:50,000 map, 25 meters. Hill shading is sometimes used to supplement contours and spot heights.

(3) *Symbols.* Symbolization on maps of the Netherlands Indies is clear, complete, and detailed. Roads, railroads, types of buildings, cultivated areas, and other works of man are classified in detail. Color is used to indicate native settlements and inhabited areas. However, the same color is often used to indicate a wooded area. A list of abbreviations used on the map may be found in the legend. A series of notes, *Toelichtingen,* providing information pertinent to survey data, boundaries, and communications not found elsewhere on the map are also included in the legend.

d. UNITED STATES MAPS. United States maps of the Netherlands Indies were reproduced from the Dutch originals. Colored and black and white halftone reprints were made, and some sheets were compiled. Original Dutch symbolization is retained with only a few minor modifications. British grids are used for most of the Netherlands Indies. The United States yard grid, NEI equatorial zone, replaces the British grids in the northern part of this area. This grid uses 500,000-, 100,000-, and 1,000-yard squares similar to British yard grids and coordinates are written using the British method.

Section II. WESTERN EUROPE

43. Spain

The military maps of Spain are published by the *Instituto Geografico y Estadistico* (Geographical and Statistical Institute). The principal map series are drawn to scales of 1:200,000, 1:100,000, and 1:50,000, although 1:25,000 sheets are available for some areas. Geographic coordinates are expressed in both degrees and grades with longitude based on the meridian of Madrid. A kilometric grid system patterned after the French Lambert grid is found on Spanish maps. Graphic scales, contours, and spot heights are measured in meters. Spanish maps are inferior to those of other countries in Western Europe. Roads and outlines of wooded areas are often inaccurate. Many large scale sheets give little detail.

44. Belgium

a. MILITARY MAPS OF BELGIUM. Belgian military maps are published by the *Institut Cartographique Militaire* (*Het Militair Cartografisch Institut*) (The Military Cartographic Institute). The principal map series are drawn to scales of 1:20,000, 1:40,000, and 1:100,000. The basic 1:20,000 series is printed in color and consists of 446 sheets. The sheets were prepared between 1933 and 1939 and are clear and accurate. The 1:40,000 series is produced in black and white and also in color. The 1:100,000 series was prepared from the 1:40,000 series. It is clear, detailed, and printed in color. Belgium is also covered by 1:200,000 road maps published by the *Touring Club de Belgique.*

b. COORDINATE SYSTEMS. (1) *Geographic coordinates.* Geographic coordinates on Belgian maps, like those on French maps, are expressed in grades. Longitude is measured from the meridian of Brussels. Ticks showing geographic coordinates in the degree system are sometimes added.

(2) *Military grid.* A Bonne military grid is found on Belgian maps. The grid is usually printed in orange at 1-kilometer intervals. The numerical values of grid lines are printed in the margin in figures of uniform size. The method of giving grid references follows the French practice.

c. CHARACTERISTICS. Relief is shown by contours and spot elevations. The contour interval on the 1:20,000 and 1:40,000 sheets is 5 meters. Elevations are measured from the mean low watermark of spring tides at Ostende. Spot elevations are given in meters. Belgian maps contain complete legends of conventional signs with clear symbols. Belgian maps are among the finest and most accurate in Europe. A study of captured German maps reveals the Germans reproduced the Belgian originals changing only the marginal information into German.

45. Holland

a. MILITARY MAPS OF HOLLAND. Military maps of Holland are published by the *Topografische Dienst* (Topographic Service). A modern 1:25,000 series was begun in 1904 and completed in 1934. A 1:50,000 series based on the 1:25,000 was also prepared during these years. In 1934, the Dutch began a new 1:25,000 series similar to the older series but along different sheet lines. This series also was the basis for a 1:50,000 series. A 1:200,000 series also covers the entire country.

b. COORDINATE SYSTEMS. (1) *Geographic coordinates.* Geographic coordinates are expressed in degrees with longitude based on the meridian of Amsterdam.

(2) *Military grids.* Two military grids, the Bonne and stereographic, are found on the maps of Holland.

(*a*) *Bonne.* Older sheets are gridded with 1-kilometer squares based on the Bonne grid. On the early 1:50,000 sheets, these squares are numbered from 0 to 40 from west to east, and from 50 to 75 from south to north. References are given by sheet number and square number.

(*b*) *Stereographic.* Recent Dutch maps carry a Dutch stereographic grid printed in black. Grid lines are at 1-kilometer intervals and are given full kilometric values in uniform figures printed in red or brown. References are read to the right and up.

c. CHARACTERISTICS. Dutch military maps conform to the highest standards of cartography. They have as much detail as German maps, yet they are as clear as the newest French and Belgian maps. Relief is shown by contours and spot heights in meters. The basic contour interval is 5 meters with every other line accentuated. Hachures indicate small rises in the terrain. Railroads, dirt roads, dikes, and other works of man are shown in black; cities and main roads, in red; water, in blue; sand, in yellow; waste land (heath) in light brown; and forests, in green.

Section III. CENTRAL EUROPE

46. Hungary

a. MILITARY MAPS OF HUNGARY. Hungarian military maps are published by the *M Kir Allami Terkepeszet* (Royal Hungarian Cartographic Institute). The principal map series are drawn to the scales of 1:200,000, 1:75,000 and 1:25,000. The first two series are based on revised editions of the old Austrian General Staff maps of the same scales. There are three types of 1:25,000 maps: first, those based on old Austrian survey sheets; second, on corrected and redrawn Austrian survey sheets; and third, on new Hungarian surveys. Sheets belonging to the first group are out-of-date and inaccurate.

Sheets of the second group are better but are not exact. Sheets of the third group are up-to-date and accurate enough to meet all requirements of modern artillery maps.

b. COORDINATE SYSTEMS. (1) *Geographic coordinates.* Geographic coordinates are expressed in degrees. Older sheets measure longitude from Ferro, while newer sheets measure longitude from Greenwich. Some sheets show longitude from both meridians.

(2) *Military grid.* A kilometric Hungarian stereographic grid is found on most sheets. Grid lines on some old maps are numbered from the true origin, and negative values sometimes occur. Therefore, grid references must be measured from the corner of the square nearest the origin of the zone. This system of numbering grids is now obsolete. On the latest maps false coordinates are assigned to the origin, thus giving positive values for all grid lines, and grid references are read to the right and up.

c. CHARACTERISTICS. Contours are the principal method of showing relief although many 1:200,000 and 1:75,000 sheets use hachures. Spot heights are based on the Adriatic Sea and altitudes are given in meters. Place names on maps of various series may differ.

47. Poland

a. MILITARY MAPS OF POLAND. Polish maps are published by the Military Geographic Institute (*Wojskowy Instytut Geograficzny*). The principal map series are drawn to the scale of 1:300,000, 1:100,000, 1:50,000, and 1:25,000. Polish maps are similar to German maps.

b. COORDINATE SYSTEMS. (1) *Geographic coordinates.* Geographic coordinates on modern Polish maps are read in degrees, and longitude is measured from Greenwich. However, a few older sheets use the meridian of Ferro.

