FOREIGN MAPS

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WAR DEPARTMENT
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EDWARD F. WITSELL
Major General
The Adjutant General

Chief of Staff

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FOREWORD

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

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CHAPTER I

INTRODUCTION TO FOREIGN MAPS

Section I. GENERAL

1. Purpose and Scope

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

2. Military Maps

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

3. Projections

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

Section II. MAP ANALYSIS

4. Method of Analysis

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

5. Evaluation and Orientation

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

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

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

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

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

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

(6) Date of reprint refers to the time at which a set of maps was printed from previously used plates. This date does not signify that changes were made on the map.
b. AGENCY. The type of agency responsible for preparing a map indicates its accuracy. Maps published by governmental or military agencies are generally the most accurate. Some civilian agencies produce accurate maps, but these are frequently of a general nature and do not contain the specific detail necessary for military purposes.

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

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

6. Scale

a. Scales of most foreign maps are similar to our scales. Most foreign countries use the metric system of measurement, and their most common map scales are 1:200,000, 1:100,000, 1:50,000, and 1:25,000. These scales permit map distances to be converted quickly and easily into ground distances. For example, 1 centimeter on a map of 1:100,000 scale represents 1 kilometer on the ground. Similarly, 1 centimeter represents \( \frac{1}{2} \) kilometer on a 1:50,000 map or \( \frac{1}{4} \) kilometer on a map of 1:25,000 scale.

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

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

7. Coordinate System

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

Figure 1. Appearance of a declination protractor oriented on a line of the grid from which the magnetic angle is given. Protractor is based on the data shown by the sample declination diagram on the left and is shown here as all protractors should appear when no border is used around the map.
The degree or sexagesimal system is used almost universally. The principal variation on foreign maps is the use of prime meridians other than that of Greenwich. The prime meridian usually passes through the principal city of the country; for example, through Oslo on Norwegian maps.

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

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

8. Declination

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

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

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

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

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

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

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

10. Conventional Signs
Conventional signs on maps published by one country differ from those on maps of other countries. Although the symbol for a particular object may vary on maps of different countries, and on different map series of the same country, these symbols possess a basic similarity. Conventional signs are intended to represent, as pictorially as possible, the actual appearance of terrain features and of objects on the ground.
CHAPTER 2

BRITISH MILITARY MAPS

11. General

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

12. British Maps of Foreign Countries

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

13. Reading Aids

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

---

The Grid on this map is Nord de Guerre Zone
with the longitude 6 Grades East of Paris Observatory.

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

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

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

---

**REFERENCE**

- Railway, normal gauge (double track)
- Railway, normal gauge (single track)
- Railway, narrow gauge (under construction)
- Cutting, tunnel, embankment
- Railway stations, halts
- Tramway lines
- Cable railway
- Principal roads
- Minor roads
- Cart roads, Cart tracks
- British 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, Mausoleum

**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

**Heights in Metres**

**Figure 3. Legend translation from Yugoslavia series, 1:100,000, G.S.G.S. 4386.**

**Figure 4. Grid data from Italy series, 1:100,000, G.S.G.S. 4104.**

**Figure 5. Grid data from France and Belgium series, 1:50,000, G.S.G.S. 4040.**
(2) A grid reference box explains briefly how to read the British grid. (See fig. 6.)

TO GIVE A GRID REFERENCE ON THIS SHEET
Use only LARGER Grid Figures with........again
POINT LETTER from face of map......L
EASTINGS.
Take figure of West edge of small square in which point lies..........29
NORTHINGS.
Take figure of South edge of small square in which point lies........00
REFERENCE....................007
that........miles. Square........1000 Reference to nearest........100
Nearest similar reference on this grid 500 Km distant.

Figure 6. Grid reference box from Yugoslavia series, 1:100,000, G.S.G.S. 4386, sheet 76.

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

INCIDENCE OF GRID LETTERS AND INDEX TO ADJOINING SHEETS

<table>
<thead>
<tr>
<th>Grid Letters</th>
<th>Index Points</th>
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<tr>
<td>.............</td>
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<td>.............</td>
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<td>.............</td>
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</tbody>
</table>

Figure 7. Incidence of grid letters and index to adjoining sheets from France and Belgium series, 1:50,000, G.S.G.S. 4050, sheet 61.

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

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

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

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

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

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

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

| Magnetic Variation from True North for centre of sheet is |
|------------------|------------------|
| 8°20' W Jan 1945. |

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

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

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

14. British Coordinate Systems

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

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

The War Department and the War Office have agreed that their respective Forces shall use the British systems of grid references within the British areas of responsibility for basic map production, and vice versa. Africa and Europe lie within the British area of this responsibility. In this theatre British military grids will be used exclusively.

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

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

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

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

(b) The 9° of longitude include an overlap of 1° on each side of a United States grid zone. British grid zones do not overlap, except in the case of Australian grid belts.
Figure 13. Diagram of British grid zones from Army Map Service Memorandum No. 425, "Grids and Magnetic Declinations," third edition, September 1943.
In the Normal lettering System the 500,000 unit Square letter V and the 100,000-unit Square letter V are both north and east of the false origin. This diagram can be used for bastard Systems of lettering by ignoring the values about the edge of the diagram and assigning appropriate values to the lines.

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

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

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

(3) Grid squares. (a) The zone on which a grid is to be placed is subdivided into squares by vertical and horizontal lines at 500-kilometer intervals, beginning at or beyond the southwest corner of the zone. These squares are lettered alphabetically from left to right and from top to bottom as shown in figure 14. If the number of 500-kilometer squares within a given zone is greater than 25, the lettering system is repeated. (See fig. 14.) Each 500-kilometer square is subdivided by vertical and horizontal grid lines at 100-kilometer intervals. These grid squares are lettered as shown in figure 14. The actual position of adjacent grid zones and lettered squares within grid zones is illustrated in figure 15.
(b) The 100-kilometer squares are subdivided by vertical and horizontal grid lines at 1-kilometer intervals, every tenth grid line being accentuated. These lines are numbered consecutively from west to east and from south to north, beginning at or beyond the southwest corner of the grid zone. On maps of smaller scale than 1:100,000, only the accentuated 10-kilometer lines are shown; on maps with larger scales, the grid interval is 1 kilometer.

