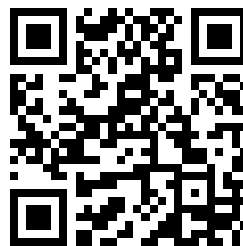

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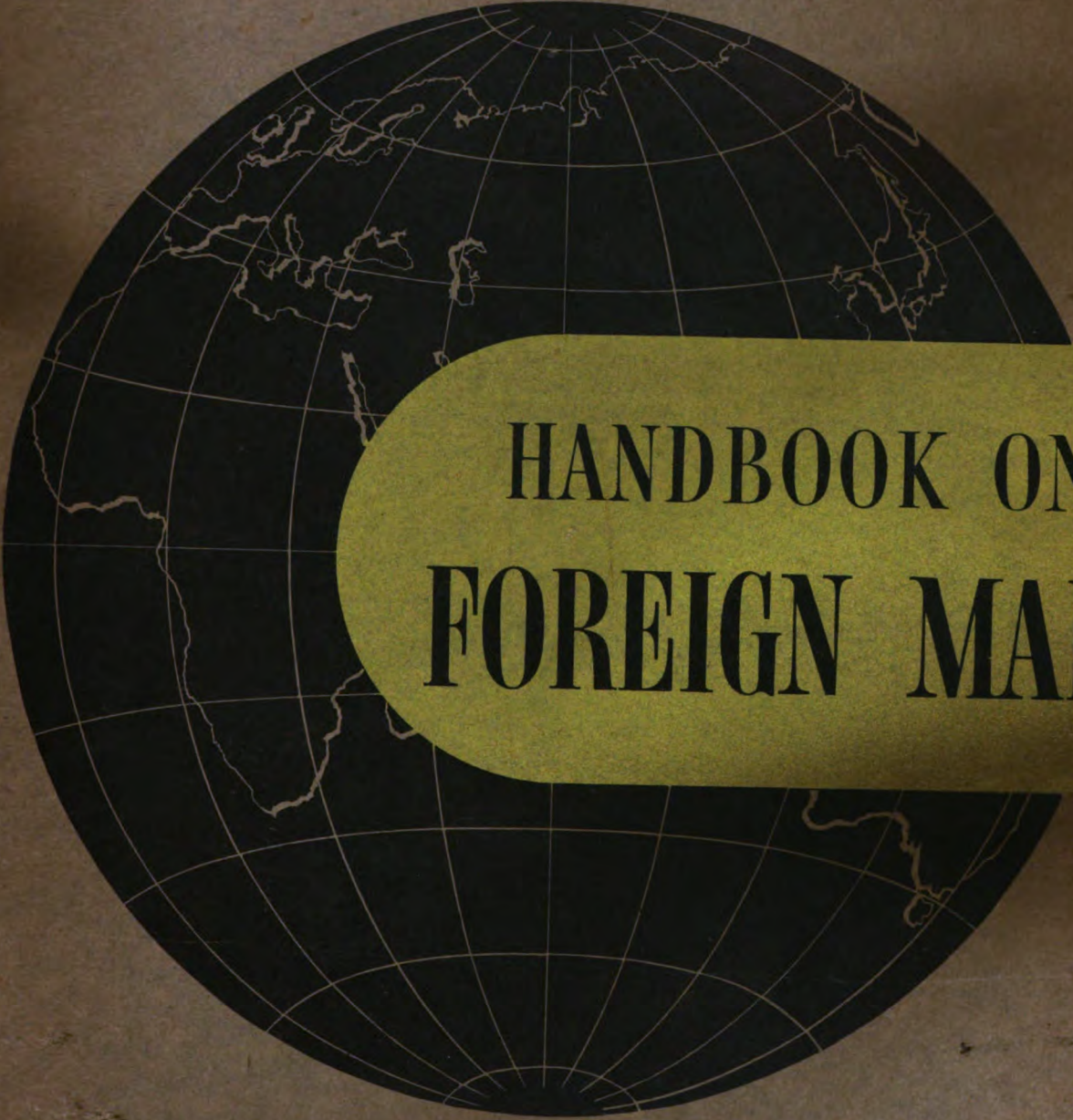


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HANDBOOK ON FOREIGN MAPS

WAR DEPARTMENT
Military Intelligence Division
WASHINGTON, D. C.

HANDBOOK ON FOREIGN MAPS



Robert C. Priestaf

WAR DEPARTMENT

The Military Intelligence Training Center

CAMP RITCHIE · MARYLAND

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PREFACE

Handbook on Foreign Maps has been compiled for instructional purposes by the Military Intelligence Training Center, Camp Ritchie, Maryland. It is issued to students during the course of instruction and is not intended for general dissemination. Its purpose is to point out characteristics and peculiarities of maps of certain foreign countries. Technical discussions have not been presented in this handbook.

Complete information on foreign conventional signs and symbols is available in field manuals, technical manuals, maps, and other publications. Refer to the Bibliography at the end of the book for sources containing such information.

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INTRODUCTION TO FOREIGN MAPS

Since the United States cannot make its own map surveys of foreign countries for military purposes, it is necessary for the United States armed forces to make use of maps published by the mapping agencies of the countries concerned. In order to plan and conduct successfully all types of operations, United States military personnel must develop a good working knowledge of the military maps published by foreign countries.

Military Maps

One may classify military maps according to their method of production, viz., original surveys, compilations, and copies. An *original survey* is a map drawn directly from data obtained by actual ground surveys. A *compilation* is a map made from existing maps, aerial photographs, new surveys, reconnaissance, and intelligence reports. A *copy* is a map reproduced in its original form, usually supplemented by a military grid and additional marginal information.

Projections

Map projections (see Glossary) 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 be concerned with the intricacies of this complex subject, since a knowledge of it is not necessary when using ordinary point designation methods or for obtaining practical terrain intelligence from United States or foreign maps.

Map Analysis

The interpretation of foreign maps is materially aided if a methodical outline of analysis is followed. A systematic approach will outline pertinent information in an orderly manner, thus obviating the loss of such information in a mass of interesting but disorganized detail. A suggested outline of analysis consists of six steps: evaluation and orientation, scale, coordinate systems, declination, relief, and conventional signs.

Introduction to Foreign Maps

The *evaluation and orientation* of a map will 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 manner in which it was made, and the source of its information are indications of 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.

The date of survey indicates the time the essential data was obtained by actual ground survey.

The date of revision is the most definite evidence of a map's "up-to-dateness," providing that the extent of the 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.

The date of compilation indicates the time at which data from appropriate available sources went into the making of a new map, but provides no indication as to the "up-to-dateness" of the information found on that map. However, the date of the sources from which the map is compiled may be helpful.

The date of copy refers to the time a map was reproduced in its original form and amplified by additional data. It does not necessarily indicate that a map is up-to-date.

The date of publication is the date most commonly found on maps. It indicates only the time at which a map, and therefore, the information on it, was made available for general use.

The 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 have been made on the map.

The type of agency responsible for the preparation of a map is an indication of its accuracy. Maps published by governmental or military agencies are generally the most accurate. However,

the standards of these agencies vary. On the other hand, some civilian agencies produce accurate maps, but frequently are concerned only with maps of a general nature; i.e., some maps produced for civilian use may not contain the specific detail necessary for military purposes.

The composition of a map is a key to its reliability. The proper placing of place names and symbols, the detail in which a coastline is represented, the careful use of color, and other items of draftsmanship will indicate the care with which a map has been prepared.

Marginal information usually provides a means of orienting a map geographically, besides indicating its "up-to-dateness" and accuracy. The 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 to aid further in geographical orientation.

The scales of most foreign maps are different from the scales to which we are accustomed. Most foreign countries use the metric system of measurement. This being the case, 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 $\frac{1}{2}$ kilometer on a 1:50,000 map or $\frac{1}{4}$ kilometer on a map of 1:25,000 scale.

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

Troops operating in foreign countries should have complete command of the metric system and be able to convert without difficulty from the metric system into 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.

Introduction to Foreign Maps

A consideration of the *coordinate system(s)* used on a map constitutes the third step of the map analysis. Geographic coordinates are basically the same on all maps. Longitude is measured east and west from a prime meridian (see Glossary), and latitude is measured north and south from the equator.

The degree system (sexagesimal system) is in almost universal use. 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. On French maps, the prime meridian passes through Paris; on Norwegian maps, through Oslo, etc.

Two countries employing the grade system (centesimal system) of geographic coordinates are 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.

Each nation has its own military grid system. Foreign countries employ the metric system of measurement in their grid systems almost exclusively.

Declinations on foreign maps are usually indicated in a manner similar to that used on United States maps. The usual abbreviations and symbols for the three norths and for declinations are not always present and are sometimes different from those found on United States maps.

True north, if not indicated in the margin, can be determined from meridians of longitude; while grid north can be determined from the military grid. Magnetic declination may be printed on a map, and magnetic north may be indicated by a diagram in the margin. The incidence of arrows in the diagram must not be construed as being exact, since the sketch may be diagrammatic.

Declination protractors are used on a few foreign maps. The declination protractor is a device printed on the face of a map enabling one to draw a magnetic north line across that map.

Each ground map on 1:250,000 and larger scales now published by the Army Map Service, United States War Department, has a

declination protractor for use in plotting the magnetic north line across such maps. This protractor consists of a pivot point (P) at the bottom and a horizontal degree scale at the top of the map. Thus a line drawn between the "P" point at the bottom of the map and the value of the G-M angle (see Glossary) plotted on the degree scale at the top of the map represents the direction of magnetic north in the area covered by the map. The magnetic north line so computed may be used for orienting the map by means of a compass and for determining magnetic azimuths between points on the map. (On German maps the declination protractor is slightly different, and will be explained later.)

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.

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

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. Several countries have endeavored to develop a method of hachuring that will provide a more definite means of determining slope, though these efforts have not proved entirely successful.

Spot elevations are used to supplement other methods of representing relief and are rarely used alone.

Hill shading (see Glossary) 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 very hilly or mountainous territory.

Layer tints or altitude tints (see Glossary) indicate elevations above sea level by use of color intensities. This method is sometimes used in conjunction with contouring to accentuate differences in elevation.

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, it should be observed that 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 II

BRITISH MILITARY MAPS

The *Geographical Section, General Staff (G.S.G.S.)* of the British War Office (W.O.) is the agency of the British government which establishes the policies of British map reproduction. The mechanical processes of map-making are performed by the *Ordnance Survey (O.S.)*.

British Maps of Foreign Countries

Since 1940 the policy of the Geographical Section of the General Staff in regard to maps of foreign countries has been to utilize existing maps of those countries in the making of British maps. In carrying out this policy, it has been necessary to make numerous additions to the original maps. First editions published by G.S.G.S. are frequently identical with the original, if material for revision is not at hand. Subsequent editions are revised to include information as it becomes available.

The reading of foreign maps is facilitated by the addition of the following features: (1) legend translation; (2) British grid and accompanying data; (3) glossary of foreign terms and abbreviations; (4) graphic scales in miles and yards; (5) index to adjoining sheets; (6) declination diagrams; (7) reliability diagram.

REFERENCE

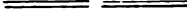
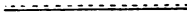
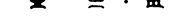
Railway, normal gauge (double track).....	
Railway, normal gauge (single track).....	
Railway, normal gauge (under construction).....	
Railway, narrow gauge 0.76 metres.....	
Cutting, tunnel, embankment.....	
Railway stations, halts.....	
Tramway line.....	
Cable railway.....	
Principal roads.....	
Minor roads.....	
Cart roads, Cart tracks.....	
Bridle Path, Footpath.....	
Bridge; iron, stone, wood.....	
International boundary.....	
Post office, Telegraph office.....	
Wireless station; transmission, receiving....	
Church or monastery with one or more towers	
Mosque with one or more minarets.....	
Synagogue, Chapel, Calvary, Monument.....	

FIG. 1.--Legend translation from Yugoslavia Series
1: 100,000, G.S.G.S. 4396

British Military Maps

The *legend translation* gives the most common conventional signs used on the map. The 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.

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. Grid data, in the distinctive color of the grid, is printed in the margin of the map.

GRID DATA	
Southern Italy Grid	
Colour.....	Blue
Projection.....	Lambert Conical Orthomorphic
Spheroid.....	Bessel
Origin.....	39° 30' N. 14° E. of Greenwich
• False Co-ordinates of origin.....	700,000 metres E. 600,000 metres N.

FIG. 2.--Grid data from Italy Series
1: 100,000, G.S.G.S. 4164

The Grid on this map is Nord de Guerre Zone. Origin: the intersection of the parallel 55 Grades North
with the longitude 8 Grades East of Paris Observatory. Longitude of Paris is 2° 20' 14" East of Greenwich.

HEIGHTS IN METRES

FIG. 3.--Grid data from France and Belgium Series, 1: 50,000, G.S.G.S. 4040

A grid reference box explains briefly how to read the British grid.

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
	<u>298</u>
NORTHINGS	
Take figure of South edge of small square in which point lies.....	00
Estimate tenths northwards.....	7
	<u>007</u>
REFERENCE	L 29800.
Unit metre Square..... 1000 Reference to nearest..... 100	
Nearest similar reference on this grid 500 Km distant	

FIG. 4.--Grid reference box from Yugoslavia Series
1: 100,000, G.S.G.S. 4396, Sheet 79

The incidence of grid letters in the area covered by the map may be superimposed on an index to adjoining sheets.

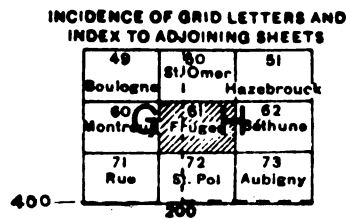


FIG. 5.--Incidence of grid letters and index to adjoining sheets from France and Belgium Series, 1:50,000, G.S.G.S. 4040, Sheet 61

The *glossary of foreign terms and abbreviations* consists of English translations of foreign words and abbreviations used on the map.

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

FIG. 6.--Glossary of foreign terms and abbreviations from Java and Madura Series, 1:50,000, G.S.G.S. 4202, Sheet 51/XLIII-C and 51/XLIV-A

British Military Maps

Graphic scales in miles and yards are added to supplement the metric scales on foreign maps, since Britons and Americans are, generally speaking, unfamiliar with the metric system of measurement.

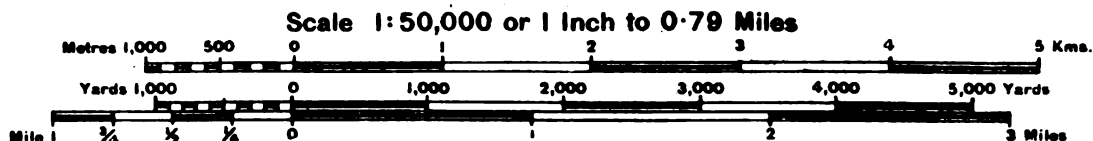


FIG. 7.--Graphic scales in miles and yards from France and Belgium Series 1:50,000, G.S.G.S. 4040

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.

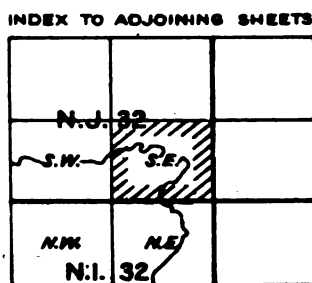


FIG. 8.--Index to adjoining sheets from French North Africa Series, 1:500,000, G.S.G.S. 4175

A *declination diagram* indicates grid declinations for the east and west edges of a sheet and magnetic declination for the center. This information is lacking on some foreign maps. The term *convergence* (see Glossary) is frequently used in referring to grid declinations.

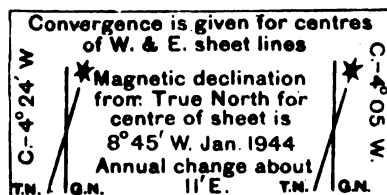


FIG. 9.--Declination diagram from France and Belgium Series, 1:50,000, G.S.G.S. 4040, Sheet 61

A *reliability diagram* indicates the area of revision and the sources from which the map was revised.

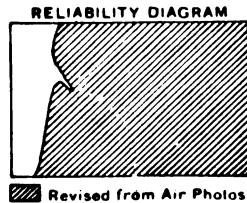


FIG. 10.--Reliability diagram
from France and Belgium Series,
1:50,000, G.S.G.S. 4040, Sheet 60

The addition of the above information to British editions of foreign maps has provided an extensive map coverage of foreign countries which can readily be put to use by English-speaking troops. Other information may be found on G.S.G.S. editions, although those features discussed here are the most important in the interpretation of a foreign map.

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 prior to that time. Both systems of reference are basically the same. They differ only in small details.

The *Modified British Grid System* has been used on maps published by the British since 1927. This system is found on some map series issued by the United States Army Map Service. The following directive 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.¹

¹Allied Force Headquarters, North Africa, Operations Memorandum No. 26, 8 August 1943, "Designation of Map Coordinates," Par 2.

British Military Maps

Note.—British military grids are also used on maps covering a large part of the Pacific and Asiatic theaters of operations.

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 designated according to their geographic locations, e.g., South Italy Grid Zone, Northern European Zones I, II, and III, etc. (See Plate I.)

British military grids 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:

(1) The size and shape of United States grid zones are defined, i.e., each is 9 degrees of longitude in width and extends roughly from the northern to the southern boundary of the United States. British grid zones do not have definite sizes and shapes, as shown in Plate I.

(2) There is an overlap of 1 degree on each side of a United States grid zone. British grid zones do not overlap.

(3) The point of origin of a United States grid zone lies at the intersection of the central meridian of the zone and $40^{\circ}30'$ north latitude. The origin of a British grid zone, the true origin (see Glossary), is at the intersection of a specific meridian of longitude and a specific parallel of latitude located in the approximate center of the zone.

(4) 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, and the grid data 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 purposes of clarity or convenience.

The zone on which a grid is to be placed is subdivided by vertical and horizontal lines at 500-kilometer intervals, beginning at the southwest corner of the zone. The squares so formed are

(text continued on Page 19)

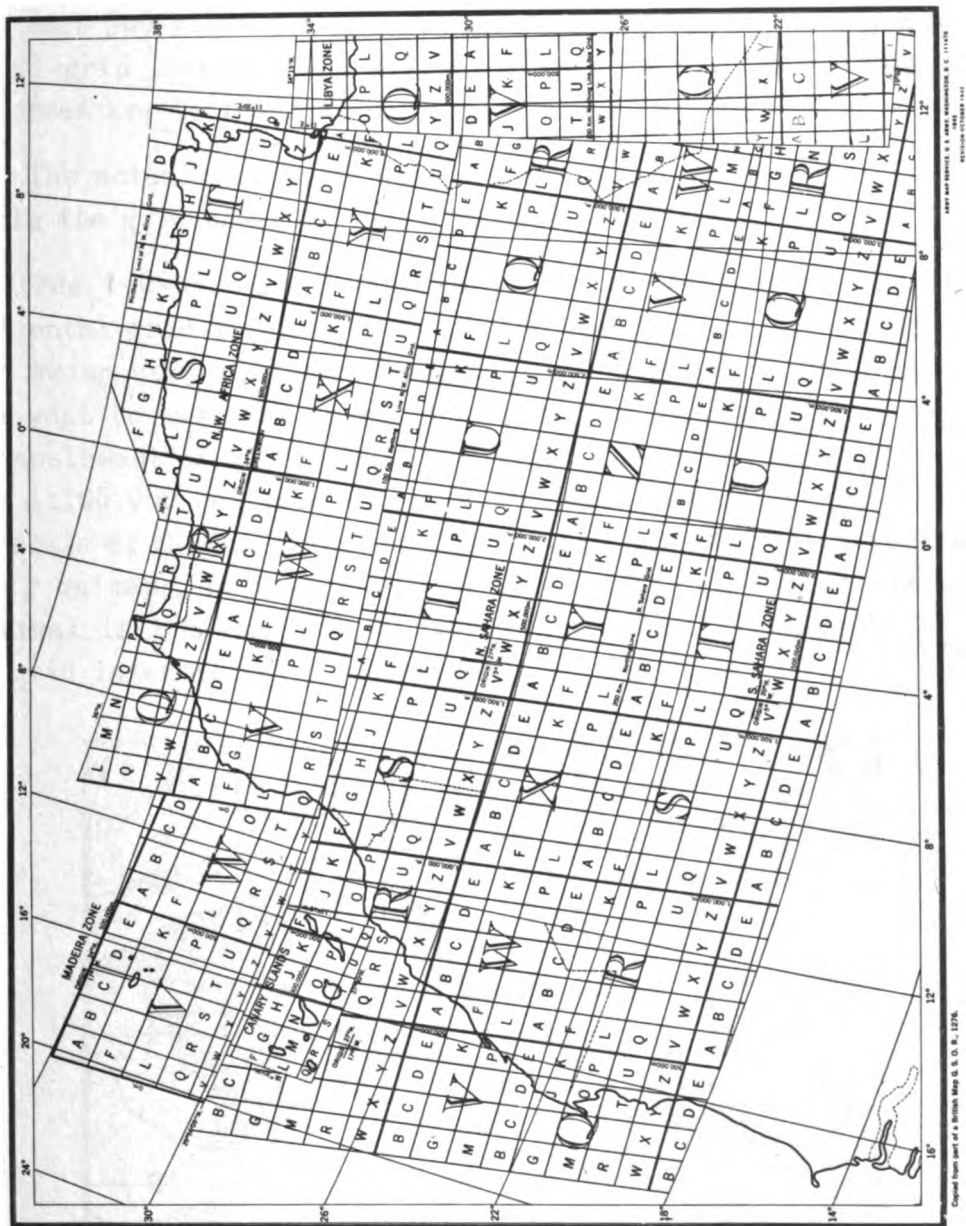


PLATE III.—Diagram of British Grid Zones of NW Africa, approximate scale 1:7,874,000

lettered alphabetically from left to right and from top to bottom in accordance with the lettering system in Plate II. If the number of 500-kilometer squares within a given zone is greater than twenty-five, the lettering system is repeated.

Each 500-kilometer square is subdivided by vertical and horizontal grid lines at 100-kilometer intervals. The grid squares so formed are lettered as shown in Plate II.

The actual juxtaposition of grid zones and lettered squares within the grid zones is illustrated in Plate III.

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, the scale of the map obviating the use of the 1-kilometer interval. Thus, on maps having scales of 1:100,000 and larger the grid interval is 1 kilometer; on maps of scale smaller than 1:100,000 the grid interval is 10 kilometers.