(2) *Military grid.* A military grid is found on most sheets. The grid interval on 1:100,000 maps is 2 kilometers. Two-digit numbers on alternate grid lines give grid distances in units and tens of kilometers. Grid lines nearest the sheet corners have an additional digit in smaller type giving grid distances in hundreds of kilometers. Maps of 1:25,000 scale contain grid lines at 1-kilometer intervals. All grid coordinates are read to the right and up.

c. CHARACTERISTICS. Scales are graduated in meters and strides (*kroki*). The latter is equal to 80 centimeters, the same as the German *Schritt.* Grid declinations are shown both in degrees and in mils. Conventional signs used on Polish maps are similar to conventional signs used on German maps of 1:25,000 scale.

48. Czechoslovakia

a. MILITARY MAPS OF CZECHOSLOVAKIA. Czechoslovakian military maps are published by the Military Geographical Institute (*Vojenskeno Zemepiseho Ustavav*). The principal map series are drawn to scales of 1:200,000, 1:75,000, and 1:25,000, the last two being modernizations of Austrian General Staff series.

b. COORDINATE SYSTEMS. (1) *Geographic coordinates.* Geographic coordinates are expressed in degrees. The prime meridian used on modern maps is that of Greenwich.

(2) *Military grid.* A kilometric grid system with a basic 1,000-meter grid interval is used. Unlike other grid systems, the numerical value of grid lines increases to the west and to the south. The grid lines nearest the sheet corners are numbered with their full grid distances. Other grid lines have two-digit numbers giving grid distances in units and tens of kilometers. In giving a short grid reference only the latter two digits are used, but all grid references are preceded by the sheet number. For example, the grid reference (to the nearest 100 meters) of a point whose full coordinates are 624.5 west and 718.5 kilometers south, which falls on sheet 920, would be: sheet 920, 245185. If a fuller grid reference is needed, the figures denoting grid distances in hundreds of kilometers are used, but the sheet number is omitted. In this case, the grid reference of the same point would be: 62457185.

c. CHARACTERISTICS. Graphic scale in *kroku* (strides) and metric units appear in the margins. Relief is shown by contours at metric intervals, supplemented by spot heights on large-scale maps; hachuring is used on the 1:200,000 series.

Section IV. SCANDINAVIA

49. Denmark

a. MILITARY MAPS OF DENMARK. The military maps of Denmark are published by the *Generalstabens Topografiske Afdeling* (Topographic Section of the General Staff) on scales of 1:200,000, 1:100,000, 1:40,000, and 1:20,000. Tactical sheets are similar to large-scale maps of Germany in symbols, contours, and general appearance.

b. COORDINATE SYSTEMS. (1) *Geographic coordinates.* Geographic coordinates are expressed in degrees, with longitude measured from the prime meridian of Copenhagen.

(2) *Military grid.* A kilometric grid system is used. The area of Denmark is divided into 50-kilometer squares which are numbered. Each 50-kilometer square is subdivided into twenty-five 10-kilometer squares which are lettered. Each 10-kilometer square is subdivided into 100 1-kilometer squares which are numbered. The 1-kilometer squares are subdivided into tenths to the right and up from the southwest corner. A point is located by referring to—

(*a*) Number of the 50-kilometer square.
(*b*) Letter of the 10-kilometer square.
(*c*) Number of the 1-kilometer square.
(*d*) Number of tenths to the right and up within the 1-kilometer square.

c. CHARACTERISTICS. Graphic scales are in meters. An adequate legend, a list of abbreviations, and a diagram explaining both land and underwater contours are found in the margin.

50. Norway

Norwegian military maps are published by the *Norges Geografiske Opmaling* (Norway's Geographical Survey) on scales of 1:400,000, 1:200,000, 1:100,000, 1:50,000 and 1:25,000. The 1:100,000 and 1:50,000 series together cover the entire kingdom except for extremely mountainous areas. The 1:25,000 series consists of isolated sheets of urban and strategic areas. Geographic coordinates are expressed in degrees with longitude based on Oslo. The meridian of Ferro is sometimes used on old sheets. A kilometric grid is found on some sheets. Contours, supplemented by hill shading and spot elevations, are used to show relief. The contour interval on the 1:100,000 series is 30 meters with every fifth line accentuated. Graphic scales are in kilometers, Norwegian miles, and geographic miles.

51. Sweden

Swedish military maps are published by the *Generalstabens Litografiska Anstalt* (The Lithographic Institute of the General Staff). The principal map series are drawn to scales of 1:400,000, 1:200,000, and 1:100,000. Geographic coordinates are expressed in degrees. Longitude is usually measured from the meridian of Stockholm, although it is sometimes measured from Greenwich. A kilometric grid is used. Contours, hachures, cliff symbols, and spot heights are often used on the same sheet to show relief. Graphic scales are subdivided into kilometers and Swedish miles.

Section V. BALKANS

52. General

Many of the older Balkan military maps are reproduced or are based on World War I Austrian General Staff maps. Modern maps show French influence in style and in geographic coordinates. The U. S. Army Map Service prepared colored maps of the Balkans and Eastern Europe. These maps are contoured and contain metric grids. Greece, Poland, and the Middle Danube area are each covered by a 1:100,000 series. Bulgaria is mapped to scales of 1:126,000 and 1:40,000; Yugoslavia, to 1:50,000; and European Turkey, to 1:25,000.

53. Yugoslavia

a. MILITARY MAPS OF YUGOSLAVIA. Yugoslavian maps are prepared by the *Vojni Geografski Institut Kraljevine Jugoslavije.* The principal map series is drawn to the scale of 1:100,000, published both in Roman and Cyrillic script. Maps to the scales of 1:50,000 and 1:25,000 were prepared from the 1:100,000 series. (See fig. 76.) Other maps to the scales of 1:75,000 and 1:200,000 were produced. Other European countries base their maps of Yugoslavia on the 1:100,000 series.

b. COORDINATE SYSTEMS. Geographic coordinates are expressed in degrees with longitude measured from either Greenwich or Paris. A kilometric military grid, similar to the German *Gauss-Krüger* grid is used.

Figure 76. Section of map from Yugoslavia series, 1:100,000 G.S.G.S. 4396, sheet 79.

c. CHARACTERISTICS. Relief is shown by contours, spot heights, and hill shading. Contours on large Yugoslavian maps are similar to those on German tactical maps. Spot heights are given in meters. The 1:25,000 and 1:50,000 maps were published in five colors; detail in black, roads in red, water in blue, forests in green, and contours in brown.

54. Rumania

a. MILITARY MAPS OF RUMANIA. The military maps of Rumania are published by the *Institutul Geografic al Armatei* (The Army Geographic Institute). The principal map series are drawn to scales of 1:200,000, 1:100,000, 1:75,000, 1:50,000, and 1:20,000. The data from which these maps are prepared varies. Some maps are made from Austrian surveys; others, from Russian or Rumanian surveys. In general, Rumanian maps are below normal European cartography standards.

b. COORDINATE SYSTEMS. The degree system is used to express geographic coordinates. Longitude is measured from Paris and Greenwich. Graticules indicated along sheet lines on Rumanian maps are not always accurate. The military grid is known as the Rumanian Lambert grid. Areas are divided into 5-kilometer squares, and each square is marked and numbered in the margin. Each 5-kilometer square is divided into 1-kilometer squares. These squares are referred to by two letters in the margins of the map. The letters are used in combination with the 5-kilometer grid numbers to designate areas. Point grid references are read to the right and up, using numerical coordinates only.

c. CHARACTERISTICS. Contours and spot heights measured in meters from the harbor level of Constanza are used to show relief on large-scale tactical sheets. Hachures are sometimes used on 1:75,000 sheets. Place names on Rumanian maps sometimes vary with different series.