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

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

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

---

Figure 15. Diagram of British grid zones of NW Africa, approximate scale 1:7,874,000.
(a) The letter of the 500-kilometer square is written as a small capital and is inclosed in parentheses. It may be printed on the face of a map or in a marginal diagram.

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

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

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

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

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

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

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

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

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

*The rule of thumb used in United States map reading, "read right—up," applies when using British grids.
the letter of the 100-kilometer square, the cast-
ing and the northing. Zones in this category are
the Canary Island Zone, Cyprus Grid, Crete
Zone, French Lambert Zone I, and Johore Grid.
(See fig. 13.)

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

b. BRITISH GRID SYSTEM. In the older British
grid system, an area 50 kilometers square is
covered by a grid composed of vertical and
horizontal lines at 10-kilometer intervals. The
25 grid squares so formed are lettered alphabetically from left to right and from top to bot-
tom, the letter I being omitted. (See fig. 17.)
Each of the 10-kilometer lettered squares is
subdivided by grid lines at 1-kilometer inter-
vals. These grid lines are numbered from left
to right and from bottom to top. Since the let-
tering system of grids on adjoining 50-kilo-
meter squares is the same, references are dupli-
cated 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 sys-
tems of point designation, such as templates
and thrust lines, are not used by the British
Army.

\[ \begin{array}{cccccc}
    & A & B & C & D & E \\
    F & G & H & J & K \\
    L & M & N & O & P \\
    Q & R & S & T & U \\
    V & W & X & Y & Z \\
\end{array} \]

Figure 17. Diagram of 50-kilometer square of the
British Grid System.
CHAPTER 3

FRENCH MILITARY MAPS

15. General

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

16. Military Map Series of France

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

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

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

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

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

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

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

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

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

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

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

17. French Coordinate Systems

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

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

b. Grade System. (1) The grade system of measurement is based on an angular unit of measure equal to 1/100 of a quadrant. Thus, a
The circle contains 400 grades, each of which is subdivided into 100 centigrades (grade minutes), each centigrade being composed of 100 decimilligrades (grade seconds). The symbol for the grade is G or g. Coordinates read to the nearest centigrade have the centigrade symbol (') at the end; those read to the nearest decimilligrade; the symbol for decimilligrade ("). Since the system is based on the division of units into 100 parts, coordinates are written in decimal form, for example, 4.07550" or 4.075', 9.03725" or 9.037', and so on.

(2) Latitude is measured north and south from the Equator. Longitude is measured east and west from the prime meridian of Paris. Coordinates read to the nearest centigrade have the centigrade symbol (') at the end; those read to the nearest decimilligrade; the symbol for decimilligrade ("). Since the system is based on the division of units into 100 parts, coordinates are written in decimal form, for example, 4.07550" or 4.075', 9.03725" or 9.037', and so on.

(2) Latitude is measured north and south from the Equator. Longitude is measured east and west from the prime meridian of Paris. Coordinates read to the nearest centigrade have the centigrade symbol (') at the end; those read to the nearest decimilligrade; the symbol for decimilligrade ("). Since the system is based on the division of units into 100 parts, coordinates are written in decimal form, for example, 4.07550" or 4.075', 9.03725" or 9.037', and so on.

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

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

(1) To convert grades into degrees, multiply the grade value by 9/10; then change the decimal part of the degree value into minutes and seconds. For example, 2.5969" = 2°20'14". The conversion is done as follows:

\[
2.5969'' \times \frac{9}{10} = 2.3372'
\]

\[
0.3372' \times 60 = 20.2326'
\]

\[
20.2326' + 2 = 2°20'14''
\]

(2) To convert degrees into grades, multiply the degree value, expressed in decimal form, by 10/9. For example, 2°20'14" = 2.5969". This conversion is done as follows:

\[
14'' \div 60 = 0.2333'
\]

\[
(20' + 0.2333') \div 60 = 0.3372''
\]

\[
2'' + 0.3372'' \times 10/9 = 2.5969''
\]

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

(2) Grids on these zones are based on 1-kilometer intervals. Grid lines are numbered from an origin in the southwest corner of the zone. The coordinates are read to the right and up and may be written as either 141,8/328,8 or 1418328. Other systems of point designation, similar to those of the US and German armies, are used by the French.
Figure 19. Section of map from Carte d'Etat-Major series, 1:80,000, sheet 35.
18. Characteristics of French Military Maps

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

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

Table I. Glossary of French map expressions

 Authorities

Institut Cartographique Militaire………………Military Cartographic Institute.
Institut Géographique de Paris………………Geographic Institute of Paris.
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 Géographique, Maritimes
et Coloniales………………Society of Geographic, Maritime, and Colonial Editions.

Key terms for identifying map dates

dessiné (e) ………………….drawn.
dressé (e) ………………….prepared.
exécuté (e) ………………….executed.
gravé (e) ………………….engraved.
héliogravé (e) ………………….photoengraved.
impression ………………….printing.
imprimé (e) ………………….printed.
levé (e) ………………….surveyed.
mis(e) à jour en ………………….brought up-to-date in.
publié (e) ………………….published.
rectifié (e) ………………….corrected.
rédaction ………………….editing.
rédigé (e) ………………….edited.
revisé (e) ………………….revised.
revision en ………………….revision in.
revision partielle en ………………….partial revision in.
tirage ………………….issue, printing.
Figure 20. Section of map from Europe road map series, 1:200,000, G.S.G.S. 4238, sheet 51.
Figure 21. Section of map from France series, 1:100,000, AMS M661, G.S.G.S. 4249, sheet 14Q.
Figure 22. Section of map from Carte d'Etat-Major series, 1:80,000, sheet 5.
Figure 23. Section of Map from France and Belgium series, 1:50,000, G.S.G.S. 4040, sheet 49.
Figure 24. Section of map from Southern France series, 1:25,000 AMS M861, G.S.G.S. 4411, sheets XXV–44 3 and 4
Figure 25. Section of map from Plans Directeurs, 1:20,000, Halluin sheet No XXV-3, Lille No 7.
CHAPTER 4

GERMAN MILITARY MAPS

19. General

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

20. Military Map Series of Germany

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

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

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

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

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

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

Figure 26. Diagram of German grid zones, from Major Uebel, Soderlein's Leitfaden zum Gelän­dezeichnen und Kartenlesen (eighth edition, Berlin: R. Eismenschmidt, 1885, page 24).
b. UNITED STATES MAPS. United States maps of Germany consist of a 1:100,000 colored and contoured series prepared under a joint agreement between United States and British agencies. (See fig. 38.) These maps were compiled from existing maps of central Europe and from air photographs. They are gridded with modified British grids and are available with or without altitude tints.