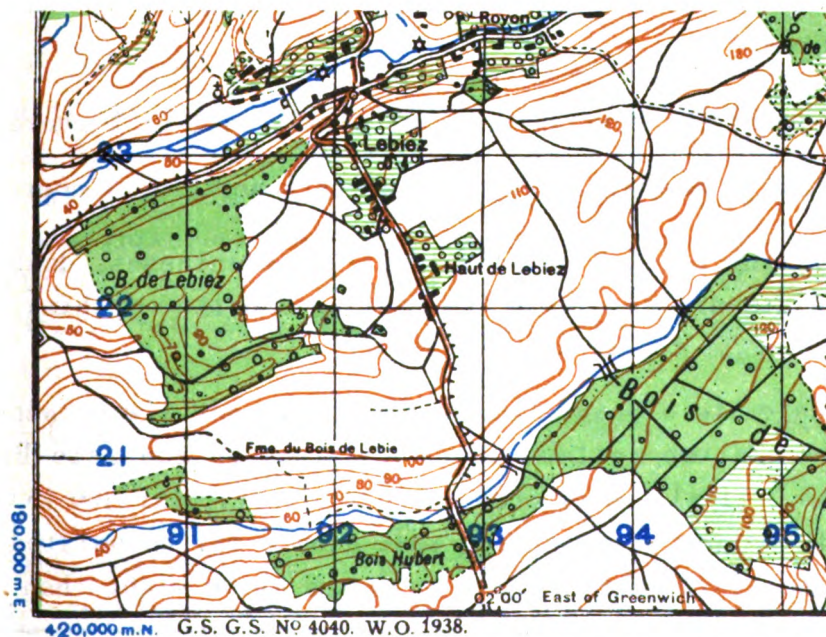


FIG. 11.--Section of map with Modified British Grid from France and Belgium Series, 1:50,000, G.S.G.S. 4040, Sheet 61

British Military Maps

The numerical value of a grid line is dependent upon its distance from a false origin (see Glossary) 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. 11.) 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.

Note.--It should be observed that only the abbreviated numbers printed on the grid lines are used in reading grid coordinates.

Complete British grid coordinates consist of four parts: (1) letter of the 500-kilometer square; (2) letter of the 100-kilometer square; (3) easting; (4) northing.

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

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.

Easting is the British term for a west-east or X-coordinate.

Northing is the British term for a south-north or Y-coordinate.

In writing British coordinates,² no parentheses, dashes, or decimal points are used with the easting and the northing. Such coordinates might appear as: (s)B5784.

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

²The rule of thumb used in United States map reading, "read right--up," applies when using the British grids.

as: B5784. When references apply to an area within the limits of a 100-kilometer square, the letter for that square may also be omitted. Thus, B5784 becomes 5784.

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

Three variations of the Modified British Grid System as described above follow:

(1) The kilometer is not always the basis for the subdivision of grid zones. Some zones are subdivided with the 1000-yard interval as the basis, instead of the 1-kilometer (1000-meter) interval. Other than this change of basic unit of measurement, the system of subdivision, lettering, numbering, and designation of points remains exactly as described. The 1000-yard interval is used on British-gridded maps covered by the following: South Africa Belts, India Zones, Ceylon Belt, Maldives-Chagos Belt, Malay Grid, Johore Grid, New Zealand Belts, Australian Belts, Mauritius Zone, English Grid, and Malta Belt. (See Plate I.)

(2) Some grid zones are not sufficiently large to warrant their subdivision into 500-kilometer lettered squares, and so they are first divided into 100-kilometer lettered squares. In such cases, the complete coordinates of points within these zones include the letter of the 100-kilometer square, the easting, and the northing. Zones in this category are: Canary Island Zone, Cyprus Grid, Crete Zone, French Lambert Zone I, and Johore Grid. (See Plate I.)

(3) Other zones have neither 500-kilometer nor 100-kilometer squares. This obviates the use of letters in coordinates taken from grids of such zones, viz., 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 Plate I.)

British Military Maps

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 twenty-five grid squares so formed are lettered alphabetically from left to right and from top to bottom, the letter "I" being omitted.

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

FIG. 12.--Diagram of 50-kilometer square of the British Grid System

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 the 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.

Chapter III

FRENCH MILITARY MAPS

French military maps are published by the *Service Géographique de l'Armée*, the military mapping agency of France. The function of this agency is to provide the French General Staff with the necessary 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.

Military Map Series of France

The principal series of French military maps are described briefly below.

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

The *Carte d'Etat-Major* ("General Staff Map"), a 1:80,000 series, is the series of French maps on which many maps of other scales are based. 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.

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.

The *Plans Directeurs* are on two scales, 1:20,000 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.

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

French Military Maps

The following *United States and British maps of France* have been compiled jointly by the United States Army Map Service and the Geographical Section, General Staff, British War Office: (1) 1:250,000 colored and contoured series; (2) 1:100,000 colored, layer tinted, and contoured series; (3) 1:50,000 colored and contoured series; (4) 1:25,000 colored and contoured series.

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.

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 $2^{\circ}20'14''$ ($2^{\circ}20'13.95''$) east of Greenwich, and by using this longitudinal value, it is possible to convert longitude from the Greenwich meridian to the Paris meridian, and vice versa.

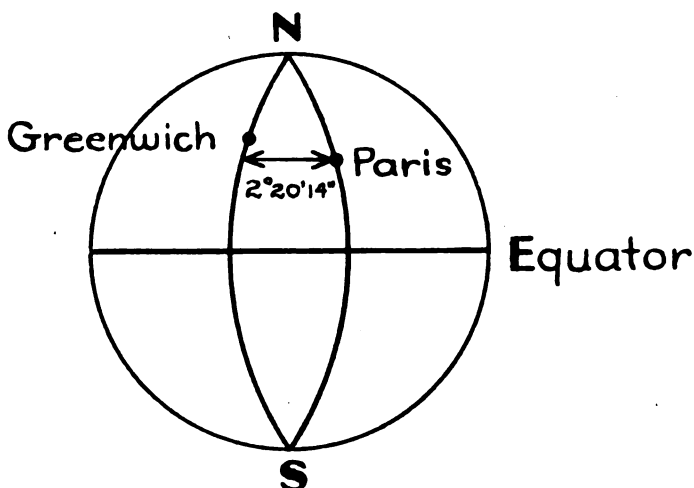


FIG. 13.--Paris and Greenwich Meridians

The geographic coordinates, latitude $40^{\circ}45'30''$ N and longitude $4^{\circ}30'45''$ E (measured from Greenwich), would be latitude $40^{\circ}45'30''$ N and longitude $2^{\circ}10'31''$ E if measured from the Paris meridian.

Similarly, a point on a French map having the geographic coordinates, latitude $35^{\circ}15'55''$ N and longitude $3^{\circ}30'30''$ W, would be designated as latitude $35^{\circ}15'55''$ N, longitude $1^{\circ}10'16''$ W if located on a British map of the same area.

The *grade system* of measurement is based on an angular unit of measure equal to 1/100 of a quadrant. Thus, a 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 will have the centigrade symbol (^) at the end; those read to the nearest decimilligrade will have the symbol for decimilligrade (^) at the end. Since the system is based on the division of units into 100 parts, coordinates are written in decimal form, e.g., $4^{\text{G}}7550\text{^}$ or $4^{\text{G}}75\text{^}$, $9^{\text{G}}3725\text{^}$ or $9^{\text{G}}37\text{^}$, etc.

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, for example, as follows: latitude $46^{\text{G}}7925\text{^}$ N, longitude $3^{\text{G}}5560\text{^}$ E. Coordinates read to the nearest centigrade are written in this form: latitude $37^{\text{G}}76\text{^}$ N, longitude $2^{\text{G}}25\text{^}$ W.

Some French maps will have both the degree scale and the grade scale around the edge of a sheet. (See Plate IV.) These scales can be identified by: (1) the numbers on them; (2) the comparative size of the subdivisions of the scales; (3) the symbols 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, will therefore have 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.

In Plate IV the geographic coordinates of the crossroads at Point A are latitude $49^{\circ}10'56''$ N, longitude $2^{\circ}17'15''$ E or latitude $54^{\text{G}}6475\text{^}$ N, longitude $2^{\text{G}}5420\text{^}$ E.

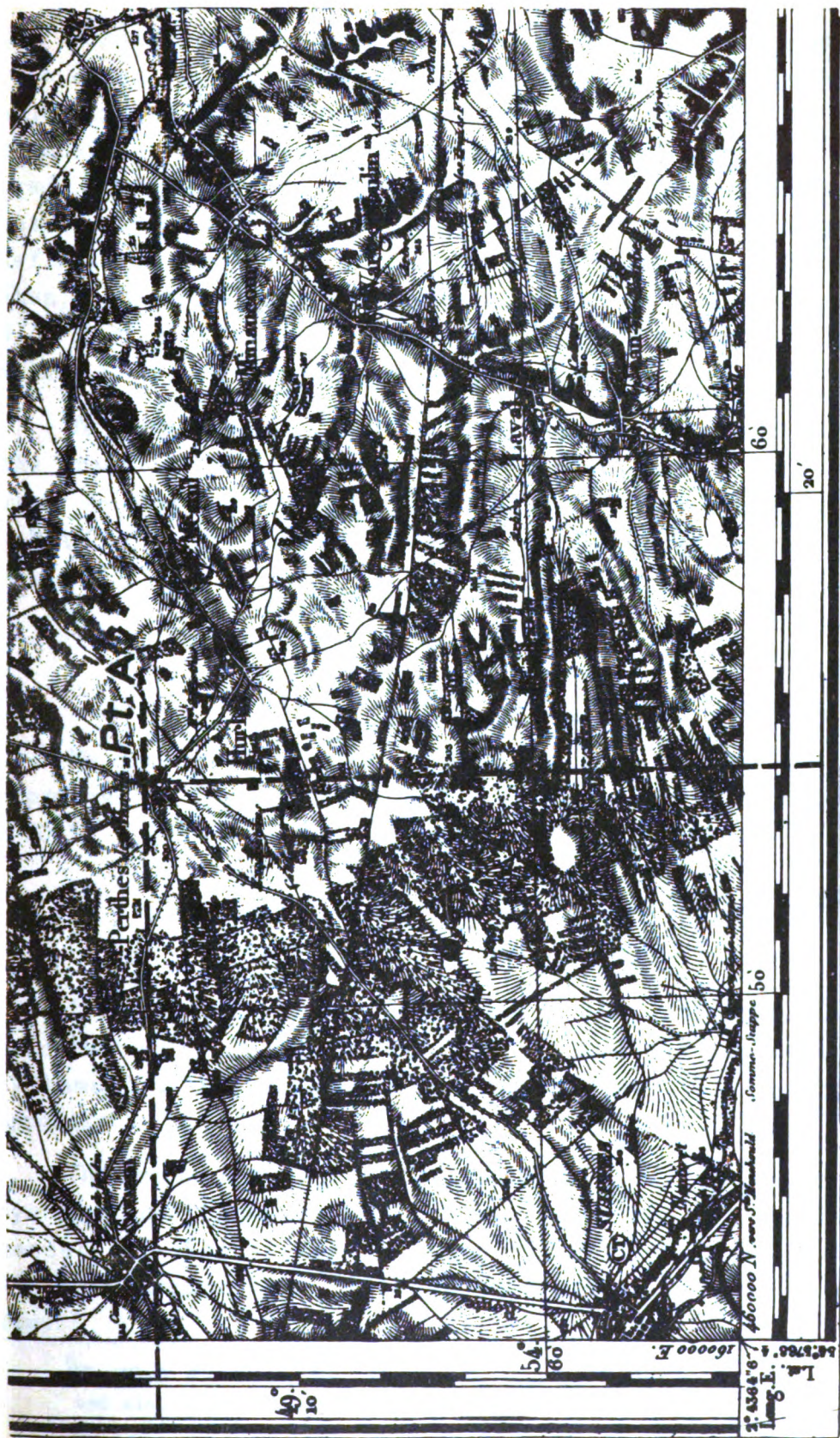


PLATE IV.--Section of map from *Carte d'Etat-Major* Series, 1:80,000, Sheet 35

Conversion from the degree system to the grade system, and vice versa, is applied when changing geographic coordinates or azimuths and declinations from one system to the other. (The standard unit of angular measurement of the French Army is the grade, though mils and degrees may be used.) Grades and degrees can be expressed in equivalent values, one to the other. By definition, a quadrant is composed of 90 degrees or 100 grades. Thus, 1 degree equals 10/9 grades. Conversely, 1 grade equals 9/10 degree. For the relationship between the corresponding values of the two systems, see p. 147, Appendix.

To convert grades into degrees, multiply the grade value by the fraction 9/10; then change the decimal part of the degree value so obtained into minutes and seconds. For example, $2^G5969'' = 2^{\circ}20'14''$. The conversion may be performed in the following steps:

$$\begin{aligned} 2^G5969'' \times 9/10 &= 2.3372^{\circ} \\ 0.3372^{\circ} \times 60 &= 20.2326' \\ 0.2326' \times 60 &= 13.95'' \text{ or } 14'' \\ 2^{\circ} + 20' + 14'' &= 2^{\circ}20'14'' \end{aligned}$$

To convert degrees into grades, multiply the degree value, expressed in decimal form, by the fraction 10/9. For example, $2^{\circ}20'14'' = 2^G5969''$. This conversion is done as follows:

$$\begin{aligned} 14'' \div 60 &= 0.2333' \\ (20' + 0.2333') \div 60 &= 0.3372^{\circ} \\ (2^{\circ} + 0.3372^{\circ}) \times 10/9 &= 2^G5969'' \end{aligned}$$

Other methods of conversion may be used. However, the one described above is recommended, since it does not require a broad mathematical background or special tables. (See pp. 148-149, Appendix.)

The French military grid system is known as the Lambert Grid System (*Quadrillage Lambert*). France is covered by four Lambert zones: (1) North Lambert Zone; (2) Central Lambert Zone; (3) South Lambert Zone; (4) westernmost portion of Nord de Guerre Zone.¹

¹The Nord de Guerre Zone also covers the Netherlands, Belgium, and almost all of Germany.

French Military Maps

These zones were adopted by the British for use on their maps of France, the first three being renamed Lambert Zones I, II, and III, respectively. Also, the British extended the Nord de Guerre Zone 100 kilometers to the west.

The grids on these zones are based on a grid interval of 1 kilometer. The 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 in either of the following forms: 141,8/328,8 or 14183288.

Other systems of point designation, similar to those of the United States and German armies, are employed by the French.

Characteristics of French Military Maps

The representative fraction, 1:80,000, is peculiar to the *Carte d'Etat-Major* Series. With the exception of this 1:80,000 scale, the scales on French maps are the same as other European map scales based on the metric system of measurement.

Declination diagrams are not usually found in the margins of the 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 the declination diagrams. *Nord magnétique* is the French expression for magnetic north. On the map it is abbreviated "NM". Grid north is called *nord Lambert* ("Lambert north") and is abbreviated "NL".

Glossary of French Map Expressions²

Authorities

Institut Cartographique Mili- taire	 Military Cartographic Insti- tute
Institut Géographique de Paris	 Geographic Institute of Paris
Ministère 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 Géographi- ques, Maritimes et Coloniales	 Society of Geographic; Mari- time, and Colonial Editions

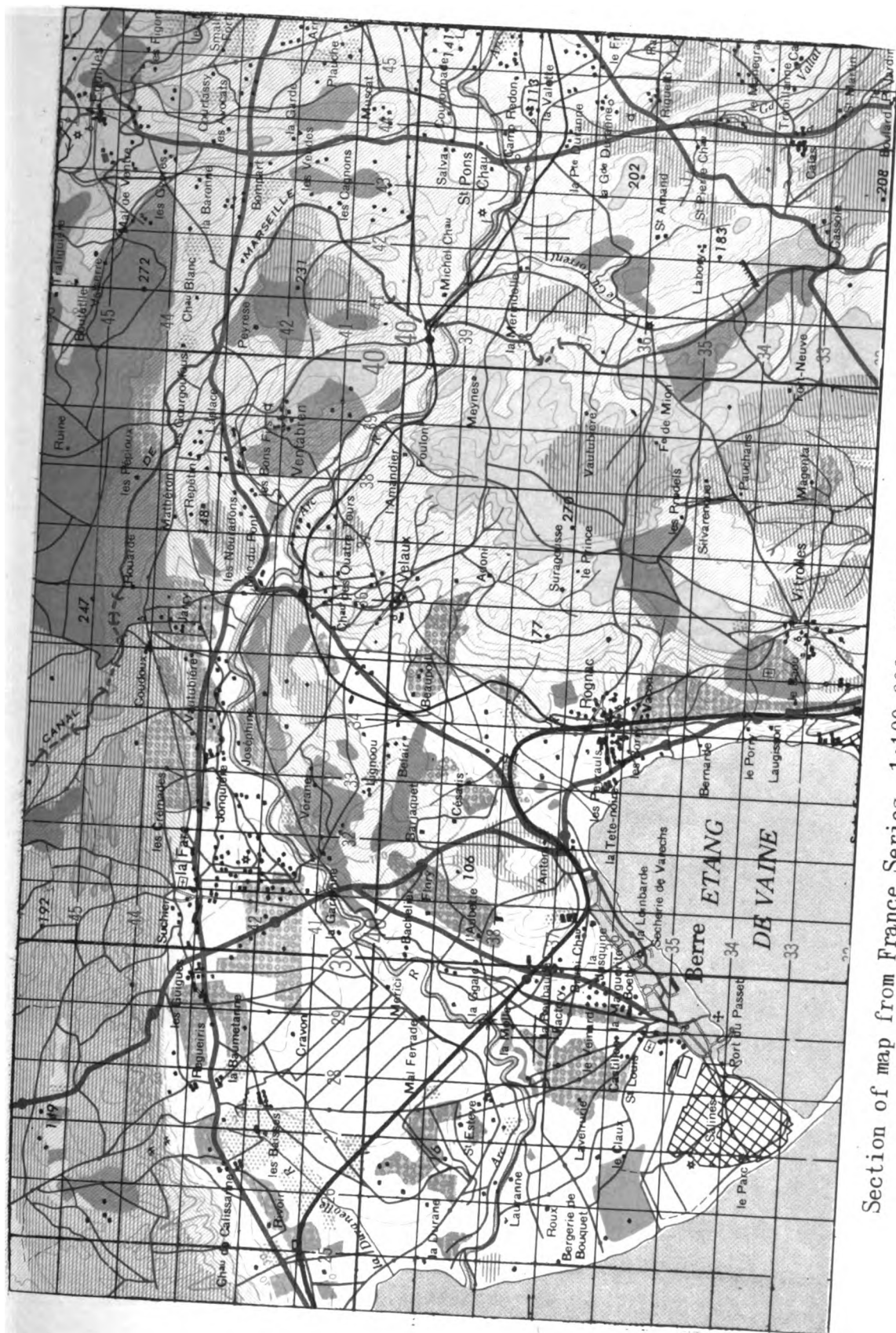
Key Terms for Identifying Map Dates

dessiné(e)	drawn
dressé(e)	prepared
exécuté(e)	executed
gravé(e)	engraved
héliogravé(e)	photo-engraved
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
révisé(e)	revised
revision en	revision in
revision partielle en	partial revision in
tirage	issue, printing

²"Glossary of Selected Map Terms Relative to Authorities, Dates, Scales, Editions, and Locations in Foreign Text Maps," March 1944, Army Map Service, Corps of Engineers, U. S. Army, Washington, D. C.



Section of map from Europe Road Map Series, 1:200,000
G.S.G.S. 4238, Sheet 51

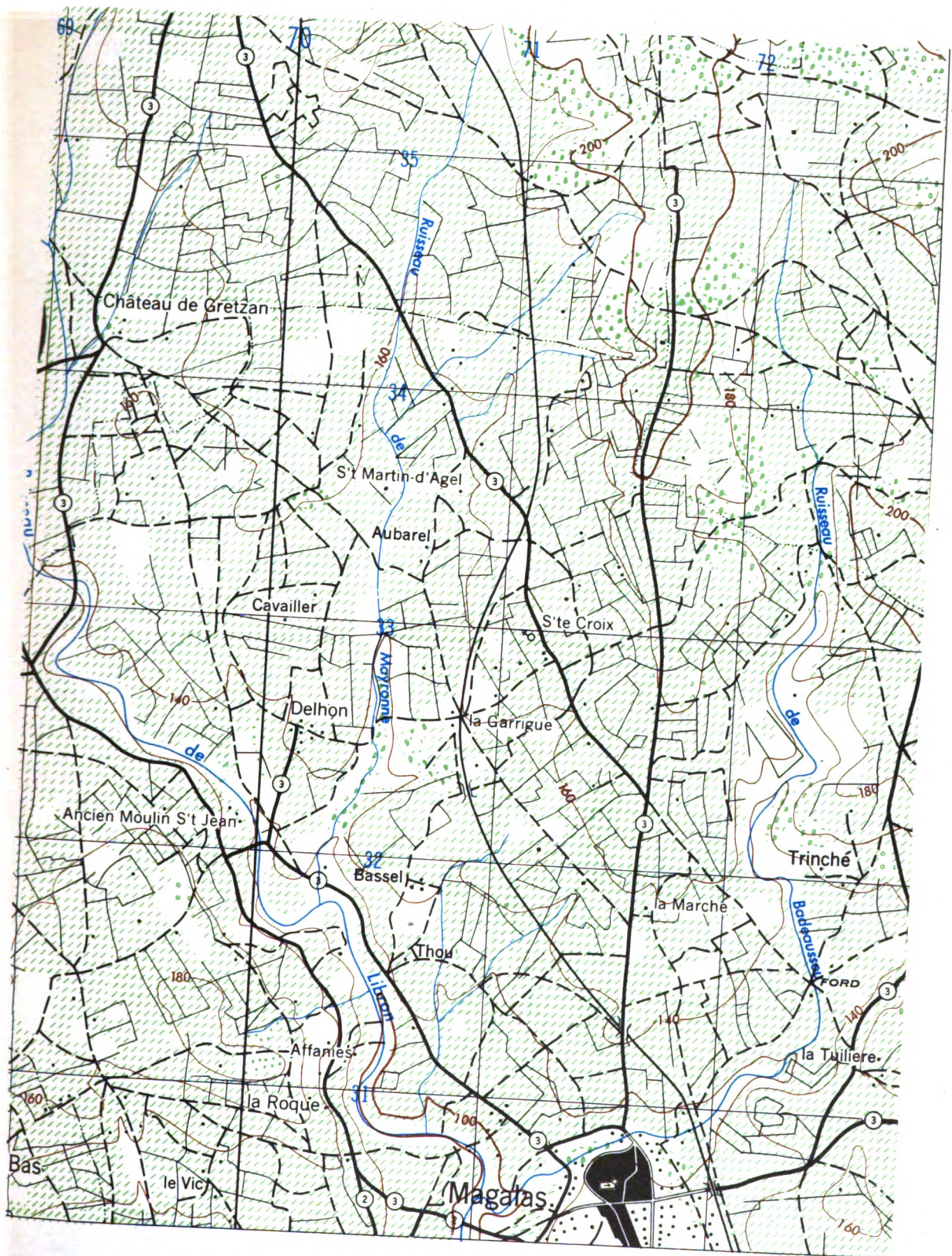




Section of map from Carte d'Etat-Major Series, 1:80,000, Sheet 3



Section of map from France and Belgium Series, 1:50,000
 G.S.G.S. 4040, Sheet 49



Section of map from Southern France Series, 1:25,000

AMS M861 (G.S.G.S. 4411), Sheet XXV-44 3 & 4

Chapter IV

GERMAN MILITARY MAPS

German military maps are published by the *Reichsamt für Landesaufnahme* ("Government Bureau for Land Survey"). Formerly, some editions of military maps were published by various agencies which have since been incorporated into the *Reichsamt für Landesaufnahme*. Certain editions of military series are produced by authorized civilian agencies.