55. Bulgaria

a. MILITARY MAPS OF BULGARIA. The military maps of Bulgaria are published by the *Kartografisheski Institute* (Cartographic Institute). Early Bulgarian maps were based on an old Russian survey. These were scaled at 1:210,000, 1:126,000 and 1:42,000. A map series to the scale of 1:40,000, the *Reambulierte Karte,* was prepared from the earlier maps. New 1:100,000, 1:50,000, and 1:25,000 maps of Bulgaria are based on more recent surveys and methods.

b. COORDINATE SYSTEMS. Geographic coordinates are expressed in degrees. Longitude is measured from the meridian of Greenwich on the new maps. Older maps use the meridian of Paris or Pulkovo. The military grid on modern Bulgarian maps is almost identical to the German *Gauss-Krüger* grid. The basic grid interval is 1 kilometer.

c. CHARACTERISTICS. Relief is shown principally by contours. Contour intervals on modern maps are measured in meters; those on older sheets based on the Russian survey are sometimes measured in *sazheni.* The Cyrillic alphabet is used on most Bulgarian maps.

56. Greece

a. MILITARY MAPS OF GREECE. Greek military maps are published by the *Kartografica Hyperesia Stratoy* (The Institute of Strategic Cartography). The principal map series is the 1:100,000 General Staff map, covering the entire country. Other series to the scales of 1:50,000 and 1:25,000 cover parts of the Greek mainland, Crete, and the various islands of the Aegean. Maps of the Greek mainland are more reliable than those of the Aegean islands. The former are made from accurate survey while the latter were prepared in rough diagrammatic form or from naval charts. British and German maps of these islands were corrected and contoured from air photographs.

b. COORDINATE SYSTEMS. Geographic coordinates are shown in degrees with longitude measured from the meridian of Athens. The country is divided into a number of grid zones. Each zone has an origin located along the meridian of Athens at the intersection of a principal parallel within each zone. Grid distances and intervals are measured in meters.

c. CHARACTERISTICS. Relief is shown by contours and the Greek alphabet is used on all maps.

57. Turkey

a. MILITARY MAPS OF TURKEY. Turkish military maps are published by the *Harta Genel Direktörlügü.* The three principal map series are to the scales of 1:200,000, 1:50,000, and 1:25,000. The 1:200,000 series covers the en-

tire country. Other countries base maps of Turkey on this series. The 1:50,000 series covers the Dardanelles area. The 1:25,000 series covers all of European Turkey.

b. COORDINATE SYSTEMS. Geographic coordinates are expressed in degrees. The prime meridian on some of the modern editions is Greenwich, although most sheets measure longitude from Istanbul. A *Turkish Bonne* grid with basic 1-kilometer grid intervals is used on maps of Turkey.

c. CHARACTERISTICS. Relief is shown by contours and by a few spot heights. Most sheets are printed in Arabic script, but some of the most recent editions use the modern romanized Turkish alphabet.

APPENDIX I

REFERENCE DATA

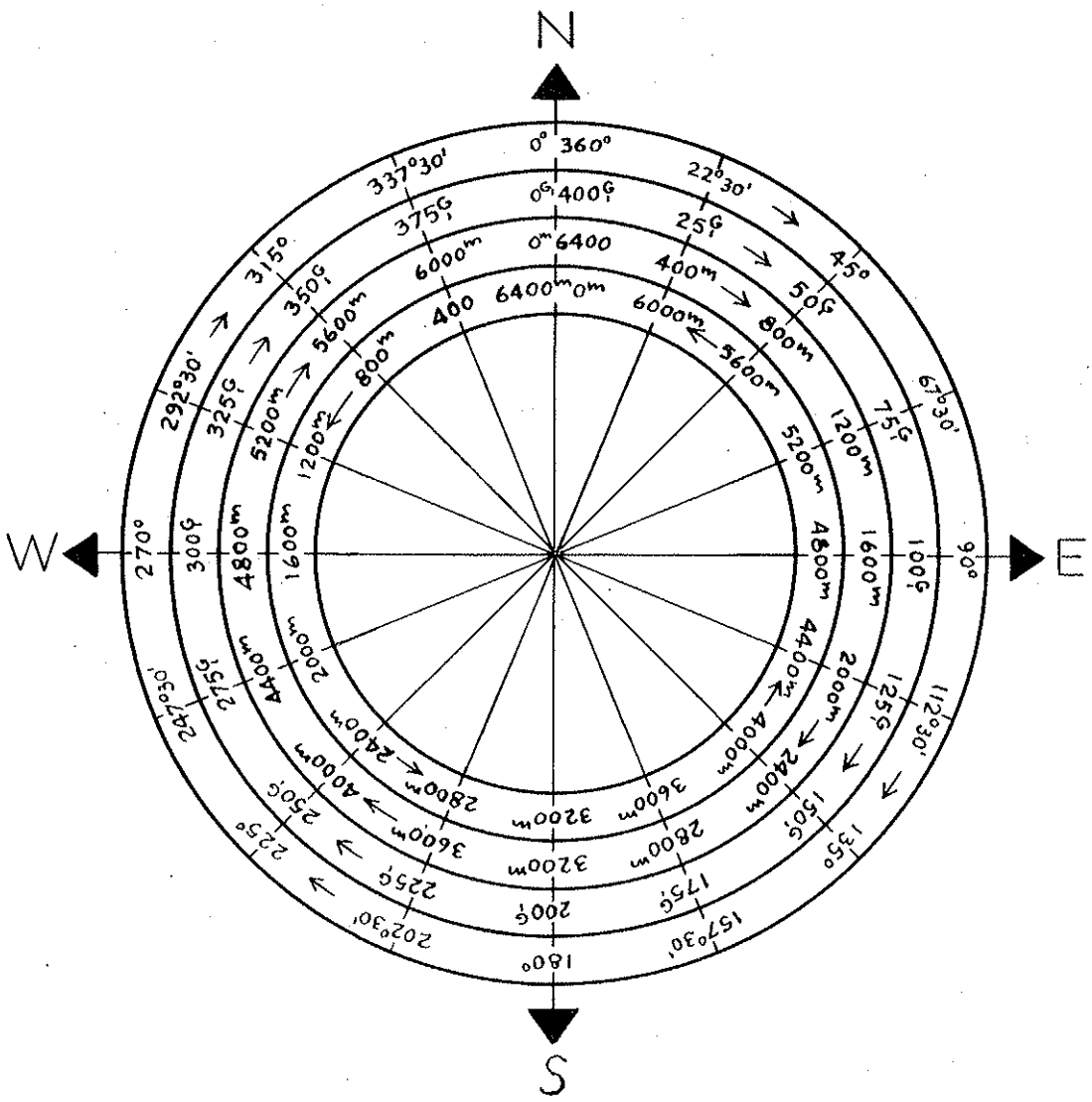


Figure 77. Diagram showing relationship of degrees, grades, mils clockwise, and mils counterclockwise.