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

21. German Coordinate Systems

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

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

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

<table>
<thead>
<tr>
<th>Ostgrenze des Gitterstreifens 9°</th>
<th>Westgrenze des Gitterstreifens 12°</th>
</tr>
</thead>
</table>

(translated as:)

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

Figure 27. Designation of zone boundaries on German maps.

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

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

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

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

Figure 28. Section of map from Reichskarte series, 1:100,000, sheet 33. Notice the boundary between grid zones, the numbering system, and the tick marks used to extend the grids of the two zones.
They are numbered from the equator. Therefore, the horizontal line numbered 3650 is 3,650 kilometers north of the point at which the central meridian crosses the equator. Horizontal grid lines of all zones are numbered similarly, and do not have other identification numbers.

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

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

(1) Description. The template is divided into 5-millimeter squares, with rows numbered horizontally from 10 to 49, inclusive, and vertically from 50 to 71 inclusive. These squares are divided by inspection into quadrants (Zielgevierte), lettered a, b, c, and d. Five reference points (Festpunkte), in the corners and center, are shown by X's. These reference points are designated by their position on the template. For example: middle (Mitte), northeast (Nordost), northwest (Nordwest), southeast (Südost), and southwest (Südwest); or middle
(Mitte), upper right (Rechts Oben or RO), upper left (Links Oben or LO), lower right (Rechts Unter or RU), and lower left (Links Unter or LU). Arrows on the template indicate north, south, east, and west.

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

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

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

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

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

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

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

![Figure 30. Diagram of German thrust line (Stosslinie).](image)
France and Italy. The general pattern of the grids and their method of use are the same on the maps of both countries.

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

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

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

(a) Letters of the lettered square.
(b) Number of the next smallest square.
(c) Letter of the small lettered quarter.
(d) Numbers representing the location of a point within the small lettered quarter (read to the right and up).

The coordinates of the bridge at 0 in figure 31 are JA 9a Brücke, or JA 9a 77.
f. Polar Coordinates. Polar coordinates were frequently employed by German troops as a method of point designation. Two methods of application are given below.

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

(2) The second method of application was found on a French map used by the German Army. It is a less accurate means of point designation than that described above. A series of squares with 60-kilometer sides was drawn.
on the face of a map and each square numbered. Within each square, prominent terrain features and easily recognized objects were circled and numbered for use as reference points. In expressing the location of an object or point, a five-step sequence was followed:

(a) Number of the 60-kilometer square in which the reference point lay.
(b) Number of the reference point.
(c) Direction of the point in question from the reference point, stated approximately; that is, north, south, east, or west.
(d) Distance from the reference point to the point in question.
(e) Identification of the point in question.

The reference for point A in figure 33 is: 7/22 S 1,000m Whs (square 7, reference point 22, south 1,000 meters, inn).

22. Characteristics of German Military Maps

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

20-meter contour lines
10-meter contour lines
5-meter contour lines
Auxiliary contours at 2.5- and 1:25-meter intervals

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

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

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

d. Declination Protractors. Declination protractors similar to those on recent US maps are found at the edges of most gridded maps. The pivot point (M-Punkt) is printed at the
top and the degree scale at the bottom of
German sheets. West declinations are indicated
by negative values; east declinations, by posi-
tive values. (See fig. 36.)

e. CONVERSION TABLE. A table for the con-
version of mils (Striche) into grades (Neu-
grade) was found in the marginal information
of recent German maps of Italy.

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

Table II. Glossary of German map expressions

Authorities

Bibliographisches Institut..............Bibliographic Institute.
Kartendienst der Raumforschung......Map Service of the Land Survey Department.
Kartographisches Institut..........Cartographic Institute (Austria).
Königl. Preuss. Landesaufnahme.......Royal Prussian Office for Land Survey.
Reichsamt für Landesaufnahme.......Government Bureau for Land Survey.
Vermessungskommissar für die
Reichshauptstadt..............Land Survey Commissioner for the Capital.

Key terms for identifying map dates

Abdruck .................reproduction.
aufgenommen ...............surveyed.
Auflagedruck ..............edition, impression, printing.
Aufnahme .................survey.
bearbeitet ................compiled, prepared.
berichtigt .................corrected.
Druck .....................impression, printing.
einzige Nachträge ..........single supplements.
ergänzt bis ................complete as of.
freigegeben durch ..........issued by.
gezeichnet ..................drawn.
herausgegeben ...............published.
kleine Nachträge ..........slight revisions.

Lieferung ..................press run, series.
Nachdruck ..................reprint.
Nachträge ..................revisions, supplements.
Nadelabweichung ..........G-M angle.
neue Ausgabe ...............new edition.
rekognosziert ...............reconnoitered.
teilweise .................partial.
Umdruck ..................reprint.
Vervielfältigungs-recht ..........copyrighted.
vorbehalten ...............copyrighted.
vorläufig ..................provisional.
zeitweilig ..................temporary.
zwende (Hte) Auflage .........second edition.
Figure 37. Section of map from Reichskarto series, 1:100,000, sheet 33.
Figure 38. Section of map from Germany series, 1:100,000, AMS M641, sheet V–S.
Figure 39. Section of map from Topographische Karte series, 1:25,000, sheet 1766.
Figure 40. Section of map from Germany series, 1:25,000, G.S.G.S. 4411, sheet 3715.
CHAPTER 5

ITALIAN MILITARY MAPS

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

24. Military Map Series of Italy

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

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

(2) **Quadranti.** To produce maps on larger scale, each foglio is divided into quadrants (quadranti). Each quadrante is on 1:50,000 scale, its geographic dimensions being half those of a quadrante, or 5' latitude by 7' 30" longitude. The tavolett within any quadrante are designated by the directions N.E., S.E., N.O., and S.O. (The Italian word for west is ovest.)