Military Map Series of Germany

The principal series of German military maps are briefly described below.

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

The *Überstichtskarte* ("General Survey Map") Series is on a scale of 1:200,000. The 1:100,000 series mentioned in the paragraph below is the basis for this series of German maps.

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

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.

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

United States maps of Germany currently consist of a 1:100,000 colored and contoured series prepared under a joint agree-

German Military Maps

ment between United States and British agencies. These maps have been compiled from existing maps of central Europe and from air photographs of those areas for which photo coverage was available. They are gridded with Modified British grids. These maps are available with or without altitude tints.

British maps of Germany are copies of the German 1:25,000 Series. British grids have been superimposed on the copied German maps and marginal information provided in English. Since these are copied maps, the conventional signs are German. Declinations are indicated on a three-pronged marginal diagram.

German Coordinate Systems

The different methods of point designation discussed in the succeeding paragraphs are used on German military maps at the present time.

Geographic coordinates on German maps are expressed in degrees. Prior to 1921, the Germans measured longitude from Ferro, approximately $17^{\circ}40'$ west of Greenwich. Since that time,

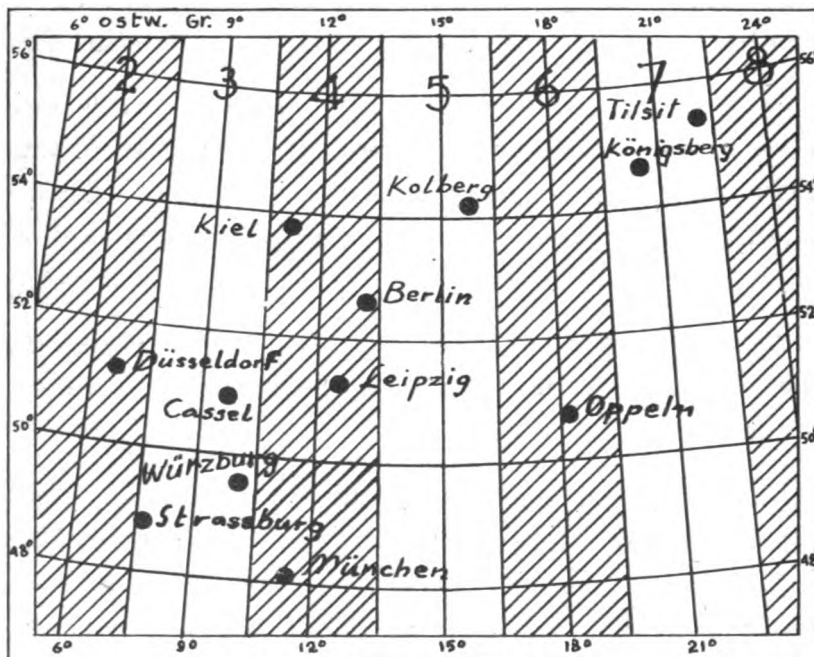


FIG. 14.--Diagram of German Grid Zones, from Major Uebe, *Soderleins Leitfaden zum Geländezeichnen und Kartenlesen* (8th ed., Berlin: R. Eisenschmidt, 1935), p. 23

they have used the prime meridian of Greenwich. Some older sheets have longitudes from both Ferro and Greenwich indicated in their corners.

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. Coordinates are read and written in a manner similar to that used in United States map reading.

The German grid zones are 3 degrees in width and are centered on the 6° , 9° , 12° , 15° , 18° , 21° , and 24° meridians. (See Fig. 14.) (Provisions have been made to extend the zoning system 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 may be extended over a portion of the other. The boundary between zones is indicated on the border of a map in the following way:

Ostgrenze des Gitterstreifens 9°	Westgrenze des Gitterstreifens 12°
--	--

(translated as:)

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

(See Fig. 15.)

Vertical grid lines within a zone are parallel to the central meridian of that zone and are spaced at 1-kilometer intervals. All of the grid lines of a zone are assigned one identification number (*Kennziffer*). The identification number for each zone can be determined by dividing the degree value of the central meridian of the zone 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 assigned a value of 500 kilometers. Lines west of the central meridian are numbered below 500, e.g., 497, 498, 499, etc. Those east of the central

German Military Maps

meridian are numbered above 500, e.g., _501, _502, _503, etc. 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, respectively, assuming that the grid lines are in the 18° Zone. The grid lines coinciding with the central meridians of the German grid zones are assigned values in kilometers as follows:

6° Zone	- 2500 km
9° Zone	- 3500 km
12° Zone	- 4500 km
15° Zone	- 5500 km
18° Zone	- 6500 km
21° Zone	- 7500 km
24° Zone	- 8500 km

Owing to the convergence of meridians, a gradual widening of a zone takes place 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.

Horizontal grid lines are constructed perpendicularly to the central meridian of a grid zone and spaced at 1-kilometer intervals. They are numbered from the equator. Therefore, the horizontal line numbered 3650 is 3650 kilometers north of the point at which the central meridian crosses the equator. Horizontal grid lines of all zones are numbered in the same fashion, and do not have identification numbers as do the vertical grid lines.

Coordinates in the Gauss-Krüger system, as previously mentioned, are read and written in a manner similar to that used in United States map reading, i.e., "right and up." A coordinate scale (*Planzeiger*) printed in the margin of German maps may be employed when interpolating values between grid lines. The first two digits of the complete number of the grid lines 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, it is ordinarily sufficient to use only the larger figure 97. The coordinates of the road junction

German Military Maps

in the 24° Zone, Figure 15, are 02,87-87,70 (full coordinates: 8402,87-6087,70). Similarly, a road junction in the 21° Belt, Figure 15, is located by the coordinates 89,10-87,25 (full coordinates: 7589,10-6087,25).



FIG. 15.--Section of map from *Reichskarte* Series, 1:100,000, Sheet 33. Note the boundary between grid zones, the numbering system, and the tick marks used to extend the grids of the two zones.

German Military Maps

A transparent map template (*Zielgevierttafel*) is used by the Germans for purposes of point designation--usually on maps having no grid system. (See Plate V.) It can be used on maps of any scale.

The template is divided into 5-millimeter squares, the rows of which are 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, as illustrated in Plate V.

Five reference points (*Festpunkte*), located in the corners and the center, are shown on the template by "X's." These reference points are designated according to their position on the template, i.e., middle (*Mitte*), northeast (*Nordost*), northwest (*Nordwest*), southeast (*Südost*), and southwest (*Südwest*); or middle (*Mitte*), upper right (*Rechts Oben*) (*RO*), upper left (*Links Oben*) (*LO*), lower right (*Rechts Unter*) (*RU*), and lower left (*Links Unter*) (*LU*).

Arrows on the template indicate the direction of north, south, east, and west.

To locate map points by means of the template, place a predetermined reference point (*Festpunkt*) of the template on a predetermined map reference point (*Kartendunkt*). Then orient the template on the map, i.e., place the north and south edges of the template parallel to the corresponding edges of the sheet. (The horizontal and vertical edges of the sheet are formed by parallels of latitude and meridians of longitude; thus, the edges of the sheet indicate the east-west and north-south directions.) Read the coordinates "up--right" (not "right--up"), estimating the quadrant of the square in which the point in question 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*,"¹ or in translation, "Point 'y' lies in *Zielgeviert* 64/22 a, middle reference point, watchtower due east of 'X' city."

¹"The German Rifle Company," *Military Intelligence Service Information Bulletin No. 15*, U.S. War Department (Washington, D.C.: United States Government Printing Office, 1942), p. 279.

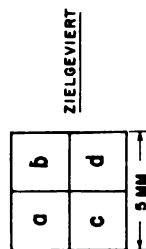
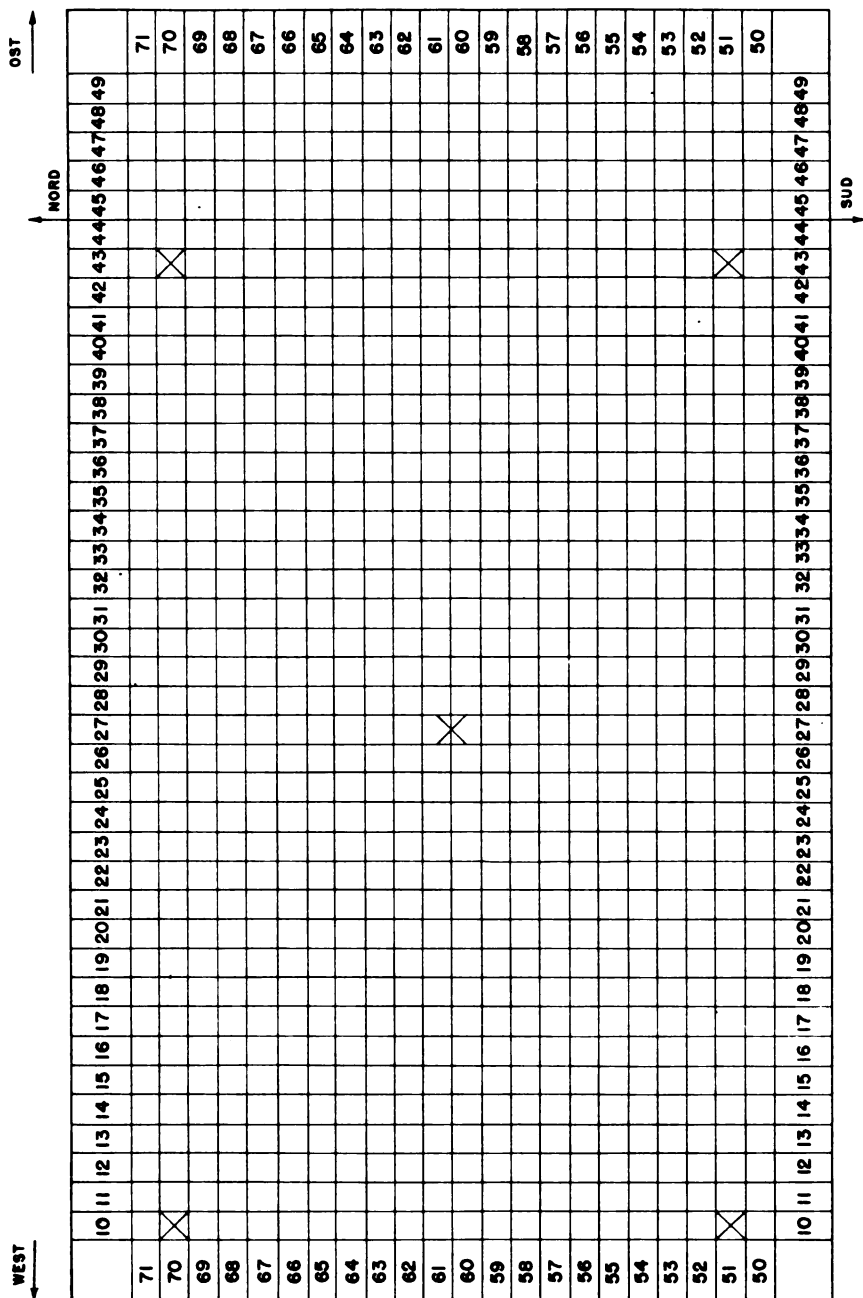


PLATE V.—Diagram of German map template (Zielgevierttafel)

The German *thrust line (Stosslinie)* system of point designation is basically the same as that of the United States Army.

A thrust line is a straight line plotted on a map for the purpose of designating the location of a given point. 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. Theoretically, it can extend indefinitely in any direction, but has usually been found to extend in the direction of anticipated movement.

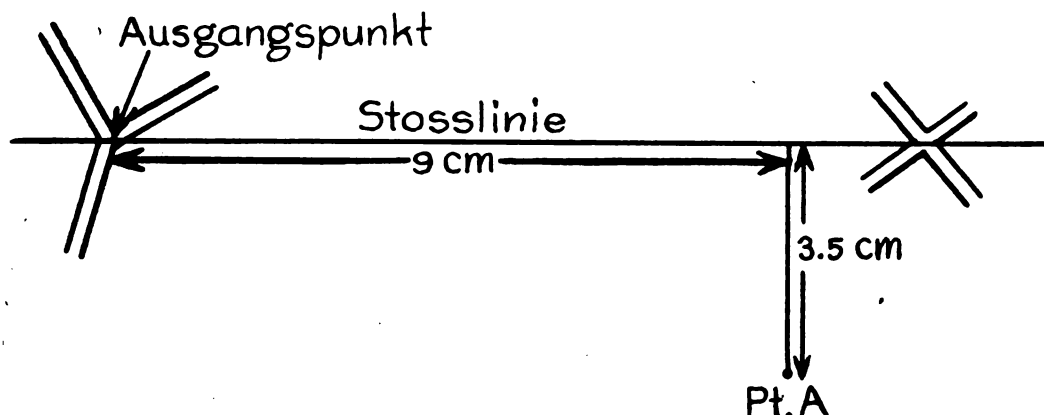


FIG. 16.--Diagram of German thrust line (*Stosslinie*)

In order to give a map reference by means of the *Stosslinie*, a perpendicular is drawn from the point in question, Point A in Figure 16, to the thrust line. The distance forward from the point of origin (*Ausgangspunkt*) to the perpendicular is measured in units previously agreed upon. Centimeters are ordinarily used (see Fig. 16), although ground distances may be specified. The distance to the right (*R*) or left (*L*) along the perpendicular to the point in question is then measured in the units selected. Thrust line coordinates consist of: (1) the distance from the point of origin to the perpendicular; (2) the direction, either right or left, from the thrust line; (3) the distance from the thrust line to the point in question. Thus, the thrust line coordinates in Figure 16 are 9R3.5.

For purposes of security the point of origin is usually given an initial value. If the *Ausgangspunkt* in Figure 16 were given an

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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 such case, the coordinates 32R3.5 might become 83726R73954.

If more than one thrust line is used, each is numbered, and a reference begins with the number of the thrust line from which it is derived.

The *German Army Grid (Deutsches Heeresgitter)* is a grid system printed by the Germans on maps of countries other than Germany. This grid system is basically the same as the Gauss-Krüger Grid, i.e., 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 that of the Gauss-Krüger Grid.

An *arbitrary grid system* has been used on German maps of France and Italy. The general pattern of the grids and their method of use are the same on the maps of both countries.

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 Plate VI.) 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 Plate VII.)

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 Plates VI and VII.)

The lettered squares above are subdivided into nine smaller squares numbered from 1 to 9.

(Text continued on Page 57)

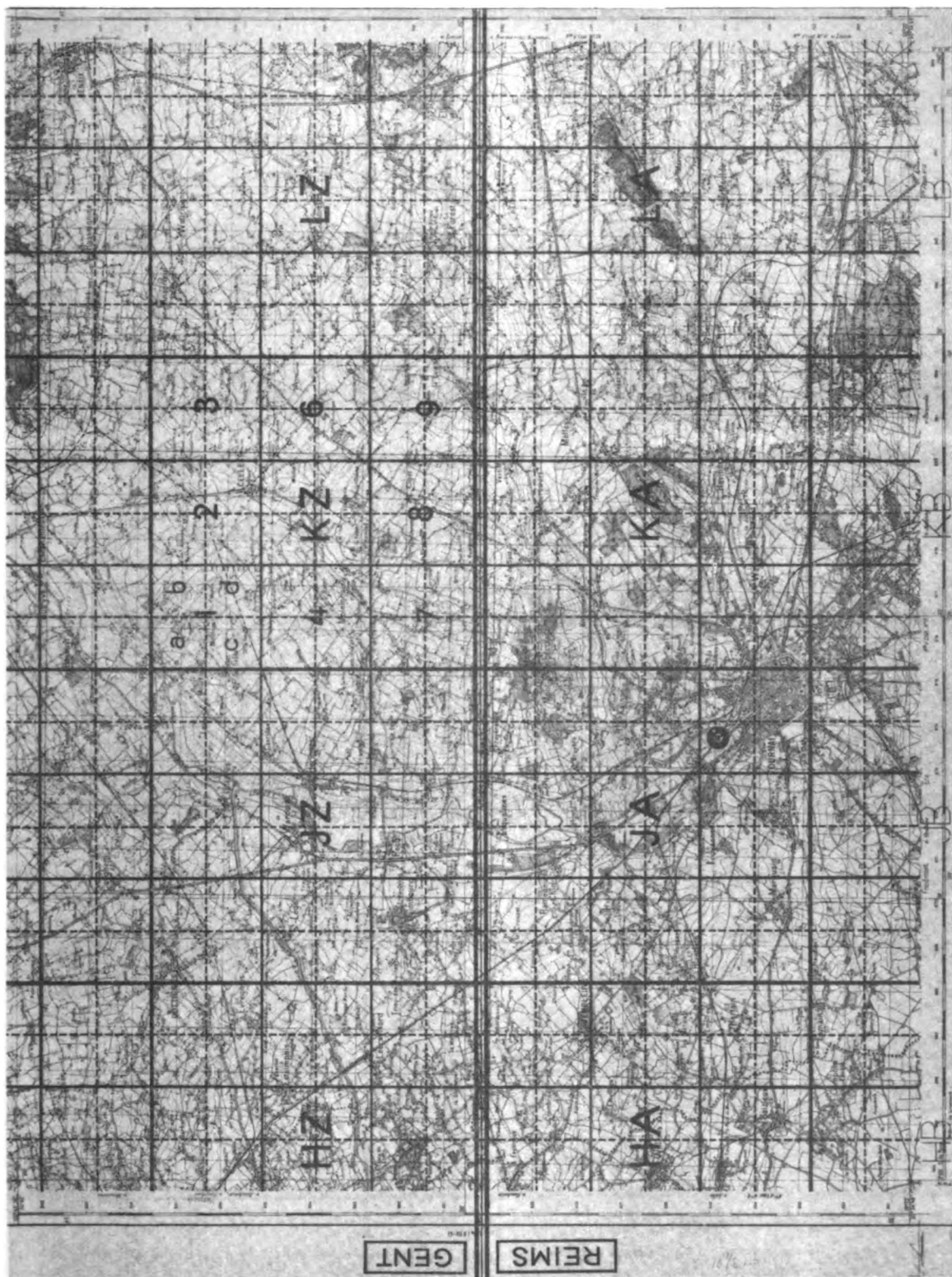


PLATE VI.--Photographic copy of arbitrary.grid found on German maps of France

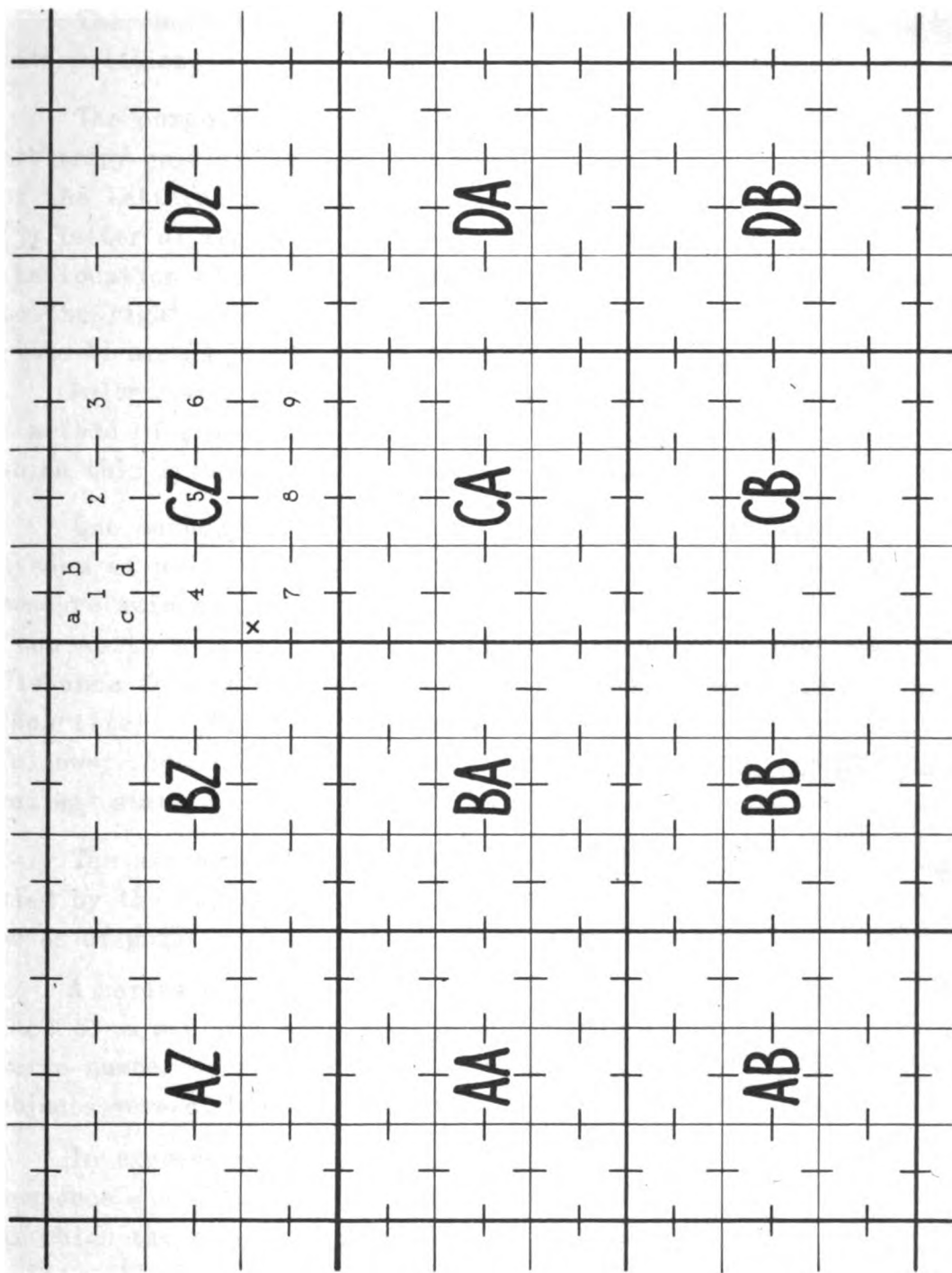


PLATE VII.—Diagram of German arbitrary grid system as found on German maps of Italy

Numbered squares are further subdivided into quarters lettered a, b, c, and d.