Table IX. Foreign units of linear Measure.

a. Table of equivalent units of length.

Mile	Yd	Ft	In.	Km	M	Cm
Mile 1.0000	1760.0000	5280.0000	63,360.0000	1.6093	1609.3490	
Yd	1.0000	3.0000	36.0000		.9144	91.44
Ft	.3333	1.0000	12.0000		.3048	30.48
In.	.0277	.0833	1.0000		.0254	2.54
Km .6214	1093.6112	3280.8336	39,370.0032	1.0000	1000.0000	100,000.00
M	1.0936	3.2808	39.3700	.0010	1.0000	100.00
Cm	.0109	.0328	.3937		.0100	1.00

b. Metric system of linear measure (with equivalents in English system).

1 millimeter	0.1 centimeter	0.0393	inch.
10 millimeters	1.0 centimeter	0.3937	inch.
10 centimeters	1.0 decimeter	3.937	inches.
10 decimeters	1.0 meter	39.37	inches.
10 meters	1.0 dekameter	32.81	feet.
10 dekameters	1.0 hectometer	328.1	feet.
10 hectometers	1.0 kilometer	0.62	mile.
10 kilometers	1.0 myriameter	6.21	miles.

c. Japanese system of linear measure (with equivalents in metric and English systems).

	1 rin	0.303	millimeter	0.012	inch.
10 rin	1 bu	3.03	millimeters	0.12	inch.
10 bu	1 sun	3.03	centimeters	1.2	inches.
10 sun	1 shaku	30.3	centimeters	0.994	foot.
6 shaku	1 ken	1.82	meters	1.99	yards.
10 shaku	1 jo	3.03	meters	3.31	yards.
60 ken	1 cho	109.0	meters	119.0	yards.
36 cho	1 ri	3.93	kilometers	2.44	miles.

d. Chinese system of linear measure (with equivalents in metric and English systems).

	1 hou	0.032	millimeter	0.0012	inch.
10 hou	1 li	0.32	millimeter	0.0125	inch.
10 li	1 feng	3.2	millimeters	0.1259	inch.
10 feng	1 chun	3.2	centimeters	1.259	inches.
10 chun	1 chi	32.0	centimeters	12.59	inches.
10 chi	1 chang	3.2	meters	10.49	feet.
180 chang	1 shi li	576.0	meters	1889.28	feet.

Note. When length of shi li differs from that shown above, all other units change correspondingly.

(As used on Chinese general staff maps).

	1 chang	3.333	meters	10.935	feet.
150 chang	1 shi li	500.0	meters	1640.5	feet.

e. Russian system of linear measure (with equivalents in metric and English systems).

	1 duim	2.54	centimeters	1.0	inch.
12 duims	1 foute	30.48	centimeters	12.0	inches.
7 foutes	1 saszhen	2.1336	meters	7.0	feet.
500 saszhen	1 verst	1.066	kilometers	0.663	miles.
7 versts	1 milya	7.467	kilometers	4.64	miles.

f. Equivalent units of angular measure.

1 mil	1/6400 circle	0.0166	degree	0.0185	grade.
1 grade	1/400 circle	16.0	mils	9/10	degree.
1 degree	1/360 circle	17.8	mils	10/9	grades.

Table X. Grades to degrees, minutes, and seconds.

(In converting the decimal system of grades to the sexagesimal system of degrees, minutes, and seconds (first 8 columns), the seconds column is omitted. Thus 101 grades = 90° 54′ (or 90° 54′ 00″).)

Grades ° ′	Grades ° ′	Grades ° ′	Grades ° ′	Grades ° ′	Grades ° ′	Grades ° ′	Grades ° ′	Grade ′ ″	Grade ′ ″	Grade ″
1 0 54	51 45 54	101 90 54	151 135 54	201 180 54	251 225 54	301 270 54	351 315 54	0.01 0 32.4	0.51 27 32.4	0.001 3.24
2 1 48	52 46 48	102 91 48	152 136 48	202 181 48	252 226 48	302 271 48	352 316 48	0.02 1 04.8	0.52 28 04.8	0.002 6.48
3 2 42	53 47 42	103 92 42	153 137 42	203 182 42	253 227 42	303 272 42	353 317 42	0.03 1 37.2	0.53 28 37.2	0.003 9.72
4 3 36	54 48 36	104 93 36	154 138 36	204 183 36	254 228 36	304 273 36	354 318 36	0.04 2 09.6	0.54 29 09.6	0.004 12.96
5 4 30	55 49 30	105 94 30	155 139 30	205 184 30	255 229 30	305 274 30	355 319 30	0.05 2 42.0	0.55 29 42.0	0.005 16.20
6 5 24	56 50 24	106 95 24	156 140 24	206 185 24	256 230 24	306 275 24	356 320 24	0.06 3 14.4	0.56 30 14.4	0.006 19.44
7 6 18	57 51 18	107 96 18	157 141 18	207 186 18	257 231 18	307 276 18	357 321 18	0.07 3 46.8	0.57 30 46.8	0.007 22.68
8 7 12	58 52 12	108 97 12	158 142 12	208 187 12	258 232 12	308 277 12	358 322 12	0.08 4 19.2	0.58 31 19.2	0.008 25.92
9 8 06	59 53 06	109 98 06	159 143 06	209 188 06	259 233 06	309 278 06	359 323 06	0.09 4 51.6	0.59 31 51.6	0.009 29.16
10 9 00	60 54 00	110 99 00	160 144 00	210 189 00	260 234 00	310 279 00	360 324 00	0.10 5 24.0	0.60 32 24.0	0.010 32.40
11 9 54	61 54 54	111 99 54	161 144 54	211 189 54	261 234 54	311 279 54	361 324 54	0.11 5 56.4	0.61 32 56.4	
12 10 48	62 55 48	112 100 48	162 145 48	212 190 48	262 235 48	312 280 48	362 325 48	0.12 6 28.8	0.62 33 28.8	
13 11 42	63 56 42	113 101 42	163 146 42	213 191 42	263 236 42	313 281 42	363 326 42	0.13 7 01.2	0.63 34 01.2	
14 12 36	64 57 36	114 102 36	164 147 36	214 192 36	264 237 36	314 282 36	364 327 36	0.14 7 33.6	0.64 34 33.6	
15 13 30	65 58 30	115 103 30	165 148 30	215 193 30	265 238 30	315 283 30	365 328 30	0.15 8 06.0	0.65 35 06.0	
16 14 24	66 59 24	116 104 24	166 149 24	216 194 24	266 239 24	316 284 24	366 329 24	0.16 8 38.4	0.66 35 38.4	
17 15 18	67 60 18	117 105 18	167 150 18	217 195 18	267 240 18	317 285 18	367 330 18	0.17 9 10.8	0.67 36 10.8	
18 16 12	68 61 12	118 106 12	168 151 12	218 196 12	268 241 12	318 286 12	368 331 12	0.18 9 43.2	0.68 36 43.2	
19 17 06	69 62 06	119 107 06	169 152 06	219 197 06	269 242 06	319 287 06	369 332 06	0.19 10 15.6	0.69 37 15.6	
20 18 00	70 63 00	120 108 00	170 153 00	220 198 00	270 243 00	320 288 00	370 333 00	0.20 10 48.0	0.70 37 48.0	
21 18 54	71 63 54	121 108 54	171 153 54	221 198 54	271 243 54	321 288 54	371 333 54	0.21 11 20.4	0.71 38 20.4	0.0001 0.324
22 19 48	72 64 48	122 109 48	172 154 48	222 199 48	272 244 48	322 289 48	372 334 48	0.22 11 52.8	0.72 38 52.8	0.0002 0.648
23 20 42	73 65 42	123 110 42	173 155 42	223 200 42	273 245 42	323 290 42	373 335 42	0.23 12 25.2	0.73 39 25.2	0.0003 0.972
24 21 36	74 66 36	124 111 36	174 156 36	224 201 36	274 246 36	324 291 36	374 336 36	0.24 12 57.6	0.74 39 57.6	0.0004 1.296
25 22 30	75 67 30	125 112 30	175 157 30	225 202 30	275 247 30	325 292 30	375 337 30	0.25 13 30.0	0.75 40 30.0	0.0005 1.620
26 23 24	76 68 24	126 113 24	176 158 24	226 203 24	276 248 24	326 293 24	376 338 24	0.26 14 02.4	0.76 41 02.4	0.0006 1.944
27 24 18	77 69 18	127 114 18	177 159 18	227 204 18	277 249 18	327 294 18	377 339 18	0.27 14 34.8	0.77 41 34.8	0.0007 2.268
28 25 12	78 70 12	128 115 12	178 160 12	228 205 12	278 250 12	328 295 12	378 340 12	0.28 15 07.2	0.78 42 07.2	0.0008 2.592
29 26 06	79 71 06	129 116 06	179 161 06	229 206 06	279 251 06	329 296 06	379 341 06	0.29 15 39.6	0.79 42 39.6	0.0009 2.916
30 27 00	80 72 00	130 117 00	180 162 00	230 207 00	280 252 00	330 297 00	380 342 00	0.30 16 12.0	0.80 43 12.0	0.0010 3.240