(3) **Tavolette.** Each quadrante is further subdivided into quadrants (tavolette). (See fig. 42.) Each tavolletta is on 1:25,000 scale, its geographic dimensions being half those of a tavolletta, or 2' 30" latitude by 3' 45" longitude. Within a tavolletta, the four sezioni are designated by the letters a, b, c, and d, lettered clockwise beginning with the upper right quadrant. Only a small portion of Italy is covered by these sezioni. (See fig. 42.)
(5) Characteristics. Although the above series of maps are on different scales, all use the same system of conventional signs. The 1:100,000 series (the fogli) is colored. The 1:50,000 (the quadranti) and the 1:25,000 series (the tavolette) were originally black and white but have since been printed in color. Relief is expressed by a combination of contours, spot elevations, and hill shading. These three series are the basis for United States, British, and German military maps of Italy. (See figs. 44, 46, and 47.)

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

*This organization was called the Touring Club Italiano until 1936.
25. Italian Coordinate Systems

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

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

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

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

Table III. Glossary of Italian map expressions

Authorities

Consociazione Turistica Italiana
(formerly, Touring Club Italiano) .......... Italian Touring Club.

Istituto Geografico Militare ................ Military Geographic Institute.

Istituto Italiano d'Arti-Grafiche ............. Institute of Graphic Arts.

Laboratorio Foto-litografico
del Ministero della Guerra ................ Lithographic Laboratory of the Ministry of War.

R. Commissione per la Toponomastica ....... Royal Place Name Commission.


Key terms for identifying map dates

aggiornamento del .......... corrected to.
aggiornato .................. revised to date.
aggiunta .................. addition.
anno .................. year.
con le aggiunte e varianti .... with the additions and variations.
correzione .................. correction.
editi .................. published.
editore .................. publisher.
edizione .................. edition.
edizione nuova ........... new edition.
eseguito .................. executed.
impresso .................. printed.
l'angolo di declinazione e valevole per l'anno .......... magnetic declination for the year.

levate .................. survey.
levat (o, i, a, e) ............... surveyed.
parziale .................. partial.
proprieta riservata ........ copyrighted.
riconoscimento per le strade ............ ...reconnaissance for highways and railroads in.
riconoscimenti generali ........ general reconnaissance.
riconoscimenti parziali ........ partial reconnaissance.
ridisegno ............. redrawn.
rilevamento ............. survey.
rilievo del ............. survey of the.
riconoscimento .......... reproduction.
riconoscimento vietato .......... all rights reserved.
riveduto ............. revised.
stampato ............. printed.
tutti i diritti di riproduzione riservati .......... all reproduction rights reserved.
Figure 44. Section of map from Italy series, 1:100,000, G.S.G.S. 4194, sheet 142.
Figure 45. Section of map of Italy road map, 1:200,000, AMS M592, sheet 17.
Figure 46. Section of map from Italy series, 1:50,000, G.S.G.S. 4229, sheet 142 II.
Figure 47. Section of map from Italy series, 1:25,000, G.S.G.S. 4228, sheet 419 II NW.
RUSSIAN MILITARY MAPS

26. General

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

27. Military Map Series of Russia

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

28. Russian Coordinate Systems

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

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

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

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

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

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

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

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

c. VERST GRID SYSTEM. A second type of grid system was observed on a Russian map
of 1:42,000 scale, dated 1926. This grid is composed of vertical and horizontal lines spaced at 1-verst intervals. Every second grid line is numbered, the vertical lines from west to east and horizontal lines from north to south. Coordinates are read to the right and down.

29. Characteristics of Russian Military Maps

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

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

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

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

c. Relief. Relief is indicated on various Russian maps by contour lines, hachures, and spot elevations. Hypsometric diagrams and slope scales are also used.
Translation. 1. *Vertical line of the grid coordinate (grid north).*
2. *From meridian (G-M angle).*
3. *True meridian.*
5. *Magnetic meridian.*

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

---

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

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

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

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

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

---

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

---

Figure 52. Hypsometric diagram from Russia series, 1:50,000.
Translation. 1. For levels of contour interval 10 meters.
2. For levels of contour interval 50 meters.
3. For levels of contour interval 100 meters.

Figure 53. Slope scale from Russia series, 1:50,000.

Table IV. Glossary of Russian map expressions.

Key terms for identifying map dates

вре́менный (vremennyi) provisionally.
вто́рое издание (vторoye izdaniye) second edition.
высо́та сечения (visota secheniya) contour interval.
глазомерные сёмки (glazomernye semyki) field reconnaissance survey (hasty sketch).
градус (gradus) degree.
долгота (dolgota) longitude.
дополнена и примерчена (dopolzena i primerychena) revised and drawn.
издание (izdaniye) edition.
лист (list) sheet.
масштаб (masshtab) scale.
первое издание ( pervoye izdaniye) first edition.
печатано (pechatano) printed.
примерчено (proverialos) verified.
рекогносцировка (rekonosstirovka) reconnaissance, reconnoitering.
сближение меридианов (sblizheniye meridianov) meridional convergence.
сдано в производство (sdano v proizvodstvo) released for publication.
составлял ( sostavlyal) compiled by.
съёмка (siemka) survey.
широта (shirota) latitude.