The small lettered quarters are subdivided into tenths by interpolation.

The component parts of coordinates given in terms of this arbitrary grid system are read in the following order: (1) letters of the lettered square; (2) number of the next smallest square; (3) letter of the small lettered quarter; (4) 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 Plate VI are JA 9a *Brücke*, or JA 9a 77.

Polar coordinates are frequently employed by German troops as a method of point designation. Below are described two ways in which this system has been applied by the Germans.

One method of application is similar to the United States system of polar coordinates. The German soldier is taught to measure azimuths or direction in mils (*Striche*) counterclockwise from north by means of his military compass (*Marschkompass*). Distance is almost always measured in meters or 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.)

The second method of application was found on a French map used by the German Army in North Africa. 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 a large number of 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: (1) the number of the 60-kilometer square in which the reference point lay; (2) the number of the reference point; (3) the direction of the point in question from the reference point, stated approximately, i.e., north, south, east, or west; (4) the distance from the reference point to the point in

German Military Maps

question; (5) the identification of the point in question. The reference for Point A in Figure 17 is: 7/22 S 1000m Wbs. (Square 7, reference point 22, south 1000 meters, inn.)

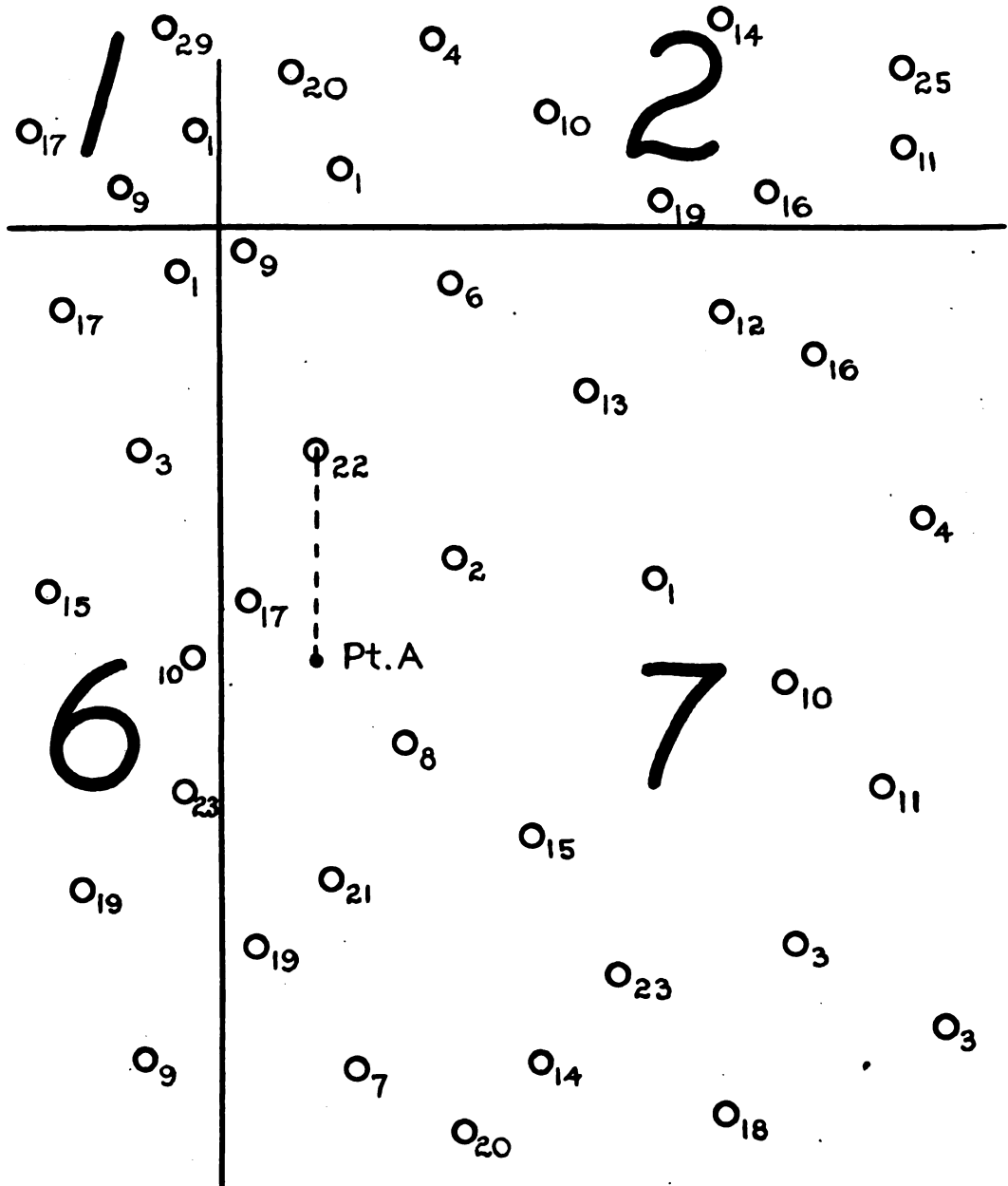


FIG. 17.--Diagram of a German polar coordinate system

Characteristics of German Military Maps

The scales of German military maps are based on the metric system of measurement. The commonly-used European map scales,

German Military Maps

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 in length.

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. The following contour intervals and symbols are used:

20-meter contour lines	
10-meter contour lines	
5-meter contour lines	
Auxiliary contours at 2.5- and 1.25-meter intervals	

Small arrows are employed on some large-scale maps to indicate slight depressions and downhill slopes.

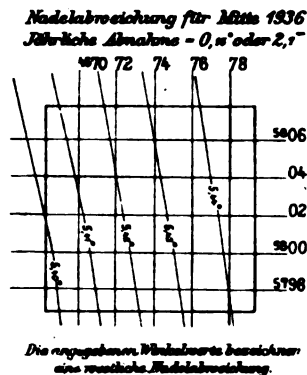


FIG. 18.--*Nadelabweichung* diagram from
Messtischblatt Series, 1:25,000, Sheet 1974

The *G-M* angle (see Glossary) 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. 18). German maps of other countries use the conventional two-pronged diagram to indicate this declination.

German Military Maps

Declination protractors (see Glossary), similar to those on recent United States 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.



FIG. 19.--Degree scale of German declination protractor from *Reichskarte* Series, 1:100,000, Sheet 33

A table for the conversion of mils (*Striche*) into grades (*Neugrade*) has been found in the marginal information of recent German maps of Italy.

Glossary of German Map Expressions²

Authorities

Bibliographisches Institut		Bibliographic Institute
Geogr. Verlagsanstalt u. Druckerei		Geographic Printing and Pub- lishing House
Kartendienst der Raumforschung.....		Map Service of the Land Sur- vey Department
Kartographisches Institut		Cartographic Institute (Aus- tria)
Königl. Preuss. Landesaufnahme.....		Royal Prussian Office for Land Survey
Reichsamt für Landesaufnahme		Government Bureau for Land Sur- vey
Vermessungskommissar für die Reichshauptstadt		Land Survey Commissioner for the Capital

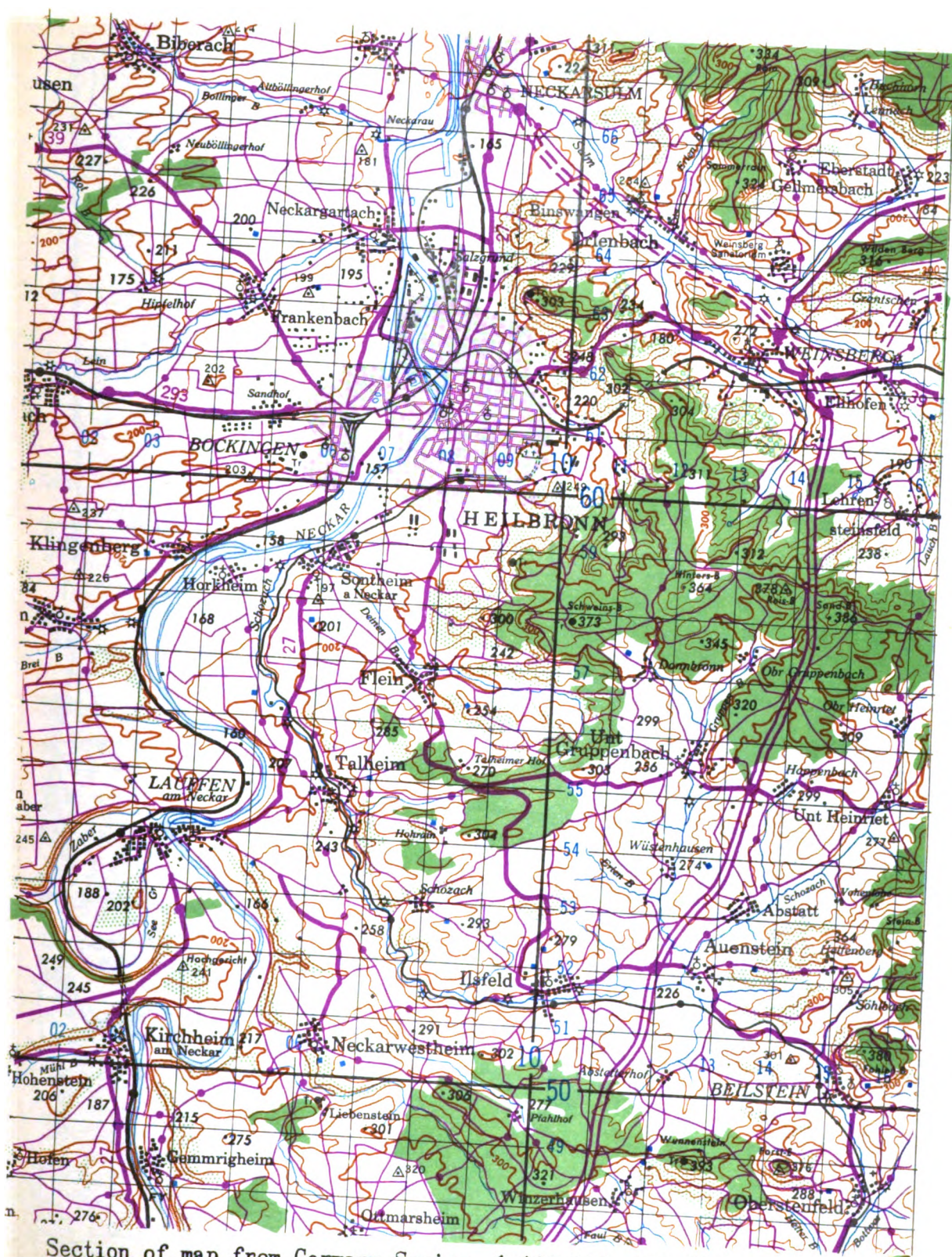
Key Terms for Identifying Map Dates

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

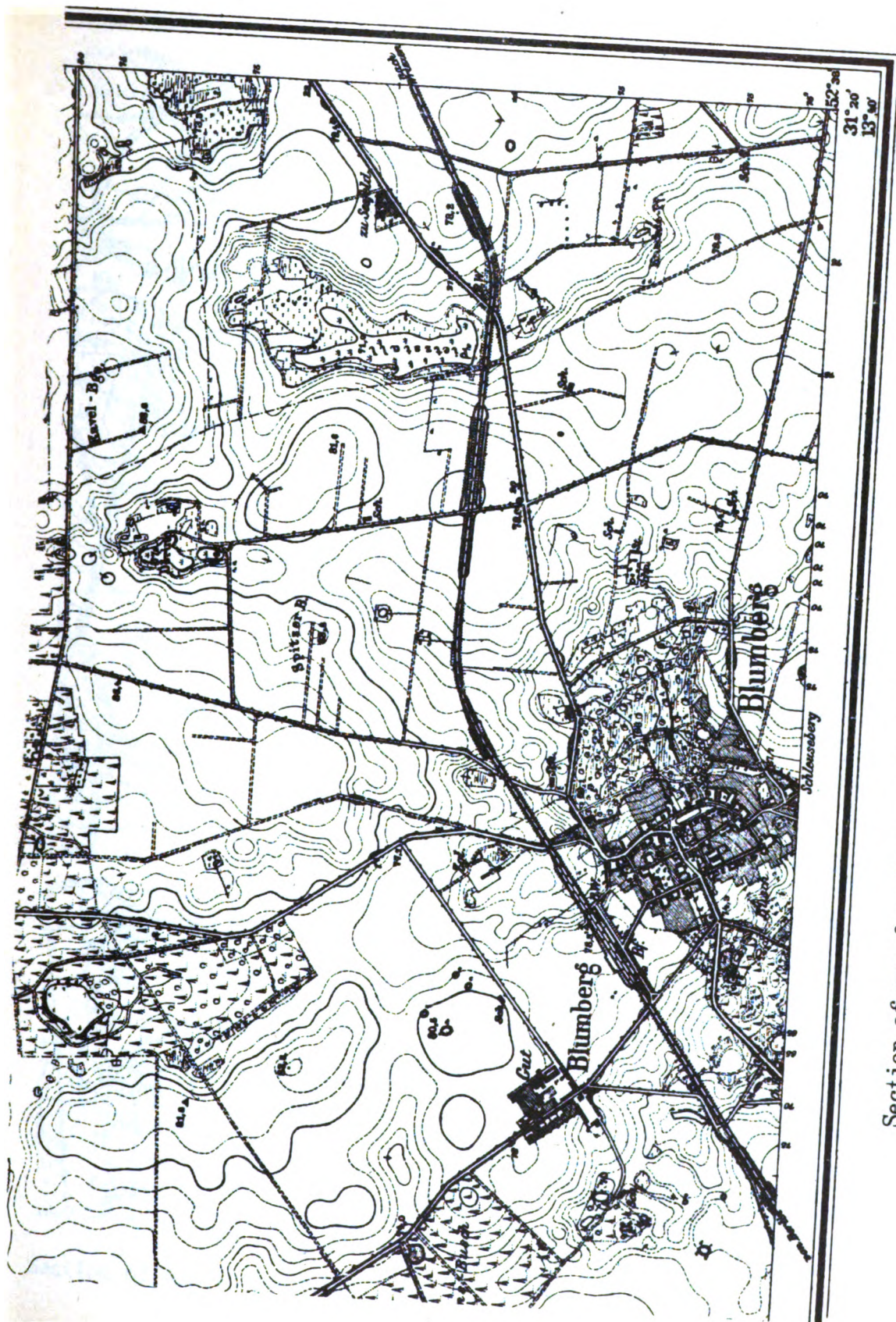
²"Glossary of Selected Map Terms...", March 1944, Army Map Service, Corps of Engineers, U.S. Army, Washington, D.C.

German Military Maps

kleine Nachträge	slight revisions
Lieferung	press run, series
Nachdruck	reprint
Nachträge	revisions, supplements
Nadelabweichung	G-M angle
neue Ausgabe	new edition
rekognosziert	reconnoitered
teilweise	partial
Umdruck	reprint
Umdruckausgabe	reprint edition (implies corrections)
Vervielfältigungs-recht	copyrighted
vorbehalten	
vorläufig	provisional
zeitweilig	temporary
zweite (IIte) Auflage	second edition



Section of map from Germany Series, 1:100,000, AMS M641, Sheet V-3



Section of map from *Topographische Karte Series*, 1:25,000, Sheet 1766



Chapter V

ITALIAN MILITARY MAPS

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

Military Map Series of Italy

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. The *Grande Carta* was published on 1:100,000 sheets (*fogli*), each of which measures 20 minutes of latitude by 30 minutes of longitude. It consisted of 277 of these *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, etc. 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. A knowledge of this numbering system is useful in the general geographic orientation of these sheets.

In order 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 minutes of latitude by 15 minutes of longitude. The *quadranti* within any *foglio* are designated by Roman numerals, numbered clockwise beginning with the upper right quadrant. (See Fig. 20.) Thus, *Foglio 5 II* indicates the lower right quadrant of *Foglio 5*.

Each *quadrante* is further subdivided into quadrants (*tavolette*). (See Fig. 20.) Each *tavoletta* is on 1:25,000 scale, its geographic dimensions being half those of a *quadrante*, or 5 minutes of

Italian Military Maps

latitude by 7 minutes, 30 seconds of longitude. The *tavolette* within any *quadrante* are designated by the directions N.E., S.E., N.O., and S.O. (The Italian word for west is "ovest.")

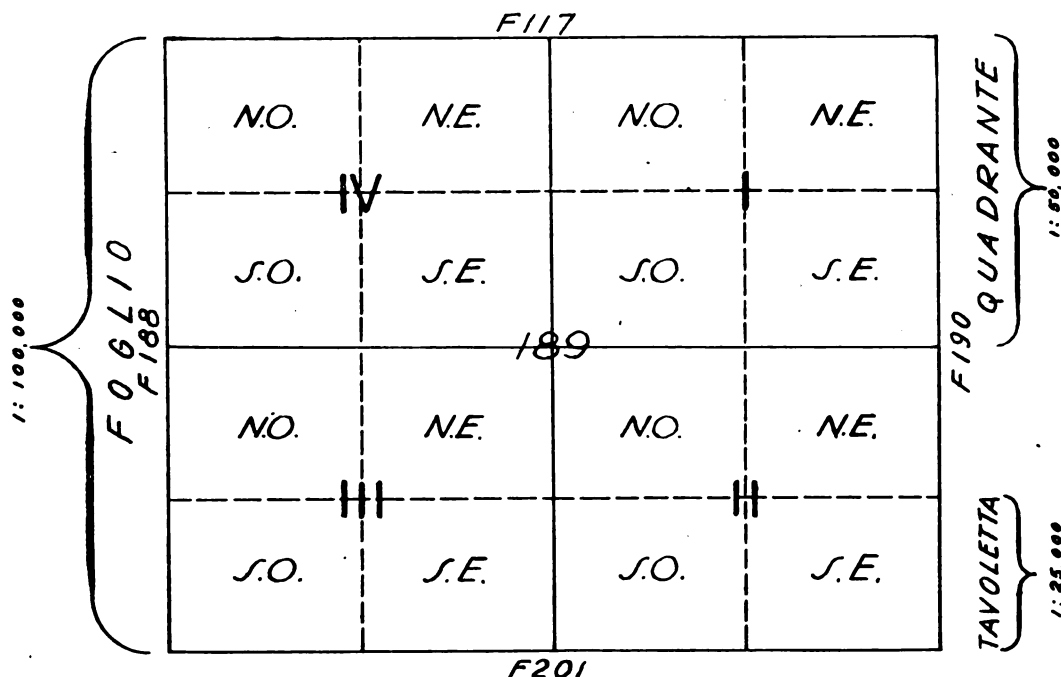


FIG. 20.--Diagram of division of 1:100,000 foglio into quadranti and tavolette

There is one further subdivision into *sezioni*. (See Fig. 21.) 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 minutes, 30 seconds of latitude by 3 minutes, 45 seconds of 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*.

Although the above series of maps are on different scales, all of them use the same system of conventional signs. The 1:100,000 Series (the *foglio*) 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.

Italian Military Maps

A 1:250,000 and a 1:200,000 series of road maps published by the *Consociatazone Turistica Italiana*¹ ("Italian Touring Club") are two excellent series of unofficial maps used as the basis for a recent British 1:250,000 series.

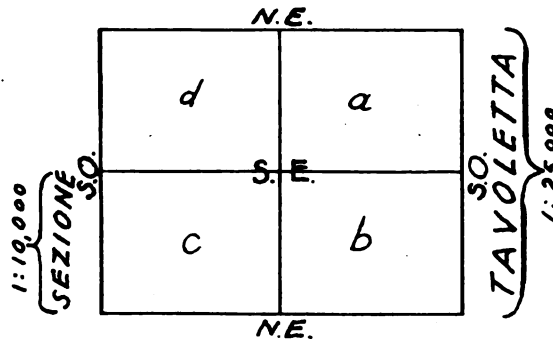


FIG. 21.--Diagram of division of *tavoletta* into *sezioni*

Italian Coordinate Systems

Geographic coordinates on Italian maps are measured in degrees. Longitude is measured from the prime meridian of Rome (Monte Mario), $12^{\circ}27'07.1''$ 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. 22.) The system of lettering these intervals is very complex and is not described here.

In giving the coordinates of a point, the letters of the minute of longitude are given first, followed by the letters of the minute of latitude, i.e., "read right—up." A point within any 1-minute graticule (see Glossary) is located by giving the seconds east, then north of its southwest corner. The coordinates of the point in Figure 22 are TLCT4530.

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.

¹This organization was called the Touring Club Italiano until 1936.

Italian Military Maps

It is believed that rectangular grid systems of the type found on United States, British, French, and German maps do not exist on Italian maps.