31	27	54	81	72	54	131	117	54	181	162	54	231	207	54	281	252	54	331	297	54	381	342	54	0.31	16	44.4	0.81	43	44.4
32	28	48	82	73	48	132	118	48	182	163	48	232	208	48	282	253	48	332	298	48	382	343	48	0.32	17	16.8	0.82	44	16.8
33	29	42	83	74	42	133	119	42	183	164	42	233	209	42	283	254	42	333	299	42	383	344	42	0.33	17	49.2	0.83	44	49.2
34	30	36	84	75	36	134	120	36	184	165	36	234	210	36	284	255	36	334	300	36	384	345	36	0.34	18	21.6	0.84	45	21.6
35	31	30	85	76	30	135	121	30	185	166	30	235	211	30	285	256	30	335	301	30	385	346	30	0.35	18	54.0	0.85	45	54.0
36	32	24	86	77	24	136	122	24	186	167	24	236	212	24	286	257	24	336	302	24	386	347	24	0.36	19	26.4	0.86	46	26.4
37	33	18	87	78	18	137	123	18	187	168	18	237	213	18	287	258	18	337	303	18	387	348	18	0.37	19	58.8	0.87	46	58.8
38	34	12	88	79	12	138	124	12	188	169	12	238	214	12	288	259	12	338	304	12	388	349	12	0.38	20	31.2	0.88	47	31.2
39	35	06	89	80	06	139	125	06	189	170	06	239	215	06	289	260	06	339	305	06	389	350	06	0.39	21	03.6	0.89	48	03.6
40	36	00	90	81	00	140	126	00	190	171	00	240	216	00	290	261	00	340	306	00	390	351	00	0.40	21	36.0	0.90	48	36.0
41	36	54	91	81	54	141	126	54	191	171	54	241	216	54	291	261	54	341	306	54	391	351	54	0.41	22	08.4	0.91	49	08.4
42	37	48	92	82	48	142	127	48	192	172	48	242	217	48	292	262	48	342	307	48	392	352	48	0.42	22	40.8	0.92	49	40.8
43	38	42	93	83	42	143	128	42	193	173	42	243	218	42	293	263	42	343	308	42	393	353	42	0.43	23	13.2	0.93	50	13.2
44	39	36	94	84	36	144	129	36	194	174	36	244	219	36	294	264	36	344	309	36	394	354	36	0.44	23	45.6	0.94	50	45.6
45	40	30	95	85	30	145	130	30	195	175	30	245	220	30	295	265	30	345	310	30	395	355	30	0.45	24	18.0	0.95	51	18.0
46	41	24	96	86	24	146	131	24	196	176	24	246	221	24	296	266	24	346	311	24	396	356	24	0.46	24	50.4	0.96	51	50.4
47	42	18	97	87	18	147	132	18	197	177	18	247	222	18	297	267	18	347	312	18	397	357	18	0.47	25	22.8	0.97	52	22.8
48	43	12	98	88	12	148	133	12	198	178	12	248	223	12	298	268	12	348	313	12	398	358	12	0.48	25	55.2	0.98	52	55.2
49	44	06	99	89	06	149	134	06	199	179	06	249	224	06	299	269	06	349	314	06	399	359	06	0.49	26	27.6	0.99	53	27.6
50	45	00	100	90	00	150	135	00	200	180	00	250	225	00	300	270	00	350	315	00	400	360	00	0.50	27	00.0	1.00	54	00.0

Table XI. Degrees, minutes, and seconds to grades.

(In the French notation, the following equivalent expressions are used: $9^{G}.6285$ = 9 grades, 62 centrigrades, and 85 decimilligrades = 9 grades, 62 minutes centesimales, and 85 seconds centesimales = $9^{G}62'\ 85''$.)

