

LAND NAVIGATION

I. GENERAL:

A. Map – is a graphic representation of the earth surface drawn to scale on a plane surface.

1. Importance of Map:

- a. Use for strategic, tactical planning in all level of command.
- b. Use to show relative position on a certain given area.
- c. Use to show accurate distance, location, best routes, key terrain

features.

- d. To avoid lost and keep alive.

2. Care of Map:

- a. Proper folding of maps
- b. Carry maps in a waterproof pocket and use acetate to cover the map.
- c. Avoid drawing of improper marking on a map to avoid confusion.

3. Security of Map:

- a. Maps must not fall into unauthorized hands.
- b. When in danger, destroy the map.
- c. Avoid indication of plans of area of interest on map.

II. MARGINAL INFORMATION:

Marginal information – are those printed notes outside the printed diagram of maps used as an instructional guide in reading maps.

Sheet Name – found at the upper center margin. A map is named after its outstanding cultural or geographic features.

Sheet Number – found in the upper right margin and used as reference number assigned to each map.

Series Name and Scale – found on the upper left margin. A map series usually comprises a group of smaller maps at some scale designed to cover a particular geographic area.

Series Number – appears in the upper right margin and lower left margin.

Edition Number – is found in the upper margin and in the lower margin, representing the age of the map.

Bar Scale – located in the center of the lower margin and in the lower margin use for determination of map distance to the corresponding ground distance with three different unit of measures.

Credit Note – in lower left margin, primary purpose is to list the procedures and reference, the method of compilation for used by technicians.

Index to Ajoining Sheet – in lower margin, it identifies the map sheet covering areas around the area covered by the map you are using.

Index to Bounderies Diagrams – in lower margin, this is a miniature map that shows the bounderies and special showline that occurs within the map area.

Projection Note – in lower margin, it indicate the method use to portray the map area.

Grid Note – in the center lower margin, it gives information pertaining to the grid system used, the initial guidelines, and the number of digit omitted from grid values.

Grid Reference Box – usually located in the lower margin. It contains information for identifying the grid zone and 100 meter square in which the area represented by the map is located and instruction, for giving grid reference on the map.

Datum Notes – in the center lower margin, indicates the vertical datum notes and horizontal notes appearing on the map.

Legend – in the lower margin, illustrate and identifies some of the symbols on the map.

Declination Diagram – in lower margin, indicates the relationship of map features as to true north, grid north, and magnetic north.

Protractor Scale – in upper margin, use for laying out a magnetic north line on the map.

Users Note – in lower margin use for connections and errors on the map.

Unit Imprint – in the lower right margin, it identifies the agency which printed the map date of printing and number to facilitate filing.

Contour Interval Note – in lower margin, it states the vertical distance between contour line on the map. When supplementary contours are use, the note also indicate the intervals.

Coverage Diagram – normally in lower margin, it indicates the methods by which the map was made, dates of photography and other sources material.

OFFICIAL ITEMS:

Glossary – may appear on maps of foreign agencies, where the native language is other than English.

Classification – when required, a security classification will appear in lower and upper margin.

Special Note – under special condition, special note maybe added to the marginal information to aid or resist the map used.

III. MAPS SIGNS AND SYMBOLS:

A. Purpose:

1. To visualize an area of the earth surface with pertinent feature planning.
2. To represent the natural and manmade feature.

B. Classification:

1. Topographic Symbols – are standard drawing of map features and organized by their colors.

a. Topographic Colors:

- 1) Black – all manmade features, such as buildings, roads not shown in red, etc.
- 2) Blue – all water features, such as lakes, rivers, swamps, streams, etc.
- 3) Brown – all land forms, such contours, cuts, fills, etc.
- 4) Green – all vegetation, such as forest, orchid, hide grass, jungles, etc.
- 5) Red – main roads, built-up areas, and special info.

b. Topographic Symbols: (See legend and other symbols)

2. Military Symbols – a standard drawing to denote all military units, installation and activities.

a. Military Colors:

- 1) Blue – all friendly forces, installations, activities and firepower.
- 2) Red – all enemy forces, installations and activities (double lines means enemy).
- 3) Yellow – shows grassed or contaminated areas maybe the result of either friendly or enemy actions.
- 4) Green – indicates friendly or enemy demolition, minefields and manmade obstacles.
- 5) Spare Colors – use for classification and accompanied by legend.

b. Types of Military Symbols:

- 1) Troops Unit Symbols – are shown by rectangle. (Basic symbols for military unit and activities).
- 2) Branch Arm of Service and Type–Organization Symbol – used in conjunction either other symbols to signify a military unit activity or installation.
- 3) Size of Unit – used to identify the size of a unit or installation.

IV. GRIDS AND COORDINATES:

Grids – are paralleled lines from east to west and north or south that form a square as a reference system to help the map reader located or point quickly.

Coordinates – are the numbered grid line on the map and are further subdivided to show the specific location.

Geographic Coordinates – the location of any point of the earth surface maybe given by stating into its distance north or south of the equator (latitude) and east or west of prime meridian (longitude).

Polar Coordinates – on the map may be determined or plotted from a known point by giving a distance along that direction.