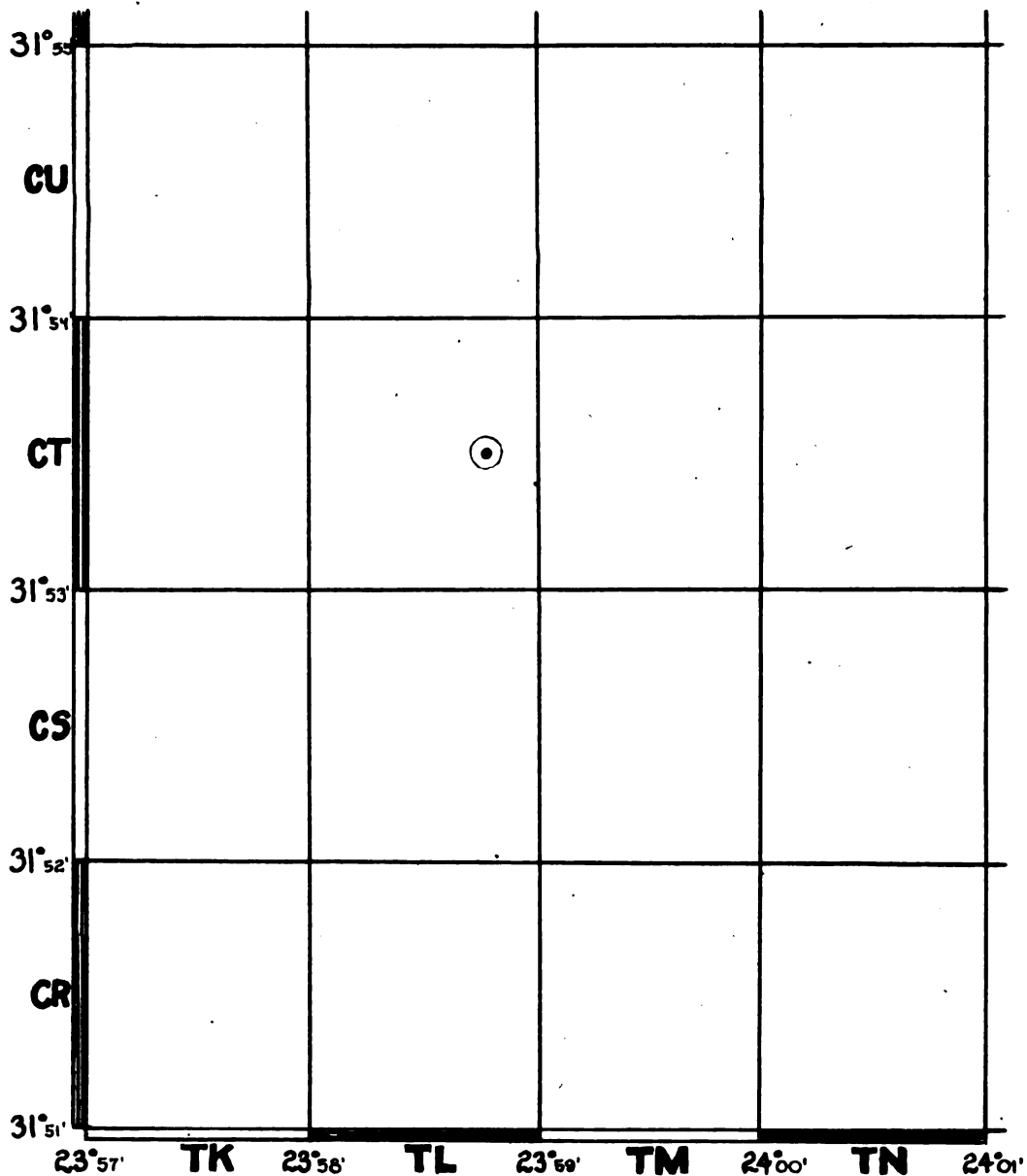


FIG. 22. --Diagram of Italian map reference system

Glossary of Italian Map Expressions²

Authorities

Consociazione Turistica Italiana .. Italian Touring Club (formerly, Touring Club Italiano)	
Istituto Geografico Militare .. Military Geographic Institute	
Istituto Italiano d'Arti Grafiche .. Institute of Graphic Arts	
Laboratorio Foto-litografico del .. Lithographic Laboratory of the Ministero della Guerra 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 è	magnetic declination for the year valevole per l'anno
legge	law (authorizing surveys)
levata	survey
levat(o, i, a, e)	surveyed

²"Glossary of Selected Map Terms....," March 1944; Army Map Service, Corps of Engineers, U.S. Army, Washington, D.C.

Italian Military Maps

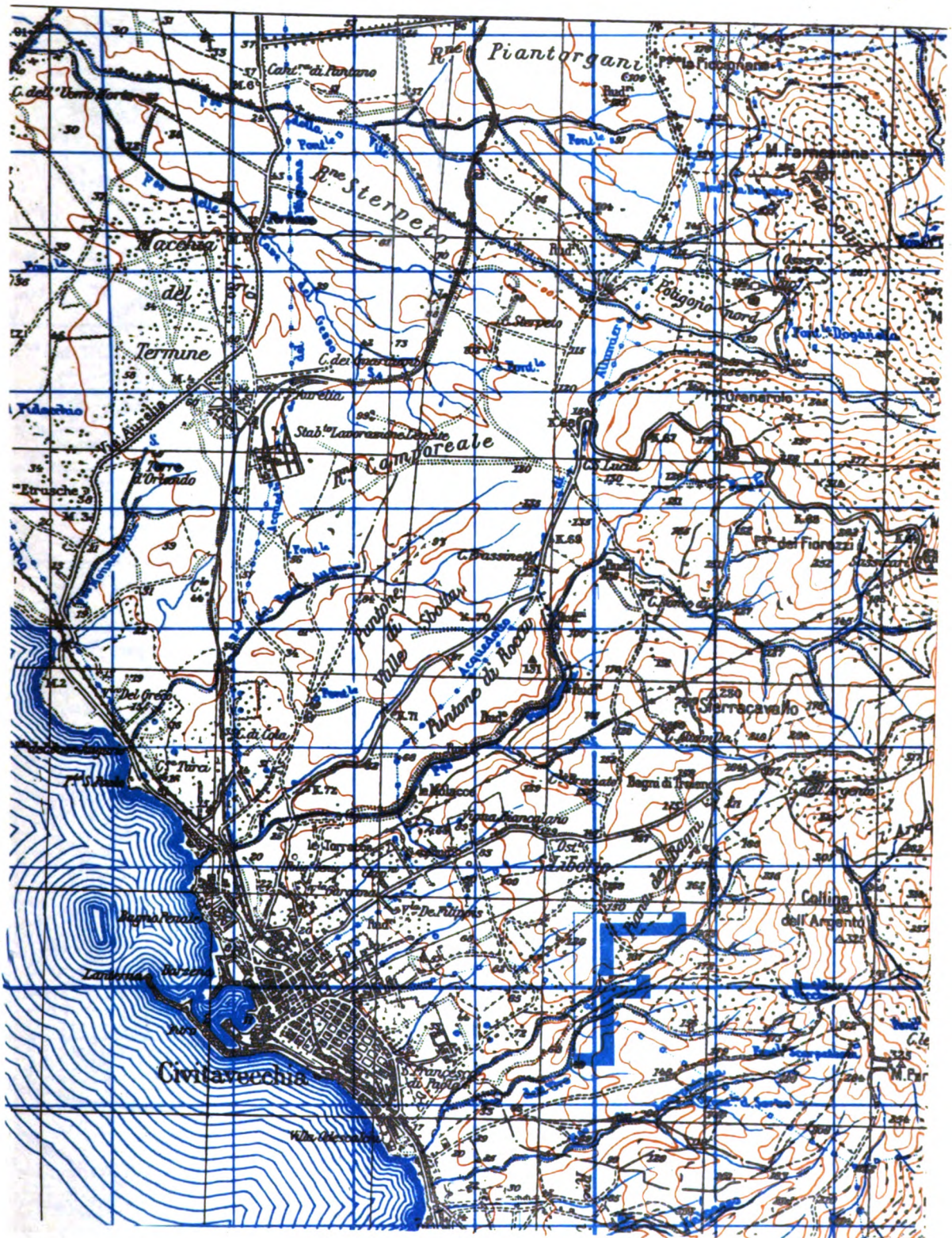
parziale	partial
proprietà riservata	copyrighted
ricognizione per le strade	reconnaissance for highways and
rotabili e ferrovie nel	railroads in
ricognizioni generali	general reconnaissance
ricognizioni parziali	partial reconnaissance
ridisegno	redrawn
rilevamento	survey
rilievo del	survey of the
riproduzione	reproduction
riproduzione vietata	all rights reserved
riveduto	revised
stampato	printed
tutti i diritti di riprodu-	all reproduction rights reserved
zione riservati	



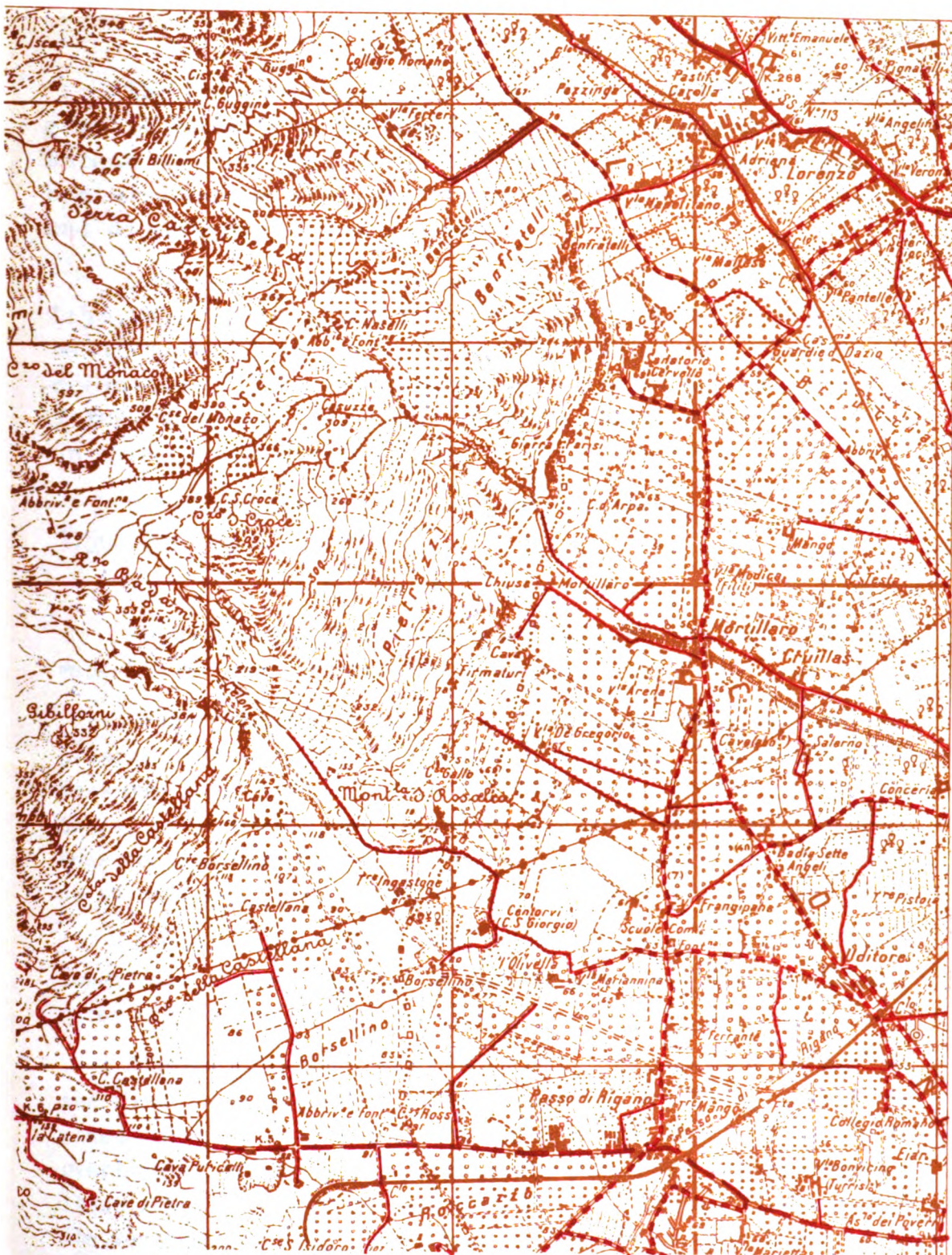
Section of map from Italy Series, 1:100,000, G.S.G.S. 4164, Sheet 142



Section of map from Italy Road Map, 1:200,000, AMS M592, Sheet 17



Section of map from Italy Series, 1:50,000, G.S.G.S. 4229, Sheet 142 II



Section of map from Italy Series, 1:25,000, G.S.G.S. 4228, Sheet 249 II N.W.

Chapter VI

RUSSIAN MILITARY MAPS

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.

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. These large-scale maps are supplemented by the 1:100,000 series. The latter series is the basic tactical series in sparsely populated districts.

Small-scale maps are published on scales of 1:1,000,000, 1:500,000, and 1:200,000.

Russian Coordinate Systems

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

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 Appendix, p. 150). Modern military maps measure longitude from the prime meridian of Greenwich. Latitude, as on maps of all other countries, is measured from the equator.

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.

Russian grid zones are 6° in width. The western boundary of the first zone is formed by the Greenwich meridian, successive zones occurring at 6-degree 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 Plate VIII.) The origin of each grid zone is at the intersection of its central meridian and the

Russian Military Maps

equator. This point is given the arbitrary value of 500 kilometers east, 0 kilometers north.

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, i.e., 501, 502, 503, etc.; those to the west are numbered downward, i.e., 499, 498, 497, etc. 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 figure 4. (See Plate VIII.)

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.

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

Coordinates are read up and to the right. Full 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 full value of 7355 kilometers, only the 55 will ordinarily be used. (See Fig. 23.)

A second type of grid system has been observed on a Russian map 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.

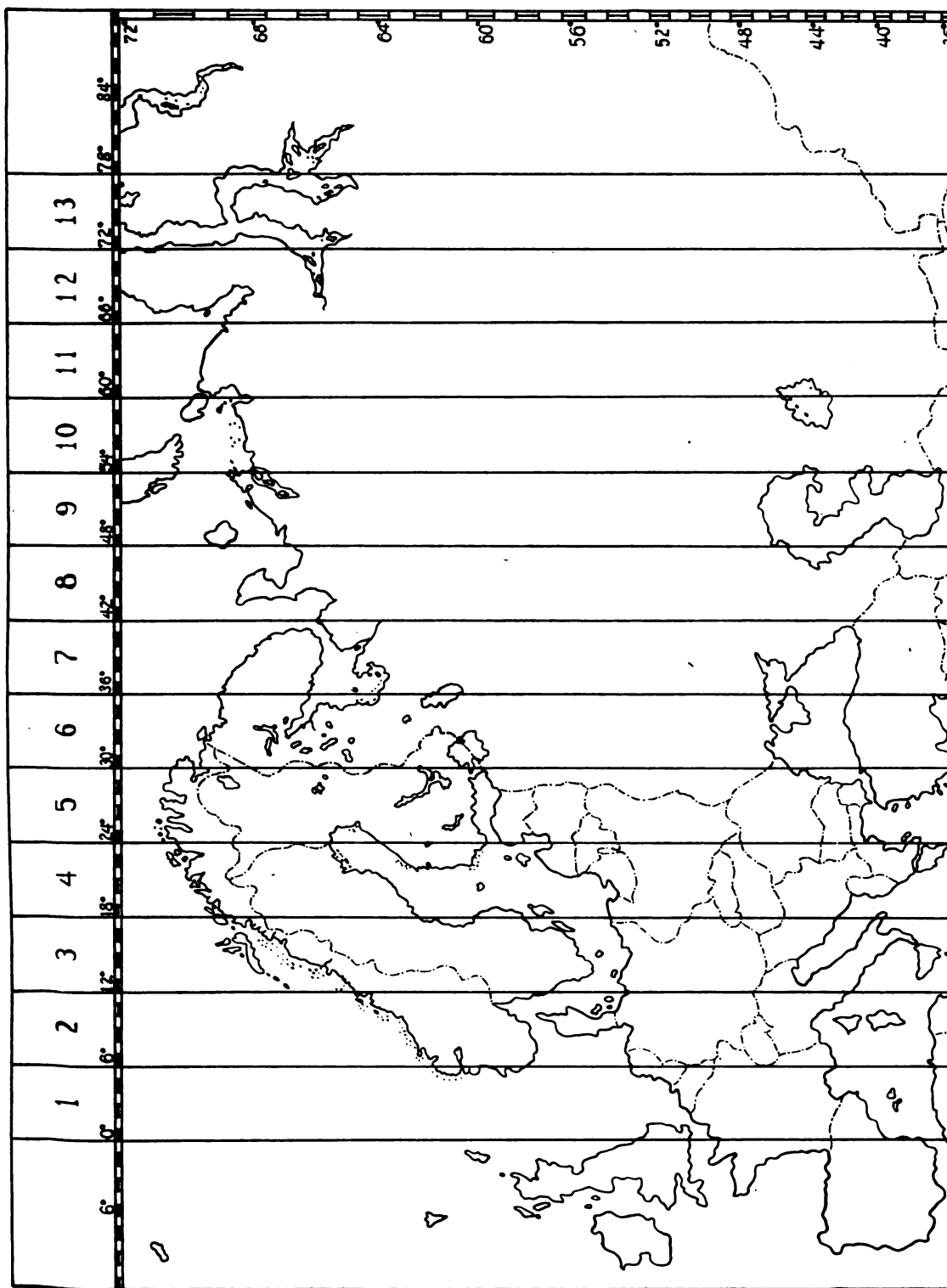


PLATE VIII.—Diagram of Russian Grid Zones

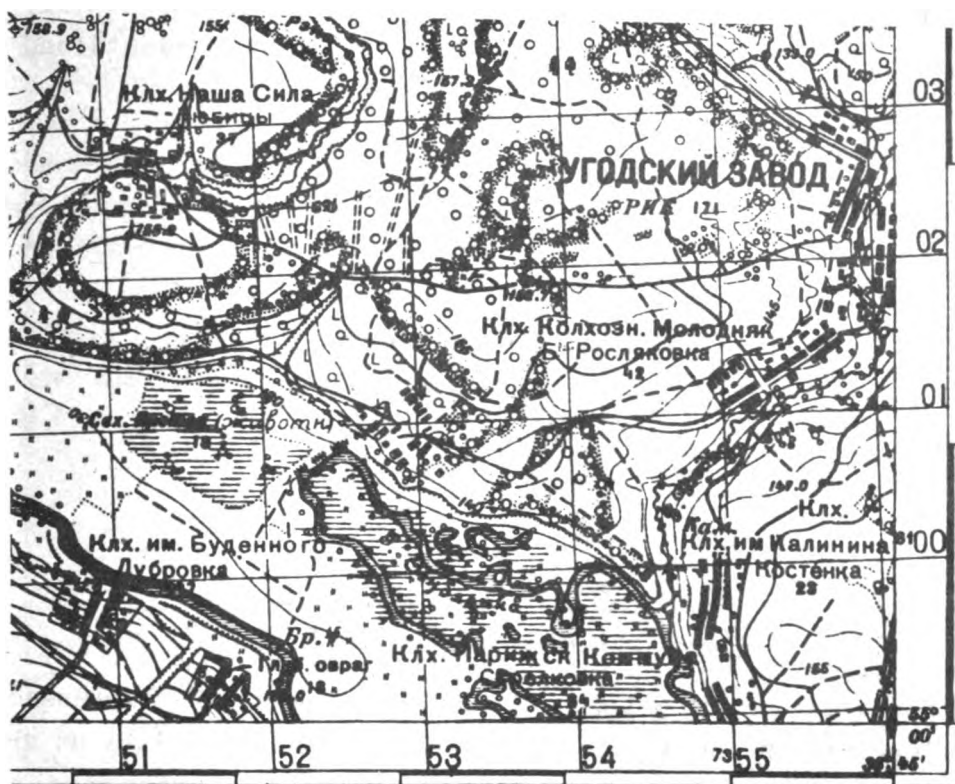


FIG. 23.--Section of map from Russian Series, 1:50,000

Characteristics of Russian Military Maps

The 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, etc. Map distances measured in *duims* (see Appendix, p. 149) on maps of these scales are easily converted into ground distances in *versts* (see Appendix, p. 149). 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.

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

The three-pronged diagram is similar in construction to the United States and British diagrams. True north is indicated by a

Russian Military Maps

star and magnetic north is identified 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. 24.)

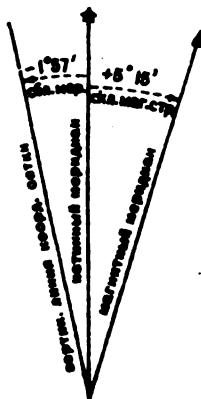


FIG. 24.--Three-pronged declination diagram from Russian Series, 1:50,000

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 minutes. Thus, an angle of 70 artillery mils is equal to an angle of $4^{\circ}12'$.

Magnetic declination is shown in a small isogonic diagram in the margin of the map. Isogonic lines indicate magnetic declinations at 30-minute intervals for the entire area of the map. Positive values indicate east declinations and negative values indicate west declinations. (See Fig. 25.)

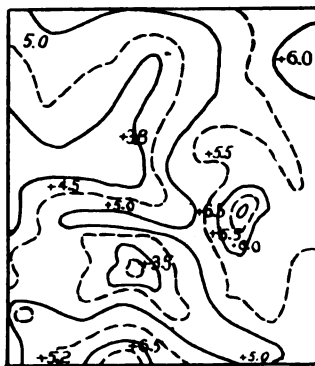


FIG. 25.--Magnetic declination diagram from Russian Series, 1:50,000

Relief is indicated on various Russian maps by contour lines, hachures, and spot elevations.

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 where necessary to depict relief more accurately. Stated levels of elevation for a specific map are indicated in a hypsometric diagram (see Glossary) in the margin. Reference to this diagram and to the key beside it enables the map reader to obtain a general picture of the topography of the area covered by the map without making a detailed study of the map itself. (See Fig. 26.)