Degrees	Grades	Degrees	Grades	Degrees	Grades	Degrees	Grades	Degrees	Grades	Degrees	Grades	Minutes	Grades	Seconds	Grades
1	1.111111	61	67.777778	121	134.444444	181	201.111111	241	267.777778	301	334.444444	1	0.018519	1	0.000309
2	2.222222	62	68.888889	122	135.555556	182	202.222222	242	268.888889	302	335.555556	2	0.037037	2	0.000617
3	3.333333	63	70.000000	123	136.666667	183	203.333333	243	270.000000	303	336.666667	3	0.055556	3	0.000926
4	4.444444	64	71.111111	124	137.777778	184	204.444444	244	271.111111	304	337.777778	4	0.074074	4	0.001235
5	5.555556	65	72.222222	125	138.888889	185	205.555556	245	272.222222	305	338.888889	5	0.092593	5	0.001543
6	6.666667	66	73.333333	126	140.000000	186	206.666667	246	273.333333	306	340.000000	6	0.111111	6	0.001852
7	7.777778	67	74.444444	127	141.111111	187	207.777778	247	274.444444	307	341.111111	7	0.129630	7	0.002160
8	8.888889	68	75.555556	128	142.222222	188	208.888889	248	275.555556	308	342.222222	8	0.148148	8	0.002469
9	10.000000	69	76.666667	129	143.333333	189	210.000000	249	276.666667	309	343.333333	9	0.166667	9	0.002778
10	11.111111	70	77.777778	130	144.444444	190	211.111111	250	277.777778	310	344.444444	10	0.185185	10	0.003086
11	12.222222	71	78.888889	131	145.555556	191	212.222222	251	278.888889	311	345.555556	11	0.203704	11	0.003395
12	13.333333	72	80.000000	132	146.666667	192	213.333333	252	280.000000	312	346.666667	12	0.222222	12	0.003704
13	14.444444	73	81.111111	133	147.777778	193	214.444444	253	281.111111	313	347.777778	13	0.240741	13	0.004012
14	15.555556	74	82.222222	134	148.888889	194	215.555556	254	282.222222	314	348.888889	14	0.259259	14	0.004321
15	16.666667	75	83.333333	135	150.000000	195	216.666667	255	283.333333	315	350.000000	15	0.277778	15	0.004630
16	17.777778	76	84.444444	136	151.111111	196	217.777778	256	284.444444	316	351.111111	16	0.296296	16	0.004938
17	18.888889	77	85.555556	137	152.222222	197	218.888889	257	285.555556	317	352.222222	17	0.314815	17	0.005247
18	20.000000	78	86.666667	138	153.333333	198	220.000000	258	286.666667	318	353.333333	18	0.333333	18	0.005556
19	21.111111	79	87.777778	139	154.444444	199	221.111111	259	287.777778	319	354.444444	19	0.351852	19	0.005864
20	22.222222	80	88.888889	140	155.555556	200	222.222222	260	288.888889	320	355.555556	20	0.370370	20	0.006173
21	23.333333	81	90.000000	141	156.666667	201	223.333333	261	290.000000	321	356.666667	21	0.388889	21	0.006481
22	24.444444	82	91.111111	142	157.777778	202	224.444444	262	291.111111	322	357.777778	22	0.407407	22	0.006790
23	25.555556	83	92.222222	143	158.888889	203	225.555556	263	292.222222	323	358.888889	23	0.425926	23	0.007099
24	26.666667	84	93.333333	144	160.000000	204	226.666667	264	293.333333	324	360.000000	24	0.444444	24	0.007407
25	27.777778	85	94.444444	145	161.111111	205	227.777778	265	294.444444	325	361.111111	25	0.462963	25	0.007716
26	28.888889	86	95.555556	146	162.222222	206	228.888889	266	295.555556	326	362.222222	26	0.481481	26	0.008025
27	30.000000	87	96.666667	147	163.333333	207	230.000000	267	296.666667	327	363.333333	27	0.500000	27	0.008333
28	31.111111	88	97.777778	148	164.444444	208	231.111111	268	297.777778	328	364.444444	28	0.518519	28	0.008642
29	32.222222	89	98.888889	149	165.555556	209	232.222222	269	298.888889	329	365.555556	29	0.537037	29	0.008951
30	33.333333	90	100.000000	150	166.666667	210	233.333333	270	300.000000	330	366.666667	30	0.555556	30	0.009259

31	34.444444	91	101.111111	151	167.777778	211	234.444444	271	301.111111	331	367.777778	31	0.574074	31	0.009568
32	35.555556	92	102.222222	152	168.888889	212	235.555556	272	302.222222	332	368.888889	32	0.592593	32	0.009877
33	36.666667	93	103.333333	153	170.000000	213	236.666667	273	303.333333	333	370.000000	33	0.611111	33	0.010185
34	37.777778	94	104.444444	154	171.111111	214	237.777778	274	304.444444	334	371.111111	34	0.629630	34	0.010494
35	38.888889	95	105.555556	155	172.222222	215	238.888889	275	305.555556	335	372.222222	35	0.648148	35	0.010802
36	40.000000	96	106.666667	156	173.333333	216	240.000000	276	306.666667	336	373.333333	36	0.666667	36	0.011111
37	41.111111	97	107.777778	157	174.444444	217	241.111111	277	307.777778	337	374.444444	37	0.685185	37	0.011420
38	42.222222	98	108.888889	158	175.555556	218	242.222222	278	308.888889	338	375.555556	38	0.703704	38	0.011728
39	43.333333	99	110.000000	159	176.666667	219	243.333333	279	310.000000	339	376.666667	39	0.722222	39	0.012037
40	44.444444	100	111.111111	160	177.777778	220	244.444444	280	311.111111	340	377.777778	40	0.740741	40	0.012346
41	45.555556	101	112.222222	161	178.888889	221	245.555556	281	312.222222	341	378.888889	41	0.759259	41	0.012654
42	46.666667	102	113.333333	162	180.000000	222	246.666667	282	313.333333	342	380.000000	42	0.777778	42	0.012963
43	47.777778	103	114.444444	163	181.111111	223	247.777778	283	314.444444	343	381.111111	43	0.796296	43	0.013272
44	48.888889	104	115.555556	164	182.222222	224	248.888889	284	315.555556	344	382.222222	44	0.814815	44	0.013580
45	50.000000	105	116.666667	165	183.333333	225	250.000000	285	316.666667	345	383.333333	45	0.833333	45	0.013889
46	51.111111	106	117.777778	166	184.444444	226	251.111111	286	317.777778	346	384.444444	46	0.851852	46	0.014198
47	52.222222	107	118.888889	167	185.555556	227	252.222222	287	318.888889	347	385.555556	47	0.870370	47	0.014506
48	53.333333	108	120.000000	168	186.666667	228	253.333333	288	320.000000	348	386.666667	48	0.888889	48	0.014815
49	54.444444	109	121.111111	169	187.777778	229	254.444444	289	321.111111	349	387.777778	49	0.907407	49	0.015123
50	55.555556	110	122.222222	170	188.888889	230	255.555556	290	322.222222	350	388.888889	50	0.925926	50	0.015432
51	56.666667	111	123.333333	171	190.000000	231	256.666667	291	323.333333	351	390.000000	51	0.944444	51	0.015741
52	57.777778	112	124.444444	172	191.111111	232	257.777778	292	324.444444	352	391.111111	52	0.962963	52	0.016049
53	58.888889	113	125.555556	173	192.222222	233	258.888889	293	325.555556	353	392.222222	53	0.981481	53	0.016358
54	60.000000	114	126.666667	174	193.333333	234	260.000000	294	326.666667	354	393.333333	54	1.000000	54	0.016667
55	61.111111	115	127.777778	175	194.444444	235	261.111111	295	327.777778	355	394.444444	55	1.018519	55	0.016975
56	62.222222	116	128.888889	176	195.555556	236	262.222222	296	328.888889	356	395.555556	56	1.037037	56	0.017284
57	63.333333	117	130.000000	177	196.666667	237	263.333333	297	330.000000	357	396.666667	57	1.055556	57	0.017593
58	64.444444	118	131.111111	178	197.777778	238	264.444444	298	331.111111	358	397.777778	58	1.074074	58	0.017901
59	65.555556	119	132.222222	179	198.888889	239	265.555556	299	332.222222	359	398.888889	59	1.092593	59	0.018210
60	66.666667	120	133.333333	180	200.000000	240	266.666667	300	333.333333	360	400.000000	60	1.111111	60	0.018519

Table XII. Conversion factors.