Authorities

Военно-Топографическое Управление (Vojennno-Tografiicheskoye Upravleniye).
Генеральный Штаб Красной Армии ( Generalny Shtab Krasnoy Armii).
Управление Военных Топографов ( Upravleniye Voyennykh Topografov).
Figure 54. Section of map from Russia series, 1:100,000, sheet П56-133.
Figure 55. Section of map from Russia series, 1:100,000, sheet P-35-144.
Figure 56. Section of map from Russia series, 1:50,000, sheet N-37-26-B.
CHAPTER 7

JAPANESE TOPOGRAPHIC MAPS

30. General

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

31. Military Map Series of Japan

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

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

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

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

32. Japanese Coordinate Systems

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

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

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

(2) Grids. Grids on the Japanese zones are printed in brown and have a basic interval of
1 kilometer. Grid lines are numbered to the right and up, with only the 1,000- and 10,000-meter digits printed on the lines. Full values of grid lines are printed only on lines nearest the corners of the map and on those at even 100-kilometer intervals.

(3) Coordinates. Japanese grid coordinates are read to the right and up. Ordinarily only the abbreviated numerical values printed on the grid lines are used in giving grid references. A point whose full coordinates are 4553.7 E, 3979.9 N may be located by the abbreviated references 53.7/79.9 or 53779.9.

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

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

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

Base point 102

\[
\frac{1800}{500m}
\]

33. Characteristics of Japanese Topographic Maps

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

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

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

Figure 57. Diagram showing approximate positions of various items of marginal information on Japanese maps.
Table V. English and metric equivalents of Japanese units of linear measure.

<table>
<thead>
<tr>
<th>Japanese</th>
<th>English</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 shaku</td>
<td>0.994 ft.</td>
<td>30.3 cm.</td>
</tr>
<tr>
<td>360 shaku</td>
<td>119.0 yd.</td>
<td>109.0 m.</td>
</tr>
<tr>
<td>36 cho</td>
<td>2.44 mile.</td>
<td>3.93 km.</td>
</tr>
</tbody>
</table>

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

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

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

34. Japanese Characters

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

![Figure 58. Basic characters of Japanese number system.](image)

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

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

![Figure 59. Examples of Japanese numbers formed by addition.](image)
Although it is not often found on their maps, the Japanese also use Japanese characters written as in the Arabic system. The number 3794, for example, is written horizontally as shown in figure 61. Contour numbering in figures 64 and 65 also follows this system.

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

<table>
<thead>
<tr>
<th>ENGLISH</th>
<th>JAPANESE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARABIC NUMERALS</td>
<td>WRITTEN TEXT</td>
</tr>
<tr>
<td>37</td>
<td>Thirty-seven</td>
</tr>
<tr>
<td>(Also may be written horizontally as)</td>
<td>三千七百七十七</td>
</tr>
<tr>
<td>3794</td>
<td>Three thousand, seven hundred and ninety-four</td>
</tr>
<tr>
<td>(Also may be written horizontally as)</td>
<td>三千七百九十四</td>
</tr>
</tbody>
</table>

Figure 61. English and Japanese equivalents in examples of forming numbers.
b. **DATES.** Japanese dates are calculated from the beginning of one of three reigns: Meiji (1868–1912); Taisho (1912–26); Showa (1926– ). To convert the Japanese year to our calendar, add to the number of the Japanese year one of the following amounts: Meiji, 1867; Taisho, 1911; Showa, 1925. For example: Meiji 40th year equals 1907 (40 plus 1867); Taisho 9th year, 1920 (9 plus 1911); and Showa 16, 1941 (16 plus 1925). Japanese dates are preceded by characters representing the reign. These characters and those for year, month, and day are shown in figure 62. Characters are combined to form complete date as shown in figure 63.

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

<table>
<thead>
<tr>
<th>ENGLISH</th>
<th>JAPANESE EQUIVALENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Representative fraction equals 1:</td>
<td>1:1</td>
</tr>
<tr>
<td>Representative fraction equals 1:200,000</td>
<td>1:200,000</td>
</tr>
<tr>
<td>Representative fraction equals 1:50,000</td>
<td>1:50,000</td>
</tr>
<tr>
<td>Representative fraction equals 1:25,000</td>
<td>1:25,000</td>
</tr>
</tbody>
</table>

Table VII. Glossary of Japanese map expressions.

Authorities

Imperial Japanese Land Survey Bureau

Key Terms for Identifying Map Dates

測量 or 測量圖 ............................... survey
製版 ................................. engraving made
発行 ............................... published
Table VII. Glossary of Japanese map expressions—Continued.

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

Units of Linear Measurement

| 記丈 | millimeter |
| 標尺 | centimeter |
| 米 | meter |
| 千米 | kilometer |
| 尺 | shaku |
| 町 | cho |
| 里 | ri |
Figure 64. Section of map from original Japanese series, 1:50,000, sheet 12.
Figure 65. Section of map from Kyushu series, 1:50,000, AMS L772, sheet 139.
CHAPTER 8

CHINESE MILITARY MAPS

35. General

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

36. Military Maps of China

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

37. Chinese Coordinate Systems

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

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

38. Characteristics of Chinese Military Maps

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

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

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

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

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

3) Spot heights. Spot heights supplement other methods of indicating relief. Elevations are given in meters.
39. Chinese Characters

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

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

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

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

Authorities

参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

版权声明 .................................. copyright
再版或重印 ............................... reprinted
軍用本測量 ............................... official edition

surveyed
Directions

- north
- west
- east
- south

Units of Linear Measure

- kilometer
- meter
- centimeter
- shi li
- chang

- photolithographed
- printed
- revised
Figure 71. Section of map from China series, 1:50,000.
CHAPTER 9

MISCELLANEOUS MILITARY MAPS

Section I. FAR EAST

40. Burma, India, and Malaya

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

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

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

41. French Indo-China

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

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

42. Netherlands Indies

The original surveying and mapping of the Netherlands Indies was done by the Topografische Dienst. All of Sumatra, Bali, and Java, except for the interior, was surveyed trigonometrically; the remainder of the Netherlands Indies was mapped from reconnaissance surveys. Hydrographic surveys and systematic charting of the waters and coastlines were conducted by the Afdeeling Hydrografische van het Ministerie van Defensie (Hydrographic Division of the Defense Ministry) (Netherlands) and the British Admiralty. Extensive use of aerial photography in mapping was begun in 1911, and since then, areas of Borneo, Netherlands New Guinea, and the remainder of Sumatra were mapped from air photos.