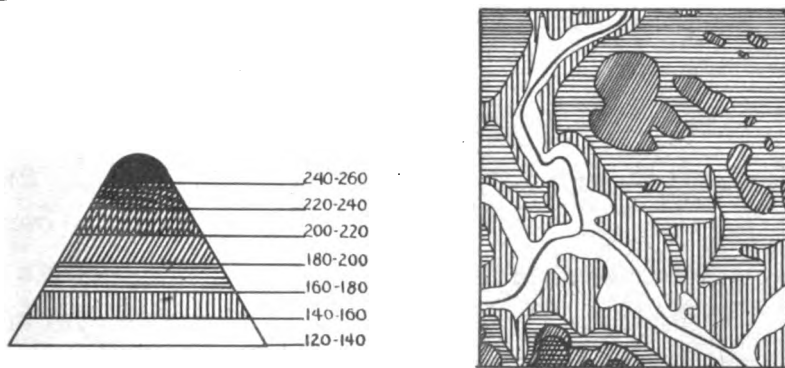


FIG. 26.--Hypsometric diagram from Russian Series, 1:50,000

A scale for determining degrees of slope is provided in the marginal information of contoured Russian maps. The steepness of slope expressed in degrees is determined by comparing 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. The slope scale in Figure 27 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 27, 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° .

Russian Military Maps

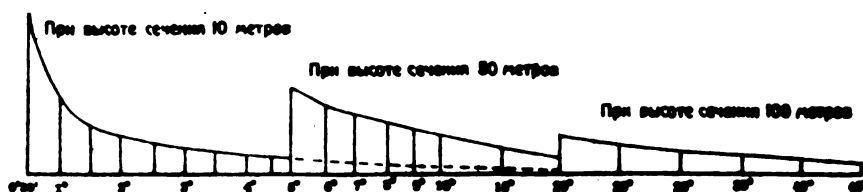


FIG. 27.--Slope scale from Russian Series, 1:50,000

Hachures are used to represent topography on small-scale Russian maps.

Spot elevations supplement hachures and contours.

Glossary of Russian Map Expressions¹

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 Topo- graphers

Key Terms for Identifying Map Dates

временный (vremennyyi)	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

¹ Extracted from "Glossary of Selected Map Terms...", March 1944, Army Map Service, Corps of Engineers, U.S. Army, Washington, D.C., with additions.

Russian Military Maps

лист sheet
(list)

масштаб scale
(masshtab)

первое издание first edition
(pervoye izdaniye)

печатано printed
(pechatano)

проверялось verified
(proverialos)

рекогносцировка reconnaissance, reconnoiter-
(recognostzirovka) ing

сближение меридианов meridional convergence
(sblizheniye meridianov)

сдано в производство released for publication
(zdano v proizvodstvo)

составлял compiled by
(sostavlyal)

с'ёмка survey
(siemka)

широта latitude
(shirota)

Chapter VII

JAPANESE TOPOGRAPHIC MAPS

Japanese maps will be considered here in a general way, because of the difficulty of 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 has been obtained from a careful study of many Japanese maps. The purpose of this chapter is to give some of the characteristics of Japanese maps and to explain the Japanese characters pertaining to numbers, dates, and representative fractions. Field sketches are used to a great extent by the Japanese Army in its operations. These sketches are not discussed here.

Commercial maps used by the Japanese Army are published by the Imperial Japanese Land Survey Bureau. This bureau is a government monopoly. Other mapping agencies may not produce maps without its consent.

Military Map Series of Japan

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.

The *1:50,000 Series* published by the Imperial Japanese Land Survey covers practically all of the Japanese Empire. 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.

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

United States maps of Japan have been prepared on scales of 1:250,000, 1:50,000, and 1:25,000. The *1:250,000 Series* has been compiled from Japanese 1:200,000 and 1:50,000 sheets. The

Japanese Topographic Maps

1:50,000 United States series consists of maps copied in black and white from Japanese sheets of the same scale. A World Polyconic grid has been superimposed, transliterations have been provided in purple, and the Japanese legend has been translated into English. Colored editions at 1:50,000 scale are also being prepared. These have 1000-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.

Japanese Coordinate Systems

Geographic coordinates are used on Japanese maps in the conventional manner. Longitude is measured east and west from the Greenwich meridian. Latitude is measured 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.

A standardized *military grid system*, similar to grids placed on United States, British, French, and German maps, has been established by the Japanese. According to the best available reports, this grid system uses a metric grid and consists of seven grid zones. Five zones cover Japan; one, Korea; and another, Formosa. Each zone is 4° in width. Those covering Japan are centered on the 132° , 136° , 140° , 144° , and 148° meridians; the zone covering Korea is centered 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.

Grids on the Japanese zones are printed in brown. They are metric grids with a basic interval of 1 kilometer. Grid lines are numbered to the right and up, with only the 1000- 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.

Japanese Topographic Maps

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 537,798.

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: (1) reference or base point; (2) azimuth; (3) distance. An object 500 meters from a triangulation point 102 meters high on an azimuth of 1800 mils would be indicated as follows:
Base point $\triangle 102 \frac{1800}{500m}$.

Characteristics of Japanese Topographic Maps

Marginal information may be placed on Japanese maps as indicated in Figure 28. The position of items of marginal information may vary on different maps and map series. Also, certain items may not be found on some sheets.

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 Fig. 28 and Japanese Glossary, page 109.) Variations in place names are found on Japanese maps of different scales. This is due to the Japanese custom of indicating names of small individual settlements on large-scale maps, but only those of village groups on maps of small 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 follow:

<i>Japanese</i>	<i>English</i>	<i>Metric</i>
1 shaku	0.994 ft	30.3 cm
360 shaku = 1 cho	119.0 yd	109.0 m
36 cho = 1 ri	2.44 mi	3.93 km

(See Appendix, page 148, for other Japanese units of linear measurement and their equivalents.)

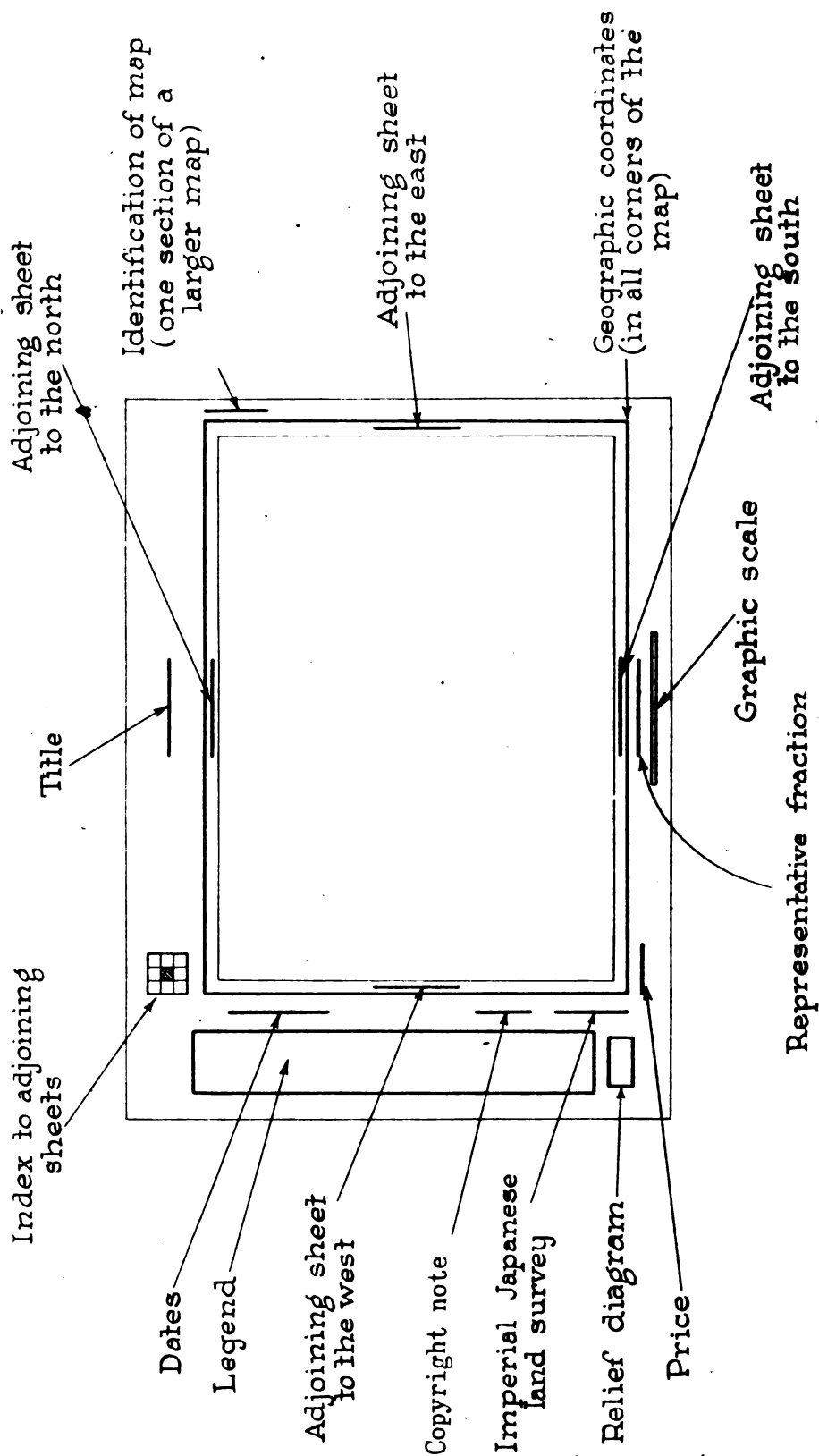


FIG. 28.--Diagram showing approximate positions of various items of marginal information on Japanese maps

Japanese Topographic Maps

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

Contours are printed in green on colored maps and indicate elevation in meters. 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 the contour lines meet the edges of the sheet.

Every fifth contour line may be accentuated. Broken contours represent smaller intervals than do the contours shown by solid lines. The former supplement regular contour lines when regular contours alone will not give a sufficiently detailed picture of land forms. Craters or depressions in the terrain are indicated on a topographic map by small arrows. The Japanese contouring system is similar in several respects to that of the Germans.

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

Hill shading in green supplements contours on colored maps.

Japanese Characters

A knowledge of the Japanese system of writing numbers is necessary to the map reader when deciphering representative fractions and dates found on Japanese maps. The basic characters illustrated below are used on maps published by the Imperial Japanese Land Survey. More intricate symbols for numbers are used on other maps, e.g., the symbol representing 10,000. The basic characters for numbers are as follows:

1	一	6	六	10	十
2	二	7	七	100	百
3	三	8	八	1000	千
4	四	9	九	10000	万
5	五				

Japanese Topographic Maps

Combinations of numbers may be written in any one of three ways: top to bottom, left to right, or right to left. In the examples which follow, read the left column of symbols from top to bottom, the middle column from left to right, and the right column from right to left.

Note that in the first two examples, the second character is added to the first.

11 十一 or 十一 or 一十

15 十五 or 十五 or 五十

In the following examples, the second character is multiplied by the first, and the third character is added, e.g., "three tens, seven," or thirty-seven.

37 三十七 or 三十七 or 七十三

94 九十四 or 九十四 or 四十九

The next group of characters may be interpreted: "one one hundred, nine tens, three," or one hundred and ninety-three.

193 一百九十三 or 一百九十三 or 三十九百一

The principles developed above are further illustrated in the following examples:

3794 三千七百九十四 or 三七九四 or 四九七三

50,000 五万 or 五万 or 万五

Some numbers, such as 二十 and 三十六, may be read as 20 or 12 and 36 or 63, respectively. When such cases arise, the reader should compare other figures on the sheet to determine the direction in which figures must be read.

Although it is not found on their maps, the Japanese also use another numbering system with figures written as in the Arabic system. The number 3794, for example, is written:

三七九四 or 三七九四 or 四九七三

As in the first system described, these numbers may be read in both directions.

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 into our calendar, add to the number of the Japanese year one of the following dates: Meiji 1867, Taisho 1911, Showa 1925, depending on the Japanese period indicated. Therefore, Meiji 40 would become 1907 (40 plus 1867); Taisho 9, 1920 (9 plus 1911); and Showa 16, 1941 (16 plus 1925).

Japanese Topographic Maps

Japanese dates are preceded by a reign, each of which is represented by the characters below:

Meiji 明治

Taisho 大正

Showa 昭和

Characters for year, month, and day are as follows:

Year 年

Month 月

Day 日

The entire date appears as:

明治三十年五月二十三日

The characters indicating *representative fractions* appear on Japanese maps above the graphic scales. The four Japanese characters **尺之一分** symbolize to a Japanese what the words "representative fraction equals 1: _____" would symbolize in English, although they are not literally translatable in this fashion; the characters which precede or follow them indicate the denominator of the representative fraction or the second half of the ratio. Example: **尺之一分万十二** and **尺之一分万五** are the characters for 1:200,000 and 1:50,000, respectively. Representative fractions may be written in reverse order to that shown above, e.g., **二万五千分之一之尺** is 1:25,000. If the four characters, **尺之一分**, are written on the left, read the rest of the representative fraction from the right. If these four characters are on the right, read the remaining characters from the left.

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
Depart-
ment

Key Terms for Identifying Map Dates

測量 or 測圖

..... survey

製版

..... engraving made

發行

..... published

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

毫	 millimeter
厘	 centimeter
米	 meter
料	 kilometer
尺	 shaku
町	 cho
里	 ri



Section of map from original Japanese Series, 1:50,000, Sheet 12



Section of map from Kyūshū Series, 1:50,000, AMS L772, Sheet 133



Section of map from Formosa Series, 1:50,000, AMS I792, Sheet 2214-IV

Chapter VIII

CHINESE MILITARY MAPS

Chinese military maps are published by the Chinese Central Land Survey. This agency is 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. In spite of the efforts of the Central Land Survey to coordinate the activities of these provincial units, many discrepancies are found among the map series of the various provinces.

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. These may be encountered in two "styles." Maps published prior to 1935 are classified "Old Style" maps. The form of these "Old Style" sheets is not consistent. The sheets were made from sources of varying accuracy, and in many instances boundaries on maps of adjoining provinces do not agree. The "New Style" sheets published since 1935 follow a more definite form than the older maps; they have a military grid and are fairly reliable. These improvements in the "New Style" sheets can be attributed to the close supervision exercised by the Central Land Survey in the preparation of these maps.

United States maps of China are being prepared. They are similar in style, scale, symbolization, and marginal content to the new US maps of Japan and the Philippines.

Chinese Coordinate Systems

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, respectively. On a few old Chinese maps, longitude is measured from the meridian of Peking.

The *Chinese military grid* is used on Chinese maps published since 1935. A series of latitudinal overlapping zones was established. These zones appear to cover 3°30' of latitude and

Chinese Military Maps

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.

Characteristics of Chinese Military Maps

The *marginal information* found on Chinese maps is scanty when compared with that found on maps of other countries. Figure 30 shows the type and approximate position of *marginal information* on Chinese maps. The exact nature and position of the various items may vary with the series.

When *evaluating a Chinese map* due consideration should be given to the general characteristics of Chinese mapping. The differences in mapping technique of the many provincial mapping units result in a lack of uniformity and consistency.

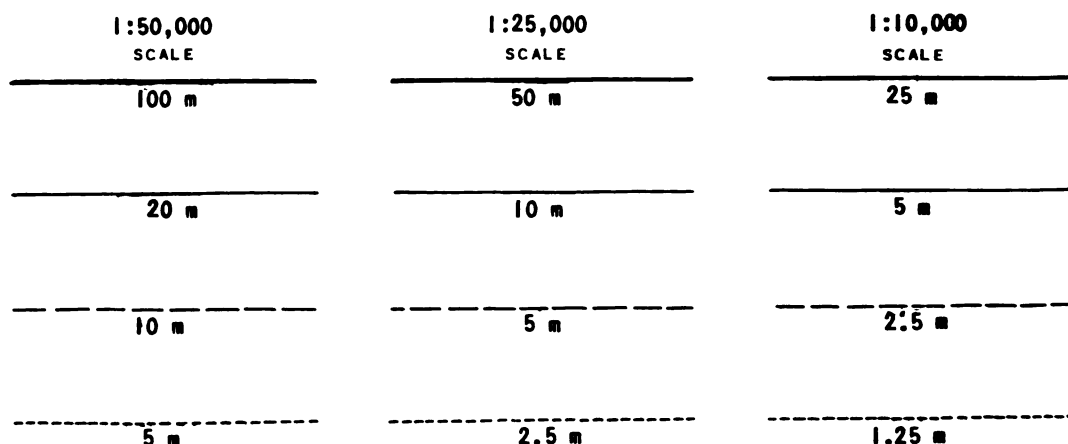


FIG. 29.--Contours used on Chinese maps

Graphic scales in kilometers and in *shi li* will be found in the lower margin of a Chinese map. The kilometer scale is usually

the upper one. The *shi li*, as used on Chinese General Staff maps, is equivalent to 500 meters. However, on maps other than General Staff maps, this particular unit of measure may vary in length in the different Chinese provinces. Although the metric system has been officially adopted in China, the older Chinese units still may be encountered. (See Appendix, p. 149.)

Relief is shown on Chinese maps by means of contours, supplemented by shading and spot heights.

Four types of contour lines are found on maps of China. The symbols used are the same for maps of all scales. However, the symbol representing a particular interval on a map of one scale will represent a different interval on a map of another scale. (See Fig. 30.)

An unusual type of *shading*, combining some of the characteristics of both hachuring and hill shading, is also used on Chinese maps to represent topography. This means of showing relief is found on contoured maps in many areas having very steep slopes or rough terrain. (See Fig. 31.)

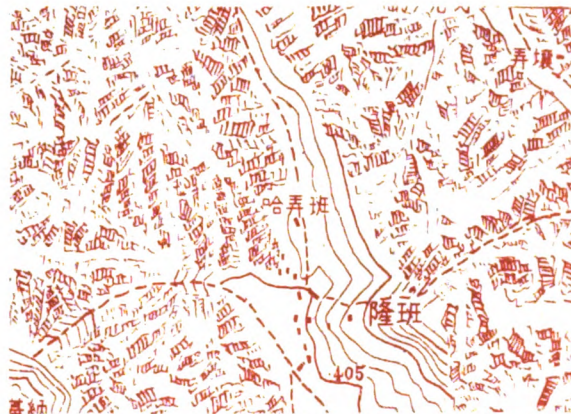


FIG. 31.--Section of Chinese Map, 1:50,000
Note method of representing rough terrain

Spot heights supplement other methods of indicating relief. Elevations are given in meters.

Caution should be exercised in interpreting relief on Chinese maps. 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.

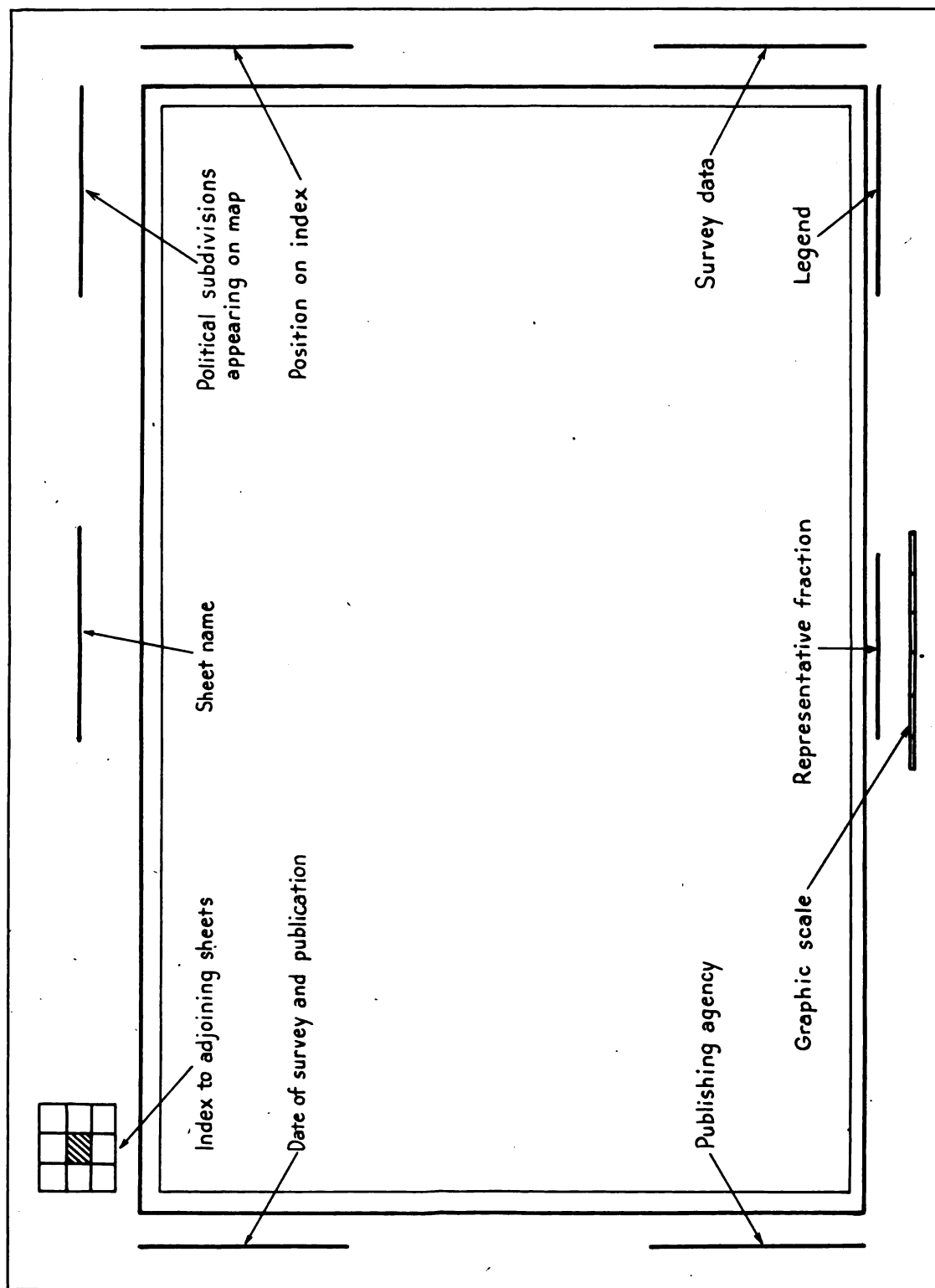


FIG. 30.--Diagram showing positions of marginal information on Chinese maps.

Chinese Characters

A knowledge of the Chinese method of writing numbers, representative fractions, and dates is necessary when reading a Chinese map. In addition, familiarity with certain characters commonly found in the marginal information will be helpful to the map reader.

The Chinese characters for numbers and representative fractions are the same as those of the Japanese described in the previous chapter. About the 8th century, the Chinese system of characters was adopted by the Japanese. This explains the similarity between the written language of the two countries.