To convert—	Multiply by—	
	Exact	Approximate
Inches into centimeters	2.540	2.5
Feet into meters	0.3048	0.3
Yards into meters	0.9144	0.9
Miles into kilometers	1.609	1.6
Centimeters into inches	0.3937	0.4
Meters into feet	3.281	3.3
Meters into yards	1.094	1.1
Kilometers into miles	0.6214	0.62
Grades into degrees	0.9	0.9
Grades into mils	16.00	16.0
Degrees into grades	1.11	1.1
Degrees into mils	17.77	17.8

Table XIII. Prime meridians used on foreign maps with longitudinal distances from Greenwich.

Amsterdam	4°53′ 05″ E.
Athens	23°42′ 59″ E.
Batavia	106°48′ 28″ E.
Brussels	4°22′ 13″ E.
Copenhagen	12°34′ 40″ E.
Ferro	17°39′ 46″ W.[1]
	17°40′ W.[2]
Istanbul	28°59′ 20″ E.
Lisbon	99°11′ 10″ W.
Madrid	3°41′ 15″ W.
Moscow	37°34′ 15″ E.
Oslo	10°43′ 23″ E.
Padang	100°22′ 01″ E.
Paris	2°20′ 14″ E.
Peking	116°28′ 10″ E.
Pulkovo	30°19′ 38″ E.
Rome	12°27′ 07″ E.
Singkawang	108°59′ 41″ E.
Stockholm	18°18′ 30″ E.
Tokyo	139°44′ 41″ E.

[1] French value.
[2] German value.

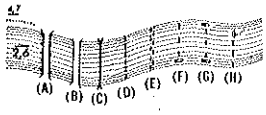
APPENDIX II

LEGENDS

The legends illustrated on succeeding pages are taken from United States and British maps of foreign countries. The maps from which the legends are taken are copied maps which have retained the original foreign symbols. Therefore, these legends are equally applicable to United States and British editions and to the foreign originals from which the United States and British copies were reproduced.

Density of Construction in Urban Areas

Dense | Moderate | Sparse



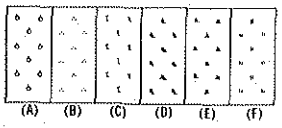
4.7 Height of Bank

2.3 Depth of Water

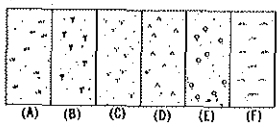
(A) Iron Bridge
(B) Wooden Bridge
(C) Foot Bridge
(D) Foot Ford
(E) Vehicular Ford
(F) Passenger Ferry (Single Boat)
(G) Passenger and Horse Ferry (Two Boats)
(H) Steam Ferry

Lighthouse
Radio Mast
Warning Signal
Boat Anchorage
Ship Anchorage
Anchorage
Commercial Port
Fixed Beacon
Fixed Beacon (Lightless)
Buoy (Lightless)

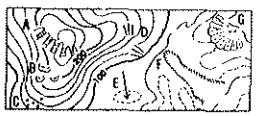
(A) Flower Garden
(B) Grove
(C) Truck Garden



(A) Orchard
(B) Tea
(C) Mulberry
(D) Cultivated Marsh
(E) Irrigated Rice Field
(F) Dry Rice Field



(A) Wild Land
(B) Palm
(C) Bamboo
(D) Conifers
(E) Broad-leaf Trees
(F) Grass Land



(A) Cliff
(B) Rock Outcropping
(C) Scattered Rock
(D) Talus Slope
(E) Depression
(F) Ravine, Gully
(G) Crumbling Bank

Navy Lookout Tower
Factory
Bank
Powder Magazine
Water Wheel or Mill
Generating Plant
Masonry Wall
Fences
Bamboo Fences
Stone Wall
Earthen Wall
Hedge
Cemetery
Ditches
Shrine Gate
Stone Lantern
Monument
Statue
Signpost
Stone Steps
Crane
Oil Well
Mileage Marker
Stumps
Isolated Trees
Chimney
Triangulation Point
Secondary Control Point
Bench Mark
Spot Elevation
Old Battlefield
Spring
Tomb
Castle Site
Volcano
Mineral Spring
Material Dump
Mine

Shrine
Temple
Grave
Pagoda
Church
Japanese Government Building
Foreign Government Building
Military Reservation
Naval Reservation
Division Headquarters
Brigade Headquarters
Fortress and Defense Headquarters
Battalion Headquarters and Garrison
Regimental Headquarters
Naval Station
Secondary Naval Station
Naval Camp
Army Camp
Shipyard
Prefectural Seat
Sub-prefectural, Island-office or Gun Seat
City Office
Town, Village or Ward Office
School
Hospital
Isolation Hospital
Gendarmerie Post
Police Station
Court of Appeals
Prison
Customs House
Tax Office
Forestry Office
Mining Office
Government Monopoly Bureau Office or Factory
Office of Maritime Affairs
Meteorological Station
Post Office (with Telegraph and Telephone service)
Post Office
Telegraph Office
Telephone Office
Boundary Marker

All above Sea Level

National Highway
Main Prefectural Roads
More than 3 Meters Wide
More than 2 Meters Wide
More than 1 Meter Wide
Less than 1 Meter Wide
Impassable for Carts
Tree-lined Roads: (A) Narrow (B) Wide
Power Lines along Road: (A) Ordinary (B) High Tension
Main Railways: (A) Two Tracks (B) Single Track
Special Railways: (C) Station (D) Double (E) Single
Boundaries: International
Prefectural, sub-prefectural
Province (Obsolete)
Gun, shi
Ward, Machi or Mura
Government Lands
Property Lines

GLOSSARY

VARIANTS IN PARENTHESES

-bae (-hae) ..... rock
-bakufu ..... waterfall
-bama (-hama) ..... beach, field
-bana (-hana) ..... point
-bara (-hara) ..... plain, field
-chō (-machi) ..... township
-dai (-tai) ..... plateau, plain
-dake (-take) ..... mountain
-daki (-taki) ..... waterfall
-dani (-tani) ..... valley, stream
-gan (-iwa) ..... rock, cliff
-gata ..... bay, inlet, lake
-gawa (-kawa) ..... river
-goe (-koe) ..... mountain pass
-gun ..... county
-guntō ..... archipelago
-hama (-bama) ..... beach, field
-hana (-bana) ..... point
-hantō ..... peninsula
-hara (-bara) ..... plain, field
-ike ..... pond
-ishi ..... rock, cliff
-iso ..... beach
-iwa (-gan) ..... rock, cliff
-jima (-shima, -tō) ..... island
-kai (-umi) ..... bay, gulf
-kaikyō ..... strait
-kawa (-gawa) ..... river
-ken ..... prefecture
-ko ..... lake
-kō ..... harbor
-koe (-goe) ..... mountain pass
-kojima ..... small isle
-machi (-chō) ..... township
-mine ..... mountain peak
-misaki (-saki, -zaki) ..... cape
-mori ..... forest
-mura ..... township
-nada ..... sea
-no ..... plain, field
-onsen ..... hot spring, spa
-rettō ..... island chain
-saki (-zaki, -misaki) ..... cape
-san (-zan, -yama) ..... mt. chain
-se ..... reef, shoal, rapid
-seto ..... strait
-shi ..... municipality, city
-shima (-jima, -tō) ..... island
-shō ..... reef, shoal
-shotō ..... island group
-suidō ..... channel
-tai (-dai) ..... plateau, plain
-take (-dake) ..... mountain
-taki (-daki) ..... waterfall
-tani (-dani) ..... valley, stream
-tō (-shima, -jima) ..... island
-tōge ..... mountain pass or ridge
-uchi ..... inlet
-umi (-kai) ..... bay, gulf
-ura ..... inlet, beach
-wan ..... bay
-yama (-san, -zan) ..... mt. chain
-yu ..... mineral spring, spa
-zaki (-saki, -misaki) ..... cape
-zan (-san, -yama) ..... mt. chain

Figure 78. Typical legend from United States map of Japanese island (AMS L764, Hokkaido, 1:50,000, sheet 17).