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

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

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

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

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

   (e) Overzichtskaart. Overzichtskaart (General Maps) and Schetskaart (Reconnaissance
Figure 74. Section of map from Indo-China series, 1:100,000, HIND, sheet 137 (East).
Figure 75. Section of map from Java and Madura series, 1:50,000, G.S.G.S. 4202, sheets 51/XLIII-C and 51/XLIV-A.
Maps) are compiled from topographic maps, the latter from less reliable data than the former.

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

1. Simple revisions of reprinted maps, such as changes in road classifications or place names, are identified by the Dutch word Herdruk.

2. A more extensive revision is identified by the term Gewijzigde Herdruk.

3. A complete revision or entirely new edition, Hermtten, constitutes the third type.

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

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

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

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

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

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

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

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

Section II. Western Europe

43. Spain

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

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

b. Coordinate Systems. (1) Geographic coordinates. Geographic coordinates are expressed in degrees with longitude based on the meridian of Brussels. Ticks showing geographic numerical values of grid lines are printed in orange at 1-kilometer intervals.

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

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

45. Holland

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

b. Coordinate Systems. (1) Geographic coordinates. Geographic coordinates are expressed in degrees with longitude based on the meridian of Amsterdam.

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

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

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

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

Section III. CENTRAL EUROPE

46. Hungary

a. Military Maps of Hungary. Hungarian military maps are published by the M Kir Allami Terkepeszet (Royal Hungarian Cartographic Institute). The principal map series are drawn to the scales of 1:200,000, 1:75,000 and 1:25,000. The first two series are based on revised editions of the old Austrian General Staff maps of the same scales. There are three types of 1:25,000 maps: first, those based on old Austrian survey sheets; second, on corrected and redrawn Austrian survey sheets; and third, on new Hungarian surveys. Sheets belonging to the first group are out-of-date and inaccurate.
Sheets of the second group are better but are not exact. Sheets of the third group are up-to-date and accurate enough to meet all requirements of modern artillery maps.

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

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

c. CHARACTERISTICS. Contours are the principal method of showing relief although many spot altitudes are given in meters. Place names on older sheets use the meridian of Ferro. The principal grid series are drawn to the scale of 1:200,000, 1:75,000, and 1:25,000, the last two being modernizations of Austrian General Staff series.

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

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

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

48. Czechoslovakia

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

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

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

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

49. Denmark

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

b. Coordinate Systems. (1) Geographic coordinates. Geographic coordinates are expressed in degrees with longitude measured from the prime meridian of Copenhagen.

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

(a) Number of the 50-kilometer square.

(b) Letter of the 10-kilometer square.

(c) Number of the 1-kilometer square.

(d) Number of tenths to the right and up within the 1-kilometer square.

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

50. Norway

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

51. Sweden

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

Section V. BALKANS

52. General

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

53. Yugoslavia

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

b. Coordinate Systems. Geographic coordinates are expressed in degrees with longitude measured from either Greenwich or Paris. A kilometric military grid, similar to the German Gauss-Krüger grid is used.
Figure 76. Section of map from Yugoslavia series, 1:100,000 G.S.G.S. 4396, sheet 79.
c. CHARACTERISTICS. Relief is shown by contours, spot heights, and hill shading. Contours on large Yugoslavian maps are similar to those on German tactical maps. Spot heights are given in meters. The 1:25,000 and 1:50,000 maps were published in five colors; detail in black, roads in red, water in blue, forests in green, and contours in brown.

54. Rumania

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

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

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

55. Bulgaria

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

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

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

56. Greece

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

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

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

57. Turkey

a. MILITARY MAPS OF TURKEY. Turkish military maps are published by the Harta Genel Direktörlüğü. The three principal map series are to the scales of 1:200,000, 1:50,000, and 1:25,000. The 1:200,000 series covers the en-
tire country. Other countries base maps of Turkey on this series. The 1:50,000 series covers the Dardanelles area. The 1:25,000 series covers all of European Turkey.

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

c. CHARACTERISTICS. Relief is shown by contours and by a few spot heights. Most sheets are printed in Arabic script, but some of the most recent editions use the modern romanized Turkish alphabet.
Figure 77. Diagram showing relationship of degrees, grades, mils clockwise, and mils counterclockwise.
### Table IX. Foreign units of linear measure.

#### a. Table of equivalent units of length.

<table>
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<tr>
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<th>Mile</th>
<th>Yd</th>
<th>Ft</th>
<th>In.</th>
<th>Km</th>
<th>M</th>
<th>Cm</th>
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<td>39,370.062</td>
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<td>0.0100</td>
<td>0.0100</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

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

- 1 millimeter = 0.0393 inch.
- 10 millimeters = 1.0 centimeter = 0.0393 inch.
- 100 millimeters = 1.0 decimeter = 0.3937 inches.
- 1000 millimeters = 1.0 meter = 39.37 inches.
- 10000 millimeters = 1.0 kilometer = 3281 feet.
- 100000 millimeters = 1.0 hectometer = 328.1 feet.
- 1000000 millimeters = 1.0 kilometer = 5280 feet.
- 10000000 millimeters = 1.0 myriameter = 1640.9 feet.

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

- 1 chin = 0.303 millimeter = 0.012 inch.
- 10 chin = 3.03 millimeters = 0.12 inches.
- 100 chin = 30.3 centimeters = 1.19 inches.
- 1000 chin = 303 centimeters = 11.9 inches.
- 10000 chin = 3030 centimeters = 118.9 inches.
- 100000 chin = 30300 centimeters = 1189 inches.
- 1000000 chin = 303000 centimeters = 11890 inches.

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

- 1 hou = 0.032 millimeter = 0.0012 inch.
- 10 hou = 0.32 millimeters = 0.0125 inches.
- 100 hou = 3.2 millimeters = 0.1259 inches.
- 1000 hou = 32 millimeters = 1.259 inches.
- 10000 hou = 320 millimeters = 12.59 inches.
- 100000 hou = 3200 millimeters = 125.9 inches.
- 1000000 hou = 32000 millimeters = 1259 inches.