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 prior to 1912 to our calendar. These are the Kuan Tsui Tzi, 1875, and Hsuan Tung Tzi, 1908. Dates earlier than 1875 are calculated from other eras not listed here.

The characters for the above-mentioned eras are:

Kuan Tsui Tzi

Hsuan Tung Tzi

Chung Hua Ming Kuo

光緒紀
宣統紀
中華民國

Chinese Military Maps

The characters representing year, month, and day are:

year 年

month 月

day 日

Thus, the 25th year of the Chinese republic, 1936, will be represented by the characters:

中華民國二十五年

Glossary of Chinese Map Expressions¹

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

¹ "Glossary of Selected Map Terms...", March 1944, Army Map Service, Corps of Engineers, U.S. Army, Washington, D.C.

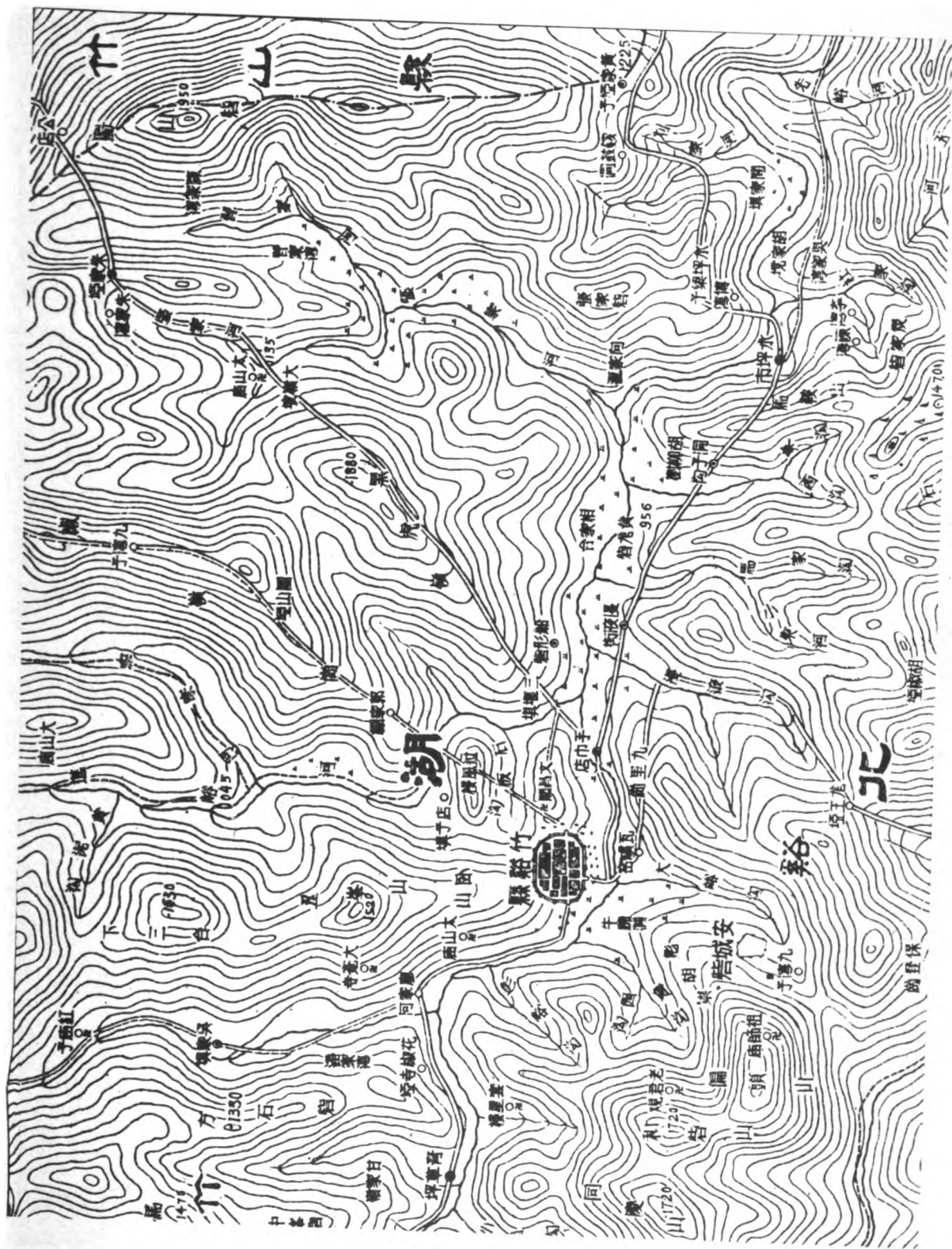
寫真石印	 photolithographed
印刷	 printed
修正	 revised

Directions

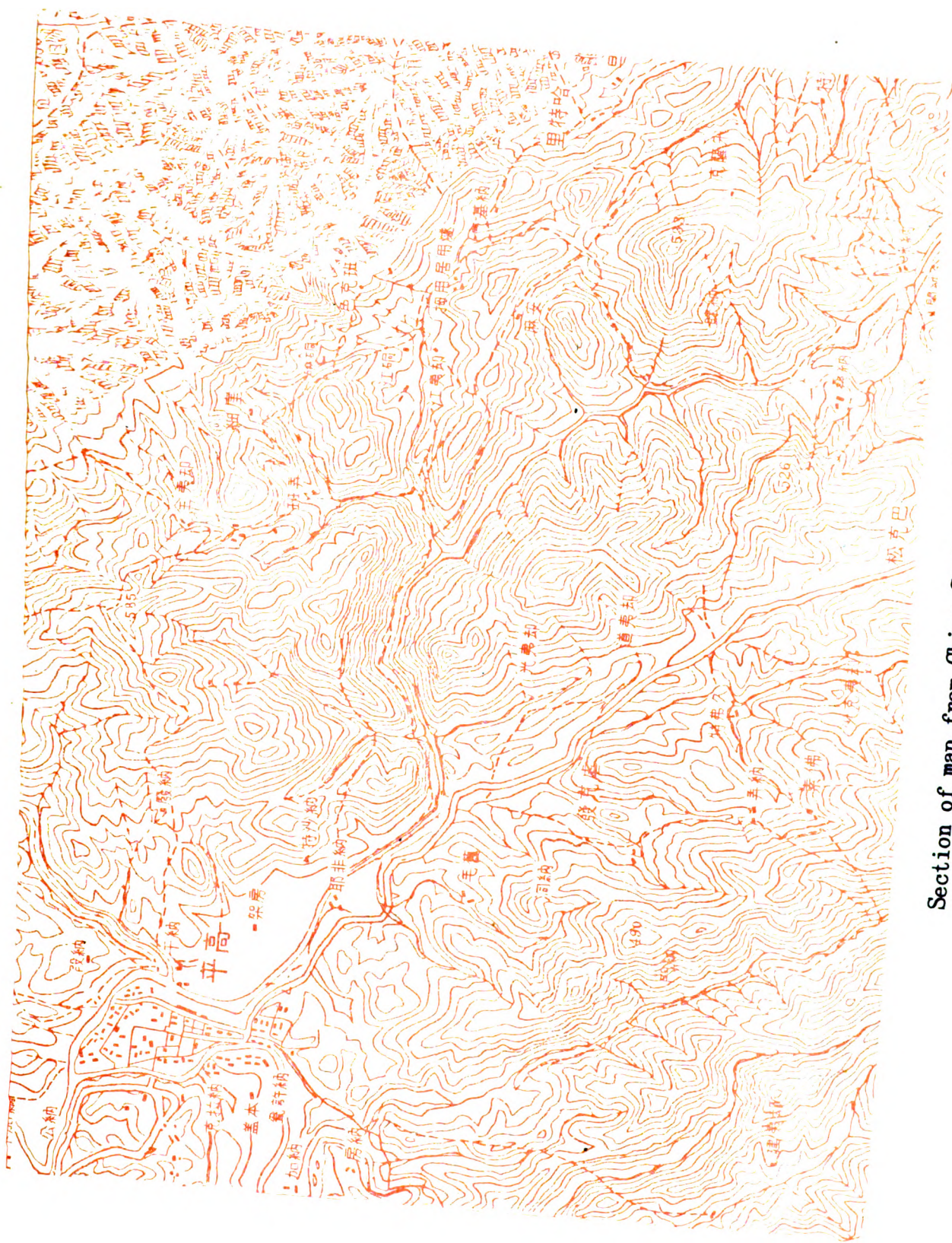
北	 north
西	 west
東	 east
南	 south

Units of Linear Measure

公里	 kilometer
公尺	 meter
公分	 centimeter
市里	 shi li
丈	 chang



Section of map from China Series, 1:100,000



Chapter IX

CHARACTERISTICS OF MISCELLANEOUS MILITARY MAPS

Burma, India, and Malaya

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.

Burma and India are adequately covered by maps scaled at 1:253,440, 1:126,720, 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.

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.

French Indo-China

The *Service Géographique de l'Indo-Chine* 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. 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.

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

Miscellaneous Military Maps

Netherlands East Indies

The original surveying and mapping of the Netherlands East Indies was done by the *Topografische Dienst*. Java, Bali, Southwestern Celebes, and Amboina are mapped on a scale of 1:50,000. Sumatra, Southeast Borneo, Halmahera, and Dutch Timor are mapped on a scale of 1:100,000. Western Borneo is covered by maps of 1:200,000 scale. The remaining islands of the Netherlands East Indies are either mapped by reconnaissance sketches of various scales or are not mapped at all. Geographic coordinates are expressed in the degree system on these maps, but the meridian of Batavia or Padang or Singkawang may be used for measuring longitude. The Dutch used their own military grid on maps of these areas. These grids are metric grids similar in construction to others previously discussed. Topography is represented by contours and spot heights in meters. Hill shading and hachuring are used in only a few instances on Dutch maps of this area. Dutch maps are printed in color.

United States maps of the Netherlands East Indies are copied from the original Dutch sheets. The original Dutch symbols and use of color have been retained. A glossary of Dutch terms is included in the margin to aid in interpreting various features identified by Dutch names. Other marginal information is similar to that found on other maps.

The Balkans

Balkan military maps are distinguished by two characteristics. Many of the older maps of these countries are reproduced from, or are based on, pre-World War I Austrian General Staff maps. Modern maps of these countries show a marked French influence both in style and in geographic coordinates used.

The military maps of *Yugoslavia* are published by the *Vojni Geografski Institut*. The principal map series is drawn on a scale of 1:100,000, although maps on scales of 1:200,000, 1:75,000, and 1:50,000 are available for a considerable part of the country. Geographic coordinates can be expressed in degrees with longitude measured from either Greenwich or Paris. Relief is depicted by contours, spot heights, and hill shading. Contours

Miscellaneous Military Maps

used on maps of Yugoslavia are similar to those used on large-scale maps of Germany.

The *Institutul Geografic Al Armatelor* publishes military maps of Roumania. They are drawn to scales of 1:200,000, 1:100,000, and 1:50,000. The degree system is used in expressing geographic coordinates. Longitude is measured from Paris and Greenwich. A military grid with a basic 1-kilometer interval is used.

Bulgarian maps are published by the Cartographical Institute. Graphic scales on these sheets are subdivided into versts (units of Russian linear measure) and also into units of the metric system. The principal map series are drawn on scales of 1:210,000, 1:126,000, and 1:50,000. As on the maps of other Balkan countries, geographic coordinates are read in the degree system, and longitude is measured from both Paris and Greenwich. The Cyrillic alphabet is used on most Bulgarian maps.

Greek military maps are published by the *Kartografika Hiperesea Stratoy*. The most important map series is the 1:100,000 contoured General Staff map covering all of the country. Other series of various scales cover only parts of Greece. Geographic coordinates are shown in degrees, with longitude measured from Athens. A kilometric grid may be found. A knowledge of the Greek alphabet is essential to complete understanding of information given on maps of this country.

The principal *Turkish map series* is the 1:200,000 series. The degree system of geographic coordinates is used, and longitude is measured from Istanbul. Old Turkish maps are printed in Arabic script, but the modern series use the Latin alphabet.

The United States Army Map Service has 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 the scale of 1:126,000 and 1:40,000; Yugoslavia, to the scale of 1:50,000; and European Turkey, to the scale of 1:25,000.

Eastern and Central Europe

Polish maps are published by the Military Geographic Institute (*Wojskowy Instytut Geograficzny*). The principal map series are

Miscellaneous Military Maps

those to the scale of 1:300,000, 1:100,000, 1:50,000, and 1:25,000. Polish maps resemble German maps in many respects. Geographic coordinates on modern Polish maps are read in degrees, and longitude is measured from Greenwich, although a few older sheets use the meridian of Ferro. A military grid is found on most sheets. The grid interval on maps to the scale of 1:100,000 is two kilometers. Alternate grid lines bear two-digit numbers denoting grid distances in kilometers and tens of kilometers. The grid lines nearest the sheet corners bear an additional digit in smaller type denoting grid distances in hundreds of kilometers. Maps to the scale of 1:25,000 contain grid lines at 1-kilometer intervals. All grid coordinates are read to the right and up. Scales on these maps 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 show a marked similarity to conventional signs used on German maps of 1:25,000 scale.

Czechoslovakian military maps are published by the Military Geographical Institute (*Vojenskeno Zemeptiseho Ustavu*). The principal map series are those to the scale of 1:200,000, 1:75,000, and 1:25,000, the latter two being modernizations of Austrian General Staff series. Geographic coordinates are expressed in degrees. The prime meridian used on modern maps is that of Greenwich. A kilometric grid system with a basic 1000-meter grid interval is found. 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. The other grid lines bear the two digits denoting grid distances in kilometers 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. Thus 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 it is desired to give a fuller grid reference, 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. Graphic scales in *kroku* (strides) and metric units appear in the margins. Contours at metric intervals, supplemented by metric spot heights, are used to depict relief on the large-scale maps, while hachuring is used on the 1:200,000 series.

Hungarian military maps are published by the *Magyar Kiralyi Allami Terkepszet*. The older maps which are based on Austrian General Staff maps are 1:200,000 and 1:75,000 in scale. A modern series to the scale of 1:25,000 has been prepared, many of the sheets being based on aerial photos. Graphic scales, contour intervals, and spot elevations are expressed in metric units of measure. Geographic coordinates are expressed in degrees with longitude based on the meridian of Greenwich. The meridian of Ferro is used on older sheets.

Scandinavia

The *military maps of Denmark* are published by the *Generalstabens Topografiske Afdeling* on the scale of 1:200,000, 1:100,000, 1:40,000, and 1:20,000. The tactical sheets bear a strong resemblance to the large-scale maps of Germany in symbolization, contours, and general appearance. Geographic coordinates are expressed in degrees, with longitude measured from the prime meridian of Copenhagen. 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 one hundred 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: (1) the number of the 50-kilometer square; (2) the letter of the 10-kilometer square; (3) the number of the 1-kilometer square; (4) the number of tenths to the right and up within the 1-kilometer square. 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.

Norwegian military maps are published by the *Norges Geografiske Opmåling* on scales of 1:400,000, 1:200,000, 1:100,000, 1:50,000,

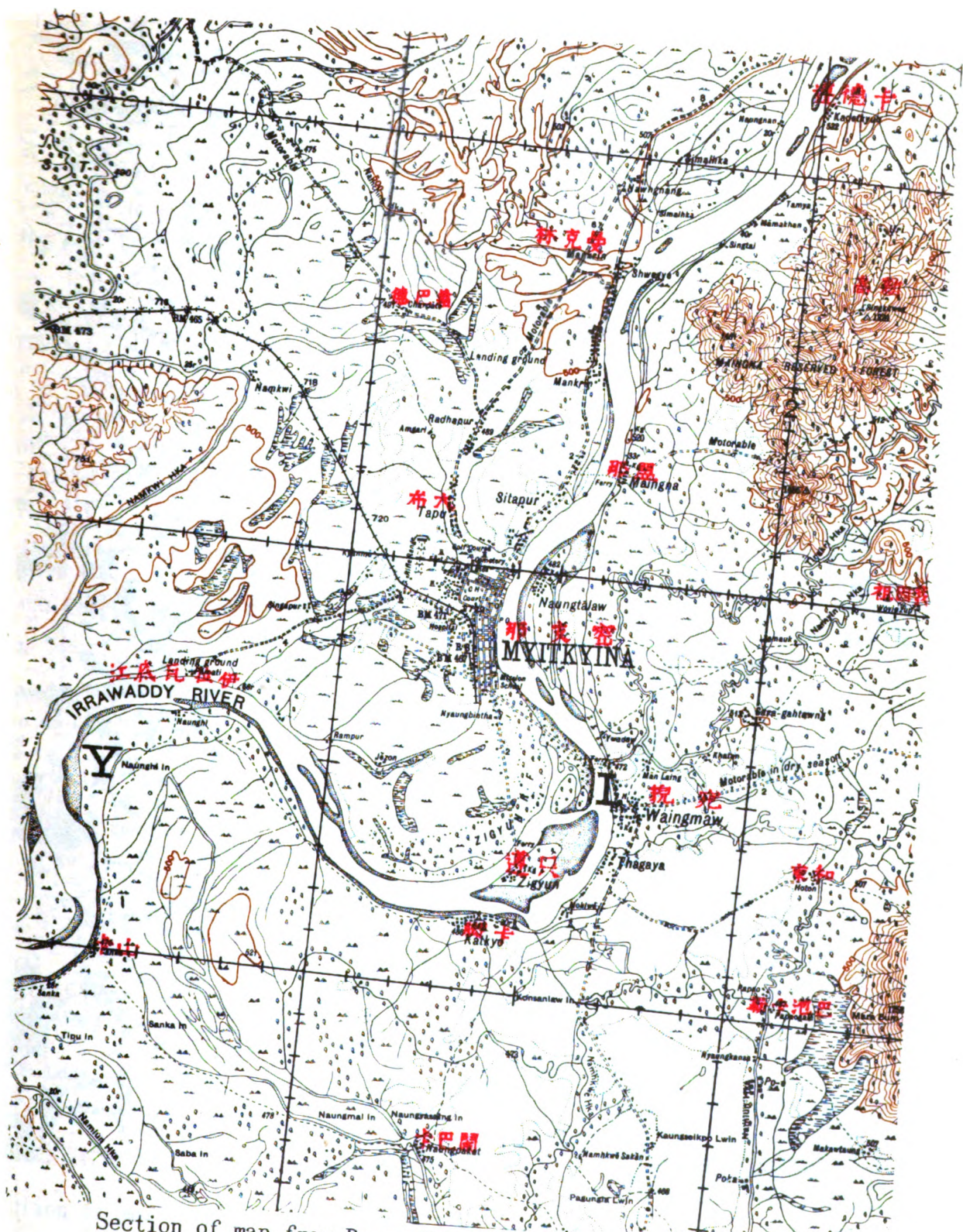
Miscellaneous Military Maps

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 depict 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.

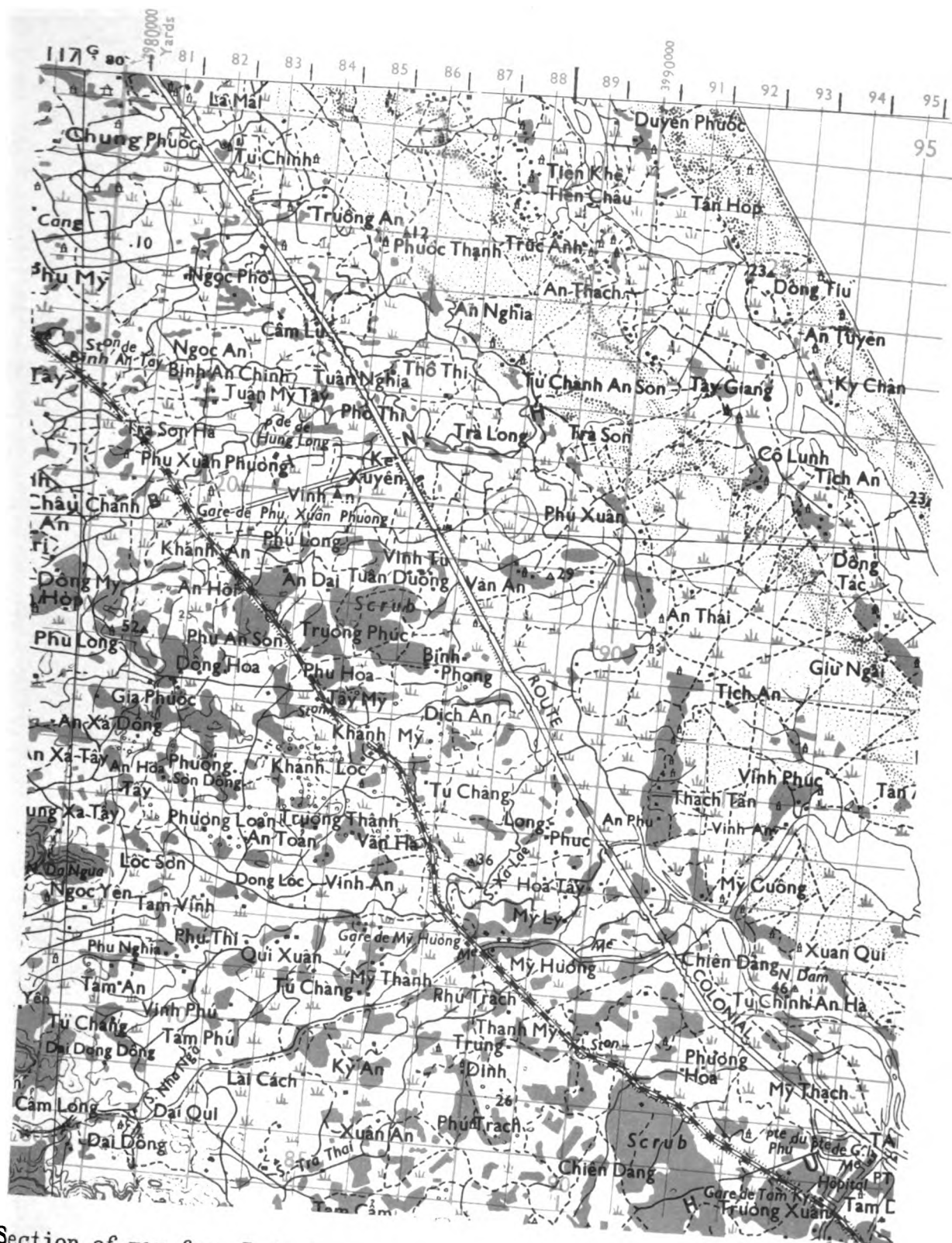
Swedish military maps are published by the *Generalstabens Litografiska Anstalt*. The principal map series are 1:400,000, 1:200,000, and 1:100,000 in scale. Geographic coordinates are expressed in degrees. Longitude is usually measured from the meridian of Stockholm, although it is sometimes measured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