Grid Coordinates – the military grid system divides the earth surface into many 100,000 meters squares are further subdivided into ten 1,000-meter squares. The 1,000 meters square is the basic of military grid system, which is used, in the reading military maps.

Grid Squares – located or identified by combining the number of vertical grid line and horizontal grid line which intersect at the lower corner of the square.

Characteristics of Grids:

- does not requires knowledge of the area
- applied to large areas
- does not requires land marks
- applies to all map scales

Locating Points within a Grid Squares:

- 4 digits nearest to 1,000 meters
- 6 digits nearest to 100 meters
- 8 digits nearest to 10 meters
- 10 digits nearest to 1 meter

Rule in determining grid coordinate – read right up

IV. SCALE AND MEASUREMENT:

A. Map Scale – maps are drawn into scale, this means that a certain distance on the map represents a certain larger distances on the earth surface. The ration of the horizontal distance on the map equal to the corresponding distance on the ground.

B. Comparison of the Map Scales – when comparing scales maps we say that one map is smaller or large than another. The scale 1:25,000 is larger than 1:50,000. In other words, the larger the denominator of the RF, the smaller the scale of the map.

C. Graphic Scale – as a ruled representation of ground distance drawn to scale of the map.

1. Parts:
 - a. Primary Parts – rights of zero, mark off in full units of measure.
 - b. Extension Scale – left of zero, divided into tenth of unit.

2. Measuring Straight Line Distance – to measure straight line distance, two points on map, lay a straight strip of paper on the map, the edge touches both points. This give map distance between two points. Now, lay the paper on the graphic scale that correspond to the unit of measure you are using, extension scale the reminder of the measurement.

3. Measuring curved or irregular line to be measured – point the strip to the second tick marked until another straight portion of the line is aligned and determined the ground distance measured by graphic scale.

D. Representative Fraction – the scale of the map expressed the ration of horizontal distance on the map to the corresponding horizontal on the group.

RF is expressed as a fraction with map distance is one;

$$RF = \frac{MD}{GD}$$

1. The representative fraction is important to any unit of measurement, means that one unit of measurement on the map equals the number of the same unit as expressed by the denominator.

RF = 1/50,000 or 1:50,000 mean that one unit of measure on the map is equal to 50,000 on the same unit of measurement on the ground.

V. **ELEVATION AND RELIEF:**

A. Definition:

1. Elevation – the height (vertical distance) of an object above or below a datum plane.
2. Datum Plane – a reference from which measurement maybe taken. This datum plane for most map is average sea level.
3. Relief – the configuration (shape) of the ground.

B. Effects of the Elevation and Relief:

1. Employment and movement of troops.
2. Limit route and speed.
3. Restrict a certain types of equipment.
4. Affect attack and defense position.

5. Affect observation, field of fire, cover, concealment and the selection of key terrain features.

C. Methods of Showing Elevation and Relief:

1. Hackures – are short lines used to indicate significant ground formations not normally revealed by contour lines.

Characteristics and uses:

- a. usually printed in brown
- b. don't represent exact location
- c. show the relative slope in places where contour lines or other method fail to accurately show the relief
- d. the shorter and closer together the lines are drawn, the steeper the slope they represent
- e. hackures radiating out from the center indicate a peak

D. Layer Tinting – shows relief by means of color.

- a. Blue – water level
- b. Green – orange and red for successively higher level
- c. Brown – high mountain region

NOTE: A legend is printed in the margin of layer tinted maps to indicate the elevation ranges represented by each color.

Shading:

Characteristics and uses:

- a. Use like layer tinting except that only one color is used.
- b. Light shades for low level lands and darker shades for successively higher levels of terrain.
- c. Shading does not give determination of elevation but gives the effect of the relief.

Spot Elevation – are points on a map where they are indicated by numbers.

Contour Lines – is an imaginary lines on the surface of the earth at the same elevation above or below sea level.

Uses:

- a. to indicate elevation
- b. to show the relative configuration of the ground
- c. to analyze terrain

Characteristics:

- a. indicate vertical distance
- b. small curving lines
- c. has the same elevation
- d. distance between them are the same and never met
- e. brown color

Types of Contour:

- a. Index Contour – every fifth contour line is an inches line and is indicated by heavier brown line.
- b. Intermediate Contour – are the four lighter contour lines drawn between the index contour.
- c. Supplementary Contour – represent half intervals between intermediate contour and are shown by brown lines.
- d. Depression Contour – an area that is lower in elevation than all the surrounding terrain is indicated by tick marks pointing down slope.
- e. Approximate Contour – are broken lines of the same thickness and type as the contour they represent.

Using Contour Lines to Identify Ground Forms:

- a. Hills – represented by series of concentric contour lines which gradually grow smaller, ending with a small closed contour line in the center.
- b. Peaks or Hill Tops – a small closed, relatively circular contour at the center of the series of concentric contour lines identifies a peak or hill top.
- c. Ridges – a ridge is a series of connecting peak or hills indicated by a series of elongated contour lines.
- d. Saddles – is a low point between two peaks along the crest of a ridge.
- e. Spur – contour lines that form a series of successive rounded U shapes.
- f. Cliff-C – lines that converge into one (1).
- g. Draw-C – lines that form a series of successive V-shape, a stream course that has not developed a valley floor.