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

- 1 duin = 2.54 centimeters = 1.0 inch.
- 12 duins = 30.48 centimeters = 12.0 inches.
- 7 foutes = 2.1336 meters = 7.0 feet.
- 800 saschen = 1.066 kilometers = 0.663 miles.
- 7 vers = 7.467 kilometers = 4.64 miles.

#### f. Equivalent units of angular measure.

- 1 mil = 1/3600 circle = 0.0166 degree = 0.00185 grade.
- 1 grade = 1/400 circle = 16.0 mils = 9/10 degree.
- 1 degree = 1/360 circle = 17.8 mils = 10/9 grades.
Table X. Grades to degrees, minutes, and seconds.

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

<table>
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### Table XI. Degrees, minutes, and seconds to grades.

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

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<th>Grades</th>
<th>Degrees</th>
<th>Grades</th>
<th>Minutes</th>
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### Table XII. Conversion factors.

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<th>Approximate</th>
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<tr>
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<tr>
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<tr>
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### Table XIII. Prime meridians used on foreign maps with longitudinal distances from Greenwich.

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<tr>
<td>Athens</td>
<td>23°42'59&quot; E.</td>
</tr>
<tr>
<td>Batavia</td>
<td>106°48'28&quot; E.</td>
</tr>
<tr>
<td>Brussels</td>
<td>4°32'13&quot; E.</td>
</tr>
<tr>
<td>Copenhagen</td>
<td>12°34'40&quot; E.</td>
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<tr>
<td>Ferrao</td>
<td>17°30'46&quot; W.1</td>
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<tr>
<td></td>
<td>17°40' W.2</td>
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<tr>
<td>Istanbul</td>
<td>28°39'20&quot; E.</td>
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<tr>
<td>Lisbon</td>
<td>9°11'10&quot; W.</td>
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<tr>
<td>Madrid</td>
<td>3°41'15&quot; W.</td>
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<tr>
<td>Moscow</td>
<td>37°34'15&quot; E.</td>
</tr>
<tr>
<td>Oslo</td>
<td>10°43'23&quot; E.</td>
</tr>
<tr>
<td>Paddang</td>
<td>100°22'04&quot; E.</td>
</tr>
<tr>
<td>Paris</td>
<td>2°20'14&quot; E.</td>
</tr>
<tr>
<td>Peking</td>
<td>116°28'10&quot; E.</td>
</tr>
<tr>
<td>Pulkovo</td>
<td>30°19'38&quot; E.</td>
</tr>
<tr>
<td>Rome</td>
<td>12°27'07&quot; E.</td>
</tr>
<tr>
<td>Singkawang</td>
<td>108°59'41&quot; E.</td>
</tr>
<tr>
<td>Stockholm</td>
<td>18°18'30&quot; E.</td>
</tr>
<tr>
<td>Tokyo</td>
<td>130°44'41&quot; E.</td>
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</tbody>
</table>

1 French value.
2 German value.

### APPENDIX II

#### LEGENDS

The legends illustrated on succeeding pages are taken from United States and British maps of foreign countries. The maps from which the legends are taken are copied maps which have retained the original foreign symbols. Therefore, these legends are equally applicable to United States and British editions and to the foreign originals from which the United States and British copies were reproduced.
Figure 78. Typical legend from United States map of Japanese island (AMS L764, Hokkaido, 1:50,000, sheet 17).
Figure 79. Typical legend from British maps of the Netherlands Indies (provisional G.S.G.S. 4202, Java and Madura 1:50,000, sheets 51/XLIII-C and 51/XLIV-A).
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</tr>
<tr>
<td>Narrow gauge</td>
<td><img src="#" alt="Narrow gauge" /></td>
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</tr>
<tr>
<td>Tramway or Mineral railway</td>
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</tr>
<tr>
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</tr>
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</tr>
<tr>
<td>Less than 4 metres wide metalled</td>
<td><img src="#" alt="Less than 4 metres wide metalled" /></td>
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<tr>
<td>Masonry, 3 or 4 tracks, Width variable not always metalled</td>
<td><img src="#" alt="Masonry, 3 or 4 tracks, Width variable not always metalled" /></td>
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<tr>
<td>Lanes, tracks, paths</td>
<td><img src="#" alt="Lanes, tracks, paths" /></td>
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</tr>
<tr>
<td>NOTE: Road classification is NOT based on reconnaissance.</td>
<td><img src="#" alt="NOTE: Road classification is NOT based on reconnaissance." /></td>
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<tr>
<td>Kilometre stone, signed</td>
<td><img src="#" alt="Kilometre stone, signed" /></td>
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<tr>
<td>Boundaries: International, Provincial, District, Town or parish</td>
<td><img src="#" alt="Boundaries: International, Provincial, District, Town or parish" /></td>
<td></td>
</tr>
<tr>
<td>Wire fence, hedge</td>
<td><img src="#" alt="Wire fence, hedge" /></td>
<td></td>
</tr>
<tr>
<td>Wall, fence</td>
<td><img src="#" alt="Wall, fence" /></td>
<td></td>
</tr>
<tr>
<td>Monument, windmill</td>
<td><img src="#" alt="Monument, windmill" /></td>
<td></td>
</tr>
<tr>
<td>Chimney, water tower</td>
<td><img src="#" alt="Chimney, water tower" /></td>
<td></td>
</tr>
<tr>
<td>Shire, chapel, church</td>
<td><img src="#" alt="Shire, chapel, church" /></td>
<td></td>
</tr>
<tr>
<td>Cemetery,</td>
<td><img src="#" alt="Cemetery," /></td>
<td></td>
</tr>
<tr>
<td>High tension cable</td>
<td><img src="#" alt="High tension cable" /></td>
<td></td>
</tr>
<tr>
<td>W/T Station, and with tow over 200 ft high</td>
<td><img src="#" alt="W/T Station, and with tow over 200 ft high" /></td>
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</tr>
<tr>
<td>Quarry, Mine</td>
<td><img src="#" alt="Quarry, Mine" /></td>
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<tr>
<td>Spellheight (in metres), bench mark</td>
<td><img src="#" alt="Spellheight (in metres), bench mark" /></td>
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<tr>
<td>Trigonometrical point</td>
<td><img src="#" alt="Trigonometrical point" /></td>
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<tr>
<td>Bridges, etc</td>
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<tr>
<td>Iron, stone, wood, pontoon, footbridge, ferries</td>
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<tr>
<td>Canal, weir, lock, sluice</td>
<td><img src="#" alt="Canal, weir, lock, sluice" /></td>
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<tr>
<td>Discharge ditch, dry river bed</td>
<td><img src="#" alt="Discharge ditch, dry river bed" /></td>
<td></td>
</tr>
<tr>
<td>Well, spring</td>
<td><img src="#" alt="Well, spring" /></td>
<td></td>
</tr>
<tr>
<td>Lighthouse, beacon</td>
<td><img src="#" alt="Lighthouse, beacon" /></td>
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<tr>
<td>Woods, etc</td>
<td><img src="#" alt="Woods, etc" /></td>
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<tr>
<td>Deciduous, coniferous</td>
<td><img src="#" alt="Deciduous, coniferous" /></td>
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<tr>
<td>Scrub, reforestation</td>
<td><img src="#" alt="Scrub, reforestation" /></td>
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<tr>
<td>Orchard, plantation, park</td>
<td><img src="#" alt="Orchard, plantation, park" /></td>
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<tr>
<td>Heath, peat cuttings</td>
<td><img src="#" alt="Heath, peat cuttings" /></td>
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<tr>
<td>Sand (or gravel)</td>
<td>![Sand (or gravel)]</td>
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<tr>
<td>Meadow-swamp</td>
<td><img src="#" alt="Meadow-swamp" /></td>
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<tr>
<td>Vineyard, hopfield</td>
<td><img src="#" alt="Vineyard, hopfield" /></td>
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<tr>
<td>Built-up areas, gardens</td>
<td><img src="#" alt="Built-up areas, gardens" /></td>
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<tr>
<td>Broken unstable ground, slag heaps, etc</td>
<td><img src="#" alt="Broken unstable ground, slag heaps, etc" /></td>
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<tr>
<td>Terraces, rocky cliff</td>
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| Contours                                                                 | ![Contours](#)                                |      |