Section of map from Burma and Thailand Series, 1:253,440
Provisional G.S.G.S. 4218, Sheet F-47D



Section of map from Burma Series, 1:126,720, Sheet 92G/SW



Section of map from Indo-China Series, 1:100,000, HIND, Sheet No. 137(East)



Section of map from Java and Madura Series, 1:50,000,
G.S.G.S. 4202, Sheet 51/XLIII-C & 51/XLIV-A

44°
30'

14° 30' istočno od Pariza

17° 0' istočno



Section of map from Yugoslavia Series, 1:100,000
G.S.G.S. 4396, Sheet 79

APPENDIX

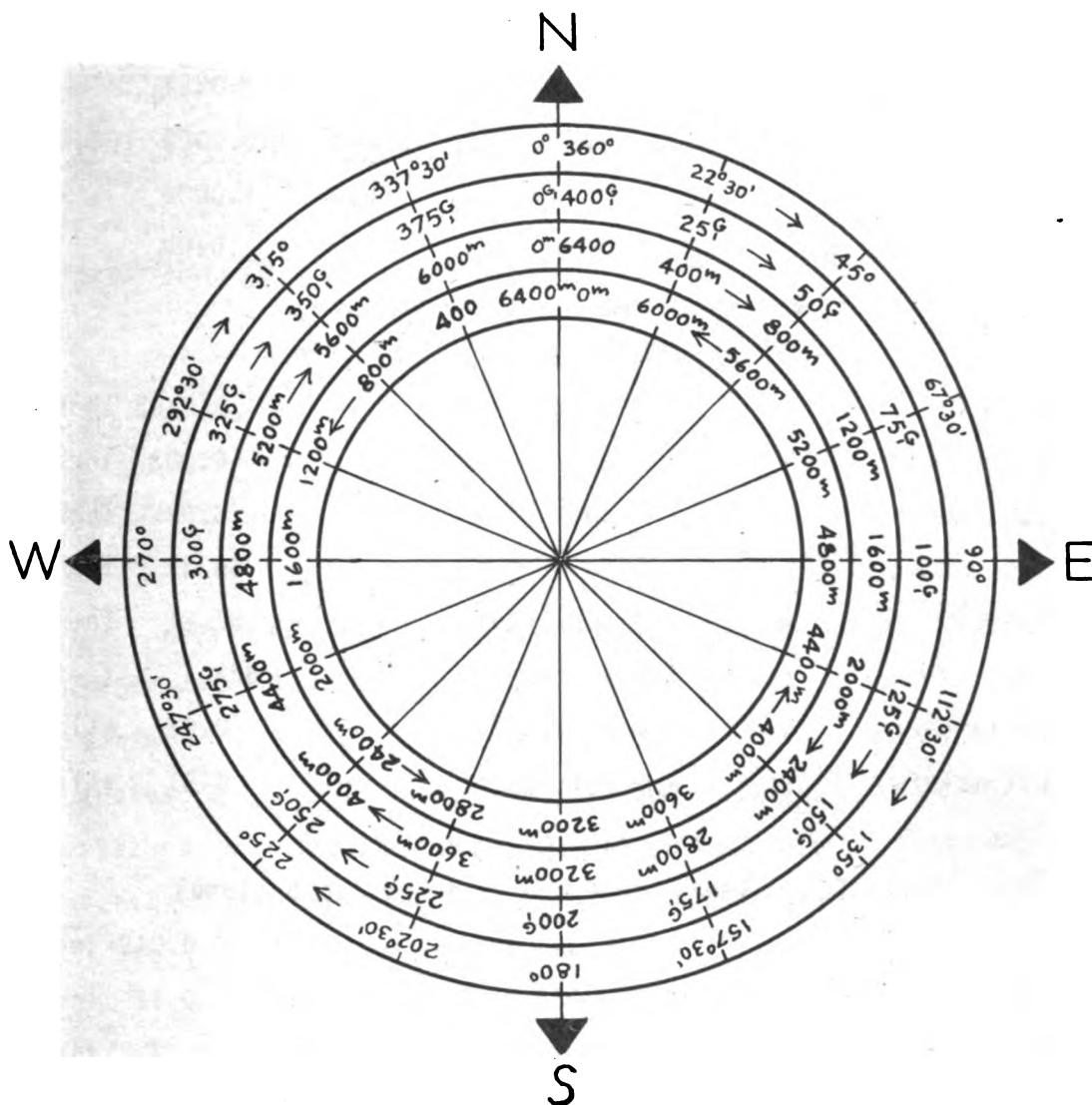


Diagram showing relationship of degrees, grades, mils clockwise, and mils counterclockwise

Foreign Units of Linear Measure

Table of Equivalent Units of Length

	Mi	Yd	Ft	In	Km	M	Cm
Mi	1.0000	1760.0000	5280.0000	63,360.0000	1.6093	1609.3470	--
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

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

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

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
10 li	-	1 feng	-	3.2 millimeters
10 feng	-	1 chun	-	3.2 centimeters
10 chun	-	1 chi	-	32.0 centimeters
10 chi	-	1 chang	-	3.2 meters
180 chang	-	1 shi li	-	576.0 meters

(NOTE: When the length of the *shi li* differs from that shown above, all other units are correspondingly changed in length.)

Chinese System of Linear Measure
(as Used on Chinese General Staff Maps)

1 chang	-	3.333 meters	-	10.935 feet
150 chang	-	1 shi li	-	500.0 meters

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
7 foutes	-	1 saszen	-	2.1336 meters
500 saszen	-	1 verst	-	1.066 kilometers
7 versts	-	1 milya	-	7.467 kilometers

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

In the conversion of the decimal system of grades to the sexagesimal system of degrees, minutes, and seconds—first 8 columns—the seconds column is omitted, the conversion being complete without it; thus, 101 grades = $90^{\circ} 54'$ (or $90^{\circ} 54' 00''$).]

-150-

In the French notation, the following equivalent expressions are used: 99.6265 = 99 grades, 62 centigrades, and 65 decimilligrades = 9 grades, 62 minutes cental males, and 65 secondes cental males = 9° 62' 65".

-151-

Conversion Factors

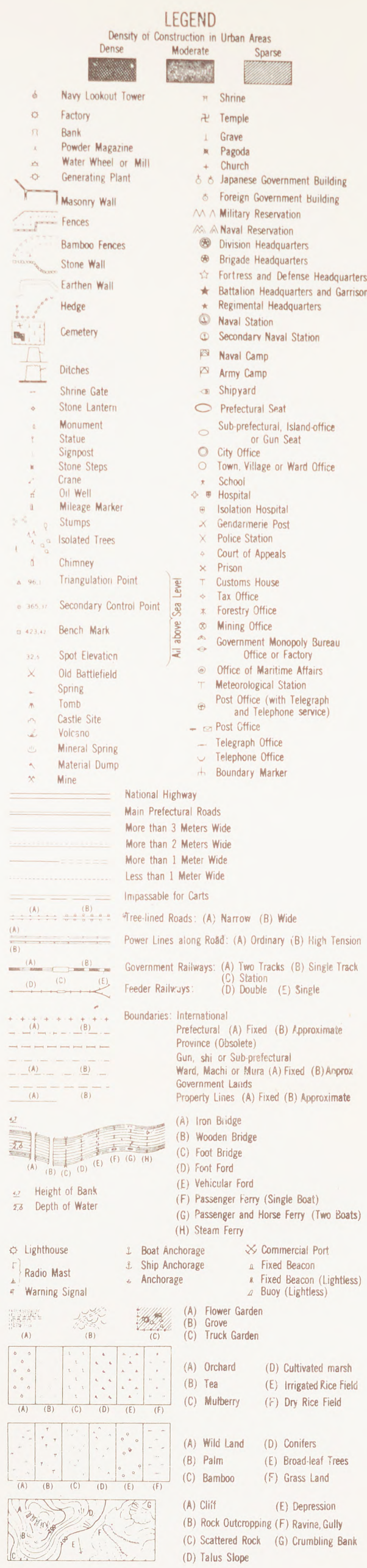
To convert:	Multiply by:	
	<i>Exact</i>	<i>Approximate</i>
Inches into centimeters	2.540	2.5
Feet into meters	0.3048	0.3
Yards into meters	0.9144	0.9
Miles into kilometers	1.609	1.6
Centimeters into inches	0.3937	0.4
Meters into feet	3.281	3.3
Meters into yards	1.094	1.1
Kilometers into miles	0.6214	0.62
Grades into degrees	9/10	
Grades into mils	16.00	
Degrees into grades	10/9	
Degrees into mils	17.77	17.8

*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 (French value) 17°40' W (German value)
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

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 the United States and British editions and to the foreign originals from which the United States and British copies were reproduced.



GLOSSARY

VARIANTS IN PARENTHESES

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

British Maps of Germany

REFERENCE

Railways: Normal gauge, 2 or more tracks	
Normal gauge, single track	
Narrow gauge	
Tramway or Mineral railway	
Cable railway	
Station, Halt	
Embankment, Cutting	
Tunnel, Level crossing	
Roads: Motor highways: Reichsautobahnen (independent of road system) Two metalled carriage ways, each 7.5 metres wide	
Reichsautobahn under construction	
Main roads, Reichstrassen with route numbers metalled and mostly 6 metres wide	
Other main roads, (mostly Landstrassen, 10 ft) metalled and 5.5 metres average useful width	
Secondary roads, metalled and 4 metres average useful width	
Other roads & cart tracks, not always motorable and often unmetalled	
Lanes, tracks, paths	
Kilometre stone, signpost	
Boundaries: International, Provincial	
District, Town or parish	
Wire fence, hedge	
Wall, fence	
Monument, windmill	
Chimney, water tower	
Shrine, chapel, church	
Cemetery	
High tension cable	
W/T Station, and with tower over 200 ft. high	
Quarry, mine	
Spotheight (in metres), bench mark	
Trigonometrical point	
Bridges, etc	
Iron, stone, wood, pontoon, footbridge, ferrass	
Canal, weir, lock, sluice	
Drainage ditch, dry river bed	
Well, spring	
Lighthouse, beacon	
Woods, etc	
Deciduous, coniferous	
Scrub, reforestation	
Heath, peat cuttings	
Sand (or gravel)	
Meadow-swamp	
Vineyard, hopfield	
Orchard-plantation, park	
Built-up areas, gardens	
Broken unstable ground, slag heaps, etc.	
Terraces, rocky cliff	
Contours	

Heights in metres

Legend from G.S.G.S. 4414, Germany, 1:25,000, Sheet 3715

	Main surfaced roads: (a) - more than 4 meters wide; (b) - 2-4 meters wide		Graves; Chinese, native
	Other surfaced roads		Cemetery; heathen, Christian
	Unsurfaced roads, passable all seasons		Ruins; monuments
	Unsurfaced roads, passable in dry season		Buildings; iron, stone, wooden, bamboo
	(a) - pack trail; (b) - trail		Warehouses; stone, iron, wooden, bamboo
	(a) - wood and stone distance posts; (b) - iron bridge; (c) - wooden bridge; (d) - bamboo bridge; (e) - wooden culvert; (f) - stone culvert; (g) - cut; (h) - fill; (i) - grade		Government hostels
	Plantation crossroads; road under construction		Boundary markers; stone, wood, iron; signpost
	Railroad; (a) - station; (b) - under construction		Fences; stone, barbed wire
	Narrow gauge railroad; (a) - station; (b) - tramway, steam and electric		Hedges; living, dead
	(a) - settlement; (b) - sparsely settled area; (c) - cleared area		Well; spring; fumarole; sulphur spring; running spring
	(a) - orchard or gardens; (b) - arable upland; (c) - wet rice field		Marsh; swamp; mud spring
	Salt pans; Administrative headquarters		(a) - stream; (b) - unsurveyed stream; (c) - irrigation or drainage ditch; (d) - dry ditch
	Astronomical stations; electric power: lines		(a) - stone sluice; (b) - navigable; (c) - sandbank; (d) - ford; (e) - ferry; (f) - sandy shore
	Telephone line; triangulation points		Lake; fishponds
	Christian church; mosque; Chinese temple		(a) - dike; (b) - cut; (c) - island; (d and e) - direction of flow; (f) - fill; (g) - bank
	Radio station; airfield; oil tanks		Contour interval 25 meters with every 10th contour heavy; (a) - depression contour; (b) - elevation figures; (c) - irrigated upland rice field; (d) - form line; (e) - slight elevation; (f) - rocky ground; (g) - irregular ground; (h) - line separating land always wet from dry land
	Piers or breakwaters; stone, iron, wood		(a) - cave; (b) - mine; (c) - tunnel
	Seawall; cofferdam		Forest; tree used as landmark; underbrush; mangrove
	Stone lighthouse; iron lighthouse; watch towers		Grass; along along grass; wild sugar cane
	Drydock; floating drydock; warning signal		Plantations; rubber, tea, coffee
	Anchorage; harbor; harbor lights		Trees of various types
	Buoys and beacons (various)		Boundaries: (a) - residency; (b) - division; (c) - sub-division; (d) - parish; (e) - plantation; (f) - district
	Rocks awash and under water; breakers; low water line		

GLOSSARY OF MAP TERMS

- Agonic line* A line passing through points having no magnetic declination.
- Altitude tints* See *layer tints*.
- Annual change* The yearly increase or decrease in magnetic declination.
- Arbitrary grid* A grid arbitrarily constructed and over-printed on a map and used to locate and designate map points without regard to their actual geographic location.
- Azimuth* A direction usually expressed in degrees and usually measured clockwise from one of the three norths.
- Back azimuth* Azimuth($\pm$) 180° ; the reverse or backward direction of an azimuth.
- Bench mark* A marker along a line of survey indicating elevation.
- Cadastral map* A map of extremely large scale showing the exact position and dimensions of objects and real estate properties.
- Centigrade* A 100th part of a grade; 100 decimilligrades; a unit of angular measure equal to 0.54 of a degree minute.
- Centimeter* A measure of length equal to 1/100 of a meter or approximately 2/5 (0.3937) of an inch.
- Clinometer* An instrument for measuring or indicating angles of slope and elevation.
- Compass* An instrument for determining directions upon the earth's surface by means of a magnetized needle turning freely upon a pivot and pointing to the magnetic north and south.

- Compiled map* A map prepared by assembling data from existing maps, photo maps, intelligence reports, reconnaissance, etc.
- Coniferous woods* Woods composed of trees (generally evergreen) bearing cones.
- Contour interval* The difference in elevation between two adjacent contour lines; vertical interval.
- Contour line* An imaginary line on the surface of the earth (represented on maps by actual lines) all points of which are the same height above a datum plane.
- Convergence* An elliptical expression of the British "angle of convergence"; grid declination. (See *Grid declination*.)
- Copied map* A map reproduced from an existing map.
- Datum plane* A plane or level used as a basis for reckoning altitudes. (Usually mean sea level on maps.)
- Deciduous woods* Woods composed of trees (usually broad-leaved) which shed their leaves.
- Decimilligrade* A 100th part of a centigrade; a unit of angular measure equal to 0.324 of a degree second.
- Declination pro-tractor* A map-orienting device, consisting of a horizontal degree scale and a pivot point, by means of which a magnetic north line may be drawn across the face of a map.
- Defiladed area* An area not visible from a given point.
- Degree* A 360th part of the circumference of a circle.
- Easting* The eastward (i.e., from left to right) reading of grid values; the X-coordinate of a British grid reference.

- False origin** A fixed point to the south and west of a British grid zone from which grid lines are numbered eastward and northward; the origin of grid values.
- Form line** An approximate contour, shown on a map as a dotted or broken line, used to depict elevation in the absence of contours or between widely spaced contour lines.
- Geodetic surveying** The branch of surveying which takes into account the curvature of the earth.
- Grade** A 400th part of the circumference of a circle; a unit of angular measure equal to 9/10 of a degree.
- Gradient** A slope expressed as a fraction, e.g., a gradient of 1/30 represents a rise or fall of one unit of linear measure in a distance of 30 like units of measure. (Formula for computing gradient between two points:
- $$\frac{\text{Vertical Difference}}{\text{Horizontal Distance}} = \text{Gradient.})$$
- Graphic scale** A graduated line on the margin of a map, by means of which distances on the map may be measured in terms of actual ground distances.
- Graticule** A four-sided figure on a map formed by the intersection of two meridians and two parallels.
- Grid azimuth** An azimuth measured from grid north.
- Grid declination** The angular difference between grid north and true north measured east or west from true north.
- Grid junction** The boundary between two grid zones, sometimes emphasized by Zip-A-Tone.

- G-M angle* The angular difference between magnetic north and grid north measured east or west from grid north; sometimes referred to on United States maps as magnetic declination from grid north.
- Grid north* The north toward which the vertical grid lines on a map point.
- Grid zone* An area covered by grid lines based on one origin, and for which area grid tables have been prepared for use in the computation of geographic coordinates.
- Hachuring* A system of depicting relief by means of short disconnected lines drawn in the directions of steepest slope.
- Hill shading* A system of depicting relief on a map by means of shadows caused by an imaginary oblique light assumed to be shining on the map from a northerly direction.
- Hypsometric diagram* ... A small-scale diagram representing relief by means of different patterns or degrees of shading for specified levels of elevation.
- Intersection* A method of locating a point by plotting the azimuths to that point from two or more known fixed points. (The intersection of these azimuths indicates the location of the point.)
- Isogonic line* A line passing through points of equal magnetic declination.
- JAN Grid (Joint Army-Navy Grid)* A point designation grid used jointly by United States land and naval forces. (Described in TB 21-25-1, 2 Mar 44.)
- Kilometer* A unit of linear measure approximately $\frac{5}{8}$ (0.62) of a mile; 1000 meters.

- Latitude* The angular distance in degrees north or south of the equator.
- Layer tints (alti-
tude tints)* A system of depicting relief by use of different colors and tints to indicate specified levels of altitude.
- Longitude* The angular distance in degrees east or west of a prime meridian.
- Magnetic azimuth* An azimuth measured from magnetic north.
- Magnetic declina-
tion* The angular difference between magnetic north and true north measured east or west from true north.
- Magnetic north* The north toward which the needle of a compass points.
- Map* A representation of a portion of the earth's surface drawn to a definite scale and depicted on a flat surface.
- Map orientation* The act of placing a map so that its north lines point to their corresponding norths. (The British call this process "setting a map.")
- Map template (map
templet)* A thin transparent plate divided into grid squares of a definite size and used for point designation purposes.
- Meridian* Half of a great circle passing through the poles; one of a series of imaginary lines of longitude extending from pole to pole and the representation of such a line on a map.
- Metalled road* A road constructed of gravel, crushed stone, slag, or similar material with a binder of fine aggregate, tar, or cement.
- Meter* A unit of linear measure approximately 39.37 inches; the basic unit of measure of the metric system.

- Mil* A 6400th part of the circumference of a circle. (1 degree equals approximately 17.78 mils.)
- Millimeter* 1/1000 of a meter; a metric measure approximately 0.039 of an inch.
- Northing* The northward (i.e., from bottom to top) reading of grid values or the Y-coordinate of a British grid reference.
- Parallel* One of a series of imaginary circles on the surface of the earth, parallel to the equator, marking the latitude; also the representation of such a line on a map.
- Percent of slope* The angle of ascent or descent expressed as a percent; the number of linear units a slope rises or falls vertically in a horizontal distance of 100 like units. (Formula for computing percent of slope between two points:
- $$\frac{\text{Vertical Difference}}{\text{Horizontal Distance}} \times 100 = \text{Percent of Slope.})$$
- Photomap* A reproduction of a photograph or mosaic upon which grid lines, marginal data, and place names may be added.
- Plan* A map, usually of a city or a small area, having an extremely large representative fraction (RF).
- Plane table map* A large-scale map depicting objects and their distances from each other horizontally and vertically; a map made without considering the effect of the curvature of the earth. (It differs from a planimetric sketch in that it depicts relief.)
- Planimetric sketch* A sketch depicting objects and their distances from each other horizontally without regard to their elevation.

- Polar coordinates** A means of designating a point by stating its direction and distance from a known reference point.
- Prime meridian** A meridian from which longitude is measured, both east and west; the meridian line at which longitude is zero.
- Profile** A cross section of a portion of the earth's surface formed by the intersection of the earth's surface with an imaginary vertical plane.
- Projection** Any one of a number of systems of parallels and meridians upon which a map can be drawn.
- Quadrant** One of the four parts into which a plane is divided by vertical and horizontal axes.
- Relief** The representation on a map of ground forms, such as ridges, valleys, mountains, etc.
- Representative fraction (RF)** The relationship between map distance and ground distance expressed as a ratio, e.g., 1:25,000 or 1/25,000.
- Resection** A method of locating a point by plotting the back azimuths to that point from two or more known fixed points. (The intersection of these back azimuths indicates the location of the point.)
- Scale** The relationship between map distances and ground distances expressed in one or more of the following ways: words and figures, representative fractions, and graphic scales.
- Scale factor** The value by which an actual ground distance is multiplied to obtain that ground distance as represented on a map. (This factor compensates for map distortion.)

- "Schritt"* The German pace or step used as a unit of linear measure and equal to 80 centimeters or approximately 32 inches.
- Spot height* The printed figure on a map which designates the elevation of a point above a datum plane; spot elevation.
- Survey* The determination and delineation of the form, extent, and position of portions of the earth's surface, accomplished by measuring linear and angular distances and the application of the principles of triangulation.
- TAD Grid (Target-Area Designator Grid)* A system of grid reference, applicable to maps using a 1000-yard World Polyconic grid, which identifies 200-yard squares by a four-digit number and a letter.
- Terrain intelligence* The understanding and appreciation of the topographic nature of terrain and the evaluation of its potential effect on military operations.
- Topographic map* A map depicting objects and their distances from one another horizontally and vertically; a map depicting relief.
- Triangulation point* ... A point whose precise elevation and geographic position is known; primary traverse station; trigonometrical point (British).
- True north* The direction of the geographic north pole from any point on the earth's surface; geographic north.
- True origin* The intersection of the central meridian and the median parallel of a British grid zone. (This intersection determines the directions, i.e., north-south and east-west, of the grid lines covering the zone in question.)

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