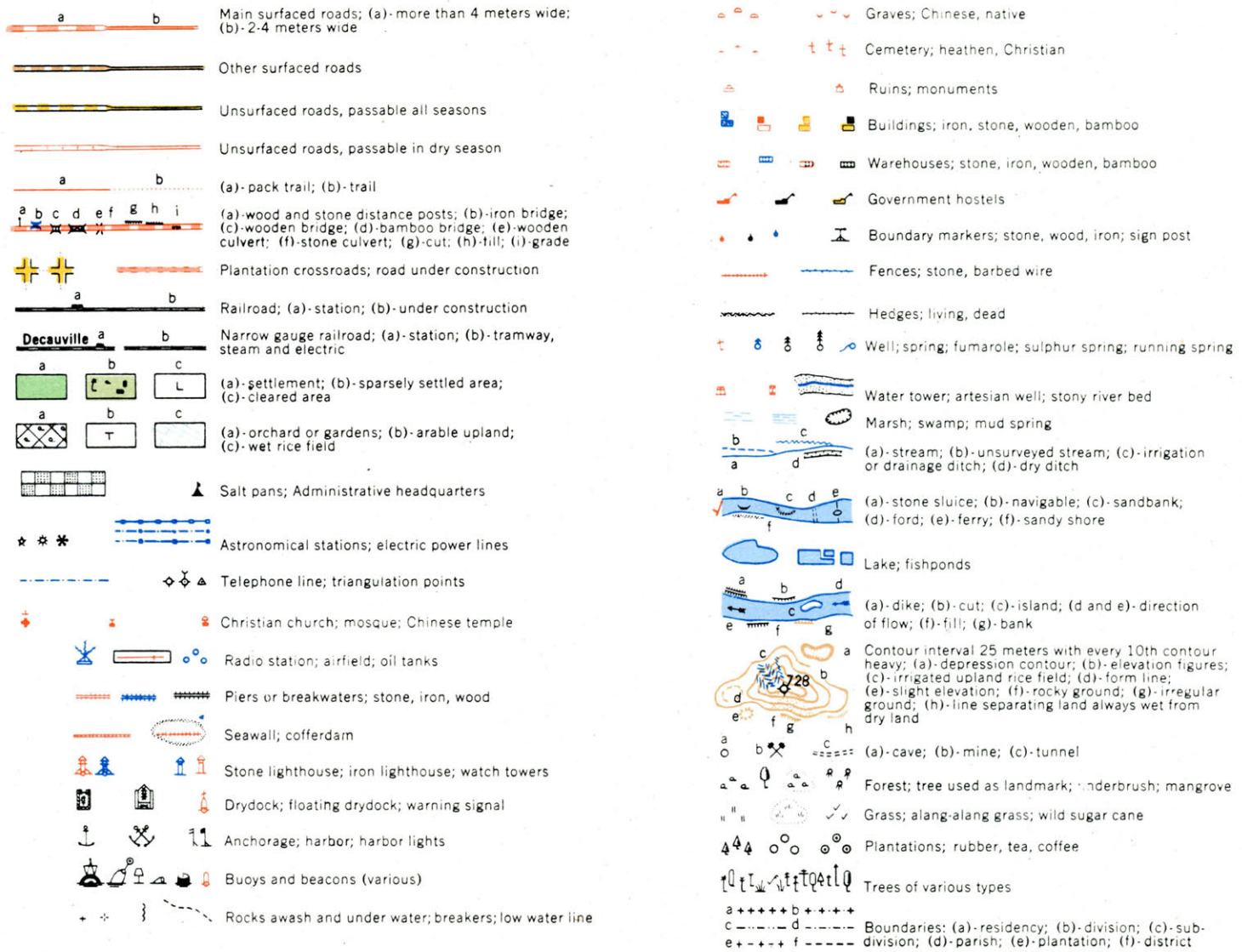


Figure 79. Typical legend from British maps of the Netherlands Indies (provisional G.S.G.S. 4202, Java and Madura 1:50,000, sheets 51/XLIII–C and 51/XLIV–A).

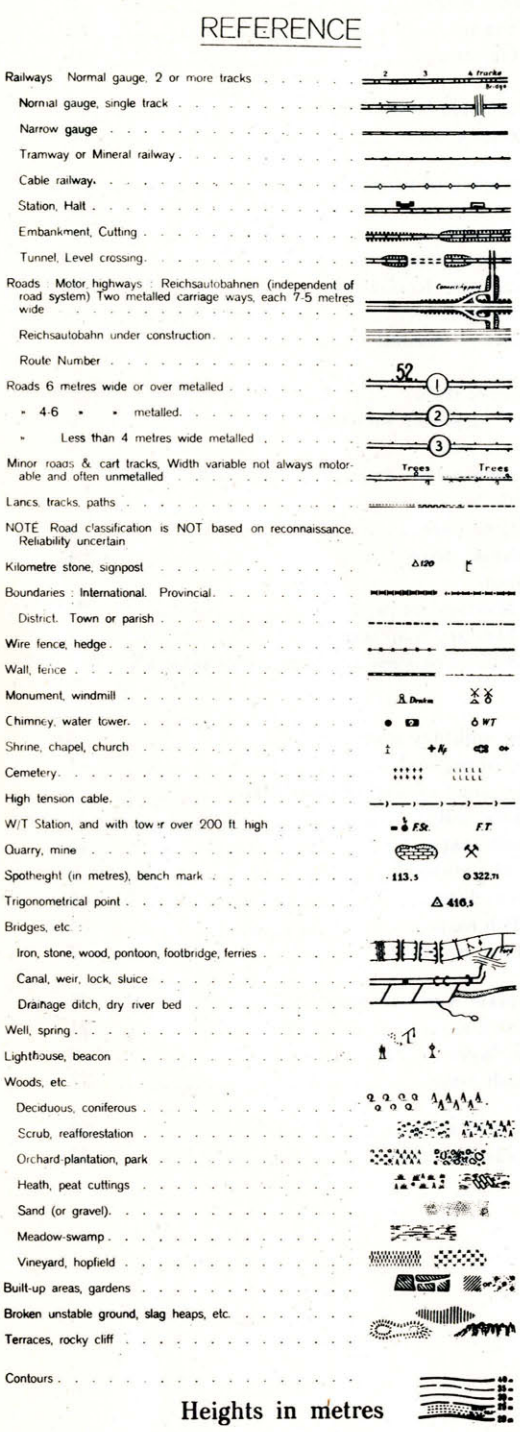


Figure 80. Legend symbols from a British map of Germany (G.S.G.S. 4414, Germany, 1:25,000, sheet 3715).

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