Figure 80. Legend symbols from a British map of Germany (G.S.G.S. 4414, Germany, 1:25,000, sheet 3715).
<table>
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<tr>
<th>Glossary of map expressions:</th>
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<td>Italian. (See table VII.)</td>
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<tr>
<td>Japanese. (See table IV.)</td>
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<tr>
<td>Russian. (See table V.)</td>
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<td>Grade table of conversion.</td>
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<tr>
<td>British, modified</td>
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<td>Gauss-Kruger system</td>
<td>21</td>
<td>24</td>
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<td>German Army</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>German Army arbitrary</td>
<td>21</td>
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<tr>
<td>Russian systems</td>
<td>28</td>
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| Hachures                 | 9         | 4    |
| Hill shading             | 9         | 4    |
| Holland maps             | 45        | 45   |
| Hungarian maps           | 46        |      |
| India maps               | 40        | 69   |
| Italian military maps    | 23        | 37   |
| Italy, military map series | 24      | 37   |

<table>
<thead>
<tr>
<th>Japanese</th>
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<tr>
<td>Coordinate systems</td>
<td>32</td>
<td>52</td>
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<tr>
<td>Military maps</td>
<td>30</td>
<td>52</td>
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<tr>
<td>Military map series</td>
<td>31</td>
<td>52</td>
</tr>
<tr>
<td>System of linear measure</td>
<td>(See table IX.)</td>
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</table>

| Layer tints              | 9         | 4    |
| Legends:                |           |      |
| British                 |           | App. II |
| United States           |           | App. II |

<table>
<thead>
<tr>
<th>Linear measure tables.</th>
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<tbody>
<tr>
<td>(See table IX.)</td>
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</table>

| Malay maps              | 40        | 69   |
| Marginal information    | 5         | 1    |
| Meridians, prime table. | (See table XIII.) | 52   |
| Metric equivalents of Japanese units. (See table V.) | 23 | 37 |

<table>
<thead>
<tr>
<th>Metric system of linear measure</th>
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<th>Page</th>
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<th>Paragraph</th>
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<td>France</td>
<td>16</td>
<td>13</td>
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<tr>
<td>Germany</td>
<td>20</td>
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</tbody>
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| Netherlands Indies maps                | 42        | 69   |
| Norwegian maps                         | 50        | 76   |

| Orientation of maps                   | 5         | 1    |

| Polish maps                           | 47        | 75   |
| Projections, map.                     | 3         | 1    |
| Protractors, declination              | 8         | 3    |
| Publication, date.                    | 5         | 1    |
| Purpose of manual                     | 1         |      |
| Reference data                        | (App. I.) | 80   |
| Relief, means of showing              | 9         | 4    |
| Reprint, date                         | 5         | 1    |
| Representative fractions, Japanese.   | (See table VI.) | 45   |
| Military maps                         | 26        | 45   |
| Military map series                   | 27        | 45   |

<table>
<thead>
<tr>
<th>System of linear measure. (See table IX.)</th>
<th>Paragraph</th>
<th>Page</th>
</tr>
</thead>
</table>

| Scales, military map                    | 6         | 2    |
| Scope of manual                          | 1         | 1    |
| Sexagesimal system of coordinates        | 7         | 2    |
| Shading, hill                            | 9         | 4    |
| Spanish maps                             | 43        | 73   |
| Spot elevations                          | 9         | 4    |
| Survey, dates                            | 5         | 1    |
| Swedish maps                             | 51        | 76   |
| Systems, coordinate                      | 7         | 2    |

| Template, German map                    | 21        | 24   |
| Thrust line                              | 21        | 24   |
| Tints, layer                             | 9         | 4    |
| Turkish maps                             | 57        | 78   |

| Verst grid system                       | 28        | 45   |
| Yugoslavia, maps                        | 53        | 76   |